Impact Assessment of Better Cotton Initiative (BCI) Programme

A Study on Small Holder Cotton Producers in Erstwhile Mahabubnagar District of Telangana State, India

A REPORT- 2017

FROM

Extension Education Institute

(Southern Region)

Ministry of Agriculture & Farmers Welfare,
Govt. of India,
PJTS Agriculture University, Rajendranagar,
Hyderabad-500 030

Extension Education Institution
(Southern Region)

Action Photographs

FGD's by study team of Extension Education Institute in selected villages

Velkicherla village

Kothamulgara Village

Hasnapur village

Gangaram village

Mahadevunipet village

Karukonda village

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Preface

India has been producing cotton for thousands of years and the country is now the second largest producer of cotton in the World. It has also the largest area under cotton cultivation in the World representing about 25% of the world area under cotton cultivation. However, the productivity of Cotton is low. There are many biotic and abiotic constraints in cotton cultivation. The major problem is indiscriminate use of chemicals which are contributing to degradation of soil health, environment and human health besides increasing the cost of cultivation.

In order to redress the constraints and to transform cotton production globally as a sustainable main stream commodity the Better Cotton Initiative (BCI) programme was launched as a holistic approach to sustainable cotton production contributing to environment, social and economic concerns. It was felt necessary after implementing programme since four years to initiate an Impact Assessment Study to understand the pros and cons of the programme for future guidance.

A team of staff comprising of Dr. M.Preethi and Dr. P.Vijayalakshmi, Professors lead by Dr.M.Suryamani Director, EEI, Hyderabad conducted an Impact Assessment of Better Cotton Initiative Programme in Erstwhile Mahabubnagar District,Telangana State, India from August to September 2017 on the request of Participatory Rural Development Initiative Society (PRDIS)- A Professional NGO based in Hyderabad which is one of the implementing partners for BCI in India.

The study was conducted in the villages of Boothpur and Bijinepally mandals where BCI programme was first implemented in Telangana state. The study was conducted with randomly selected 360 BCI and 100 non BCI and 60 Control farmers. The before and after Expost Facto and controlled experimental research designs were adopted for the study.

The report presents the impact of BCI programme interms of building human, social and economic capital of the farmers. Besides, environment and health concerns were also unearthed.

The EEI would like to thank PRDIS for giving the opportunity to conduct the study. We also acknowledge the field investigators who have collected quantitative data and the data processor for analyzing the data and presenting the tables in a given format. Some of the case studies on best practices which were prepared by PRDIS were cross validated and presented in the report. I hope the findings and recommendations will be used by the concerned stakeholders for revisiting the standards and in fine tuning the implementation of the BCI programme.

DIRECTOR

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INTRODUCTION

Chapter - I

INTRODUCTION

1.1. PREAMBLE

Globally and domestically, cotton is an important agricultural commodity. In India, cotton exports are not only a source of vital foreign exchange earnings, but also account for a substantial proportion of their GDP and tax income, leading to significant economic and social development. About 70% of the global cotton production comes from 4 countries, which include China (27%), India (24%), USA (13%) and Pakistan ( )%. However the crop in rainfed areas is substantially low.

In Telangana State, Cotton is cultivated in 16.51 lakh hectares during 2014-15 with the production of 50.0 lakh bales. About 65% of cotton cultivation is under rainfed. The productivity of cotton is very low ranging from 3 to 10 qs of Lint per hectare. In Telangana the major cotton growing districts are Adilabad, Karimnagar, Warangal, Nalgonda, Khammam, Rangareddy, Medak and Mahaboobnagar. The major constraints in cotton production practices has been the use of unsustainable production practices including intensive input application of pesticides and fertilizers, not following water, soil, drought and flood management techniques at individual farmer level, poor harvesting and post-harvest practices. Under such circumstances poor supply chain linkages, environment, health, biodiversity and social impacts are the key issues need to be addressed for sustainable increase in cotton productivity and quality.

With the introduction of Bt-cotton during the year 2002, there was a decline in pesticide usage. Though pink bollworm damage declined, the changes in pest management systems and introduction of several new Bt hybrids, lead to highly susceptible pests and diseases, which resulted in increased damage by sucking pests such as Jassids, white flies, thrips, mealy bugs aphids etc. As a consequence of this, insecticide usage which had declined from Rs.10520 million in 2001 to Rs.5790 million, increased gradually to Rs.8804 million by 2010 (Central Institute for Cotton Research (CICR) Vision, 2030). The excess chemical inputs used not only resulted in high incidence of pests and diseases, but also contributed adversely to environment, soil and human health.

In the Indian cotton growing season of 2005, some researchers set out to investigate the impact of acute pesticide poisoning of cotton farmers living in three villages in Andhra Pradesh. This investigation stated that over a five month growing season, 97 cotton labourers involved in the study experienced a total of 323 separate incidents of ill health, of which 83.6 per cent were associated with signs of mild to severe pesticide poisoning. Reported symptoms included burning eyes, breathlessness, excessive salivation, vomiting, nausea, dizziness, blurred vision, muscle cramp, tumours, loss of consciousness (The Deadly Chemicals in cotton – A report by the Environmental Justice Foundation).

Keeping in view the above issues in 2005, a group of visionary organisations came together to frame out the ways and means of Safeguarding the cotton farmers and industry which lead to the initiation of Better Cotton Initiative (BCI) Programme.

1.2. THE BETTER COTTON INITIATIVE (BCI) PROGRAMME

BCI is an independent multi stakeholder not for profit organisation that exists to make global cotton production better for the people who produce it, better for the environment it grows in, and better for the sectors future, by developing Better Cotton as a sustainable mainstream commodity. During the 2015-16 harvest, BCI reached nearly 1.6 million farmers in 23 countries, Mean-while, demand for better cotton continues to rise, as more retailers and brands join BCI and choose to make Better Cotton an integral part of their sustainable cotton strategies. A sizeable 12% of global cotton production is already licensed as Better Cotton, and by 2020 this figure is expected to rise to 30% i.e. 8.2 million metric tonnes of Better Cotton.

Better Cotton means producing cotton in a way that cares for the environment through processes that minimise the negative impact of fertilizers and pesticides and cares for water, soil health and natural habitats. BCI Farmers aim to reduce cost of production, achieve better yields and more financial security through access to global markets, while improving the working conditions in their fields.

Cotton that is made in this way meets the Better Cotton Standards. The standards have been developed by BCI, whose members are committed to making Better Cotton a mainstream product. The partners rage from Civilians, NGO sector, Garment manufactures, Farmers, Household brand names etc, all of whom are working to transform the way cotton is produced and safeguard the future generations.

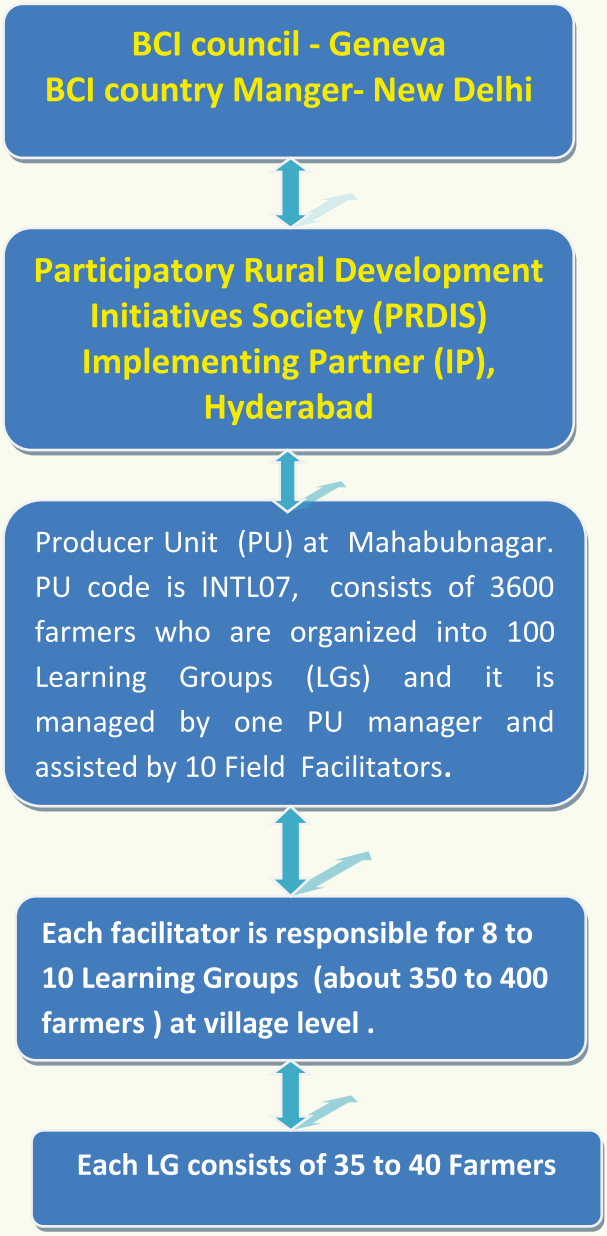
The Better Cotton Standard System is a holistic approach to sustainable cotton production which covers all three pillars of sustainability: environment, social and economic. Each of the elements – from the Production Principles and Criteria to the monitoring mechanisms which show Results and Impact – Work together to support the Better Cotton Standard System and the credibility of BCI and Better Cotton. The system is designed to ensure the exchange of good practices and to encourage the scaling up of collective action to establish Better Cotton as a sustainable mainstream commodity.

