

Annual Report

2006-2007



**Chaudhary Charan Singh
Haryana Agricultural University**

Hisar – 125 004, Haryana (India)

Acknowledgement

The valuable help and assistance extended by Deans, Officers and Sections' Incharge of the University in supplying information for the annual report is thankfully acknowledged.

Compiled and Edited by :

Dr. R. K. Kashyap, Dr. A. K. Bhatnagar, Dr. R. B. Srivastava and Dr. Aparna
Directorate of Human Resource Management, CCSHAU, Hisar - 125 004 (Haryana)

Contents

| S.No. | Description | Page No. |
|-----------|--|----------|
| | Mandate | 1 |
| | Preamble | 3 |
| | सारांश | 5 |
| 1. | An Overview | 21 |
| 2. | Research | 39 |
| 2.1 | Plant Sciences | 39 |
| 2.2 | Agriculture Mechanization & Energy Management | 62 |
| 2.3 | Animal Sciences | 66 |
| 2.4 | Veterinary Sciences | 69 |
| 2.5 | Basic Sciences | 75 |
| 2.6 | Home Sciences | 86 |
| 3. | Extension Education | 89 |
| 3.1 | Farm Advisory Service | 89 |
| 3.1.1 | Krishi Vigyan Kendras | 89 |
| 3.1.2 | Agricultural Technology Information Centre (ATIC) | 117 |
| 3.2 | Farm Training Service | 120 |
| 3.2.1 | Institute of Agricultural Technology, Training and Education | 120 |
| 3.2.2 | Extension Education Institute, Nilokheri | 122 |
| 3.3 | Farm Information and Communication Service | 124 |
| 4. | Teaching | 126 |
| 4.1 | Graduate Programmes | 126 |
| 4.1.1 | College of Agriculture | 126 |
| 4.1.2 | College of Agricultural Engineering & Technology | 126 |
| 4.1.3 | College of Basic Sciences & Humanities | 127 |
| 4.1.4 | College of Home Sciences | 128 |
| 4.1.5 | College of Animal Sciences | 130 |
| 4.1.6 | College of Veterinary Sciences | 130 |
| 4.1.7 | College of Agriculture, Kaul | 130 |
| 4.2 | Post-graduate Programmes | 131 |

| S.No. | Description | Page No. |
|--------------|--|-----------------|
| 5. | Services | 133 |
| 5.1 | ATIC | 133 |
| 5.2 | Directorate of Human Resource Management | 133 |
| 5.3 | Health Services | 134 |
| 5.4 | Engineering-cum-Estate Organization | 134 |
| 5.5 | Student's Welfare and activities | 135 |
| 5.6 | Teaching Veterinary Clinical Service Complex | 136 |
| 5.7 | Public Relations | 137 |
| 5.8 | Campus School | 137 |
| 6. | Nehru Library | 139 |
| 7. | University Authorities and Administrations | 146 |
| 7.1 | Office of Registrar | 146 |
| 7.2 | Office of Comptroller | 148 |
| 8. | Awards and Recognitions | 152 |
| | Annexures | |
| I | Board of Management and its decisions | 154 |
| II | Academic Council and its decisions | 156 |
| III | Officers of the University | 159 |
| IV | List of Head of Departments | 160 |
| V | List of Completed Works/Buildings | 162 |
| VI | List of Facilities Provided | 165 |
| VII | List of Works in Progress | 166 |
| VIII | List of Approval of Works | 169 |
| IX | List of Works Completed/Taken over of Haryana Government | 171 |



The Mandate

- Imparting education in different branches of study, particularly Agriculture, Veterinary and Animal Sciences, Agricultural Engineering, Home Science and other allied sciences.
- Furthering the advancement of learning and research, particularly in agriculture and allied sciences.
- Undertaking the extension of such sciences to the rural people within the State.
- Such other purposes as the State Government may, by notification in the official gazette, direct.

Preamble

Chaudhary Charan Singh Haryana Agricultural University (CCSHAU), initially a campus of Punjab Agricultural University, Ludhiana, Punjab, became an independent entity as Haryana Agricultural University (HAU) on February 2, 1970. In October 1991, it was rechristened as Chaudhary Charan Singh Haryana Agricultural University, Hisar after the name of the renowned farmer leader and the former Prime Minister of India. The University has done full justice to its name and has earned the distinction of being one of the three universities to be a recipient of the World Bank Project on Agricultural Human Resource Development.

Campuses of the university are spread over a total area of 3444 hectares. The spectacular main campus is situated at Hisar (Haryana state), one of the important cities of Northern India, (Latitude : 29°5'N and Longitude 75°46' E, Altitude : 215.2 msl.), located about 160 km north-west of New Delhi on the National Highway No. 10. This campus occupies 2922 hectares of land – 2624 hectares under research and seed production farms and the remaining 298 hectares under buildings and roads.

The university has been able to propel the erstwhile food-deficit State of Haryana to prosperity resulting in its becoming the 2nd largest contributor to the central food grain pool. The efforts of the University have also resulted in making the state of Haryana a leader in Basmati-rice export and the 3rd largest producer of wheat in the country. The university has released/identified 230-odd varieties of various crops and registered 97 elite genetic strains with National Bureau of Plant Genetic Resources, New Delhi. In 1997, the Indian Council of Agricultural Research, New Delhi recognized CCS HAU as the Best State Agricultural University of the country. In the recent past CCSHAU has gone global by developing inter-institutional linkages with the universities in USA and Europe. It has provided an international platform for research to its students. During the period under report, the University has signed MoUs with Michigan State University and University of Maryland, USA for academic collaboration. The university has modern infrastructure equipped with IT-enabled facilities, which include a spacious and rich library, state-of-the-art teaching and research infrastructure in its laboratories; and fully modernized, well-laid expansive farms for research and seed production.

The university is governed by a policy making body - Board of Management (BoM). Representatives of state government, ICAR, farmers and nominated Technical Advisors constitute the BoM. The Governor and the Chancellor of the University is the Honorary Chairman and the Vice-Chancellor is the Working Chairman of the Board of Management.

The university is pursuing its Mandate through the three major activities of teaching, research and extension. The university runs its degree programmes through seven constituent colleges which house fifty-six departments. The university follows the semester system of examination and offers 121

programmes of study: 49 Ph.D., 56 Masters, 4 Undergraduate, 1 Veterinary and Livestock Development Diploma, 7 Post-graduate Diploma and 4 Certificate courses. Rural Awareness Work Experience (RAWE) and Earn-While-You-Learn are two striking features of the undergraduate programme in agriculture. Till the year of report, *i.e.* 2006-07, a total of 14,420 degrees have been awarded by the University.

The university has particularly excelled in the development of high yielding varieties in field, horticulture and vegetable crops. The Directorate of Research at the main campus is the Nodal Agency for planning and monitoring research activities in different disciplines. The university owns six crop-specific Research Stations spread over 522 hectares in different agro-climatic zones of the State. With the establishment of IPR Cell at the Directorate of Human Resource Management in Dec. 2006, the university has established itself as a leading center on the IPR issues too. So far, it has filed 24 patents and protected 4 technologies.

The basic focus of university extension activities is to improve and modernize skills and aptitude of farmers so as to achieve higher productivity, profitability and stability. The university has developed a network of 19 *Krishi Vigyan Kendras* which provide unique extension services by creating a channel for the transfer of technology from the lab. to the field in agriculture, animal husbandry, home economics, etc. The Directorate of Extension Education located at the main campus reaches all the 6067 villages of the state through this network. Besides, it caters to the farmers' varied needs through its other extension establishments, *viz.* Agriculture Technology Information Centre (ATIC) at the CCSHAU Hisar; Extension Education Institute at Nilokheri, district Karnal; Institute of Agricultural Technology and Training Education at the CCS HAU Hisar and the Publication Unit at the Directorate.

The university had a total annual budget of Rupees 1.65 billions drawn from State sources, Indian Council of Agricultural Research and other funding agencies. Around 43% of budget was spent on research, 28% on teaching and 12% on extension activities. The remaining 17% went towards employees' welfare, administration, construction and maintenance.

सारांश

चौ० चरणसिंह हरियाणा कृषि विश्वविद्यालय अपने स्थापना वर्ष 1970 से हरियाणा राज्य में कृषि के टिकाऊ विकास में महती भूमिका निभाता आ रहा है। विश्वविद्यालय में हुए अनुसंधानों व तकनीकों के अपनाने से न केवल खाद्यान्नों के उत्पादन एवं उत्पादकता में अभिवृद्धि हुई अपितु पशुधन प्रबन्ध व उनकी बीमारियों की रोकथाम की गणवत्ता तथा कुशलता में भी सुधार हुआ है। इससे अंततः राज्य की जनता की आर्थिक स्थिति सुदृढ़ व उनके जीवन स्तर में व्यापक सुधार हुआ है।

वर्ष 2006-07 के दौरान अनुसंधान, अध्यापन तथा विस्तार के क्षेत्र में उल्लेखनीय उपलब्धियां हासिल कीं। वर्ष 2006-07 की विशिष्ट उपलब्धियों की एक झलक निम्नानुसार है :-

क. अनुसंधान

पौध विज्ञान

1. विमोचित/अधिसूचित किस्में

विमोचित/अधिसूचित किस्में अगले पृष्ठ पर दी गई हैं।

2. विकसित प्रजनन सामग्री

फसल किस्मों के विकास के अलावा सब्जी, रेशा, औषधीय तथा सुगन्धित पौधों तथा अन्य फसलों की अनेक अधिक उपज देने वाली व बेहतरीन गुणवत्ता वाली फसलें तैयार/प्रस्तुत की गईं। इन पर व्यापक स्तर पर क्षेत्रीय परीक्षण किये गये तथा अग्रिम किस्म प्रत्यक्षणों हेतु संवर्धित किया गया।

3. बीज विज्ञान एवं तकनीक

सिफारिशशुदा खरीफ (अरहर, मूंग, लोबिया, ग्वार तथा ज्वार) तथा रबी (गेहूँ, राया, चना, लेटिन, मटर, जई, बरसीम तथा जौ) फसलों की किस्मों के नाभिक एवं प्रजनन बीजों के उगाव परीक्षण किये गये तथा आनुवंशिक शुद्धता का, भारतीय न्यूनतम बीज प्रमाणीकरण मानकों के अनुरूप अनुमोदित सीमाओं के अन्तर्गत पता लगाया गया।

खरीफ 2006 के दौरान हरियाणा के विभिन्न जिलों से लिए गए किसानों के चावल के अपने संचित बीज नमूने (161) तथा अप्रक्रमित (कच्चा) प्रमाणित बीज नमूनों (100) ने बंट से संक्रमण के लक्षण नहीं दिखाये। यद्यपि विभिन्न किस्मों में (10-90 प्रतिशत) बीज सुसुप्ता पाई गई तथापि अधिकतर जीनोटाइप में कटाई के 75 दिनों उपरान्त सुसुप्ता विमोचित कर दी गई।

बीज उत्पादन

अच्छी किस्म के बीज तैयार करना विश्वविद्यालय का सर्वाधिक महत्वपूर्ण कार्य है। यहां सभी प्रकार के नाभिक, प्रजनन, आधार, प्रमाणित तथा विश्वसनीय लेबल लगे बीज तैयार किये जाते हैं। भारत सरकार के कृषि एवं सहकारिता मन्त्रालय तथा अन्य सरकारी एवं निजी बीज उत्पादक अधिकरणों की मांग अनुसार बीज अधिनियम के अन्तर्गत विभिन्न किस्मों/फसलों के प्रजनक (ब्रीडर) बीजों का उत्पादन किया जाता है।

2006-07 के दौरान फार्म निदेशालय तथा आर.डी.एस. बीज फार्म द्वारा 22 फसलों के विभिन्न प्रकार के (प्रजनक,

प्रमाणित तथा टी.एफ.एल.) कुल 26,020.80 क्विंटल बीज आम जनता/निजी बीज एजेंसियों तथा किसानों हेतु उत्पादित किया गया।

कृषि मौसम विज्ञान विभाग

रोजाना ऑनलाइन आद्यतन मौसम सम्बन्धी सूचना उपलब्ध होती है। जो एच.टी.टी.पी.-।। एच.ए.यू. अरनेट.इन/एग्रोमेट पर भी सुलभ रहती है।

चौधरी चरण सिंह हरियाणा कृषि विश्वविद्यालय, हिसार सी.आर.आई.डी.ए. हैदराबाद में राष्ट्रीय आंकड़ा बैंक हेतु प्रतिदिन मौसम सम्बन्धी आंकड़ा आद्यतन करता है तथा साथ ही पाक्षिक मौसम आधारित सूचना/रणनीति व फुटकर उपाय/योजनाएं ऑनलाइन डब्ल्यू डब्ल्यू डब्ल्यू क्रॉप वेदर आऊट लुक.अरनेट.इन पर आद्यतन किये जाते हैं। हिसार क्षेत्र के किसानों हेतु मध्यम दूरी को मौसम सम्बन्धी भविष्यवाणी प्रत्येक मंगलवार और शुक्रवार अखबारों व दूरदर्शन के द्वारा प्रसारित की गई। इसी प्रकार प्रत्येक चार दिनों उपरान्त हिन्दी तथा अंग्रेजी में कृषि सलाह सम्बन्धी 99 मौसम सम्बन्धी बुलेटिन निकाले गए। पिछली मानसून के दौरान बादल छाये रहने तथा मानसून व सर्दी में उपरान्त हवा दाब 95 प्रतिशत, एस डब्ल्यू मानसून में न्यूनतम तापमान 40 प्रतिशत तथा शरद ऋतुओं में वर्षा सम्बन्धी भविष्यवाणी 98 प्रतिशत सही रही।

जनवरी के तीसरे सप्ताह के दौरान वर्षा, अधिकतम तापमान, साक्षेप सान्द्रता व 26 फरवरी से 4 मार्च तक धूप के खिलने से करनाल बंट नामक रोग के सैक्रेण्डरी स्पोरिडिया की संरचना व बहुगुणन में एक अच्छा संयोग रहा। मौसम में परिवर्तनशीलता के फलस्वरूप गेहूँ में करनाल बंट का विकास हुआ व उपज में प्रभाव पड़ा तथा उसका प्रभाव सरसों की फसल में पाया गया।

सस्यविज्ञान

चावल में स्पेनोक्लीया, जीलेनिका, फिमब्रीस्टीलिस मिलिसिया, स्कीरपस, टूबरोसस तथा अमानीया बेसीफीरा का प्रभाव प्रतिवर्ष बढ़ रहा है। जबकि गन्ना इपोमिया हाईड्रासिया जैसे क्लाइमरों से ग्रस्त रहा। कपास व ग्वार में ट्रेनथीमा, पोरटूलाकेसट्रम, डक्टीलो सीटिनियम एग्रीपरीकम, एचीनोक्लोआ कोलोना डिजीरा एखेनसिस तथा साइपरस रोटूनडस जैसे सर्वाधिक प्रभावी खरपतवार पाये गये।

दक्षिण पूर्वी हरियाणा की राया की फसल में ओरोबेन्सी एडगी परीयाका का संक्रमण बढ़ रहा है तथा इस पर किसी भी रसायन का कारगर प्रभाव नहीं पाया गया। विभिन्न फसलों में खरपतवार प्रबन्ध पर विभिन्न तृणनाशकों की प्रभावशीलता अर्थात् जैसे कि आगामी फसलों, उनके अवशेषों के प्रभाव का अध्ययन किया गया।

कपास के पौधों की आपसी दूरी उसके उत्पादन को बढ़ाने में पर्याप्त उपयोगी पाई गई।

चावल गेहूँ पद्धति में दीर्घाविधि प्रत्याहरण, परम्परागत टिलेज विधियों की अपेक्षा जीरो टिलेज विधि में पानी की मांग तथा चौड़ी पत्ती वाले खरपतवारों की सघनता अधिक पाई गई। इसी भान्ति परम्परागत टिलेज की अपेक्षा जीरो टिलेज में मृदा माइक्रोबायल बायोमास, डीहाइड्रोजीनसिस तथा फास्फेटासी गतिविधियां अधिक पाई गई। इनका मृदा बायलौजी पर सकारात्मक प्रभाव पाया गया।

सूखा प्रबन्ध में, बिजाई के ठीक 30 दिन बाद चारे के लिए प्रत्येक तीसरी पंक्ति की कटाई करने के उपरांत खूड निकालने से 45 सें.मी. पंक्ति से पंक्ति की दूरी पर बिजाई की सामान्य विधि की अपेक्षा उल्लेखनीय रूप से बाजरे की अधिक उपज प्राप्त हुई।

उर्वरक की सिफारिशशुदा 100 प्रतिशत (मानसून न आने पर) मात्रा के अग्रिम प्रयोग तथा बायोमिक्स से टीकाकरण करने से चने (चिकपी) की मात्रा उपज से (765 किंव./है.) में उल्लेखनीय वृद्धि हुई। पोषक तत्वों के अग्रिम (50 प्रतिशत या 75 प्रतिशत आर.डी.एफ.) प्रयोग के संग आर्गेनिक अथवा जैव उर्वरक या दोनों के संयोग से (407-592 किंव./है.)।

गड्ढा विधि से (50 प्रतिशत) सर्वाधिक अंकुरण प्राप्त किया ऐसा गड्ढों में गन्ने के टुकड़े डालकर हल्की सिंचाई करके उन पर पानी सूखने के उपरान्त 3-4 इंच हल्की सूखी मिट्टी डालकर किया गया। चूने के संतृप्त पानी में गन्ने के टुकड़ों को तर-बतर करने से 10-13 प्रतिशत अधिक अंकुरण भी प्राप्त किया गया। विभिन्न प्री-प्लांटिंग टिलेज तकनीक (जीरो टिलेज परम्परागत, रोटावेटर एक बार, रोटावेटर दो बार अथवा दो बार हैरोविंग) समान ही थी। लेकिन ऐसा पाया गया कि आपसी दूरी 90 सें.मी. से अधिक बढ़ाने पर गन्ने की उपज में उल्लेखनीय ढंग से कमी आई। गन्ने के पौधों में खरबूजे, लोंग मीलन, वैक्स गार्ड, करेला, गोल खरबूजा/तरबूज तथा टमाटर की अन्तर्वर्ती फसल बोने से गन्ने की उपज 10 प्रतिशत कम प्राप्त हुई। ऐसा ही पेड़ी/मोढ़ी फसल में पाया गया जबकि ककड़ी, लोबिया, क्लस्टर बीन तथा भिंडी ने गन्ना उपज पर दुष्प्रभाव नहीं डाला।

नवम्बर 25 के बाद चने की फसल की बिजाई में देर करने के फलस्वरूप चने की पैदावार में प्रति सप्ताह 8, 23 व 37 प्रतिशत की कमी आई। एस सी ने इन परिस्थितियों में सर्वाधिक उपज दी तथा क्रमशः एस सी 3, एस सी 5 तथा पी बी जी 1 से 17, 7 तथा 12 प्रतिशत अधिक दाना उपज दी। 1.35 मीटर की उभरी हुई क्यारियों पर चार पंक्तियों में या 67.5 सें.मी. की स्थिति में 2 पंक्तियों में चने का पौधारोपण संभाव्य है। बीज प्राइमिंग (अस्तर) से 105 किलोग्राम/हैक्टेयर चने की अधिक दाना उपज प्राप्त हुई। चने की फसल पर फूल आने के समय पानी के छिड़काव की अपेक्षा 2 प्रतिशत यूरिया का छिड़काव तथा ठीक 10 दिन बाद यही छिड़काव पुनः करने से 25 प्रतिशत अधिक दाना उपज प्राप्त हुई। उर्वरक की सिफारिश की गई मात्रा के साथ 30 किलोग्राम सल्फेट/हैक्टेयर प्रयोग से 8 प्रतिशत अधिक दाना उपज प्राप्त हुई।

कृषि वानिकी

पोपलर पौधारोपण के दो वर्षों उपरान्त चारा तथा ढैंचा (हरी खाद) हेतु खरीफ की अन्तर्वर्ती फसलों से बहुत कम उपज प्राप्त होने के कारण उपयोगी नहीं पाई गई। लेकिन गेहूँ और जौ की काश्त लाभकारी रही। सफेदे के पौधारोपण (6 मी. x 2 मी.) के तीन वर्षों उपरान्त गेहूँ, जौ, लैंटिन तथा बरसीम की रबी फसलें लाभकारी नहीं पाई गई क्योंकि नमी एवं प्रकाश की कड़ी प्रतियोगिता के फलस्वरूप उपज बहुत कम थी। लवणीय एवं शुष्क परिस्थितियों में इजराइल के जीनोटाइप की तुलना में जोजोबा के स्थानीय जीनोटाइप अधिक स्वीकार्य पाए गए।

स्यूडामोनास मालरोफिला को जब वर्मी कम्पोस्ट में संवर्धित किया गया तो वह डलबेरजिया सीसो के आर्द्रगलन रोग में प्रभावकारी पाया गया। कृषि वानिकी की नर्सरियों में आर्द्रगलन रोग के नियन्त्रण में बाविस्टिन तथा मेन्कोजब ने प्रभावकारी नियन्त्रण दिखाया।

सेम वाली भूमि में पेड़ की प्रजातियां जैसे मेलिया एजेडराच, यूकेलिप्टस सी-10, टेरमीनालिया अरजना, पोंगामिया, पिनाटा, सिडीजियम क्यूमिन, टेमेरिक्स डायोसिया, यूकेलिप्टस-हाइब्रिड, पोपलर एल-70, डेनडोकेलामस स्ट्रीक्टस को उगाकर (20 एकड़ में) सुधार लाया जा रहा है।

इंसमें पोपलर की प्रजाति एच एस-8 सर्वोत्तम पाई गई। आठ वर्ष की आयु वाले पौधों की जीवन्तता 82 प्रतिशत रही तथा उसके पेड़ों का घेरा 65.9 सें.मी. पाया गया।

कीट विज्ञान

खरीफ 2006 में लम्बे समय तक सूखा रहने के कारण कपास पर लीफ हॉपर (<0.9 निम्फ/लीफ) तथा सफेद मक्खी (<3.0 प्रौढ़/लीफ) की आबादी के कारण आर्थिक सीमा रेखा से नीचे रही तथा धब्बेदार बालवार्म ने कपास की फसल को

मुख्य हानि पहुंचाई। अगस्त के तीसरे व सितम्बर के दूसरे सप्ताह के दौरान हरे फलों में मीन वालवार्म का प्रभाव क्रमशः 13.3 तथा 13.9 प्रतिशत था।

एच आर्मीगेरा की संख्या ई टी से नीचे रही जिसमें पिंक वालवार्म की घटनाएं प्रमुखतः 33 प्रतिशत खेतों में रही। चने (चिकपी) में फली नुकसान 10.7, 9.5, 10.4 तथा एच ए एन पी वी (HANPV) अकेले में 10.2 प्रतिशत (250 एल ई) था।

विस्तार शिक्षा

अधिकतर विस्तार कर्मियों ने प्रभावी प्रबन्ध हेतु ऐसे किसान जिनके पास 5 एकड़ से कम कृषि भूमि है उनके लिए 2 से 3 भैंसों/गायें, 5-10 भेड़ें/बकरियां, 16-32 लेयरज (अण्डे देने वाले), 9-18 मधुमक्खी बॉक्स की सिफारिश की तथा जिन किसानों के पास 5-15 एकड़ कृषि भूमि है उनके पास 10-15 भैंसों/गायें, 10 से 20 भेड़ें/बकरियां, 63-106 लेयरज तथा 41-57 मधुमक्खी बॉक्स होने चाहिए।

बागवानी

जुलाई के चौथे सप्ताह में एओनला (AONLA) तथा चकइया ने क्रमशः 80 प्रतिशत व 72 प्रतिशत व एन ए/कल्टीवर ने सर्वाधिक सफलता दर प्राप्त की तथा उसके उपरान्त संगततः घटती गई। अग्रिम दिनों के फलस्वरूप अर्थात् जुलाई के चौथे सप्ताह से सितम्बर के चौथे सप्ताह तक अधिकतर कलिकाएं (50 प्रतिशत) हरी बनी रहीं और प्रस्फुटित नहीं हुईं जबकि सितम्बर में यह संभव हुआ। जुलाई के द्वितीय सप्ताह से अगस्त के चौथे सप्ताह के मध्य की गई बडिंग में सापेक्षतः अधिक सफलता प्राप्त हुई। बावल में एन ए-10 तथा कंचन ने (80.2 किं.व./पेड़) सर्वाधिक उपज दी। अट्राजीन (फसल उगने से पूर्व) + ग्लाइफोसेट (उगने के उपरान्त) से 85 प्रतिशत खरपतवार नियन्त्रित हो सके तथा नियन्त्रण उपरान्त अधिकतम पैदावार प्राप्त हुई। (AONLA) बागों पर हुए सर्वेक्षण से ज्ञात हुआ कि इसमें माइट (60 प्रतिशत) तथा रस्ट (40 प्रतिशत) एक मुख्य कीट व बीमारी है तथा एन ए-7 कीट तथा बीमारियों का पसंदीदा कल्टीवर है।

जीरो ऊर्जा चैम्बर में आलू सी वी के अंकुरण को चैक करने के लिए सी आई पी सी 2 ग्रा./किलो की दर से सर्वाधिक प्रभावकारी पाया गया। मटर दानों के भण्डारण हेतु पी एल डब्ल्यू न्यून करने में एल डी पी ई 100 तथा 200 गाज प्रभावकारी पाया गया। पी एल डब्ल्यू तथा फल के गुण हेतु किन्नो फलों की क्लिंग फिल्मों से पैकिंग, पॉलीथीन पैकिंग के समान ही पाई गई।

बेर में रासायनिक उर्वरकों के माध्यम से 50 प्रतिशत पोषक तत्व तथा शेष बायो उर्वरकों व गोबर खाद द्वारा प्रदान करने पर सर्वाधिक उपज प्राप्त की गई। सी वी में सर्वाधिक पौध ऊंचाई (3.1 मी.) तथा उपज (75.2 किं.व./पेड़) दर्ज की गई। कैथली की रोटूनडिफोलिया की जड़ स्टाक बडिंग की गई लेकिन स्टाक तथा संकुल डाली का घेरा सी वी गोला में ही सर्वाधिक पाया गया। दिसम्बर के तीसरे सप्ताह में कैथली एवं गोला किस्मों पर पाउडरी मिल्ड्यू रोग अन्त में दिखाई पड़ा यद्यपि यह भारी ओस के कारण दब गया।

सूत्रकृमि विज्ञान

सिरियल सिस्ट नेमाटोड, हेटेरोडेरा ऐवेनाई को हिसार, सिरसा व फतेहाबाद जिलों के खेतों से एकत्रित गेहूं व जौ के नमूनों में पाया गया। पानीपत, करनाल तथा यमुनानगर जिलों में गन्ने में हेलीकोटीलेनचस, डिहिस्टेरा, होपलोआइमस, इडिकस नेमाटोड की संख्या बहुतायत में थी। कलस्टर बीन के रीजोस्फेरे नमूने पिजनपी सिस्ट नेमाटोड से (29 प्रतिशत) संक्रमित पाये गये।

हिसार- I (आदमपुर, अग्रोहा), हिसार- II (भट्टकलां), फतेहाबाद, सिरसा (नाथूसरी, चौपटा तथा ओडा) में अनाज पुरी नेमाटोड का फैलाव अत्यधिक था। गेहूँ तथा जौ में टी मासोहोडी, डिटीलेन चूस माइसी लीओपाघस, डीरोबूटस तथा एफीलेन सेचोआइडेस एस पी बाह्य परजीवी नेमाटोडो से आमतौर पर जुड़े हुए थे।

ट्रिफोलियम ऐलीजेन्डीनम, एनागालिस आरबेनसिस, ट्रियनथिमा पोरटूलाकेसट्रम तथा गुल्ली डंडा रोगी अवस्थाओं में एम ग्रामीनीकोला (तृणवासी) के मेजबान पाये गये।

2. कृषि यन्त्रीकरण तथा ऊर्जा प्रबन्ध

फार्म पावर मशीनरी : स्वचालित पीछे चलने वाले पावर वीडर विभिन्न फसल अवस्थाओं के अधीन ट्रैक्टर चालित रोटावेटर, ट्रैक्टर चालित रीजर सीडर, स्वचालित/अर्ध स्वचालित आलू प्लांटर तथा आलू खोदने वाले यन्त्रों पर संभाव्य प्रत्यक्षण तथा प्रदर्शन आयोजित किये गये। इन मशीनों को सीमान्त किसानों व बेरोजगार ग्रामीण युवाओं द्वारा किराये पर उपलब्ध करवाने सम्बन्धी सुविधा उपलब्ध करवाई जा रही है। कस्टम हायरिंग (custom hiring) उन्होंने 1226 रोटावेटरज, 74 ट्रैक्टर चालित आलू खादक, 125 ट्रैक्टर चालित पोस्ट होल डिगरज तथा 1194 स्ट्र रीपर खरीदे। उनका राशि लौटाने का समय दो फसलीय मौसम था।

मृदा एवं जल अभियन्त्रण : रायपुर (280 है.), मिर्जापुर (440 है.), नियाणा (320 है.), खाराखेड़ी (200 है.) तथा कहोका (160 है.) गांवों के आसपास के क्षेत्रों में लगभग 1400 हैक्टेयर क्षेत्र में जल भराव (सेम) क्षेत्रों को चिन्हित किया गया। वर्षा, भूमि, जल की गहराई तथा मृदा के जल ग्रहण करने की क्षमता आदि के आंकड़ों से यह ज्ञात हुआ कि हिसार जिले के जल भराव क्षेत्र का सतही जल निकास गुणांक 75 एम एम/प्रतिदिन (संवेदनशील फसलों हेतु) से 36 एम एम/प्रतिदिन (साक्षेप सहनशील फसलों हेतु) 5 वर्षों के वापसी समय हेतु पाया गया।

स्थल मण्डल जल निकास प्रणाली का संचारेक्षण एवं मूल्यांकन से ज्ञात हुआ कि कलायत गांव के आसपास के किसानों के खेतों पर स्थल मण्डल जल निकास प्रणाली स्थापित करने के उपरान्त औसतन धान की उपज में 62.5 प्रतिशत बढ़ोत्तरी दर्ज की गई। फसल उत्पादकता में सुधार के साथ-साथ समस्या ग्रस्त क्षेत्र को काशत अधीन लाने के फलस्वरूप इस क्षेत्र के किसानों को प्रति हैक्टेयर 13,200/- रुपये की अतिरिक्त आमदनी हुई। इस परियोजना में 54 हैक्टेयर क्षेत्र का सुधार किया गया जिसमें 7,12,400 रुपयों की अतिरिक्त वार्षिक आमदनी हुई।

कृषि प्रसंस्करण तथा ऊर्जा : अमरूद को जब 125 एच एल डी पी ई पाऊच में पैक किया गया तो उसकी सुरक्षित रहने की अवधि 2 दिन (अनुपचारित) से 7 दिन तक बढ़ गई तथा जब फल को हवारहित पैक किया गया तब वह 11 दिनों तक सुरक्षित रहा। जब फल को एल डी पी ई पाऊच में पैक किया गया तो पी एल डब्ल्यू 0.72 प्रतिशत था जबकि जिस फल को बिना लपेटे रखा वह 9.71 प्रतिशत पाया गया। 8 दिनों के भण्डारण में पैकेट पाऊच का ओ₂ स्तर लगभग 13 प्रतिशत घट गया जबकि सी ओ₂ लेवल लगभग 10 प्रतिशत बढ़ गया।

3. पशु विज्ञान

कुल 23 बछड़ियों ने प्रथम ब्यांत पूरा किया तथा इनमें से लगभग 26 प्रतिशत ने इस ब्यांत में 2000 किलोग्राम दूध दिया।

दूध उत्पादन हेतु अधिक आनुवांशिक क्षमता 63 संकर नस्ल के नर बछड़ों को किसानों को दिया गया ताकि उत्तम किस्म के जर्मप्लाजम प्रसारित किये जा सकें।

बीटल तथा जखराना बकरियों ने प्रति ब्यांत क्रमशः 1.28 तथा 1.6 बच्चे दिये। राज्य के किसानों को प्रजनन में सुधार हेतु 41 बकरियां प्रदान की गईं।

भेड़ों की सैन्थेटिक संख्या के कारण ऊन की गुणवत्ता में पर्याप्त सुधार आया। रेशे की औसत लम्बाई, रेशे का घेरा तथा मेदावृन्त प्रतिशत क्रमशः 11.69, 16.33 तथा 49.61 थे।

पशु उत्पादन एवं कार्थिकी विज्ञान

यदि जमे हुए वीर्य से भैंसों को 60° सेंटीग्रेड पर 7 सैकिण्ड के लिए संप्रवण किया जाये तो 37° सेंटीग्रेड पर 30 सैकिण्ड संप्रवण करने की अपेक्षा उल्लेखनीय रूप में अधिक गर्भ धारण होता है।

पशु उत्पाद तकनीक

परोसने हेतु हर समय तैयार पनीर की एक ऐसी किस्म तैयार की गई है जो स्वीकार्य आर्गेनोलेपटिक क्वालिटी के साथ कक्ष तापमान पर 15 दिनों तक भण्डारित की जा सकती है।

दो नई स्कीमें “दूध व दूध उत्पादों में अनुसूचित जाति के युवाओं हेतु प्रशिक्षण कार्यक्रम” तथा “अनुसूचित जाति के युवाओं हेतु मांस, कुक्कुट पालन व इनके उत्पाद” शामिल करने हेतु अनुमोदित की जा चुकी है तथा इनको क्रियान्वित करने की प्रक्रिया प्रगति में है।

पशु उत्पादन प्रबन्ध

औसतन ब्यांत दूध की पैदावार 2346.9 किलोग्राम से बढ़कर 2407.9 किलोग्राम हुई जबकि ब्यांत का समय बढ़कर 307.8 दिन से 325.2 दिन हो गया।

भैंस की कटड़ियों ब्रीकिंग इन प्रैक्टिस से भैंस की कटड़ियों में दूध की मात्रा तथा ब्यांत की दूरी बढ़ने में सहायता मिली।

4. पशु चिकित्सा विज्ञान

महामारी विज्ञान तथा निवारक (औषध) चिकित्सा-शास्त्र

पशु, भैंस, भेड़, सांभर तथा मोर विषैली अवस्थाओं हेतु संभावित 14 उत्पादों के नमूने लिए गये तथा उन्हें प्रयोगशालाओं में विश्लेषित किया गया। प्रत्येक में से एक उत्पाद क्रमशः एच सी. एन (HCN) तथा एन्डोफलफ अवशेष भैंस आहार तथा रूमिनल कन्टैन्ट में सकारात्मक पाया गया। कीट नाशक के दो उत्पाद जो विषैलापन घोलते हैं वे भिवानी में मोरों पर चिन्हित किये गए। टी-2 माइकोटावसीसिटी का एक उत्पाद हिसार के राजकीय पशुधन फार्म पर भी चिन्हित किया गया। 79 आहार प्रतिदर्शों में कुल 43 नमूनों में 30 पीपीबी मान्य सीमा से ऊपर एफलाटोक्सीन पाया गया। 35 नमूनों में 0.6 प्रतिशत मान्य सीमा से ऊपर नमक पाया गया। फील्ड स्पॉट टेस्ट में दूध का कोई नमूना पोजीटिव नहीं पाया गया। संक्रामक गर्भस्राव के लिए कुल 411 नमूने परीक्षित किये गये उनमें से 36 नमूने पोजीटिव पाये गये। जबकि 300 पशुओं को टी.बी. के लिए परीक्षित किया गया जिनमें से 28 शंका ग्रस्त पाये गये। कुल 19 पशुओं को जोहनस रोग हेतु परीक्षित किया गया तथा इनमें से कोई भी पोजीटिव नहीं पाया गया।

मुर्गी पालन में लगभग 3000 झुंडों में जिन मुख्य बीमारियों का निदान किया गया वे ई. कूली संक्रमण, सांस रोग संकुल, प्राणघातक सांस की बीमारी, कोसीडायसिस, संक्रमणकारी बुरसल रोग, आन्तरांग गाऊट थी। इसके अलावा अन्य बीमारियां जैसे ऐस्पेर्जिलस-आर्ति, मुर्गा टाइफाइड, विटामिन एवं खनिज पदार्थों की कमी, निमोनिया, ताप आघात तथा मारेक बीमारी का निदान किया गया। ब्रायलर चूजों को मुर्गा एडिनो विषाणु बॉडी हेपीटाईटिस सिन्ड्रोम सहित हाइड्रोपेरिकार्डियम से ग्रस्त होने पर उन्हें मोलीकूलर बायो लौजिकल उपकरणों से अभिलाक्षणिक किया गया। हरियाणा में इस रोग की चेतावनी देने हेतु आर एफ

एल पी पद्धति तथा न्यूक्लीओटाइड अनुक्रम से एफ ए वी-4 तथा एफ ए वी-8 सहित अन्य सीरम प्ररूपों की संलिप्तता का पता चला।

सूक्ष्म जीव विज्ञान

एफ एम डी विषाणु किस्म 'O' के कारण केवल एक एफ एम डी उत्पाद हरियाणा राज्य में दर्ज किया गया जिसने एफ एम डी नियन्त्रण कार्यक्रम को सफलतापूर्वक लागू करने में सहायता की। हरियाणा के आठ जिलों से यादृच्छिक विधि से चुने गये कुल 3048 पशुओं (1484 प्री-1 तथा 1564-प्री-4 फेस आफ वेक्सीनेशन) को वाहक पशुओं के रूप में चिन्हित करने के लिए एन्टी-3ए. एन.एस.पी. प्रतिरोधकों हेतु विध्वंसित किया गया। जो पशु एन्टी-3ए. एन.एस.पी. एन्टीबाइज के लिए इन दो अवस्थाओं प्री-प्रथम टीकाकरण (एफ एम डी सी पी के प्रारम्भ से पूर्व) तथा प्री-चतुर्थ टीकाकरण (एफ एम डी - सी पी के दो वर्षों उपरान्त) के दौरान पोजीटिव पाये गये उनकी प्रतिशतता क्रमशः 31.9 तथा 18.4 थी।

दो वर्षों के प्रारम्भ के उपरान्त एन्टी-एन एस पी एन्टीबाडी प्रोफाइल में उल्लेखनीय (पी < 0.01) कमी आई साथ ही हरियाणा में एफ एम डी- सी पी के सफलतापूर्वक लागू करने में सहायता की। एल पी बी - ई एल आई एस ए के माध्यम से एफ एम डी टाइप ओ ए तथा एसिया-1 के विरुद्ध एंटीबाडी अनुमापांक मानीटर करने हेतु कुल 615 सिरा नमूने प्रोसेस किए गए।

रोगविज्ञान

ब्रायलर चूजों में प्रायोगिक हाइड्रो पेरिकारडियम सिन्ड्रोम में पूरक विटामिन ई देने से उग्र ग्रोस तथा माइक्रोस्कोपिक धब्बे लीवर तथा फेफड़ों पर कम दिखाई दिए तथा इससे सेल मेडिएटिड इम्यून प्रतिदान बढ़ा तथा रोग विज्ञान में तथा एच पी एस पैथोजीनिसिस में प्रतिरक्षा मोड्युलेटरी भूमि को दर्शाया। (54) भेड़ों तथा (32) बकरियों सहित कुल 86 पशुओं की शव परीक्षा की गई। जो महत्वपूर्ण स्थितियां शामिल की गईं उनमें निमोनिया (28), न्यूमोइन्ट्रिटीस (4), आन्त्रशोध (23), गेस्ट्रोइन्ट्रिटीस (7), एबोमासिटिस (2), पेरिकारडिटिस (1), पीलिया (1), जलोदर (1), हाइड्रो पेरिकारडियम (1), परिहीपाटाइटिस (1), सेप्टीकैम्पिक धब्बे (1) एन ए डी (1) लीवर संविदारण-2, हैपीटाइटिस-2 11 कंकाल सड़े हुए पाये गये। ग्रोस एण्ड माइक्रोस्कोपिक आल्ट्रेशन इन डिफरेंट आर्गन पर अध्ययन किया गया।

परजीवी विज्ञान

भारतवर्ष में पहली बार ट्राइपानोसोमा इवानसी के निदान हेतु मोनोक्लोनल एन्टीबाडी आधारित लाटेक्स एग्लूटिनेशन टेस्ट का विकास किया जा चुका है। वर्तमान में उपलब्ध अन्य नैदानिक परीक्षणों जैसे सिंपल टू परफोरम, रेपिड तथा क्षेत्रीय परिस्थितियों में आसानी से अपनाये जाने लायक कम लागत वाले नैदानिक परीक्षणों की अपेक्षा इसके अनेक लाभ हैं।

एंथीलमिनटिक रेसिस्टेंस पर हुए अध्ययन से यह पता चला कि हिसार व सिरसा जिलों में यहां आम प्रयोग होने वाली दवा एन्थीलमिनटिक रेसिस्टेंस (फेनबेन्डाजोल एण्ड ट्रिट्रामिसोल एच सी एल) वर्तमान में उपलब्ध है। उसके स्थान पर इस दवा को कीड़े मारने वाली (Dewormers) दवा के रूप में प्रयोग किया जा सकता है।

जन स्वास्थ्य

स्थानीय मण्डी से एकत्रित किये गये सूअर एवं बकरी के मांस नमूनों में आहार जनित रोग जनक ई. कोलि, सलमोनीला तथा येरसिनिया विद्यमान पाये गये जो मांस प्रसंस्करण में घटिया व अस्वास्थ्यकर विधियां अपनाने की ओर इशारा करते हैं।

5. मौलिक विज्ञान

जैव तकनीक एवं अणु जीव विज्ञान :

परम्परागत बासमती (टी बी) क्रॉस ब्रीड बासमती, इण्डिका तथा वाइलु राइस ग्रुप का पचास एस एस आर तथा तीस परिवर्तनशील ऐलिमेंट (टी ई) आधारित 50 धान जीनोटाइप प्रतिनिधियों के लिए एक डीएनए (DNA) फिंगरप्रिंट डाटाबेस विकसित किया जा चुका है।

गेहूँ की 31 किस्मों का आर ए पी डी, एस एस आर तथा आई एस एस आर मेकर का प्रयोग करके, अध्ययन किया गया तथा उन्हें तीन मुख्य संहति समूहों में बांटा गया। एक संहति (कलस्टर) ने देसी मूल की (एन पी 4 के 68 तथा एच डी 1949) एन पी श्रृंखला की विकसित किस्मों का प्रतिनिधित्व किया। द्वितीय मुख्य संहति समूह लवण व सूखा सहनशील तथा मध्यम सहनशील कृषि जोप जाति (कल्टीवर) (खरचिया, खरचिया 65, सी 391, सी 306, के आर एल-1-4 तथा के आर एल 19) ज्यादातर अधिक उपज देने वाली किस्में (पी बी डब्ल्यू 343, यू पी 2338 तथा सी पी ए एन 3004) तथा क्वालिटी गेहूँ किस्में (कुंदन, एटलस, डब्ल्यू एच 416 या डब्ल्यू एच 146, डब्ल्यू 283 आदि) संहति को तीसरे मुख्य समूह में रखा गया जो किस्में दूसरे व तीसरे मुख्य समूहों में रखी गईं वे मुख्यतः विदेशी/देशी किस्में थीं।

कोट रोधी ट्रांसजीनिक पंक्तियों वाली चने की सी-235 किस्म विकसित की गई (पेटेंट दर्ज किया गया है)।

एलोवेरा के पौधे सूक्ष्म संचारित करके ग्रीन हाऊस में स्थानान्तरित किए गये। एलोवेरा का एक परिवर्त (वेरियट) चिन्हित किया जा चुका है जिनमें कम कांटे, पतली उपत्वचा, अधिक गूददेदार पत्ते हैं। इन पौधों को गमलों में लगाने पर भी अधिक संख्या में फुटाव हुआ। वेरियट पौधों तथा सामान्य पुनर् उत्पादित पौधों (>100 पौधे) को हर्बल बाग में लगाया गया ताकि उनका विभिन्न अनुपातों (पैरामीटरों) में मूल्यांकन किया जा सके। पौधों को क्षेत्रीय अवस्थाओं में 95 प्रतिशत सफलता के साथ बहुत अच्छी तरह सुस्थापित किया गया। इन पौधों का आंकड़ा जून माह में दर्ज किया जाएगा।

क) वनस्पति तथा पौध शरीर क्रिया विज्ञान

आहार विज्ञान तकनीक :

बलेन्डिंग बाएल तथा अमरूद के गूददे से 50 : 50 के अनुपात से तैयार पनीर व टाफी को बहुत अधिक पसंद किया गया। वेल-गुवा चीज तथा टाफी में क्रमशः (12.70 तथा 10.45 मि.ग्रा./100 ग्रा.) स्वीकार्य एसकार्बिक एसिड तत्व था।

जामुन आर टी एस (पीने को तैयार) पेय 20 प्रतिशत गूददे, 15 प्रतिशत टी एस एस तथा 027 प्रतिशत अम्लता से तैयार किया गया तथा 35 प्रतिशत गूददे, 50 प्रतिशत टी एस एस तथा 1.0 प्रतिशत अम्लता से तैयार किया गया जामुन स्कवैश को सर्वाधिक पसंद किया गया।

सरसों के पत्तों+मेथी+बाथू का 3 : 1 : 1 अनुपात में 'प्रयोग हेतु तैयार' साग तैयार किया गया। विवर्ण किये गये पत्तों को 60° सेंटीग्रेड पर हॉट-एयर ड्रायर में सुखाया गया। रीहाइड्रेशन औसत 1 : 75 पाई गई। डीहाईड्रेटिड साग को ताजा साग तैयार करने हेतु प्रयोग किया गया जो सर्वाधिक स्वीकार्य था।

अमरूद के फलों को 0.5 प्रतिशत परफोरेशन रहित व सहित 150 एच मोटाई वाले 100 तथा 150 एल डी पी ई तथा पी पी वाले थैलों में पैक किया गया तथा उन्हें कक्ष तापमान के साथ-साथ कम तापमान पर भण्डारित किया गया। नान-परफोरेटिड एल डी पी ई 150 एच कक्ष तापमान पर सैल्फ लाईफ हेतु सर्वोत्तम पाया गया। 0.5 प्रतिशत स्तर के परफोरेशन से बिना पैक किये गये फलों की भण्डारण अवस्था में कोई विशेष सुधार नहीं हुआ।

गन्ने के रस से पृथीकृत खमीर प्रमेद को (20-25° सेंटीग्रेड) पर किण्वन करके बेइल (Boil) फल के गूदे से शराब तैयार की गई। इस शराब में अमरूद एवं अंगूर की शराब की अपेक्षा अधिक कषाय था तथा इसमें 8-10 प्रतिशत अल्कोहल था। इसे मूल्यांकित करने वाले पैनल ने आमतौर पर सराहा।

प्याज, टमाटर, अदरक तथा लहसुन के सम्मिश्रण को कैंबिनेट ड्रायर में 60° सेंटीग्रेड पर सुखाने के बाद तात्कालिक उपयोग हेतु करी पाऊंडर तैयार किया गया। इस पाऊंडर का निर्जलीकरण अनुपात 1:5 पाया गया तथा इसे पोलिप्रोपीलीन व अल्यूमिनाइज्ड बैग में कमरे के तापमान पर तीन महीनों तक भण्डारित किया जा सकता है। इस करी पाऊंडर से तैयार करी और दाल अधिकतर पसंद की गई।

प्रयोग हेतु तैयार घी में करी सांदण तैयार किया गया। इस पेस्ट को कमरे के तापमान में एक महीना तथा रेफ्रिजरेटर तापमान में तीन महीने तक भण्डारित किया जा सकता है। इसकी गुणवत्ता कमरे के तापमान की अपेक्षा रेफ्रिजरेटर तापमान पर अधिक अच्छी रही। इस पेस्ट से तैयार करी व दाल लोगों को पसंद आई।

खाद्यान्न एवं दालों से तैयार मिश्रित आटा पोलिप्रोफीलीन थैलों में कक्ष तापमान पर तीन महीनों तक भण्डारित किया जा सकता है।

पनीर स्लाइसिस (120-150 ग्राम) को माइक्रोवेव में 80 डब्ल्यू x 8 मि. तथा 800 डब्ल्यू x 2 मि. के ताप से तापित करके उसी समय पी ई पाऊचों तथा एल्यूमीनियम पन्ना से आवरित पी एस सी पी एस से पैक कर दिया गया। पनीर को जब पी ई पाऊचों में पैक कर रेफ्रिजरेटर तापमान पर भण्डारित किया गया तब माइक्रोवेव की अधिक मात्रा से पनीर की सेल्फ लाइफ में सुधार हुआ।

सूक्ष्म जीव विज्ञान :

तरल जीवाणु खाद (500 मि.ली.) के कुल 152645 जिनमें 33298 राईजोबियम 36396 एजोटोबेक्टर तथा 82451 पीएसबी तैयार किये गये। इनमें ग्लूकोन एसीटोबेक्टर बायोटीका के 500 कल्चर भी शामिल हैं।

एजोटोबेक्टर स्ट्रेन तथा इसी भान्ति फास्फेट घुलनशील बैक्टीरिया (पीएसबी) के संचारण से बीज अंकुरण फलभार तथा बैंगन व घीया के बीज उपज में वृद्धि दर्ज की गई। बायोफर्टीलाइजर का 75 प्रतिशत सिफारिशशुदा नत्रजन की मात्रा के साथ उपयोग करने से उतनी ही बीज उपज प्राप्त हुई जितनी कि नत्रजन की सिफारिशशुदा पूरी मात्रा देने से होती है। इससे स्पष्टतः बैंगन तथा घीया में 25 प्रतिशत नत्रजन की बचत हुई।

मिश्रित जीवाणु खाद के संचारण से शुष्क कृषि अवस्थाओं में सरसों की विभिन्न किस्मों में आर डी एफ पर दाना उपज में 2.6 से 9 प्रतिशत की वृद्धि हुई। इसके साथ-साथ झज्जर व रेवाड़ी जिलों में आर डी एफ पर मिश्रित जीवाणु खाद से किसानों के खेतों में यही वृद्धि दर्ज की गई।

एजोटोबेक्टर की विभिन्न प्रजातियों से बीजोपचार करने से शुष्क कृषि अवस्थाओं अधीन बाजरा की दाना उपज 1.1 से 1.7 किंव. प्रति हैक्टेयर तथा सरसों की 61-194 किलो/हैक्टेयर बढ़ी। दोनों फसलों की मूल परिवेशी संख्या व दाना उपज में इन दोनों प्रभेदों मेक 27 तथा मेक 68 ने, जहां तक दाना उपज का मामला है, बेहतर प्रदर्शन किया।

शुष्क कृषि अवस्थाओं अधीन नत्रजन तथा फास्फोरस विभिन्न मात्राओं व नियन्त्रित अधीन पीएसबी (PSB) प्रमेद पी 36 के उपयोग से ग्वार की उपज में 7-8 प्रतिशत अधिक पैदावार हुई। 50 दिनों की बिजाई उपरान्त पीएसबी की संख्या 10⁶ बनाये रखी गई। पीएसबी कल्चर को रायपुर, पेटवाड़, सीसवाल तथा बादल में परीक्षित किया गया। परिणामतः गेहूं की उपज में 4-5 प्रतिशत वृद्धि दर्ज की गई।

ख) विस्तार शिक्षा

इस विश्वविद्यालय की विस्तार गतिविधियों का संचालन कृषि सलाहकार सेवा, कृषि प्रशिक्षण सेवा, कृषि सूचना एवं संचार सेवा तथा विस्तार शिक्षा निदेशालय द्वारा किया जाता है। ग्रामीण विकास हेतु विभिन्न विषयों पर संगत तकनीक का निस्सारण 19 कृषि विज्ञान केन्द्रों, किसान सूचना केन्द्र (ATIC) तथा हिसार, ऊचानी (करनाल) व बावल (रिवाड़ी) की टोल फ्री हैल्पलाइन द्वारा किया जाता है। विस्तार शिक्षा निदेशालय अनेक गतिविधियों जैसे तकनीकियों का प्रदर्शन, खेत दिवस, किसान मेलों, अभियानों, फार्म दर्शन, प्रदर्शनियों, गोष्ठियों आदि का आयोजन करता है। कृषि अधिकारियों की दो कार्यशालाएं क्रमशः रबी एवं खरीफ आयोजित की गईं जिसमें विश्वविद्यालय अधिकारियों तथा क्षेत्रीय अधिकारियों ने आपसी विचार-विमर्श से समग्र सिफारिशों को अन्तिम रूप दिया। इसी भान्ति फरवरी 2007 में पशुपालन कार्यशाला में पशुपालन सम्बन्धी समग्र सिफारिशों को अन्तिम रूप देने के लिए पशुपालन कार्यशाला का आयोजन किया गया।

कुल 7421 व्यवसाय जनक प्रशिक्षणों का आयोजन किया गया जिनमें सामान्य वर्ग के 3415 पुरुष तथा 2826 महिलायें थीं तथा 506 पुरुष व 674 महिलायें अनुजाति/अनु जनजाति की थीं तथा विभिन्न महत्वपूर्ण विषयों जैसे मधुमक्खी पालन, कुकुरमुत्ता की काशत, वर्मी कम्पोस्ट, फल एवं सब्जी परिरक्षण, पशु पालन, वस्त्र बनाना आदि में प्रशिक्षण दिया गया। फसल उत्पादन, बागवानी, सब्जी, कृषि वानिकी, पशु-विज्ञान, गृह विज्ञान तथा सम्बन्धित विषयों में भी प्रशिक्षण कार्यक्रम आयोजित किये गये। इन सभी प्रशिक्षण कार्यक्रमों के माध्यम से 61693 व्यक्तियों को जिनमें 46423 पुरुष, 7396 महिलायें सामान्य वर्ग की तथा 6111 पुरुष व 1763 महिलाएं अनु.ज./अनु.ज. लाभान्वित हुईं।

इनके अतिरिक्त कृषि के विभिन्न क्षेत्रों में सेवारत अभ्यर्थियों हेतु 245 प्रशिक्षण आयोजित किये गये। इनमें 5914 पुरुष तथा 1085 महिलाएं सामान्य वर्ग की तथा 592 पुरुष तथा 369 महिलाएं अनुसूचित जाति/अनुसूचित जन जाति की थीं, जिन्हें प्रशिक्षित किया गया।

कृषि विपणन, उत्पादन अर्थशास्त्र, उद्यमीय विकास, कृषि वित्त तथा कृषि समझौतों के बारे में कुल 145 प्रशिक्षण आयोजित किए गए जिनसे 4020 किसान लाभान्वित हुए।

महिलाओं के सशक्तिकरण हेतु साफ-सुथरा दूध उत्पादन, फल तथा सब्जी परिरक्षण, स्वास्थ्य वर्धक आहार तथा प्रसंस्करण व आहार सुरक्षा, स्वच्छ पीने के पानी, मूल्य/मान संवर्धन, अनाज का सुरक्षित भण्डारण, ग्रामीण दस्तकारी, गृह रसोई की सुरक्षा आदि के बारे में एस एच जी एस के माध्यम से 52 प्रशिक्षण आयोजित किए गए। इसी भान्ति 23 व्यवसाय जनक प्रशिक्षण ग्रामीण महिलाओं के लिए आयोजित किए गए। परिसर से बाहर कुल 493 प्रशिक्षण आयोजित किए गए जिनमें कुल 8439 महिलायें थीं तथा इन में 1513 अनुसूचित जाति/अनुसूचित जन जाति की महिलायें भी थीं।

60 पाठ्यक्रम विस्तार कर्मियों, 152 पाठ्यक्रम ग्रामीण युवाओं हेतु आयोजित किये गए ताकि वे ज्ञान वृद्धि के साथ-साथ स्वयं रोजगार हेतु अभिप्रेरित हो सकें।

हिसार, रोहतक, करनाल तथा बावल की मृदा एवं जल परीक्षण प्रयोगशालाओं में 7241 मृदा तथा 3081 पानी के नमूनों का परीक्षण किया गया। गांधी भवन स्थित हरियाणा ग्रामीण पुरातन संग्रहालय ने 1154 छात्रों, संकाय सदस्यों तथा अन्य दर्शकों को आकर्षित किया।

ग) अध्यापन

1. स्नातकोत्तर कार्यक्रम :

2006-07 के दौरान कुल 583 छात्र पंजीयन सूची में थे। कुल 199 छात्रों ने स्नातकोत्तर कार्यक्रम तथा 66 स्नातकोत्तर ने शोध कार्यक्रम पूरा किया। 466 स्नातकोत्तर छात्रों ने छात्रवृत्तियां प्राप्त कीं जिनमें से 139 छात्रों ने भा.कृ.अ.प., सी एस आई आर तथा यूजीसी आदि से छात्रवृत्ति प्राप्त की।

2. पूर्व स्नातक कार्यक्रम :

कृषि महाविद्यालय, हिसार अपने चौदह विभागों के माध्यम से स्नातक, स्नातकोत्तर तथा पीएच. डी. स्तर के पाठ्यक्रम चलाता है। रिपोर्टाधीन वर्ष के दौरान 115 छात्रों ने अपनी डिग्रियां पूरी कीं जिनमें से 92 एम. एससी. के छात्र थे तथा 23 शोध स्कॉलर थे। 122 नए छात्रों को प्रवेश दिया गया। इनमें से 107 को एम. एससी. तथा 15 को पीएच. डी. में प्रवेश दिया गया। कुल 183 एम. एससी. के छात्र तथा 58 पीएच. डी. स्कॉलर रोल पर हैं। छात्रों ने सी एस आई आर जूनियर रिसर्च फ़ैलोशिप तथा जवाहर लाल नेहरू पुरस्कार देश में सर्वोत्तम पीएच. डी. थीसिस लिखने पर प्राप्त कर महाविद्यालय का नाम रोशन किया। दो छात्रों ने नेट परीक्षा पास की। तीन छात्रों ने सीनियर रिसर्च फ़ैलोशिप तथा दो छात्रों ने जूनियर रिसर्च फ़ैलोशिप प्राप्त की।

कृषि अभियन्त्रण एवं तकनीकी महाविद्यालय :

यह महाविद्यालय छात्रों द्वारा हासिल ए आई ई ई ई प्राप्तांक के आधार पर बी. टेक (कृषि अभि.) में प्रवेश देता है। वर्ष 2006-07 में 49 छात्रों को प्रवेश दिया गया। मौलिक अभियन्त्रण, फार्म पावर तथा मशीनरी, मृदा व जल अभियन्त्रण तथा कृषि प्रोसेसिंग व ऊर्जा में नियमित अध्ययन कार्य के अतिरिक्त इस महाविद्यालय ने दो व्यावसायिक प्रशिक्षण कार्यक्रम जैसे ट्रेक्टरों की मरम्मत तथा रखरखाव, पम्पिंग सैट्स तथा फार्म मशीनरी आयोजित किये। ग्रामीण स्कूलों के छात्रों हेतु परामर्श एवं अनुश्रवण कार्यक्रम भी आयोजित किया गया ताकि प्रगतिशील किसानों, ग्रामीण युवाओं तथा छात्रों को उच्च तकनीकी शिक्षा हेतु प्रोत्साहित किया जा सके।

मौलिक विज्ञान एवं मानविकी महाविद्यालय :

मौलिक विज्ञान एवं मानविकी महाविद्यालय सभी सबद्ध महाविद्यालयों के छात्रों को पूर्व स्नातक स्तर तक शिक्षा प्रदान करता है। इसके अतिरिक्त अपने विभिन्न विभागों के माध्यम से महाविद्यालय एम. एससी. तथा पीएच. डी. कार्यक्रम भी चलाता है। वर्ष 2006-07 के दौरान 64 छात्रों ने अपनी उपाधियां पूर्ण की। इनमें 48 छात्रों ने एम. एससी. तथा 16 छात्रों ने पीएच. डी. की। 122 एम. एससी. तथा 58 पीएच. डी. स्कॉलर रोल पर थे। इस प्रकार कुल 180 छात्र थे। इनमें से 2006-07 के दौरान 60 एम. एससी. तथा 38 पीएच. डी. के छात्रों को प्रवेश दिया गया।

गृह विज्ञान महाविद्यालय :

गृह विज्ञान महाविद्यालय पूर्व स्नातक तथा स्नातकोत्तर स्तर के कार्यक्रम चलाता है। विभाग 5 विषयों (डिसिप्लिन) में एम.एससी. तथा पी.एचडी कार्यक्रम चलाता है। स्नातकोत्तर डिप्लोमा तीन विषयों में तथा प्रमाण-पत्र पाठ्यक्रम चार विषयों में संचालित करता है। रिपोर्टाधीन वर्ष के दौरान 241 छात्र रोल पर थे। इनमें से 133 छात्र बी. एससी, 45 एम. एससी. तथा 19 छात्र पीएच. डी. के थे। 22 छात्र स्नातकोत्तर डिप्लोमा कार्यक्रम के तथा इतने ही छात्र प्रमाण-पत्र पाठ्यक्रम में पंजीकृत हैं। 2006-07 के दौरान 13 पीएच. डी. स्कॉलर, 19 एम. एससी. छात्रों तथा 27 बी. एससी. ने अपनी उपाधियां पूरी कीं। 19 छात्रों

