IMPACT OF FARMERS' FIELD SCHOOL ON COTTON GROWERS

THESIS

Submitted to
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By

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DECLARATION OF STUDENT

I hereby declare that the experimental work and its interpretation of the Thesis entitled **"IMPACT OF FARMERS' FIELD SCHOOL ON COTTON GROWERS"** or part thereof has neither been submitted for any other degree or diploma of any University, nor the data have been derived from any thesis / publication of any University or scientific organization. The source of materials used and all assistance received during the course of investigation have been duly acknowledged.

Deokarse

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CERTIFICATE

This is to certify that the thesis entitled **"IMPACT OF FARMERS' FIELD SCHOOL ON COTTON GROWERS"** submitted in partial fulfilment of the requirements for the degree of **"Master of Science in Agriculture (Extension Education)"** of Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola is a record of bonafide research work carried out by Deokar Sujata Balkrishna under my guidance and supervision.

The subject of the thesis has been approved by the Student's Advisory Committee.

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Place : Akola

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(**Deokar Sujata Balkrishna**)

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(Ɗ) List of Abbreviations

%	-	Per cent
Agric.	-	Agriculture
Agril.	-	Agricultural
Dev.	-	Development
EU	-	European Union
Extn. Educ.	-	Extension Education
FAO	-	Food and Agriculture Organization
Fig.	-	Figure
ha	-	Hectare
HaNPV	-	*Helicoverpa armigera* Nuclear Polyhydrosis Virus
i.e.	-	that is
IPM	-	Integrated Pest Management
IRDP	-	Integrated Rural Development Programme
J.	-	Journal
KVK	-	Krishi Vigyan Kendra
NSKE	-	Neem Seed Karnel Extract
Res.	-	Research
Rev.	-	Review
Rs.	-	Rupees
Univ.	-	University
Unpub.	-	Unpublished

(F) THESIS ABSTRACT

a. Title of the thesis	:**"IMPACT OF FARMERS' FIELD SCHOOL ON COTTON GROWERS"**
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ABSTRACT

The present study on "Impact of Farmers' Field School on cotton growers" was undertaken in villages of Akola panchayat samiti of Akola district in Maharashtra state. The study was taken up with a objective, to study the personal, socio-economic and psychological characteristics of beneficiary and non-beneficiary

cotton growers and their knowledge and adoption about integrated pest management practices along with the impact of Farmers' Field School on them.

Sixty cotton growers who were the beneficiaries of Farmers' Field School before three years were selected in beneficiary farmers group and another sixty cotton growers who were not the beneficiaries of Farmers' Field School but from the same villages purposively selected matching with the land holding of the beneficiary farmers. Thus, the sample of 120 farmers was drawn and the information on the basis of research objectives from each respondent was collected with the help of prestructured and pretested interview schedule by contacting them personally. An experimental research design of social research was used for the present study.

The findings of the study revealed that majority of beneficiary and non- beneficiary farmers were from younger age group, had education upto high school level, belonging to small land holding, agriculture as their main occupation, had moderate experience in cotton cultivation, the annual income was observed in between Rs. 50,001 to Rs. 1,00,000, had moderate level scientific orientation and economic motivation. In case of socio-economic status maximum number of beneficiary farmers were found in medium category whereas non-beneficiary farmers were found in low level of category.

The knowledge and adoption of majority of beneficiary farmers were found to be higher degree whereas non beneficiary farmers had medium degree of knowledge and adoption.

The relational analysis revealed that, out of selected characteristics only age, education and socio-economic status had shown positive and significant relationship with knowledge of beneficiary farmers whereas in non-beneficiary farmers only occupation was found positive and significant with their knowledge. However, socio-economic status of beneficiary farmers was found positive and significant with their adoption, whereas in case of non-beneficiary farmers only occupation was found significant with their adoption.

As regards to the total impact of Farmers' Field School on beneficiary farmers over non-beneficiary farmers in terms of change in knowledge, change in adoption, change in production, change in productivity and change in annual income were found positively significant.

CHAPTER I

INTRODUCTION

1.1 Background information

Development and communication of research is the important aspect in the agriculture. Research in agriculture shows definite increase in agricultural production while effective communication of appropriate scientific innovation to the millions of farmers who are the ultimate user of them is a key to economic and social progress of any nation.

To accelerate agricultural development virtually, all developing countries have initiated communication system in various ways. In India launching of Community Development Programme, Krishi Vigyan Kendra, National Extension Service, Intensive Agriculture Development Programme, Lab to Land Programme, Training and Visit System, National Horticulture Mission and Single Window System in Maharashtra, etc. are some of the communication strategies attempted since independence to accelerate Agricultural and Rural Development.

All these requires two way communication situation, based on mutual respect, continuous feedback and common elaboration. It is important to understand the real goal of farmer and to develop solution, which meet such goals. This requires location specific approach and it can be done with the context of Farmers' Field School (FFS).

Transmitting the new research based technologies about improved cultivation practices among the farmers is the main aim of any extension programme. It is necessary to do this with a non-formal type of education means by a field school, which offers farmers the opportunity to learn by doing, by being involved in experimentation.

Concept of Farmers' Field School

The term Farmers' Field School comes from Indonesian expression `Sekolah Lapangan' means just field school. The first `field school' was established in 1989, in Central Java. The name `Sekolah Lapangan' was created reflected educational goal. The course took place in the field and field condition defined most of the curriculum, but real field problems were observed and analyzed from planting of crop to harvest. Group discussion on the crop management could be evaluated at the end of season by measuring the yield. A field was established by the participant with a research study to compare IPM methods and farmers conventional methods. Pre and post test were given the same farmers and facilitators attended throughout the season and graduation was based on attendance and testing performance. Graduation certificate was awarded to farmers. Thus, the Farmers' Field School is a school without walk that taught basic agro-ecology and management skill.

The Farmers' Field School is a tool to build capacities of farmers group through participatory approach for promoting sustainable agriculture development, managing crop ecosystem, to make them better decision maker in sustainable use of resources at the cropping, farming and watershed. The Farmers' Field School approach is an effective approach to technical education and capacity building, which enable them to analyze their own production practices and identify possible solutions and implements his or her own decision in his or her field.

Farmers' Field School serve as means to better extension work. The main objective of Farmers' Field School is to help the farmers to solve the problem of not only today but also gives insight on future problem and to develop farmers skill, knowledge, attitude in identifying problem and taking decision of adoption as to get a healthy crop. The rationale of the Farmers' Field School comes from growing realization that agricultural growth for resources poor

farmers must be knowledge intensive. It must deal with complete environments which have characteristics that are often specific to a particular location.

Below are the basic concepts which are common to Farmers' Field School across many countries.

- Adult non-formal education
- Technically strong facilitator
- Based on crop phenology and time limited
- Group study
- Test and validate
- Hands on learning activities
- Evaluation and certificates
- A process, not a goal
- Work self out of a job
- Follow up
- Local funding goal

Salient features of Farmers' Field School

1. A season long crop stage linked schedule of curriculum
2. Training to selected number of farmers
3. Pre-evaluation to understand the current level of knowledge of selected farmers.
4. Periodical definite day and time to visit with clear cut action plan
5. Master trainees who had undergone seasonal long training programme are only facilitators working full time in the programme.
6. A field lab / training plot for learning activities
7. Layout of several experiments in their field by the farmers to know the better variety, good combination of fertilizers, plant compensation ability etc.
8. Latest methodology for use of need based IPM practices.

9. Motivating the farmers to learn skill in small groups by organizing group dynamic exercises.
10. Field oriented special topics to solve the local specific problems.
11. Post evaluation to understand the progress in level of knowledge.

Spread of Farmers' Field School

The success of Farmers' Field School approach in East Asia let to it being extended into the other parts of Asia, Central America and Africa. There has been a shift from the original rice crop to other crops, which means the approach had to be tailor made to suit other crops, examples are Indonesia adopted the IPM is a national policy in 1986 and there have been a lot of initiatives to expand IPM to other crops such as horticultural crops. Another good example of that was in 1994 project in Java carried by the `Research Institute for Legumes and Tubers'. In Africa, in the year 1996 FAO worked with an IPM vegetable project in Sudan and in Zimbabwe it was involved in training of Agricultural Extension Workers in a cotton IPM Project. There was a new IPM project, which started in February 2000 and supporting the training of cotton farmers in Bangladesh, China, India, Pakisthan, Phillipines, Vietnam, it is funded by EU and managed by FAO.

In India firstly, the project was started in the year 1999 only in Andhra Pradesh, Karnataka and Tamilnadu.

Farmers' Field School scenario in Maharashtra

Farmers' Field School has been started in Maharashtra in 2001 on IPM technology of cotton crop. Since 2002 the programme was handed over to State Department of Agriculture (SDA) with a view for effective transfer of IPM technology among the farming community through Farmers' Field School. State Department of Agriculture organized the season long IPM training programme for their extension staff i.e. Agriculture Supervisor and Agriculture Assistant. This grass root level extension workers performing the role of facilitators in Farmers'

Field School gives technical advice and guidance to the farmers to find their own solution locally.

In Maharashtra State Farmers' Field School is projected for IPM in cotton, sugarcane, oilseeds pulses and cereals.

Table 1. Crop wise status of Farmers' Field School in Maharashtra state (2001-2007).

Year	Number of Farmers' Field School						Total farmers
	Cotton	Sugarcane	Oilseeds	Pulses	Cereals	Total FFS	
2001-02	6	0	0	0	0	6	150
2002-03	55	0	0	0	0	55	1375
2003-04	929	0	64	70	0	1063	27245
2004-05	1569	0	105	211	0	1885	48705
2005-06	710	91	378	238	143	1560	42080
2006-07	850	400	596	265	500	2611	78330
2007-08	3000	500	441	201	570	4712	141360
Total	7119	991	1584	985	1213	11892	356760

(Source: State Department of Agriculture, 2007-08)

The Farmers' Field School is projected for IPM practices in crop like cotton, sugarcane, oilseeds, pulses and cereals.

According to report of State Department of Agriculture, during the year 2007-08 total number of Farmers' Field School on IPM of all these crops were 4712 out of that 3000 Farmers' Field School are conducted only for cotton crop which was more than any other crop.

1.2 Importance and need of study

Cotton is the major cash crop of India and it is also the main cash crop for farmers of Vidarbha region of Maharashtra state. India ranks first in cultivation of cotton crop. The area under cotton crop of a country during 2007-08 was 95.30 lakh hectares and production was 310 lakh bales i.e. cotton yield was 392 kg/ha. In India, Maharashtra ranks first in area covering 31.91 lakh hectare

area followed by Gujarat state which covers 25.16 lakh hectare area during the year 2007-08 (Anonymous, 2008).

Gujarat state is highest in production of cotton as compared to other states. The production of cotton in Gujarat during 2007-08 was 110.0 lakh bales and that of Maharashtra was 60 lakh bales. It is due to the continuous pest attack on cotton crop.

Vidarbha region covers 65 per cent area under cotton out of total cotton cultivable area of Maharashtra i.e. 17-18 lakh ha area. In this major area of cotton production, 20-90 per cent loss occurs due to continuous attack of pest on the cotton crop (Anonymous, 2007).

It is from the time of green revolution for minimizing the damage due to pest on the crop and for getting higher yield and income, farmers use the large quantity of chemical pesticides. It has been now realized that the improper and indiscriminate application of chemical pesticides have disturbed the balance of agro-ecosystem and created the new problems in the pest management like increasing in resistivity of pest against chemical, pollution, residual hazardous, low productivity and production, etc. To overcome these problems, it is now essential to minimize the use of chemical pesticide on the crop and there should be ecofriendly and biocontrol methods which were found to be most effective for maintaining the ecological balance of the nature, and on the same line IPM methods found to be very effective for control of pest and also for reducing the cost of cultivation of the crop.

In the Farmers' Field School, the concept of IPM was first introduced in Maharashtra State only in cotton on the basis of its success. Large number of Farmers' Field School were organized by State Department of Agriculture in Maharashtra not only in cotton but also in other crops. There are number of studies found on the different extension activities and the programmes, but no study was found related to the evaluation or impact of Farmers' Field School on the cotton growers. It is, therefore, the study was framed

and formulated on the theme of impact of Farmers' Field School on the cotton growers. Government of Maharashtra has also understood the utility and importance of this programme.

It is, therefore, felt necessary to understand and identify the impact of Farmers' Field School on beneficiaries in terms of knowledge about IPM practices of cotton crop among the cotton growers and adoption of IPM practices by the cotton growers and whether there is change in production and productivity of cotton crop and annual income due to adoption of IPM practices in cotton. So that the useful recommendation and modification in the IPM programme will be possible.

1.3 Objectives of the study

The objectives for the present investigation are delineated as below:

1. To study the personal, socio-economic and psychological characteristics of beneficiaries and non-beneficiaries of Farmers' Field School.
2. To study the knowledge and adoption of Integrated Pest Management practices by beneficiaries and non-beneficiaries of Farmers' Field School.
3. To study the relationship between selected characteristics of beneficiaries and non-beneficiaries of Farmers' Field School with their knowledge and adoption about Integrated Pest Management practices of cotton crop.
4. To study the impact of Farmers' Field School on cotton growers.

1.4 Scope and limitation of the study

Scope of the study

At present Farmers' Field School is found to be an emerging area in agriculture and its network is spreading not only in the cotton crop but also in other crops. Its utility and success is also noted at the state level and at the farmers community.

The findings of the present study would be helpful to estimate the knowledge, adoption and impact of Farmers' Field School on the farmer. The

impact of Farmers' Field School in terms of change in knowledge, change in adoption, change in production, change in productivity and change in annual income of beneficiaries due to implementation of the IPM practices in cotton crop and it would also found useful in knowing constraints faced by them in adoption of IPM practices. So that, it will be helpful in knowing usefulness and utility of Farmers' Field School at farmers level.

The findings of the study would be helpful to understand the effect of Farmers' Field School of IPM technology at grass root level and also provide useful guidelines for effective and efficient changes in technology for researcher, developing agencies and extension workers which would be beneficial and suited to farmers.

Limitation of the study

1. Study is restricted to cotton growers of Akola panchayat samiti of Akola district in Maharashtra state.
2. In a view of limited time and resources, the study restricted to certain variables which may have influence on the impact of Farmers' Field School on cotton growers.
3. The researcher has not covered all the technologies disseminated through Farmers' Field School of various crops.
4. This being a student's research, time and money are the constraints which limit the coverage of area and the number of respondents to be interviewed.

1.5 Research hypothesis

Keeping the objectives of the study in view, the following research hypothesis were framed on the different aspects of the study. The nature of relationship between the variables were determined on the basis of the review of literature. The hypotheses are set up and presented in `null form' (Ho).

1. There is no significant relationship between the selected personal, socio-economic and psychological characteristics of farmers with their knowledge about IPM practices of cotton crop.
2. There is no significant relationship between selected personal, socio-economic and psychological characteristics of farmer with their adoption about IPM practices of cotton crop.

1.6 Organization of Thesis

The report of the present study has been presented in seven major chapters. In the first chapter introduction dealing with background history, growth and development, need and importance, objectives of the study, scope and limitation of the study.

In second chapter, the theoretical framework is given. It comprises related literature and findings of various research studies conducted at different locations and in varied type of situation.

The methodology of study has been discussed in third chapter. It includes study location, population, research design and sample of the study, tools and techniques used for data collection procedure used for measurement of variables and analysis of data.

The fourth chapter is devoted to the findings of the study along with the discussion thereon.

In the fifth chapter, the findings are summarized and conclusions are drawn according to objectives of study.

Implications emerged out of the investigation are presented in the sixth chapter. This is followed by bibliography and appendices and vita at the end.

CHAPTER II

REVIEW OF LITERATURE

Research is a continuous process. An exhaustive review of literature is essential in any research endeavour. It makes the researcher uptodate with the theoretical knowledge and findings of research topic in the field of investigation. Also the review of past literature makes the researcher aware about the methods, procedure and techniques available and used as well as the outcomes and conclusions of the past studies. It provides clues and guidance throughout the research process. Attempts were made to gather findings having relevance with the topic under study. The reviews so collected are presented in this chapter under the following main heads.

2.1 Reviews related to independent variables

2.2 Reviews related to dependent variables

2.3 Conceptual model

2.1 Reviews related to independent variables

The reviews of independent variables related to the beneficiary farmers and non-beneficiary farmers as respondents for present study were the various characteristics such as, age, education, land holding, occupation, experience in cotton cultivation, annual income, socio-economic status, scientific orientation and economic motivation.

The review related to these variables have been presented, as below:

2.1.1 Age

Kumbhare (1996) reported that the age of the farmers trained in Krishi Vigyan Kendra had non significant with the impact of training on adoption of improved cultivation practices and it had significant relationship with the impact on knowledge gain.

Gaikwad and Gunjal (1999) showed that the age of beneficiaries of KVK in Maharashtra had significant and positive relation with their knowledge and adoption of technologies imparted by KVK.

Kubde *et al* (1999) revealed that the age established a significant but negative correlation with knowledge about soybean production technology possessed by respondents and adoption level of respondents.

Gogoi *et al* (2000) reported that the majority of both trained and untrained farmers of training programme on adoption of rice production technologies were observed in middle age group.

Jondhale *et al.* (2000) observed that the age of trained and untrained farmers established significant and positive relationship with the adoption of improved practices of summer groundnut.

Landge (2001) observed that the majority of the respondents of PKV Rajat cotton cultivar were from middle age category, followed by young age category.

