

Annual Report

2013-2014



Jawaharlal Nehru Krishi Vishwa Vidyalaya
Jabalpur 482004 (M.P.), India

ANNUAL REPORT

2013-2014



**Jawaharlal Nehru Krishi Vishwa Vidyalaya
Jabalpur 482004 (M.P.)**

Citation: Annual Report 2013-2014

Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur 482 004 (M.P.)

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Vice Chancellor

JNKVV, Jabalpur

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Prof. Vijay Singh Tomar
Vice Chancellor



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FOREWORD

It gives me an immense pleasure to present the Annual Report of the Jawaharlal Nehru Krishi Vishwa Vidyalaya for the year 2013-14 to the end users. This report highlights the activities related to education, research and extension carried out by the university staff. The University has developed credible technology in the field of agriculture and agricultural engineering. Farmers of the State are being benefited through its six constituent colleges, 12 research stations and 20 Krishi Vigyan Kendras. Teaching staff of the university is engaged in imparting quality education to students, research scientists are generating newer concepts and technologies and the extension staff is engaged in effective transfer of modern technologies to farmers.

I am proud of the fact that the University has made commendable progress in research with tireless efforts by its scientists. Several cost effective technologies have been developed by the scientists that brought Madhya Pradesh at the top at National level in agricultural growth.

I express my sincere gratitude to the Government of Madhya Pradesh, the ICAR and Government of India for their continued financial support. The contribution of the Members of the statutory bodies like the Board, the Academic Council and the Administrative Council in smooth functioning of the University has been praise worthy.

The contribution of all the Deans, Directors, Registrar and Comptroller of the University in providing relevant information for the Annual Report is acknowledged.

I place on record my appreciation to the Editorial Committee for putting information together and bringing the comprehensive Annual Report 2013-14 in the present shape.

(V.S. Tomar)



Dr. G.S. Rajput
Director Instruction



जिडॉ उडो-स्वषड्ड फडइफुयडख
षड्डो फॅ, ईडिडि, िथू ६४८२ ००४ (. .)

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PREFACE

It is a great pleasure that the Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur is publishing Annual Report for the year 2013-14. The University has experienced tremendous development and remodeling of various units under its control during the year. The progress and activities of the University during the year in the areas of teaching and manpower development, research and extension, are presented in the report. There has been drastic improvement in field and farm layouts and excellent planning and execution is reflected in improved yields. Similarly, the efforts in improving the teaching standards are reflected in large placement of students in various organizations. Research activities in fields like the crop and soil improvement, plant protection, promotion of medicinal plants, etc. are leading the University ahead of other organizations in the country.

Extension activities carried out by various KVK's are of immense utility to the farmers of the region and have helped in sustaining the crop yields. I wish that the conducted efforts in various fields will bring the university to the top of the ranking list of all SAU's. I thank the editors for their efforts for publishing the activities of the University

(G.S. Rajput)

INTRODUCTION

Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur was established in 1964, as the biggest multi-campus university, with an approach to narrow down the gap between the experts and farmers, through Joint Indo-American Team on Agricultural Research and Education in 1954-55 and 1959-60 on the patterns of Land Grant Colleges of USA. In subsequent years, the University had to part with its area of jurisdiction due to creation of sister universities- Indira Gandhi Krishi Vishwavidyalaya (IGKV) at Raipur in 1987, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior in 2008 and Nanaji Deshmukh Pashu Chikitsa Vigyan Vishwa Vidyalaya, Jabalpur in 2009.

The Central Administrative Office of the University is located about 7 km North of Jabalpur town on National Highway No. 7. At present, JNKVV encompasses five Colleges of Agriculture (Jabalpur, Rewa, Tikamgarh, Ganjbasoda and Waraseoni); one College of Agricultural Engineering (Jabalpur); four Zonal Agricultural Research Stations (ZARS) (Jabalpur, Powarkheda, Tikamgarh and Chhindwara); four Regional Agricultural Research Stations (Rewa, Sagar, Dindori and Waraseoni); four Agricultural Research Stations (ARS) (Naugaon, Garhakota, Sausar and Tendini) and twenty Krishi Vigyan Kendras (KVK) representing six agro-climatic zones spread over 25 districts.

JNKVV has produced competent human resource for managing the activities of agriculture and allied sectors, and the need based research and its rapid dissemination has led to several improved technologies, which have played important role for increased production and productivity of crops on sustainable basis, as reflected in 18.9% growth rate in total agricultural food grain production during the year 2011-12 and 16.4% during the year 2012-13 of the state of Madhya Pradesh.. The State ranks first in production of pulses, second in production of oilseeds and third in production of cereals at national level. The state's contribution to the national food basket is about 11.2% (2012-13). The State received "Krishi Karman Award" at national level for two consecutive years, i.e. for the years 2011-12 and 2012-13.

The area covered by the University is not only large but also diversified. Since its establishment the university has made laudable progress and has come to the expectations of the people of the state by greatly benefiting the farming community.

The Vishwa Vidyalaya has been established with the following mission and mandate:

Mission

To conduct education, research and extension activities for enhancing productivity,

profitability and sustainability of agricultural production systems and quality of rural livelihood in the state of Madhya Pradesh.

Mandate

To serve as a centre of higher education and research in the field of agriculture and allied sciences and to disseminate technology to farmers, extension personnel and organizations engaged in agricultural development through various extension programmes.

Major Events

- | | | | |
|------|---|------|--|
| 1963 | Establishment of University as per M.P. Legislative Assembly Act. No. 12 of 1963 and its notification in M.P. Gazette of 25th May. | | Hon'ble Chief Minister of Madhya Pradesh on 12th January |
| 1964 | Padma Bhusan (Late) Dr. J.S. Patel was appointed as first Vice Chancellor of the University in October. | 1971 | Fourth Convocation of the University chaired by the then Vice Chancellor, Dr. L.S. Negi and addressed by the then His Excellency Governor of M.P. Dr. Satya Narayan Sinha on 12th April |
| 1964 | Transfer of six Agriculture Colleges, two Veterinary Colleges and 19 Research Farms of Government of M.P. to Vishwa Vidyalaya | 1973 | Fifth Convocation of the University, held at College of Agriculture, Indore and chaired by the then Vice Chancellor, Dr. Chandrika Thakur and addressed by the then His Excellency Governor of M.P. and Chancellor Dr. Satya Narayan Singh on 15th April |
| 1966 | Establishment of Faculty of Agricultural Engineering | 1984 | Establishment of College of Veterinary Science and Animal Husbandry at Anjora District, Durg (now with IGKVV) |
| 1967 | First Convocation of the University, Chaired by Dr. J.S. Patel, the then Vice Chancellor, JNKVV and addressed by Dr. V.K.R.V. Rao, Central Minister for Education and Human Resources on 10th January | 1987 | College of Agriculture at Khandwa and Mandsaur were established (now with RVSKVV) |
| 1967 | Start of College of Agricultural Engineering, Jabalpur | 1988 | The then Hon'ble Central Minister of State for Agriculture, Shri Harikrishna Shastri visited the Vishwa Vidyalaya |
| 1969 | Second Convocation of the University, chaired by the then Vice Chancellor Dr. L.S. Negi and addressed by the then His Excellency Vice President of India, Dr. G.S. Pathak on 1st March | 1988 | The undergraduate degree programme in Forestry started in College of Agriculture, Jabalpur |
| 1970 | Third Convocation of the University, chaired by the then Vice Chancellor Dr. L.S. Negi and addressed by Shri Govind Narayan Singh the then | 1989 | Silver Jubilee of the establishment of the University was celebrated on 2nd October. The then Chief Minister of M.P., Shri Motilal Vora and Minister for Agriculture, Shri Shivbhanu Singh Solanki were the Guests of Honour |
| | | 1989 | Celebration of Nehru Centenary was held round the year |
| | | 1997 | The then Prime Minister of India, Shri I.K. Gujral, the then Central Minister for Agriculture, Shri Chaturanand Mishra, the then His Excellency Governor of M.P., Shri Mohammad Shafi Qureshi and the then Chief Minister of M.P. Shri Digvijay Singh visited the Vishwa Vidyalaya |
| | | 1999 | Golden Jubilee of College of Veterinary |

	Science & Animal Husbandry, Jabalpur was celebrated	2007	Establishment of College of Veterinary Science & A.H., Rewa
2000	Golden Jubilee of College of Agriculture, Gwalior was celebrated (now with RVSKVV)		Establishment of Dryland Horticulture Station at Garhakota
2001	Sixth Convocation of the University, chaired by the then His Excellency Governor of M.P. Dr. Bhai Mahavir and addressed by the then Secretary, DARE and Director General, ICAR, Padma Bhusan Dr. R.S. Paroda on 10th April	2008	Creation of Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya at Gwalior by transfer of some Research Stations, Colleges and KVKs of JNKVV
		2009	JNKVV hosted the AGRIUNISPORTS 2009, the mega event organized with splendid success
2002	Seventh Convocation of the University, presided by the then His Excellency Governor of M.P. and Chancellor of JNKVV, Dr. Bhai Mahavir, Dr. Sompal, Member, Planning Commission delivered the Convocation Address	2009	JNKVV organized ninth Convocation in October
		2009	Veterinary University created at Jabalpur and colleges of Veterinary Science & A.H. (Jabalpur & Rewa), under the jurisdiction of JNKVV, transferred to new university
2002	College of Agriculture, Mandsaur, converted into College of Horticulture (now with RVSKVV)		
		2010	Tenth Convocation held on 25th June. Prof. Gurdev Singh Khush, Adjunct Professor, University of California, USA was delivered the Convocation Address
2004	College of Agriculture, Tikamgarh inaugurated by Hon'ble Chief Minister of Madhya Pradesh		
2004	Centenary Celebration of Zonal Agricultural Research Station, Powarkheda was held. Dr. Mangala Rai, Secretary, DARE and Director General, ICAR, New Delhi was the Chief Guest	2012	Eleventh Convocation of the University held on May 5. Dr. S. Ayyappan, Secretary, DARE and Director General, ICAR awarded D.Sc. Degree (<i>Honoris Causa</i>)
2007	Establishment of College of Agriculture, Ganjbasoda	2012	Establishment of College of Agriculture at Waraseoni, Balaghat

Members of Statutory bodies

Members, Board of Management

Dr. V.S. Tomar
Vice Chancellor
JNKVV, Jabalpur

Chief Secretary
Govt. of M.P.
Deptt. of Farmer Welfare & Agriculture
Development
Govt. of MP, Bhopal

Secretary
Finance Department
Govt. of MP, Bhopal

Prof. Saket Kushwaha
Dept. of Agriculture Economics
Banaras Hindu V.V., Varanasi

Prof. Rishipal Singh
Flat No. L.G.-2, Block No. C-179
Ramprasth Colony, Gaziabad (U.P.)

Shri Mahipal Singh
M/198, E-7, Arera Colony
Bhopal (M.P.)

Shri Devdatt Sharma
Patankar Colony, Dholibua Pul, Lashkar
Gwalior (M.P.)

Smt. Asha Arun Yadav
House No. B-159, Jayant Pariyojna
Jila-Singrolly (M.P.)

Dr. Harpal Singh Sandhu
Dean, College of Veterinary Science
Guru Angad Dev Veterinary and A.H.
Vishwavidyalaya, Ludhiana (Panjab)

Shri Subhash Bhatia
R-65/A, Shakti Nagar, Gupteshwar
Jabalpur (M.P.)

Shri Prabhashankar Shukla
Associate Professor (Agril Engg.)
Govind Vallabh Pant Agriculture and
Proudyogiki V.V., Dist.: Rudrapur
Pantnagar (Uttanchal)

Shri Kedarnath Shukla
M.L.A.
Distt. Sidhi (M.P.)

Shri Girish Gautam
M.L.A.
Dist. Rewa (M.P.)

Shri Tarun Bhanot
M.L.A.
Pt. Banarasi Das Bhanot Ward, Gorakhpur
Jabalpur (M.P.)

Dr. Pitam Chandra
Director, Central Institute of Agricultural
Engineering
Bhopal (M.P.)

Shri Rajesh Paliwal
Registrar/Secretary
JNKVV, Jabalpur

Members, Academic Council

Dr. V.S. Tomar
Vice Chancellor
JNKVV, Jabalpur

Dr. S.K. Rao
Dean Faculty of Agriculture
JNKVV, Jabalpur

Dr. S.S. Tomar
Director of Research Services
JNKVV, Jabalpur

Dr. Gyanendra Singh
Ex-Vice Chancellor, R.K.D.F. University
Bhopal

Dr. A.S. Tiwari
Retd. Dean Faculty of Agriculture (JNKVV)
Gwalior

Dr. P.K. Mishra
Director Extension Services
JNKVV, Jabalpur

Dr. T.K. Bhattacharya
Dean, Faculty of Agricultural Engineering
JNKVV, Jabalpur

Dr. N.K. Raghuwanshi

Professor & Head (Agril. Economics & F.M.)
JNKVV, Jabalpur

Dr. K.L. Mishra

Associate Professor (SWE)
Deptt. of SWE, JNKVV, Jabalpur

Shri Rajesh Paliwal

Registrar
JNKVV, Jabalpur

Members, Administrative Council

Dr. V.S. Tomar

Vice Chancellor
JNKVV, Jabalpur

Dr. S.K. Rao

Dean Faculty of Agriculture
JNKVV, Jabalpur

Dr. S.S. Tomar

Director Research Services
JNKVV, Jabalpur

Dr. P.K. Mishra

Director Extension Services
JNKVV, Jabalpur

Dr. O.P. Veda

Director Instruction
JNKVV, Jabalpur

Dr. D.K. Mishra

Director Farms & Professor & Head
(Pl. Breeding)
JNKVV, Jabalpur

Dr. P.K. Bisen

Dean Student Welfare
JNKVV, Jabalpur

Dr. G.S. Rajput

Dean Faculty of Agricultural Engineering
JNKVV, Jabalpur

Dr. R.V. Singh

Dean, College of Agriculture
JNKVV, Jabalpur

Dr. (Smt.) Om Gupta

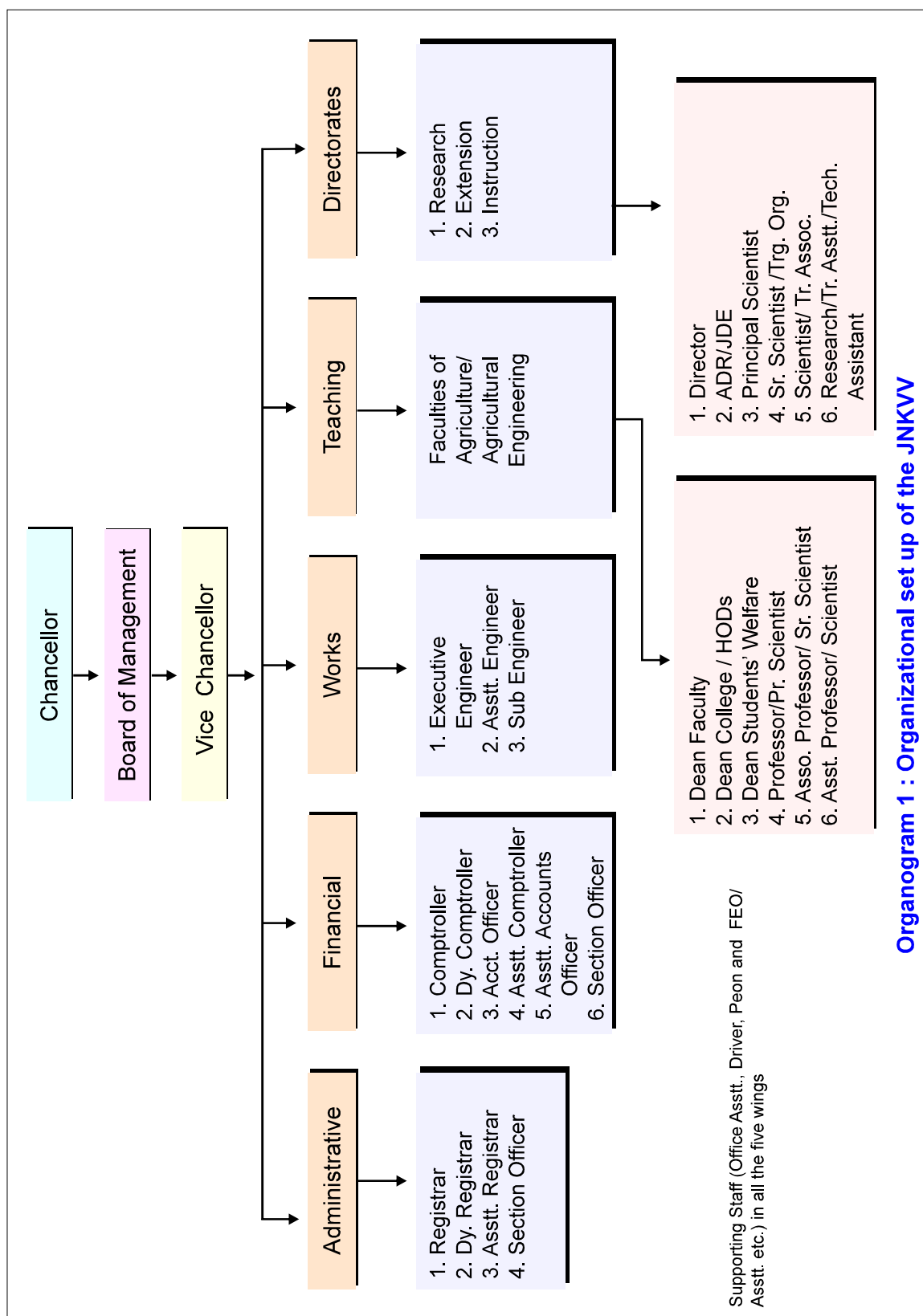
Professor (Plant Pathology)
College of Agriculture, JNKVV, Jabalpur

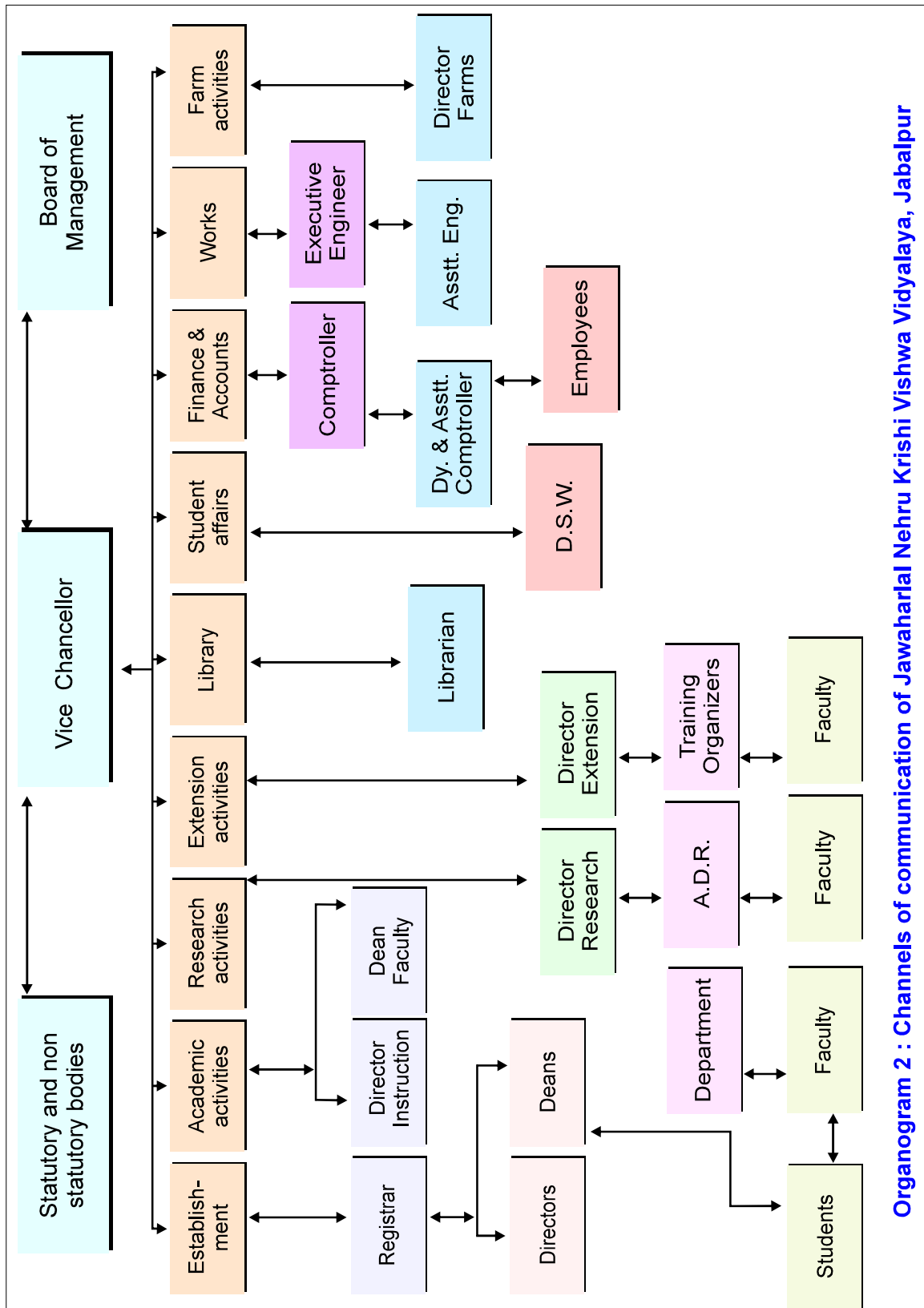
Dr. Deva Kant

Professor (SWE), College of Agril. Engg.
JNKVV, Jabalpur

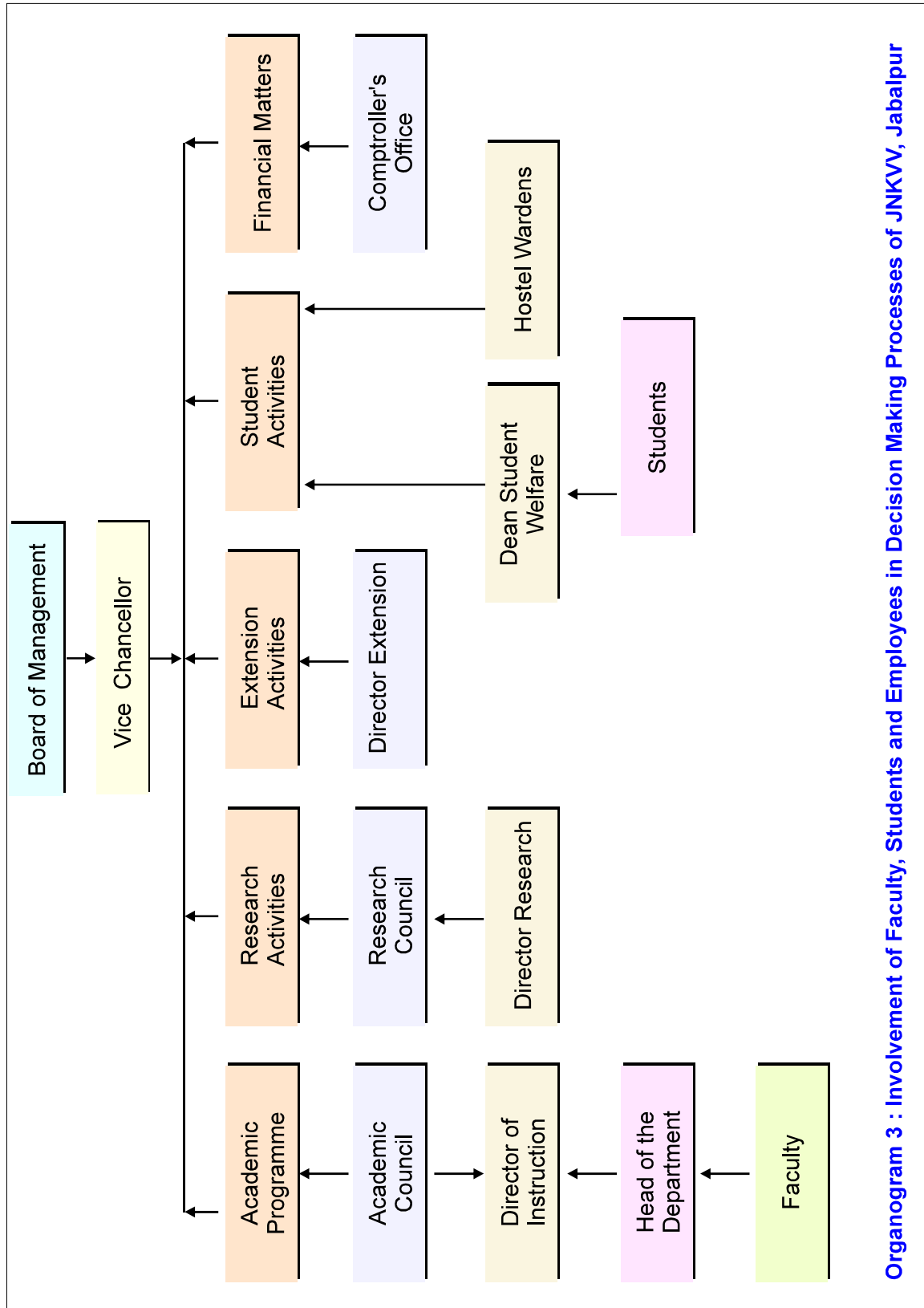
Shri Rajesh Paliwal

Registrar
JNKVV, Jabalpur

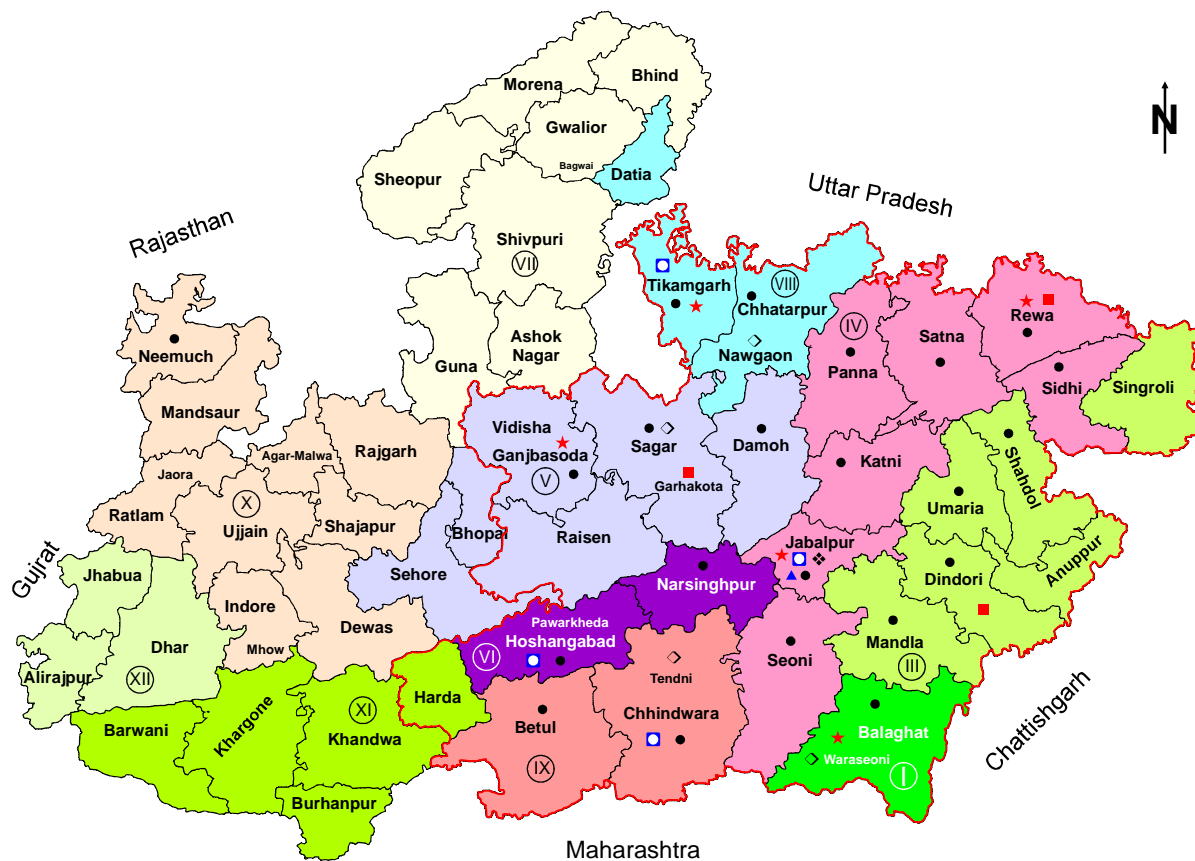




Organogram 2 : Channels of communication of Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur



Organogram 3 : Involvement of Faculty, Students and Employees in Decision Making Processes of JNKVV, Jabalpur



(Districts under JNKVV jurisdiction - encircled by red colour boundary)

AGROCLIMATIC ZONE	
I. CHHATTISGARH PLAINS	
III. NORTHERN HILLS ZONE OF CHHATTISGARH	
IV. KYMORE PLATEAU AND SATPURA HILLS	
V. VINDHYA PLATEAU	
VI. CENTRAL NARMADA VALLEY	
VII. GIRD ZONE	
IX. SATPURA PLATEAU	
X. MALWA PLATEAU	
XI. NIMAR VALLEY	
XII. JHABUA HILLS	

College Research Stations & KVKs	
◆ MAIN CAMPUS	
★ AGRICULTURE COLLEGE	
■ HORTICULTURE COLLEGE	
▲ AGRIL. ENGINEERING COLLEGE	
□ ZONAL AGRIL. RES. STATION	
■ REGIONAL AGRIL. RES. STATION	
◇ AGRIL. RES. STATION	
● KRISHI VIGYAN KENDRA	

Agroclimate Zones of Madhya Pradesh Colleges, Research Station and KVK's of JNKVV

EDUCATION

Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Jabalpur named after Pt. Jawaharlal Nehru, the architect of modern India, came into existence on October 2, 1964. JNKVV is the State Agriculture University in Madhya Pradesh managing research, extension and education in agricultural and allied sciences.

J.N. Krishi Vishwa Vidyalaya was inaugurated by Late Smt. Indira Gandhi, the then Minister of Broadcasting, Govt. of India, in 1964, with an integrated mandate of teaching, research and extension. Though the Vishwa Vidyalaya was formally inaugurated on 2nd October 1964, most of its constituent colleges and research stations are quite old.

2. Academic programmes

Jawaharlal Nehru Krishi Vishwa Vidyalaya has been the seat of Agro-Technology and Human Resource Development in Central India. Its prime mission is to impart education in agriculture and its allied sciences so as to provide human resource for meeting the future challenges. The university has two Faculties viz. Agriculture (five constituent colleges at Jabalpur, Rewa, Tikamgarh, Ganj Basoda and Balaghat) and Agricultural Engineering (Jabalpur) with 13 and 5 departments, respectively.

2.1. Academic institutions and programmes at a glance

The university offers three Bachelor's Degree programmes viz. B.Sc. (Ag.), B.Sc. (Forestry) and B.Tech (Ag. Engineering). The Masters' Degree programmes are available in thirteen departments under Agriculture Faculty and in three departments in the Faculty of Agricultural Engineering. The programme on Master of Agri-Business Management is also available under Agriculture Faculty. Doctoral degree programmes are available in ten departments of Agriculture Faculty and in three departments of Agricultural Engineering Faculty.

In addition the university has also started diploma courses in Horticulture on (1) Seed Production & (2) Nursery Management, at Horticulture Vocational Education Institute, Rangua, Garhakota, District Sagar, from the academic session 2008-09. The Diploma courses are of two years duration (4 semesters) with a capacity of 40 students in each course.

The University has two Faculties viz. Agriculture and Agricultural Engineering. The degrees granted include B.Sc. (Ag.), B.Sc. (Forestry), B. Tech. (Ag. Engg.), M.Sc. (Ag.), M.Sc. (Forestry), M. Tech. (Ag. Engg.) and Ph.D. in two Faculties. Various degree programmes offered at different colleges.

Table 2.1: Location and year of establishment of colleges of JNKVV

Name of college and location	Year of establishment
Faculty of Agriculture	
College of Agriculture, Jabalpur	1955
College of Agriculture, Rewa	1955
College of Agriculture, Tikamgarh	2004
College of Agriculture, Ganjbasoda	2007
College of Agriculture, Waraseoni	2012
Faculty of Agricultural Engineering	
College of Agricultural Engineering, Jabalpur	1966

Table 2.1.1: Details of the colleges

Degree programmes offered	
College of Agriculture, Jabalpur	
i) B.Sc. (Ag)	
ii) B.Sc. (Forestry)	
iii) M. Sc (Ag)	
1. Agronomy	8. Fruit Science
2. Extension Education	9. Vegetable Science
3. Entomology	10. Plant Physiology
4. Agriculture Economics and F.M.	11. Agricultural Statistics
5. Genetics & Plant Breeding	12. Molecular Biology & Biotechnology
6. Plant Pathology	13. Food Technology
7. Soil Science & Agril. Chemistry	
M.Sc. (Forestry)	
1. Agroforestry	
2. Plantation Technology	
M.B.A. (Agri-Business Management)	
iv) Ph.D (Ag)	
1. Agronomy	6. Agriculture Economics and F.M.
2. Entomology	7. Extension Education
3. Genetics & Plant Breeding	8. Fruit Science
4. Soil Science & Agril. Chemistry	9. Vegetable Science
5. Plant Pathology	10. Molecular Biology & Biotechnology
v) Ph.D. (Forestry)	
1. Agroforestry	

College of Agriculture, Rewa

i) B.Sc. (Ag)

ii) M.Sc. (Ag)

- | | |
|-----------------------------------|------------------------------|
| 1. Agronomy | 5. Genetics & Plant breeding |
| 2. Extension Education | 6. Plant Pathology |
| 3. Entomology | 7. Fruit Science |
| 4. Agriculture Economics and F.M. | 8. Vegetable Science |
-

iii) Ph. D

1. Genetics & Plant Breeding
-

College of Agriculture, Tikamgarh

i) B.Sc. (Ag)

ii) M. Sc (Ag)

1. Agronomy
2. Extension Education
3. Entomology
4. Vegetable Science
5. Plant Pathology
6. Agricultural Economics & F.M.
-

College of Agriculture, Ganjbasoda

i) B.Sc. (Ag)

College of Agriculture, Waraseoni (Balaghat)

i) B.Sc. (Ag)

College of Agricultural Engineering, Jabalpur

i) B. Tech.

ii) M.Tech.

1. Farm Machinery and Power Engineering
2. Soil and Water Engineering
3. Post Harvest Process and Food Engineering
-

iii) Ph.D.

1. Farm Machinery and Power Engineering
2. Soil and Water Engineering
3. Post Harvest Process and Food Engineering
-

2.2 Admission

2.2.1 U.G. Programme

Admission to UG degree programmes is through entrance test conducted by Professional Examination Board, Bhopal. The

availability of seats under different UG/ PG / Ph.D. programmes is mentioned in Table 2.2.1.1. Fifty per cent of seats are reserved for various reserve categories of candidates, in accordance with the rules laid down by the Government for permanent residents of M.P. State.

Table 2.2.1.1 Availability of seats in different programmes at JNKVV under the Faculty of Agriculture and Agricultural Engineering

Programmes	Intake capacity				
	Free	ICAR	Payment	NRI	Total
B.Sc.(Ag)	240	48	12	36	336
B.Sc. (Forestry)	20	4	1	3	28
B.Tech.	60	12	3	9	84
Total	320	64	16	48	448
M.Sc. (Ag)/Forestry	153	140	-	38	331
M.Tech	18	18	2	3	41
M.B.A (Agri-Business)	15	15	-	-	30
Total	186	173	2	41	402
Ph. D. Agriculture	32	24	-	7	63
Ph. D. Engineering	12	12	1	2	27
Total	44	36	1	9	90
Grand Total	550	273	19	98	940

2.2.2 Postgraduate degree programmes

The Director Instruction co-ordinates the entire postgraduate programmes of the university. The Director recommends the constitution of an Advisory Committee of each post graduate student admitted in the university based on the proposal of the respective Head of the Department. The Director scrutinizes the plan of work of each postgraduate student in his programme of study including thesis-research undertaken by the student for the degree programme. The Director of Instruction also recommends the appointment of external examiner, for evaluating the thesis of every postgraduate student. The Registrar issues the notification regarding the declaration of results and the award of the Degree. The Advisory Committee is constituted for each student, drawn from different faculties depending on the research topic. Inter campus movement is also allowed to the students for the conduct of their research

for utilizing the expertise and infrastructure facilities available. Inter disciplinary approach is adopted in post graduate programmes and the students register courses of other disciplines also. Six new non-credit courses have also been introduced from 2009-10, as proposed by ICAR.

2.2.2.1 Thesis evaluation

Every student admitted to the PG programme in the university, is required to submit a thesis towards partial fulfillment of the PG programme. The thesis of the student should be of such a nature as to indicate the student's potentiality for conducting research. The thesis is on a topic falling within the field of major subject and contains the result of the students' own work. A certificate to this effect duly endorsed by the Professor and Head and the major advisor accompanies the thesis at the time of submission for evaluation by the external examiner.