को स्नातकोत्तर डिप्लोमा तथा 30 छात्रों को प्रमाण-पत्र प्रदान किये गये। कुल 81 छात्रों को गृह विज्ञान महाविद्यालय में प्रवेश दिया गया। 21 को प्रमाण-पत्र कार्यक्रम में, 32 को स्नातकोत्तर डिप्लोमा, 21 को एम. एससी. तथा 7 को पीएच. डी. में प्रवेश दिया गया।

महाविद्यालय ने कार्यक्रमों तथा अभियानों का आयोजन कर अनेक विभिन्न दिवसों/सप्ताहों जैसे ब्रेस्ट फीडिंग सप्ताह (अगस्त 1-7, 2008) तथा राष्ट्रीय पोषक तत्व सप्ताह (आईसीडीएस के सहयोग) से (सितम्बर 1-7, 2008) का आयोजन किया गया। फतेहाबाद जिले के मताना गांव में सकल सफाई अभियान, अन्तर्राष्ट्रीय महिला दिवस (8 मार्च 2007) विश्व उपभोक्ता अधिकार दिवस (फतेहाबाद के भारतीय स्टेट बैंक द्वारा प्रायोजित) 15 मार्च 2007 तथा 5 जून, 2007 को विश्व पर्यावरण दिवस मनाया गया। इस अभियान से इन चुनिंदा दिनों एवं घटनाओं के महत्व के बारे में छात्रों एवं प्रतिभागियों को जानकारी प्रदान की गई।

पशु विज्ञान महाविद्यालय :

पशु विज्ञान महाविद्यालय में पशु विज्ञान के पांच विषयों (डिसिप्लिन) में एम. एससी./एम. वी. एससी. तथा पीएच. डी. करवाई जाती है। उसके साथ-साथ पूर्व स्नातक स्तर पर सभी महाविद्यालयों में अध्यापन कार्यक्रम भी चलाया जाता है। 2006-07 वर्ष के दौरान इस महाविद्यालय के वैज्ञानिकों ने किसानों, बेरोजगार युवाओं पूर्व सैनिकों तथा कृषि में रत महिलाओं हेतु पशुधन तथा मुर्गी पालन पर विभिन्न प्रशिक्षण कार्यक्रम आयोजित किए। वैज्ञानिकों ने गुंजन (ब्रज) अधिवेशन भी आयोजित किया। जिसमें उन्होंने किसानों के प्रश्नों का ऑनलाइन उत्तर दिया। वैज्ञानिकों ने पशुओं, मुर्गी स्वास्थ्य तथा पशु प्रजनन से सम्बन्धित विषयों पर रेडियो तथा दूरदर्शन वार्ता में भी भाग लिया।

पशु चिकित्सा विज्ञान महाविद्यालय :

यह इस विश्वविद्यालय का सबसे पुराना महाविद्यालय है। यह देश के पशु चिकित्सा महाविद्यालयों में पहला महाविद्यालय है जिसने पूर्वस्नातक कार्यक्रम में समरूपता लाने हेतु भारतीय पशु चिकित्सा परिषद् नियमों को लागू किया। वर्ष 2006-07 के दौरान 22 छात्रों ने अपनी डिग्रियां पूरी कीं। इनमें से 20 छात्रों को एम.बी.एस.सी. तथा एक स्कॉलर को पीएच. डी. हेतु पंजीकृत किया गया। कुल 78 छात्र रोल पर थे। इनमें से तीन पीएच. डी. स्कालर थे तथा बाकी के 75 एम. एससी. के छात्र थे। यह महाविद्यालय "पशु चिकित्सा अध्यापन सेवा संकुल" (जिसमें विभिन्न प्रजातियों के 7433 पशुओं का इलाज किया गया तथा 2283 नमूनों को पशुचिकित्सा विज्ञान प्रयोगशाला में परीक्षित किया गया) तथा रोग मुक्त छोटे पशु आवास गृह रोग मुक्त प्रयोगशाला पशु तैयार करता है। यह महाविद्यालय इस विश्वविद्यालय के विभिन्न विभागों तथा बाह्य विभिन्न अनुसंधान तथा अध्यापन संस्थाओं को, जिनमें कुछ महत्वपूर्ण संस्थान जैसे अखिल भारतीय आयुर्विज्ञान संस्थान, नई दिल्ली, वनस्थली विद्यापीठ, वनस्थली, बीआईटीएस, पिलानी आदि शामिल हैं, में पशु उपलब्ध करवाता है। इस कार्य से 9,57,450 रुपयों की आमदनी हुई।

टी वी सी एस सी में चिकित्सकीय, चीर-फाड़, प्रसूति/पुनर्संस्थापन सम्बन्धी समस्याओं का निदान किया गया। दिवान तथा हरिकोट गांव के एम्बूलेटरी केन्द्रों में स्वास्थ्य सेवाएं उपलब्ध करवाई गईं जहां 228 तथा 304 पशु चमड़ी की समस्याओं से ग्रस्त पाये गये। ऐसे 1729 पशुओं का चमड़ी की विभिन्न बीमारियों हेतु इलाज किया गया, जिन्हें यहां निदानशाला में लाया गया था।

कृषि महाविद्यालय, कौल

कृषि महाविद्यालय कौल का परिसर 11076 स्क्वेयर मीटर में फैला हुआ है। यह महाविद्यालय 4 वर्षीय बी. एससी. (आनर्ज) डिग्री तक का कार्यक्रम चलाता है। इस महाविद्यालय के रोल पर 175 छात्र हैं।

घ) सेवायें

कृषि तकनीकी सूचना केन्द्र (एटिक) :

इस विश्वविद्यालय में "एक अपनी किस्म" का एटिक है जो एकल खिड़की के माध्यम से विश्वविद्यालय के बीजों, बीज इतर मुद्दों पौध सामग्री तथा विश्वविद्यालय प्रकाशनों एवं उत्पादों की बिक्री को सुनिश्चित करता है। वर्ष 2006-07 के दौरान एटिक के माध्यम से 47.6 लाख रुपयों की बिक्री हुई। कृषक समुदाय को एटिक के माध्यम से आन लाइन सलाह तथा मृदा एवं जल परीक्षण सुविधायें प्रदान करना निश्चय ही एक विलक्षण सुविधा है। यह अनेक प्रकार से किसानों के लिए सहायक सिद्ध हुई है। एकल खिड़की सेवा की किसानों द्वारा भरपूर प्रशंसा हुई है। इस एकल खिड़की के द्वारा अनाज वाली फसलों (13,51,963 रुपये) सब्जियों (1,11,250 रुपये) तथा फलदार पौधों (1,11,250 रुपये) की बिक्री की गई। इसके अलावा आंवला और अमरूद के पौधों की एटिक की नर्सरी से 300480 रुपयों की बिक्री की गई। बिना बीज वाले अनाजों (1,12,298 रुपये) जैव उर्वरक (4,88,310 रुपये) प्रसंस्कृत उत्पादों (1,15,425 रुपये) तथा प्रकाशनों (28,21,529 रुपये) की भी बिक्री की गई।

मानव संसाधन प्रबन्ध :

मानव संसाधन प्रबन्ध निदेशालय की स्थापना 1 अप्रैल 2002 में हुई थी। इसके चार अनुभाग हैं जैसे : कृषि अनुसंधान तथा शिक्षा प्रबन्ध, आयोजन तथा मूल्यांकन, मानव शक्ति आंकलन सैल तथा बौद्धिक सम्पदा अधिकार।

कृषि अनुसंधान तथा शिक्षा प्रबन्ध इस विश्वविद्यालय के अध्यापकों/वैज्ञानिकों तथा परा प्रशासनिक (स्टाफ) कर्मचारियों हेतु प्रशिक्षण कार्यक्रम अभिकल्पित एवं आयोजित करने का उत्तरदायी है। अब तक इस अकादमी द्वारा आयोजित कार्यक्रमों से 5000 प्रतिभागी लाभान्वित हो चुके हैं। रिपोर्टाधीन वर्ष के दौरान ए ए आर ई एम ने 13 प्रशिक्षण कार्यक्रम आयोजित किए जिनमें से 6 कार्यक्रम चौ.च.सिं.ह.कृ.वि. के प्रशासनिक स्टाफ हेतु थे। रिपोर्टाधीन वर्ष के दौरान आयोजन एवं मूल्यांकन सैल ने विश्वविद्यालय की वार्षिक योजना तैयार की। मानव शक्ति आंकलन सैल ने स्रोतों के उपयोगीकरण तथा मानव शक्ति मांग क्षेत्रों के बारे में अध्ययन किया तथा विश्वविद्यालय की विभिन्न गतिविधियों पर आंकड़ा अधिकोष तैयार किया।

आई पी आर नीति तथा विनियमों का निर्माण तथा लागू करना :-

चौ. च. सिं. हरियाणा कृषि विश्वविद्यालय की अनुसंधान गतिविधियों का ध्येय नवीन ज्ञान, विश्वविद्यालय उद्देश्यों की उपलब्धि तथा राज्य का संवर्धन है ताकि वह कृषि के क्षेत्र में राष्ट्रीय व अन्तर्राष्ट्रीय स्तर पर नेतृत्व हासिल कर सकें।

बौद्धिक संपदा संरक्षण की क्षमता अभिवृद्धि हेतु मिक्सीज स्टेट युनिवर्सिटी, यू. एस. ए. के साथ एक घोषणा-पत्र पर हस्ताक्षर हुए तदुपरान्त एक आई पी आर सैल की मानव संसाधन प्रबन्ध निदेशालय में दिनांक 21 मार्च 2006 में स्थापना की गई। आई पी आर नीति तथा विनियमों को अप्रैल 2007 में प्रबन्ध मण्डल से अनुमोदित किया गया। जिसकी प्रति एच.ए.यू. की वेबसाइट डब्ल्यू डब्ल्यू डब्ल्यू एच ए यू ऐरनेट . इन पर उपलब्ध है। रिपोर्टाधीन वर्ष के दौरान पी पी वी तथा एस आर आई वी आर पर जागरूकता कार्यक्रम व संकाय क्षेत्रीय कार्यकर्ताओं, विद्यार्थियों, छात्रों तथा किसानों हेतु व्यावसायिक तकनीकों का आयोजन किया गया। इस विश्वविद्यालय द्वारा जनित तकनीकों के व्यावसायीकरण, प्रशिक्षण तथा अनुसंधान हेतु निजी क्षेत्रों से सहयोग के प्रयासों की शुरुआत की गई।

(ङ) स्वास्थ्य सेवाएं

हिसार स्थित 50 बिस्तरों से युक्त हस्पताल तथा तीन बाह्य स्थानों जैसे केन्द्रीय अनुसंधान केन्द्र, बावल, केन्द्रीय अनुसंधान

केन्द्र, उचानी (करनाल) तथा कृषि महाविद्यालय तथा केन्द्रीय अनुसंधान केन्द्र कौल स्थित डिस्पैनसरीज़, विश्वविद्यालय तथा भा.कृ.अ.प. के कर्मचारियों को चिकित्सीय सहायता उपलब्ध करवाती है।

पुनरीक्षण अवधि के दौरान 51042 मरीजों का ओ पी डी उपचार किया गया तथा 1151 मरीजों का नैमित्तिक उपचार किया गया। 200 मरीजों का इन्डोर (हस्पताल में) उपचार किया गया।

(च) अभियन्त्रण एवं सम्पदा संगठन

रिपोर्टाधीन वर्ष के दौरान सम्पदा कार्यालय ने विश्वविद्यालय के विभिन्न भवनों के नवीनीकरण, रखरखाव तथा मरम्मत का कार्य निष्पादित किया। विश्वविद्यालय के मौलिक एवं बकाया कार्यों को बनाए रखने के लिए कुल 9,21,56,394 रुपये खर्च किये गये।

(छ) छात्र कल्याण एवं गतिविधियां

छात्र कल्याण निदेशालय छात्रों के कल्याण व उनसे सम्बन्धित सभी प्रकार की गतिविधियों का उत्तरदायित्व वहन करता है। यह निदेशालय हिसार परिसर स्थित 12 छात्रावासों तथा कौल स्थित दो छात्रावासों का संचालन करता है। इस समय लगभग 1340 छात्र इन छात्रावासों में निवास करते हैं। यहां के अन्तर्राष्ट्रीय स्तर के सिन्थेटिक ट्रैक की विलक्षण सुविधा विश्वविद्यालय के खिलाड़ियों के प्रदर्शन को बेहतरीन बनाने में महती भूमिका अदा करता है। रिपोर्टाधीन वर्ष के दौरान सलाहकार एवं रोजगार केन्द्र ने 32 छात्रों को विभिन्न फर्मों/कम्पनियों/बैंकों में रोजगार उपलब्ध करवाने में सफलता हासिल की। पर्वतारोहण क्लब के सदस्यों ने 14500 फुट के उनन्ताश तक लम्बी चढ़ाई की। हमारे छात्रों ने विभिन्न खेल गतिविधियों में बढ़चढ़ कर भाग लिया तथा बैडमिन्टन तथा टेबल टेनिस में क्रमशः गोल्ड एवं रजत पदक जीते। फिल्म क्लब जो सप्ताह में तीन दिन चलचित्र दिखाता है उसका संचालन भी छात्र कल्याण निदेशालय द्वारा किया जाता है। जून 2006 - जुलाई 2007 के दौरान निदेशालय ने बड़ी संख्या में साहित्यिक गतिविधियों जैसे वार्ता/ओजस्वी भाषण/प्रस्ताव तथा लेखन प्रतियोगिता का आयोजन किया।

यह निदेशालय एन.सी.सी. तथा एन.एस.एस. गतिविधियों का भी संचालन करता है तथा इसके 8 छात्रों ने सी.सर्टीफिकेट परीक्षा तथा 54 छात्रों ने बी.सर्टीफिकेट परीक्षा उत्तीर्ण की। एन.एस.एस. स्वयं सेवकों ने विभिन्न लाभदायक एवं उपयोगी जनजागरण कार्यक्रम आयोजित किए।

ज) परिसर विद्यालय

रिपोर्टाधीन वर्ष के दौरान परिसर विद्यालय में विद्यार्थियों की संख्या 880 थी। 98 छात्रों ने दसवीं की परीक्षा दी तथा सभी ने सफलता हासिल की (दो छात्रों ने क्रमशः गणित व विज्ञान में शतप्रतिशत अंक हासिल किए) बारहवीं कक्षा के कुल 27 छात्रों में से 26 छात्रों ने सफलता हासिल की। शैक्षणिक गतिविधियों के अलावा विद्यालय ने शिक्षा इतर गतिविधियों का भी आयोजन किया जिसमें छात्रों ने वही उत्कृष्टता दिखाई। परिसर विद्यालय ने राष्ट्रीय स्तर पर विभिन्न खेल कूद गतिविधियों में बढ़चढ़ कर भाग लिया तथा ख्याति अर्जित की।

झ) नेहरू पुस्तकालय

नेहरू पुस्तकालय हिसार तथा राज्य के अन्य भागों में स्थित विश्वविद्यालय के विद्यार्थियों, अध्यापकों, अनुसंधानकर्ताओं, विस्तार विशेषज्ञों की ज्ञान एवं सूचना संबंधी मांग को पूरा करता है। पुस्तकालय में 650 छात्रों के बैठने की व्यवस्था है तथा 21 छात्र कक्ष हैं।

पुस्तकालय में 1,96,352 पुस्तकें हैं, 95807 पत्र-पत्रिकाएं, 9879 थीसिस, 131 सी डी-रोम (डाटाबेसिस तथा 1187 सी डी (पुस्तकें तथा थीसिस)।

पाठक सेवा डिजीजन में बुक बैंक भी शामिल है जिसमें नाम मात्र का मूल्य चुकाकर पुस्तकें उधार ले सकते हैं। रिपोर्टाधीन वर्ष के दौरान 6267 से भी अधिक पुस्तकालय उपयोग कर्ताओं ने डाटाबेस का प्रयोग किया। इसके अतिरिक्त पुस्तकालय को अनेक विदेशी एवं भारतीय जर्नलों के प्रकाशकों से आदान-प्रदान की व्यवस्था है। पुस्तकालय कर्मचारियों द्वारा पुस्तकालय स्वचालित गतिविधियों तथा पुस्तकालय उपयोग कर्ताओं का आनलाइन डाटाबेस उपलब्ध करवाने हेतु नवीनतम उपकरणों का प्रयोग किया जा रहा है।

ज) वित्तीय परिव्यय

वर्ष 2006-07 का परिमार्जित बजट आंकलन 16529.81 लाख रुपये था। प्लान स्कीम के लिए 800 लाख का प्रावधान था। प्रत्येक कार्य/गतिविधि अनुसार खर्च ब्यौरा इस प्रकार है अनुसंधान (42.64 प्रतिशत) अध्यापन (27.50 प्रतिशत) विस्तार (12.28 प्रतिशत) तथा बाकी का प्रशासन, छात्र कल्याण, भवन तथा उनके रख-रखाव पर खर्च हुआ।

त) पदोन्नतियां

कैरियर एडवांस स्कीम अधीन 69 सहायक प्राध्यापकों को सह-प्राध्यापकों अथवा उनके समकक्ष पदोन्नत किया गया। 74 सह-प्राध्यापकों को प्राध्यापक/समकक्ष, चार सहायक प्राध्यापकों को सीनियर स्केल पर पदोन्नत किया गया तथा दो को सिलैक्शन ग्रेड प्रदान किया गया। पांच टीचिंग एसोसिएट को कान्ट्रैक्ट आधार पर, एक क्लर्क (पी एच कोट) अधीन तथा फार्मासिस्ट नियुक्त किया गया।

गैर शिक्षक वर्ग निम्न अनुसार पदोन्नतियां दी गई : उप नियन्ता (1) अधीक्षक (2) उपाधीक्षक (3) निजी सहायक (7) कार्यकारी अभियन्ता (1) उप-मण्डल अधिकारी (4) तथा जी.ओ.कम. दफ्तरी (6) इसके अतिरिक्त 7 नियुक्तियां (एक्स-ग्रेसियां) स्कीम अधीन की गई।

1. An Overview

Since its inception in 1970, CCS Haryana Agricultural University is providing yeoman service for sustainable development of agriculture in Haryana State. The researches carried out by the University and adoption of technologies thus generated have not only enhanced food production and productivity, but also improved quality and efficiency in the management of livestock and their diseases as well. This has eventually strengthened living standards and raised the economic status of rural people in the State.

The year 2006-07 has been noted for significant achievements in research, teaching and extension. An overview of the salient accomplishments during 2006-07 is presented below :

A. RESEARCH

I PLANT SCIENCES

Crop Improvement

i) Varieties released/notified

Varieties released/notified have been given on page 2.

ii) Breeding Material Developed

Besides, development of crop varieties, a number of high yielding and super quality types of vegetable, fibre, medicinal & aromatic plants and other crops were evolved. These were subjected to large scale field testings and promoted to Advanced Variety Trials.

iii) Seed Science and Technology

Grow out test of nucleus and breeder seed of recommended *kharif* (arhar, moong, cowpea, guar and sorghum) and *rabi* (wheat, raya, gram, lentil, field pea, oats, berseem and barley) crop varieties was conducted and genetic purity was found within permissible limits as per Indian Minimum Seed Certification Standards.

During *kharif* 2006, farmers' own saved seed samples (161) and unprocessed (raw) certified seed samples (100) of rice from different districts of Haryana did not reveal any infection of bunt. Though seed dormancy (10-90%) was observed in different varieties. However, the dormancy was released within 75 days after harvest in most genotypes.

Seed Production

Quality seed production is one of the most important activities of the University. All classes (Nucleus, Breeder, Foundation, Certified and Truthfully Labelled) of seeds are produced. As per Seed Act, the breeder seed of various varieties/crops is produced to fill the indents received from Ministry of Agriculture & Cooperation, Govt. of India and other public and private seed producing agencies.

During 2006-07, a total of 26020.86 quintal seed of different varieties of 22 crops was produced at Directorate of Farms and RDS Seed Farm for public/private seed agencies (Breeder Seed) and farmers (Certified and TFL).

Agricultural Meteorology

Online daily updated weather based information has been made available and is accessible from <http://hau.ernet.in/agromet>.

Varieties released/notified

| S. No. | Crop | Variety | Yield Potential (q/ha) | | Disease/Pest Resistance | Special Traits | Remarks |
|--------|--------------|-----------------------|----------------------------------|--------|---|---|--|
| | | | Grain | Fodder | | | |
| 1. | Guar | HG-884 | 22.0 | - | Bacterial and Alternaria blights; Root rot | Yields 28% higher gum 15% more galactomannan | Good for rained and irrigated conditions |
| 2. | Pearl millet | HHB-197 | 50.0 | 110.0 | | Togo earheads and reduces bird damage due to presence of bristles | Released across the country |
| 3. | Maize | HQPM-5 | 55-60 (Summer) 70-75 (Winter) | - | Maydis leaf blight, common rust, banded leaf sheath blight and post flowering stock-rot | Single cross hybrid with quality protein | |
| 4. | | HM-8 | 60-65 (Summer) 75-85 (Winter) | | Turcicum leaf blight, sorghum downy mildew and post flowering stock rot | Single cross hybrid | AP, Karnataka, TN, and Maharashtra |
| 5. | | HM-9 | 55-60 (Summer) 70-75 (Winter) | | Maydis leaf blight, common rust | Orange & flint grain | Eastern UP, Chhatisgarh, Orissa, Bihar, WB, Jharkhand and MP |
| 6. | Fieldpea | Hariyal | 21.0 | - | Powdery mildew, Root rot and Rust | Light green medium bold seeds (18.2 g/100 seed) Long pods (6.5 seeds/ pod) | Recommended for irrigated areas |
| 7. | Mungbean | Satya | 21.0 | - | Powdery mildew, yellow vein mosaic, Anthrachose web, cercospora leaf spot, leaf crinkle, root knot nematode | - | Punjab, Haryana, Raj., U.P. and Delhi |
| 8. | Wheat | WH-1021 | Yields 4% more than PBW-373 | - | Yellow and brown rust and flag smut | Late sown, heat and salinity, tolerant; protein content 12.21% | North-West Plain Zone of India |
| 9. | Rice | Haryana Sankar Dhan-1 | 75.0-100.0 | - | White back plant hopper, stem borer, leaf folder, blast and brown leaf spots | White belly absent, can tolerate water stress | North-West Plain Zone Medium duration hybrid (139 days) |
| 10. | Sugarcane | CoH-119 | 74 tonnes | - | Red rot | - | North-West Zone mid early maturing |
| 11. | Okra | HRB-107-4 | 120.0 | - | Yellow vein mosaic virus | Yields 18.8% more than National check | Delhi, Kerala, Haryana, Gujarat, Rajasthan, Karnataka, T.N. |
| 12. | Coriander | Hisar Surtbhi | 192.8 | - | - | Leaf yield 41% higher than National check, Pant Haritima | Haryana, Bihar and Chhatisgarh |

CCSHAU, Hisar regularly updates the daily weather data for National Data Bank at CRIDA, Hyderabad and biweekly weather based crop production information/strategies and contingency measures/plans were updated online at www.cropweatheroutlook.ernet.in.

A total of 99 weather based Agro Advisory Bulletins in Hindi as well as English (each of 4 days), based on medium range weather forecast for farmers of Hisar region, were disseminated on every Tuesday and Friday through print and electronic media. The highest correct forecast values were 61% for cloud cover during post monsoon, 95% for wind speed during post monsoon & winter, 40% for minimum temperature during SW monsoon and 98% for rainfall during winter seasons.

Rainfall during 3rd week of January and maximum temperature, relative humidity, rainfall and sunshine duration during 26th Feb to 4th March showed a good relationship with the formation and multiplication of the secondary sporidia of Karnal bunt disease. Relationship of weather variables with Karnal bunt development in wheat and effect on yield and its attributes have also been worked out for Mustard.

Agronomy

In rice, infestation of *Sphenoclea zeylenica*, *Fimbristyllis miliacea*, *Scirpus tuberosus* and *Ammania baccifera* is increasing every year whereas sugarcane was infested with climbers like *Ipomea hyderacea*. In cotton and guar, *Trianthema portulacastrum*, *Dactyloctenium aegypticum*, *Echinochloa colona*, *Digera arvensis* and *Cyperus rotundus* were the most dominant weeds. Infestation of *Orobanche aegyptiaca* in raya is increasing in South West Haryana and no chemical control was found effective against it. Efficacy of various herbicides on weed management in various crops vis-à-vis effect of their residues on the preceding crops was studied.

The spacing was found to have significant effect on yield potential of cotton.

In long-term tillage trial in rice-wheat system, water requirement and density of broadleaf weeds was more in ZT-ZT (zero tillage) than CT-CT (conventional tillage) methods. Soil microbial biomass, dehydrogenase and phosphatase activities were more in ZT-ZT as compared to CT-CT. These developments showed a positive impact on soil biology.

In drought management, harvesting of every third row for fodder at 30 days after sowing and furrow making in the vacant space resulted in significantly higher pearl millet equivalent yield compared to normal practice of sowing at 45 cm row spacing.

Advance application (on withdrawal of monsoon) of 100% recommended dose of fertilizer (RDF) and seed inoculation with biomix had significant influence on seed yield of chickpea (765 kg/ha) over advance application of nutrients (50% or 75% RDF) in association with organics or bio-fertilizer or combination of both (407-592 kg/ha).

Maximum sugarcane germination (50%) in pit method was obtained by placing the setts in pits followed by light irrigation and covering with 3-4 inch loose dry soil after water disappearance. Also, germination was increased by 10-13% by soaking the setts in saturated lime water. Different pre-planting tillage technique (zero tillage, conventional, rotavator once, rotavator twice and two harrowing) were at par but significant reduction in cane yield with increase in spacing beyond 90 cm was observed. Intercropping of musk melon, long melon, wax gourd, bitter melon, round melon and tomato in sugarcane plant as well as in ratoon crop reduced the cane yield by more than 10% but intercropping of cucumber, cluster bean, cowpea and lady finger did not affect adversely the cane yield.

Grain yield of chickpea decreased by 8, 23 and 37 per cent per week with the delay in sowing beyond November 25. HC 1 gave highest grain yield in these conditions and produced 17, 7 and 12 per cent higher grain yield over HC 3, HC 5 and PBG 1, respectively. Planting of chickpea on raised bed of 1.35 m with 4 rows or 67.5 cm with 2 rows is feasible. Seed priming produced 105 kg/ha higher grain yield of chickpea. Spray of 2% urea at flower initiation and another after 10 days produced 25% higher grain yield as compared to water spray. Application of 30 kg S/ha along with recommended dose of fertilizer produced 8% higher grain yield.

Agro-Forestry

Intercropping of *kharif* crops for fodder and *dhaincha* (green manuring) was not found economical after two years of poplar plantation due to severe reduction in yield but cultivation of wheat and barley was economical. *Rabi* crops of wheat, barley, lentil and berseem were found uneconomical after 3 years of eucalypts plantation (6m x 2m) as yields were very low due to severe competition for moisture and light.

Local genotype of jojoba was found more adaptable to saline and arid conditions in comparison to genotypes from Israel.

Pseudomonas maltophylla raised in vermin-compost was found effective against damping off disease in *Dalbergia sissoo*. Bavistin and Mancozeb exhibited effective control of damping off disease in agro-forestry nurseries.

Waterlogged soils (20 acres) are being improved by growing tree species viz., *Melia azedarach*, Eucalyptus C-10, *Terminalia arjuna*, *Pongamia pinnata*, *Syzygium cumini*, *Tamarix dioica*, Eucalyptus-Hybrid, Poplar L-70, *Dendocalamus strictus*.

A Poplar strain HS-8 was found best with 82% survival and 65.9 cm girth at 8 years of age.

Entomology

Due to long dry spells in *kharif* 2006, population of leafhopper (<0.9 nymphs/leaf) and whitefly (<3.0 adults/leaf) on cotton remained below economic threshold (ET) and spotted bollworms (*Earias* spp.) caused major damage to cotton. Mean bollworms incidence in green fruiting bodies was 13.3 and 13.9 per cent during 3rd week of August and 2nd week of September, respectively. Population of *H. armigera* remained below ET with pink bollworm incidence being prominent in 33% of the fields.

In chickpea, pod damage was 10.7, 9.5, 10.4 and 10.2 per cent in HaNPV alone (250 LE), HaNPV followed by endosulfan (0.07%), HaNPV followed by *B.t.* (1 kg/ha) and endosulfan alone treated plots as compared to 16% in control. Based on survey, press notes on future population trends of different insect-pests and their management practices to be adopted were issued from time to time.

IPM module (*Trichogramma* + Neem + Bt + Insecticide) decreased (32%) the fruit borer (*H. armigera*) damage in tomato fruits as against 67% in untreated but was not better than the insecticidal spray schedule. In onion, garlic oil 0.1% was equally effective as synthetic insecticides against onion thrips but the costs were much higher than synthetic insecticide spray.

Treatment of chickpea seed with groundnut oil @ 3.75 ml/kg seed + turmeric powder @ 1.75 g/kg, mustard oil @ 3.75 ml/kg + turmeric powder @ 1.75 ml/kg, neem oil @ 10 ml/kg and 7 cm sand and dung cake ash covering on chickpea proved effective in protecting chickpea from pulse beetle, *Callosobruchus* spp. for a storage period of 240 days. Three exposures on solar bed on

sunny days for 15-30 minutes, first before storage and thereafter at regular intervals of 60 days, proved effective for storing it insect free for 180 days.

Seed treatment with vitavax, confidor and foliar sprays (one each) of Tilt 25EC @ 0.1%, and confidor @ 20 g a.i./ha was found best for integrated pest management in barley.

Cocoons of *Epiricania melanoleuca* and egg masses of egg parasitoid of *P. perpusilla* were produced/collected and supplied to farmers for their release in 7635 acres of sugarcane, sorghum and rice. Simultaneously, egg parasitoids *Trichogramma chilonis* and *T. japonicum* were also produced and supplied to farmers of Haryana for their inundative releases in 15445 and 13425 acres of borer infested fields. In chickpea fields, four parasitoids, *Campoletis chloridae*, *Apanteles*, Tachnid fly and an unidentified species, were found parasitizing pod borer larvae in chickpea crop.

Residues of fipronil in rice grain were below the MRL value ($0.04 \mu\text{gg}^{-1}$), at recommended X as well as at 2X but its residues in straw exceeded the MRL ($0.10 \mu\text{gg}^{-1}$) at 2X dose. At harvest, average residues of thiodicarb in cotton seed oil exceeded the MRL value of $0.02 \mu\text{gg}^{-1}$ at 2X dose only. Application of ethion at higher dose (12 ml/kg seed) is not safe. No residues of Clodinafop Propargyl applied as a post emergent herbicide, i.e. 35 days after sowing of wheat @ 45, 60 and 75 g a.i./ha were detected in any grain, straw and soil sample.

Extension Education

Majority of the Extension functionaries recommended 2 to 3 buffaloes/cows, 5-10 sheep/goats, 16-32 layers and 9-18 honey bee boxes for farmers having less than 5 acres land holding for effective management. Farmers with 5 to 15 acres land holding should have 10-15 buffaloes/cows, 10-20 sheep/goats, 63-106 layers and 41-57 honey bee boxes.

Horticulture

Budding of aonla in 4th week of July gave highest success rate of 80 and 72 per cent in Chakaiya and NA-7 cultivars, respectively and decreased consistently thereafter. With advancement of days from 4th week of July to 4th week of September most (50 %) of the buds remained green and did not sprout when done in September. Chakaiya showed relatively higher success rate of budding in 2nd week of July to 4th week of August. At Bawal, varieties NA-10 and Kanchan gave the maximum yield (80.2 kg/tree). Application of atrazine (pre-emergence) + glyphosate (post-emergence) gave 85% weed control and highest yield over the control. Survey of aonla orchards revealed mite (60%) and rust (40%) as the main pest and disease and NA-7 was the preferred cultivar by its pest as well as diseases.

In zero energy chambers, CIPC @ 2 g/kg was most effective to check sprouting of potato cv. Kufri Bahar. For pea grains storage, LDPE 100 and 200 gauges were effective in reducing PLW. Kinnow fruits packed in cling films were at par with polythene packing for PLW and fruit quality.

In ber, higher yields were obtained when 50% of the nutrients were applied through chemical fertilizers and rest through bio-fertilizers and FYM. Maximum plant height (3.1 m) and yield (75.2 kg/tree) were recorded in cv. Kaithli budded on *rotundifolia* root stock but girth of stock and scion were maximum in cv. Gola. The powdery mildew disease of ber appeared late, i.e. during 3rd week of December on Kaithli and Gola cultivars, though it was suppressed by heavy dew.

Nematology

Cereal cyst nematode, *Heterodera avenae*, was recorded in 16% samples collected from wheat and barley fields in Hisar, Sirsa and Fatehabad districts. *Pratylenchus thornei*, *T. mashhoodi*, *Helicotylenchus dihystra*, *Hoplolaimus indicus* were predominant nematode species in sugarcane

rhizosphere in Panipat, Karnal and Yamuna Nagar districts. Samples from the rhizosphere of cluster bean were found infested (29%) with pigeon pea cyst nematode.

Cereal Cyst Nematode was widespread in Hisar-I (Adampur, Agroha), Hisar-II (Bhattukalan), Fatehabad and Sirsa (Nathusari Chopta, and Odhan). *Tylenchorhynchus goffarti*, *T. mashhoodi*, *Ditylenchus myceliophagus*, *D. robustus* and *Aphelenchoides* sp. were the most commonly associated ectoparasitic nematodes with wheat and barley.

Trifolium alexandrinum, *Anagallis arvensis*, *Trianthema portulacastrum* and *Phalaris minor* were recorded as hosts of *M. graminicola* under field conditions.

In rice, nursery treatment with carbofuran @ 0.3 g a.i./m² followed by its field application @ 1 kg a.i./ha 40 days after transplanting managed *H. oryzae* infestation and yielded significantly higher as compared to control. Seed treatment with carbosulfan @ 3.0% (w/w) + soil application of carbofuran @ 1.0 kg a.i./ha reduced the root knot nematode infestation and improved the yield in a root-knot infested field.

Strains 35-47, Co 99-70 and 761-31 of *Gluconacetobacter diazotrophicus* and HT-54 and AVK-42 of *Azotobacter chroococcum* were effective in reducing root knot nematode infestation and improving plant growth parameters in tomato nursery. *G. diazotrophicus* strains Co 99-70, HT-54, *A. chroococcum* strains 35-47 and 103 gave similar results in smooth gourd.

Plant Pathology

GM cotton was found completely resistant to CLCuV under artificial inoculation with virus charged whiteflies. Soil treatment with *Trichoderma* spp. @ 5 g/kg soil proved superior (10-15%) than seed treatment (5 g/kg seed) for the control of root rot in green house.

Surveys during 2006-07 crop season revealed an increased incidence of Flag smut disease (traces to 40%) in wheat growing districts (Rohtak, Jhajjar, Sonapat, Jind, Mohindergarh, Kaithal, Panipat, Karnal and Hisar) particularly in varieties PBW 343, WH 542, PBW 502, WH 147, C 306 and UP 2338. Loose smut severity (< 1%) was also observed throughout the State. Other diseases like yellow rust, leaf rust, powdery mildew and leaf blight appeared late in the season with low to moderate severity.

Application of antagonists @ 5 g/l of water and MPG (10%) improved the growth of tomato plant and checked root rot in the field. Disease control with *Trichoderma* species and MPG was between 6 to 15 per cent. Integration of *T. harzianum* 5 g/kg soil with neem cake at 250 g/m² soil resulted up to 68% control of tomato damping-off in nursery beds. Tomato lines M-121, MK-1, Sel-21 and Cherry yellow and red (Indeterminate type) were identified to be resistant to early blight. Dipping tomato seedlings roots in salicylic acid (200 µM) before transplanting followed by spray of SA (200 µM) and two subsequent sprays of mancozeb (0.2%) at 15 days interval were effective in control of early blight.

Soil Science

Using geomorphic map and satellite data, physiographic map of Faridabad district was prepared and sixteen soil series were identified. Physiographic map of Kaithal district has been updated and identified eight soil series. One hundred and ten soil series identified and 279 pedons studied in Haryana were compiled for ready reference.

Spectral data, meteorological data and empirical models were used to predict the pre-harvest yield of wheat, mustard and cotton. Estimates on area and production were issued much earlier compared to BES estimates using crop cutting experiments. The relative deviation of cotton estimates in Haryana from the BES data was 5.8% for area and 10.5% for production and effects are being to further refine the models by incorporating more variables.

In Panipat district, 19 and 27 per cent soil, plant and grain samples were deficient in Zn and S, whereas deficiency of Fe and Mn was 16 and 17 per cent in district Sonapat only.

Basmati rice can be grown organically by applying 15 t FYM/ha or incorporating *dhaincha* as green manure before transplanting. This technology has been incorporated in Package of Practices for *kharif* crops. Compost from rice straw can be prepared within four months by applying 0.1% urea solution, 0.001% *Aspergillus awamoori*, doing two turnings (after one and two months) and maintaining proper moisture (60-70%). Cooking quality of Taraori basmati rice (HBC-19) was positively correlated to potassium ($r = 0.82^*$) and clay ($r = 0.64^{**}$) contents of the soils but was negatively correlated with Na ($r = 0.70^{**}$), SAR ($r = 0.66^{**}$) and EC ($r = 0.64^{**}$) of irrigation waters. Significant relationship between aroma of Taraori basmati rice with K ($r = 0.74^{**}$) and clay ($r = 0.64^{**}$) content in soils was observed. Microbial counts, rainfall, temperature and evaporation failed to exhibit relationship with any quality traits.

Ready reckoners for fertilizer recommendations of bajra (var.HHB 94) and wheat (var.WH 711) have been included in the Package of Practices for targeted yields. Bajra yield targets of 25 and 30 q/ha were achieved within variations of $\pm 6-7.6\%$ while targets of 45 and 50 q/ha in wheat were obtained with deviations of $\pm 2-5\%$; and 35 & 40 q/ha of barley with deviations of $\pm 3-5\%$ at farmers' fields.

Water productivity in wheat under FIRBS was 23% higher as compared to the conventional method. Water use efficiency (WUE) and total water use in wheat was higher when sown after mungbean (335 kg/ha cm and 102 kg/cm) than sorghum (271 kg/ha cm and 88 kg/cm). Zero tillage in wheat resulted in 21% higher WUE as compared to conventional tillage.

At Karnal, in sugarcane ratoon, application of $\frac{3}{4}$ dose of recommended NP + bio-fertilizers (Azotobacter + PSB + *Trichoderma viride*) or 225 kg +50 kg P_2O_5 as rock phosphate + bio-fertilizers produced equal cane yield and CCS % compared to recommended dose of N and P.

II AGRICULTURE MECHANIZATION AND ENERGY MANAGEMENT

Farm Power Machinery

Feasibility trials and demonstrations of self propelled walk-behind power weeder, tractor operated rotavator under different crop conditions, tractor drawn ridger seeder, automatic/semi-automatic potato planter and potato digger were conducted. Custom hiring of these machines is being done by marginal farmers and unemployed rural youth. They purchased 1226 rotavators, 74 tractor drawn potato diggers, 125 tractor drawn post hole diggers and 1194 straw reapers. The pay back period was one to two seasons.

Soil and Water Engineering

Area of about 1400 ha was identified as waterlogged around villages Raipur (280 ha), Mirjapur (440 ha), Niyana (320 ha), Kharkari (200 ha) and Kahoka (160 ha). Analysis of rainfall, ground

water depth and soil water holding capacity data showed that the surface drainage coefficient in the delineated water logged area in Hisar District was high at 75 mm/day (for sensitive crops) to 36 mm/day (for relative tolerant crop) for return period of 5 years.

Monitoring and evaluation of sub-surface drainage system revealed that on an average, the paddy yield increased by 62.5% after the installation of sub-surface drainage system at the farmers' fields around village Kalayat. Improvement in crop productivity as well as bringing back problem area under cultivation resulted in an additional annual income of Rs. 13200/- ha to the farmers of the area. The project generated an additional annual income of Rs. 7,12,400/- by reclaiming 54 ha area.

Agricultural Processing and Energy

The shelf life of guava fruits increased from 2 (untreated) to 7 days when packed in 125 μ LDPE pouch and to 11 days when fruits were vacuum packed. The PLW was 0.72% when packed in LDPE pouch as against 9.71% when fruits were kept unwrapped. The O₂ level in packed pouch reduced to around 13% while CO₂ level increased to about 10% during 8 days of storage.

III ANIMAL SCIENCES

A total of 23 heifers completed the first lactation and about 26% of these produced more than 2000 kg of milk/lactation.

Sixty-six crossbred male calves out of dams of high genetic potential for milk production were supplied to farmers for the dissemination of superior germplasm.

Beetal and Jakhrana goats produced 1.28 and 1.16 kids per kidding, respectively. Forty one goats were disseminated for breed improvement to the farmers of the state.

Synthetic population of sheep showed marked improvement in wool quality. The average staple length, fibre diameter and medullation per cent were 11.69, 16.33 and 49.61, respectively.

Animal Production Physiology

Significantly higher conception rate in buffaloes with frozen semen thawed at 60°C for 7 sec. in comparison to thawing at 37°C for 30 sec.

Animal Products Technology

Ready-to-serve spice *paneer* was prepared and it can be stored for 15 days at room temperature with acceptable organoleptic quality.

Two new plan schemes "Training Programme for SC Youth in Processing of Milk and Milk Products" and "Training Programme for SC Youth in Processing of Meat, Poultry and their Products" have been approved for inclusion and their implementation is under progress.

Livestock Production Management

Average total lactation yield increased from 2346.9 to 2407.9 kg while lactation length increased from 307.8 to 325.2 days.

Breaking in practices in buffalo heifers helped in increasing the milk yield and lactation length of buffalo heifers.

IV VETERINARY SCIENCES

Epidemiology and Preventive Medicine

Samples from 14 outbreaks suspected for toxic conditions in cattle, buffalo, sheep, samber and peacock were collected and analysed in the laboratory. One outbreak each was found positive for HCN and endosulphan residues in buffalo feed and ruminal content, respectively. Two outbreaks of pesticide induced toxicity were observed in peacocks in Bhiwani. One outbreak of T-2 mycotoxicity was observed at GLF Hisar. A total of 43 out of 79 feed samples were found to contain aflatoxin above permissible limit of 30 ppb. Thirty-five samples were having salt above the permissible limit of 0.6 per cent. No milk sample was found positive when tested for the urea by field spot test.

A total of 411 samples were tested for Brucellosis, out of them 36 samples were found positive whereas of 300 animals tested for T.B., 28 were found doubtful. A total of 19 animals were tested for John's disease and none was found positive for it.

In Poultry, major diseases in about 3000 flocks diagnosed were *E. coli* infections, respiratory disease complex, chronic respiratory disease, coccidiosis, infectious bursal disease and visceral gout. In addition, other diseases like aspergillosis, fowl typhoid, vitamin and mineral deficiencies, Pneumonia, heat stroke, Marek's disease etc. were also diagnosed. Fowl adeno viruses from broiler chicks affected with hydropericardium- inclusion body hepatitis syndrome were characterized by employing molecular biological tools. RFLP pattern and nucleotide sequencing revealed the involvement of other serotypes alongwith FAV-4 and FAV-8 in causation of this disease in Haryana.

Microbiology

Only one FMD outbreak due to FMD virus type 'O' in Haryana was recorded which indicated successful implementation of FMD Control programme. A total of 3048 randomly selected animals (1484, Pre- 1st and 1564, Pre- 4th Phase of vaccination) from different villages in eight districts of Haryana were analysed for anti- 3A NSP antibodies for the identification of carrier animals. The percentage of animals which were found positive for anti-3A NSP antibodies during these two phases: Pre 1st vaccination (before start of FMD CP) and Pre 4th vaccination (after two years of FMD-CP) were 31.9 and 18.4%, respectively. A significant ($P < 0.01$) reduction in anti-NSP antibody profile 2 years after launching FMD-CP also revealed successful implementation of FMD-CP in Haryana. A total of 615 sera sample were processed for monitoring antibody titres against FMD type O, A and Asia-1 through LPB-ELISA.

Pathology

Supplementation of Vitamin E in experimental Hydro pericardium syndrome in broiler chicks resulted in less severe gross and microscopic lesions in liver and lungs and increased cell mediated immune response indicating immunomodulatory role in pathology and pathogenesis of HPS. A total of 86 animals including Sheep (54) and Goats (32) were necropsied. Important conditions included Pneumonia (28), Pneumoenteritis (4), Enteritis (23), Gastroenteritis (7), Abomasitis (2), Pericarditis (1), Jaundice (1), Ascites (1), Hydropericardium (1), Perihepatitis (1) and Septicaemic lesions (1), NAD, (1) Liver ruputre-2, Hepatitis-2. Eleven carcasses were found putrefied. Gross and microscopic alterations in different organs were studied.

Parasitology

A monoclonal antibody based latex agglutination test (LAT) for diagnosis of *Trypanosoma evansi* has been developed for the first time in India. It has several advantages over the presently available other diagnostic tests, e.g. simple to perform, rapid, cost-effective and easily adaptable to the field conditions.

Studies carried out on anthelmintic resistance indicated that ivermectin and closantel can be used as dewormers in Hisar and Sirsa districts where anthelmintic resistance for commonly used drugs (fenbendazole and tetramisole Hcl) is present.

Public Health

Food borne pathogens, *E. coli*, *Salmonella* and *Yersinia*, were found to be present in pig and goat meat samples collected from local market indicating poor hygienic practices in the processing of meat.

V BASIC SCIENCES

Biotechnology and Molecular Biology

A DNA fingerprint database has been developed for 50 rice genotypes representative of the traditional Basmati (TB), cross-bred Basmati, *indica*, *japonica* and wild rice groups using fifty SSR and thirty transposable element (TE) based markers.

Genetic diversity among 31 wheat varieties was studied using RAPD, SSR and ISSR markers and genotypes were grouped in three major clusters. One cluster represented varieties developed with NP series of Indigenous origin (NP4, K68 and HD1949). Second major group clustered salt and drought tolerant and moderately tolerant cultivars (Kharchia, Kharchia 65, C391, C306, KRL1-4 and KRL19). Most of high yielding varieties (PBW343, UP2338 and CPAN3004) and quality wheat varieties (Kundan, Atlas, WH416 or WH146, WH283, etc.) were clustered in third major group. The varieties present in second and third major groups were mainly exotic or exotic x indigenous types.

Insect resistant transgenic lines of chickpea cultivar C-235 have been developed (Patent filed). PCR amplification of genomic DNA of T_0 transgenics gave an amplified product of 360 bp confirming the presence of *Cry1Aa* (3). Seed from T_0 plants were collected and T_1 generation raised this year. Insect larval bioassay was conducted using leaves of these T_1 plants confirming the transgenic nature of the plants

Isolates of *Rhizobium ciceri* were found to improve survival rate of *in vitro* regenerated chickpea plantlets in the soil. Rhizobial isolates producing significant amount of IAA helped plantlets survive the trauma of transplantation thus providing hope for development and establishment of regenerated chickpea plants.

The *Aloe vera* plants were micro-propagated and transferred to greenhouse. One variant of *Aloe vera* has been identified, which showed less thorns, thin cuticle, and more succulent leaves. These plants also showed more number of sprouts in pot conditions. The variant plants and normal regenerated plants (>100 plants) were grown in herbal garden to evaluate them for different parameters. The plants established very well under field conditions with more than 95% success. The data will be recorded in June in these plants.

Botany and Plant Physiology

In chickpea, sodium nitroprusside (nitric oxide donor) was found effective in ameliorating NaCl induced decline in antioxidative defence system.

Food Science Technology

Cheese and toffee prepared by blending *bael* and guava pulp in the ratio of 50:50 were found most acceptable with ascorbic acid content (12.70 and 10.45 mg/100 g) in bael-guava cheese and toffee, respectively.

Jamun RTS (ready-to-serve) drink prepared with 20% pulp, 15% TSS and 0.27% acidity while *Jamun* squash prepared with 35% pulp, 50% TSS and 1.0% acidity were found most acceptable.

Ready-to-use *saag* was prepared after drying of *sarson* leaves + *methi* + *bathu* in the ratio of 3:1:1. Blanched leaves were dried at 60°C in hot air drier. Rehydration ratio was found to be 1:75. Dehydrated *saag* was used for preparation of fresh *saag* and it was highly acceptable.

Guava fruits were packed in LDPE & PP bags of 100 & 150 µ thickness with and without 0.5% perforation and stored at room temperature as well as low temperature. Non-perforated LDPE 150 µ was found to be best with 18 days shelf life at room temperature. A 0.5% level of perforation did not significantly improved the fruits storage life over unpacked fruits.

Wine was prepared from the pulp of *Bael* fruit by fermentation (20-25°C) with a yeast strain isolated from sugarcane juice. The wine contained 8-10% alcohol and had more astringency as compared with wines from guava and grapes. It was moderately liked by untrained panel of judges.

Curry powder was prepared for instant use after drying blended mixture of onion, tomato, ginger and garlic in cabinet drier at 60°C. The dehydration ratio of the powder was found to be 1:5, and can be stored in a polypropylene and aluminized bags at room temperature for three months. The curries and *dal* prepared after using curry powder were highly acceptable.

The ready to use curry concentrate in *ghee* was prepared. The paste can be stored for one month at room temperature and three months at refrigeration temperature. Its quality when stored at refrigerated temperature was better than that at room temperature. Curries and *dals* prepared using paste were acceptable.

Blended flour prepared from cereal and pulses can be stored for three months at room temperature in polypropylene bags.

Paneer slices (120-150 g) were heat treated by microwave with 80 W x 8 min. and 800 W x 2 min. and vacuum packed immediately into PE pouches and PS cps covered with aluminium foil. High dose of microwave improved the shelf life of *paneer* when packed into PE pouches and stored at refrigeration temperature.

Microbiology

A total 1,52,645 liquid biofertilizers (50 ml each) comprising of 33,298 of *Rhizobium*, 36,396 of *Azotobacter* and 82,451 of PSB were produced including 500 cultures of Bioteeka of *Gluconacetobacter*.

Inoculation of *Azotobacter* strain MSX-9 individually as well as with phosphate solubilizing bacteria (PSB) increased seed germination; fruit weight and seed yield of brinjal and bottle gourd.

The use of biofertilizers along with 75% of recommended dose of nitrogen gave seed yield at par with full-recommended dose of nitrogen, thus showing a net saving of about 25% of nitrogen in brinjal and bottle gourd.

Mixed biofertilizer inoculation on different varieties of Mustard under rain fed conditions resulted in 2.6 to 9.0 per cent increase in grain yield at RDF along with mixed biofertilizer over RDF at farmers' fields in Rewari and Jhajjar districts.

Seed treatment with various strains of *Azotobacter* increased the grain yield 1.1 to 1.7 q/ha in pearl millet and 61-194 kg/ha in mustard under dry land conditions. Two strains Mac 27 and Mac 68 performed better than others in terms of grain yield as well as their population in the rhizosphere in both the crops.

Under dry land conditions use of PSB strain P-36 resulted in the increase of yield of guar by 7-8% over control and with different doses of N and P. The population of PSB was maintained to 10^5 after 50 days of sowing. PSB cultures were tested at farmer's field in Raipur, Petwar, Siswal and Bawal and resulted in 4-5 per cent increase in the yield of wheat.

B. EXTENSION EDUCATION

The extension activities of the University are carried out through Farm Advisory Service, Farm Training Service and Farm Information and Communication Service, Directorate of Extension Education. The relevant technologies for different clientele entailing rural development are disseminated through 19 KVKs and ATIC as well as toll free helpline which has been provided at Hisar, Uchani (Karnal) and Bawal (Rewari). The Directorate of Extension Education organized several activities like Technology Demonstrations, Field Days, Film Shows, Kisan Melas, Campaigns, Farm Darshan, Exhibitions, Gosthis etc. Two Agricultural Officers' Workshops for *Rabi* and *Kharif* were organized in which University scientists and field officers interacted and finalized package of practices. Similarly, Animal Husbandry Workshop was also organized in Feb. 2007 to finalize the package of practices for animal husbandry.

A total of 7421 Vocational Trainings were organized in which 3415 males and 2826 females of general category and 506 males and 674 females of SC/ST categories were trained in different fields of importance like Bee Keeping, Mushroom Cultivation, Vermi-Composting, Fruits & Vegetable Preservation, Dairy farming, Tailoring etc. The training programmes were also conducted on Crop Production, Horticulture, Vegetables, Agro-forestry, Animal Sciences, Home Sciences and allied fields. Through all the above training programmes, 61693 persons including 46423 males and 7396 females of general category and 6111 males and 1763 females of SC/ST category were benefited.

Besides, 245 trainings were organized for in-service candidates in different fields of agriculture. In these trainings, 5914 males and 1085 females of general category and 592 males and 369 females of SC/ST category were trained.

A total of 145 trainings in the areas of Agricultural Marketing, Production Economics, Entrepreneurial Development, Agricultural Financing and Agreement of Agriculture were organized which benefited 4020 farmers.

For women empowerment, 52 trainings in the areas like clean milk production, fruits and vegetable preservation, hygienic food & processing and food safety, safe drinking water, value addition, safe storage of grains, rural craft household kitchen security, gender mainstream through

SHGS etc. were organized. Similarly, 23 vocational trainings for rural women were also organized. A total of 493 off-campus trainings for 8439 women including 1513 SC/ST were organized.

Sixty courses for extension personnel, 152 courses for rural youth were organized to enrich their knowledge and motivate them for self-employment.

The Soil & Water Testing Laboratories at Hisar, Rohtak, Karnal and Bawal analyzed 7241 soil and 3081 water samples to help the farmers for better crop cultivation.

Haryana Rural Antique Museum in Gandhi Bhawan attracted 1154 students, faculty members and other visitors.

C. TEACHING

I. Post-graduate Programme

During 2006-07, a total of 583 students were on rolls. A total of 199 students completed their Masters' programmes and 66 scholars completed their Ph.D. programmes. 466 post-graduate students received fellowships out of which 139 were from agencies like ICAR, CSIR, UGC, etc.

II. Under-graduate Programme

College of Agriculture, Hisar

The College of Agriculture, Hisar offers courses at Under-graduate, Masters' and Doctoral level through fourteen departments. During the period under report, a total of 115 students completed their degrees, of which 92 were M.Sc. students and 23 were Ph.D. scholars. One hundred and twenty-two new admissions were made; one hundred and seven of which were in M.Sc. and fifteen were in Ph.D. A total of one hundred and eighty-three M.Sc. students and fifty-eight Ph.D. scholars are on rolls. The students brought laurels to the College by winning such prestigious awards as CSIR Junior Research Fellowship and **Jawaharlal Nehru Award for best Ph.D. thesis in the country**. Two students passed NET examination, three won SRF and two students succeeded in bagging JRF.

College of Agricultural Engineering & Technology

The college makes admissions to the B.Tech. (Agril. Engg.) on the basis of AIEEE score of the students. During 2006-07, forty nine students were admitted. In addition to the teaching of regular courses in Basic Engineering, Farm Power & Machinery, Soil & Water Engineering and Agricultural Processing & Energy, the College conducted two training programmes, viz. Vocational training on repair and maintenance of tractors, pumping sets & farm machinery and Counselling and mentoring of students of rural schools to encourage progressive farmers, rural youths and students for higher studies in technical education.

College of Basic Sciences & Humanities

College of Basic Sciences & Humanities imparts teaching at Under-graduate level to the students of all the constituent colleges. In addition, College offered M.Sc. and Ph.D. programmes through its various departments. During 2006-07, sixty-four students completed their degrees, out of which forty-eight were M.Sc. students and sixteen were that of Ph.D. One hundred and twenty-two M.Sc. and fifty-eight Ph.D. scholars were on rolls, thus bringing the total to one hundred and eighty. Out of this, sixty in M.Sc. and thirty-eight in Ph.D. were admitted during 2006-07.

College of Home Science

The College of Home Science offers degree programmes at both Under-graduate and Post-graduate levels. The departments offer M.Sc. and Ph.D. programmes in five disciplines, P.G. Diploma in three disciplines and certificate courses in four disciplines. During the period under report, two hundred and forty one students were on roll out of which one hundred and thirty-three were in B.Sc., forty-five in M.Sc. and nineteen in Ph.D. Twenty-two students were on roll in P.G. Diploma Programmes and the same number got themselves enrolled for certificate courses. During 2006-07 thirteen were Ph.D. scholars, nineteen M.Sc. students and twenty seven B.Sc. students completed their degrees. Nineteen students were awarded P.G. Diplomas and thirty earned certificates. A total of 81 students were admitted to the College of Home Science – twenty-one in Certificate Programmes, thirty-two in P.G. Diploma, twenty-one in M.Sc., seven in Ph.D.

The college observed various days/weeks/events by organizing functions and campaigns, viz. Breast Feeding Week (August 1-7, 2006) and National Nutrition Week (in collaboration with ICDS Sept. 1-7, 2006), Total sanitation campaign at Village Matana of Fatehabad district, International Women's Day (March 8, 2007), World Consumers' Rights Day (Sponsored by S.B.I., Fatehabad) on March 15, 2007 and World Environment Day on June 5, 2007. This drive resulted in sensitizing the students as well as the participants to the importance of the chosen days and events.

College of Animal Sciences

College of Animal Sciences offers M.Sc/M.V.Sc. and Ph.D. programmes in five disciplines of Animal Sciences in addition to teaching courses in all the Colleges at the Under-graduate level. During the year 2006-07, the scientists of the College organized various training programmes on livestock and poultry farming for the farmers, unemployed youth, ex-servicemen and women engaged in agriculture. The scientists also conducted buzz sessions, and answered queries of farmers online.

The scientists of the college also delivered radio and T.V. talks on topics related to animal and poultry health and animal breeding.

College of Veterinary Sciences

The oldest college of the University, this is the first amongst Veterinary Colleges to implement regulations of the Veterinary Council of India for a uniform Under-graduate programme. During the year 2006-07, twenty-two students completed their degrees, out of which twenty were M.V.Sc. students and two were Ph.D. scholars. Forty two students were admitted in M.V.Sc. and one scholar was registered for Ph.D. A total number of seventy-eight students were on roll, out of which three were Ph.D. scholars and the remaining seventy-five were M.Sc. students. The college offers two unique services in the shape of 'Teaching Veterinary Clinical Service Complex' (where 7433 animals of various species were treated; and in Vety. Diagnostic Lab. 2283 samples were tested); and 'Disease Free Small Animal House' which is engaged in raising disease free laboratory animals. The college supplies animals to various departments of the University and to various outside research and teaching institutions which include such prestigious institutions as AIIMS, New Delhi, Banasthali Vidyapeeth, Banasthali, BITS, Pilani etc. Through this activity, an income of Rs. 9,57,450/- was raised.

In TVCSC, medical, surgical and obstetrical/reproductive problems were attended. Health services were provided to ambulatory centres in villages Devan and Harikot where 228 and 304 animals were found affected with skin problems. 1729 animals were diagnosed with various skin ailments which were brought to this Clinic.

College of Agriculture, Kaul

The campus of College of Agriculture, Kaul is spread over an area of 11076 sq. meters. The college offers B.Sc. (Hons.) 4-year degree programme. The college has one hundred and seventy five students on roll.

D. SERVICES

Agricultural Technology Information Centre (ATIC)

The University has "one of its own kind" ATIC which ensures sale of seeds, non-seed items, planting materials, university publications and all other products of the University through a single window. During 2006-07, a sale of Rs. 47.6 lacs was made through ATIC. A unique facility provided by ATIC is the online advice to farming community and also soil and water testing facilities. It has proven to be very helpful for farmers in various ways. Single-window delivery system has been appreciated by farmers. Through this window, the sale of seed of field crops (Rs.13,51,963/-), vegetables (Rs.1,11,250/-) and fruit plant material (Rs. 1,11,250/-) was made. Besides, Aonla and Guava plant material were sold from ATIC nursery to the value of Rs. 3,00,480/-. The sale of non-seed grains (Rs. 1,12,298/-), Bio-fertilizers (Rs. 4,88,310/-), Processed Products (Rs. 1,15,425/-), Publications (Rs. 28,21,529/-) was also done.

Human Resource Management

Established on April 1, 2002, the Directorate of Human Resource Management is comprised of four sections, *i.e.* Academy of Agricultural Research & Education Management; Planning & Evaluation; Manpower Assessment Cell and Intellectual Property Rights.

The Academy of Agricultural Research & Education Management is responsible for designing and organizing training programmes for teachers/scientists and para administrative staff of the University. So far, over 5000 participants have benefited themselves from the various training programmes offered by the Academy. During the period under report, the AAREM conducted 13 training programmes including six for CCSHAU Administrative staff.

The Planning & Evaluation Cell prepared the Annual Plan of the University during the period of report. Manpower Assessment Cell made studies on areas of manpower requirement and resource utilization; and prepared a data bank on the various activities of the University.

Formulation and Implementation of IPR Policy and Regulations

CCS Haryana Agricultural University's research activities are aimed at the creation of new knowledge and innovations, achievement of the University's missions and ascension to state to provide leadership at national and international levels in agriculture.

