IMPACT OF FARMERS FIELD SCHOOL ON COTTON GROWERS

THESIS

Submitted to
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola
in partial fulfilment of the requirements
for the Degree of

MASTER OF SCIENCE
IN
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By
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Enrolment Number – MM/03 **2021**

DECLARATION OF STUDENT

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

Place: Akola **(AGME RAJANI MANIKRAO)**

Date: / /2021 Enrolment No. MM/03

CERTIFICATE

This is to certify that, 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 **AGME RAJANI MANIKRAO** under my guidance and supervision.

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

Place: Akola
Date: / /2021

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Place: Akola (AGME RAJANI MANIKRAO)

Date: / /2021 Enrolment No. MM/03

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%	:	Per cent
/	:	Per
Agri.	:	Agriculture
Agril.	:	Agricultural
Bene	:	Beneficiary
COA	:	College of agriculture
Dr. PDKV	:	Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola
et al.	:	et alia (and associates)
etc.	:	Etcetera
Extn. Educ.	:	Extension Education
Fig.	:	Figure
Govt.	:	Government
ha.	:	Hectares
http	:	Hyper Text Transfer Protocol
i.e.	:	That is
Int.	:	International
J.	:	Journal
kg	:	Kilogram
KVK	:	Krishi Vigyan Kendra
Ltd.	:	Limited
m	:	Million
MAU	:	Marathwada Agricultural University
MPKV	:	Mahatma Phule Krishi Vidyapeeth

M. Sc.	:	Master of Science
PDKV	:	Dr. Panjabrao Deshmukh Krishi Vidyapeeth
Ph. D.	:	Doctor of Philosophy
Res.	:	Research
Rs.	:	Rupees
SD	:	Standard Deviation
Std.	:	Standard
VNMKV	:	Vasantrao Naik Marathwada Krishi Vidyapeeth
Unpub.	:	Unpublished
U. P.	:	Uttar Pradesh
www	:	World Wide Web

E) THESIS ABSTRACT

a) Title of the Thesis	**:**	**IMPACT OF FARMERS FIELD SCHOOL ON COTTON GROWERS**
b) Full Name of Student	**:**	**AGME RAJANI MANIKRAO**
c) Name and Address of Major Advisor	**:**	**Dr. S. A. GAWANDE** Assistant Professor, Department of Extension Education, PGI, Akola.
d) Degree to be awarded	**:**	M. Sc. (Agriculture)
e) Year of award of degree	**:**	2021
f) Major subject	**:**	Extension Education
g) Total No. of pages in thesis	**:**	131
h) Number of words in abstract	**:**	568
i) Signature of the student	**:**	
j) Signature, Name and address of forwarding authority	**:**	

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ABSTRACT

The present study on “Impact of Farmers Field School on Cotton Growers” was conducted in Akola districts of Maharashtra state. The experimental research design of social research was used. In all, 120 beneficiary and non beneficiary farmers were selected by random sampling method. The data were collected by personally interviewing the beneficiary and non beneficiary farmers with the help of structured interview schedule.

The data collected were carefully examined, classified, quantified and tabulated. Frequencies, mean, standard deviation, coefficient of correlation and Z test were employed for interpreting the results.

The findings revealed that, majority of beneficiary and non-beneficiary farmers were from middle age group, had education up to secondary school, possessed semi-medium land holding, with medium level of farming experience, the average area under cotton crop was up to 0.89 to 1.32 ha and the source of information, the economic motivation and scientific orientation were found to be medium level in case of beneficiary and non-beneficiary farmers.

Regarding dependent variable, impact of Farmers Field School on cotton the beneficiary farmers was studied in terms of change in knowledge, change in adoption, change in productivity and change in annual income. There were total change was found to be 36.87 per cent. The 'Z' value for knowledge, adoption, productivity and annual income was found to be positively and highly significant at 0.01 level of probability.

Regarding relational in case of beneficiary farmers education, land holding, area under cotton cultivation, source of information, were found to be positive and highly significant with knowledge at 0.01 level of probability. Whereas, annual income, economic motivation and scientific orientation significance were found to be positively significant at 0.05 level of probability. in case of beneficiary farmers area under cotton cultivation was found to be positive and highly significant with adoption at 0.01 level of probability. Whereas, education, farming experience, land holding, annual income, sources of information and scientific orientation was found to be positively significant at 0.05 level of probability. in case of beneficiary farmers only land holding, farming experience and scientific orientation were found to be positive and highly significant with productivity at 0.01 level of probability. Whereas, age, annual income, area under cotton cultivation, source of information and economic motivation were found to be positively significant at 0.05 level of probability. in case of beneficiary farmer's education, land holding, area under cotton cultivation, source of information and scientific orientation were found to be positive and highly significant with annual income

at 0.01 level of probability. Whereas, only annual income and economic motivation was found to be positively significant at 0.05 level of probability.

Constraints in Farmers Field School, which were faced by the farmers, were unavailability of pesticide on subsidized rate (60.00%), unavailability of biological agent (48.33%), unavailability of inorganic fertilizer on subsidized rate (40.00%), unavailability of good quality seed at reasonable price (43.33%), unavailability of subsidy in terms of financial assistance (41.67%). moderately perceived constraints were government has to give cotton MSP on the basis of cost of cultivation(40.00%), unavailability of Captain/ Thrum/ Carbendazium before sowing (30.00%), unavailability properly guidance of fertilizer application(28.33%). The moderately perceived constraints were government not announcing reasonable prices, agricultural assistant guidance not available regularly, Captan/ Thirum/ Carbendazium not available before sowing, application of fertilizers proper guidance not available, fertilizer seed drill not available. The less perceived constraints were needs to be arranged weed management method demonstration, needs to give more emphasis on plant protection in training.

CHAPTER I

INTRODUCTION

1.1 Background information

Development of India cannot be conceived without the development of villages, where agriculture is the main occupation of the people. Indian agriculture is not a business, but a way of life. Agriculture is the main source of livelihood of more than 70.00 per cent of the population and contributes 50.00 per cent of the national income. Therefore, the development of agriculture has been given priority in the national planning after independence. Research in agriculture shows definite increase in agriculture production while effective communication of appropriate scientific innovation help the millions farmers and develop economic and social progress of any nation. To increase Agriculture development virtually all developing countries initiates communication system in various way. In India It is necessary to understand the real goal of farmer and to develop solution to their problem, which meets such goals. This requires location specific approach and proper guidance and it can be done with the content of farmer field school. Transmitting the new research based technology about improved cultivation practices among the farmer is the main objective of farmer field schools. It is necessary to do this with a non-formal type of education means by a field school, which offers farmers the opportunity of learning by doing and seeing is believing involved in experimentation.

A Farmers Field School (FFS) is a group-based learning process. The term Farmers Field School (FFS) comes from Indonesian expression "Sekolahlepangan" which means just field school. The first "field school" was established in 1989, in Central Java. During an FFS, farmers carried out experiential learning activities that helped them to understand the ecology of their crops fields. These activities involve simple experiments, regular field observations and group analysis. Cotton is an important cash crop with high potential to reduce rural household poverty. Cotton is a soft, fluffy staple fiber that grows in a boll, or protective case, around the seeds of the cotton plants of the genus Gossypium in the mallow family malvaceae. The fiber is almost pure cellulose. Under natural conditions, the cotton bolls

will increase the dispersal of the seeds. An experimental method is use to study impact of farmers field school on cotton. 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 management. The FFS demonstrated its potential to enhance human, social, natural and financial capital of rural communities. Considering the positive effects the FFS can have on rural livelihoods, the FFS has potential to contribute to achieving the Sustainable Development Goals.

The FFS model was designed for groups of farmers who meet routinely with a trained facilitator in practical, field-based sessions during an entire production cycle. Accordingly, the FFS can be expected to have wide-ranging effects on rural livelihoods; effects that go beyond those of linear extension services. The objective of this qualitative study is to review the available evidence on FFS effects across the human, social, natural and financial capital domains of the sustainable livelihoods approach in order to inform operational programmes about the types and pathways of effects that can practicably be expected. Below are the basic concepts which are common to farmer's field schools across many countries.

- Adult non formal education
- Technically strong facilitator
- Based on crop phenology and time limited
- Group study
- Test and Validate
- Hand on learning activities
- Evaluation and Certificates
- A process not a goal
- Work self out of a job
- Follow up
- Local funding goal
- Basic principles of farmers field school

- The farmers are participating in weekly meetings during full cropping season
- They learn important ecological principles by managing learning plots and experimenting themselves.
- The discussion between farmers is the pulling force in FFS.

1.2 Need and Importance of study.

Cotton is essentially produced for its fibre, which is universally used as a textile raw material. Cotton is known for its versatility, performance and natural comfort. Cotton's strength and absorbency makes it an ideal fabric to make clothes and home wares, and industrial products like tarpaulins, tents, hotel sheets, army uniforms, and even astronauts' clothing choices when inside a space shuttle. Cotton is an important commodity in the world economy. Grown in more than 100 countries, cotton is a heavily traded agricultural commodity, with over 150 countries involved in exports or imports of cotton.

- Uses of Cotton
  - It is basically used for every type of clothing from jackets to normal shirts.
  - In home, it finds its use in bed sheets and curtains.
  - Its seed oil is used in food and cosmetics.
  - It is also used in coffee filters.
  - Its seeds are fed to cattle and crushed to make oil, rubber and plastics.

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 solutions to their problem and implements his or her own decision in his or her field. 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 for insight on future problem and to develop farmers skill, knowledge, attitude in identifying problem and taking decision of adoption on their own basis as to get a healthy crop. Hence, this study is frame and will be conducted in Akola district of Vidarbha region of Maharashtra state. Farmer Field School is necessary to give proper guidance to the farmers. It is also important to know

the proper management of farmer regarding the cultivation of crop. Farmer Field Schools are also necessary to know the constraints face by farmers.

1.3 Objectives

1. To study the personal, socio-economic, communication and psychological characteristic of Cotton growers of Farmers Field School.
2. To study the Impact of Farmers Field School on Cotton growers.
3. To analyze the relationship between selected characteristic of Cotton growers of Farmers Field School with the Impact of Farmers Field School on Cotton growers.
4. To identify the constraints faced by Cotton growers of Farmers Field School.

1.4 Hypothesis

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

Ho: - There is no significant relationship between the selected personal, socioeconomic and psychological characteristics of farmer with the impact of Farmers Field School on cotton crop.

1.5 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 farmer community. The findings of the present study would be helpful to estimate the 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 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. 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.

1.6 Limitation of the study

1. Study restricted to cotton growers of Akot, Akola and Murtizapur taluka of Akola district in Maharashtra state.
2. The sample is limited up to 120 due to time constraints.
3. This is being a student's research, time and money are the constraints which limit the coverage of area.

1.7 Organization of thesis

The report of thesis includes almost eight chapters in it. All chapters have their own importance. In that first chapter include all the history of topic and background information. Also in that include need and importance of the study, objective of the study, scope and limitations of the study.

The second chapter is of theoretical framework. It compromise of review of literature of different variable in the research study.

The methodology of research study is given in the third chapter. It includes the methodology and related information of the study. Accordingly it include the population, research design, sample of study, tools and technique used for the data collection and measurement of variable in the study.

The fourth chapter deals with the socioeconomic situation and condition of Akola district. In fifth chapter deals with result and discussion of study.

In sixth chapter contains summary and conclusion followed by seventh chapter implication of the investigation are present and last eighth chapter literature cited and finally vita and appendix are at the end of the thesis.

CHAPTER II

REVIEW OF LITERATURE

This chapter deals with reviews of literature which is relevant to the objective of study. Review of literature is the survey of scholarly sources on a specific topic. It is specifically an overview of current knowledge that will help you to identify relevant theories and methods in the existing research. Review of literature based on previous findings. It is necessary for further study. For this researchers become aware about various topics its definition and process selected for their study. Attempts were made to collect reviews having relevance with the topic under study.

The review of literature has been presented in this chapter following sequence:

2.1 Personal, socio-economic, communicational and psychological characteristics of respondents.

2.2 Impact of Farmers Field School on cotton grower.

2.3 Relationship between profile of respondents and their independent variables of Impact of Farmers Field School on Cotton grower.

2.4 Constraints faced by the farmers of Farmers Field School

2.5 Conceptual model of the study.

A. Independent variables

2.1 Personal, socio-economic, communicational and psychological characteristics of respondents

The independent variables selected for the present study related to cotton grower of farmers field school were the various characteristics such as age, education, land holding, annual income, farming experience, area under cotton cultivation, sources of information, scientific orientation, economic motivation.

2.1.1 Age

Chapke *et al.* (2015) observed that, half (50.00 per cent) of participants belonged to middle age group, followed by 30.00 per cent of them

belonged young age group and rest of 20.00 per cent of the participants belonged old age group.

Kale *et al*. (2015) reported that 46.00 per cent of the selected cotton grower were found in middle age group having age between 36 to 50 age years. It was followed by more than one third (34.00 %) respondent were in old age category and remaining 20.00 per cent of the respondent were observed in young age category i.e. up to 35 age years.

Borhude (2016) revealed that, majority of respondents (46.25%) were belongs to middle age group.

Adsul (2016) found that, majority (71.25%) of the NHM beneficiaries were belongs from middle age group. Whereas, 18.33 per cent of NHM beneficiaries were from young age group and remaining 10.42 per cent of NHM beneficiaries were old age.

Deshmukh (2016) revealed that majority (70.00%) of respondents from watershed villages and 73.00 per cent of respondents from non-watershed villages were found to be in medium age group followed by young and old age group of watershed and non-watershed village.

Swaroop (2016) found that, majority (54.17 per cent) of the respondents were in middle age category of age.

Roy (2017) observed that, maximum percentage of cotton growers (54.17%) were belongs to middle age category.

Ahire *et al.* (2018) observed that, 61.66 per cent respondents were belongs to middle age group category, followed by 15.84 per cent respondents belonged to young age category.

Chavhan (2019) observed that, majority (70.00%) of the respondents were belonged to middle age group. Whereas, 15.83 per cent of them were from young age group and remaining 14.17 per cent of respondents were old**.**

Jakkawad *et al.* (2019) revealed that, 61.25 per cent of the respondents were belongs to middle age group category, followed by 22.50 per cent of the respondents belonged to young age category.

2.1.2 Education

Ghosh et al. (2012) observed that, 39.07 per cent of the farmers were educated secondary school education, 26.54 per cent of them were educated primary school education, 17.94 per cent of them were educated higher secondary education, 10.32 per cent of them were educated diploma/degree and least of them only 6.13 per cent farmers were illiterate.

Kale et al. (2014) observed that more than one third of 35.83 per cent soybean farmers were educated up to high school level followed by 26.68 per cent had higher secondary school education

Kale *et al.* (2015) reported that, 44.00 per cent of the selected respondents were completed high school education, 20.67 per cent had higher secondary school level education followed by college level (23.33%) middle school (06.00%) primary (04.67%) and only 01.33 per cent of the respondents illiterate have not attended formal schooling.

Deshmukh (2016) observed that, 38.00 per cent of respondents from watershed villages and 36.00 per cent of respondents from non-watershed villages were having education up to secondary school level followed by education up to primary school level, higher secondary and illiterate from watershed and non-watershed villages.

Borhude (2016) revealed that, majority of respondents (35.00%) were educated up to secondary school.

Hasan et al. (2016) observed that, near about half (48.10 per cent) of the projected farmers were educated secondary education, while 25.90 per cent of projected farmers were illiterate, 22.30 per cent of them were educated above 10thstandard and remaining 3.70 per cent were educated primary school education

Roy (2017) observed that, maximum per cent of cotton growers (52.50%) were educated up to secondary school level category.

Ahire *et al.* (2018) reported that, 36.67 per cent of the selected respondents were having high school education, 16.67 per cent had respondents educated up to higher secondary school level education followed by college level (23.33) middle school (10.83%) primary (02.50%) and only 10.00 per cent illiterate have not attended formal schooling.

Chavhan (2019) revealed that majority (32.92%) of the respondents were educated up to college level, followed by (29.17%) high school level. Whereas 19.59 percent of them were educated up to middle school level. Near about 12.91 per cent of the respondents had education up to primary school and 5.41 per cent were found illiterate during the course of investigation?

Jakkawad *et al.* (2019) revealed that, 11.25 per cent of the selected respondents were having high school education, followed by 16.67 per cent had higher secondary school level education, college level (47.50%) middle school (07.50%) primary (02.50%) and only (17.50%) per cent illiterate have not attended formal schooling. From the above references we can conclude that most of the respondents have various levels of education starting from primary school to college level education.

2.1.3. Land Holding

Anonymous (2013) observed that moderate per centage (35.00 per cent) of the beneficiary farmer were possessing medium, semi medium 30.84 per cent and small 17.50 per cent category of land holding, followed by large 16.66 per cent category of land holding.

Ghintala and Singh (2013) noticed that 52.50 per cent of the respondents had medium size of land holding, whereas 28.33 per cent had large size of land holding and only 19.17 per cent of the respondents had small size of land holding

Mankar et al. (2013) observed that, 37.50 per cent NHM beneficiaries were found in semi medium land holding category, 23.33 per cent were from small land holding category, NHM beneficiaries found in large and medium land holding category were 20.00 per cent and 19.17

per cent respectively. There was no any NHM beneficiaries belong to marginal land holding category.

Rathod et al. (2013) observed that, half (50 per cent) respondents were having large land holding while, 30.00 per cent were having small land holding and remaining 20.00 per cent were having medium land holding.

Mohite (2013) revealed that majority of the respondent had semi-medium category of land holding.

Kale *et al.* (2015) reported that 38.00 per cent were observed in small land holding group. It was followed by more than one third 35.33 per cent of respondents were having land holding between 2.01 to 4.00 hectare (semi –medium) and 20.00 per cent of the farmers having land between 4.00 to 10.00 hectare (medium) whereas 5.34 per cent selected farmers. Were marginal (up to 1.00 hectare) land holders, only 1.33 per cent comes under large (above 10.00 hectare) land holding

Deshmukh (2016) elucidated that, nearly half of the respondents (49.00%) from watershed villages were having semi medium size of land holding i.e. 2.1 to 4 ha., followed by 30.00 per cent of them had small size of land holding i.e. 1.1 to 2 ha Whereas 12.00 per cent and 08.00 per cent of them were having medium i.e. 41.to 10 ha. And marginal size of land holding i.e. up to 1 ha. respectively and only few (1.00%) of them were belongs to big size.

Borhude (2016) revealed that, majority of respondents (46.25%) comes under medium land holding category.

Roy (2017) revealed that, majority of respondents (35.83%) belongs to semi –medium category of land holding having land between 2.00 to 4.00ha.

Ahire *et al* (2018) observed that, 34.16 per cent of respondents were small farmers (1.01 to 2.00 ha), followed by 25.00 per cent of respondents were semi medium farmers (4.01 to 10.00 ha), 03.33 per cent of the respondents were from large farmers (10 ha and above), respectively.

Jakkawad *et al.* (2019) observed that, 16.25 per cent of respondents were small farmers (1.01 to 2.00 ha) 25.00 per cent of respondents were semi medium farmers (4.01 to 10.00 ha), 46.25 per cent of the respondents were medium level and large farmers 21.25 per cent (10 ha and above), respectively.

2.1.4. Annual income

Khandave and Suryawanshi (2015) observed that, majority (76.00 per cent) of the farmers beneficiaries had medium annual income i.e. Rs. 200001 to 900000, followed by 24.00 per cent of the farmers beneficiaries had high annual income i.e. above Rs. 900000.

Rathod and Damodhar (2015) observed that, 44.16 per cent of women respondents had annual income between Rs. 100001-150000, followed by 23.36 per cent of women respondents had annual income in the range of Rs. 150001-400000, 16.66 per cent of women respondents had annual income in the range of Rs. 50001-100000, 11.66 per cent of women respondents had annual income in the range of up to Rs. 50000 and 4.16 per cent of women respondents had annual income of Rs. 40000.

Adsul (2016) concluded that, majority (80.83 %) of the NHM beneficiaries had medium annual income, followed by 12.50 per cent of them were belonged from high annual income and 6.67 per cent of them were belonged from low annual income category. It was observed from above table that, most of the NHM beneficiaries were having medium annual income i.e. Rs. 42982 to Rs. 248977.

Deshmukh (2016) revealed that majority (66.00 %) of respondents from watershed villages and 64.00 per cent of respondents from non-watershed villages had medium annual income (Rs. 95,768 to Rs.1,68,372), whereas nearly one forth (24.00%) of respondents from watershed villages and 20.00 per cent of respondents from non-watershed villages had low annual income (up to Rs. 95,767). While 10.00 per cent of respondents from watershed villages and 16.00 per cent of respondents from non-watershed villages had high annual income (Rs.1,68,373 & above).

Borhude (2016) revealed that, majority of respondents (40.00 %) had annual income between Rs 1, 00,000 to Rs 1, 50,000.

Roy (2017) revealed that, majority of respondents (32.50 %) had annual income between Rs 1,00,000 to Rs 1,50,000.

Ahire *et al.* (2018) revealed that, majority of respondents (83.34%) had annual income between Rs 1,00,000 to Rs 1,50,000.

Jakkawad *et al.* (2019) revealed that, majority of respondents (60.00%) had annual income between Rs 1,00,000 to Rs 1,50,000.

2.1.5. Farming Experience in cotton cultivation

Deokar (2008) concluded that farmers had medium category of experiencing cotton cultivation.

Madhushekar (2009) reported that 41.25 per cent of the chilli growers had medium experience followed by low experience (37.50%) and high experience (21.25%) in chilli cultivation.

Kishor kumar (2010) revealed that 48.33 per cent of respondents had low farming experience, followed by medium (31.66%) and high (20.01 %) farming experience respectively.

Praveena (2010) found that majority (38.63%) of the respondents had farming experience of 21-30 years while 28.33 per cent had more than 30 years of farming experience, 21.67 per cent had 11-20 years of farming experience and 11.67 per cent had less than 10 years.

Chowdhury and Ray (2010) revealed that 38.00 per cent of respondents had up to 5 year's experience in vegetable cultivation followed by 24.66 per cent had 5.1 to 9.9 years' experience, followed by 20.67 per cent with more than 15 years of experience.

Keshav Kattel (2011) observed that majority (48.00%) of the farmers had low experience in tea cultivation followed by medium experience (42.00%) and high experience (10.00%).

Mukunda Rao (2011) found that nearly one-third (32.22%) of the Bt cotton farmers had farming experience of 1 to 2 years followed by 25.55 per cent of the farmers with 3 to 4 years of farming experience, 27.77 per cent

with farming experience of 5 to 6 years, and only 14.44 per cent of the farmers with 7 to 10 years of farming experience in Bt cotton cultivation

Prashanth (2011) indicated that, high proportion of the organic cotton farmers had medium farming experience (45.00%), followed by low (30.00%) and high farming experience (25.00%) whereas, majority of the conventional cotton farmers had medium farming experience (50.00%) and equal per cent under (25.00%) high and low farming experience.

Pynbianglang (2011) indicated that majority of the potato growers were under medium farming experience (47.50%), followed by high farming experience (28.33%) and low farming experience (24.17%).

Shashikant (2013) in his study on utilization of crop loan by farmers revealed that majority of respondents had high level of farming experience (68.12%), followed by medium level (21.87%) and low level (10.00%), respectively.

Bhosale (2014) observed that more than one third of the beneficiary farmers had medium level of experience in cotton cultivation.