2.2.2.2 Inter institutional collaboration of the PG programme

The University has established close linkages with other national and international research institutes in conducting collaborative research programmes at Post Graduate level. In these programmes, Post Graduate students complete their course work at JNKVV and carry out their research work at other institutes. Institutes at which students have conducted their research include International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi; International Crop Research Institute for Semi

Arid Tropics (ICRISAT), Patancheru, Hyderabad (Andhra Pradesh), Directorate of Weed Science Research (DWSR) Jabalpur, Bhabha

Atomic Research Centre (BARC), Central Institute for Cotton Research (CICR), Nagpur (Maharashtra) and Goat and Sheep Research Institute, etc. The university has signed MoUs with various research organizations and private institutes e.g. Jain Irrigations Pvt. Ltd., etc. to conduct collaborative research in various fields of agriculture and agricultural engineering.

2.3 Experiential learning programmes at a glance



2.4 Rural Agricultural Work Experience (RAWE) & Forestry Work Experience (FWE)

JNKVV Jabalpur has introduced Rural Agricultural Work Experience (RAWE) programme during the year 2013-14 as an essential requirement for B.Sc. (Ag). The Dean's Site selection Committee visited the villages under ZARS and KVKs on schedule time to ensure the availability of the basic living facilities like food, water etc. in the village or nearby area. Orientation programme of one week was arranged for all the registered

students. The concerned course teachers provided orientation to the students for specified day in their respective subject as per the guidelines given in the manual.

The programme was implemented in all the College of Agriculture viz Jabalpur, Rewa, Tikamgarh, Ganjbasoda, and Department of Forestry, Jabalpur. During the year, a total 256 final year students of B.Sc. (Ag.) & Forestry have been placed in various Krishi Vigyan Kendras and Zonal Agricultural Research Stations of the Vishwa Vidyalyaya.

The details of the placement of students are as follows:

Table 2.4.1 Placement of Students in RAWE programme

S.No.	Name of the College	Total Number	Placement Centre
1.	College of Agriculture, Jabalpur	86	ZARS, Chhindwara 09 Girls KVK, Betul 12 Girls KVK, Seoni 13 Girls KVK, Dindori 17 Boys KVK, Mandla 16 Boys KVK, Narsingpur 19 Boys
2.	College of Agriculture, Rewa	69	KVK, Panna 17 Boys KVK, Sidhi 20 Girls KVK, Shahdol 16 Boys KVK, Umeriya 16 Boys
3.	College of Agriculture, Tikamgarh	44	KVK, Navgaon 10 Girls KVK, Sagar 34 Boys
4.	College of Agriculture, Ganj Basoda	34	KVK, Powarkheda 31 Boys KVK, Harda 03 Boys KVK, Chhatarpur 03 Girls
5.	Department of Forestry, Jabalpur	23	KVK, Seoni 12 Boys 11 Girls
Total		256	



Field activities



Use of Insecticides



Layout of nursery



Manure application



Ridge furrow planting



Paddy transplanting

2.5 Upgradation of teaching facilities

Under the one time catch up grant received from ICAR, works on renovation/modernization of class rooms, laboratories, hostels, departments, library and other teaching facilities have been carried out at all the campus.

2.6 Human Resource Development

Human Resource Development is one of

the most important functions of the university. Since its establishment, the University has produced 15988 Graduates, 5947 Masters' and 338 Ph.D. Degree holders (till 2014 academic session) who are rendering their valuable services in the field of agriculture and allied sectors in the country and abroad. In addition, the university has awarded one year diploma to 56 women who were appointed as Rural Extension Officers by the Government of Madhya Pradesh under a programme funded

by the Danish International Development Agency (DANIDA) aimed at providing knowledge and skills of improved agricultural technology to the farm women. The quality education is the top most priority with main thrust on improving the infrastructure and teaching capabilities of the faculty. All the constituent colleges are equipped with adequate facilities to carry out teaching and research activities. However there is need to upgrade the teaching and research facilities at College of Agriculture, Tikamgarh and College of Agriculture, Ganj Basoda.

2. Centre of Advanced Faculty Training

Indian Council of Agricultural Research, New Delhi has recognized the Department of Soil Science & Agricultural Chemistry, College of Agriculture, Jabalpur as Centre of Advanced Faculty Training, erstwhile Centre of Advanced Studies (CAS) in Soil Science & Agricultural Chemistry is functioning since 1995. The centre is engaged in organizing training programmes, in which scientists / teachers from different States participate and update their knowledge and skill. In all, these training programme besides JNKVV trainers, eminent scientists, resource persons from other universities and subject matter specialists from various fields of specialization are invited to deliver lectures.

2.8 Books and book chapters

- | Gupta Om, Bhale U, Mishra M and Tiwari SP 2014 contributed chapter entitled integrated management of pea powdery mildew diseases in approaches and trends in plant disease management. pp 333-343. Scientific Publishers (India). Jodhpur. Eds. S.K. Gupta & Dr. Monica Sharma.
- | Khare MN and Tiwari SP 2014 contributed chapter on Utility of microorganisms antagonistic to plant pathogens in crop disease control in plant disease management and Microbes. pp.44-55. Ed. Nehra, S. Published by Avishkar Publishers, Distributors, Jaipur.
- | Mallikarjuna N, Krishnamurthy L and Gowda CLL 2014 chapter contributed on climate change and heat stress tolerance in chickpea in climate change and plant abiotic stress Tolerance. Vol 2. pp 839-855. Eds Tuteja N and Gill SS. Wiley-VCH Verlag GmbH and Co. KGaA, Weinheim, Germany. ISBN 978-3-527-33491-9.
- | Nair R and Barche S 2014 - A monograph on Nursery management of fruits and vegetable. Lambert Academic Publishing Germany. ISBN-978-3-8484-9889-5.
- | Pradeep D 2013. Metadata Standards: Knowledge organization in academic libraries (KOAL-2013) at the National Conference 27 April 2013. Viva Books Pvt. Ltd., New Delhi. pp. 311-316. ISBN 978-81-309242-8-1.
- | Rao DLN, Natrajan T, Illamurgu K, Raut RS and Rawat AK 2014. Rhizobium inoculation of Leguminous Oilseeds-Results of on-farm and Farmers' Field Demonstrations in the ICAR coordinated project on BNF. In Symbiotic Nitrogen Fixation: Prospects for Enhanced Application in Tropical Agriculture (Ed. Rachid Serraj). pp. 301. Jointly Published by Oxford and IBH (New Delhi) and Science Publishers (NY, USA).
- | Rao SK., Kar D, Nahatkar SB, Upadhyaya SD and Mitra NG 2014. contributed chapter on technology transfer and commercialization an overview in the book from Michigan State University Press, Michigan, USA.
- | Shukla UN, Parihar GN, Singh S, Kumar R and Kumawat N 2014 contributed food security in India: Its challenges and solution in Sustainable rural development through agriculture. pp 3-28. Biotech Books, New Delhi, INDIA. ISBN: 978-81-7622-327-0.
- | Singh AK, Singh J, Tripathi A, and Shrivastava MK 2014 Organic Agriculture: An Environment friendly Ecological production system. pp.35
- | Singh S, Singh AK, Singh LB, Sharma A, Srivastava D, Baghel SS and Jerman M 2014 contributed chapter on factor's for

- improving rice quality in sustainable rural development through agriculture. pp 159-167. Biotech Books, New Delhi, INDIA. ISBN: 978-81-7622-327.
- | Singh S, Singh LB, Srivastava D and Baghel SS 2014. contributed chapter to conserve resource base in rice through system of rice intensification, in sustainable rural development through agriculture. pp168 -180. Biotech Books, New Delhi, INDIA. ISBN:978-81-7622-327.
 - | Tiwari RK, Tripathi SK, Khan IM, Tiwari RN and Rao SK 2013. Contributed chapter on Water management for sustainable rice production in recent advance in environmental management and biotechnology. Govt. New Science College, APSU, Rewa (MP) India. ISBN-978-81-928063-2-7, 32-37.
 - | Tiwari S and Kumar S. 2013. Contributed on neglected oil crop biotechnology in biotechnology of neglected and underutilized crops. pp 117-171. Eds. Jain S.M. and Dutta Gupta S. ISBN: 978-94-007-5499-7 (Print), 978-94-007-5500-0 (On-line).
 - | Tomar DS, Kaushik SK, Dixit AK and Saxena A 2014. given contribution on low cost technology for in-situ moisture conservation in soybean based cropping system in Malwa Plateau of Madhya Pradesh in Conservation Agriculture: The New Paradigm. pp 239-249. Eds. Shobhana Gupta and Neeraj Hada. Biotech Books.
 - | Tripathi AN, Agarwal PC, Hazarika BN, Tripathi SK, Tripathi RK, Gotyal BS and Ramesh V Babu 2013. The biology, epidemiology and management of rice tungro disease. In: innovative approaches in plant disease management. pp. 306-323. Lambert Academic Publishing House.
 - | Tripathi AN, Sharma P, Agrawal PC, Dev U, Hajarika BN, Tripathi SK, Singh S, Khetrpal RK and Satpathy S 2013 Aflatoxins- threat for agricultural trade and food security in Biotechnological approaches in crop protection. pp 490-499 . Biotech books, New Delhi.
 - | Tripathi SK, Nema S, Tiwari RK and Rao SK 2013. given chapter on fungicide resistance and their management in biotechnological approaches in crop protection. pp263-297. Biotech books, New Delhi.
 - | Tripathi SK, Nema S and Tripathi AN 2013. Current Status of Sesame and Their disease Management in biotechnological approaches in crop protection. pp 573-595 .Biotech books New Delhi.
 - | Upadhyaya SD and Sharma A 2014. Agroforestry: An Alternate Land use for Wasteland Utilization in Central India in Agroforestry: Systems and prospects. pp 449-476. Eds C.B. Pandey and O.P. Chaturvedi. New India Publishing Agency.
 - | Vibha 2014 Scenario of betelvine production and protection in Madhya Pradesh. In Compendium: Kaipa HB, Suriyanarayan MA and Basant Kumar (eds.), National Meet on Betelvine-Farmers, Traders and Researchers Interface held on 22-23 February, 2014 at IIHR, Benbaluru. pp.132-136.
 - | Yadav VK, Khare C P, Shrivastava JN and Sushma N 2013. Sheath rot of Rice: Current status and their management in recent trends in plant diseases management in India. pp.175-193. Ed. Shahid Ahmad. Kalyan Publishers.
 - | Yogranjan, Satpute GK, Marabi RS and Mishra SP 2014. Sesame: Identifying an orphan crop in international arena through a sustainable compromise between quality and productivity in major constrains and verdict of crop productivity. Eds. U.N. Bhale. Daya Publishing House, New Delhi.

2.9 Audio-visual aids for smart classrooms

Different colleges of the university have been equipped with modern audio-visual aids and possess smart e-classrooms.

2.10 Video conferencing system: distance learning

Video conferencing units have been installed at JNKVV headquarters and at other colleges and are used in various lectures for simultaneous delivery at other colleges.

2.11 Efforts made in the personality development of students' including those belonging to weaker sections

- | Book bank facility is provided to all the students including students belonging to weaker sections.
- | A tutorial cell is established by the Dean Students Welfare office for the students of SC/ST and weaker sections. Main objective behind establishment of cell is to provide proper guidance and prepare students for graduation and post graduation level courses in Agriculture. Large number of books and study material related to competitive examinations are available in this cell which includes books published from ICAR, question banks related to various national level competitive examinations, question papers of previous years along with large number of collection of books of CD's containing matter on agriculture science.
- | English and general knowledge coaching started at all the colleges of agriculture for personality development of students belonging to weaker sections and reserve categories for carrier building preparation of competitive examinations and to develop entrepreneurship.
- | Debate/script writing competitions are organized at all the colleges of agriculture for promoting the students for the skill development.

2.12 Examination cell / education technology cell / placement cell and allied facilities

- | Examination cell & education technology cell have been updated with modern amenities, safe drinking water facility with

water coolers, photocopier, computers and modern furniture etc.

- | Facility of LCD projector is made in all the class rooms and the conference halls of all the colleges and biotechnology center.
- | To improve education facilities, flip charts, exhibition panels, display boards, ceramic green chalk boards, data sign boards, lecture stand, magazine displayer, glass wares, chemicals & tools were purchased under development grant in various colleges.
- | Examination evaluation cell and academic cell have been established in all the colleges.
- | Use of multimedia viz LCD for PG teaching and conducting PG seminar of M.Sc. students at all the colleges.
- | The Placement cell counsels students on the availability of scholarships and avenues for higher studies.
- | Books for general knowledge and competitive examinations are purchased for SC/ST and weaker section students.
- | Placement cell and counseling cell have been established and students are benefited through placements in various organizations viz. Bank of India, Union Bank of India, Private organization and Semi Govt. organizations.

2.13 Efforts made in capacity building and faculty development of teachers / technical/ para- professional and administrative staff

2.13.1 Training programmes attended

- | Dr. Arvind Kumar Saxena attended eight day orientation course on human values and professional ethics at IIT, Kanpur.
- | Dr. B.K. Dixit attended training on bestowing food security and soil health through crop diversification during 8-28 January 2014 at Department of Agronomy, G.B.P.U.A. & T, Pantnagar (Uttarakhand).
- | Dr. D.S. Tomar, attended training on technology information forecasting & assessment council (TIFAC), New-Delhi on 23 August 2013 at Tikamgarh under

Integrated hydrology, climate change and IWRM with livelihood. Technology information forecasting & assessment council (TIFAC), New Delhi.

- | Dr. D.S. Tomar attended training on human value and professional ethics during 2-3 September, 2013. JNKVV, Jabalpur.
- | Dr. D.S. Tomar attended training on human value and professional ethics at 20 June, 2013, Bhopal.
- | Dr. D.S. Tomar training on human value and professional ethics during 3-10 June, 2013 at IIT, Kanpur.
- | Dr. M.K. Nayak attended training on technology information forecasting & assessment council (TIFAC), New-Delhi on 23 August 2013 at Tikamgarh under Integrated Hydrology, Climate Change and IWRM with Livelihood Technology Information, Forecasting and Assessment Council (TIFAC), New Delhi.
- | Dr. M.K. Nayak attended training on human value & professional ethics during 3-10 June, 2013 at IIT, Kanpur.
- | Dr. M.K. Nayak attended training on human value & professional ethics at 20 June, 2013, Bhopal.
- | Dr. M.K. Nayak attended training on human value & professional ethics during 2-3 September, 2013. JNKVV, Jabalpur.
- | Dr. P.K. Jaga attended five days trainings for trainer program on gender equity from 11-15, March, 2013 RGNIYD, Shriperumbudur, Tamilnadu with the help of Vikram University, Ujjain and NSS Regional Office, Bhopal.
- | Dr. T.K. Singh attended winter training High tech horticultural fruits and flower poly House condition from 10-30 December 2013 at GBPUA&T, Uttarakhand.
- | Dr. V.K. Singh attended training at GB Pant University Pantnagar on hi-tech technologies for enhancing productivity, nutritional quality and value- addition in fruits and flower production during 10-30, December 2013.

2.13.2 Meetings, seminars and conferences attended

- | Dr. B.M. Maurya participated in group meeting cum workshop held at ICAR Research complex Umian (Meghalaya) during 2-4 December 2013.
- | Dr. A.K. Dwivedi attended the workshop on AICRP on long term fertilizer experiment (LTFE) held at CSKHPKV, Palampur (HP) during 2-4 June, 2014.
- | Dr. A.K. Jain and Dr. R.P. Joshi participated in annual workshop of small millets was organized at JNKVV, Jabalpur during 3-5 May, 2013.
- | Dr. A.K. Rawat attended QRT meeting for AINP on SBB project from 20- 22 Sep. 2012 at MPUA & T, Udaipur (Raj.).
- | Dr. B. Sachidanand, Dr. S.S. Baghel and Dr. A.K. Upadhyay attended QRT meeting for AICRP on STCR project from 20-22 Sep. 2012 at MPUA & T, Udaipur.
- | Dr. B.S. Dwivedi, Dr. G.D. Sharma and Dr. R.K. Thakur participated in SoyCon held at Indore during February, 2014
- | Dr. H.K. Rai participated in 5 days training programme organized by ICAR, New Delhi for CAFT Directors on systematic approach to training" from 25 February to 1 March, 2014 held at Tamil Nadu Veterinary & Animal Science University, Chennai (T.N.).
- | Dr. Kumar, Prashant, Rai, N Singh, R.K Singh, T.K, and Singh DK attended conference on 16th IAFC on nanobiotechnology approaches for sustainable agriculture and rural development from 22-23 February 2014. Bioved research institute of agriculture & technology Allahabad, U.P Integral University, Lucknow, U.P.
- | Dr. N.G. Mitra attended a meeting on BPD project held at Bhopal on May 9, 2014.
- | Dr. N.K. Khamparia and Dr. S.D. Sawarkar attended QRT meeting for AICRP on LTFE project from 20-22 Sep. 2012 at MPUA & T, Udaipur (Raj.)

- | Dr. P.S. Kulhare and Dr. H.K. Rai attended QRT meeting for AICRP on MN project from 20-22 Sep. 2012 at MPUA & T, Udaipur (Raj.)
- | Dr. P.S. Kulhare and Dr. G.S. Tagore attended the workshop meeting of AICRP on micronutrient and pollutant element held at PKVV, Akola during March 6-8, 2014.
- | Dr. S.K. Tripathi, Dr. I.M. Khan, Dr. P. Perraju, Dr. R.K. Tiwari and Dr. M.R. Dhingra attended 48th rice group meeting cum workshop at SKUAST, Kashmir during 13-16 April 2013.
- | Dr. T.K. Singh, J. Singh and D.B. Singh attended National conference on Biotechnology, biodiversity & environment management research, from 19-20 April, 2013 at APS University, Rewa
- | Dr. S. Barche attended conference on 16th IAFC on nanobiotechnology approaches for sustainable agriculture and rural development from 22-23 February 2014. Bioved research institute of agriculture & technology Allahabad, U.P Integral University, Lucknow.
- | Dr. S. Barche attended conference on changing scenario of Agriculture in M.P. prospects and challenges during September 1-2, 2013, Bhopal.
- | Dr. (Smt.) S. Rao, Department of Plant Physiology, JNKVV, Jabalpur attended workshop on review and planning meeting of the project on selection utilization of water logging tolerant cultivars of pigeonpea during 23-25 September, 2013 at Ludhiana.
- | Dr. A. Shukla attended ISTS-IUFRO conference on sustainable resource management for climate change mitigation and social security, 13-15 March, 2014.
- | Dr. A. Shukla attended National Science Day Programme on Fostering Scientific Temper on 28 February, 2014 at Govt. Science College, Jabalpur.
- | Dr. A. Shukla attended National Seminar on Changing Scenario of the Education System in Govt. H.S. College, Jabalpur.
- | Dr. A. Shukla attended National seminar on Promotion of Agriculture through Hindi Language during 6-7 June, 2013 at A.B. Bajpai Hindi Vishwa Vidyalaya, Bhopal.
- | Dr. S.B. Das attended workshop on all India Coordinated small millet improvement during 4-5 May, 2013 at J.N. Krishi Vishwa Vidyalaya, Jabalpur.
- | Dr. S.B. Das attended workshop on innovations in agriculture for marketing and business development 2013 during 24 September at J.N. Krishi Vishwa Vidyalaya, Jabalpur.
- | Dr. S.B. Das attended Workshop on real time surveillance of Pigeonpea pests in the thematic area of Pest and disease dynamics in relation to climate change during 30 July, 2013 at NCIPM, New Delhi.
- | Dr. S.D. Upadhyaya and Dr. A.B. Tiwari participated in National seminar on non-timber forest produce, medicinal, aromatic plants and spices innovation for livelihood security during 21-25 December, 2013 at IGKV, Raipur.
- | Sri R.S. Marabi attended Soycon-2014: international soybean research conference on mitigating productivity constraints in soybean for sustainable agriculture, 22-24 February, 2014 at society for soybean research and development at Indore.

2.13.3 Papers presented in Conferences/ Seminars

- | Badkul AJ, Jain N and Chourasia SK. 2013 presented paper on efficacy of herbicides on yield and economics of sesame in biennial conference on emerging challenges in weed management held on Feb. 15-17, by Indian society of weed science and Directorate of weed science research Jabalpur.
- | Bhowmick, AK, Yadav VK, Shrivastava SK, Varma RK, Wada T, Kato M, Tazawa J, Ochi S, Tsuji K. and S Kobayashi 2014. participated on Observation materials and diagnostic book on soybean pests and diseases for farmers of Madhya Pradesh, India in International soybean research conference 22-24 February, 2014 on

- "Mitigating Productivity Constraints in Soybean for Sustainable Agriculture".
- | Choudhary AK, Garg SK, and Bawankar MK 2013. Presented paper on comparative studies of single and double stage hammer grinding on quality attributes of ground turmeric power presented in 48th annual convention of Indian Society of Agricultural Engineers (ISAE) and symposium on engineering interventions in conservation agriculture held on February 21-23, College of Technology and Engineering, Maharana Pratap University of Agriculture & Technology, Udaipur (Raj.)
 - | Dixit AK, Saxena A, Singh SK and Bhargava KS 2014. Presented paper on studies on doses of sulphur sources and modes of application on response of soybean (*Glycine max. L.*) in ustochrept of semi-arid tropic of Madhya Pradesh. International Soybean research conference, DSR.(ICAR): 22-24 February 2014. 187. (22).
 - | Dixit P 2013. Attended a National Conference (Library Professional Association) on 27 April 2013 at New Delhi.
 - | Dixit P 2013. Attended National Workshop on Leadership Development and Team Work for Excellence Performance at CRISP Bhopal, 23-27 September 2013.
 - | Dixit P 2014. Attended National Conference on Agricultural Information Management in Digital Era at IGKV Raipur, 4-5 February 2014.
 - | Dwivedi M 2014. Participated and paper published in conference proceedings of National Conference of agricultural librarians and user community NCALVC 2014 organised by IGKV Agricultural Education and Research foundation India Gandhi Krishi Vishwavidyala and Association of Agricultural Librarians and documentalists of India on Feb 4-5, 2014.
 - | Garg V K, Patel Y and Nayak MP 2014. Participated on response of kharif legumes to Soybean Girdle beetle, *Obereopsis brevis* (Swed.) in International soybean research conference on "mitigating productivity constraints in soybean for sustainable agriculture". 22-24 February 2014, DSR, Indore (MP).
 - | Jain AK, Joshi RP and Singh G 2013 paper presented on status and management of kodo millet diseases in Madhya Pradesh in National seminar on recent advances of varietal improvement in small millets organized by DHAN foundation at Madurai on 12 September, 2013.
 - | Jain AK, Dhingra MR, Tiwari A and Joshi RP 2013 paper participated on evaluation of diverse genotypes of kodo millet against biotic stresses and their conservation in National conference on recent advances in biodiversity conservation, biotechnology and environmental management research, 19-20, April 2013 at Govt. New Science College, Rewa (M.P.).
 - | Jain AK, Singh G and Joshi RP 2014 presented paper on identification of host resistance against banded leaf and sheath blight of foxtail millet in National symposium on innovative and eco-friendly approaches for plant disease management organized by Indian Society of Mycology and Plant Pathology, Udaipur on 8-10 January, 2014 at Dr. PDKV, Akola (M.S.).
 - | Jaiswal A 2013. Presented paper on Profile of Rural Women Entrepreneur in Indore block of Indore district (M.P) in National Seminar on women education: scope and perspective at Jawaharlal Nehru Smriti Mahavidyalaya, Ganj Basoda, Distt. Vidisha, M.P.
 - | Jaiswal A 2014. Participated on knowledge, perception and adoption strategies to climate change among farmers of Vidisha district (M.P) in National seminar on role of green technology in Agriculture, Horticulture and Forestry, Govt. Autonomous Girls, P.G. College of Excellence Sagar (M.P), 26-27 Feb 2014.
 - | Joshi RP, Jain AK and Mishra MK 2014. Presented paper on forecasting of small millets in Madhya Pradesh in National seminar on watershed management for

- sustainable development, February 15-16, 2014 at Govt. Science College, Rewa (M.P.)
- I Joshi RP and Jain AK 2013. Presented paper on utilization of plant genetic resources for the improvement of kodo millet in Madhya Pradeshin National seminar on recent advances of varietal improvement in small millets organized by DHAN foundation at Madurai on 12 September, 2013.
 - I Kumar P, Rai N, Singh RK, Singh TK, and Singh DK. 2014. Presented paper on a potential breeding line for biotic and abiotic stresses in Tomato (*Solanum Lycopersicon* L.) in 16th IAFC on nanobiotechnology approches for sustainable agriculture and rural development. from 22-23 February, Bioved research Institute of Agriculture & Technology Allahabad, U.P., Integral University, Lucknow, U.P.
 - I Mahajan G, Tiwari RK, Tripathi SK and Jain AK. 2013. Paper presented on elucidate the effect of early, mid or terminal drought during crop growth phases of kodo millet (*Paspalum scrobiculatum* L.) in National conference on recent advances in biodiversity conservation, biotechnology and environmental management research, 19-20 April 2013 at Govt. New Science College, Rewa (M.P.).
 - I I Nemade J, Jain AK and Kumar A 2014. presented paper on Phyto-pathological effect of head smut caused by Soroporium paspali thunbergii on host plant Paspalum scrobiculatum L.in national symposium on innovative and eco-friendly approaches for plant disease management organized by Indian Society of Mycology and Plant Pathology, Udaipur on 8-10 January 2014 at Dr. PDKV, Akola (M.S.).
 - I Nemade J, Jain AK, Panwar A and Tripathi SK 2013. Participated and presented paper on prevalence and vulnerability of kodo millet genotypes to head smut caused by Sorosporium paspali-thunbergiii in National conference on recent advances in biodiversity conservation, biotechnology and environmental management research, 19-20 April 2013. at Govt. New Science College, Rewa (M.P.)
 - I Patel Y, Garg VK, and Upadhyay VB 2013. Participated on Samekiet Naseejeev Prabandhan dwara Parybaran Suracha published in National Conference Smarica avam Shodhpatra of 14th Rastriya Krishi Vigyan Sanghosthi on "Krishi ki Aadhunic Prodhhyoghici ki Upalabdhiya avam Chunotiya" from 14-16 December at Mumbai India organised by Bhartiya Krishi Anusandhan Samiti Karnal, Kendriya Matasyaki Shicha Sanshthan Mumbai and Indian Fishieries Association Mumbai India.
 - I Patel Y, Garg VK, Jaga PK and Upadhyay VB 2014. Presented paper on pest complex associated with soybean Glycine Max.L merril crop in Central Madhya Pradesh of India published in Proceeding of Soycon 2014 - international soybean research conference on mitigating productivity constraints in soybean for sustainable agriculture from 22-24 February 2014 at Indore, organised by SSRD, Indore, DSR, Indore and ICAR, New Delhi.
 - I Patil RJ and Sharma SK 2013. Published paper on remote sensing and GIS based modeling for crop/cover management factor (C) of USLE in Shakker river watershed in international conference on chemical, agricultural and medical sciences (CSSM-2013) December 29-30, 2013 held at Kaulalalumpur, Malaysia. Pp 35-38.
 - I Pawar KK and Singh A K 2013. Presented paper on development and phenotypic characterization of mapping populations for drought segregation in wheat (*Triticum aestivum* L.) in VII National Conference on Recent advances in biodiversity conser-vation, biotechnology and environmental management research organized by New Science college, Rewa (M.P.) on 19-20 April 2013.
 - I Pawar KK, Perraju P and Singh AK 2013. Participated on evaluation of drought tolerant genotypes under drought stress

and non stress environment in upland rice (*Oryza sativa* L.) in National seminar on climate resilient rice production under rainfed eco system organized by Dr. B.S. Konkan Krishi Vidyapeeth Agriculture Research Station Shirgaon, Ratnagiri during May 20-22, 2013.

- I Raghuwanshi SRS, Raghuwanshi OPS, Ambawatia GR and Upadhyay VB 2014. Presented paper on effect of integrated nutrient management in soybean [*Glycine max* (L.) Merrill] in vindhya plateau of Madhya Pradesh, India in International soybean research conference 22-24 February 2014 on mitigating productivity constraints in soybean for sustainable Agriculture.
- I Sharma A, Dwivedi VD, Singh S and Pawar KK 2014. Participated on Increasing water use efficiency in Wheat through improved irrigation method in National conference on emerging problems and recent advances in applied sciences: basic to molecular approaches organized by Society For Scientific Development In Agriculture And Technology, Meerut (U.P.) India on 8-9 February 2014.
- I Sharma SK, Gajbhiye S, Nema RK and Tignath S. 2014. Presented paper on assessing vulnerability to soil erosion of a watershed of tons river basin in Madhya Pradesh using remote sensing and GIS in International Conference On "Sustainable Innovative Techniques In Civil and Environmental Engineering"(SITCEE - 2014) held at Jawaharlal Nehru University, New Delhi, during 4-5 January.
- I Singh TK, Singh J and Singh DB 2013. Presented paper on performance of mango varieties in Kymore plateau of Madhya Pradesh in VIII National conference on biotechnology, biodiversity & environment management researc, from 19-20 April, 2013 at APS University, Rewa..
- I Tiwari A, Jain AK and Kumar A 2013. Paper presented on response of little millet

genotypes against important diseases in National conference on recent advances in biodiversity conservation, biotechnology and environmental management research, 19-20, April 2013 at Govt. New Science College Rewa, (M.P.).

- I Tiwari RK, Rai CL, Singh SK, Dwivedi BS, Jha AK, Mahajan G, Tarwariya MK and Tripathi SK 2013. Presented paper on weed control method under direct seeded rice in relation to applied nitrogen levels"and published in extended summary of biennial conference on emerging challenges in weed management organized by Indian Society of Weed Science and Directorate of Weed Science Research, Jabalpur on 15-17 Feb. 2014 at Jabalpur .

2.13.4 Seminars/ symposium/ conferences/ trainings/ workshops/meetings

I Annual Group Meet of All India Coordinated Research Project on Chickpea

The 18th Annual Group meet of All India Coordinated Research Project on Chickpea was organized from 24-26 August, 2013 at JNKVV, Jabalpur. 150 scientists from SAU's, ICAR, ICRISAT and ICARDA attended the



workshop. Shri Ishwar Das Rohani, Hon'ble Speaker, Madhya Pradesh Assembly was the Chief Guest and Dr. Ramkrishna Kusmaria, Minister, Department of Farmer Welfare and Agriculture Development, Govt. of Madhya Pradesh was the Chairman. Dr. Swapan Kumar Datta, Deputy Director General (Crop Science), ICAR, New Delhi; Prof. V.S. Tomar, Vice Chancellor, JNKVV, Jabalpur, Dr. B.B. Singh, Assistant Director General (Oilseed and Pulses), ICAR, Dr. N. Nadrajan, Director, Indian Institute of Pulses Research, Kanpur, Dr N.P. Singh, Project Coordinator, AICRP on Chickpea, Dr. S.S. Tomar, Director Research Services, JNKVV, Jabalpur, Deans, Directors, distinguished faculty members and dignitaries gave their kind presence and provided valuable guidance. On this occasion, RAU, Sriganaganagar was honored with 'Best Centre Award of 2012-13'. The research activities of Rabi 2012-13 was discussed with formulation of technical programme for Rabi 2013-14. Varieties GJG 0809 for NHZ, CSJ 515 for NWPZ and GLK 28127 for NWPZ have been identified for release.

I National Group Meet of AICRP on Forage Crops (Rabi)



National Group Meet of AICRP on Forage Crops (Rabi) was organized at College of Agriculture, Jabalpur during 7-8 September 2013 as joint auspices of Indian Council of Agricultural Research, New Delhi, Indian Grassland & Forage Research Institute, Jhansi and JNKVV, Jabalpur under the Chairmanship of Hon'ble Vice Chancellor, Prof. V.S. Tomar. The Chief Guest of the function was Dr. Swapan Kumar Datta, Deputy Director General (Crop Science) and Guest of Honour was Dr. R.P. Dua, Assistant Director General (FFC), Indian Council of Agricultural Research, New Delhi. About 150 scientists were participated in the meeting.

I Annual Workshop of All India Coordinated Small Millets Improvement Project

The Annual Workshop of All India Coordinated Small Millets Improvement Project (ICAR) was organized at JNKVV, Jabalpur from May 3-5, 2013 under the chairmanship of Hon'ble Vice Chancellor, JNKVV, Jabalpur, Prof. V.S. Tomar and honoured with gracious presence of Dr. R.P. Dua, Assistant Director General (FFC), ICAR as Chief Guest. Dr. A. Seetharam, Ex-Project Coordinator (Small Millets), Dr. M.V.C. Gowda,



Project Coordinator (Small Millets), Dr. P. Chandra, Director, Central Institute of Agricultural Engineering, Bhopal, Dr. N.T. Yaduraju, Former Director, National Research Centre for Weed Science, Jabalpur and Dr. S.S. Tomar, Director Research Services, JNKVV, Jabalpur were among eminent dignitaries who blessed the event with their precious views.

In the inaugural session, Prof. V.S. Tomar, Vice Chancellor, JNKVV, Jabalpur highlighted the importance of small millets in the light of nutritional and medicinal competence and emphasized on increase in the area, production and productivity of small millets.

Dr. R.P. Dua, ADG (FFC), ICAR showed concern on decrease in area of these crops and insisted upon keeping in pace with Government policies for increase in production of these nutri-cereal crops.

Dr. P. Chandra, Director, CIAE, Bhopal, discussed recent advances and progress in processing equipments and post harvest technologies of these crops.

Dr. S.S. Tomar, Director Research Services, JNKVV, Jabalpur emphasized on development of integrated nutrient management module for these crops to attain satisfactory productivity.

About 150 scientists from all corners of the country participated and reciprocated their findings and views on small millets. The meet came out with the concrete solutions to the problems and final technical plan for *Kharif* 2013-14. Major issues of these crops were discussed in four sessions on exploration and conservation of germplasm, development of varieties, plant protection technologies and crop husbandry.

5th Coordination Committee Meeting of Network Project on Harvesting, Processing and Value Addition of Natural Resins and Gums

The two days 5th Coordination committee Meeting of Network Project on Harvesting, Processing and Value Addition of Natural Resins and Gums was held at JNKVV on 8-9 October, 2013. The Meeting was inaugurated by the Chief Guest Dr. U. Prakasham, Additional Principal Chief Conservator of Forests and Director, Tropical Forest Research



Institute, Jabalpur in the presence of Prof. K.N.S. Yadav, Hon'ble Vice Chancellor, Rani Durgawati Vishwavidyalaya Jabalpur, Dr. R. Ramani, Director, Indian Institute of Natural Resins and Gums, Ranchi, Mr. H.S. Mohanta, Conservator of Forests, Jabalpur and Dr. Niranjana Prasad, Project Coordinator. Prof. V S Tomar, Vice Chancellor, JNKVV chaired the session while Dr. S.S. Tomar, Director Research Services welcomed the delegates. All the senior officers, Director of Instruction, Director Extension Services and Dean Faculty of Agriculture along with Principal Investigators of Network Centres were present. There were over 88 participants. Dr. V.P. Singh, Regional Director, World Agro-Forestry Centre for South East Asia, New Delhi was the Chief Guest in the Valedictory Function of the 5th CCM on 9th October, 2013. In the inaugural function, three publications (Guggul - a natural oleo-resin; Guggul-ek parichaya and Guggul - sattat vidhohan aur sanrakshan:ek prayas) and a Guggul Tapping device- Jawahar Guggul Blazer was released by the Chief Guest and Vice Chancellor, JNKVV. Chief Guest of Valedictory Session was Dr. V.P. Singh, Prof. V.S. Tomar, Vice Chancellor.

National Soybean Stakeholder's Meet

National Soybean Stakeholder's meeting to prepare a Contingent Plan for off season



soybean seed production was held on 28 November 2013 at JNKVV, Jabalpur under the Chairmanship of Prof. V.S. Tomar, Vice Chancellor, JNKVV, Jabalpur. The meeting was jointly held by National Centre for Soybean, Indore and JNKVV, Jabalpur. The participants from MP Seed Corporation, NRC, Indore, Beej Nigam, Rajmata Vijaya Raje Scindia Krishi Vishwa Vidyalaya, Gwalior participated the meeting. Dr. D.A. Vishwvardhan, Director (Seeds), ANGRAU, Hyderabad. Dr. J.S. Chauhan, ADG (Seeds) ICAR, Dr. B.B. Singh, ADG (OP) ICAR, Dr. S.K. Gupta, General Manager (Production), NSC, New Delhi Dr. S. K. Shrivastava, Director, Directorate of Soybean Research, Indore, Dr. C.M. Jaiswal, JDA, MP Seed Federation, Bhopal, Dr. S.P. Singh, Regional Manager, MP Seed Corporation, Bhopal, Dr. Koji Tsuji, Expert JICA, Dr. H.S. Yadav, Director Research Services, RVSKVV, Gwalior, Dr. S.M. Hussain, Principal Secretary, Director of Soybean Research, Dr. R.K. Gupta, IFS, Managing Director, MP Seed Corporation, Bhopal, Dr. S.D. Wankhede, Managing Director, MSSCL, Akola (MS), Dr. Anupam Mishra, Zonal Product Director, ZPD Unit VII, Dr. P. K. Mishra Director Extension Services, Dr. S.K. Rao, Dean Faculty of Agriculture, Dr. S.K. Shrivastava, ADR (HQ), Jabalpur besides Heads of Departments,

Principal Scientists, Seniors scientist and Soybean Research Workers of JNKVV.