A Memorandum of Understanding was signed with Michigan State University, USA, for capacity building in Intellectual Property Protection. Consequently an IPR Cell was established at the Directorate of Human Resource Management on March 21, 2006. The IPR Policy and Regulations were approved by the Board of Management in April, 2007 and a copy of the same is available on HAU website www.hau.ernet.in. During the period under report, awareness programmes on PPV&FR, IPR and commercialization of technologies were organized for faculty, field functionaries, students and farmers. Efforts were initiated for collaboration with private sector for research, training and commercialization of technologies generated by the University.

E. HEALTH SERVICES

A 50-bed hospital at Hisar and dispensaries at three outstations, viz. RRS Bawal, RRS Uchani (Karnal) and COA & RRS Kaul provide medical assistance to the University and ICAR employees, their dependants and students. During the period under review, 51042 patients were given treatment in OPD and 1151 patients in casualty. Two hundred patients received indoor treatment.

F. ENGINEERING-CUM-ESTATE ORGANIZATION

The Estate Office undertook renovation, maintenance and repair work of various buildings of the University during the period under report. A total of Rs. 9,21,56,394/- were utilized for carrying out University's Original and Deposit Works, Maintenance and Other Services and Deposit Works for other agencies.

G. STUDENTS' WELFARE & ACTIVITIES

The Directorate of Students' Welfare is responsible for students' welfare and all the co-curricular activities. The Directorate runs twelve hostels at Hisar Campus and two at Kaul. About 1340 students are residing in these hostels at present. An international level synthetic track is a unique facility which gives a fillip to the performance of the sports' persons of the University. The Counselling & Placement Centre succeeded in getting 32 students placed in various firms/companies/banks during the period under review. The members of the Mountaineering Club trekked upto an altitude of 14,500 feet. The students participated in various sports activities and won gold and silver medals in badminton and table tennis. A film club running films for three days a week is also run by the Directorate of Students' Welfare. The Directorate also organized a large number of literary activities, viz. debate/declamation/essay writing competitions during July 2006 – June 2007.

The NCC & NSS activities were also taken care of by the Directorate and eight cadets passed C-certificate examination while 54 passed B-certificate examination. NSS volunteers organized various socially useful and awareness programmes.

H. CAMPUS SCHOOL

Campus School had a strength of 880 students during the period under review. Ninety-eight students appeared for Class X examination and all were successful (Two students scored 100 per cent in Mathematics & Science, respectively). In Class XII out of 27, 26 students passed. In addition to academics the school organized a host of extra-curricular activities in which also the students showed the same excellence. The students of Campus School took part in various sports activities at national level and won laurels too.

I. NEHRU LIBRARY

Nehru Library caters to the informational requirements of the students, teachers, research scholars, extension specialists and other staff of the University at Hisar and other parts of the State of Haryana. It has a seating capacity of 650 and 21 students rooms.

The Library has 1,96,352 books, 95,807 periodicals, 9,879 thesis, 131 CD-Rom (Databases) and 1187 CDs (Books & Thesis).

Readers' Service Division includes Book Bank from where students are entitled to borrow books on nominal charge. Over 6267 library users used the databases during the period under report. Besides, the library has exchange relations with several foreign and Indian Journals Publishers. Latest equipments being used by the library staff for library automation activities and library users to access online databases.

J. FINANCIAL OUTLAY

The revised Budget Estimates for 2006-07 were of Rs. 16,529.81 lacs. The provision of Plan scheme was 800 lacs. The activity-wise spending was : Research (42.64%), Teaching (27.50%), Extension (12.28%) and rest on Administration, Students' Welfare, Building and Maintenance.

K. PROMOTIONS

Under Career Advancement Schemes, 69 Assistant Professors were promoted as Associate Professors or equivalent; 74 Associate Professors/equivalent as Professors/equivalent, four Assistant Professors elevated to Senior Scale and two to Selection Grade. Five Teaching associates were appointed on contract basis and one Clerk (under PH Quota) and one Pharmacist was appointed. One Registrar has also appointed.

In Non-teaching cadre the promotions made were: Deputy Comptroller (1), Superintendent (2), Deputy Superintendent (3), Private Assistant (7), Executive Engineer (1), Sub-Divisional Officers (4) and G.O.-cum-Daftri (6). Besides 7 appointments were made under Ex-gratia Scheme.

2. Research

Development of users' friendly (farmers & industry) technologies is one of the very important mandates of this University. About 42% budget of the University is utilized to carry out various research pursuits to meet the agricultural needs of various agro-climatic regions of the State. Following achievements were made during 2006-07.

2.1 PLANT SCIENCES

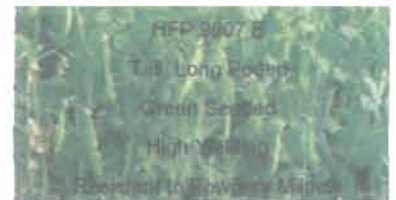
2.1.1 CROP IMPROVEMENT

Varieties Released/Notified :

1. **Guar :**
HG 884 Average yield is 22 q/ha; early to medium in maturity (95 to 105 days); tolerant to bacterial and *alternaria* blights and root-rot. Yields 23-28% high gum over RGC 986 and GG 1, respectively. Galactomannan yield is 3.61 q/ha against 2.67 and 2.97 in GG-1 and RGC 986, respectively.
2. **Pearlmillet :**
HHB 197 Medium tall, dark green leaves; released for Rajasthan, Gujarat, Punjab, New Delhi, U.P. and M.P. High grain (50 q/ha) and fodder yield potential (110 q/ha); average yield is 29.8 q/ha against national checks Pusa-23 (22.8 q) & GHB 558 (28.5 q). Medium to early in maturity (68-72 days). Togo earheads with long bristles on ear heads reduce (8-10%) loss by bird damage. Highly resistant to downy mildew; only hybrid tolerant to smut and ergot diseases, performs well under both, rainfed as well as irrigated conditions.
3. **Maize :**
HQPM-5 Nutritionally superior high yielding quality protein, single cross hybrid, round and yellow grains, identified for release across the country, resistant to maydis leaf blight, common rust, bended leaf and sheath blight and post flowering stock rot. Tolerant to frost/cold; maturity in 95-100 days; yield 55-60 q/ha (summer) and 70-75 q/ha (winter).
4. **Maize :**
HM-8 Medium maturing single cross hybrid, attractive orange and flint grain, identified for release for AP, Karnataka, Tamil Nadu and Maharashtra; resistant to Turcicum leaf blight, Sorghum downy mildew and Post flowering stock rot; tolerant to frost/cold; Maturity in 90-95 days, Yields 60-65 q/ha during summer and 75-85 q/ha during winter.



- 5. Maize :** Medium maturing single cross hybrid; bold, attractive orange and flint grains, identified for release for Eastern UP, Bihar, West Bengal, Orissa, Jharkhand, Chhatisgarh and Madhya Pradesh, resistant to maydis leaf blight and common rust; tolerant to frost/cold, maturity in 85-90 days, yields 55-60 q/ha during summer and 70-75 q/ha during winter.
- HM-9**
- 6. Field pea :** Matures in about 128 days; average yield is 21q/ha; resistant to powdery mildew, root-rot and tolerant to rust, suitable for irrigated areas with seed rate 80 to 90 kg/ha. Long pods (6.5 seeds/pod) and light green medium bold seed (18.2 g/100 seeds); tall, spreading, white flowered and broad light green leaves and large stipules.
- Hariyal**
- 7. Mungbean :** Identified for Punjab, Haryana, Rajasthan, U.P. and Delhi. Light green, shining medium small seeds and long straight pods; stable resistance against powdery mildew; resistant to yellow mosaic virus, anthracnose web and mosaic blight and tolerant to Cercospora Leaf Spot and Leaf Crinkle, resistant to nematode *M. incognita*, better in nutritional quality including protein.
- Sattya**
- 8. Wheat :** Identified for North-West Plain Zone, suitable for late sown, high fertility and irrigated conditions; heat & salinity tolerant; genetic diversity and highly resistant to Yellow and Brown rust and Flag smut; marginally superior (4%) in yield over PBW 373, UP 2425 and Raj 3765, Protein content 12.21% compared to 11.85% in PBW 373, superior in other quality parameters.
- WH 1021**
- 9. Rice :** Rice Hybrid "Haryana Sankar Dhan-1" of medium duration has been released and notified for Haryana. Now identified for commercial cultivation in North-West Zone in mid-late group.
- Haryana Sankar Dhan-1**
- 10. Sugarcane :** The key features of this variety suits the sugar industry. It is mid early maturing, suitable for normal and late planting, average cane yield is 74 t/ha, resistant to red rot disease, recommended for Haryana and North-West Zone of India.
- CoH 119**



HFP 9907 B(Hariyal) has recently been identified for NWFPZ



- 11. Okra :** Resistant to Yellow Vein Mosaic Virus disease; released and notified for Zone-IV (Delhi, Haryana, Gujarat & Rajasthan) and VIII (Karnataka, Kerala, Tamil Nadu) by Central Variety Release Committee. Resulted in 18.8% higher fruit yields (120 q/ha) than national check Prabhani Kranti.



- 12. Coriander :** Recommended for release by AICRP on Spices for Haryana, Bihar and Chhatisgarh states. Leaf yield is 192.8 q/ha. Produced 41 and 72 per cent higher leaf yield than check Pant Haritima under normal and off season (March sown), respectively.



Registration of Genetic Stock

Wheat germplasm DI 717 registered as semi-dwarf isogenic line with Rht-3 gene conferring lodging resistance registered with National Identity # INGR No. 06008 and IC 546939, respectively.

Breeding Material Developed

Bajra

- HHB 199 and HHB 205 completed three years of testing at National level and their proposal for identification for release at National level is under process. Total 423 hybrids were evaluated in 11 different station trials and 9 hybrids were selected for evaluation in National Trials.
- Four hybrids, ICMA 94222 x ICMV 155/5-3, ICMA 94222 x ICMV 155/5-7, ICMA 94222 x ICMV 155/5-9 and HMS 36A x ICMV 155/5-6 showed promise for yield and other agronomic traits and qualified for evaluation in multi-location trials for yield and quality traits.
- At Bawal, strain MH-1248 produced maximum seed yield (16.1q/ha). Under rainfed conditions, promising hybrids were IHT-320 (45.9 q), 7A x HTP-94/54 (45.6 q), ICMA 03666 x H 77/833-2 (43.8 q), 97111A x H 77/371 (42.2 q), 16A x H 77/371 (41.3 q), AHT-510 (40.8 q) IHT 218 (40.7 q), AHT-414 (40.6 q) and 95222A x HBL 11 (40.6 q/ha). Promising populations were HMP-210 (34.8 q), ICMV-91450 (34.2 q), FYT-Bulk (32.1 q), APT-707 (28.6 q) and IPT-610 (28.3 q/ha).

Barley

- In station trials at Hisar and Bawal, genotypes BH 05-59, BH 855, BH 05-20, BH 05-2, BH 885 and BH 05-25 out yielded the best check BH 393 by 5.4 to 18.0 per cent. At Bawal, entry RD-2683 (30.1 q/ha) in AVT (FB); NDB-1410 (25.5 q/ha) in IVT (RF); K-857 (27.0 q/ha), RD-2737 (26.9 q/ha) and BH-894 (26.7 q/ha) in SST (sodicity); and PL-751 (34.5 q/ha) in AVT (dual purpose) out yielded the checks RD-2035 (26.9 q/ha), K-603 (23.6 q/ha), NDB-1173 (23.4 q/ha) and RD-2552 (29.8 q/ha), respectively.

Cotton

- Hirsutum cotton variety H 1226 was released for cultivation in Haryana and proposal of genotype H 1250, due to its superior performance was submitted for release in south zone. Genotype H 1300 has been promoted for testing in zonal trial. Hybrid HHH 433 promoted to Advanced Coordinated Trial (ACT) in north zone along with hybrid HHH 386 having better yield potential, being recommended for agronomical trials in this zone. Early maturing desi cotton genotypes, HD 458 and HD 432 had low kapas shedding and seed cotton yield at par with check whereas genotype HD 451 had more than 45% ginning out turn.
- Hybrids, AAH 20, AAH 26 and AAH 28 have been promoted in AVT in north and south zones.
- New promising hybrid HHH-270 gave 11% higher seed cotton yield over hybrid CSHH-243.

Forages

- Single cut forage sorghum variety HJ 513 was released by Haryana State Varietal Release Sub Committee and its notification proposal submitted to Central Varietal Release Committee. Hybrid HH 273 ranked first in Coordinated Advance Multicut Forage Sorghum Trial and hybrid HH 293 was promoted from Initial to Advanced Forage Sorghum Trial. Best sorghum genotypes were UTMC 1302 with 27 ppm HCN and SSG GK 909, HH 273 for 26.7, 24.6 q/ha (protein yield) and 147.9, 125.3 q/ha digestible dry matter yield. Variety S 541 yielded significantly higher green as well as dry matter yield 381.5 and 116.0 q/ha over S 540 and UTFS 45.
- Guar genotype HVG 2-30 (vegetable type) was identified by University Variety Identification Committee for testing at farmers' fields. Genotype HG 02-20 has been proposed for identification. Moth genotype HM 61 for grain has been proposed for identification in next meeting of AICRP on Arid Legumes.

Maize

- High yielding and quality protein maize hybrids HQPM 3, HQPM 4, HQPM 5, HQPM 6 and HQPM 7 performed better in AVTs. Hybrids HKH 1188 and HKH 1200 received best ranking in AICRP trials. Quality Protein Maize hybrids HQPM 4 (42.2 q/ha) and HQPM 7 (44.7 q/ha) gave higher yield over check HQPM 1 (31.9 q/ha).
- The best cross-combinations identified were 1040-7 x 1126 (Yellow) and C-448 x C-1378 (White).

Medicinal, Aromatic and Under-utilized Plants

- In mutation breeding of **Mulhatti**, highest plant height of 110 cm was recorded in 4 kr treatment against HM-1 (65 cm).
- Highest seed yield/plant of **Isabgol** genotypes was recorded in the order : RI 49 (8.96 g) > RI 149 (8.82 g) > RI 87 (7.98 g) > RI 99 (7.83 g) > RI 9808 > HI 8 (7.12 g) > HI 6 (6.88 g) against the best check HI 5 (5.86g).
- Kalmegh** genotype HAP-2 recorded the highest dry herb yield (6231 kg/ha), followed by IC-111288 (5673 kg/ha), HAP-7 (5584 kg/ha), IC-111290 (5491 kg/ha) and HAP-6 (5120 kg/ha).
- In **Guarpatha**, genotype HAV-05-7 recorded the highest fresh leaf yield/plant (2.23 kg) compared to local HAV-1 (2.13 kg). Mucilage content varied from 60.1 to 87.5 per cent on wet basis and was controlled by the maturity of the leaf.

- e) **Safed Musli** genotype CBI-7 recorded the highest fresh root yield/plant (80.7 g), followed by HCB-6 (69.0 g) and HCB-4 (68.3 g), against the check MCB-405 (47.7 g).
- f) **Ashwagandha** genotype HWS-04-5 recorded the highest dry root yield/plant (247.5 g), followed by HWS-04-2 (141.0 g), Hisar Local (131.0 g) as against check, JA-20 (21.0 g). Total alkaloids content in root samples collected from Hisar, Bhiwani and Gurgaon districts varied from 0.47 to 0.63 per cent. Moisture content varied from 8.37 to 9.14 per cent, while crude fibre content from 25.3 to 26.5 per cent.
- g) **Lemongrass** variety CKP-25 recorded the highest oil content (0.92% on fresh weight basis), followed by HL-11 (0.64%). Genotype OD-388 recorded the highest citral content (83.7%) followed by NLG-118 (82.7%) and HL-3 (80.1%).
- h) **Palmarosa** clones RH-03-35 (59.4), RH-03-62-1 (141.5), RH-03-12 (137.8) and RH-03-31 (133.8 L/ha) recorded higher oil yield and quality. Oil content varied from 0.22 to 0.54 and 0.28 to 0.56% in 2nd and 3rd cuttings, respectively, in 16 colonel selections. Clones RH-03-13, RH-03-31, RH-03-35, RH-03-62 and RH-03-62-1 had high geraniol content (>80%) in both cuts.
- i) High seed yielding **Fababean** genotypes in different trials were : HB-430, HB-418, HB-303, HB-416, HB-180, HB-516, ST-51, ST-40, PRT-15 and PRT-32 over check (Vikrant).
- j) In grain **amaranth**, high seed yielding genotypes over check (GA-1 & GA-2) in different trials were : BGA-15, BGA-10 SKNA-21, RMA-7, BGA-1, BGA-5 and IC-423448. High protein genotypes were: LPKB-504-55 (14.2), VL 0344 (14.1) and PRA-2 (13.8%); while genotypes with high lysine content were : PRA 2005-1 (5.5), PRA-2005-2 (5.3) and PRA-3 (5.1%).
- k) High seed yielding ricebean genotypes in different trials were : LRB-334, LRB-107, LRB-309 ST-10, ST-14, ST-12, Selection-1, Selection-2, LRB-461 and LRB-438 over check (RBL-6). High protein content genotypes were: LRB-330 (21.3), LRB-303 (21.2), RBL-1 (20.9), RBL-1 (21.8), LRB-463 (21.7) and LRB-023 (21.5%); while genotypes with high methionine content (crude protein basis) were: PRR-2 (0.98), LRB-234 (0.93), RBL-1 (0.92), RB-3-016 (0.98), LRB-005 (0.97) and Totru (Local) (0.94%).

Oilseeds

Groundnut

Ninety-nine germplasm accessions were evaluated and lines HNG-1, HNG-22 and HNG-32 showed promise both for pod yield as well as quality. Strain HNG-22 gave highest pod yield (21.2 q/ha) in Large Scale Trial (LSTs).

Sesame

In Large Scale Trials, strain HT 9316 recorded the highest seed yield of 13.6 q/ha while in Small Scale Trials (SSTs), strain HT 2000 (11.0 q/ha) was highest yielder and contained highest (53%) oil content.

Rapeseed-Mustard

- a) Germplasm accessions (460) of rapeseed-mustard were maintained as per their mating system. The population TH 0503 and TH 0505 of toria and genotypes RH 0120, RH 0432, RH 0209 and RH 0501 of early raya were significantly superior than the respective best check.

- b) Genotype YSG 0401 of yellow sarson, RH 0209, RH 0120, RH 0210, RH 0505, RH 0446, RH 0345 and RH 0402 of Indian mustard, HC 0214 and HC 0211 of Karan Rai and HNS 0301 and HNS 0004 of Gobhi sarson were found promising.
- c) Thirty early generation hybrids have been developed and evaluated to identify commercial hybrid. Raya genotypes RH (OE) 0206, QM 06-1, QM 06-3 possessed low erucic acid. Gobhi sarson genotypes NCN 06-07 and NCN 06-08 possessed low erucic and glucosinolate.

Pulses

- a) **Pigeonpea** genotype HDM 04-1 was included in National Crossing Program as an extra early parent as well as in National Insect Screening Nurseries (NISN) against pod borer & pod fly and National Nematodes Screening Nurseries (NNSN) against *Meloidogyne javanica*.
- b) Seven **mothbean** genotypes, viz. GMO-01-02, RMO-435, MH-164, RMB-100, GMO-01-04, GMO-002 and Mb-2 with protein content ranging from 24.3 to 27.6 per cent were identified as high protein genotypes (as compared to 4 checks, viz. Jawala, Jadia, RMO-225 and RMO-40) which had protein content between 21.5 to 23.5 per cent. These high protein genotypes may be used in breeding programmes for developing high protein mothbean varieties.
- c) In **Mungbean**, MH1K-25 (Basanti) having high protein (26.7%) and resistant to YMV, root rot and anthracnose and MH1K-24 (Bharpai) has been identified for Haryana and under testing at farmers' fields. Also, MH 3-18 with Identification No. NBPGR 546945 (National Bureau of Plant Genetic Resources) been conserved as valuable germplasm. MH 418 and MH 429 have also been promoted to AVT 1 in more than two zones. MH 419 (summer, Central zone) and MH 421 (summer, North West plain zone), taking <60 days to mature, have been promoted to AVT-1 summer.
- d) **Chickpea varieties** H03-45 (desi) and H03-113 (Kabuli) rated as resistant to multiple diseases (*Fusarium* wilt & dry root rot) were the only genotypes promoted for AVT for North West Plain Zone. H03-113 (Kabuli) and H02-113 (bold seeded desi) has been promoted for AVT for North Eastern Plain Zone and Central Zone, respectively.
- e) At Bawal, the promising chickpea entries were H 04-18 (22.0 q/ha) and C-513 (17.7 q/ha). Genotypes H 03-56, H 04-11, H 04-31, H 04-44 and H 04-45 are thermo-insensitive and showed tolerance to heat stress. Genotype H 04-31 maintained overall stability against heat stress under both, normal and late sown conditions.

Rice

In medium duration (136-150 days), genotypes HKR 02-94 (83.5 q/ha) and HKR 95-222 (83.9 q/ha) yielded higher than HKR 126 (79.0 q/ha).

- a) In early duration (100-120 days), genotypes HKR 03-52 (65.1 q/ha), HKR 02-45 (63.8 q/ha) and a bacterial blight resistance genotype, HKR 99-60 (69.0 q/ha) yielded significantly higher than Govind (57.5 q/ha).
- b) Rice hybrid HKRH-1083 (IET 18825) of mid-early duration and resistant to leaf blast and moderately resistant to rice tungro disease was found promising in Madhya Pradesh, Uttarakhand, Tripura and Maharashtra. Another rice hybrid HKRH-1094 (IET 18136) of mid-early duration (for Haryana in early group) was found promising in Haryana and Tripura.

- c) In **scented group**, HKR-04-489 (51.0 q/ha), Pusa Sugandha-4 (48.3 q/ha), HKR 93-401 (45.0 q/ha), HKR 03-428 (41.7 q/ha) yielded significantly higher than Pusa Basmati No. 1 (38.4 q/ha), possessed blast resistance and had similar grain quality as that of Taraori Basmati (30.3 q/ha). However, two more strains HKR 03-408 (IET 19441) and HKR 02-486 (IET 18981) performed well in coordinated trials.

Wheat

- a) A promising newly developed genotype WH 1025 (29.6 q/ha) was identified for cultivation under rain fed conditions on the basis of its consistent superiority (12%) over check C306 (26.3 q/ha).
- b) A newly developed late heat tolerant genotype WH 1022 (41.0 q/ha) was evaluated under farmers' fields, promoted to the final year of testing in the North Eastern Plain Zone under late sown conditions and under process of identification for cultivation under late sown conditions on the basis of its consistent superiority over check PBW 373 (37.9 q/ha). This genotype is likely to be identified for release at national level under late sown conditions.
- c) Genotype WH 1046 was promoted to the AVT for testing in North Eastern Plain Zone under late sown conditions on the basis of its superiority over the check PBW 373.

Vegetable Crops

The proposal of **onion** variety HOS-3 (**National Identity Number IC-545627** by NBPGR, New Delhi) has been submitted to this committee for release and notification.

Promising Genotypes

The promising lines of **Ajwain** were HAJ-12, HAJ-18 and HAJ-30.

The **garlic** variety HG-17 performed better than others and local for second year and also at farmer's fields.

- a) **Bottle gourd** hybrids HBGH-20 and hybrids HBGH-35 and HKH-56, HKH-58 and HKH-96 of bitter gourd were promising.
- b) **Tomato hybrid** HTH-2-2 performed (531.3 q/ha) better than National check hybrid ARTH-3 (439.4 q/ha). TLCV resistant lines H78-T3 and HT3-1 performed better for resistance and yield when sown on first September. Tomato hybrids Sel-21 x VFN-8 and Sel-21 x Hisar N-2 with attractive fruits and resistance to RKN were found high yielding. Tomato hybrids (using functional male sterility) FMS x FEB-4 and FMS x Floradade were found promising for fruit yield.
- c) Advance **pea** lines HVP 03-08, HVP03-14 and HVP 03-05 (edible pod) under large scale trial (LST) and HVP04-67 under small scale trial (SST) found promising in comparison to check Azad.
- d) Hybrid J/93-86 of **potato** was found superior with regard to yield in 'On Farm Trial' conducted at three locations. Hybrid J/95-242 produced 34% higher tuber yield (300 q/ha) than check Kufri Pukhraj at 75 days harvest.
- e) For ecofriendly management of black scurf and common scab of potato, seed tubers treatment with *boric acid+Bacillus subtilis* produced significantly lowest number of tubers infected with black scurf (10%) followed by boric acid alone.

Seed Science Technology

- a) Grow out test of nucleus and breeder seed of *kharif* (arhar, mungbean, cowpea, guar and sorghum) and *rabi* (wheat, raya, gram, lentil, field pea, oats, berseem and barley) crops was conducted an genetic purity was found within permissible standards of Indian Minimum Seed Certification Standards.
- b) Leaf serration, pubescence of leaf and pod, growth and branching habits, flower colour, plant height, pod length and shape were the most important diagnostic characters for varietal identification of guar.
- c) Out of 80 samples of paddy tested, 5% failed in the germination tests while in physical purity analysis, 36% samples did not confirm to standards. The main component of the physical purity sample failure was presence of other crop seed (51.75%) and in all 39% samples were rejected.
- d) In participatory seed production program, farmers were apprised of principles and practices of quality seed production of different varieties of wheat and raya at the demonstration plots in Harita, Jagan and Satrod Khurd villages of Hisar district.
- e) SDS-PAGE analyses of the soluble seed proteins of seven hybrids and their parental lines of both *G. hirsutum* and *G. arborium* showed that the banding pattern of all the seven hybrids were distinctly different from their parents and could be used as marker for varietals characterization.
- f) Accelerated Ageing Test (100% RH, $40 \pm 1^\circ\text{C}$ for 96 h) was found reliable test to predict storability and vigor of cotton and pigeon pea genotypes.
- g) There was wide range of seed dormancy (10-90%) among the different varieties of rice but in most of genotypes it was released within 75 days of harvest.
- h) During *kharif* 2006, farmers' own saved seed samples (161) and unprocessed certified (raw) seed samples (100) of rice were collected and analyzed for bunt. No sample was found infected with bunt.

Seed Production Programme

The seed production programme for all classes (Nucleus, Breeder, Foundation, Certified, Truthfully labeled) of seed was taken up by respective crop breeders, Department of Seed Science & Technology, Directorate of Farms, RDS Seed Farm and KVKs. A total of 26020.86 quintals of quality seed was produced during the year under report.

The Directorate of Farms was established on cultivated waste land and pasture area, transferred from Govt. Livestock Farm, Hisar in 1961 and some areas were transferred in 1971. The total cultivated area of Directorate of Farms (Seed Production Unit) is 378.75 ha.

Ram Dhan Singh Seed Farm is situated at village Beer Babran (about 18 km from CCS Haryana Agricultural University, Hisar) and comprises of an area of 4020 acres. Presently the roads, buildings etc. occupy 150 acres. The area under Canal/channels is 41 acres. About 583 acres is occupied by forests/barren land. The farm is divided into four Blocks and the net cultivable area is 3246 acres which includes 95 acres of *ber* and *aonla* plantation.

The foundation, certified and TFL seeds of guar, mungbean and cotton are produced during the *kharif* season and the seeds of wheat, chickpea, raya/sarson and barley are produced during the *rabi* season.

Details of all classes of seed produced during 2006-07


| Crops | Nucleus (q) | Breeder (q) | Foundation (q) | Certified (q) | TFL (q) |
|-----------------|--------------|----------------|----------------|---------------|-----------------|
| Cotton | 1.10 | 118.95 | 479.52 | 28.6 | 115 |
| Paddy | 12.77 | 181.66 | - | 746.8 | 1661 |
| Bajra | 0.34 | - | - | 31.0 | 15.72 |
| Sorghum | 1.15 | 4.06 | - | - | - |
| Maize | - | 3.2 | - | - | - |
| Sugarcane | - | 2710 | - | - | 2862.0 |
| Mungbean | 0.90 | 28.5 | 117.7 | 89.0 | 60.00 |
| Urd | - | - | - | 4.8 | 5.00 |
| Cowpea | 0.10 | - | - | - | - |
| Pigeonpea | 0.80 | 9.05 | - | - | - |
| Guar | 1.32 | 45.7 | 387.0 | 248.6 | 3.70 |
| Dhaincha | 8.0 | - | - | 1.4 | 65.6 |
| Teosinte | 0.08 | - | - | - | - |
| Wheat | 23.50 | 1930.2 | 4438.65 | 5924.8 | 5536.43 |
| Barley | 3.00 | 56.4 | 186.5 | 377.2 | 204 |
| Raya | 0.87 | 33.05 | 180 | 333.4 | 749 |
| Sunflower | 0.20 | - | - | - | - |
| Chickpea | 7.00 | 51.59 | 58.7 | 100.0 | 208.4 |
| Lentil | 0.30 | 8.0 | - | - | - |
| Field pea | 7.00 | 8.65 | - | - | 3.90 |
| Berseem | 0.90 | 12.95 | - | - | - |
| Oats | 3.50 | 19.8 | - | - | - |
| Total | 72.83 | 5221.76 | 5848.07 | 6874.4 | 8003.8 |
| G. Total | | | | | 26020.86 |

Agricultural Economics

- a) 'Input use efficiency' study in North-eastern zone of Haryana indicated the need to curtail the use of mechanical labour, irrigation, fertilizers and plant protection expenses in paddy (dwarf as well as basmati) while seed need to be used at the recommended level. In wheat, use of mechanical and human labour can be increased to reach optimal level, while expenditure on seed and irrigation are at optimum. The expenditure on fertilizer and plant protection measures need to be curtailed to enhance the input use efficiency. To lower production costs and improving productivity, restructuring of cropping pattern and efficient input use need to be emphasized.
- b) Total gross returns for buffalo's milk yield (1980 l) was Rs. 24,950/- compared to Rs. 21,962/- of a cross-bred cow (2790 l). The maximum cost (69%) was found on fodder and feed of the total cost for buffalo and 66% for cow.

- c) Self-sufficiency in seed production of Indian Major Carp and Common Carp has been achieved. More than 80% of the village ponds are under fish culture and yielding more than Rs. 3 crores annually. Due to inadequate marketing facilities, fish farmers send their produce to neighboring states and Delhi market and incur extra expenditure on packing and forwarding. The farmers adjoining Delhi have evolved a new technique of harvesting fish at 600 to 700 g and to carry it live to Delhi Fish market to get premium price.

Agricultural Meteorology

- a) Online daily updated weather based information has been made available and is accessible from <http://hau.ernet.in/agromet>.
- b) It provides the information on :
- Current weather conditions prevailing in the region
 - Weather based agro advisories (Hindi and English)
 - Daily agro-meteorological data for research users
 - Weekly rainfall data of monsoon season
 - Monsoon updates received from India Met Dept.
- 
- c) CCS HAU, Hisar regularly updates the daily weather data for National Data Bank at CRIDA, Hyderabad and biweekly weather based crop production information/strategies and contingency measures/plans were updated online at www.cropweatheroutlook.ernet.in.
- d) A total of 99 weather based Agro Advisory Bulletins (each of 4 days), based on medium range weather forecast for farmers of Hisar region, were disseminated on every Tuesday and Friday through print and electronic media, HAU website and Agriculture Technology and Information Centre (ATIC). The highest correct forecast values were 61% for cloud cover during post monsoon, 95% for wind speed during post monsoon and winter, 40% for minimum temperature during SW monsoon and 98% for rainfall during winter seasons.
- e) Rainfall during 3rd week of January showed a good relationship with the formation and multiplication of the secondary sporidia of Karnal bunt disease. Maximum temperature, relative humidity, rainfall and sunshine duration showed strong relation during 9th SMW (26th Feb to 4th March).
- f) SOYGRO model predicted the soybean phenology, growth and yield parameters within acceptable accuracy. The yield of barley was higher when sown on 10th November. The yield reduction in east-west sowing of cowpea, sorghum, pearl millet and *dhaincha* was 73, 81, 75 and 90 per cent while for barley, wheat, lentil and berseem it was 26, 34, 34 and 45 per cent, respectively.
- g) Mustard (var. Laxmi) sown between Oct. 5 and 20, produced significantly higher seed yield over sown on Nov. 5 as relatively high temperature regimes during grain filling phase lead to forced maturity under delayed sowing.
- h) Lower leaves removals at 60 and 75 days after sowing (DAS) of mustard were found economically viable growth manipulations for enhanced net returns. Seed yield and yield attributes were significantly and positively correlated with maximum and minimum temperature, sunshine hours and evaporation during flowering phenophases.

- i) In rainfed pearl millet and castor, integrated nutrient management involving application of 15 kg N through compost + 20 kg N through inorganic fertilizer and 15 kg N through green leaf + 20 kg N through inorganic fertilizer in pearl millet was found superior to inorganic source.

Agronomy

- a) In rice, infestation of *Sphenoclea zeylenica*, *Fimbristyllis miliacea*, *Scirpus tuberosus* and *Ammania baccifera* is increasing every year whereas sugarcane was infested with climbers like *Ipomoea hyderacea*. In cotton and guar, *Trianthema portulacastrum*, *Dactyloctenium aegypticum*, *Echinochloa colona*, *Digera arvensis* and *Cyperus rotundus* were the most dominant weeds. Infestation of *Orobanche aegyptiaca* in raya is increasing in South West Haryana and no chemical control was found effective against it.
- b) Ready-mix formulation of sulfosulfuron + metsulfuron (TOTAL) applied in wheat at recommended and double rates, caused residual mortality in succeeding sorghum and maize but not in cotton. Contrary to this, Carfentrazone in wheat at these rates had no residual effect on succeeding sorghum, maize, bajra or cotton. Also, atrazine at these doses in pearl millet did not cause any residual toxicity to succeeding raya. Imazethapyr @ 80-100 g/ha (pre- or post- emergence) was very effective against weeds in cluster bean but its residue caused mortality of mustard and barley. There were no signs of development of resistance in *Echinochloa* spp. due to continuous use of butachlor.
- c) Irrigating potato crop at 25 mm CPE resulted in highest tuber yield but when alternate row were irrigated, it caused reduction in tuber yield. Incorporation of crop residues, addition of biodynamic compost and FYM, treatment of seed tubers with *Azotobactor* and phosphobacteria improved tuber yield and net returns.
- d) Pendimethalin at 1.5 kg/ha (PE) followed by one hoeing at 35 DAS directed spray of glyphosate (Roundup/Glycel @ 0.5% solution) at 60-70 days after sowing produced seed cotton yield (22.3 q/ha) at par to the weed free check (23.8 q/ha).
- e) Penoxsulam 24 SC (XDE 638) at 22.5-25.0 g/ha at 3 days after transplanting (DAT) and 20.0-22.5 g/ha at 8-12 DAT provided satisfactory control of weeds in transplanted rice. New formulation of pretilachlor (Erijan 400 EW) at 800 g was at par with other recommended herbicides in transplanted rice. In direct seeded rice, Bispyribac (PIH 2023) at 25-30 g/ha, Penoxsulam 24SC (XDE 638) at 25.0 g/ha and Azimsulfuron 30 g/ha + S applied at 20-25 DAS were found promising. A new herbicide, Pinoxaden 5EC, at 45-50 g/ha compatible as tank mixture with metsulfuron at 4 g/ha, carfentrazone at 20 g/ha and 2,4-D at 500 g/ha applied at 35-45 DAS provided excellent control of *P. minor*, *Avena ludoviciana* in wheat.
- f) Pre-emergence use of oxadiargyl at 100-120 g/ha as sand mix or spray provided excellent control of *Chenopodium album* and *Coronopus didymus* in onion and garlic.
- g) A reduction of 14.5 q/ha in grain yield of bread wheat was recorded under January planting compared to December planting (44.4 q/ha). Significantly higher grain yield (57.7 q/ha) of wheat variety WH 711 was recorded under recommended N and P supplied through inorganic sources as compared to 125% N supplied through vermin-compost (52.8 q/ha) or 100% N either through FYM (50.7 q/ha) or vermin-compost (50.0 q/ha).
- h) The *hirsutum* genotype LH-1968 gave significantly higher seed cotton yield (21.8 q/ha) with 100% recommended dose of nitrogen (RDN) at a spacing of 67.5 x 60 cm. New promising hybrid

HHH-270 gave 11% higher seed cotton yield over hybrid CSHH-243 and spacing 67.5 x 75 cm gave 22% higher seed cotton yield over 67.5 x 60 cm.

- i) The RCH-134 Bt cotton hybrid gave significantly higher seed cotton yield (40 q/ha) with application of fertilizer @ 125% RDN over 75% RDN (34 q/ha) and 100% RDN (37 q/ha).
- j) The spacing 67.5 x 60 cm (38.27 q/ha) and 100 x 45 cm (38.38 q/ha) gave significantly higher seed cotton yield over 100 x 60 cm (35.30 q/ha). The average boll weight of RCH-134 Bt cotton hybrid was observed as 3.99 g.
- k) In long-term tillage trial in rice–wheat system, water requirement and density of broadleaf weeds was more in ZT-ZT than CT-CT methods. Soil microbial biomass, dehydrogenase and phosphatase activities were more in ZT-ZT as compared to CT-CT. Bulk density of soil and OC (%) did not vary among different treatments even after 3 years of experimentation.
- l) In drought management, harvesting of every third row for fodder at 30 DAS and furrow making in the vacant space resulted in significantly higher pearl millet equivalent yield compared to normal practice of sowing at 45 cm row spacing.
- m) Application of organic manures in *kharif* fallow field at either 4 t/ha FYM or vermi-compost significantly increased the yield of mustard over control or green manuring of *dhaincha* and cowpea at 40 DAS and gave highest B : C ratio.
- n) Advance application (on withdrawal of monsoon) of 100% RDF and seed inoculation with biomix had significant influence on seed yield of chickpea (765 kg/ha) over advance application of nutrients (50% or 75% RDF) in association with organics or bio-fertilizer or combination of both (407-592 kg/ha).
- o) The paired row wheat planting gave comparable yield to flat bed (30 cm) planting and showed improved harvest index. Planting of wheat on raised beds (with 30 cm space between the beds) revealed that planting 3 rows on 90 cm bed gave significantly higher yield due to high number of spikes/m² and seeds/spike over 2 rows on 90 cm bed, flat sowing and 4 rows on 90 cm bed, 3 and 2 rows on 75 cm beds.
- p) Under late sown conditions, wheat genotype WH 1022 gave highest yield among the late sown varieties/genotypes. Application of N in two or three splits in different combinations resulted in no increase in grain yield of late sown wheat (PBW 373). Under these conditions, seeding of primed wheat seed improved grain yield by more than 6% over normal seeding. A spray of thiourea (0.2%) after anthesis increased the grain yield by about 5% over control.
- q) Under no irrigation, one irrigation (45 days) and 2 irrigations (45 and 80 days) barley genotypes BH 04-07, BH 04-09, BH 393, BH 05-25, BH 05-54 and BH 06-41 produced consistent yield and showed higher rates of photosynthesis, low canopy temperature and greater extraction of soil moisture from lower soil layers.
- r) At Karnal, maximum sugarcane germination (50%) in pit method was obtained by placing the setts in pits followed by light irrigation and covering with 3-4 inch loose dry soil after water disappearance. Also, germination was increased by 10-13% by soaking the setts in saturated lime water. Different pre-planting tillage technique (zero tillage, conventional, rotavator once, rotavator twice and two harrowing) were at par but significant reduction in cane yield with increase in spacing beyond 90 cm was observed. Intercropping of musk melon, long melon, wax

gourd, bitter gourd, round melon and tomato in sugarcane plant as well as in ratoon crop reduced the cane yield by more than 10% but intercropping of cucumber, cluster bean, cowpea and lady finger did not affect adversely the cane yield.

- s) Furrow sowing of maize in *kharif* was at par with ridge and flat sowing but avoided crop lodging and saved irrigation water along with draining out excess rain water.
- t) At Bawal, mothbean sown in 2nd week of July was found better than late sown for seed yield.
- u) Maximum grain yield of pigeon pea was recorded with the application of 100% RDF, supplemented with water spray at flowering stage under drought conditions. Half of RDF + 2% urea spray at flowering stage was as good as 100% RDF application under these conditions.
- v) Raised bed sowing along with lower seed rate (150 g/ha) had a significant effect on the grain yield as compared to traditional method. The yield increase with raised bed planting in lentil was 7 and 37 per cent over flat bed and zero till sowing, respectively.
- w) Grain yield of chickpea decreased by 8, 23 and 37 per cent per week with the delay in sowing beyond November 25. HC 1 gave highest grain yield in these conditions and produced 17, 7 and 12 per cent higher grain yield over HC 3, HC 5 and PBG 1, respectively. Planting of chickpea on raised bed of 1.35 m with 4 rows or 67.5 cm with 2 rows is feasible. Seed priming produced 105 kg/ha higher grain yield of chickpea. Spray of 2% urea at flower initiation and another after 10 days produced 25% higher grain yield as compared to water spray. Application of 30 kg S/ha along with recommended dose of fertilizer produced 8% higher grain yield.
- x) Spread of 5 t FYM/ha over planted rows of bajra gave higher yield over other treatments. Soil application of 20 kg ZnSO₄/ha gave maximum grain, dry fodder yield, net return and B : C ratio.
- y) In forage-forage based cropping system, the highest net income of Rs.18658/ha/yr was obtained with use of 75% recommended dose of inorganic fertilizers + 25% N through FYM.
- z) The spacing of 45x15 cm and addition of 15 kg N and 50 kg P₂O₅/ha gave the maximum groundnut pod yield.

Agro Forestry

- a) Poplar clones PIP 102 and PIP 321 showed maximum survival and girth (60 cm, 72 cm) after 8 years of plantation. Out of 38 seed sources of eucalypts, HS-8 was found best with 82% survival and 65.9 cm girth at 8 years of age.
- b) Intercropping of *kharif* crops for fodder and *dhaincha* (green manuring) was not found economical after two years of poplar plantation due to severe reduction in yield but cultivation of wheat and barley was economical. *Rabi* crops of wheat, barley, lentil and berseem were found uneconomical after 3 years of eucalypts plantation (6m x 2m) as yields were very low due to severe competition for moisture and light.
- c) Local genotype of jojoba was found more adaptable to saline and arid conditions in comparison to genotypes from Israel.
- d) Treatments with IBA (2500 ppm) and thiamine (1000 ppm) were found best for clonal multiplication of *Prosopis chilensis*. Seedlings raised through seeds developed early tap root but the stacklings developed by cuttings showed lateral spread of roots. It can be propagated successfully by

seed and cuttings. In wasteland, however seed raised plants should be planted as they have good rooting system. EC beyond 6.0 dSm⁻¹ is not good for the growth of *Jatropha curcas*.

- e) Shisham progenies P 25, P 13 and P 18 were found superior in terms of growth parameters under Hisar conditions, whereas P 8, P 12, P 14 and P 15 were found promising for total height and collar diameter. An association of *Ganoderma lucidum* and root borer was found in dying trees of shisham, khejri and Israeli kikar in southern parts of State.
- f) *Pseudomonas maltophylla* raised in vermin-compost was found effective against damping off disease in *Dalbergia sissoo*. Bavistin and Mancozeb exhibited effective control of damping off disease in nurseries.
- g) In a silvipastoral system at Bawal comprising *A. bevinosa*, *H. binnata* and *C. mopane*, pearl millet and cowpea, pearl millet gave maximum green fodder yield (180 q/ha) under *H. binnata*. In a jatropha based agroforestry system, maximum fodder yield (155 q/ha) was recorded in cowpea during 2nd year of plantation. Maximum yield (12.0 q/ha) of *methi* was recorded with micro-sprinkler irrigation (100% ETc). Maximum yield of aonla (11.0 q/ha) was observed with 100% ETc level of drip irrigation. Among trees species, *H. binnata* attained maximum height (5 m). Fifty accessions of jatropha and 37 of karanj collected from different parts of country showed significant variation in seed characters and oil content varied from 32 to 39 per cent in jatropha.

Entomology

Survey

Due to long dry spells in *kharif* 2006, population of leafhopper (<0.9 nymphs/leaf) and whitefly (<3.0 adults/leaf) on cotton remained below economic threshold (ET) and spotted bollworms (*Earias* spp.) caused major damage to cotton. Mean bollworms incidence in green fruiting bodies was 13.3 and 13.9 per cent during 3rd week of August and 2nd week of September, respectively. Population of *H. armigera* remained below ET with pink bollworm incidence being prominent in 33% of the fields, with highest incidence (>10% rosetted flowers) at Saniana, Panjuvana, Bawanikhara, Sahuwala and Barwala. Heavy incidence of *Spodoptera litura* for the 5th consecutive year on cotton was observed in some pockets in Hisar, Fatehabad and Sirsa districts.

In chickpea, *H. armigera* population crossed ET during 2nd week of March, 2007 at Siwani, Bakhtawarpur, Mohilla, Kalod and Isharwal and caused considerable damage.

Screening

- a) Amongst *hirsutum* genotypes, entries H 1230, H 1332, H 1334, H 1242, H 1282, H 1326 and HS 274, H 1226-2, CCHLS 2, H 1300, H 1117, CSH 7106, HHH 437 and HHH 433 were tolerant to cotton insect-pests. *Arboreum* entries, JLA 1799, HD 457, Swadeshi 651, AAH 20, and CISAA 7 were found highly tolerant to bollworm infestation. In CVT trial of *arboreum*, entry HD-123 and HD-402 were found tolerant to bollworm infestation. In chemical control, RIL-042 @ 500 ml/ha + Flubendiamide 24% + Thiacloprid 24% 480 SC @ 250 ml/ha were better than others.
- b) Maize inbred lines 1347-4Lt (1+2+3), 1011, 1332, 1344, 326, 536, 193-2 and 1128 were found resistant against stem borer, *Chilo partellus* and will be utilized in breeding program. Hybrids 170 (1+2) x 1105, MBR 139 x 1378 and MBR 139 x 1348-6-2 were found productive and resistant against *Chilo partellus*.

Pest Management

- a) In chickpea, pod damage was 10.7, 9.5, 10.4 and 10.2 per cent in HaNPV alone (250 LE), HaNPV followed by endosulfan (0.07%), HaNPV followed by *B.t.* (1 kg/ha) and endosulfan alone treated plots as compared to 16% in control. Survey reports/press notes on future population trends of different insect-pests and their management practices to be adopted were issued from time to time for end users.
- b) IPM module (*Trichogramma* + Neem + Bt + Insecticide) decreased the fruit borer damage in tomato fruits to 32% compared to 67% in control but was not better than the insecticides' spray schedule. In onion, garlic oil 0.1% was equally effective as synthetic insecticides against onion thrips but the costs were much higher than synthetic insecticide spray.
- c) Treatment of chickpea seed with groundnut oil @ 3.75 ml/kg seed + turmeric powder @ 1.75 g/kg, mustard oil @ 3.75 ml/kg + turmeric powder @ 1.75 ml/kg, *neem* oil @ 10 ml/kg and 7 cm sand and dung cake ash covering on chickpea proved effective in protecting chickpea from pulse beetle, *Callosobruchus* spp. for a storage period of 240 days. Three exposures on solar bed on sunny days for 15-30 minutes, first before storage and thereafter at regular intervals of 60 days, proved effective for a storage period of 180 days.
- d) Seed treatment with vitavax, confidor and foliar sprays (one each) of Tilt 25EC @ 0.1%, and confidor @ 20 g a.i./ha was found best for integrated pest management in barley.

Different dosages (2.85, 5.7, 11.4 and 22.8 ml/kg okra seed) of Cruiser 35 PS as seed treatment saved the crop from leafhopper damage for 30 to 48 days but Carbosulfan seed treatment was not totally ineffective. Cruiser and imidacloprid seed treatment were not effective against mite and whitefly in okra. Seed treatment with 10 ml each of imidacloprid 200 SL, endosulfan 35 EC and chlorpyrifos 20 EC had no adverse effect on germination of cotton seed and proved equally effective in checking termite damage.

Chemical Control

- a) Spinosad 45 SC @ 187.5 ml/ha reduced okra fruit damage by shoot and fruit borer by 68% and was better than the existing recommended spray schedule but failed to control whitefly and leafhopper. In brinjal, its different dosages (100, 125, 162.5 and 187.5 ml/ha) gave 61-75% control of shoot and fruit borer. Clothianidin (Dantop 50 WDG) at 22.5, 30.0 and 37.5 g a.i./ha proved effective against leafhopper but was ineffective against whitefly.
- b) In sugarcane, for termite shoot and root borer control, granular and SC formulations of fipronil and imidagold 200 SL were recommended while for top borer, a trade formulation of phorate (Umet 10 CG) from UPL was prescribed.
- c) Amongst various white grub species, *Holotrichia consanguinea* was the most prevalent species as leaves and root feeder and *Rhyniptia laeviceps* as pollen feeder. Seed treatment with Chlorpyrifos 20 EC, Quinalphos 25 EC, PM-4 and fully decomposed poultry manure (2t/acre) were significantly superior to other treatments in controlling white grub and collar rot in groundnut. Pre-sowing application and mixing in soil of phorate 10 G @ 10 kg/acre was significantly compared to others in controlling white grubs in pearl millet.
- d) Seed treatments with PM-4 @ 20 g/kg and Ethion 50 EC @ 6 ml/kg were found significantly superior to other treatments for the control of termite in wheat. Seed treatment @ 20 g/kg seed

with strains PM-4 of *Pseudomonas maltophilia* and *P. fluorescense* were most effective (82%) for the control of aphid in Indian mustard.

- e) *Tetranychus urticae* population varied from 1.2 to 48.8 mites/cm² leaf, with peak in first fortnight of June. Significant positive correlation was observed with maximum and minimum temperature and significant negative correlation with relative humidity. Its population was reduced by 86, 77 and 62 per cent with spray (1%) of each of garlic, turmeric and karanj, respectively as compared to 28% in ethion (0.05%).
- f) Seed treatment with 8, 10 and 12 ml leaf extract of eucalyptus, 10.0 ml each of garlic and *datura*, 3.5 ml endosulfan 35EC and 5.0 ml ethion (Fosmite) 50EC/kg seed did not adversely affect germination of wheat seed.

Biological Control

- a) Four parasitoids, *Campoletis chloridae*, *Apanteles*, Tachnid fly and an unidentified species, were found parasitizing pod borer (*H. armigera*) larvae in chickpea crop.
- b) Cocoons of *Epiricania melanoleuca* and egg masses of egg parasitoid of *P. perpusilla* were produced/ collected and supplied to farmers for their release in 7635 acres of sugarcane, sorghum and rice. Simultaneously, egg parasitoids *Trichogramma chilonis* and *T. japonicum* were also produced and supplied to farmers of Haryana for their inundative releases in 15445 and 13425 acres of borer infested fields.

Cultural practices

Intercropping of sesame or sorghum in cotton after 6 or 12 rows resulted in reduced (19-25 per cent) bollworms incidence (spotted and pink) due to the enhanced parasitoids activity. Tricho-cards bearing 20,000 eggs of parasitoid *T. chilonis* were produced and 197 tricho-cards were provided to KVK, Sirsa for use in cotton crop. Also, 10,000 Le HaNPV was produced with 5000 being provided to farmers.

Intercropping of chickpea with coriander and linseed resulted in more parasitization of the pod borer, *H. armigera* larvae in chickpea.

Residues

Residues of fipronil in rice grain were below the MRL value (0.04 µg g⁻¹), at recommended X as well as at 2X but its residues in straw exceeded the MRL (0.10 µg g⁻¹) at 2X dose. At harvest, average residues of thiodicarb in cotton seed oil exceeded the MRL value of 0.02 µg g⁻¹ at 2X dose only. Application of ethion at higher dose (12 ml/kg seed) is not safe. No residues of Clodinafop Propargyl applied as a post emergent herbicide, *i.e.* 35 days after sowing of wheat @ 45, 60 and 75 g a.i./ha were detected in any grain, straw and soil sample.

Honeybee

Varroa mite and European foul brood caused serious damage (20-25 per cent) to honeybee colonies in the State. For the first time in Haryana, red ant was observed as a predator of honeybee adults. Diet with soybean as a substitute of pollen was found to be the best for colony growth and buildup. Twenty eight trainings on beekeeping were organized at different places of the State.

Extension Education

- a) Case study on Problems and Prospects of Photovoltaic Water Pumping System (PWPS) for diversification in agriculture indicated that during the *rabi* season maximum decrease in area (4.41%) was observed in wheat whereas area under berseem, mustard and barley decreased by 3.31, 2.48 and 0.67 per cent, respectively. On the contrary, area under vegetable (9.1%) and horticulture (1.8%) increased.
- b) Lack of extension literature and package of practices for PWPS irrigation farming were listed as major constraints by the adopted respondents.
- c) Extension functionaries suggested that 16, 8, 7, 8, 5, 4.5, 4 and 3.7 per cent farm area should be under vegetable, mushroom, horticulture, floriculture, spices, medicinal plants and fisheries, respectively for PWPS adopted farmers having less than 5 acres land holding. For 5-15 acres of land holders, 12, 8, 5.5, 4.5, 3.16, 2 and 2 per cent under vegetable, horticulture, mushroom, floriculture, fisheries, spices and medicinal plants, respectively.
- d) Majority of the Extension functionaries recommended 2 to 3 buffaloes/cows, 5-10 sheep/ goats, 16-32 layers and 9-18 honey bee boxes for farmers having less than 5 acres land holding for effective management. Farmers with 5 to 15 acres land holding should have 10-15 buffaloes/cows, 10-20 sheep/goats, 63-106 layers and 41-57 honey bee boxes.
- e) It was suggested that appropriate literature about PWPS technology, procedure for availing the subsidy, organization of live demo of the technology to clear the doubts of the farmers, need to be taken care of. Technology specific farming models for different group of farmers on the basis of land holding, available inputs and requirements of local market, need to be provided. Efforts to reduce the initial cost of the technology and improve it to work on deep water table conditions should be made.

Horticulture

Surveys

- a) Pollination studies in guava revealed that *Psidium guajava* cvs and species – Strawberry guava (*Psidium cattleianum*) and Chinese guava (*P. friedrichsthalianum*) are primarily self-pollinated. Per cent fruit set (93.8%) was highest in cross Hisar Safeda X L-49.
- b) In ber, quality parameters like Total soluble sugars and ascorbic acid of hybrid-1 (Umran x Kaithli) and hybrid-3 (Ladoo x Safeda Rohtak) were better as compared to other hybrids or their parents.
- c) Budding of aonla in 4th week of July gave highest success rate of 80 and 72 per cent in Chakaiya and NA-7 cultivars, respectively, and decreased consistently thereafter. With advancement of days from 4th week of July to 4th week of September (50%) most of the buds remained green and did not sprout when done in September. Chakaiya showed relatively higher success rate of budding in 2nd week of July to 4th week of August. At Bawal, varieties NA-10 and Kanchan gave the maximum yield (80.2 kg/tree). Application of atrazine (pre-emergence) + glyphosate



(post-emergence) gave 85% weed control and highest yield over the control. Survey of aonla orchards revealed mite (60%) and rust (40%) as the main pest and disease and NA-7 was the preferred cultivar by its pest as well as diseases.

- d) Plant growth and yield parameters were better on Troyer rootstock followed by Rough lemon and less on Rangpur lime. Highest TSS (10.8%) and juice content (42%) were recorded on Troyer rootstock followed by Rough lemon.
- e) The most suitable time for litchi propagation through air layering was mid August to mid September.

Fertigation

- a) In nine year-old sweet orange (var. Blood Red), plant growth, fruit yield (41.4 kg/plant) and quality improved as N was applied through both, organic as well as inorganic sources. Maximum fruit yield of 41.4 kg/plant was recorded when 800 g N (half through FYM and rest through urea) was applied compared to full N through urea or FYM. Organic manure (60-80 kg/plant) was found optimum for vegetative growth of 4 years old citrus var. Jaffa. Application of 300 g P_2O_5 per plant to 9 year-old citrus var. Pineapple resulted in maximum yield (45 kg/plant) and better quality fruits.
- b) In strawberry, MS media supplemented with BAP 1.5 mg/l, Kinetin 1.5 mg/l and IBA 0.5 mg/l was found better. In gladiolus, MS media supplemented with BAP 2 mg/l with Adenine sulphate and praline 125 mg/l initiated shoot regeneration.
- c) In zero energy chambers, CIPC @ 2 g/kg was most effective to check sprouting of potato cv. Kufri Bahar. For pea grains storage, LDPE 100 and 200 gauge were effective in reducing PLW. Kinnow fruits packed in cling films were at par with polythene packing for PLW and fruit quality.
- d) In ber, higher yields were obtained when 50% of the nutrients were applied through chemical fertilizers and rest through bio-fertilizers and FYM. Maximum plant height (3.1 m) and yield (75.2 kg/tree) were recorded in cv. Kaithli budded on *rotundifolia* root stock but girth of stock and scion were maximum in cv. Gola. The powdery mildew disease of ber appeared late, i.e. during 3rd week of December on Kaithli and Gola cultivars, though it was suppressed by heavy dew.

Screening/Pruning

- a) In Litchi, Calcuttia gave maximum fruit yield (44.5 kg/plant) followed by Early Large Red (35 kg/plant) and was minimum in Muzaffarpur (25 kg/plant).
- b) In Loquat, variety Golden Yellow gave maximum fruit yield (38 kg/plant) followed by variety California Advance (32.5 kg/plant).
- c) At Bawal, highest fruit yield (26.1 kg/tree) was harvested from Lasora germplasm IC No. 201597.
- d) Pruning of infested twigs together with destruction during winter, application of recommended FYM and NPK in January, two sprays of NSKE (5%) in March, spray of monocrotophos (0.05%) in April and NSKE (5%) in June was most effective for the management of flat head borer in peach.

Plastic culture

Yield of summer squash increased by 163% when cultivated under plastic low tunnel as compared to open field conditions. In cucumber, 24 fruits per plant with average weight of 163.3 g/fruit were harvested from the gynococious line of var. NVS-2-26F₁, when grown under naturally ventilated polyhouse. GA₃ (25 ppm) sprayed at 2- and 4- true leaf stage of gynococious cucumber line (NVS-2-26 F₁) induced maximum number of staminate flowers (pollen source) for selfing and resulted in maximum fruit set with selfing of pistillate flowers bearing hybrid seeds of cucumber.

Nematology

Surveys

- a) Cereal cyst nematode, *Heterodera avenae*, was recorded in 16% samples collected from wheat and barley fields in Hisar, Sirsa and Fatehabad districts. *Pratylenchus thornei*, *T. mashhoodi*, *Helicotylenchus dihystra*, *Hoplolaimus indicus* were predominant nematode species in sugarcane rhizosphere in Panipat, Karnal and Yamuna Nagar districts. Samples from the rhizosphere of cluster bean were found infested (29%) with pigeon pea cyst nematode.
- b) Cereal Cyst Nematode was widespread in Hisar-I (Adampur, Agroha), Hisar-II (Bhattukalan), Fatehabad and Sirsa (Nathusari Chopta and Odhan). *Tylenchorhynchus goffarti*, *T. mashhoodi*, *Ditylenchus myceliophagus*, *D. robustus* and *Aphelenchoides* sp. were the most commonly associated ectoparasitic nematodes with wheat and barley.



Hosts

Trifolium alexandrinum, *Anagallis arvensis*, *Trianthema portulacastrum* and *Phalaris minor* were recorded as hosts of *M. graminicola* under field conditions.

Biology

Fictor species, a predatory diplogasterid nematode, completed its life cycle in 3-4 days. It killed and multiplied on common nematode pests of button mushroom, e.g. *Aphelenchus avenae*, *A. radicolus*, *Aphelenchoides swarupi* and *A. siddiqii*.

Screening

- a) Paddy genotypes, HRI-148, KRH-2, Phalguna, RP-4621-1845, RP-4622-669 and RP-4623-713 were found resistant against *M. graminicola* but none exhibited resistant reaction against *Hirschmanniella oryzae*.
- b) Molya resistant wheat var. Raj MR1 gave 77% higher yield than PBW 373 and reduced molya population (16 to 3.0 per 250 g soil) in infested field at Khairampur, Hisar.

Chemical Control

- Two sprays of biozyme or zinc sulphate + urea after first irrigation were not found effective in reducing the infestation of *H. avenae*.
- In a cluster bean field infested with *Heterodera cajani*, application of carbofuran (2 kg a.i./ha) at sowing resulted in 29% increase in yield and 45% reduction in cyst population.
- In rice, nursery treatment with carbofuran @ 0.3 g a.i./m² followed by its field application @ 1 kg a.i./ha 40 days after transplanting managed *H. oryzae* infestation and yielded significantly higher as compared to control. Seed treatment with carbosulfan @ 3.0% (w/w) + soil application of carbofuran @ 1.0 kg a.i./ha reduced the root knot nematode infestation and improved the yield in a root-knot infested field.