Bonde (2002) observed that majority of trainee vegetable growers (64.00%) were in the young age group of upto 35 years, however the non-trainee found in the middle age group of 36 to 50 years.

Chikhale (2002) concluded that majority of trainee and non-trainee of KVK training programme about dryland agricultural technologies were from middle age group.

Deshmukh (2002) concluded that majority of the trainee of training programme arranged by KVK were from young age group, whereas non trainee were from middle age group.

2.1.2 Education

Kumbhare (1996) found that education of the farmers were significantly related with the impact of training on adoption and knowledge gain about improved practices.

Dhule (2000) observed that education had significant relationship with adoption of plant protection practices by the cotton growers.

Gogoi and Phukan (2000) revealed that majority of both trained and untrained farmers were found educated upto middle school level of education.

Gogoi *et al.* (2000) noticed that education level of majority of respondents while training programme on adoption of rice production technologies were middle school level.

Landge (2001) inferred that most of the farmers had educated upto high school and primary school level while assessing knowledge and adoption about cultivation practices recommended for PKV Rajat cotton.

Wase (2001) showed that relatively higher proportion of respondents were primary school educated (29.17%) followed by 25.83% respondents having high school and 23.33 per cent respondents having college education, only 5.84 per cent respondent were illiterate.

Bansod (2002) found that education had positive and significant relationship with adoption of cotton practices.

Chikhale (2002) concluded that the majority of trainee of KVK training programme about dryland agriculture techniques had education upto secondary school level whereas majority of non-trainee were with primary school level education.

Deshmukh (2002) concluded that the majority of trainee cotton growers of KVK training programme were educated upto high school level, whereas non trainees were educated upto primary school level.

Patil (2004) observed that majority of respondents of experimental and control group farmers of Institution Village Linkage Programme were educated upto high school level.

2.1.3 Land holding

Kumbhare (1996) reported that land holding of farmers have shown significant relationship with the impact of training on adoption and knowledge gain.

Gaikwad and Gunjal (1999) showed that land holding of KVK beneficiaries in Maharashtra state was significantly related with the knowledge about technologies.

Dhule (2000) reported that size of land holding was positive in relation with adoption of plant protection practices for cotton crop.

Kalaskar *et al.* (2001) stated that land holding was found highly significant with knowledge possessed by the respondents about IPM.

Landge (2001) observed that majority of PKV Rajat cotton growers (56.67%) had 5 to 10 acre of land holding that is semi-medium size of land holding.

Bansod (2002) showed the significant relationship between land holding and adoption level of the farmers about improved package of practices of cotton cultivation.

Chikhale (2002) observed that majority of the trainee of KVK training programme about dryland agriculture techniques belonged to big farmers level and non-trainee belonged to medium farmers level category.

Deshmukh (2002) concluded that majority of trainee cotton growers of KVK training programme were big farmers whereas majority of non trainees were medium farmers.

Patil (2004) observed that majority of Institution Village Linkage Programme beneficiaries were possessing semi-medium land holding.

Gawande *et al* (2007) observed that 50.00 per cent of the respondents were having medium category of land holding followed by 30.67 per cent from low and only 19.33 per cent respondents were having high category of land holding.

2.1.4 Occupation

Katariya and Singh (1987) observed the non-significant relationship between occupation and knowledge of the respondents.

Sarkar and Bandopadhyay (1996) reported that 90 per cent of respondents had agriculture as their primary occupation, but the occupation has non significant association with adoption of scientific farm innovation.

Gogoi *et al.* (2000) noticed that majority of both trained and untrained rice farmers of training programmes were engaged with cultivation as their main occupation.

David Rajni (2005) revealed that majority of the respondents of home science training programme of KVK were having agriculture as their main occupation.

2.1.5 Experience in cotton cultivation

Kale (1990) revealed that majority of the respondents had medium farming experience in cotton cultivation.

Kumbhare (1996) concluded that 72.00 per cent farmers of training programme of KVK about improved practices were found in the medium category of farming experience.

Kalaskar (1998) revealed that cotton farming experience was non-significantly correlated with adoption of IPM practices by cotton growers.

2.1.6 Annual income

Katariya and Singh (1987) revealed that annual income of trained farmers of KVK was significantly related to their knowledge level.

Jondhale and Bhele (1998) reported that annual income was positively and significantly related with adoption of improved farm technology by KVK trainees.

Landge (2001) observed that majority of respondents were in medium level of annual income followed by high and low level of annual income due to adoption of recommended cultivation practices for PKV Rajat cotton.

Bansod (2002) noticed positive and significant relationship between annual income and adoption of improved package of practices of cotton cultivation.

Bonde (2002) reported that trainee and non-trainee vegetables growers of KVK were in the annual income group of Rs. 1,00,000 to Rs. 2,00,000/-.

Chikhale (2002) concluded that majority of trainee and non-trainee of KVK training programme had income above Rs. 1,15,000.

Deshmukh (2002) revealed that majority of trainee cotton growers of KVK had annual income above Rs. 1,15,000 whereas majority of non-trainee had annual income in between Rs. 15001 to Rs. 40000/-.

Christain *et al.* (2003) found that annual income were significantly correlated with extent of adoption of IPM strategy of agricultural belief.

2.1.7 Socio-economic status

Veeraiah *et al.* (1998) observed that socio-economic status of trained farmers in KVK about groundnut cultivation had positive and significant relationship with their knowledge about recommended critical skills in rainfed groundnut cultivation.

Kalaskar (1998) reported that over half of the respondents (56.46%) belonged to the middle category of socio-economic status, followed by one-fourth of them (26.57%) occupying lower middle category of socio-economic status in their community. The percentage of the respondents who appeared in the lower middle category of socio-economic status was meagre (15.76%). Moreover, it was also observed that quite a few of the respondents (1.21%) had level of upper socio-economic status, whereas none of them appeared in lower category of socio-economic status.

Jondhale *et al.* (2000) found that socio-economic status of trained and untrained farmers established significant and positive relationship with the adoption of improved practices of summer groundnut.

Wane (2000) indicated that socio-economic status had positive and significant correlation with adoption of improved farm production technology.

Landge (2001) observed that the majority of the respondents had middle level of socio-economic status, followed by upper middle level of socio-economic status and lower middle level of socio-economic status.

Deshmukh (2002) concluded that the majority of trainees cotton growers trainees of KVK training programme were from upper middle level of socio-economic status, whereas majority of non-trainee were appeared in middle level of socio-economic status category.

Chikhale (2007) concluded that majority of trainee of KVK training programme were from upper middle level of socio-economic status and majority of non-trainee were middle level of socio-economic status category.

2.1.8 Scientific orientation

Supe (1969) reported that an individual who were more scientifically oriented had higher knowledge about changes in farming practices.

Chaudhari (1992) noted that majority of the demonstrator (96.67%) and non-demonstrator (76.67%) farmers were highly declined towards scientific orientation.

Katole (1996) reported that scientific orientation was significantly associated with the knowledge and adoption of plant protection measures in hybrid cotton AHH-468.

Kumbhare (1996) concluded that the scientific orientation of the farmer had non significant relationship with impact of training on adoption whereas, it was shown significant relationship with the impact of training on knowledge gain.

Khodwe (1997) observed that scientific orientation was significantly related with adoption level of recommended package of practices by cotton growers.

More *et al.* (2000) observed that the scientific orientation had positive and significant relationship with adoption of cotton production practices.

Sarangkar (2001) indicated that majority of the respondents (54.60%) had medium level of scientific orientation about of recommendations of cotton technology.

2.1.9 Economic motivation

Humane (1992) concluded that farmers knowledge about fertilizer use in paddy cultivation and economic motivation have shown positive association.

Katole *et al.* (1996) revealed that the variable economic motivation was found non-significant with the cotton growing respondents.

Jondhale *et al* (2000) observed economic motivation of trained and untrained farmers established significant and positive relationship with the adoption of improved practices of summer groundnut.

Bansod (2002) found significant relationship between economic motivation of the respondents and adoption of package of practices of cotton cultivation.

2.2 Reviews related to dependent variables

Reviews of dependent variables related to the beneficiary and non-beneficiary farmers as respondents for present study were knowledge, adoption and impact. Impact in terms of change in knowledge, change in adoption, change in production change in productivity and change in annual income. The reviews related to these variables have been presented as below.

2.2.1 Knowledge

Mahipal and Prasad (1997) observed that majority of the respondents (80.50%) had gained medium level of knowledge about various technologies imparted during training.

Dhule (2000) noticed that majority of the respondents belonged to low level of knowledge regarding biocontrol practices of pest management on cotton crop.

Gogoi *et al* (2000) found that the majority of the trained respondents (67.00%) had medium level of knowledge of recommended practices while majority of untrained respondents (57.00%) had low level of knowledge on the recommended practices of rice production.

More *et al* (2000) observed that majority of the trainee respondents had medium level of knowledge, followed by high and low level of knowledge about cotton cultivation practices due to training arranged by Krishi Vigyan Kendra.

Bhople *et al* (2001) concluded that majority of cotton growers (73.33%) possessed low level of knowledge about biocontrol practices for pest management in cotton crop.

Kalaskar *et al.* (2001) observed that respondents with regards to knowledge level indicated that the majority of the them were moderately aware about different IPM practices of cotton.

Landge (2001) revealed that majority of respondents belonged to medium category of knowledge, followed by low knowledge level and high knowledge level about recommended cultivation practices for cotton.

Chikhale (2002) noted that majority of the KVK trainee farmers were aware about most of the dryland practices. However in case of non-trainee majority of them were deficient in knowledge about most of the dryland practices.

Deshmukh (2002) inferred that majority of trainees had knowledge about practices like spraying of neem seed extract (5%) against bollworms, spraying pyrethroids, grazing of sheep and goat in cotton field after last picking, removal and destruction of rosette shaped flowers and spraying of HaNPV.

2.2.2 Adoption

Kalaskar *et al* (1999) observed that majority of farmers were adopting practices like deep ploughing, crop rotation, pest resistant and tolerant varieties, grazing of sheep and goat in cotton field after last picking and spraying of neem extract.

Dhule (2000) revealed that majority of the cotton growers adopted biocontrol practices only to low extent viz., HaNPV spraying, Bt spraying, Trichocards, chrysopa, Trichoderma powder, use of neem seed extract and use of *Bacillus subtilis*.

Gogoi *et al.* (2000) found that the trained farmers had significantly higher level of adoption than the untrained farmers. Majority of trained respondents (50%) were found in medium level of adoption category.

Kale (2000) stated that majority of respondents (71.30%) had medium level of adoption of IPM, while 12.10 per cent of cotton growers had high and 16.60 per cent had low level of adoption.

More *et al.* (2000) concluded regarding the extent of knowledge and adoption of recommended cultivation practices of cotton, 57.86 per cent of the respondents had medium level of adoption of recommended cultivation practices followed by 22.86% and 19.28% high and low level of adoption of cotton production practices respectively.

Bhople *et al* (2001) noticed that the majority of the respondents had low level of adoption of biocontrol practices for pest management in cotton.

Landge (2001) observed that majority of the respondents had medium level of adoption of recommended cultivation practices. As regards to the practicewise adoption more than 50 per cent of the respondents had complete adoption about seed rate, time of sowing, method of sowing, pit method of fertilizer application, chemical control method for jassids and aphids and bollworm, monitoring of pest and spacing for PKV Rajat cotton.

Bansod (2002) observed majority of the respondents were in medium level of adoption category followed by in low and high level of adoption category of package of practices of cotton.

Deshmukh *et al* (2002) found that the majority of the trainees of KVK training of IPM belonged to medium whereas majority of non trainees were in low category of adoption.

2.2.3 Impact

Narayan Gowda and Jayaramaiah (1996) concluded that the Watershed Development Programme was able to bring about significant changes among its beneficiaries and also among different categories of farmers.

Shrivastava *et al.* (1996) concluded that the significant impact of training on the extent of knowledge and adoption of improved home practices was evident.

Mahipal and Prasad (1997) reported from the study that a well designed training programme based on the needs of the participants would result in gain in their knowledge substantially which ultimately leads to satisfaction.

Mohod *et al.* (1997) concluded from the findings that project introduction has left an impact with a short period of time in terms of increase in area under irrigation, change in cropping pattern with particular reference to introduction of rabi crops such as soybean, wheat, gram and safflower crops and significant increase in the yield levels of the existing crops grown by the project beneficiaries and the crop introduced after the project.

Singh and Prasad (1998) found that the impact of training indicated appreciable increase in knowledge of trained farmers than non trained farmers.

Jondhale *et al* (2000) concluded that proportion of trained farmers was higher than the proportion of untrained farmers appearing in high level of adoption of improved groundnut cultivation practices. Thus there was a significant impact of KVK's training on adoption by the summer groundnut growers.

Chikhale (2002) found that 35.41 per cent impact of training in dryland practices imparted to the trainee farmers by KVK when compared with non trainee farmers as a control group.

Deshmukh (2002) concluded with regard to the impact of KVK training as a whole it was observed that there was substantial impact on the trainee farmers to the extent of 30.97 per cent of the IPM training imparted by KVK.

2.2.3.1 Change in knowledge

Sharma *et al* (2001) concluded that the effect of extension personnel of T & V system was more on contact farmers in relation to increase in their knowledge of low cost input technology about agriculture than non-contact farmers. Extension personnels visit is significantly associated with increase in knowledge about agriculture of contact farmers.

Chikhale (2002) observed that the trainee farmers differed significantly in possession of knowledge as a result of undergoing training of KVK was compared to non trainee farmers.

Deshmukh (2002) found definite increase in the amount of knowledge among the trainee farmers as a result of imparting training to them about IPM of cotton.

Deshmukh (2002) observed that trainee cotton growers differed significantly in possession of knowledge as a result of undergoing training of KVK as compared to non-trainee cotton growers.

Patil (2004) indicated that there was a definite impact of Institution Village Linkage Programme on adopters, than non adopters with respect to change in knowledge to the extent of 18.42 per cent.

David Rajni (2005) shows that the majority of the respondents possessed medium level of knowledge about various aspects of home science training programmes before training while after training increased percentage in

medium level of knowledge about various aspects of home science training programmes.

2.2.3.2 Change in adoption

Kubde *et al* (1994) revealed that there was sharp increase of 25 to 28 per cent of adoption of kharip crop cultivation technologies in case of contact farmers as against the adoption by non-contact farmers.

David Rajni (2005) showed that the majority of the respondents possessed medium level of adoption about various aspects of home science training programmes after training while increased percentage in medium level of adoption about various aspects of home science training programmes.

Deshmukh (2002) observed that majority of trainee observed in medium whereas non-trainees were in low level of category of adoption, it may be due to impact of training.

Chikhale (2002) observed that the trainee farmers differed significantly in adoption belonged medium whereas majority of non trainees were in low level of category of adoption it may be due to impact of training.

Patil (2004) indicated that there was a definite impact of institution village linkage programme on adopters than non adopters with respect to change in adoption to the extent of 23.72 per cent.

2.2.3.3 Change in production

Lande (1996) observed that the intensive cotton development programme had impact on production of cotton which raised from 22.85 lakh bales to 110.48 lakh bales in the major cotton growing states like Maharashtra, Andhra Pradesh, Karnataka and Gujarat.

Vyas *et al.* (2003) concluded that Farmers field of Sehore district of Madhya Pradesh showed increased in soybean production significantly in the front line demonstrations conducted on improved technologies of soybean cultivation.

Patil (2004) indicated that there was a definite impact of Institution Village Linkage Programme on adopters than non adopters with respect to change in productivity to the extent of 17.06 per cent.

2.2.3.4 Change in productivity

Gaikwad (1991) reported that the difference in productivity between beneficiaries and non-beneficiaries were significant. Average productivity level of beneficiaries was 149.61 kg/ha on the contrary average productivity level of non beneficiaries was 116.68 kg/ha.

Lande (1996) observed that the intensive cotton development programme had impact on productivity of cotton which raised from 88 kg per ha to 250 kg per ha in the major cotton growing states like Maharashtra, Andhra Pradesh, Karnataka and Gujarat etc.

Vyas *et al* (2003) revealed that the adoption of improved production technologies of soybean cultivation is capable to enhance the productivity by 53.15 per cent over other farmers practice.

Patil (2004) indicated that there was a definite impact of Institution Village Linkage Programme on adopters than non adopters with respect to change in productivity to the extent of 27.21 per cent.

2.2.3.5 Change in annual income

Ratti and Sharda (1992) concluded that the integrated rural development programme had made a positive impact on the income generation. There has been a considerable increase in the income of the beneficiaries as a results of the assistance provided through IRDP.

Sondarapandian (1992) shows that with the change in average annual income of Rs. 852 per household, 90 per cent of the beneficiaries crossed the poverty line after the implementation of the National Rural Extension Programme.

Mehta and Joshi (1993) observed that there has been substantial increase 27.06 per cent in the income of the IRDP on beneficiaries.

Naidu and Sachinandan (1998) reported that there was a significant impact of Integrated Rural Development Programme on the beneficiaries, that over one third of them (35.00%) raise their annual income and crossed over the poverty line.

Vyas *et al* (2003) found that the per rupee return obtained through improved production technologies was 1.53 which was 5.5 per cent higher than the farmers practices.

Patil (2004) indicated that the farmers of experimental group did not differ significantly from the farmers of control group. Mean annual income of experimental group farmer was Rs. 54163 and that of control group was Rs. 36857. The per cent change in annual income was 23.53.