? Special Guest lecture on Global Biofuel scenario has been delivered by Dr. Navin Sharma, Director, Biofuel Development, ICRAF-IFAD, NASA Complex New Delhi on 8 November 2013. On this occasion guest and dignitaries from Bio-fuel Development, ICRAF-IFAD, New Delhi Dr. Navin Sharma, Director Biofuel Development, ICRAF-IFAD, New Delhi, Dr. Rodrigo, Program Officer, Bio-fuel World Agro Forestry Centre and Dr. (Mrs.) Ana Maria PAEZ, ICRAF were present. Prof. V.S. Tomar, Vice Chancellor, Dr. S. S. Tomar, Director Research Services, Dr. P.K. Mishra, Director, Extension Services, Dr. N.N. Pathak, Director Farms, Dr. Sharad Tiwari, Director Biotechnology Centre, Dr. V.K. Gour, Associate Professor (PB), Heads of Departments, Scientist, Research workers and students were present.

Twelfth satellite based distance learning programme on "Microwave (SAR) Remote Sensing for Natural Resources" is being organized by IIRS, Deharadun (IIRS Outreach Programme) at College of Agriculture and Agricultural Engineering, Jabalpur during 3 February to 29 March 2014. 50 participants attended the training programme.

A meeting was organized on 11 February, 2014 to review the mid term examination system and coaching classes under the chairmanship of Vice-Chancellor, Prof. V.S. Tomar. All the Directors, Registrar, Dean, College of Agriculture Jabalpur, Dean College of Agriculture Engineering, Jabalpur and DSW were present.

Business Planning & Development Unit, JNKVV, Jabalpur organized training programme during 11-20 February, 2014 for agri-service providers who would stand as technology ambassadors and disseminators amongst farmers.

The Faculty of Agriculture started a programme on "Capacity Building in Computer Skills" for the teachers/scientists and other staff of the Vishwa Vidyalaya from February 2014.

The University scientists engaged in JICA funded Soybean Research Projects, Dr. S.K. Shrivastava, Associate Director Research, Dr. A.N. Shrivastava, Soybean (Breeder), Dr. A.K. Bhowmick, Principal Scientist (Entomology), Dr. S.B. Nahatkar, Principal Scientist (Agril. Economics), Dr. Deepak Rathi, Associate

Professor (Agril. Economics), Dr. Amit Jha, Scientist (Agronomy), Dr. B.S. Dwevedi, Scientist (Soil Science), Dr. Vinod Kumar Garg, Scientist (PB), Dr. Vijay Kumar Yadav, Senior Scientist (Plant Pathology), Dr. Yogesh Patel, Scientist (Entomology) and Dr. A.S. Tomar, SMS (Food Science) have participated in the International Soybean Research Conference (SOYACON) organized by Society for Soybean Research & Development and Directorate of Soybean Research (DSR-ICAR), Indore during 22-24 February, 2014.

Business Planning & Development Unit, JNKVV, Jabalpur organized a Field Day on "Business Opportunity in Wheat Varieties for Seed Stake-holders" on 28 February, 2014.

Department of Farm Machinery and Power Engineering organized a training programme on "निजी क्षेत्रों में कस्टम हायरिंग केन्द्रों की स्थापना" during 1-15 March, 2014. In all 16 participants from different districts of Madhya Pradesh attended the training programme.

A one day meeting on "Improving the Agricultural Education" organized by Dean Faculty of Agriculture, JNKVV, Jabalpur on 21 March, 2014 under the chairmanship of Vice Chancellor, JNKVV, Jabalpur, Prof. V.S. Tomar.

2.13.5 Scientist visited abroad

- I Dr. (Mrs) Anita Babbar, Principal scientist (Chickpea Breeding) Department of Plant Breeding and Genetics attended a training on Integrated Breeding Programme Multi Year Course-Year 2 under Generation Challenge Programme of CGIAR Coordinated by CIMMYT, Mexico at The Mediterranean Agronomic Institute of Zaragoza (CIHEAM IAMZ), Spain from 01-12, July 2013.
- I Dr. S.K. Rao, Dean, Faculty of Agriculture, JNKVV Jabalpur, visited Japan during 7-15 September 2013 as a member of team for Counterpart training for strategies making for Agricultural Research Extension System and Rural Infrastructure System towards the maximization of soybean cultivation.
- I Dr. P.C. Mishra, Principal Scientist (Plant Breeding & Genetics), Zonal Agricultural Research Station, Powarkheda visited Lisbon, Portugal during 27-30 September,

2013 to attend the 2013 CGP General Research Meeting organized by the CGIAR, Generation Challenge Programme (CGP).

- I Dr. Namrata Jain, Asstt. Professor attended the training on "Sustainable Agriculture and Food Security" From April 28 - May 31, 2013 at The Office of International Agriculture (OIA), Faculty of Agriculture, Khon Kaen University, Khon Kaen 40002, THAILAND.
- I Dr. Sharad Tiwari, Director, Biotechnology Centre, JNKVV, Jabalpur attended International workshop on Strategic Approaches in Evaluation of the Science Underpinning GMO Regulatory Decision-making at International Centre for Genetic Engineering and Biotechnology (ICGEB), Trieste, Italy during 1-5 July 2013 organized by ICGEB.
- I Dr. Yoganjan, Asstt. Professor attended training on integrated breeding in mediterranean agronomic institute of Zaragoza, (IAMZ-CIHEAM) at Zaragoza, Spain from 1-12 July, 2013 under Multi-Year Course (IB-MYC) Yr-2 The Generation Challenge Programme (GCP www.generationcp.org) of the Consultative Group on International Agricultural Research (CGIAR), and CIMMYT, Mexico.
- I Dr. S.K. Shrivatava, ADR (HQ), Dr. Keerti Tantuwai, Scientist (Biotechnology), College of Agriculture, Jabalpur and Dr. Vijay Yadav, Associate Professor (Plant Pathology), College of Agriculture, Ganj Basoda (Vidisha) visited NARO Agriculture Research Centre at Tsukuba (Japan) under Research, Planning and Discussion Trip Programme of JICA from 12-17 May, 2013.

2.13.6 Awards received by the teachers/scientists/students

- I Under the joint collaboration of Ministry of Agriculture M.P. & Search and Research Society Bhopal, a National Conference on "Changing Scenario of Agriculture in Madhya Pradesh: Prospects and Challenges" was organized at Bhopal during 1-2 September, 2013. In the two



days "Agro Summit 2013", Dr. B.P. Bisen, Scientist, Horticulture received the award for best oral presentation on Door crop: A way to livelihood Security to landless and small farmers. Ku. Stuti Mishra received the award for best poster presentation and Dr. Raghuraj Tiwari, Associate Professor, College of Agriculture, Rewa received the award for best oral presentation.

- I Dr. V. K. Shukla and Dr. S. K. Vishwakarma received the Best Poster Presentation Award in the National seminar on relevance



of organic farming in India organised by National Institute of Advance Science at Indian Institute of Science, Bangalore from 3-4 February 2014.

- I Dr. R.S. Shukla, Principal Scientist, Wheat Improvement Project, Department of Plant Breeding & Genetics, College of Agriculture, Jabalpur has been awarded for his outstanding contribution for development of wheat variety MP 3666 by *Padam Vibhushan* Dr. M.S. Swaminathan, Ex. Director General, Indian Council of Agricultural Research, New Delhi in 52nd Group Meeting of AICRP on Wheat at Chandra Shekhar Azad University of

Agriculture and Technology, Kanpur, on 2 Sept., 2013.

- I Dr. A. K. Jha, Scientist, JNKVV, Jabalpur received the ISWS Young Scientist Award



2014 by Indian Society of Weed Science at Biennial Conference held at DWSR Jabalpur during 15-17 February 2014.

- I Shyamlal Shahu, P.G. Student, Dr. M.L. Kewat and Ms. Tarun Suryavanshi jointly got the Best Poster Paper Award 2014 during Biennial Conference of Indian



Society of Weed Science (ISWS) held at DWSR Jabalpur held at 15-17 February 2014.

- I Mr. Ajay Chourasiya, Ph.D. Scholars and Tushar Thorat, P.G. Student, Shyamlal



Shahu, Dr. M.L.Kewat and Ms. Tarun Suryavanshi jointly got the Best Poster



during 24-27th April 2014.

- I **Best Research Centre Award at National Level:** All India Coordinated Forage Improvement Project, College of Agriculture, Jabalpur has been recognized as Best Research Centre of All India Coordinated Research Project on Forage Crops during the workshop held on 10-11 May, 2013 at Assam Agricultural University, Jorhat. The team consists of Dr. A.K. Mehta, Dr. S.K. Billaiya and Dr. Amit Jha.
- I **Best Paper Awards at National Level:** Dr. Dharendra Khare received the Best Paper Award on the paper entitled Effect of raised bed planting method on seed producibility and sowing seed quality of soybean on Vertisols under heavy rainfall and Dr. M.S. Bhale on Utilization and identification of genetic resources of hybrid rice to combat climate resilient disease of hybrids and parental lines under Kaymore Plateau Zone of MP during XIII National Seed Seminar organized by Indian Society of Seed Technology from 8-10 June, 2013 at UAS, Bangalore.



2.14 Students Educational Tour

During the year 2013-14 the educational



tour (22.03.2014 to 30.03.2014) of College of Agriculture, Rewa was clubbed with Experiential learning programme. All the three modules i.e. Production group Protection and Horticulture module visited to different places.

Name of The Institute/ Department/ Units Visited:

- | Indian Institute of Sugarcane Research (IISR), Lucknow, Uttar Pradesh.
- | Indian Institute of Veterinary Research (IIVR), Bareilly, Uttar Pradesh.
- | Punjab Agriculture University (PAU), Ludhiana, Punjab.
- | Guru Nanak Dev University (GNDU) and Khalsa College, Amritsar, Punjab.
- | ChanderShekar Azad University of Agricultural Science and Technology (CSAUAT), Kanpur, Uttar Pradesh.

Educational Tour ,Tikamgarh (13.03.2014-22.03.2014)

Students visited following institutes/ units:

- | CSWCR & TI Res. Center, Agra.
- | IARI, ICAR, NBPGR, New Delhi.
- | National Dairy Research Institute, Karnal.
- | Directorate Of Wheat Research, Karnal.
- | Punjab Agricultural University , Ludhiana.
- | Central Institute For Research On Buffaloes and CCSAU, Hissar.
- | RVSKVV, Gwalior.
- | Indian Grassland And Fodder Research Institute, Zhansi

2.15 Fellowships/scholarships

Students of JNKVV performed well in various competitive examinations and were awarded fellowships. The scholarships awarded to the V.V. students during academic session 2013-14 are mentioned.

National Talent Scholarship	48
Junior Research Fellowship	02
Merit-cum-means	02
Merit Scholarship	108
Total:	159

- | Ph.D. Scholar Shri Abhishek Chouhan

and Asha Singh, Department of Agronomy and eight students from Department of horticulture/Plant breeding and genetics/ Agriculture Extension/ Agricultural biotechnology passed the ICAR NET-2014

2.16 Visits of dignitaries

- | Hon'ble Chief Secretary, Shri Anthony JC DeSa visited Zonal Agricultural Research Station, Powarkheda (Hoshangabad) on 16 February 2014. Prof. V.S. Tomar, Vice Chancellor, Dean Faculty of Agriculture Dr. S.K. Rao, Director Research Services Dr. S.S. Tomar were present during the visit. The activities of research projects at ZARS, Powakheda viz. AICRP on Water Management Project, Wheat Research Project, Integrated Farming System, Oilseeds Research Project and Sugarcane



Research Project were seen by Hon. Chief Secretary.

- | Dr. A.K. Sikka, Dy. Director General (NRM) and Incharge Dy. Director General (Extension), ICAR visited JNKVV Jabalpur on 21-22 April, 2014 and delivered a guest lecture.



- I Medicinal Garden, Department of Plant Physiology, JNKVV was visited by Dr. S.K. Dutta, Deputy Director General (Crop Science), ICAR, New Delhi on 24 August 2013 and Mr. P. Joy Dellon, Dean, Bio Energy, Chennai on 28 October 2013.
- I Dr. Muneshwar Singh, Project Coordinator, LTFE, Indian Institute of Soil Science, Bhopal visited LTFE experiments, JNKVV, Jabalpur on 7 February, 2014.

2.17 Central library

The Central Library, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (JNKVV) Jabalpur (M.P.), India is an essential



constituent of the Vishwa Vidyalaya's mandates. The Central Library of JNKVV is one of the major Agricultural Libraries of Central India. The main activity of library is collection, compilation, tabulation, classifying, accessioning, cataloguing and indexing of all types of reading material related to agriculture and allied fields. Theses and books, annual reports, journals, periodicals etc were also processed. About 300 post graduate and doctoral theses are added to the collection of Central Library, every year. The registered users (faculty, staff and students) are given facilities of borrowing books available in the library where they can get the book issued for a fixed period and then return it or renew it. Students in particular are given special facility of Book Bank where the students are provided books for one semester at a 10% price of book. A separate Book Bank for SC/ST students is also available. 1100 books were purchased during the financial year. An amount of rupees

fifty to sixty thousand is collected from book bank scheme.

An amount of Rs. 5019665.00 (Rs. Fifty Lakhs Nineteen thousand six Hundred and Sixty Five Only) was received under the budget head C-2(Res.) ICAR P-384- Library Strengthening of Agril Universities vide letter Endt.No.EFP-4/P-384/Libr. Strengthening/933 dated 30th March 2013 during the financial year 2012-2013. The amount was utilized for strengthening library facilities at four agricultural colleges (College of Agriculture, Jabalpur, Rewa, Tikamgarh and Gangbasoda) and one agricultural engineering college at Jabalpur.

Amenities are being created in the central library and constituent libraries to provide better facilities for reading to the students, faculty and readers. Civil work is a necessity and has to be done on priority basis to increase the life of the building, waterproofing is essential to prevent leakage and seepage from side walls, which in turns creates dampness and spoils the reading material. Repairing and replacement of doors and windows is essential to ensure safety and security of library holdings. Facility of girl's toilet is being developed inside the periodical section. Renovation of electrical's will provide better lighting and air circulation to create congenial atmosphere for using the library facilities. It will also ensure the long life and safety of equipments like photocopier, UPS etc. which run on electricity.

The strength of UG, PG and PhD students is increasing every year. Also the numbers of colleges are also increasing and hence furniture and allied items are being procured for proper storage of reading material like Textbooks/ Reference Books/General Books/ Advances/ Journals/ Dictionaries/ Encyclopedias/ Book Series / Annual Reviews / Monographs/ Serials/ Reading Material and others items. Various newspapers are subscribed for current awareness and newspaper stands are being procured. Notices regarding current opening, conferences/ seminars, training etc are displayed on the

notice board located in library. Due to increase in strength of students more chairs and reading tables are being procured to accommodate them. Faculty staff, students, scholars etc visit library for issue return of books and for consultation and reference, during the year 464870 consultations were done.

2.18 Publications

- | Agrawal D, Upadhyay A and Nayak PS. 2013. Feasibility and acceptability of fortified vermicelli prepared from barnyard millet and defatted soyflour. Asian Journal of Home Science 8(2):461-464.
- | Agrawal D, Upadhyay A and Nayak PS. 2013. Investigations on the nutritional characteristics of kodo millet based traditional fermented food by tribals of Madhya Pradesh. JNKVV Res. J. 47(3) : 298-302.
- | Ahirwar KC, Marabi RS, Bhowmick AK and Das SB. 2013 Evaluation of microbial pesticides against major foliar feeders on soybean [*Glycine max* (L.) Merrill]. J Biopest 6(2):144-148
- | Ahirwar RF, Sharma SK and Mahajan KC. 2013. An Economic Analysis of Cultivation and Production constraints of Rice in Central Narmada valley of Madhya Pradesh. Indian Journal of Tropical Biodiversity 21(1&2): 65-72.
- | Ahirwar RF, Tiwari R and Sahu RM. 2013. Dynamics of Chickpea Production in different Agro-Climatic Zones of Madhya Pradesh. JNKVV Res. J. 47(2): 209-216
- | Amrate PK, Singh A, and Mohan C. 2013. Effect of weather parameters on development of ber powdery mildew and its control by fungicides. JNKVV Res. J. 47 (3): 321-324.
- | Amrate PK, Sharma JR and Singh C. 2013. In vitro evaluation of fungicides, plant extracts and oils against *Alternaria alternata* (Fr.). Keissler causing leaf spot of *Aloe barbadensis* (Miller). Asian Jr. of Microbiol Biotech. Env. Sc. 15(3): 609-613.
- | Amule R, Gupta Om and Mishra M. 2014. Techniques for screening of chickpea genotypes against collar rot, its management through host plant resistance and fungicides. Legume Res. 37(1): 110-114.
- | Aujla I, Amrate S, Kumar PK., Pardeep and Thind TS. 2013. Efficacy of some new fungicides in controlling purple blotch of onion under Punjab conditions. Pl. Dis. Res. 28 (2): 171-173.
- | Babbar A, Singh P and Sharma R. 2013. Character association analysis among yield traits in chickpea under agroclimatic condition of Kymore plateau zone M.P. JNKVV Res. J. 47 (2) 181-184.
- | Bajpai R and Hemant D. 2013. Seasonal Incidence and population dynamic of major insect pest of *Acacia nilotica*. JNKVV Res. J. 47 (3).
- | Bara N, Khare D and Shrivastava AN. 2013. Studies on the factors affecting pod shattering in soybean. Indian J. Genet. 73(3): 270-277.
- | Barche S, Kirad SK and Sharma AK. 2014. *Withania somnifera* (ashwagandha)-an Important medicinal plant. Review Article. Int. J. Agric. Sc & Vet. Med. 2(2). ISSN 2320-3730.
- | Bhadouria RS, Singh TK, Singh J and Halder. A. 2013. Effect of various planting methods on growth and yield of Turmeric (*Curcuma longa* L.). Plant Archives 13(2):1093-1095.
- | Bhale U, Dubey P and Tiwari SP. 2013. Genetic resources of okra for the utilization in the management of okra yellow vein mosaic virus disease under climate conditions of Kymore plateau zone, Madhya Pradesh. JNKVV Res. J. 47 (3): 315-320.
- | Bhatt J, Jaware A and Tiwari SP. 2013. Population dynamics and management of lesion nematode (*Pratylenchus thornei*) in chickpea. JNKVV Res. J. 47(2):325-329.
- | Bisen AP, Nair and Khare D. 2013. Standardization of protocol for genomic DNA isolation from fresh leaf of soybean without liquid nitrogen. JNKVV Res J. 47 (1):1-4.
- | Bornare SS, Mittra SK, Mehta AK, Madakemohekar A, Gaur LB, and Chavhan

- AS. 2013. Identification of best putative lines based on floral traits in CMS and restorer lines of rice. Crop Improvement (special issue) 355-56 in Int. con. on Sustainable Agriculture for Food and Lively-hood Security. Nov. 25-28.
- | Chandrawanshi N, Upadhyaya SD, Nayak PS, Paroha S and Tiwari AB. 2013. Growth and yield quality parameters of *Phyllanthus amarus* as affected by moisture and temperature stress factors. Journal of stress physiology and biochemistry 9(2) 181-188.
 - | Dhakad SS, Rao R KV, Agrawal V and Mahajan KC. 2014. Performance of rotavator for soybean crop in Raisen district of M P. Research in Environment and Life Sciences 7 (1-2).
 - | Dhurve OP, Khan IM, Upadhyaya SD and Nema S. 2014. Effect of Khameer (*Glinelina arborea*) + Lemongrass (*Cymbopogon flexuosus*) intercropping on plant and soil characters under agroclimatic conditions of Jabalpur, Madhya Pradesh, JNKVV Res. J. 48(1): 51-54.
 - | Dubey S, Awasthi MK, Nema RK, Kulahare PS, Tiwari YK and Sharma SK. 2014. Water Quality of Moti Nala Sewage and its effect on adjoining ground water, under Jabalpur city condition, Madhya Pradesh. JNKVV Res. J. 47(1).
 - | Gajbhiye S, Upadhyay A, Nayak A, Preeti Sagar Gontia, AS and Singh A. 2013. Influence of sowing dates on biochemical and seed yield parameters in Chandrasur. Journal of Medicinal and Aromatic Plant Sciences 35 (1 and 2): 1-5.
 - | Garg SK and Singh DS. 2013. Textural Properties of Defatted Soy-Rice Based Extrudates. International Journal of Current Research 5(10): 2739-2743.
 - | Garg, VK and Patel Y .2014. Impact of Integrated pest management technology on insect pest incidence ,their natural enemies and economic viability of Bt seed cotton. Journal of Cotton Research and Development 28 (1):116-119.
 - | Gontia I and Tiwari S. 2013. Molecular characterization and comparative phylogenetic analysis of phytases from fungi with their prospective applications. Food Technol. Biotechnol 51 (3): 313-326.
 - | Gontia I, Shashidharan S and Tiwari S. 2014. Recent developments in use of 1-aminocyclopropane-1-carboxylate (ACC) deaminase for conferring tolerance to biotic and abiotic stress. Biotechnol Lett. 36:889-898.
 - | Gontia, Mishra I, Deshmukh D. Tripathi N, Bardiya-Bhurat K, Tantwai K, and Tiwari S. 2013. Isolation, morphological and molecular characterization of phytate-hydrolysing fungi by 18S rDNA sequence analysis. Brazilian J. Microbiol 44(1): 317-323.
 - | Gupta Om, Padole S and Mishra M. 2013. Pathogenic variation and compatibility groups in *Sclerotium rolfsii* isolates causing collar rot on chickpea (*Cicer arietinum* L.). Journal of Food Legumes 26 (3&4) : 55-58
 - | Gupta V and Sharma HL. 2013.. Correlation Coefficient Amongst Seed Yield and its Attributing Characters for Wheat Crop under Rice-Wheat Cropping System under Agro -climatic conditions of Kymore Plateau and Satpura Hills. JNKVV Res. J. 47(2): 140-142.
 - | Jaga PK and Sharma S. 2013. Comparative response of mustard and wheat to sulphur application. Annals of Soil and Plant Research 15(1): 73-74.
 - | Jaga PK and Upadhyay VB. 2013. Effect of integrated nutrient management on wheat - A review. Innovare Journal of Agricultural Science 1(1): 1-3.
 - | Jaga PK and Upadhyay VB. 2013. Effect of FYM, bio-fertilizer and Chemical fertilizer on wheat -A review. An Asian Journal of Soil Science 8(1): 185-188.
 - | Jain AK and Tiwari A. 2013. Evaluation of promising genotypes of proso millet against banded leaf and sheath blight disease caused by *Rhizoctonia solani* Kuhn. Mysore J. Agric. Sci. 47(3):648-650
 - | Jain AK, Dhingra MR and Joshi RP. 2014. Integrated approach for the management of head smut and shoot fly in Kodo millet (*Paspalum scrobiculatum* L.) under rainfed

- ecosystem. Ann. Pl. Protec. Sci. 22(1):116-121.
- | Jain AK, Tiwari A, and Dhingra MR. 2013. Resistance against head smut in Kodo millets (*Paspalum scrobiculatum* L.). Mysore J. Agric. Sci. 47(3):645-647.
- | Jain KK. 2013. Floristic composition of paddy (*Oryza sativa* L) - weed ecosystem and influence of tillage on weed dynamics under guava based agrihorticulture system. Journal of Tropical Forestry 29 (3): 37-42.
- | Jaiswal A, Mujahida S and Shekhawat LS. 2013. Correlation of socio-economic and communicational attributes with adoption of dairy management practices. Journal of Plant Development Sciences 5(4):537-539.
- | Jaiswal A and Patel M M .2013. Profile of Rural Women Entrepreneur in Indore Block of Indore District (M.P). Proceedings of the National conference on women education: scope and perspective: 93-97.
- | Jaiswal DK, Dubey MK and Khan P. 2013. Training needs of vegetable growers. Technofame 2 (2):50-56.
- | Jha AK, Shrivastava A and Raghuvanshi NS. 2013. Effect of different concentration of seaweed saps on green fodder and seed yields of berseem (*Trifolium alexandrinum*). Search and Research Agro Summit on Changing Scenario of Agriculture in Madhya Pradesh, Bhopal.
- | Jha AK, Shrivastava A, Raghuvanshi NS. 2013. Effect of nitrogen levels on fodder yield and quality of pearl millet genotypes under irrigated condition of Madhya Pradesh. JNKV Res. J. 47 (2):167-174
- | Jhankare A, Tripathi MK, Tiwari G, Pandey A, Patel R P and Patidar H. 2013. Efficient plantlet regeneration from cultured nodal segment of *Withania somnifera* (L.) Dunal. Plant Cell Biotechnology and Molecular Biology 14 (3&4):99-110.
- | Kachre S. Tiwari S and Tripathi N. 2013. Morphological and molecular assessment of genetic diversity of water chestnut (*Trapa natans*) from different ponds of Central India. World Res. J. Cell Biol. 1(2): 28-31.
- | Kelatkar S, Tantwai K, Rajput Gontia LPS, Mishra I, Kumar S and Tiwari S. 2013. Cloning and Sequencing of Novel Phy Gene from *Pseudomonas syringae* MTCC-2730. Advanced studies in Biology 5(11): 465-471.
- | Kelatkar SK, Tantwai K, Rajput, Gontia LPS, Mishra I, Kumar S, Tiwari S, Bedekar MK and Jain SK. 2013. Cloning and Sequencing of Novel Phy Gene from *Pseudomonas syringae* MTCC-2730. Adv. Studies Biol. 5(11): 465 - 471.
- | Keram KS and Sharma BL. 2013. Influence of zinc application on yield attribute, yield, chemical composition and protein content of Wheat grown on Typic hepluesterts of Kymore plateau of Madhya Pradesh. JNKVV Res. J. 47(3): 278-283
- | Khamparia NK, Thakur R, Sawarkar SD and Singh M. 2013. Effect of continuous use of chemical fertilizers and organic manure with intensive cropping on soil quality, crop productivity and sustainability in a Typic Haplustert. Indian Journal of Agricultural Science.
- | Khan IM, Tiwari RK and Dhurve OP. 2013. Effect of moisture stress on photosynthetic characters and yield attributes of upland rice genotypes in Kymore plateau, Madhya Pradesh. JNKVV Res. J. 47 (1):37-41.
- | Khan IM, Tiwari RK, Singh S, Dhurve OP and Voleti SR. 2013. Effect of silicon solubilizer on stress tolerance and productivity in rice (*Oryza sativa* L.) Extended summary In: NCPP-2013 on Current trends in plant biology research O3-2, 311-312.
- | Khare AK, Rawat AK, Dubey SB, Patel KS, Rathore GS, Thompson JP and Takkar PN. 1998. Role of native vesicular-arbuscular mycorrhizal fungi in Wheat (*Triticum aestivum*) - based cropping sequence for efficient use of phosphorus and zinc in black soils of Madhya Pradesh. Ind. J. Agric. Sci. 68 (5):247.
- | Kshitiz PK and Singh AK. 2013. Combining Ability Analysis for Grain yield and its Attributing traits in Barley. Int. J. Agric. Sc. &

- Vet. Med. 1 (2):83 - 87.
- | Kumar A, Jain AK, Suhu TK, Singh TK, and Solanki S. 2013. Exploration of potential biocontrol agent *Tricoderma* spp. from Madhya Pradesh against *Fusarium oxysporum* f. sp. *ciceris* causing wilt of chickpea. *Environment and Ecology* 31(2B): 877-882.
 - | Kumar P and Singh J. 2014. Evaluation of polyembryonic Root stocks of Mango (*Mangifera Indica* L.) in vindhya region of Madhya Pradesh. *Environment and Ecology* 32(1): 67-69.
 - | Kumar S and Upadhyay JP. 2014. Studies on cultural morphological and pathogenic variability in isolates of *Fusarium udum* causing wilt of pigeonpea. *Indian Phytopathology* 67 (1): 55-58.
 - | Kumar V, Koutu GK, Mishra DK and Singh SK. 2013. Principal component analysis of inter sub-specific RILs of rice for the important traits responsible for yield and quality. *JNKVV Res. J.* 47(3): 185-190.
 - | Kumari A, Jha PK, Vibha. 2013. Effect of rhizosphere and phylloplane fungi on crop health of *Piper longum*. *Journal of Mycology and Plant Pathology* 43 (1): 117.
 - | Kumari, A and Sairam R K. 2013. Moisture stress induced increases in the activity of enzymes of osmolytes biosynthesis are associated with stress tolerance in wheat genotypes. *Indian Journal of Plant Physiology* 18(3): 223-230.
 - | Mahajan G, Singh RN and Kumar R. 2013. Growth, yield, nutrient uptake and net return of sweet corn (*Zea mays Saccharata* Strut.) with different fertilizer levels, plant densities and sulphur nutrition. *Current Advances in Agricultural Sciences* 5(2): 201-204.
 - | Meena KC, Rao SK, Rao S, Gontia AS and Singh SK. 2013. Influence of submergence on germination and vigour of pigeon pea genotypes. *Environment and Ecology* 31 (3): 45-49.
 - | Meena SC, Sharma HO and Rath D. 2014. Magnitude of crop losses due to pest and diseases and weeds in Soybean - an economic analysis. (Abstract). *Soybean Research (Special Issue)*: 240-241
 - | Meshram K and Upadhyaya SD. 2013. Physiological studies of Soybean (*Glycine max* L. Merrill) varieties in relation to climate change. *Plant Achieves* 13(1): 579-581.
 - | Mishra P, Singh RB and Sharma HL. 2013. Life Testing Using Probability Distributions., *Int. J. Agricult. Stat. Sci.* 9(2): 699-707.
 - | Mishra A and Pathak G. 2013. A study of Assessment of work life balance of Textile Industry. *International Journal of Management Prudence* 4(2): 76-80 .
 - | Mishra A. 2014. Impact of SMS Advertisement in Uttar Pradesh. *International Journal of Management and Social Development* 1(2): 1-8.
 - | Mishra Anil and Jharkariya Priyanka. 2013. Impact of Climate Change on tourism. *Management Prudence J.* 5 (2) : 60-65.
 - | Mishra P, Sharma HL, Singh RB and Nayak S. 2013. Modelling and forecasting of area, production and yield of soybean in India. *JNKVV Res. J.* 47(3): 330-336.
 - | Mishra PC and Shukla RS. 2013. Genetic analysis for screening high temperature and moisture stress tolerance in bread Wheat International general resource seminar under generation challenge programme 27-30 Sept. 2013 Lisbon, Portugal, pp.57-60.
 - | Nagle D and Shukla A. 2013. Evaluation of green gram (*Vigna radiata* (L.) Wilzek) varieties against insect pest complex during summer. *Geobios* 40 (4): 211- 219.
 - | Nagle P, Rao SK, Koutu GK and Nair P. 2013. Association analysis studies in indigenous and exotic germplasm lines of Rice. *JNKVV Res. J.* 7(3): 274-277.
 - | Nair B, Sengupta SK, Singh KP and Naidu AK. 2013. Association and path coefficient analysis among seed yield and its components in Coriander. *Asian J. Hort.* 8(2): 403-408.
 - | Nair P, Rao SK and Koutu GK. 2013. Ideotype breeding in Rice. *JNKVV Res. J.* 7(1): 1-18.
 - | Nayak MK, Gupta MP and Tomar DS. 2013. Screening of linseed genotypes against

- bud fly and bud blight. Ann. Pl. Protec. Sci. 22(1): 155-158.
- | Nayak S, Pandey V, Jain SK, Ahmed S, Nayak PS and Rajput LPS. 2013. A study of Doctoral Dissertations of soil and water research discipline at Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV) Jabalpur. International J. Library and Information studies 3(1):46-56.
 - | Nigam AK and Saxena A . 2013. Comparison of leadership preferences between senior national level male and female volleyball players. Indian Journal of Physical Education, Sports and Applied Sciences 3(2): 18-24. (ISSN 2229-550X)
 - | Pachori R, Tanve S, Sharma AK and Thakur AS. 2013. Efficacy of some new molecules against the infestation of brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenee). JNKVV Res. J. 47 (3) 308-311.
 - | Pal V, Garg SK and Pandey J P. 2013. Effect of Degree of Polishing on Physical and Milling Properties of Rice. International Journal of Processing and Post Harvest Technology 4 (2). 90-93.
 - | Pandey SA and Das SB. 2013. Efficacy of some insecticides against green stink bug (*Nezara viridula* Linn.) on pigeonpea. J. Agril. Issues 18 (1&2) : 106-107.
 - | Pandey KK, Gupta RC and Mishra KK. 2014. Effective inoculation technique for identification of resistance source in chilli (*Capsicum annum*). Journal of Spices and Aromatic Plants 24.
 - | Pandey SA and Das SB. 2013. Bio-efficacy of insecticides against gram pod borer (*Helicoverpa armigera* Hubner) on pigeonpea. Life Science Bulletin 10(2): 290-292.
 - | Patel P and Patel Y. 2014. Relative abundance of Coccinellid in cotton ecosystem in relation to environmental factors. International Journal of Current Microbiology Applied Science 3(3): 1067-1073.
 - | Patel N, Pandey SK and Jain PK. 2013. Effect of growth promoting substances and PGR's on fruit retention, drop and yield of acid lime var. kagzi (*Citrus aurantifolia* Swingle). JNKVV Res. J. 7(1):70-75.
 - | Patel N, Pandey SK and Soni N. 2013. Evaluation study of some superior genotype of Lime Citrus aurantifolia (Christm) Swingle under Jabalpur conditions. Flora and Fauna 19(1): 55-60.
 - | Patel N, Tyagi PK and Shukla KC. 2013. Influence of sowing dates and varieties on total biomass and its partitioning in to different plant parts of Indian mustard (*Brassica Jinceh* L). Technofame 2(2): 12-16.
 - | Patel Y. 2013. Reaction of cotton genotype to Amrasca bigutula vis-a-vis crop age. Annals of Plant Protection Science 21(1): 49-51.
 - | Patel Y 2013. Population dynamics of *Coccinella septumpunctata* L. in cotton ecosystem in relation to environmental factors. Trends in Bioscience 6(5): 622-624.
 - | Patel Y. 2013. Effect of environmental factors on population dynamics of Aphis gossypii (Aphidae: Hemiptera) in cotton under agroclimatic condition of Madhya Pradesh. International Journal of Plant Protection 6(2): 394-397.
 - | Patel Y. 2013. Efficacy and economics of some modern insecticides against Aphid in cotton. Trends in Bioscience 6(6): 824-827.
 - | Patel Y. 2013. Utilization of ne wer insecticide for management of cotton bollworm. International Journal of Plant Protection 6(2): 367-372.
 - | Patidar SL, Tripathi MK, Tiwari G, Chundawat RS, Pandey A, Patidar H and Pandey G . 2013. In vitro micropropagation of *Plumbago zeylanica* L. through nodal segment and leaf explants. Plant Cell Biotechnology and Molecular Biology 14 (3&4):72-83.
 - | Patil RJ and Sharma SK. 2013. Estimation of Crop management factor (C) of Universal Soil Loss Equation for soil erosion modeling using RS and GIS techniques in Shakker river watershed Chhindwara, Madhya Pradesh, India. JNKVV Res. J. 47(1):111-115.
 - | Patil Y, Kalyanrao, Rajput LPS, Singh Y and