Bio-control

- Strains 35-47, Co 99-70 and 761-31 of *Gluconacetobacter diazotrophicus* and HT-54 and AVK-42 of *Azotobacter chroococcum* were effective in reducing root knot nematode infestation and improving plant growth parameters in tomato nursery. *G. diazotrophicus* strains Co 99-70, HT-54, *A. chroococcum* strains 35-47 and 103 gave similar results in smooth gourd.
- Field application (@ 200 g cha culture or 50 ml liquid culture per 5 kg seed) of *Gluconacetobacter diazotrophicus* 35-47 against root knot nematode resulted in higher (16.5 q) yield against control (12.7 q/ha) in cotton.
- Bacterial isolates (78, 84, 113 and 124) as seed dip on okra or nursery soil treatment in tomato against *M. javanica* in green house proved very effective, yielding higher number of transplantable, healthy seedlings.

Plant Pathology

Etiology

Progress of stem gall of coriander was maximum when temperature varied between 21-25°C and relative humidity (Morning) >84% and RH (Evening) > 50 per cent. Temperature (minimum) and sunshine hours were significantly and positively correlated with the disease development. Leafy type varieties consistently showed resistance against stem gall while in seed type varieties, incidence was 100% with severity around 60 per cent.

Survey

- Survey of major cotton growing districts, viz. Hisar, Sirsa, Fatehabad and non-traditional districts (Bhiwani, Mohindergarh and Rewari) indicated that incidence of bacterial blight and fungal foliar diseases was quite comparable to as in previous years. Cotton leaf curl virus (CLCuV) was observed in 1st week of June and varied in intensity (traces to 80%) in recommended and non-descriptive varieties. In 2nd year Bt cotton trial, all entries showed resistant to CLCuV and Myrothecium leaf spot diseases, coded entries 6002, 6011 and 6004, 6008, 6012, 6018 and 6021 were found susceptible to CLCuV and Myrothecium leaf spot diseases, respectively in 1st year Bt cotton trial.
- In Cotton, Bacterial blight was observed in the first fortnight of July and recorded up to vein necrosis (Grade 3) at farmers' fields. Fungal foliar diseases, Myrothecium leaf spot and Alternaria leaf spot were observed with varying intensities (Traces–Grade 3) in hybrids as compared to

varieties. Root rot (5-15%) and Fusarium wilt (2-8%) was observed whereas para wilt was prevalent (up to 60%) in sandy soils in cotton hybrids in Hisar, Fatehabad and Sirsa districts.

- c) GM cotton was found completely resistant to CLCuV under artificial inoculation with virus charged whiteflies. Soil treatment with *Trichoderma* spp. @ 5 g/kg soil proved superior (10-15%) than seed treatment (5 g/kg seed) for the control of root rot in green house.
- d) Surveys during 2006-07 crop season revealed an increased incidence of Flag smut disease (traces to 40%) in wheat growing districts (Rohtak, Jhajjar, Sonapat, Jind, Mohindergarh, Kaithal, Panipat, Karnal and Hisar) particularly in varieties PBW 343, WH 542, PBW 502, WH 147, C 306 and UP 2338. Loose smut severity (<1%) was also observed throughout the State. Other diseases like yellow rust, leaf rust, powdery mildew and leaf blight appeared late in the season with low to moderate severity.
- e) Karnal bunt and Black Point diseases revealed an increased incidence during 2006-07 as compared to 2005-06 due to high frequency and heavy rains.

Survey and Chemical Control

- a) Occurrence of Iris Yellow Spot Virus was recorded for the first time on onion in northern India. Long and flexuous virus particles were detected by electron microscopy in mustard. Co infection of okra yellow vein mosaic virus and okra leaf curl virus in okra caused a drastic reduction (86%) in per plant yield. Apical leaf curl virus incidence was highest (32%) in potato Kufri Badshah.
- b) Aqueous extracts of jatropha, marigold and eucalyptus leaves (20% w/v) were most promising in controlling soft rot of potato seed tubers caused by *Pectobacterium carotovorum* subsp. *carotovorum*.
- c) In cluster bean, aqueous leaf extracts of aonla and eucalyptus (20% w/v) provided 48-59% control of bacterial blight under disease stress conditions.
- d) Application of antagonists @ 5 g/l of water and MPG (10%) improved the growth of tomato plant and checked root rot in the field. Disease control with *Trichoderma* species and MPG was between 6 to 15%. Integration of *T. harzianum* 5 g/kg soil with neem cake at 250 g/m² soil resulted up to 68% control of tomato damping-off in nursery beds. Tomato lines M-121, MK-1, Sel-21 and Cherry yellow and red (Indeterminate type) were identified to be resistant to early blight. Dipping tomato seedlings roots in salicylic acid (200 µM) before transplanting followed by spray of SA (200 µM) and two subsequent sprays of mancozeb (0.2%) at 15 days interval were effective in control of early blight.
- e) In various trials, entries IB 4 and AB 1 and genotypes HFB 119, 165, 700, 5-10 and HB 1 showed resistance against stem rot and root rot diseases. Seed treatment with Carbendazim + Thiram @ 2 gm each/kg seed significantly reduced the stem rot and root rot diseases in berseem.

Survey Mushroom

Mushroom strains S-11, H-1 (for normal) and HU-3 (for late spawning) of white button mushroom (*Agaricus bisporus*) were found suitable. Spray of DAP (0.1%) or urea (0.1%) increased the yield of oyster mushroom by 16 and 13 per cent, respectively. *Pleurotus sajor-caju* can also be cultivated on substrates like water hyacinth, green gram and pea straw.

Screening

- a) Garlic lines HG-17 and HG-27 maintained resistance to purple blotch and *Stemphylium* blight. Onion seed crop was saved (60%) from lodging due to disease complex by two sprays of Ridomil MZ (0.2%) and endosulfan (0.15%) followed by two sprays of mancozeb (0.2%) alongwith insecticide.
- b) Maize inbreds 488, 488E, 690, 699, 788, 1011, 1348-8, 161 and 163 were found resistant against Maydis Leaf Blight disease.
- c) Groundnut germplasm lines HNG 1, HNG 10, HNG 17 and HNG 18 were moderately tolerant to Tikka disease.

Soil Science

- a) Basmati rice can be grown organically by applying 15 t FYM/ha or incorporating *dhaincha* as green manure before transplanting. This technology has been incorporated in Package of Practices for *kharif* crops. Compost from rice straw can be prepared within four months by applying 0.1% urea solution, 0.001% *Aspergillus awamoori*, doing two turnings (after one and two months) and maintaining proper moisture (60-70%). Cooking quality of Taraori basmati rice (HBC-19) was positively correlated to potassium ($r=0.82^*$) and clay ($r=0.64^{**}$) contents of the soils but was negatively correlated with Na ($r=0.70^{**}$), SAR ($r=0.66^{**}$) and EC ($r=0.64^{**}$) of irrigation waters. Significant relationship between aroma of Taraori basmati rice with K ($r=0.74^{**}$) and clay ($r=0.64^{**}$) content in soils was observed. Microbial counts, rainfall, temperature and evaporation failed to exhibit relationship with any quality traits.
- b) Using geomorphic map and satellite data, physiographic map of Faridabad district was prepared and sixteen soil series were identified. Physiographic map of Kaithal district has been updated and identified eight soil series. One hundred and ten soil series identified and 279 pedons studied in Haryana were compiled for the ready reference.
- c) Spectral data, meteorological data and empirical models were used to predict the pre-harvest yield of wheat, mustard and cotton. Estimates on area and production were issued much earlier compared to BES estimates using crop cutting experiments. The relative deviation of cotton estimates in Haryana from the BES data was 5.8% for area and -10.5% for production and effects are being to further refine the models by incorporating more variables.
- d) Ready reckoners for fertilizer recommendations of bajra (var. HHB 94) and wheat (var. WH 711) have been included in the Package of Practices for targeted yields. Bajra yield targets of 25 and 30 q/ha were achieved within variations of $\pm 6-7.6\%$ while targets of 45 and 50 q/ha in wheat were obtained with deviations of $\pm 2-5\%$; and 35 & 40 q/ha of barley with deviations of $\pm 3-5\%$ at farmers' fields.
- e) In field experiments, significant increase in yield of cotton (2.5 q/ha) and mustard (2 q/ha) was recorded with Boron application @ 1.0 kg ha⁻¹ as Borax.
- f) The upper toxic limit of cadmium and nickel for cowpea and onion in light textured soils were 14, 116 and 8, 126 mg kg⁻¹, respectively, whereas in heavy textured soils these values were 20, 160 for cadmium and nickel in cowpea and 11, 140 mg kg⁻¹ for onion, respectively.

- g) Water productivity in wheat under FIRBS was 23% higher as compared to the conventional method. Water use efficiency (WUE) and total water use in wheat was higher when sown after mungbean (335 kg/ha cm and 102 kg/cm) than sorghum (271 kg/ha cm and 88 kg/cm). Zero tillage in wheat resulted in 21% higher WUE as compared to conventional tillage.
- h) The characterization of under ground water quality revealed that 43, 11, 5, 11, 14, 8 and 8 per cent in Pataudi and 41, 8, 9, 13, 13, 11 and 5 per cent waters in Farukhnagar block of Gurgaon district were good, marginally saline, saline, high SAR saline, marginally alkali, alkali and high alkali, respectively.
- i) Cotton varieties H1226 and H-1117 were found comparatively better salt tolerant. Under saline conditions, grain yield of wheat genotypes WH-1043 and WH-1036 was 16 and 10% higher, respectively over KRL-19. Cyclic irrigation of 2 canal (C) and one saline (S) and 1C:1S were at par with canal in crop sequences of cotton-wheat and pearl millet-mustard. The grain yields of pearl-millet and wheat irrigated with sodic water (RSC 12 me/l) through sprinkler increased significantly with the increasing levels of gypsum and irrigation depth. The yield of broccoli and cluster bean irrigated with sodic water (RSC 11.6 me/l) increased significantly with the addition of gypsum and FYM. Under 100% gypsum neutralization of RSC, knol-khol yield increased by 600% as compared to no gypsum. In pearl millet-wheat system, higher yield was recorded with 6 cm depth of sodic water through sprinkler irrigation than 4 and 5 cm. Application of gypsum @ 75% neutralization of 12 me/l RSC of water was optimum for this system. Kalmegh seed yield decreased significantly with increase in RSC of irrigation water and 100% neutralization of 12 me/l RSC of water with gypsum yielded (1.67 q seed/ha) at par to 2.8 me/l RSC water (1.7q seed/ha).
- j) At Karnal, in sugarcane ratoon, application of $\frac{3}{4}$ dose of recommended NP + bio-fertilizers (Azotobacter + PSB + *Trichoderma viride*) or 225 kg +50 kg P_2O_5 as rock phosphate+ bio-fertilizers produced equal cane yield and CCS% compared to recommended dose of N and P.
- k) At Bawal, mungbean responded to the application of (up to 40 kg) P_2O_5 /ha. In light textured medium K status (160 kg K_2O /ha) soil, pearl millet responded significantly to direct application of K up to 30 kg K_2O /ha but wheat up to 60 kg K_2O /ha. Residual effect of K in pearl millet was significant at 60 kg K_2O /ha and wheat responded up to direct application of 30 kg K_2O /ha in wheat-pearl millet rotation. The yield increase in pearl millet grain was 11.6 and 16.7 per cent at 90 kg N/ha and 11.7 and 17.5 per cent at 120 kg N/ha due to direct application of 30 and 60 kg K_2O /ha, respectively, over control.
- l) In mustard, there was 16% increase in yield due to biomix inoculation at 75% RDF, while this increase was 9.7% at 100% RDF + biomix over their the respective fertilizer treatments. Biomix inoculation at 75% RF (17.8 q/ha) significantly increased grain yield in pearl millet over 75% RF only (16.1 q/ha) in pearl millet-mustard rotation. At 50% RF dose, all the three soil amendments of vermi-compost (11.3 q/ha), FYM (10.9 q/ha) and crop residue incorporation (10.5 q/ha) significantly increased seed yield of cluster bean over 50% RF alone (9.6 q/ha).

Fertigation

- a) Economizing on fertilizer N is not possible due to linear response up to 120 kg N ha⁻¹ and therefore available N status of the soil cannot be sustained with application of 15 t FYM ha⁻¹ year⁻¹.
- b) Except Rock phosphate, Narmada phos, SSP, DAP and UAP were found at par in wheat and pearl millet. Increasing level of P (60 to 120 kg P_2O_5 /ha) increased the yield of wheat significantly but not in pearl millet.

Survey

In Panipat district, 19 and 27 per cent soil, plant and grain samples were deficient in Zn and S, whereas deficiency of Fe and Mn was 16 and 17 per cent in district Sonapat only.

Physiology

Okra seed attains physiological maturity in 47 days after anthesis and seed quality was not affected if pods were retained on plants for more than 50 days of anthesis. Maximum seed yield of okra was recorded when first twelve fruits were retained till maturity as compared to sixteen or more fruits.

Fertility

Addition of FYM (20 t/ha) and gypsum (30 kg/irrigation) significantly increased the yield of broccoli, ridge-gourd, knol khol, cluster bean and cabbage.

Chemical weed control

Among various herbicides, oxadiargyl at 150 g/ha was the most effective herbicide in controlling weeds in onion. HOS-3 variety of onion was found tolerant to salinity.

Agronomy

HRB 107-4 variety of okra produced highest (126.6 q/ha) yield with 60 x 20 cm spacing. The maximum (305.8 q/ha) yield of seed tuber of potato variety Kufri Badshah was obtained when plants were spaced at 60x20 cm and irrigated at 40 mm CPE. Maximum (3.7 q/ha) seed yield of radish Variety Hisar Selection-1 was produced under 55 mm CPE+ recommended doze (80 kg N and 40 P₂O₅ kg/ha) of fertilizer.

2.2 AGRICULTURE MECHANIZATION AND ENERGY MANAGEMENT



Performance/Evaluation of Farm Machines

Self Propelled Walk-behind Power Weeder

The machine is successful in weeding in row spacing of 30 to 60 cm. With weeding efficiency 70% in one operation, the field capacity of machine in guar was 1.25 acres/day while in sugarcane and cotton, it was 3.125 acres/day. The cost of weeding with power weeder is Rs. 500/acre compared to manual weeding at Rs. 1500/acre. Thus there is net saving of Rs. 1000/acre. The cost of machine is Rs. 30,000/- and its pay back period is two years.

Inclined cell type Bt Cotton Planter

The average field capacity of Bt cotton planter was 2.0 acres/hour while with manual dibbling it was 25 man-hrs/acre. With seed rate of 650 g/acre and plant to plant/row to row spacing of one meter, the average yield obtained was 9.0 q/acre. The cost of operation is Rs.150/acre while with manual dibbling it is Rs. 240/acre with a saving of Rs. 90/acre. The pay back period of machine is two years provided a farmer covers an area of 100 acre for cotton sowing in one season.

Economic Evaluation of Different Harvesting and Threshing Methods in Wheat

Total cost of harvesting and threshing of one acre on custom hiring was in the order : combine harvester (Rs. 2650/-) > harvesting with sickle and threshing with thresher (Rs. 2630/-) > self propelled reaper binder and threshing with thresher (Rs. 2375/-). Combine harvester saved 94% of time while with the use of self propelled reaper binder and threshing with thresher it was 82% manual method. Average *bhusa* recovery was in the order : manual harvesting (20 q/acre), reaper binder (17.5 q/ha) and combine harvester (10 q/acre). Also, the *bhusa* quality was very good when harvested with sickle or self propelled reaper binder and threshed with thresher. The self propelled Reaper binder was most economical method of harvesting.

Feasibility Trials

Tractor drawn straw chopper cum spreader for paddy straw management

The field capacity of *PAU designed* straw chopper cum spreader was 2.0 acres/h at forward speed of 2.0-2.5 km/h and average fuel consumption was 5 l/h. The average number of hills of stubble per square meter were 20 with 25 average tillers/hill. The average height of stubbles before and after cut was 18 and 3 cm, respectively. The cost of operation with straw chopper cum spreader followed by zero till drill was found to be Rs. 400 per acre and there was no problem in operation of zero till drill and moisture also remained conserved for more time.

Tractor operated Rotavator under different crop conditions

Feasibility trials were conducted at farmers' fields at different location of paddy region for puddling and simultaneous incorporation of *dhaincha* under wet land condition. There was saving of three irrigations (15 cm) and 48% saving in time during initial 15-20 days with the use of rotavator over the traditional practice. The average cost of operation was Rs. 480/- with the rotavator as compared to Rs. 660/acre in traditional practice and additional increase in yield of 1 q/ acre.

Feasibility trials on land preparation for wheat sowing revealed that one operation was found effective and sufficient for the smooth operation of seed cum fertilizer drill compared to four operations of harrow/cultivator/planker required in broadcasting of seed under traditional practice.

Frontline Demonstrations

Tractor Drawn Ridger Seeder

The front line demonstrations of machine were conducted for sowing of raya covering 181 acres. The average seed emergence was 6 plants per meter length with average yield of 7.04 q/ acre. The field capacity of machine was 1.0 acre/h and costs Rs. 15,000/-.

Automatic/semiautomatic Potato Planter

This machine was demonstrated in 30 acres. The seed rate dropped by 8 q/acre while with the semiautomatic potato planter it was 12 q/acre but there was 2-3% loss of potato with the use of automatic potato planter at turnings due to lifting. Saving in labour was around 60-70% over control accompanied by increase in yield by 10-15 per cent. Machine is simple, easy to operate with high output.

Potato Digger

Front line demonstration on tractor drawn Potato Digger cum Elevator was given at farmer's fields covering an area of 60 acres. The yield levels were 90-120 q/acre. The field capacity of machine was observed to be 0.5 acre/h with field efficiency of 60-70 per cent. About 10-12 labours are required to pick up the potato simultaneously.

Tractor Operated Post Hole Digger

Tractor drawn post hole digger, 4845 pits were dug at farmer's fields for horticultural plantation. Its field capacity was 0.5 acre/h and saving of Rs. 800/acre. The cost of machine is Rs. 25,000/- with pay back period of one year provided pits are dug in an area of 310 acres.

Custom Hiring of Improved Machines

Tractor drawn Rotavator

Marginal farmers and unemployed rural youths have purchased 1226 rotavators during 2006-07 and have adopted it as an enterprise for custom hiring with a net profit of about Rs. One lac per year, thus the pay back period of rotavator is just one season. It has been estimated that total area covered for field preparation after paddy harvest for sowing of wheat in 2007 using rotavators was 3,75,000 acres.

Tractor drawn Automatic/semi-automatic Potato Planter

Data were collected in 2006-07 and about 222 farmers purchased semi automatic potato planter costing Rs. 25,000/- machine in the potato growing region of the State. At custom hiring rate of Rs. 500/- acre, the pay back period of machine is two year if a farmer covers an area of 50 acres in one season.

Tractor drawn Potato Digger

Farmers purchased 74 tractor drawn Potato Digger cum Elevator during the year 2006-07. The rate of custom hiring of potato digger was Rs. 500/- acre with an average saving of Rs. 200-250/- acre. The pay back period of machine is one year, if a farmer covers an area of about 60-70 acres with the present cost of machine at Rs. 25,000/-. The machine is operated leaving one row in between so that tubers could be picked by labour.

Tractor operated Post Hole Digger

The number of this machine purchased by the farmers and unemployed youth stood at 125 during the year. With the custom hiring rate of Rs. 15 per pit (Rs. 1500/acre), its pay back period is one year only.

Tractor operated Straw Reaper

About 1194 straw combines were purchased by the farmers and unemployed youths during this year. The out put was 10 trolleys per day (10 q/trolley). The rate of custom hiring was Rs. 550/- per trolley and average expenditure was Rs. 300/- per trolley thus with a net saving of Rs. 250/- per trolley. The cost of machine varies between Rs. 90,000/- to Rs. 1,10,000/- and the pay back period of straw reaper comes to be two years.

Soil & Water Engineering

- Area of about 1400 ha was identified as waterlogged around villages Raipur (280 ha), Mirjapur (440 ha), Niyana (320 ha), Kharkari (200 ha) and Kahoka (160 ha). Analysis of rainfall, ground water depth and soil water holding capacity data showed that the surface drainage coefficient in the delineated water logged area in Hisar District was high at 75 mm/day (for sensitive crops) to 36 mm/day (for relative tolerant crop) for return period of 5 years.
- Simulation study with a validated SWAP model showed that sub-surface drainage coefficient used for the design of suitable drainage system varied from 1.0 to 1.5 mm/day in the selected water logged sites around villages Satrod, Ghirai and Petwar in Hisar district.
- Field study for Kabir and Sarsana Minor showed that the water productivity under the existing farmers' practices for cotton, cluster bean, pearl millet (grain), pearl millet (fodder), sorghum (fodder), sorghum (grain) and green gram varied from 0.66-0.70, 1.30-1.74, 6.06-8.83, 1.35-1.69, 11.59-13.73, 0.55-0.77 and 0.53-0.63 kg/m³, respectively.
- Monitoring and evaluation of sub-surface drainage system revealed that on an average, the paddy yield increased by 62.5% after the installation of sub-surface drainage system at the farmers' fields around village Kalayat. Improvement in crop productivity as well as bringing back problem area under cultivation resulted in an additional annual income of Rs. 13,200/- ha to the farmers of the area. The project generated an additional annual income of Rs. 7,12,400/- by reclaiming 54 ha area.

Agricultural Processing & Energy

- The working of groundnut decorticator was demonstrated at the farmers' fields in the village Khabra Kalan (Fatehabad). More than 30 q of groundnut was shelled by the farmers for seed purpose and the recovery was 90% and the output capacity of the machine was 45 kg/h.
- Performance of PKV pulse mill was tested for milling pigeon pea and chickpea. It took three passes to mill pigeonpea and two passes for chickpea. The overall capacity was 40 kg/h with split (*dal*) recovery of 75 per cent. The mill consumed 1.2 kWh (units) of energy per hour.
- The CIAE general purpose grain mill was tested for milling of wheat and milling of chickpea for making *dal* and *besan*. The machine was capable to split/mill about 45 to 50 kg/h of chickpea, 13 to 14 kg/h wheat to flour and about 10 kg/h *besan* from chickpea.
- The shelf life of guava fruits increased from 2 (untreated) to 7 days when packed in 125 μ LDPE pouch and to 11 days when fruits were vacuum packed. The PLW was 0.72% when packed in LDPE pouch as against 9.71% when fruits were kept unwrapped. The O₂ level in packed pouch reduced to around 13% while CO₂ level increased to about 10% during 8 days of storage.

- e) Open sun, shade, solar drying and tray drying (60°C) were compared for drying of satawar and mulathi. In satawar, drying was very slow and it took 10-14 days for drying. In mulathi, tray drying took 36 followed by solar drying 52 hours, open sun drying 64 hours and shade drying 76 hours. The final moisture content was about 10 to 12 per cent.
- f) A prototype of hand operated aonla fruit pricking machine with an output capacity of approximately 15 kg/h was developed. The machine can prick 70 to 90 holes at a time depending on the size of aonla fruit.
- g) The demonstration unit of agro processing centre having grain cleaner, flour mill, multi-purpose grain mill, grain peeler, pulse mill, hammer mill, sack holder, groundnut decorticator, balance etc has been established. Imparting training to the farmers/entrepreneurs would be a regular activity of this unit.
- h) The pilot plant including sorting table, washing machine, sponger, inclined roller conveyor, fruit grader, waxing machine and infra red dryer for primary processing of horticultural produce was set up.

2.3 ANIMAL SCIENCES

Animal Breeding

Cattle Breeding

- a) Average calving interval of 13.2 months recorded during the period under report was well below the target value of 15 months envisaged.
- b) Three crossbred cows (# 838, 1008 and 988) produced 3988, 3915 and 3893 kg milk, respectively in a mature lactation period of 300 days.
- c) A total of 23 heifers completed the first lactation and about 26% of these produced more than 2000 kg of milk/lactation.
- d) About 29% crossbred cows produced more than 3000 kg of milk during lactation and about 71% of the cows produced between 2200 and 3000 kg milk/lactation.
- e) Sixty-six crossbred male calves out of dams of high genetic potential for milk production were supplied to farmers for the dissemination of superior germplasm.
- f) In Harijana cattle, six sets have completed their test mating while seventh set is in progress, four sets have been evaluated and out of them eight sires have been selected for nominated mating. A total of 608 inseminations from selected bulls of 6th set have been performed during the current year.

Goat Breeding

Beetal and Jakhrana goats produced 1.28 and 1.16 kids per kidding, respectively. Forty-one goats were disseminated for breed improvement to the farmers of the state.



Sheep Breeding

- Average 6 months body weights were 14.24, 16.83 and 20.43 kg in Nali, Synthetic and Munjal lambs, respectively.
- Synthetic population of sheep showed marked improvement in wool quality. The average staple length, fibre diameter and medullation per cent were 11.69, 16.33 and 49.61, respectively.
- Out of the total mating, 93.3% of the ewes lambed during the year. The survivability of the flock was 93.6 per cent.
- Forty-three sheep were disseminated for breed improvement to the farmers.



Poultry Breeding

- The crossbred and purebred layer pullets were similar in respect of performance traits. However crossbred pullets were heavier than purebred pullets at 20 and 40 weeks of age.
- Broiler dam line has improved significantly for egg number up to 40 weeks of age and laid on an average 87 eggs.
- Mortality in poultry flock during the period under report was quite lower than the standard norms.

Animal Nutrition

- Crossbred calves and heifers be fed 15% extra energy than the standard to get better growth and reproductive performance.
- Feeding either 15% protein or energy higher than NRC Feeding Standards to the lactating cattle, improved the digestibility of nutrients, reduced the age of puberty and age at first calving.
- Cost of feeding for milk production was the lowest in goats reared solely on berseem hay as compared to those on conventional feed and fodder.
- Supplementation of P, Cu and Zn was recommended in the diet of animals reared in soil mineral deficient zones of Haryana.
- White pith of sugarcane is the best absorbent of molasses. Molasses up to 45% level can be used in concentrate mixture without any dough/cake formation.

Animal Production Physiology

- Artificial insemination trial results clearly showed significantly higher conception rate in buffaloes with frozen semen thawed at 60°C for 7 sec. in comparison to thawing at 37°C for 30 sec.
- Thirty-eight postpartum anestrus cows of Haryana/Sahiwal/Tharparker/crossbred at Bhiwani Gaushala were treated with various locally available hormones such as Duraprogen (2 ml), Progynon (1 ml), Lutalyse (5 ml) and other Veterinary Ayurvedic preparations. Out of these 22 (58%) came into heat within one month of the treatment and subsequently 12 (55%) conceived with 1st artificial insemination after treatment. Eight Repeat Breeder cows at this Gaushala were also treated with Chorulon hormone and out of these 3 (38%) conceived after the treatment.

- c) Treatment of 12 anestrus buffaloes and heifers of BRC (Deptt. of LPM) was done with CIDR+Folligon and other locally available hormones. Out of these 11 came to heat after treatment and 6 (55%) settled with 1st A.I. after treatment.
- d) One hundred thirty hormonal kits (E_2+P_4 , 1 : 2.5) for induction of lactation were formulated and supplied on demand by the animal owners from different places. These cows are yielding between 3 to 15 l of milk/day. An income of Rs. 1,38,400/- has been generated during this period through this scheme.

Animal Products Technology

- a) Ready-to-serve spice *paneer* was prepared and shelf-life study results indicated that it can be stored for 15 days at room temperature with acceptable organoleptic quality.
- b) Extension of shelf life of *paneer* was studied by microwave treatment and it was found that it could be stored upto 60 days under refrigeration conditions.
- c) Two new plan schemes "Training Programme for SC Youth in Processing of Milk and Milk Products" and "Training Programme for SC Youth in Processing of Meat, Poultry and their Products" have been approved for inclusion and their implementation is under progress.

Meat and milk processing labs were strengthened by adding the required equipments.

Livestock Production Management

- a) Average total lactation yield increased from 2346.9 to 2407.9 kg.
- b) Average 305 days yield increased from 2251.9 to 2261.4 kg.
- c) Average lactation length increased from 307.8 days to 325.2 days.
- d) The wet average increased from 7.7 to 7.8 kg which is higher than the target fixed and herd average increased from 5.2 to 5.3 kg which was higher than the target allotted.
- e) Thirteen daughters completed their first lactation during 2006-07.
- f) Three elite daughters produced 2796, 2433 and 2421 kg milk, respectively, in 305 days in their first lactation.
- g) With better management mortality rate has been successfully reduced from 4.0 to 3.3 per cent.
- h) Breaking in practices in buffalo heifers helped in increasing the milk yield and lactation length of buffalo heifers.
- i) Four breeding bulls were supplied to Village Panchayats/HAU Department during the period.
- j) Five Murrah Buffaloes of superior germplasm have been purchased from the field.
- k) Booklet on Management of heifer for early maturity and conception has been brought out.

2.4 VETERINARY SCIENCES

Anatomy & Histology

- a) Scanning electron microscopy of uterus revealed that marked differences occurred during the follicular and luteal phases of the estrous cycle with respect to distribution of ciliated and non-ciliated cells, which were corroborated by the histological studies. Topography and shape of different minor salivary glands (Buccal and labial glands) in goat were also studied. The dorsal buccal glands were found arranged in dorsal, middle and ventral rows which were lanceolate, quadrilateral and triangular/prismatic in shape, respectively. In addition histomorphological and histochemical studies on labial minor salivary gland in buffalo were also studied in detail. The ultrastructural features of the nasopharyngeal tonsil of the sheep indicate that it is a component of mucosa associated lymphoid tissue and an immunological target organ.
- b) At places, the non-ciliated areas representing follicular associated epithelium (FAE) showed different types of microvillus (MV) cells including M cells. The number of MV and M cells appeared to be more than in goat and horse. TEM revealed different cell types of respiratory and FAE with irregular distribution of almost all the cell organelles. M cells, superficially located in FAE, had irregular free surface with very small sized microvilli. The cytoplasm of these cells had a large number of supranuclear small vacuoles in addition to cell organelles distributed in MV cells. These cells were in initiate contact with intercellular placed lymphocytes. The ultra structural features of M cells resembled to those of the horse.

Animal Biotechnology

- a) Bluetongue virus (BTV) VP2 gene specific primers were designed which successfully amplified Indian isolates of BTV serotypes 1 and 23 by RT-PCR. Hence, a technology has been developed which has potential application for serotyping of BTV-1 and 23 using rapid, reliable and specific RT-PCR assay. The partial VP2 gene sequences of BTV-1 Avikanagar (Rajasthan), Sirsa 3 (Haryana) and Madras (Tamil Nadu) isolates exhibited 99% nucleotide sequence homology while BTV-1 Sirsa 1 (Haryana) exhibited 11-13 per cent divergence from the three isolates. The phylogenetic relationship revealed that the four BTV-1 Indian isolates are closely related to BTV-1 Australian isolates followed by BTV-1 South African isolates. Therefore, it is concluded that the Indian isolates of BTV-1 might have originated from Australian isolates of BTV-1.
- b) About 60% diarrheic samples from age group of 5 days–21 months of children were found positive by RNA-PAGE for Group-A rotavirus. The avian fecal samples from different poultry farms were screened for rotaviruses and all positive samples showed long electropherotype, similar to bovine Group-A rotavirus indicating that rotavirus a major diarrhea causing pathogens, is circulating in human, avian and livestock population.
- c) Buffalo oocytes retrieved from the ovaries from the slaughter house were vitrified in two concentrations of cryoprotactants (Ethylene glycol) 5mM and 7mM with two additive in maturative media FCS and BSA. It was found that 7mM case of Ethylene glycol and BSA is effective for vitrification of buffalo oocytes. Study was also conducted to evaluate the mRNA transcript in buffalo oocytes for Bax and Bcl-2 and found that in good quality cumulus oocytes complex, the ratio of Bax and Bcl is optimum.
- d) Random amplified polymorphic DNA (RAPD) technique was used to characterize Murrah, Nili-Ravi and Bhadawari breeds of buffaloes. Microsatellite markers recommended by FAO are being standardized and will be used for characterization and to study genetic diversity of these breeds.

- e) Polymorphism in DRB 3.2 gene by PCR-RFLP and its association with mastitis in Murrah and Nili-Ravi buffaloes was carried out by polymerase chain reaction-restriction fragment length polymorphism (PCR-RELP) technique and its association was studied with mastitis.

Animal Husbandry Extension

The department has initiated AP Cess funded Research Project entitled, "An Economic Analysis of Cattle and Buffalo Husbandry in Haryana". The selection of districts, tehsils, cluster villages and stratified sample farmers (200) were chosen. Likewise the respondent schedule in accordance with the objectives of the present study was designed as a research-tool covering areas of both Livestock Economics and Veterinary & Animal Husbandry Extension and summer season data collection was started. A schedule was also developed, pre-tested and finalized to measure the productivity of Veterinary Surgeons working in the State Department of Animal Husbandry.

Animal Reproduction Gynecology & Obstetrics

Investigations were carried out to determine prognostic indices in cases of bovine dystocia. It was observed that the dystocia was associated with high levels of blood histamine and plasma cortisol. Evaluation of surgical and non-surgical methods of handling of dystocia revealed that the animals handled by non-surgical means had better success rate than the animals which were operated upon. The animals which were brought for treatment within 24 hours torsion had better recovery rate than the delayed cases.

Biochemistry

- a) Clinical efficacy of inorganic salts with aqueous extract of dried leaves of *Azadirachta indica* against gastrointestinal tract (GIT) parasites of sheep did not prove beneficial in enhancing the clinical efficacy of inorganic copper salts and rather the clinical efficacy was reduced as evidenced by decrease in per cent reduction of eggs per gram of faeces. The clinical cases presented at TVCSC were pursued for study on biochemical changes in blood. Parameters indicating intermediary metabolic status were analyzed from samples collected from buffalo and canine patients. The elevations in Lactate dehydrogenase observed were significant by high variety of hepatic disorders. Changes observed showed it to be high in abnormality in the liver damage suspected cases. Hypertriglyceridemia was observed in liver disorders cases.
- b) The alcoholic extract of the garlic cloves which showed activity against infectious bursal disease virus in *in vitro* conditions was checked for the activities in *in vivo* conditions. In chicks fed garlic extract at the rate of 500 mg/kg body weight, the feed efficiency was found to be raised. The biochemical values were comparable in garlic fed and control group chicks. Histologically all the tissues examined appeared to be normal except for the mild to moderate hydropic changes in the sections of the liver from chicks fed garlic extract at higher dose.

Clinical Medicine, Ethics Jurisprudence

- a) Investigations were carried out on therapeutic management of clinical mastitis in cattle and buffaloes, post-parturient haemoglobinuria in buffaloes and pica/allotriophagia in large and pet animals and appropriate therapeutic regimen developed for each problem. Clinical and bacteriological responses to different therapeutic regimens, viz. Cefquinome and cloxacilin intramammary, ampicillin + cloxacilin in high dose (4 g) and vitamin + selenium (antioxidant) intramuscularly alone and also in combination were assessed and found to be effective in treating

clinical cases of mastitis in cattle and buffaloes. Therapeutic trial investigations in post-parturient haemoglobinuria in buffaloes revealed that vitamin A @ 18 lac units intra-muscularly along with the sodium acid phosphate 80.0 g in 500 ml NSS intra-venously administered intravenously daily for 4-5 days was highly effective in treatment of disease. Comparative evaluation of therapeutic efficacy of dextrose (20%) one litre intra-venously along with long-acting insulin 80 IU sub-cutaneously daily for three days and oral administration of glucose 500 g in water immediately after drenching sodium bicarbonate 30 g in water twice a day for 3 days revealed that the former therapeutic regimen was better in treating clinical cases of ketosis in buffaloes.

- b) Clinico-therapeutic investigations were carried out on 34 clinical cases of pica/allotriophagia in buffaloes, cows and camels. Most of these animals were found to be positive for gastro-intestinal parasitic infections and deficient in minerals. These animals recovered well when treated with fenbendazole (anthelmintics) along with mineral mixture. However, three pica affected cases suffered from *Balantidium coli* infection and responded well when treated with metronidazole for 5 days along with mineral mixture. Clinical investigations on 65 cases of allotriophagia in canines revealed that oral administration of anthelmintics combination (fenbendazole, praziquantel and pyrantel pamoate) and supportive therapy with multivitamins/multiminerals and calcium supplementation were found highly effective in therapeutic management of disease condition.

Epidemiology and Preventive Medicine

- a) Major diseases investigated were haemorrhagic septicemia (HS), foot & mouth disease, Surra, mixed infection of HS and Surra, mixed infection of *Theileria* and Babesiosis in bovines. Five outbreaks of HS alone, outbreak of HS along with surra and one of surra alone was investigated and H.S. was responsible for maximum mortality. Eight outbreaks of sheep pox were investigated with mortality of 87 sheep due to this. Sheep pox, strongylosis and haemonchosis were identified as the major health problems in sheep and goats during this period. In pigs, three outbreaks of swine fever and one due to *E. coli* were recorded. A total of 90 out of 151 affected pigs died of swine fever. One outbreak of mixed infection of *Theileria* and *Babesiosis* was investigated at HAU Farm.
- b) Samples from 14 outbreaks suspected for toxic conditions in cattle, buffalo, sheep, sambar and peacock were collected and analysed in the laboratory. One outbreak each was found positive for HCN and endosulphan residues in buffalo feed and ruminal content, respectively. Two outbreaks of pesticide induced toxicity were observed in peacocks in Bhiwani. One outbreak of T-2 mycotoxicity was observed at GLF Hisar. A total of 43 out of 79 fed samples were found to contain aflatoxin above permissible limit of 30 ppb. Total 35 samples were having salt above the permissible limit of 0.6 per cent. No milk sample was positive when tested for the urea by field spot test.
- c) A total of 411 samples were tested for Brucellosis, out of them 36 samples were found positive. A total of 300 animals were tested for T.B. and 28 were found doubtful. A total of 19 animals were tested for John's disease and none was found positive for it.
- d) In poultry, disease investigation work was carried out in about 3000 flocks. Major diseases diagnosed were *E. coli* infections, respiratory disease complex, chronic respiratory disease, coccidiosis, infectious bursal disease and visceral gout. In addition, other diseases like aspergillosis, fowl typhoid, vitamin and mineral deficiencies, Pneumonia, heat stroke, Marek's disease etc. were also diagnosed. Fowl adeno viruses from broiler chicks affected with

hydropericardium- inclusion body hepatitis syndrome were characterized by employing molecular biological tools. RFLP pattern and nucleotide sequencing revealed the involvement of other serotypes alongwith FAV-4 and FAV-8 in causation of this disease in Haryana.

Microbiology

- a) FMD surveillance studies revealed only one FMD outbreak due to FMD virus type O in Haryana which indicated successful implementation of FMD- Control programme. A total of 3048 randomly selected animals (1484, Pre- 1st and 1564, Pre- 4th Phase of vaccination) from different villages in eight districts of Haryana were analysed for anti- 3A NSP antibodies for the identification of carrier animals. The percentage of animals which were found positive for anti-3A NSP antibodies during these two phases: Pre 1st vaccination (before start of FMD CP) and Pre 4th vaccination (after two years of FMD-CP) were 31.9 and 18.4 per cent, respectively. A significant ($P < 0.01$) reduction in anti-NSP antibody profile 2 years after launching FMD-CP also revealed successful implementation of FMD-CP in Haryana. A total of 615 sera samples were processed for monitoring antibody titres against FMD type O, A and Asia-1 through LPB-ELISA.
- b) *E. coli* chromosomal DNA as adjuvant, antigen preparations, hyper-immune camel serum for affinity purification of 'heavy chain antibodies' (HCABs), mononuclear cells separation for total RNA extraction, etc. were produced/processed in sufficient amounts. The hypothesis that HCABs- the source of dAbs- can be generated against LPS, an antigen during anamnestic response was tested before proceeding for construction of phage display library representing anti-LPS dAbs as its part. Work on RT-PCR of camel VHH gene segments was initiated.
- c) Sero-monitoring studies on performance of hemorrhagic septicemia vaccine under farm and village conditions indicated that six month vaccination schedule should be followed for maintaining high protective status of animals and thus minimizing the chances of immunity breakdown at the time of the disease outbreaks in unprotected/poorly protected animals.
- d) One hundred and twenty isolates of *E. coli* were characterized (isolated from respiratory disease complex).

Parasitology

- a) A monoclonal antibody based latex agglutination test (LAT) for diagnosis of *Trypanosoma evansi* has been developed for the first time in India. It has several advantages over the presently available other diagnostic tests, e.g. simple to perform, rapid, cost-effective and easily adaptable to the field conditions.
- b) Studies carried out on anthelmintic resistance indicated that ivermectin and closantel can be used as dewormers in Hisar and Sirsa districts where anthelmintic resistance for commonly used drugs (fenbendazole and tetramisole HCl) is present. Similarly, ivermectin can be used as dewormer in Bhiwani and Fatehabad districts, whereas the use of morantel citrate should be judicious. Studies on development of reversion to susceptibility of fenbendazole and levamisole resistant *Haemonchus contortus* strain in sheep on University Sheep Breeding Farm revealed that resistance against these drugs was still present and there is only partial reversion, therefore, use of these anthelmintics on University Sheep Farm is still not recommended.
- c) Ground truth collection for validation of the preliminary map 'snail-borne diseases of livestock in Haryana' prepared last year (based on RS and GIS techniques), was undertaken in Hisar,

Sirsa, Fatehabad and Bhiwani districts this year. Largely status of map remained unchanged but several villages in Sirsa district Lohgarh, Sahuwala, Jotanwali, Fatehpurian and waterlogged areas near Abubshahar that were mapped as risk free have been included as infected areas.

Pathology

Supplementation of Vitamin E in experimental Hydro pericardium syndrome in broiler chicks resulted in less severe gross and microscopic lesions in liver and lungs and increased cell mediated immune response indicating immunomodulatory role in pathology and pathogenesis of HPS. A total of 86 animals including Sheep – 54 and Goats – 32 were necropsied. Important conditions included Pneumonia (28), Pneumoenteritis (4), Enteritis (23), Gastroenteritis (7), Abomasitis (2), Pericarditis (1), Jaundice (1), Ascites (1), Hydropericardium (1), Perihepatitis (1) and Septicaemic lesions – (1), NAD, (1) Liver rupture-2, Hepatitis-2. Eleven carcasses were found putrefied. Gross and microscopic alterations in different organs were studied.

Pharmacology & Toxicology

- a) Maximum tolerated doses of acetamiprid were found to be 3600 mg/kg by oral and 2400 mg/kg by intraperitoneal route in male adult rats. The gross observable symptoms started at 10 minutes and continued up to 90 minutes with peak severity between 40-60 minutes. The main symptoms were depression, abnormal posture, opisthotonus, upward intermittent head jerks and slow hind limb kicking/stretching.
- b) Subacute toxicity studies were conducted in adult male rats following daily oral administration of acetamiprid @ 720 and 1440 mg/kg for 7, 14 and 28 days. None of the treated rats showed any significant toxic symptoms or drastic change in general activity during 28 days. There was no significant effect on Hb, TLC, TEC and PCV up to 28 days in treated rats. It did not affect DLC except eosinophilia ($5.8 \pm 0.5\%$) was observed on 28th day. Acetamiprid caused decrease in plasma glucose (101.1-106.0 mg/100 ml) and albumin levels (1.06-1.36 g/100 ml) in some rats but were within normal range. The levels of protein were in the normal range indicating no severe damage to vital organs. There was no effect on creatinine levels suggesting that acetamiprid had no general toxic effects on kidney. Acetamiprid caused slight increase on blood urea levels (37.46-41.96 mg/100 ml) but it was within normal range. It did not cause any significant effect on plasma transaminases (AST, ALT) and alkaline phosphatase levels indicating that it did not cause severe damage to the vital organs (liver, lung, kidney, heart), which was further confirmed by histopathological findings, as only mild lesions in lung (perivascular and peribronchiole lymphoid aggregation) and in liver (fatty changes, dilatation of sinusoids) being observed only in some rats. The results of subacute toxicity of acetamiprid suggested it to be a safer insecticide in mammals.

Physiology

Studies have been conducted to investigate the effect of environmental variations/different seasons on rumen fermentation pattern and blood metabolites in buffaloes. Total VFA concentration, ammonia nitrogen and rumen micro-organisms were higher in March-April season as compared to extreme hot and cold environment. Similarly, the blood metabolites like glucose, enzyme etc. were also affected in extreme hot & cold environment. The above results revealed that rumen metabolism as well as blood metabolites are affected by the seasonal variations.

Public Health

Food borne pathogens, *E. coli*, *Salmonella* and *Yersinia*, were found to be present in pig and goat meat samples collected from local market indicating poor hygienic practices in the processing of meat. Samples of drinking water received from the Campus and public were examined for bacteriological quality and potability. 7% samples were non-potable based on bacteriological quality, while the quality of 12.4% samples was doubtful due to high viable bacteria count. Non-potable and bacteriologically doubtful water sources included tap, tube well, hand pumps and water purifiers. Haemagglutination Inhibition test was standardized for detection of antibodies against Japanese Encephalitis. The department organized one-day Symposium on "Interdisciplinary Approach for Tuberculosis Control" on the occasion of the World TB Day on 24th March 2007.

Surgery & Radiology

- Comparative efficacy of tramadol @ 2 mg/kg i.m. and buprenorphine @ .01 mg/kg as pre-emptive analgesic following ovariohysterectomy in female dogs was studied. These drugs were administered 30 minutes prior to atropine sulfate 0.4 mg/kg i.m. followed by diazepam @ 0.2 mg/kg i.m. General anaesthesia was induced by propofol 6 mg/kg b.w. and maintained by propofol @ 4 mg/kg b.w. by repeat bolus injection. Tramadol was repeated after every six hours and buprenorphine after every 12 hours upto 2nd post-operative day. Tramadol was found to be more effective as pre-emptive analgesic than buprenorphine.
- Comparative efficacy of meloxicam and rofecoxib in pain management following long bone fractures in dogs was studied under general anaesthesia with acepromazine 0.5 mg/kg i.m. atropine 0.2 mg/kg SC and propofol intravenously. In one group, meloxicam @ 0.2 mg/kg i.m. and in group 2 rofecoxib @ 1 mg/kg i.m. half an hour pre-operatively administered at least for 3 days. Rofecoxib was found to be better analgesic at immediate post-operative period and both the drugs should be repeated 9 hours for efficient post operative pain management.
- Ultrasonographic assessment of wound healing at different incision sites, *i.e.* linea alba and flank region for ovariohysterectomy in 18 female dogs can be helpful in assessing the wound healing.
- Atropine (0.04 mg/kg i.m.), glycopyrrolate (0.01 mg/kg i.m.) and xylazine (0.04 mg/kg i.m.) were evaluated in buffalo calves. Both atropine and glycopyrrolate blocked vagal mediated (xylazine induced) bradycardia. Antisialagogue activity was more pronounced in glycopyrrolate than atropine. Glycopyrrolate is better than atropine in offsetting the side effects on haemodynamic parameters induced by xylazine.

College Central Lab

- Brucella abortus* from buffaloes and *Brucella melitensis* from sheep and goats were isolated following abortion establishing existence of brucellosis in animals in the State. The OIE prescribed test for brucellosis in bovine, *i.e.* competitive ELISA was found much superior in distinguishing vaccinated buffaloes than infected ones in comparison to indirect ELISA and RBPT. The ELISA test developed by the Laboratory for diagnosing brucellosis in sheep is as effective as



commercial ELISA Kit marketed by M/S Institut Pourquier, France. The molecular diagnostic technique (PCR) for detecting brucellosis in sheep has been developed by the Laboratory and was found to be useful in identifying *Brucella* DNA in clinical samples like uterine discharge, milk and blood of sheep. The best clinical sample for PCR for diagnosing brucellosis in sheep was found to be uterine discharge in comparison to milk and blood.

- b) Polymerase chain reaction (PCR) assay was standardized in the laboratory for the first time in India to detect *Staphylococcus aureus* directly from milk of cows and buffaloes and from the broth culture also to detect sub clinical mastitis.
- c) A total of 266 semen samples microbial load, 4368 quarter milk samples from 1092 cows and buffaloes and 140 clinical samples, were subjected to cultural examination and antimicrobial sensitivity testing. Results were communicated to farmers to institute proper line of treatment.
- d) Latex Agglutination test, coagulase test and PCR assay were compared to identify and differentiate 633 cultures of Staphylococci isolated from milk samples of cows and buffaloes. Although sensitivity of latex agglutination test was less (78.85%) as compared to Coagulase test (80.76%) and PCR (100%) but the test could differentiate *S. aureus* with other staphylococci within 5 minutes. Treatment trial with Amoxyrum and Sulbactam combination indicated encouraging results when the medicine is administered by combination of systemic and intramammary route.

Disease Free Small Animal House

- a) A unique facility only available at Hisar in Haryana, it is engaged in raising disease free laboratory animals, viz. *Swiss Albino Mice*, *Wistar Albino Rats*, *Duncan Hartley Guinea pigs*, *Golden Syrian Hamsters* and *New Zealand White Rabbits* for biological research and teaching purpose. The animal house is registered with Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Government of India vide registration No. 235/CPCSEA. This animal house supplies quality animals to various outside institutions on payment basis after meeting the demand of various departments of this university. During the period under report a total of 9811 laboratory animals (6010 mice, 1433 rats, 2153 guinea pigs, 215 rabbits) were supplied and raised the income of Rs.9.57,450/-.



2.5 BASIC SCIENCES

Biochemistry

- a) L-49 and Hisar Safeda of guava differing in their shelf lives were analyzed for various components of oxidative stress and enzymatic and non-enzymatic antioxidative systems at different stages of fruit ripening. Indices of oxidative stress, viz. lipoxigenase activity, malondialdehyde value and H_2O_2 content increased throughout during ripening in both the varieties. The extent of oxidative stress was more pronounced in Hisar Safeda- than in L-49, Except for superoxide dismutase, activities of all other antioxidative enzymes, catalase, peroxidase, ascorbate peroxidase and glutathione reductase increased up to color turning stage and decreased

thereafter. It was inferred that ripening of guava fruit is accompanied by a progressive increase in oxidative/peroxidative stress which induces antioxidant system but not until later stages of ripening. Over-accumulation of ROS due to dysfunctioning of ROS scavenging systems at later stages of fruit ripening appears to be responsible for membrane deterioration and loss of tissue structure in ripened/over-ripened fruits.

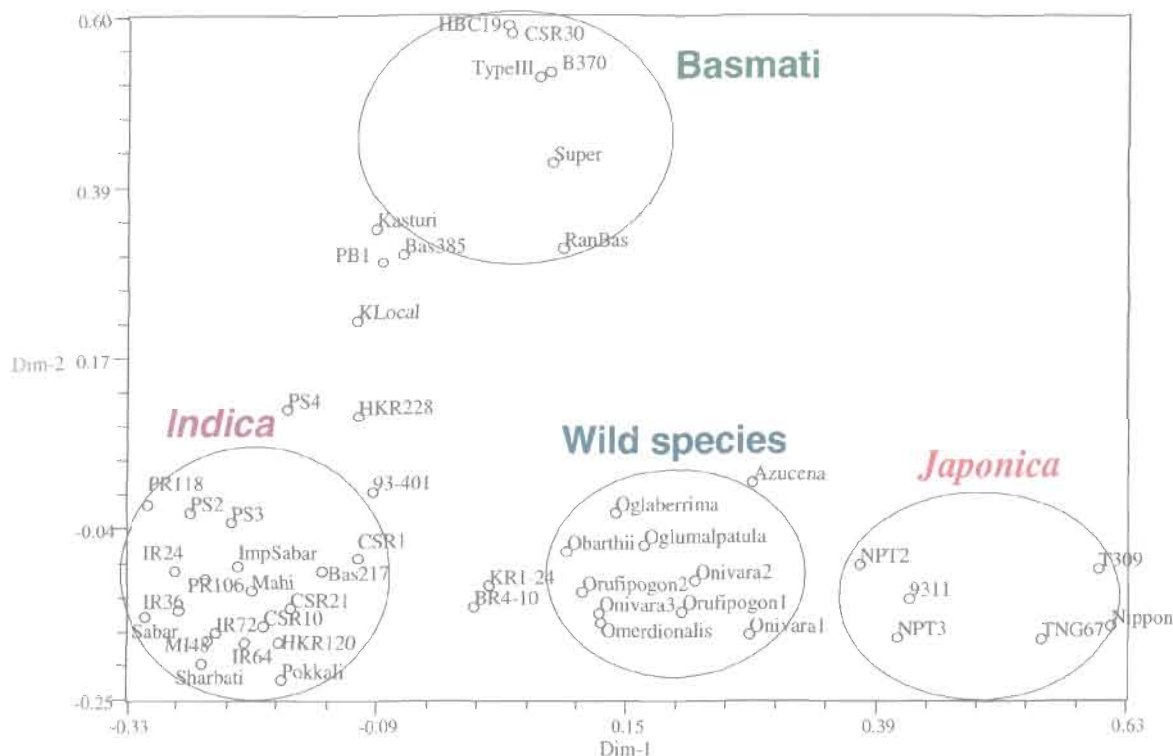


Safed Musli (*Chlorophytum*) – Micropropagation

- b) Effect of salinity on osmoregulation and enzymes and metabolites of ROS scavenging pathway in leaves of rice (*Oryza sativa*) seedling was studied and four cultivars of rice, two tolerant (CSR-1, CSR-10) and two susceptible (IR 28, MI 48) to salinity. Relative water content and osmotic potential decreased upon salinization in all the four cultivars, however, the magnitude of reduction was more at high salt concentration. K^+/Na^+ was higher in CSR-1 and CSR-10 than that in IR 28 and MI-48. The activity of superoxide dismutase glutathione reductase and dehydroascorbate reductase was enhanced in CSR-1 and CSR-10 & in IR-28 and MI-48. There was reduction in the level of these enzymes. Imposition of stress resulted in increase in CAT and POX in all the cultivars, however, the magnitude of increase was higher in sensitive cultivars than in resistant varieties. The tolerant cultivars had higher ratio of reduced/oxidized glutathione.
- c) For the maximum production of pectin methyl esterase, an enzyme important in fruit processing industry, from *Aspergillus* sp., culture conditions on incubation time, temperature, concentration of C and N sources etc. have been optimized.
- d) Investigations on six genotypes each of yellow and grey colored pearl millet have shown that development of off flavour and odour was neither related to fat content nor to the content of free fatty acids and fat acidity, but it corresponded well with peroxidase activity and C-glycosylflavone content.

Biotechnology & Molecular Biology

- a) Recombinant Inbred Lines (RILs) from CSR10 x HBC19 (Taraori Basmati), New Plant Type II x HBC19 and Azucena x HBC19 crosses using single seed descent have been developed and partially characterized for agronomic and grain quality characteristics. These RIL populations have been prepared for linkage mapping of genes/QTLs for Basmati rice grain quality and stress tolerance traits.



Genetic relationship among 50 rice genotypes based on micro satellite marker analysis

- b) A DNA fingerprint database has been developed for 50 rice genotypes representative of the traditional Basmati (TB), cross-bred Basmati, *indica*, *japonica* and wild rice groups using fifty SSR and thirty transposable element (TE) based markers.
- c) About 25 putative transgenic *indica* (IR72 and HKR47) rice plants with seed albumin (*Ama1*) gene from *Amaranthus hypochondriacus* have been developed, hardened and transplanted in the transgenic greenhouse.
- d) Micropropagation of *Lilium* Asiatic (Golden Melody & Orange Pixie) and oriental (Yelloween & Crystal light) hybrids: A number of explants including stem transverse thin cell layers, leaf pieces, bulb scale basal segments, bulb transverse thin cell layers and shoot tip were used. The micropropagated plantlets were hardened and transplanted to the potted soil.
- e) Genetic diversity among 31 wheat varieties was studied using RAPD, SSR and ISSR markers and genotypes were grouped in three major clusters. One cluster represented varieties developed with NP series of Indigenous origin (NP4, K68 and HD1949). Second major group clustered salt and drought tolerant and moderately tolerant cultivars (Kharchia, Kharchia 65, C391, C306, KRL1-4 and KRL19). Most of high yielding varieties (PBW343, UP2338 and CPAN3004) and quality wheat varieties (Kundan, Atlas, WH416 or WH146, WH283, etc.) were clustered in third major group. The varieties present in second and third major groups were mainly exotic or exotic x Indigenous types.
- f) Insect resistant transgenic lines of chickpea cultivar C-235 have been developed (Patent filed). PCR amplification of genomic DNA of T₀ transgenics gave an amplified product of 360 bp

confirming the presence of *Cry1Aa* (3). Seed from T_0 plants were collected and T_1 generation raised this year. Insect larval bioassay was conducted using leaves of these T_1 plants confirming the transgenic nature of the plants.

- g) Genetic diversity and identification of gender-specific markers in two dioecious plant species, date palm (*Phoenix dactylifera*) and jojoba (*Simmondsia chinensis*) was studied. Protocols for DNA isolation and PCR amplification using RAPD primers have been standardized in both the plant species. RAPD analysis of thirty date-palm plants (ten male plants of unknown origin and ten female plants each of Khadrawi and Shamran varieties) has led to the identification two putative sex-linked markers.
- h) Isolates of *Rhizobium ciceri* were found to improve survival rate of *in vitro* regenerated chickpea plantlets in the soil. Rhizobial isolates producing significant amount of IAA helped plantlets survive the trauma of transplantation thus providing hope for development and establishment of regenerated chickpea plants.
- i) To maximize and economize PHB production by rhizobia, several new bacterial strains have been isolated and their PHB production efficiency is being evaluated.
- j) The *Aloe vera* plants were micro-propagated and transferred to greenhouse. One variant of *Aloe vera* has been identified, which showed less thorns, thin cuticle, and more succulent leaves. These plants also showed more number of sprouts in pot conditions. The variant plants and normal regenerated plants (>100 plants) were grown in herbal garden to evaluate them for different parameters. The plants established very well under field conditions with more than 95% success. The data will be recorded in June in these plants.
- k) In citrus, Kinnow and Mosambi were used in micropropagation. Nodal and epicotyl explants from seedlings were used. Multiple shoot formation was observed in mosambi. Regenerated shoots were rooted at low frequency.
- l) Cauliflower varieties, Pusa Kartiki and Pusa Agheni, were transformed with BT (*cry*) genes. The plants were transferred to pots after molecular analysis where these flowered and set seeds. The plants were PCR positive for introduced gene. Seeds were collected and will be analysed at molecular level.
- m) Embryo rescue in interspecific hybrids between *Brassica juncea* and *Brassica alba* was carried out to transfer the *Alternaria* blight resistant gene into *Brassica juncea*. The interspecific crosses were made between two promising *Brassica juncea* cultivars, viz. Varuna and RH 0345 and *Brassica alba* and immature silique containing developing seeds were collected after 20 days of pollination on MS (1962) modified media. The silique was surface sterilized and immature seeds were cultured on the modified MS media to rescue the hybrid embryo. The plantlets grew well on both the media and rooted on MS medium without growth regulators. The plants exhibited morphological characteristics of both the parents in cultures. These plants are being maintained *in vitro* through nodal cultures. The plants will be evaluated further and will be used in hybridization programme.
- n) Two cultivars of tomato, viz. Hisar Lalima and Hisar Anmol, were used for plant regeneration using hypocotyls and cotyledons from 14 days old seedlings grown *in vitro*. The highest regeneration response (68.73%) from hypocotyls in cv Hisar Anmol was observed on MS medium supplemented with BAP 2.5 mg/l and IAA 0.2 mg/l followed by cotyledon (65.43%) on the same

medium. In case of Cv. Hisar Lalima highest regeneration (81.5%) was on MS medium fortified with BAP 2.5 mg/l and IAA 0.2 mg/l on the same medium mentioned above. Rooting was 100% on MS medium supplemented with 0.2 IAA. All the plants survived transferred to soil conditions (1:1 sand and FYM).

- o) *Balanites aegyptiaca* commonly known as desert date is highly drought resistant, multipurpose spiny shrub/tree and a medicinal plant which has vast biological activities due to its saponin content. Nodal and shoot tips were cultured on 20 media. MS basal medium supplemented with 2.0 mg/l BAP for shoot induction and MS basal medium supplemented with 1.0 mg/l BAP in combination with 0.1 mg/l NAA was found to be most effective for shoot multiplication in all explants tried. Shoots were rooted in MS (half) medium supplemented with 2.5 mg/l IBA; transplantation success was 44 per cent.
- p) Experiments were initiated for linkage mapping for yellow mosaic virus disease in mothbean. A total of 60 genotype collections were screened for YMV; 29 of these were resistant and 31 were susceptible. Genomic DNA has been isolated from leaf tissue of these genotypes and conditions for PCR amplification using RAPD and SSR markers have been standardized.
- q) In *Brassica juncea* cvs. CS 52 (salt tolerant) and RH 0116 (salt and drought tolerant), total RNA was isolated from 14-day old seedling exposed to 100-400 mM NaCl for 15, 30, 60 and 120 min. For drought, seedlings were exposed to 15 to 120 min on dry filter paper. RT-PCR was carried out with specific primers designed for ATMYB-2 gene. In CS52, it was observed that expression of this transcription factor remain unaffected by NaCl concentration but it increases with increase in NaCl treatment period. In case of RH0116 seedlings, ATMYB-2 expression was observed at all the salinity levels and after 30 min of drought treatment. Specific RTPCR product was further amplified eluted out and have been cloned in a suitable vector. Further work is in progress.
- r) Culture filtrates of 2-deoxy glucose (2-DG) resistant mutants of *Trichoderma reesei* were able to carry out more than 80% saccharification of delignified rice straw. *Saccharomyces cerevisiae* was able produced 4% ethanol using hydrolysed rice straw.
- s) Cloning of exoglucanase and endoglucanase genes of *Trichoderme reesei* in *E.coli*. A 1.2 kb fragment of exoglucanase gene and about 1.1 kb fragment of endoglucanase gene of *Trichoderme reesei* has been amplified by PCR and cloned in *E.coli*.
- t) *Bacillus thuringeinsis* strain S6 has been evaluated for insecticidal activity against *Earis insulatata* and *Helicoverpa armigera* in cotton under field conditions. There was more than 70% control of insect pests within 4 days of spray. In okra native Bt strain was able to control *Earis insulatata* upto 65% within 5 days of spray.