2.3 Conceptual model of study

During the course of investigation the researcher has to assume relations amongst study variables, develop conceptual model and use the same during research. A model helps in critical and logical thinking about the research problem. Theoretical model presents the concepts and variable used in research.

Based on foregoing review of the past research studies a conceptual model has developed for the present study and same has been depicted in Fig. 1(a).

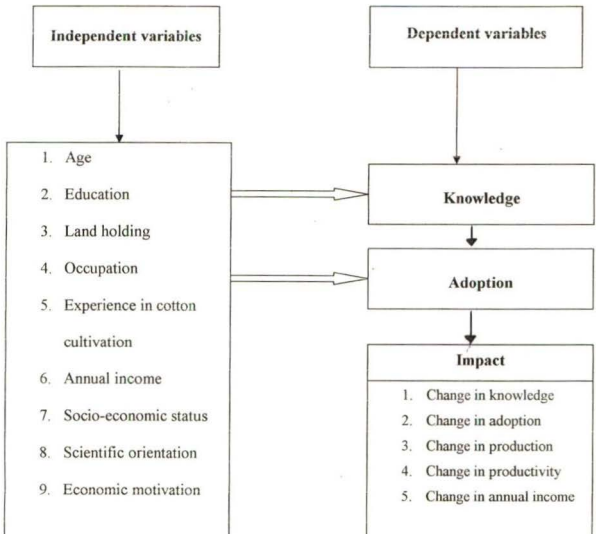


Fig. 1(a): Conceptual Model of study

CHAPTER III

METHODOLOGY

The main purpose of this chapter is to describe the research methods and techniques used in the present study. The various aspects included in this chapter have been described with relevant details under following heads.

3.1 Research design

3.2 Locale of study

3.3 Variables, their operational definitions, measurement, scoring and categorization.

3.4 Preparation of interview schedule

3.5 Sampling procedure

3.6 Statistical methods used for analysis of data

3.1 Research Design

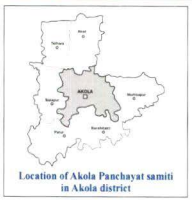
The present study was based on the `Experimental Research Design' of the social research. In the experimental research design two groups were selected, one beneficiary farmers group and another non- beneficiary farmers group.

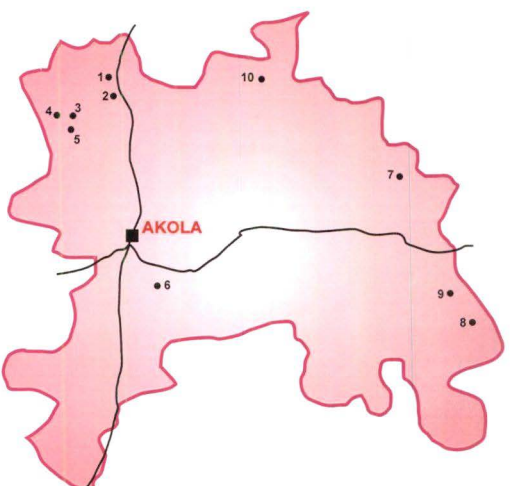
3.2 Locale of study

The present study was conducted in the Akola Panchayat Samiti of Akola district in Vidarbha region of Maharashtra State.

The Akola district lies in between 19.61 and 21.61^0 North latitude and East longitude respectively. The district is surrounded by Amravati district in East, Washim district in South and Buldana district in West.

The total geographical area of Akola panchayat samiti is 1041 sq. km. In all, there are 196 villages out of them, 180 villages are populated and 16 are deserted. The total land under cultivation in Akola panchayat samiti is 94,584 ha.





Legend :

- Akola District
- Panchayat Samiti

Selected Gram Panchayats

1. Gandhigram
2. Wallabhnagar
3. Khekdi
4. Navthad
5. Paritwada
6. Maispur
7. Mirzapur
8. Patur Nandapur
9. Borgaon (K)
10. Dapura

Fig. 1(b). Map of Akola Panchayat samiti

In Akola Panchayat Samiti, the soils are medium black cotton soils. The average rainfall ranges from 750 mm to 850 mm and comes in subtropical zones.

The crops grown are totally dependent on rainfall. Cotton sorghum, pigeonpea, greengram and sunflower are major *Kharif* crops. During *Rabi* season, the crops like safflower, gram, sunflower and wheat are sown.

3.3 Variables, their operational definitions, measurements, scoring and categorization

The procedure of assigning scores, categorization of independent and dependent variables selected for the study and their operational definitions have been given as follows:

3.3.1 Independent variables

The independent variables selected for the present study were age, education, land holding, occupation, experience in cotton cultivation, annual income, socio-economic status, scientific orientation and economic motivation.

3.3.1.1 Age

It is operationally defined as, chronological age of the beneficiary and non-beneficiary farmers in completed years at the time of interview. The score of one was assigned for each complete year of age.

The categorization was done as young, middle and old as below.

Sr. No.	Age	Years
1	Young	Upto 35
2	Middle	36 to 50
3	Old	Above 50

3.3.1.2 Education

It is operationally defined as the formal level of education measured in years of schooling completed by beneficiary and non-beneficiary farmers. The score of one was allotted for each standard possessed by the respondents.

It has been categorized as illiterate, primary school, middle school, high school and college on the basis of their educational qualification as below.

Sr. No.	Education	Standard passed
1	Illiterate	No schooling
2	Primary school	1^{st} to 4^{th}
3	Middle school	5^{th} to 7^{th}
4	High school	8^{th} to 10^{th}
5	College	Above 10^{th}

3.3.1.3 Land holding

It is operationally defined as the land in hectares possessed by the beneficiary and non-beneficiary farmers for cultivation of crops. The actual number of hectare of land possessed was considered as score. The categorization of the land holding was done as below.

Sr. No.	Land holding	Area (ha)
1	Marginal	Upto 1.00
2	Small	1.01 to 2.00
3	Semi-medium	2.01 to 4.00
4	Medium	4.01 to 10.00
5	Large	Above 10.00

3.3.1.4 Occupation

Occupation is operationally defined as profession of the beneficiary and non-beneficiary farmers. It includes only main and subsidiary occupation of them.

The scoring and categorization was made as per the scores and categories mentioned for the dimension of occupation, in the scale developed for measurement of socio-economic status by Thakare (2004).

Sr. No.	Occupation	Score
1	Agriculture + Labour	2
2	Agriculture	3
3	Agriculture + Allied occupation	4
4	Agriculture + Business	5
5	Agriculture + Service	6

3.3.1.5 Experience in cotton cultivation

It is operationally defined as the experience of the beneficiary and non-beneficiary farmers in terms of year of working and cultivation of cotton crop on their field. The number of years of experience in cotton cultivation was considered as score. Categorization of respondents was done on the basis of mean and standard deviation.

Sr. No.	Experience in cotton cultivation	Score range	
		Beneficiary farmers	Non-beneficiary farmers
1	Low	Upto 8	Upto 9
2	Medium	9 to 22	10 to 27
3	High	Above 22	Above 27

$\bar{X}$ = 14.55 $\bar{X}$ = 17.58
σ = 7.22 σ = 9.02

3.3.1.6 Annual income

It is operationally defined as actual income in rupees of a family of the beneficiary and non-beneficiary farmers derived from all resources per year.

Following categories of annual income were formulated on the basis of their income by adopting equal interval method.

Sr. No.	Annual income (Rs.)
1	Upto 50,000
2	50,001 to 1,00,000
3	1,00,001 to. 1,50,000
4	Above 1,50,000

3.3.1.7 Socio-economic status

It is operationally defined as the position of the beneficiary and non-beneficiary farmers occupies in the society with reference to average standard of land holding, education, material possession, effective income, housing position and participation in group activities.

It was measured by the scale developed by Thakare (2004). The respondents were categorized in the following categories.

Sr. No.	Socio-economic status	Score range
1	Very low	Upto 5.21
2	Low	5.22 to 8.37
3	Medium	8.38 to 11.82
4	Medium high	11.83 to 14.67
5	High	Above 14.67

3.3.1.8 Scientific orientation

It is operationally defined as the degree to which the beneficiary and non-beneficiary farmers inclined to use scientific method and decision making in cotton cultivation.

It was measured with the help of scale developed by Supe (1969). The scale includes six statements of which 1,2,3,4 and 6 were positive and number 5 was negative. The score of 5,4,3,2 and 1 was given for strongly agree, agree, undecided, disagree and strongly disagree, respectively for positive statement. In case of negative statement reversed scoring procedure was followed. The total score obtained by each respondent was worked out. Categorization of respondents was done on the basis of mean and standard deviation.

Sr. No.	Scientific orientation	Score range	
		Beneficiary farmers	Non-beneficiary farmers
1	Low	Upto 23	Upto 21
2	Medium	24 to 28	22 to 25
3	High	Above 28	Above 25

$\bar{X}$ = 25.25 $\bar{X}$ = 24.18
σ = 2.24 σ = 1.87

3.3.1.9 Economic motivation

It is operationally defined as occupational success in terms of profit maximization of relative value the beneficiary and non-beneficiary farmers places on economic ends.

Economic motivation of respondent was measured by the scale developed by Supe (1969). The scale consisted of six statement of which 1,2,3,4 and 5 were positive and number 6 was negative statement. The positive statement were assigned the score of 5,4,3,2 and 1 for strongly agree, agree, undecided, disagree and strongly disagree responses respectively. While reverse for negative statements. The score of all statements were summed up which indicated the economic motivation score for the individual respondents. The categorization was done on the basis of mean and standard deviation.

Sr. No.	Economic motivation	Score range	
		Beneficiary farmers	Non-beneficiary farmers
1	Low	Upto 23	Upto 23
2	Medium	24 to 26	24 to 26
3	High	Above 26	Above 26

$\bar{X}$ = 24.38 $\bar{X}$ = 23.65
σ = 1.50 σ = 1.91

3.3.2 Dependent variables

The dependent variables in the present study were knowledge, adoption and impact. The impact was studied in terms of change in knowledge, change in adoption, change in production, change in productivity and change in

annual income. The operational definition, scoring and categorization of this variables has been discussed below.

3.3.2.1 Knowledge

Knowledge is operationally defined as the body of understood information possessed by the beneficiary and non-beneficiary farmers about IPM practices of cotton crop.

With a view to measure the knowledge of beneficiary and non-beneficiary farmers in quantitative terms with respect to IPM technology of cotton crop disseminated through Farmers' Field School, a teacher made knowledge test was developed. The score was given in the three point continuum i.e. 2, 1 and 0 for complete knowledge, partial knowledge and no knowledge. The knowledge score was converted into knowledge index with the help of formula as below.

$$\text{Knowledge index} = \frac{\text{Actual obtained knowledge score}}{\text{Maximum obtainable knowledge score}} \times 100$$

In this way knowledge index was computed for an individual respondent in both categories.

On the basis of individual knowledge index, the respondents were categorized as below.

Sr. No.	Knowledge	Index range
1	Low	Upto 33.33
2	Medium	33.34 to 66.66
3	High	Above 66.66

3.3.2.2 Adoption

Adoption is operationally defined as a degree of actual use of the recommended IPM practices by cotton growers.

With a view to measure the adoption of IPM technology of cotton in quantitative terms disseminated through Farmers' Field School, a teacher made adoption test was developed. The score was given in the three point continuum

2, 1 and 0 for complete adoption, partial adoption and no adoption respectively. The adoption score was converted into adoption index with the help of formula as below.

$$\text{Adoption index} = \frac{\text{Actual obtained Adoption score}}{\text{Maximum obtainable Adoption score}} \times 100$$

In this way adoption index was computed for an individual respondent in both categories.

On the basis of individual adoption index the respondents were categorized as below.

Sr. No.	Adoption	Index range
1	Low	Upto 33.33
2	Medium	33.34 to 66.66
3	High	Above 66.66

3.3.2.3 Impact of Farmers' Field School

In operational terms it is defined as the effect of Farmers' Field School on beneficiary and non-beneficiary farmers in adopted villages.

The effect was ascertained in respect of change in knowledge, change in adoption, change in production, change in productivity and change in annual income of beneficiary farmers over non-beneficiary farmers.

In the context of present study, an impact of Farmers' Field School have been conceptualized as per cent change in knowledge, per cent change in adoption, per cent change in production, per cent change in productivity and per cent change in annual income of beneficiary cotton growers over non beneficiary farmers. Thus, the mean impact of field school was computed by summing up the per cent change of all the above dimension as below.

$$\text{Impact of FFS} = \frac{\text{Per cent change in knowledge + per cent change in adoption + per cent change in production + per cent change in productivity + per cent change in annual income}}{5}$$

a. Change in knowledge

The per cent change in knowledge was measured on the basis of difference between the mean knowledge score of beneficiary farmers and the mean knowledge score of non-beneficiary farmers with the help of following formula.

$$\Delta K = \frac{Ke - Kc}{Kc} \times 100$$

Where,

ΔK = Per cent change in knowledge

Ke = Mean knowledge score of beneficiary cotton growers

Kc = Mean knowledge score of non-beneficiary cotton growers

b. Change in adoption

The per cent change in adoption is operationalized or measured on the basis of difference between the mean adoption score of beneficiary farmers and the mean adoption score of non beneficiary farmers with the help of following formula.

$$\Delta A = \frac{Ae - Ac}{Ac} \times 100$$

Where,

ΔA = Per cent change in adoption

Ae = Mean adoption score of beneficiary cotton growers

Ac = Mean adoption score of non-beneficiary cotton growers

c. Change in production

The per cent change in production operationalized or measured on the basis of difference between the mean score of production of beneficiary farmers and mean score of production of non-beneficiary farmers with the help of following formula.

$$\Delta Pn = \frac{Pn_e - Pn_c}{Pn_c} \times 100$$

Where,

ΔPn = Per cent change in production

Pn_e = Mean production score of beneficiary cotton growers

Pn_c = Mean production score of non-beneficiary cotton growers

d. Change in productivity

The per cent change in productivity was worked out on the basis of difference between the mean score of productivity of beneficiary farmers and mean score of productivity of non-beneficiary farmers with the help of following formula.

$$\Delta Py = \frac{Py_e - Py_c}{Py_c} \times 100$$

Where,

ΔPy = Per cent change in productivity

Py_e = Mean productivity score of beneficiary cotton growers

Py_c = Mean productivity score of non-beneficiary cotton growers

e. Change in annual income

The per cent change in annual income was worked out on the basis of difference between the mean annual income of beneficiary framers and mean annual income of non beneficiary farmers with the help of following formula.

$$\Delta I = \frac{I_e - I_c}{I_c} \times 100$$

Where,

ΔI = Per cent change in annual income

I_e = Mean annual income of beneficiary cotton growers

I_c = Mean annual income of non-beneficiary cotton growers

3.4 Preparation of interview schedule

The interview schedule was constructed by formulating relevant questions, in accordance with the study objectives. The schedule was divided into three parts. The first part of the schedule included the questions related to general, personal, socio-economical, communication and situational characteristics of farmers. The questions regarding knowledge of the farmers about IPM practices were included in the second part. In the third part questions regarding adoption of IPM practices by farmers were included. The schedule was developed in English and Marathi.

3.4.1 Pre testing of interview schedule

In order to detect the mistakes and short falls and to achieve clarity and practicability of the schedule, it was pre tested with 5 beneficiary cotton growers and 5 non-beneficiary cotton growers. These respondents were not included in sample. The data collected from them were thoroughly examined, necessary modification was incorporated in the schedule. The nature of some questions was modified and thus the selected schedule was finalized and requisite copies were cyclostyled for collecting data from respondents.

3.4.2 Collection of data

The method used for collection of data was that of personal interview method.

For easy approach to farmers, the help of Sarpanch and the Extension personnel was sought. Before actually procuring the information, the researcher introduced herself and explained about the objectives and purpose of present study.

3.5 Sampling procedure

The sampling plan adopted for this research study has been delineated in the succeeding paragraphs.

3.5.1 Selection of villages

Villages were selected for conducting of research work from Akola Panchayat Samiti of Akola district, where the beneficiary cotton growers of Farmers' Field School are located.

3.5.2 Selection of respondents

Respondents were selected for research study has been delineated below.

3.5.2.1 Selection of beneficiary farmers

Sixty cotton growers those who had undergone the training of IPM technology imparted through Farmers' Field School and applying this technology in their field from last 3 years had been selected randomly from the selected villages and included under this category.

3.5.2.2 Selection of non-beneficiary farmers

Sixty cotton growers those having 3 years of experience in cotton cultivation from the same selected villages but those who had not undergone the training of IPM technology imparted through Farmers' Field School but having same land holding under cotton crop to that of beneficiary farmers were considered under this category for the present study.

3.6 Statistical methods used for analysis of data

The data collected through personal interviews were carefully examined for completeness and correctness before tabulation. Both qualitative and quantitative classes were formed. In case of some variables the classes were formed arbitrarily, while for some other variables accepted standard classification was adopted. The scoring procedure was decided and all the data from schedule were transferred to master tables. The following statistical techniques were used in the present study for analysis of data and drawing of conclusions.