The standards give assurance that more responsible farming is happening at field level. Every step of cotton production, from sowing and growing to picking and harvesting, adheres to the production principles. BCI Farmers are also expected to continually improve their production processes.

There are six components which make up the Better Cotton Standard System

1. Production Principles and Criteria; providing a global definition of Better Cotton through the following Key principles.
    - Better Cotton Produced by farmer who minimises the harmful impact of crop protection practices
    - Better Cotton is produced by farmers who use water efficiently and care for the availability of water
    - Better Cotton is produced by farmers who care for the health of the soil
    - Better Cotton is produced by farmers who conserve natural habitats.
    - Better Cotton is produced by farmers who care for and preserve the quality of the fibre.
    - Better Cotton is produced by farmers who promote Decent Work
2. **Capacity Building:** Supporting and training farmers in growing Better Cotton, through working with experienced partners at field level.
3. **Assurance Programme:** Regular farm assessment and measurement of result indicators, encouraging farmers to continuously improve
4. **Chain of Custody:** Connecting supply and demand in the Better Cotton supply chain
5. **Claims Framework:** Spreading the word about Better Cotton by communicating powerful data, information and stories from the field.
6. **Results and Impact:** Monitoring and evaluation mechanisms to measure progress and change, and to ensure that Better Cotton delivers the intended impact.

1.3. ORGANISATIONAL STRUCTURE OF BCI – PRDIS PROGRAMME



1.4. PRDIS AS AN IMPLEMENTING PARTNER (IP)

There are 23 IPs working in India for BCI, PRDIS is a member of BCI and a recognized IP for BCI. It is authorised to work with local partners in Andhra Pradesh, Telangana, Maharashtra and Karnataka on BCI Programme from 2013. Initially Krushi Foundation – an NGO (Karimnagar district) and We Care Society (WCS) – an NGO (Karnataka) were chosen as Local Partners during 2014.

Sarvareddy Venkureddy Foundation for Development (SVFD), Guntur is also added as local partner. During 2014, the programme was operated with about 12000 farmers

(Mahabubnagar-5000 by PRDIS, Karimnagar-3500, Raichur-3500, Guntur – 1000) on 24000 Hectares. The Better Cotton Fast Track Programme (BCFT), Solidaridad, Govt Organisations, Universities, farmers, Department of Agriculture, ATMA and supply chain partners have supported the programme.

Similarly during this year (2015) PRDIS also worked with 21000 farmers (7000, Mahabubnagar, 7000 Karimnagar 5000 Guntur and 2000 Kurnool) in an area of about 38000 hectares. At present PRDIS is working with 23,000 farmers in erstwhile Mahaboobnagar, Karimnagar Districts of Telangana (Now newly covered districts of Mahaboobnagar, Nagarkurnool, Rangareddy, Karimnagar, Rajanna Siricilla and Jagityal) and Guntur and Kurnool of Andhra Pradesh. Incidentally i-Seal is conducting Impact Study at Adhoni area of Kurnool district with PRDIS producer unit.

1.5. NEED AND IMPORTANCE OF THE STUDY

The cotton farmers are in severe distress due to increase in cost of cultivation, decline in productivity and uncertainty of climate changes, market trends and price support. This has also lead to spat of suicides in Telangana, Andhra Pradesh and Maharashtra States of India where cotton is cultivated mostly in rainfed areas.

At the time when farmers are looking for cost effective technologies and sustainability in cotton production, the BCI programme has been designed to make better for farmers, environment and industry. The farmers are being educated in Pest and fertilizer Management Practices through IPM Technologies, Soil and Water Management techniques, Biodiversity and mitigating climate variations, harvesting and postharvest technologies to monitor fibre quality and also on the principles of decent work as well as with supply chain linkages.

The programme is being implemented in 23 countries covering different continents of the globe. Therefore the programme has also ambitious targets of reaching 5 millions farmers in producing 8.2 million tons of Better Cotton to make industry supplied with 33% as Better Cotton out of Global Production by 2020.

Keeping in view the magnitude of the programme, PRDIS approached EEI to undertake an impact assessment in order to learn the lessons for further strengthening and future expansion of the programme.

1.6. OBJECTIVES OF THE STUDY

The overall objectives of the study was to assess the Impact of Better Cotton Initiative (BCI) programme in terms of changes in human and social capital, existing practices and economics of cotton production, pesticides and fertilisers usage, decent work, environment and health issues.

Specific Objectives

1. To study personal and social profile of cotton farmers (beneficiaries, non-beneficiaries of BCI programme)
2. To know the level of knowledge on recommended practices in Cotton Cultivation and Awareness on Principles and criteria of BCI.
3. To assess the extent of adoption of recommended practices of Cotton Cultivation and adoption of best practices of BCI.
4. To find out the changes in relation to economics of cotton cultivation namely yields, cost of cultivation and net returns
5. To find out the changes in extent of use of pesticides and fertilisers.
6. To study the level of confidence on skills, decision making patterns, spread effect of BCI farmers, knowledge on environment & Health and opinion of field staff.
7. To unearth the constraints and suggest possible solutions and develop a suitable strategy to overcome the constraints.

1.7. LIMITATIONS

1. The study was limited to 360 BCI farmers, 100 Non BCI farmers from BCI villages, 60 control group of farmers and hence findings have to be interpreted with caution for generalisation.

2. In the present study the expost – facto design was used and baseline captured through recall method and control group for measuring the extent of knowledge and adoption of practices using Interview Schedule and Focussed Group Discussions.

3. However, before and after experimental design with baseline data was used for capturing yield, income, cost of cultivation, net returns, reduction in pesticides and fertilisers usage etc with available Result Indicators Report (RIR) data with PRDIS which is submitted annually to BCI. It was furture validated through FGDs and Interview Schedule.

1.8. PRESENTATION OF THE STUDY

This study is presented in Four chapters as follows:

Chapter -1 : Deals with Introduction which gives an account of BCI programme, PRDIS, Cotton scenario, Need and importance of the study, Objectives and Limitations.

Chapter- 2: Deals with Methodology with different dimensions namely sampling procedures, variables and measurements, instruments of investigation, methods of data collection and analytical tools.

Chapter-3: Deals with Results and discussions of the study with valid reasoning of the findings.

Chapter-4 : Deals with Summary, Recommendations and Conclusions

Chapter II

METHODOLOGY

Chapter II

METHODOLOGY

This chapter presents the methodology followed in conducting the study. It gives details of research design, sampling procedure, variables and their empirical measurement, instruments and methods used for collection of data, analytical procedures and statistical tools followed for interpretation of the data.

2.1. RESEARCH DESIGN

Ex-post facto research design was adopted to obtain data related to personal socio-economic and situational variables as well as knowledge and adoption of practices. However, the data was also compared with Non BCI farmers and control group of farmers to observe the changes.

According to Kerlinger (1983) Ex-post –facto research was systematic empirical enquiry in which the scientist does not have any direct control of independent variables and were not manipulatable. Inferences about relations among variables made without direct interventions from concomitant variation of independent and dependent variables.