- Tantwai K. 2013. Wine production from guava fruits using *Saccharomyces cerevisiae*. JNKVV Res. J. 47(3): 291-297.
- | Pawar KK, Yadav S, Baghel KS and Singh AK. 2014. Study of diallel analysis in bread wheat for yield and its components. Int. J. Sci. Res. 3 (3): 63-67.
- | Pawar KK, Yadav SK, Jarman M and Singh AK. 2013. Assessment of divergence in soybean (*Glycine max* L. merrill) germplasm for yield attributing traits, Int. J. Sci. Res. 2 (10): 1-2.
- | Raghuwanshi MS and Garg VK. 2013. Influence of abiotic factors on the pheromone catches population of gram pod borer, *Helicovera armigera* (Hubner) in chickpea. Journal of Insect Science 26(1): 42-44.
- | Raghuwanshi SRS, Raghuwanshi OPS, Umat R, Ambawatia GR and Bhargav KS. 2013. Effect of sulphur on seed yield, nutrient content and uptake by soybean [*Glycine max* (L.) Merrill]. Soybean Research 11(1):80-83.
- | Rahangdale CP, Pathak NN and Koshta LD. 2013. Impact of bamboo species on growth and yield attributes of Kharif crops under agroforestry system in wasteland condition of the central India . International Journal of Agroforestry and silviculture 1 (3):32.
- | Rai SK, Rajput LPS, Singh Y and Tantwai K. 2013. Bioethanol production from waste potatoes using bacterium *Zymomonas mobilis* MTCC 2427. Applied Biological Research 15(2): 154-158.
- | Rai SK, Rajput LPS, Singh Y and Tantwai K. 2013. Studies on bioethanol production from waste potatoes using Yeast (*S. cerevisiae*). Plant Archives. 13(2): 847-853.
- | Raikwar RS, Upadhyay AK, Gautam US, Singh VK. 2014. Genetic architecture of quantitative traits in barley (*Hordeum vulgare* L.). Indian Journal of Genetics & Plant Breeding 74(01): 93-97.
- | Rajan P, Dubey MK, Singh SRK and Khan MA. 2013. Factors affecting knowledge of fish farmers regarding fish production technology. Indian Research Journal of Extension Education 13(2): 126-128.
- | Ramana KV Rao, Agrawal V, Chourasia L, Keshri R and Patel GP. 2013. Performance evaluation of Capsicum crop in open field and under covered cultivation. International Journal of Agricultural Scienc 9 (2): 602-604. .
- | Rawat AK. 2002. Symbiotic nitrogen fixation in soybean: a sustainable preposition. JNKVV Res. J. 36 (1 and 2):4-9.
- | Samadariya P, Dubey MK, Jaiswal DK and Agrawal SK. 2013. Role of farm women in decision making process related to vegetable cultivation practices Res. Journal of Social Life Science 13(2): 147-151.
- | Sanodhia S, Uzma W and Varma RK. 2013. Fungal degradation of an acetolactate synthase (ALS inhibitor pyrazosulfuron-ethyl in soil. Chemospher. 93(9): 2140-2147.
- | Sanodiya Pratik, Jha, AK and Shrivastava A. 2013. Effect of integrated weed management on seed yield of fodder maize. Indian Journal of Weed Science 45(3
- | Sasode RS, Sasode DS and Jaga PK. 2013. Anti-fungal evaluations of Aloe vera extract against some plant pathogenic fungi. Annals of Plant and Soil Research 15(2): 97-100.
- | Sawarkar, SD, Khamparia NK, Thakur R, Dewda MS and Singh M. 2013. Effect of long-term application of inorganic fertilizers and organic manure on yield, potassium uptake and profile distribution of potassium fractions in vertisol under soybean-wheat cropping system. Journal of the Indian Society of Soil Science 61 (2): 94-98.
- | Sharma HL. 2013. Nested balanced ternary designs and their pb arrays. Journal of Reliability and Statistical Studies 6(2),127-138.
- | Sharma A and Sengupta SK. 2013. Genetic diversity, heritability and morphological characterization in bottle gourd (*Lagenaria Siceraria* (Mol) Stand).The Bioscan 8(4)

- :1461-1465.
- I Sharma DP, Prajapati JL and Tiwari A. 2014. Effects of NPK, vermicompost and vermiwash on growth and yield of okra. Pantnagar Journal of Research 12 (1): 5-8.
 - I Sharma GD, Thakur R, SomRaj, Kauraw DL and Kulhare PS. 2013. Impact of integrated nutrient management on yield, nutrient uptake, protein content of wheat (*Triticum astivum*) and soil fertility in a Typic Haplustert. The Bioscan 8(4): 1159-1164.
 - I Sharma HL, Singh RN, and Tiwari R. 2013. balanced ternary, ternary group divisible and nested ternary group divisible designs. Journal of the Indian Society of Agricultural Statistics 67(3): 339-344.
 - I Sharma HO, Chouhan RS and Agrawal GP. 2013. Status and profitability of fodder crops in Madhya Pradesh JNKVV Res. J. 47(2):217-223.
 - I Sharma SK, Gajbhiye S and Tignath S . 2014.. Application of principal component analysis in grouping geomorphic parameters of a watershed for hydrological modeling. Appl Water Sci (Springer) DOI 10.1007/s13201-014-0170-1.
 - I Sharma SK, Gajbhiye S, Nema RK and Tignath S .2014. Assessing vulnerability to soil erosion of a watershed of Tons river basin in Madhya Pradesh using Remote Sensing and GIS. International Journal of Environmental Research and Development 4(2):153-164.
 - I Sharma SK, Tignath S, Gajbhiye S and Patil RJ. 2013. Application of principal component analysis in grouping geomorphic parameters of uttela watershed for hydrological modeling. International Journal of Remote Sensing and Geosciences 2(6): 63-70.
 - I Sharma SK, Tignath S, Gajbhiye S and Patil RJ. 2013. Use of geographical information system in hypsometric analysis of kanhiya nala watershed. International Journal of Remote Sensing and Geosciences 2(3):30-35.
 - I Sharma Vandana, Sharma A and Sharma HL.2014. Asymmetrical factorial experiment approach for improved gas/odor discrimination using thick film gas sensor data, International Journal of Science, Environment and Technology 3(1):233-240.
 - I Shekhawat LS, Mahajan KC and Jaiswal A. 2013. Cattle owners and their extent of knowledge about individual animal husbandry practices. Journal of Progressive Agriculture 4(2):41-43.
 - I Shrivastava A. 2013. Assessment of compatibility of *Trichoderma* species with different fungicides in vitro. Int. J. Agricult. Stat. Sci. 09 (1): 101-104.
 - I Shrivastava A. 2013. Studies on variability in different fungicides in the growth of twenty isolates of *Fusarium oxysporum* f. sp. ciceri causing vascular wilt of chickpea Int. J. Plant Prot. 06 (1): 86-89.
 - I Shrivastava B, Singh Y, Tiwari S and Sapre S. 2014. Studies on micropropagation of sugarcane from leaf roll, eye bud and meristem tip. Indian Res. J. Genet. Biotech 6(1):319-323.
 - I Shrivastava, Ashish and Agarwal V. 2013. Effect of root leachate of linseed in the spore germination of *Fusarium oxysporum* f. sp. ciceri. Vegetos 26 (2) 473-475.
 - I Shukla N and Babbar A. 2013. Genetic studies for yield attributing traits among promising lines in chickpea under various environments. JNKVV Res.J. 47 (2): 175-180.
 - I Singh AK, Singh VK, Upadhyay AK, Singh SP and Singh R. 2013. Chlorophyll content in guava leaves as influenced by phosphorus. Technofame 2(2): 21-24.
 - I Singh D and Mourya BM. 2013. Response of Kodo millet (*Paspalum scrobiculatum*) to varying levels of nitrogen under rainfed condition. International Journal of Scientific Research 2(8): 10-11.
 - I Singh G, Koshta LD, Singh S, and Shrivastava A. 2013. Response of plant growth regulators on rooting potential in soft wood stem cutting of *Pongamia pinnata* under spring summer conditions. Journal of Tropical Forestry 29 (4): 1-6.
 - I Singh GP, Prabhu KV, Jain Nilu, Ramaiya

- PP, Singh K, Mishra PC, Mishra SC, Sohu VS and Mavi GS. 2013. MARS and MABC for improvement of drought tolerance in spring Wheat International general resource seminar under generation challenge programme, Lisbon, Portugal pages 54-56.
- | Singh J, Mishra KK and Singh AK. 2013. Current status of web blight of mung bean. *An Asian Journal of Soil Science* 8 (2): 495-504.
 - | Singh KP, Jain PK, Nair B and Sengupta SK. 2013. Association of characters and their direct and indirect contribution for seed yield in Fenugreek (*Trigonella foenum* L.) germplasms. *The Asian Journal of Horticulture* 8(2) : 460-465.
 - | Singh KP, Nair B, Jain PK, Naidu AK and Paroha S. 2013. Variability in the nutraceutical properties of fenugreek (*Trigonella foenum graecum* L.) Seeds. *Rev Col De Cie Hortí - 7(2)*: 228-239.
 - | Singh KP, Nair B, Prem Chand and Naidu AK. 2013. Contribution of fenugreek (*Trigonella foenum graecum* L.) seeds towards the nutritional characterization. *J. Med PI Res.* 7(41) :3052-3058.
 - | Singh M, Wanjari RH, Dwivedi A, and Dalal R. 2012. Yield response to applied nutrients and estimates of N₂ fixation in 33 Year old soybean-wheat experiment on a vertisol. *Expl Agric.* 48 (3): 311-325.
 - | Singh P, Khan IM, Singh S, and Pandey A. 2013. Relative performance of rice hybrids under system of rice intensification. *Agri Sci. Digest* 33(2): 158-160.
 - | Singh P, Shukla UN, Kumar K, Singh S, Kumar V and Kumar R. Evaluation of growth, yield and quality of maize as influenced by genotypes and nitrogen levels. *Bangladesh J. Bot.* 43(1): 59- 64.
 - | Singh R and Shrivastava P. 2013. Productivity enhancement of sesame (*Sesamum indicum* L.) through improved production technologies. *Afr. J. Agric. Res.* 8(47): 6073-6078.
 - | Singh R, Bhadouria Singh TK, Singh J and Haldar A. 2013. Effect of various planting methods on growth and yield of Turmeric (*Curcuma longa* L.) *Plant Archives* 13(2): 1093-1095.
 - | Singh R, Upadhyay AK, Gautam US and Singh VK. 2014. Genetic architecture of quantitative traits in barley (*Hordeum vulgare* L.). *Indian J. Genet.* 74(1):93-97.
 - | Singh R, Upadhyay AK, Shrivastava P, Singh VK and Singh SK. 2014. Productivity enhancement of sesame (*Sesamum indicum* L.) through improved production technologies. *The Bioscan* 9 (01): 107-110.
 - | Singh RB, Singh U, Mishra R and Jha PC. 2013. Regional analysis of technical efficiency of wheat production. *JNKVV Res. J.* 47 (2): 228-232.
 - | Singh S, Shukla UN, Khan IM, Sharma A, Pawa, K, Shrivastava D, Sisodia V, Singh LB, Jerman M and Singh S. 2013. Technologies for water saving irrigation in rice. *Int. J Agri and food Sci Tech.* 4(6):531-536.
 - | Singh TK, Kumar P, and Singh J. 2014. Evaluation of polyembryonic Root stocks of Mango (*Mangifera Indica* L.) in vindhya region of Madhya Pradesh. *Environment and Ecology* 32(1): 67-69.
 - | Singh TK, Singh J and Singh DB. 2013. Performance of mango varieties in kymore platue of madhya pradesh. *Progressive Horticulture* 45(2):268-272.
 - | Singh U, Singh RB and Gautam SS. 2013.. "Stochastic models for describing growth of soybean production and soya oil production in India and Madhya Pradesh. *JNKVV Res. J.* 47(2): 233-238.
 - | Singh, Munna, Aradhna Kumari and Krishan K. Verma. (2013). Physiological, growth, and biomass attributes in *populus deltoides* L. (clones G-48 and Kranti) influenced by water stress. *Arboriculture & Urban Forestry* 39(5): 226-230.
 - | Sisodia RS, Lal M, Vardhan D, Ashok, Singh RB, Mandal A, Manna MC, Singh VK and Brajendra. 2013. Effect of Manure and Chemical amelioration on crop yields and soil biological activities in saline soil of semiarid Indo-Gangatic alluvium (Typic ustrochrepts) type in India. *Indian Journal*

- of Agricultural Sciences 83 (10): 1031-7.
- I Soni N, Patel N, Pandey SK and Tiwari P. 2013. Influence of directions on malformation incidence in different mango malformation (*Mangifera indica* L.) cultivar. Flora and Faun 19(2): 267-276.
 - I Srivastava AK and Yogranjan . 2013. Biological Rain - A new window for harvesting atmospheric moisture. Everyman's Science 48 (4):288-291.
 - I Thakur AS, Barfa SK, Sharma AK and Pachori R. 2013. Effect of different micronutrients on the incidence of major sucking insect pests of tomato. JNKVV Res. J.47 (3): 303-307.
 - I Tiwari RK and Mahajan G. 2013. Response of different rice (*Oryza sativa*) cultivars to varying nitrogen levels under rainfed conditions. Life Science Bulletin 10(1): 10-12.
 - I Tiwari RK and Mahajan G. 2013. Yield and quality of rice cultivars as affected by different doses of nitrogen under rainfed condition of Kymore plateau. Environment and Ecology 31 (4): 1666-1668.
 - I Tiwari G. 2013. Nitrogen and sulphur affect yield attributes, oil/protein content, seed and oil yield in Mustard (*Brassica juncea*) in Kymore plateau zone of Madhya Pradesh, India. The Journal of Plant Physiology. Photon 114:176-183.
 - I Tiwari, Gyanendra, Singh, O. P. and Tiwari, Rajesh. 2012. Medicinal and aromatic herbs diversity in croplands and cultivable wastelands in Malwa Plateau, Madhya Pradesh. Annals of Pharmacy and Pharmaceutical Sciences 3(2): 62-66.
 - I Tomar, D.S. Saxena, Arvind, Kaushik, S.K. Dixit, A.K. and Singh, K.V. (2013) Transfer of improved technology of soybean production through front line demonstration in vertisols of central India : International Journal of Scientific Research 2(5):6-8.
 - I Tripathi N, Saini N, and Tiwari, S. 2013. Morphological and molecular characterization of endangered medicinal plant species *Coleus forskohlii* collected from Central India. J. Crop Sci. Biotech. 16 (4): 253-261.
 - I Tyagi PK, Shukla KC, Chourasia SK and Singh SP. 2013. Critical weed-crop competition period versus yield of sesame (*Sesamum Indicum* L.) at Tikamgarh district of Madhya Pradesh. J. Rural and Agricultural Research 13(2): 107-110
 - I Upadhyay A, Agrawal D and Nayak Preeti Sagar. 2013. Effect of moisture content on bulk density and angle of repose and coefficient of Faba bean (*Vicia faba* L.). International. Journal of Agricultural Engineering 69(2): 391-393.
 - I Upadhyaya SD and Agrawal KK. 2014. Rainfed agriculture in Central India: strategies for combating climate change. JNKVV Res. J. 48 (1):16.
 - I Varma RK and Pathe A. 2013. Morphological and cultural variability of *Rhizoctonia bataticola* causing charcoal rot of soybean ((*Glycine max* (L.) Merrill). JNKVV Res J. 47 (1): 88-94.
 - I Verma SK, Raghuwanshi SRS. Tiwari SC and R.Jain (2013). Effect of gypsum as a source of sulphur on soybean [*Glycine max* (L.) Merrill] at farmer's field on malwa region of Madhya Pradesh. Soybean Research 11(1):29-35.
 - I Vibha and Nidhi. 2014. Management of fusarium wilts of tomato by weeds and mycoflora processed weeds compost. The Bioscan 9(1):197-202.
 - I Vibha PK Jha and Nidhi. 2013. Effect of selective mycoflora amended vermicompost on suppression of root rot pathogens. Journal of Mycology and Plant Pathology 43 (3): 306-313.
 - I Yadav PS, Maurya BM and Dhakad SS. 2013. Long term effect of NPK on rice-wheat cropping system in Madhya Pradesh. Mysore J. Agric. Sci. 47.
 - I Yadav SS, Nayak MK, Srivastava AK, Gupta MP and Tomar DS. 2013. Population dynamics of insect defoliators of Soybean and correlation with weather parameters. Ann. Pl. Protec. Sci. 22 (1) : 208-209 .
 - I Yogranjan, Srivastav AK, Satpute GK. 2014. Bright Farming: An innovative

approach for sustainable socio-ecosystem in climate change scenario. Current World Environment 9(2): 399-402.

RESEARCH

The State of Madhya Pradesh has witnessed the spectacular growth rate in recent years. Prestigious Krishi Karman Award for the second consecutive year for the State of Madhya Pradesh is in confirmation of the achievement. Availability of quality seeds of high yielding varieties with development of matching technologies for nutrient, water and effective management for biotic and abiotic stress made it possible State economy is mainly depends on agriculture and allied activities. Therefore, the development of agriculture sector is a key for overall development of the State of Madhya Pradesh. For steady and sustainable development, there is a need to strengthen research in frontier area such as bio-technology and molecular biology, agro-forestry, bio-energetic, organic farming including biological control of pests and diseases, bio-fertilizers, plasticulture, natural resource management, crop improvement, cropping system, high-tech horticulture, medicinal and aromatic plants, agricultural machinery and allied aspects integrated farming system food processing and post harvest technology, approach besides systematic studies on conservation agriculture.

Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV) revolutionized in agriculture and allied sciences in MP. It is the architect of yellow revolution in Central India and now for

Wheat revolution. The JNKVV, Jabalpur marching ahead with daunting task of agricultural education, research and extension since its inception in 1964. After formation of RVSKVV, Gwalior in 2008, and MPPCVV, Jabalpur in 2009, JNKVV encompasses five Agriculture colleges, one Horticultural Vocational Educational Institute, Garhakota (Sagar), four Zonal Agricultural Research Stations, four Regional Agriculture Research Stations and four Agriculture Research Stations as mentioned below:

Zonal Agricultural Research Stations

1. Head quarter - Directorate of Research Services, JNKVV, Jabalpur - 482004
2. Powarkheda, Hoshangabad - 461 110
3. Kundeshwar Farm, Tikamgarh - 472 001
4. Chandangaon, Chhindwara - 480 001

Regional Agricultural Research Stations

1. Kuthulia Farm, Rewa - 486 001
2. Bamhori Farm, Sagar - 470 002
3. Murjhar Farm, Waraseoni, Balaghat
4. Tribal Agricultural Research Station, Dindori - 481 881

Agricultural Research Stations

1. JNKVV Betelvine Research Station, Navgaon, Chhattarpur
2. Dryland Horticultural Research Station, Rangan, Garhakota, Rehli, Sagar

3. ARS, Tendani, Chhindwara
4. ARS, Sausar, Chhindwara

Multi disciplinary research of applied nature is being conducted on natural resources management, crop improvement, crop production, crop protection, horticultural crops, allied enterprises, post harvest technology, farm machinery, soil and water conservation, energy utilization and socio-economic aspects in all the ZARS, RARS and ARS. Well-equipped modernized farms, workshops, laboratories with all necessary electronic modern equipments, Agro-met center, glass and net houses, e-library, ARIS-Cell with latest information and communication technology strengthen the research activities of the University. JNKVV is implementing research projects funded by All India Coordinated Research projects, ICAR Network projects, ad-hoc research projects, State Plan, State Tribal Plan and Non Plan projects, Madhya Pradesh Agricultural Marketing Board (Mandi), Madhya Pradesh Council of Science and Technology projects, Madhya Pradesh State Biodiversity Board, Dept. of Farmers Welfare and Agriculture Development (RKVY), Department of Science and Technology, Bhabha Atomic Research Centre, Central Biodiversity Board, Agro-Economic Research Center, Cost of Cultivation, Rashtriya Krishi Vikas Yojna, National Food Security Mission, National Horticulture Mission etc. along with internationally funded projects viz. Japan International Cooperation Agency, Japan International Rice Research Institute, Philippines, CYMMIT, Mexico, ICARDA, Syria, ICRISAT etc. to carry out the research work in agriculture and allied fields, besides extending product testing facility for corporate sector. The consultancy processing Cell facilitates testing of products developed by MNCs and Indian Corporate.

The thrust of research continues to be on the development of improved crop varieties resistant/tolerant to biotic and abiotic stresses as well as need based location specific improved crop production and protection

technologies. New research program are also formulated to match the changed scenario of new economic policies and climate change presently JNKVV is catering to the research need of the farmers of the State especially in the following zones seven agro-climatic zones and twenty five districts are under the jurisdiction of the JNKVV, Jabalpur.

1. Chhattisgarh Plain (Balaghat district only).
2. Northern Hill Zone of Chhattisgarh (Mandla, Dindori, Shahdol, Anup-pur, Umaria)
3. Kymore Plateau and Satpura Hills (Jabalpur, Katni, Seoni, Panna, Rewa, Sidhi, Singhroli and Satna).
4. Vindhyan Plateau- Partially (Sagar, Damoh, Raisen and Vidisha districts only)
5. Central Narmada Valley (Narsinghpur, Hoshangabad and Harda)
6. Bundel khand Zone- Partially (Tikamgarh and Chhatarpur)
7. Satpura Plateau (Betul and Chhindwara)

3.1 Released crop varieties

Soybean

JS 20-29 : It is an early variety maturing in 95 days with a high yield potential of 25-30 q ha⁻¹. This multiple biotic stress resistant variety possesses excellent germinability and longevity. The approximate plant population per ha⁻¹ is 0.45 million. It is well suitable for double cropping in rainfed situation. It has semi erect growth habit and most suitable for inter cropping.

3.2 Crop improvement

Soybean

1. All the three soybean entries namely JS 20-79 (2193 kg ha⁻¹), JS 20-53 (2126 kg ha⁻¹) and JS 20-89 (2038 kg ha⁻¹) of JNKVV, Jabalpur ranked first, second and third respectively in the Central Zone under excessive abnormal rainfall conditions and have been promoted in Advanced Varietal Trial. Entries 20-69 (1854 kg ha⁻¹) ranked

first and JS 20-71 (1788 kg ha⁻¹) ranked second in the Central zone, tested under AVT kharif 2013, have been promoted in AVT II in kharif 2014. Three promising entries of this centre JS 20-87, JS 20-96 and JS 20-98 have been included in initial evaluation varietal trial of kharif 2014.



Wheat

MP 3382:

This semi dwarf *Triticum aestivum* wheat genotype has completed its testing in the coordinated trial. It has bold seed, thick culm tolerant to heat, resistant to rusts suitable for early to late sowing.



- | In the year 2013 government of India identified five wheat varieties MPO 1215, JW 3211, JW 1202, MP 4010 and HI 8663, as nutri-rich and the state has been considered as nutri-rich wheat State. Out of five varieties four of these varieties are developed by the university having high protein
- | In the annual wheat workshop of the year 2013 wheat variety MPO 1255 developed

by ZARS powarkheda has been identified as the best available wheat variety for pasta product. Hence, it is recommended for industrial use. The variety MPO 1215 has been evaluated by ICAR, is the best source of vitamin A.

- | Water and nutrient efficient wheat varieties have been developed by ZARS powarkheda. JW-3211 can be yield up to 40 q ha⁻¹ with one irrigation and 50 per cent RDF. While JW 1202 yields up to 50 q ha⁻¹ with just two irrigation.

Sesame

- | Jawahar til-16 (PKDS 41) and jawahar til - 15 (PKDS 55) are under adapted trial for summer sowing in MP. Jawahar til-16 is a white seeded varieties suited for summer cultivation with an yield potential of 900 Kg ha⁻¹. It is tall, profusely branched, more capsules per plant and matures within 90 days. It is resistant to phyllody disease and white fly
- | Jawahar til-15 is brown seeded also suited for summer cultivation has a yield potential of 600-950 kg ha⁻¹. The plant character is similar to JT 15, matures less than 90 days. It is resistant to Cercospora leaf spot disease, capsule borer and leaf roller.

Linseed

- | PKDL-41 is release for whole of MP under irrigated condition has white flowers and brown seed matures in 110-115.
- | PKDL 21 is to be resubmitted to the M. P. state varietal release committee with more data on the farmer's field.
- | PKDL-62 possess multiple disease resistance under multi-location testing pathological testing under natural and artificial condition, it is identified as donor parent for breeders.
- | Extra early variety PKDL 21 and irrigated variety PKDL 41 has been proposed for identification in the M P state varietal identification committee.
- | PKDL 52 (irrigated condition), PKDL 62 (double purpose) are performing well and promoted to final year testing in AVT.

Green gram

- In IVT (mung bean) genotypes KM 13-49 recorded the highest seed yield of 9.72 q ha⁻¹ followed by KM 13-18 (9.67 q ha⁻¹) and KM 13-23 (9.25 q ha⁻¹).

Black gram

- In IVT (urd bean) genotypes KU 13-52 recorded highest seed yield of 9.39 q ha⁻¹ followed by KU 13-03 (9.68 q ha⁻¹) and KU 13-42 (9.25 q ha⁻¹).

Comparative performance of linseed varieties in adaptation to climate change

- Linseed sown on 30th October 2013 gave the highest grain yield of 15.72 q ha⁻¹ over 20th October (14.16 q ha⁻¹), 10th November 2013 (13.07 q ha⁻¹) and 20th November 2013 (12.29 q ha⁻¹). Among different cvs. JLS 66, T-397, JLS 73 and JLS 67 produced grain yield in descending order. Lower production in JLS 67 was mainly due to occurrence of heavy frost during flowering and capsule formation stage.

Kodo-kutki

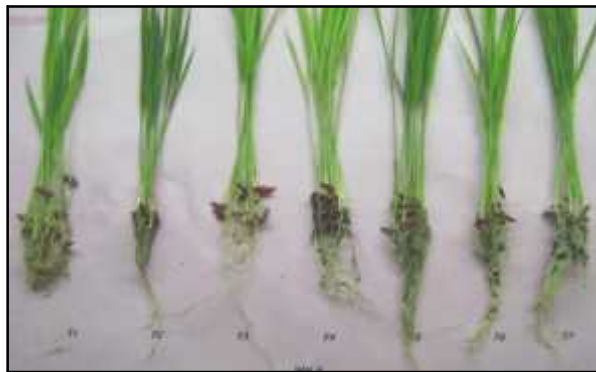
- In kodo millet AVT, dindori's entry DPS 12 recorded second highest grain yield of 1764 kg ha⁻¹ in all India followed by DPS 41-2 (1183 kg ha⁻¹).
- Kodo millet entry DPS 9-1 has been registered in NBPGR.
- Kodo millet entries: DPS 53, DPS 54, DPS 331, DPS 365, DPS 693, DPS 676, DPS 712, DPS 739, DPS 368, DPS 637 (yield potential of 25-30 q ha⁻¹) are identified.
- Little millet varieties DLM 4, DLM 5, DLM 14, DLM 18, (yield potential of 813 q ha⁻¹) were identified.
- Amongst the varieties tested of kodo millet, DPS 53 and DPS 54 were stood best and found promising for Dindori district in MP.
- In the trial comprised of 209 accessions of kodo millet along with check JK 48 grown in augmented design during kharif 2013,

only 31 accessions were selected for positive expressions. Highest grain yield was recorded in the accession DPS 22 (29 q ha⁻¹) followed by DPS 88 (27.58 q ha⁻¹), DPS 6 (26.99 q ha⁻¹) and DPS-12 (26.50 q ha⁻¹), it were higher yield than check JK 48 (19.50 q ha⁻¹).

3.3 Crop production technology

Rice

- Seed treated with thiomethoxam + vitavax grown in soil and vermi-compost medium is giving maximum initial seedling growth which is the best for SRI system



Influence of silicon solubilizers on stress tolerance rice genotypes

- Silicon is one of the beneficial element and its effects realized when plants are under stress situation. Application of silicon solubilizer in the form of carrier molecule i.e. imidazole to solubilize and make it available to rice plant.
- LAI, leaf and culm weight increased during tillering to flowering stage (LAI 2.61 to 2.86 and 5.55 to 5.71 respectively). An increase of biomass accumulation was the ultimate result at maturity.
- An average increase of 10 panicle m⁻² and 10 grain /panicle by silicon solubilizer was recorded.

Wheat

- In restricted irrigation condition, two irrigation at crown root initiation stage and boot leaf stage recorded maximum yield over one and no irrigation.

- | Refinement of dates of sowing, 18th November 2013 sowing gave highest yield over that of 10th and 24th November sowings.
- | Under Weedicide trial in wheat with clodinothop + metsulfuron- 60+4 g a.i. qha⁻¹) recorded highest grain yield which was significantly at par with Accord plus (phenoxaprop + metribuzin- 120 + 210 g a.i. q ha⁻¹), (sulfosulfuron + metribuzin - 32 g a.i. ha⁻¹) and atlantis (mesosulfuron + lodo sulfuron- 14.4 g a.i. ha⁻¹)
- | Under thermal stress tolerance trial in wheat the highest grain yield was recorded by the genotype HD 2687(88.5 q ha⁻¹) and HD 2733 (51.0 q ha⁻¹) in timely and late sown condition, respectively. Whereas lowest grain yield recorded by the genotype HW 2004 (30.0 q ha⁻¹) and HW 2004 (23.0 q ha⁻¹) in timely and late sown condition, respectively.

Sugarcane productivity and profitability under wheat - sugarcane cropping system

- | The autumn planted Sugarcane + wheat (1:2) proved significantly profitable (98.58 t ha⁻¹, B:C ratio 1.28) followed by autumn planted sugarcane + wheat (1:3) (96.76 t ha⁻¹, B:C ratio 1.25).

Priming of cane node for accelerating germination

- | Germination percent and cane yield increased significantly due to treatment of cattle dung, cattle urine and water in 1:2:5 ratio for 15 minutes (59.92 per cent, 86.73 t ha⁻¹, respectively) as compare to conventional 3 bud set planting (49.06 per cent, 80.25 t ha⁻¹, respectively).

Rainfed linseed

- | Dry sowing of linseed with (12.43 q ha⁻¹) and without planking (11.80 q ha⁻¹) followed by comeup irrigation gave slightly high grain yields over seeding after pre sowing irrigation (11.65 q ha⁻¹). Among different varieties, cv JLS 66, JLS 73, JLS 67 and T

397 produced grain yields in descending order.

Sesame

- | Timely harvesting of sesame gave maximum yield (468 kg ha⁻¹) with highest net return of Rs.19,130 ha⁻¹ along with higher B:C ratio (1:2.13) whereas harvesting done earlier or delayed reduced yield level of sesame and profit.
- | Drying of sesame bundles/heaps with the use of tarpaulin gave maximum yield (458 kg ha⁻¹) with higher economics gains of Rs.18530 ha⁻¹ along with higher B:C ratio (1:2.07).
- | Double threshing at 7 and 15 days after harvesting gave better yield (434 kg ha⁻¹) with better economical returns and also higher B:C ratio (1:1.75).

Kodo-kutki

- | Application of 100 percent RDF (40:20:10 NPK kg ha⁻¹) gave significantly higher grain yield (1209 kg ha⁻¹) as compared to 50 percent RDF (1027 kg ha⁻¹) and no fertilizer (744 kg ha⁻¹).
- | Keeping the plots weed free condition throughout the crop growth period has given significantly higher grain yield (1084 kg ha⁻¹) and straw yield (1403 kg ha⁻¹). Critical period for weed competition was first 25-30 days from sowing (593 to 586 kg ha⁻¹ respectively).
- | Inter cropping of kodo millet and pigeonpea (4:2) and opening a conservation furrow between paired rows of pigeon pea was a remunerative practice to enhance the productivity under skeletal soil conditions in little millet based cropping sequence.
- | Little millet in early kharif followed by either early pea or lentil may be grown under sandy soil conditions.
- | Application of RDF (40:20:0 kg NPK ha⁻¹) gave significantly higher grain yield (3279 kg ha⁻¹) and B: C ratio in kodo millet.
- | The highest grain yield of little millet (9.70 q ha⁻¹) was obtained with 40 kg N ha⁻¹ (B:C ration 1.53) followed by 20 kg N ha⁻¹ (7.61 q

ha⁻¹).

- I Dry sowing based on probability of receiving dependable rains at 75 per cent along with 150 per cent recommended plant stand gave significantly higher grain yield (1668 kg ha⁻¹) in little millet and 125 per cent recommended plant stand gave significantly higher grain yield (2578 kg ha⁻¹) in kodo millet.
- I Highest grain yield (17.23 q ha⁻¹), net profit (Rs 3671) and B:C ratio (1.87) of kodo millet was obtained in broadcasting of FYM @ 5 t ha⁻¹ enriched with balance of NPK to make up 10 per cent recommended NPK.

Green fodder

- I Significantly higher yield of oat fodder (2 cuttings) was recorded in open condition (457 q ha⁻¹) at par with de-heading of guava at 1.5 m height. Significantly lowest green fodder yield was recorded under no pruning
- I Oat variety JO 93 recorded significantly higher fodder yield (439 q ha⁻¹) as compared to variety JO 2 and JO 3 which were at par, variety kent gave significantly lowest fodder yield (369 q ha⁻¹).

Intercropping

- I Intercropping of soybean (JS 95-60) with pigeon pea in combination with 4:2 row proportion maximum pigeonpea equivalent yield of 2860 kg ha⁻¹, net income of Rs 81,982 ha⁻¹ with B:C ratio 5.53.
- I Soybean (NRC 37) + pigeonpea in 4:2 row proportion gave the lowest net income Rs 56,277 ha⁻¹ and B:C ratio of 4.78.
- I Soybean + pigeonpea with two varieties of soybean maximum soybean equivalent



yield of 5356 kg ha⁻¹ net income of Rs 84,940 ha⁻¹ with B:C ratio of 5.59 were attained by soybean + pigeon pea (4:2) system. JS 93-05 was superior with a net income of Rs 87,742 ha⁻¹ and B:C ratio of 6.10.

- I Soybean+ pigeon pea intercropping (4:2) gave maximum soybean equivalent yield (5356 kg ha⁻¹) and B:C ratio of 5.60 under drought mitigation trial.
- I Highest chickpea equivalent yield of 1707 kg ha⁻¹ and B:C ratio of 4:30 was recorded with chickpea and mustard (6:2) intercropping.
- I Inter cropping of kodo millet and pigeon pea (4:2) and opening a conservation furrow between paired rows of pigeonpea was a remunerative practice to enhance the productivity under skeletal soil conditions.
- I Following cultural practice of inter cropping of little millet and pigeon pea (4:2) and opening a conservation furrow between paired rows of pigeonpea was a remunerative practice to enhance the productivity in skeletal soil conditions.

Linseed and dwarf field pea inter cropping

- I Intercropping of linseed with dwarf field pea in the row arrangement of 4:4 gave higher linseed equivalent yield (LEY) of 8.58 q ha⁻¹.
- I Linseed (kiran) + gram (JG-130) (4:6) gave linseed equivalent yield (2276 kg ha⁻¹), net economic return (Rs 34746 ha⁻¹) B:C Ratio (1:2.62).
- I Linseed (kiran)+wheat (JWS 17) (4:6) gave linseed equivalent yield (2189 kg ha⁻¹), net economic return (Rs 30716 ha⁻¹) and B:C Ratio 1:2.02).
- I Linseed (kiran) +safflower (JSF-9) ,(4:4) gave linseed equivalent yield (1848 kg ha⁻¹), net economic return (Rs 25,077 ha⁻¹) and B:C ratio (1:1.92).

Weed control

Linseed

- I Post emergence use of clodinafop @ 80 gm a.i. ha⁻¹ +2, 4-D @ 0.50 kg ha⁻¹ at 30-35 DAS proved an alternative of the practice of

hand weeding twice at 20-25 and 40-45 DAS. This treatment gave seed yield (2110 kg ha⁻¹), NER (Rs 30,201), B:C ratio 1:2.76, WCE 88 per cent and WI 8.0 per cent.

- I Among the different weed management practices, integrated weed management of pre-emergent application of isoproturon @ 0.5 kg a.i. ha⁻¹ along with one inter culture gave significantly higher grain yield (1,370 kg ha⁻¹) as compared to other weed management practices.
- I Isoproturon @ 0.5 kg a.i. ha⁻¹ mixed with sand and applied as PE + two inter culture gave highest net profit of Rs 5,698 ha⁻¹ with B:C ratio of 2.13.

Integrated weed management in aerobic rice

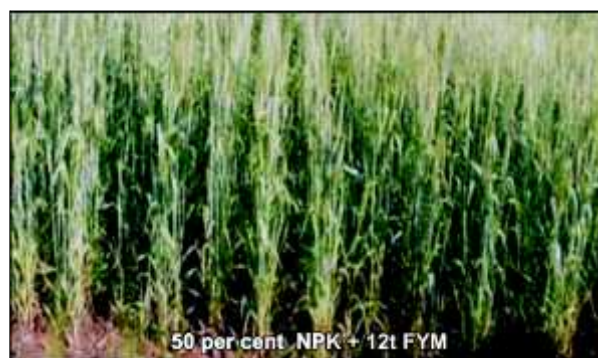
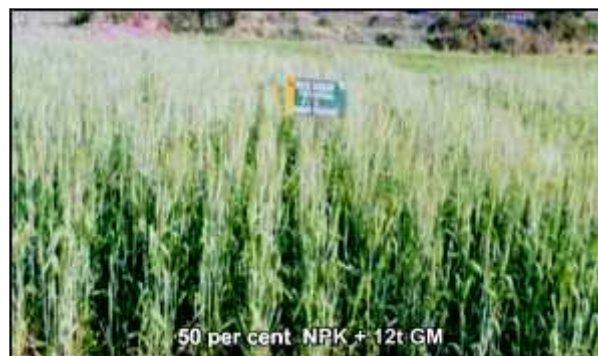
- I Among various methods of weed control under aerobic condition, application of butachlor (50 EC) @ 1.5 kg./a.i. ha⁻¹ (3-4 DAS)+ bispyribac-sodium (10 SC) @ 35 g.a.i ha⁻¹ (15-20 DAS) found superior and obtained grain yield of 6.42 t ha⁻¹ with WCE of 91.07 per cent.

Herbicides for direct seeded rice

- I Application of flucetosulfuron 10 per cent WG (25 g a.i. ha⁻¹) + bispyribac sodium 10 per cent SC (25 g a.i. ha⁻¹) was found superior and obtained grain yield of 7.55 t/ha with 96.87 weed control efficiency.