1. Arithmetic mean ($\bar{X}$)
2. Standard deviation (S.D.)
3. Coefficient of correlation (r)
4. 'Z' test for testing means difference

1. Arithmetic mean

Arithmetic mean was calculated by sum of all the individual score and dividing it by number of cases. The formula used was as follows.

$$\bar{X} = \frac{\Sigma x}{N}$$

Where, $\bar{X}$ = Arithmetic mean

Σx = Sum of respondents score

N = Number of respondents

2. Standard deviation (S.D.)

The standard deviation is the most stable index of variability and is employed in research studies. It is measure of variability calculated around mean ($\bar{X}$). Standard deviation usually denoted by Greek letter σ i.e. sigma and was calculated as follows.

$$\sigma = \sqrt{\frac{N\Sigma x^2 - (\Sigma x)^2}{N}}$$

Where,

σ = Standard deviation

Σx^2 = Sum of square of X series

$(\Sigma x)^2$ = Square of sum of X series

N = Number of respondents

3. Coefficient of correlation

The relationship between independent and dependent variable is established by calculating the coefficient of correlation and it is denoted by 'r'. Coefficient of correlation was calculated as follows.

$$r = \frac{N \Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{[N \Sigma x^2 - (\Sigma x)^2][N \Sigma y^2 - (\Sigma y)^2]}}$$

Where, r = Coefficient of correlation

Σx = Sum of the score of variable x

Σy = Sum of the score of variable y

Σxy = Sum of the products of x and y variables

Σx^2 = Sum of the square of x variables

Σy^2 = Sum of the square of y variables

N = Total number of respondents

4. `Z' test for testing mean difference

To make comparison about impact of FFS on beneficiary and non-beneficiary farmers of IPM training programme, `Z' test for testing the mean difference was used.

$$Z = \frac{|\bar{X}_1 - \bar{X}_2|}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

Where, $\bar{X}_1$ = Arithmetic mean of beneficiary farmers

$\bar{X}_2$ = Arithmetic man of non-beneficiary farmers

σ_1^2 = Standard deviation of beneficiary farmers

σ_2^2 = Standard deviation of non-beneficiary farmers

n_1 = Sample size of beneficiary farmers

n_2 = Sample size of non-beneficiary farmers

The significance of calculated values is tested with table value of 0.01 to 0.05 level of probability at $n_1 + n_2 - 2$ degree of freedom.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter is related with the results obtained after statistical treatment and analysis of the collected data from the respondents. The data have been organized in Tables considering the objectives of the study.

The results have been presented under the following sub headings.

4.1 Profile of beneficiary and non-beneficiary farmers

4.2 Impact of Farmers' Field School on its beneficiary and non beneficiary farmers

4.3 Relational analysis

4.4 Empirical research model.

4.1 Profile of beneficiary and non-beneficiary farmers

The distribution of the respondents from both the category of farmers i.e. beneficiary and non-beneficiary farmers according to their personal, socio-economic and psychological characteristics have been presented in this part.

The study of personal, socio-economic and psychological characteristics was made with reference to age, education, land holding, occupation, experience in cotton cultivation, annual income, socio-economic status, scientific orientation and economic motivation. The results have been presented in the Table 2 to 10.

4.1.1 Age

The data with regards to the distribution of respondents according to their age have been presented in Table 2.

The data in Table 2 indicated that beneficiary farmers were spread over in the young and middle age categories. Over half of the respondents (56.67%) were young, followed by middle age to the extent of 40.00 per cent. The percentage of old age respondents found meagre (3.33%).

Table 2.Distribution of beneficiary and non-beneficiary farmers according to their age

Characteristics	Category	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)		'Z' value
		Frequency	%	Frequency	%	
Age	Young	34	56.67	29	48.33	
	Middle	24	40.00	27	45.00	
	Old	2	3.33	4	6.67	
	Total	60	100.00	60	100.00	-1.67^{NS}

$\bar{X}_1 = 35.63$ $\bar{X}_2 = 38.18$

$\sigma_1 = 8.74$ $\sigma_2 = 9.55$

NS – Non significant

In case of non-beneficiary farmers near about half (48.33%) of the respondents were in young age group, followed by middle age group (45.00%). The percentage of non beneficiary group farmers in old age i.e. above 50 years was found meagre (6.67%).

Therefore, it could be inferred that majority of beneficiary and non-beneficiary farmers were found in young age group followed by middle age group.

The findings of the present study are in contradict with the findings of Landge (2001) who reported that majority of the respondents were from middle age category,followed by young age category.

The mean age of beneficiary farmers (35.63 years) was observed less than non-beneficiary farmers (38.18 years) years. The ratio between observed means was computed as indicated by 'Z' value (-1.67) which was observed non-significant at 0.05 level of probability. It could, therefore be inferred that the beneficiary farmers did not differ significantly with the non-beneficiary farmers. More or less, they were similar in age.

4.1.2 Education

The data with regards to the distribution of respondents according to their education have been presented in Table 3.

Table 3.Distribution of beneficiary and non-beneficiary farmers according to their education

Characteristics	Category	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)		'Z' value
		Frequency	%	Frequency	%	
Education	Illiterate	2	3.34	4	6.67	4.67**
	Primary school	1	1.66	8	13.33	
	Middle school	1	1.66	16	26.66	
	High school	28	46.67	22	36.67	
	College	28	46.67	10	16.67	
	Total	60	100.00	60	100.00	

$\bar{X}_1 = 10.6$ $\bar{X}_2 = 7.25$

$\sigma_1 = 3.03$ $\sigma_2 = 3.66$

** Significant at 0.01 level of probability

The educational attainment of the beneficiary and non-beneficiary farmers as presented in Table 3 revealed that equal per cent of beneficiary farmers (46.67%) were educated upto high school and college. Quite a few respondents (3.33%) were illiterate. Further it was noticed that proportion of beneficiary farmers having education upto primary and middle school was almost equal 1.66 per cent and 1.67 per cent respectively.

In case of non-beneficiary farmers, near about one-third (36.67%) of them were educated upto high school, followed by (26.66%) of them having education upto middle school. There was no much variation in percentage of non-beneficiary having primary school and college level education 13.33 and 16.67 per cent respectively. The percentage of respondents having no education was 6.67 per cent.

It could be inferred that the majority of respondents from both the categories i.e. beneficiary and non-beneficiary farmers were educated upto high school.

The findings of the present study are in line with the findings of Patil (2004) who observed that majority of respondents of experimental and

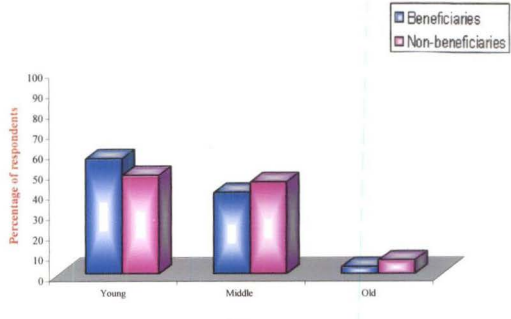


Fig. 2. Distribution of beneficiary and non-beneficiary farmers according to their age

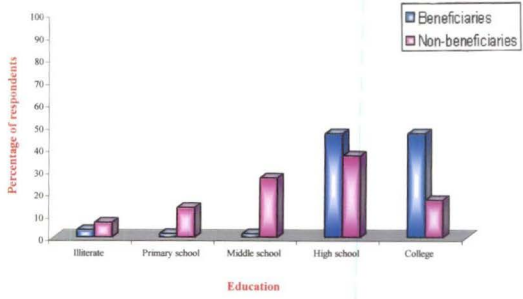


Fig. 3. Distribution of beneficiary and non-beneficiary farmers according to their education

control group farmers of Institution Village Linkage Programme were educated upto high school level and thus lend support to the findings of the present study.

The mean education score of beneficiary farmers (10.6) was observed more than that of non-beneficiary farmers (7.25). The ratio between observed means was computed as indicated by `Z' value (4.67) which was observed to be highly significant at 0.01 level of probability. It clearly indicated that the farmers of beneficiary group differed significantly over the farmers of non-beneficiary group.

4.1.3 Land holding

In present study, the beneficiary farmers were matched with non-beneficiary farmers on land holding and therefore equal number of respondents were found in each category.

The data with regards to the distribution of respondents according to their land holding have been presented in Table 4.

Table 4.Distribution of beneficiary and non-beneficiary farmers according to their land holding

Characteristics	Category	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)		`Z' value
		Frequency	%	Frequency	%	
Land holding	Marginal	3	5.00	3	5.00	
	Small	26	43.34	26	43.34	
	Semi-medium	23	38.33	23	38.33	
	Medium	8	13.33	8	13.33	
	Big	-	-	-	-	
	Total	60	100.00	60	100.00	0.00^{NS}

$\bar{X}_1 = 2.59$ $\bar{X}_2 = 2.59$

$\sigma_1 = 1.22$ $\sigma_2 = 1.22$

NS – non significant

Nearly half of the respondents (43.34%) were found in small farmers category, followed by semi-medium, medium and marginal farmers (38.33%, 13.33% and 5.00% respectively).

Both beneficiary and non-beneficiary farmers were not found as a big farmer.

It could be inferred that majority of the respondents from both the categories were from small and semi medium category possessing land between 1.01 to 4.00 ha.

The findings of the present study are in line with the findings of Patil (2004) who reported that majority of the Institution Village Linkage Programme beneficiaries were possessing semi-medium land holding.

The mean land holding of beneficiary and non-beneficiary farmers was same as they were matched on land holding. The ratio between observed means was computed as indicated by 'Z' value (0.00). It indicated that the respondents were homogenous in case of land holding

4.1.4 Occupation

The data with regards to the distribution of respondents according to their occupation have been presented in Table 5.

Table 5 .Distribution of beneficiary and non-beneficiary farmers according to their occupation

Characteristics	Category	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)		'Z' value
		Frequency	%	Frequency	%	
Occupation	Agriculture+ labour	4	6.66	15	25.00	
	Agriculture	40	66.67	39	65.00	
	Agriculture + allied occupation	7	11.67	1	1.67	
	Agriculture + Business	4	6.67	3	5.00	
	Agriculture + service	5	8.33	2	3.33	
	Total	600	100.00	60	100.00	2.91**

$\bar{X}_1 = 3.43$ $\bar{X}_2 = 2.96$

$\sigma_1 = 1.00$ $\sigma_2 = 0.87$

** Significant at 0.01 level of probability

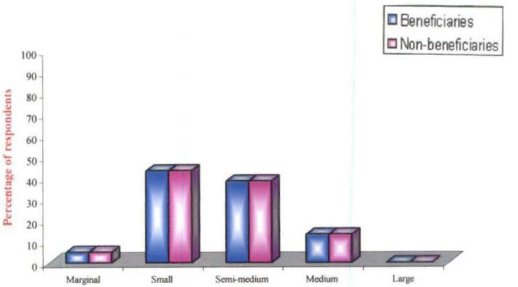


Fig. 4. Distribution of beneficiary and non-beneficiary farmers according to their land holding

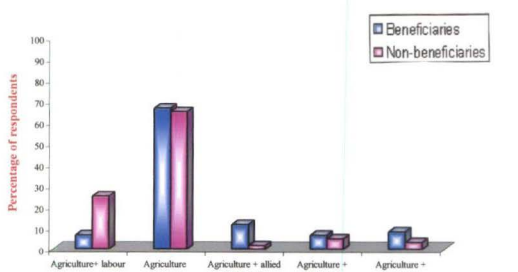


Fig. 5. Distribution of beneficiary and non-beneficiary farmers according to their occupation

It is evident from Table 5 that near about two-third of the respondents from both the categories i.e. beneficiary and non-beneficiary farmers were engaged in agriculture(66.67%)and(65.00%)respectively.

In case of beneficiary farmers about 11.67 per cent respondents had agriculture and allied occupation followed by agriculture and service, agriculture and business, then agriculture and labour as their occupation (8.33%, 6.67% and 6.66% respectively). Whereas one-fourth of non-beneficiary farmers (25.00%) had agriculture and labour as their occupation, followed by agriculture and business agriculture and service, agriculture and allied occupation (5%, 3.33% and 1.67% respectively).

The findings of the present study are in line with the findings of David Rajni (2005) who reported that majority of the respondents of home-science training programme were having agriculture as main occupation.

The mean occupation score of beneficiary farmers (3.43) was observed more than that of non beneficiary farmers (2.96). The ratio between observed means was computed as indicated by `Z' value (2.91) which was observed highly significant at 0.01% level of probability. It clearly indicated that the beneficiary farmers differed significantly over the non-beneficiary farmers.

4.1.5 Experience in cotton cultivation

The data with regards to the distribution of respondents according to their experience in cotton cultivation have been presented in Table 6.

The distribution of beneficiary farmers according to their experience in cotton cultivation indicated that more than half of the beneficiary farmers had their experience in cotton cultivation in a medium category followed by low and high 25.00% and 16.00% respectively.

Table 6.Distribution of beneficiary and non-beneficiary farmers according to their experience in cotton cultivation

Characteristics	Category	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)		'Z' value
		Frequency	%	Frequency	%	
Experience in cotton cultivation	Low	15	25.00	13	21.67	
	Medium	35	58.33	38	63.33	
	High	10	16.67	9	15.00	
	Total	60	100.00	60	100.00	-2.04^{NS}

$\bar{X}_1 = 14.55$ $\bar{X}_2 = 17.58$

$\sigma_1 = 7.22$ $\sigma_2 = 9.02$

NS – Non significant

In case of non-beneficiary farmers 63.33 per cent were found to be in medium category, followed by low and high 21.67%, 15.00% respectively.

It could be inferred that the respondents from both the categories i.e. beneficiary and non-beneficiary farmers had medium level of experience in cotton cultivation.

The findings of the present study are in line with the findings of Kumbhare (1996) who reported that majority of farmers were found in the medium category of farming experience.

The mean experience in cotton cultivation score of beneficiary farmers (14.55) was found less than the mean experience in cotton cultivation score of non beneficiary farmers (17.58). The ratio between observed means was computed as indicated by 'Z' value (-2.04) which was observed to be non significant at 0.05% level of probability. It clearly indicated that the beneficiary farmers did not differ significantly with the non beneficiary farmers, more or less they were similar in experience in cotton cultivation.

4.1.6 Annual income

The data with regards to the distribution of respondents according to their annual income have been presented in Table 7.

Table 7.Distribution of beneficiary and non-beneficiary farmers according to their annual income

Characteristics	Category	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)		'Z' value
		Frequency	%	Frequency	%	
Annual income	Upto 50,000/-	13	21.67	33	55.00	5.09**
	Rs. 50,001 to Rs. 1,00,000/-	29	48.33	25	41.67	
	Rs. 1,00,001/- to Rs. 1,50,000/-	16	26.67	2	3.33	
	Above 1,50,000/-	2	3.33	-	-	
	Total	60	100.00	60	100.00	

$\bar{X}_1 = 82766$ $\bar{X}_2 = 54483$

$\sigma_1 = 32716$ $\sigma_2 = 20231$

** Significant at 0.01 level of probability

The distribution of the beneficiary farmers according to their annual income indicated that 48.33 per cent of beneficiary farmers had their annual income ranging from Rs. 50,001 to Rs. 1,00,000 followed by nearly one-fourth of them were having annual income ranging from Rs. 1,00,001 to Rs. 1,50,000 (26.67%) and upto Rs. 50,000 (21.67%) and very few i.e. 3.33% farmers had their annual income above Rs. 1,50,000/-.

In case of non–beneficiary farmers more than half of the farmers (55.00%) had their annual income upto Rs. 50,000/- followed by 41.67 per cent respondents had annual income between Rs. 50,001/- to Rs. 1,00,000/- and very few i.e. 3.33 per cent farmers were found in range of annual income between Rs. 1,00,001/- to Rs. 1,50,000/-. None respondent was found to have annual income more than Rs. 1,50,000/-.

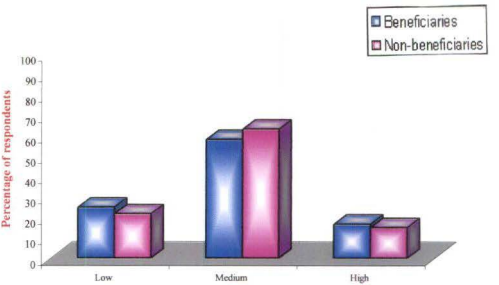


Fig. 6. Distribution of beneficiary and non-beneficiary farmers according to their experience in cotton cultivation

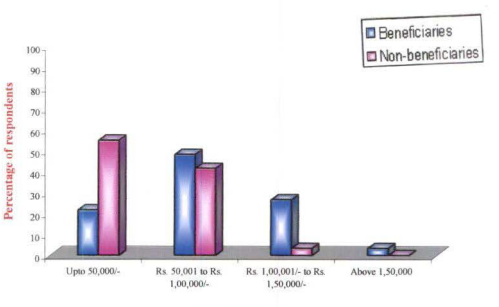


Fig. 7. Distribution of beneficiary and non-beneficiary farmers according to their annual income

It could be inferred that majority of the beneficiary and non-beneficiary farmers were found in category ranging from Rs. 50,001/- to Rs. 1,00,000/-.

The mean annual income of beneficiary farmers (Rs. 82766) was found higher than mean annual income of non beneficiary farmers (Rs. 54483). The ratio between observed means was computed as indicated by `Z' values (5.69) which was found highly significant at 0.01 level of probability. It could, therefore, be stated that beneficiary farmers had higher annual income than non beneficiary farmers.

4.1.7 Socio-economic status

The data with regards to the distribution of respondents according to their socio-economic status have been presented in Table 8.

It could be seen from the Table 8 that near about half of beneficiary farmers (51.67%) found in the medium level of socio-economic status, followed by low (46.67%) and medium high (1.66%) and no one respondent was found in very low and high category of socio-economic status.