Botany and Plant Physiology

- a) Phosphorus efficient pigeonpea genotypes have been identified, which can economize on application of P fertilizers.
- b) In chickpea, sodium nitroprusside (nitric oxide donor) was found effective in ameliorating NaCl induced decline in antioxidative defense system.
- c) It was observed that *Suaeda nudiflor*, *Suaeda fruticosa*, *Atriplex nummularia*, *Atriplex lentiformis*, *Atriplex amnicola*, *Haloxylon recurvum* and *Chenopodium murale* are salinity phytoremediating plants.

- d) To develop an efficient protocol for micropropagation of *Jatropha curcus* and selection of salt tolerant lines through tissue culture, it was observed that leaf lamina explants responded best on MS medium supplemented with $5 \times 10^{-6} \text{M}$ each of BAP and $2.5 \times 10^{-6} \text{M}$ NAA. Salt tolerant lines were characterized by high ascorbic acid content with high activities of POX, GR, APX and SOD enzymes. Polypeptides with MW100, 79.4 and 67.6 kDa synthesized in response to NaCl seemed to be critical for survival under salt stress.
- e) Increase in chlorophyll content, photosynthetic and N_2 fixing efficiency with spray of 0.5% ZnSO_4 and 0.5% urea + 0.5% ZnSO_4 have been observed in cluster bean which may prove useful for increasing clusterbean yields under dryland conditions.
- f) Waterlogged soils (20 acres) are being improved by growing tree species (*Melia azedarach*, Eucalyptus C-10, *Terminalia arjuna*, *Pongamia pinnata*, *Syzygium cumini*, *Tamarix diocia*, *Eucalyptus -Hybrid*, *Poplar L-70*, *Dendocalamus strictus*).
- g) Parameters like CSI, membrane injury and K/Na ratio of fully expanded leaf and pollen tube length have been found to be useful for screening of chickpea and pea genotypes for their relative tolerance to salinity and heavy metal stress, respectively.

Chemistry and Physics

- a) Two series of 2-(substituted benzylidene) indanones and 2-(substituted benzylidene) tetralones were synthesized by refluxing of indanone and substituted aldehyde in methanolic sodium hydroxide solution in good yields and evaluated against *Meloidogyne javanica* nematode at different concentrations. Compounds 2-(4-bromo benzylidene) indanone and 2-(4-methoxy) tetralone exhibited maximum mortality (93 and 97 per cent) at a concentration of 1000 ppm. There is no change in the activity by incorporation of hydroxy gp at *para* position and further testing under vivo conditions.
- b) Grapefruit was subjected to chemical examination for isolating and characterizing its secondary metabolites. The juice afforded the following compounds dryobalanone, β -sitosterol, 5, 4'-dihydroxyflavanone-7-O-neohesperidoside. The flavone part afforded friedelin, β -sitosterol, 7-(3',7',11',15'-tetramethyl) octadec-2',6'-dienylcoumarin, limonin, cordialin B. The orange juice does not show debittering on treatment with 8% sucrose and 0.3% β -cyclodextrin. The treated juice was heated to 95 degree centigrade for 10 minutes, cooled and no bitterness was observed up to 6 months.
- c) The methanolic extract of garlic has been prepared. The spectral data for its chemical compounds had been obtained and compounds have been characterized. Methanolic extract was fractionated into hexane, chloroform and acetone fractions and tested against *Earias vittella* (spotted bollworm of cotton) and *Plutella xylostella* (diamond back moth) and found useful against these two insects.
- d) Chemical components of *Cassia* spp. have been isolated and characterized. *Cassia* plants have been found to be useful for antimicrobial activities.

Food Science Technology

- a) Drying of aonla fruits by osmo-air dehydration was the best method as compared to sun drying. Blanched aonla fruits heated and sulphur fumigation and osmosis in 70°C sugar solution for

16 h and their drying in cabinet drier were found best nutritionally and organoleptically. It retains good amount of vitamin C with low tannins and browning. The product has a shelf life of more than 6 months with better colour retention if stored at low temperature.

- b) Cheese and toffee prepared by blending *bael* and guava pulp in the ratio of 50:50 were found most acceptable with ascorbic acid content (12.70 and 10.45 mg/100 g) in *bael*-guava cheese and toffee, respectively.
- c) Jamun RTS (ready-to-serve) drink prepared with 20% pulp, 15% TSS and 0.27% acidity while *jamun* squash prepared with 35% pulp, 50% TSS and 1.0% acidity were found most acceptable.
- d) Potato variety Kufri Bahar had the desirable quality characteristics, e.g. high starch content, total solids, and less browning after frying for producing the best quality French fries. The fries can be stored for three months at -18°C in polypropylene bags.
- e) The process for dehydration of fenugreek and coriander was standardized. Leaves were dried at 60°C after the pretreatments of blanching and non-blanching. The leaves dried after blanching retained higher green colour.
- f) Ready-to-use *saag* was prepared after drying of *sarson* leaves + *methi* + *bathu* in the ratio of 3:1:1. Blanched leaves were dried at 60°C in hot air drier. Dehydration ratio was found to be 1:75. Dehydrated *saag* was used for preparation of fresh *saag* and it was found to be highly acceptable.
- g) The pretreatment with 2% NaCl and PEF 8kV-30s proved to be the best for dehydration of brinjal slices in cabinet drier at 60°C.
- h) A blend of carrot (80%) and kinnow (20%) juices with 14% TSS and 0.3% acidity and pasteurised after bottling was most acceptable RTS juice.
- i) Guava fruits were packed in LDPE and PP bags of 100 and 150 µ thickness with and without 0.5% perforation and stored at room temperature as well as low temperature. Non-perforated LDPE 150 was found to be best with 18 days shelf life at room temperature. A 0.5% level of perforation did not significantly improved the fruits storage life over unpacked fruits.
- j) Effect of short duration of various modified atmosphere conditions was studied in winter season guava Lucknow-49 and short duration of 2 days effectively improves the shelf life of guava fruits. Complete vacuum was found to be the most effective, enhancing the shelf life by 4 days at room temperature.
- k) Wine was prepared from the pulp of *Bael* fruit by fermentation (20-25°C) with a yeast strain isolated from sugarcane juice. The wine contained 8-10 per cent alcohol and had more astringency as compared with wines from guava and grapes. It was moderately liked by untrained panel of judges.
- l) For mycological quality of thermally processed aonla juice, heat treatment of 80°C/3 min. and 70°C/15 min. were found suitable for maximum retention of Vitamin C.
- m) Curry powder was prepared for instant use after drying blended mixture of onion, tomato, ginger and garlic in cabinet drier at 60°C. The rehydration ratio of the powder was found to be 1:5, and can be stored in a polypropylene and aluminized bags at room temperature for three months. The curries and dhal prepared after using curry powder were highly acceptable.

- n) The ready to use curry concentrate in *ghee* was prepared. The shelf life study showed that paste can be stored for one month at room temperature and three months at refrigeration temperature. Its quality when stored at refrigerated temperature was better than that at room temperature. Curries and *dals* prepared using paste were acceptable.
- o) Acceptable value added high fibre biscuit and cakes can be prepared with 5 and 10 per cent anola pomace and its process was standardized.
- p) No significant change in spread ratio and improvement in sensory characters of biscuits prepared with use of soy flour and fruit powder was found. Incorporation of fruit powder significantly improved the taste and aroma as well as increased the protein and fiber content of biscuits (11.04-14.79 and 7.9-8.8 per cent, respectively). Process for preparation of high protein and high fibre biscuits by incorporation of soy flour preferably defatted soy flour and fruit powders such as banana, *ber*, guava and pear up to 15% was standardized.
- q) Blended flour prepared from cereal and pulses can be stored for three months at room temperature in polypropylene bags.
- r) Amaranth seeds contained higher protein, fat, fibre, and Fe, Zn, Cu, Mg than wheat flour and leaves contain appreciable amount of minerals, dietary fibre (47.8%) and B-carotene (3.8 mg/100 g). Amaranth protein concentrate was prepared which contained 30% protein. Amaranth flour prepared after milling was better than prepared after roasting. Biscuits (sweet as well as sweet n salty) prepared by incorporating 20% amaranth flour, 10% concentrate and 2% leaf powder were found acceptable. 10-30% Amaranth Flour (AF), 5-15% Amaranth Protein Concentrate (APC) and 2-6% Amaranth Leave Powder (ALP) were incorporated in the noodles.
- s) Sedimentation and Pelshenke value decreased with incorporation of AF and ALP but increased with incorporation of APC. No significant change in cooking time of noodles was observde. Noodles containing up to 20% AF, 15% APC and 4% ALP were found acceptable in terms of sensory and cooking characteristics. Results are further evaluated.
- t) *Paneer* cubes were marinated in thick curd containing cumin, coriander, salt and sugar with either ginger-garlic or red/black pepper for 1 to 3 h and autoclaved at 15 Psi for 10-20 min. after packaging in multilayhead PE pouches. Best combinations were (i) 10% ginger, 5% garlic and (ii) 12.5% red pepper, 0.25% black pepper with 60 min. of marination and 10 min. heat treatment. The RTS spiced *paneer* was acceptable for 15 days at room temperature in winter months.
- u) *Paneer* slices (120-150 g) were heat treated by microwave with 80 W x 8 min. and 800 W x 2 min. and vacuum packed immediately into PE pouches and PS cps covered with aluminium foil. High dose of microwave improved the shelf life of *paneer* when packed into PE pouches and stored at refrigeration temperature.
- v) Raw vegetables like cucumber, long gourd and tomatoes contained high numbers of coliforms while fruits like grapes, guava and strawberry contained high number of yeasts and molds besides having high staphylococce population directly related to unhygienic handling and storage practices. Washing them prior to consumption reduced about 90% of the micro organisms except for coliforms of vegetables.
- w) The microbiological quality of sweets like *Rasmalai*, *Gulab Jamun*, *Pera*, *Burfi* and *Boondi* was found to be better in samples obtained from well maintained shops as compared to those with poor sanitary conditions. *Rasmalai* was found to have highest number of microorganisms and least count was observed in *Gulab Jamun*.

Genetics

- a) Sodium azide had maximum mutagen efficiency followed by MMS, DES and gamma rays in variety Mescavi of berseem.
- b) Based on grain yield and protein content, wheat genotypes (HGW-25, HGW-38 and HGW-47) were better than best check (WH 711) with 13% enhanced yield and protein content also more than 12 per cent.
- c) Eighteen advanced lines of cross HD 29 x WH 542 were resistant to Karnal bunt. One line showed 5.73 g compared to parents HD 29 and WH 542 with 5.2 g and 3.7 g/100 grain weight, respectively.
- d) Vegetable pea genotypes HVP 03-08 (71.1 q/ha), HVP 03-14 (78.3 q/ha) and HVPe 03-05 (105.6 q/ha) (edible pod) under large scale trial against PC531 (56.4 q/ha) and HVP -04-67 (75.9 q/ha) under small scale trial were found promising in comparison to check Azad Pea-3 (55.8 q/ha). Morphological mutants in genotype HVPe 03-05 were more frequent on 30 kR gamma irradiations followed by 20 kR doses in M₂ generations.
- e) DNA finger print profile of ten male and female genotypes of jojoba [*Simmondsia chinensis* (Link) Schneider] using 80 RAPD primers revealed 348 polymorphic bands. Analysis of data showed that primer UP84 produced a unique allele in all the females and which was absent from all the males used.
- f) Cotton leaf curl virus (CLCuV) is governed by duplicate type of gene action. Back cross breeding method is suggested for improvement against this disease.

Microbiology

- a) A total 1,52,645 liquid biofertilizers (50 ml each) comprising of 33,298 of *Rhizobium*, 36,396 of *Azotobacter* and 82,451 of PSB were produced including 500 cultures of Bioteeka of *Gluconacetobacter*.
- b) Inoculation of *Azotobacter* strain MSX-9 individually as well as with phosphate solubilizing bacteria (PSB) increased seed germination; fruit weight and seed yield of brinjal and bottle gourd. The use of biofertilizers along with 75% of recommended dose of nitrogen gave seed yield at par with full-recommended dose of nitrogen, thus showing a net saving of about 25% of nitrogen in brinjal & bottle gourd.
- c) In pearl millet var. HHB69, inoculation of mixed biofertilizer (*Azotobacter*, *Azospirillum* and PSB) under rain fed condition showed 5.5, 9.4 and 11.2 per cent increase in grain yield at 50, 75 and 100 per cent recommended doses of fertilizers which is higher than the yield with individual inoculation.
- d) Mixed biofertilizer inoculation on different varieties of Mustard under rain fed conditions in demonstrations at farmers' fields in Rewari and Jhajjar districts. These trials resulted in 2.6 to 9.0 per cent increase in grain yield at RDF along with mixed biofertilizer over RDF.
- e) Liquid based culture of *A. chroococcum* (57 and 51) under farmer's field was tested at Masoodpur. An increase in yield of cotton from 3-5 q ha⁻¹ was observed.
- f) Seed treatment with various strains of *Azotobacter* increased the grain yield of pearl millet to the tune of 1.1 to 1.7 q/ha and that of mustard to the tune of 61-194 kg/ha under dry land conditions. Two strains Mac 27 and Mac 68 performed better than others in terms of grain yield as well as their population in the rhizosphere in both the crops.

- g) *Azotobacter* isolates were tested against *Alternaria*, *Fusarium*, *Rhizoctonia* and *Pythium* using dual culture technique. Strains 103, MSX9, AVK 42, and HT 54 showed inhibition against all the four fungi tested.
- h) Inoculation of PSB (P-36) + *Azotobacter* in the soils amended with rock phosphate + FYM increased the count of PSB and *Azotobacter* with time by 10 times. The grain and straw yield of pearl millet and wheat also increased.
- i) Under dry land conditions use of PSB strain P-36 resulted in the increase of yield of guar by 7-8 per cent over control and with different doses of N and P. The population of PSB was maintained to 10^5 after 50 days of sowing. PSB cultures were tested at farmer's field in Raipur, Petwar, Siswal and Bawal and resulted in 4-5 per cent increase in the yield of wheat.
- j) Nutrient mineralization under conventional and bed planting system in wheat revealed that C and N mineralization was higher in bed planting system (648 and 62 mg/kg soil) than conventional planting system (576 and 5.1 mg/kg soil). Amount of soil microbial biomass C and enzyme activities were also higher in bed planting system over conventional system.
- Quality control kit was successfully used for the evaluation of liquid biofertilizers, and the viable counts of liquid biofertilizers did not differ when estimated with either of the two.
- k) Composting of chopped and unchopped rice straw with cattle dung (75:25) tested. Turning and chopping of straw hastened the decomposition of waste.
- l) Supplementation of cattle dung for biogas production by 10% solids from poultry waste in $2M^3$ biogas plant increased gas production by 10-15% and NPK content of spent slurry by 15-20% after stabilization period of five months.
- m) Hydrolysates of pearl millet grain and potato flour obtained by use of commercial enzyme treatment yielded 14-15 per cent sugars which on fermentation with yeast (*Saccharomyces cerevisiae*) produced 5-6 per cent alcohol after 48 hour fermentation at 30°C .

Mathematics and Statistics

- a) Forecasting cotton yield on the basis of biometrical characters, like height, girth, unopened bolls, opened bolls, yield of first pick, second pick and third pick, data were recorded at random on sixty plants of H-1098. Seed cotton yield showed significant correlations with height, diameter at all stages of the crop. The correlation coefficients between yield and other biometrical characters, *i.e.* total number of bolls, no. of unopened bolls, yield of first pick, second pick and third pick were found to be significant at all the stages. In the first week of September when the crop was nearly four month old, the main contributing factors towards yield were total bolls and the diameter of the plant and the value of R^2 was 0.76. Inclusion of the yield of the first pick and total bolls in the last week of September increases the value of R^2 to 0.80. Inclusion of other variables like height and diameter does not increase the value of R^2 . However inclusion of no. of unopened bolls along with the yield of first pick increases the value of R^2 to 0.93 when the crop was five months old and both the partial regression coefficient were also significant.
- b) The pooled analysis data (2003-06) was also done for H-1098. At the stage when the crop was four months old, the main contributing factors were height and diameter and the value of R^2 was 0.395 and both the partial regression coefficients were significant. However, inclusion of data on total number of bolls improved value of R^2 to 60% by taking diameter and total bolls as

the explanatory variable and partial regression coefficient of total yield on diameter and total no. of bolls were found to be significant. Taking yields of first and second pick as independent variables along with the number of opened bolls, increased to 0.78 and both the partial regression coefficient significant. For the year 2006-07, the forecasted yield was approximately 1382 kg/ha. So the seed cotton yield when the crop is five and a half month old would be fairly adequate for advance estimates of yield of cotton.

Sociology

- a) Farmers (40) were drawn from Madho Singhania and Farikala villages. Further, twenty farmers who were using vermi-compost were also selected purposely from the group of farmers from different villages of Sirsa who were attending the training at Sirsa. On the whole, sample comprised 100 farmers and four new improved agricultural practices, *i.e.* vermi-compost, bio-fertilizer, cotton seed treatment and HYVs were selected. Selected farmers (100) were surveyed with the help of pre-tested Interview Schedule. Information was collected on the attitude, level of knowledge and adoption of new improved agricultural practices and the factors affecting them and constraints faced by the farmers in adoption of new agricultural practices.
- b) Information about the impact of these improved agricultural practices on the socio-economic status of farming families has also been collected. Data are being analyzed and tabulated to draw inferences.

Zoology & Aquaculture

- a) Biochemical analysis in fishes exposed to various heavy metals indicated significant reduction in tissue carbohydrates, proteins, lipids and enzyme activity on treatment with As and Cd alone or in combination. Least reduction was observed in case of Zn individually and Cd and Zn combinations, because Cd and Zn are antagonist to each other and inhibits the absorption of each other. The most susceptible fish in terms of quantitative changes in carbohydrates in muscles and gills was *Catla catla* and *Labeo rohita* was least susceptible. Co and Cd caused reduction upto 55% in liver glycogen in *C. mrigala* and Zn upto 8% only. Cr in *C. carpio* and *C. mrigala* enhanced tissue proteins upto 20% in liver and muscles and reduced maximally the amylase and proteolytic enzyme activity in *C. mrigala* and Zn was having the lowest effects.
- b) The most commonly synthesized new protein fractions induced by metals in most of the tissues were of 154.8 and 158.4 Kd Mr, and form the basis for identification of metal toxicity in fish. Study of electropherograms of muscles, gills, liver and kidney extracts of rohu and common carps after their exposure to chlorpyrifos and melathion however, revealed the occurrence of 38 KDa protein fraction in muscles and 30.2 KD a protein fraction in liver, which persisted in the tissue even after 20 days of recovery period thus indicating their importance as biomarkers in pesticide exposed fishes. The activity of some metabolic enzyme showed dose dependent inhibition in the dehydrogenase enzyme like GDH, SDH, MDH and PDH in muscles, liver and kidney in both the species. LDH activity however, was enhanced in these organs in these fishes. Some enzymes like GOT and GPT in both the fish species after exposure to these pesticides were found to show their elevation in order of endosulfan + chlorpyridos + malathion > malathion



+ endosulfan > chlorpyrifos + malathion > endosulfan + chlorpyrifos indicating additive effects of combination of pesticides in comparison to individual pesticides treatments. Recovery studies revealed a partial recovery in activity of all the metabolic enzymes.

- c) Tail rot, black spot disease, Larval mid cycle, Yellow gills, Body cramp or Bent body. Black gills and vibriosis have been identified as the major diseases in freshwater prawn, *Macrobrachium rosenbergii*. Eighteen gram-negative rods (*Aeromonas hydrophila*, *Enterobacter aerogenes*, *Escherichia coli*, *Klebsiella oxytoca*, Kl. *Pneumoniae* subsp. *Aerogenes*, Kl. *Pneumoniae* subsp. *Ozaenae*, *Citrobacter freundii*, *C. koseri*, *Pseudomonas aeruginosa*, *P. alcaligenes*, *P. putida*, *P. stutzeri*, *P. fluorescens*, *Vibrio alginolyticus*, *V. splendidus*, *V. logei*, *V. parahaemolyticus*, *V. diazotrophicus*, *V. fluvialis*), 4 gram positive-bacilli (*Lactobacillus casei*, *L. brevis*, *L. lactis* and *Bacillus subtilis*) and 5 gram-positive cocci (*Micrococcus luteus*, *M. varians*, *Cellobiosococcus sciuri*, *Staphylococcus aureus*, *Streptococcus* grp Q1) were found associated with these diseases.
- d) Otta Head of Ghaggar river fishes showed ulcer and epizootic ulcerative syndrome (EUS) in *Clarias gariepinus* and also in some major carps, resulting in mass mortality. Survey of fish farms of Hansi also showed some brooders of *catla*, rohu and mrigal infected with red spot disease in Nov. 2006 and a disease called Arguloses in the fingerlings and brooders of rohu and mrigal. These carps and some Tilapia fish were also found infected with ulceration and red spot disease in Feb. 2007. There were some symptoms of recovery from these diseases after their treatment with potassium permanganate @ 5 ppm.
- e) Periphytons constitute preferred food to fishes. The use of an additional substrate for the development of periphyton not only enhanced growth but also eliminate the use of costly supplementary feeds- a step towards organic farming. Proximate analysis of periphyton showed that it has high protein (38-41%), which coincides well with the optimal protein requirements of brackish water fish species).
- f) Study on transmission of photic information by pineal organ in fishes the catfish *H. fossilis*. Revealed the impact of environmental photoperiod on the pineal gland. During continuous illuminated phase, small sized nucleus, large vacuoles, extensive endoplasmic reticulum and average sized mitochondria which have densely folded cristae and normal lumen were observed. During the dark phase, an increase in the metabolic activities was noted.
- g) Old model on honeybee repellency proposed by earlier workers gave out 50% repellency even for a non-repellent inert compound. A new model was proposed after removal of this error and gave zero repellency for the non-repellent/inert compound. A new order of upper threshold of repellency was earmarked at 80 instead of 60 per cent.

2.6 HOME SCIENCE

4 Foods & Nutrition

- a) Probiotic food mixtures (germinated as well as non germinated) were used for development of recipes like *kadhi*, *papad*, *wadi* and were found acceptable and nutritionally rich as compared to the products developed from non germinated food mixtures. Probiotic food mixtures were found effective in controlling diarrhoea in mice.
- b) Soya biscuit and barley biscuit were developed and evaluated organoleptically and were well acceptable and rated as 'Very Good' by the panel of judges.

- c) Four traditional recipes namely *ladoo*, salty porridge, *khichari* and *chapatti* were enriched with ragi and kondhara leaves and all products were highly acceptable and nutritionally superior.
- d) *Bael* powder, developed from its fruit, was utilized for development of value added products, *i.e.* traditional, baked and extruded. All the products were acceptable and could be stored well for one month.
- e) Various products utilizing locally available β -carotene rich vegetables (fresh/dried), *e.g.* amaranth, *palak*, carrot, pumpkin and papaya fruit, were developed. All the products had significantly high calcium, iron, magnesium, zinc and phosphorus as compared to the control products. Feeding trials indicated that there was slight increase in height, weight and mid arm circumference and significant reduction in clinical symptoms of various nutritional deficiencies of experimental children.

Clothing & Textiles

- a) Twelve girls' garments (9 *kameez*, 3 *salwar*) and twelve boys' garments (6 *kurta*, 6 *pyjama*) were stitched on the basis of foundation paper patterns and tried on 150 respondents (90 girls and 60 boys) and were modified and standardized. Seventy-two paper patterns of *kameez* and blouse of different sizes standardized in the preceding years were developed for mass production.
- b) Two dyes *neem* leaves and *kachnar* bark, two mordents – alum and ferrous sulphate were selected on the basis of colour and prints obtained. Printing technique for cotton by pre-mordanting method using selected dyes and mordants were standardized. The fastness of colour was found satisfactory which improved slightly after treatment with alum and washing soda.
- c) Evaluation of **Vardi** center set by women of Self Help Group revealed that it was working very well and members were earning around Rs.1,500/month with an investment of Rs. 8000/-.
- d) Developed paper patterns of preferred styles for *kameez-salwar*, top-trousers using TUKA cad software. Opinion of the working women, designers, merchandisers, experts and overseas consumers was sought regarding market & export potential, preferences of the styles with reference to work place and drape ability of the styles in cottons and blends. The designing features were highly appreciated and CD ROM and paper pattern catalogue was prepared for documentation, teaching and imparting trainings.

Skill oriented trainings were imparted on embroidery, crochet, U-pin, block printing, embellishment of ladies suits and construction of cot bag for women of selected village Kaimari.

Family Resource Management

- a) Ergonomic assessment of pearl millet earhead harvesting and bundling activity in wheat harvesting was done. Grip fatigue after pearl millet ear head cutting was 7.1% and women reported maximum pain in fingers, shoulder joints, upper back and mid back. Women adopted standing and bending posture 45 times while collecting the straws while she adopted this posture 12 times for collecting the tying material and tying the bundles. During bundling activity, women reported maximum pain in fingers, mid back and upper back and peak heart rate was 140 bpm making it a heavy and drudgerious activity.
- b) Improved wood stove (first generation improved wood stove) was refined based on the feed back from the rural areas and second generation improved wood stove has been developed and it was named as FRM II wood stove and its acceptability was also assessed.

Human Development & Family Studies

- a) Children admitted to pre-school laboratory were assessed for language, social and cognitive developmental aspects. Children of 2-4 years of age were found above the standard norms in verbal comprehension and were near the norms in language expression, whereas children of 4-5 years performed below the norms. Guidance and counseling sessions were arranged for parents to improve the social behaviour of children and a remarkable improvement was observed thereafter.
- b) Intervention and DAP curriculum was provided throughout the year and a significant improvement in various developmental level of the children was observed.
- c) Emotional intelligence skills (EI) of parents were studied to utilize their EI skills for the improvement of their children's language. An intervention program to improve EI skills proved effective and significant improvement resulted in children's language performance.
- d) The intervention program to empower the rural girls for quality life, proved effective in improving the quality life index of the sample and the programme was efficient in bringing about the desired changes.
- e) The members of Self Help Group's (SHG) were imparted trainings for undertaking skill-oriented employment. Two groups were motivated to start Women's corner in the village and are earning more than Rs. 3000/month. One SHG is involved in cooking the Supplementary Nutrition for *anganwadi* children after developing linkage with ICDS.

Home Science Extension Education

- a) Eight SHGs consisting of 10-15 women in all the five adopted villages were formulated. SHGs members were imparted trainings for undertaking skill oriented employment in various areas. Health and sanitation campaigns and *Gosthis* were organised in Ludas and Bherian village. Under aforestation drive, 250 fruit plants and 60 medicinal plants were distributed in all the adopted villages. About 18 training programmes (3-4 days) were organized on detergents, safe storage of grains and preparation of herbal and kitchen garden for rural women and adolescent girls and impact analysis of trainings was carried out.
- b) Dissemination and field testing of technologies generated by technical departments resist dyeing, capron, solar disinfestations technique for water purification, paper pattern of pick bag, weaning mixtures and instant potato carrot mixes was done. Each technology was disseminated among 90 women of Umra, Sultanpur and Patan village (30 from each village). Adoption feasibility of resist dyeing was found to be highest followed by paper pattern of pick bag, capron and weaning mixtures. However, potato carrot mixes and SODIS techniques were rated comparatively low in terms of adoption feasibility.
- c) A total 210 women were imparted training on tie and dye, detergent making and *rakhi* making under Corporate Social Responsibility Programme of 'Jindal Foundation' Hisar.

3. Extension Education

The Directorate of Extension Education has the overall responsibility of planning, organizing, conducting and coordinating extension activities at the University level through its three full fledged wings namely Farm Advisory Service, Farm Training Service and Farm Information and Communication Service.

3.1 Farm Advisory Service

Farm Advisory Service is the major wing of the Directorate which covers the entire State through its 19 KVKs and ATIC as well as toll free help line service for disseminating relevant technologies to different clientele entailing rural developments including farmers, farm women, rural youth and development agencies. The toll free help line service has also been provided at Hisar, Uchani (Karnal) and Bawal (Rewari).

3.1.1 Krishi Vigyan Kendra

Trainings of farmers, farm women, rural youth and extension functionaries in agriculture and allied fields are a critical input for overall development of rural life. Realizing the crucial need, the Indian Council of Agricultural Research, New Delhi, conceptualized and introduced Krishi Vigyan Kendras (Farmers Service Centers) as an innovative science based institute for vocational training of farming community, conduct "on farm" research for technology assessment and frontline demonstrations to promptly demonstrate the latest farm technologies to the farmers as well as the extension workers. Refresher courses are also arranged for updating the academic resourcefulness of field officers of different state development departments.

The philosophy behind the launching of KVKs system is to accelerate production in agriculture and allied fields by reducing the time lag between the technology generation and its transfer to the end users farmers through the application of Science and Technology, based on principle of "Seeing is believing" and "Learning by doing". To achieve this aim, the KVKs have been given following four revised mandates :

- (i) Collaborate with the subject matter specialists of the State Agricultural Universities/Scientists of the Regional Research Station (NARP) and the State Extension Personnel in "On Farm Testing", refining and documenting technologies for developing region specific sustainable land use system.
- (ii) Organize training to update the Extension Personnel within the areas of operation with emerging advances in agricultural research on regular basis.
- (iii) Organize long term vocational training courses in agricultural and allied fields for the rural youths with emphasis on "Learning by doing" for generating self employment through institutional financing.
- (iv) Organize front line demonstration in various crops to generate production data and feed back information.

KVKs also organized several extension activities like conducting demonstrations, trainings, field days, film shows, campaigns, camps, exhibitions, advising the farmers through farm and house visits, correspondence, office calls, etc. Some other activities are as follows :

Agricultural Officers' Workshop : Agricultural Officers' Workshop, a biennial feature (one for *Kharif* and one for *Rabi* crops) provides a forum for discussing the problems faced by the field

staff with the university scientists about crops, animal husbandry and then to finalize the package of practices based on the experiences of field staff and research findings. Agricultural Officers' Workshop for *rabi* crops was organized on 25-26 September, 2006 and for *kharif* crops was organized on April 9-10, 2007. The University scientists presented the data of the research trials after the same have been tested/evaluated at farmers' fields.

In addition to it, Animal Husbandry Officers' Workshop was organized on 5-6, Feb. 2007 to discuss and finalize package and practices for Animal Production.

Kisan Mela : Kisan Mela was organized on March 25-26, 2007. Hon'ble Sh. Bhupender Singh Hooda, Chief Minister, Haryana was the Chief Guest on this occasion. The theme of the kisan mela was: **More crop per drop**. An Agro Industrial Exhibition, besides, Scientists Farmers Meet (Buzz Session), sale of seeds of improved varieties of crops, horticultural plants, bio-fertilizers, university literature, soil and water testing, plant clinic, crop competitions and farmers' guided visit to University research farm, etc. were major activities of two days duration of Kisan Mela. A large number of farmers from Haryana and adjoining states participated in it. The seed sale was of Rs. 27,67,300/- and the sale of publications was Rs. 65,280/- during this mela.

Farm Darshan : Farm Darshan was organized on September 19-20, 2006 to show the field trials and experiments conducted on various *kharif* crops. The major activities arranged were Scientist farmer meet (Buzz Session), farmers' guided visits, seed sale, water and soil testing, crop competitions and dummy demonstrations, etc. A large number of farmers from Haryana and adjoining states participated in it. The seed of Rs. 58,36,219/- was sold and the sale of publications was Rs. 52,155/- during this Farm Darshan.

(i) Vocational Trainings

In all, 202 vocational trainings were organized by KVKs. In these trainings, the number of beneficiaries was 7421 in which 3415 males, 2826 females of general category and 506 males and 674 females of SC/ST categories were imparted trainings (Table 3.1).

The training courses were devoted to income generating activities like mushroom cultivation, bee keeping, dairy, fish farming, poultry, piggery, nursery raising, preservation of vegetable and fruits crops, vermin compost, tailoring, tie & die, toy making, seed production and others.

Table 3.1 Vocational trainings organized by KVKs

| Activities | Number | General participants | | SC/ST participants | | Total participants |
|--------------------------------------|------------|----------------------|-------------|--------------------|------------|--------------------|
| | | Male | Female | Male | Female | |
| Mushroom cultivation | 19 | 714 | 242 | 95 | 19 | 1070 |
| Bee Keeping | 20 | 617 | 11 | 80 | 08 | 716 |
| Vermi composting | 17 | 335 | 88 | 57 | 43 | 523 |
| Fruits and vegetable preservation | 46 | 396 | 868 | 28 | 293 | 1585 |
| Nursery Production | 10 | 172 | 07 | 16 | 05 | 200 |
| Milk and Milk Products | 09 | 123 | 147 | 3 | 28 | 301 |
| Seed Production | 11 | 293 | 19 | 44 | 08 | 364 |
| Dairy Farming | 20 | 406 | 95 | 108 | 52 | 661 |
| Garments, cutting and tailoring etc. | 16 | 0 | 230 | 0 | 58 | 288 |
| Others | 34 | 359 | 1119 | 75 | 160 | 1713 |
| Total | 202 | 3415 | 2826 | 506 | 674 | 7421 |

(ii) Other Trainings

The trainings other than vocational ones were also organized by KVKs. In all 2244 trainings were organized. In these trainings, the number of beneficiaries was 61693 including 46423 males and 7396 females of general category and 6111 males and 1763 females of SC/ST category (Table 3.2). The training programmes were conducted on crop production, plant protection, horticulture, vegetable, agro-forestry, animal sciences, home science, extension education and allied fields.

Table 3.2 Discipline wise trainings and their beneficiaries

| Discipline | Number | General participants | | SC/ST participants | | Total participants |
|---------------------|-------------|----------------------|-------------|--------------------|-------------|--------------------|
| | | Male | Female | Male | Female | |
| Agronomy | 479 | 14122 | 504 | 1555 | 175 | 16356 |
| Plant Protection | 285 | 6674 | 366 | 886 | 119 | 8045 |
| Entomology | 127 | 3002 | 136 | 353 | 53 | 3544 |
| Soil Science | 171 | 4149 | 134 | 583 | 50 | 4916 |
| Horticulture | 224 | 4239 | 244 | 515 | 72 | 5070 |
| Home Science | 295 | 0 | 4840 | 0 | 937 | 5777 |
| Agro-forestry | 99 | 2091 | 91 | 269 | 49 | 2500 |
| Agril. Engineering | 14 | 604 | 23 | 85 | 18 | 730 |
| Vegetable crops | 216 | 4314 | 386 | 646 | 120 | 5466 |
| Farm Management | 115 | 2064 | 200 | 436 | 27 | 2727 |
| Animal Science | 192 | 4574 | 392 | 645 | 93 | 5704 |
| Vety. Science | 18 | 370 | 80 | 130 | 50 | 630 |
| Poultry | 3 | 95 | 0 | 6 | 0 | 101 |
| Extension Education | 6 | 125 | 0 | 2 | 0 | 127 |
| Total | 2244 | 46423 | 7396 | 6111 | 1763 | 61693 |

(iii) In service Trainings

In service trainings were also organized by KVKs in different disciplines for different extension personnel. In all 245 trainings were organized which were attended by 5914 males and 1085 female of general category and 592 males and 369 females of SC/ST category (Table 3.3).

Table 3.3 Discipline wise trainings for in service extension personnel

| Discipline | Number | Participants | | SC/ST Participants | | Total |
|---|------------|--------------|-------------|--------------------|------------|-------------|
| | | Male | Female | Male | Female | |
| Agronomy | 41 | 1388 | 10 | 140 | 06 | 1544 |
| Plant Protection/Plant Pathology/Entomology | 57 | 1654 | 16 | 140 | 08 | 1789 |
| Horticulture | 17 | 313 | 53 | 02 | 10 | 378 |
| Home Science | 37 | 50 | 855 | 0 | 296 | 1201 |
| Vegetable crops | 19 | 488 | 114 | 77 | 33 | 712 |
| Soil Science | 34 | 1162 | 30 | 137 | 10 | 1339 |
| Animal Science | 13 | 316 | 07 | 61 | 06 | 390 |
| Agro-forestry | 14 | 268 | 0 | 20 | 0 | 288 |
| Farm Management | 12 | 260 | 0 | 44 | 0 | 304 |
| Extension Education | 01 | 15 | 0 | 0 | 0 | 15 |
| Total | 245 | 5914 | 1085 | 592 | 369 | 7960 |

(iv) Other extension activities organized

The Directorate of extension education undertook various multifarious extension activities and programmes as given in Table 3.4.

Table 3.4 Extension activities

| Activities | Number | Participants | Extension functionaries |
|-------------------------------|--------|--------------|-------------------------|
| Kisan Mela/Mini Kisan Mela | 13 | 12310 | 322 |
| Field Days | 210 | 12276 | 373 |
| Kisan Goshthi | 131 | 9461 | 284 |
| Group Meetings | 869 | 12736 | 293 |
| Udyan Goshthies/Gyan Diwas | 48 | 3343 | 118 |
| Camps including clinical ones | 52 | 5435 | 206 |
| Campaigns | 193 | 17543 | 873 |

- (a) **Demonstrations** : As many as 542 result demonstrations were organized by KVKs to transfer the technical 'know how' to the farmers. Similarly, the method demonstrations to the tune of 675 were organized for the benefit of the farmers. 1062 front line demonstrations were also conducted by the KVKs.
- (b) **Field Days** : KVKs organized 210 field days to show and demonstrate the performance of improved technologies which were attended by 12276 participants.
- (c) **Kisan Mela/Mini Kisan Mela** : Kisan Melas/Mini Kisan Melas numbering 13 were organized by KVKs to depict improved technologies. The farmers to the tune of 12310 participated and benefited. These extension programmes/activities provided an opportunity to farmers to have live contacts with University/KVKs scientists for speedy solution of their farming problems.
- (d) **Campaign/Camps** : As many as 193 campaigns and 52 camps were also arranged by KVKs to educate farmers for adopting the latest technologies in which 17543 and 5435 participants, respectively, were benefited.
- (e) **Other Extension Activities** : Besides the above activities, KVKs organized 131 kisan goshthies, 869 group meetings and 48 udyan goshthies/gyan diwas for the benefit of the farmers.
- (f) **Crop Specific Mela** : Apart from Kisan Mela and Farm Darshan, Directorate organized crop specific Kisan Mela at RRS, Kaul for Dhan, at RRS, Uchani for Sugarcane, at RRS, Bawal for dryland agriculture and at RRS Sirsa for cotton (Kapas) for the benefit of the farmers of the State. The emphasis was given during such crop specific melas on the activities concerning that particular crop in order to make the participating farmers abreast with the latest technical 'know-how' and 'do how' about these location specific crops.
- (g) **Farmers/ Farm Women visit to KVKs** : About 14299 farmers/farm women visited different KVKs to seek the advice of University scientists for solution of their field problems.
- (h) **Scientists visit to clientele** : About 2101 visits were undertaken by the scientists to the farmers' fields to solve their field problems.

Frontline Demonstrations

Table 3.5 Performance of Mungbean varieties in FLDs conducted in Haryana

| S. No. | District | Recommended varieties | No. of farmers | Area (ha) | Average yield (q/ha) | | %age increase in yield over local check |
|--------|----------------|-----------------------|----------------|-------------|----------------------|-------------|---|
| | | | | | Demonstration | Local check | |
| 1. | Panipat | SML-668 | 20 | 8.0 | 6.1 | 5.3 | 14.3 |
| 2. | Kurukshetra | SML-668 | 33 | 8.0 | 7.8 | 6.6 | 19.0 |
| 3. | Sonapat | Asha | 10 | 4.0 | 5.9 | 4.9 | 28.0 |
| 4. | Fatehabad | Asha | 10 | 4.0 | 13.3 | 11.5 | 16.3 |
| 5. | Bhiwani | Muskan | 02 | 2.0 | 11.7 | 7.5 | 57.0 |
| | Total | | 77 | 26.0 | 44.8 | 35.8 | 134.6 |
| | Average | | - | - | 9.0 | 7.19 | 26.9 |

The data in Table 3.5 indicate an overall per cent increase in mungbean grain yield upto 26.9 under demonstration trials over local check at all the locations in Haryana state. All the three varieties of mungbean proved better over the local checks.

Table 3.6 Performance of Castor hybrid in FLDs conducted in Haryana

| S. No. | District | Recommended varieties | No. of farmers | Area (ha) | Average yield (q/ha) | | %age increase in yield over local check |
|--------|----------|-----------------------|----------------|-----------|----------------------|-------------|---|
| | | | | | Demon. | Local check | |
| 1. | Hisar | DCH-32 | 3 | 2.0 | 18.8 | 10.8 | 80.0 |
| 2. | Bhiwani | MRCH-409 | 20 | 8.0 | 30.6 | 26.9 | 14.0 |

The data in Table 3.6 indicate that castor hybrid yield at Hisar and Bhiwani districts were 80.0 and 14.0 per cent higher, respectively, under demonstration trials over the local check.

Table 3.7 Performance of Cotton varieties in FLDs conducted in Haryana

| S. No. | District | Recommended varieties | No. of farmers | Area (ha) | Average yield (q/ha) with balanced use of Fertilizers | | %age increase in yield over local check | | |
|--------|----------|-----------------------|----------------|-----------|---|-------------|---|------|------|
| | | | | | Demon. | Local check | | | |
| 1. | Bhiwani | HD-123 | 30 | 12 | 19.7 | 17.1 | 15.0 | | |
| | | H-1226 | | | 21.6 | 17.5 | 23.0 | | |
| 2. | Sirsa | MRC-6301 | - | - | 25.3 | 19.9 | 27.0 | | |
| | | Rasi-6304 | | | | | | | |
| | | AAH-1 | | | | | | - | - |
| | | CICR-2 | | | - | - | 21.1 | 18.3 | 15.6 |

The data in Table 3.7 reveal that american cotton variety H-1226 gave higher yield than desi variety HD-123 and the per cent increase in the yield of variety H-1226 was found to be 23.0% over local check in district Bhiwani. The Bt. cotton varieties MRC-6301 and Rasi-6304 were found superior over variety AAH-1 and CICR-2 in district Sirsa.

Table 3.8 Performance of Raya varieties in FLDs conducted in Haryana

| S. No. | District | Recommended variety | No. of farmers | Area (ha) | Average yield (q/ha) | | %age increase in yield over local check |
|--------|--------------|---------------------|----------------|-----------|----------------------|-------------|---|
| | | | | | Demonstration | Local check | |
| 1. | Kaithal | RH-30 | 9 | 4 | 15.3 | 13.0 | 17.7 |
| 2. | Sonepat | RH-30 | 50 | 20 | 18.1 | 15.7 | 15.3 |
| 3. | Fatehabad | RH-30 | 25 | 10 | 14.3 | 12.2 | 16.9 |
| 4. | Hisar | RH-30 | 25 | 10 | 18.0 | 17.3 | 4.0 |
| 5. | Yamuna Nagar | RH-30 | 10 | 4 | 16.5 | 14.5 | 13.8 |
| 6. | Mohindergarh | RH-8812 | 25 | 10 | 16.3 | 15.6 | 4.4 |
| 7. | Sirsa | RH-30 | 15 | 6 | 18.2 | 16.0 | 16.5 |
| 8. | Panipat | Laxmi | 50 | 20 | 21.7 | 19.1 | 13.6 |
| 9. | Bhiwani | Laxmi | 20 | 8 | 19.4 | 18.6 | 4.0 |

The data in Table 3.8 reveal that the grain yield of raya was higher in all recommended varieties under demonstration plots over the local checks at different locations while the Laxmi variety gave higher yields in Panipat district as compared to Bhiwani both under demonstration and local check.

Table 3.9 Performance of Lentil varieties in FLDs conducted in Haryana

| S. No. | District | Recommended varieties | No. of farmers | Area (ha) | Average yield (q/ha) | | %age increase in yield over local check |
|--------|--------------|-----------------------|----------------|-----------|----------------------|-------------|---|
| | | | | | Demon. | Local check | |
| 1. | Yamuna Nagar | Sapna | 5 | 2 | 8.0 | 7.0 | 14.3 |
| 2. | Kaithal | Sapna & Garima | 10 | 2.4 | 11.7 | 10.2 | 14.7 |
| 3. | Rohtak | LH 82-6LH 90-54 | 2 | 1.0 | 16.0 | 12.0 | 25.0 |

The data in Table 3.9 indicate that all the recommended varieties of lentil gave higher yield under demonstration plots over the local checks at all the locations.

Table 3.10 Performance of Til in FLDs conducted in Haryana

| S. No. | District | Recommended varieties | No. of farmers | Area (ha) | Average yield (q/ha) | | %age increase in yield over local check |
|--------|--------------|-----------------------|----------------|-----------|----------------------|-------------|---|
| | | | | | Demon. | Local check | |
| 1. | Faridabad | | HT-1 | 5 | 2.0 | 5.3 | 14.8 10.4 |
| 2. | Mohindergarh | HT-1 | 5 | 2.0 | 4.5 | 14.1 | 9.7 |

The grain yield of Til increased by 10.4 and 9.7 per cent in demonstration trials over local check in district Faridabad and Mohindergarh, respectively (Table 3.10).

Table 3.11 Performance of Groundnut in FLDs conducted in Haryana

| S. No. | District | Recommended varieties | No. of farmers | Area (ha) | Average yield (q/ha) | | %age increase in yield over local check |
|--------|--------------|-----------------------|----------------|-----------|----------------------|-------------|---|
| | | | | | Demon. | Local check | |
| 1. | Mohindergarh | MH-34 | 5 | 2.0 | 193 | 17.5 | 10.2 |
| 2. | Bhiwani | HNG-10 | 3 | 2.0 | 22.0 | 19.0 | 16 |

The data in Table 3.11 reveal that the yield of groundnut varieties increased by 10.2 and 16.0 per cent under demonstration plot as compared to local check at Mohindergarh and Bhiwani districts, respectively.

Table 3.12 Performance of Arhar variety in FLDs conducted in Haryana

| S. No. | District | Recommended varieties | No. of farmers | Area (ha) | Average yield (q/ha) | | %age increase in yield over local check |
|--------|-----------|-----------------------|----------------|-----------|----------------------|-------------|---|
| | | | | | Demon. | Local check | |
| 1. | Sonipat | Manak | 9 | 4.0 | 17.3 | 14.7 | 17.9 |
| 2. | Faridabad | | Manak | 7 | 3.0 | 12.7 | 10.9 16.5 |

The data in Table 3.12 reveal that the grain yield of Arhar variety Manak was higher under demonstration trials as compared to local check in both the districts.

Table 3.13 Performance of Sunflower varieties in FLDs conducted in Haryana

| S. No. | District | Recommended varieties | No. of farmers | Area (ha) | Average yield (q/ha) | | %age increase in yield over local check |
|--------|-------------|-----------------------|----------------|-----------|----------------------|-------------|---|
| | | | | | Demon. | Local check | |
| 1. | Yamunanagar | Pioneer 6460 | 10 | 4.0 | 19.0 | 16.5 | 14.7 |
| 2. | Kurukshetra | Pioneer Subeej | 38 | 12.4 | 18.0 | 15.8 | 13.9 |
| | | Prosen | 9 | | | | |

The grain yield data in Table 3.13 indicate that the per cent increase in yield of sunflower varieties was 14.7 and 13.9 under demonstration trials over local check at Yamunanagar and Kurukshetra districts, respectively.

Table 3.14 Performance of Toria variety in FLDs conducted in Haryana

| S. No. | District | Recommended varieties | No. of farmers | Area (ha) | Average yield (q/ha) | | %age increase in yield over local check |
|--------|-------------|-----------------------|----------------|-----------|----------------------|-------------|---|
| | | | | | Demon. | Local check | |
| 1. | Yamunanagar | T-9 | 5 | 2.0 | 12.7 | 11.5 | 10.4 |
| 2. | Kaithal | T-9 | 8 | 4.0 | 13.2 | 10.8 | 22.2 |

The data in Table 3.14 reveal that yield of Toria variety T-9 increased by 10.4 and 22.2 per cent under demonstration trials over local check in district Yamuna Nagar and Kaithal, respectively.

Table: 3.15 Performance of Chickpea in FLDs conducted in Haryana

| S. No. | District | Recommended varieties | No. of farmers | Area (ha) | Average yield (q/ha) | | %age increase in yield over local check |
|--------|--------------|-----------------------|----------------|-----------|----------------------|-------------|---|
| | | | | | Demon. | Local check | |
| 1. | Faridabad | | HC-1 | 7 | 3.0 | 16.0 | 14.6 13.6 |
| 2. | Yamunanagar | HC-5 | 10 | 4.0 | 13.3 | 10.8 | 23.1 |
| 3. | Mohindergarh | HC-1 | 10 | 4.0 | 9.9 | 8.0 | 8.0 |
| 4. | Bhiwani | HC-5 | 9 | 4.0 | 17.7 | 14.2 | 25.0 |
| 5. | Hisar | HC-1 | 5 | 2.0 | 7.2 | 5.8 | 24.1 |
| 6. | Kaithal | HC-5 | 10 | 4.0 | 15.1 | 13.2 | 14.4 |
| 7. | Fatehabad | HC-1 | 10 | 4.0 | 11.6 | 8.8 | 31.9 |

The data in Table 3.15 reveal that in all the districts the grain yield of chickpea varieties HC-1 and HC-5 was higher under demonstration plots as compared to local checks.

Table 3.16 Performance of Wheat varieties in FLDs conducted in Haryana

| S. No. | District | Recommended varieties | No. of farmers | Area (ha) | Average yield (q/ha) | | %age increase in yield over local check |
|--------|-------------|-----------------------|----------------|-----------|----------------------|-------------|---|
| | | | | | Demon. | Local check | |
| 1. | Panipat | PBW-502 | 10 | 4.0 | 49.2 | 48.4 | 1.6 |
| 2. | Kurukshetra | WH-542 | 20 | 8.0 | 52.5 | 53.1 | - |
| | | WH-711 | | | 52.0 | - | - |
| 3. | Rohtak | PBH-343 | 40 | 16.0 | 49.5 | 47.7 | 3.8 |
| 4. | Jhajjar | WH-502 | 25 | 10.0 | 41.2 | 39.0 | 5.6 |
| | | RAJ 3765 | | | 43.7 | 40.2 | 8.7 |
| 5. | Bhiwani | WH-711 | 20 | 8 | 45.0 | 40.0 | 12.5 |
| 6. | Sonipat | PBW-343 | 60 | 24 | 50.5 | - | - |
| | | HD-2687 | | | 44.7 | - | - |
| 7. | Faridabad | | WH-711 | 5 | 2 | 47.0 | 45.8 2.6 |

The perusal of data in Table 3.16 reveal that the grain yield of wheat varieties was higher in demonstration trials over the control in all the seven districts.

On Farm Trials

Table 3.17 Performance of Raya in On Farm Trials conducted in Haryana

| S. No. | District | Treatments | No. of trials | Variety | Mean yield (q/ha) | | %age increase in yield |
|----------------|-------------|--------------|---------------|---------|-------------------|-------------|------------------------|
| | | | | | Demon. | Local check | |
| 1. | Bhiwani | Irrigation | 1 | RH-30 | 18.0 | 16.0 | 12.5 |
| 2. | Bhiwani | Weed control | 1 | RH-30 | 10.5 | 7.5 | 40.0 |
| 3. | Kurukshetra | Irrigation | 4 | RH-30 | 23.1 | 22.5 | 2.67 |
| Total | | | 6 | | 51.6 | 46 | - |
| Average | | | | | 17.2 | 15.3 | 12.4 |

Table 3.18 Performance of New Varieties of Guar in On Farm Trials conducted in Haryana

| S. No. | District | No. of Trials | Mean yield (q/ha) | | | |
|----------------|--------------|---------------|-------------------|-------------|-------------|-------------|
| | | | HG-867 | HG-563 | HG-75 | HG-870 |
| 1. | Mohindergarh | 2 | 12.0 | 13.7 | 11.2 | 13.0 |
| 2. | Rewari | 2 | 7.8 | 8.7 | 7.5 | 9.4 |
| 3. | Faridabad | 1 | 10.8 | 12.7 | 10.5 | 12.0 |
| Total | | 5 | 30.6 | 35.1 | 29.2 | 34.4 |
| Average | | - | 10.2 | 11.7 | 9.7 | 11.5 |

The data presented in Table 3.18 indicate that the average yield was highest in variety HG-563 followed by HG-870, HG-867 and HG-75, respectively. Similarly, HG-563 produced the highest average grain yield in districts Mohindergarh and Faridabad.

Table 3.19 Performance of Mungbean in On Farm Trials conducted in district Faridabad

| Treatments | Mean yield (q/ha) | | %age increase in yield |
|------------|-------------------|---------------------------|------------------------|
| | Demonstration | Farmer's Practice (K-851) | |
| SML-668 | 7.5 | 6.5 | 13.3 |

Variety SML 668 was found to be superior over K 851 as it gave 13.3% higher yield as compared to K 851 variety which was used as check.

Table 3.20 Performance of Paddy varieties in On Farm Trials conducted in Haryana

| S. No. | District | Recomm. varieties/Treatments | No. of trials | Mean yield (g/ha) |
|--------|-------------|---|---------------|-------------------|
| 1. | Yamunanagar | HKR-47 | 1 | 82.0 |
| 2. | Sonipat | Transplanted | 5 | 28.6 |
| | | Direct seeding | | 28.4 |
| | | Roughing | | 40.0 |
| | | No roughing | | 42.8 |
| 3. | Panipat | Sharbati | 5 | 50.8 |
| | | HKR-47 | | 64.2 |
| | | Pusa-251 1 | | 46.5 |
| 4. | Rohtak | HKR-98-476 | 2 | 35.9 |
| | | HBC- 19 | | 30.0 |
| 5. | Hisar | HBC-90 | 6 | 8.3 |
| | | CSR-30 | 10 | 11.2 |
| 6. | Kurukshetra | HBC-19 | 5 | 14.0 |
| | | HKR-98-476 | 5 | 14.0 |
| 7. | Kurukshetra | Water Deficit July 15-31 (Var.PR-113 PR-114) | | 27.0 |
| | | Water Deficit Aug. 1-15 (HKR-47 and H-6444) | | 27.5 |
| | | No Water Deficit | | 28.1 |

The data in Table 3.20 reveal that in district Yamunanagar var. HKR-47 was found good yielder. In district Sonipat, there was no difference in paddy yield under transplanted and direct seeded method of planting, whereas when no roughing was adopted, the paddy yield was higher over roughing method. In district Panipat, var. HKR-47 was found superior over Sarbati and Pusa-2511, while in district Rohtak HKR 99-476 proved better over HBC-19. In district Kurukshetra, the

paddy yield of HBC-19 and HKR 98-476 was found at par. There was no significant difference in paddy yields when there was water deficit from July 15-31 and from Aug. 1-15 and also when there was no water deficit in Kurukshetra.

Table 3.21 Performance of new variety of Bajra HHB 197 against HHB 67-2

| S. No. | District | No. of trials | Mean yield (q/ha) | |
|--------|--------------|---------------|-------------------|----------|
| | | | HHB-197 | HHB-67-2 |
| 1. | Mohindergarh | 3 | 22.2 | 19.0 |
| 2. | Rewari | 2 | 25.2 | 22.5 |
| 3. | Faridabad | 1 | 21.6 | 18.7 |
| 4. | Rohtak | 2 | 12.0 | 16.0 |
| | Total | 8 | 81.0 | 76.2 |
| | Average | | 20.2 | 19.0 |

The data in Table 3.21 show that the overall performance of HHB-197 was superior over HHB 67-2. Hybrid HHB-197 gave higher yield of 6.3% over HHB 67-2.

Table 3.22 Performance of Wheat varieties in On Farm Trials in Haryana

| S.No. | District | Varieties | No. of trials | Mean yield (q/ha) |
|-------|-----------|----------------|---------------|-------------------|
| 1. | Fatehabad | PBW-343 | 79 | 42.2 |
| | | WH-711 | | 46.8 |
| 2. | Rohtak | WH-1025 | 2 | 41.2 |
| | | C-306 | | 30.5 |
| 3. | Panipat | PBW-343 | 5 | 49.8 |
| | | WH-711 | | 48.2 |
| | | PBW-502 | | 49.7 |
| | | Total | | 308.4 |
| | | Average | | 44.06 |

The data in Table 3.22 reveal that in dist. Fatehabad, wheat variety WH-711 gave higher yield as compared to PBW-343. In district Rohtak, wheat variety WH-1025 gave 35.1% higher yield over C-306. In district Panipat, the wheat varieties PBW-343 and PBW-502 were found at par in yield performance and WH-711 gave slightly lower yield as compared to PBW-343 and PBW-502 varieties.

Table 3.23 Performance of Wheat in Zero till v/s Conventional tillage

| S. No. | District | Variety | No. of trials | Mean yield (q/ha) | |
|--------|-----------|----------------|---------------|-------------------|--------------|
| | | | | HHB-197 | HHB-67-2 |
| 1. | Faridabad | PBW-343 | 25 | 39.5 | 37.2 |
| | | PBW-373 | 1 | 35.5 | — |
| | | WH-1022 | 1 | 37.0 | — |
| 2. | Rewari | — | — | — | — |
| 3. | Gurgaon | — | — | — | — |
| 4. | Sonipat | PBW-343 | 1 | 50.2 | 48.0 |
| | | HD-2687 | 1 | 53.4 | 48.0 |
| | | WH-711 | — | 47.5 | 48.0 |
| | | Total | — | 352.0 | 268.0 |
| | | Average | — | 44.0 | 44.7 |

When the performance of zero tillage was compared against conventional tillage in different districts for wheat yield of different varieties, it was found that at all the locations zero tillage proved better than conventional tillage in terms of yield parameters except in Gurgaon.

Table 3.24 Performance of Cotton varieties in On Farm Trials conducted in Haryana

| S. No. | District1 | Variety | No. of trials | Mean yield (q/ha) |
|--------|-----------|-------------|---------------|-------------------|
| 1. | Rohtak | H-1226 | 1 | 8.5 |
| | | H-1117 | | 9.2 |
| 2. | Fatehabad | Mahyco 6304 | 35 | 25.9 |
| | | Rasi Bt 104 | | 28.1 |

The data in Table 3.24 indicate that american cotton variety H-1117 was superior variety than H-1226 in district Rohtak. In district Fatehabad, Rasi Bt 104 was found better over Mahyco-6304. Rasi BT 104 gave 8.5% higher cotton yield over Mahyco-6304.

DISCIPLINE WISE REPORT

ANIMAL SCIENCE

Table 3.25 On Farm Trials on the balanced feeding in Cattle in Distt. Faridabad

| S. No. | Technology Assessed Refined | Performance of Technology | Final recommendation for solution | Constraints | Process of farmers participation and their feed back |
|--------|---|---------------------------|-----------------------------------|-------------|--|
| 1. | Imbalance feeding (Green fodder 20 kg + Bhusa 2 kg + grain mix ½ kg) | 6 l/animal | Continued | Nil | Demonstration field days and technically accepted by farmers |
| 2. | Balance feeding (Green fodder 55 kg + Bhusa 2 kg + grain mix 2 kg) | 8 l/animal | Continued | Nil | |

The data in Table 3.25 reveal that the milk yield increased by 33.3% per animal but the technology was further recommended for final demonstration.

Table 3.26 On Farm Trials on the balanced ration in buffalo in Distt. Faridabad

| S. No. | Technology assessed/ Refined | Performance of technology | Final recommendation for solution | Constraints | Process of farmers participation and their feed back |
|--------|--|---------------------------|-----------------------------------|-------------|---|
| 1. | Normal ration | 9.2 l/animal | Nil | Nil | Demonstration field days and technology accepted by farmers |
| 2. | Balanced ration (cattle HAFED Feed) | 13.3 l/animal | | | |

The data in Table 3.26 indicate an increase of 4.1 l/animal in balanced ratio treatment over normal ratio treatment.

Table 3.27 Deficiency of minerals in buffaloes in District Bhiwani

| Enterprise | Title of OFT | Technically assessed | Results of assessment | Feedback from the farmers | Any refinement |
|-----------------|---|--|------------------------------------|---------------------------------|----------------|
| Buffalo Rearing | Deficiency of minerals in milch buffaloes | Impact of mineral mixture in feed of milch buffalo | Increased milk production by 5-12% | Positive satisfied with results | - |

The data in Table 3.27 reveal that the increase in milk yield was 5-12% in buffaloes in District Bhiwani as a result of feeding of mineral mixture.