Prathyusha (2014) indicated that majority of the cotton farmers were grouped under medium farming experience (61.00%), followed by low (29.00%) and high farming experience (10.00%), respectively.

Barkhade (2015) observed that more than one third of beneficiary farmers had medium level experience in cotton cultivation i.e. 13 to 24 year followed by low and high level 20 per cent and 6.66 per cent respectively.

Neema (2015) indicate that majority (56.66%) of the respondents were in medium category of farming experience followed by low (28.34%) and high (15.00%) categories respectively.

2.1.6. Area under cotton cultivation

Chavai (2004) indicated that more than half of the respondents had semi medium area under cotton crop followed by small marginal and medium area under cotton crop.

Joshi (2004) revealed that majority of the respondents were found to have up to 5.00 hectares of land under cotton cultivation. Whereas, 27.27 per cent and 15.46 per cent of the respondents were possessing 5 to 10 hectares and above 10 hectare of land under cotton cultivation, respectively.

Shinde (2004) showed that, majority of the soybean growers possessed area under soybean from 2.66 to 4.34 acres followed by 16.00 per cent of soybean growers had area under soybean crop upto 2.67 acres. only 12.67 per cent of soybean grower cultivate soybean on above 4.34 acres of land

Gedam (2007) observed that, maximum per centage of the respondents (52.67%) had 2.01 to 4.00 ha area under paddy cultivation, followed by 34.67 per cent and 12.66 per cent of respondents had area up to 2 ha and above 4.00 ha area under paddy, respectively.

Ekatpure (2007) noticed that, 44.67 per cent 0f respondents had 1.01 to 2.00 ha of land under cotton cultivation, while (30.00%) and (18.00%) of the respondent had up to 2.01 to 3.00 and above (03.01%) respectively.

Sandip (2008) found that majority of the respondents (95.33%) had put the area under soybean crop ranged between 0.39 to 2.44 ha. Only 4.67 per cent of them put the area under soybean crop above 2.44 ha category. There was no respondent on the category up to 0.38 ha area under soybean.

Godase (2009) observed that, majority of respondents (81.34%) possessed area under cotton crop up to 1.60 ha followed by 14.86 per cent respondents were found to be having area under cotton cultivation ranges between 1.6 to 2.6 ha

Padmaiah et al. (2010) observed that, 44.00 per cent of the respondents had small area i.e 1.00-2.00 ha area under castor crop, 40.00 per cent of the respondents had semi medium area i.e. 2.01-5.00 ha area under castor crop, 16.00 per cent of the respondents had marginal area

under castor crop, there was no any respondents from medium and large area.

Kale et al. (2015) observed that, selected farmer under wheat crop is observed in decreasing trend as area under wheat up to 1 ha 67.00% farmers. 1.01 to 2 ha 30.50 per cent farmers and above 2.00 ha was observed with only 2.50 per cent wheat farmers

Roy (2017) found that, majority of respondents (60.00%) having 2.01 to 4.00 ha area under cotton cultivation.

Jakkawad *et al.* (2019) found that majority of respondents (50.00%) having 2.01 to 4.00 ha area under cotton cultivation**.**

2.1.7. Source of information

Gedam (2007) revealed that majority of the respondents belong to medium category of use of information sources.

Jadhav (2008) reported that two third of the respondents (66.67%) have utilized the medium level of sources of information followed by 20.00 per cent of the respondents had utilized high level of sources of information. only 13.33 per cent of the respondents found to utilize low level of sources of information.

Khade (2008) observed that higher proportion of the respondents 53.00 per cent were having medium sources of information, while 4 per cent of the respondents were having high source of information and 43 per cent of respondents were having low sources of information about cultivation of AKA-8 cotton variety.

Todasam (2009) observed that 73.33 per cent of soybean growers were in medium level category of sources of information in soybean cultivation technology.

Sangane (2010) observed that, 56.00 per cent of the respondents were in uses medium sources of information however, about equal per cent (23.00 and 21.00%) of the respondents belonged to high and low categories of use of sources of information, respectively.

Zanjar (2011) observed that 56.33 per cent of high information followed by medium (28.39 %) and (12.40 %) from low source category.

Barkhade (2015) observed that high per cent of the respondents (70.00%) were utilizing the source of information to the medium level, it was followed by (16.00 %) of the respondents who were in low level of utilization of information source and 14.00 per cent of the respondents were highly utilizing the source of information.

Mohite (2013) inferred that 48.33 % respondents had medium level of information sources.

Gudadhe (2015) observed that 67.00% soybean growers belonged to medium category of use of source of information followed by 21.00 % respondents were observed in low category of sources of information.

Hingane (2016) found that majority of respondents 63.00% belonged to medium category of use of source of information followed by 20.00% respondents belonged to low level of source of information.

Tayade (2016) observed that majority of soybean growers 63.34% were having medium level of sources of information followed by 20.66% of respondents were having low level of source of information.

Roy (2017) revealed that majority of respondents (70.83%) belongs to medium level of source of information.

Jakkawad et al. (2019) observed that, majority of respondents (56.25%) uses medium information followed by low level (31.25%) and (12.50%) from high category.

2.1.8. Scientific Orientation

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

Sarangkar (2011) indicated that majority of the respondents (54.60%) had medium level of scientific orientation about of recommendations of cotton technology**.**

Ativade (2012) found that more than half (51.66%) of respondents belongs to medium level of scientific orientation category whereas 27.25 and 21.09 per cent of respondents belonged to high and low level of scientific orientation category, respectively.

Jaganathan et al. (2012) three fourth of the respondents (75.25%) had high level of scientific orientation, followed by low level (23.33%). Only about 1.42 per cent belonged to medium level of scientific orientation.

Chouhan *et al.* (2013) reported that majority of the respondents (67.50%) had medium level of scientific orientation and followed by 17.50 per cent had high level and 15.00 per cent had low level of scientific orientation.

Alok Kumar et al. (2014) observed that two third (66.66%) of the respondents possessed low level of scientific orientation followed by medium (19.25 %) and high levels (14.09 per cent) of scientific orientation.

Parvez Rajan et al. (2014) revealed that majority of the respondents (77.78%) had high level of scientific orientation, followed by low level (13.33%) and only about 8.89 per cent belonged to medium level of scientific orientation. Naberia et al (2015) reported that three fourth (75.33 %) of the respondents

Naberia *et al.* (2015) reported that three fourth (75.33 %) of the respondents had medium level of scientific orientation followed by high level (17.50 %) and only 7.17 per cent had low level of scientific orientation.

2.1.9 Economic motivation

Khare et al (2013) observed that, majority (43.33%) of respondents had medium level of economic motivation; whereas 31.67 per cent of the respondents had high level of economic motivations followed by 25.00 per cent of the respondent were having low level of economic motivation.

Pandya et al. (2013) noticed that majority (66.50 per cent) of the beneficiaries were in medium category of economic motivation, followed by 18.50 per cent of them were in high category of economic motivation and 15.00 per cent of beneficiaries were in low category of economic motivation

Dhodia et al. (2014) found that majority (69.00 per cent) of respondents were having medium economic motivation, followed by 20.00 per cent of the respondents had low level economic motivation and 11.00 per cent with high level of economic motivation.

Shete (2014) revealed that most (75.83 per cent) of the respondents had medium level of economic motivation. Whereas, 14.16 per cent of the respondents had low level economic motivation and 10.00 per cent with high level of economic motivation

Thorat (2014) noticed that majority (66.67 per cent) of respondents were having medium economic motivation, followed by 23.33 per cent and 10.00 per cent high and low economic motivation, respectively.

Kavad et al. (2015) reported that majority (78.00 per cent) of respondents were having medium economic motivation, followed by 21.00 per cent were having high economic motivation and only 1.00 per cent were having low economic motivation.

Upreti and Bhardwaj (2015) observed that, majority (78.34 per cent) of the respondents had medium level of economic motivation, followed by 16.67 per cent of the respondents had high level of economic motivation and remaining 5% respondent have low level of economic motivation.

Barkhade (2015) observed that 72.67 per cent of the respondents had medium category of economic motivation followed by (17.33%) respondents had low category of economic motivation only 10.00 per cent respondents had high category of economic motivation.

Neema (2015) observed that Majority (67.5%) of the respondent belong to high economic motivation, followed by medium (26.67) and low (5.83%) respectively.

Ahire et al. (2018) observed that, majority (78.00%) of respondents had medium level of economic motivation; followed by 20.00 per cent of the respondents had low level of economic motivations and 02.00 per cent of the respondent were having high level of economic motivation.

Shambharkr *et al.* (2018) indicate that 60.00 per cent of the Bt cotton growers were had medium level of economic motivation while 24.67 and 16.00 per cent of the Bt. cotton growers were belong to low and high level of economic motivation respectively

B. Dependent variables.

2.2 Impact of Farmers Field School on Cotton grower

2.2.1. Impact of Farmers Field School

Salame (2000) observed that the area under chilli crop had significant and positive correlation with the adoption of chilli cultivation practices by the respondents

Deshmukh (2002) observed that there was substantial impact i.e. 30.97 per cent over the existing adoption of IPM practices due to training imparted to the trainees by KVK when compared with non trainee farmers as a control group.

Prabudesai and Mahadik (2004) observed that the rice grain yields obtained using recommended package of practices were higher ranging from 1.4 to 31.2 per cent over control plots when improved rice varieties viz., Palghar-1, Karjat-3 were cultivated.

Ravi Kumar et al. (2004) observed that the release of high yielding varieties of different pulse crops after 1985 boosted their production due to significant increase in productivity level.

Shrivastava et al. (2004) observed that the institution village Linkage Programme has been successful in improving the adoption of recommended Agnl. Technologies among the beneficiaries. This reflected in improving the productivity of rice and also increased the double cropping by taking more remunerate crops like chickpea and wheat instead of another crop rice yield increased from 102.15 to 124.16 per cent in different groups of farmers

Dhere (2009) found that majority of the respondents were found in medium level (3.1-8.0 quintals) of additional gain in yield.

Dhere (2009) found that majority of the respondents were found in medium to high level (80.00 per cent) of additional gain in income.

Gudhade (2015) observed that there was definite impact of integrated pest management on soybean under NRTT project with extent of 27.91 per cent.

Archana Jadhav (2017) observed that, mean impact of crop pest surveillance and advisory project on beneficiary farmers over non- beneficiary farmers was found 34.22 per cent.

Ghagare (2018) observed that, definite impact of seed production programme organized under RKVY project on the trainee farmers to the extent of 36.24 per cent.

2.2.1.1. Change in Knowledge

Zunjar (2011) observed that, majority (59.16%) of respondents possessed medium level of knowledge, followed by 26.66 per cent had low and 14.18 per cent had high level of knowledge about IPM technology of cotton growers.

Upadhyay *et al.* (2014) observed that 61.67 per cent of the farmers had medium level of knowledge about integrated pest management practices followed by low level of knowledge (25.00%), and 13.33 per cent of respondent shave high level of knowledge.

Kerketta *et al.* (2015) observed that, the majority of respondents (65.00%) had medium level knowledge regarding IPM practices of chickpea, Whereas, 15.00 and 20.00 per cent of respondents were having low and high level of knowledge, respectively.

Verma *et al*. (2015) found that the more than three fourth (38.33%) of the respondents had medium level of knowledge about chilli production technology followed by low level of knowledge (35.00%) and high level of knowledge (26.67%).

Borhude (2016) reported that, majority of respondents (55.00%) were observed medium level of knowledge regarding use of

pesticide in cotton, 25.00 per cent and 20.00 per cent respondents had high and low level of knowledge respectively

Kumar (2016) found that most (52.00%) of the respondents had medium level of knowledge towards gram production technology followed by 19.00 per cent who had high level of knowledge. The 15.00 per cent of the respondents had low and 14.00 per cent had very low level of knowledge.

Mohammad *et al.* (2017) found that almost half of(48.40%) the farmers had good to excellent levels of technical knowledge of integrated pest management, while almost a one third (35.40%) of the farmers had a moderate knowledge level. However, a very few (14.20%) of the farmers had poor knowledge of integrated management.

Kapde *et al.* (2018) revealed that majority of the respondent (48.33%) were observed medium level of knowledge regarding the use of IPM practices by cotton growers, (45.83%) and (05.83%) had high and low level of knowledge respectively.

Kapse *et al.* (2018) revealed that, majority of the respondents (53.33%) were observed medium level of knowledge regarding the use of IPM practices by cotton growers, 38.34 per cent respondents had high and low level of knowledge respectively.

2.2.1.2 Change in Adoption

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.

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 per cent in medium level of adoption about various aspects of home science training programmes.

Verma *et al.* (2015) it is opined that the maximum (43.33%) respondents had low extent of adoption followed by medium (40.80%) and high (15.83%) extent of adoption in adoption about recommended chilli production technology.

Borhude (2016) reported that, 67.50 per cent of respondents had medium level of adoption, followed by 20.00 per cent respondents were from low level of adoption and 12.50 per cent of respondents were from high level of adoption

Roy (2017) revealed that majority of respondents (57.50%) were having medium level of adoption regarding cultivation of cotton.

Pavan Kumar and Dhorey (2017) stated that majority (70 %) of the farmers had medium level of adoption followed by low (18.00%), high (12.00%) level of adoption.

Yadav *et al.* (2017) stated that the adoption level of the agronomical practices, more than one third (39.37%) of the respondents fall in the category of medium level of adoption followed by high(36.25%) level of adoption and low (24.38%) level of adoption, respectively.

Kumar *et al*. (2017) was clearly revealed that most (81.95%) of the respondents were falling under low adoption level, while remaining respondents i.e. 09.38 and 08.68 per cent were high and medium adoption level respectively.

2.2.1.3 Change in productivity.

Vyas el 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.

Deshmukh (2012) revealed that 61.67 per cent of cotton grower had medium level of Productivity while 28.33 and 10.00 per cent of the respondents had more than average level and below average level productivity respectively. Also 48.33 per cent of non participants cotton growers had below average level of productivity. 35.00 per cent had average level productivity 16.67 per cent of non participants of cotton growers were more than average level productivity.

Agarwal *et al*. (2014), it was revealed that, the area under soybean production in Madhya Pradesh plays a major role in growth of soybean production due to area effect (55.96 per cent) the productivity effect was influencing soybean production in the state by 33.72 per cent, whereas interaction effect was very low to enhance soybean production in the state.

More *et al*. (2015) studied the performance of pulses crops in Gujarat state. Decomposition analysis revealed that, the production of chickpea in all the sub-period as well as during overall period was mainly because of area expansion effect (except period IV) followed by interaction of area in to yield. Area expansion was main reason for increase in production of chickpea in the state.

Sharma *et al*. (2017), a study undertaken on Soybean has reported that, the decomposition analysis of output growth of soybean revealed that, growth in soybean production in the country was mainly on account of changes in area and there was negligible effect of growth on yield. The net returns from cultivation of soybean in Madhya Pradesh, Maharashtra and Rajasthan were higher compared to other kharif crops except arhar and cotton. The yield risk coupled with price was found to be on lower side compared to major kharif crops.

2.2.1.4 Change in annual income

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.

Dhere (2009) found that the correlation between the productivity level and annual gross income of the respondents was statistically significant.

Deshmukh (2012) revealed that 61.67 Per cent of cotton growers have medium level of additional gain in income followed by (20.00) per cent of them had low levels of additional gain in income. Only 18.33 per cent participants were high level of additional gain in income. Also 48.33 per cent of non participants of cotton growers had low level of additional gain in

income where as 33.33 and 18.33 per cent of them medium and high level of additional gain in income.

Karale (2014) revealed that more than one half of (56.67) per cent of the IPM Bt-cotton growers in medium level of annual income. The 33.33 per cent of IPM Bt cotton growers were in high level of annual income category and 10.00 per cent of Bt cotton growers in low level of annual income category.

Parveen (2015) stated that majority (71.66%) of the cotton farmers had annual income between 20, 000–40, 000, followed by 24.16 per cent with annual income below 20, 000 and 4.18 per cent with annual income more than 40, 000.

Rani and Selvaraj (2015) reported that the irrigated Bt cotton growers were found with Rs. 15, 000 –20, 000 income per annum and rainfed Bt cotton growers were found with Rs. 40, 000 –60, 000 annual income per annum.

Waywal (2019) revealed that majority of the respondents (43.34%) comes under semi-medium level of annual income.

2.3 Relationship between profile of respondents and their independent variables of impact of Farmers Field School on Cotton grower

Salame (2000) observed that the area under chilli crop had significant and positive correlation with the adoption of chilli cultivation practices by the respondents

Fulzele et al. (2003) observed that. farm experience had shown a significant relationship with information utilization by the farmers.

Shrivastava et al. (2004) found that the annual income significantly correlated with the productivity of crop at 0.05 level of probability.

Shrivastava et al. (2004) found that the age, of farmers negatively and non-significantly co-related with the productivity of crop.

Shrivastava et al. (2004) observed that education was positively and significantly correlated at 0.01 level of probability with the productivity level of selected crop.

Shrinivastava et al. (2004) observed that size of land holding was positively and significantly correlated at 0.01 per cent level of probability with the productivity of selected crop.

Dhere (2009) found that the age of the respondents showed a statistically significant negative correlation with the productivity level achieved by them.

Dhere (2009) found that the formal education of the respondents showed a statistically significant correlation with the productivity level achieved by them.

Dhere (2009) found that there was statistically significant correlation between the productivity level and the size of land holding of the respondent productivity level achieved by them.

Dhere (2009) found that the correlation between the productivity level and annual gross income of the respondents was statistically significant.

2.4 Constraints faced by the farmers of Farmers of Farmers Field School

Mohite (2013) observed that lack of and lack of guidance and lack of lack of timely finance was the major constraints in adoption of bio-fertilizer in soyabean crop.

Kale *et al*. (2014) observed that over half 62.50 per cent of the farmers expressed that they were not get proper information about herbicide application from extension functionaries.

Garg *et* al. (2014) observed that, 90.00 per cent of the respondents expressed their view in ability to read the instructions given by the manufacturers on the label of the containers about to correct use of insecticides due to unawareness, illiteracy and language problem.

Karade *et* al. (2014) revealed that, 76.66 per cent of respondent had faced the problem of improper technical knowledge about bio-agents and bio-insecticides.

Kale *et al.* (2015) observed that 93.33 per cent of farmers have lack of awareness about label claim of pesticides.

Kerketta *et al*. (2015) observed that majority of respondents (91.66%) faced the problem of non availability of bio-agents.

Kapse *et al*. (2018) revealed that 93.33 per cent of respondent had faced the problem of improper knowledge about IPM.

2.5 Conceptual model of study

During the course of investigation the researcher has to assume relations amongst study variables develop a conceptual model/scheme and use the same during research. A model helps in critical and logical thinking about the research problem. Theoretical model presents the concepts and variables used in research studies, a conceptual model has been developed for the present study and same has been depicted in Fig.1

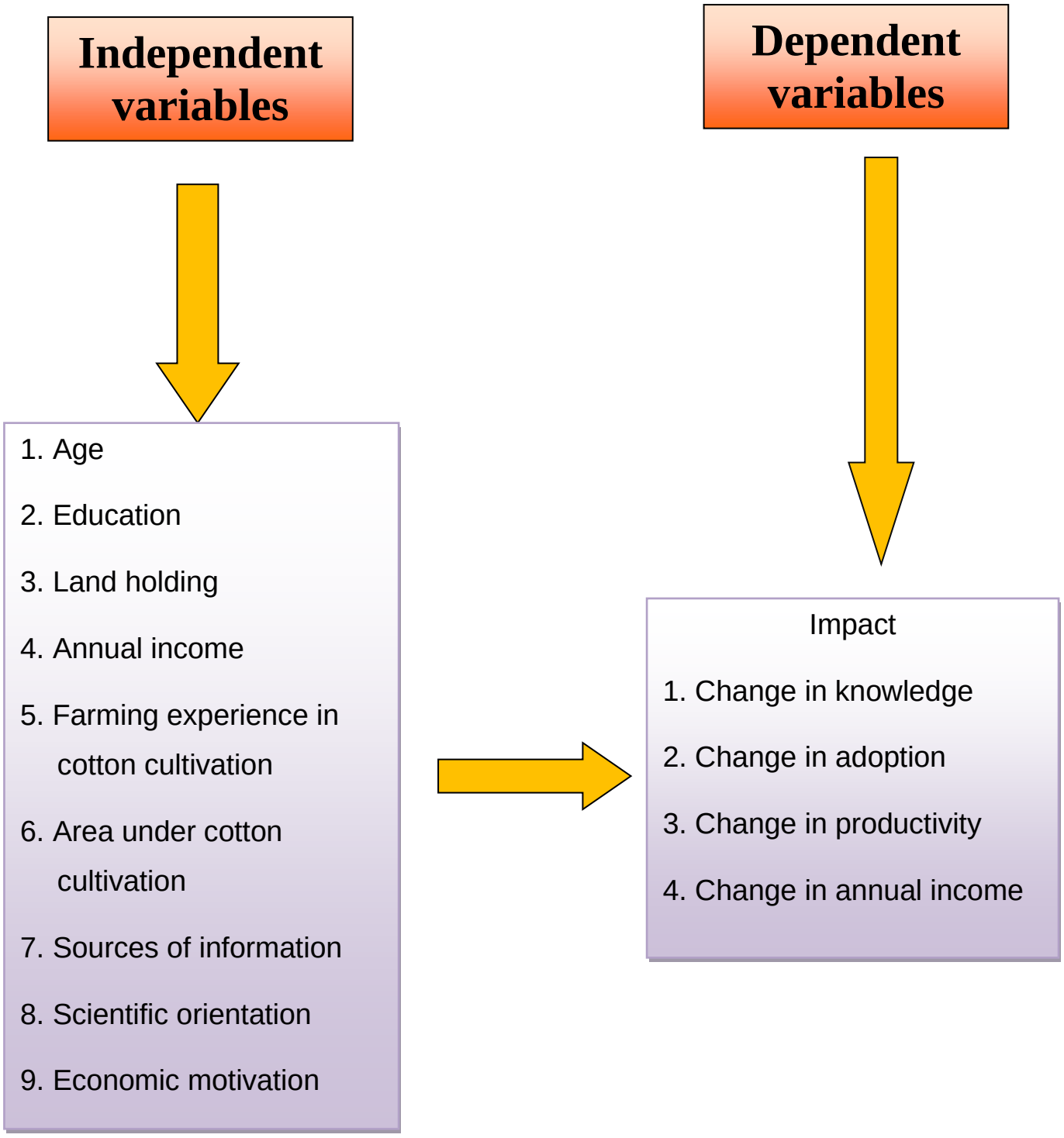


Fig.1.Conceptual model of the study

CHAPTER III

METHODOLOGY

Research Methodology

Research methodology deals with the description of the research method, procedure used in present study, the selection of the sample, the research process, the type of data analysis, the ethical considerations and the research limitations of the project.

The methods, procedure and techniques proposed to be used in the present study are delineated on the following points.

3.1 Locale of the study

3.2 Research design

3.3 Sample and sampling plan

3.4 Preparation of interview schedule

3.5 Pre-testing of interview schedule

3.6 Collection of data

3.7 Variables and their measurement

3.8 Operational definition, categorization of the variables and their measurement

3.9 Constraints

3.10 Statistical methods used for the analysis of data

3.1 Locale of study

The present study was conducted in Akola district of Vidarbha region of Maharashtra state as shown in fig 2. Akola district is one of the leading districts on cotton. Akola was selected for the study of impact of farmer's field school on cotton growers.