2.1.2 In case of observing the changes in pesticides use, fertilizers use, yields, cost of cultivation, net income (profitability), before and after controlled experimental design was followed for the study based on Result Indicator Reports (RIR) submitted by PRDIS to BCI annually to track the changes.

The Result Indicator Reports (RIR) have number of Sustainable Indicators to help BCI to track progress towards their initiated changes. Some of the indicators are fully integrated into Better Cotton Assurance Programme. Each season, producer units collect the data from a representative sample of randomly selected Learning Groups (LGs) (participating farmers) and report it to BCI.

However further validation of RIR data was also made by asking the sample farmers questions on those indicators and getting the answers through recall method.

2.2 SAMPLING PROCEDURE

2.2.1 Locale of the study

Telangana was selected purposively for the study since BCI was first initiated by PRDIS and has been implementing the Programme in the State for past five years.

2.2.2 Selection of the District

Out of the erstwhile ten districts of Telangana state, PRDIS started BCI Programme first in Mahaboobnagar District. Hence it was purposively selected for the study.

2.2.3. Selection of a Producer Unit (PU)

PRDIS is working with two (2) PUs in the District. The PU (INTL 07 – BCI code) which was first started at Mahaboobnagar comprising villages from Bhoothpur mandal(10), Bijinepally mandals (13) consisting about 3600 farmers was selected purposively.

2.2.4 Selection of the Mandals

The Bhoothpur and Bijinepally mandals of erstwhile Mahaboobnagar District, where BCI programme was first initiated were selected. In the present reorganization of districts. Bhoothpur falls in Mahaboobnagar district and Bijinepalli mandal falls in Nagarkurnool district (Profile of Mandals Annex 2 and Maps in Annexure 3).

2.2.5 Selection of the Villages

Out of the total 23 villages in two mandals three (03) villages from each mandal, thus making a total of 6 villages were selected randomly. The villages selected were Hasnapur, Velkecherla and Kothamolgara from Bhoothpur and Gangaram, Mahadevpeta, Karukonda in Bijinepally mandal.

2.2.6 Selection of the respondents

A beneficiary respondent (BCI Farmer) is operationally defined as a cotton grower involved in practicing Better Cotton Standard System through BCI principles and practices recommended by PRDIS under BCI programme from 2012-13 to 2015-16 in selected villages.

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1. *The mandal is coterminous with Block and is an administrative unit comprising 15-50 villages.*

A Non beneficiary respondent (Non BCI Farmer) is operationally defined as a cotton grower who is not a beneficiary of BCI programme in the BCI villages. They are also called as comparison farmer for purpose of RIR data.

The control group of cotton farmers were selected from two villages where no BCI Programme was initiated and are distantly located form BCI PU village but falling in same ecological zone and having similar soil type.

Thus a total of randomly selected 360 beneficiary (BCI) farmers, 100 Non Beneficiary farmers who were not BCI farmers but cotton growers from the BCI PU villages and 60 sample farmers from two villages where BCI Programme is not initiated (Control group) constituted as sample respondents for the study.

For the purpose of arriving at yields, net Income, cost of cultivation, pesticides and fertilizer usage, the secondary data submitted to BCI as a Result Indicator Reports (RIR) with randomly selected 360 farmers and 100 Non BCI farmers were used for analysis as before and after randomized controlled experimental data. (Village wise selected respondents is given in Annex 1)

2.3 VARIABLES AND THEIR EMPIRICAL MEASUREMENT

Table – I Variable and Measurements

S.No.	Variables	Empirical Measurement
DEPENDENT VARIABLES		
1.	Knowledge	Schedule developed for the study
2.	Adoption	Schedule developed for the study
3.	Yield	Result Indicator Report (RIR) data
4.	Cost of cultivation	Result Indicator Report (RIR) data
5.	Net returns	Result Indicator Report (RIR) data
6.	Pesticides Usage	Result Indicator Report (RIR) data
7.	Fertilisers Usage	Result Indicator Report (RIR) data
INDEPENDENT VARIABLES		
1.	Age	Chronological age of the respondent
2.	Education	Schedule developed by Krishnamurthy (1993) with suitable modifications was adopted for the study

3.	Farming experience	Completed years of respondent in cotton farming
4.	Cotton farming experience	Completed years of experience of the respondents in farming
5.	Extension contact	Schedule developed by Krishnamurthy (1993) with suitable modifications was adopted
6.	Land Holding	Possession of total land by respondents
7	Source of information	Scale developed by Nandapurkar (1980) with suitable modifications was adopted
8	Risk taking ability	Scale developed by Supe (1969) was adopted
9	Opinion on Market facility	Schedule developed for the study
10	Opinion of BCI farmers on Training	Schedule developed for the study
11	Trainings undergone	Schedule developed for the study
12	Awareness about BCI objectives and Principles	Schedule developed for the study
13	Social Participation	Schedule developed for the study
14	Confidence on Skills	Schedule developed for the study and Observations
15	Spread / Multiple Effect	Schedule developed for the study
16	Decision making pattern	Schedule developed for the study
17	Attitude of BCI field staff	Schedule developed for the study
18	Environment and health concerns	Schedule developed for the study

In addition check lists were prepared for Focused Group Discussion (FGDs) where in the women and labor concerns as well knowledge, adoption trends were captured for validation.

2.4. DEPENDENT VARIABLES – KNOWLEDGE AND ADOPTION

2.4.1. Level of Knowledge of the respondents with regard to recommended package of practices in cotton cultivation.

The variable knowledge was operationalized as the information possessed on cotton cultivation practices by the selected "Sample Farmers" A schedule was developed to measure the knowledge of respondents on recommended package of practices in cotton cultivation. In terms of scoring the knowledge items of cotton cultivation, for each correct response one score and zero for an incorrect response was assigned.

Categorization: The respondents were grouped into following three categories based on exclusive class interval technique.

Table: II Knowledge Level with Class Interval Scores

S.No.	Category	Class Interval
1	Low level of knowledge	0-20
2	Medium level of knowledge	21-30
3	High level of knowledge	30-38

2.4.2. Extent of Adoption of the recommended package of practices of cotton Cultivation by the respondents.

Categorisation: The respondents were grouped into following three categories based on exclusive class interval technique.

Table : III Adoption Level with Class Interval Scores

S.NO.	Category	Class Interval
1)	Low extent of adoption	0-11
2)	Medium extent of adoption	12-21
3)	High extent of adoption	22-31

2.5. DEPENDENT VARIABLES – YIELD, NET RETURNS, COST OF CULTIVATION, PESTICIDES & FERTILIZER USE

In addition to knowledge and adoption, Impact of BCI programme in terms of increase in yields, net returns, reduction in cost of cultivation and difference in pesticide and fertilizer usage in implementation of BCI programmes was studied by using Result Indicator Report (RIR) data. However, it was also further validated by cross checking through FGDs and schedule (recall method).

2.5.1. Yields

It was operationally defined as additional yields gained by the beneficiaries due to the implementation of BCI programme. The increased yields were calculated for the year of implementation of BCI i.e., 2013 and 2016 both for beneficiaries and non beneficiaries (Comparison farmers). Based on the total yields obtained by the beneficiaries and non

beneficiaries each year, the statistical test 'z' test was applied to find out the significant difference between the beneficiaries and non beneficiaries to know the impact of BCI.

2.5.2 Cost of cultivation

Reduction in cost of cultivation is operationally defined as the reduction of expenditure on different operations by the beneficiaries due to the implementation of BCI programme. The reduction in cost of cultivation was calculated starting from the year of implementation of BCI 2013 to 2016 both for beneficiaries and non beneficiaries.

Based on the total cost of cultivation obtained by the beneficiaries and non beneficiaries each year, the statistical test i.e. 'z' test was applied to find out the significant difference between the beneficiaries and non beneficiaries to know the impact of BCI.

2.5.3. Net returns

It was operationally defined as the total net returns gained by the beneficiaries due to the implementation of BCI programme. The net returns obtained by the beneficiaries and non beneficiaries were calculated for the starting year of implementation of BCI i.e.2013 and year 2016.

Based on the net returns obtained by the beneficiaries and non beneficiaries each year, the statistical test i.e. 'z' test was applied to find out the significant difference between the beneficiaries and non beneficiaries to know the impact of BCI.

2.5.4. Changes in Pesticides

Based on Result Indictor Report (RIR) the average pesticide consumption per hectare in Kgs / liters is calculated for base year 2013 and 2016 for both BCI farmers and Non beneficiaries A `z` test was administered to know the significant difference in use of pesticides.