Table 8.Distribution of beneficiary and non-beneficiary farmers according to their socio-economic status

Characteristics	Category	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)		`Z' value
		Frequency	%	Frequency	%	
Socio-economic status	Very low	-	-	21	35.00	9.76**
	Low	28	46.67	33	55.00	
	Medium	31	51.67	6	10.00	
	Medium high	1	1.66	-	-	
	High	-	-	-	-	
	Total	60	100.00	60	100.00	

$\bar{X}_1 = 8.66$ $\bar{X}_2 = 6.02$

$\sigma_1 = 1.44$ $\sigma_2 = 1.59$

** Significant at 0.01 level of probability

In case of non-beneficiary farmers, more than half (55.00%) of respondents were found in low category of socio-economic status, 35.00 per cent of respondents were found in very low categories of socio-economic status and only 10.00 per cent in medium category of socio-economic status. No one respondent was found in medium high and high category of socio-economic status.

It could be inferred that majority of the beneficiary farmers were found in medium category of socio-economic status whereas non-beneficiary farmers were found in low category of socio-economic status.

The findings of the present study go to contradict the findings of Vrushali Deshmukh (2002) who reported that majority of trainees were from upper middle level of socio-economic status, whereas majority of non trainee were from middle level of socio-economic status category.

The mean socio-economic status score of beneficiary farmers (8.66) was higher than that of non-beneficiary farmers (6.02). The ratio between observed means was computed as indicated by `Z' value (9.76) which was observed highly significant at 0.01 level of probability. It could, therefore, stated that the beneficiary farmers had better socio-economic status as compared to the non beneficiary farmers.

4.1.8 Scientific orientation

The data with regards to the distribution of respondents according to their scientific orientation have been presented in Table 9.

Majority of beneficiary farmers (78.33%) were in medium level of scientific orientation, followed by 16.67 per cent in low level and 5.00 per cent farmers in high level of scientific orientation.

In case of non-beneficiary farmers, majority (70.00%) belonged to the medium level of scientific orientation. The percentage of non-beneficiary farmers in high and low category of scientific orientation were found 23.33 per cent and 6.67 per cent respectively.

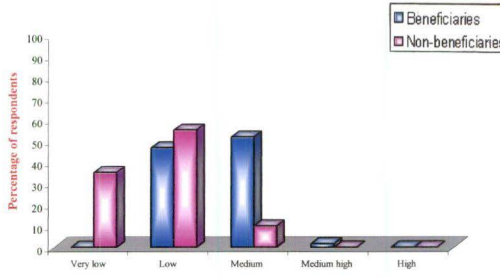


Fig. 8. Distribution of beneficiary and non-beneficiary farmers according to their socio-economic status

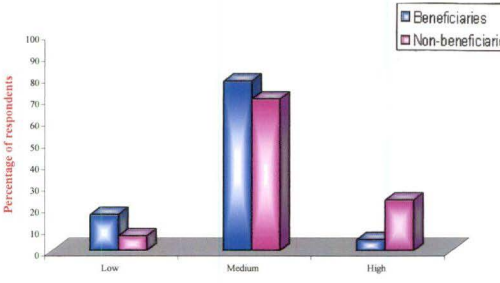


Fig. 9. Distribution of beneficiary and non-beneficiary farmers according to their scientific orientation

Table 9.Distribution of beneficiary and non-beneficiary farmers according to their scientific orientation

Characteristics	Category	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)		`Z' value
		Frequency	%	Frequency	%	
Scientific orientation	Low	10	16.67	4	6.67	
	Medium	47	78.33	42	70.00	
	High	3	5.00	14	23.33	
	Total	60	100.00	60	100.00	2.89**

$\bar{X}_1 = 25.25$ $\bar{X}_2 = 24.18$

$\sigma_1 = 2.24$ $\sigma_2 = 1.87$

** Significant at 0.01 level of probability

It could be inferred that, majority of the respondents from both the categories of beneficiary and non-beneficiary farmers were found in medium level of scientific orientation. However, it is interesting to note that the percentage of respondents from beneficiary farmers (78.33%) was higher than the non-beneficiary farmers (70.00%).

The findings of present study are in line with Sarangkar (2001) who reported that majority of the respondents had medium level of scientific orientation towards Dr. PDKV recommendations about cotton technology.

The mean scientific orientation score of beneficiary farmers (25.25) was higher than the mean scientific orientation score of non-beneficiary farmers (24.18). The ratio between observed mean was computed as indicated by `Z' value (2.89) which was observed highly significant at 0.01% level of probability. It clearly indicated that beneficiary farmers differed significantly over the non-beneficiary farmers.

4.1.9 Economic motivation

The data with regards to the distribution of respondents according to their economic motivation have been presented in Table 10.

Table 10.Distribution of beneficiary and non-beneficiary farmers according to their economic motivation

Characteristics	Category	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)		'Z' value
		Frequency	%	Frequency	%	
Economic motivation	Low	14	23.33	27	45.00	
	Medium	44	73.34	31	51.67	
	High	2	3.33	2	3.33	
	Total	60	100.00	60	100.00	2.95*

$\bar{X}_1 = 24.38$ $\bar{X}_2 = 23.65$

$\sigma_1 = 1.50$ $\sigma_2 = 1.91$

* Significant at 0.05 level of probability

Majority of beneficiary farmers (73.34%) were in medium level of economic motivation, followed by 23.33 per cent in low level and only 3.33 per cent farmers were in high level of economic motivation.

In case of non-beneficiary farmers more than half (51.67%) belonged to the medium level of economic motivation. The percentage of non-beneficiary farmers in low and high category of economic motivation were found 45.00 per cent and 3.33 per cent respectively.

It could be inferred that, majority of the respondents from both the categories of beneficiary and non-beneficiary farmers were found in medium level of economic motivation.

The mean economic motivation score of beneficiary farmers (24.38) was higher than mean economic motivation score of non-beneficiary farmers (23.65). The ratio between observed mean was computed as indicated by 'Z' value (2.95) which was found significant at 0.05 level of probability. It clearly indicated that beneficiary farmers differed significantly over the non beneficiary farmers.

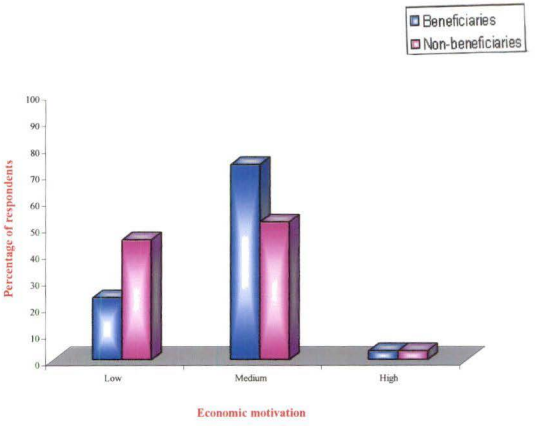


Fig. 10. Distribution of beneficiary and non-beneficiary farmers according to their economic motivation

In summing up the findings of distributional analysis in a nut shell, it could be stated that majority of the respondents from both the categories i.e. beneficiary and non-beneficiary farmers were young aged, educated upto high school level, possessing small to semi-medium category of land holding, agriculture as their main occupation, medium level of experience in cotton cultivation, medium level of scientific orientation and economic motivation. In case of annual income beneficiary farmers were having higher income while non-beneficiary farmers had low income as compared to beneficiary farmers. At the same time near about half of the beneficiary farmers were found in medium level of socio-economic status, where as non beneficiary farmers were found in low level of socio-economic status.

4.2 Dependent variables

The dependent variables for the present study was knowledge and adoption. The impact of Farmers' Field School at farmers level was also studied in terms of change in knowledge, change in adoption, change in production, change in productivity and change in annual income.

4.2.1 Practicewise knowledge IPM practices of cotton

Distribution of the beneficiary and non-beneficiary farmers according to their knowledge about IPM practices of cotton which was given to the beneficiaries of Farmers' Field School during their training programme have been furnished in Table 11.

It is evident from Table 11 that in case of knowledge of beneficiary farmers about cultural practices, most of them had higher level of knowledge about these practices. When the knowledge of beneficiary and non-beneficiary farmers about IPM practices of cotton crop was compared, it was found that cent per cent of the beneficiary farmers had knowledge about hoeing in crop field, avoiding ratooning of crop, whereas, in case of non beneficiary farmers their percentage was 86.67% and 80.00% respectively. Majority (98.33%) of beneficiary farmers were completely aware about the practices viz. necessity of

removal and destruction of alternate host of pest, crop rotation for cotton and grazing the animals after last picking in the field, whereas percentage of non beneficiary farmers were 90.00%, 85.00% and 88.33% respectively. 96.67 per cent beneficiary farmers had complete knowledge about practices viz. burning of plant parts at the end of the season, followed by deep ploughing during summer and avoiding monocropping of cotton (93.33% each) whereas non beneficiary farmers were 75.00, 31.97 and 85.00 per cent respectively.

Table 11. Distribution of beneficiary and non-beneficiary farmers according to their knowledge about IPM practices of cotton crop

Sr. No.	Name of practices	Knowledge					
		Beneficiary farmers (n=60)			Non beneficiary farmers (n=60)		
		Complete	Partial	No	Complete	Partial	No
I	**Cultural practices**						
1	Deep ploughing during summer	56 (93.33)	4 (6.67)	0 (0.00)	37 (31.67)	12 (20.00)	11 (18.33)
2	Necessity of removal and destruction of alternate host of pest	59 (98.33)	1 (1.67)	0 (0.00)	54 (90.00)	6 (10.00)	0 (0.00)
3	Avoiding monocropping of cotton crop	56 (93.33)	4 (6.67)	0 (0.00)	51 (85.00)	6 (10.00)	3 (5.00)
4	Crop rotation for cotton	59 (98.33)	1 (1.67)	0 (0.00)	51 (85.00)	6 (10.00)	3 (5.00)
5	Use of certified seed	57 (95.00)	3 (5.00)	0 (0.00)	18 (30.00)	38 (63.33)	4 (6.67)
6	Resistant and tolerant varieties of cotton	44 (73.33)	15 (25.00)	1 (1.67)	5 (8.33)	37 (61.67)	18 (30.00)
7	Proper time of sowing	44 (73.33)	16 (26.67)	0 (0.00)	10 (16.67)	250 (83.33)	0 (0.00)
8	Seed rate for sowing	37 (61.67)	23 (38.33)	0 (0.00)	5 (8.33)	51 (85.00)	4 (6.67)
9	Proper spacing	40 (66.67)	20 (33.33)	0 (0.00)	3 (5.00)	55 (91.67)	2 (3.33)
10	Trap crops	35 (58.33)	22 (36.67)	3 (5.00)	8 (13.33)	29 (48.33)	23 (38.33)
11	Intercropping and their ratio	45 (75.00)	15 (25.00)	0 (0.00)	12 (20.00)	46 (76.67)	3 (5.00)
12	Hoeing in crop field	60 (100.00)	0 (0.00)	0 (0.00)	52 (86.67)	8 (13.33)	0 (0.00)
13	Irrigation management	40 (66.67)	20 (33.33)	0 (0.00)	7 (11.67)	18 (30.00)	35 (58.33)
14	Recommended fertilizer dose	30 (50.0)	26 (43.33)	4 (6.67)	1 (1.67)	38 (63.33)	21 (35.00)
15	Installing bird perches in crop field	28 (46.67)	23 (43.33)	6 (10.00)	4 (6.67)	5 (8.33)	51 (85.00)
16	Grazing the animals	59	1	0	53	5	2

	after last p icking in the field	(98.33)	(1.67)	(0.00)	(88.33)	(8.33)	(3.34)
17	Burning of plant parts at the end of season	58 (96.67)	0 (0.00)	2 (3.33)	45 (75.00)	13 (21.67)	2 (3.33)
18	Avoiding ratooning of crop	60 (100.00)	0 (0.00)	0 (0.00)	48 (80.00)	6 (10.0)	6 (10.00)
II	**Mechanical practices**						
1	Removal of loose shoot	44 (73.33)	15 (25.00)	1 (1.67)	1 (1.67)	19 (31.67)	40 (66.66)
2	Management of bollworm	31 (51.67)	24 (40.00)	5 (8.33)	0 (0.00)	2 (3.33)	58 (96.67)
3	Use of pheromone traps in the field	55 (91.07)	5 (8.33)	0 (0.00)	0 (0.00)	1 (1.67)	59 (98.33)
4	Benefits of use of yellow sticky traps	57 (95.00)	2 (3.33)	1 (1.67)	3 (5.00)	1 (1.67)	56 (93.33)
5	Detopping of crop	60 (100.00)	0 (0.00)	0 (0.00)	30 (50.00)	12 (20.00)	18 (30.00)
III	**Physical practices**						
1	Use of light traps for pest management	19 (31.67)	26 (43.33)	15 (25.00)	0 (0.00)	1 (1.67)	59 (98.33)
IV	**Biological practices**						
1	Parasitoids like Trichogramma for different pest management	49 (81.67)	11 (18.33)	0 (0.00)	0 (0.00)	2 (3.33)	58 (96.67)
2	Predators like chrysopa for different pest management	49 (81.67)	9 (15.00)	2 (3.33)	0 (0.00)	2 (3.33)	58 (96.67)
3	Method of application of trichogramma in field	53 (88.33)	7 (11.67)	0 (0.00)	1 (1.67)	1 (1.66)	58 (96.67)
4	Method of application of chrysopa in field	51 (85.00)	9 (15.00)	0 (0.00)	1 (1.67)	1 (1.66)	58 (96.67)
5	HaNPV	44 (73.33)	16 (26.67)	0 (0.00)	0 (0.00)	2 (3.33)	58 (96.67)
6	Knowing about bacterial biological insecticides	36 (60.00)	21 (35.00)	3 (5.00)	2 (3.33)	2 (3.33)	36 (93.33)
7	Use of 5% NSKE	60 (100.00)	0 (0.00)	0 (0.00)	34 (56.67)	7 (11.67)	19 (31.67)
8	Time of spraying of biological insecticides	44 (73.33)	13 (21.67)	3 (5.00)	1 (1.67)	10 (16.66)	49 (81.67)
9	Avoiding spraying of chemical pesticides after applying bioagents	52 (86.67)	8 (13.33)	0 (0.00)	0 (0.00)	6 (10.00)	54 (90.00)
V	**Chemical pesticides**						
1	Economic threshold level	30 (50.0)	30 (50.00)	0 (0.00)	0 (0.00)	9 (15.00)	51 (85.00)
2	Precautions while spraying of chemical insecticides	58 (96.67)	2 (3.33)	0 (00.00)	6 (10.00)	48 (80.00)	6 (10.00)
3	Avoid use of toxic pesticides	58 (96.67)	2 (3.33)	0 (0.00)	0 (0.00)	43 (71.67)	11 (18.33)
4	Following seed	28	25	7	2	1	59

	treatment	(46.67)	(41.66)	(11.67)	(3.33)	(1.67)	(98.33)
5	Application of granular pesticides	30 (50.00)	23 (38.33)	7 (11.67)	0 (0.00)	4 (6.07)	34 (90.00)
6	Rate of application of chemical pesticides for control of sucking pests	15 (25.00)	43 (71.67)	2 (3.33)	0 (0.00)	40 (66.67)	20 (33.33)
7	Rate and application of chemical pesticides for control of cotton bollworms	17 (28.33)	40 (66.67)	3 (5.00)	0 (0.00)	41 (68.33)	19 (31.67)
8	Knowing about synthetic pyrethroids	3 (5.00)	19 (31.67)	38 (63.33)	0 (0.00)	0 (0.00)	60 (100)
9	Time of application of synthetic pyrethroids	1 (1.67)	7 (11.67)	52 (86.66)	0 (0.00)	0 (0.00)	60 (100)
10	Avoiding application of synthetic pyrethroids at early stage of crop	2 (3.33)	4 (6.67)	54 (90.00)	0 (0.00)	0 (0.00)	60 (100)

(Figures in parenthesis indicate the percentage)

Regarding mechanical practices about IPM practices of cotton, cent per cent of the beneficiary farmers were completely aware about detopping of crop at the same time half of the non-beneficiary farmers were aware about it. Majority (95.00%) of beneficiary farmers were known about other mechanical practices viz. benefits of use of yellow sticky traps followed by use of pheromone traps (91.67%), removal of loose shoot (73.33%) and management of bollworm (51.67%) on the other hand very few of non beneficiary farmers had knowledge of it.

In case of physical practices, 31.67 per cent beneficiary farmers had complete knowledge about use of light traps for pest management, at the same time it was found that no any non-beneficiary farmers was aware about it.

It is found that cent per cent of beneficiary farmers had complete knowledge about use of 5% NSKE, followed by method of application of trichogramma in field (88.33%), avoiding spraying of chemical pesticides after application of bioagent (86.67%), chrysopa (85.00%), parasitoids and predators (81.67%) then HaNPV, time of spraying of biological insecticides (77.33% each) and bacterial biological insecticides (60.00%), whereas in case of non beneficiary farmers more than half of them (56.67%) did not know about use of 5% NSKE,

followed by bacterial biological insecticides (3.33%), method of application of trichogramma, chrysopa and time of spraying of biological insecticides (1.67% each). It was also noticed that, non-beneficiary farmers did not know about different parasitoids and predators, HaNPV and avoiding spraying of chemical pesticides after applying bioagents.