Out of seven panchayat samitis in Akola district, three panchayat samitis namely, Akola, Akot and Murtizapur were selected on the basis of maximum Farmers Field School conducted on cotton crop shown in fig. 3.

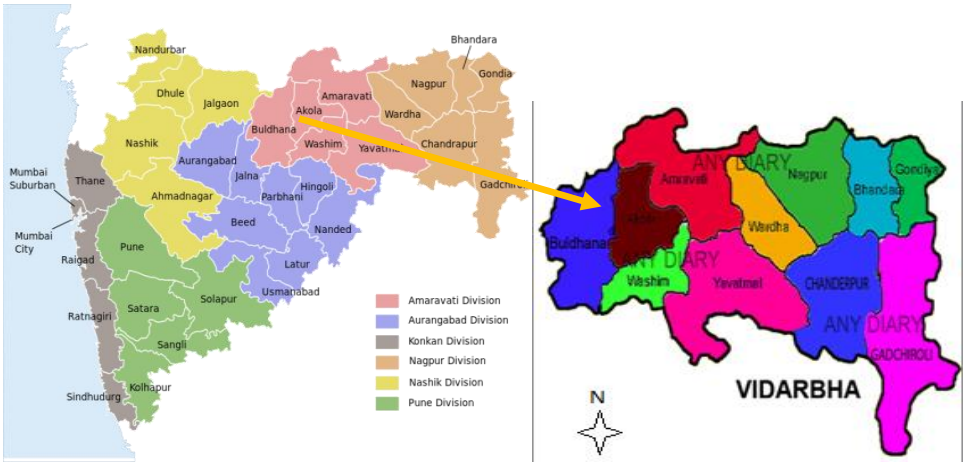
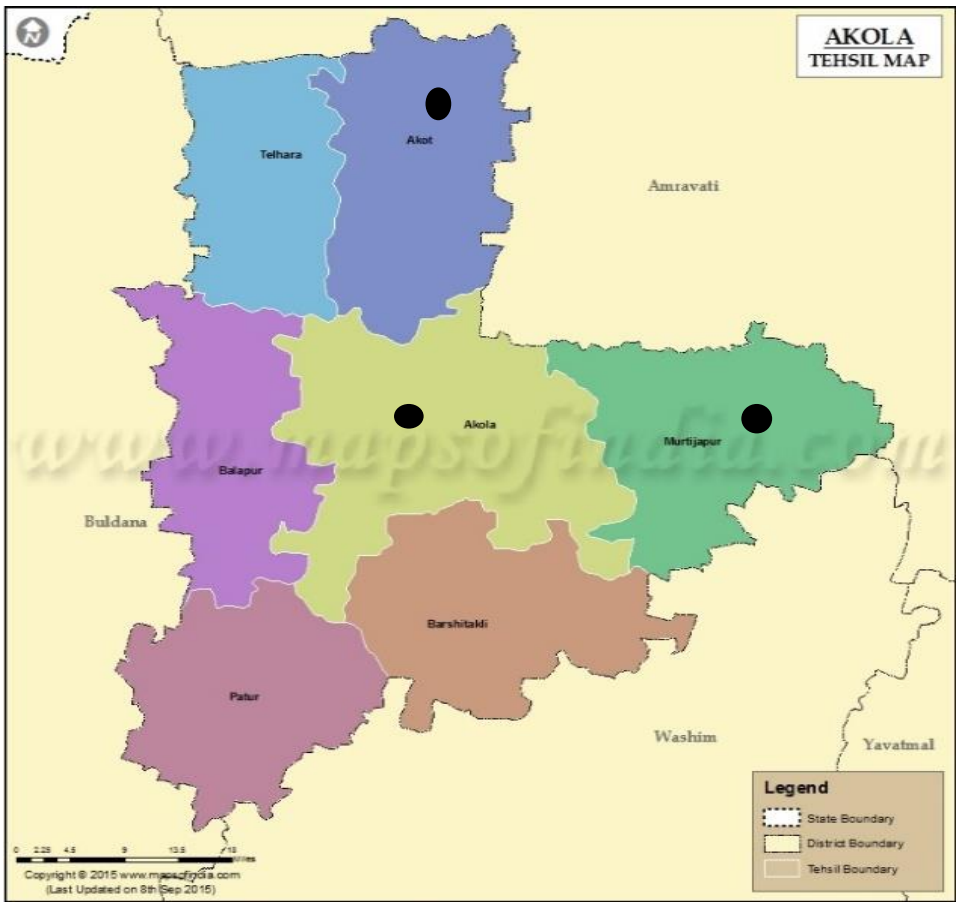


Fig.2 Map of Maharashtra indicating Akola district



● **Selected talukas**

Fig. 3 Map showing selected talukas of Akola district

3.2 Research design

For present study experimental research design of social research was used for present study. In the experimental research design two groups were selected one beneficiary farmers group and other non-beneficiary farmers groups.

3.3 Sample and sampling plan

3.3.1 Selection of talukas

Three taluka's namely Akola, Akot and Murtizapur were purposely selected on the basis of maximum number of Farmers Field School conducted in this area under cotton crop. From each taluka 20 beneficiary and 20 non beneficiary farmers were selected of cotton growers.

3.3.2 Selection of villages

In Akola, Murtizapur and Akot taluka four villages from each taluka were selected. From each selected talukas, four villages was purposively selected on the basis of Farmers Field School conducted in these village and from each selected village 5 beneficiary and 5 non beneficiary farmers were selected of cotton growers.

3.3.3 Selection of respondents

Respondent were selected in two categories one beneficiary and other non-beneficiary as explained below.

From each selected village, 5 beneficiary of Farmers Field School and 5 non beneficiary farmers were selected for the present study. Thus, total 60 beneficiary and 60 non beneficiary cotton growers were selected purposively.

Interview schedule was prepared on the basis of objectives of the study. Interview should be in simple and easy language so that respondent can easily understand the questions mentioned in the interview schedule and we got desired response from respondents.

Table 1. Name of selected villages and number of cotton growers selected as respondents for study

Sl. No.	Name of tahasils and villages	Number of beneficiary farmers	Number of non beneficiary farmers	Total no. of farmers
A.	**Akot Taluka**			
1.	Wani	5	5	10
2.	Kherda	5	5	10
3.	Warula	5	5	10
4.	Sonabardi	5	5	10
	Total (A)	20	20	40
B.	**Murtizapur Taluka**			
1.	Bhatori	5	5	10
2.	Shelunajik	5	5	10
3.	Parad	5	5	10
4.	Datala	5	5	10
	Total (B)	20	20	40
C.	**Akola Taluka**			
1.	Sanglud	5	5	10
2.	Dhothardi	5	5	10
3.	Kasali	5	5	10
4.	Ghusar	5	5	10
	Total (C)	20	20	40
	Total (A+B+C)	60	60	120

3.4 preparation of interview schedule

The interview schedule was prepared in simple way and in local language that was convenient to farmers. A structured interview schedule contained detailed information about dependent and independent variable. The interview schedule contained all the questions about personal, socio economic and psychological characteristics of farmers. Also the questions regarding knowledge of farmers about IPM practices of cotton growers. Also the suggestions were collected.

3.5 Pre testing of interview schedule

Pre testing of interview schedule was done in order to detect mistakes and to achieve clarity and practicability of schedule. The collected data was thoroughly examined and necessary modifications were incorporated in the interview schedule after pretesting of schedule.

3.6 Collection of data

The data were collected by personal interview method with help of structured and pretested interview schedule. The respondents were contacted and interviewed personally. Total 120 respondents were contacted personally and proper information was collected from them and their responses were mentioned in the schedule.

3.7 Variables and their measurement

Proper methods and techniques were used for the measurement of dependents and independent variables. The variables were selected by consulting with experts in various fields like Extension education, Agronomy, Economy and Entomology after review of available literature. The detailed information about variable's were studied and mentioned as below.

Table 2. Variables and their measurements

Sl. No.	Variables	Measurements
A	**Independent variables**	
1	Age	Chronological age of the cotton grower since birth in completed years was considered as the age and taken as a score.
2	Education	The number of standard passed by the cotton grower in formal schooling was considered as his/her educational score.
3	Land Holding	A numerical score of one was assigned for each hectare of land possessed by the cotton grower.
4	Annual income	The total income of cotton grower and his family members received in rupees from all the sources in a year was considered as score.

5	Farming experience in cotton cultivation	It is defined as farming experience is the actual number of years taken by the respondents in managing their farming occupation.
6	Area under cotton cultivation	It was measured as total area in hectares of land covered under cotton.
7	Sources of information	A score of 2, 1 and 0 was assigned for always, sometime and never responses of the respondents respectively. The teacher made test of collection of sources of information was used.
8	Scientific orientation	It was measured with the help of scale developed by Supe (1969).
9	Economic motivation	It was measured with the help of scale developed by Supe (1969).
B	**Dependent variables**	
	Impact of farm field school	
1	Change in knowledge	A teacher made knowledge test was used to measure the knowledge of the respondents. It is measured on two point continuum i.e. yes and no with a score of 1 and 0, respectively.
2	Change in adoption	A teacher made adoption test was used to measure the adoption of the respondents. It is measured on two point continuum i.e. yes and no with a score of 1 and 0, respectively
3	Change in productivity	It is operationalized as the difference between the mean productivity score of beneficiary and the mean productivity score of non-beneficiary farmers. It was measured with formula and score was assigned.
4	Change in annual income	It is operationalized as the difference between the mean annual income of beneficiary cotton growers and of non-beneficiary cotton growers of FFS. It was measured with the help of formula and score was assigned.

3.8 Operational definition, categorization of the variables and their measurement

The operational definition, scoring pattern and categorization of independent and dependent variables have been delineated as under.

3.8.1 Independent variables

3.8.1.1 Age

It is operationally defined as the chronological age of the respondent at the time of interview expressed in terms of completed years. Chronological age of the cotton grower from birth in years was considered as the score of an individual. The categorization was done of actual age of farmers at the time of data collection.

Sl. No.	Age	Years
1	Young	Up to 35 years
2	Middle	36 to 50 years
3	Old	Above 50 years

3.8.1.2. Education

Education is operationally defined as formal schooling completed by an individual respondent. It was measured in terms of standard completed in formal school passed by the respondent and considered the score. It was categorized as below:

Sl. No.	Education	Standard.
1	Illiterate	No schooling
2	Primary	Up to 4^{th} std.
3	Middle school	$5^{th}$to 7^{th} std.
4	Secondary school	8^{th} to 10^{th} std.
5	Higher secondary School	11^{th} to 12^{th}
6	College	Above 12^{th}

3.8.1.3 Land holding

It is operationally defined as the area owned and cultivated in the family of the respondents. The actual hectares of land possessed by an respondent and his family was consider as score and then respondents were categorized into following categories as per Government norms.

Sl. No.	Land holding	Land
1	Marginal	Up to 1.00 ha.
2	Small	1.01 to 2.00 ha.
3	Semi-medium	2.01 to 4.00 ha
4	Medium	4.01 to 10.00 ha
5	Large	Above 10.00 ha

3.8.1.4 Annual income

It is operationally defined as gross income in rupees derived from all sources in a year by cotton growers and his family members. The actual income was considered as score of the respondents. It was categorized on the basis of equal interval method as bellow.

Sl. No.	Category	Annual income (Rs.)
1	Low	Up to 2,20,000
2	Medium	2,20,000 to 4,40,000
3	High	Above 4,40,000

3.8.1.5 Farming experience in cotton cultivation

Operationally it is defined as farming experience of the cotton growers in terms of year of working in cotton cultivation.

The categorization was done on the basis of equal interval method after obtaining the score.

Sl. No.	Farming experience	Score
1	Low	Up to 12
2	Medium	13 to 24
3	High	Above 24

3.8.1.6. Area under cotton cultivation

It is operationally defined as actual area under cotton crop Owens by cotton growers. The cotton growers were grouped into five categories as below mentioned.

Sl. No.	Category	Range (ha)
1	Marginal	upto 0.44
2	Small	0.45 to 0.88
3	Semi-medium	0.89 to 1.32
4	Medium	1.33 to 1.76
5	Big	above 1.76

3.8.1.7 Sources of information

The sources of information has been operationally defined as degree of different information sources consulted by the respondents for seeking technical information and guidance.

Scoring was given on the basis of their response to the sources of information. A score of 2 for regular, 1 for occasional and 0 for never response was assigned. On the basis of total score obtained, the respondents were grouped into following categories by using mean ± standard deviation formula:

Sl. No.	Sources of information	Score
1.	Low	Up to 21
2.	Medium	22 to 29
3.	High	above 29

Mean bene. -24.86666667 SD bene. - 3.811075148

Mean non bene. – 24.35 SD non bene. -3.913579141

3.8.1.8. Scientific orientation

Scientific orientation It is operationally defined as the degree to which the beneficiary farmers of Farmer's Field School inclined to use

scientific method and decision making in cotton cultivation. A scale developed by Supe (1969) was used to measure scientific orientation. That scale includes 6 statements. Out of these, statement number 1, 2, 3, 4 and 6 are positive and statement number 5 is negative. The positive statements was assigned by score of 5, 4, 3, 2 and 1 for strongly agree, undecided, disagree and strongly disagree respectively and it was reversed in case of negative statement. The score of all 6 statements was summed up.

Total score obtained by each respondent was calculated and the respondents were grouped into three categories as low, medium and high by equal interval method.

Sl. No.	Scientific orientation	Score range
1	Low	upto 10
2	Medium	11 to 20
3	High	Above 20

3.8.1.9 Economic motivation

It is operationally defined as occupational success in terms of profit maximization of relative value the beneficiary of Farmer's Field School places in economic ends. .

It was measured with help of scale developed by Supe (1969). The scale has 6 statements. In this scale, statement number 1, 2, 3, 4 and 5 are positive and statement number 6 is negative. The score of 5, 4, 3, 2, and 1 was assigned to five point continuum i.e. strongly agree, agree, undecided, disagree and strongly disagree, respectively for positive statement and reverse procedure for scoring was adopted for negative statement. Score of all statements of the scale was summed up and the respondents were grouped into three categories by using equal interval method as below

Sl. No.	Economic motivation	Score range
1	Low	upto 10
2	Medium	11 to 20

3	High	Above 20

3.8.2 Dependent Variable

3.8.2.1 Impact of Farmers Field School

The dictionary meaning of the term impact is strong impression or effect. Impression is effect on mind or feeling and behavioural outcomes of a person.

In the context of present study, it is operationally defined as the effect of Farmers Field School on Cotton growers. The impact of Farmers Field School was as certain in terms of change in knowledge, change in adoption, change in productivity and change in annual income.

In the context of present study, an impact of Farmers Field School was calculated as per cent change in knowledge, per cent change in adoption, per cent change in productivity and per cent change in annual income of beneficiary cotton farmers over non-beneficiary farmers of Farmers Field School. Thus, the mean impact of Farmers Field School was calculated by summing up the above dimensions as below:-

$$\text{Impact of FFS} = \frac{\text{Per cent change in knowledge + Per cent change in adoption + Per cent change in productivity + Per cent change in annual income}}{4}$$

3.8.2.1.1. 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:-

$$\Delta K = \frac{Kb - Knb}{Knb} \times 100$$

Where,

ΔK = Per cent change in knowledge

Kb = Mean knowledge score of beneficiary cotton growers of FFS

Knb = Mean knowledge score of non-beneficiary cotton growers of FFS

The categorization was done on the basis of equal interval method as below:

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

3.8.2.1.2. Change in Adoption

The per cent Change in adoption was measured on the basis of difference between mean adoption score of beneficiary farmers and non-beneficiary farmers with the following formula

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

Where,

ΔA = Per cent change in adoption

Ae = Mean adoption score of beneficiary growers of FFS.

Ac = Mean adoption score of non-beneficiary growers of FFS.

The categorization was done on the basis of equal interval method as below:

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

3.8.2.1.3. Change in Productivity

It is operationalized as the difference between the mean productivity score of beneficiary and the mean productivity score of non-beneficiary farmers.

It was measured with following formula:

$$\Delta P = \frac{P_a - P_b}{Pb} \times 100$$

Where,

ΔP = Change in productivity.

P_a = Mean productivity score of beneficiary cotton growers of FFS.

P_b= Mean productivity score of non-beneficiary cotton growers of FFS.

The categorization was done on the basis of equal interval method as below

Sl. No.	Productivity	Index range
1.	Low	up to 5 .00
2.	Medium	5.01 to 10.00
3.	High	above 10

3.8.2.1.4. Change in Annual income

It is operationalized as the difference between the mean annual income of beneficiary cotton growers and of non-beneficiary cotton growers of FFS. It was measured with the help of following formula.

$$\Delta AI = \frac{Ia - I_b}{I_b} X\ 100$$

Where,

ΔAI = Change in income.

I_a = Mean income score of beneficiary cotton growers of FFS.

I_b = Mean income score of non-beneficiary cotton growers of FFS.

The categorization was done on the basis of equal interval method as below

Sl. No.	Annual Income	Score range
1.	Low	up to 50000
2.	Medium	50001 to 100000
3.	High	above 100000

3.9 Constraints

Reading (1971) defined constraints as use of force to influence or prevent as action or utility or state of being compelled to do or not to do something.

In the present study, 'constraints' were operationally defined as the problem encountered or perceived by the farmer with regard to adoption of recommended IPM practices of cotton.

The number and per cent of each constraint were work out to measure the constraints encountered by the respondent.

3.10 Statistical methods used for analysis of data

The statistical methods used in the present investigation was mean, standard deviation, co-efficient of correlation and Z test.

3.10.1. Arithmetic mean (X)

It was calculated by summing all the score and dividing it by number of respondents.

$$\overline{X} = \frac{\Sigma X}{N} \times 100$$

Where,

$\overline{X}$ = Arithmetic mean

ΣX = Sum of respondent score

N =Number of respondents

3.10.2 Standard Deviation

It is measured of variability calculated around mean. The formula as:

$$\text{S.D. } (\sigma) = \sqrt{\frac{1}{N}\Sigma(x_i - \bar{x})^2}$$

Where,

σ = Standard deviation.

Xi = Observation.

$\bar{x}$ = Mean of observation.

N = Number of respondents.

3.10.3 Coefficient of correlation

The relationship between independent and dependent variable was calculated with the help of following given formula.

$$r = \frac{\sum XY - \frac{(\sum X)(\sum Y)}{n}}{\sqrt{\left(\sum X^2 - \frac{(\sum X)^2}{n}\right)\left(\sum Y^2 - \frac{(\sum Y)^2}{n}\right)}}$$

Where,

r = Coefficient of correlation

ΣX = Sum of the score of variable X

ΣY = Sum of the score of variable Y

ΣXY = Sum of products of 'X' and 'Y' variables

ΣX^2 = Sum of the square of 'X' variable

ΣY^2 = Sum of the square of 'Y' variable

n = Total number of respondent.

3.10.4 Z- test

To make comparisons about impact of Farmers Field School of cotton grower on the beneficiary farmer, Z – test for the mean difference was used.

$$Z = \frac{|X_1| + |X_2|}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

Where,

X_1 = Arithmetic mean of beneficiary farmers

X_2 = Arithmetic mean of non- beneficiary farmers

σ_1^2= Standard deviation of beneficiary farmers

σ_1^2= 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.

Plate 1. Interview with the beneficiary farmers of Farmers Field School

Plate 2. Interview with the non beneficiary farmers of Farmers Field School

CHAPTER IV

SOCIO-ECONOMIC FEATURES OF AKOLA DISTRICT

There are six revenue divisions viz., Mumbai, Pune, Nasik, Aurangabad, Amravati and Nagpur of Maharashtra state. Vidarbha region includes Amravati and Nagpur revenue divisions comprising eleven districts viz., Amravati, Akola, Buldhana, Washim, Yavatmal, Wardha, Nagpur, Bhandara, Gondia, Chandrapur, and Gadchiroli. Washim and Gondia are newly formed districts bifurcating Akola and Bhandara districts respectively. Nagpur division includes Bhandara, Gondia, Chandrapur, Gadchiroli and Wardha are the eastern district of Vidarbha. The western districts are Buldana, Akola, Amravati, Yavatmal and Washim. The western districts are known for its cotton crop and the eastern region is for good quality of rice. Vidarbha as a whole contributes Cotton, Rice, Jowar, Millets, Oilseeds, Soybean, Citrus, Forest timber etc.

The present study is confined to Akola districts of Western Vidarbha. The agro-climatic conditions differ from place to place and even in close vicinity also.

4.1 Physical features of Akola district

4.1.1 Location

Maharashtra is the third largest state (in area) in India after Rajasthan and Madhya Pradesh. It covers an area of 307,713 km and is bordered by the states of Madhya Pradesh to the North, Chhattisgarh to the East, Telangana to the Southeast, Karnataka to the South and Goa to the Southwest.

Maharashtra is located in the Western count of India which has geographical area 30.7 million hectares, which is second largest, state in the country. Next to the state Rajasthan. It is located between 16° to 22°N latitudes and 72° to 80°E longitude. On the basis of geographical features, the state is divided into three natural regions.

1) Konkan comprising the coastal area
2) Sahyadri hill ranges known as Western Ghats.

3) The Deccan plateaus.

Major portion of the state is semi-arid with three distinct seasons of which rainy season comprises of July to September. There are large variations in the quantity of rainfall within different parts of the state. Ghats and coastal districts receive an annual rainfall of 2000 mm but most of the state lies in the rain shadow belt of the ghat with an average of 600 mm to 700 mm. The rainfall variations from 500 to 5000 mm have been recorded with an average of 1000 mm distributed over 60 to 70 days.

Maharashtra state comprises the six revenue divisions viz., Mumbai, Pune, Nashik, Aurangabad, Nagpur and Amravati. The Nagpur and Amravati together is popularly known as Vidarbha region. Vidarbha region comprises of eleven districts namely Buldhana, Akola, Amravati, Yavatmal, Wardha, Nagpur, Bhandara, Chandrapur, Gadchiroli, Washim and Gondia. Out of which Akola and district from Vidarbha region was selected for the present study.

Akola District is situated in the central east of Maharashtra State finding its place at 20.17^0 to 21.16^0 North latitude and 76.7^0 to 77.4^0 east longitudes. It occupies an area of 5,429 square kilometer.

4.1.2 Boundaries

Akola District had mountain range of Satpuda in its North. The District touches the boundaries of Anjangaon Panchayat Samiti, Daryapur Panchayat Samiti and Nandgaon Panchayat Samiti of Amravati District in its East. The South boundary touches to Washim District and the West boundary touches to part of Buldana District.

4.1.3 Geographical location

Akola is a district in the Indian state of Maharashtra. Akola district is one of the eleven districts of Vidarbha Region of Maharashtra State. It is situated in the northern part of the State abutting Madhya Pradesh and lies between north latitudes 20°16’ and 21°17’ and east longitudes 76°38’ and 77°38’. The total area of the district is 5417 sq.km. While the area of the district accounts for 1.84 per cent of the total area of the State. Akola district forms the central part of Amravati Division. Akola district is surrounded by

Amravati district in North, part of Amravati and Yavatmal district in East, Washim and Yavatmal district to the South and Buldhana district towards the West.