2.5.5. Changes in Fertilizers use

Based on the RIR data the consumption of fertilisers per hectare in kgs was obtained for BCI farmers and comparison (Non-BCI) farmers. A `z` test was administered to know the significant difference between BCI and Non Beneficiaries (Comparison Farmers).

2.6. INDEPENDENT VARIABLES

In perusal of Table I, the independent variables viz Age, Education, Farming Experience, Cotton Farming Experience, Land Holding, Extension Contact, Source of information, Risk taking ability, Marketing Facility, Opinion on marketing facilities, Social participation, Information on decision making, Confidence on skills, Multiplier effect. Decision making

pattern were measured through interview schedule and cross validated through PU data and focused group discussions.

The independent variables were classified with equal class intervals based on their scores and some of the variables were analysed using frequency and percentages. The results and discussion chapter presents the tables, classification, categories based on the scores, frequency and percentages.

2.7. METHODS OF DATA COLLECTION

a) Interview

Interview method was one of the prominent methods employed for data collection. This involves interviewing the respondents and getting answers through verbal responses based on the structured and open-ended questions.

b) Participatory methods

The highlights of the study is the use of participatory methods by the consultants in order to supplement and complement the data generated through interviewing with the help of questionnaire. The participatory methods has also given an opportunity to generate additional qualitative data and also **cross validate the data** obtained through interview schedule questionnaire.

The following participatory methods were employed

a) Focused group discussions
b) Participatory monitoring of the field conditions

The entire data collection was managed and supervised by the EEI staff and consultants at various stages. In addition, the data were also cross validated by checking at random some of the questions with the respondents. The validity of the data was also confirmed with the stakeholders.

c) **Case Studies:** In order to strengthen the study further, case studies on different Best Practices / Innovations / improvement criteria were conducted. The cases also reflected the changes in decision making patterns and adoption of Innovations.

2.8. INSTRUMENTS USED FOR DATA COLLECTION

It includes both interviewing farmers and collection of the data from respondents. The structured schedule was used for data collection. Besides interviewing, field visits were made till the total information was collected from all the respondents.

2.8.1. Designing the Interview Schedule

The schedule consisted of five parts. The first part associated with profile characteristics of farmers. The second part dealt with knowledge of the farmers about recommended package of practices in cotton cultivation. Third part meant for knowing adoption of different package of practices of cotton cultivation. The fourth part dealt with impact of BCI on cotton in relation to increase in yields, net returns, reduction in cost of cultivation and difference in market value. The final parts dealt with the constraints and suggestions perceived by the cotton farmers in adoption of recommended packages. The interview schedule was constructed in English and translated into vernacular language, ie., Telugu

2.8.2. For the purpose of impact of BCI on Cotton in terms of reduction in pesticides, fertilizers, cost of cultivation, yields, mass value and net return as mentioned previously Result Indicator Report (RIR) data were used and the data was validated using schedule by recall method.

2.8.3.Training

The field supervisors and investigators were trained in data collection methods and tools.

2.8.4. Pretesting of interview schedule

The pretesting of interview schedule was done in villages other than sample villages

2.8.5. A check list was prepared for Focused Group Discussion (FGDs) with farmers and conducted by faculty of Extension Education Institute, Hyderabad in all the sample villages.

2.9. CONSTRAINTS AND SUGGESTIONS ELICITED FROM THE BENEFICIARIES AND NON BENEFICIARIES OF BCI PROGRAMME.

Problems of the beneficiaries and non beneficiaries of BCI programme were operationally defined as constraints faced by farmers in implementing the BCI programme in their fields. The respondents were asked to express the problems faced by them in the implementation of BCI programme and the problems as stated by them were recorded. Frequencies and percentages were calculated and ranking was given in the order of magnitude.

Suggestions by the beneficiaries and non beneficiaries of BCI programme were operationally defined as the solutions given by them for the improvement in order to have effective implementation of BCI programme. Respondents were requested to give their suggestions in

order to enhance the effectiveness of programme implementation in their area. Frequencies and percentages were calculated and ranking was given in the order of magnitude.

2.10. STATISTICAL TOOLS USED

To convert the results into findings few statistical tests were used as given below for analyzing the data .

1. Mean ($\overline{X}$)
2. Standard Deviation (σ)
3. Frequency and Percentage
4. Class interval
5. `z` test

2.11 PREPARATION OF REPORT

The data thus collected through interview schedule were coded, tabulated, analyzed and presented in tables to make the findings easily understandable. The findings emerged out of the study were suitably interpreted, necessary conclusions and inferences were drawn and presented in the following chapter.

Chapter III

RESULTS AND DISCUSSIONS

Chapter III

RESULTS AND DISCUSSIONS

This chapter presents the objective wise results of the study. The discussion of the study is presented in percentages.

3.1. PERSONAL AND SOCIAL PROFILE OF THE RESPONDENTS

3.1.1 Age

Table 3.1: Distribution of respondents according to age (Percentage)

Category	BCI (N 360)	Non BCI (N 100)	Control (N 60)
Young Age (>35)	22	13	17
Middle Age (36 - 55)	54	75	49
Old Age (<56)	24	12	34
Total	**100**	**100**	**100**

It can be interpreted from table 3.1 that majority (54%) of the BCI Farmers and Non BCI farmers (75%) as well as control group of farmers (49%) were of middle age.

This trend shows that many young farmers are resorting to other occupations rather than farming.

3.1.2. Education

Table: 3.2. Distribution of respondents according to their education (Percentage)

Category	BCI	Non BCI	Control
Illiterate	49	47	72
Primary School	17	26	6
Middle School	7	9	2
High School	18	13	15
Diploma	1	1	0
Intermediate	6	2	5
Under Graduate	2	2	0
Total	**100**	**100**	**100**

Table 3.2 shows that a higher percentage of BCI farmers (49%) and non BCI farmers (47%) and control group of farmers (72%) were illiterates. This trend again signals the need for introducing functional literacy programme in BCI projects, which would enable the farmers to better understand the labels of pesticides & fertilizers, read and write the farmer field Books and empower them to accelerate the adoption process and business sense.

3.1.3. Farming experience

Table 3.3. Distribution of respondents according to their farming experiment (Percentage)

Category	BCI	Non BCI	Control
Low (Below 15) yrs	18	26	24
Medium (15 - 23) yrs	27	29	17
High (24 - 32) yrs	27	32	36
Very high (Above 32) yrs	28	13	23
Total	100	100	100

From table 3.3 it can be observed that the farmers are equally distributed with respect to farming experience in BCI programme. The farmer with low farming experience need to be focussed more in the BCI training programmes so that they will be knowledgeable on par with others.

3.1.4. Cotton farming experience

Table 3.4. Distribution of respondent according to their experience in Cotton Farming (Percentage)

Cotton farming experience			
Category	**BCI**	**Non BCI**	**Control**
Low (Below 15) yrs	51	55	61
Medium (15 - 23) yrs	38	31	27
High (24 - 32) yrs	10	11	12
Very high (Above 32) yrs	1	3	0
Total	100	100	100

The table 3.4 shows that majority of farmers in all categories have below 15 years of experience in cotton farming. The percentage in higher categories is low.This is because in the selected mandals and villages cotton was a relatively new introduction. prior to this, the farmers used to cultivate millets like Sorghum, Bajra, Redgram, Castor etc. With the introduction of cotton, the farmer livelihoods have relatively improved.

3.1.5. Land Holding

Table 3.5. Distribution of respondents according to their land holding (Percentage)

Category	BCI	Non BCI	Control
Marginal (> 1Ha)	21	22	17
Small (1ha - 2Ha)	43	42	53
Semi Medium (2Ha - 4Ha)	28	33	27
Medium (4Ha - 8Ha)	7	3	3
Large (< 8Ha)	1	0	0
Total	**100**	**100**	**100**

From the table 3.5, it can be concluded that majority of farmers are marginal and small holders. Similar trend is observed with other categories. The project also aims at small and marginal famers as such the control groups also were selected with matching variables as of BCI farmers.