Integrated farming systems

- I Productivity of individual crop components and cropping system as a whole (WEY),



were maximum (rice 31.74 q ha⁻¹, wheat 30.80 q ha⁻¹ and WEY 52.62 q ha⁻¹ year⁻¹) with the application of 50 per cent NPK through fertilizer+50 per cent N through green manuring to rice and 100 per cent NPK to wheat. The same treatment also produced the maximum system productivity (18.86 kg ha⁻¹ day⁻¹) while the

NMR (Rs. 36,246 ha⁻¹yr⁻¹) and B:C ratio (1.86) were higher where RDF was approved to both the crops.

- I There was a saving of 50 per cent NPK fertilizers through INM without sacrificing the productivity and profit of the cropping system along with the improvement in soil health and dependency on inorganic fertilizers. Based on the sustainability yield index of productivity worked out from the yields of crops during last 28th years, INM treatments particularly fertilizer + FYM or green manure produced almost at par sustainable grain yields of entire cropping system than 100 per cent NPK through fertilizer to both crops.
- I Rice-garlic and Rice-berseem cropping systems gave maximum net profit (Rs.1,66,943 and 1,66,267 ha⁻¹) followed by rice-pea-wheat (Rs.1,32,133 ha⁻¹). These cropping systems were superior than the existing rice-wheat and rice-gram cropping system

Nutrient management in organic farming

- I Rice-berseem system proved to be better than rice-wheat system with regard to productivity and economics under organic farming system.
- I Application of FYM, VC and NC each equivalent to 1/3rd of recommended N was more remunerative than other combinations of organic manures.
- I Gradual improvement in OC content and microbial population of soil was noted over initial status of the soil.

Long range effect of continuous cropping and manuring on soil fertility and yield stability

- I Application of 120 kg N, 80 kg P₂O₅ and 40 kg K₂O ha⁻¹ in rice and wheat gave maximum grain yield on long term basis.
- I Application of 100 per cent NPK on the basis of soil test value (120 Kg N, 60 kg P₂O₅ and 40 kg K₂O ha⁻¹) along with 25 kg zinc sulphate/ ha in rice and wheat gave maximum rice and wheat yield followed by

integrated approaches in which 50 per cent NPK in rice and wheat were given through fertilizer and 50 per cent N was given through FYM.

Soil health and plant nutrient management

Long term fertilizer experiments

- I Imbalance use of fertilizer adversely affected while, integrated use of fertilizer maintained soil fertility and productivity of soybean-wheat in a vertisol.
- I The maximum build-up of OC content (9.9 g kg⁻¹) noted in 100 per cent NPK + FYM treatment over initial values (5.7 g kg⁻¹).
- I Major proportion of added P is known to fix in vertisol. Thus, its continuous additions indicated a build-up (34.2 kg ha⁻¹) against initial status (7.6 kg ha⁻¹).
- I The depletion of soil K was noted (349 kg Kha⁻¹) as against initial status (370 kg ha⁻¹).
- I A declining trend in S status (13.7kg S ha⁻¹) with continuous application of S free fertilizer - DAP (15.6 kg S ha⁻¹).
- I Imbalance use of fertilizers i.e. application of N alone or NP had adverse effect on yield sustainability. However, the role of P in crop production is clearly observed as the yield in NP treatment was found to be significantly higher over N alone.
- I Integration of chemical fertilizers with organic manure was found to be quite promising in improvement of soil fertility status and enhancing productivity of crops.
- I Depletion of S has been manifested through yield reduction by 8 per cent as against 100 per cent NPK in soybean and wheat.
- I The notion that application of chemical fertilizers deteriorates available soil organic carbon is disapproved with the findings of this experiment as there is 33 per cent increase in organic carbon 7.6 g kg⁻¹ with 100 per cent NPK over initial level of 5.7 g kg⁻¹.
- I The results of long term fertilizer experiment indicate that the real response to fertilizers can be realized only when all the essential plant nutrients are applied



(STV) in optimal amounts. Thus monitoring of nutrients becomes important for maintaining sustainability of crop production in years to come.

- | Application of 100 per cent N through compost was superior in all the blocks with a maximum net income of Rs 6,600+ 9424 ha⁻¹, Rs, 13,620+16774 ha⁻¹ and Rs. 9,765 +20,092 ha⁻¹ and B:C ratio 1.53 + 1.75, 2.94 + 2.34 and 2.00 + 2.60 respectively
- | Application of 50 per cent N (urea) + 50 per cent N (compost) + Azotobacter was the 2nd best in rice- wheat block with a net income of Rs 6,730 + 6,556 ha⁻¹ and B:C ratio of 1.60 + 1.50 in black gram chickpea block with Rs 10170 + 13,318 ha⁻¹ in rice + black gram, Wheat-chickpea block Rs. 8,900 + 16,636 ha⁻¹ and B:C ratio of 2.02 + 2.26, 1.26+4.08 and 1.41+4.0 respectively.

Micronutrient, secondary nutrients and pollutant elements in soil and plants

- | 51 per cent and 10.31 per cent soil samples tested were low in Zn and Fe respectively in soils of Umari.
- | Application of 5 kg Zn significantly increased the yield of soybean and wheat Zn content of soybean increased with

increasing level of Zn.

- | Application of 1 kg Boron significantly increased the yield of soybean and wheat and B content of soybean.
- | Application of 5 kg Zn and 40 kg S ha⁻¹ significantly increased yield of rice, wheat, soybean and chickpea over recommended dose of NPK under farmer's field.
- | In MP 71 per cent soil samples analyzed, indicated deficiency of Zn. The deficiency of Fe and Mn was in 7.0 and 2.4 per cent soil samples respectively whereas soils were sufficient in copper. The deficiency of S was noticed in 40.6 per cent.
- | Critical limits of Zn, S and Fe have been established for different soils and crops which can be used by soil testing laboratories and researchers for diagnosing nutritional disorder.
- | To ameliorate Zn deficiency, application of 10 kg Zn ha⁻¹ to heavy clay soil and 5 kg Zn ha⁻¹ to light textured soils have been recommended.
- | The residual effect of 10 kg Zn ha⁻¹ persisted up to 6 crops in soybean wheat sequence giving the response at 51.3, 34.3 and 17.9 per cent in soybean and 11.4 to 13.6 per cent in wheat. Response reduced

to 5 per cent in 8th crop. Available Zn increased from 0.26 to 2.45 mg kg⁻¹ after 1st crop and then decreased gradually to 0.40 mg kg⁻¹ after 8th crop.

- | Zinc and iron deficiency in standing crops can be corrected by the foliar spray of 0.5 per cent and 2 per cent of ZnSO₄ and FeSO₄ respectively at an interval of 10 to 15 days.
- | Application of 1.25 kg ha⁻¹ boron increased yield of cauliflower and highest net income over other doses of boron application.
- | The coating of soybean and chickpea seed with ammonium molybdate @ 1.0 g per kg seed significantly increased the yield (21.8 per cent) over control in vertisol of jabalpur.
- | Under low cost input technology, yield of wheat, pulses and oilseed increased by 23, 26 and 27 per cent respectively, over control due to application of 200 kg FYM enriched with 5 kg Zn ha⁻¹ by incubating for 30 days which was at par with the yield obtained at 10 kg Zn ha⁻¹.
- | The content of heavy metal in soil was increased where soils were irrigated with sewage effluent in comparison to ground water from tube well.
- | Analysis of blood plasma indicated hypozincaemia in the patients suffering from IHD, liver cirrhosis, renal disorders and acute UTI.
- | Sulphur deficiency in soils is corrected by application of 20 to 40 kg S in maize, sorghum, soybean, urid, wheat and gram and 40 to 60 kg S in mustard.
- | In both Zn and S deficient soils, application of 5 kg Zn + 40 kg S ha⁻¹ is recommended along with the recommended dose of NPK to most of the crops as they gave 28 and 39 per cent higher pulses and oilseeds yield respectively.
- | Various soil test methods were evaluated for suitability of zinc. Among them DTPA soil test for Zn proved better than other extractants for predicting available Zn status of soils. Ammonium bicarbonate DTPA extractant was also equally good for predicting availability of Zn phosphorus

and potassium in soil.

- | The fate of soil Zn was evaluated by fractions of Zn, among the various chemical pools of Zn in vertisol water soluble fraction is contributing only 0.10 per cent to total pool of Zn while, maximum 91% contributed by residual fraction.
- | Among the fertility gradients tested on Kodo millet, application of 100 per cent RDF (40:20:10 NPK kg ha⁻¹) gave significantly higher grain yield (1209 kg ha⁻¹) as compared to 50 per cent recommended dose of fertilizer (1027 kg ha⁻¹) and no fertilizer (744 kg ha⁻¹).

Onion and garlic

- | Experiment was conducted under IPNS mode with yield target of 100, 150 and 200 q ha⁻¹. Actual yields experienced against targeted one were 99.5, 132.2 and 171.0 qha⁻¹ which were under achieved to the extent of 0.5, 11.9 and 14.5 per cent, respectively.

Biodiversity and bio-fertilizers

- | Field evaluation trial with carrier (dried FYM passed through 0.2 mm sieve and sterilized (wet and dry before using) based inoculants of 17 actinomycetes isolates were conducted on maize (JM 216) along with only carrier (without inoculums), fertilized (120:60:40) un-inoculated and UFUI (unfertilized un-inoculated controls).
- | Isolate B10 gave the highest yield of 4034 kg ha⁻¹.
- | Six more isolates (B1, B2, B6, B9, B12, B14,) were at par to it with average yield of 3740 kg ha⁻¹.

Liquid formulations of bio-fertilizer consortia on chickpea

- | Liquid formulations of screened actinomycetes isolates (B6, B10) individually and mixed consortium (CRP) of Rhizobium (R40, R56) and PGPR (P3, P10, P25) were evaluated separately and in combination on chickpea (JG-16) along with 20:80:20 without inoculum and UFUI.

- Combination of fertilization + B6 + B10 + CRP gave the highest yield of chickpea (2538 kg ha⁻¹) and it was 48 per cent more over FUI (1805 kg ha⁻¹).

Population behavior of soybean-rhizobia

- Wheat inoculation with soybean rhizobia is beneficial. Soybean rhizobia exhibited PGPR effect to wheat. MPN counts of soybean rhizobia in soil were higher with inoculated and fertilized plots.
- MPN counts of soybean rhizobia in soil varied significantly among different cropping sequences (paddy-wheat; maize-wheat; soybean-chickpea; maize-chickpea; soybean-wheat under different treatments (control, 100 per cent NPK, 100 per cent NPK + FYM).

Crop physiology

Screening of maize (*Zea mays* L.) genotypes for physiological efficiency and productivity

- The investigations revealed that the maize genotype Kaveri Super 244 out yielded

other genotypes (48.39 g plant⁻¹ and 6452 kg ha⁻¹) owing to its highest chlorophyll index (21.40), dry matter production (101.87 g plant⁻¹), comparatively higher carboxylation efficiency (0.049 $\mu\text{mol m}^{-2}\text{s}^{-1}$) and water use efficiency (3.57 $\mu\text{mol mmol}^{-1}$) reflected in its highest plant height (153.98 cm), no. of cobs plant⁻¹ (2.0), no. of grains cob⁻¹ (227.84), cob length (25.19 cm), cob girth (39.10 mm), biological yield (127.65 g plant⁻¹ and 17019 kg ha⁻¹) and ultimately grain yield.

- Genotypes Kaveri 25-K60 for quantum efficiency (0.0125) and photosynthetic rate (14.96 $\mu\text{mol m}^{-2}\text{s}^{-1}$), Kaveri 25-K45 for carboxylation efficiency (0.057 $\mu\text{mol m}^{-2}\text{s}^{-1}$), HPQM for water use efficiency (4.74 $\mu\text{mol mmol}^{-1}$), mesophyll efficiency (1523.60 ($\text{mol mol}^{-1} (\text{mol m}^{-2}\text{s}^{-1})^{-1}$)) and HI (40.15 per cent) and lowest stomatal conductance (0.19 $\text{mol m}^{-2}\text{s}^{-1}$), transpiration rate (3.15 $\text{mmol m}^{-2}\text{s}^{-1}$) for drought resistance.

Yield and yield contributing attributes in maize genotypes

Treatment Genotypes	Plant height (cm)	No. cobs/plant	No. of grains/cob	cob length (cm)	cob girth (mm)	100 grain weight (g)
G-1 3110	147.88	1.00	152.66	23.66	32.10	20.51
G2- KAVERI SUPER 244	153.98	2.00	227.84	25.19	39.10	21.44
G3- KMH 3696	149.47	1.33	132.82	24.96	33.52	29.39
G4- KMH 2589	146.86	1.00	122.40	22.9	33.43	20.45
G5- KMH 3712	146.5	1.00	162.28	24.72	33.20	25.86
G6-KAVERI 25-K60	147.7	1.67	157.60	23.67	33.26	24.38
G7-KAVERI 25-K45	153.5	1.00	162.86	25.01	33.97	21.69
G8- HPQM	138.9	1.00	142.26	23.03	31.90	18.81
SEm \pm	0.3508	0.1606	0.7408	0.2190	0.1338	0.5763
CD @ 5 per cent	1.0617	0.4861	2.2421	0.6629	0.4049	1.7442

Physiological investigation on optimization of niger (*Guizotia abyssinica*) (L.f.) production under resource constraints environment

- The various treatment combination of resource constraint environment exhibited

a significant variability in phenological development, physiological growth

phenophase development significantly affected by full package treatment and reduction of agronomic practices. The treatment comprised full package treatment caused earliness in attainment of general flowering, completion of flowering, reproduction phase period, physical and physiological maturity as compared to after resources.

- I Quantification of different physiological traits indicated maximum photosynthetic ratio obtained with full package treatments (T1) at par with treatment T3 and T4 (without plant protection and thinning) however QUE, stomatal conduction, transpiration rate, WUE and carboxylation affected by resource constraint treatments.
- I Maximum chlorophyll content index was obtained with without weeding and plant protection due to supply of sufficient nutrient. Full package treatment estimated maximum content of seed protein and seed oil along with seed oil yield of Niger and considerable reduction was noted with resource constraint environments including control.
- I The improvement in structural yield attributes caused a significant impact on maximum realization of yield potential. Full package treatment showed significantly higher plant height, number of nodes, seed/capitulum, seed index, biological yield and harvest index which finally resulting in higher yield and at par with without plant protection.
- I It may be concluded from this research investigation that the treatment with full package (T1) caused a significantly improvement in various phenological development, physiological growth determinants and parameters, chlorophyll content index, biochemical estimation morphological structural yield component and productivity which finally resulting in registering maximum seed yield. A reduction in seed yield was noticed when the Niger crop was grown under resource constraint environment.

Screening of soybean (*Glycine max* (L.) Merrill) genotypes for morpho physiological traits of productivity

- I Study of phenological traits indicated that JS 20-91 had the earliest flower initiation (37.75 days), pod emergence (46.25 days) and days to seed formation (56 days), however JS 20-82 was found to be associated with longer reproductive phase (56 days). JS 20-89 (81.50 days) attained the physiological maturity at the earliest. These traits may be utilized in a breeding programme.
- I Genotypes JS 20-79 for higher dry matter production in pods (21.13g plant⁻¹) as well as total (39.48 g plant⁻¹), average maximum LAI (5.02), LAD (16674.16 cm² days), water use efficiency (3.71 $\mu\text{mol}/\text{mmol}$), protein (43.15 per cent) and fat (22.25) JS 20-91 - chlorophyll index (34.77 g m²) and quantum efficiency (0.020), JS 20-88- transpiration rate and (6.94 mmol m² s⁻¹) stomatal conductance (0.795 mol/m²s⁻¹), JS 20-89-photo-synthetic rate (23.26 $\mu\text{mol}/\text{m}^2 \text{ s}^{-1}$) and carboxylation efficiency (0.077 $\mu\text{mol}/\text{m}^2/\text{s}^{-1}$ ($\mu\text{molmmol}^{-1}$)⁻¹), JS 20-53 - mesophyll efficiency (582.42 ($\mu\text{mol mmol}^{-1}(\text{mol m}^{-2} \text{ s}^{-1})^{-1}$) and may be utilized in a breeding programme for mentioned traits.
- I Genotype JS 20-79 possessed higher dry matter in pods (21.13 g), LAI (5.02), LAD (16674.16 cm² days) higher WUE (3.709 $\mu\text{mol}/\text{mmol}$), protein (43.15 per cent) and fat (22.25 per cent) resulted in highest magnitudes of plant height (112.94 cm), number of seeds/pod (3.25), seed index (13.45 g), pod length (44.91 mm), pod girth (4.58 mm), pod width (8.06 mm), number of pods/ plant (180.00) which in turn had reflected in highest grain yield (10.61 g plant and 2611.90 kg ha⁻¹).
- I JS 20-86 was ranked second in yield performance (9.31 g plant⁻¹ and 2323.65 kg ha⁻¹) owing to comparatively higher magnitudes for number of pods/plant (134.00), number of seeds/pod (2.75), seed index (12.65 g), pod length (40.25

mm), pod girth (4.30 mm), and pod width (7.62 mm) resultant of comparatively higher magnitudes of physiological parameters.

Effect of foliar application of nutrients on wheat (*Triticum aestivum* L.)

- I A linear pattern of LAI accumulation was noted with the advancement of crop growth and maximum at 75-90 DAS for boron @

Bio-chemical constituents in different soybean genotypes

Genotypes	protein per cent	fat per cent	fibre per cent	carbohydrate per cent	ash per cent
G1 JS 20-53	40.76	20.07	3.62	18.35	4.25
G2 JS 20-74	38.42	18.83	4.08	21.13	5.23
G3 JS 20-79	43.15	22.25	3.77	19.19	3.90
G4 JS 20-82	38.61	19.46	4.47	20.80	4.63
G5 JS 20-86	39.77	21.41	3.91	18.25	5.16
G6 JS 20-88	38.92	18.76	4.29	19.90	5.41
G7 JS 20-89	41.35	20.50	3.71	17.54	3.91
G8 JS 20-90	39.43	19.81	3.87	20.01	4.23
G9 JS 20-91	39.78	19.73	4.05	19.64	4.83
G10 JS 97-52	40.32	21.67	3.70	18.73	4.17
SEm±	0.0586	0.0298	0.0379	0.0317	0.0404
CD at 5 per cent	0.1699	0.0866	0.1099	0.0920	0.1172

0.25 per cent maximum LAD was noted with FeSO_4 @ 0.25 per cent at DAS. The foliar application of MgSO_4 @ 1.0 per cent enhanced the SLW at DAS while RGR was maximum ZnSO_4 @ 1.50 per cent DAS. The physiological parameters was also significantly increased by foliar spray of nutrients as Boron @ 0.25 per cent enhanced PAR but FeSO_4 @ 0.25 per cent improved net photosynthesis and transpiration rate was high MgSO_4 @ 1.0 per cent. The foliar spray of ZnSO_4 @ 1.0 per cent increased water utilization and maximum stomatal conductance was expressed by CaCO_3 @ 1.50 per cent.

- I Number of general leaf and total number of leaves per plant was maximum under foliar application of CaCO_3 @ 1.0 per cent at 105 DAS. Under foliar application of nutrients ZnSO_4 @ 1.50 per cent number of penultimate and flag leaf per plant was found to be maximum at 75 DAS.
- I The dry weight of general leaf, penultimate leaf and flag leaf exhibited maximum value at 105 DAS for foliar application of ZnSO_4

@ 0.50 per cent, 1.0 per cent, 1.50 per cent respectively. Stem dry weight exhibited

improve significantly various physiological parameters and growth determinants, physiological properties, nitrogen content, proximate parameters and forskolin content in roots, morphological yield attributing parameters which finally resulted in maximum dry root yield of coleus.

Evaluation of bio-efficacy, phytotoxicity and residue analysis of mepiquat chloride 5 per cent AS plant growth regulator on Potato crop

- | All the treatments recorded the increased tuber yield owing to highest tuber length, tuber width, tuber girth, tuber volume, and weight/tuber.
- | Treatment mepiquat chloride 5 per cent AS @ 2500 ml) out yielded other treatments due to its highest tuber width (39.21mm) and tuber weight (57.08 g tuber⁻¹).
- | Check CHAMATKAR M.C. 5 per cent AS @ 1500ml and Check CHAMATKAR M.C. 5 per cent AS @ 1250 ml stood equal in yield performance owing to higher yield characters and a comparatively higher magnitudes for other yield components.
- | Reduction in vegetative growth was noticed during the later phase of growth in treated plants. The highest LAI (2.10) and LAD (24,835.89 cm² days) and harvest index (80.16 per cent) were recorded in treatment mepiquat chloride 5 per cent AS @ 3000ml.
- | Based on these investigations it is recommended that the mepiquat chloride 5 per cent AS @ 2500 ml ha⁻¹ should be sprayed evenly on potato crop at 45 DAS for better crop and yield contributing characters.

Effect of foliar application of paclobutrazol on growth and yield of pigeon pea (*Cajanus cajan* (L.) Millsp.)

- | Seed yield (q ha⁻¹) was significantly influenced by the foliar application of paclobutrazol. The seed yield was varied from 10.23 q ha⁻¹ to 12.73 ha⁻¹. The low

seed yield was registered due to heavy continuous rains during active crop growth period. The maximum seed yield 12.73 qha⁻¹ was registered under paclobutrazol 40SC @ 90ml ha⁻¹. The minimum seed yield was noted in control (10.23 q ha⁻¹). There was 24.41 per cent increase in yield was recorded over control as per the data revealed.

- | No phytotoxicity on pigeon pea was observed with paclobutrazol 40 SC at doses 75 ml, 150 ml and 300 ml ha⁻¹.
- | Foliar application of paclobutrazol 40SC @ 90 ml ha⁻¹ showed marked influence on the growth and seed yield components of Pigeon pea. The foliar application of Paclobutrazol Paclobutrazol 40 SC @ 90 ml ha⁻¹) at 60 DAS enhanced the seed yield (12.73 q ha⁻¹). This is the 24.41 per cent increase in seed yield over control.

Selection and utilization of water logging tolerant cultivars in pigeon pea

- | Genotypes ICPB 2039, JKM 7 and KPBR 80-2-1 attained the highest survival percentage after seven days water logging.
- | After 6th and 8th days of drain out genotype ICPB 2039 exhibited maximum survival percentage, while in fourteen days water logging the maximum survival percentage was achieved by ICPL 87051.
- | After 6 days of drain out maximum survival percent was noted in ICPB 2039 and 8 days of drain out maximum survival percent was noted in ICPH 2431.
- | Under seven days water logging genotype ICPH 2431 was superior for plant height, leaf area, chlorophyll content, root length, root capacitance and total dry matter production and genotype JKM 7 showed maximum relative water content in control and waterlogged condition respectively.
- | Fourteen days water logging treatment genotype ICPH 2431 achieved maximum chlorophyll content, relative water content, root capacitance and total dry matter production and JKM 7 for plant height under control and waterlogged condition

respectively. Maximum leaf area and root length were exhibited in JBP 110-B under control and JP 10 and JKM 7 under waterlogged conditions.

Water management

- | The average seed yield of paddy under the SRI was maximum (48.8 q ha^{-1}) which was 9.77 percent more than the yield of transplanting method with 1 DADPW (44.5 q ha^{-1}) and 28.21 per cent more than the yield under continuous submergence condition (farmers practice) 38.1 q ha^{-1} .
- | The net return Rs.1,50,302 ha^{-1} and B:C ratio 6.37 were found maximum under the SRI method. The data showed maximum water expense efficiency $51.64 \text{ kg ha}^{-1} \text{ cm}$ with SRI method.
- | The result revealed that the coriander crop with four irrigation and one cutting gave 7.67 q ha^{-1} seed yield and 39.00 q ha^{-1} green leaf yields which in turn resulted in Wheat equivalent yield of 59.12 q ha^{-1} as against 39.32 q ha^{-1} yield of Wheat. The net monetary returns of Rs. 65,469 ha^{-1} and B:C ratio 3.85 with coriander were found to be substantially higher than the value with Wheat i.e. Rs.36,980 ha^{-1} and B:C ratio 2.68. The water productivity was also higher with coriander $29.48 \text{ kg ha}^{-1} \text{ cm}$ as compared to Wheat crop.
- | The data revealed that seed yield of Wheat (3908 kg ha^{-1}) under FIRBS method with irrigation at 1.0 IW/CPE ratio was considerably higher than the yield with conventional method (3711 kg ha^{-1}). The WUE with FIRBS ($108 \text{ kg ha}^{-1} \text{ cm}$) was also higher as compared to conventional ($102.6 \text{ kg ha}^{-1} \text{ cm}$).
- | During kharif season broad bed furrow (BBF) sowing proved superior over conventional method (Normal planting).
- | In case of Sorghum, the seed yield was significantly higher (1857 kg ha^{-1}) with BBF as compared to flat bed method (1357 kg ha^{-1}). Sesame and soybean seed yields were found to be very low due to incidence of insect-pest complex and continuous

heavy rains.

- | The economic evaluation revealed that Wheat-Sorghum crop sequence gave maximum Wheat equivalent yield (5748 kg ha^{-1}), net monetary returns (44420 ha^{-1}) and B:C ratio (2.06) followed by Wheat - soybean crop sequence.

Quality analysis of irrigation water in tawa command

- | The mean pH value of water in Tawa command area (ORP) was 8.5 (range 8.4 - 8.8) (Table 1.4.1). The electrical conductivity of water varied between $0.24 - 0.75 \text{ dsm}^{-1}$ and mean value of EC was 0.60 dsm^{-1} .
- | Based on electrical conductivity values, water samples were rated as highly saline (C2) which showed that this water cannot be used for irrigation under restricted drainage. Based on Sodium Absorption Ratio (SAR) values of all 12 samples were rated as no sodium hazards and can be used for all types of soil safely in command area.
- | Based on residual sodium carbonate (RSC) values (0.13 to 2.55 and mean value of 1.51 me/l) this water was rated as marginal limit and can be used for all types of soils with proper drainage conditions.

3.4 Plant protection

Pest management

Soybean

- | *Beauveria bassiana* (DOR), was found to be most effective against lepidopteran defoliator complex of soybean (94-98 per cent larval mortality) followed by *Metarhizium anisopliae* (92-98 per cent larval mortality) and *Verticillium lecanii* (94 per cent larval mortality) respectively. Similar findings were observed in the field also.

Paddy

- | Treatment Bifenthrin 10 per cent EC @ 50 g a.i. ha^{-1} and WCPL 240 @ 1250 ml ha^{-1}

were found to be most effective against Lepidopteran pest complex of paddy (leaf folder and yellow stem borer) and also registered highest grain yield without any phytotoxic effect on the crop.

Black gram

- I Novaluron 8.8 SC @ 62.5 g a.i. /ha and novaluron 5.25 per cent + indoxacarb 4.5 per cent SC @ 825 ml ha⁻¹ were found to be highly effective against thrips and aphids infesting black gram and also recorded maximum grain yield and did not have any phytotoxic effect on the crop.

Pigeonpea

- I Studies on influence of climate change on bio-diversity of natural enemies of insect pests of Pigeon pea revealed that a total of six natural enemies was recorded on pigeon pea which included lady bird beetle, *Cheilomenes sexmaculatus* Fab.; spiders; dragon fly, damsel fly, mud wasps and *Cotessia* (=Apanteles) sp. Maximum populations of all the natural enemies were observed on sole Pigeon pea crop under unprotected condition in comparison to protected condition.

Chickpea

- I Novaluron 5.25 per cent + indoxacarb 4.5 per cent SC @ 825 g ha⁻¹ and novaluron 5.25 per cent SC @ 62.5g a.i. ha⁻¹ were found to be highly effective in reducing the gram pod borer infestation on chickpea without any phytotoxic effect on the crop.

Vegetables

- I NC-512 @ 250 ml ha⁻¹ was found to be most effective against insect pest complex of chilli. Oxymatrine 0.5 per cent EC @ 500 ml ha⁻¹ was found to be most effective against insect pest complex of okra and tomato and also registered highest fruit yields.

Small Millets

- I The most effective control of shoot fly was

attained by use of seed treatment with imidachloprid 0.3 ml lt⁻¹ 4.18 per cent, 2.04 per cent and 2.35 per cent followed by chlorpyrifos 2ml lt⁻¹ 4.70 per cent, 3.65 per cent and 2.86 per cent respectively.

Kodo

- I The percent incidence of shootfly ranged from 2.57 per cent to 12.92 per cent. The maximum incidence being in DPS 110 and minimum in RK 971.
- I Ten varieties Vvz. RK 971, DPS 45, BK 22, BK 2, RK 739, RK 390-25 RK 58, NDLK 1, BK 5 and JK 48 were found promising against shoot fly with its incidence below 5 per cent.
- I Application of higher doses of nitrogen (20 to 40 kg N ha⁻¹) reduces the Striga emergence in Kodo millet.

Management of borer complex of sugarcane through pheromone trap

- I Six pheromone traps acre⁻¹ from 2nd fortnight of February and change of lure every 2 months reduced the ESB infestation by 14.62 per cent. The pheromone traps can be used as monitoring tool for early shoot borer and timely implementation of IPM. The moth captures at traps found to be positively correlated with field population.

Bio-efficacy of new insecticides for the control of sugarcane early shoot borer.

- I Soil application of chlorantraniliprole 0.4 G @ 22.5 kg ha⁻¹ at planting and 60 DAP found effective in reducing the early shoot borer infestation (2.84 per cent) significantly and increasing the cane yield (107.52 t ha⁻¹, 14.26 per cent increase) as compared to other treatments and control (18.32 per cent and 94.10 t ha⁻¹).

Disease management

Rice leaf blast

- I Trifloxystrobin + tebuconazole @ 0.4g l⁻¹ gave outstanding result for controlling the

leaf blast of rice (13.73 per cent) and increased the grain yield (69.50 q ha^{-1}) followed by Propiconazole (16.7 per cent) and Kresoxim methyl (19.63 per cent) over untreated check (49.9 q ha^{-1}).

False smut of rice

- I Propiconazole 25 EC @ 1 ml l^{-1} at 50 per cent PE gave most promising results for controlling the false smut of rice (3.5 per cent) followed by trifloxystrobin 25 per cent + tebuconazole 50 per cent @ 1 ml l^{-1} at 50 per cent PE (4.1 per cent) and increased the grain yield over control.



Integrated disease management of soybean

- I Seed treatment with thiamethoxam 70 WS @ 3 g kg^{-1} seeds + Spray of imazethapyr $100 \text{ g a.i. ha}^{-1}$ in plot and bunds at 25 DAS + barrier crop of sorghum/maize + yellow sticky traps 15 days after sowing + spray of quinalphos @ 2 ml lit^{-1} at 30-35 days after sowing had reduced white fly count and disease intensity of YMD with increase in yield.

Biological control of *P. thornei* and disease complex in soybean

- I Reduction in nematode population and increase in yield due to *T. harzianum* (2.5 kg ha^{-1}) + *P. chlamydosporia* @ 10 kg ha^{-1} talc formulation.
- I Among the organic compounds along with *Trichoderma viride*, maximum yield was recorded with combination of neem cake @ 10 g/m^2 and *T. viride* @ 2.5 kg ha^{-1} (12.64 q ha^{-1}) with nematode population 204 N/200cc soil followed by soil application of *T. viride* @ 2.5 kg ha^{-1} where 12.33 q ha^{-1} yield with 172.5 nematode population.

Millets

- I Seed treatment with carboxin @ 2 g kg^{-1} seed is highly effective in controlling head

smut of little millets besides producing higher seed yield followed by ST with carboxin $1 \text{ g} + T. viride 2.5 \text{ g kg}^{-1}$ seed.

- I Seed treatment with carboxin and carbendazim @ 2 g kg^{-1} seed controls (72.2 to 74.6 per cent) the grain smut of little millet.
- I Sheath blight of Kodo millet and Little millet may be managed economically by seed treatment with validamycin followed by hexaconazole @ 2 ml kg^{-1} seed.
- I One foliar spray of non-conventional chemical namely salicylic acid and sodium fluoride @ 200 ppm were found to induce the resistance in little millet and Kodo millet by reduced sheath blight incidence (36.2 to 38.2 per cent) in Kodo millet and 45.1 to 45.7 per cent in Little millet.

Potato

- I Incidence of soil borne disease i.e., pitted and brown rot ranges from 0.3 to 0.45 per cent and 0.6 to 2.1 per cent. Variety K. Surya exhibited minimum incidence of all soil borne diseases (Pitted type and brown rot).
- I Mainly early blight and phoma disease

observed on all CVs of potato. Maximum incidence of early blight and phoma i.e. 26.2 and 10.9 per cent recorded on K. ashoka and K. Pukhraj respectively. However cultivar K. Surya exhibited least incidence of all diseases.

- | Variety K. Surya exhibited minimum incidence of all soil born diseases (pitted type and brown rot)
- | Maximum incidence of stem necrosis (14.33 per cent and 14.23 per cent) recorded on variety K. Bahar and K. Jyoti respectively. While minimum incidence of 11.76 per cent noticed in K. Pukhraj.

Management of foliar diseases of onion

- | 0.25 per cent mancozeb at 30DAT, 0.1 per cent propiconazole at 45 DAT and 0.25 per cent COC at 60DAT was observed to be superior treatment among the other treatments with regard to minimum incidence of stemphyllium blight (8.61), purple blotch (17.12), anthracnose (5.22) and the maximum total yield (34.47 t ha⁻¹).

Bio-pesticide for management of M. incognita nematode in tomato

- | Initial nematode population 243.7 to 275 N/200 cm³ soil.
- | Carbofuran @ 10g/m² reduced nematodes (142.75 N) with maximum (340.8 kg) yield with 3.10 gall index.
- | Paecilomyces lilacinus (@ 50g/m²) + P. lilacinus (@ 5 kg/ha) along with FYM reduced nematode (145.5) with 3.45 gall index and 337.65 kg yield.

Bio-pesticide for management of M. incognita nematode in okra

- | Maximum yield (20.09 q ha⁻¹) was recorded with seed treatment with carbosulfan @ 3 per cent a.i. with 192.7 nematodes
- | Paecilomyces lilacinus incorporated with FYM /vermicompost (2.5 tons) mixed with the field soil, showed 14.49 q ha⁻¹ yield with 179.2 nematodes/cm³ soil.
- | P. lilacinus @ 20 g kg⁻¹ as seed treatment and its incorporation in soil with FYM

recorded 13.70 q ha⁻¹ yield with 205.7 nematodes as final population.

Integrated disease management of betelvine

- | Sanitation + one soil application of bordeaux mixture (1 per cent) at pre monsoon + application of T. viride one month after application of bordeaux mixture + second application of bordeaux mixture, two month after the first application of bordeaux mixture has been recommended for diseases management and better leaf yield.

3.5 Horticulture

Potato

- | Highest total tuber of 32.98 t ha⁻¹ recorded with the application of 300 kg nitrogen along with RD of P and K but the treatment with application of nitrogen 225 kg ha⁻¹ and 150 kg nitrogen ha⁻¹ (32.70 and 32.19 t ha⁻¹) were at par with higher dose of 300 kg nitrogen.
- | Highest net return of Rs 1,44,474 ha⁻¹ recorded with application of 300 kg nitrogen ha⁻¹.
- | However treatment 225 kg ha⁻¹ N (Rs. 144056) and 150 kg ha⁻¹ N (Rs. 140838) were at par with higher dose of 300 kg ha⁻¹ nitrogen along with RD of P and K.
- | Application of 100 per cent RDF of NPK recorded higher yield 36.3 t ha⁻¹ and at par with higher dose (150 per cent RDF).
- | Spray of metribuzin @ 0.75 kg ha⁻¹ as post emergence at 10 per cent of plant emergence found more effective to control the weeds (4 sqm area) and recorded higher yield of potato 37.7t ha⁻¹ against weedy check (24.5t ha⁻¹) This was also effective as pre emergence to control weeds and getting yield of 35.9 t ha⁻¹. Spray of metribuzin @ 0.75 kg ha⁻¹ gave maximum economic returns also.

Fruit crops

- Tamarind fruits collected from different locations. Significantly higher net profit (Rs. 43,161 ha⁻¹) was recorded under 1.5 m deheading of guava at par with no deheading and was significantly superior to deheading at 2.0 m height (Rs. 40495 ha⁻¹) and 1.0 m height (Rs. 40,290 ha⁻¹).

Survey and collection of tamarind

- Fruit weight varied from 16.65 to 22.78 g., number of seeds from 3 to 6, pulp percentage from 59.60 to 71.50 and TSS percentage from 7.5 to 10.5, acidity(%) 1.32-1.57.
- Maximum fruit weight was recorded in JT-7 (22.78 g) followed by JT-8 (20.65 g). The maximum pulp percentage was recorded in JT-7 (71.5 per cent) followed by JT-6 (65.01 per cent) while minimum in JT-5 (59.6 per cent).
- Maximum TSS was recorded in JT-6 (10.5) and acidity in JT-8 (1.57 per cent).

Survey and collection of jamun

- Maximum fruit weight was recorded in JJ-9 (14.1 g) with 77 percent pulp and minimum acidity (0.29 per cent).
- Maximum pulp percentage (81 per cent) was recorded in JJ-8 with acidity 0.37 per cent . The fruit weight varied from 12.1 g to 14.1 g, stone weight 2.4 to 2.9 g and pulp percentage 72-81.