However, in case of chemical practices, majority (96.67%) of beneficiary farmers had complete knowledge about precautions while spraying of chemical insecticides and avoiding use of toxic pesticides, half of them were knowing about economic threshold level and application of granular pesticides, seed treatment (46.67%), rate of application of chemical pesticides for control of sucking pests (25.00%) and cotton bollworm (28.33%). At the same time, only 10 per cent non beneficiary farmers were aware about precautions while spraying of chemical insecticide followed by seed treatment (3.33%). It was also found that non-beneficiary farmers did not aware about economic threshold level, avoid use of toxic pesticides, application of granular pesticides, chemical pesticides for control of sucking pest and cotton bollworms, synthetic pyrethroids and its time of application.

Information regarding partial and no knowledge of beneficiary and non-beneficiary farmers about above IPM practices had furnished in Table 11.

It could, therefore, be inferred that the respondents of beneficiaries group were better knower about the IPM practices of cotton than their counterparts i.e. non-beneficiary farmers. The possible reason for this findings, might be that the beneficiary farmers had exposed to the team of scientists of Farmers' Field School and thereby they sought the information and guidance and kept updated themselves.

4.2.1.1 Knowledge level about IPM practices of cotton

Table 12. Distribution of the beneficiary and non beneficiary farmers according to the knowledge possessed by them about IPM practices

Sr. No.	Knowledge category	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
1	Low	-	-	-	-
2	Medium	1	1.67	59	98.33
3	High	59	98.33	1	1.67
	Total	60	100.00	60	100.00

Data with regards to the level of knowledge possessed by the beneficiary and non-beneficiary farmers have been furnished in Table 12 indicated that majority of the beneficiary farmers (98.33%) found to have high knowledge level followed by only 1.67 per cent of them having medium knowledge level about IPM practices of cotton disseminated through Farmers' Field School. No one beneficiary farmers was found in low knowledge level.

In case of non beneficiary farmers most of them (98.33%) found to have medium level of knowledge about IPM practices of cotton disseminated through Farmers' Filed School followed by only 1.67 per cent of them having high knowledge level. No any farmer was found in low knowledge level category.

It could be inferred from Table 12 that majority of beneficiary farmers were found in high knowledge level whereas non-beneficiary farmers in medium knowledge level about IPM practices of cotton crop.

The findings of the present study go to contradict with the findings of Mahipal and Prasad (1997) who observed that majority of the respondents had gained medium level of knowledge about various technologies imparted during training.

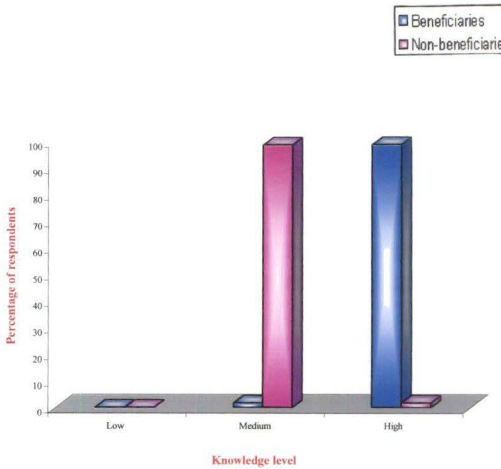


Fig. 11. Distribution of beneficiary and non-beneficiary farmers according to knowledge possessed by them about IPM practices of cotton

4.2.2 Adoption

In order to ascertain the adoption of IPM practices disseminated through Farmers' Field School distribution of the beneficiary and non beneficiary farmers according to their adoption of different practices of IPM have been furnished in Table 13.

It is evident from Table 13 that, in case of cultural practices, cent per cent of beneficiary farmers adopted practices like removal and destruction of alternate host of pest, hoeing in the crop field, grazing the animal after last picking in the field, whereas, percentage of non-beneficiary farmers in case of these practices were found 91.67, 98.33 and 96.67 per cent respectively. Majority (98.33%) of beneficiary farmers had completely adopted practices viz. avoiding monocropping of cotton, crop rotation for cotton crop and avoiding ratooning of crop. In case of non-beneficiary farmers, their percentage were found 90.00, 88.33 and 88.34 per cent respectively. Beneficiary farmers had complete adoption about cultural practices viz., use of certified seed (96.67%), deep ploughing during summer (95.00%), burning of plant parts at the end of season (93.33%) and resistant and tolerant varieties of cotton (91.56%), while percentage of non-beneficiary farmers in these practices were found 75.00, 68.33, 78.33 and 53.33 per cent respectively.

Cent per cent of beneficiary farmers had complete adoption of detopoping of crop, while 71.67 per cent non-beneficiary farmers adopted this practice. Majority (78.34%) of beneficiary farmers were adopters of practices viz. removal of loose shoot, use of pheromone traps followed by use of yellow sticky traps (71.67%) and management of bollworm (58.33%). However, in case of non-beneficiary farmers 71.67 per cent farmers had adoption of detopping of crop, followed by removal of loose shoot (8.33%) and management of bollworm (1.67%). It was also found that non-beneficiary farmers did not adopted pheromone traps and yellow sticky traps in their field.

Table 13. Distribution of beneficiary and non-beneficiary farmers according to their adoption about IPM practices of cotton crop

Sr. No.	Name of practices	Adoption					
		Beneficiary farmers (n=60)			Non beneficiary farmers (n=60)		
		Complete	Partial	No	Complete	Partial	No
I	**Cultural practices**						
1	Deep ploughing during summer	57 (95.00)	3 (5.00)	0 (00.00)	41 (68.33)	19 (31.67)	0 (0.00)
2	Necessity of removal and destruction of alternate host of pest	60 (100.00)	0 (0.00)	0 (0.00)	55 (91.67)	5 (8.33)	0 (0.00)
3	Avoiding monocropping of cotton crop	59 (98.33)	1 (1.67)	0 (0.00)	54 (90.00)	6 (10.00)	0 (0.00)
4	Crop rotation for cotton	59 (98.33)	1 (1.67)	0 (0.00)	53 (88.33)	6 (10.00)	1 (1.67)
5	Use of certified seed	58 (96.67)	2 (3.33)	0 (0.00)	45 (75.00)	14 (23.23)	1 (1.67)
6	Resistant and tolerant varieties of cotton	55 (91.66)	5 (8.33)	0 (0.00)	32 (53.33)	25 (41.67)	3 (50.00)
7	Proper time of sowing	37 (61.67)	23 (38.33)	0 (0.00)	11 (18.33)	49 (81.67)	0 (0.00)
8	Seed rate for sowing	38 (63.33)	22 (36.67)	0 (00.00)	5 (8.33)	52 (86.67)	3 (5.00)
9	Proper spacing	34 (56.67)	26 (43.33)	0 (0.00)	3 (5.00)	55 (91.67)	2 (3.33)
10	Use of trap crops	28 (46.67)	26 (43.3)	6 (10.00)	2 (3.33)	28 (46.67)	30 (50.00)
11	Intercropping and their ratio	42 (70.00)	17 (78.33)	1 (1.67)	3 (5.00)	55 (91.17)	2 (3.33)
12	Irrigation management	5 (8.33)	10 (16.67)	45 (75.00)	1 (1.67)	7 (11.66)	52 (86.67)
13	Recommended fertilizer dose	16 (26.67)	29 (48.33)	15 (25.00)	0 (0.00)	35 (58.33)	25 (41.67)
14	Installing bird perches in crop field	9 (15.00)	8 (13.33)	43 (71.67)	0 (0.00)	1 (1.67)	59 (98.33)
15	Following hoeing in field	60 (100)	0 (0.00)	0 (0.00)	59 (98.33)	1 (1.67)	0 (0.00
16	Grazing the animal after last picking in the field	60 (100.00)	0 (0.00)	0 (0.00)	58 (96.67)	2 (3.33)	0 (0.00)
17	Burning of plant parts at the end of season	56 (93.33)	2 (3.33)	2 (3.34)	47 (78.33)	13 (21.67)	0 (0.00)
18	Avoiding ratooning of crops	59 (98.33)	1 (1.67)	0 (0.00)	53 (88.34)	2 (3.33)	5 (8.33)
II	**Mechanical practices**						
1	Removal of loose shoot	47 (78.34)	13 (21.66)	0 (0.00)	5 (8.33)	17 (28.33)	38 (63.34)
2	Management of bollworm	35 (58.33)	23 (28.34)	2 (3.33)	1 (1.67)	0 (0.00)	59 (98.33)
3	Use of pheromone traps in the field	47 (78.34)	8 (13.33)	5 (8.33)	0 (0.00)	0 (0.00)	60 (100.0)

4	Benefits of use of yellow sticky traps	43 (71.67)	9 (15.00)	8 (13.33)	0 (0.00)	0 (0.00)	60 (100.00)
5	Detopping of crop	60 (100)	0 (0.00)	0 (0.00)	43 (71.67)	14 (23.33)	3 (5.00)
III	**Physical practices**						
1	Use of light traps for pest management	1 (1.67)	11 (18.33)	48 (80.00)	1 (1.67)	1 (1.67)	58 (96.66)
IV	**Biological practices**						
1	Use of parasitoids like Trichogramma for different pest management	28 (48.67)	28 (46.67)	4 (6.66)	0 (0.00)	0 (0.00)	60 (100)
2	Use of predators like chrysopa for different pest management	28 (46.67)	29 (48.33)	3 (5.00)	0 (0.00)	0 (0.00)	60 (100)
3	Rate and application of HaNPV against cotton bollworm	26 (43.33)	22 (36.67)	12 (20.00)	0 (0.00)	0 (0.00)	60 (100)
4	Use of bacterial biological insecticides	15 (25.00)	21 (35.00)	24 (40.00)	0 (0.00)	0 (0.00)	60 (1.00)
5	Use of 5% NSKE	56 (93.33)	2 (3.33)	2 (3.34)	20 (33.33)	17 (28.33)	23 (38.34)
6	Time of spraying of biological insecticides	38 (63.33)	20 (33.33)	2 (3.34)	0 (0.00)	11 (18.33)	49 (81.67)
7	Avoiding spraying of chemical pesticides after applying bioagents	50 (83.33)	3 (5.00)	7 (11.67)	0 (0.00)	0 (0.00)	60 (100.00)
V	**Chemical pesticides**						
1	Precautions while spraying of chemical pesticides	46 (76.67)	11 (18.33)	3 (5.00)	7 (11.67)	47 (78.33)	6 (10.00)
2	Avoiding toxic pesticides	53 (88.33)	7 (11.67)	0 (0.00)	8 (13.33)	45 (75.00)	7 (11.67)
3	Following seed treatment	10 (16.66)	20 (33.33)	30 (50.00)	2 (3.33)	4 (6.67)	54 (90.00)
4	Application of granular pesticide	17 (28.33)	24 (40.00)	19 (31.67)	0 (0.00)	3 (5.00)	57 (95.00)
5	Rate and application of chemical pesticides for control of sucking pest	16 (26.67)	36 (60.00)	8 (13.33)	0 (0.00)	43 (71.67)	17 (28.33)
6	Rate of application of chemical pesticides for control of cotton bollworm	13 (21.67)	28 (46.66)	19 (31.67)	0 (0.00)	44 (73.33)	16 (26.67)
7	Use of synthetic pyrethroids	2 (3.33)	0 (0.00)	58 (96.67)	0 (0.00)	0 (0.00)	60 (100)
8	Time of use of synthetic pyrethroids	2 (3.33)	0 (0.00)	58 (96.67)	0 (0.00)	0 (0.00)	60 (100)

(Figures in parenthesis indicate the percentage)

In case of physical practices, it was found that the same extent (1.67%) of beneficiary and non-beneficiary farmers adopted the light traps for the pest management.

In case of adoption of biological practices it was found that majority (93.33%) of the beneficiary farmers had adoption of 5% NSKE followed by avoiding spraying of chemical pesticides after applying bioagentes (83.33%), time of spraying of biological insecticides (63.33%), use of parasitoids (48.67%), predators (46.67%), rate and application of HaNPV against cotton bollworm (43.33%) and use of bacterial biological insecticides (25.00%). However, 33. 33 per cent non beneficiary farmers had adoption of 5% NSKE. It were also found that non beneficiary farmers did not adopt other biological practices in their field.

In case of adoption of chemical practices, majority (88.33%) of beneficiary farmers adopted practices viz. avoiding toxic pesticides followed by precautions while spraying of chemical pesticides (76.67%) application of granular pesticides (28.33%) then rate and application of chemical pesticides for control of sucking pest (26.67%) and cotton bollworm (21.67%), seed treatment (16.67%) and use of synthetic pyrethroids and its time of application 3.33% each. However, in case of non beneficiary farmers 13.33 per cent farmers had complete adoption of avoiding toxic pesticides followed by precautions while spraying of chemical pesticides (11.67%) and seed treatment (3.33%). It was also found that non beneficiary farmers did not adopt the chemical practices viz. application of granular pesticides, chemical pesticides for control of sucking pest and cotton bollworms, synthetic pyrethroids and its time of application.

Information regarding partial and no adoption of beneficiary and non-beneficiary farmers about above IPM practices had furnished in Table 13.

The less adoption about IPM practices of cotton by non-beneficiary farmers can therefore be attributed to lack of knowledge on their part.

4.2.2.1 Adoption level about IPM practices of cotton

Table 14. Distribution of the beneficiary and non-beneficiary farmers on the basis of their adoption about IPM practices of cotton

Sr. No.	Adoption category	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
1	Low	-	-	11	18.33
2	Medium	22	36.67	49	81.67
3	High	38	63.33	-	-
	Total	60	100.00	60	100.00

Data with regards to the level of adoption of the beneficiary and non beneficiary farmers had furnished in Table 14 indicated that about two third of beneficiary farmers (63.33%) found to have higher adoption level followed by 36.67 per cent of them having medium adoption level and no one farmer was found in low category of adoption about IPM practices of cotton crop.

In case of non beneficiary farmers, most of them (81.67%) were found to have medium adoption level followed by 18.33 per cent farmers having low adoption level and not a single per cent of farmers were found in high category of adoption about IPM practices of cotton.

It could be inferred from Table 14 that majority of beneficiary farmers were found in high category whereas non-beneficiary farmers in medium category of adoption about IPM practices of cotton crop.

The findings of the present study are in contradict with the findings of Deshmukh *et al.* (2002) who found that majority of the trainees of KVK training programme of IPM belonged to medium whereas majority of non trainees were in low category of adoption.

4.2.3 Impact

As stated in preceding chapter of Methodology that impact of Farmers' Field School has been studied in terms of change in knowledge, adoption, production, productivity and annual income and measured in terms of per cent change. The data thus obtained have been furnished in Table 15.

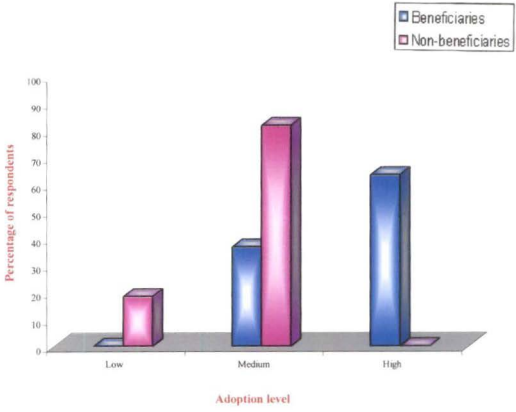


Fig. 12. Distribution of beneficiary and non-beneficiary farmers according to their adoption about IPM practices of cotton

Table 15. Impact of Farmers' Field School on beneficiary farmers over non-beneficiary farmers

Sr. No.	Impact dimension	Mean score		% change
		Beneficiary farmers	Non-beneficiary farmers	
1	Knowledge	69.88	40.1	74.07
2	Adoption	55.11	30.25	82.18
3	Production	15.00	12.00	25.00
4	Productivity	11.00	10.23	7.52
5	Annual income	82767	54484	51.90
	Mean impact			48.13

A cursory look at Table 15 revealed that the mean scores of knowledge (69.88), adoption (55.11), production (15.00), productivity (11.00) and annual income Rs. 82,767 of the beneficiary farmers were higher than the mean scores of knowledge (40.1), adoption (30.25), production (12), productivity (10.23) and annual income (Rs. 54,484) of the non-beneficiary farmers. It was also found that there was a change in knowledge, adoption, production, productivity and annual income to the tune of 74.04, 82.18, 25, 7.52 and 51.90 per cent of beneficiary farmers over non-beneficiary farmers as a result of adoption about IPM practices of cotton by them which were disseminated through Farmers' Field School. Thus, it could be stated that the Farmers' Field School had created a positive impact on the beneficiary farmers.

When the impact of Farmers' Field School as a whole was considered, it is evident from Table 15 that there was 48.13 per cent impact on beneficiary farmers when compared with non-beneficiary farmers. It could, therefore, be stated that there was definite impact of the Farmers' Field School on the beneficiary farmers in terms of change in knowledge, change in adoption,

change in production, change in productivity and change in annual income to the extent of 48.13 per cent over and above, as a whole.

The findings of the present study are in line with the findings of Deshmukh (2002) who observed that, 30.41 per cent impact on trainee farmers about IPM training imparted by KVK.

4.3.1 Testing the significance of the difference in the means

In order to test the variability of means of knowledge, adoption, production, productivity and annual income of beneficiary farmers over non-beneficiary farmers, the data were subjected to `Z' test and the results thus obtained have been presented in Table 16.