3.1.6. Extension Contact

Table 3.6. Distribution of respondents according to frequency of contact with extension agencies

Agency contact to farmers	Category	BCI	Non BCI	Control
PRDIS	Always	96	2	0
	Occasionally	2	19	0
	Rarely	1	16	0
	Never	1	63	100
Total		**100**	**100**	**100**
Govt Officials	Always	5	1	0
	Occasionally	18	4	0
	Rarely	15	18	0
	Never	62	77	100
Total		**100**	**100**	**100**
Dealers	Always	19	3	33
	Occasionally	6	49	12
	Rarely	16	12	44
	Never	59	36	11
Total		**100**	**100**	**100**

The table 3.6. shows that PRDIS is the major Extension Agency contacted by 96% of BCI farmers, followed by Government agencies occasionally. However, majority of Non-BCI farmers contacted dealers followed by PRDIS, while the control group of farmers mostly relayed on the input Dealers.

3.1.7. Source of information

3.7. Distribution of respondents according to the source of information on Cotton Cultivation

Source of information	Category	BCI	Non BCI	Control
PRDIS	Frequently	97	0	0
	Less Frequently	1	22	0
	Never	2	78	100
Total		**100**	**100**	**100**
Friends & Relatives	Frequently	36	60	47

	Less Frequently	58	20	53
	Never	6	20	0
Total		100	100	100
Mass Media	Frequently	54	17	59
	Less Frequently	26	77	36
	Never	20	6	5
Total		**100**	**100**	**100**
Others	Frequently	34	47	28
	Less Frequently	50	43	55
	Never	16	10	17
Total		**100**	**100**	**100**

As per table 3.7. It is clear that for BCI farmers the main source of information for Cotton Cultivation is PRDIS followed by friends, relatives, mass media and others including government agencies and dealers, where as for other categories of farmers, farmers & relatives, mass media, government, dealers were major sources, of information. Hence there is a dire need to promote more Farmer to Farmer Extension.

3.1.8. Risk taking ability

3.8. Distribution of respondents according to their Risk taking ability

Risk Taking Ability			
Category	**BCI Farmers**	**Non BCI Farmers**	**Control Farmers**
Low (0-2)	9	52	82
Medium (3-5)	38	27	12
High (6-7)	53	21	6
Total	100	100	100

From table 3.8. It can be seen that majority of BCI farmers (53%) have high risk taking ability. It could be concluded from the table that cotton cultivation itself includes risk in rain fed areas, BCI was a new programme and anything new includes uncertainty and risk. Although farmers knew that it is a new programme, they have joined BCI programme as members of PU which shows that they had high risk taking ability.

3.1.9. Marketing facilities

Table 3.9. Distribution of respondents according to their utilisation of market facilities

Category	**BCI Farmers**	**Non BCI**	**Control**
Agri Market	17	14	0
Ginners	12	0	0
Middle man	70	86	100
Total	**100**	**100**	**100**

As per the table 3.9, it is evident that majority of respondents depended on the middlemen for purchase of the cotton since they pay money on the spot in cash and some of them give loans to the farmers to recover at harvest. However, uptake to ginners directly is reported by about 12% of BCI farmers due to the effort of PRDIS team. This aspect need to be looked in future since there is lot of exploitation by middle men in weighing cotton and market rates BCI need to put more directed efforts in creating demand as supply chain management is crucial for sustainability. Further, there is a need to provide timely market information by BCI staff.

In fact, linking Ginners to farmers for direct Marketing is an important task for which due weightage need to be placed in apportioning the time and effort of PU Managers and field staff.

3.1.10. Opinion on market facility

Table 3.10. Shows opinion of farmer on market facility

Category	BCI	Non BCI	Control
Satisfactory	36	27	3
Good	12	40	73
Very good	4	0	0
Unsatisfactory	48	33	24
Total	100	100	100

The analysis of the table 3.10 shows that BCI farmer (48%) were dissatisfied with market facility. They are of opinion that if they contact ginners directly, they will get better price for the quality of cotton and exploitation by middlemen can be avoided. This was due to education about market and supply chain by PRDIS in the programme.

3.1.11. Social Participation

Table: 3.11. Distribution of respondents according to their Social Participation (percentage)

Category	BCI	Non BCI	Control
Low (1-2)	88	70	80
Medium (2-4)	11	2	1
High (4-6)	1	0	3
No Membership	0	28	16
Total	**100**	**100**	**100**

It can be informed from the table 3.11that most of the BCI farmers were members of LGs or farmer groups followed by medium category who were either office bearers or members in more than one group / organisation. Similar trend is observed in other categories.

BCI promotes learning groups where in about 30-40 farmers will be included. The group is led by a lead farmer. Similarly government is also encouraging SHGs and Commodity Groups in rural areas.

3.2. SKILLS, DECISION MAKING PATTERN, SPREAD EFFECT, AND ATTITUDES

3.2.1. Skills

Table 3.12. Distribution of respondent according to their level of confidence about practicing skills (percentage)

Category	BCI	Non BCI	Control
Fully confident (16-24)	40	-	-
Partially confident (8-16)	60	30	14
Not confident (1-8)	0	70	86

It can be concluded from the table 3.12. that about 60% of BCI farmers were partially confident about skills involved in Integrated Crop Management Practices of cotton where as 40% reported they were confident. Regarding Non BCI farmers and control group majority reported that they have no confidence. The complex skills learned by BCI farmers were diagnostic skills, Agro Eco System Analysis (AESA) for decision making, facilitation and communication skills besides simple skills like placement of fertilisers, techniques of spraying, weeding, harvesting etc.,

It was evident that the BCI farmers were imparted with knowledge and taught skills through FFS Demonstration plots and other programmes.

3.2.2 Spread / Multiplier Effect

Table 3.13. Distribution of respondent according to their information spread effect (percentage)

Particulars	BCI	Non BCI	Control
Below 5 farmers	40	-	-
5-10 Farmers	60	30	14
Above 10 farmers	0	70	86
No spread of information	10	85	80

It was observed from the table 3.13, that majority (84%) of BCI farmers reported that they have spread the farm related information learned from facilitators and other sources to less than 5 farmers where as 10% farmers said they did not communicate to any farmer. On the contrary the majority of Non BCI and control farmers reported that they have not spread the messages / technologies to the other farmers. This effort is through motivation of farmers by BCI facilitators.

This is also due to the BCI emphasis on group dynamics, social aspects which might have influenced them to spread the useful information / technology to other farmers. In addition BCI farmer responded that they are also following the principles to other crops. Thus BCI is laying solid foundation towards sustainability.

3.2.3. Decision Making Pattern

Table 3.14. Distribution of respondents according to their decision making patterns (Percentage)

Category	BCI	Collective decisions with Spouses / family members	Consultation with others
Crops to be grown	60	35	5
Selection of seed	90	-	10
Labour requirements	50	40	-
Crop Management	70	20	10
Pest Management	60	20	20
Crop Management	60	40	-
Storage and processing	40	60	-
Marketing	60	40	-

It was observed from the table 3.14, that majority of farmers were taking own decisions on many aspects of farming. However, collective decisions in consultation with spouse and family members is also happening in some of the practices.

The BCI enrolled farmers have their own /leased land with decision making capabilities hence the male farmers are more. However since women also participate in decision making as well as contribute as labour / managerial input to cotton farming, it is advisable to have both men and women involved in training while enrolling them in to LGs. Alternatively special training programmes on management and imparting skills could be organised to women in order to address Gender concerns in BCI programme. They also should be taught skills as majority work as farm labour in their own farms. In addition it is also recommended to recruit female facilitators and staff to have better access to women.

3.2.4. Environment and Health Concerns

3.15. Distribution of respondents according to their operation health and environmental concerns

Particulars	BCI Farmers	Non BCI Farmers
Health Concerns		
a)After spraying pesticides farmers get skin / eye irritation.	75	70
b) Farm produce grown using IPM technologies with less chemicals /organically are more tasty	85	80
Environmental Concerns	85	50
a) Spraying of neem leaf extracts protect natural enemies.	70	56
b) Pesticides application contaminates air, water, soil and farm produce		
c) Proper disposal of pesticide containers is vital for healthy environment	87	54

It was observed from the table 3.15 that majority of BCI farmers and Non BCI farmers have perceived the ill effect of pesticides on health. Similarly, majority of BCI farmers perceived the damage done to environment and Biodiversity by toxic pesticide application and storage where about 50% of Non BCI farmer had the similar perceptions.