Effect of salicylic acid on onion production

- The treatment foliar application of salicylic acid at 30 DAS and second spray at 30 DAT and third spray at 45 DAT recorded the maximum equatorial diameter (42.470 mm), polar diameter (40.550 mm) and marketable yield (28.33 t ha⁻¹). However, total bulb yield was the highest in foliar application of salicylic acid at 30 DAS and second spray at 30 DAT and third spray at 60 DAT (29.867 t ha⁻¹).

Evaluation of integrated nutrient management module for garlic

- Among the different treatments, 75:40:40:40 kg NPKS + 5 t FYM + 2.5 t PM + 2.5 t VC ha⁻¹ was observed to be superior with regard to plant height (53.93), number of leaves (10.37), equatorial diameter (3.72), polar diameter (3.77), neck thickness (0.83), average bulb weight (188.80), marketable yield (44.40) as well as total yield (55.34 q ha⁻¹) of garlic.

Effect of micronutrients application on yield of onion

- The treatment soil application of zinc sulphate @ 10.0 kg ha⁻¹ recorded the maximum mean bulb weight (40.58 per cent) and total bulb yield (42.08 t ha⁻¹) while, foliar application of zinc sulphate @ 0.5 per cent @ 30 and 45 DAP recorded the highest marketable bulb yield (41.07 t ha⁻¹).

Technology mission on citrus

- Nearly 25 000 rough lemon rootstock plants during the year 2012-13 and 1,10,000 (approx.) seedlings of rough lemon and rangpur lime in primary nursery in 2013-14 was raised.
- Budding work initiated in Dec. 2013 and continued till end of March 2014 as per availability of bud-wood from NRCC, Nagpur .
- Approximately 10,000 successful budding are available.

3.6 Seed technology

Integrated approach for maximization of seed yield of hybrid rice (JRH 5)

- The Alternate method for planting (5days interval) of pollen parent was significantly superior over mixed method of planting for unprocessed and processed seed yield, 100 seed weight and vigour index.

Effect of micronutrient on seed yield

- The treatment NPK+ boron+ sulphur+ zinc was significantly superior over other treatments for unprocessed and processed yield.

Integrated approach for maximization of seed yield of soybean

- The ridge and furrow method of sowing was found to be significantly superior over normal sowing for 100 seed weight (9.02g), germination (84 per cent) and vigour index (2688).
- The treatment S+Zn+B+Mo followed by Mo (1g kg⁻¹ of seed)were significantly superior



Orange growing districts of M.P. Orange
growing blocks of Chhindwara district



for processed seed yield, 100 seed weight, seed recovery, germination percent and vigour index.

Optimization of seed production technology for maximizing seed yield in mungbean

Date of sowing (1st August) at 30 X10cm spacing with recommended dose of fertilizer +seed treatment with rhizobium and PSB+ spray of borax (100ppm) at flower initiation was found to be significant superior for seed yield ha^{-1} for seed production of mung bean during Kharif at Jabalpur.

Identifications of SSR markers associated with distinguishing morphological traits of Soybean

Character	Marker
Flower colour	Satt309, Satt125
Pubescence colour	Satt207 Satt367 Satt557
Presence of pubescence	Satt309
Leaflet forms	Satt369 Satt 270 Sat_268
Hilum colour	Satt070
Seed coat colour	Satt207 Satt493
Presence of four seeded pod	Satt 270

Factors ascertaining seed longevity in soybean

- I A mean reduction of 14-62% in germination observed with maximum 87 per cent germination in the first month to 43 per cent in the ninth month under ambient condition. The crop achieved less than 70 per cent germination after 6 to 7 month storage.
- I Longevity of small seeded genotypes of soybean is more than the bold seeded because of its high compression strength due to low electrical conductivity, wrinkled and cracked seed coat, hydration and swelling coefficient; high hull percentage, testa thickness and phenol and tannin content. These traits exhibit high variability along with high heritability (>62 percent)

and significant association and direct effect on seed longevity.

Standardization of seed coating technique with synthetic polymers and additives for seed quality enhancement of maize

- | Standard blotter method was employed for detection of associated mycoflora with maize under stereoscopic binocular microscope.
- | Seed dressing with flowable thiram @ 2.5ml kg⁻¹ of seed or vitavax 200 (containing thiram 37.5 per cent and carboxin 37.5 per cent) @ 2g kg⁻¹ seed effectively reduced the association of *Aspergillus flavus*, *Aspergillus niger*, *Helminthosporium* sp., *Curvularia lunata*, *Fusarium oxysporum* and *Rhizopus* sp. as compared to control.

Detection, transmission and management of *Alternaria carthemi* associated with safflower seeds

- | *Alternaria carthemi* was not recorded in seeds treated with copper oxychloride (0.25 per cent), carbendazim (0.20 per cent), carboxin (0.20 per cent), thiram (0.30 per cent), thiram + carbendazim (0.30 + 0.20 per cent) and thiram + carboxin (0.30+0.20 per cent), whereas its association was 14.0 per cent in control.
- | Seed germination was enhanced in fungicide treated seeds. In untreated seeds the germination was 85 per cent, while it

ranged from 92-96 per cent in seeds treated with copper oxychloride (0.25 per cent), thiram+carbendazim (0.30+0.20 per cent) and thiram + carboxin (0.30+0.20 %).

Shelf life of *Trichoderma viride* and *Pseudomonas fluorescens* treated seeds during storage of urid bean

- | CFU of *Trichoderma virid*: At initial stage maximum 44.0 CFU was recorded in the seed treated @ 8 g per kg of seed and it reduced gradually up to 11.3 after 120 days. Minimum CFU count was in seed treated @ 2g kg⁻¹ seed. Reduction from 21.9 to 5.0 was noticed up to 120 days.
- | CFU of *Pseudomonas fluorescens*: At initial stage maximum (22.4) CFU were recorded in the seed treated @ 14 g kg⁻¹ of seeds and it reduced gradually up to 4.6 after 120 days. Minimum CFU count recorded in seed treated @ 8 g kg⁻¹. Reduction from 11.8 to 1.3 was noticed up to 120 days.

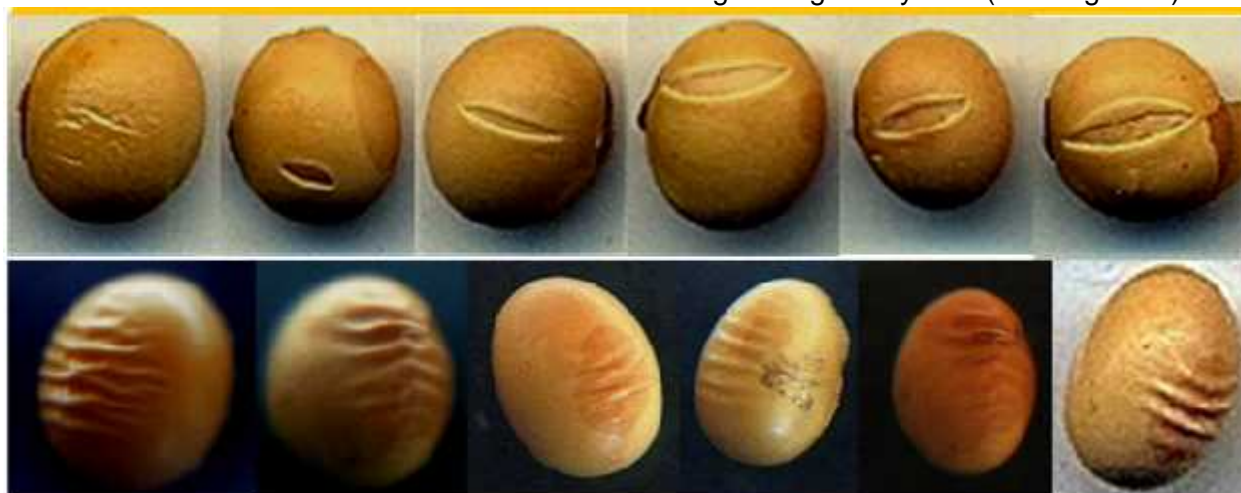
3.7 Agro-forestry

Block plantation of MPTs for biomass study

At the age of 21 years (2009) eucalyptus (2 x 2 m) produced maximum above ground biomass (856.1 t ha⁻¹) whereas in 3x3 m spacing Shisham produced higher above ground biomass (203 t ha⁻¹).

Guava based agri-horticulture system

- | Open condition recorded significantly highest grain yield (647 kg ha⁻¹) as



compared to different pruning management and no pruning. Among different pruning intensities, heavy pruning intensities (i.e. 60 cm pruning) recorded significantly higher grain yield (574 kg ha^{-1})

- I Managed agroforestry system (Pruning) is more profitable (Rs. 18,533 ha^{-1}) as compared to unmanaged agroforestry system i.e. no pruning (Rs. 17,121 ha^{-1}), crop alone (Rs. 6,659 ha^{-1}) and fruit crop alone (Rs. 12,220 ha^{-1}).
- I Managed agroforestry system is more profitable (Rs. 30,416 ha^{-1}) than growing of crop alone (Rs. 15,009 ha^{-1}) and unmanaged agro forestry system i.e. no pruning (Rs. 24,475 ha^{-1}). Under managed Agro forestry system i.e. growing of crop with different pruning intensities wheat + sissoo in 25 per cent pruning is more profitable (Rs. 32460 ha^{-1}) as compared to 50 per cent pruning (Rs. 30,485 ha^{-1}) and 75 per cent pruning (Rs. 28,305 ha^{-1}).

Babul+Paddy based agri-silviculture



system

Two paddy varieties (viz; JR 199 and JR 201) were grown with 10 year old provenances of babul under alley cropping and rain fed condition. Paddy variety JR 201 gave higher yield (1505 kg ha^{-1}) than variety JR 199 (1012 kg ha^{-1}). Mean performance of ten years old babul provenance trial revealed that the growing of paddy crop with babul (Bilaspur prove.) under alley cropping will be economical as it gave an average return of Rs. 5414 ha^{-1} whereas paddy alone gave a return of Rs. 4764 ha^{-1} . Hence, there is an additional income of Rs. 650 ha^{-1} year under alley cropping (babul + paddy) over arable crop (i.e. paddy alone). It has been estimated that if babul will be felled at the age of 10 years it will provide fuel wood/small timber @ 22 tons ha^{-1} in addition to paddy yield (approx. market value of fuel wood will be Rs. 2000 ha^{-1}).

Evaluation of bamboo species in agri-silviculture/silvo-pastoral system of agro-forestry under wasteland conditions of M.P.



(a) Bamboo based agri-silviculture system

Moong when grown with bamboo recorded significantly higher net profit (Rs.10612 ha⁻¹) followed by Til (Rs. 4976 ha⁻¹). soybean + bamboo (Rs. 2825 ha⁻¹) and paddy+ bamboo (Rs. 2761 ha⁻¹) gave significantly lowest monetary return.

(b) Bamboo based silvopastoral system

Napier grass produced significantly higher green fodder yield during first cutting (3040 kg ha⁻¹) as compared to guinea grass (1 577 kg ha⁻¹)



¹) and anjan grass (1 093 kg ha⁻¹). Dicanthium recorded lowest green fodder yield (629 kg ha⁻¹) and at par with anjan and guinea grass. Growth of dicanthium grass was suppressed by stylo during first cutting.

Establishment of progeny trial of karanja

Provenance bahoripar, bargi recorded significantly highest pod yield: 432.0 kg ha⁻¹, Seed yield: 222.6 kg ha⁻¹ highest oil content : 41.83 per cent (provenance Maihar-1), lowest : 35.10 per cent (provenance Bandol-1 Seoni)

- I Managed agroforestry system i.e. paddy-wheat with D.sissoo gave significantly higher monetary return (Rs. 78,209 ha⁻¹) than crop alone (Rs. 63,405 ha⁻¹), and no pruning i.e. un managed agro forestry (Rs. 66,247 ha⁻¹).
- I In managed agro forestry system paddy-wheat + D.sissoo in 50 per cent pruning gave higher monetary return (Rs. 81,672 ha⁻¹) than crop alone (Rs. 60,405 ha⁻¹), tree alone (Rs. 33,224 ha⁻¹) and unmanaged



Bamboo + Agast + Moong



Bamboo + Agast+ Napier+ Stylo

agro forestry system (Rs. 66,247 ha⁻¹).

Horti-pastoral system (guava + oat)

- I Significantly higher yield of oat fodder (2 cuttings) was recorded in open condition (457 q ha⁻¹) at par with de-heading of guava at 1.5 m height. Significantly lowest green fodder yield was recorded under no pruning
- I Oat variety JO-93 recorded significantly higher fodder yield (439 q ha⁻¹) as compared to variety JO-2 and JO-3 which were at par. Variety kent gave significantly lowest fodder yield (369 q ha⁻¹).

3.8 Food science

- I Nutritious dalia was made from the grits of wheat, oat, soybean, green gram and horse gram in different proportions. The product made from the Wheat, soybean and green gram in the ratio 80:10:10 was excellent and nutritious having all the essential nutrients.



- | Nutritious warries were developed from black gram , green gram ,soybean mixed with vegetables ash guard, potato and brinjal. The best product was made from soybean, black gram and potato in the ratio of 32:48:20.They had excellent consumer acceptability and thus could be recommended for commercialization.
- | The technology for preservation and packaging of tofu was standardized using gamma radiations in different packaging materials. The results showed that 1.25kgy gamma radiation treatment in combination with LDPE could be successfully utilized for



shelf-life extension of tofu up to 15 days without any deterioration of product quality.

- | Sorghum based chakli made from sorghum 40 per cent, bengal gram 30 per cent , black gram 20 per cent and soybean 10 per cent, and other product based on bajra contained chakli bajra 50 per cent, bengal gram 25 per cent , black gram 15 per cent and soybean 10 per cent in place of rice and green gram were superior in nutritional quality with good acceptability.
- | Kodo could be used upto 75 per cent along with 15 per cent black gram and 10 per cent soyflour in place of rice for making idli. The product had good cooking quality, acceptability, storability and high nutritive value and may be used for diabetic persons in controlling the blood glucose level.
- | An acceptable pizza base could be developed by replacing wheat flour with fresh fenugreek leaves / carrot shreds up to the level of 30% with good acceptability. Being rich in fibre, this product has therapeutic value for the persons suffering from constipation, high plasma cholesterol and high blood glucose level.
- | The nutritious dhokla mixes could be developed from kodo or kutki flour in combination with soy flour similar to rice and chickpea flours. They contained higher amount of protein, fibres and minerals. Hence, these products could be considered as therapeutic foods and may be used for the patients suffering from diabetes, constipation and other nutritional disorders.

3.9 Biotechnology

- | Studies on agrobacterium-mediated transformation in oat (*Avena sativa* L.) for transformation, *Agrobacterium tumefaciens* GV3101 carrying the binary vector pCambia 1305.1 was used, which carried a reporter gene (gus) and after transformation, further experiments were carried out for confirmation of transformation. In vitro regeneration in oat was studied by culturing explants on MS

medium supplemented with BAP (0.1-5.0 mg L⁻¹) in combination with NAA (1-2 mg L⁻¹), IAA (1-3 mg L⁻¹), IBA (2-3 mg L⁻¹) and 2,4-D (2-50 mg L⁻¹). The transformation validation through GUS staining and molecular analysis employing polymerase chain reaction that clearly indicated the integration of the transgenic from the T-DNA region of agro bacterium to the oat host genome was performed. The use of vacuum infiltration technique during co-cultivation treatment, 40.74 per cent transformation efficiency was registered. Vacuum infiltration assisted Agro bacterium mediated transformation was the most efficient method to carry out transformation studies in oat.

- I **Studies on effect of cytokinin in combination with auxins on micro-propagation efficiency of pomegranate (*Punica granatum* L.):** Pomegranate (*Punica granatum* L.) of family puniceae a native to persia has been associated with the most ancient civilization in the middle east. Reliable and reproducible protocol to get healthy plants from different juvenile explants like stem segment without meristematic buds, stem segment with axillary buds and nodal segment with lateral buds for pomegranate cv 'bhagava' has been developed. Out of these three explants, multiplications of shoots were observed in nodal segment with lateral buds on MS medium fortified with 3 mg/l BAP. MS medium containing 0.5 mg L⁻¹ of GA3 was found to be the best for shoot elongation. Elongated shoots were transferred in MS media fortified 0.1 to 0.5 mg L⁻¹ of NAA and 0.1 to 0.5 mg L⁻¹ of IBA for rhizogenesis but root initiation was not started within 25 days incubation period as it may require some more time. Present study is carried out with an aim to develop a protocol for commercial production of pomegranate.
- I **Molecular diversity analysis of hitefly (*bemisia tabaci*) collected from different regions of Madhya Pradesh:** The genomic DNA of whitefly collected from

different geographical regions of east Madhya Pradesh was isolated by standardize protocol (SDS + Proteinase K) produce intact band with high molecular weight. The mtCOI primer was used for identification of B biotype. Amplified products were resolved by electrophoresis on 1.2 per cent agarose gel and photographed under gel documentation system. Specific mtCOI primer CI-J-2195 and L2-N-3014 showed the presence of ~880bp bands which confirmed the presence of B biotype in different geographical regions of East Madhya Pradesh. All identified B biotypes were used for molecular diversity analysis. The DNA samples were amplified with 5 RAPD primers in thermal cycler. Amplified products were resolved by electrophoresis on 1.2 per cent agarose gel and photographed under gel documentation system. Four decamer primers amplified 8 RAPD marker loci. All 8 bands scored by RAPD markers found to be monomorphic. Average number of bands per primer was 2.00. One RAPD primer is not amplified in all population. No variation was found among whitefly samples collected from different geographical regions of East Madhya Pradesh. Its seems that *B. tabaci* found in there region of collection are of conserved type.

- I **Studies on genome recovery percentage for opaque2 introgressed in backcross population for marker assisted selection of quality protein maize:** The present study was carried out with objectives of foreground selection of plants using opaque2 specific markers and analysis of genome recovery of recurrent parent in BC2F1 and BC3F1 populations using SSR markers. For intro-gression of quality protein opaque 2 genes into maize, steps were followed for foreground selection and background selection. Two non QPM inbreeds namely HKI287 and HKI1126 are the parents of a promising hybrids identified for Central India were undertaken for conversion into QPM. The

highest genome recovery was 0.976 in plants no. six followed by 0.971 in plant no. thirteen and lowest genome recovery was 0.891 in plant no. seventeen. in case of BC3F1 HKI287 plants genome recovery of recurrent parent can be grouped under three categorization viz. High genome recovery (0.986 - 0.993), Medium genome recovery (0.981 - 0.985) and Low genome recovery (0.968 - 0.980). Highest recovery was found in plant no. fourteen (0.993) and lowest recovery was found in plant no. four (0.968). The average genome recovery was found 0.983.

Wine production from over ripe guava fruits using *Saccharomyces cerevisiae*:

In the first part of investigation different chemical constituents of guava fruit pulp were analysed. The results analysed showed that the guava fruit pulp was found to contain a good amount of TSS required for bio-conversion into alcohol. In second part of this investigation to get maximum recovery of alcohol yield, initially incubation period was optimized at standard TSS of 20° Brix, incubation temperature of 30°C and pH of 3.76 (original pH of guava fruit juice) with different ranges of incubation period viz. 24, 48, 72, 96, 120, 144, 168 and 192 hr. The third part of this investigation on the sensory quality evaluation of guava fruit wine revealed that guava fruit wine sample with alcohol yield of 13.2 per cent was found to be more acceptable with respect to all the sensory attributes in comparison to other samples of guava wine.

Amplification of phy gene from *Bacillus* spp. isolated from soil: Four phytase producing isolates are used to amplify the phy gene using gene specific primers. PCR amplification product of ~650 bp was obtained. After sequencing of amplified products the length phy gene fragment revealed the 634 and 635 bp from two bacterial isolates. In-silico analysis showed that the phy gene sequence obtained had 69.7 per cent homology with phy gene of *Bacillus subtilis*. Phylogenetic tree was generated which also showed the similarity

with the other *Bacillus* spp. The analysis of open reading frame and deduced amino acid sequences was carried out and it showed the complete ORF of phy gene of amplified fragments with one site start codon and two sites of stop codon.

Molecular Screening of Soybean germplasm resistant to *Rhizoctonia* root rot:

In present investigation details of the polymorphism revealed by the 10 SSR primers demonstrated that the alleles are putatively associated with *Rhizoctonia* resistance genes. The polymorphisms revealed between the genotypes provide additional support for a few key loci; specifically Satt 281 (alleles at 220 bp) in JS93-05, JS 97-52 and JS 95-60. These genotypes showed resistance against *Rhizoctonia* root rot at field level, Satt 177 (225 bp allele) in resistant genotypes JS335, JS 93-05 and JS95-60, JS 20-50, JS 20-53 and JS 20-59. Satt 246 (240 bp allele) in resistant genotypes JS335, JS 93-05 and JS 95-60. Satt 245 (290 bp allele) in JS 20-50, JS 20-53 and JS 20-59. These alleles are putatively associated with *Rhizoctonia* resistance and are present in both *Rhizoctonia* root rot resistant genotypes and absent in the susceptible genotypes. Resistant Soybean lines JS335, JS 93-05, JS 95-60, JS 96-31 and JS 97-52 showed maximum genetic similarity and formed a separate cluster. JS 20-71 and JS 20-72 showed resistance on field level performances and in molecular analysis were grouped together in sub cluster.

Multiple shoot regeneration of sugarcane from meristem tip, leaf roll and axillary bud culture:

Sugarcane is a tropical, perennial grass that forms lateral shoots at the base to produce multiple stems. Sugarcane is indigenous to tropical South and Southeast Asia. Although several graminaceous crop plants and forage grasses have been successfully regenerated from tissue culture yet lack of multiplication procedure has long been a serious problem in sugarcane breeding

program. A newly identified variety with desirable character, e.g pest/disease resistant, high sugar content, stress resistant can be propagated through tissue culture and made available to the farmer for commercial benefit. Micro propagation can also be used for production of disease/pathogen free stock material as thorough meristem culture. Present study was done having objectives, to study the most responding explants for micro propagation and to select most suitable culture for micro propagation. Meristem tip, leaf roll and eye bud were taken as explants. The explants were cultured on MS-medium. This media was fortified with different types of plant with regulators in varying concentration. Shoot formation was highly influenced by concentrations and type of the growth regulators used in the experiment. Among different concentrations and combinations for shoot multiplication, best performance was showed on MS medium supplemented with BAP (4mg/l) followed by MS medium supplemented with BAP (6mg/l).

- I **Multiple shoot regeneration from nodal explant of aswagandha:** *Withania somnifera* commonly known as Ashwagandha belongs to the family Solanaceae. Its root part is rich in alkaloids (*withania*) which are valuable constitutes in many traditional Ayurvedic drug preparations against many diseases viz., hiccup, female disorders, cough, rheumatism and dropsy. Multipurpose medicinal plant with unique properties, while being an energy tonic like Ginseng or Codonopsis. One of the best known and most researched Ayurvedic herb important medicinal plant known classically for its rejuvenating properties. Ashwagandha is conventionally propagated by seeds but the percentage of germination is very low. Conventional propagation method cannot meet the increasing demand of this plant. Considering these difficulties the introduction of tissue culture techniques can be the alternative for the continuous

provision of plantlet stocks for large scale field cultivation and shoot multiplication from node and internode. Numbers of experiments were undertaken with nodal explants of ashwagandha in an attempt to improve the process of regeneration of multiple shoot in in vitro. Shoots were induced from the axillary buds of *Withania somnifera* on Murashige and Skoog's (MS) basal media. Attempts were made to regenerate multiple shoots from nodal explants of ashwagandha on MS media supplemented with different concentrations of cytokinin (BAP) alone or in combination with auxin (IAA). Result showed that the nodal explants cultured on MS basal medium without growth regulators failed to induce shoot proliferation. All the concentrations of BAP (0.5-1.5 mg L⁻¹) alone or in combination with IAA (1.5 mg L⁻¹) promoted adventitious shoot buds via direct organogenesis after five weeks of culture.

Studies on organogenesis from seedling derived callus in maize: Maize (*Zea mays*) is one of the most important crops around the world because of its importance as food and feed in the past and present. Using traditional breeding methods, a large number of fine inbred, hybrid and elite lines of maize have been developed by the plant breeders. But under the pressures exerted by limited land, expanding population, plant diseases and insect pests stresses, traditional breeding methods alone cannot cater the demand of quality maize. Genetic engineering for important traits requires an efficient in vitro regeneration system. Organogenesis involves culture of plant parts or tissues or organs aseptically in controlled laboratory conditions. In the present study mature embryos of maize (*Zea mays*.) inbred line HKI-1126, HKI-287 was used to establish regenerable culture from isolated embryos. In order to initiate maize callus formation, M.S media supplemented with variable levels of 2,4-D (2,4-Dichlorophenoxyacetic acid) BAP (6-Benzyl-aminopurine) and

sucrose were used. Highest callus formation appeared in whole embryos cultured on MS (Murashige and Skoog) medium supplemented with 1 mg/L 2, 4-D + 3 per cent sucrose.

Molecular marker evaluation of soybean cultivars for gene-based cultivar selection (PI: MP-JICA Soybean Project): Morphological data (Hypocotyl colour, Days to 50 per cent flowering, Flower colour, Color of hairs, Presence of hairs, Days to maturity) 148 soybean germplasm lines were cultivated at Breeding farm, JNKVV, Jabalpur in Rabi and Kharif season 2013. On the morphological basis, cluster analysis classified soybean genotypes into eight clusters in Rabi season 2013 and nine clusters in Kharif 2013. Yellow Mosaic Virus (YMV) incidence percentage was recorded and found to be high infection in kharif 2013. Molecular screening of YMV infected soybean lines were confirmed with YMV specific marker. Crosses were made between highly YMV resistant genotype with YMV susceptible, high yielding local soybean variety. Screening of all germplasm lines using 16 morphological trait specific molecular markers and dendrogram has been constructed with the help of Power Marker software.

Molecular characterization of mungbean yellow mosaic virus and white fly for soybean disease control in East M.P. (MP-JICA Soybean Project): YMV infected leaves and whiteflies of soybean and other host crop such as, okra, tomato, urd, mungbean, including some weedy plants sample were collected from eastern part of M.P. DNA was isolated from YMV infected leaf sample and whiteflies. PCR amplification has been done using coat protein specific markers for YMV screening and mitochondrial specific markers for whitefly. Amplified PCR products were sequenced and phylogenetic analysis has been done. On the basis of sequence alignment and phylogenetic analysis of the samples,

whiteflies belong to Bbiotype except the sample collected from Narsinghpur, Piparia and Chhindwara and all the YMV samples belong to group Mung Bean Indian Yellow Mosaic Virus (MIYMV).

Development of transgenic oat (*Avena sativum*) over-expressing fungal phytase gene (MPCST Project): Eight phytase producing fungal isolates were identified as various species of *Aspergillus*. Isolate IG 3 and IG 1 showed higher phytase activities up to the extent of 0.46 U ml⁻¹ and 0.39 U ml⁻¹ of culture broths, respectively. The phy gene from these fungi was amplified using gene specific primers. The phy genes had an open reading frame of 1404 and 1413 bp, encoding 468 and 471aa residues of a protein, respectively. The deduced protein sequence contained the consensus motifs (RHGARYP and HD), ten cysteine residues and nine to ten conserved putative N-glycosylation sites which are conserved among histidine acid phosphatases. This was cloned and inserted in pCAMBIA vector. The pCAMBIA+phy construct was transformed in *Agrobacterium tumefaciens*. *Agrobacterium* mediated transformation of phy gene in *Avena sativum* (oat) was carried out using vacuum infiltration assisted *Agrobacterium*-mediated transformation method. The measurement of phytase activity in putative transgenic *Avena sativa* lines was performed. Transgenic oat seeds will be as animal feed especially for monogastric animals.

Metagenomic analysis of the 1-aminocyclopropane-1-carboxylate deaminase gene (*acdS*) diversity of rhizospheric and endophytic bacterial population associated with Wheat : Approximate 50 soil samples from Wheat rhizosphere were collected. ACC deaminase producing bacteria were isolated from the soil samples. For isolation of ACC deaminase producing bacteria (both rhizospheric and endophytic), DF medium was used with 1-aminocyclo-

propane-1-carboxylic acid as sole source of nitrogen. Ten ACC deaminase producing bacterial isolates were obtained. DNA was isolated from these bacterial isolates. In order to provide the phylogenetic affiliation to these bacteria, 16S rRNA gene was amplified using gene specific primers. Simultaneously, DNA was also isolated directly from the soil samples for metagenomic analysis.

1 **Rapid conversion of normal maize inbreds to quality protein maize and further enhancement of limiting amino acid in elite inbreds through marker assisted selection**

Two non QPM maize inbred lines were selected for their conversion into QPM by marker assisted backcrossing. Opaque-2 gene specific markers were used for foreground selection and polymorphic SSR markers located on different chromosomes of maize were used for background selection. 97 per cent genome recovery obtained till BC2F1 generation.

1 **DNA fingerprinting of important crops in Madhya Pradesh**

Kodo millet (*Paspalum scrobiculatum*) and Little millet were collected from College of Agriculture, Rewa to assess genetic diversity using RAPD method. Seeds of Kodo and little millet were sown in polyhouse and isolated DNA from fresh leaves samples after germination. DNA was quantified using known DNA ladder. RAPD markers were used to detect polymorphism among millets.

3.10 Agro- Meteorology

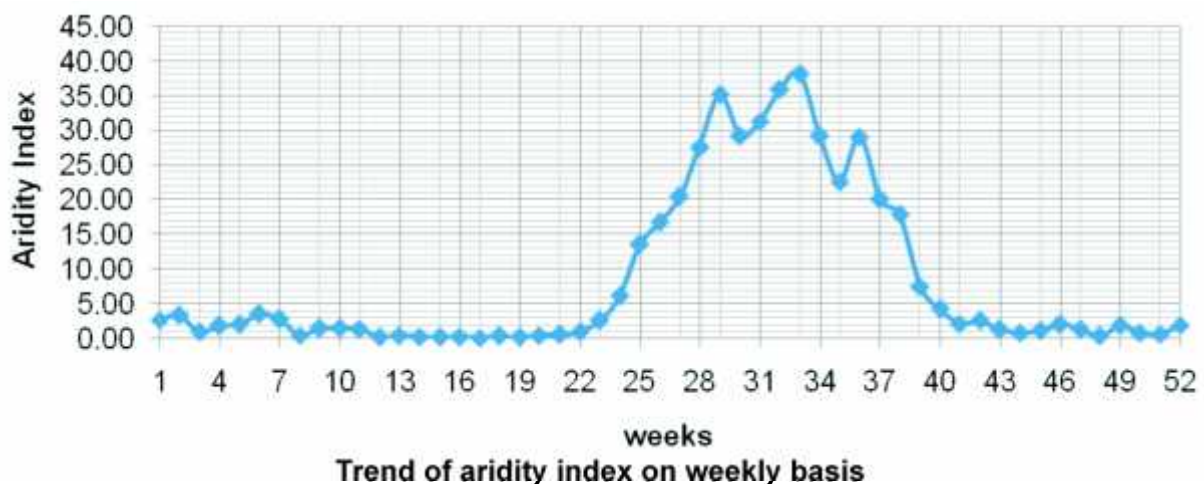
Climatic variability and moisture availability (Jabalpur region)

- 1 The trends in evapo-transpiration components (i.e. energy balance and aerodynamic component) were estimated using software package based on FAO Penman-Monteith method. The FAO Penman-Monteith equation determines the evapotranspiration.

- 1 In Jabalpur region, the energy balance and aerodynamic components are generally in the ratio 75:25. Proportion of reference Evapo-transpiration and its components at Jabalpur using FAO Penman-Monteith equation at 5 year assessment are computed from 1983-2013. During first two decades from 1983 to 2002, annual ETo is decreasing from 1390 to 1300mm, but during last decade from 2003 to 2013, it is increasing from 1340 to 1390mm.
- 1 Aridity Index shows a clear trend of increasing values. In this case climate is sub-humid in the years 1989, 1996 and 1998 and in the remaining years 1983-1988, 1990-1995, 1997 and 1999-2013, index values comes under humid climate.

3.11 Agricultural Engineering Studies on ground water pollution

- 1 For assessing water quality in tribal dominated districts of Madhya Pradesh and Narmada basin area water quality deterioration was determined in Mandla, Dindori, Seoni, Chhindwara, Narshingpur, Shahdol and Hoshangabad districts due to various reasons.
- 1 The pH value of water samples obtained from Narshingpur, Chhindwara, Shahdol and Hoshangabad districts (ranging in between 7.37 to 7.94) did not show significant variations and are within permissible limit. But the pH value of water sample obtained from district Seoni was found ranging from 7.12 to 8.14, which is towards alkaline in nature.
- 1 The EC value of water samples obtained from Hoshangabad and Shahdol districts of all the stations are ranging between 252 to 953 micro S cm⁻¹ and are within desirable limit at 250C. The EC values exceeding BIS limit (1000 micro S cm⁻¹) were noticed at some villages of Narshingpur and Chhindwara district.
- 1 The nitrate concentration exceeding 45 mg l⁻¹ of different districts Seoni, Chhindwara, Narshingpur, Shahdol and Hoshangabad represents the localized pollution effect on



ground water quality of the different regions of above district.

- | The study of analyzed data shows that Shahdol, Narshingpur, Hoshangabad and Seoni district does not have any problem of fluoride and arsenic. Since all the ground water have fluoride less than 1.5 ppm of BIS (1990) permissible limit. But most of the part of Chhindwara district is affected by fluoride problem.
- | The sodium concentrations of water samples obtained from Narshingpur, Chhindwara, Shahdol and Hoshangabad districts is ranging between 6 to 178 mg l⁻¹ with permissible limit.

Water productivity of wheat under drip irrigation

- | Built-in drippers with discharge of 4 lph at 1.0 bar operating pressure were used to irrigate Wheat crop. The emission uniformity was more than 80 per cent. Also the manufacture's coefficient of variation is less than 10 per cent which is classified as good. In drip irrigation grain yield was 11.84 per cent more and test weight was 9.52 per cent more than the yield in flood irrigated Wheat.
- | Water productivity of drip irrigated Wheat was 44.52 per cent more than the flood irrigated Wheat. This may be due to high overall irrigation efficiency of drip (80-90 per cent) as compared to flood irrigation system (30-35 per cent).

- | Water productivity was found maximum in dripper spacing of 40 cm which is at par with 30 cm spacing with lateral spacing of 60 cm (one line for three rows).

Water productivity improvement through better water application methods

- | The water productivity of 1.48 kg⁻¹ m³ was achieved which was very well comparable to the water productivity as obtained in border irrigation (1.52 kg⁻¹ m³) but the yield recorded in border irrigation was 2.36 times more than the rainfed irrigation.
- | In case of supervised irrigation the water application was 1.81 times more than the border irrigation but the yield reduction was recorded as 36.2 per cent less than the border irrigation. The test weight (1000 grain wt) is an indicator of seed boldness. The test weight in border irrigation was recorded 23.1 per cent and 13.2 per cent more than sole irrigation and supervised flooding respectively.
- | Effect of higher irrigation efficiencies were clearly seen in case of border irrigation with same number of irrigations (five) gave 36.2 per cent higher Wheat yield with saving of 44.9 per cent of water.
- | The grain - straw ratio of drip irrigation was found as 20.2 per cent more than the sprinkler irrigation and the test weight was also found 14.1 per cent more than the sprinkler irrigation which contributed to register only 3.6 per cent increase in the

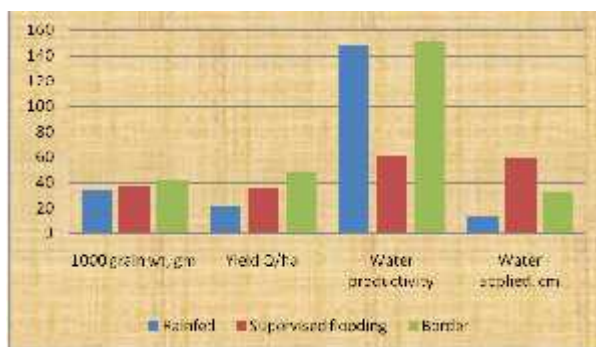


Installation of drip system in Wheat crop

Wheat yield in drip. But the water productivity was 9.7 per cent higher in case of drip irrigation.