Management

One hundred and forty five trainings on different aspects, viz. Agril. Marketing, Production Economics, Entrepreneurial Development, Agril. Finance and AOA (Agreement on Agriculture) were organized benefiting 4020 farmers in Haryana State. Economic Surveys were conducted in eight districts of Haryana state to find out the comparative economics of important *kharif* and *rabi* crops grown during the year 2006-07. The summarized findings of the surveys indicated the average level of inputs used in different crops, their variable and total cost production per acre, the returns over variable cost, net returns and per quintal cost of production of main product which would be useful for the farmers, administrators, policy makers and input supplying agencies in making rational production, management and sale decisions. These could also be useful in effecting right choices and decisions regarding allocation of area resources in different crops/enterprises in different regions of State.

Table 3.28 Trainings and their beneficiaries

| Discipline | Number | General participants | | SC/ST participants | | Total participants |
|-----------------|--------|----------------------|--------|--------------------|--------|--------------------|
| | | Male | Female | Male | Female | |
| Farm Management | 145 | 3369 | 39 | 603 | 9 | 4020 |

During *rabi* 2006-07, Sugarcane (ratoon) was found to be most remunerative crop with net returns of about Rs. 7,256/acre followed by chickpea with net returns of about Rs. 2,255/acre, sunflower with net returns about Rs. 1,447/acre, wheat (Planted) with net returns about Rs. 1,385/acre, Barley with net returns about Rs. 928/acre and Raya with net returns about Rs. 840/acre, respectively. Lowest returns per acre were received from main *rabi* fodder crop, i.e. Berseem having net returns about Rs. 644/acre.

Table 3.29 Average cost and returns from different *rabi* crops in Haryana (2006)

(Rs./acre)

| Particulars/Crops | Wheat | Barley | Chick-pea | Mustard (Raya) | Sugarcane (Planted) | Sugarcane | Berseem | Sun-flower |
|-------------------------------|--------|--------|-----------|----------------|---------------------|-----------|---------|------------|
| Average yield (q/acre) | | | | | | | | |
| Main product | 15.0 | 13.7 | 4.0 | 4.1 | 269.6 | 235.3 | 248.3 | 7.8 |
| By-product | 14.6 | 13.5 | 4.0 | - | 25.2 | - | - | - |
| Gross returns | 13716 | 10351 | 8598 | 7984 | 34827 | 29726 | 12396 | 11700 |
| Variable cost | 6742 | 4920 | 2980 | 3632 | 19140 | 9409 | 6337 | 5084 |
| Total cost | 12216 | 9423 | 6343 | 7144 | 33442 | 22470 | 11752 | 10253 |
| Returns over variable cost | 6974 | 5431 | 5618 | 4351 | 15687 | 20317 | 6059 | 6616 |
| Net returns | 1500 | 928 | 2255 | 840 | 1385 | 7256 | 644 | 1447 |
| Benefit Cost ratio | 1:1.12 | 1:1.10 | 1:1.36 | 1:1.12 | 1:1.04 | 1:1.32 | 1:1.05 | 1:1.14 |

During *kharif* 2006-07, Basmati paddy was found to be most remunerative crop having returns of about Rs.7,630/acre followed by Evolved (Duplicate) Basmati with net returns of Rs. 3,084/acre, Guar (Rs. 2,9913/acre), Paddy dwarf (Rs. 2,103/acre), Jowar Green fodder (Rs.1,742/acre), Cotton American (Rs. 875/acre), Arhar (Rs. 401/acre) and Cotton *Desi* (Rs. 233/acre), respectively, while net returns were found negative in Bajra (Hybrid/crop).

Table 3.30 Average costs and returns from *kharif* crops in Haryana (2006)

(Rs/acre)

| Particulars/Crops | Qty. | Value | Qty. | Value | Qty. | Value |
|-------------------------------|---------------------------|--------|------------------------|--------|--------------------------------|--------|
| Average yield (q/acre) | Paddy (dwarf fine) | | Paddy (Basmati) | | Paddy (evolved Basmati) | |
| Main product | 28.4 | 18460 | 13.2 | 21468 | 15.6 | 18992 |
| By-product | - | | - | 589 | - | - |
| Gross income | | 18460 | | 22057 | | 18992 |
| Variable cost | | 8725 | | 8209 | | 9452 |
| Total cost | | 16357 | | 14427 | | 15908 |
| Returns over variable cost | | 9735 | | 13848 | | 9540 |
| Net returns | | 2103 | | 7630 | | 3084 |
| Benefit Cost ratio | | 1:1.13 | | 1:1.53 | | 1:1.19 |
| | Cotton (American) | | Cotton (Desi) | | Bajra (Hybrid) | |
| Main Product | 5.5 | 10175 | 5.2 | 9388 | 7.11 | 4241 |
| By-product | - | 700 | - | 1284 | 4.6 | 1950 |
| Gross income | | 10875 | | 10672 | | 6191 |
| Variable cost | | 6124 | | 6248 | | 3070 |
| Total cost | | 9999 | | 10439 | | 6539 |
| Returns over variable cost | | 4751 | | 4434 | | 3121 |
| Net returns | | 875 | | 233 | | -348 |
| Benefit Cost ratio | | 1:1.09 | | 1:1.02 | | 1:0.95 |
| | Guar | | Arhar | | Jowar | |
| Main product | 4.8 | 8016 | 3.30 | 5753 | 162.4 | 10314 |
| By-product | 5.1 | 702 | - | 1001 | - | - |
| Gross income | | 8718 | | 6754 | | 10314 |
| Variable cost | | 2406 | | 2761 | | 3897 |
| Total cost | | 5725 | | 6353 | | 8572 |
| Returns over variable cost | | 6312 | | 3993 | | 6417 |
| Net returns | | 2993 | | 401 | | 1742 |
| Benefit Cost ratio | | 1:1.52 | | 1:1.06 | | 1:1.20 |

HOME SCIENCE

1. ON CAMPUS TRAININGS

Table 3.31 Women Empowerment

| S. No. | Name of training | No. of trainings | No. of participants | | | | | Grand total | |
|--------------|---|------------------|---------------------|------------|------------|----------|------------|-------------|-------------|
| | | | General | | | SC/ST | | | |
| | | | M | F | Total | M | F | | Total |
| i) | Fruit & Vegetable Preservation | 8 | 12 | 69 | 81 | - | 39 | 39 | 120 |
| ii) | Clear milk production | 2 | - | 9 | 9 | - | 1 | 1 | 10 |
| iii) | Preservation of milk made products | 1 | - | 11 | 11 | - | - | - | 11 |
| iv) | Hygiene food processing & food safety | 1 | - | 15 | 15 | - | - | - | 15 |
| v) | Income generation for Women Empowerment | 15 | - | 292 | 292 | - | 72 | 72 | 364 |
| vi) | Preparation of nutritious snacks | 1 | - | 20 | 20 | - | - | - | 20 |
| vii) | Safe drinking water technology | 5 | - | 64 | 64 | - | 28 | 28 | 92 |
| viii) | Safe storage of grains | 2 | 77 | 30 | 107 | - | 14 | 14 | 121 |
| ix) | Value addition | 3 | - | 35 | 35 | - | 10 | 10 | 45 |
| x) | Design & development of low cost diet | 2 | - | 32 | 32 | - | 5 | 5 | 37 |
| xi) | Household kitchen security & kitchen gardening | 2 | - | 36 | 36 | - | 14 | 14 | 50 |
| xii) | Minimization of nutrient loss in processing | 2 | - | 40 | 40 | - | 10 | 10 | 50 |
| xiii) | Gender mainstream through SHGS | 1 | - | 15 | 15 | - | 6 | 6 | 21 |
| xiv) | Vermi-compost | 2 | - | 57 | 57 | - | - | - | 57 |
| xv) | Rural craft | 3 | - | 48 | 48 | - | 12 | 12 | 60 |
| xvi) | Location specific drudgery reduction technology | 2 | - | 32 | 32 | - | 8 | 8 | 40 |
| Total | | 52 | 89 | 805 | 894 | - | 219 | 219 | 1113 |

Fifty-two trainings were organized for women empowerment covering 1113 participants out of which 20% were SC/ST. Major importance was given to income generation activity which is need of the hour (Table 3.31).

Table 3.32 Vocational Training for Rural women

| S. No. | Name of training | No. of trainings | Duration (days) | Participants | Man days trained |
|--------------|--|------------------|------------------|--------------|------------------|
| 1. | Use of paper pattern for stitching blouse & kameez | 3 | 20 | 20 | 300 |
| 2. | Fruit and vegetable preservation | 7 | 3 to 5 | 221 | 1105 |
| 3. | Hand Embroidery | 4 | 13 to 15 | 44 | 220 |
| 4. | Fabric Painting | 4 | 15 | 43 | 215 |
| 5. | Tie & Dye | 2 | 7 | 15 | 75 |
| 6. | Hygienic food processing and food safety | 1 | 5 | 15 | 75 |
| 7. | Milk based sweets for rural ladies | 1 | 5 | 25 | 125 |
| 8. | Value added milk based products for rural women and members of SHG | 1 | 1-2 | 53 | 165 |
| Total | | 23 | 1-20 days | 476 | 75-1105 |

Table 3.32 reveals that 23 trainings were organized for rural trainees. The duration of trainings varied from 1 to 20 days and 476 participants were benefited.

Table 3.33 Extension Personnel

| S. No. | Name of Training | No. of courses | General | | | SC/ST | | | Grand total |
|--------------|---|----------------|-----------|------------|------------|----------|------------|------------|-------------|
| | | | M | F | Total | M | F | Total | |
| 1. | Household food security by kitchen-gardening & nutrition garden | 2 | 31 | 18 | 49 | - | - | - | 49 |
| 2. | Design & development for high nutrient efficiency diet | 8 | - | 165 | 165 | - | 23 | 23 | 188 |
| 3. | Storage loss minimization techniques | 2 | 35 | - | 35 | - | - | - | 35 |
| 4. | Women and child care | 2 | - | 32 | 32 | - | - | - | 32 |
| 5. | Low cost nutrient efficient diet designing | 9 | - | 177 | 177 | - | 40 | 40 | 217 |
| 6. | Hygienic food processing & food supply | 2 | - | 27 | 27 | - | 6 | 6 | 33 |
| 7. | Clean milk production | 1 | - | 3 | 3 | - | - | - | 3 |
| 8. | Fruit and Vegetable preservation | 3 | - | 118 | 118 | - | 12 | 12 | 130 |
| 9. | Preparation of milk made products | 8 | 34 | 22 | 56 | - | 8 | 8 | 64 |
| 10. | Women and child care | 9 | - | 125 | 125 | - | 46 | 46 | 171 |
| 11. | Value addition | 10 | - | 132 | 132 | - | 50 | 50 | 182 |
| 12. | Conservation of nutrients | 1 | - | 21 | 21 | - | 7 | 7 | 28 |
| 13. | Storage of food grains | 2 | - | 23 | 23 | - | 4 | 4 | 27 |
| 14. | Time & energy saving devices | 1 | - | 20 | 20 | - | 5 | 5 | 25 |
| Total | | 60 | 66 | 883 | 937 | - | 207 | 207 | 1144 |

The data revealed that 60 courses were organized for the extension personnel. Maximum trainings were organized on value addition (10) followed by low cost nutrient efficient diet designing and women and child care (9 each). The 937 and 207 participants were from General and SC/ST categories, respectively (Table 3.33).

Table 3.34 Vocational Training for Rural Youth

| S. No. | Name of training | No. of courses | Duration | General | | | SC/ST | | | Grand total |
|---|---|----------------|-----------------------------|------------|-------------|-------------|-----------|------------|------------|-------------|
| | | | | M | F | Total | M | F | Total | |
| 1. | Preparation of milk products for unemployed youth | 1 | 1 | - | 13 | 13 | - | - | - | 13 |
| 2. | Preservation of fruit & vegetable | 1 | 5 | - | 20 | 20 | - | - | - | 20 |
| 3. | Clean milk production | 2 | 3 | 34 | 24 | 58 | 4 | - | - | 62 |
| 4. | Value addition | 6 | - | 56 | 84 | 140 | 8 | 27 | 35 | 175 |
| 5. | Rural craft | 2 | - | - | 23 | 23 | - | 17 | 17 | 40 |
| 6. | Tailoring & stitching | 2 | 5 days 6 months | - | 63 | 63 | - | 12 | 12 | 75 |
| 7. | Household food security kitchen gardening & nutrition gardening | 1 | 1 | - | 25 | 25 | - | 13 | 13 | 38 |
| 8. | Storage of foodgrains | 1 | 1 | - | 33 | 33 | - | 4 | 4 | 37 |
| 9. | Preparation of milk based products | 1 | 1 | - | 16 | 16 | - | - | - | 16 |
| Total | | 17 | 1 day - 6 months | 90 | 301 | 391 | 12 | 73 | 85 | 476 |
| Total (31 + 32 + 33 + 34 tables) | | 152 | | 179 | 1992 | 2171 | 12 | 975 | 987 | 3158 |

Seventeen vocational trainings were organized for rural youth. The duration of training ranged from 1 day to 6 months and participants covered were 476. Table 3.34 further reveals that 52, 23, 60 and 17 trainings as indicated in Tables 3.31, 3.32, 3.33 and 3.34 were organized for women empowerment, rural ladies, extension personnel and rural youth, respectively. The participants covered in the above mentioned trainings were 3158, out of which 2171 and 987 participants were from General and SC/ST category.

The data revealed that 60 courses were organized for the extension personnel. The maximum trainings were organized on value addition (*i.e.* 10) followed by low cost nutrient efficient diet designing and women and child care (9 each). The 937 and 207 participants were covered from General and SC/ST categories (Table 3.33).

Off-Campus Trainings

Table 3.35 Women Empowerment

| S. No. | Name of training | No. of trainings | General | | | SC/ST | | | Grand total |
|--------|--|------------------|---------|------|-------|-------|-----|-------|-------------|
| | | | M | F | Total | M | F | Total | |
| i) | Pre- and post-natal care of infants and mother | 6 | | 83 | 83 | | 23 | 23 | 106 |
| ii) | Cheap and low cost nutritious recipes | 2 | | 1032 | 1032 | | 9 | 9 | 1041 |
| iii) | Prevention of water borne diseases | 3 | | 53 | 53 | | 25 | 25 | 78 |
| iv) | Importance of girl child for equalities in society | 2 | 7 | 33 | 83 | 14 | 31 | 45 | 85 |
| v) | Fruit and vegetable preservation | 7 | | 83 | 83 | | 58 | 58 | 141 |
| vi) | Preparation of milk product for children | 1 | | 20 | 20 | | 4 | 4 | 24 |
| vii) | Safe storage of grains | 14 | 34 | 292 | 326 | | 118 | 118 | 444 |
| viii) | Value addition | 29 | | 391 | 391 | | 132 | 132 | 523 |
| ix) | Preparation of weaning mixture | 1 | | 20 | 20 | | 5 | 5 | 25 |
| x) | Importance of home science for girls | 1 | 12 | 11 | 23 | | 23 | 23 | 46 |
| xi) | Kitchen gardening, layout and its importance | 4 | | 96 | 96 | | 5 | 5 | 101 |
| xii) | Preparation of milk based products | 4 | | 100 | 100 | | 10 | 10 | 110 |
| xiii) | Child care and nutrition | 3 | | 48 | 48 | | 10 | 10 | 58 |
| xiv) | Stitching of ladies suit | 1 | | 20 | 20 | | - | - | 20 |
| xv) | Drying of winter vegetables | 3 | | 68 | 68 | | 18 | 18 | 86 |
| xvi) | Clean milk production | 2 | 10 | 71 | 81 | | - | - | 81 |
| xvii) | Development of low cost nutritious diet | 15 | | 222 | 222 | | 121 | 121 | 343 |
| xviii) | Development of high nutrient efficiency diet | 24 | | 465 | 465 | | 131 | 131 | 596 |
| xix) | Minimization of nutrients loss in processing | 17 | | 251 | 251 | | 103 | 354 | 354 |

| | | | | | | | | |
|--|------------|------------|-------------|-------------|-----------|-------------|-------------|-------------|
| xx) Gender mainstream through SHGs | 9 | 2 | 107 | 109 | 1 | 76 | 186 | 186 |
| xxi) Income generation activities for employment of rural women | 33 | | 569 | 569 | | 160 | 160 | 729 |
| xxii) Location specific drudgery reduction technology | 1 | | 181 | 181 | | 68 | 68 | 249 |
| xxiii) Preparation of ARF | 6 | 14 | 102 | 116 | 2 | 39 | 41 | 157 |
| xxiv) Rural crafts | 13 | | 141 | 141 | | 22 | 22 | 163 |
| xxv) Sanitation and personal hygiene | 3 | | 60 | 60 | | 24 | 24 | 84 |
| xxvi) Women and child care | 29 | | 486 | 486 | | 149 | 149 | 635 |
| xxvii) Importance of G.L.V. in daily diet | 1 | | 64 | 64 | | 16 | 16 | 80 |
| xxviii) Household food security by kitchen gardening and vegetable gardening | 7 | 31 | 141 | 172 | | 37 | 37 | 209 |
| xxix) Detergent making | 1 | | 22 | 22 | | 8 | 8 | 30 |
| xxx) Safe water technology | 8 | | 94 | 94 | | 15 | 15 | 109 |
| xxxi) Minor care or repair of household electrical appliances | 1 | | 20 | 20 | | 5 | 5 | 25 |
| xxxii) Fabric enrichment | 1 | | 15 | 15 | | 3 | 18 | 18 |
| xxxiii) Conservation of nutrients | 1 | | 10 | 10 | | 2 | 12 | 12 |
| xxxiv) Sprouting and fermentation of pulses | 1 | | 40 | 40 | | 6 | 46 | 46 |
| xxxv) Value addition and dye | 3 | | 60 | 60 | | 10 | 70 | 70 |
| xxxvi) Fruit and vegetable preservation | 2 | | 47 | 47 | | 10 | 57 | 57 |
| xxxvii) Sweet preparation | 2 | | 40 | 40 | | 9 | 49 | 49 |
| xxxviii) Nutritional gardening | 1 | | 20 | 20 | | 4 | 24 | 24 |
| xxxix) Storage of foodgrains | 1 | | 20 | 20 | | 4 | 24 | 24 |
| xxxx) Time and energy saving devices | 1 | | 20 | 20 | | 3 | 23 | 23 |
| xxxxi) To enrich the knowledge of Home Science | 38 | | 1197 | 1197 | | - | 1197 | 1197 |
| Total | 493 | 111 | 6815 | 6926 | 17 | 1496 | 1513 | 8439 |

Data in Table 3.35 reveal that 493 off-campus trainings were organized for women empowerment. While imparting training like on campus training, maximum number of trainings (33) were followed by value addition and women and child care.

Table 3.36 Extension Personnel

| S. No. | Name of Course | No. of trainings | General | | | SC/ST | | | Grand total |
|--------|----------------------------------|------------------|------------|-------------|-------------|-----------|-------------|-------------|-------------|
| | | | M | F | Total | M | F | Total | |
| i) | Low cost nutrient efficient diet | 2 | - | 18 | 18 | - | 5 | 5 | 23 |
| ii) | Women and child care | 1 | - | 8 | 8 | - | 7 | 7 | 15 |
| iii) | Gender mainstream through SHGs | 1 | - | 15 | 15 | - | 5 | 5 | 20 |
| | Rural craft | 1 | - | 24 | 24 | - | 6 | 6 | 30 |
| | Total | 5 | - | 65 | 65 | - | 23 | 23 | 88 |
| | Total (36 + 37 tables) | 498 | 111 | 6880 | 6991 | 17 | 1519 | 1536 | 8527 |

Five trainings were organized for extension personnel (Table 3.36) and these were attended by 88 participants.

Table 3.37 Rural Youth

| S. No. | Name of Training | No. of training | General | | | SC/ST | | | Grand total |
|--------|--|-----------------|----------|------------|------------|----------|------------|------------|-------------|
| | | | M | F | Total | M | F | Total | |
| 1. | Value addition | 1 | - | 15 | 15 | - | 8 | 8 | 23 |
| 2. | Rural crops | 5 | - | 78 | 78 | - | 32 | 32 | 110 |
| 3. | Tailoring and stitching | 4 | - | 55 | 55 | - | 30 | 30 | 85 |
| 4. | Fruit and vegetable preservation | 3 | - | 100 | 100 | - | 24 | 24 | 124 |
| 5. | Detergent making | 2 | - | 50 | 50 | - | 15 | 15 | 65 |
| 6. | Value addition in garment construction and soft toys | 1 | - | 15 | 15 | - | 4 | 4 | 19 |
| 7. | Rakhi making | 1 | - | 20 | 20 | - | 4 | 4 | 24 |
| | Total | 17 | - | 333 | 333 | - | 117 | 117 | 450 |

Seventeen trainings were organized for rural youth in the category of off-campus. The participants covered under General and SC/ST category were 333 and 117, respectively (Table 3.37).

Table 3.38 Method Demonstrations

| S. No. | Name of Extension Activity | No. |
|--------|------------------------------------|-----|
| 1. | Fruit and vegetable preservation | 1 |
| 2. | Preparation of nutritious snacks | 1 |
| 3. | Construction of Janta Water Filter | 9 |
| 4. | Fabric painting | 9 |
| 5. | Artificial flower making | 1 |
| 6. | Hand embroidery | 3 |
| 7. | Garment construction | 3 |
| 8. | Tie and dye | 2 |
| 9. | Decorative art and craft | 6 |

It was surprising to note from data in Table 3.38 that one demonstration was organized each on Fruit & Vegetable Preservation, Preparation of Nutritious Snacks and Artificial Flower Making followed by equal number of demonstrations, i.e. Construction of Janta Water Filter and Fabric Painting (9 each), respectively.

Table 3.39 Extension Activities

| S. No. | Name of the Course | No. of training | General participants | | | Extension officials | | | Grand total |
|--------|---|-----------------|----------------------|-------------|-------------|---------------------|------------|------------|-------------|
| | | | M | F | Total | M | F | Total | |
| 1. | Mahila Mandal convenor meeting | 4 | - | 7 | 7 | - | 1 | 1 | 8 |
| 2. | Self help group convenor meeting | 7 | 7 | 10 | 17 | - | 2 | 2 | 19 |
| 3. | Mahila Samelan | 2 | - | - | - | - | - | - | 2 |
| 4. | Breast Feeding Week | 2 | - | 83 | 83 | - | - | - | 83 |
| 5. | Kisan Mela | 2 | 300 | 150 | 450 | - | - | - | 450 |
| 6. | Mothers' Day | 1 | - | 115 | 115 | - | - | - | 115 |
| 7. | Parthenium Eradication Campaign | 2 | - | 140 | 140 | - | - | - | 140 |
| 8. | National Nutrition Week | 3 | - | 205 | 205 | - | - | - | 205 |
| 9. | Bal Diwas | 1 | - | 15 | 15 | - | 2 | 2 | 17 |
| 10. | Diwali Eve Competition | 1 | - | 10 | 10 | - | 3 | 3 | 13 |
| 11. | World Food Day | 13 | 10 | 275 | 285 | 2 | 9 | 11 | 296 |
| 12. | Women in Agriculture Day | 3 | - | 235 | 235 | - | 57 | 57 | 292 |
| 13. | Sanitation campaign | 13 | 824 | 22 | 846 | 9 | 4 | 13 | 859 |
| 14. | Kisan Goshthi | 1 | - | 51 | 51 | - | - | - | 51 |
| 15. | World Consumer Right Day | 1 | - | 28 | 28 | - | - | - | 28 |
| 16. | International Women Day | 1 | - | 17 | 17 | - | - | - | 17 |
| 17. | World Environment Day | 11 | 10 | 180 | 190 | 2 | 4 | 6 | 196 |
| 18. | Exhibition | 2 | - | 1250 | 1250 | - | - | - | 1250 |
| 19. | Group Meeting | 40 | - | 447 | 447 | - | - | - | 447 |
| 20. | Van Mahotsava | 2 | 370 | 59 | 429 | 25 | 5 | 30 | 459 |
| 21. | Women Day | 1 | - | 75 | 75 | - | 12 | 12 | 87 |
| 22. | National Nutritional Week | 1 | - | 95 | 95 | - | 5 | 5 | 100 |
| 23. | Prevalence of malnutrition among infants and its consequences | 1 | - | 4 | 4 | - | - | - | 4 |
| 24. | Home Science awareness camp | 2 | - | 49 | 49 | - | 10 | 10 | 59 |
| 25. | Janta Water Filter | 2 | - | 57 | 57 | - | - | - | 57 |
| 26. | Gyan Diwas Child Care | 1 | - | 39 | 39 | - | - | - | 39 |
| 27. | Role of Women in Rural Upliftment | 1 | - | 17 | 17 | - | 7 | 7 | 24 |
| | Total | 117 | 1518 | 3635 | 5153 | 47 | 121 | 168 | 5921 |

Data in Table 3.39 reveal extension activities by the Home Science Scientists from time to time. Forty group meetings were followed by equal number, *i.e.* 13 each on World Food Day and sanitation campaign, respectively.

Table 3.40 Group Meetings

| No. of participants | General | | | SC/ST | | | Grand total |
|---------------------|---------|-----|-------|-------|---|-------|-------------|
| | M | F | Total | M | F | Total | |
| 90 | - | 621 | 621 | - | - | - | 621 |

Table 3.40 reveal that 621 rural women participated in group meetings conducted by Home Science Scientists on various occasions.

Table 3.41 Exhibitions organized

| |
|---|
| Value added food products |
| Slogans competition |
| Rangoli competition |
| Designing of garments |
| Designing of different types of bags with quilting impact |
| Rural handicrafts |
| Preparation of old items |

Exhibitions organized by Home Science Scientists from time to time were on preparation of value added food products, competitions on various occasions, garment construction and preparation of bags with quilting effect, etc.

Table 3.42 Farm Women Visited KVKs

| No. of participants | General | | | SC/ST | | | Grand total |
|---------------------|---------|-----|-------|-------|---|-------|-------------|
| | M | F | Total | M | F | Total | |
| 21 | - | 249 | 249 | - | - | - | 249 |

Table 3.42 reveal that only 249 women from General Category had visited KVK for their problems.

Table 3.43 Publications

| | |
|---|----|
| Research Paper published | 4 |
| Research Paper under process | 2 |
| Articles published | 12 |
| New paper coverage | 15 |
| Extension literature | 5 |
| Abstract published | 1 |
| Abstract presented | 2 |
| Poster presentation | 2 |
| Seminar organized | 1 |
| Refresher course/Short course organized | 2 |

Data in Table 3.43 reveal publications, *i.e.* research papers published, research papers under process, abstract presented, poster presentation, seminar attended/organized, refresher courses attended by Home Scientists from time to time. Fifteen newspaper coverage followed by 12 published articles.

Table 3.44 Impact of Vocational Trainings on Rural Youth

| District | Identified Area | Course | Training title | Participants | | Type of unit | No. of units | No. of persons employed |
|--------------|-----------------------|--------|------------------------------------|--------------|-----|--------------|------------------|-------------------------|
| | | | | M | F | | | |
| Mahendergarh | Income generation | 1 | Candle making | - | 70 | - | 70 | - |
| Faridabad | Value addition | 1 | Fruit & Dry veg. preservation | - | 20 | 20 | Pickle making | 4 |
| Mohindergarh | -do- | 1 | -do- | - | 24 | 24 | Small unit | 1 |
| Jhajjar | Food & Nutrition | 1 | Low cost nutritious snacks | - | 30 | 30 | Small unit | 1 |
| Jhajjar | Processing | 1 | Fruit & Vegetable preservation | - | 51 | 51 | Home | 1 |
| Mohindergarh | -do- | 1 | Fruit & Vegetable preservation | - | 30 | 30 | Small unit | 1 |
| Jhajjar | -do- | 1 | Fruit & Vegetable preservation | - | 36 | 36 | - | - |
| Mohindergarh | -do- | 1 | Processing of milk & milk products | 9 | 21 | 30 | Small unit | 1 |
| Rohtak | Food processing | 1 | Fruit & vegetable preservation | - | 100 | 100 | - | 4 |
| Rohtak | - | 1 | Detergent making | - | 50 | 50 | - | 2 |
| Rohtak | Tailoring & stitching | 1 | Tailoring & stitching | - | 15 | 15 | - | 1 |
| Rohtak | Rural craft | 1 | Rakhi making | - | 20 | - | - | 2 |
| Faridabad | Rural craft | 2 | Soft toys making | - | 20 | 20 | Soft toys making | 2 |
| Mohindergarh | Fabric enrichment | 1 | Tie & Dye | - | 56 | 56 | Small unit | Household level |
| Mohindergarh | Cutting & stitching | 1 | Cutting & stitching | - | 30 | 30 | -do- | -do- |

Data presented in Table 3.44 reveal the impact of vocational trainings on rural youth. Value addition, garment construction, fabric enrichment, preparation of rural crafts were the main activities organized by the Home Scientists from time to time. Most of the participants have established their own small units giving employment to one to 21 persons depending upon the size of established unit.

Table 3.45 Impact of KVK Activities

| S. No. | District | Skill transferrred | No. of partici-pants | %age of adoption | Change in income (Rs. per unit) | |
|--------|-------------------|---|----------------------|--|---------------------------------|--|
| | | | | | Before | After |
| 1. | Karnal | Stitching of ladies garments | 20 | 45 | Nil | Rs. 300-900 per month |
| 2. | Bawal | Garment construction | - | Nil | - | Four rural women and girls have taken up garment construction as entrepreneurial activity and earning about Rs.300 to 4000 per month. Others are stitching own suits which is an indirect saving of income. |
| 3. | Mohindergarh -do- | | 35 | 56 | - | Rs. 1000 per month |
| 4. | Faridabad | Storage of drinking water and use of Janta Water Filter | 40 | 58 | - | Safe guarded health of family against water borne diseases which is an indirect saving of expenses on medicines. |
| 5. | Bawal | Improved Sickle (Falcon premium with wood handle) | - | - | - | 40 improved sickles are being used by rural women of Banikar, Khara, Murale, Nandram, Phepas, Mohammadpur, Kapriwas and RRS, Bawal for harvesting of crops. |
| 6. | Faridabad | Drudgery reducing and labour saving device, i.e. improved sickles for harvesting the crop | 20 | 100 | - | Save about 25% harvesting time as compared to local sickle thereby reducing drudgery. |
| 7. | Bawal | Food preservation & nutritious receipes | Nil | Few girls have prepared tomato chatni and sauce, mango squash & chatni, sprouted moong dal | - | - |

Table 3.46 Linkages with other Organizations

| S. No. | District | Name of organization | Nature of linkage | Other districts |
|--------|--------------|---|---|--|
| 1. | Sadapur | ICDS | Training of rural women demonstration of extension activities | Damla, Panipat, Mohindergarh, Jhajjar, Rohtak, Faridabad |
| 2. | Sadapur | NYK | Training of youth and its members | Faridabad, Damla, Rohtak |
| 3. | Sadapur | NABARD | Training of youth and its members | Faridabad, Damla, Panipat, Rohtak, Mohindergarh, Jhajjar |
| 4. | Sadapur | PNB Sachakhera (Jind) | Conducted training for rural persons | Directorate of Extension Education |
| 5. | Faridabad | DRDA | Training under MOU with CCSHAU, Hisar | Mohindergarh, Jhajjar, Rohtak |
| 6. | Faridabad | Food & Nutrition Board | Training of extension activities as and when needed | |
| 7. | Panipat | Nitcon | Trainings and demonstrations | |
| 8. | Mohindergarh | KRIBHCO | Delivered expert lecture, technical guidance attended, field problems | Rohtak |
| 9. | Mohindergarh | PRIYA | -do- | |
| 10. | Mohindergarh | IFFCO & Chambal Fertilizer | Training, field day and kisan Goshties | |
| 11. | Jhajjar | DIC | Training, demonstration, lecture, participation in programme | |
| 12. | Rohtak | DDA, Rohtak | Extension activities and training | - |
| 13. | Rohtak | IFFCO | Conference, Seminar-held, training, other extension activities | - |
| 14. | Rohtak | NFL | Conference/Seminar, training and other extension activities | |
| 15. | Ambala | IFFCO, KRIBHCO, Chambal Fertilizer & ICDS | Conferences, trainings, attended the workshop | |

Linkages of KVKs with various organizations, i.e. ICDS, NYK, PNB, Sachakhera, KRIBHCO, PRIYA, IFFCO, NFL, DDA and DIC were made. These organizations also sought help from the scientists of KVKs as and when required (Table 3.46).

Table 3.47 Projects submitted

| | |
|----|--|
| 1. | Establishment of Tie & Dye unit at Krishi Vigyan Kendra. Project submitted to DRDA, Rewari by DES (H.Sc.). |
| 2. | An individual research project entitled "Acceptability of Drudgery Reducing Technologies" developed by FRM was conducted by Dr. (Mrs.) Manju Gupta, Sr. ES (H.Sc.) |

Methodology

Data were collected regarding two drudgery reducing technologies, *i.e.* improved sickles, and capron from 4 villages and RRS, Bawal after their introduction.

Results

Forty improved sickles are being used by rural women. Capron was opined as a useful and effective technology for threshing activity, but ready to adopt if given a stitched one.

Table 3.48 Studies & Survey Studies undertaken

| S. No. | District | Studies undertaken |
|--------|----------|---|
| 1. | Ambala | (i) Survey on feed back of training on fashion designing and modern stitching (ii) Awareness of paper pattern for stitching ladies suits (iii) Awareness of improved sickle for harvesting (iv) Awareness of cotton bag and mask among rural women for cotton picking. |

Table 3.49 Miscellaneous Activities

| |
|--|
| Expert lecture delivered : 11 D.E.S. (H.Sc.) and Sr.D.E.S. (H.Sc.) holding an additional charge of KVK Library. Compilation of MPRs annual report and major extension activities done by home science experts. |
|--|

HORTICULTURE AND AGRO FORESTRY

Table 3.50 On farm trial on planting time of fruit plant by KVK, Bawal

| Crop | Farming situation | Problem identified | Treatment | Survival |
|-------------|-------------------|---------------------------|--|-------------------------------|
| Fruit plant | Irrigated | Mortality during planting | Planting time (1) Aug.-Sep. (2) Jan.-Feb. | Maximum survival in Aug.-Sep. |

Data in Table 3.50 reveal that the best planting time is Aug.-Sep. *i.e.* after on-set of rains.

Table 3.51 On farm trial on Identification of causal organism for citrus die back

| Crop | Farming situation | Problem identified | Treatment | Survival |
|-----------------------------|--------------------------|--|-------------------------------------|-------------------------------------|
| Citrus kinnows and mossambe | Irrigated and sandy soil | Phytophathisa + Cankar (CaCO_3) | Digging of pit size of 4' x 3' x 3' | Digging of pit size of 4' x 3' x 3' |

Dr. Steve from Florida (USA) visited the farmers' fields of Sirsa district and was of the opinion that the main cause of die back in Citrus is phytophathora disease and calcareous layer in the soil.

Table 3.52 On farm trial on comparison of Eucalyptus cline in KVK, Kaithal

| Clone Number | Average height (m) | Average girth (cm) |
|--------------|--------------------|--------------------|
| 3 | 6.9 | 46.2 |
| 7 | 7.8 | 54.4 |
| 10 | 6.7 | 48.5 |
| Control | 6.2 | 39.6 |

Data reveal that Clone No. 7 had better height 7.8 m and girth 54.4 cm as compared to other clones.

Table 3.53 On farm trial on fertilizer application in fruit/flower by KVK, Jhajjar

| Crop | Farming situation | Problem diagnosed | Treatment | Result |
|-----------|-------------------|-----------------------------|-------------------------------------|--------------|
| Guava | Irrigated | Imbalance use of fertilizer | Fertilized used at recommended dose | Higher yield |
| Aonla | -do- | -do- | -do- | -do- |
| Marigold | -do- | -do- | -do- | -do- |
| Gladiolus | -do- | -do- | -do- | -do- |
| Ber | -do- | -do- | -do- | -do- |

Recommended dose of fertilizer gave considerably higher yield, whereas farmers' practices resulted in reduced crop yields. It is suggested that Phosphorus should also be applied along with Nitrogen in *ber*.

Table 3.54 On farm trial on spray of urea and zinc sulphate in Ber

| Crop | Farming situation | Problem identified | Treatment | Yield (q/ha) |
|------|-------------------|--------------------|---|---------------|
| Ber | Irrigated | Fruit drop | (1) Control | (1) 2769 q/ha |
| | | | (2) Urea 15% + ZnSO ₄ 0.5% thrice in July and Sep. | (2) 340 q/ha |

In *ber*, spray of 15% urea + 0.5% ZnSO₄ controlled the fruit drop and increased the yield up to 340 q/ha as compared to control (Table 3.54).

Table 3.55 Survey of different fruits in districts of Faridabad, Mohindergarh and Jhajjar (area in acre)

| S. No. | District | Guava | Ber | Citrus | Mango | Aonla | Others | Total |
|--------|--------------|-------|-------|--------|-------|-------|--------|---------|
| 1. | Faridabad | 640.0 | 237.5 | 174.0 | 111.5 | 124.0 | 161.5 | 1448.5 |
| 2. | Mohindergarh | 8.0 | 37.0 | 61.0 | - | 129.0 | 10.0 | 235.0 |
| 3. | Jhajjar | 364.0 | 340.0 | 150.0 | 500.0 | 118.0 | 53.0 | 10350.0 |

A survey was conducted to know the actual area of fruit plants grown in above districts by KVK scientists so that future planning could be made accordingly and more area could be under Horticulture Mission.

Plant Protection

On farm trials were conducted at Krishi Vigyan Kendra (Jagdishpur), Sonapat on the efficacy of different insecticides for controlling termite and shoot borer in sugarcane. All the chemicals were found to control shoot borer and termites effectively. It is clear from the data (Table 3.57) that Confidor was most effective against Shoot Borer followed by Kanodan, Chlorpyrifos, Regent and Endosulfan, respectively. Regent and Kanodan were found most effective in checking the population of termites in sugarcane. No termite incidence was observed with the use of these chemicals. Termite infestation in Confidor, Chlorpyrifos and Endosulfan treatments was 7.14, 6.67 and 14.28 per cent, respectively.

Table 3.56 Effect of Regent, Confidor, Kanodan, Chlorpyrifos and Endosulfan against termite and shoot borer in sugarcane

| Treatment | Dose/ha | Per cent infestation | | Net Return (Rs./unit) | B:C Ratio |
|--------------|------------|----------------------|---------|-----------------------|-----------|
| | | Shoot Borer | Termite | | |
| Control | - | 20.77 | 73.68 | 36500 | 1.60 |
| Regent | 25 kg | 5.24 | 0.00 | 40450 | 1.66 |
| Confidor | 375 ml | 2.63 | 7.14 | 39000 | 1.64 |
| Kanodan | 6.25 litre | 3.22 | 0.00 | 39750 | 1.65 |
| Chlorpyrifos | 6.25 litre | 4.52 | 6.67 | 39500 | 1.65 |
| Endosulfan | 3.75 litre | 9.73 | 14.28 | 38540 | 1.63 |

Table 3.57 Management of sugarcane stalk borer *Chilo auricilius* by its egg parasitoid *Trichogramma chilonis*

| Treatment | Dose/ha | Per cent infestation of stalk borer shoot borer termite | Infestation reduction (%) | Intensity (%) | Intensity reduction (%) | Net return (Rs./Unit) | B:C Ratio |
|-----------------------------------|---------|---|---------------------------|---------------|-------------------------|-----------------------|-----------|
| <i>Trichogramma chilonis</i> eggs | 50000 | 28.00 | | 2.27 | | 48640 | 1.80 |
| Control | | 54.00 | 48.15 | 7.12 | 68.12 | 38000 | 1.62 |

A trial conducted by KVK (Jagdishpur), Sonipat on biological control of sugarcane stalk borer and the results are presented in Table 3.57. Population of 50,000 eggs of *Trichogramma chilonis* per ha when applied, significantly increased the cane yield resulting in profitability by Rs. 10640/ha.

On Farm Trial was conducted by KVK, Kurukshetra for the control of Stem borer in Basmati Rice. Two insecticides, viz. Fortax 10G (Phorate) and Cartap Hydrochloride (Padan 4G) were found to control the borer effectively. Both the insecticides performed equally well and the yield was same in both the treatments. The same trial was conducted at KVK (Jagdishpur), Sonipat and KVK, Kaithal and the results are presented in Tables 3.58 and 3.59.

Table 3.58 Efficacy of Padan 4G and Fortox 10G against rice stem borer at KVK, Sonipat

| Treatment | Dose (kg/ha) | Infestation (%) of stem borer | | | | Yield (kg/ha) | Net return (Rs./Unit) | B:C ratio |
|------------|--------------|-------------------------------|---------------------|----------------|------|---------------|-----------------------|-----------|
| | | Before application | At vegetative stage | Before harvest | | | | |
| Padan 4G | 18.75 | 6.56 | 1.50 | 0.98 | 4873 | 44537 | 3.71 | |
| Fortax 10G | 12.5 | 6.59 | 1.95 | 1.38 | 4550 | 44500 | 3.47 | |
| Control | - | 5.44 | 4.64 | 4.40 | 4140 | 35375 | 3.16 | |

It is clear from the data that Padan 4G is superior to Fortax 10G in controlling the stem borer at vegetative stage and near maturity of the crop thereby increasing the yield. The increase in yield was 3.23 q/ha resulting in appreciation of BC ratio from 3.47 to 3.71 (Table 3.58).

Table 3.59 Comparison of Fortax 10G with Padan 4G in controlling rice stem borer

| Location | Treatment | Yield/acre (q) | | Per cent incidence |
|--------------|------------|---------------------|-----------------------|--------------------|
| | | At vegetative stage | At reproductive stage | |
| KVK, Kaithal | Padan 4G | 21.5 | 1.49 | 1.11 |
| | Fortax 10G | 23.5 | 0.79 | 1.28 |

Use of Padan 4G and Fortax 10G improved the grain yield by reducing the stem borer incidence. Another trial conducted by KVK, Kurukeshtra was on reducing the cost of production of white button mushroom. Wheat straw, the base material used for preparation of synthetic compost was replaced by paddy straw i.e. straw alone and in combination with 40% poultry manure. Although paddy straw compost produced less yield yet the cost of production was significantly high. Mushroom growers saved Rs. 250/q for the cost of raw straw.

An On Field Trial was conducted for the evaluation of Basmati genotype for resistance against blast diseases by KVK, Kurukeshtra. The genotype HKR 98 476 showed resistance against blast disease and the grain yield was at par with existing varieties but the grain quality was not liked by the traders.

A trial for evaluation of casing material in production of white button mushroom was conducted by KVK (Damla) Yamunanagar. Three different types of casing mixture, viz. burnt rice, burnt rice husk + garden soil (3:1) and well decomposed FYM were included in the studies. Burnt husk alone or in combination with garden soil yielded better. The income of growers increased by Rs. 40/q of compost.

Seed treatment in vegetable crops

Treatment of Seed with chemicals is considered to be the best, cheapest and easiest method of reducing the damage caused by soil and seed borne pathogens. To evaluate the effect, treatment trials were conducted by KVK (Jagdishpur), Sonipat and the results are in Tables 3.60.

Table 3.60 Effect of seed treatment in Okra

| Technology assessed/refined (okra) | Production per unit | Net return (Rs./unit) | B:C ratio |
|--|---------------------|-----------------------|-----------|
| Farmer's practice | Hybrid 87.5 | 38630 | 3.57 |
| No seed treatment | Arka Anamika 99.5 | | |
| Technology assessed seed treatment @ 2.5g thiram/kg seed | Hybrid 88.5 | 40520 | 3.70 |
| | Arka Anamika 105.5 | | |

KVK, Bawal also conducted demonstration during the year 2006-07. Seed treatment with thiram was popularized in 55 villages benefiting 1965 farmers (1120 hectare) in Rewari District.

Soil Science

a) National Demonstration

Two field trials at the farmers' fields were laid out during the months of November and December, 2006 on raya and wheat crops in village Dinod (Bhiwani) and Harita (Hisar), respectively. It was inferred that in raya, the respective yield increased by 18.8 and 11.1 per cent under soil test based balanced fertilizer application and state recommendation as compared to the farmers' practice.

In another trial on wheat, the yields obtained under soil test based balanced fertilizer application and state recommendations were equal but higher by 5 to 6 per cent than farmer's practice. Yields though being equal, there was a net saving of 16 kg P_2O_5 and 1.0 kg zinc sulphate under the soil test based balanced fertilizer recommendation over the state recommendation. Thus, in terms of monetary gains, there is a net saving of Rs. 490/acre, as per date.

b) Crop Diwas organized

For transfer of technology from Lab. to Land in wheat and raya amongst farmers, two Crop Diwas, one on wheat and other on raya was organized in village Harita (Hisar) and Dinod (Bhiwani) on February 22 and February 27, respectively. Lectures by different experts relevant to the subjects were delivered. About 50-60 farmers of the respective villages participated in the function.

c) Technological Transfer

Based on the principle - seeing is believing, it was demonstrated amongst the farmers that soil test based balanced fertilizer application is better than state recommendation either yield wise (Raya) or economically (Wheat) to the farmer's practice.

d) Demonstrations

Various demonstrations (FLD/OFT/VT) on different aspects of Soil Science Discipline were conducted on different crops at farmers' fields as well as KVK farms of different districts. The details of these demonstrations are given below :

Table 3.61 Effect of balanced fertilizers and Bio-inoculants (Rhizobium+PSB) on the grain yield of clusterbean at RRS, Bawal

| Treatments | Grain yield (q/ha) | Increase in yield over control (%) |
|---|--------------------|------------------------------------|
| T ₁ = Full Package (as per recommendations) | 12.25 | 16.7 |
| T ₂ = Farmers' Practice | 10.50 | |
| T ₁ = Full Package + Rh+PSB (As per recommendations) | 8.6 | 7.5 |
| T ₂ = Full Package (Without bio-inoculants) | 8.6 | - |

The data in Table 3.61 reveal that both the technologies, *i.e.* balanced fertilization and use of bio inoculants showed an increase of 16.7 and 7.5 per cent on clusterbean yield over the farmers' practice, respectively.

Table 3.62 Fertilizer management in raya crop in Distt. Bhiwani

| Treatments | Yield (q/ha) | Net return (Rs./ha) | B:C Ratio |
|--|--------------|---------------------|-----------|
| T ₁ = Farmers practice (Double dose of P + No N at sowing time) | 16.0 | 16000 | 1.17 |
| T ₂ = Technology Assessed (Double dose of P + V ₂ dose of N at sowing) | 18.0 | 19700 | 1.44 |
| T ₃ = Recommended fertilizers | 7.5 | 500 | 0.03 |
| T ₄ = 25% higher N + Recommended fertilizer (other than N) | 10.5 | 5900 | 0.45 |

The data in Table 3.62 reveal that the yield, net return and B:C ratio were found to be maximum in T₂ (Technology Assessed) treatment and these parameters were found to be minimum in treatment T₃ (Recommended doses of fertilizers) in raya crop.

Table 3.63 Effect of potassium in sugarcane and paddy crops and bio fertilizers effect in wheat crop in Distt. Yamunanagar

| Crop | Treatments | Yield (q/ha) | % increase in yield over control |
|-----------|---|--------------|----------------------------------|
| Sugarcane | T ₁ = Control (No potash) | 821.2 | - |
| | T ₂ = 50 kg (K/ha) | 872.5 | 6.2 |
| Paddy | T ₁ = Control (No potash) | 59.5 | - |
| | T ₂ = 75 Kg (K/ha) | 61.5 | 3.4 |
| Wheat | T ₁ = Control (without bio-fertilizers) | 45.8 | - |
| | T ₂ = Seed treatment with bio-fertilizer (Azotobacter + phosphotika) | 48.0 | 4.9 |

The data in Table 3.63 indicate 6.2, 3.4 and 4.9 per cent increase in the yield of sugarcane, paddy and wheat crops, respectively, with the application of potash in sugarcane and paddy and seed treatment with bio-fertilizers in wheat crop.

Table 3.64 Effect of different assessed/refined technologies on the yield of wheat and paddy crops in Distt. Faridabad

| Crop | Technology assessed/refined | Treatments | Yield (q/ha) | % increase in yield over control | Net return (Rs./ha) | B : C Ratio |
|-------|--|--|--------------|----------------------------------|---------------------|-------------|
| Wheat | Green manuring | T ₁ = Green manuring with <i>Dhaincha</i> | 55.1 | 7.00 | 28080 | 2.43 |
| | | T ₂ = No green manuring | 51.5 | - | 26240 | - |
| Paddy | LCC based N application | T ₁ = N application on LCC basis | 49.8 | 1.0 | 19740 | 1.98 |
| | | T ₂ = Use of recomm. N dose (150 kg/ha) | 49.3 | - | 19340 | 1.96 |
| Wheat | INM | T ₁ = Recomm. Dose of Inorganic Fertilizer | 40.0 | 102.0 | 18360 | 1.85 |
| | | T ₂ = Only 15t FYM/ha | 19.8 | - | 9090 | 0.91 |
| | | T ₃ = FYM @ 15 V/ha | 42.8 | 116.2 | 19643 | 1.98 |
| | | 150 kg N + 30 kg P ₂ O ₅ /ha | | | | |
| Wheat | Soil Test based fertilizer application | T ₁ = Farmer practice | 29.0 | - | 13310 | 1.34 |
| | | T ₂ = Fertilizer application on soil test basis | 39.5 | 36.2 | 18130 | 0.82 |

The data in Table 3.64 show a positive impact of all the technologies assessed on all the test crops in terms of their yield, net return and B:C ratios.

Soil Testing Laboratories

All the four Soil and Water Testing Laboratories of CCS HAU, Hisar based at Hisar, Rohtak, Bawal and Uchani (Karnal) have collectively analysed 7241 soil and 3081 samples during the year 2006-07. Of the 7241 soil samples received, 7067 were from Haryana while 174 were from adjoining States such as Punjab, U.P., Rajasthan and Delhi, etc. Of the 7067 soil samples received from Haryana, 56.3% (3976), 42.2% (2985) and 1.5% (106) were analysed with respect to fertility evaluation, garden plantation and *Kallar* reclamation, respectively.

Table 3.65 Soil and water samples analysed

| Soil testing laboratories | Soil | Water |
|---------------------------|-------------|-------------|
| Bawal | 851 | 387 |
| Hisar | 5096 | 2257 |
| Karnal | 702 | 79 |
| Rohtak | 592 | 358 |
| Total | 7241 | 3081 |

It was observed that 63.2, 18.9 and 5.2 per cent of the samples analysed with respect to fertility evaluation (3976) were found to be low in available nitrogen (organic carbon basis), available phosphorus and potash, respectively while the corresponding percentage with respect to these nutrients in medium category were 35.22, 63.0 and 60.7. Similarly 1.6, 18.1 and 34.1 per cent of the samples were found to be in high category with respect to available nitrogen, available phosphorus and potash, respectively.

Likewise, 3081 underground water samples were received during the period under report. Of these, 2912 and 162 water samples were received from Haryana and adjoining States as stated above, respectively. On the basis of tubewell water samples received (2912), it is inferred that 15.6, 39.5, 33.5 and 11.4 per cent were good, marginally saline to saline, sodic and unfit, respectively for crop cultivation for which various reclamation measures were suggested to the farmers. Of the total 7241 soil and 3081 water samples analysed, RSTL, Hisar analysed 5096 soil and 2257 water samples.

3.1.2 Agricultural Technology Information Centre (Kisan Seva Kendra)

ATIC came into existence at CCS Haryana Agricultural University, Hisar in February, 2002 with the three objectives. The detail of the progress of 'work done by the ATIC and the activities performed by it during the period to achieve its objectives is enlisted below :

- i) To provide a 'single window' delivery system for the products and species available from an institution to the farmers and other interested groups as a process of innovativeness in Technology Dissemination at the institute level.

Table 3.66 Sale of Technological inputs through 'Single Window' Delivery System

| S. No. | Technological Inputs | Quantity (q) | Value (Rs.) | S. No. | Technological Inputs | Quantity (q) | Value (Rs.) |
|--------|----------------------|--------------|----------------|--------|-----------------------------|---------------|---------------|
| 1. | Seeds | | | | Radish | 005.40 | 5400 |
| | a) Cereals | | | | Carrot | 064.00 | 9600 |
| | i) Wheat | | | | Chillies | 008.20 | 2460 |
| | WH-711 | 090.00 | 108000 | | Tomato | 017.70 | 12390 |
| | PBW-502 | 014.00 | 16800 | | Bhindi | 203.75 | 16300 |
| | PBW-343 | 096.00 | 134400 | | Tori | 024.00 | 4800 |
| | ii) Barley | | | | K.G. Packet | 103 1 pkt. | 29620 |
| | BH-393 | 001.70 | 18375 | | Palak | 0200 pkt. | 1000 |
| | iii) Bajra | | | | Cariander | 0228 pkt. | 1140 |
| | HC-20 | 003.24 | 17820 | | Turnip | 017.20 | 1720 |
| | HH-1 17 | 010.00 | 55000 | | Onion | 030.00 | 9000 |
| | HI-M-67-2 | 022.20 | 122100 | | Sem | 012.50 | 500 |
| | b) Pulses | | | | Brinjal | 005.00 | 2000 |
| | Mungbean | | 0 | | Total | 111250 | |
| | Gram | | 0 | 3. | Fruit Plant Material | | |
| | Pea | | 0 | 1. | Ber (BP) @ Rs. 151/- | 2351 | 35265 |
| | c) Oilseeds | | | 2. | Citrus (BP) @ Rs. 151/- | 3285 | 49275 |
| | Raya | - | 0 | 3. | Datepalm @ Rs. 40/- | 30 | 1200 |
| | RH-30 | 125.87 | 377620 | 4. | Guava (BP) @ Rs.20/- | 2758 | 55160 |
| | Laxmi | - | 0 | 5. | Aonla (BP) @ Rs.20/- | 1013 | 20260 |
| | d) Forage | | | 6. | Mulbery (BP) @ Rs. 151/- | 142 | 2130 |
| | i) Berseem | | | 7. | Mulbery (S) @ Rs.5/- | 2 | 10 |
| | Muskan | - | 0 | 8. | Bael (BP) @ Rs. 151/- | 541 | 8115 |
| | HB- 1 | 001.33 | 13965 | 9. | Bael (S) @ Rs.5/- | 39 | 195 |
| | ii) Oats | | | 10. | Peach (BP) @ Rs. 151/- | 903 | 13545 |
| | iii) Sorghum | 015.80 | 10000 | 11. | Mango (BP) @ Rs.20/- | 532 | 10640 |
| | HC-26 | - | 0 | 12. | Mango (S) @ Rs.5/- | 24 | 120 |
| | iv) Guar | | | 13. | Grape @ Rs. 10/- | 1264 | 12640 |
| | HG-365 | 102.28 | 276180 | 14. | Pomrgranate (9-10/-) | 2143 | 21430 |
| | HG-563 | 051.20 | 138240 | 15. | Plum @ Rs. 10/- | 679 | 6790 |
| | Total Seeds | | 1351963 | 16. | Sapot (BP) @ Rs.20/- | 83 | 1660 |
| 2. | Vegetables | (kg) | | 17. | Karonda (S) @ Rs.5/- | 1513 | 7565 |
| | Methi | 304.00 | 1200 | 18. | Jamun (S) @ Rs.5/- | 2077 | 10385 |
| | Tur-kakri | 015.63 | 7855 | 19. | Papaya (S) @ Rs.5/- | 3055 | 15275 |
| | Muskmelon | 000.75 | 195 | 20. | Banana @ Rs. 10/- | 38 | 380 |
| | Tinda | 045.00 | 9170 | | Total | 22472 | 272040 |
| | Bottleguard | 29.50 | 5900 | | | | |

BP : Budded Plants; S : Seedling; R : Rooted Plants/Cuttings

Table 3.67 ATIC Nursery

| | | |
|---|------------------|----------------|
| 1. Guava (BP) @ Rs.20/- | 737 | 14740 |
| 2. Aonla (BP) @ Rs.20/- | 685 | 13700 |
| Total | 1422 | 28440 |
| Grand Total (Fruit Plant Material) | 23894 | 300480 |
| 3. Non-seeds | (q) | (Rs.) |
| Mungbean | 28.33 | 85343 |
| Urd | 01.11 | 6885 |
| Mothbean | 00.43 | 1290 |
| Soyabean | 12.00 | 18000 |
| Til | 00.10 | 190 |
| Wheat | 01.72 | 1800 |
| Bajra | 05.25 | 1790 |
| Total | 48.94 | 112298 |
| 4. Bio-fertilizers | 48831 pkt | 488310 |
| 5. Processed products | (Qty.) | (Rs.) |
| Honey | 740 bottle | 74000 |
| Bael-squash | 724 bottle | 36200 |
| Apple jam | 008 bottle | 400 |
| Guava squash | 003 bottle | 45 |
| Aonla Muraba | 052 kg | 3120 |
| Pineapple | 014 bottle | 700 |
| Anar squash | 0 16 bottle | 960 |
| Total | - | 115425 |
| 7. Publications | (Qty.) | (Rs.) |
| i) Analytical Tech. Animal Nutrition | 001 | 40 |
| ii) Laboratory Manual for Poultry | 001 | 36 |
| iii) Krishi Tractor Avem Upkaran - 1 | 001 | 30 |
| iv) Mrida Vigyan Prashnotri | 009 | 405 |
| v) Pashu Prajanan Ke Sidhanth | 002 | 100 |
| vi) Lakh Ke Kire | 004 | 160 |
| vii) Madhu Makhiyon Ke Satrot Avem Pragan | 009 | 810 |
| viii) Farm Bahi Khata | 001 | 20 |
| ix) Barani Local Vait | 006 | 42 |
| x) Sprinkler Sinchai | 003 | 45 |
| xi) Poultry Products | 006 | 60 |
| xii) Gharelu Star Par Fal Avem Sabjyan | 027 | 405 |
| xiii) Suar Palan | Oil | 220 |
| xiv) Padap Rog | 002 | 100 |
| xv) Bhains Prajanan Avem Prabandh | 004 | 280 |
| xvi) Acha Pashu Palan | 033 | 1650 |
| xvii) Rabbit Breeding | 003 | 165 |
| xviii) Suar Prajanan Avem Prabandhan | 006 | 300 |
| xix) Aushdiye Avem Sambandh Poudhon Ki Tadarthj Sainagar Sifarishen | 117 | 5850 |
| xx) Package of Practice - Horticulture | 173 | 8650 |
| xxi) Package of Practice - <i>Kharif</i> | 260 | 13000 |
| xxii) Package of Practice - <i>Rabi</i> | 234 | 11700 |
| Total | - | 44048 |
| Last Years' Requisition Sale | - | 297755 |
| Grand Total Sale | - | 2821529 |

- ii) To facilitate direct access to the farmers to the institutional resources available in terms of technology, advice, technology products etc. for reducing technology dissemination losses.
- iii) To provide feedback from the users to the institute. To achieve these objectives, sale of seeds, non seed items, planting material, university publications and all other products of the university are sold to the farmers and other interested persons through a 'Single Window' delivery system. Farm Advisory Services are provided to the farmers and other growers through :
 - a) Personal contacts to the visiting farmers
 - b) Toll free telephone helpline
 - c) Publication material and
 - d) Lectures delivered during various trainings and visiting groups at the centre.

Table 3.68 Farm Advisory Services provided to Farmers and Other Stake Holders

| Advisory services provided | Number of Beneficiaries Advised Through | | | |
|--|---|----------------|---------------------|-------------|
| | Personal visit at ATIC | Correspondence | Telephone help line | Total |
| (a) Field crops | | | | |
| i) Crop Production | 2812 | 73 | 620 | 3505 |
| ii) Plant Protection | 506 | 31 | 382 | 919 |
| (b) Horticultural crops (Fruits, Flowers & Vegetables) | 1104 | 33 | 558 | 1695 |
| (c) Animal Science | 151 | 22 | 228 | 401 |
| (d) Others | | | | |
| i) Agro Forestry | 10 | 8 | 16 | 34 |
| ii) Medicinal Plants | 51 | 13 | 32 | 96 |
| iii) Others | 375 | 31 | 212 | 618 |
| Total | 5009 | 211 | 2048 | 7268 |

Other Activities Performed by ATIC

1. Scientists of ATIC participated and delivered lectures in various trainings organized by the Department of Agriculture, Haryana, Horticulture Department, Haryana, IFFCO, KRIBHCO, World Bank and DRDA, etc. for the farmers.
2. Conducted publicity campaigns for Farm Darshan and Kisan Mela in villages of Hisar district.
3. Scientists and staff of ATIC participated in Farm Darshan and Kisan Mela for guiding farmers for proper seeds, sale of university publications, etc.
4. Scientists and staff of ATIC participated in Rabi and Kharif Agricultural Officers Workshops and performed all the duties assigned to them during the workshop.
5. Organized and coordinated RAWE Training Programme for B.Sc. (Hons.) Ag. Final year students from 24.01.2007 to 21.03.2007.
6. Conducted three days lecture programme for RAWE Trainees from 25.01.07 to 27.01.07 by all the Specialists of ATIC.
7. Attended various groups of farmers, students and visitors visiting ATIC from time to time.