From the focused group discussion also it is observed that the opinion of BCI farmers regarding environment and health concerns is favourable. Thus BCI had created public awareness on Health and Environmental Issues.

3.2.5. Opinion of PU Field Staff about BCI programme

Table 3.16. Distribution of respondents according to their attitude (Percentage)

Categorization	Frequency	Percentage
Favourable (24-26)	49	98
Undecided (12-24	1	2
Net farmers	0	0

As per the table 3.16 it is evident that a large majority of staff members were favourable about BCI programme and its usefulness to farmers, environment and the industry.

They also expressed scaling of the programme to uncovered villages. They recognised the need for finding out a mechanism for reducing dropout rates in LG training. Intensive follow-up encouraging farmer to farmer extension, use of ICT, organisation of more exposure visits and above all the need to strengthen supply chain by creating more demand for BCI cotton so that the Ginners are encouraged to procure the BCI cotton from the villages and pay reasonable market price for quality of cotton.

3.3. HUMAN CAPITAL – AWARENESS, KNOWLEDGE AND ADOPTION OF PRACTICES

3.3.1 Opinion of BCI farmers on Training

Table 3.17. Showing opinion of BCI farmers on the LG trainings imparted by PRDIS (Percentage)

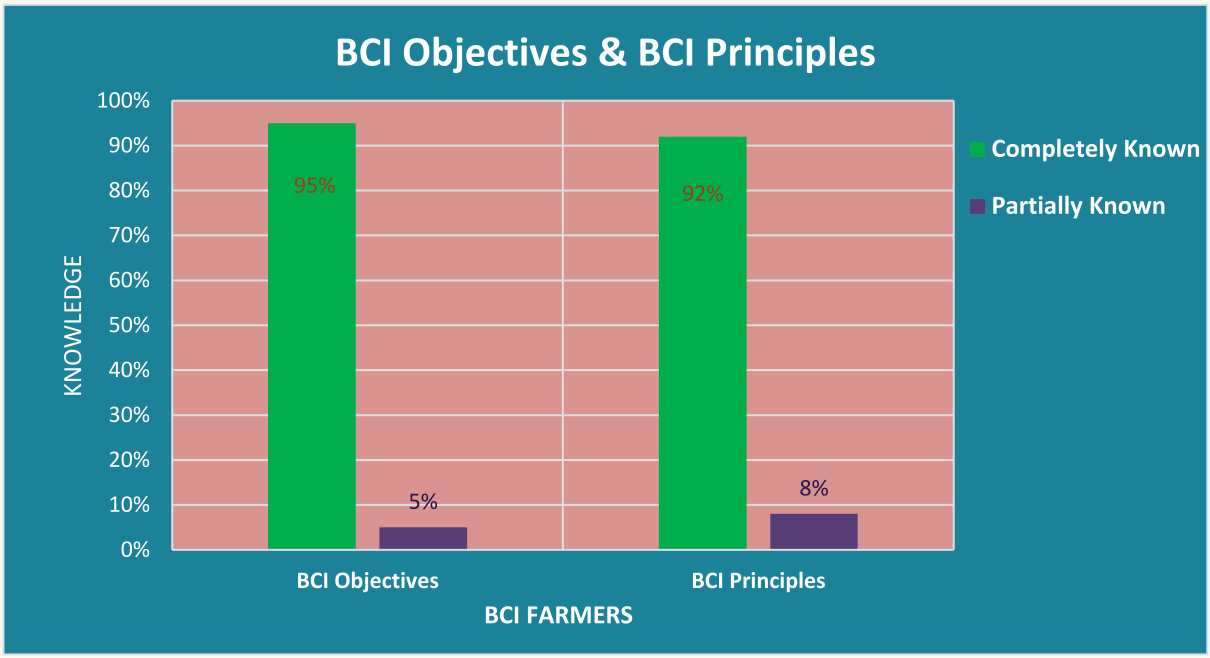
Training given to BCI farmers by PRDIS	
Category	**(Percentage)**
Regular	72
Irregular	28
Total	100

Majority of BCI farmers reported that the trainings were being conducted at LG level regularly as per plan and they have benefited out of it. Whereas non BCI and control farmers reported that they did not attend any Training Programme from any other source.

3.3.2. Awareness on BCI objectives and Minimum Production Principles

Table 3.18. Shows the Awareness about BCI objectives and minimum production principles (Percentage)

Category	BCI Objectives	BCI Principles
Completely Known	95	92
Partially known	5	8

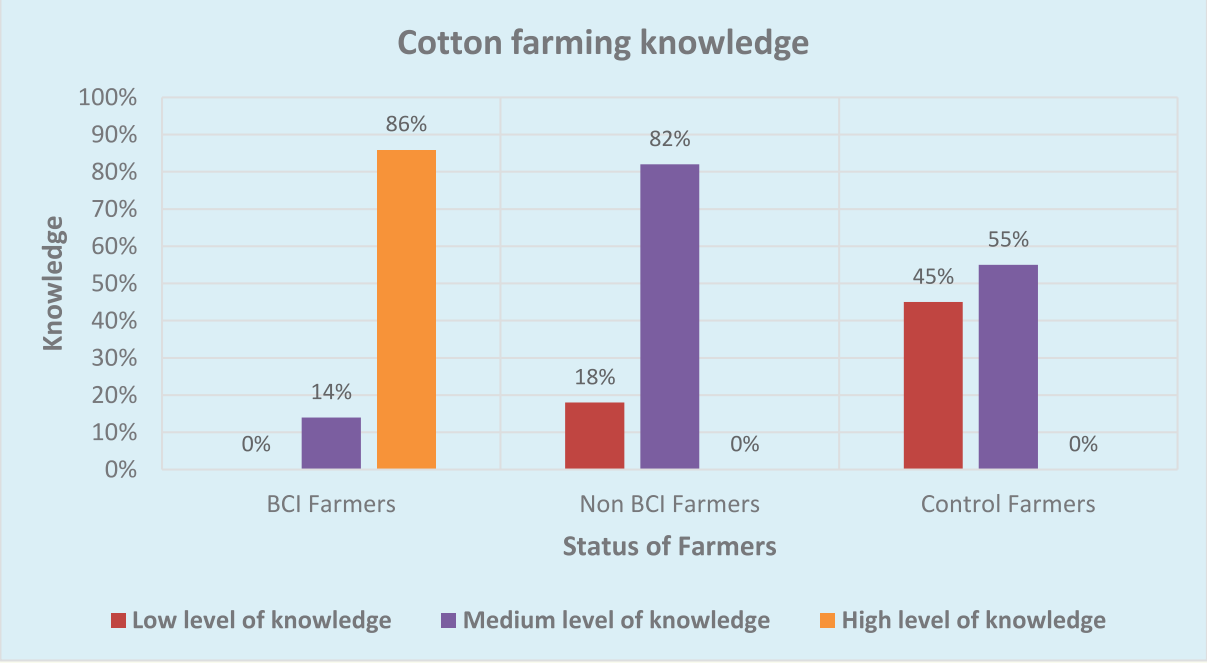


From table 3.18 it is clear that large majority of BCI farmers were aware about BCI objectives production principles.

3.3.3 Showing the knowledge level of respondents on cotton farming

Table 3.19 : Knowledge on Cotton farming (Package of practices)

Category	BCI Farmers	Non BCI Farmers	Control Farmers
Low level of Knowledge (0-11)	0	18	45
Medium level of Knowledge (12 - 21)	14	82	55
High level of Knowledge (22-31)	86	0	0
Total	100	100	100



From the table 3.19. it is evident that about 86% of BCI farmers have high knowledge on Cotton production and protection technologies as well as farm management where as most of Non BCI and Control farmers fell in the medium level knowledge category.

This was attributed by BCI farmers to BCI training, SMS Messages, Mass Media, Farmer Field Schools, Demonstration and Exposure visits. Although baseline survey was not conducted through FGDs similar results were seen and validated.