Water quality of tribal districts

- | Ground water quality in terms of pH, EC, NO₃⁻, total hardness, Ca⁺⁺, Mg, Na, K, CO₃⁻, HCO₃⁻, Cl⁻, P, Micronutrient and heavy metals was obtained from records (1970-75) of Water resources Department of Government of Madhya Pradesh during the year 2013-14, the change in water quality of different districts is determined.
- | The value of quality parameters observed during the year 1973-75 were compared with the value obtained during testing of sample of the same location during current year 2013-14. pH values of ground water samples of all the blocks under consideration did not fall within the permissible range of 6.5-8.5.
- | During the seventies the EC values ranged between 360 mS cm⁻¹ to 2550 mS cm⁻¹, which were all within permissible limit.
- | The bicarbonate values are increasing in all districts except Mandla district but under the safe limit. During the year 1973-75, the Cl values in ground water samples of all blocks were found under the safe limit. The chloride values are now increasing beyond the permissible limit in Bichiya block of Mandla District, all blocks of Dindori district, Kundam block of Jabalpur district and Keolari and Ghansore of district Seoni.
- | The recommended safe limit for Ca+Mg according to BIS for irrigation water is 200 mg/l and 70 mg/l for calcium and magnesium respectively. In seventies the Ca+Mg values of ground water sample of all the blocks under consideration did not fall within the permissible range. The average value of Ca was found 226.73 ppm in Bajag of Dindori District and 384.13 ppm



Comparison of water productivity in surface irrigation



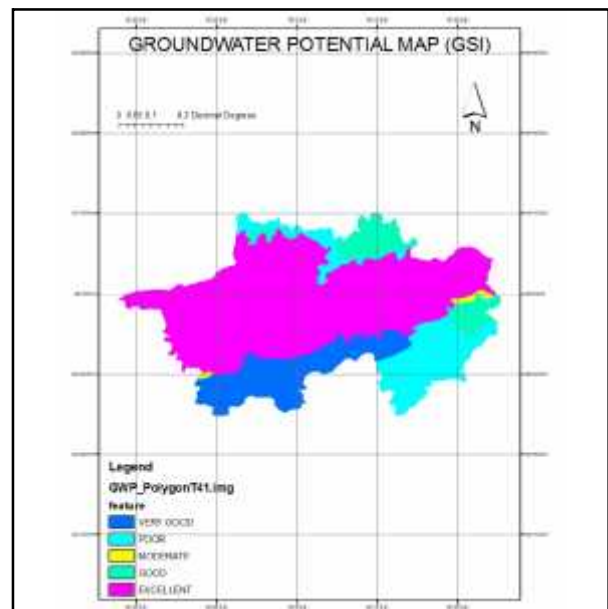
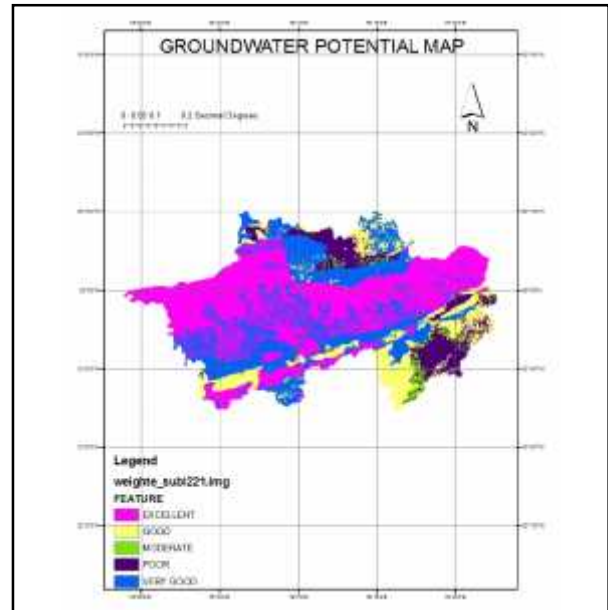
in Mohgaon block, and 366 ppm in Bichhia of Mandla district. But During 2013-14 the average Ca value of all blocks are found beyond the permissible limit.

Demarcation of groundwater potential zones with the help of RS and GIS

- | Thematic maps of soil, geo-morphology, lithology and land use/land cover were prepared. The maps were overlaid and applied decision rules to decide the ground water potential of the area.
- | 75.4 percent of the total area (3870.2 km² out of 5133 km²) comes under excellent and very good ground water potential zone. The producer's accuracy for poor class and excellent class was found as 100 percent. For very good and good potential, the accuracy was 66.67 percent.
- | The user's accuracy for the poor class was 75 percent for very good and good it was 100 percent and for the excellent class it was found 86.67 percent.
- | The overall accuracy of the classification of these classified zones was estimated as 88 percent.

Simulation of groundwater system

- | Groundwater system was simulated in a selected area of alluvial plain of Narmada Basin. Area under district Narsinghpur was simulated using Visual Modflow software.
- | Boundaries were digitized, grids were formed and input files were prepared for aquifer properties, land use, crops, topography, ground water abstraction and flow boundaries in the study area.
- | The Narsinghpur district covers an area of 5133 km² of which 388415 ha falls under cultivation. Length of boundary is 541 km and total 1300 grids were formed.
- | Well yields are ranging from 2×10^{-4} to 5.3×10^{-2} m³/sec per m drawdown.
- | The well strata of the area shows that there are four to five layers of aquifer material namely soil (0.33m to 1m), alluvial strata (35m to 176m), coarse sand (5m to 35m) and gravel (15m to 91m).



- | Ground water survey department and our own observation shows declining water table at a rate of 20 cm year⁻¹.
- | The water table is ranging from 4.30 to 22.50 m depth from ground surface during pre monsoon and at 2.80 to 20.72 m during post monsoon season. (100 POW). Calibration and Validation process is going on.

Renewable energy sources for agriculture and agro based industries

Technology for conversion of rice husk into producer gas as a substitute fuel for diesel

engine

- | A 3.5 kW rice husk gasifier operated to run 5 hp diesel engine revealed an average diesel saving of 60 per cent under long term operation at the average rice husk consumption rate of 8.5 kg h^{-1} . About 13 to 15 kg rice husk was required to save 1 litre of diesel.

Technology for conversion of wood pieces into producer gas as a substitute fuel for diesel engine

- | A 10 kW wood-based gasifier system operated to run a 10 hp diesel engine revealed an average diesel substitution of 68 per cent under long term operation of the system, at an average wood consumption of 7.2 kg h^{-1} . About 6 kg of wood was required to save 1 litre of diesel. The cost of the 10 kW gasifier plant is approximately Rs.15000/-.

Portable biomass gasifier for process heating application

- | The gasifier was operated using dry processed firewood, Ipomoea and Lantana stalks in application of water heating, grain roasting, deep-frying of food and mentha oil distillation. The conversion efficiency of 65 per cent to 76 per cent was observed at gasifier fuel consumption rate of 11 to 16 kg h^{-1} . The gasifier was found suitable for replacing use of fuel oil or electricity in process heating applications. About 3 to 3.5 kg of processed biomass is required to save 1 litre of fuel oil.

Natural draft biomass gasifier for process heating application

- | The system was operated using processed fire wood, lantana and Ipomoea stalks, and briquetted fuel in laboratory and in an amla processing industry. Conversion efficiency of 76 per cent to 82 per cent was observed at specific gasification rate of 105 to $140 \text{ kg m}^2 \text{ h}^{-1}$ with maximum flame temperature of

860°C . The estimated cost of the system is Rs.50,000/-. About 3kg of fuel was required to save 1 litre of fuel oil. The system was found suitable for replacing use of fuel oil and electricity in process heating.

Technology of solid state biogas plant

ORP trials of 6 numbers of modified biogas plants of 2 to 4 m^3 capacity and one plant of 10 m^3 were carried out. The plants were commissioned as usual by charging with 1:1 mixture of dung and water. After the stabilization of the plant operation over a period of about two months, the plants were daily charged with fresh cattle dung of 16-18 per cent total solid content without mixing water at the feed rate of 25 kg per m^3 of plant capacity. The monitoring of the plants revealed increase in gas yield up to 30 per cent as compared to conventional designs and daily water requirement reduced up to 75 per cent of common plant during summer; easier slurry handling, and reduced feeding time.

- | The total cost of the construction of 10 m^3 Modified Janta type biogas plant was found to be Rs. 1.10 lacs.
- | The biogas generation started after 7 days of first initial charging of the plant. The feed slurry was water dung in ratio 1:1. The gas generation from plant appeared satisfactory qualitatively.
- | The plant is meeting cooking energy need of 2 families each comprising of 6 members and lighting 4 lamps.
- | The biogas yield varied in range of:
 - a) 36 to 42 lkg^{-1} of cattle dung during June to November, 2013
 - b) 30 to 40 lkg^{-1} of cattle dung during December to March, 2014
 - c) 40 to 44 lkg^{-1} of cattle dung during April, 2014
- | The beneficiary is charging the plant every alternate day with 200 kg of cattle dung
- | The total solid content in the fresh cattle dung was observed between 18 to 20 per cent

- | The effluent slurry was observed to have total solid content of 10 to 20 per cent
- | The effluent slurry gets dried within a weeks time and transported to field for use as manure
- | The water requirement for operation of the plant reduced by 60 to 70 per cent against the conventional practice of 1:1 (water dung ratio)
- | The beneficiary is highly satisfied with the performance of biogas plant

Projects sanctioned

1. Strengthening of instructional infrastructure, demonstration of technologies and knowledge and skill up gradation of farmers and farmwomen in tribal districts of Madhya Pradesh. P. I.: Dr. T. R. Sharma, Senior Scientist (Horti.) Directorate of Extension Services, JNKVV Jabalpur. Rs. 26.72 lakh
2. Certificate and Diploma Course in Agri-Business Management (M.B.A). PI: Head, Dept. of Agril. Economics, JNKVV Jabalpur. Rs. 200.00 lakhs
3. Setting up DNA Finger Printing Lab at JNKVV Jabalpur. P. I. Dr. Sharad Tiwari, Director, Biotechnology Centre, JNKVV Jabalpur. Rs. 200.00 lakhs
4. Survey, collection and conservation of wild traditional agricultural cultivars of Vindhya Plateau of Madhya Pradesh. PI: Dr. Gynendra Tiwari, Assistant Professor, (Plant Physiology), College of Agriculture, Ganj Basoda (Vidisha) Rs. 7.70 lakhs
5. Network project on Marketing Intelligence. P.I. Dr. P.K. Awasthi, Professor (Agril. Economics) College of Agriculture, JNKVV Jabalpur. Rs. 35.94 lakhs
6. Evaluation and utility of direct application of Gypsum and its mixture with low grade rock phosphate, feldspar, vermi compost, poultry manure and cow dung in different crops of Vindhya Plateau of Madhya Pradesh. PI.: Dr. S. R. S. Raghuwanshi, Associate Professor (Soil Science) College of Agriculture, Ganj Basoda (Vidisha). Sanctioned by FCI Arawali Gypsum and Minerals Limited Jodhpur (Private Agency) for Rs. 13.593 lakhs
7. Pilot study for estimation of seed, feed and wastage ratios of major food grains in Madhya Pradesh. PI: Dr. Hari Om Shama, Dept. of Agril. Economics and Farm Management, JNKVV, Jabalpur, funded by ICAR, New Delhi Rs. 7.14 lakhs.
8. Shelf life enhancement of maize and small millets based food products prepared from local varieties of MP using Radiation process. PI: Dr. (Smt.) Alpana Singh, Assoc. Prof (Home Science), Dept. of Food Science, JNKVV, Jabalpur Rs. 23.81 lakhs.
9. Maximization of soybean production in Madhya Pradesh, Research Component Project on various aspects worth Rs. 55.51 lakhs.
10. Genetic improvement of non toxic Jatropha varieties for bio-fuels and animal feeds P. I. Prof. V. K. Gour, Sr. Scientist (PB). Rs. 6.00 lakhs.
11. Infrastructure for College of Agriculture, Waraseoni Rs. 2391.00 lakhs.
12. Strengthening of Biotechnology Centre (Rs. 200.00 lakhs).
13. Infrastructure of JNKVV Administrative Building (Rs. 300 lakhs).
14. Metagenomic analysis of the 1-Aminocyclopropane-1-Carboxylate Deaminase gene (AcdS) diversity of rhizospheric and endophytic bacterial population associate with Wheat P. I. Dr. I. Gontia Mishra, Biotechnology Centre, JNKVV, Sanctioned Rs. 24.50 lakhs.
15. Development of an improved seed drill chock indicator P. I. Dr. A. K. Rai, Associate Professor, Instruments Development and Service Centre, JNKVV Jabalpur. Rs. 18.38 lakhs.

Consultancy Processing Cell

Products (seeds, fertilizer, insecticides, pesticides, weedicides, herbicides, PGR, etc.) of various private agencies/firms (about 83) were tested during Kharif and Rabi seasons 2013-14 worth Rs. 1,36,59, 100 out of which net income of Rs. 68,29,550 received as

resources generation of Vishwa Vidyalaya,.

3.12 Ongoing Projects

AICRPs

S. No.	Name of Project	Centre
Agriculture Faculty		
1	Maize Improvement	Chhindwara
2	Rice Improvement	Rewa
3	Niger	Chhindwara
4	Linseed	Sagar
5	Linseed	Powarkheda
6	Sesame	Tikamgarh
7	Sesame	Powarkheda
8	Soybean	Jabalpur
9	Chickpea	Jabalpur
10	Millets Improvement	Dindori
11	Millets Improvement	Rewa
12	Wheat Improvement	Powarkheda
13	Wheat Improvement	Sagar
14	Integrated Farming System Research	
15	(i) MAE	Jabalpur
16		Rewa
17		Powarkheda
18	(ii) ECF	Dindori
19		Katni
20	Sugarcane	Powarkheda
21	Micro-nutrients of Soils	Jabalpur
22	Soil Test Crop Response	Jabalpur
23	Long Term Fertilizer Experiments	Jabalpur
24	Nematode Pests and their control	Jabalpur
25	Vegetable Improvement	Jabalpur
26	Potato Improvement	Chhindwara
27	Sub Tropical Fruits	Rewa
28	Barley Improvement	Rewa
29	Agro-Forestry	Jabalpur
30	Forage Crops	Jabalpur

31	Dryland Agriculture	Rewa
32	NSP -	Breeder Seed Production Unit Jabalpur
33	NSP -	Seed Technology Research Unit Jabalpur
34	NSP - Vegetables (Merged with AICRP on Vegetable)	Jabalpur
35	Production of Breeder Seed of Annual Oilseed Crop - Soybean	Jabalpur
37	Groundnut	Jabalpur

All India Network project

38	NWP on Betelvine	Jabalpur
39	NWP on Biofertilizer (BNF)	Jabalpur
40	NWP - Organic Farming	Jabalpur
45	NWP on Onion and Garlic	Jabalpur

Agricultural Engineering Faculty

41	Farm Implements and Machinery	Jabalpur
42	Ground Water Utilization	Jabalpur
43	Harvest and Post Harvest Technology	Jabalpur
44	Renewable Sources of Energy for Agricultural and Agro based Industries.	Jabalpur
45	Agro-meteorology	Jabalpur
46	Water Management	Powarkheda

AD-HOC PROJECTS

S. No	Title	Amount (in lacs)
1.	Rapid conversion of normal maize inbreds to quality protein maize and further enhancement of limiting amino acids in elite inbreds through market assisted selection	52.61
2.	Identification of potential vegetation for bio drainage and fitting in evaluation of bio drainage in Tawa Command of Madhya Pradesh	55.52
3.	Improving heat tolerance in chickpea for enhancing its productivity in warm growing conditions and mitigating impact of climate change.	29.94
4.	Isolation and characterization of phygene from fungi and its transformation in <i>Avena sativa</i> (Oat)	3.95
5.	Marker assisted breeding of abiotic stress tolerant rice varieties with major QTLs for drought, submergence and salt tolerance at Rewa.	48.60
6.	Integrated Agri-biotechnologies of socio-economic upliftment of Baiga and Gond tribes of Madhya Pradesh	108.48
7.	Preservation of water chestnut (<i>Trapa bispinosa roxburg.</i>) by gamma radiation.	17.55
8.	Seed production in agricultural crops (Mega Seed project)	111.50
9.	Establishment of mother plant nurseries for high pedigree planting material of fruit crops.	42.62
10.	Development of molecular markers in chickpea breeding for developing superior cultivars with enhanced disease resistance	56.39
11.	Molecular breeding selection strategies to combine and validate QTLs for improving WUE and Heat tolerance in Wheat	33.75
12.	Ensuring livelihood security through management of genetic resources and seed supply system in tribal areas of Madhya Pradesh	751.47
13.	Selection and utilization of water logging tolerance cultivars in Pigeon pea	68.53
14.	Effective water logging in Pigeon pea	2.48
15.	Metabolic and molecular profiling of aromatic rice germplasm of India for gaining insights about aroma	10.20
16.	Baseline survey of flora and fauna around atomic power plant at Chutka (BARC)	24.55
17.	Human resources development in medicinal plants through facilitation centre.	27.00
18.	Pilot study for estimation of seed, feed and wastage ratios of major food grains in Madhya Pradesh	7.14
19.	Development of an improved choke indicator	18.38
20.	Shelf life enhancement of maize and small millets based food products prepared from local varieties of MP using Radiation process	23.815
21.	Network project on Biotic Stress (Rusts) of Wheat, Powarkheda	5.05
22.	Technology Mission Citrus	284.06

23.	Network project on harvest, processing and value addition of Natural resin & gums	61.15
24.	Business planning and development (BPD) Project	327.61
25.	Development of new plant type varieties with higher yield and in built resistance to major pest and disease	14.65
26.	Network project on hybrid rice research	9.00
27.	Network centre on National initiative on climate change resilient agriculture—AICRPDA-NICRA (ICAR)	30.25
28.	Weather based agro advisories and assessment of vulnerable areas of major food crops production zone. AICRPAM-NICRA (ICAR)	13.05
29.	National Initiatives on Climate Resilient Agriculture (NICRA) Real time pest surveillance in Pigeon pea	5.00
30.	Climate change and <i>Lak</i> crop performance at Jabalpur (NICRA)	4.00
31.	Strengthening of instructional infrastructure, demonstration of technologies and knowledge and skill up gradation of farmers and farmwomen in tribal districts of MP	26.72
32.	Establishment Of five Model Nursery of medicinal and aromatic plants under JNKVV (Jabalpur/Rewa/Powarkheda/Sagar/dindori)	100.00
33.	Marketing intelligence	35.94
34.	Data generation and evaluation of production technology of medicinal and aromatic plants using IT tools	3.33
35.	Metagenomic analysis of the 16S rRNA-Aminocyclopropane-L-Carboxylate Deaminase gene (AcdS)diversity of rhizospheric and endophytic bacterial population associate with Wheat	24.50
36.	Genetic improvement of non toxic <i>Jatropha</i> varieties for bio-fuels and animal feeds (DARE-ICRAF)	6.00
37.	Stress Tolerance Rice for Africa and South Asia (STRASA)	20.00
38.	Exploration, collection and characterization of lentil germplasm in Madhya Pradesh (CARDS, Morocco)	6.30
39.	Maximization of soybean production in Madhya Pradesh (India) MP -JICA Collaborative project	52.50
40.	Development of transgenic Oat (<i>Avena sativum</i>) over expression fungal	7.98
41.	Exploration, collection and conservation of wild species and land races from eastern Madhya Pradesh	9.77
42.	Conservation and evaluation of germplasm of mango in Rewa district of Madhya Pradesh	8.47
43.	Data generation and evaluation of production technology of medicinal and aromatic plants using IT tools	3.33
44.	Biocontrol potential of local isolates of <i>Trichoderma</i> in Madhya Pradesh	6.39
45.	Development of farm equipments and machinery testing, training and demonstration facility at JNKVV. Jabalpur	490.00

46.	Collection, evaluation and utilization of elite lines of Wheat from different parts of MP	7.82
47.	Survey, collection and conservation of wild and traditional cultivars of Vindhyan Plateau of MP	7.70
48.	Madhya Pradesh Water Sector Restructuring Project (MPWSRP)	1301.00
49.	Revalorizing small millets in rainfed regions of South Asia	6.40
50.	Evaluation and utility of direct application of Gypsum and its mixture with low grade rock phosphate, feldspar, vermi compost, poultry manure and cow dung in different crops of Vindhya Plateau of Madhya Pradesh	13.59

EXTENSION

Directorate of Extension Services as an important constituent unit of Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur is entrusted with the responsibility for promotion of development of agricultural and allied disciplines in the state through quick and timely transfer of technology directly to the rural residents by testing and validating it locally, followed by its demonstration and imparting trainings. Supportive extension activities such as farmers' fair, seminars, symposiums are also conducted. Interpersonal communication, print and electronic media are extensively used as a means to transfer the technology effectively by Krishi Vigyan Kendras.

Farmers are also approached through the extension workers and officers of other extension agencies who are duly trained by the Krishi Vigyan Kendras of the respective districts as a master trainer in different agro-climatic zones of 25 districts.

The Directorate is administering 22 Krishi Vigyan Kendras under the competent direction of the university and also functions as a coordinating unit in close association with the University Research System on one hand and with the Zonal Project Directorate, Zone -VII, on the other to fulfill the motto of the university that is "To reach the unreached through extension system". Along with Krishi Vigyan Kendras, communication center and agricultural technology information center are also working under the Directorate.

4.1 Agricultural Technology Information Centre

The Agricultural Technology Information Centre (ATIC) is a "Single Window System" linking the various units of research institutions with intermediary users and end users (Rural Population) in decision-making and problem solving exercise.

Technology displayed: About 35 laminated photographs showing various technologies related to Agriculture, Veterinary and Agriculture Engineering. The photographs are enough to tell the farmers regarding the technologies of the university generated for various sections of the farmers.

Technological inputs & sales: Technical inputs products of JNKVV such as improved seed varieties under the brand of Jawahar Seeds, planting materials of ornamental plants, fruit trees and other plant material, mushroom spawn, medicinal and aromatic plants and seeds, bio-fertilizers and honey were sold under the umbrella of ATIC.

Un-priced publication: The Directorate of Extension / College / ZARS / KVKs regularly organize farmers' fair, kisan sangoshthis, monthly meeting and scientist-farmer interfaces. During these occasions a large number of farmers participate. In these programs, technical literature comprising of pamphlets, leaflets, technical brochures and folders are provided free of cost.

Diagnostic services: Diagnostics services like soil testing, water testing, and plant clinic, covering field crops, horticultural crops, medicinal and aromatic crops and animal clinic are rendered.

Farmers visited: Total 1899 farmers and farm women, visited the centre to learn various technologies related to agriculture and allied disciplines.

Enquiry letters and calls: Thirty one farmers called ATIC for technical advice on agriculture and allied disciplines time to time, which were answered and duly referred as and when required to the specialists. Total 722 calls of the farmers were answered this year. Twenty seven letters of the farmers were received enquiring about agricultural and allied disciplines' practices which were duly answered.

4.2 Communication Centre

Under the Directorate of Extension Services, Communication Centre works as printing and radio recording unit where Krishi Vishwa, the technical magazine of the

S No.	Name	Number of copies
1	Sag-Bhaji Visheshank	5000
2	Rabi Visheshank	2000
3	Krishak Labharth Yojnaye	2500
4	New Year Diary	1000
5	Table Calendar	5000
6	Wall Calendar	5000
7	University Telephone Directory	250

University is printed along with other essential official document of the University. Radio programs for 'Krishi Vishwa Vidyalya Se Kheto Tak' broadcasted ever Monday from Akashwani Jabalpur between 7.20 pm to 8.00 pm, is recorded in the communication center recording studio covering range of topics on technologies related to agricultural and allied discipline. This year, 52 radio programs were recorded.

Printing of Krishi Vishwa (University Magazine) and other documents is an important and essential activity of the Communication Center. Printing work done 2013-14 year was as follows:

4.3 Krishi vigyan kendra (KVK)

To fulfill the need of food and nutritional security amongst the population, latest technology generated by the research system, is disseminated through the Krishi Vigyan Kendras which are funded by Government of India. The assessed technology acts as a model for line departments and catalyzes the existing extension process for betterment which is demonstrated and is well supported by trainings of extension functionaries, farmers and farm women. Capacity building of rural youth on income generating activities and women empowerment is also done. Other extension activities to provide pace to the technology transfer to the beneficiaries is also organized.

For proper functioning, KVKs are strengthened by improving the infrastructural facilities and the manpower to work as knowledge and resource center to extend support the public, private and voluntary sector initiatives in the field of agriculture.

Mandate

Assessment, refinement and demonstration of technology/ methodology/products.

Activities

1. On farm testing to identify the location specificity of technologies in various farming systems.
2. Frontline demonstrations to establish production potentials of newly released technologies on farmers' fields and provide feedback.
3. Training of farmers and farm women to update their knowledge and skills in modern agricultural technologies and training of extension personnel to orient them in the frontier areas of technology development.

4. Work as resources and knowledge centre of agricultural technology for supporting initiatives of public, private and voluntary sector for improving the agricultural economy of the district.
5. Create awareness about frontier technologies through large number of extension activities like Farmer fair, Field day, Strategic campaign, Ex-trainees Meet, etc.
6. The seed and planting materials produce by the KVKs are also made available to the farmers.

Location of KVKs

Following 20 Krishi Vigyan Kendras are functional under JNKVV in 25 district:

Chhindwara (1982), Balaghat (1992), Seoni (1994), Shahdol (1994), Sidhi (1994), Tikamgarh (1994), Betul (2002), Panna (2002), Dindori (2003), Damoh (2004), Harda (2004), Hoshangabad (2004), Jabalpur (2004), Narsinghpur (2004), Rewa (2004), Sagar (2004), Chhatarpur (2005), Katni (2005), Mandla (2006) and Umari (2006). 2 KVKs, KVK Raisen and KVK Satna are under NGOs.

Need assessment

Every extension program was designed on the basis of assessed need of the beneficiaries with the help of PRA, RRA, observations, discussions, meetings and feedbacks received from the beneficiaries and extension functionaries related to the problems. Related thrust areas are identified and action plans are developed on the basis of the same.

Funding sources

Indian Council of Agricultural Research (ICAR) funded for KVKs' programs and activities. Beside this, the University also provided the funds for implementing different programs, especially for production of quality seeds at Instructional Farm.

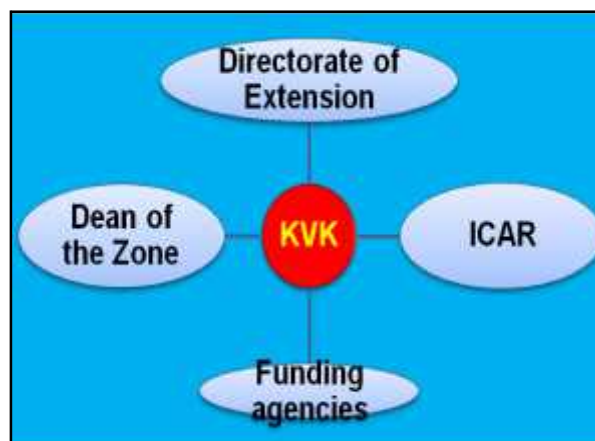
Funds were also made available by the Central Government for producing quality seeds of major crops on the farmers' fields through participatory mode. State Government

provided fund under National Horticultural Mission for production of quality planting material of horticultural crops. Directorate of Extension Services and Communication Centre are being funded by the State government under State plan.

Agricultural technology information center is functional on revolving fund. Extension activities organized at Zonal Research Stations, Regional Research Stations and college campi were funded by the ICAR and State Government.

Monitoring system

Efforts were made to improve the monitoring system for which different programme were launched for timely submission of information. E-linkage facility was created in five KVKs. The fundamental and need based infrastructural facilities were



provided in all the KVKs for smooth functioning. Reporting and documentation system was functional under which monthly, quarterly, half yearly, annual and five yearly reports was prepared by each KVK and was scrutinized by the competent authority.

Scientific advisory meetings (SACs) are also used as tool to monitor the activities of KVK. 31 SAC meetings are organized by KVKs in which work progress of the past six months was reviewed and action plan of the forthcoming six months were developed for implementation in the operational areas in consent with all stakeholders of agriculture

including farmers. Pre-zonal and Zonal workshops of KVKs were organized successfully to review the progress of all the KVKs.

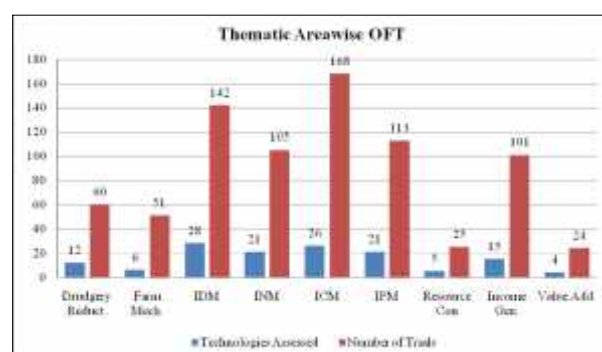
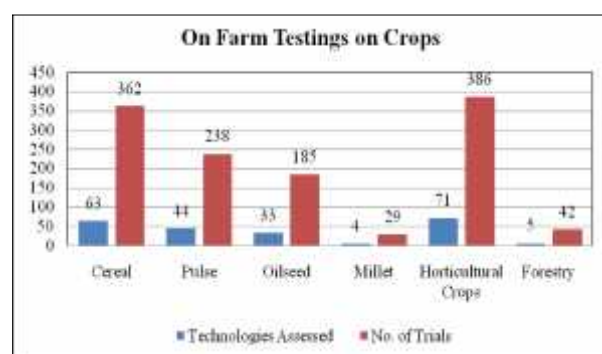
Human Resource Development

The Krishi Vigyan Kendra with the consent of the Directorate of Extension Services allows and sends its staff to participate in trainings, workshops, seminars and conferences for their knowledge and skill improvement in order to serve the beneficiaries better.

On-farm testing

During 2013-14, 291 OFTs on different aspects of crop production and crop protection were conducted by KVKs. These were conducted in participatory mode on 11810 farmers' fields. The process gave opportunities to the scientists to work and interact with farming community and collect useful feedback for production purposes.

The approach helped the farmers to get convinced with the technological options assessed on farmers' fields. The suitable technologies identified by the scientists were taken in the FLDs programs for their wider acceptability and horizontal expansion.

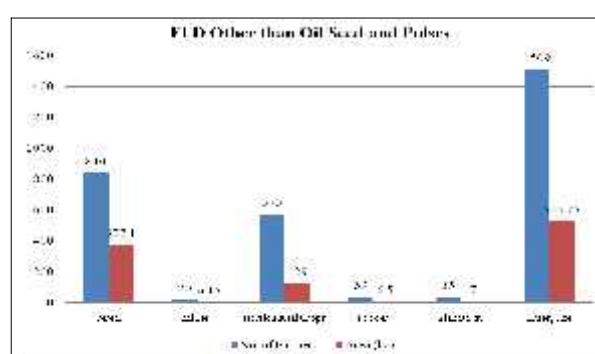
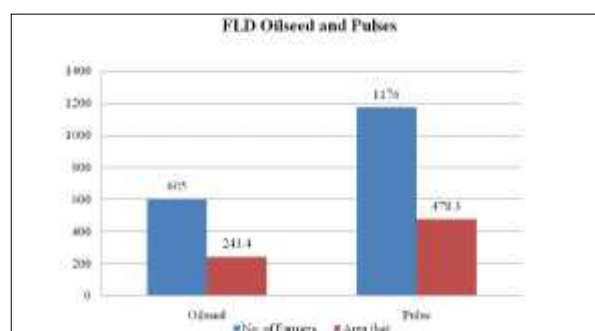


Frontline demonstrations

The University conducts large number of field demonstrations to make the farmers aware of the new technologies generated by the scientists. Front Line Demonstrations are regularly conducted in Kharif and Rabi seasons on need based components of production technologies. Total front line demonstrations on crop were in 1247.45 ha of 3290 farmers and on enterprise were 526 of 1509 farmers.

Frontline demonstrations on oilseed and pulses:

A comprehensive FLD programme on oilseed (soybean, Niger, sesame, groundnut, linseed mustard) and pulses (Arhar, Moong, Urd, Lentil, Pea and Gram) was taken up on farmers' field through KVKs for transferring the improved location specific technologies. FLD on oilseeds and pulses covered 721.7 hectares area and 1781 farm families during 2013-14. Major emphasis was given on introduction of improved varieties, IPM, INM and IPDM. Superiority of improved technology over farmers' practices was demonstrated successfully.



Frontline demonstrations on other than oilseed and pulses:

FLD programme on other than oilseeds and pulses were organized in 525.75 hectares, covering 1509 farm families on crops and on enterprise, 526 units were demonstrated of 1509. Major emphasis was given on production technologies including ICM, INM, IPM and IDM along with Farm Machineries, Animal Husbandry, Drudgery Reduction and Income Generation.

Training programs

The University has given high priority for competency development. It has an extensive programme of imparting skill-oriented trainings to the farmers and extension officials.

Training for extension personnel

To update the knowledge and skill of extension functionaries, KVKs arranged courses to benefit extension officials. These courses were formulated looking to the needs of field extension functionaries.

The Human Resource Development (HRD) could play a key role in the progress of agriculture. Field extension personnel were offered the latest production technology of field crops, vegetables, fruit crops, medicinal and aromatic plants etc.

During 2013-14, 88 in-service training programs were conducted in which 1085 participants upgraded their knowledge and skill.

Training for farmers and farm women

One of the mandates of KVKs is to organize trainings for farmers and farm women. In training programs, emphasis was given for skill improvement on various aspects of management of field crops, vegetables, fruit crops, medicinal and aromatic plants like plant protection, identification of symptoms of diseases, pest damage, nutrient deficiency and their management practices. During 2013-14, 1023 training programs were organized and

21800 participants were benefitted. These need based training programs facilitated them to update the knowledge and skills for improved farming.

Training for rural youth

Efforts were also made to organize vocational training courses for rural youths, school dropouts etc. with the aim to generate employment opportunity for them.

The courses covered cattle management, poultry, lac cultivation, maintenance and repair of farm equipments, mushroom cultivation, preparation of wormy compost, nursery management, vegetative propagation of fruits and ornamental crops.

During 2013-14, 63 vocational training courses on various aspects were organized in which 1822 rural youngsters learnt the skill necessary for self-employment.

Training for empowerment of farm women

Under empowerment of farm women programs, trainings to farm women in different fields such as kitchen gardening, tailoring, preservation, health and hygiene were imparted. The other activities included training of screen painting, tie and dye printing and safe storage of grains to rural youths including farm women and 63 training programs were organized in which 10822 trainees were benefitted.

Trainings on livelihood security

To ensure livelihood security of the rural people 21 livelihood trainings were provided in which 435 trainees were benefitted

Sponsored training programme

The trainings organized by KVK but sponsored by other agencies such as Department of Farmers' Welfare and Agriculture Development were 172 in which 7205 farmers and farm women were benefitted. In all there were 1338 trainings held in which 37617 participants were benefitted directly.

Vocation trainings program (VTP)

Other than mandatory trainings, vocational training programs were conducted by the Krishi Vigyan Kendras for skill development of the beneficiaries with the objective of their financial self-dependence. Trainings were organized on seed production technology, wormy composting, stitching and bag making, basic maintenance of farm implements and computer application etc. Total number of trainings organized this year was 39 in which 57 women and 824 participants were benefitted.

Other extension activities

Other Extension activities conducted were 4717 including Farmers' Fair, Kisan Sangoshthis and Crop Days are the regular features of the extension activities of the university. These were organized at different colleges, research stations and KVKs to equip the farmers, farm women and rural youths with the latest development of agricultural research and technologies, review their reactions and to assess their problems.

Eight Farmers' Fair (Farmers and Farm Women: 32242; Extension Functionaries 339), and 16 field days (Farmers and Farm Women: 477; Extension Functionaries: 39) from block level to state level were organized. There were 47 Farmers' Seminar, Group Meetings and Kisan Sangoshthis in which 1433 farmers and farm women and 78 extension functionaries participated. There were 37 animal Health camps organized in which 1692 farmers and farm women along with 43 in-service personnel participated.

News letter

All Krishi Vigyan Kendras published KVK News letter on quarterly basis. These newsletters covered the events scheduled for following three months and achievements made by them in the previous quarter. Technical recommendation, as per need, were also made available through these newsletters for further dissemination to farmers, farm

women, field extension workers and agri-input dealers. These news letters were sent to larger numbers of panchayats, farmers, field extension personnel and district authorities. In this year 23500 copies of news letter were printed out of which 23062 were distributed.

Kisan mobile advisory service

This programme was launched by the university in 2008-09 and is still continuing successfully. Through KMA service need based technologies in form of text messages in Hindi language were sent to farmers, farm women, extension functionaries, Akashwani Kendra and agri-input dealers on their mobile once a week on a fixed day, quickly. Beneficiaries were not charged for this service.

Seed production program

Each KVK has implemented the seed production programme both in Kharif and Rabi seasons and produce the quality seeds of Soybean, Rice, Maize, Wheat, Gram, Small millets on the instructional farm. Quality seeds were produced by the KVK which were made available to the farmers and government farms for further multiplication.

Quality planting materials

Infrastructural facilities were developed in six KVK viz. Betul, Jabalpur, Damoh, Sagar, Katni and Chhindwara to produce quality planting material of horticultural crops. These KVKs have developed the scion block of different horticultural crops and started producing the quality planting materials.

Crop cafeteria

Crop cafeteria was established in each KVK for live demonstrations of new agricultural and allied technologies to the farmers and farm women visiting the Krishi Vigyan Kendra. The technologies demonstrated this year mainly were SRI in paddy, Ridge Furrow Technology in Soybean, Rain Water Harvesting and Micro-Irrigation, Medicinal and Aromatic Crop Unit, Improved Seed Production Unit, Agro-climatic based Crop Production Unit, Millet Production

Unit and Nutrition Kitchen Garden Unit. Few other demonstrations laid were wormy compost unit and farm yard manure unit.