ACHIEVEMENTS OF RBC PROJECT (HISAR CENTRE)

The existing farming system was not sustainable in meeting the needs of the farmers in the selected villages of Hisar and Sonapat districts. To meet the needs of the farmers, the RBC project helped in bringing the sustainability by imparting 73 trainings to 2190 farmers on various aspects, viz. Crop and Seed production (9), Vegetables (13), Mushroom cultivation (9), Bee keeping (5), Dairying and Vermi composting (19) and Food processing (18). Twenty farmers of selected villages of both the districts started producing organic crops by using Bio-fertilizers in their fields and have stopped burning the crop residues. By adoption of new technologies the income of the farmers increased from Rs. 1400/- to Rs. 6300/ha. through crop production and from Rs. 4400/- to Rs. 5500/- animal/annum through dairying. The farmers have also reduced their cost of cultivation of wheat crop by using Zero tillage technology from Rs.1400/- to Rs. 1600/- per acre. The trainings on food processing increased the profit ranged from 62.50 to 150.00 per cent depending upon the products. The rural masses have started such employment opportunities and human labour absorption per household in dairying and crop production increased from 179 to 206 and 215 to 270 mandays, respectively after implementation of the project (April, 2005 to November, 2006). It may be concluded that transfer of new technologies of crop production, food processing and dairying has positive and significant effect on the farm income and the employment.

3.2 Farm Training Service

Institute of Agricultural Technology, Training & Education (IATTE) is responsible for disseminating the latest technology in the field of Agriculture to the farming community and field extension personnel. The Institute is mainly entrusted with organization of training to various categories of clientele, i.e. farmers, livestock owners, farm women, rural unemployed youth, farm functionaries, personnel engaged in development & professional agencies and administrators (IAS/HCS) through its well planned skill oriented and need based Trainings for increasing farm production, to have better home and to raise the standard of living of rural masses.

3.2.1 Institute of Agricultural Technology, Training and Education

During the year 2006-07, IATTE organized 110 trainings in various disciplines for a variety of clientele and benefited 3596 participants. Twenty eight trainings were organized for SAO's/ Extension personnel and Extension Scientists and 858 participants were benefited.

Important trainings organized for SC and ST of Haryana State for Self employment, monthly T&V Training Workshop, ZREAC Workshops, trainings on Cotton Production Technology and Rural Bioresource Complex, Finance Management and Organic Farming.

Table 3.69 Progress of activities IATTE

| S. No. | Activity | No. | No. of participants |
|----------------------------|----------------------------|-----|---------------------|
| 1. | Trainings organized | 111 | 3596 |
| 2. | Visits organized/conducted | 72 | 2965 |
| 3. | Lectures delivered | 131 | 5026 |
| Total Beneficiaries | | | 11632 |

Table 3.70 Clientele wise Trainings organized by IATTE in the field of Agriculture and allied subjects

| S. No. | Clientele | No. of trainings | No. of participants |
|--------|----------------------------|------------------|---------------------|
| 1. | SAO's/Extension Scientists | 28 | 858 |
| 2. | Rural/urban Ladies | 21 | 580 |
| 3. | Farmers | 39 | 1220 |
| 4. | Unemployed Rural Youth | 23 | 938 |
| | Total | 111 | 3596 |

Note: On an average 9.2 trainings were organized per month, 32.4 participants per training and 1.47 Trainings working day.

The Institute organized a number of special trainings on **Cotton Production Technology** for State Agricultural Officers. Institute has also organized trainings for SC and ST youth of Haryana on different aspects, viz. Piggery, Mushroom Production Technology, Bee Keeping, Nursery Raising, Soft Toys Making and Surf & Detergent Making for self employment.

The Institute also organized vocational training courses like Hybrid Seed Production of Rice, Mushroom Production Technology, Bee Keeping, Dairy, Poultry, Piggery, Fruit & Vegetable Preservation, Soap & Detergent Making, Candle Making, Rakhi Making, Baking, Painting and Tie & Dye. One vocational course was organized each on Nursery Production Technology and Cotton Production and Protection sponsored by Vardhman Spinning and General Mill.

Table 3.71 Details of Important trainings organized

| S. No. | Name of training | Training | Clientele | Duration (day) | Participants |
|--------------------------|--|----------|-------------------------|----------------|--------------|
| A. Govt. of India | | | | | |
| 1 | Hindi Workshop | 1 | Officers of IFFCO | 2 | 35 |
| 2. | Production Technology of Rabi Crops | 1 | Field staff of CSF | 1 | 30 |
| 3. | Cotton Production & Protection | 1 | Cotton Purchase Officer | 1 | 10 |
| 4. | Production Technology of Hybrid Rice | 1 | Field staff of CSF | 1 | 24 |
| B. Haryana Govt. | | | | | |
| 1. | Agroforestry | 2 | Forester | 5 | 61 |
| 2. | Processing of Fruit & Vegetable for Dickling | 1 | Scientists | 1 | 20 |
| 3. | Bee Keeping | 1 | SC/ST | 3 | 25 |
| 4. | Organic Farming | 1 | Scientists of KVK | 2 | 29 |
| 5. | Finance Management | 1 | -do- | 1 | 29 |
| 6. | Cotton Prod. Tech. (JDA, Cotton) | 8 | SAOs | 2 | 201 |
| 7. | Nursery Raising | 1 | SC and ST | 4 | 25 |
| 8. | Mushroom Production Technology | 2 | SC and ST | 3 | 50 |
| 9. | Soft Toys Making | 1 | -do- | 3 | 25 |
| 10. | Pig Farming | 1 | -do- | 5 | 24 |
| 11. | T&V Monthly Training Workshops | 9 | SAO's/Extn.Scientists | 2 | 298 |
| 12. | C Workshop Rabi | 1 | -do- | 1 | 50 |
| 13. | ZREAC Workshop Kharif | 1 | -do- | 1 | 61 |

Food Processing Training Centre (FPTC)

The Ministry of Food Processing, GOI, New Delhi also established one of its FPTC at this Institute in the year 2000 for encouraging rural entrepreneurship in Food Processing and during the period under report, this centre organized 6 trainings on Fruit & Vegetable Preservation and benefited 160 participants.

During the year under report, an average of 9.2 trainings were organized per month with an average number of 32.4 participants per training and 1.47 trainings per working day. It clearly shows that the Institute is working excellently and fulfilling its mandate. It is also to be mentioned here that among all the State Agricultural Universities (SAUs) having training facilities, the set up of this Institute (IATTE) has always been considered a unique one and most appropriate for organization of trainings for T.O.T.

Technical Visits & Study Tour

The University being the active centre of excellence in Research, Teaching & Extension Education learning, fetches a large number of visitors to get the knowledge of agriculture development for the overall well being of the farmers. During the period under report IATTE organized/conducted 72 visits for the farmers, students and Extension Officials from various States of India and benefited 2965 visitors.

Specialized Lectures

The Faculty of IATTE also delivered Specialized Lectures on various aspects and disciplines in various trainings/visits/study tours as well in trainings organized by IATTE. During the period under report, the faculty of IATTE delivered 131 specialized lectures in various trainings and 5026 participants were benefited.

Other Activities

IATTE faculty members attended duties in various activities as Committee Chairman/Members organized by Directorate of Extension Education, CCS HAU, viz. AOW (*Kharif and Rabi*), Horticultural Officers Workshops, Animal Husbandry Officers Workshops and *Farm Darshan & Kisan Mela* etc. Faculty members also taught various courses in their discipline, guided M.Sc. and Ph.D. students as Major Advisor/Advisory Committee.

Farmers' Hostel and Kisan Ashram

Farmers' Hostel and Kisan Ashram, the two major lodging places, accommodating about 150 persons for the University visitors and trainees, are being managed by IATTE. During the period under report IATTE deposited the income of Rs. 1,90,095/- for Farmers' Hostel and Rs.99,000/- for Kisan Ashram and Institute with the University.

Publications

IATTE faculty members published 16 Research Papers, 28 Semi-technical articles and also delivered 17 Radio and T.V. talks.

3.2.2 Extension Education Institute, Nilokheri

This Institute is to provide training in Extension methods and Communication media to the staff of GTS/ETs. It also organizes workshops of upgradation and communication skill, training methodology, extension management and PRA techniques, video production orientation courses, refresher training courses, etc.

During the period under report, the Institute organized 5 off-campus with 140 participants; 28 on-campus workshops with 423 participants. Thus, a total of 33 workshops with 563 participants were organized during this period. The details are given in Table 3.72.

Table 3.72 Workshops conducted by EEI, Nilokheri

| Name of the workshop | Participants |
|--|--------------|
| Off-Campus Workshops | |
| 1. Management of Training Programme for Staff of line Deptts. from Aug. 2-8, 2006 at CSAUA&T, Kanpur | 25 |
| 2. Capacity Building for the MTs/Scientists at SVBPUA&T Meerut from Sept. 12-19, 2006 | 27 |
| 3. Motivational Skills for MTs/Scientists of CSKHPKVV at Palampur (HP) from Nov. 13 -18, 2006 | 20 |
| 4. Additional paid courses on Participatory Watershed Management for Para Accountants & Motivators at Solan from March 5-7, 2007 | 30 |
| 5. Additional paid courses on Participatory Watershed Management for Para Accountants & Motivators at Nahan from March 5-7, 2007 | 38 |
| On-Campus Workshops | |
| 1. Management of Training Programme from July 6-13, 2006 | 10 |
| 2. Extension Reforms from July 14-19, 2006 | 08 |
| 3. Monitoring & evaluation from 25-07-06 to 01-08-06 | 15 |

3.3 Farm Information and Communication Service

The Farm Information and Communication Service (FICS), a unit of Directorate of Extension Education, is one the important channels through which the activities of the University and the Directorate are disseminated for general use by the rural masses and also to bring back the farmers' problems for the attention of the scientists. Besides, the technical support concerning educational technology and mass media are being provided by the section not only to the other two units of the Directorate, viz. Farm Advisory Service and Farm Training Unit but also to different departments/sections of the constituent colleges of the University. This unit discharges multifarious responsibilities ranging from preparing exhibits, models, display boards and charts, providing audio visual and supports, publishing bulletins, leaflets, folders, posters and handbills, arranging and organizing agro industrial exhibitions on various occasions and participation in national and state level exhibitions. A large number of extension education activities were organized during the year under report.

(a) Haryana Rural Antique Museum

There is no denying the fact that Haryana has got a rich cultural heritage. To highlight this unique cultural heritage of Haryana, Haryana Rural Antique Museum has been established in Gandhi Bhawan under the control and supervision of this Unit. This Museum not only highlights cultural details but also provides linkages between the old and new culture. Being a part of the Directorate of Extension Education of an Agricultural University, the museum was considered appropriate to preserve and display all those things related with agriculture in particular and rural life in general. New additions were also added to the existing collections. In brief, the old agricultural implements, costumes, household items, pottery pieces and the art objects have been displayed in an artistic manner so as to attract and educate the visitors about the rich culture of Haryana.

As many as 1154 students, faculty, farmers, administrators and others visited the university exhibition and Haryana Rural Antique Museum during the year under report and appreciated the display of exhibits in the Exhibition and collection of artifacts in the Haryana Rural Antique Museum.

(b) University Exhibition

The updating work of university level exhibition located in Gandhi Bhawan under the control and supervision of this Unit has been undertaken. This exhibition is frequently visited by persons from all ranks and files. In fact, this exhibition is a show window of the techniques/technologies evolved/developed by the different departments of the university in a comprehensive and effective manner. Almost daily it is being visited by the scientists, students, defence personnel, farmers, etc. not only from the State of Haryana but other States of Indian Union too.

(c) Publication Unit

The Publication Unit has brought out a large number of extension and research publications for the students, farmers, scientists and all others interested in and associated with agricultural and allied activities. Besides, bringing out monthly farm magazine *Haryana Kheti*, the Publication Unit has published regularly two journals 'Journal of Research' and 'Thesis Abstracts', Package of Practices for *Kharif* and *Rabi*, Horticultural Crops and *Adhunik Pashupalan* which are in great demand among the farming community. During the period under report, the University Press completed 809 jobs and realized income of Rs. 29.00 lacs from printing work and sale of publications.

(d) Exhibitions/Farmers' Fairs

A brief account of extension education programmes organized by the university as well as participated in programmes organized by other units/departments is given as under :

Table 3.73 Extension activities exhibited by the unit

| S.No. | Date | Place | Occasion | Chief guest |
|-------|-------------------------|-------|--|--|
| 1. | 06.08.06 to 07.08.06 | Hisar | Exhibition in Conference entitled "Challenges in Agriculture Dev. - Role of KVKs" | Sh. H. S. Chatha, Minister for Agriculture, Animal Husbandry, Dairying & Fisheries, Govt. of Haryana |
| 2. | 30.09.06 | Kaul | <i>Dhan Mela</i> | Smt. Asha Sharma, Financial Commissioner & Principal Secretary (Agriculture), Govt. of Haryana |
| 3. | 03.10.06 | Sirsa | <i>Kapas Mela</i> | Vice-Chancellor, CCS HAU, Hisar |
| 4. | 04.10.06 | Bawal | <i>Dryland Mela</i> | Capt. Ajay Singh, Minister for Irrigation & Revenue, Govt. of Haryana |
| 5. | 19.09.06 to 20.09.06 | Hisar | Farm Darshan | Vice-Chancellor, CCS HAU, Hisar |
| 6. | 06.10.06 | Hisar | Exhibition in Seminar on Role of KVKs in Agric. Dev. | Ch. Birender Singh, Minister for Finance, Govt. of Haryana |
| 7. | 01.11.06 to 04.11.06 | Hisar | Exhibition in Zonal Workshop of KVKs of Zone-I | Dr. P. Das, DDG (Agri. Extn.), ICAR, KAB-II, New Delhi |
| 8. | 26.01.07 | Hisar | Tableau | |
| 9. | 25.03.07 to 26.03.07 | Hisar | Kisan Mela | Sh. Bhupender Singh Hooda, Chief Minister, Haryana |
| 10. | 05.06.07 | Hisar | Exhibition of old age articles of KVKs | Sh. Raj Kumar, IAS, Financial Commissioner & Principal Secretary (Agri.), Govt. of Haryana |

4. Teaching

There are seven colleges functioning in this University. The report of individual college is as under:

4.1 GRADUATE PROGRAMME

4.1.1 College of Agriculture

College of Agriculture, the biggest college of the university in terms of staff as well as students, has fourteen well-established departments.

The details of students and research scholars who completed their degrees; those who got admissions and the total number on rolls in the masters and doctoral programmes offered in the college during the period under report are as under.

| | Degree completed | | | Admitted | | | Total on the rolls | | |
|---------------------------|------------------|-----------|------------|------------|-----------|------------|--------------------|-----------|------------|
| | M.Sc. | Ph.D. | Total | M.Sc. | Ph.D. | Total | M.Sc. | Ph.D. | Total |
| Agril. Economics | 8 | 2 | 10 | 6 | 1 | 7 | 4 | 4 | 8 |
| Agronomy | 9 | 5 | 14 | 11 | 5 | 16 | 20 | 8 | 28 |
| Forestry | 6 | 2 | 8 | 1 | - | 1 | 8 | 3 | 11 |
| Agril. Meteorology | 2 | - | 2 | 1 | 1 | 2 | 2 | 3 | 5 |
| Entomology | 5 | - | 5 | 11 | 1 | 12 | 28 | 5 | 33 |
| Extension Education | - | 1 | 1 | 3 | - | 3 | 3 | 2 | 5 |
| Horticulture | 8 | 3 | 11 | 8 | 1 | 9 | 24 | 9 | 33 |
| Nematology | - | 1 | 1 | 1 | - | 1 | 3 | 1 | 4 |
| Plant Breeding | 9 | 1 | 10 | 1 | 2 | 13 | 20 | 5 | 25 |
| Plant Pathology | 7 | 3 | 10 | 18 | - | 8 | 21 | 8 | 29 |
| Seed Science & Technology | 2 | 1 | 3 | 2 | 1 | 3 | 2 | 2 | 4 |
| Soil Science | 6 | 3 | 9 | 5 | 3 | 8 | 10 | 8 | 18 |
| Vegetable Sciences | 4 | 1 | 5 | 6 | - | 6 | 11 | - | 11 |
| Business Management | 26 | - | 26 | 33 | - | 33 | 27 | - | 27 |
| Total | 92 | 23 | 115 | 107 | 15 | 122 | 183 | 58 | 241 |

- One student from the Dept. of Agril. Meteorology was awarded CSIR Junior Research Fellowship.
- Two students from the Department of Plant Pathology passed NET examination, three students were selected SRF and two students got JRF.

Dr. Mukesh Kumar Dhillon, PG student in the Deptt. of Entomology won "Jawahar Lal Nehru Award" for best Thesis.

4.1.2 College of Agricultural Engineering & Technology

College of Agricultural Engineering and Technology, one of the constituent colleges of the University came into being in August 1987, as the Department of Agricultural Engineering. In that year, the four-year B.Tech. (Agril. Engg.) degree programme took off with an intake of 20 students. The department developed into a full-fledged College of Agricultural Engineering and Technology in 1992

and the annual intake was increased gradually to 49 students. Subsequently, three departments namely Farm Power & Machinery, Soil & Water Engineering and Agricultural Processing & Energy were established along with one section of Basic Engineering. The College also started awarding M. Tech. (Agril. Engg.) with major in Farm Power & Machinery, Soil and Water Engineering and Agricultural Processing and Food Engineering. In addition to offering courses in the disciplines of Agril. Engineering and Technology at the Undergraduate and Postgraduate level, the College also offers excellent facilities for advanced research in the emerging areas of Agricultural Engineering. The syllabi and the curricula are being constantly updated. In the design of the course curriculum, a great emphasis is laid on the practical aspect, project work, practical training and learning by doing. The high standard and modern infrastructure enables the College to turn out technical personnel of high competence.

Teaching

All the scheduled courses for the degree programme of B. Tech. (Agril. Engg.) and M. Tech. (Agril. Engg.) in different disciplines were offered and classes conducted successfully during the period under report.

Placement and Summer Field Training Institute Industry Linkages

The College publishes its Annual Placement Brochure in coordination with the Directorate of Students Welfare of the University. The brochure highlights the bio-data of all the final year B. Tech. (Agril. Engg.) students besides the Faculty Position & Course Structure. The Placement Brochure is sent to all the potential employers with an invitation to participate in the campus placement process which is organized in collaboration with the Directorate of Students' Welfare. The off campus placements are coordinated at the college level. A strong linkage with the industry & institutions has been developed. This has resulted in excellent placement of students for Summer Trainings and jobs in a large number of reputed national and international industries and organizations. The college has also organized the following socially useful training programmes during 2006-07:

| S. No. | Training programme | Month | Remarks |
|--------|---|-----------------------|---|
| 1. | Vocational training on repair & maintenance of tractors, pumping sets & farm machinery. The training was organized at Rohtak in collaboration with KVK, Rohtak. | January, 2007 | There were about 50 participants consisting of progressive farmers, rural youths etc. |
| 2. | Counselling & mentoring of students of rural schools to encourage them for higher studies in technical education | February, March, 2007 | Covered four rural Sr. Secondary Schools. |

4.1.3 College of Basic Sciences & Humanities

The College of Basic Sciences & Humanities does not have an undergraduate programme of its own but shoulders the responsibility to teach basic sciences and humanities courses to the students of all other constituent colleges. In addition to this, the college offers post graduate programmes in fourteen disciplines. The college has ultra modern teaching aids and facilities in most of the departments. The Computer Centre provides necessary support to research by providing the facility of data analysis to the students and faculty members.

The details of students and research scholars who completed their degrees, those who were

admitted and the total number on the rolls in the Masters and Doctoral programmes offered in this college are exhibited in the following table :

| | Degree completed | | | Admitted | | | Total on the rolls | | |
|-----------------------------------|------------------|-----------|-----------|-----------|-----------|-----------|--------------------|-----------|------------|
| | M.Sc. | Ph.D. | Total | M.Sc. | Ph.D. | Total | M.Sc. | Ph.D. | Total |
| Genetics | 2 | 2 | 4 | 4 | 1 | 5 | 7 | 3 | 10 |
| Chemistry & Physics | 3 | - | 3 | 3 | 2 | 5 | 8 | 7 | 15 |
| Sociology | - | - | - | - | 1 | 1 | - | 3 | 3 |
| Microbiology | 7 | 1 | 8 | 5 | 6 | 11 | 17 | 9 | 26 |
| Botany & Plant Physiology | 5 | 3 | 8 | 5 | 3 | 8 | 7 | 5 | 12 |
| Maths & Stat. | 1 | 1 | 2 | 4 | - | 4 | 6 | 4 | 10 |
| Biochem. | 7 | - | 7 | 2 | 5 | 7 | 12 | 10 | 22 |
| Zoology & Aquaculture | - | 2 | 2 | 5 | 3 | 8 | 14 | 7 | 21 |
| Biotechnology & Molecular Biology | 8 | 7 | 15 | 17 | 17 | 34 | 21 | 10 | 31 |
| F.S.T. | 15 | - | 15 | 15 | - | 15 | 30 | - | 30 |
| Languages & Haryanvi Culture | - | - | - | - | - | - | - | - | - |
| Total | 48 | 16 | 64 | 60 | 38 | 98 | 122 | 58 | 180 |

4.1.4 College of Home Science

The main responsibilities of the College of Home Science are to bring about an appreciation of rural life and improvement of rural home living, to develop an understanding of basic scientific facts related to improved family living; to bring about better resource management and to help the household to develop their potential to the maximum. The table below presents the data of admissions and pass outs during July 2006 to June 2007.

| Programme | No. of students admitted | No. of students completed the degree | Students on roll |
|--|--------------------------|--------------------------------------|------------------|
| B.Sc. (Home Science) | - | - | 133 |
| One year Certificate course (CT) | 21 | 21 | 22 |
| Apprentice Workshop | - | 9 | - |
| Certificate course in Bakery and Confectionery | - | - | - |
| Certificate Course in Creative Arts | - | - | - |
| PG Diploma | | | |
| Clothing & Textiles | 22 | 9 | 22 |
| Family Resource Management | 10 | 10 | - |
| Nutrition & Dietetics | - | - | - |
| M.Sc. | | | |
| Human Development & Family Studies | 4 | 2 | 8 |
| Clothing & Textiles | 3 | 3 | 6 |
| Family Resource Management | 2 | - | 5 |
| Foods & Nutrition | 7 | 6 | 14 |
| Home Science Extension Education | 5 | 8 | 12 |
| Ph.D. | | | |
| Human Development & Family Studies | 2 | 1 | 5 |
| Clothing & Textiles | - | 1 | 2 |
| Family Resource Management | - | 1 | 1 |
| Foods & Nutrition | 3 | 8 | 4 |
| Home Science Extension Education | 2 | 2 | 7 |
| Total | 81 | 81 | 241 |

Number of teachers in teaching schemes

| Departments | Professor | Assoc. Prof. | Asstt. Prof. | Instructors |
|------------------------------------|-----------|--------------|--------------|-------------|
| Dean Office | - | - | | |
| Human Development & Family Studies | 1 | 6 | - | |
| Clothing & Textiles | - | 3 | 6 | |
| Family Resource Management | 1 | 2 | 3 | |

Field Days/ Special Days

Breast Feeding Week

The Department of Foods and Nutrition organized Breast Feeding Week from 1-7 Aug, 2006 in collaboration with ICDS Hisar. All the faculty members of the department visited various villages of Hisar District with CDPOs and Anganwari workers. Lectures were delivered on the topics related to breast feeding and its importance and two recipes namely *Poustic Sev* and *Poustic Panjiri* were demonstrated to the rural ladies. Various competitions like home made infant foods, slogan writing and poster making were organized on 7th and 8th Aug. in the department.

National Nutrition Week

The Department of Foods and Nutrition organized Nutrition Week from 1-7 Sept, 2006 in collaboration with ICDS, Hisar. Various competitions, viz. slogan writing and poster making on 5th Sept. and cooking competition on 7th Sept. 2006 were organized in the department. A one-day seminar was organized on the concluding day, i.e. 7th Sept., 2006.

Total Sanitation Campaign

Village Matana of Fatehabad district was selected under RHWE programme for Total Sanitation Campaign to improve the sanitary condition of the village in collaboration with ADC Fatehabad. Eighty-one families of the village were selected with the help of Panchayat members & APO, Fatehabad. Rapport was established with the selected families and a survey was conducted on village profile and pre-knowledge of the respondent families. Ninety-one smokeless chulhas, thirty-five vermi composting units and sixteen soakage pits were installed in the houses of selected families. Demonstrations on other technologies related to home science were also organized.

International Women's Day

International Women's Day was celebrated by the Department of Home Science Extension Education on March 8, 2007. Competitions on slogan writing and poster making were organized.

World Consumers' Rights Day

The World Consumers' Rights Day was celebrated on 15th March, 2007. This event was sponsored by State Bank of India, Fatehabad. Display on duplicate products, competitions on collection of bills and quiz were the various events organized on this occasion.

World Environment Day

The Department of FRM and CT celebrated World Environment Day on 5th June, 2007 and organized a Workshop on "Save Earth Protect Environment" which was sponsored by the Haryana State Pollution Control Board. Resource Lectures on such important topics as Management of Household Water, Environmental Awareness, Environmental Conservation, Environmental Pollution, Protection and Laws, Polythene a Havoc for Society were delivered. The participants were school and college students, teachers, field functionaries, homemakers and NGOs specially working for the cause of animals/cattle. Demonstration on bag making and exhibition of various kinds of bags were arranged. A rally of Eco Clubs was also organized.

4.1.5 College of Animal Sciences

The College of Animal Sciences, the only one of its kind in the country, has its genesis in the concept of effective development of livestock and poultry through research and education. The College offers M.Sc/M.V.Sc. and Ph.D. programmes in all the five disciplines of Animal Sciences. At the undergraduate level, the college imparts teaching, training and skill in all aspects of scientific animal production leading to the award of the following degrees/diploma of other constituent colleges of the University.

B.V.Sc. & AH, VLD Diploma, B.Sc. (Home Science), B.Sc. (Hons.) Ag. and B. Tech (Agri. Engg.).

The internship training programme of six months duration to B.V.Sc. & AH students is also conducted at the Animal Farm of the College.

The objectives of the college are to develop education, research and extension programmes for improving the overall productivity of all species of livestock and poultry through the application of scientific principles of Genetics and breeding; Nutrition and Feed technology; Livestock Management; Reproduction and Production; and Processing of Animal Products

Sallient extension achievements

Scientists participated in the following extension activities:

- Exhibition and Buzz session during Kisan Mela and Farm Darshan organized by the university.
- Training programmes on dairy, sheep and goat, piggery and poultry farming conducted by IATTE for farmers of different categories, unemployed youth, and ex-servicemen and for women in agriculture.
- Trainings on livestock and poultry farming organized by Farmer Training Centre of Punjab National Bank at Sachakhera, Distt. Jind.
- Online answering of queries made by farmers related to Animal Breeding at ATIC.
- Training on sheep rearing organized by Central Sheep Breeding Farm, Hisar.
- Arranged visits of dignitaries, farmers and students at Animal and Poultry Farm.
- A number of Radio and TV talks on different topics by the scientists.

4.1.6 College of Agriculture, Kaul

The College of Agriculture, Kaul, which was earlier affiliated to the Kurukshetra University, Kurukshetra was taken over in 1974 by CCS HAU, Hisar. To begin with, two undergraduate programmes leading to B.Sc. (Hons.) Agriculture were introduced. Since 1990-91 session, the college has been offering only B.Sc. (Hons.) Agri. Programme of four years duration. There are 17 teachers and 175 students. The non-teaching staff of 75 persons includes Assistants, Clerks, Stenographers, Drivers, Peons, Lab. Attendants, Daftari, Mali, Safai Workers, etc. Teachers from the College of Basic Sciences & Humanities, CCS HAU, Hisar visit COA, Kaul to teach Basic Sciences & Humanities subjects. There are two hostels – one each for boys and girls. There are 110 boys in Boys' Hostel and 35 girls in Girls' Hostel. The campus has all the necessary facilities. It's area is 11076 sq. metre. The Rice Research Station is also attached to it.

4.1.7 College of Veterinary Sciences

The college of Veterinary Sciences is the oldest college of the University. It is one of the best colleges in the country and the first amongst the Veterinary colleges to implement regulations of the Veterinary Council of India for a uniform under graduate programme.

The details of students and research scholars who completed their degrees, those who were admitted and the total number on rolls in the Master & Doctoral programmes offered in this college are exhibited in the following table :

| Department | Degree Completed | | | Admitted | | | Total on the roll | | |
|------------------------------------|------------------|----------|-----------|-----------|----------|-----------|-------------------|----------|-----------|
| | MVSc | Ph.D. | Total | MVSc | Ph.D. | Total | MVSc | Ph.D. | Total |
| Anatomy | 2 | - | 2 | 1 | - | 1 | 1 | - | 1 |
| Animal Biotechnology | 4 | - | 4 | 9 | 1 | 10 | 20 | 2 | 22 |
| ARG&O | 2 | - | 2 | 3 | - | 3 | 1 | - | 1 |
| Biochemistry | - | - | - | - | - | - | 1 | - | 1 |
| Clinical Medicine | 1 | - | 1 | 4 | - | 4 | 9 | - | 9 |
| Epidemiology & Preventive Medicine | 2 | 1 | 3 | 5 | - | 5 | 6 | - | 6 |
| Immunology | - | - | - | 2 | - | 2 | 4 | - | 4 |
| Microbiology | 4 | - | 4 | 4 | - | 4 | 8 | - | 8 |
| Parasitology | - | 1 | 1 | 2 | - | 2 | 4 | - | 4 |
| Pathology | 1 | - | 1 | 2 | - | 2 | 4 | - | 4 |
| Pharmacology | 1 | - | 1 | 3 | - | 3 | 4 | - | 4 |
| Physiology | - | - | - | 1 | - | 1 | 2 | - | 2 |
| Public Health | - | - | - | 1 | 1 | 2 | 3 | - | 3 |
| Surgery | 2 | - | 2 | 4 | - | 4 | 7 | - | 7 |
| Vety. & A.H. Extension | 1 | - | 1 | 1 | - | 1 | 1 | 1 | 2 |
| Total | 20 | 2 | 22 | 42 | 1 | 43 | 75 | 3 | 78 |

4.2 POST-GRADUATE PROGRAMMES

During the period under report, the University offered Masters and Doctor of Philosophy degree in 55 and 49 disciplines, respectively. In both M.Sc. and Ph.D. programmes, 25% students were admitted through Indian Council of Agricultural Research (ICAR) representing different States of India. A total of 257 students were admitted to M.Sc. and 53 students to Ph.D. Programme during this period. Thus, number of students on roll was 609 (437 M.Sc. and 172 Ph.D. students).

The University has also launched P.G. Diploma Programmes with a view to provide "Job Oriented and Self Employment Opportunity Targeted Training" to fresh graduates as well as employed persons of different organizations who required technical know-how and went to face the challenges in the new millennium. Seven PG diploma programmes, viz. Diploma in Biotechnology, Industrial Microbiology, Apparel Designing and Management, Human Nutrition and Dietetics, School Counselling, Communication Skills in English and English-Hindi Translation were started in different colleges.

During the year under report, 139 students got their fellowship assistance from other agencies like ICAR, CSIR and UGC, and 327 students benefited from CCS HAU fellowships. A sum of Rs. 83.96 lacs was paid to post graduate students on account of fellowship/merit stipend/stipend.

To meet the market demand and competitiveness in various sectors due to globalization, the course curriculum was updated for postgraduate programme which is in accordance with the guidelines and requirement of ICAR and stakeholders to enable the students to compete at national level in various examinations for job opportunity. The university has also adopted academic regulations received from ICAR for M.Sc. and Ph.D programmes. The university has been accredited by the ICAR for its excellence in teaching, research and extension. Out of 42 State

Agricultural Universities and Deemed Universities in the country, CCSHAU is among the first four universities to earn the distinction of accreditation. The university has collaborative programmes with the ICAR and other international institutes in the areas of education and research where postgraduate students can take up their advanced studies of research for their masters and Ph.D. programmes after completing their course work at this university. Teachers' training in the subject matter areas and pedagogy skills to improve professional competence is a regular feature through the Academy of Agricultural Research and Education Management.

One hundred and ninety nine students successfully completed the Master's Degree Programme and 66 students completed Ph.D programme during the period under report.

TEACHING VETERINARY CLINICAL SERVICE COMPLEX

Teaching Veterinary Clinical Service Complex is a premier centre for treatment of animals and serves as a referral Vet. Clinic for Haryana and neighbouring States. It has all the modern facilities for large animal radiography and ultrasound; a well-equipped diagnostic laboratory and operation theatres for all types of surgeries. The clinic provides animal health care services round the clock and is open except for 4 holidays throughout the year.

During 2006-07, 7433 animals of various species were treated for complicated conditions in medicine, gynaecology, surgery and pet animal section of the clinic. In Vet. Diagnostic Laboratory 2283 samples were tested. Radiography was undertaken on 884 animals and 833 animals were operated upon. Health services were also provided to ambulatory centres in villages of Devan Harikot and University Farm where 601 animals were treated for various ailments. Three clinical camps were organized in different districts of Haryana.

DISEASE FREE SMALL ANIMAL HOUSE (DFSAH)

Disease Free Small Animal House is a unique facility available only at Hisar in Haryana. It is engaged in raising disease free laboratory animals, viz. *Swiss Albino Mice*, *Wistar Albino Rats*, *Dun n Hartley Guinea pigs*, *Golden Syrian Hamsters* and *New Zealand White Rabbits* for biological research and teaching purpose. The animal house is registered with "Committee for the Purpose of Control and Supervision of Experiments on Animals" (CPCSEA), Government of India vide registration No. 235/CPCSEA. There is an Institutional Animal Ethics Committee (IAEC) which takes care of rules and regulations of CPCSEA for judicious use of laboratory animals for experimentation. This animal house also supplies quality animals to various outside institutions (registered with CPCSE) on payment basis (after meeting the demand of various departments of this university). During the period under report, i.e. July, 2006 to June, 2007; a total of 9811 laboratory animals (6010 mice, 1433 rats, 2153 guinea pigs, 215 rabbits) were supplied to various departments of CCSHAU and outside research and teaching institutions, viz. HVVI, Hisar; GJU, Hisar; NRCE Hisar; PGIMS Rohtak; MDU Rohtak; NDRI, Karnal; Hi Tech Lab, Faridabad; Indu College of Pharmacy, Sonipat; Panacea Biotec., Lalru; PGIMER, Chandigarh; CSPKV, Palampur (HP); CRI, Kasauli; SRIIR, Delhi; South Campus, Delhi; College of Pharmacy, Delhi; Veterinary College, Bikaner; G.L. Bihani SD College, Sriganaganagar; NBRC, Gurgaon; Dr. Reddy's Lab., Hyderabad; BITS, Pilani; Ranbaxy Lab., Gurgaon; Hindustan Syringes, Ballabgarh; Ranchi Veterinary College, Ranchi; Banasthali Vidyapeeth, Banasthali; Medical College, Agroha; AIIMS, New Delhi and an income of Rs.9,57,450/- was raised.

1687 animals were treated for various surgical afflictions (including both major surgery and minor surgery) during the period under report. A total of 972 animals were subjected to radiographic examination.

5. Services

5.1 AGRICULTURAL TECHNOLOGY INFORMATION CENTRE (ATIC)

Sale of seeds, non-seed items, planning materials, University publications and all other products of the university are sold through a 'single' window delivery system.

During 2006-07, seeds of cereals worth Rs.13.5 lakh, seeds of vegetables worth Rs.1.1 lakh, fruit plant material worth Rs.3.0 lakhs and bio-fertilizers worth Rs.5.0 lakhs were sold. Sale of university publications was for Rs. 25 lakhs. More than five thousand farmers visited ATIC personally, whereas 211 farmers contacted through correspondence. Two thousand and forty-eight calls were received from farmers for various inquiries about their crops. Soil and water testing facilities are also available at ATIC.



5.2 DIRECTORATE OF HUMAN RESOURCE MANAGEMENT

The Directorate of Human Resource Management, established on April 1, 2002, comprises four sections, viz. Academy of Agricultural Research and Education Management (AAREM), Planning & Evaluation Section (P&E), Manpower Assessment Cell (MPAC) and Intellectual Property Rights (IPR) cell working towards the broader aim of human resource management in a fruitful manner.

AAREM was in existence before the establishment of this directorate. This section has been doing a pioneering job in imparting the much-needed institutionalized training to scientists and teachers of SAUs and ICAR Institutes of this country since October 1994.

So far it has conducted 230 training programmes benefiting more than 4000 scientists/teachers/extension specialists. During the period under report, the Academy conducted 14 training programmes. This also includes six programmes conducted for CCSHAU administrative staff under HRD. Four hundred and sixty participants from different institutes of India attended the training programmes.

The Planning and Evaluation Section prepared overall Perspective Development Plans, both long term and short-term, XI Five Year Plan, the Annual Plan, pertaining to the university for balanced and effective use of resources. It also maintained linkages with State Govt. Departments, ICAR, SAUs and Govt. of India in the interest of the university.



The Manpower Assessment Cell made studies on areas like manpower requirement and resource utilization, etc. It also prepared a data bank on the various activities of the university. This cell also provides information to the scientists regarding various research projects after contacting various national and international organizations for providing funds for the project. A directory of such organizations is available on the website of the university.

The Intellectual Property Rights cell was established at this directorate under a Memorandum of Understanding (MOU) between Michigan State University, USA and CCSHAU, Hisar for IPR Management at CCSHAU on March 21, 2006. The main objective of the cell is to accelerate the programme of collaborative research, training and capacity building in IPR Management and Technology Transfer. Dr. Terry Young, a scientist from Michigan State University, USA visited CCSHAU from April 25-29, 2006 for framing the policy and regulations for IPR Management at HAU, Hisar in collaboration with CCSHAU IPR cell. On 29th April, 2006 Dr. Young briefed the Deans/Directors/HODs of the university on IPR policy and regulations draft. Dr. R. B. Srivastava, Associate Director, HRM was deputed for USA in June 2006 for a three months training in IPR Management. So far 21 patent applications have been filed through National Research Development Corporation, New Delhi. Steps have been taken to license the crop varieties. During July 2006-June 2007, awareness programmes on PPV & FR, IPR and commercialization of technologies were organized for faculty, field functionaries, students and farmers. Efforts were initiated for collaboration with private sector.



5.3 HEALTH SERVICES

The University has a 50 bed hospital at Hisar and dispensaries at three outstations, viz. RRS Bawal, RRS Uchani (Karnal) and COA and RRS Kaul. Medical cover is given to the University employees, their dependants and the students, the periodical trainees from Army and other departments, the staff of HARSAC, Tissue Culture Lab and other ICAR staff posted at Hisar. Casualty services are run round the clock. Special Immunization Clinic, T.B. Clinic, Diabetic Clinic and Ante-natal Clinic are run once every week. The efforts of the University hospital have resulted in 2/3rd reduction in T.B. During the period under report, 51042 patients were attended to in Out Patient Department, out of which 4601 were Dental patients. 1151 patients were attended to in Casualty/ E.O.P.D., 200 patients received Indoor treatment. Family Planning work and IUCD insertions were made. However, the Indoor and obstetrical work suffered due to shortage of Nursing Staff. 4460 Laboratory examinations were conducted.

5.4 ENGINEERING-CUM-ESTATE ORGANIZATION

The Estate Office undertook various renovation, maintenance and repair work of various buildings of the University during the period under report. A total of Rs. 9,21,56,394/- were utilized for carrying out University Original and Deposit Works, Maintenance and Other Services and Deposit Works for other agencies.

The Construction Unit completed 67 works (Annexure V), provided 18 facilities (Annexure VI). The construction work during the year was taken up for 53 jobs (Annexure VII) and the approval

was taken for 45 works (Annexure VIII). The Engineering Unit also completed/taken over the construction work of Haryana Govt. for 18 jobs (Annexure IX).

5.5 STUDENTS' WELFARE AND ACTIVITIES

The Directorate of Students' Welfare is responsible for the welfare of students, viz. arrangements for their comfortable stay in university hostels, regular mess facilities, participation in games and various extra and co-curricular activities. The Directorate also provides the facility of students' counselling, organizes training programmes for personality development of the students and assists the university graduates in seeking job placements in government and private sectors. This directorate also organizes regular convention of Alumni Association and assists the administration in maintaining proper discipline among students.

Hostel Facilities

This directorate runs twelve hostels at Hisar campus and two at Kaul Campus. About 1340 students are residing in these hostels at present. All the modern amenities for a comfortable stay have been provided in the hostels. The facilities such as solar water heating system, aqua-guard, water and desert coolers and LPG connections have also been provided in all the hostels.

Sports Facilities

There are well maintained playgrounds for almost all outdoor and indoor games. An international level synthetic track is a unique facility for different sports activities.

Counselling and Placement Centre

During the period under report, 32 students were placed in various firms/companies/banks. Various trainings in different areas of skills were also organized. Mock interviews and Interview Preparatory Trainings were also conducted for the benefit of the university students.

Mountaineering Club & Sports Activities

The students of this university successfully completed the 90 km trek and went upto an attitude of 14,500 feet at the base camp of Kanchanjunga. The sports team participated in Inter-University competition organized by AIU as well as All India InterAgricultural University Sports Meet at CCSHAU. The Vety. College Team participated in All India Vety. College Meet at Pantnagar in Badminton and Table Tennis and won gold and silver medals, respectively.



Film Club

A film club functions under this directorate. It arranges feature films which are screened in the Vety. Auditorium in three shows per day on Friday, Saturday and Sunday every week.

Literary Activities

Inter-College Debate Contest and On the Spot Essay Writing Competition were organized in November and December 2006, respectively. Our students, Kumar Anushmant, Ravi Shankar Sharma, Praveen Pawar, Seema Duhan, Manesh Jhamb, Deepak Saini and Neelesh Sandhu took part in Declamation Contests organized by various institutions and won prizes.

NCC

During the period under report eight cadets appeared in 'C' certificate and all the cadets passed the examination whereas 54 cadets passed the 'B' certificate test. Besides, the students also actively participated in Polio Eradication, Blood Donation and Tree Plantation campaigns.

NSS

NSS volunteers organized various programmes on many important days such as World AIDS Day, Eradication of Congress Grass Week, Communal Harmony Day, Blood Donation and Tree Plantation Days.



5.6 TEACHING VETERINARY CLINICAL SERVICE COMPLEX

The clinic provides animal health care services. During 2006-07, 7433 animals of various species were treated. In veterinary diagnostic Laboratory, 2283 samples were tested.

Radiography was conducted on 884 animals and 833 animals were operated upon for various diseases. Three clinical camps were organized in different districts of Haryana.

A total of 1729 animals were diagnosed with various skin ailments/infestations at Teaching Veterinary Clinical Service Complex, Ambulatory centers, clinical camps and different State and Central livestock farms located in and around Hisar. 590 cases of skin diseases were brought to Veterinary Clinic, CCSHAU, Hisar. In the animal farms of College of Animal Sciences, 85 animals were diagnosed with skin diseases. A total of 153 animals were found suffering from various skin ailments at the animal farms of Govt. Livestock Farms Sector-I, II and III; State Pig Breeding Farm and Central Sheep Breeding Farm. At two ambulatory centres of Devan and Harikot, 228 and 304 animals, respectively, were found affected with skin problems. A total of 369 animals were diagnosed with skin disorders at 3 clinical camps at village Sadalpur, district Hisar; villages Hassangarh, and Gandhara, District Rohtak. Sarcoptic mange was diagnosed in 337 animals comprising dogs, buffaloes and pigs. Psoroptic mange was diagnosed in 126 animals like buffaloes, sheep and equines. Demodectic mange was diagnosed in 41 dogs. Allergic dermatitis cases were diagnosed in 82 animals, majority of which were dogs and buffaloes. The allergy problem was seen more in summer and rainy seasons, *i.e.* from April to September. The fungal infection of the skin (dermatomycosis) was diagnosed in 128 animals particularly cattle calves and dogs. Bacterial dermatitis (pyoderma) was diagnosed in 30 dogs and flea allergy dermatitis in 29 dogs. Pruritus due to tick infestation was recorded in 752 animals and pediculosis (lice infestation) in 163 animals at different locations. Ectoparasitic infestation of ticks and lice was seen more in villages in comparison to farms in cattle and buffaloes. In 41 animals, other skin problems like warts, tumors, and alopecia/dermatitis due to nutritional or hormonal reasons were observed. Animals with pruritus due to ectoparasitic infestation and fungal infection were treated with 0.5% spray each of carbaryl and copper oxychloride, respectively.



5.7 PUBLIC RELATIONS

The office of the Public Relations brings the University close to the people by highlighting its achievements through print and electronic media. During the period under report, the office provided an exhaustive/extensive coverage to all important programmes and new initiatives implemented at the university for the welfare of staff and students and the agriculture in the Haryana State. The day to day programmes like: seminars, symposia, workshops, trainings, prize-distribution functions, etc. were covered widely in national as well as local print and electronic media. Photo features/Articles based on new successes achieved by the university in the field of researches, extension and academics have been published in various weeklies, fortnightlies and monthlies. In all, 469 press releases were issued by the office during the period under report.

The office has successfully discharged the responsibility of publication of advertisements concerning various departments of the university. All the advertisements including auction notices, tender notices, admission notices etc. are got published by this office in different newspapers and journals. Besides, the office also succeeded in ensuring substantial coverage to CCS HAU in the Indian Agricultural Universities Association (IAUA) Journal. During the period under report, the office attended to visitors and query seekers both from the city and outside.

The office assisted in successful conduct of visits of VIPs and delegations to the university. The distinguished visitors who visited the university during the period under report include diplomats, statesmen, scientists, policy planners, educationists and administrators, editors and journalists. Some of the important delegations and visitors include a five member high level delegation from University of Maryland, USA led by Dr. Ramond J. Mieler, Director, a three member delegation of Consortium of Agriculture Institutes of France comprising Director General of El Purpan Postgraduation School for Agri.& Agro. Industry; a four member Russian delegation led by Russian Academy of Agricultural Sciences' Vice President, Ivanov Andrey; a three member delegation from France, Dr. Steve Futch Multy Country Extension specialist from Citrus Research and Education Centre, Univerisity of Florida, USA; Dr. Mangla Rai, Director General of ICAR; Mr. Bhupender Singh Hooda, Chief Minister, Haryana; Dr. A. R. Kidwai, Governor, Haryana and Chancellor of CCSSHAU, Hisar; Mrs. Meenakshi Anand Chaudhary, Information Commissioner, Haryana; Mr. Har Mohinder Singh Chattha, Agriculture and Animal Husbandry Minister; Ch. Virender Singh, Minister for Finance, Labour and Employment, Haryana; a five member delegation comprising members of Board of Management of University of Veterinary and Animal Sciences, Karnataka; Mr. Jairam Ramesh, Union Minister of State for Commerce; Dr. Paul L. G. Vlek, Director and Professor, University of Bonn, Germany; Dr. Brigitte Winklehmer, President, Eurasia Pacific Uninet; Mr. G. Madhvan, the then Information Commissioner, Haryana; Mr G. K. Pillai, Secretary, Ministry of Commerce and Industry; Mr. P. A. Dadu, President of Hindustan Government Chemical Industry and Dr. P. Das, Deputy Director General (Extension Education), ICAR, New Delhi.

5.8 CAMPUS SCHOOL

Campus school, CCS Haryana Agricultural University, Hisar enjoys the honour of being a premier institute of learning. The school, established in the year 1971 under the stewardship of the then Vice Chancellor, Shri A. L. Fletcher, has earned, over the past three and a half decades, the distinction of imparting quality education which gets manifested in meritorious performance of the students. The present strength of students stands at around 880. A well qualified, experienced, and a dedicated team of 33 teachers is the pride of the school.

During the year under report, Campus School students did their school proud with their brilliant achievements in the field of academics. In Class X, 98 students appeared in the examination

conducted by the CBSE, and all were declared successful. Aman Tehri and Shweta Dahiya, the outstanding students of class X, did the school proud being placed in 'A 1' grade in all the subjects. Shweta Dahiya, also won a National Scholarship through the National Talent Search Examination (NTSE). Aryan Singh and Lalit Vijay of Class X earned laurels for their school when they secured a cent per cent score in Mathematics and Science, respectively. Lalit Vijay also received a cash award of Rs. 800/- and a Brilliance Award Badge in All India Talent Search Examination conducted in July, 2006. He was also honoured with a certificate of Brilliance. In class XII, out of the total of 27 students, 26 passed.

In addition to academics, the school organized a host of activities to stimulate the creative faculties of the students. A good number of Inter House Competitions, viz. dialogue delivery, story telling in English and Hindi, declamation and poetry recitation, provided opportunities to the budding speakers of the school to articulate their ideas fluently and effectively. Anisha Malik and Ritika Goyal, both of Class X, received certificates of Merit in an Essay Writing Competition organized by "Foundation for Unity of Religious and Enlightened Citizenship".

A series of events were organized by the school like Inter School Solo Dance Competition, Inter School Drawing and Painting Competition, Teachers' day celebration, and Independence & Republic Day celebrations. Besides these, competitions related to communication skills, Inter House Quizes in Mathematics and Science were also organized. Competitions in art and aesthetics helped the teachers to scout and polish the budding talents of the campus school.

Inter House Rang Bharo Pratiyogita and other competitions in clay modeling, Mehendi Rachao, Solo Dance, Drawing and Painting, helped the students to express their artistic skills, which were well appreciated by the panel of judges who assessed their work.

The brilliant artists of the school brought fame to their institute when they bagged coveted positions in the Inter school competitions at the district and the national level. The budding artist of the school, Chetna of class XI, got the 1st position in an All India Inter Public School Imaginative Drawing and Painting Competition, hosted by Vidya Devi Jindal School, Hisar. As part of consumer awareness programme, the College of Home Science organized slogan writing and cartoon making competitions, 1st positions, in both competitions were bagged by Ambika and Nishtha of our school. In an Inter School Mehendi Rachao Competition held at Bal Bhawan, Arti of class XI won the first prize.

Sports and Games are essential for a balanced personality development and thus they form an integral part of the School curriculum. Miss Saina Nehwal, an alumna of Campus School, has emerged as a badminton player of international repute. Rahul Sangwan who bagged the 1st position in the district level tournament of badminton is showing the same promise. Savita Sibag, Anshul, Bhawna, Gunjan and Seema - our Volleyball team - bagged the second position at the state level and were selected to play at the National Level Tournaments. Under the captaincy of Savita Sihag, the team of Haryana secured the first position at the National Level Tournaments. The winners were awarded cash prizes worth Rs. 10,000/- each. Ritika Tandon and Nisha Kundu, two brilliant Volleyball players were honoured with cash prizes worth Rs. 31,000/ each for their spectacular performance.

To generate awareness amongst the students about the growing relevance of environmental protection, a declamation contest was organized in the school on the topic "Pollution and Environment". Two students of the school, Nishant Thakral and Aishwarya participated in the 'National Level Young Environmentalists' Conference. Dheeraj Verma and Ankita Sangwan secured the third position in 'Bharat Jano Pratiyogita' conducted by Bharat Vikas Parishad.

The school is committed to draw out the best in the students and to lead them towards a bright future.

6. Nehru Library

Nehru Library is a central facility, which caters to the informational requirements of the students, teachers, research scholars, extension specialists and other staff of the University located at Main Campus Hisar as also Colleges, RRSs and KVKs at other stations. Library collections at the College of Home Science at Hisar and College of Agriculture at Kaul, 17 Krishi Vigyan Kendras, 6 Regional Research Stations and about 90 other Departmental and Administrative Units of the University are maintained separately.

LIBRARY ADVISORY COMMITTEE

Library Advisory Committee – a policy making body - decides the guidelines for smooth functioning of the Library. The worthy Vice-Chancellor is the Chairman and University Librarian is the Member-Secretary of this Committee. All the Deans/Directors, Registrar, Principal, College of Agriculture, Kaul and President of HAUTA are its *ex-officio* members while one HOD, one faculty member and one PG student from each College are nominated by the Vice-Chancellor for a term of two academic years.

BUDGET FOR BOOKS AND JOURNALS

| | 2005-06 (in Rs.) | 2006-07 (in Rs.) |
|----------------|---------------------|---------------------|
| M&S (Journals) | 94,41,371 | 71,74,870 |
| M&E (Books) | 33,04,644 | 37,04,706 |
| Others | 1,31,34,538 | 1,10,81,520 |
| Total | 2,58,80,553 | 2,19,61,096 |

READERS' SERVICES DIVISION

Nehru Library is essentially meant for the students, faculty and other staff of this University, but the library facilities are also extended to some special categories of users, *viz.* teachers of local colleges, progressive farmers and class-I Officers of the Govt. of India and Haryana posted at Hisar. The library, during the year under report had registered **5249** active members, of which **2411** were students, **863** faculty, **1876** other staff and **99** special members. The Visitor Register maintained at the gate of the library recorded a total of **1,37,816** visitors who used the library services during the period under report.

- Book Bank** : Book Bank was established for the benefit of the students, who are entitled to borrow books from the Book Bank on nominal charges. The Book Bank has a collection of **9136** volumes. **1283** books were issued, and a sum of **Rs. 2,59,300/-** was collected as rental and overdue charges, library fee, etc.
- Loan of Books** : Library conducted **53862** circulation transactions during the period under report. In addition to this **834186** volumes were consulted within the library premises. A sum of **Rs. 1,38,366/-** was recovered on account of cost of books lost by the borrowers and overdue charges.
- Library Timings** : The following timings were observed by Nehru Library :

Summer (May to July)

| | |
|-------------------|--------------------|
| Working days & RH | 7.00 AM to 8.00 PM |
| Holidays | 7.00 AM to 1.30 PM |

Winter (August to April)

| | |
|-------------------|--------------------|
| Working days & RH | 8.30 AM to 9.00 PM |
| Holidays | 9.00 AM to 4.00 PM |

The Library observed only 9 National Holidays during the year.

CD-ROM DATABASE SERVICES

CD-ROM Database services were launched on **15 September 2001**. Five CD-ROM databases – **CABI Abstracts, AGRICOLA, Indian Science Abstracts and Biological Abstracts** – were subscribed during the period under report. Over **6267** library users benefited from the databases during the period under report. A sum of **Rs. 17,366/-** was collected as consultation and printing charges. Timings of CD-ROM Databases Services are as under :

| | |
|--------|--------------------|
| Summer | 7.00 AM to 5.00 PM |
| Winter | 9.00 AM to 6.00 PM |

Internet Facility

Internet facility with **13 nodes** was added to existing **4 nodes on 23-02-2007**. To provide this facility, the room adjoining the CD-ROM database Service at first floor has been renovated and fitted with plasma computers.

Canteen

A long standing demand of the users of library was met by opening a canteen on the library premises on **29-01-2007**.

TECHNICAL DIVISION

- Acquisition Section** : During the period under report, **2637** books, **1015** periodicals (bound volumes), **263** CDs and **302** theses were added to the collection of the main library and its various off-shoots, while **127** were withdrawn. The collection-wise break-up of the library as on **30th June 2007** is given below :

| | |
|----------------------|-----------------|
| Books | 1,96,352 |
| Periodicals | 95,801 |
| Theses | 9,879 |
| CD-ROM (databases) | 131 |
| CDs (Books & Theses) | 1187 |
| Total | 3,03,350 |

- HAU Bookshop** : Bookshop functions on '**no loss-no profit**' basis on the premises of Nehru Library. It caters to the requirements of the library, students, faculty and other university staff. The transactions of bookshop during **2006-07** are given below :

A. Business Transactions

| | |
|------------------------------|--------------------------|
| i. Supplies to Nehru Library | |
| a. Books | Rs. 48, 03, 941 |
| b. Journals | Rs. 71, 74, 870 |
| ii. Books sold to others | Rs. 3, 33, 761 |
| Total | Rs. 1,23, 12, 572 |

B. Savings on account of credit sales

| | |
|--------------------------|------------------|
| i. Total Receipts | Rs. 3,68,967 |
| ii. Expenditure on books | Rs. (-) 3,59,100 |
| Net Savings : | Rs. 9,867 |

The entire discount earned by the Bookshop was passed on to Nehru Library on the sale of **books and journals**, and to other purchasers on cash sales. Thus, the library saved a sum of about Rs. 18,68,248/- in the form of discount. This saving is supplemented by the net saving of Rs. 9867/-, which the Bookshop earned on credit sales.

3. **Processing Section** : This Section processed 1749 documents during the year under report. A total of 1724 catalogue cards were typed and filed in the Shelf List. Spine writing of 6816 documents was done. Library Catalogue of books has been converted into online catalogue. Retro-conversion of 4041 books has been done. 23094 barcodes have been generated and pasted to 7698 documents.
4. **Bindery** : The library has its own well-equipped bindery where all the binding work of the University Library is done. A total of 4578 volumes - 976 journals, 336 theses and 3266 books were bound during this year.

PERIODICALS AND EXCHANGE DIVISION

1. **Subscription and exchange of periodicals** : Nehru library has a vast collection of journals in the fields of Agricultural Sciences, Veterinary Sciences, Animal Sciences, Basic Sciences and Home Science. The position of journals, which were on the active subscription list of Nehru Library, and their offshoots for the year under report is as under :

| S. No. | Description | Foreign | Indian | Total |
|--------------|--------------------------|---------|------------|------------|
| i. | a. Nehru Library | 145 | 267 | 412 |
| | b. Home Science Library | 01 | 07 | 08 |
| | c. College Library, Kaul | 01 | 25 | 26 |
| | d. KGKs/KVKs/RRS | - | 146 | 146 |
| ii. | CD-ROM databases | 04 | 1 | 05 |
| iii. | Serials (standing order) | 40 | 4 | 44 |
| iv. | Exchange | 13 | 11 | 24 |
| v. | Free | 21 | 12 | 33 |
| Total | | | 225 | 473 |
| | | | | 698 |

The library has exchange relations with several foreign and Indian journals' publishers. **HAU Journal of Research, Haryana Veterinarian, Haryana Kheti, Thesis Abstracts and Annual Report** - official publications of this University - form the backbone of the exchange programme.

2. **Additions** : 1015 volumes of periodicals were accessioned, classified, and added in shelf list and computer; and released for the library users.
3. **Transfer of periodicals to outstations** : Around 15903 periodicals stand transferred as reflected in the statement given below :

i. Colleges

| | |
|---------------------------------------|------|
| a. College of Agriculture & RRS, Kaul | 2088 |
| b. College of Home Science, Hisar | 1226 |

ii. Research Stations/KGKs/KVKs

| | |
|--|-------|
| a. RRS, Uchani, Karnal | 1164 |
| b. RRS, Buria, Yamunanagar | 24 |
| c. College of Agriculture & RRS, Bawal | 1102 |
| d. KGKs/KVKs | 10299 |

Total 15903

4. **Recovery on account of non-supply of issues** : A sum of **Rs. 2,21,056/-** was recovered from the suppliers on account of unsupplied issues of periodicals.

5. **Computerization (data entry)**

Current Subscription : Renewal of subscription of **267** Indian and **145** Foreign journals for the year **2007** was initiated and daily attendance marked thereof. Ordering, invoicing, monitoring of loose issues, accessioning of bound volumes of journals, etc. are also being done.

Editing and Correction : **2791** records

RESEARCH, PLANNING AND DEVELOPMENT DIVISION

This Division was created in **September 1991** with the aim to carry out research and prepare plans for the development of the library. Automation of Nehru Library started as this Division began its work. Starting with one PC in 1991, the Library, now has 64 PCs/multimedia/workstations, 4 servers including one CD server called NASTorage, 2 scanners, 6 Barcode Readers, 1 Modem, 29 UPSs, 18 printers and 5 Software - UNIX, LibSys, MS-Office, Windows 1998 and Windows XP. These equipments are being used by the library staff for library automation activities and library users to access online databases such as OPAC, CD-ROM databases and Internet, etc.

Computerization of library involves the application of computing and other technologies to the following library activities :

- i. Acquisition of books.
- ii. Subscription of printed and e-journals.
- iii. Cataloguing of current acquisitions and display of new additions.
- iv. Retro-conversion of the Library Catalogue.
- v. Bar-coding of books.
- vi. Circulation of books and other reading material.
- vii. Linkage of Online Catalogue to the university website.
- viii. Acquisition of CD-ROM databases.
- ix. Digitization of doctoral dissertations, rare books and other reading material.

All these activities have been completely automated.

Three more facilities – Internet Lab., Video Conferencing Facility and Multimedia Library have been created in the library. Internet Lab. has been functioning since 23.2.3007 with 13 Internet Nods and Video Conferencing Facility and Multimedia Library will start functioning soon. These are only some of the milestone in the history of Library.