3.3.4. Difference in Knowledge Levels on Cotton Farming

Table 3.20. Showing the difference in Knowledge levels on Cotton Farming

S.No	Respondent category	Size of the sample	Mean	S.D	Z' value
1	BCI	360	33.63	3.02	23.8*
2	Non BCI	100	23.62	3.98	

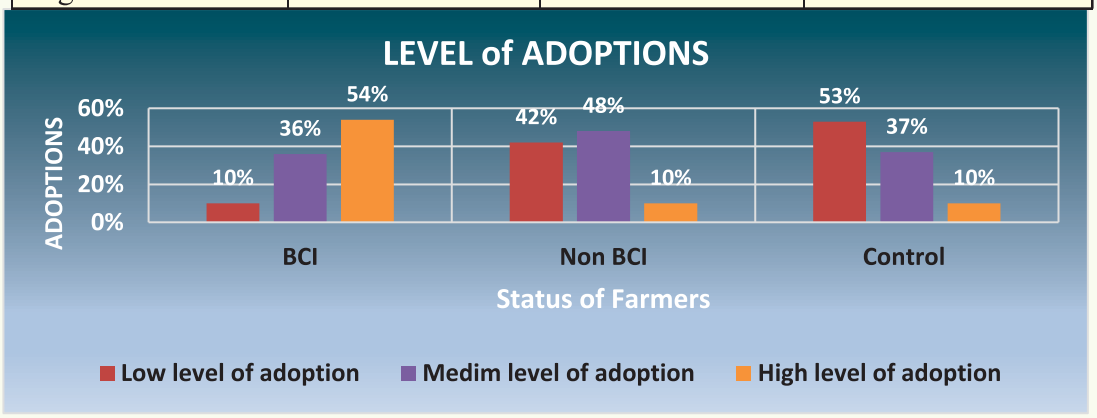
*Significant at 0.05 percent level of probability.

It was evident from table 3.20 that calculated Z value was greater than the Z table value at 0.05 level of probability. Hence the null hypothesis was rejected and empirical hypothesis was accepted. Therefore it could be concluded that there was a significant difference between knowledge level of BCI and non BCI farmers on recommended package of practices in cotton cultivation. Similar trend is observed with BCI and control group of farmers.

3.3.5. Adoption Levels of BCI Farmers (percentage)

Table 3.21. Table showing the extent of Adoption of Recommended package of practices in cotton cultivation

Category	BCI	Non BCI	Control
Low	10	42	53
Medium	36	48	37
High	54	10	10



From the tabe 3.21, it is evident that about 54% of BCI farmers are high adopters followed by medium category. However only 10% of Non BCI and control group were high adopters. Futhermore, more than 50% of control group and 40% of Non-BCI farmers were low adopters.

This trend shows the effect of BCI in motivating farmers to adopt the recommeded production technologies in cotton farming.

3.3.6. Difference between BCI and Non BCI farmer in adopting

3.22. Table showing difference between BCI and Non-BCI Farmers in extent of adoption

S.No	Respondent category	Size of the sample	Mean	S.D	Z' value
1	BCI	360	71.75	11.3	12.2*
2	Non BCI	100	50.88	16.6	

*Significant at 0.05 percent level of probability.

It was evident from table 3.22 that calculated Z value was greater than the Z table value at 0.05 level of probability. Hence the null hypothesis was rejected and empirical hypothesis was accepted. Therefore it could be concluded that there was a significant difference between adoption level of BCI and non BCI farmers on recommended package of practices in cotton cultivation.

3.3.7. Best Practices knowledge & adoption

3.23. Showing the knowledge & adoption of Best Practices advocated by BCI

(Percentages)

S.No	Practices	Knowledge	Adoption
1.	Intercrop	80	20
2.	Border crop / Refugia	90	60
3.	Trap crop	90	50
4.	Regular Monitoring	95	95
5.	Safety measures in using plant protection equipment, spraying	90	50
6.	Decent Work	90	Followed
7.	Child Labour	90	No child labour
8.	Bagging	85	70
9	Storing / Transport	95	90
10	Precautions in Harvesting	85	70
11	Pesticide Label Reading	80	30
12	Not to use cock tails	75	65
13	Not to use Monocrotophos	80	70

14	Soil test based fertiliser use	90	85
15	Nitrogen Management	90	90
16.	Water management	80	70
17.	Mulching	70	20
18	Use of compost / enriched FYM	80	70
19.	Use of botanicals	90	80
20	Use of traps for pest management	80	50

From the table 3.23 it is clear that a large majority of farmers are knowledgeable about best practices taught to them in BCI programme (both as minimum and improvement criteria). However percentage of adoption of the practices is varying from practice to practice.

The above trend also shows the impact of the BCI programme.

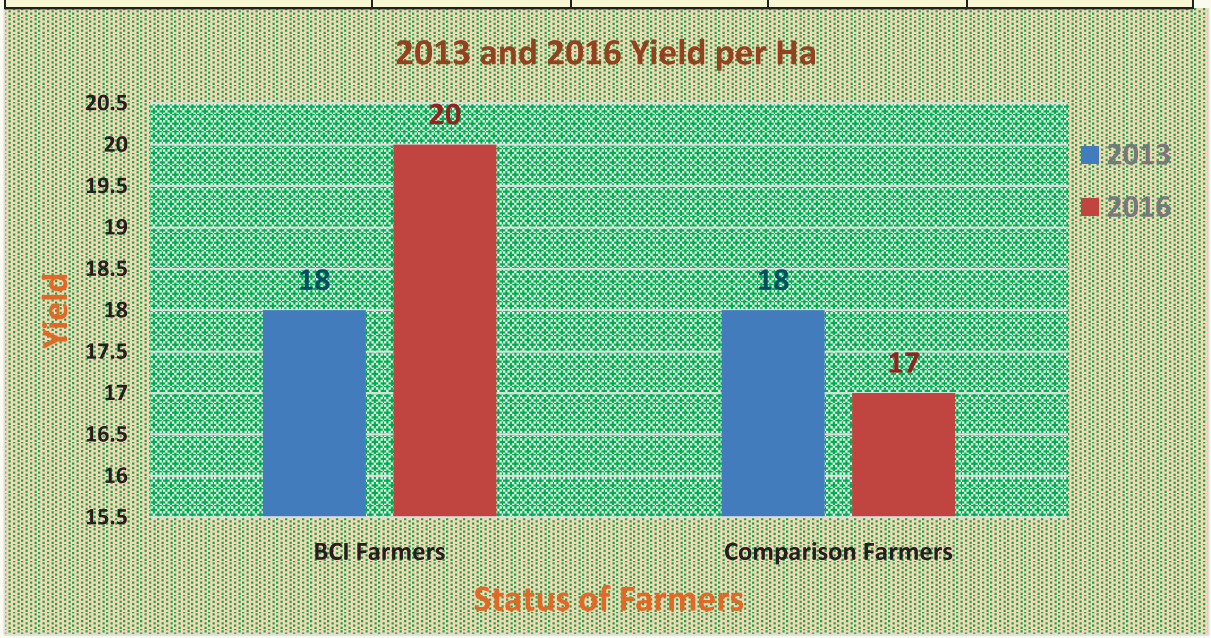
3.4. CHANGES IN ECONOMICS OF COTTON CULTIVATION

This chapter deals with changes in economics of cotton cultivation namely yields, cost of cultivation, and net income.

3.4.1. Yield

Table 3.24. Yield per Ha of BCI farmers and Comparison farmers of 2013 and 2016 years

Category	BCI Farmers		Comparison Farmers	
	2013	2016	2013	2016
Average Yield per Ha in Quintals	18	20	18	17



From table 3.24 it is evident that BCI farmers reported on an average of getting 11% of yield increase. On the contrary the comparison farmers reported 6% decrease in yield compared the year 2016.

The increased yield is a result of following the good management practices eco-friendly and cost effective technologies. The yield increase happened despite the usage of less chemical pesticides, fertilisers and less water.

3.4.2. Difference between BCI and Comparison farmers in yield data

3.25. Table showing Yield Z-test

S.No	Year	BCI			Comparison			Z' value
		n values	Mean yield	S.D	n values	Mean yield	S.D	
1	2013	317	18.5	6.86	96	18	7.02	0.6*
2	2016	473	20	6.75	100	17	6.7	4.1*

*Significant at 0.05 percent level of probability.