Technical program for drought prone area

Special technical program was conducted for drought prone area in which technologies such as SRI in paddy, ridge furrow technology in soybean production, crop diversification were promoted using live demonstrations, electronic media, trainings to the beneficiaries and extension functionaries and providing technical guidance to the allied departments.

NICRA (National Initiative on Climatic Resilient Agriculture):

National Initiative on Climate Resilient Agriculture (NICRA) is a network project of the Indian Council of Agricultural Research (ICAR) launched in 2011. The project aims to enhance resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. The research on adaptation and mitigation covers crops, livestock, fisheries and natural resource management. The project consists of four components viz. strategic

research, technology demonstration, capacity building and sponsored/competitive grants. It was operational in Balaghat, Chhatarpur and Tikamgarh Krishi Vigyan Kendras.

Tribal sub plan (Agro-forestry):

Tribal Sub Plan (Agro-forestry) is implemented with the objective of transfer of technology and extension of forest crops In Krishi Vigyan Kendra - Dindori, Jabalpur, Mandla, Seoni, Shahdol and Umariya.

Tribal sub plan (Pulses):

Funded by Indian Pulse Research Center, Kanpur program is implemented in tribal populated districts of Madhya Pradesh namely Shahdol, Mandla and Dindori with the objective of extension of improved production technology of pulse crop.

Nutri-cereal project:

Department of Farmers' Welfare and Agricultural Development is establishing food processing unit in seven districts i.e. Betul, Chhatarpur, Dindori, Jabalpur, Rewa, Sidhi and Tikamgarh.

Outstanding performing farmers

KVK Name	Name of Awardees	Awarding Organizations	Amount received
Betul	Sh. Jairam Gaikwad	State Government Gujarat	51000
Betul	Sh. Jairam Gaikwad	Department of Farmers' Welfare and Agricultural Developed	10000
Betul	Sh. Swadesh Chaudhary	Department of Farmers' Welfare and Agricultural Developed	25000
Betul	Siddhi Vinayak Kisan Club	Department of Farmers' Welfare and Agricultural Developed	20000
Betul	Sh. Santulal Dhannu	Department of Farmers' Welfare and Agricultural Developed	10000
Chhindwara	Sh. Madhusudan Tonpe	Gujrat Govt.	51000
Chhindwara	Sh. Madhusudan Tonpe	Government of Madhya Pradesh	51000
Chhindwara	Sh. Narendra Thakre	Government of Madhya Pradesh	50000
Chhatarpur	Shri Chitranjan Chaurasiya	Global Event, Gujarat	51000
Chhatarpur	Shri Chitranjan Chaurasiya	ATMA	10000
Chhatarpur	Shri Salim Khan,	ATMA	10000

TRAINING/SEMINAR/WORKSHOP

- I Advanced Training programme on "Agro-ecological Approaches towards Sustainable Agricultural Production" was organized by the Department of Soil Science & Agricultural Science, Jabalpur



during 1-21 October, 2013 under CAFT programme. Eighteen scientists from ICAR Institutions and SAUs across the country participated in this training programme.

- I Dr. Hitendra Kumar Rai, Senior Scientist (Soil Science) participated and presented a lead paper entitled "Efficient Land Use Planning for Medium Rainfall Regions (750-1150 mm) of India" authored by V.S. Tomar, H.K. Rai and A.K. Rawat in 78th Annual Convention of Indian Society of Soil Science and National Symposium on "Agro-Ecozone based Land use Planning" during 23-26 October, 2013 held at CAZRI, Jodhpur.
- I Training cum Workshop on Protection of Plant Varieties and Farmers Right Act (PPV&FRA) 2001 was organized under joint auspices of Zonal Project Directorate Zone-VII and Krishi Vigyan Kendra, JNKVV, Jabalpur on 30 November 2013. The specific objectives of the PPV&FRA are focused on (i) to provide an effective system for protection of plant varieties and rights of farmers and plant breeders, (ii) recognize the farmers in respect of their contribution made at conserving, improving and making available PGR for development of new plant varieties, (iii) to protect plant breeders' rights to stimulate investment for R&D and development of new varieties, (iv) to facilitate the growth of seed industry to ensure production and

availability of high quality seed I planting material and (v) to facilitate the growth of seed industry to ensure production and availability of high quality seed I planting material. Dr. R.R. Hanchinal, President, PPV and FRA, New Delhi was the chief guest of inaugural function and Prof V.S. Tomar, Vice Chancellor JNKW presided over the function. Dr Hanchinal in his inaugural address informed that with the creation of this Act, farmers would be benefited and there is a right to save their plant varieties and their brand name. Prof. Tomar announced that nodal agency would be constituted in the University premises for the benefit of the farmers. Hon'ble chief guest, Dr Hanchinal and Prof. Tomar jointly inaugurated the exhibition displayed by various KVKs of JNKW, which was appreciated by the authorities.

- I Dr. Ravi Prakash, Registrar, PPV & FRA, Dr. S.S. Tomar, Director Research Services, Dr S.K. Rao, Dean Faculty Agriculture and Dr. Anupam Mishra Director Zonal Project Directorate Zone-VII were the special guests. About 30 scientists and 100 agriculture extension officers and farmers were also participated in the workshop. At this occasion, a bulletin compiled by KVK scientists on Vermi compost was also released.
- I Sensitization Workshop on e-Resource in Agriculture Education (e-Krishi Shiksha)" is jointly orgazied by Knowledge Management UNit, IARI, New Delhi and JNKVV, Jabalpur on 22 October 2013. Prof V.S. Tomar, Vice Chancellor, JNKVV, Jabalpur was the Chief Guest. More than



250 students and 50 faculty members were participated in the Workshop. Dr. R.C. Goyal, Emeritus Scientist, IASRI, New Delhi, delivered the expert lecture on use of e-resources.

- I 8th National Conference on Krishi Vigyan Kendras 2013 was organized at University of Agricultural Sciences, Bengaluru from 23-25 October, 2013. All Krishi Vigyan Kendras under JNKVV participated in the conference by displaying exhibition for showcasing various agricultural and allied technologies.
- I Plantation Programme was organized on 2 October 2013 "Gandhi Javanti" at College of Agriculture, Jabalpur. 125 Ashok plants were planted at Naveen Hostel by NSS volunteers. Prof. V.S. Tomar, Vice



Chancellor, JNKVV, Jabalpur was the chief guest of the function.

- I Review Workshop on 'KVK-ATMA, Joint Efforts in Madhya Pradesh' organized at Directorate of Extension Services, on 16 of December, 2013. Vice Chancellor, Prof. V.S. Tomar was the Chief Guest. Director Extension Services, Dr. P.K. Mishra, Zonal Project Director, Zone VII, Dr. Anupam



Mishra graced the occasion.

- I AIDS Awareness Programme "World AIDS Day" was organized on 1 December 2013. Speech, Slogans and Group discussion related to prevention of AIDS were presented by the NSS students of College of Agriculture, Jabalpur. 68 NSS students were participated.
- I Launching Workshop of TSP was held on 10 January, 2014 under the chairmanship



of Vice Chancellor, JNKVV, Jabalpur, Prof. V.S. Tomar.

- I Farmers' Fair (Dhan Dhanya Mela - 2014) was organized at Waraseoni (Balaghat) during 23-24 January 2014. Chief Guest of the function was Shri Nitin Gadkari. Shri Gouri Shanker Bisen, Minister, Farmer Welfare and Agriculture Development, Government of Madhya Pradesh, Prof. Vijay Singh Tomar, Vice Chancellor, JNKVV, Jabalpur, Dr. P.K. Mishra, Director Extension Services, Dr. S.S. Tomar, Director Research Services, Dr. S.K. Rao, Dean Faculty, Dr. P.K. Bisen, Joint Director were present. During kisan mela, KVKs exhibited the technology and guided the farmers through the technical stall of the University. Soil Testing Van was also placed in the fair premises for testing soil samples of the farmers.

FARMS

5.1 Seed production system of JNKVV

Jawaharlal Nehru Krishi Vishwa Vidyalyaya (JNKVV) is the premier institution for seed production and distribution in the country. It caters around one fourth of breeder seed requirement of the nation and ranked 2nd after UAS Dharwad. The clientele include National and State Seed Corporations, State Farms Corporation of India, State Department of Agriculture, Horticulture & Farm Forestry and Animal Husbandry, State Agriculture Cooperatives, KRIBHCO, Ministry of Agriculture, Govt. of India, National Dairy Development Board, Bhart Krishak Samaj, National and Multinational Seed Companies, Progressive Farmers, Oil Federations and several others. The university has developed an expertise in production, processing and management of seeds of spices, sugarcane, medicinal & aromatic plants within the well conceived and unique framework of single window system of operation.

The important features of the seed production programme are: maintenance breeding based production. Effective internal monitoring system and In house strong quality assurance mechanisms; diversification of nucleus/breeder seed production programme with a view to meet the growing demand of quality seed of vegetables, species, sugarcane, medicinal and aromatic plants

have added new dimensions. The seed production programme is reviewed every year at university level during Kharif & Rabi seasons. The university has also initiated need-based training programmes for seed professionals from State Agricultural Universities (SAU), State Department of Horticulture, State Seed Corporations, State Seed Certification Agencies, national and multi-national seed companies to update knowledge on seed technology, seed certification standards and covering all important and relevant aspects of seed production, processing and storage. Considering these activities and contribution of JNKVV in National Seed Programme first time initiated best Breeder Seed Production Centre award by ICAR was given to JNKVV for 2013-14 in AIC National Seed Project Group Meeting at Srinagar.

5.2 Single window system

The execution of system envisages planning, production, monitoring, processing, marketing and supply of seeds to the indenters from a single window. It is being operated through Director Farms of the University. The system has been effective for the successful implementation of seed production programme. The Nodal Centre for the programme is under operation at Jabalpur with two satellite centres viz., Tikamgarh and

Powarkheda located at Zonal Agricultural Research Stations.

Financial resources

Financial assistance has been made available from ICAR under National Seed Project since the year 1983. The project has also been strengthened in terms of infrastructure and manpower in the year 1993. The project has developed the large operational systems that utilize the internal scientific/technical resources of the University to produce quality breeder seed. The system is strongly supported by Nucleus Seed Programme (Field crops) ICAR, Mega Seed Project ICAR; Vegetable ICAR; Spices-Govt. of MP & GOI and Water Management Project (World Bank).

Financial Returns from Farms (Rs. in lakhs)

Year	Receipt	Expenditure	Net Receipt
2013-14	906.85	615.84	291.01

5.3 Seed production planning

Seed production programmes of all the crops are being planned based on indents of national and state seed corporation through ICAR, private seed sector, seed market intelligence reports and based on previous year sales and demands. The total indent of all the sectors put together is being planned on the basis of suitability of the selected varieties to different agro-climatic zones of MP.

5.4 Crop improvement

A dynamic seed sector has been developed at JNKVV with continuous release of improved varieties and hybrids from crop research programmes. To ensure the crop research programmes, strong support is provided from the State.

5.5 Maintenance breeding

The maintenance breeding is one of the important activities of seed production

programme of the University. The programme involves a dedicated team of crop scientists located at various research stations to maintain the varieties. Crop varieties are being maintained by Single Plant Selection (SPS) grown in progeny rows. The SPS bulk seed is multiplied to produce breeder seed depending up on the indents.

Size of seed production programme

Crops	Number	Varieties
Field crops	32	250
Vegetable crops	13	23
Spices	11	26
Fruit plants	05	15
Medicinal & aromatics	20	35
Ornamental plants	20	40
Total	101	389

5.6 Status of breeder seed production

JNKVV produces more than 20% of Breeder Seed Produced by NARS for field crops as well as substantial quantities of Breeder, Foundation and truthfully labeled seeds of vegetables spices and medicinal & aromatic crops. Similarly a large number of saplings of Aonla, Mango and Beer are being produced and supplied. The University has been a major player in the multiplication of seeds and saplings of medicinal & aromatic plants by virtue of developing several improved varieties.

Year	India	JNKVV	% Contribution
2013-14	94987.61	15810.52	16.64

Seed replacement rate and varietal replacement

The replacement of the farmers saved seed with the certified seed of high quality will have a improvement increasing yield potential to the extent of 15 to 25% in different crops. The impact of certified seed increasing the yield

Maintenance breeding of wheat varieties



Single Ear to Row Progeny Plot



Single Ear to Row Progeny Plot



Selection of Single Ear heads



Harvesting of Single Ear Heads

Maintenance breeding of Chick pea varieties



Layout of Maintenance Breeding Block



Maintenance Breeding Block of Field Crop Varieties



Single Plant Progenies of Chickpea Varieties



Single Plant Progenies of Chickpea variety JG-322

Maintenance breeding of Moong and Urid varieties



Single Plant Progenies of Moong & Urid varieties



Breeder Seed Production plots of LBG-20

Maintenance breeding of Rice varieties



Long Row Plot of variety Kranti



Breeder Seed Production Plot of MTU-1010



Maintenance breeding of CMS lines of rice



Maintenance breeding of CMS lines of rice



Single plant progeny of Soybean



Long row of Soybean variety

Breeder seed production plots of Chickpea

JG-11



JG-315

Breeder seed production plots of Wheat varieties

JW-3211



GW-322

potential has been well recognized by the farming community. Chickpea varieties of JNKVV namely JG-315 (wilt resistant; insolation to 5 races) and JG 74, (wilt resistant; insolation to 2 races) of Fusarium and oxysporium, are used as donor, world wide. Releases of new varieties (J-11, JAKI- 9218, JG- 30, etc.) have changed the monoculture of JG-315 and enhanced the yields in Madhya Pradesh and Maharashtra substantially. Developed white rust resistant variety of mustard JM-1 for the first time and napus variety Jawahar Teri Uttam with low erusic acid and glucosinolate. JG 11 brought the chickpea revolution in Andhra Pradesh by covering 70% area with potential yield of 36.0 q/ha by replacing age old wide adopted variety Annagiri.

Seed replacement rate of important crops in Madhya Pradesh

Crop	Seed Replacement Rate%
Paddy	23.84
Maize	52.17
Jowar	14.33
Bajra	75.79
Kodo	0.95
Urd	21.22
Moong	44.44
Arhar	38.71
Til	9.13
Ramtil	2.45
Groundnut	1.04
Soyabean	44.48
Cotton Hy	100.00
Wheat Dwarf	33.00
Wheat Tall	4.55

Barley	2.01
Gram	17.00
Pea	11.04
Lentil	4.44
Mustard	28.54
Linseed	1.56

5.7 Public-private partnerships

JNKVV has implemented the benefit sharing of the public sector breeds with the private sector. There seems to be a tremendous potential to develop the seed links programme of public/ private sector. This helps in developing/ strengthening research resources and adequate resource income to University. An MOU has been developed for the purpose. This MOU is as per the guidelines of IPR Management for Agriculture Research Technologies of NARS and approved by Board of Management of University. Seed companies i.e., Vikki Agro Tech, Vibha Seeds, J.K. Agric Genetics, Dhanuka Seeds, Agri. Co. Seed, Spriha Seeds, Sarkar Seeds, Kohinoor Seeds, Amareswara Agritech, Ajit Seed and a dozen of seed companies showed interest for commercialization of early maturing Rice hybrids on non exclusive basis. Similarly in medicinal and aromatic plants partnerships are being developed through three-party agreement i.e., JNKVV, farmers and industry on mutually agreeable terms and conditions. A Business Planning Development Unit of the University has been established to care of transferable technologies for commercialization of Seed Production, Medicinal & Aromatics, Biofertilizer technologies etc.

5.8 Seed quality assurance mechanism

An in house seed quality assurance system has been developed to regulate the quality of seed and planting material produced at the University. This is being done through field monitoring systems. Later on the seed samples are being drawn for the processed seed of each variety and are being tested at Govt. Seed

Testing Lab as well as JNKVV Seed Testing Laboratory of STR. The seed samples are supplied to STR lab for verification of genetic purity of the seed supplied to various agencies through grow out test as post control plot.

5.9 Marketing strategy and information systems

Seed is being made available to the indenters as per demand/indents. Quantity of seed available of all the crops, varieties and categories for sale is placed in the university web site along with name of center where seed is available, price list, contact phone numbers etc. this information is made available to all the concerned.

5.10 Innovative seed system

Several seed system i.e., seed village programme, model seed systems in chickpea at Vidisha and Sagar, Rice fallow chickpea quality seed production in Rewa, Satna, Jabalpur and Damoh livelihood seed system in tribal areas has paid dividends to the farmers and brought self reliance in quality seed availability in M.P.

5.11 Quality seed production in tribal area

Low productivity of crops is the major cause of poverty amongst the tribal farming communities. The technologies developed during the recent past in agriculture are still out of the reach of tribal, small & marginal farmers of Bhariya, Sahariya, Baiga of Mandla, Dindori, Chhindwara, Seopur and Shivpuri of MP. In spite of remarkable progress in agriculture development in some rural areas and farmers are still dependent on the crop landraces which are available with them since ages. However, these landraces are adapted under limited resources and due to poor maintenance still remain poor yielders and with deteriorated seed quality. The technologies are yet to be disseminated amongst these underprivileged by demonstrating and training them about the

benefits of the technologies developed. There is a limited availability of seeds of the improved



varieties in spite of the large quantity of quality seeds being produced by the government agencies, SAUs and private sectors. Distribution and awareness about the quality seeds and technology related to this aspects increased dependency of the farmers to the farming. The knowledge management programme of seed systems has paid dividends to tribal farmers by increased productivity as well as livelihood and nutritional security in these districts of Madhya Pradesh.

5.12 Rice fallow chickpea seed system

Early maturing drought tolerant rice hybrids developed by JNKVV have been provided in the Rice fallow chickpea rainfed farming system of Rewa, Satna, Jabalpur, Damoh, followed by cultivation of chickpea under rainfed condition with improved technologies. In this model early maturing Rice hybrids JRH-4, JRH-5 transplanted through System of Rice Intensification followed by planting of suitable

varieties i.e. JG 130 (Rewa/Satna), JG 16 (Damoh/ Jabalpur) with the package of technologies to ensure the legume nutritional security as well as enhanced farmers income as compared to keeping fallow land after rice. In this system, technology transfer has been managed through knowledge management system and more than 2500 farmers perceived the technologies and spread across the farming community. Now these technologies showed impact through expanding the area of chickpea horizontally as well as increased the production vertically. This has been one of the success stories of knowledge management through seed system to improve the economic returns of the rice fallow chickpea farmers as well as nutritional security compared to the growing rice alone leaving rabi fallows. Certified seed is being produced in the farms of selected farmers fields of the project areas and village seed system were established resulted in increased productivity of chickpea (Table 4). More than two thousand five hundred farmers were trained for quality seed production resulted in the high production and high seed replacement rates with enhanced chickpea production in Rewa, Satna, Jabalpur and Damoh districts of Madhya Pradesh.

5.13 Farmers participatory seed production

Quality seed at the door step is the basic requirements of the farmers, to make available quality seed at village level and to encourage farmers participation in seed production for self reliance in seed, JNKVV has initiated an ambitious programme of farmers participatory seed production at village level to make farmers self reliant with respect to quality seed requirement and also increase their income by selling of quality seeds. Surplus Breeder seed produced at JNKVV farms was distributed to the farmers to produce their own seed and reduce their dependency on the market. Every year about more than one thousand farmers involved in the production of quality seed under this programme.

During 2013-14 farmers participatory hybrid seed production programme of JNKVV



bred rice hybrids namely JRH 5 has been undertaken in 10 acre during Rabi at five villages of Balaghat District of MP .At Seoni district also 5 acre programme of JRH 5 has been undertaken in two villages and also one acre programme has also been initiated of new hybrid JRH 19. The programme was successfully undertaken with the highest productivity of 15.6 q/ha .

5.14 Benefits and beneficiaries

The seed cost has come down as it has been produced where it was needed most by eliminating transport costs and role of middlemen through farmers seed cooperative societies in M.P. The integrity and quality of the seed would be assured, as it is produced under the supervision of competent person. Adoption of improved varieties led to increase productivity by 20-30%. Promotion of local seed enterprise in the cooperative section has also generated employment at the village level.

The major beneficiaries are small holder farming families and gain access quality seed of improved varieties.

5.15 Livelihood security through quality seed production

Quality seed of various crops is being distributed in the tribal areas to provide an advantage of increased availability of quality seed. This programme had tremendous positive impact on upliftment of socioeconomic status of the targeted tribal farmers. These programmes are being implemented through KVK of the V.V.

5.16 Special focus on horticulture crops

Seed production programme of spices and fruit-plant saplings was initiated on a large-scale. This resulted in availability of sufficient quantity of seed and planting materials of horticultural crops in the state. Fruits plant nurseries were established in all the centers of V.V.

5.17 Brand management of jawahar seeds

Brand Jawahar seed has been established with a logo to popularize the seed and planting materials. Now Jawahar seed is an established brand as the quality seed planting materials. Research programme were included for the development as well as promotion of hybrid technologies of maize, rice, castor, pigeon pea. Identification of seed production areas as well as standardization for rice, maize, pigeon pea hybrid production technology along with centers has been the top of the agenda of the management of seed programme.

5.18 Best centre award

Best Centre Award was given to Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur in XXIX group meeting of National Seed Project at SKUSAT, Shrinagar.

5.19 New areas of seed production

Several new areas have been identified for hybrid seed production for strengthening of commercial activities.

After having extensive research experimentation on suitability of different areas for hybrid seed production, it has been established that Madhya Pradesh is the most

suitable for hybrid seed production of maize (32-35 q/ha) pigeonpea (15 to 20 q/ha), Rice (10-15 q/ha) hybrid seed recovery. This has been a remarkable achievement of JNKVV hybrid seed research promotion. Hybrid paddy seeds can be produced in low rain fall area of Vindhya and Mahakosal region of Madhya Pradesh during kharif season.

List of different crops & varieties for which breeder seed is produced:

S. No.	Crop	No.	Name of Varieties
1	Soybean	06	JS 93-05, JS 97-52, JS 95-60, JS 20-29, JS 20-34, JS 335
2	G. Nut	02	TG 37A, TAG 24
3	Rice	32	MTU-1010, Kranti, IR-64, PS-4, JR-201, PS-5, IR-36, WGL-32100, PS-3, JR-503, JR-75, JR-353, JR-345, JR-504, P-1460, Mahamaya, Danteshwari, MTU-1081, NPT-65, NPT-29, NPT-13-10, BVD-109, Sahbhagi, JRH-5 A, B & R Line, JRH-8 A, B & R Line, JRH-19 A, B & R Line
4	Arhar	04	ICPL 87-119, ICPL 87, TJT 501, TT 401
5	Wheat	28	JW 3288, JW 3020, JW 3269, Malav Shakti, GW 366, GW 273, GW 3211, HD 2932, Lok 1, GW322, HD 2864, Sujata, JW 3173, C 306, JW 17, GW-173, JW 1106 (D), JW 1142, JW 1215 (D), JW 1202, JW 1203, JW 1201, WR 544, WH-147, HI 8627, MP 3336, DL 803-3, Raj 3765
6	Gram	16	JG 130, JG 11, JG 63, JG 74, JG 315, JG 322, JG 14, JAKI 92-18, JG 16, JGG 1, JGK-1, JGK-2, JGK-3, JG 12, Vijay, Vishal
7	Pea	06	Arkel, JM 6, IPF 99-25, JP 885, PSM 3, IPF 99-13
8	Linseed	05	JLS 27, JLS 9, JLS 67, PKDL 41, JLS 66
9	Lentil	02	JL-1, JL-3
10	Mustard	01	Pusa Tarak
11	Berseem	02	JB-1, JB-5
12	Oat	02	Kent, JO 1
13	Moong	12	Ganga-8, PDM 11, TJM 3, PDM-139, TM 99-37, HUM-1, LGG-460, P. Vishal, SL-668, JM-721, HUM 12, HUM 16
14	URID	10	LBG 20, T 9, PU 30, PU-35, PU 19, JU-3, PDU-1, TU 98-14, TAU-2, TU 94-2
15	KODO	06	JK 48, JK 439, JK 41, JK 13, JK 65, JK 106

16	KUTKI	02	JK 8, JK 36
17	NIZER	03	JNC 6, JNC 1, JNC 9
18	SESAME	07	JT 7, TJT 308, TLG 22, TKG 21, TKG 55, TKG 306, JTS 8
19	BARLEY	02	JB 58, JB 1
20	MAIZE	11	JM 216, HKI 163, HKI 161, HKI 193, JM 8, JM 12, Chandan Makka-1, Chandan Makka-2, Chandan Makka-3, Jawahar Pop 11, A.Tall(F)
21	Sugarcane	08	COC 671, COJN 86-141, COO 6027, CO 94008, COO 403, CO 99004, CO 86032, COJN 86600
22	Cotton	02	PKV 081/ Suraj / NH615, AKA 7/ AKA 8
23	Sunhemp	01	K-12 Yellow

Quality seed production during 2012-13

Summary

(In quintals)

Particulars	Kharif 2013				Rabi 2013-14			
	In Institute/university farm		In farmers' field		In institute/university farm		In farmers' field	
Field crops	Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement
Breeder Seed	18473.00	7679.62	-	-	8130.9	9979.00	-	-
Foundation Seed	-	-	0.00	24585.50	-	-	0.00	11620.00
Certified Seed	-	-	-	-	-	-	-	-
Truthfully labeled Seed	-	-	-	-	-	-	-	-
Planting Material	-	-	-	-	-	-	-	-
Total	18473.00	7679.62	0.00	24585.50	8130.9	9979.00	0.00	11620.00

(in lakh)

Planting Material	0.00	16287.00	-	-	-	-	-	-
Tissue Culture plantlets	-	-	-	-	-	-	-	-
Total	0.00	16287.00	-	-	-	-	-	-

Targeted production programme for Kharif 2014

Crop	Area (in ha)	Total production (q)		
Paddy	307.95	12896.00	Kodo	8.40 100.80
Soybean	419.70	8595.00	Kutki	3.30 39.60
Arhar	31.20	624.00	Dhaincha	24.00 240.00
Niger	5.50	27.50	Til	20.50 205.00
Maize	3.40	103.00	Urid	8.50 102.00
Groundnut	2.00	20.00	Moong	1.50 18.00
			Sunhemp	1.00 8.00
			Total	835.95 22978.90

Alternate areas for hybrid seed production

Crop	Season	Area
Maize	Rabi	Kymore plateau, Satpura hills, Vindhya plateau and Mahakaushal region of Madhya Pradesh
Rice & Wheat	Rabi	Balaghat, Seoni
	Kharif	Jabalpur, Rewa
Pigeonpea	Kharif	Malwa, Kymore plateau, Satpura hill, Vindya plateau
Castor	Rabi	Kaymore plateau, Satpura hill

Targeted production programme for Rabi 2014-15

Crop	Area (in ha)	Total production (q)
Wheat	280.00	12618.00
Barley	2.00	100.00
Chikpea	241.50	3665.00
Linseed	8.00	120.00
Lentil	15.50	218.00
Berseem	4.80	44.50
OAT	3.90	156.00
Pea	10.20	152.00
Maize	1.00	20.00
Mustard	1.90	15.00
Total	568.80	17108.50

STUDENTS' WELFARE

6.1 Inter collegiate games, sports and cultural meets

- | Fifteenth inter collegiate cultural competitions was organized during 3-4 February, 2014 at College of Agriculture Jabalpur. About 100 students from six colleges of Vishwa Vidyalaya have participated with great zeal in eighteen events of literary, fine arts, theatre, music and folk dance competitions.
- | Inter collegiate sports meet was organized between 31 January and 1 February 2014, at college of Agriculture Jabalpur. Total 272 students participated from all colleges of JNKVV.
- | Inter collegiate Athletic Meet (Badminton, T.T. & Athletics) was organized on 1 Feb., 2014, Jabalpur. Total 74 students of all college of JNKVV participated in the event.

Participation in 15th Agriunisports 2014

- | All India Inter Agricultural University Sports

& Games Competitions sponsored by ICAR New Delhi was organized at Assam Agriculture University, Jorhat, Assam from 24-28 March 2014. JNKVV participated in this tournament in athletics, volley ball, table tennis and badminton. Total 40 students participated in this national event.

| Participation in 14th Agriunifest 2014

The Students of JNKVV participated in 14th Agriunifest held from 13-17 February, 2014 at University of Agricultural Sciences, GKVK, Bangalore and won 2 Gold medal, 1 Bronze medal and got 4th position in 3 events.

6.2 National Cadet Corps (NCC)

(1MP and 2MP NCC unit JNKVV, Jabalpur)

- | In total 53 girls and 53 boys joined NCC in college of agriculture, JNKVV, Jabalpur. Out of which 19 girls and 15 boys cadets appeared for "C" certificate exam. All were qualified with good grades.
- | In addition to regular parade in the college, Guard of Honour was extended to



Republic Day parade and Guard of Honour to the Vice Chancellor

Honourable Vice Chancellor, JNKVV, Jabalpur on republic day. Flag hoisting was done by Hon'ble Vice-Chancellor and after his speech prizes were distributed to outstanding cadets of girls and boys units. Best cadet award was received by Anurag Shah and best cadet girl was awarded to Ku. Roshni Jharia.

- | To create awareness for voting a vote appeal was made on 23rd Nov 2013 by NCC cadets of JNKVV, Jabalpur. Their message of vote appeal was well circulated among the public through all the popular newspapers.
- | NCC cadets of JNKVV organized lecture series, question answer sessions and formed a human chain to create awareness against HIV/ AIDS on 1st Dec 2013, the AIDS day.
- | On 16th Dec 2013 (Nirbhaya Day) NCC cadets of JNKVV took active part in forming human chain across the city. On this occasion Honourable Vice Chancellor, JNKVV, addressed the cadets and other students of college.
- | A twelve day first aid training camp of NCC cadets was organised. In this camp 12 cadets of the university participated. Duration of the camp was from 15 July to 26 July, 2013. The principle objective of this training was to educate the cadets for saving the precious lives of injured or sick persons by providing them first aid.

6.3 NSS



- | A plantation programme was organized on October 2, 2013, "Gandhi Jayanti", at college of Agriculture, Jabalpur. 125 Ashok plants were planted in the programme of New Hostel by NSS volunteers.



- | AIDS awareness programme was organized on December 1, 2013, "World AIDS Day" in which speech, slogans & group discussions related to prevention of AIDS were presented by the NSS students of College of Agriculture, JNKVV, Jabalpur. In the programme 68 NSS students participated.
- | 125, NSS volunteers participated in rally organized on the occasion of "Nirbhaya Divas on 16 Dec, 2013" at Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur .

Fellowship

- | Mr. Ranvijay Pratap Singh, Ph.D. Student, Department of Horticulture has been awarded Inspire Fellowship by Ministry of Science and Technology, Govt. of India, New Delhi for a period of five years.



- | Ms. Chinmayee Roy, M.Sc. (Ag), 1st year student of Department of Soil Science & Agricultural Chemistry, Jabalpur has been awarded with Sitaram Jindal Foundation Scholarship for perusing M.Sc. (Ag) degree in Soil Science and Agricultural Chemistry.



6.4 Tutorial cell

- I As per directive of Hon'ble Vice-Chancellor tutorial cell for students of Jawaharlal Nehru Krishi Vishwa Vidyalaya has been started for preparation of ADA/RHEO/JRF Competition Examination. Students registered under tutorial cell.

I	RHEO	-	141
I	ADA	-	60

V.V. Students selected for JRF and GATE**(A) JRF**

College of Agril. Engineering	12
College of Agriculture, Rewa	27
College of Agriculture, Jabalpur	21
College of Agriculture, Ganjbasoda	03
College of Agriculture, Tikamgarh	04

(B) GATE

College of Agril. Engineering	19
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Total number of students selected 86

- I Out of seventeen students selected in Graduate Aptitude Test in Engineering

(GATE) and Ashish K. Dubey ranked 3rd, Nandita Keshri 7th and Awani Shrivastava 16th. These seventeen students have got admission in IIT Bombay, Kharagpur, Roorkee and different NITs (National Institute of Technology). Out of fifteen students selected in Junior Research Fellowship of ICAR, Sanket Rai ranked 2nd, Alka Mishra 4th and Trilok Patidar 7th.

- I Students of B.Tech. Final year, Mr. Harshal Agrawal and Vineet Dubey participated in "COGNIZANCE-2014" organized by IIT, Rurkee and Wipro during 21- 23 March, 2014. In event 'Idea', they presented a case study titled 'Bio Remediation of Petroleum Wastage' and awarded second prize. In 'Spotlight' event, Mr. Harshal Agrawal presented a case study on 'Soil and water conservation practices in semi arid region' and won second prize. Mr. Vineet Dubey secured first prize and Mr. Harshal Agrawal second prize in the event 'Spectrum'.

6.5 Employment generation through placement cell

I	Organization/NGOs/Companies/ Banks visited V.V. Campus	06
I	Number of students got employment	65 (April, 2013 to March, 2014)

S.No.	Name of company	Date of visit	No. of student selected
1	NCML Mumbai	March 7-8, 2013	04
2	PRADAN, New Delhi	May, 2013	09
3	ICICI Bank	June 24, 2013	06
4	Nature Bio Food Ltd., Haryana	June 27, 2013	16
5	Reliance Agro. Chemical	Aug.13, 2013	20
6	Dev Enterprises (for NOG training)	Sept. 13, 2013	10
	Total		65

NEW CONSTRUCTION/ INFRASTRUCTURE DEVELOPMENT

S. No.	Particulates of work	Estimated cost	Physical status
(A) College of Agriculture, Jabalpur			
1.	Renovation of roof treatment of P.G. Girls Hostel at College of Agriculture, Jabalpur.	1,70,000.00	Work in progress
2.	Renovation of cycle stand and Choukidar hut that at U.G. Girls Hostel.	1,06,000.00	Work in progress
3.	Renovation of roof of U.G. Girls Hostel at Jabalpur.	4,85,000.00	Work in progress
4.	Providing crusher Dust of approach Road from main entrance gate to entrance of U.G. Boys Hostel.	41,075.00	Work in progress
5.	White washing of tribal Girls Hostel.	14,000.00	Completed
6.	White washing and repairing of tribal Boys Hostel.	25,000.00	Completed
7.	Renovation of tribal Girls Hostel.	1,45,000.00	Completed
8.	Renovation of Electrification work on PVC wiring system at U.G. Hostel.	7,80,700.00	Work in progress
(B) Department of Forestry			
1.	Renovation of Electric work at forestry Building (Mains only)	74,381.00	Work order issued
2.	Replacement of existing window with alluminium window in forestry Deptt. JNKVV, Jabalpur.	1,50,000.00	Work order issued
(C) Dean, Faculty office at J.N.K.V.V., Jabalpur			
1.	Renovation of Dean, Faculty office at J.N.K.V.V., Jabalpur	2,50,000.00	Work under progress
(D) Renovation of Director Extension Service office			
1.	Renovation of D.E.S. Chamber / Office at J.N.K.V.V., Jabalpur	2,53,000.00	Work order issued
(E) College of Agriculture Tikamgarh			
1.	Fencing with PCC pole & chain link mesh around Agriculture College & Boys Hostel, Building.	9,43,500.00	Work under progress
(F) College of Agriculture, Rewa			
1.	Putty emulsion painting (Inside) of all the corridors of College of Agri. Rewa.	3,70,000.00	Work under progress
(G) J.N.K.V.V., Main Campus			
1.	Electrification of computer room of library at JNKVV Jabalpur	95,000.00	Work completed

(H) College of Agriculture Engineering, Jabalpur			
1.	U.G. Hostel (a) Vitrified tiles in dining hall. (b) Kota stone work of kitchen and other Granite work of dining table. (c) Replacement of Doors & windows of both the hostel.	68,181.00 98,422.00 1,44,860.00	Work in progress
2.	Renovation of toilet of girls common room at college.	1,39,903.00	Work under progress
3.	Renovation of meeting hall.	2,10,965.00	Work in
4.	Renovation of toilet of ground floor & first floor at college.	1,12,258.00	Work completed
5.	Renovation of ladies toilet at college.	54,602.00	Work completed
6.	Vitrified tiles flooring in Deans meeting hall.	89,266.00	Work in progress
7.	Complete electrification of B -Tech Hostel No.1	3,11,079.00	Work order issued

(a) Civil Works (Ongoing Works)

S. No.	Particulars of works	Physical status of works
1.1(A)	Const. of Girls Hostel at College of Agriculture, Tikamgarh	Completed and handed over for use
1.1(B)	Const. of Boys Hostel at JNKVV Jabalpur (Rewa)	Lay-out given
1.2	Const. of Girls Hostel at JNKVV Jabalpur	G. Floor finishing work in progress F. floor RCC Roof work in progress
1.3	Const. of International hostel at JNKVV Jabalpur	G. Floor finishing work in progress F. floor RCC Roof work in progress
1.4	Educational Museum	90 % Completed
1.5(a) (b)	Examination Hall Const. of Swimming Pool	Completed Foundation work & Const. of filtration plant in progress
1.6	Establishment of Zonal Sports Complex at H.Q.	60 % work completed