In Akola Panchayat Samiti, the soil is medium black cotton soil. The average rainfall ranges from 750 mm to 950 mm and comes in subtropical zone. The summer is severe in Akola District. The temperature touches to 45^0C to 48^0C in the month of May and slides to 8^0C to 10^0C in the month of December. The crops grown totally depend on rainfall. Cotton, Sorghum, Pigeon pea, Green gram and Sunflower are major Kharif crops. During Rabi season Safflower, Gram, Sunflower and Wheat are grown.

Almost all the villages in this Panchayat Samiti are well facilitated. The educational and health care facilities through schools, colleges and primary health centers are adequately available in the study area. The transport, marketing and communication network is also well developed.

4.1.4 Demographics

According to 2011 census Akola district has a population of 18, 18,617 which constitute about 1.62 per cent of state population. Out of the total population 9, 36,226 (51.48 %) were males and 8, 82,391(48.52 %) were females. The sex ratio was 942 females for every 1000 males. The density of the population for the district was 321 persons per sq.km. The population growth was recorded at 11.60 per cent when compared to 2001 census which was 20.58 per cent.

4.1.5 Area and administrative departments

Akola District comprises of 7 Panchayat Samitis with the total geographical area of 5417 sq. kms. This contributes 1.76 per cent of area of Maharashtra State.

4.1.6 Topography and soil

The northern part of the Akola district lies in Purna valley which itself is a part of Tapi river basin. River Purna has formed fertile basin in Akola, Balapur and Murtizapur Tahsil of Akola. Akola district is divided into 7 tehsils for smooth administration. The district ranks fourth in respect of size and fifth in respect of population among the eleven districts of Vidarbha region

of Maharashtra. The soil of the district is basically derived from volcanic trap rock and it is quite fertile. It is classified into categories as coarse soil found in south, medium black soil found in the plain and deep black soil found in river valley.

4.1.7 Climate and rainfall

Being away from the sea, the district has extreme climate. The weather during winter is too cool, while in summer it is too hot. The average maximum and minimum temperature extremities observed throughout the year was 31.1°C and 21.3°C, respectively. Akola district falls in assured rainfall zone of Maharashtra state having on an average rainfall between 750 to 950 mm.

4.2 Land use pattern

The details of land use pattern of Akola district are presented in Table 3.

Table 3. Land use pattern of Akola district

Sl. No.	Particular	Area (ha)	Per cent to total area
1.	Total geographical area	540481	100
2.	Area under forest	36414	6.73
3.	Barren and uncultivable land	18280	3.38
4.	Permanent pastures and other grazing land	5292	0.97
5.	Land under miscellaneous tree crops and grooves not included in net area sown	8098	1.49
6.	Cultivable waste land	5958	1.10
7.	Land put under non-agricultural use	5801	1.07
8.	Current fallow	7911	1.46
9.	Other Fallow	5262	0.97
10.	Net sown area	447331	82.76
11.	Area sown more than once	37086	6.86
12.	Gross cropped area	484417	89.62

13.	Cropping intensity (%)	108.29	-

(Source: Agricultural statistical information Maharashtra state, 2018)

4.3 Cropping pattern

The usual cropping pattern is determined by large number of factors. The most important factors are climate, soil, topography, customs and distance to market (Table 4).

Table 4. Cropping pattern of Akola district

Sl. No.	Crop	Area (ha)	Per centage to total
1.	Wheat	18871	3.89
2.	Kharif jowar	84922	17.53
3.	Bajra	1210	0.24
4.	Maize	2451	0.50
5.	Other cereals.	21	0.004
	Total cereals.	**107367**	**22.16**
6.	Gram	20087	4.14
7.	Tur	25634	5.29
8.	Mung	43334	8.94
9.	Udid	14082	2.90
10.	Other Pulses	1038	0.21
	Total Pulses	**104308**	**21.53**
	Total food grains	**211675**	**43.69**
11.	Sugarcane	335	0.06
12.	Cotton	192994	39.84
	Total Fibre crops	**194166**	**40.08**
13.	Soyabean	40613	8.38
14.	Sunflower	3550	0.73
15.	Groundnut	1332	0.27
16.	Other oilseeds	8497	1.75

	Total oilseeds	**55877**	**11.53**
17.	Total fruits and Vegetables	6924	1.42

(Source: Directorate of Economics and Statistics, 2018)

4.4 Crop season and crop rotation

There are two important crop seasons i.e. Kharif and Rabi where as in summer season land generally remains fallow and preparatory tillage operations are under taken.

Cotton, Jowar are important crops grown in Kharif season on large scale. Tur, Mung, Udid are also grown in Kharif on large scale. Soybean crop is grown by the farmers on large area. Wheat and Gram are important Rabi crops grown in the area. Linseed, Sunflower, Safflower, some spices and vegetables, fruit crops are also grown in Rabi season, wherever the source of irrigation is mostly through wells and cannel. The manners in which crop rotations are commonly followed is presented in Table 5

Table 5. Crop season and crop rotation

Sl. No.	Kharif	Rabi
1.	Cotton	-
2.	Cotton + Tur + Jowar	-
3.	Soybean	Gram
4.	Soybean + Tur	Wheat
5.	Jowar	Gram
6.	Cotton + Mung / Udid	Safflower/ Wheat
7.	Cotton + Tur	Safflower
8.	Cotton + Tur + Jowar + Mung	Sunflower
9.	Mung	Safflower
10.	Cotton + Mung	-

(Source: SAO, Akola, Annual Report, 2018)

4.5 Input supply

Agricultural inputs like seed manure, fertilizers, insecticides, pesticides etc. are required by the farmers are made available to them through number of agricultural service centers established at district level and block levels.

Maharashtra State Seed Corporation Ltd., Dr. PDKV, Akola and other private seed companies supply the quality seeds to the farmers. The farm inputs are made available to the farmers by co-operative societies and nationalize banks functioning at block level, Panchayat Samiti also provide inputs to the farmers. Co-operative society supply input against the loan sanctioned by the District Central Co-operation Bank to individual cultivator.

4.6 Credit Supply

The credit supply in Akola district is done by Primary Agriculture Co-operative Credit Society, Non-agricultural Credit Society, Panan Sanstha, Production Society and Social Service Society.

Table 6. Credit Supply in Akola district

Sl.No.	Credit Society	Number	Working capital (Lakh)	Loan given (Lakh)
1.	Primary Agricutural Co-operative Credit Society	413	10180	495942
2.	Non-agricultural Credit Society	273	210392	5859
3.	Panan Sanstha (Marketing societies)	14	58783	-
4.	Production Society	395	-	-
5.	Social Service Society	687	-	-

(Directorate of Economics and Statistics 2018)

4.7 Market

For the marketing of agricultural produce, agricultural market committees are functioning in the district. All seven tahsils having facilities of regulated markets. These sub-markets are connected with roads and having facilities of banking, electricity etc.

CHAPTERV

RESULTS AND DISCUSSION

This chapter deals with the presentation of the result of the investigation and critical discussion of the result presented. The data collected from 120 respondents from 12 villages of Akola district under both beneficiary and non beneficiary of cotton growers were mentioned into primary tables. They were then put up into secondary tables under the objectives of the study. Appropriate statistical tests were used for drawing the inference. The results of the investigation are presented and discussed in this chapter under following heads.

5.1 Profile of beneficiary and non-beneficiary farmers

5.2 Impact of Farmers Field School on the beneficiary farmers

5.3 Relationship between selected characteristics of beneficiary and non beneficiary farmers with the impact of Farmers Field School of Cotton growers

5.4 Constraints faced by Farmers of Farmers Field School of Cotton growers

5.1 Profile of beneficiary and non-beneficiary farmers

The study of personal, socio-economic, situational, communicational and psychological characteristics was made with reference to age, education, land holding, annual income, farming experience, and area under cotton cultivation, source of information, scientific orientation, and economic motivation. The results have been presented under the following heading.

5.1.1 Age

Age is normally an indicator of maturity, experience and depth of knowledge.

It could be seen from the Table 7 that, 50.00 per cent of beneficiary farmers belonged to middle age group i.e. 36 to 50 years of age, followed by old age i.e. above 50 years of age to the extent of 35.00 per cent. Remaining 15.00 per cent of beneficiary farmers were in the young age category i.e. up to 35 years.

Regarding non-beneficiary farmers old age group i.e. above 50 years to extent of 45 per cent. 40 percent of the farmers were belonged in middle age group i.e. 36 to 50 years of age group, Remaining 15 per cent of non-beneficiary farmers were in young age category i.e. up to 35 years.

Thus, it could be concluded that, majority of beneficiary and non-beneficiary farmers were from middle age group, with no distinction in their age group.

The findings of the present study are in accordance with Patel (2011), Kale *et al.* (2015), Borhude (2016), and Roy (2017), Swaroop (2016) who reported that majority of respondents belonged to middle age group.

Table 7: Distribution of beneficiary and non-beneficiary cotton farmers according to their age

Sl. No.	Age	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Young	09	15.00	09	15.00
2.	Middle	30	50.00	24	40.00
3.	Old	21	35.00	27	45.00
	Total	**60**	**100.00**	**60**	**100.00**

5.1.2 Education

Educational accomplishment of an individual plays crucial role in acquiring latest farm information and its adoption. On the basis of formal schooling the respondents were categorized into six categories and the results obtained.

From Table 8, it is evident that, 50 per cent of beneficiary farmers were educated up to secondary school level, followed by 15 per cent beneficiary farmers educated up to higher secondary school and college and 11.67 per cent of beneficiary farmers educated up to middle school. The Remaining beneficiary farmers educated up to primary school level 05.00 per cent and very few 03.33 per cent were found illiterate.

Regarding non-beneficiary farmers, 41.67 per cent were found educated up to secondary school level, followed by 23.33 per cent educated up to primary school level, 15.00 per cent were found middle level of school

and 10.00 per cent were found illiterate. Remaining 05.00 per cent were found college level and higher secondary school level education.

It could be concluded that, the majority of beneficiary and non-beneficiary farmers were educated up to secondary school level.

The findings of the present study are similar with Ghosh (2012), Kale *et al.* (2015), Deshmukh (2016), Borhude (2016), Hasan (2016) and Roy *et al.* (2017) who observed that majority of respondents were educated up to secondary school i.e. high school.

Table 8: Distribution of beneficiary and non-beneficiary cotton farmers according to their education

Sl. No.	Education	Beneficiary farmers(n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Illiterate	02	03.33	06	10.00
2.	Primary school	03	05.00	14	23.33
3.	Middle school	07	11.67	09	15.00
4.	Secondary school	30	50.00	25	41.67
5.	Higher Secondary School	09	15.00	03	05.00
6.	College	09	15.00	03	05.00
	Total	**60**	**100.00**	**60**	**100.00**

5.1.3 Land holding

The hectarage of land possessed by an individual might influence on adoption of innovation and also determine the actual status of an individual in farming community.

It is revealed from Table 9 that, 45.00 per cent beneficiary farmers possess semi-medium land holding i.e. 2.01 - 4.00 ha, followed by 28.33 per cent possess small land holding i.e. 1.01 - 2.00 ha, whereas 16.67 per cent beneficiary farmers possess medium land holding i.e. 4.01 - 10.00 ha. and 05.00 per cent beneficiary farmers possess marginal land holding i.e. up to 1.00 ha. Very less i.e. 05.00 per cent of beneficiary farmer was found to be in large category of land holding i.e. above 10.00 ha.

Regarding the non-beneficiary farmers, 36.67 per cent of them possess semi-medium land holding i.e. 2.01 - 4.00 ha, followed by 35.00 per

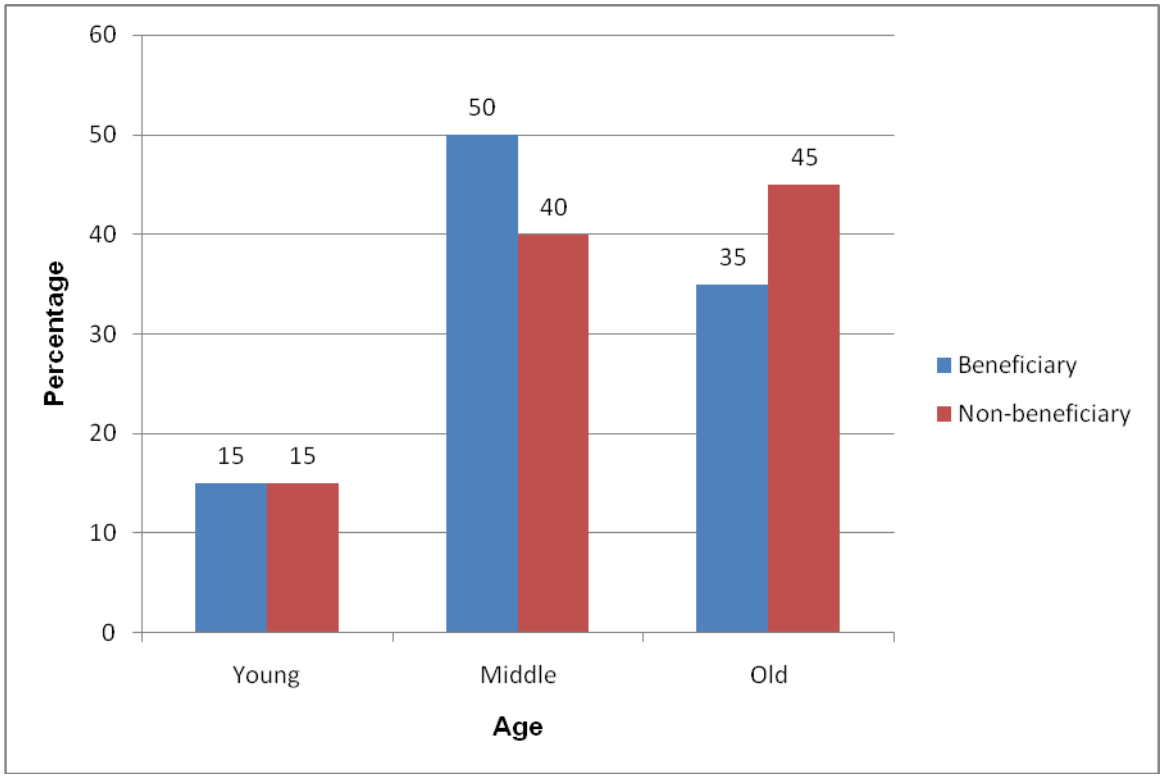


Fig 4. Distribution of beneficiary and non-beneficiary cotton farmers according to their age

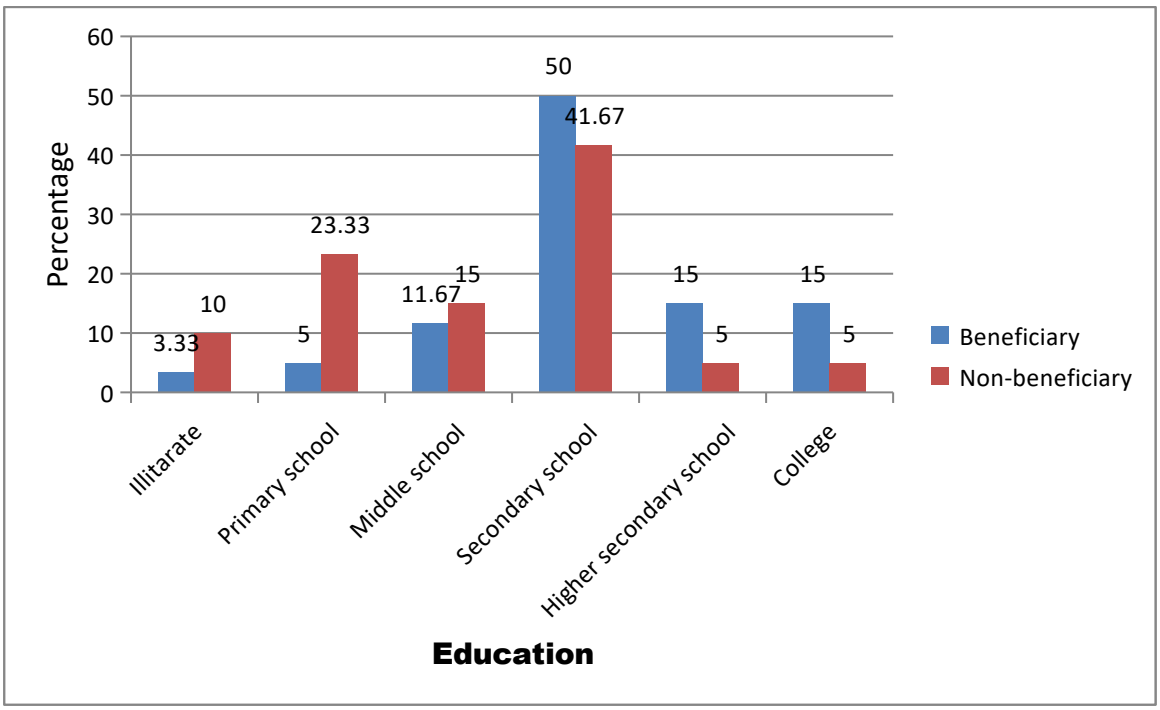


Fig 5. Distribution of beneficiary and non-beneficiary cotton farmers according to their education

cent beneficiary farmers possess small land holding i.e. 1.01 - 2.00 ha, whereas 15.00 per cent possess medium land holding i.e. 4.01 – 10.00 ha and 10.00 per cent possess marginal land holding i.e. up to 1.00 ha. 03.33 per cent the non-beneficiary farmer was found to be in large category of land holding i.e. above 10.00 ha.

It could be concluded that, the majority of beneficiary and non-beneficiary farmers had semi-medium land holding.

The findings of present study are similar to Mankar *et al.* (2013), Mohite *et al.* (2013), who reported majority of respondents possessed semi-medium land holding.

Table 9: Distribution of beneficiary and non-beneficiary cotton farmers according to their land holding

Sl. No.	Land holding	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Marginal	03	05.00	06	10.00
2.	Small	17	28.33	21	35.00
3.	Semi-medium	27	45.00	22	36.67
4.	Medium	10	16.67	09	15.00
5.	Large	03	05.00	02	03.33
	Total	**60**	**100.00**	**60**	**100.00**

5.1.4 Annual income

The amounts of income of whole family members determine material possessed and economic conditions of family and useful in adoption of improved farm technology.

It is revealed from Table 10 that, 50 per cent of beneficiary farmers were found in medium level of annual income followed by 40 per cent of farmers were found in low medium and very rare 10 per cent of farmers were found in high level of annual income category.

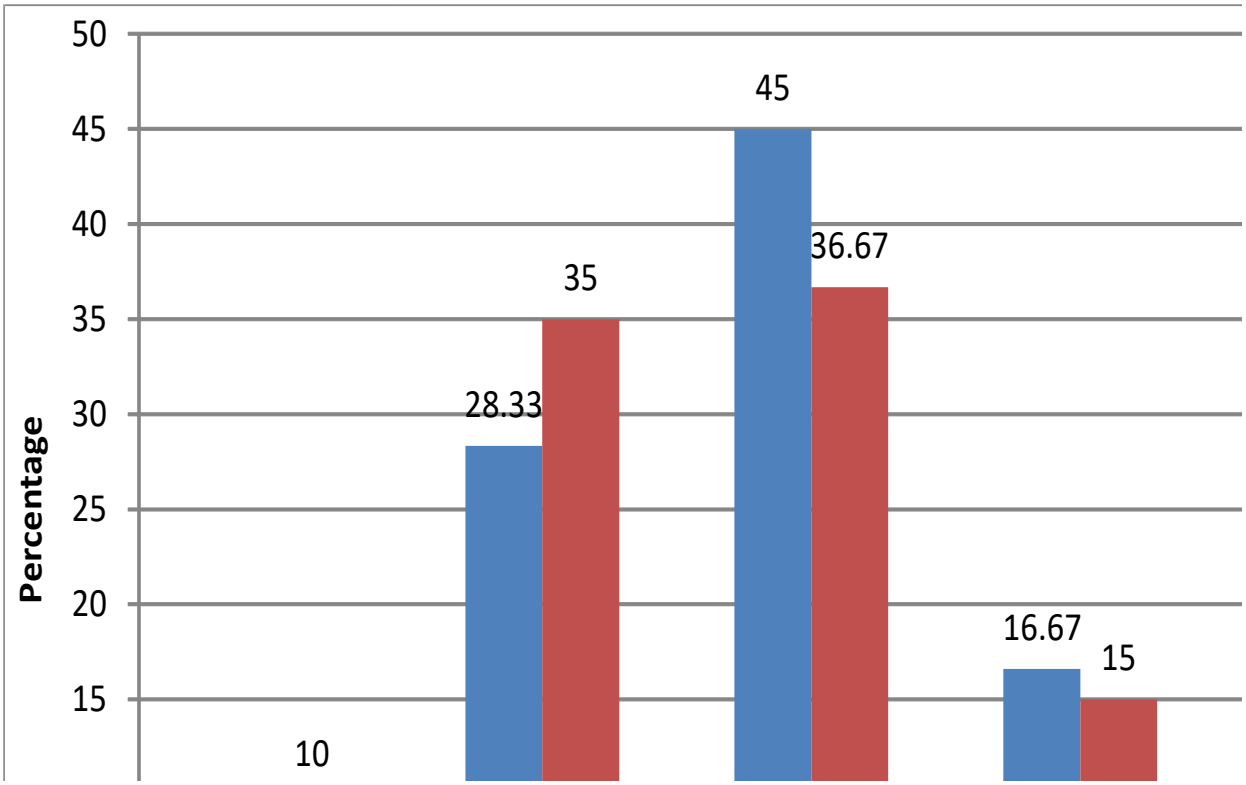


Fig 6. Distribution of beneficiary and non-beneficiary cotton farmers according to their land holding

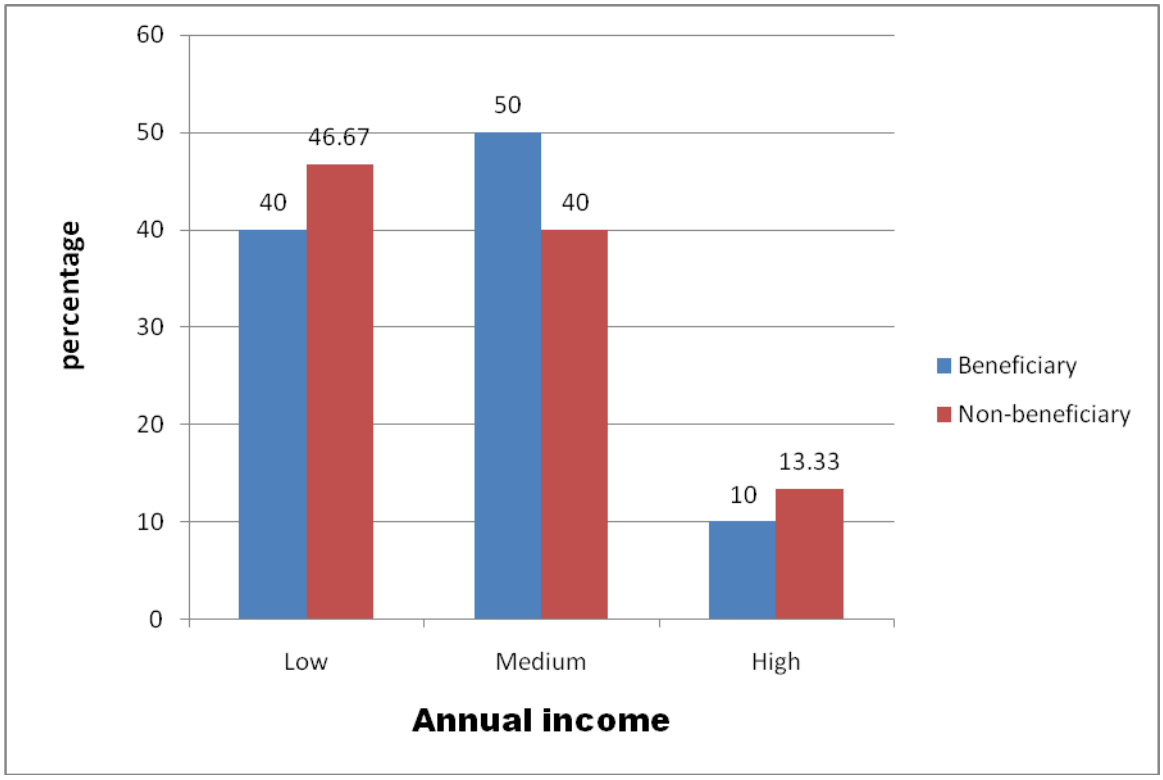


Fig 7. Distribution of beneficiary and non-beneficiary cotton farmers according to their annual income

In case of non-beneficiary farmers, 46.67 per cent from low level whereas 40.00 per cent of farmers were found in medium level of annual income and very rare 13.33 per cent from high level of annual income.