Table 16.Testing the significance of difference of the means in knowledge, adoption, production, productivity and annual income of beneficiary farmers and non-beneficiary farmers

Sr. No.	Impact dimension	Mean score		`Z' value
		Beneficiary farmers	Non-beneficiary farmers	
1	Knowledge	69.88	40.1	23.08**
2	Adoption	55.11	30.25	23.23**
3	Production	15.00	12.00	2.14*
4	Productivity	11.00	10.23	4.81**
5	Annual income	82767	54484	7.81**

** Significant at 0.01 level of probability
* Significant at 0.05 level of probability

It is observed from the Table 16 that the means of the various dimension of impact viz. knowledge (69.88), adoption (55.11), production (15.00), productivity (11.00) and annual income (Rs. 82,767) of the beneficiary farmers were found higher than the mean of knowelge (40.01, adoption (30.25), production (12.00), productivity (10.23) and annual income (Rs. 54484) of the non-beneficiary farmers.

A mere quantitative superiority of the mean score of the beneficiary farmers over the mean score of the non-beneficiary farmers is not conclusive proof of its superiority. Hence the ratio between observed differences was computed as indicated by 'Z' values.

The 'Z' values of knowledge (23.08), adoption (23.23), production (2.14), productivity (4.81) and annual income (7.81) were found significant at 0.01 and 0.05 level of probability.

It could, therefore, be inferred that the beneficiary farmers differed significantly over the non-beneficiary farmers in knowledge, adoption, production, productivity and annual income. It could, therefore be explicitly stated that there was definite increase in knowledge, adoption, production, productivity and annual income among the beneficiary farmers over non-beneficiary farmers as results of dissemination of IPM practices of cotton through Farmers' Field School.

By end large, it could definitely be stated that the Farmers' Field School had a positive significant impact on the beneficiary farmers.

4.3 Relational analysis

In order of find out the relationship of the selected characteristics of the beneficiary and non-beneficiary farmers with their knowledge and adoption, correlation coefficient were worked out. The results obtained from the relational analysis have been presented as below.

4.3.1 Relationship of selected characteristics of respondents with their knowledge

The correlation coefficient of knowledge with personal, socio-economic and psychological characteristics of the beneficiary and non-beneficiary farmers have been furnished in Table 17.

Table 17.Coefficient of correlation of selected characteristics of respondents with their knowledge

Sr. No.	Characteristics	Beneficiary farmers `r' value	Non beneficiary farmers `r' value
1	Age	0.250*	0.088
2	Education	-0.027	-0.059
3	Land holding	-0.000	0.081
4	Occupation	0.275*	0.282*
5	Experience in cotton cultivation	0.149	0.079
6	Annual income	-0.014	0.195
7	Socio-economic status	0.329**	-0.106
8	Scientific orientation	0.041	-0.025
9	Economic motivation	0.052	0.132

** significant at 0.01 level of probability
* significant at 0.05 level of probability

It is evident from Table 17 that among the personal, socio-economic and psychological characteristics, only socio-economic status was found to have positive and highly significant correlation with the knowledge possessed by beneficiary farmers. Farmers age and occupation were significant at 0.05 level of probability. The null hypothesis was therefore rejected for these characteristics and stated that there was significant relationship between these characteristics and the knowledge.

The variables viz. education, land holding, experience in cotton cultivation, annual income, scientific orientation and economic motivation did not show any significant association with the knowledge possessed by the beneficiary farmers. The null hypothesis for these variables was therefore accepted.

In case of non-beneficiary farmers, only occupation found to have positive and significant correlation with the knowledge possessed by them at

0.01 level of probability. Thus null hypothesis was therefore rejected for this characteristic stating that there was significant relationship between occupation and knowledge.

The variables viz. age, education, land holding, experience in cotton cultivation, annual income, socio-economic status, scientific orientation and economic motivation did not show any significant association with the knowledge possessed by the non beneficiary farmers. The null hypothesis for these variables was therefore accepted.

From the above findings, it could be interpreted that the beneficiary farmers with higher socio-economic status, younger in age and agriculture as a main occupation had an influence on the possession of knowledge by them. It is quite logical that the farmers with younger in age and farming as their main occupation and high socio-economic status were getting acquainted easily with the scientific aspects of IPM practices of cotton disseminated through Farmers' Field School and possess higher knowledge about practices of cotton.

These findings are in line with the findings of Gaikwad and Gunjal (1999) who reported that age of beneficiaries of Krishi Vigyan Kendra in Maharashtra had significant and positive relation with their knowledge. The findings also in line with the finding of Veeraiah *et al.* (1998) who reported that there was positive and significant relationship between socio-economic status and knowledge.

4.3.2 Relationship of selected characteristics of the respondents with their adoption

The correlation of adoption with personal, socio-economic and psychological characteristics of beneficiary and non-beneficiary farmers have been furnished in Table 18 .

Table 18. Coefficient of correlation of selected characteristics of respondents with their adoption

Sr. No.	Characteristics	Beneficiary farmers `r' value	Non beneficiary farmers `r' value
1	Age	0.089	0.107
2	Education	0.111	0.134
3	Land holding	0.052	0.002
4	Occupation	-0.004	0.251*
5	Experience in cotton cultivation	0.141	0.182
6	Annual income	-0.009	0.138
7	Socio-economic status	0.272*	-0.181
8	Scientific orientation	0.121	-0.062
9	Economic motivation	0.114	0.185
10	Knowledge	0.50**	0.81**

* significant at 0.05 level of probability
** significant at 0.01 level of probability

It could be seen from the Table 18 that only socio-economic status of beneficiary farmers were found positively significant at 0.05 level of probability. The null hypothesis was therefore, rejected for this characteristics stating that there was significant relationship between socio-economic status and knowledge.

However, other variables i.e. age, education, land holding, occupation, experience in cotton cultivation, annual income, scientific orientation and economic motivation did not show any significant association with adoption about of cotton disseminated through Farmers' Field School by beneficiary farmers. This leads to acceptance of null hypothesis. Thus the findings indicated that these factor were not influenced on adoption about IPM practices of cotton disseminated through Farmers' Field School. Logical reasoning behind this might be the farmers with higher socio-economic status attempted to acquire more knowledge about IPM practices of cotton disseminated through Farmers'

Field School which led to the higher adoption of these practices by them on their field.

In case of non-beneficiary farmers occupation was found positive and significant at 0.05 level of probability. This leads to reject null hypothesis. Thus the findings indicated that occupation of the non-beneficiary farmers were influencing the rate of adoption about IPM practices of cotton crop i.e. regarding cultural practices they had no much knowledge but adopted these practices because these are traditional practices.

However, the other variable viz., age, education, land holding, experience in cotton cultivation, annual income, socio-economic status, scientific orientation and economic motivation did not show any significant association with the adoption of IPM practices of cotton by farmers. The null hypothesis for these variables was therefore accepted. Logical reasoning behind this may be that the non-beneficiary farmers having agriculture as their main occupation attempt to acquire more amount of knowledge about IPM practices of cotton which led to higher adoption of these practices in their field.

The findings of the present study are in line with the findings of Wane (2002) who reported that socio-economic status had positive and significant correlation with adoption of improved farm production technology. In case of occupation the findings, are contradictory to findings of Sarkar and Bandopadhyay (1996) who reported that occupation had non significant relationship with adoption of scientific farm innovation.

4.4 Empirical model of study

Considering the anticipated relations amongst the independent and dependent variables and actual results obtained after analysis of data an empirical model of relations was prepared and relationship has been depicted in Fig. 13.

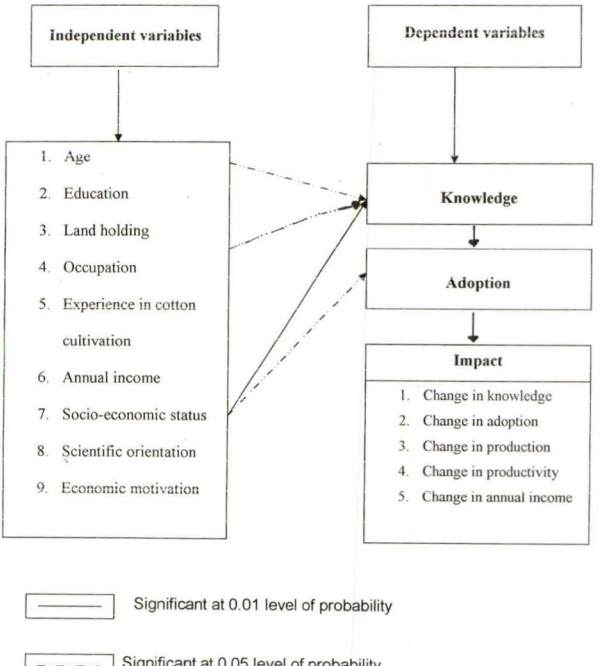


Fig. 13(a): Empirical Model of study of beneficiary farmers

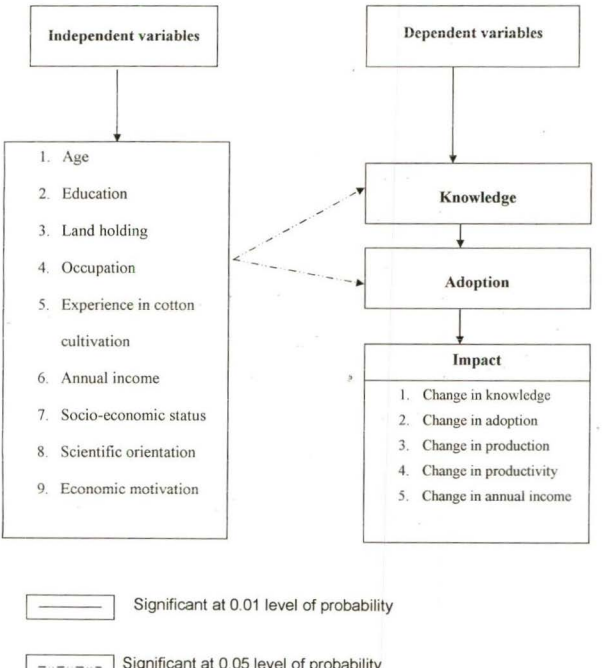


Fig. 13(b): Empirical Model of study of non-beneficiary farmers

CHAPTER V

SUMMARY AND CONCLUSIONS

The present research study entitled "Impact of Farmers' Field School on cotton growers" was conducted to ascertain the knowledge, adoption and impact. Impact in terms of change in knowledge, change in adoption, change in production, change in productivity and change in annual income in beneficiary and non-beneficiary farmers in the area under Farmers' Field School with the following objectives.

5.1 Objectives of the study

1. To study the personal, socio-economic and psychological characteristics of beneficiaries and non-beneficiaries of Farmers' Field School.
2. To study the knowledge and adoption of Integrated Pest Management practices by beneficiaries and non-beneficiaries of Farmers' Field School.
3. To study the relationship between selected characteristics of beneficiaries and non-beneficiaries of Farmers' Field School with their knowledge and adoption about Integrated Pest Management practices of cotton crop.
4. To study the impact of Farmers' Field School on cotton growers.

The present study was carried out in 10 villages of Akola Panchayat Samiti of Akola district in Maharashtra State, since 2001 Farmers' Field School is under implementation in Maharashtra State. practices of various crops viz., cotton, cereals, oilseeds, pulses and sugarcane are disseminated through Farmers' Field School.

Sixty cotton grower who were beneficiaries of Farmers' Field School before three years back were selected as population representing beneficiary farmers. Sixty cotton growers who had not undergone the training of Farmers' Field School from the same villages were selected as respondents as non-beneficiary farmers on the basis of same land holding by random sampling method. The interview schedule was designed with relevant questions in

accordance with the study objectives. Data were collected by personally interviewing the respondents, the collected data were tabulated for mean, standard deviation, percentage, correlation and `Z' test was employed for interpretation of the findings.

The characteristics of the respondents viz., age, education, land holding, occupation, experience in cotton cultivation, annual income, socio-economic status, scientific orientation and economic motivation were studied as independent variables whereas, knowledge, adoption and impact were studied as dependent variables.

5.2 Results

The salient findings of the present study are summarized in the succeeding paragraphs.

5.2.1 Distributional analysis

5.2.1.1 Profile of the beneficiary and non-beneficiary farmers

Near about half of beneficiary (56.67%) and non –beneficiary farmers (48.33%) were in young age group.

In beneficiary farmers, equal percentage of farmers (46.67%) were educated upto high school and college level. In case of non-beneficiary farmers 36.67 per cent farmers were educated upto high school level.

In both the categories 43.44 per cent of the beneficiary and non-beneficiary farmers had small category of land holding.

Two-third of the beneficiary farmers (66.67%) and non-beneficiary farmers (65.00%) had agriculture as their main occupation.

More than 50 per cent of beneficiary farmers (58.33%) and non-beneficiary farmers (63.33%) had medium level of experience in cotton cultivation.

Near about half (48.33%) of beneficiary farmers were in the annual income group between Rs. 50,001 to Rs. 1,00,000 whereas 55.00 per cent of non-beneficiary farmers had their income upto Rs. 50000/-.

More than 50 per cent (51.67%) of the beneficiary farmers were in medium category of socio-economic status, whereas 55.00 per cent of non beneficiary farmers were in low category of socio-economic status.

Majority of beneficiary farmers (78.33%) and non-beneficiary farmers (70.00%) belonged to medium level of scientific orientation.

Majority of beneficiary farmers (73.34%) and non-beneficiary farmers (51.67%) belonged to medium level of economic motivation.

Majority of beneficiary farmers (98.33%) belonged to high level of knowledge whereas, majority of non-beneficiary farmers observed in medium category of knowledge level (98.33%).

Majority of beneficiary farmers (63.33%) were in high category of adoption, whereas 81.67 per cent non beneficiary farmers were in medium category of adoption of IPM practices.

5.2.2 Relational analysis

5.2.2.1 Knowledge

Findings of the relational analysis revealed that out of 9 characteristics of beneficiary farmers, three characteristics viz. age, occupation were positively and significantly correlated with their knowledge about IPM practices of cotton at 0.05 level of probability and the socio-economic status was positive and highly significant with their knowledge about IPM practices of cotton at 0.01 level of probability.

In case of non-beneficiary farmers only occupation was positively and significantly correlated with knowledge about IPM practices of cotton whereas none other variable showed significant correlation with their knowledge about IPM practices of cotton.

5.2.2.2 Adoption

Findings of the relational analysis with adoption revealed that out of 9 characteristics of beneficiary farmers only socio-economic status was positively

and significantly correlated at 0.05 level of probability with their adoption about the IPM practices of cotton disseminated through Farmers' Field School.

In case of non-beneficiary farmers only occupation was positively and significantly correlated at 0.05 level of probability with their adoption of IPM practices of cotton.

5.2.3 Impact

Impact of Farmers' Field School on the beneficiary farmers was studied in terms of change in knowledge, change in adoption, change in production, change in productivity and change in annual income over non-beneficiary farmers.

5.2.3.1 Change in knowledge

Mean knowledge score of beneficiary farmers was found 69.88 and that of non beneficiary farmers was 40.00. Change in knowledge over non-beneficiary farmers was 74.07 per cent. The 'Z' value (23.08) of difference was observed significant. This indicated that there was a definite positive impact of Farmers' Field School on beneficiaries than non- beneficiaries with respect to change in knowledge to the extent of 74.07 per cent.

5.2.3.2 Change in adoption

Mean adoption score of beneficiary farmers was found 55.11 and that of non-beneficiary farmers was 30.25. Change in adoption was 82.18 per cent. The 'Z' value (23.23) of differences was observed significant. This indicated that there was a definite positive impact of Farmers' Field School on beneficiaries than non-beneficiaries with respect to change in adoption to the extent of 82.18 per cent.

5.2.3.3 Change in production

Mean production score of beneficiary farmers (15.00) was found higher than that of non-beneficiary farmers (12.00). Change in production over non-beneficiary farmers was 25.00 per cent and the 'Z' value (2.14) of differences was observed significant. This indicated that there was a definite

positive impact of Farmers' Field School on beneficiaries than non-beneficiaries farmers.

5.2.3.4 Change in productivity

Mean productivity score of beneficiary farmers was 11.00 quintal per hectare and that of non-beneficiary farmers was 10.23 quintal per hectare. The per cent change in productivity was 7.52 per cent. The 'Z' value (4.18) of differences was observed significant. This indicated that there was a definite positive impact of Farmers' Field School on beneficiaries than non-beneficiaries farmers with respect to change in productivity to the extent of 7.52 per cent.

5.2.3.5 Change in annual income

Mean annual income of beneficiary farmers was Rs. 82767/- and that of non-beneficiary farmers was Rs. 54484/-. The per cent change in annual income was 51.90 per cent. The 'Z' value (5.69) of differences was observed significant. This indicated that there was a positive impact of Farmers' Field School on beneficiary than non beneficiary farmers with respect to change in annual income to the extent of 51.90 per cent.

5.2.3.6 Total mean impact

The total impact of Farmers' Field School on the beneficiary farmers in terms of change in knowledge (74.07%), change in adoption (82.18%), change in production (25.00%), change in productivity (7.52%) and change in annual income was 51.90 per cent. Hence total mean impact of Farmers' Field School on beneficiary farmers over non beneficiary farmers was found 48.13 per cent.

CHAPTER VI

IMPLICATIONS

The findings of the present study lead to certain generalization and implications. The implications emanated from the findings are presented into two parts i.e. implications for action and implications for future research. The implications will be useful for development activities of Farmers' Field School and for future research.