COMPUTERS/PERIPHERALS TRANSFERRED

1. **Two Computer tables and Chairs** have been transferred to Director (S&P), CCSHAU, Hisar.
2. **One EPBAX** (Uptron) with battery and one UPS (1 KVA) Sr. No. Q11K43933 have been transferred to C.M.O, CCSHAU, Hisar.
3. **Two PCs** (Acer) Sr. No. 5060642, 506644, **One Printer** (HP LaserJet 1022) Sr. No. CNB 63DOD7 **Two UPSs** (One Elnova- offline) -1KVA- Sr. No. Q11K43984, and **One Online** (APC Make) 1 KVA- Sr. No. JS629031932 with eight batteries bank, 1 Extension Board (Elec.) have been transferred to COA, Kaul.
4. **Two PCs** (Sr. No. INI64000H7 with 19" TFT, INI 64000GS with 15" TFT), and **One Laptop** (HP Compaq NX6320) Sr. No. CNU7100T21 have been transferred to O/o Vice Chancellor, CCSHAU, Hisar.

5. **One Multimedia (Compaq) Sr. No. P205JG3Z0101** with cordless mouse/connector and one Computer table (Delite Make) have been transferred to COHS (FRM), CCSHAU, Hisar.
6. **One UPS (Online) 1KVA Sr. No. FF1300** with 3 Battery Bank has been transferred to Library, COHS, CCSHAU, Hisar.

TEACHING OF COURSE NO. PGS 595

Course No. PGS 595 entitled, "**Library Services and Technical Writing**" was taught to **126 M.Sc./Ph.D.** students during the period under report.

HUMAN RESOURCE DEVELOPMENT

1. Sh. P. C. Kapila, Assistant Librarian attended refresher course from 9-29 November, 2006 at Pondicherry University.
2. Sh. P. C. Kapila also attended *International Conference on Digital Library* from 5-8 Dec. 2006 and presented a paper on Digital Resources in Nehru Library co-authored by Sh. Balwan Singh, Assistant Librarian.
3. Sh. Rajive Pateria, Assistant Librarian attended refresher course from 7-28 February 2007 at AMU, Aligarh.

DISTINGUISHED VISITORS TO LIBRARY :

The following dignitaries from India and abroad visited the library :

| Sr. No. | Name | Address | Dated |
|---------|--------------------|-------------------------|------------|
| 1. | Ray Miller | - | 28/07/2007 |
| 2. | Dr. Mangla Rai | DG, ICAR | 02/08/2006 |
| 3. | Dr. R. S. Paroda | - | 14/08/2006 |
| 4. | Shri G. K. Pilklai | Commerce Secretary, GOI | 28/10/2006 |
| 5. | Dr. S. P. Tiwari | DDG, ICAR | 16/12/2006 |
| 6. | Dr. M. P. Yadav | VC, SVBPUAT, Meerut | 26/02/2007 |
| 7. | Mary Ochs | Cornell Univ., USA | 05/06/2007 |
| 8. | A. Nouv & Peter | Purdue Univ., USA | 07/06/2007 |
| 9. | Shri R. Somiyappu | TNAU, Coimbatore | 07/06/2007 |

STATISTICS AT A GLANCE

Physical Infrastructure

| | |
|-------------------|----------------|
| Area | 97,700 sq. ft. |
| Stacking Capacity | 3,00,000 vol. |
| Seating Capacity | 650 |
| Study Rooms | 21 |

Total Information Resources

| | |
|----------------------|-----------------|
| Books | 1, 96,352 |
| Periodicals | 95,801 |
| Theses | 9,879 |
| CD-ROM (Databases) | 131 |
| CDs (Books & Theses) | 1187 |
| Total | 3,03,350 |

Information Resources added during the year

| | |
|--------------------|------|
| Books | 2637 |
| Periodicals | 1015 |
| Theses | 302 |
| CD-ROM (Databases) | 5 |
| CDs (Books) | 263 |

Periodicals subscribed during 2006-07**A. Nehru Library**

| | |
|------------------|-----|
| a. Foreign | 145 |
| b. Indian | 267 |
| c. Free/Exchange | 57 |

B. Home Science

| | |
|------------|---|
| a. Foreign | 1 |
| b. Indian | 7 |

C. Outstations 172**D. Standing Orders** 44**E. CD-ROM (Databases)** 5**Processing of Information Resources (Manually)**

| | |
|-------------------------------|------|
| Books catalogued & Classified | 1749 |
| Catalogue Cards typed & filed | 1724 |
| Periodicals bound | 976 |
| Books bound | 3266 |
| Theses bound | 336 |

Computerization

| | |
|--|-------|
| No. of barcodes generated & pasted @ 3 labels per book | 23094 |
| No. of volumes of books, whose data has been entered in computer | 4041 |
| Renewal of subscription of Indian and Foreign journals | 643 |
| Records edited and corrected | 2791 |

Library Membership

| | |
|---------------------------------|-------------|
| Teachers/Scientists/Other staff | 2739 |
| Students | 2411 |
| Special Members | 99 |
| Total | 5249 |

Library use

| | |
|---|--------|
| Circulation transactions | 53862 |
| No. of books issued from Book bank | 1277 |
| Documents consulted within library premises | 834186 |
| Use of CD-ROM | 6267 |
| Visitors | 137816 |

HAU Bookshop

| | |
|---|------------------------|
| Cost of books and periodicals purchased for Nehru Library | Rs. 1,19,78,811 |
| Books sold to others | Rs. 3,33,761 |
| Total | Rs. 1,23,12,572 |

Savings

| | |
|--------------------------------|----------------------|
| a. Savings on credit sales | Rs. 9,867 |
| b. Savings effected by library | Rs. 18,68,248 |
| Total savings | Rs. 18,78,115 |

College of Home Science

| | |
|--|------|
| a. No. of books issued | 1913 |
| b. No. of books returned | 1899 |
| c. Documents consulted within Library premises | 1824 |
| d. No. of readers visited the library | 3210 |

Income

| | |
|-----------------------------------|----------|
| a. Over dues realized | Rs. 2914 |
| b. Cost of books realized, if any | Nil |

College of Agriculture, Kaul

| | |
|--|-------|
| a. No. of books issued | 6312 |
| b. No. of books returned | 6298 |
| c. Documents consulted within Library premises | 5274 |
| d. No. of readers visited the library | 14606 |

Income

| | |
|----------------------------|------------------|
| a. Over dues realized | Rs. 6918 |
| b. Rental charges realized | Rs. 8780 |
| | Rs. 15698 |

7. University Authorities and Administration

The Board of Management and the Academic Council are declared as University's Authorities in the Acts and Statues of the University. The decisions taken by the BOM and the Academic Council during 2006-07 are given in Annexure-I and II. A list of the University Officers and Heads of the Departments is also presented in Annexure-III and IV.

7.1 OFFICE OF THE REGISTRAR

The office of the Registrar comprises of three branches: Academic & Faculty Affairs, General Administration and Legal. Besides, the Faculty House and Trainees Hostel also function under the administrative control of the Registrar. The Registrar is the 'Controlling Officer' of the Security Organization. There is office of Controller of Examination in Registrar's office. The Registrar is assisted by Assistant Registrars/Deputy Registrars.

1. ACADEMIC & FACULTY AFFAIRS

Faculty Branch

The following staff members were promoted on various teaching, research and extension posts during 1.07.06 to 30.06.07. Promotion under Career Advancement Scheme :

| | |
|---|----|
| i) Asstt. Professors promoted as Assoc. Professor/equivalent | 69 |
| ii) Assoc. Professors/equivalents promoted as Professors under CAS | 74 |
| iii) Asstt. Professors elevated to the Senior Scale | 4 |
| iv) Asstt. Professors elevated from Senior Scale to Selection Grade | 2 |

Academic Branch

The Academic Wing mainly deals with admissions, examinations and results of the UG students and award of degrees and medals. It maintains the minutes of the meetings of the Academic Council and makes official correspondence for conduct of the meetings and their follow up action. It maintains a register of all degrees/diplomas conferred by the University upon the students apart from the other Academic record such as semester reports, transcript of academic records etc. of UG students.

2. GENERAL ADMINISTRATION

General Branch

The total budget for the Registrar's office for the year 2006-07 was Rs. 2,74,28,075. The strength of sanctioned posts was 118. Membership of various academic and other bodies such as Indian Agricultural Universities Association, Association of Indian Universities etc. are taken care of by this branch. Matters relating to Higher Power Coordination Committee of the State Govt., appointment of Welfare Officer and constitution of House Allotment Committee are handled by this branch too. The information called for by GOI/ICAR/UGC/State Govt. pertaining to CCSHAU is sent after compilation thereof. The matters regarding signing of MoUs with foreign Universities/Indian Universities/Institutions including visit of foreign delegations are dealt within this branch.

All recruitment matters of teachers and non teachers are taken care of by this branch. The details of the recruitment made during the year under report are as under :

Grade wise appointment of teachers

| | | |
|---------------------|---|--|
| Registrar | 1 | Rs. 16400-22400 + unfurnished rent free accommodation. |
| Teaching Associates | 5 | Contract basis on fixed emoluments of Rs.8000/8800/10500 per month. |

Grade wise appointment of non teachers

| | | |
|-----------------------------|---|--------------------------|
| Clerk (under PH quota) | 1 | Rs. 3050-4590+Rs. 40 SP. |
| Pharmacist (For RRS Karnal) | 1 | Rs.5000-7850 |

In addition to the above, the services of one DPL (contingent paid) were regularized w.e.f. 01.10.2003 as per State Govt. policy adopted by the University.

3. EMPLOYEES BRANCH

The employees wing deals with establishment cases and other matters relating to service conditions of non teaching employees along with the following work :

- i) Amendment in the Statutes relating to establishment.
- ii) Instructions regarding annual confidential reports.
- iii) Deals with the non teaching employees associations, Sweepers union, etc.
- iv) Conduct of Departmental Examinations for ministerial employees.
- v) Deals with the disciplinary cases of non teaching employees.
- vi) Adoption of State Govt. instructions in connection with establishment matters as well as of general matters.
- vii) Grant of ACP scales to the non teaching employees.
- viii) Render advice in service matters to the various appointing authorities.
- ix) Appointment under ex gratia schemes.
- x) Interpretation of the Statutes/rules/instructions pertaining to non teaching employees.

The detail of promotions/adjustments made during the period under report is as under :

| S. No. | Name of the post to which promotions made | No. of promotions made |
|--------|---|------------------------|
| 1. | Deputy Comptroller | 1 |
| 2. | Superintendent | 2 |
| 3. | Deputy Superintendent | 3 |
| 4. | PA | 7 |
| 5. | Executive Engineer | 1 |
| 6. | Sub Divisional Engineer | 4 |
| 7. | GO-cum-Daftri | 6 |

Besides seven appointments were made under ex gratia scheme and 13 cases for grant of Compassionate Financial Assistance were decided. One Senior Technical Assistant was granted assessment promotion in Grade T 6 of Rs. 8000-13500. ACP scales have also been granted to various Class III & IV employees on completion of 10/20 years of regular satisfactory service.

4. LEGAL BRANCH

This branch was established in the year 2001 and has been working under the supervision of Legal Remembrance (L.R.). The main function of the Legal Branch is that the court cases filed against/by the University are defended by this branch. Legal opinion/advice on various cases is given by the L.R. In addition, legal opinion/advice on various cases as sought by different departments/offices is given. The replies pertaining to the court cases are prepared by the L.R. The reply to the legal notice, draft show cause notice and charge-sheets to be served upon the employees are also drafted/vetted by this branch.

5. CONTROLLER OF EXAMINATION

This office completed satisfactorily all the secrecy work pertaining to external examinations of various under graduate and post graduate programmes, viz. B.V.Sc. & AH; B.Sc. (Hons.) Agri.; B.Sc. (Hons.) Home Science; B.Tech. (Agri. Engg.) and Master of Business Administration. The secrecy work includes paper setting, printing, etc., conduct of examinations, evaluation of answer books, compilation and tabulation of results of external examinations.

The Entrance Test Examinations for admission to B.V.Sc.& AH, B.Sc. (Hons.) Agri. and M.Sc. (Bio informatics, BMB & FST) were conducted and completed satisfactorily. In these examinations various jobs, i.e. secrecy, conduct, evaluation, tabulation and preparation of results were completed successfully and satisfactorily.

6. FACULTY HOUSE AND TRAINEES HOSTEL

Details of rooms of Faculty House occupied during the period under report are as under :

| Month | Number of Guests | Month | Number of Guests |
|-----------|------------------|--------------|------------------|
| July, 06 | 149 | Aug. 06 | 292 |
| Sept. 06 | 239 | Oct. 06 | 230 |
| Nov. 06 | 175 | Dec. 06 | 322 |
| Jan. 07 | 222 | Feb. 07 | 382 |
| March, 07 | 326 | April, 07 | 347 |
| May, 07 | 269 | June, 07 | 236 |
| | | Total | 3189 |

7.2 OFFICE OF COMPTROLLER

The Comptroller manages the finances of the University, prepares the budget and ensures that the expenditure, not authorized in the budget, is not incurred. There are six branches in the office of the Comptroller. These are (i) Accounts Branch (ii) Budget Branch (iii) Establishment Branch (iv) Inspection Branch (v) PF Branch and (vi) Pension Branch. The Comptroller is also the Controlling Officer of Store Purchase Organization. The Branch wise report is as under :

1. Accounts Branch

The work of expenditure and income of the University is centralized in Accounts Branch of the Comptroller's Office. The Accounts Branch mainly deals with the issue of cheques, classification of expenditure under various schemes provided in the University budget, reconciliation of scheme-wise income figures, reconciliation of bank ledger accounts including outstations and lastly issue of GUC depicting the figures of grants and income realized and the expenditure incurred during a year. The GUC is got issued from the Director, Local Audit, Haryana, Chandigarh.

The financial position of the University for the year 2005-06 and 2006-07 was as under :

| Financial | Grants received (in lacs) | Income realized (in lacs) | Total (in lacs) | Expenditure (in lacs) |
|---------------------|------------------------------|------------------------------|--------------------|--------------------------|
| Year 2005-06 | | | | |
| State Schemes | 10369.25 | 898.78 | 11268.03 | 9851.11 |
| ICAR and OA Schemes | 3476.37 | 14.33 | 3494.70 | 3251.53 |
| Year 2006-07 | | | | |
| State Schemes | 11342.67 | 1061.97 | 12404.64 | 9717.85 |
| ICAR and OA Schemes | 3939.02 | 18.12 | 3957.14 | 4002.78 |

2. Budget Branch

This branch prepares the budget, obtains the approval of the Board of Management and monitors the expenditure. The budget allocations made during the year 2006-07 are as under :

| Item | Salary | TA | Contingencies | | Total | %age |
|--------------------------------|----------------|--------------|----------------|---------------|-----------------|---------------|
| | | | Rec. | Non-Rec. | | |
| Research including Farm | 4062.20 | 39.68 | 1587.87 | 111.40 | 5801.15 | 42.64 |
| Teaching including Lib. | 2602.08 | 7.66 | 1106.69 | 24.34 | 3741.23 | 27.50 |
| Extension | 1313.08 | 19.14 | 265.44 | 72.78 | 1670.44 | 12.28 |
| Administration & Misc. | 511.32 | 4.36 | 105.77 | 1.10 | 622.55 | 4.57 |
| Students/Exp. Welfare | 199.13 | 0.18 | 33.09 | 0.67 | 233.07 | 1.71 |
| Service Units | 273.36 | 0.44 | 11.86 | 0.12 | 285.78 | 2.10 |
| Buildings & Maint./Landscaping | 999.00 | 0.93 | 251.61 | 0.5 | 1252.04 | 9.20 |
| Total | 9960.63 | 72.39 | 3362.33 | 210.91 | 13606.26 | 100.00 |

However, the revised budget estimates for the year 2006-07 were of Rs.16529.81 lacs. The Board of Management approved original budget estimates for the year 2007-08 amounting to Rs.16016.11 lacs.

Besides operating the budget for the year 2006-07, the other main highlights of Budget Branch are as under :

1. Granted interest free loan of Rs.5,000/- to class IV employees for purchase of wheat on State Govt. pattern.
2. Granted Dearness Allowance to University employees w.e.f. 1.7.06 and 1.1.07 on State Govt. pattern.

3. Granted interest free loan of Rs.1500/- to class IV employees for Diwali Festival for the year 2006-07.
4. After making vigorous efforts funds amounting to Rs. 1500 lacs during 2005-06 and Rs. 2000 lacs for the year 2007-08 has been got earmarked.
5. Satisfactorily attended queries raised by the agriculture/finance departments.
6. Satisfactorily attended A.G. Party objections/queries.
7. Motivated the departments for increase of income which yielded satisfactory results.
8. Provision of Plan Scheme got enhanced from Rs. 800 lacs for the year 2006-07 to Rs. 2000 lacs for the year 2007-08.
9. Provision of Rs. 21 lacs for the year 2006-07 under "loans and advances" got enhanced to Rs. 50 lacs for the year 2007-08.

3. Establishment Branch

Establishment Branch mainly deals with cases of pay fixation of teachers and other employees of the University, processing of financial sanctions of the level of Vice Chancellor, rules and regulations regarding medical reimbursement, TA rules, Wages, Liveries and misc. issues. Besides, it deals with cases of Employees Welfare Fund, Teachers Welfare Fund, Group Saving Linked Insurance Scheme and ex gratia grants to the families of the deceased employees.

- (i) Four Amendments in A/c Vol. I/II were got finalized and issued.
- (ii) Instructions/clarifications as received from the State Govt. on various matters such as; medical facilities to University employees/Pensioners/Family Pensioners/their dependents, Air Travel, LTC, Conveyance Allowance to blind and orthopaedically handicapped employees etc. were issued/circulated in the University.
- (iii) Facility of taking medical treatment by the University employees at NC Jindal and Churamani Hospitals at Hisar was revived during the above period.
- (iv) All the remaining Animal Attendants were granted HRA in lieu of rent free accommodation @ 5% of the initial of pre revised pay scale, *i.e.* on Rs. 750/- w.e.f. 04.05.07.
- (v) Instructions for granting the benefit of two advance increments to all the teachers (including Readers/Assoc. Prof./equiv., Professors & Principals) with cut off date 27.07.98, who acquired Ph.D. degree during service even prior to 01.01.96 and who were not given the benefit of any advance increment as per earlier CAS were issued.
- (vi) Final claims of GSLIS for 145 employees to the tune of Rs. 21.80 lacs approx. were prepared and processed to LIC of India (P&GS Branch), Karnal for payment. All claims stand paid.
- (vii) Payment of Rs. 7.0 lacs was made under ex gratia grant to 28 families of the deceased employees/heirs.
- (viii) During this period financial assistance of Rs. 20.25 lacs was granted out of EWF to 45 employees.

Besides hundreds of cases of pay fixation were approved. Financial sanctions cases submitted by the departments were obtained from the Vice-Chancellor, clarifications were given in many cases to the departments on various issues involving interpretation of University rules and regulations.

4. Inspection Branch

The Inspection Branch conducts inspection of accounts of the various departments/offices, conducts surprise checks and physical verification of cash/stores, renders advice for settling outstanding audit objections, helps in regularization of provisional payments and adjustment of advances, investigates the complaints relating to financial transactions and associates with the Spot Purchase Committee. This branch got settled 277 Audit requisitions and one Audit Para.

5. & 6. P.F. and Pension Branch

a) CPF :

There were 521 subscribers to CPF. An amount of Rs.136.25 lacs advanced to 175 subscribers, Final payment of Rs.90.64 lacs have also been made to 24 retirees. The amount of Rs.25.27 crores stands invested relating to CPF with various banks/agencies.

b) GPF :

There were 4479 subscribers to GPF. An amount of Rs.1249.15 lacs advanced to 1542 subscribers. Final payment of Rs. 992.03 lacs have also been made to 212 retirees. The amount of Rs. 104.67 crores stands invested with various banks/agencies.

c) Pension

- i) 172 pension cases were finalized.
- ii) 79 cases of pension/family pension were revised.
- iii) 10 cases of counting of ad hoc service towards pension benefits were finalized.
- iv) 2 cases of benefit of weightage under Clause 3.2 of Chapter-XII of the University Statutes were finalized.
- v) 244 cases of payment of gratuity were sanctioned.
- vi) The amount of Rs.3792.60 lacs stand invested out of pension fund with various banks/agencies.

7. Director (Stores & Purchases)

During the period from 1st July, 2006 to 30th June, 2007 purchases worth Rs.26,86,143/- were made by the Office of Director (Stores & Purchases) for central stores and material worth Rs. 24,90,720/- approx. was issued to various departments. The rate contracts concluded by this office during the period were operated by the user departments directly apart from the material indented by this office for Central Stores to meet the day to day requirements of the user departments. About 475 cases relating to purchase/rate contracts were considered by the Central Purchase Committee during the above period.

8. Awards and Recognitions

The university teachers won several awards and recognitions during 2006-07. The college-wise awards and recognitions are detailed below :

Research

Based on outstanding achievements in pearl millet improvement, CCSHAU was conferred "**Best Pearl Millet Research Centre**" by Millet Research Society and AICPMIP (ICAR) at JAU, Junagarh.

College of Agriculture

- **Dr. S. C. Khurana** of the Department of Vegetable Science was awarded fellowship of Indian Potato Association.
- **Dr. K. K. Thakral** of the Department of Vegetable Science was awarded fellowship of Indian Society of Spices.
- **Dr. R.S. Malik, Dr. M. L. Dixit, Dr. Ram Kala and Dr. S. P. Gupta** of Department of Soil Science were jointly awarded Third Prize in Agricultural Sciences by the Fertiliser Association of India, New Delhi for their article entitled "Suksham Poshak Tatv-Uplabhdhta Avem Prabandh" published in Khad Patrika.
- **Dr. Satyavir** of the Department of Plant Pathology was elected President, INSOPP; **Dr. S.K. Gandhi** Councillor, INNSOPP and **Dr. Sher Singh** was elected President, IPS (NZ).
- **Dr. (Mrs.) Indra Hooda** of the Department of Plant Pathology maintained her position as Councillor, IPS and **Dr. N. Mehta** was elected Councillor, INSMPP.

College of Home Science

- **Dr. Savita Singal** availed herself of sabbatical leave at Carleton University, Ottawa, Canada from Oct. 2006 to April, 2007. During this period she worked on "Feminist Perspectives on Globalization" as CIDA IDRC CU-UO Visiting Scholar.
- **Dr. Indu Grover** worked as Review Team Editor of the "Global Report of the International Assessment of Agricultural Technology for Development (IAASTD) - 2006" of World Bank.
- **Dr Lali Yadav** got the Best Community Mobilization Award by the Society of Community Mobilization and Sustainable Development at Pant Nagar in Jan 2007 and Best Alumnus Award 2007 at CCSHAU Alumni Association Meet.

College of Veterinary Sciences

- **Dr. S. K. Gupta, Professor & Head**, Vety. Parasitology was selected as Fellow of National Academy of Veterinary Sciences during Annual Convention of NAVS, held at Bangalore on 27.06.2007.
- **Dr. Arun Sangwan, Scientist**, Vety. Parasitology was awarded the INSA Visiting Fellowship for 2007-08 to work on "Application of Remote Sensing and GIS for Mapping Livestock Diseases" at the Indian Institute of Remote Sensing, Dehradun.
- **Dr. Pawan Kumar, Assoc. Prof.** was given **BEST PAPER AWARD** (December, 2006) by Indian Association of Veterinary Anatomists.
- **Dr. Pawan Kumar, Assoc. Prof.** was awarded **Short Term Fellowship** for three months by University of Kentucky, USA
- **Rajender Paul Gold Medal** for the best MVSc thesis was awarded to **Ms. Maitri Sharma** (Adm. No. 2002VI90M) for the year 2004-05.
- **Dr. (Mrs.) Minakshi, Scientist**, Department of ABT has been awarded the **Dr. J. V. Bhatt Award** by the Central Council of Association of Microbiologist of India (AMI).
- **Dr. Kuldip Singh, Prof. & Head and Dr. R. S. Bisla** were awarded an Appreciation Certificate for their poster presentation in 30th Annual Congress of Indian Society for Veterinary Surgery and National Symposium.
- **Dr. Rishi Tayal, Professor** has been awarded Fellow of the ISVS in 30th Annual Congress of Indian Society for Veterinary Surgery and National Symposium.

Annexures

Annexure-I

UNIVERSITY AUTHORITIES

The Board of Management and the Academic Council are declared as University's Authorities in the Act and Statutes of the University.

BOARD OF MANAGEMENT AS ON 30.06.2007

Honorary Chairman : Dr. A. R. Kidwai
H.E. Governor of Haryana

Working Chairman : Dr. J. C. Katyal
Vice-Chancellor

Members

Sh. Prem Prashant, IAS
Chief Secretary to Govt. Haryana,
Chandigarh

Mrs. Urvashi Gulati, IAS
Financial Commissioner &
Principal Secretary to Govt. Haryana,
Development & Panchayats Department,
Chandigarh

Sh. N. Bala Baskar, IAS
Financial Commissioner &
Principal Secretary to Govt. Haryana,
Finance Department, Chandigarh

Sh. Raj Kumar, IAS,
Financial Commissioner &
Principal Secretary to Govt. Haryana,
Agricultural Department, Chandigarh

Dr. B. S. Bisht
ADG (HRD-1)
Indian Council of Agricultural Research KAB-II
Pusa, New Delhi
DDG (Edn.) ICAR, KAB-II

Technical Advisors

Sh. R. K. Khullar, IAS
Director of Agriculture, Haryana,
Kandi Vikas Bhawan, Sector 21, Panchkula

Dr. K. S. Dangi
Director General,
Animal Husbandry, Haryana,
Bays No. 9 to 12, Pashudhan Bhavan,
Sector-2, Panchkula

Dr. R. K. Malik
Director, Extension Education
CCS HAU, Hisar

Dr. S. K. Nagpal
Dean, College of Vety. Sciences,
CCS HAU, Hisar

Member Secretary

Dr. R. S. Dalal

Registrar, CCS HAU, Hisar

IMPORTANT DECISIONS TAKEN BY THE BOARD OF MANAGEMENT (01.07.2006 to 30.06.2007)

1. Dr. R. S. Dalal appointed as the Registrar of the University.
2. Dr. R. K. Malik, Director, Extension Education, and Dr. S. K. Nagpal, Dean, College of Veterinary Sciences appointed as Technical Advisors to the Board.
3. The establishment of a Krishi Vigyan Kendra in Mewat (Nuh).
4. Tailoring Food Sciences to Endogenous patterns of Local Food Supply for Future Nutrition (TELFUN) approved.
5. Fulbright Senior Specialist Programme approved.
6. Intellectual Property Rights – Policy and Regulations approved.
7. The signing of Memorandum of Understanding (MoU) between CCS Haryana Agricultural University, Hisar, India and Centre for Development Research, University of Bonn, Germany approved.

ACADEMIC COUNCIL**Chairman**

Dr. J. C. Katyal
Vice-Chancellor

Members

Dr. B. S. Chhillar
Director of Research

Dr. R. K. Malik
Director of Extension Education

Dr. D. C. Gupta
Dean, College of Agriculture/Dean, PGS

Dr. S. K. Nagpal
Dean, College of Vety. Sciences

Dr. Pratap Singh
Dean, College of Agril. Engg. & Technology

Dr. Vijay K. Chowdhury
Dean, College of Basic Sciences & Humanities

Dr. Narender Singh Yadav
Dean, College of Animal Sciences

Dr.(Mrs.) Neelam Khetarpaul
Dean, College of Home Science

Dr. K. R. Yadav
Prof. & Head, Deptt. of Animal Nutrition

Dr. (Mrs.) Sudesh Gandhi
Prof. & Head, Dept. of FRM

Dr. Gaya Prasad
Prof. & Head, Dept. of Animal Biotechnology

Prof. V. P. Behl
Prof. & Head, Deptt. of Farm Power & Machinery

Dr. R. S. Waldia
Prof. & Head, Deptt. of Plant Breeding

Invitees

Sh. Prem Singh, Librarian

Dr. R.S. Dalal, Director, HRM

Dr. Bharat Singh, Director Students Welfare

Dr. Jit Singh, Additional Director of Research

Dr. R. K. Bakshi, Principal, COA, Kaul

Dr. Ashok Yadav, President, HAUTA

Dr. Raj Singh, Secretary, HAUTA

Member Secretary

Dr. R. S. Dalal
Registrar

IMPORTANT DECISIONS OF THE ACADEMIC COUNCIL

1. Proposal regarding the competency of the Hostel Warden to impose fine from Rs. 100/- to Rs. 500/- on those students who allow stay of unauthorized person specially the outsider in the hostel was approved. It was also decided that DSW may take serious note of it and enquire into the matter and take stern action against such elements. If need be an FIR may be lodged against such illegal occupants.

(Vide Item No. A 3 of 405th meeting held on 21.08.2006)

2. The Academic Council decided to institute one Scholarship each for the 3rd year student of B. Sc. (Hons.) Ag. at Kaul and Hisar in the name of Sh. Puran Anand Adlakha. It was further decided that most meritorious student amongst the eligible candidates be offered Sh. Puran Anand Adlakha Scholarship and minimum condition of OGPA will not apply in case of such eligible candidates.

(Vide Item No. A 4 of 405th meeting held on 21.08.2006)

3. Proposal to charge a token fee of Rs. 20/- per page for verification of documents from individuals and placement agencies was approved, However the Academic Council felt that the verification of document is an additional and arduous job and officials involved be given a suitable honorarium.

(Vide Item No. A 5 of 405th meeting held on 21.08.2006)

4. Proposal regarding Selection Procedure for identifying interns under Exchange Programme of the University of Maryland was approved by the Academic Council as under :

- (i) Top ten students will be identified on the basis of overall grade point average at the end of 5th year of B.V. Sc. & A.H. programme, *i.e.* after completion of course work. A student who is/has been on conduct probation will not be considered.
- (ii) The students will be asked to submit their Curriculum Vitae.
- (iii) The selection of final two students in the first year of exchange programme (the number may vary in subsequent years) will be based on the following criteria :

| S. No. | Criteria | Weightage |
|--------|--|-------------------------|
| i) | Academic merit (OGPA) | 70% (on pro-rata basis) |
| ii) | Achievements/participation in extra curricular activities | 10% |
| iii) | Performance in Power-point presentation on some selected topic | 20% |

Note : In case of tie between two students, the matter will be decided on academic merit. If still there is tie, the student younger in age will be preferred.

- (iv) The evaluation of achievement/participation in extra curricular activities will be done as per the criteria laid down in the University Calendar Vol. II for this purpose.

(v) The evaluation of communication skill of the students in power point presentation will be judged by a Committee consisting of:

- (i) Dean, College of Veterinary Sciences
- (ii) Dean, College of Animal Sciences
- (iii) Director, Human Resource Management
- (iv) Dean, College of Basic Sciences
- (v) Dean, Postgraduate Studies
- (vi) Director, TVCSC cum Coordinator, Internship Training Programme

Every member of this Committee will award marks individually as per his/her judgement and the average score will be awarded to the candidate.

(vi) A panel of top four students in order of merit will be recommended to the Vice-Chancellor for consideration and approval.

Note : Performance in Power point presentation will be judged before adding the marks of first and second criteria (i.e. OGPA+ Achievement in extra curricular activities) so that none of the Committee members has any idea about the standing of the candidate.

(Vide Item No. C 1 of 408th meeting held on 07.02.2007)

5. Proposal for evaluation of entrance test answer sheet, using OMR technology was approved.

(Vide Item No. A 6 of 410th meeting held 12.04.2007)

6. Proposal for formulation of new plan scheme during 2007-08, for direct benefit of SCs was approved.

(Vide Item No. A 7 of 410th meeting held on 12.04.2007)

7. Proposal for starting of MBA (Agribusiness) Programme from 2007-08 academic session and bifurcate the MBA programme was approved with the following number of seats.

| | |
|--------------------|----------------------------|
| MBA General | 20 seats for Haryana State |
| MBA (Agribusiness) | 10 seats for Haryana State |
| | 10 seats for ICAR |

(Vide Item No. A-8 of 410th meeting held on 12.04.2007)

8. Proposal regarding Declaration between CCS Haryana Agricultural University, Hlsar and Eurasia-Pacific Uninet in the field of student exchange, teaching and research activities was approved.

(Vide Item No. C-1 of 412th meeting held on 02.05.2007)

Annexure-III**OFFICERS OF THE UNIVERSITY (01.07.2006 to 30.06.2007)**

The list of Officers as declared in the Acts and Statutes of the University is given below :

1. Dr. A. R. Kidwai, His Excellency Governor of Haryana and Chancellor
2. Dr. J. C. Katyal, Vice-Chancellor
3. Dr. R. S. Dalal, Registrar
4. Comptroller, Sh.R..C.Goyal upto 28.02.07, Addl. Charge given to Sh. S. K. Jain, Dy. Registrar upto 30.06.06
5. Dr. D. C. Gupta, Dean, College of Agriculture
6. Dr. Pratap Singh, Dean, College of Agril. Engg. & Technology
7. Dr. V. K. Chowdhury, Dean, College of Basic Sci. & Humanities
8. Dr. Narender Singh, Dean, College of Animal Sciences
9. Dr. S. K. Nagpal, Dean, College of Vety. Sciences
10. Dr. (Mrs.) Neelam Khetarpaul, Dean, College of Home Science
11. Dean, Postgraduate Studies, Dr. S. S. Dahiya upto 31.03.07, Dr. D. C. Gupta *w.e.f.* 01.04.07 (Addl. charge)
12. Dr. B. S. Chhillar, Director of Research
13. Dr. R. K. Malik, Director of Extension Education
14. Dr. R. S. Dalal, Director, Human Resource Management
15. Sh. Prem Singh, University Librarian
16. Dr. Bharat Singh, Director Students' Welfare
17. Dr. V. A. Sangwan, Chief Medical Officer
18. Sh. O. P. Hans, Estate Officer cum Superintending Engineer upto 31.10.2006, thereafter additional charge was given to Dr. R. K. Malik *w.e.f.* 01.11.06 to 31.08.07.

LIST OF HEAD OF DEPARTMENTS (01.07.2006 to 30.06.2007)

College of Agriculture

| Name of department | Name of HOD (Drs) | Remarks |
|---------------------------|--|-------------------------------|
| Entomology | J. P. Bhanot | |
| Soil Science | O. P. Dhankar upto 31.10.06 | Anoop Singh w.e.f. 01.11.06 |
| Plant Pathology | Mrs. Indira Hooda upto 17.11.06 | M. S. Panwar w.e.f.18.11.06 |
| Agril. Economics | S. P. Singh | |
| Nematology | S. N. Nandal | |
| Horticulture | M. S. Joon upto 19.02.07 Dean, 20.04.07 to 26.04.07 | V. P. Ahlawat w.e.f. 27.04.07 |
| Ext. Education | R. S. Malik | |
| Plant Breeding | R. S. Waldia upto 06.06.07 | R. K. Rana w.e.f. 31.07.07 |
| Vegetable Crops | P. S. Partap upto 19.02.07 Dean, COA 20.02.07 to 26.04.07 | S. C. Khurana w.e.f. 27.04.07 |
| Agronomy | K. P. Singh upto 17.11.06 | S. S. Pahuja w.e.f. 18.11.06 |
| Agro-Forestry | D. P. S. Nandal | |
| Seed Science & Technology | J. C. Duhan upto 10. 11.06 | R. K. Kashyap w.e.f. 11.11.06 |
| Business Management | Charge with Dean, COA upto 25.11.06 | Atul Dhingra w.e.f. 25.11.06 |
| Agril. Meteorology | Ram Singh upto 24.08.06 | Diwan Singh w.e.f. 25.08.06 |

College of Animal Sciences

| | | |
|-----------------------------|---|----------------------------------|
| Animal Breeding | K. L. Raheja upto 17.11.06 | A. S. Khanna w.e.f. 18.11.06 |
| Animal Nutrition | K. R. Yadav upto 29.06.07 Dean, COAS w.e.f. 30.06.07 | |
| L.P.M. | Dean, COAS upto 17.11.06 | Mrs. Nita Khanna w.e.f. 18.11.06 |
| Livestock Prod.& Management | R. K. Sharma | |
| Animal Product & Physiology | Pradeep Bamal | |

College of Agricultural Engineering & Technology

| | | |
|----------------------------|-----------------------------|----------------------------|
| Soil & Water Engg. | Charge with Dean, COAE&T | |
| Farm Power & Machinery | Deepak Bhalla upto 19.02.07 | V. P. Bahl w.e.f. 19.02.07 |
| Agril. Processing & Energy | Charge with Dean, COAE&T | |

College of Home Science

| | | |
|-----------------------------|---------------------------------------|------------------------------------|
| Foods & Nutrition | Mrs. Saroj Dahiya upto 21.07.07 | |
| Family Resource Management | Mrs. Sudesh Gandhi upto 09.06.07 | Dean, COHS w.e.f. 11.06.07 |
| H. Sc. Extn. Education | Mrs. Shashi Kanta Verma upto 04.11.06 | Mrs. Nishi Sethi w.e.f. 04.11.06 |
| Human Dev. & Family Studies | Mrs. Sudha Chhikara | |
| Clothing & Textiles | Saroj S. Jeet Singh upto 16.05.07 | Mrs. Parveen Punia w.e.f. 17.05.07 |

College of Basic Sciences & Humanities

| | | |
|------------------------------|--|-------------------------------|
| Biochemistry | M. R. Saharan upto 30.10.06 | D. S. Chopra w.e.f. 01.11.06 |
| Math. & Statistics | Deepak Grover | |
| Genetics | R. P. Saharan upto 05.01.07 | R. K. Yadav w.e.f. 06.01.07 |
| Microbiology | B. S. Kundu | |
| Zoology & Aquaculture | S. K. Garg upto 31.08.06 Dean, COBS&H upto 02.05.07 | V. P. Sabhlok w.e.f. 03.05.07 |
| Sociology | P. S. Malik | |
| Chemistry & Physics | S. B. Kalidhar upto 30.06.07 | |
| Botany & Plant Physiology | C. L. Goswami upto 26.04.07 | H. R. Dhingra w.e.f. 27.04.07 |
| Languages & Haryanvi Culture | Dean, COBS&H | |
| Biotech. & Molecular Biology | K. S. Boora upto 24.11.06 | Dean, COBS&H w.e.f. 25.11.06 |

College of Veterinary Sciences

| | | |
|---|----------------------------|-------------------------------|
| Vety. Microbiology | S. K. Batra upto 27.10.06 | Arvind Kumar w.e.f. 28.10.06 |
| Vety. Epid. & Preventive Med. | Dean, COVS upto 17.11.06 | N. K. Rakha w.e.f. 18.11.06 |
| Surgery & Radiology | Kuldip Singh | |
| Vety Pathology | S. K. Mishra | |
| Vety. Anatomy & Histology | A. N. Gupta upto 17.11.06 | Gurdial Singh w.e.f. 18.11.06 |
| Vety. Public Health | Dean, COVS upto 17.11.06 | S. R. Garg w.e.f. 18.11.06 |
| Ani. Reprod. Gynae. & Obst. | A. K. Sharma upto 05.02.07 | N. S. Bugalia w.e.f. 06.02.07 |
| Vety. Physiology | R. L. Goyal upto 31.10.06 | J. P. Puri w.e.f. 01.11.06 |
| Vety. Pharmacology | J. S. Punia | S. K. Gupta |
| Vety. Parasitology | | |
| Vety. Biochemistry | S. L. Garg | |
| Clinical Medicine, Ethics & Jurisprudence | Rakesh Kumar upto 13.02.07 | Sridhar w.e.f. 13.02.07 |
| Vety. & Animal Husbandry Ext. | S. P. Singh | |
| Animal Biotechnology | Gaya Prasad | |

List of Completed Works/Buildings

1. Modification of seminar hall, construction of room, repair/ renovation of composite block and bath room and demolition of old hostel at E.E.I. Nilokheri.
2. Construction of farmers/trainees hostel at K.V.K. Devigarh (Kaithal).
3. Establishment of Soil Testing Lab. at K.V.K. Devigarh (Kaithal), Damla (Yamunanagar), Sirsa, Ujha (Panipat), Mohindergarh, Pandu Pindara (Jind), Jagdishpura (Sonipat), Bhopani (Faridabad), Sadalpur, Kurukshetra.
4. Repair/renovation of K.V.K. building at Mohindergarh.
5. Repair of XII type houses at K.V.K. Mohindergarh.
6. Renovation of existing parking area by providing cement concrete pavement in front of KVK building and providing compound wall around implement shed at K.V.K. Devigarh (Kaithal).
7. Special repair of roads at R.R.S. Kaul (Phase-I).
8. Modification in lab. No. 73 for Department of Entomology, College of Agric., Hisar.
9. Construction of 4 rooms on the first floor of the building of Dean, P.G.S.
10. Construction of car/scooter stand (Phase-I) in the premises of Centre of Food Sci. & Technology.
11. Renovation of existing worktops/counters by providing marble stone slab and replacement of conglomerate/terrazzo flooring with kotah stone flooring in mess block of various hostels (Kailash, Varindavan, Triveni, Shivalik, Gangotri and Aravali), providing fencing & path in Gangotri/ SAI Hostel and wire gauge on windows of T.T./common room of Kailash Hostel.
12. Repair/renovation of drawing hall, Dean's office, pump testing lab. and water storage tank for SWE field lab. in the College of Agril. Engg. & Tech.
13. Renovation of buffalo shed in the Animal Farm for Department of LPM.
14. Renovation of existing parking area by providing CC pavements in front of KVK and repair of building at KVK Damla (Yamunanagar).
15. Special repair to experimental orchard building in the farm area.
16. Renovation of students training halls in the building of Students Counselling & Placement Centre (Directorate of Students Welfare).
17. Renovation of office/conference room and multimedia lab. for the Department of Vety. Microbiology, College of Veterinary Sciences.
18. Construction of a store at Research Farm for Department of Entomology.
19. Construction of pucca platform, earth filling, landscaping, boundary wall and steel gates etc. in playing pits area for Department of HDFs, College of Home Science.
20. Providing steel enclosures including ACC sheet roofing for 3 playing pits for Department of HDFs, College of Home Sci.
21. Construction of one implement shed in the farm area for Cotton Section, Department of Plant Breeding.

22. Renovation for establishment of internet lab. for U.G./P.G. students, wall panelling in reading halls at first and second floors and relaying/replacement of existing floor of reference area (ground floor) in Nehru Library.
23. Upgradation/renovation of Agricultural processing field lab. for creating facilities of Agro. Processing Centre in College of Agric. Engineering & Technology.
24. Repair/renovation in Faculty Club (replacement of existing flooring of corridor/ entrance and toilet block).
25. Construction of foundation for weigh bridge, cabin and cement conc. path etc. at R.D.S. Seed Farm.
26. Providing cement concrete pavements in front of KVK building at Ujha (Panipat).
27. Renovation of seminar room for the Department of Animal Biotechnology, repair of animal shed for Department of Physiology, providing iron grills in room Nos. 220 & 223 for Department of VEPM and replacement of windows in Central Lab. in premises of College of Vety. Sci.
28. Special repair/renovation of roads in Animal Farm (Phase-I).
29. Providing indoor facilities for large animals and livestock owners for Vety. Unit at R.R.S., Karnal.
30. Construction of pucca water channel at R.D. 25000/l of sally minor in the premises of RDS Seed Farm.
31. Special repair/strengthening of balconies of 80 Nos. XII type houses in New Campus.
32. Special repair/renovation of 56 Nos. XI-B type houses (House No. 29 to 84) in Old Campus.
33. Re-construction of boundary wall of university campus adjoining 6 type houses, RDS House and hockey ground of Campus School in Old Campus.
34. Special repair/renovation of Bachelor Flats (*i.e.* conversion of Bachelor Flats into Trainees' Hostel).
35. Renovation of 5 labs./rooms in University Central Lab.
36. Renovation/repair of lab. No. 2 and corridor for Bioinformatic Section for the Department of Biotechnology and Molecular Biology in College of Basic Sci.
37. Renovation of Comptroller's Office.
38. Providing grit wash (exposed aggregate plaster) on outer walls of main building of College of Veterinary Sciences.
39. Renovation of toilet at ground floor of Fletcher Bhawan.
40. Re-construction of east and north side damaged brick walls of Wheat Bhoosa Godown for Animal Nutrition Department.
41. Repair/renovation of bath rooms (ground floor) of participant hostel at E.E.I., Nilokheri.
42. Renovation of SST building.
43. Renovation of laboratories 1, 21, 23 and 23(b) and 2 UPS rooms for Bioinformatics Section of the Department of Biotechnology and Molecular Biology in College of Basic Sc. & Humanities.

44. Construction of 4 small stores for cotton section in the premises of Directorate of Farms for the Department of Plant Breeding.
45. Renovation/modifications of room No. 149 at first floor for establishment of college canteen in College of Home Science.
46. Maintenance of KVK building and earth filling in open low lying area at K.V.K., Kurukshetra.
47. Replacement/repair of electric wiring of postmortem hall for Department of Vety. Pathology, College of Vety. Sciences.
48. Repair/renovation of ladies wing of Kishan Ashram.
49. Construction of thrashing floor in research area for the Department of Soil Science.
50. Providing and raising barbed wire fencing in the field research area of Plant Pathology Department.
51. Renovation of lab. Nos. 131,142 and lecture room Nos. 6, 7 for Department of Entomology, College of Agriculture.
52. Special repair of KVK building at Bhiwani.
53. Renovation of lab. No. 11 of Forage Section in old IATTE building Department of Plant Breeding.
54. Renovation of Seed Entomology lab. for Department of SST in Farm Area.
55. Providing pre-cast cement concrete kerb & channel in front of Participant Hostel and repair of boundary wall at E.E.I, Nilokheri.
56. Construction of pucca underground water storage tank near Gate No. 4 for Directorate of Extension Education.
57. Renovation of drainage system of TVCSC in College of Veterinary Sciences.
58. Construction of pucca water channel in Cotton Section for Department of Plant Breeding in Farm Area.
59. Repair/renovation of Lab. No. 142 and seminar room (room No. 143) for Department of Biotechnology and Molecular Biology.
60. Construction of boundary wall in the premises of Botanical Garden.
61. Repair of existing wooden partition walls in lab. No. 11 of Department of Anatomy and Histology.
62. Construction of garage for jeep at K.V.K. Bawal.
63. Repair/renovation of drainage system in various labs. in College of Basic Sciences.
64. Special repair of 8 Nos. XII-M type houses in Old Campus.
65. Special repair/strengthening of balconies of 24 Nos. XI type houses in Farm Colony.
66. Renovation of dog section of Vety. Surgery and Radiology Department and providing three Nos. aluminium door for College of Vety. Science.
67. Construction of pucca water channel at RD 7825 Farm Minor in the premises of RDS Seed Farm.

Annexure-VI**List of Facilities Provided**

1. Providing and installing three phase air conditioning system of 22.5 tonne capacity in auditorium of College of Home Sci.
2. Installation of 2 No. tubewells with diesel engine pumping set in Research Area of Cotton Section, Department of Plant Breeding.
3. Providing emergency supply/replacement of cable in Faculty Club.
4. Providing seating arrangement in lecture/seminar hall at KVK Bhopani (Faridabad).
5. Repair of irrigation channel in Farm Area for Department of SST.
6. Providing false ceiling in Seminar/Conference hall at KVK, Faridabad.
7. Providing 43 Nos. wire gauge doors to rooms in Gangotri Hostel and plywood over 248 steel beds in various hostels.
8. Providing sound system in auditorium of College of Home Sci.
9. Providing additional storm water drainage system from Vety. Hostel and Hostel No. 1-4 to lake near Campus school.
10. Providing and installing submersible tubewell at new main water works near Balsamand Distributory.
11. Providing underground cable for telephones of 50 pairs capacity from EPABX (HAU Exchange) to the residential area of New Campus.
12. Providing 2 water coolers in Gangotri Hostel.
13. Installation of existing 12 Nos. window type air-conditioners in various colony rooms of DFSAH, College of Veterinary Sciences.
14. Replacement of rolling shutters with iron doors of 2 stores for Directorate of Farms.
15. Providing gates (door and glazing with iron grills) on stairs at 2nd floor of Hostel No. 1 and 4 and iron grills in 9 rooms and kitchen (ground floor) and worktop in Godavari Hostel.
16. Providing and installing submersible tubewell in Research Area of Department of Soil Science.
17. Providing and fixing road crossers for landscaping in Campus.
18. Providing additional electricity installations for weigh bridge in RDS Seed Farm.

List of Works in Progress

1. Construction of incomplete portion of main K.V.K. building, two stores and garage at Ujha (Panipat).
2. Construction of farmers/trainees hostel, six residential houses and two demonstration units (Poultry and sheep/goat shed) at K.V.K. Ujha (Panipat).
3. Construction of farmers/trainees hostel, six residential houses and two demonstration units (Poultry and sheep/ goat shed) at K.V.K. Pandu Pindara (Jind).
4. Construction of farmers/trainees hostel, six residential houses and two demonstration units (Poultry and sheep/goat shed) at K.V.K. Jagdishpur (Sonapat).
5. Construction of three Seed Stores at R.R.S. Kaul.
6. Construction of six residential houses and two demonstration units (poultry and large animal sheds) at K.V.K. Devigarh (Kaithal).
7. Construction of farmers/trainees hostel, thrashing floor and barbed wire fencing around farm land at KVK Mohindergarh (hostel at Mohindergarh and thrashing floor and fencing at Palli Farm).
8. Providing barbed wire fencing around farm at RRS Buria (Yamunanagar).
9. Repair/renovation in lab. No. 7 (bakery lab.) for Centre of Food Science & Technology.
10. Construction of ground for riding school for 01 Haryana R&V Sqn. NCC at CCS HAU.
11. Conversion of 3 rooms adjacent to bakery lab. into Institutional lab. For Department of Foods and Nutrition, College of Home Sc.
12. Repair/renovation of lab. Nos. 5, 7 and GLC lab. (lab. No. 22) in old IATTE building for MA & UUP Section, Department of Plant Breeding.
13. Construction of office building and thrashing floor and providing barbed wire fencing at K.V.K., Jhajjar.
14. Repair/renovation of Bio-pesticide labs. and construction of a store at R.R.S., Uchani (Karnal).
15. Renovation of exhibition hall/museum situated on the premises of Gandhi Bhawan.
16. Repair of balconies of Hostel No. 1 to 4, replacement of flooring of dining hall in Hostel No. 3; providing iron grills in mess block of Hostel Nos. 2, 3 and 4 and brick flooring/steel gate in Shivalik Hostel.
17. Repair/renovation of 11 remaining toilets in Hostel Nos. 2, 3 and 4.

18. Repair/renovation of one toilet block in Godavari Hostel.
19. Repair/renovation of electrical works in Hostel Nos. 2, 3 and 4.
20. Construction of one block of Seed stores with covered platform at RDS Seed Farm.
21. Construction of Pucca water channels on the premises of RDS Seed Farm.
22. Construction of underground pucca water storage tank of average size 145'x145'x10' in Horticulture Section at RDS Seed Farm.
23. Construction of underground pucca water storage tank of average size 75'x75'x8' and irrigation system including two tubewells at RDS Seed Farm for MA & UUP Section.
24. Construction of underground pucca water storage tank of average size 245'x145'x8' and pucca water channel in CCS HAU Research Area for Department of Vegetable Science.
25. Construction of hatchery shed (Phase-I) installation of submersible tubewell, providing electric connection and repair of existing channel at Fish Farm for Department of Zoology & Aquaculture at HAU Research Area.
26. Repair/renovation of 13 Nos. Nursery Tanks at Fish Farm, Department of Zoology & Aquaculture.
27. Construction of 12'-0" wide road on the premises of RDS Seed Farm.
28. Providing fencing around field No. 4, 5, 6 of square 46 and construction of field work shed for the Department of SST.
29. Renovation of examination centre at first floor of Disease Free Small Animal House.
30. Providing and installing air conditioning system of 30 tonnes capacity in auditorium in College of Basic Sci. & Humanities.
31. Providing additional water supply arrangement in horse stables for 01 Haryana R&V SQN NCC.
32. Providing water supply line, repair of mist creation system and arranging drinking water facility in Botanical Garden.
33. Renovation/modification of room No. 4 (reception room for stake holders), room No. 12 (departmental library) in directorate of students' welfare, providing steel gate in office of ADSW (Sports) and renovation roof of 'C' block of Aravali Hostel.
34. Providing additional power plugs for heaters and repair of main elect. Control panel in Disease Free Small Animal House.
35. Renovation of electrical fittings in Godavari Hostel.

36. Renovation of laboratory of SWE department and special repair of 2 lecture rooms in IATTE building for College of Ag. Engg. & Tech.
37. Providing 40 Nos. wire gauge door to rooms in Gangotri Hostel (Phase-II) and repair/ replacement of shutters in Kailash Hostel.
38. Providing remedial measures for repair of top roof slab of I.G. Auditorium.
39. Providing steel gate and CC pavement near Farm Minor at RDS Seed Farm.
40. Renovation of activity lab. (rural and urban kitchen) and computer room of Department of FRM.
41. Repair/renovation of room Nos. 99,100 and 104 of the Department of HDFFS.
42. Renovation/alterations in Computer Centre, College of Home Sci.
43. Providing water supply system to existing lysimetres in the field area for Department of Botany and Plant Physiology.
44. Renovation of Immunotechnology lab. for Department of Vety. Microbiology.
45. Improvement of Computer Centre of College of Agril. Engineering & Technology.
46. Renovation/modification of parking shed for the Directorate of Human Resource Management.
47. Construction of brick wall upto 2'-6" height to close the existing opening of cement concrete ail towards the Department of Cloth & Textile in College of Home Science.
48. Replacement of damaged portion of existing sewer line of 600 mm diameter and construction of RCC collecting well and U.G. pump house etc. near Animal Sci. College.
49. Renovation/modification for conversion of room No. 74, 75, 76 in to lab. in Gandhi Bhawan.
50. Providing HT electricity connection to new water works from existing elect. bulk supply system.
51. Special repair of houses at Cotton Research Station, Sirsa.
52. Providing and laying 8" internal dia asbestos cement pressure pipe line from old water work to Farm Colony booster and Hostel No. 1 to 4.
53. Construction of boundary wall of University Campus from new water works to existing wall near judicial complex.

Annexure-VIII**List of Approval of Works**

1. Construction of trainees' hostel, 6 residential houses and tubewell at KVK Fatehabad.
2. Renovation of field store in Farm Area for Department of Plant Breeding, College of Agril.
3. Repair/maintenance of KVK building at Rohtak.
4. Construction of trainees hostel, five residential houses and one demonstration unit at K.V.K. Sadalpur.
5. Construction of two blocks of seed stores with open platform at RDS Seed Farm.
6. Construction of seed processing shed of size 50'x30' and 4 stores for MA & UUP Section at RDS Seed Farm.
7. Construction of seed testing lab. for Department of SST.
8. Repair/strengthening of existing barbed wire fencing at RDS Seed Farm.
9. Construction of processing hall, seed stores and seed fermentation tank for Department of Vegetable Science.
10. Construction/installation of 2 green houses at ATIC Nursery.
11. Construction of store, controlled condition cultivation room, generator room, stairs and modifications in mushroom technology lab. for the Department of Plant Pathology.
12. Special repair of roof of Auditorium, COVS.
13. Repair/renovation of students' activity centre, boys hostel & labs. and construction of store & chowkidar hut at College of Agril. Kaul.
14. Extension of Rhizobium Culture/Bio-Fertilizer Production Lab. for the Department of Microbiology, College of Basic Sci.
15. Renovation of committee room situated on the premises of building of Dean, PGS.
16. Repair/renovation in room No. 123,124,125, 131 and 132 for strengthening of Plant Tissue Culture facilities for the Department of Bio-Technology and Molecular Biology (first floor), College of Basic Science.
17. Fabrication of Cyclorama in Studio Lab. for the Department of Home Science Extension Education in College of Home Science.
18. Renovation of seminar room-cum-P.G. lab. for the Department of Agril. Economics on the premises of College of Agril.
19. Repair/renovation in lab. No. 258 of Oil Seed Section for the Department of Plant Breeding in College of Agriculture.
20. Repair of chairs in auditorium of College of Basic Science & Humanities.
21. Special repair of roads (*i.e.* providing 20 mm thick premix carpet with tack and seal coats) on the premises of College of Agril. at Kaul (Phase-II).
22. Special repair/renovation of stores including electrical works in the field lab. of Pulses Section in Farm Area for the Department of Plant Breeding.

23. Renovation/modification of committee room for College of Basic Science & Humanities.
24. Upgradation/renovation of computer centre (at + 5'-3") in the premises of College of Agric.
25. Construction of cricket practice pitch for students at College of Agril., Kaul.
26. Repair/renovation of computer room (Room No. 121) in Comptroller's Office.
27. Construction of cement concrete road in place of existing damaged road between old and new block of College of Vety. Science.
28. Construction of one block of seed store with covered platform (2nd Block) on the premises of RDS Seed Farm.
29. Renovation and up gradation of labs for Department of Animal Production & Technology.
30. Repair/renovation of toilets at 2nd floor for the Department of Genetics and Microbiology, College of Basic Sciences & Humanities.
31. Renovation/modification of scientist/HOD room on the premises of SST building in Farm Area.
32. Upgradation of exhibition facilities in ATIC (providing panel display boards *i.e.* illuminated ranslate digital printing boxes with digital printing & digital printing on existing display boards).
33. Construction of Farmers' Hostel (Phase-I).
34. Fixing desert coolers with connection and water arrangements etc. in examination hall and Dean's Office, College of Home Science.
35. Replacement of damaged wooden doors of poultry shed in poultry section, Department of Animal Breeding.
36. Providing and installing solar water heating system in Faculty House, Farmers' Hostel & Trainees' Hostel.
37. Improvement of reading and book storage facilities in Nehru Library (procurement of tables, chairs and racks, etc).
38. Construction of 2 seed stores for Horticulture Section, security hut with one room and steel gate at main entrance; and boundary wall, security hut & steel gate for buildings complex in RDS Seed Farm.
39. Providing toilet facility and drinking water taps at Gate No. 1 and 4.
40. Providing false ceiling and shifting of electrical cables/pipes in the corridor of Department of Animal Bio-technology.
41. Providing enclosure and exposed aggregate (grit wash) plaster on outer walls of building of Vety. Anatomy & Physiology Block.
42. Repair/renovation of 3 rooms, one lab. and corridor of Department of Vety. Physiology.
43. Special repair of roads(road from clinic to indoor section and houses) and providing street lights/ flood lights in TVCSC.
44. Providing L.T. electric panel and renovation of electrical installations in the Central Lab of College of Vety. Sciences.
45. Providing aluminium partition wall in room adjacent to the committee room of College of Vety. Sciences.

Annexure-IX**List of Works Completed/Taken over of Haryana Government**

1. Construction of State Pesticides Testing Lab. for the Department of Agriculture at Rohtak.
2. Renovation of semen bank/lab., 60 bull boxes, construction of main gate, loading/unloading platform and boundary wall on the premises of Sector-III for the Department of State Cattle Breeding Project (GLF), Hisar.
3. Providing IRC fabric grills in existing windows of first floor of HARSAC building at CCSHAU.
4. Repair and lining work of channel in Sector-III including Seed Farm at Govt. Livestock Farm, Hisar.
5. Construction of Polyclinic (Phase-I) and Development Works for the Department of Animal Husbandry & Dairying at Bhiwani.
6. Construction of Polyclinic (Phase-I) and Development Works for the Department of Animal Husbandry & Dairying at Sonipat.
7. Providing and fixing additional barbed wire fencing in seed farm (from Rana Distributory to boundary of RDS Farm), and around 9 Baras of Sector 1, 2, 3 and Seed farm for Haryana Livestock Development Board, Hisar.
8. Construction of sheds for Bara No. 5, 6, 7, 8, repair/renovation of calf pens No. 2, 3 and compound wall of various baras (Bara No. 5 to 10) on the premises of Sector-III of State Cattle Breeding Project for Haryana Livestock Development Board at Hisar.
9. Additional work for repair/renovation of semen bank lab. (2nd block), construction of boundary wall around 50 bull boxes & loading/unloading platform etc. on the premises of Sector-III of State Cattle Breeding Project for Haryana Livestock Development Board at Hisar.
10. Annual maintenance (white washing & painting etc.) of buildings of Horticulture Training Institute for Department of Horticulture at Uchani (Karnal).
11. Repair/renovation of wool grading hall of Wool Grading-cum-Marketing Centre for Department of Animal Husbandry & Dairying at Hisar.
12. Renovation/strengthening of existing roads on the premises of Sector-2 of SCPB (Haryana Livestock Development Board) at Hisar.
13. Replacement of flooring of hall of Quality Control Lab. (Fertilizer) for the Department Agriculture in Old KVK building Near Farm Gate.

14. Construction of Quality Control Lab. (Pesticide) (Phase-I) at first floor of existing building of Agriculture Training Centre for the Department of Agriculture at Panchkula.
15. Providing barbed wire fencing around farm land of Sector-II of State Cattle Breeding Project for Haryana Livestock Development Board at Hisar.
16. Construction of Soil Testing Lab. on the first floor of Agriculture Training for Department of Agriculture in the premises of Krishi Complex, Sector 21, Panchkula.
17. Construction of building on the first floor of Centre for Research and Application in Plant Tissue Culture for Haryana State Council for Sci. & Technology on the premises of CCSHAU.
18. Providing electric wiring for 6 Nos.air conditioners in KVK building for Quality Control Lab. (Fertilizer) for the Department of Agriculture, Balsamand Road at Hisar.