It could be concluded that the majority of beneficiary farmers are found in medium level of annul income and non beneficiary from low level of annual income.

The findings of present study are in line with the findings of Kahndave and Suryawanshi (2015), Adsul (2016), who reported that majority farmers were having medium range of annual income.

Table 10: Distribution of beneficiary and non-beneficiary cotton farmers according to their Annual income

Sl. No.	Annual income	Beneficiary farmers(n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Low	24	40.00	28	46.67
2.	Medium	30	50.00	24	40.00
3.	High	06	10.00	08	13.33
	Total	**60**	**100.00**	**60**	**100.00**

5.1.5 Farming experience

It is defined as farming experience of the cotton growers in terms of year of working in cotton cultivation.

It could be seen from the Table 11 that, 51.67 per cent of beneficiary farmers were found to be in medium level of farming experience i.e. 13 to 24 years, followed by high level of farming experience i.e. above 24 years 45.00 per cent and only 03.33 per cent of beneficiary farmers having low farming experience.

In case of non-beneficiary farmers, 50.00 per cent of them having medium level of farming experience i.e. 13 to 24 years, followed by high level of farming experience i.e. above 24 years 46.67 per cent and only 03.33 per cent of non-beneficiary farmers having low farming experience.

It could be concluded that the majority of beneficiary and non-beneficiary had medium level of farming experience.

The findings of present study are in line with the findings of Prathyusha (2014) Neema (2015) and Barkhade. (2015), who showed that majority of respondents had medium level of farming experience.

Table 11: Distribution of beneficiary and non-beneficiary cotton farmers according to their farming experience

Sl. No.	Farming experience	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Low	02	03.33	02	03.33
2.	Medium	31	51.67	30	50.00
3.	High	27	45.00	28	46.67
	Total	**60**	**100.00**	**60**	**100.00**

5.1.6 Area under cotton cultivation

It refers to the area put under cultivation by the cotton growers under cotton cultivation.

It could be seen from the Table 12 that, 53.33 per cent of the beneficiary farmers has area under cotton cultivation up to 0.89 to 1.32 ha, followed by 23.33 per cent of farmers had area under cotton cultivation up to 0.44ha, ha 20.00 per cent farmer in between 0.45 ha to 0.88 ha and very negligible per cent 01.67 per cent of farmers having area under 1.33 to 1.76 ha and above 1.76 ha.

In case of non-beneficiary farmers, 43.33 per cent of farmers have area under cotton cultivation in 0.89 to 1.32 ha. followed by 25.00 percent of farmers up to 0.44 ha, 16.67 per cent of farmers has area under cotton cultivation in between 0.45 to 0.88 ha. and nearly 08.33 per cent of farmer under 1.33 to1.76 ha and 06.67 percent farmers having area above 1.76 ha. It could be concluded that majority of the beneficiary and non-beneficiary of cotton farmer having area under 0.89 to 1.32 ha.

The findings of present study are in line with the findings of Sandip (2008) who found that majority of respondent had put 0.39 to 2.44 ha area under soybean crop.

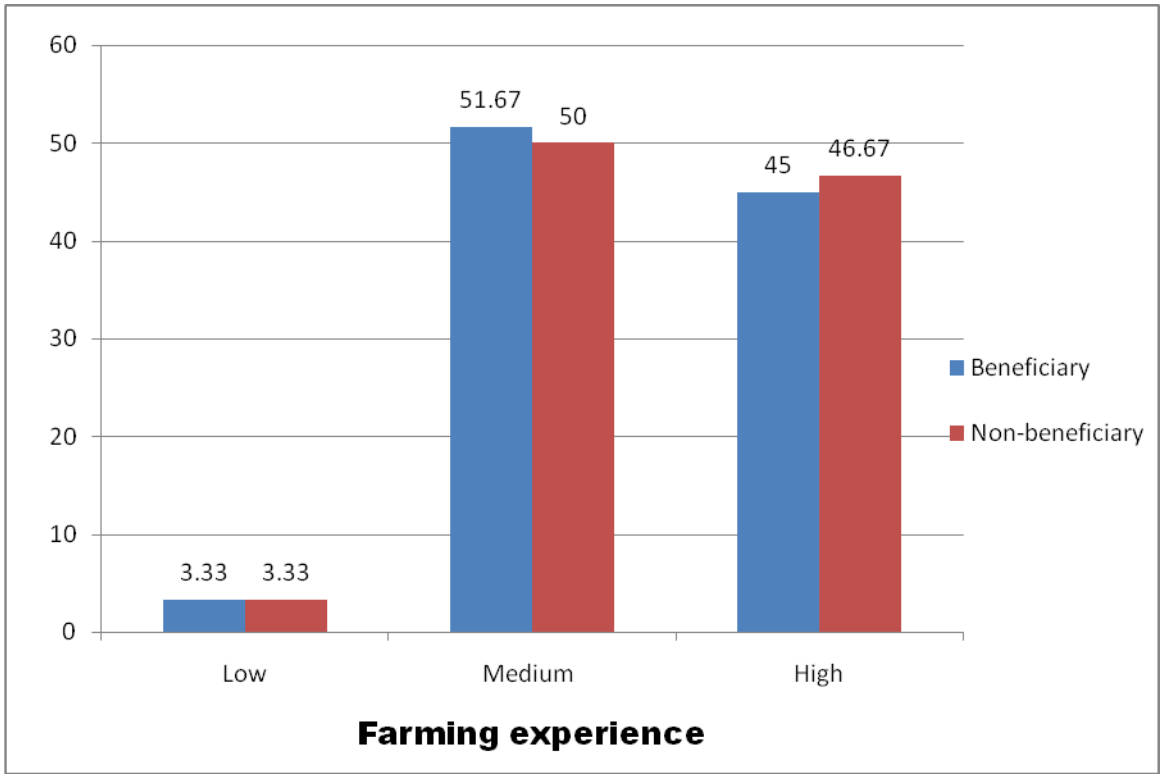


Fig 8. Distribution of beneficiary and non-beneficiary cotton farmers according to their farming experience

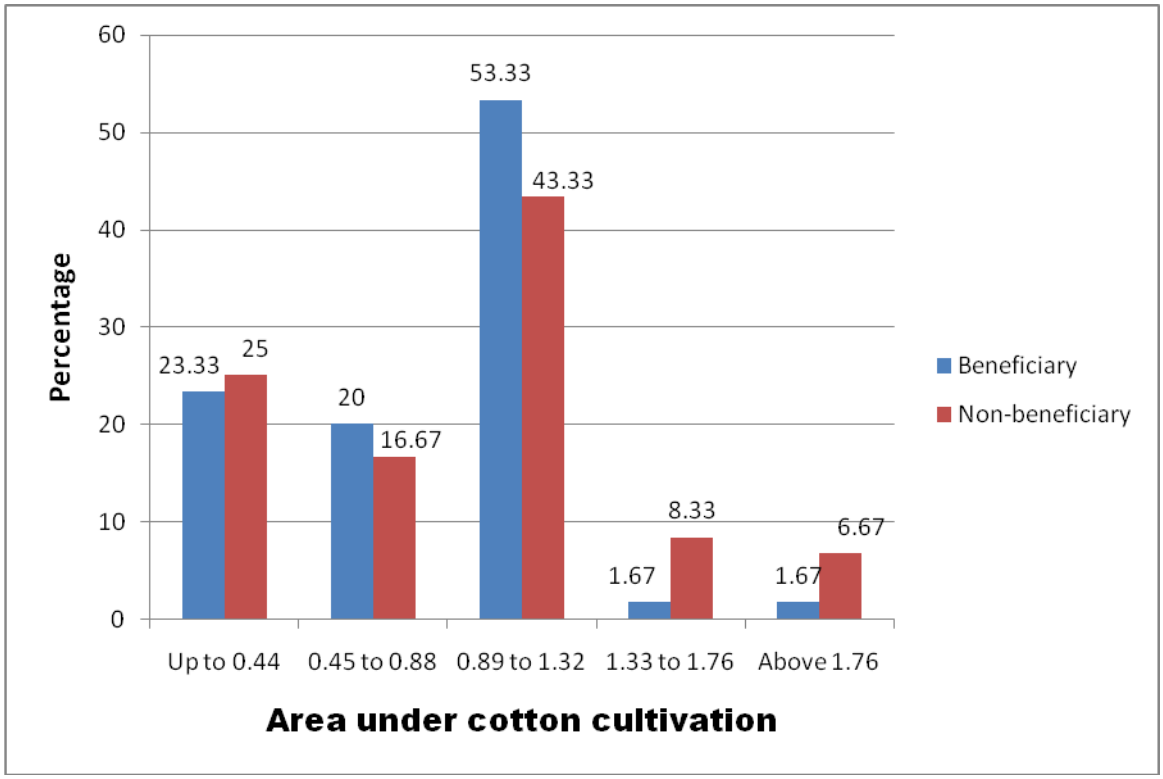


Fig 9. Distribution of beneficiary and non-beneficiary cotton farmers according to their area under cotton cultivation

Table 12: Distribution of beneficiary and non-beneficiary cotton farmers according to their area under cotton cultivation

Sl. No.	Area under cotton cultivation(ha)	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Up to 0.44	14	23.33	15	25.00
2.	0.45 to 0.88	12	20.00	10	16.67
3.	0.89 to 1.32	32	53.33	26	43.33
4.	1.33 to 1.76	01	01.67	05	8.33
5.	Above 1.76	01	01.67	04	6.67
	Total	**60**	**100.00**	**60**	**100.00**

1.1.7 Sources of information

The sources of information plays vital role in acquiring knowledge about recommended cultivation practices motivate farmers for its adoption.

The data regarding distribution of beneficiary and non-beneficiary farmers according to various types of source of information used by them furnished in Table 13.

Table 13: Distribution of beneficiary and non-beneficiary farmers according to frequency wise use of various sources of information

Sl. No.	Source of Information	Beneficiary (n=60)			Non-beneficiary (n=60)		
		Always	Occasional	Never	Always	Occasional	Never
A.	**Formal Sources**						
1.	Agriculture Assistant	48 (80.00)	06 (10.00)	06 (10.00)	21 (35.00)	21 (35.00)	18 (30.00)
2.	Gramsevak	45 (75.00)	12 (20.00)	03 (05.00)	12 (20.00)	33 (55.00)	15 (25.00)
3.	Taluka Agriculture officer	39 (65.00)	18 (30.00)	03 (05.00)	06 (10.00)	52 (86.67)	02 (03.33)
4.	Agriculture officer / Supervisor	18 (30.00)	39 (65.00)	03 (05.00)	03 (05.00)	55 (91.67)	02 (03.33)

5.	University scientists	12 (20.00)	45 (75.00)	03 (05.00)	01 (01.67)	56 (93.33)	03 (05.00)
6.	KVK Scientist	09 (15.00)	48 (80.00)	03 (05.00)	03 (05.00)	54 (90.00)	03 (05.00)
B.	**Informal Sources**						
1.	Local leader	39 (65.00)	18 (30.00)	03 (05.00)	02 (03.33)	56 (93.34)	02 (03.33)
2	Friends	38 (63.33)	18 (30.00)	04 (06.67)	27 (45.00)	18 (30.00)	15 (25.00)
3.	Relatives	21 (35.00)	38 (63.33)	01 (01.67)	16 (26.67)	32 (53.33)	12 (20.00)
4.	Progressive farmer	40 (66.67)	18 (30.00)	02 (03.33)	12 (20.00)	21 (35.00)	27 (45.00)
5	Proprietor of krishi sevak	09 (15.00)	48 (80.00)	03 (05.00)	06 (10.00)	39 (65.00)	15 (25.00)
C.	**Mass media sources**						
1.	Televison	46 (76.67)	10 (16.67)	4 (06.66)	28 (46.67)	29 (48.33)	03 (05.00)
2.	Radio	06 (10.00)	30 (50.00)	24 (40.00)	09 (15.00)	18 (30.00)	33 (55.00)
3.	Newspaper	34 (56.67)	12 (20.00)	14 (23.33)	15 (25.00)	27 (45.00)	18 (30.00)
4.	Farm magazine	13 (21.67)	22 (36.67)	25 (41.66)	12 (20.00)	24 (40.00)	24 (40.00)
5.	Agri. Exhibition	07 (11.67)	33 (55.00)	20 (33.33)	03 (05.00)	21 (35.00)	36 (60.00)
6.	Agro technology week	09 (15.00)	39 (65.00)	12 (20.00)	10 (16.67)	48 (80.00)	02 (03.33)
7.	Mobile SMS	09 (15.00)	33 (55.00)	18 (30.00)	06 (10.00)	51 (85.00)	03 (05.00)
8	Others	15 (25.00)	30 (50.00)	15 (25.00)	36 (60.00)	18 (30.00)	06 (10.00)

In case of formal sources, beneficiary farmers always contacted to Agriculture Assistant (80.00%), Gramsevak (75.00%), Taluka agriculture officer (65.00%), and Agriculture supervisor (30.00%) and followed by University scientist (20.00%), and very few respondents always contacted to KVK scientists (15.00%). However, in case of non-beneficiary farmers found that, always contacted to Agriculture Assistant (35.00) Gramsevak (20.00%), Taluka agriculture officer (10.00%) and very meagre always contacted to

Agriculture officer, (05.00%), KVK scientists (05.00%), and negligible contacted to University Scientist (1.67%).

In case of informal sources, beneficiary farmers had always contacted to progressive farmer (66.67%), followed by local leader (65.00%), friends (63.33%) Relatives (35.00) and proprietor of Krishi Seva Kendra (15.00%). However non-beneficiary farmers always contacted in very less per cent to local leader (03.33%), progressive farmer (20.00%) and proprietor of krishi sevak (10.00%).

In case of mass media sources, beneficiary farmers always watch television (76.67%), read newspaper (56.67%), read farm magazine (21.67%), visited agri. exhibition (11.67%) and uses mobile SMS (15.00%) as source of information. However, non-beneficiary farmers always watch television (46.67%), listen radio (15.00%), newspaper (25.00%), and mobile SMS (10.00%) as a source of information.

Table 14. Overall Distribution of beneficiary and non-beneficiary cotton farmers according to use of source of information

Sl. No.	Source of Information	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Low	11	18.33	15	25.00
2.	Medium	38	63.34	31	51.67
3.	High	11	18.33	14	23.33
	Total	**60**	**100.00**	**60**	**100.00**

It could be seen from the Table 14 that, 63.34 per cent of beneficiary farmers uses medium level of source of information, followed by high and low level of source of information to the extent of 18.33 per cent.

In case of non-beneficiary farmers, 51.67 per cent of farmers use medium level of source of information, followed by low level of source of information of non-beneficiaries to the extent of 25.00 per cent and only 23.33 per cent of non-beneficiary farmers use high level of source of information.

It could be concluded that, the majority of beneficiary and non-beneficiary farmers had medium level of source of information.

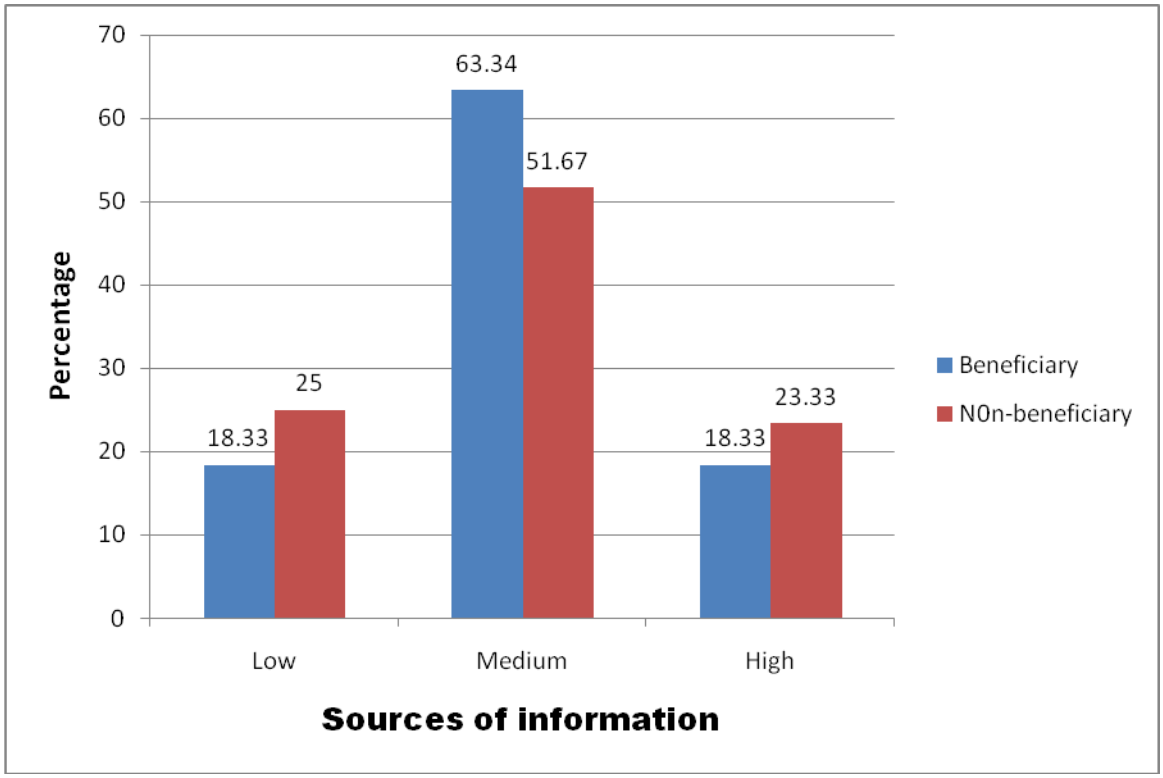


Fig 10. Distribution of beneficiary and non-beneficiary cotton farmers according to their sources of information

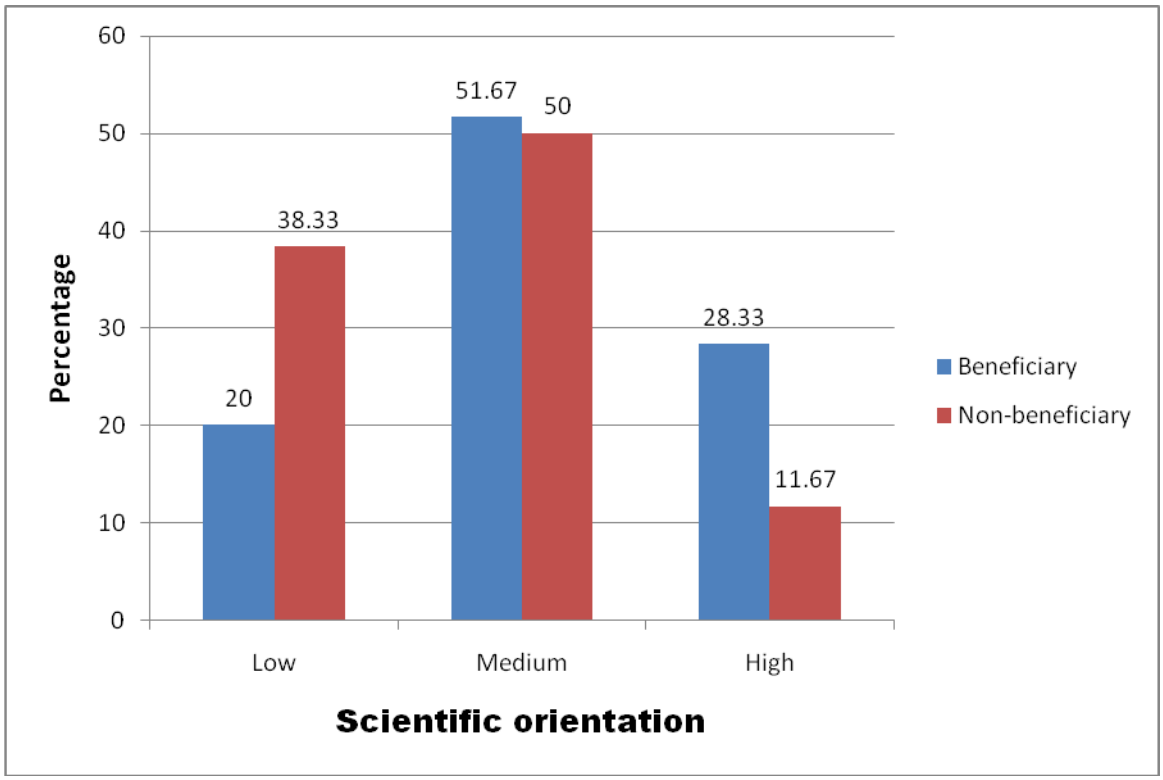


Fig 11. Distribution of beneficiary and non-beneficiary cotton farmers according to their scientific orientation

The findings of present study are in line with the findings of Roy (2017) and Jakkawad (2019) who reported that majority of respondents had medium level source of information.

5.1.8 Scientific Orientation

Scientific orientation It is operationally defined as the degree to which the beneficiary farmers of Farmer's Field School inclined to use scientific method and decision making in cotton cultivation

It could be seen from the Table 15 that majority of 51.67 per cent of beneficiary farmers having medium level of scientific orientation, followed by high level of scientific orientation to the extent of 28.33 per cent 20.00 percent of beneficiary farmers belonged to low level of scientific orientation.

In case of non-beneficiary farmers, 50.00 per cent of farmers found in medium level of scientific orientation, followed by low level of scientific orientation of non-beneficiaries to the extent of 38.33 per cent and 11.67 per cent of non-beneficiary farmers belonged to high level of scientific orientation. It could be concluded that the majority of beneficiary and non beneficiary farmers had medium level of scientific orientation

The finding of present study is similar with findings of Chouhan et al. (2013), Naberia (2015), who reported that majority of respondents had medium level of scientific orientation.

Table 15. Distribution of beneficiary and non-beneficiary cotton farmers according to scientific orientation

Sl. No.	Scientific orientation	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Low	12	20.00	23	38.33
2.	Medium	31	51.67	30	50.00
3.	High	17	28.33	07	11.67
	Total	**60**	**100.00**	**60**	**100.00**

5.1.9 Economic motivation

It is operationally defined as occupational success in terms of profit maximization of relative value the beneficiary of Farmer's Field School places in economic ends.