6.1 Implications for action

1. The findings of the present study indicated that majority of the beneficiary of Farmers' Field School had high knowledge level. Testing of differences in the knowledge of beneficiary and non-beneficiary farmers showed Farmers' Field School has definitely proved effective and hence it is suggested to organize training in the future in need based areas and in other crops of Vidarbha region.
2. The extent of adoption about IPM practices of cotton noticed that majority of beneficiary farmers had high adoption, but most of beneficiaries and majority of non beneficiaries had moderate level of adoption, so that promotion of adoption about IPM practices of cotton is of vital importance and may become a regular feature of Farmers' Field School and extension agency.
3. Farmers' Field School had significant impact on beneficiary farmers in terms of change in knowledge, change in adoption, change in production, change in productivity and change in annual income. Thus such type of programmes may be replicated in every villages of the tahsils so that the advantages of such programme may improve economic conditions and better standard of living of the farming community.
4. Change in annual income indicates that, due to adoption of IPM practices of cotton by beneficiary farmers, they had reduced the cost of cultivation

than non-beneficiary farmers. If such training of IPM practices organized for non-beneficiary farmers they may get advantages of such IPM practices to increase their annual income and improves standard of living.

5. There is significantly increase in knowledge and adoption of beneficiary farmers. It is therefore advisable in the villages, villagers should use these farmers in transfer of IPM practices of cotton to other cotton growers in their area as opinion leaders or contact farmers.

5.3.2 Implication for future research

1. The present study covered only 10 villages of Akola Panchayat Samiti of Akola district in Maharashtra State, hence generalization of the study may be applicable to villages of other Panchayat Samiti of districts having similar characteristics. A comprehensive study covering a larger area would be more appropriate to draw generalization having wider applicability.
2. The present study has been conducted under a limited characteristics, so that it will be better if more characteristics added in the future research by the researcher in their investigation.
3. It will be more appropriate to select the non-beneficiary farmers from villages of other panchayat samiti for elimination of interaction effect to have a vital comparison.
4. This study was confined to only IPM practices of cotton crop for testing knowledge, adoption, production, productivity and annual income. Similar research may be carried out in other crops.
5. The study may be carried out on constraints faced by the implementing agencies and farmers separately while implementing and adopting the IPM practices by them in the field.

CHAPTER VII

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APPENDIX

INTERVIEW SCHEDULE

Title of Research :**"Impact of Farmers' Field School on Cotton Growers"**

Name of Researcher : **Miss. Deokar Sujata Balkrishna**
M.Sc. (Agri.) II year
Department of Extension Education,
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola.

GENERAL INFORMATION

PART - I

1. **Name of respondent** : .....
2. **Village** : .....**Taluka**:.....**District**: .....
3. **Age** : ..... years
4. **Education** : ..... std.
5. **Land holding** :
   a. Rainfed area : ..... ha
   b. Irrigated area : ..... ha
   Total area (a+b) : ..... ha
6. **Occupation**
   a. Main occupation : .....
   b. Subsidiary occupation : .....

7. Experience in cotton cultivation : ..... years

8. Annual income :

a. Income from agriculture

Sr. No.	Name of crops	Variety	Area (ha)	Yield (q/ha)	Productivity (kg/ha)	Total income (Rs.)
1	Kharif season i. ii. iii.					
					Total income (1) =	
2.	Rabi season i. ii. iii.					
					Total income (2) =	
3	Summer season i. ii. iii.					
					Total income (3) =	
	Total income from agriculture (1+2+3)					

b. Income from subsidiary occupation : ..... Rs.

Total annual income (a+b) : ..... Rs.

9. Socio-economic status

Sr. No.	Indicator	Score	Cumulative weightage
1	**Occupation**		**7.52**
a.	**Occupation of family head**		
	i. Agriculture + Labour	2	
	ii. Agriculture (Farming)	3	
	iii. Agriculture + allied occupation (Goat farming/ poultry/ apiculture/ sericulture/dairy farming)	4	
	iv. Agriculture + business (professional/ non-professional)	5	
	v. Agriculture + service (job with monthly salary)	6	
b.	**Occupation of other dependent (son/brother etc.)**		
	i. Landless labour (daily wage earner)	1	
	ii. Agriculture + labour	2	
	iii. Agriculture (Farming)	3	
	iv. Agriculture + allied occupation (Goat farming/ poultry/ apiculture/ sericulture)	4	
	v. Agriculture + business (professional /non professional)	5	
	vi. Agriculture + service (job with monthly salary)	6	
2	**Land holding**		**7.42**
a.	**Farm size**		
	i. Marginal (upto 1 ha)	1	
	ii. Small (1.01 to 2.00 ha)	2	
	iii. Semi-medium (2.01 to 4.00 ha)	3	
	iv. Medium (4.01 to 10.00 ha)	4	
	v. Large (Above 10 ha)	5	
b.	**Type of cultivation**		
	i. Rainfed	1	
	ii. Irrigated	2	
c.	**Cropping pattern**		
	i. Seasonal cropping/ single cropping	1	
	ii. Double / multiple cropping	2	
	iii. Biannual cropping	3	
	iv. Orchards	4	
d.	**Source of irrigation**		
	i. No source	0	
	ii. River	1	
	iii. Well	2	
	iv.Canal	3	

e.	**Ownership of land**		
	i. Land leased out :..... ha	1	
	ii. Land leased in : ..... ha	2	
f.	**Contingency paid yearly worker**		
	i. No	0	
	ii. Yes	1	
3	**Family education**		**5.58**
a.	**Husband's education**		
	i. Illiterate	0	
	ii. Elementary (can read and write only)	1	
	iii. Primary school	2	
	iv. Middle school	3	
	v. High school	4	
	vi. Technical college	5	
	vii.Non-technical college	5	
	viii. Professional (Medical/ Engineering / Agriculture)	6	
b.	**Wife's education**		
	i. Illiterate	0	
	ii. Elementary (can read and write only)	1	
	iii. Primary school	2	
	iv. Middle school	3	
	v. High school	4	
	vi. Technical college	5	
	vii.Non-technical college	5	
	viii. Professional (Medical/ Engineering / Agriculture)	6	
4	**Annual income**		**4.32**
	i. Below poverty line	1	
	ii. upto Rs. 50,000/-	2	
	iii. Rs. 50,000/- to Rs. 1,00,000/-	3	
	iv. Rs. 1,00,000/- to Rs. 1,50,000/-	4	
	v. Rs. 1,50,000/- to creamy layer	5	
	vi. Above creamy layer	6	
5	**Socio-political participation**		**3.35**
	i. Without any position in social or political organization	0	
	ii. Membership of one social or political organization	1	
	iii. Membership of one social and political organization	2	
	iv.Involved in community work though not having membership or official position in any social or political organization	3	
	v. Financial contribution / raising common funds	3	
	vi. Official position in social or political organization	4	
	vii. Village leader / opinion leader	5	
	viii. Wide public leader	6	
6	**Household**		**2.16**
a.	**Type of house**		
	i. Shed thatched (Stalk frames)	1	

	ii. Mudwall and thatched	2	
	iii. Brick wall and tiled	3	
	iv. Concrete house	4	
	v. Double storied	5	
b.	**Ownership of house**		
	i. Rented	1	
	ii. Own	2	
c.	**Other facilities**		
	i. Toilet / Soak pit available	1	
	ii. Well inside the yard	2	
	iii. Biogas connection	3	
	iv. LPG connection	3	
d.	**Condition of the house**		
	i. Need much repair	1	
	ii. Need some repair	2	
	iii. Neat and well kept without court yard	3	
	iv. Neat and well kept with court yard	4	
e.	**Lighting facility**		
	i. Kerosene lamp / petromax	1	
	ii. Electricity	2	
f.	**Family type**		
	i. Single	1	
	ii. Joint	2	
g.	**Family size**		
	i. Small (1 to 3 members)	1	
	ii. Medium (4 to 6 members)	2	
	iii. Large (7 to 9 members)	3	
	iv. Very large (10 and above)	4	
h.	**Storage house available**		
	i. No	0	
	ii. Yes	1	
7	**Material possession**		**1.52**
a.	**Farm implements / equipments**		
	i. Harrow	1	
	ii. Hoe	1	
	iii. Wooden plough	1	
	iv. Wooden seed-drill	1	
	v. Mould-bould plough	2	
	vi. Ferti-hoe	2	
	vii. Iron seed-cum-fertilizer – drill	2	
	viii. Duster	3	
	ix. Sprayer	3	
	x. Diesel engine	4	
	xi. Electric pump	4	
	xii. Thresher / Harvester	5	

b.	**Household equipments**		
	i. Grain storage		
	Silo pits	2	
	Pev	2	
	Kangi	1	
	Metallic bins	1	
	ii.Furniture		
	Chair	1	
	Tables	1	
	Almirah	2	
	Devan	3	
	Sofa	3	
	iii. Other household equipments		
	Watch/ torch	1	
	Fan	2	
	Camera	2	
	CD player	3	
	Mixer / grinder	3	
	Tape-recorder	3	
	Telephone	4	
	Cooler	5	
	Refrigerator	5	
c.	**Animal possession**		
	i. Farm animals (Bullock)		
	Non-discrete	1	
	Discrete	2	
	ii. Milch animals		
	Non-discrete	1	
	Discrete	2	
	iii. Goat / sheep		
	Non-discrete	1	
	Discrete	2	
	iv. Poultry	1	
d.	**Information sources**		
	i. Books	1	
	ii. Farm publications	2	
	iii. Agriculture bulletins / magazines	2	
	iv. Newspaper –daily / weekly / fortnight	3	
	v. Radio	3	
	vi. TV – Black and white/ coloured	4	
	vii. Internet access (common)	5	
e.	**Farm structure**		
	i. Cattle shed		
	Katcha	1	
	Pucca	2	
	ii. Implements shade		
	Katcha	1	

	Pucca	2	
f.	**Transport**		
	i. Cycle	1	
	ii. Bullock cart	2	
	iii. Motor cycle / Moped	3	
	iv. Jeep / Lorry / Van	4	
	v. Tractor / Truck	4	
g.	**Farm visits / exhibitions / extension activities**		
	i. Always	3	
	ii. Sometimes	2	
	iii. Never	1	
8	**Other attributes**		**1.00**
	i. Seed producer	1	
	ii. Progressive farmer	2	
	iii. Prize winner – village / tahasil/ District level	3	
	iv. Krishi pandit	3	
a.	**Loans**		
	Borrowed	1	
	Not borrowed	2	
b.	**Repayment behaviour**		
	Defaulter	1	
	Non defaulter	2	

10. Scientific orientation

Sr. No.	Statement	SA	A	U	D	SA
1	New methods of farming gives better result to a farmer than old method					
2	Even a farmer with lot of experience should use new methods of farming					
3	Though it takes time for a farmer to learn new methods of farming it is worth the efforts					
4	A good farmer experiments with new idea in farming					
5	The way a farmers forefather farmed is still the best way to farm today					
6	The traditional method of farming have to be changed in order to raise the level of living of a farmer					

11. Economic motivation

Sr. No.	Statement	SA	A	U	D	SA
1	Farmer should work towards large yield and economic profit.					
2	The most successful farmer is, who make more profit.					
3	A farmer should try any new farming idea which may earn him more money.					
4	A farmer should grow cash crop to increase monetary profit in comparison to growing of food crop for home consumption.					
5	It is difficult for farmers children to make good start unless he provides them with economic assistance.					
6	A farmer must earn his living but the most important thing in life cannot be defined in economic term.					

SA = Strongly agree, A = Agree, U = Undecided, D = Disagree, SD= Strongly Disagree

PART – II

Knowledge of farmers about IPM Practices of cotton

Sr. No.	Statements	Knowledge		
		CK	PK	NK
1	What is mean by integrated pest management ?			
A	**Cultural practices**			
1	Why deep ploughing should be done during summer season?			
2	Why is it necessary to remove and destroy the alternate host of pest like weed, grasses and other plant debris?			
3	Why monocropping of cotton should be avoided?			
4	Why is it necessary to take crop rotation for cotton? If yes, which crops are used to rotate with the cotton crop?			
5	Why only certified seed should be used?			
6	Name the varieties of cotton resistant and tolerant to pest?			
7	Indicate proper time of cotton sowing?			
8	Give per hectare seed rate for sowing?			
9	Give proper spacing of cotton crop?			
10	Which crops should used as trap crops in cotton field?			
11	Which crops should used as intercrops? Why? What is the ratio of main crop to intercrop?			

12	By how many days after sowing hoeing should be followed in crop? Why?			
13	Why should proper irrigation management by followed ?			
14	Give proper fertilizer dose for cotton?			
15	Why bird perches are installed in cotton crop? How many bird perches per hectare.			
16	Why, grazing the animals in field after last picking of cotton is followed?			
17	Why should the cotton stalks, sheded leaves, bolls and other plant debris are burnt at the end of season?			
18	Why ratooning of crop should be avoided?			
B	**Mechanical practices**			
1	By removal of loose shoot which pest management is possible?			
2	How will you manage bollworms by mechanical practice?			
3	For the inspection of which pests pheromone traps are used in field? How may pheromone traps per ha, should be use?			
4	What is benefits of use of yellow sticky traps in the field?			
5	Why detopping should be followed?			
C	**Physical practices**			
1	How many light traps should be used per hectare for management of pests of cotton?			
D	**Biological practices**			
1	Which parasitoids are used for management of different pests of cotton crop?			
2	Name the predators used for management of different pests of cotton crop?			
3	What is the method of application of Trichogramma in field?			
4	What is the method of use of chrysopa for management of sucking pest and eggs of bollworms?			
5	Name the virus used for management of cotton bollworms? Give its dose per hectare?			
6	Name the bacterial biological insecticide for the control of cotton bollworms? Give its dose per hectare?			
7	Name the botanical pesticide used for the control of cotton bollworms?			
8	Spraying of biological insecticide should follow at which time of day?			
9	Why spraying of harmful chemical pesticides should be avoided after applying bioagents in the field?			
D	**Chemical practices**			
1	What is mean by economic threshold level?			

2	Which precautions should taken while spraying the chemical insecticides?			
3	Why spraying of toxic pesticide is avoided?			
4	Which chemical pesticide should be used for seed treatment in cotton? Give its rate of application.			
5	What is meant granular pesticides? Why it should be used?			
6	Which chemicals insecticides for control of sucking pest of cotton? Give its rate of application.			
7	Give name and application dose of insecticides for control of cotton bollworms?			
8	Give names of synthetic pyrethroids?			
9	At how many days after sowing of cotton application of synthetic pyrethroid is recommended?			
10	Why synthetic pyrethroids are not applied at early stage of crop?			

PART – III

Adoption of farmers about IPM practices of cotton in their field

Sr. No.	Statements	Adoption		
		Complete	Partial	No
A	**Cultural practices**			
1	Do you follow the deep ploughing during summer season?			
2	Do you follow the removal and destruction of alternate host of pest like weed, grasses and other plant debris?			
3	Do you avoid monocropping of cotton crop?			
4	Do you follow the crop rotation?			
5	Do you use only certified seed?			
6	Do you follow the sowing of pest resistant and tolerant varieties of cotton?			
7	Do you adopt the proper sowing time?			
8	What quantity of seed do you use for sowing?			
9	Give spacing maintained by you during sowing?			
10	Which crops do you used as trap crops in cotton field?			
11	Which crop do you used for intercropping in cotton field? Give ratio of main crop to intercrop which is adopted by you?			
12	Which method do you used for irrigation management?			
13	What quantity of fertilizer do you apply?			
14	Do you follow the practice of installing bird perches in cotton crop? How many perches per ha?			

15	Do you follow the hoeing in cotton field?			
16	Do you follow, the grazing of animals after last picking in cotton field?			
17	Do you follow the burning of cotton stalks, sheded leaves, bolls and other plant debris at the end of season?			
18	Do you avoid the ratooning of cotton crop?			
B	**Mechanical practices**			
1	Do you follow removal and destruction of infested shoots?			
2	Do you follow removal and destruction of pest infested buds and larvae of bollworm?			
3	Do you use the pheromone traps in cotton field?			
4	Do you use the yellow sticky traps in cotton field?			
5	Do you follow the practice of detopping?			
C	**Physical practices**			
1	Do you use the light traps for pests management in cotton? How many per hectare?			
D	**Biological practices**			
1	Do you use the parasitoid for control of pest of cotton?			
2	Do you use the predators for control of pests of cotton? Give its method and rate of application?			
3	Do you use the HaNPV for control of cotton bollworms?			
4	Do you use the spraying of bacterial biological insecticide (Bt) for control of bollworm?			
5	Do you follow spraying of Neem seed kernal extract?			
6	Do you follow the spraying of biological insecticide at evening time?			
7	Do you avoid the spraying of toxic chemical insecticide after application of bioagents?			
D	**Chemical practices**			
1	What precautions you have take while spraying the chemical insecticides?			
2	Do you avoid excess use of toxic insecticides?			
3	Which chemical insecticides do you used for seed treatment ?			
4	Do you use granular pesticides in soil?			
5	Which pesticide do you spray for control of sucking pest of cotton?			
6	Which pesticide do you spray for control of cotton bollworms?			
7	Which synthetic pyrethroids do you used?			
8	Why synthetic pyrethroides should be used? when?			

VITA

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Place: Akola

Date: 03/ 07/2008

Deokar S.B

Signature of student