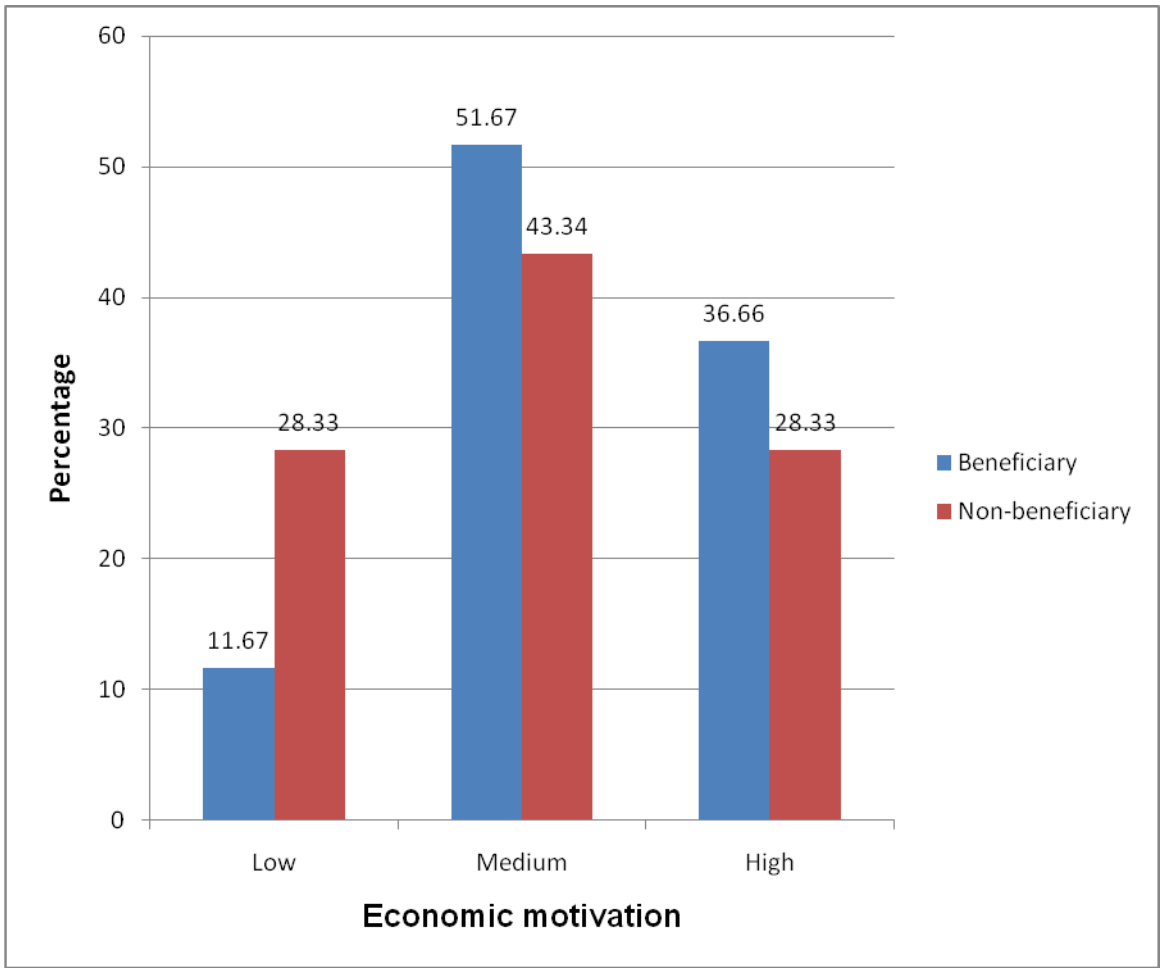


Fig 12. Distribution of beneficiary and non-beneficiary cotton farmers according to their economic motivation

It could be seen from the Table 16 that, more than half i.e. 51.67 per cent of beneficiary farmers having medium level of economic motivation, it was followed by high 36.66 percent level of economic motivation and very few 11.67percent of beneficiary farmers found in low level of economic motivation.

In case of non-beneficiary farmers, 43.34 per cent of farmers having medium level of economic motivation, followed by low and high 28.33 percent level of economic motivation

It could be concluded that, majority of beneficiary and non beneficiary farmers of cotton had medium level of economic motivation.

The finding of present study is similar with findings of Barkhade (2015), Shambharkar et al. (2018) and Ahire *et al. (*2018) who reported that majority of respondents had medium level of economic motivation.

Table 16. Distribution of beneficiary and non-beneficiary cotton farmers according to economic motivation

Sl. No.	Economic motivation	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Low	07	11.67	17	28.33
2.	Medium	31	51.67	26	43.34
3.	High	22	36.66	17	28.33
	Total	**60**	**100.00**	**60**	**100.00**

5.2 Impact

As stated in preceding chapter of methodology that impact of farmers field school on cotton growers has been studied in terms of change in knowledge, change in adoption, change in productivity and change in annual income measured in terms of per cent change.

5.2.1 Change in knowledge

Distribution of the beneficiary and non-beneficiary farmers according to their knowledge about recommended IPM practices of cotton crop have been furnished in Table 17.

Table 17. Distribution of the beneficiary and non-beneficiary farmers according to their practice wise knowledge about recommended IPM practices of cotton crop

Sl. No.	Practices	Beneficiary		Non-beneficiary	
		Yes (%)	No (%)	Yes (%)	No (%)
A	**Cultural practices**				
1	Deep ploughing	48 (80.00)	12 (20.00)	45 (75.00)	15 (25.00)
2	Follow the removal and destruction of alternate host of pest like weed, grasses And other plant debris	57 (95.00)	3 (05.00)	42 (70.00)	18 (30.00)
3	Avoid mono-cropping of cotton crop	41 (68.33)	19 (31.67)	38 (63.33)	22 (36.67)
4	Follow crop rotation	57 (95.00)	3 (05.00)	51 (85.00)	9 (15.00)
5	Use only certified seed	42 (70.00)	18 (30.00)	30 (50.00)	30 (50.00)
6	Use of pest resistant and tolerant varieties of cotton	54 (90.00)	6 (10.00)	27 (45.00)	33 (55.00)
7	Proper sowing time	24 (40.00)	36 (60.00)	12 (20.00)	48 (80.00)
8	Use of quantity of seed	48 (80.00)	12 (20.00)	45 (75.00)	15 (25.00)
9	Spacing	49 (81.67)	11 (18.33)	44 (73.33)	16 (26.67)
10	Trap crop	48 (80.00)	12 (20.00)	42 (70.00)	18 (30.00)
11	Intercropping	33 (55.00)	27 (45.00)	12 (20.00)	48 (80.00)
12	Irrigation management	15 (25.00)	45 (75.00)	6 (10.00)	54 (90.00)
13	Quantity of fertilizer	36 (60.00)	24 (40.00)	27 (45.00)	33 (55.00)
14	Bird perches in cotton crop	39 (65.00)	21 (35.00)	7 (11.67)	53 (88.33)
15	Follow the hoeing in cotton field	45 (75.00)	15 (25.00)	42 (70.00)	18 (30.00)
16	Grazing of animals after last picking in cotton field	44 (73.33)	16 (26.67)	38 (63.33)	22 (36.67)

17	Burning of cotton stalks, shaded leaves, bolls and other plant debris the end of season	40 (66.67)	20 (33.33)	35 (58.33)	25 (41.67)
18	Avoid the rationing of cotton crop	45 (75.00)	15 (25.00)	38 (63.33)	22 (36.67)
B	**Mechanical Practices**				
1	Removal and destruction of infested shuts	52 (86.67)	08 (13.33)	40 (66.67)	20 (33.33)
2	Removal and destruction of pest infested buds and larvae of bollworm	57 (95.00)	3 (05.00)	42 (70.00)	18 (30.00)
3	Use the pheromone straps in cotton field	37 (61.67)	23 (38.33)	34 (56.67)	26 (43.33)
4	Use the yellow sticky traps in cotton field	57 (95.00)	3 (05.00)	51 (85.00)	9 (15.00)
5	Practices of detopping	42 (70.00)	18 (30.00)	30 (50.00)	30 (50.00)
C	Physical Practices				
1	Light traps for per ha.	48 (80.00)	12 (20.00)	41 (68.33)	19 (31.67)
D	**Biological Practices**				
1	Use the parasitoid for control of pest of cotton	48 (80.00)	12 (20.00)	48 (80.00)	12 (20.00)
2	Use the predators for control of pests	57 (95.00)	3 (05.00)	42 (70.00)	18 (30.00)
3	Use the HaNPV for control of cotton bollworms	37 (61.67)	23 (38.33)	33 (55.00)	27 (45.00)
4	Use the spraying of bacterial biological insecticide (Bt) for control of bollworm	57 (95.00)	3 (05.00)	51 (85.00)	9 (15.00)
5	Spraying Neem Seed Kernel Extract (NSKE)	42 (70.00)	18 (30.00)	30 (50.00)	30 (50.00)
6	Spraying of biological insecticide at evening time	54 (90.00)	6 (10.00)	28 (46.67)	32 (53.33)
7	Avoid the spraying of toxic chemical insecticide after application of bio agents	26 (43.33)	34 (56.67)	13 (21.67)	47 (78.33)

E	Chemical Practices				
1	Precautions you have take while spraying the chemical insecticide	48 (80.00)	12 (20.00)	48 (80.00)	12 (20.00)
2	Avoid excesses of toxic insecticide	57 (95.00)	3 (05.00)	42 (70.00)	18 (30.00)
3	Use of chemical insecticide for seed treatment	37 (61.67)	23 (38.33)	45 (75.00)	15 (25.00)
4	Use granular pesticide in soil	57 (95.00)	3 (05.00)	51 (85.00)	9 (15.00)
5	Spraying of proper pesticide for control of sucking pest of cotton	42 (70.00)	18 (30.00)	30 (50.00)	30 (50.00)
6	Spraying of proper pesticide for control of cotton bollworms	54 (90.00)	6 (10.00)	28 (46.67)	32 (53.33)
7	Use of synthetic pyrethroids	26 (43.33)	34 (56.67)	13 (21.67)	47 (78.33)
8	Why to use of synthetic pyrethroids	48 (80.00)	12 (20.00)	45 (75.00)	15 (25.00)
9	Rate of application of chemical insecticide used	49 (81.67)	11 (18.33)	44 (73.33)	16 (26.67)

It is observed Table 17 that most of the cultural practices in cotton are known by the farmers. Practices like follow the removal and destruction of alternate host of pest like weed, grasses and other plant debris (95.00%), Follow crop rotation (95.00%),Use of pest resistant and tolerant varieties of cotton (90.00%), Spacing (81.67%), Deep ploughing (80.00%), Use of quantity of seed (80.00%), Trap crop (80.00%) were already known by the farmers of FFS respectively. Where the non beneficiary farmers have knowledge of this cultural practices Practices like follow the removal and destruction of alternate host of pest like weed, grasses And other plant debris (70.00%), Follow crop rotation (85.00%), Use of pest resistant and tolerant varieties of cotton (45.00%), Spacing (73.33%), Deep ploughing (75.00%), Use of quantity of seed (75.00%), Trap crop (70.00%).

Knowledge of almost all the cultural practice was increased due to the farmers field school (FFS). Knowledge of sowing in proper time were 20.00 per cent respondents of non beneficiary and 40.00 per cent

respondents of beneficiary, intercropping from 20.00 per cent respondents of non beneficiary and 55.00 per cent respondents of beneficiary , bird perches in cotton from 11.67 per cent of non beneficiary and 65.00 per cent of beneficiary are some important cultural practices.

In mechanical and physical practices, Removal and destruction of pest infested buds and larvae of bollworm is very important practice to control the pest population and its further damage to the plant but it was known to the 70.00 per cent of non beneficiary farmers while 95.00 per cent of beneficiary farmers. Similarly only 50.00 per cent of non beneficiary farmers were known to the Practices of detopping and 70.00 per cent of beneficiary farmer. Other mechanical and physical practices like Removal and destruction of infested shuts 86.67 percent of beneficiary and 66.67 of non beneficiary, Use the pheromones traps in cotton field 61.67 of beneficiary and 56.67 of non beneficiary, Use the yellow sticky traps in cotton field 95.00 percent of beneficiary and 85 percent non beneficiary, Light traps for per ha 80.00 percent of beneficiary and 68.33 of non beneficiary.

It is observed that Table 17 that most of the biological practices in cotton crop are known by the farmers. Practices like Use the predators for control of pests 95 percent of beneficiary and 70 percent of non beneficiary, spraying of bacterial insecticide 95 percent of beneficiary and 85 percent of non beneficiary, spraying of biological insecticide at evening time 90 percent of beneficiary and 46.67 percent of non beneficiary, Spraying Neem Seed Kernel Extract (NSKE) 70 percent of beneficiary and 50 percent of non beneficiary were already known by respondents

It is observed from Table 17 that most of the chemical practices in cotton crop are known by the farmers. Practice like Avoid excesses of toxic insecticide 95 percent of beneficiary and 70 percent of non beneficiary, Use granular pesticide in soil 95 percent of beneficiary 85 percent of non beneficiary, Spraying of proper pesticide for control of cotton bollworms 90 percent of beneficiary and 46.67 percent of non beneficiary.

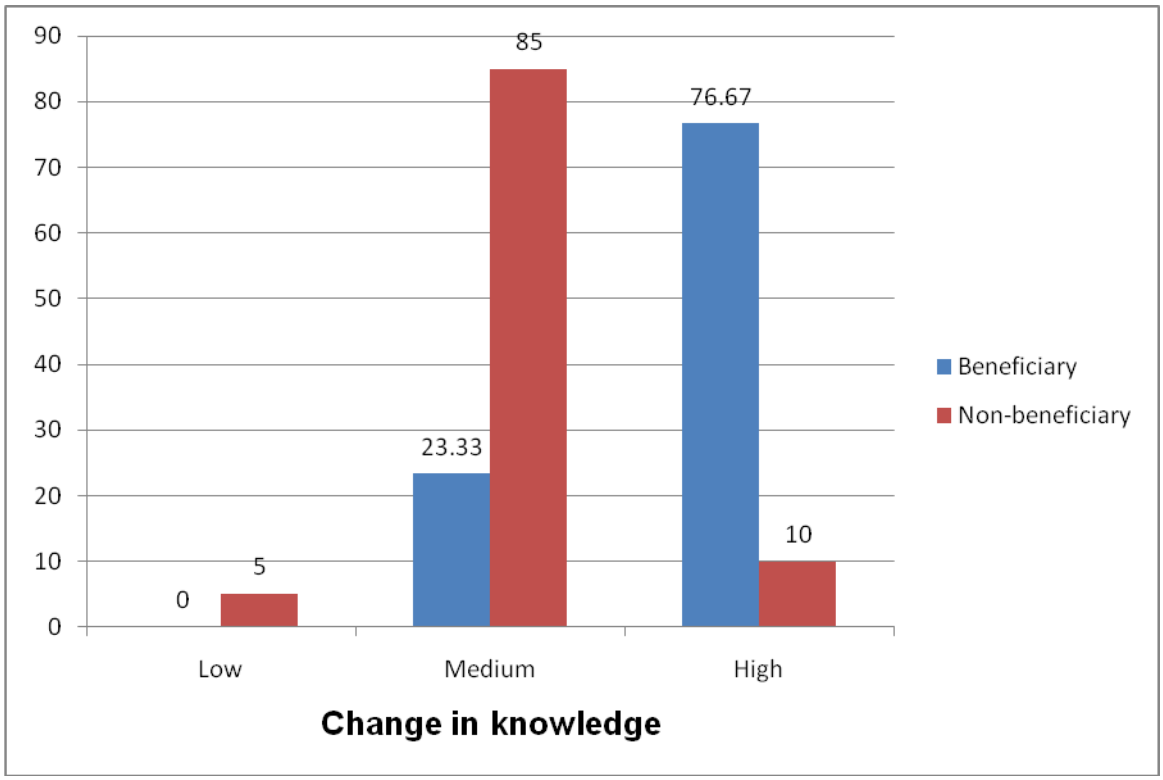


Fig 13. Distribution of beneficiary and non-beneficiary cotton farmers according to their change in knowledge

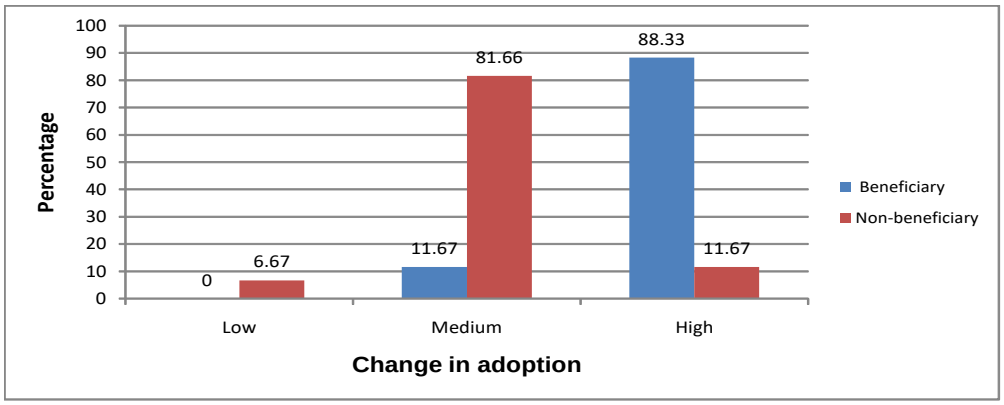


Fig 14. Distribution of beneficiary and non-beneficiary cotton farmers according to their change in adoption

Table 18. Distribution of beneficiary and non-beneficiary farmers according to the knowledge level about recommended IPM practices of cotton

Sl. No.	Knowledge	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Low	00	00.00	03	05.00
2.	Medium	14	23.33	51	85.00
3.	High	46	76.67	06	10.00
	Total	**60**	**100.00**	**60**	**100.00**

Data with regards to the level of knowledge possessed by the beneficiary and non-beneficiary cotton farmers have been furnished in Table 18. It indicated that, 76.67 per cent of beneficiary farmers found to have high knowledge level, followed by 23.33 per cent medium level knowledge about recommended IPM practices of cotton. No one beneficiary farmer was found in low knowledge level.

In case of non-beneficiary farmers, 85.00 per cent of them found to have medium level of knowledge about recommended IPM practices of cotton, followed by 10.00 per cent of them having high level of knowledge whereas only 5.00 per cent of them found in low level of knowledge.

It could be inferred from Table 18 that majority of beneficiary farmers were found in high level of knowledge whereas non-beneficiary farmers in medium level of knowledge.

5.2.2 Change in adoption

Distribution of the beneficiary and non-beneficiary farmers according to their practice wise adoption of recommended cultivation practices of cotton crop have been furnished in Table 19

Table 19. Distribution of the beneficiary and non-beneficiary farmers according to their practice wise adoption about recommended IPM practices of cotton crop

Sl. No.	Practices	Beneficiary		Non-beneficiary	
		Yes (%)	No (%)	Yes (%)	No (%)
A	Cultural practices				
1	Deep ploughing	48 (80.00)	12 (20.00)	39 (65.00)	21 (35.00)
2	Follow the removal and destruction of alternate host of pest like weed, grasses and other plant debris	54 (90.00)	06 (10.00)	42 (70.00)	18 (30.00)
3	Avoid mono-cropping of cotton crop	37 (61.67)	23 (38.33)	34 (56.67)	26 (43.33)
4	Follow crop rotation	50 (83.33)	10 (16.67)	45 (75.00)	15 (25.00)
5	Use only certified seed	48 (80.00)	12 (20.00)	30 (50.00)	30 (50.00)
6	Use of pest resistant and tolerant varieties of cotton	52 (86.67)	8 (13.33)	32 (53.33)	28 (46.67)
7	Proper sowing time	26 (43.33)	34 (56.67)	13 (21.67)	47 (78.33)
8	Use of quantity of seed	50 (83.33)	10 (16.67)	45 (75.00)	15 (25.00)
9	Spacing	50 (83.33)	10 (16.67)	42 (70.00)	18 (30.00)
10	Trap crop	46 (76.67)	14 (23.33)	37 (61.67)	23 (38.33)
11	Intercropping	35 (58.33)	25 (41.67)	24 (40.00)	36 (60.00)
12	Irrigation management	29 (48.33)	31 (51.67)	15 (25.00)	45 (75.00)
13	Quantity of fertilizer	39 (65.00)	21 (35.00)	28 (46.66)	32 (53.34)
14	Bird perches in cotton crop	41 (68.33)	19 (31.67)	32 (53.33)	28 (46.67)
15	Follow the hoeing in cotton field	49 (81.67)	11 (18.33)	46 (76.67)	14 (23.33)
16	Grazing of animals after last picking in cotton field	45 (75.00)	15 (25.00)	43 (71.67)	17 (28.33)

17	Burning of cotton stalks, shaded leaves, bolls and other plant debris the end of season	46 (76.67)	14 (23.33)	42 (70.00)	18 (30.00)
18	Avoid the rationing of cotton crop	48 (80.00)	12 (20.00)	45 (75.00)	15 (25.00)
B	**Mechanical Practices**				
1	Removal and destruction of infested shuts	52 (86.67)	8 (13.33)	48 (80.00)	12 (20.00)
2	Removal and destruction of pest infested buds and larvae of bollworm	57 (95.00)	3 (05.00)	42 (70.00)	18 (30.00)
3	Use the pheromones traps in cotton field	43 (71.67)	17 (28.33)	40 (66.67)	20 (33.33)
4	Use the yellow sticky traps in cotton field	56 (93.33)	4 (06.67)	51 (85.00)	9 (15.00)
5	Practices of de topping	42 (70.00)	18 (30.00)	28 (46.67)	32 (53.33)
C	**Physical Practices**				
1	Light traps for per ha.	50 (83.33)	10 (16.67)	46 (76.67)	14 (23.33)
D	**Biological Practices**				
1	Use the parasitoid for control of pest of cotton	44 (73.33)	16 (26.67)	29 (48.33)	31 (51.67)
2	Use the predators for control of pests	54 (90.00)	6 (10.00)	28 (46.67)	32 (53.33)
3	Use the HaNPV for control of cotton bollworms	39 (65.00)	21 (35.00)	24 (40.00)	36 (60.00)
4	Use the spraying of bacterial biological insecticide (Bt) for control of bollworm	50 (83.33)	10 (16.67)	46 (76.67)	14 (23.33)
5	Spraying Neem Seed Kernel Extract (NSKE)	45 (75.00)	15 (25.00)	43 (71.67)	17 (28.33)
6	Spraying of biological insecticide at evening time	52 (86.67)	8 (13.33)	42 (70.00)	18 (30.00)
7	Avoid the spraying of toxic chemical insecticide after application of bio agents	38 (63.33)	22 (36.67)	36 (60.00)	24 (40.00)
E	**Chemical Practices**				
1	Precautions you have take while spraying the chemical insecticide	49 (81.67)	11 (18.33)	42 (70.00)	18 (30.00)

2	Avoid excesses of toxic insecticide	55 (91.67)	5 (08.33)	32 (53.33)	28 (46.67)
3	Use of chemical insecticide for seed treatment	38 (63.33)	22 (36.67)	24 (40.00)	36 (60.00)
4	Use granular pesticide in soil	53 (88.33)	7 (11.67)	28 (46.67)	32 (53.33)
5	Spraying of proper pesticide for control of sucking pest of cotton	41 (68.33)	19 (31.67)	21 (35.00)	39 (65.00)
6	Spraying of proper pesticide for control of cotton bollworms	52 (86.67)	8 (13.33)	46 (76.67)	14 (23.33)
7	Use of synthetic pyrethroids	40 (66.67)	20 (33.33)	39 (65.00)	21 (35.00)
8	Why to use of synthetic pyrethroids	48 (80.00)	12 (20.00)	42 (70.00)	18 (30.00)
9	Rate of application of chemical insecticide used	49 (81.67)	11 (18.33)	45 (75.00)	15 (25.00)

It is revealed from Table 19 that most of the cultural practices in cotton are adopted by the farmer. Practices like Follow the removal and destruction of alternate host of pest like weed, grasses and other plant debris 90 percent of beneficiary and 70 percent of non beneficiary, crop rotation 83.33 percent of beneficiary and 75 percent of non beneficiary, rationing of cotton crop 80 percent of beneficiary and 75 percent of non beneficiary were already adopted. Use of certified seed of cotton was 80 percent of beneficiary and 50.00 per cent of non beneficiary respondents Use of pest resistant and tolerant varieties of cotton was done 86.67 per cent of beneficiary and 53.33 percent of non beneficiary respondents. Adoptions of almost all the cultural practices were increased with the help of FFS.

It is indicated from Table 19 that most of the mechanical and physical practices in cotton crop were adopted by the farmers. Practices like Removal and destruction of pest infested buds and larvae of bollworm 95 per cent of beneficiary and 70 percent of non beneficiary, yellow sticky traps 93.33 per cent of beneficiary and 85 per cent of non beneficiary, detopping 70 per cent of beneficiary and 46.67 percent of non beneficiary were already adopted

Most of the biological practices in cotton are adopted by the farmers. Practices like use of parasitoid 73.33 percent of beneficiary 48.33 percent of non beneficiary, use of predators 90.00 percent of beneficiary 46.67percent of non beneficiary, spraying biological insecticide 86.67percent of beneficiary 70.00 percent of non beneficiary, Use the spraying of bacterial biological insecticide (Bt) for control of bollworm 83.33 percent of beneficiary 76.67 percent of non beneficiary were already followed..

In chemical practices like, avoid excess use of insecticide 91.67 percent of beneficiary and 53.33 percent of non beneficiary, chemical seed treatment 63.33 percent of beneficiary and 40.00 percent of non beneficiary, control of sucking pest using proper pesticide 68.33 percent of beneficiary and 35.00 percent of non beneficiary were followed .Adoption of almost all the chemical practices was increased due to the FFS. Adoption of precautions spraying 81.67 percent of beneficiary and 70.00 percent of non beneficiary respondents, use granular pesticide in soil 83.33 percent of beneficiary and 46.67 percent of non beneficiary respondents are some important biological practices in which adoption of respondents increase by FFS.

Table 20. Distribution of beneficiary and non-beneficiary farmers according to the adoption level about recommended IPM practices of cotton

Sl. No.	Adoption	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Low	00	00.00	04	06.67
2.	Medium	07	11.67	49	81.66
3.	High	53	88.33	07	11.67
	Total	**60**	**100.00**	**60**	**100.00**

Data with regards to the level of adoption about recommended cultivation practices of cotton of beneficiary and non-beneficiary farmers have been furnished in Table 20. Indicated that, 88.33 per cent of beneficiary farmers found to have high adoption level, followed by 11.67 per cent in medium adoption level. No one beneficiary farmer was found in low adoption level.

In case of non-beneficiary farmers, 81.66 per cent of them found in medium level of adoption about recommended cultivation practices of cotton, followed by 06.67per cent of them having low level of adoption whereas 11.67 per cent of non-beneficiary farmers found in high level of adoption.

It could be inferred from Table 20 that majority of beneficiary farmers were found in high level of adoption whereas non-beneficiary farmers in medium level of adoption.

5.2.3 Change in productivity

Distributions of the beneficiary and non-beneficiary farmers according to the productivity of cotton crop have been furnished in Table 21.

Table 21. Distribution of the beneficiary and non-beneficiary farmers according to the productivity of cotton crop

Sl. No.	Productivity (Qt/ha)	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Low	01	01.67	00	00.00
2.	Medium	21	35.00	58	96.67
3.	High	38	63.33	02	03.33
	Total	**60**	**100.00**	**60**	**100.00**

It is evident from Table 21 that, majority (63.33%) of beneficiary farmer having high productivity of cotton crop, followed by 35.00 per cent of them having medium level of productivity and 01.67 percent of them having low level of productivity .

In case of non-beneficiary farmers (96.67%) having medium level of productivity followed by 03.33 per cent having high level of productivity.

Thus, it is concluded that majority of beneficiary farmers having high level of productivity, whereas most of the non-beneficiary farmers found in medium level of productivity.

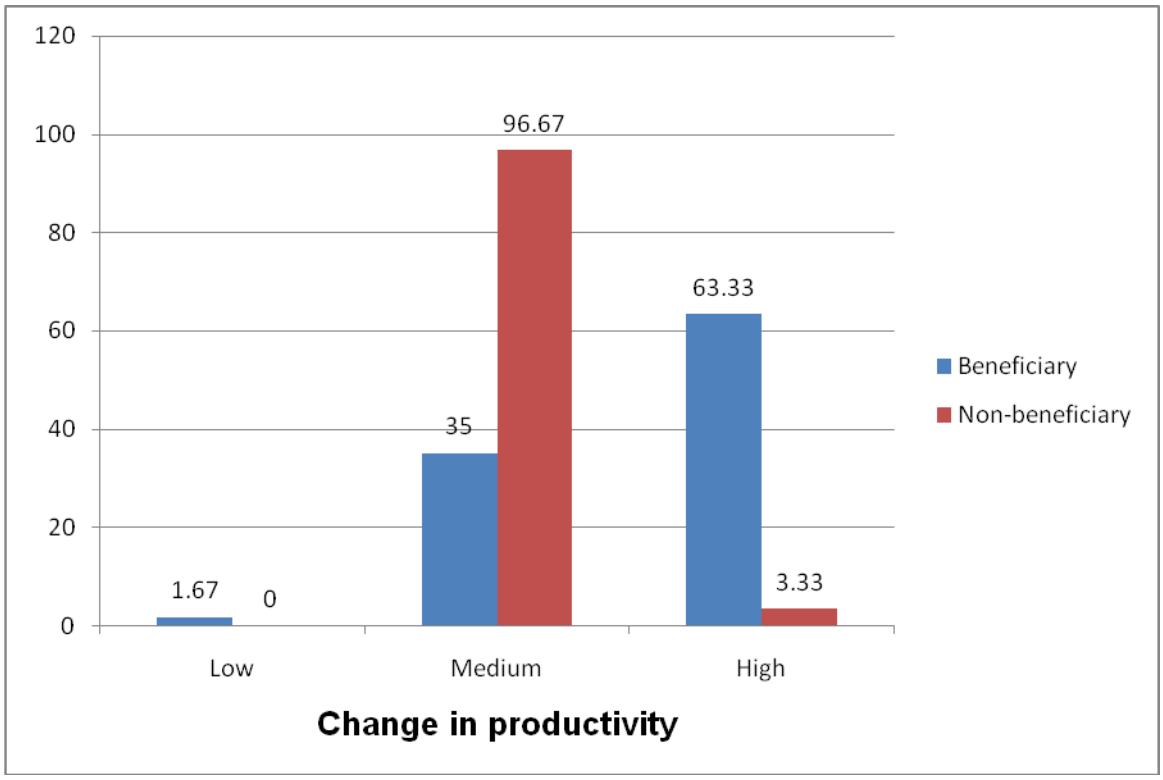


Fig 15. Distribution of beneficiary and non-beneficiary cotton farmers according to their change in productivity

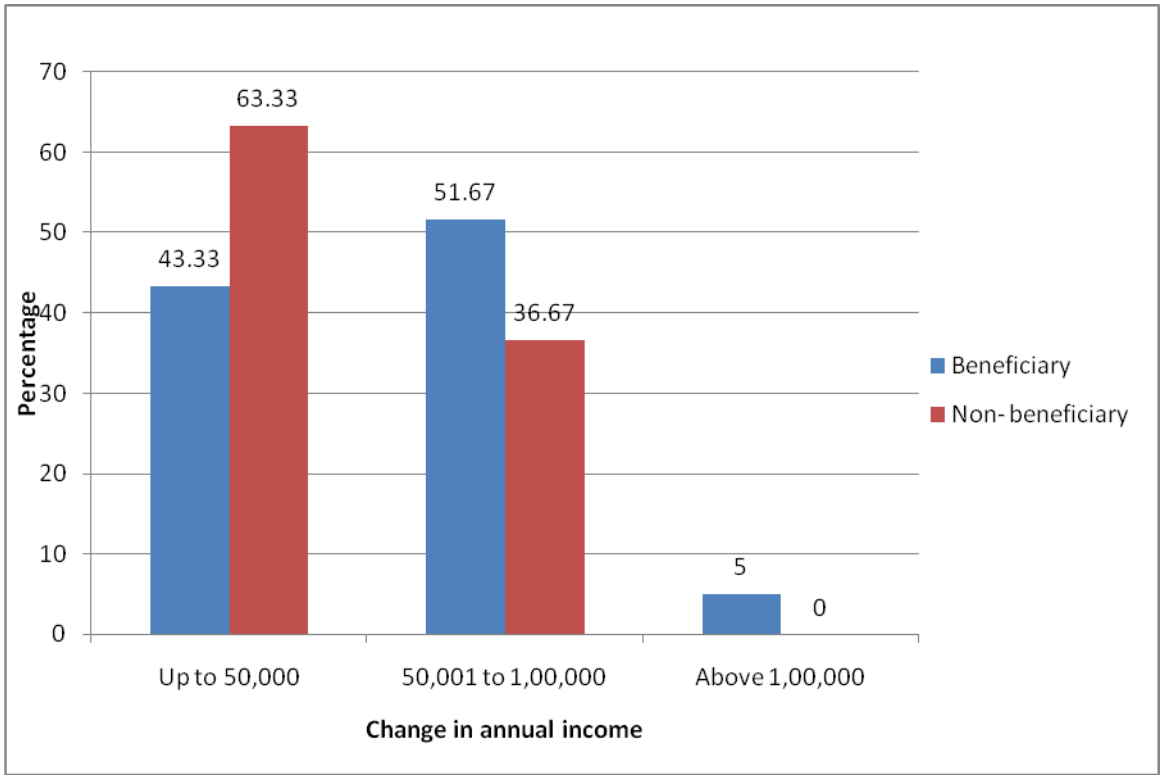


Fig 16. Distribution of beneficiary and non-beneficiary cotton farmers according to their change in annual income

5.2.4 Change in annual income

Distribution of the beneficiary and non-beneficiary farmers according to their annual income have been furnished in Table 22.

Table 22. Distribution of the beneficiary and non-beneficiary farmers according to their annual income

Sl. No.	Annual income (Rs.)	Beneficiary farmers (n=60)		Non-beneficiary farmers (n=60)	
		Frequency	Per cent	Frequency	Per cent
1.	Up to 50,000/-	26	43.33	38	63.33
2.	50,001/- to 1,00,000/-	31	51.67	22	36.67
3.	Above 1,00,000/-	03	05.00	00	00.00
	Total	**60**	**100.00**	**60**	**100.00**

It is evident from Table 22 that, majority (51.67%) of beneficiary farmers had annual income in between Rs. 50,001/- to Rs. 1,00,000/- followed by (43.33%) up to Rs. 50,000/-, 05.00 per cent beneficiary had annual income above Rs. 1,00,000/- rupees

In case of non-beneficiary, majority (63.33%) of farmers had annual income up to Rs. 50,000/-, followed by 36.67 per cent had annual income in between Rs. 50,001/- to Rs. 1, 00,000/-.

Thus, it is concluded that majority of beneficiary farmers had medium level annual income and non-beneficiary farmers had low level annual income up to 50,000/- rupees.

5.3 Impact of Farmers Field School of cotton on the beneficiary farmers over non-beneficiary farmers

Mean score of all the dimensions of impact, their per cent change are furnished in table 23

A cursory look at Table 23 revealed that, mean score of knowledge (74.87), adoption (76.79), productivity (11.26), annual income (Rs. 35,646) of the beneficiary famers were found to be higher than mean score of knowledge (64.25), adoption (53.29), productivity (8.89) and annual income (Rs. 22,240) of the non-beneficiary famers. It was also found that there was

change in knowledge, adoption, productivity, annual income and to the tune of 16.53, 44.09, 26.59, and 60.28 percent respectively of beneficiary farmers over non-beneficiary farmers as a result of impact of Farmers field school. Thus, it could be stated that farmer's field school had created positive impact on beneficiary farmers.

Table 23. Impact of farmers field school of cotton on the beneficiary farmers over non-beneficiary farmers

Sl. No.	Impact dimension	Mean score		Per cent Change
		Beneficiary farmers	Non-Beneficiary farmers	
1.	Knowledge	74.87	64.25	16.53
2.	Adoption	76.79	53.29	44.09
3.	Productivity	11.26	8.89	26.59
4.	Annual Income	35646	22240	60.28
	Mean Impact			**36.87**

When the impact of farmers field school as whole was considered, it is evident from Table 23 that, there was total 36.87 per cent impact of FFS on the beneficiary famers when compared with non-beneficiary farmers. It could therefore, be stated that there was definite impact of farmers field school on the beneficiary farmers in terms of change in knowledge, change in adoption, change in productivity and change in annual income to the extent of 36.87 per cent over and above as whole.

The findings of present study are in line with the findings of Archana Jadhav (2017) who observed that, 34.22 per cent impact on beneficiary famers about Crop Pest Surveillance and Advisory Project and Ghagare (2018) observed that definite impact of seed production programme organized under RKVY project on the trainee farmers to the extent of 36.24 per cent. ** Significant at 0.01 level of probability

5.3.1 Testing the significance difference of the means

In order to test the variability of means of knowledge, adoption, productivity and annual income of beneficiary farmer and non- beneficiary

farmers. The data were subjected to ‘Z’ test and the results thus obtained have been presented in Table 24.

Table 24. Testing the significance difference of the means in knowledge, adoption, productivity, annual income of beneficiary farmers and non- beneficiary farmers

Sl. No.	Impact dimension	Mean score		‘Z’ value
		Beneficiary farmers	Non-Beneficiary farmers	
1.	Knowledge	74.87	64.25	10.52**
2.	Adoption	76.79	53.29	9.63**
3.	Productivity	11.26	8.89	8.53**
4.	Annual Income	35646	22240	3.30**

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 (10.52), adoption (9.63), productivity (8.53), and annual income (3.30) found significant at 0.01 level of probability.

It could therefore, be inferred that the beneficiary farmers differ significantly over non-beneficiary farmers in knowledge, adoption, productivity and annual income. It could therefore, be explicitly stated that there was definite change in knowledge, adoption, productivity and annual income among beneficiary farmers over non-beneficiary farmers as result of Farmers Field School.

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

5.4 Relation analysis

The coefficient of correlation between the selected characteristics of beneficiary and non-beneficiary farmers with the impact dimension namely knowledge, adoption, productivity, annual income have been presented in this section.

5.4.1 Coefficient of correlation between selected characteristics of beneficiary and non- beneficiary farmers with their knowledge

The coefficients of correlation between selected characteristics of beneficiary and non-beneficiary farmers have been presented in Table 25.

Table 25. Coefficient of correlation between selected characteristics of beneficiary and non- beneficiary farmers with their knowledge

Sl. No.	Characteristics	'r' value	
		Beneficiary farmers	Non beneficiary farmers
1.	Age	-0.049	0.292*
2.	Education	0.336**	0.238
3.	Land holding	0.345**	0.255*
4.	Annual income	0.256*	0.194
5.	Farming experience	0.228	0.204
6.	Area under cotton cultivation	0.367**	0.341**
7.	Source of information	0.382**	0.313*
8.	Scientific orientation	0.263*	0.161
9.	Economic motivation	0.252*	0.203

**Significant of 0.01 level of probability

*Significant of 0.05 level of probability

It was noted from the Table 25 that, in case of beneficiary farmers education, land holding, area under cotton cultivation, source of information, were found to be positive and highly significant with knowledge at 0.01 level of probability. Whereas, annual income, economic motivation and scientific orientation significance were found to be positively significant at 0.05 level of probability.

In case of non-beneficiary farmers, it could be seen that area under cotton cultivation were found to be positive and highly significant with knowledge at 0.01 level of probability. The variable age, land holding,

sources of information were found to be positively significant at 0.05 level of probability. It is therefore, the null hypothesis for these variables were rejected.

5.4.2 Coefficient of correlation between selected characteristics of beneficiary and non- beneficiary farmers with their adoption

The coefficients of correlation between selected characteristics of beneficiary and non-beneficiary farmers have been presented in Table 26.

Table 26. Coefficient of correlation between selected characteristics of beneficiary and non- beneficiary farmers with their adoption

Sl. No.	Characteristics	'r' value	
		Beneficiary farmers	Non-beneficiary farmers
1.	Age	-0. 043	0.257*
2.	Education	0.282*	0.245
3.	Land holding	0.315*	0.288*
4.	Annual income	0.267*	0.141
5.	Farming experience	0.315*	0.227
6.	Area under cotton cultivation	0.366**	0.279*
7.	Source of information	0.327*	0.288*
8.	Scientific orientation	0.276*	0.256*
9.	Economic motivation	0.202	0.180

**Significant of 0.01 level of probability

*Significant of 0.05 level of probability

It was noted from the Table 26 that, in case of beneficiary farmers area under cotton cultivation was found to be positive and highly significant with adoption at 0.01 level of probability. Whereas, education, farming experience, land holding, annual income, sources of information and scientific orientation was found to be positively significant at 0.05 level of probability.

In case of non-beneficiary, age, land holding, area under cotton cultivation, source of information and scientific orientation were found to be positively significant with adoption at 0.05 level of probability. It is therefore, the null hypothesis for these variables were rejected.

5.4.3 Coefficient of correlation between selected characteristics of beneficiary and non- beneficiary farmers with their productivity

The coefficients of correlation between selected characteristics of beneficiary and non-beneficiary farmers have been presented in Table 27.

It was noted from the Table 27 that, in case of beneficiary farmers only land holding, farming experience and scientific orientation were found to be positive and highly significant with productivity at 0.01 level of probability. Whereas, age, annual income, area under cotton cultivation, source of information and economic motivation were found to be positively significant at 0.05 level of probability.

Table 27. Coefficient of correlation between selected characteristics of beneficiary and non-beneficiary farmers with their productivity

Sl. No.	Characteristics	'r' value	
		Beneficiary farmers	Non-beneficiary farmers
1.	Age	0.256*	-0.074
2.	Education	0.101	0.216
3.	Land holding	0.409**	0.333**
4.	Annual income	0.299*	0.175
5.	Farming experience	0.350**	0.165
6.	Area under cotton cultivation	0.285*	0.291*
7.	Source of information	0.285*	0.252*
8.	Scientific orientation	0.327**	0.271*
9.	Economic motivation	0.293*	0.280*

**Significant of 0.01 level of probability

*Significant of 0.05 level of probability

In case of non-beneficiary farmers land holding was found to be positive and highly significant with productivity at 0.01 level of probability. Whereas as area under cotton cultivation, sources of information, scientific orientation and economic motivation were found to be positively significant at 0.05 level of probability. It is therefore, the null hypothesis for these variables were rejected.

5.4.4 Coefficient of correlation between selected characteristics of beneficiary and non- beneficiary farmers with their annual income

The coefficients of correlation between selected characteristics of beneficiary and non-beneficiary farmers have been presented in Table 28

It was noted from the Table 28 that, in case of beneficiary farmer's education, land holding, area under cotton cultivation, source of information and scientific orientation were found to be positive and highly significant with annual income at 0.01 level of probability. Whereas, only annual income and economic motivation was found to be positively significant at 0.05 level of probability.

Table 28. Coefficient of correlation between selected characteristics of beneficiary and non- beneficiary farmers with their annual income

Sl. No.	Characteristics	'r' value	
		Beneficiary farmers	Non-beneficiary farmers
1.	Age	0.123	0.023
2.	Education	0.349**	0.094
3.	Land holding	0.545**	0.554**
4.	Annual income	0.290*	0.260*
5.	Farming experience	0.166	0.200
6.	Area under cotton cultivation	0.496**	0.444**
7.	Source of information	0.344**	0.261*
8.	Scientific orientation	0.408**	0.362**
9.	Economic motivation	0.314*	0.257*

**Significant of 0.01 level of probability

*Significant of 0.05 level of probability

In case of non-beneficiary, land holding, area under cotton cultivation and scientific orientation were found to be positive and highly significant, at 0.01 level of probability. Only annual income, source of information and economic motivation was found to be positively significant at 0.05 level of probability. It is therefore, the null hypothesis for these variables were rejected.

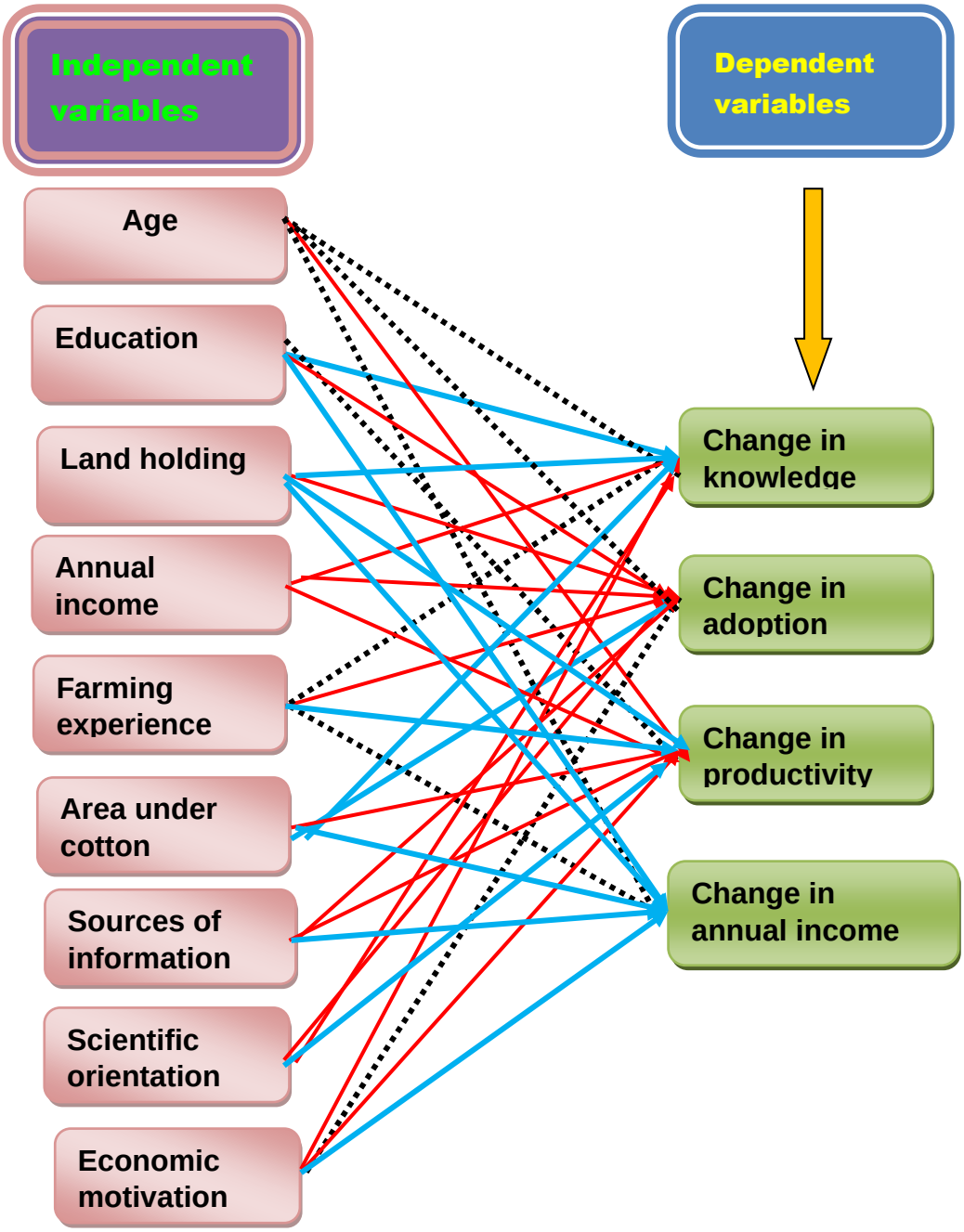
5.5 Constraints faced by the beneficiary farmers in cotton cultivation of Farmers Field School

The constraints are the circumstances or cause which prohibit and restraint the cotton farmers. The important constraints expressed by the beneficiary farmers presented in Table 29

Table 29. Constraints faced by the beneficiary farmers in cotton cultivation of Farmers Field School

Sl. No.	Constraints	Beneficiary farmers	
		Frequency (n=60)	Per cent
1.	Seed and seed treatment		
A	Unavailability of good quality seed at reasonable price	26	43.33
B	Improper demonstration of seed treatment process	12	20.00
C	Unavailability of Captan/ thirum/ Carbendazim before sowing	18	30.00
2.	Plant protection		
A	Unavailability of pesticides on subsidized rate	36	60.00
B	In training more emphasis needs to be given on plant protection	8	13.33
C	Unavailability of bio agents	29	48.33
3	Fertilizer application		
A	Unavailability of inorganic fertilizers on subsidized rates	24	40.00
B	Unavailability of fertilizer application guidance	17	28.33
4	Others		
A	Unavailability of Agriculture Assistant for regular guidance	23	38.33
B	Weed managements method demonstration needs to be arranged	12	20.00
C	Unavailability of subsidy in terms of financial assistance	25	41.67
D	Government has to give cotton MSP on the basis of cost cultivation	24	40.00

Constraints in Farmers Field School, which were faced by the farmers, were unavailability of pesticide on subsidized rate (60.00%), unavailability of biological agent (48.33%), unavailability of inorganic fertilizer on subsidized rate (40.00%), unavailability of good quality seed at reasonable price (43.33%), unavailability of subsidy in terms of financial assistance (41.67%). moderately perceived constraints were government has to give cotton MSP on the basis of cost of cultivation (40.00%), unavailability of Captan/ Thirum/ Carbendazium before sowing (30.00%), unavailability properly guidance of fertilizer application (28.33%),. The moderately perceived constraints were government not announcing reasonable prices, agricultural assistant guidance not available regularly, Captan/ Thirum/ Carbendazium not available before sowing, application of fertilizers proper guidance not available, fertilizer seed drill not available. The less perceived constraints were needs to be arranged weed management method demonstration, needs to give more emphasis on plant protection intraining.

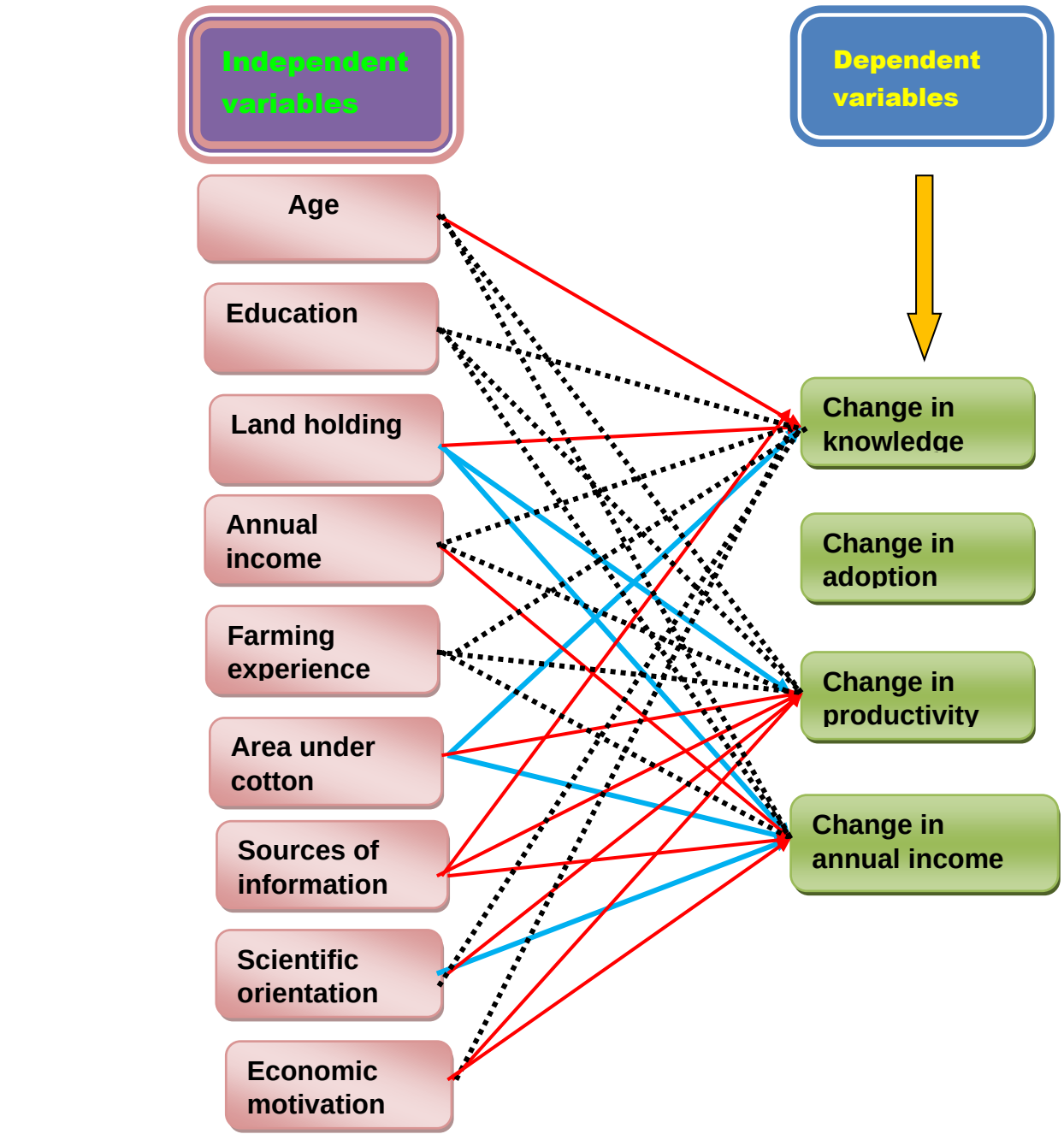


Indicate significant correlation at 0.05 level of probability

Indicate significant correlation at 0.01 level of probability

Indicate non-significant correlation

Fig. 17. Empirical research model of the study for beneficiary farmers



Indicate significant correlation at 0.05 level of probability

Indicate significant correlation at 0.01 level of probability

Indicate non-significant correlation

Fig. 18. Empirical research model of the study for non beneficiary farmers

CHAPTER VI

SUMMARY AND CONCLUSIONS

The present study entitled “Impact of Farmers Field School on cotton grower.” was conducted to ascertain the impact. Impact in term of change in knowledge, change in adoption, change in productivity and change in annual income of the beneficiary farmers with the following objective.

6.1 Objectives of the study

1. To study the personal, socio-economic, communication and psychological characteristic of Cotton growers of Farmers Field School.
2. To study the impact of Farmers Field School on Cotton grower.
3. To analyze the relationship between selected characteristic of cotton growers of Farmers Field School with the impact of Farmers Field School on Cotton growers.
4. To identify the constraints faced by Cotton growers of Farmers Field School.

The study was conducted in Akola Tahasil of Akola district of Maharashtra state. Mainly the study was confined to the villages under the jurisdiction obtained from Agriculture Department. The 60 beneficiaries farmers of Farmers Field School and 60 non beneficiary farmers were selected. Thus in all, 120 cotton growers respondents were studied. Data was collected by personally interviewing the respondents with the help of pretested structured schedule in an informal atmosphere. The study was based on experimental design of social research. The interview scheduled 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, coefficient of correlation and Z test was employed for interpretation of the findings.

One hypothesis were selected for the study and tested for either its acceptance or rejection. The characteristics of the farmers namely age, education, land holding, annual income, farming experience, area under cotton cultivation, sources of information, scientific orientation, economic

motivation, were studied as independent variable. However, the impact in terms of change in knowledge, change in adoption, change in productivity and change in annual income were studied as dependent variable

6.2 Results

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

6.2.1 Distributional analysis

6.2.1.1 Profile of the beneficiary and non-beneficiary farmers

Regarding independent variables 50.00 per cent of beneficiary and 40.00 per cent non-beneficiary farmers were found in middle age group, with no distinction in their age group.

In case of education, 50.00 per cent of beneficiary and 41.67 per cent of non-beneficiary farmers were educated up to secondary school level of education.

The beneficiary 45.00 per cent and non-beneficiary 36.67 percent farmers possessed semi-medium category of land holding.

Nearly 50.00 per cent of beneficiary and 40.00 per cent non-beneficiary farmers were found in middle level of annual income.

In case of farming experience, 51.67 per cent of beneficiary and 50.00 per cent of non-beneficiary farmers having medium level of farming experience.

Majority 53.33 per cent of beneficiary and 43.33 percent non-beneficiary farmers of cotton grower having area under cotton cultivation up to 0.89 to 1.32 ha.

Regarding source of information, 63.34 per cent beneficiary and 51.67 per cent non-beneficiary farmer’s uses medium level of source of information.

In case of variable scientific orientation, 51.67 per cent beneficiary and 50.00 per cent non-beneficiary farmers were found in medium level of scientific orientation.

In case of psychological variable economic motivation, 51.67 per cent beneficiary and 43.34 per cent non-beneficiary farmers were found in medium level of economic motivation.

.6.3 Impact

Regarding the dependent variable Impact of farmer's field school on cotton grower it was studied in term of change in knowledge, change in adoption, change in productivity, change in annual income over non-beneficiary farmers.

Mean score of knowledge (74.87), adoption (76.79), productivity (11.26), annual income (Rs. 35,646) of the beneficiary famers were found to be higher than mean score of knowledge (64.25), adoption (53.29), productivity (8.89) and annual income (Rs. 22,240) of the non-beneficiary famers. It was also found that there was change in knowledge, adoption, productivity and annual income to the tune of 16.53, 44.09, 26.59, and 60.28 per cent respectively of beneficiary farmers over non-beneficiary farmers as a result of impact of Farmers field school. The 'z' values of knowledge (10.52), adoption (9.63), productivity (8.53), annual income (3.30) were found significant at 0.01 level of probability.

Thus, it could be stated that farmer's field school had created positive impact on beneficiary farmers.

6.4 Relational analysis

6.4.1 Knowledge

In case of beneficiary farmers education, land holding, area under cotton cultivation, source of information, were found to be positive and highly significant with knowledge at 0.01 level of probability. Whereas, annual income, economic motivation and scientific orientation significance were found to be positively significant at 0.05 level of probability.

In case of non-beneficiary farmers, it could be seen that area under cotton cultivation were found to be positive and highly significant with knowledge at 0.01 level of probability. The variable age, land holding, sources of information were found to be positively significant at 0.05 level of

probability. It is therefore, the null hypothesis for these variables were rejected.

6.4.2 Adoption

In case of beneficiary farmers area under cotton cultivation was found to be positive and highly significant with adoption at 0.01 level of probability. Whereas, education, farming experience, land holding, annual income, sources of information and scientific orientation was found to be positively significant at 0.05 level of probability.

In case of non-beneficiary, age, land holding, area under cotton cultivation, source of information and scientific orientation were found to be positively significant with adoption at 0.05 level of probability. It is therefore, the null hypothesis for these variables were rejected.

6.4.3 Productivity

In case of beneficiary farmers only land holding, farming experience and scientific orientation were found to be positive and highly significant with productivity at 0.01 level of probability. Whereas, age, annual income, area under cotton cultivation, source of information and economic motivation were found to be positively significant at 0.05 level of probability.

In case of non-beneficiary farmers land holding was found to be positive and highly significant with productivity at 0.01 level of probability. Whereas as area under cotton cultivation, sources of information, scientific orientation and economic motivation were found to be positively significant at 0.05 level of probability. It is therefore, the null hypothesis for these variables were rejected.

6.4.4 Annual income

In case of beneficiary farmer’s education, land holding, area under cotton cultivation, source of information and scientific orientation were found to be positive and highly significant with annual income at 0.01 level of probability. Whereas, only annual income and economic motivation was found to be positively significant at 0.05 level of probability.

In case of non-beneficiary, land holding, area under cotton cultivation and scientific orientation were found to be positive and highly significant, at 0.01 level of probability. Only annual income, source of information and economic motivation was found to be positively significant at 0.05 level of probability. It is therefore, the null hypothesis for these variables were rejected

6.5 Constraints faced by the beneficiary farmers of cotton grower

The highly perceived constraints in Farmers Field School, which were faced by the farmers, were unavailability of pesticide on subsidized rate, unavailability of biological agent, unavailability of inorganic fertilizer on subsidized rate, unavailability of good quality seed at reasonable price, unavailability of subsidy in terms of financial assistance. The moderately perceived constraints were government has to give cotton MSP on the basis of cost of cultivation, unavailability of Captan Thirum/ Carbendazium before sowing, unavailability properly guidance of fertilizer application. The moderately perceived constraints were government not announcing reasonable prices, agricultural assistant guidance not available regularly, Captan/ Thirum/ Carbendazium not available before sowing, application of fertilizers proper guidance not available, fertilizer seed drill not available. The less perceived constraints were needs to be arranged weed management method demonstration, needs to give more emphasis on plant protection in training.

CHAPTER VII

IMPLICATIONS

The implications based on the findings of the present study, following suggestions in the form of implication are offered. The implications are presented into two parts viz., implications for action and implications for future research. Implication will be useful for development activities of Farmer's Field School and for future research.

7.1 Implications for action

1. The finding of the present study indicated that majority of the beneficiary farmers of Farmer's Field School had high level of knowledge of IPM in cotton. Testing of the knowledge of beneficiary farmers showed that Farmers Field School has definitely proved effective and it is suggested to organize Farmer's Field School in future on need based areas and crops of Vidarbha region.
2. The extent of adoption about IPM practices of cotton noticed that majority of beneficiary farmers had high level adoption, most of beneficiary farmers had moderate level of adoption, so that promotion for adoption of IPM practices of cotton is of vital importance and may become a regular feature of Farmer's Field School and extension agency.
3. Farmers Field School had significant impact on beneficiary farmers in term of change in knowledge, adoption, productivity and annual income .Thus such type of programmes may be replicated in every village of the Tahasil so that the advantages of such programme may improve economic condition and better standard of living of the farming community.
4. There is significantly increase in adoption and knowledge level of beneficiary farmers. It is therefore advisable that beneficiary farmers of Farmer's Field School should transfer of IPM practices of cotton to other cotton growers in their area as opinion leaders or contact farmers.

7.2 Implication for future research

1. The present study covered only 12 villages of Akola panchyat samiti of Akola district in Maharashtra state, hence generalization of the study may be applicable to villages of other panchyat samiti of districts having similar characteristics'. A comprehensive study covering a larger area would be more appropriate lo draw generalization having wider applicability
2. The present study has been conducted under 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 panchyat samiti for elimination of interaction effect to have a vital comparison.
4. The study was confined to only IPM practices of cotton crop for listing knowledge and adaption 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 VIII

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6. Research papers : NIL

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Place: Akola (Agme Rajani Manikrao)

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APPENDIX

INTERVIEW SCHEDULE

Title of research : IMPACT OF FARMERS FIELD SCHOOL ON COTTON GROWERS.

Name of researcher : AGME RAJANI MANIKRAO
M.Sc. (Agri.) IInd Year
Department of Extension Education,
Dr. P.D.K.V., Akola.

General Information

Name of farmer : ……..

Village : ……..….. **Tahasil :……** **Dist. :** Akola

: PART - I:

A) Personal characteristic

1. Age of farmer : …….. Years

2. Education : …….. Std.

3. Land holding

a) Rainfed **:** …….. ha.

b) Irrigated **:** ……. ha.

Total (a+b) **:** ……. ha.

4. Annual income

a) Farming **:** Rs. …….

b) Income from subsidiary occupation **:** Rs. ……....

Total Income (a+b) **:** Rs. …….

5. Farming Experience

Experience in cotton cultivation . **:**…… Years.

6. Area under cotton crop : …….. ha.

7. Source of information.

Sl. No.	Source of information	Regular	Occasional	Never
(A)	**Formal sources**			
1.	Gram Sevak			
2.	KrishiSevak			
3.	Agricultural Supervisor			
4.	Agricultural Officer			
5.	University scientists			
6.	KVK scientists			
(B)	**Informal sources**			
1.	Local leader			
2.	Friends			
3.	Relatives			
4.	Progressive farmers			
5.	Proprietor of krishi sevak			
(C)	**Mass media**			
1.	Television			
2.	Radio			
3.	Newspaper			
4.	Farm Magazine			
5.	ArgilExhibition			
6.	Agro Technology Week			
7.	Mobile SMS			
8.	Others			

8. Scientific orientation.

Sl. No.	Statement	SA	A	UD	DA	SDA
1.	New methods of farming gives better Results than old methods.					
2.	Even a farmer with lot of experience Should use new methods of farming.					
3.	The way farmers forefather farmed Is still the best way to farm today.					

4.	Though it makes time for a farmer to learn new methods in farming it is worth efforts.					
5.	A good farmer experience with new ideas In farming.					
6.	Traditional methods of farming have to be Changed in order to raise the level of Living of farmers.					

SA -: Strongly agree **AG** -: Agree **UD**-: Undecided **DA** -: Disagree **SDA** -: Strongly Disagree.

9. Economic motivation

Sl.No	**Statement**	**SA**	**AG**	**UD**	**DA**	**SD**
1.	A farmer should work towards large yield an economic profit.(+ve)					
2.	The most successful farmer is one who makes more profit.(+ve)					
3.	A farmer should try any new farming idea, which may earn him more money.(+ve)					
4.	A farmer should adopt new variety to increase monitory profit (+ve)					
5.	It is difficult for the farmer's children to make good start unless he provides them with economic assistance. (+ve)					
6.	A farmer must earn his living but the most important thing in life is one which cannot be defined in economic terms. (-ve)					

SA -: Strongly agree **AG** -: Agree **UD**-: Undecided **DA** -: Disagree **SDA** -: Strongly disagree

PART - ||

KNOWLEDGE OF BENEFICIARY/ NON BENEFICIARY FARMERS OF FFS TOWARDS RECOMMENDED IPM PRACTICES OF COTTON.

Sl. NO.	A. Cultural practices	Beneficiary		Non-beneficiary	
		Yes	No	Yes	No
1.	Do you follow 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 mono-cropping of cotton crop?				
4.	Do you follow 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?				
10.	Which crop do you used as trap crop in cotton field?				
11.	Which crops 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?				

15.	Do you follow the hoeing in cotton field?				
16.	Do you follow the grazing of animals after last picking in cotton grazing of animals after last picking in cotton field?				
17.	Do you follow the burning of cotton stalks, shaded leaves, bolls and other plant debris the end of season?				
18.	Do you avoid the rationing of cotton crop?				
B.	**Mechanical Practices**				
1.	Do you follow removal and destruction of infested shuts?				
2.	Do you follow removal and destruction of pest infested buds and larvae of bollworm?				
3.	Do you use the pheromones traps in cotton field?				
4.	Do you use the yellow sticky traps in cotton field?				
5.	Do you follow the practices of detopping?				
C	**Physical Practices**				
1.	Pests' management in cotton? How many, Do you use the light traps for I per ha?				
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 the 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 Neem Seed Kemel 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 bio agents?				
E.	**Chemical Practices**				
1.	What precautions you have take while spraying the chemical insecticide				
2.	Do you avoid excess use of toxic insecticide?				
3.	Which chemical insecticide do you used for seed treatment?				
4.	Do you use granular pesticide 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 pyrethroids should be used and when?				
9.	How many rate of application of chemical insecticide you have used?				

ADOPTION OF BENEFICIARY/ NON BENEFICIARY FARMERS OF FFS TOWARDS RECOMMENDED IPM PRACTICES OF COTTON

Sl. No.	A. Cultural practices	Beneficiary		Non-beneficiary	
		Yes	No	Yes	No
1.	Do you follow 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 mono-cropping of cotton crop?				
4.	Do you follow 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?				
10.	Which crop do you used as trap crop in cotton field?				
11.	Which crops 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?				

15.	Do you follow the hoeing in cotton field?				
16.	Do you follow the grazing of animals after last picking in cotton grazing of animals after last picking in cotton field?				
17.	Do you follow the burning of cotton stalks, shaded leaves, bolls and other plant debris the end of season?				
18.	Do you avoid the rationing of cotton crop?				
B.	**Mechanical Practices**				
1.	Do you follow removal and destruction of infested shuts?				
2.	Do you follow removal and destruction of pest infested buds and larvae of bollworm?				
3.	Do you use the pheromones traps in cotton field?				
4.	Do you use the yellow sticky traps in cotton field?				
5.	Do you follow the practices of detopping?				
C.	**Physical Practices**				
1.	Pests' management in cotton? How many, Do you use the light traps for I per ha?				
D	**Biological Practices**				
1.	Do you use the parasitoid for control of me pest of cotton?				
2.	Do you use the predators for control of pests of cotton; Give its method the 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 Neem Seed Kemel 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 bio agents?				
E.	**Chemical Practices**				
1.	What precautions you have take while spraying the chemical insecticide				
2.	Do you avoid excess use of toxic insecticide?				
3.	Which chemical insecticide do you used for seed treatment?				
4.	Do you use granular pesticide 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 pyrethroids should be used and when?				
9.	How many rate of application of chemical insecticide you have used?				

3. PRODUCTIVITY OF COTTON: -

Sl. No.	Year	Productivity (Qt/ha)	
		Beneficiary	Non Beneficiary
1.	2017-18		
2.	2018-19		
3.	2019-20		

4. ANNUAL INCOME:

Sl. No.	Year	Annual Income							
		Cotton Crop							
		Beneficiary				Non Beneficiary			
		Area (acre)	Productivity (Qtl/ha)	Rate (Rs/Qtl)	Total Amount	Area (acre)	Productivity (Qtl/ha)	Rate (Rs/Qtl)	Total Amount
1.	2017-18								
2.	2018-19								
3.	2019-20								

:: Part: III:

Constraints:

1. ……..

2. ……

3. ……

4. ……