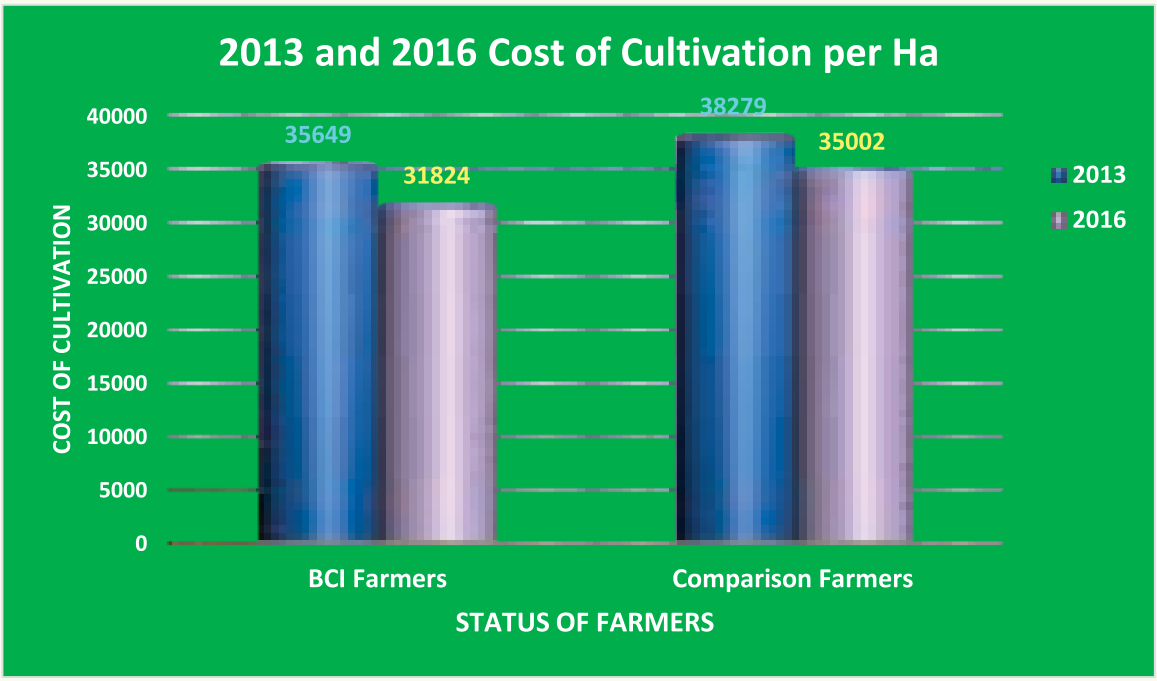
It was evident from table 3.25 that initially during the year 2013 the calculated Z value (0.6) was less than the table value. Hence, it can be concluded that there was no significant difference between BCI and Non BCI farmers.

But later there was a gradual increase in the Z values. During the year 2016 the calculated Z value (4.1) was more than the table value. Hence, it can be concluded that there was significant difference between BCI and Non BCI farmers with respect to increase in yields.

3.4.3. Cost of Cultivation

Table 3.26. Cost of cultivation, Gross Income and Net income (profit) per Ha of farmers
[Values in Rs/-]

Category	BCI Farmers		Comparison Farmers	
	2013	2016	2013	2016
Cost of cultivation per Ha	35649	31824	38279	35002
Net Income (Profit) per Ha	75798	93956	72576	79688
Net income per Ha	40149	62131	34296	44686



From the table 3.26 it is observed that (11%) BCI farmers reported that of cost of cultivation per ha was decreased where as comparison farmers reported 8% decrease of cost of cultivation compared to base year 2013.

Although the decrease in cost of cultivation was marginal (31%) compared to control farmers, the tread can be attributed due to decrease in input use specially pesticides and fertilisers.

The comparison farmers (Non-BCI farmers) were selected from same villages, they too adopted some of the BCI practices specially reduction of chemicals and adopting eco-friendly technologies by seeing neighbouring farmers and hence the marginal difference in decrease of cost of cultivation.

3.4.4 .Reduction in Cost of Cultivation:-

3.27. Difference between BCI and Non BCI about the difference in cost of cultivation of cotton

Cost of cultivation of Z - test

S.No	Year	BCI			Non BCI			Z' value
		n values	Mean cost Rs/- Ha	S.D	n values	Mean cost Rs/- Ha	S.D	
1	2013	317	35649	12465	96	18	13366	1.7*
2	2016	473	31824	12402	100	17	12804	2.3*

*Significant at 0.05 percent level of probability.

It was evident from table 3.27 that initially during the year 2013 the calculated Z value (1.7) was less than the table value. Hence, it can be concluded that there was no significant difference between BCI and Non BCI farmers.

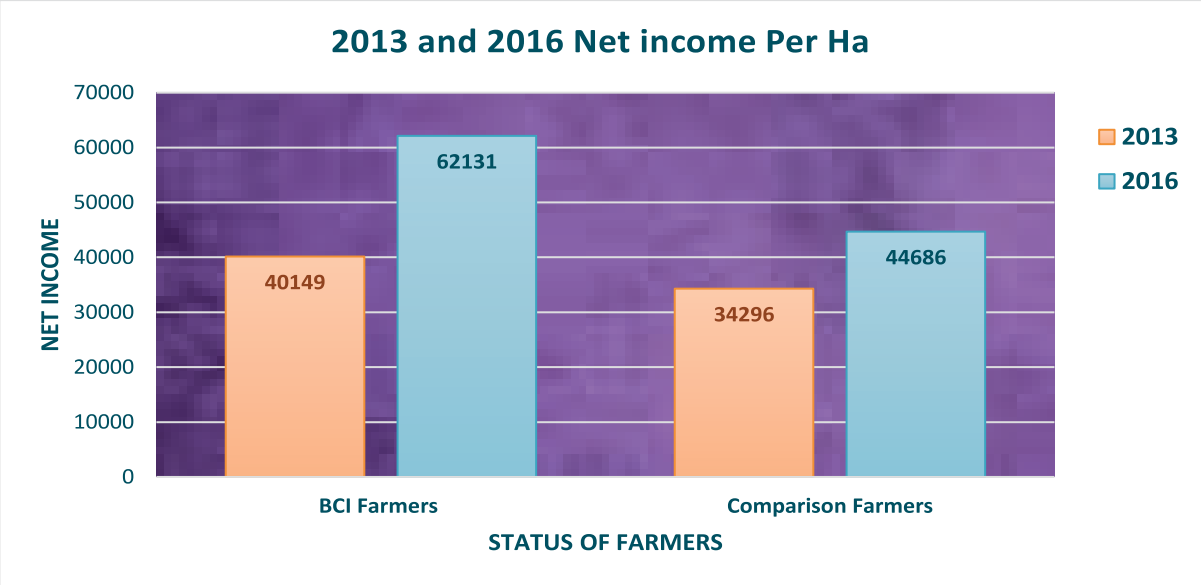
But later there was a gradual increase in the Z values. During the year 2016 the calculated Z value (2.3) was more than the table value. Hence, it can be concluded that there was significant difference between BCI and Non BCI farmers with respect to increase in yields.

3.4.5 Net Income

3.28. Changes in Net Income of respondents

From table 3.28 it can be inferred that gross income of 24% of BCI farmers increased due to increase in yield and 10% of Income decreased in case of Comparison farmers.

Category	BCI Farmers		Comparison Farmers	
	2013	2016	2013	2016
Net Income (Profit) per Ha	75798	93956	72576	79688
Net income per Ha	40149	62131	34296	44686



The BCI farmers average Net income (Profit) per hectare increased by 55% compared to base year (2013) where as the increase (profit) was about 30% with Non BCI farmers (comparison farmers). Despite the rise in labour costs, the cost of production reduced, due to the use of less pesticides, fertilisers and good management practices specially on water & soil with eco-friendly technologies inter crop / boarder crop with cereals and pulses it was possible to achieve about 50% of additional net profit. However, compared to comparison farmers, BCI farmers got 30% higher net profit. This clearly demonstrates the impact of BCI in reducing costs and increasing the profit of small and marginal farmers specially in a typical rainfed area, besides its contribution to environment and biodiversity due to promotion of eco-friendly technologies.

3.4.6 Increase in Net Income

3.29. Difference in Net Income between BCI and Non BCI Farmers

Net income Z – value

S.No	Year	BCI			Non BCI			Z' value
		n values	Mean net income Rs/- Ha	S.D	n values	Mean net income Rs/- Ha	S.D	
1	2013	317	40149	33180	96	34296	19853	2.1*
2	2016	473	62131	21829	100	44686	20460	14.6*

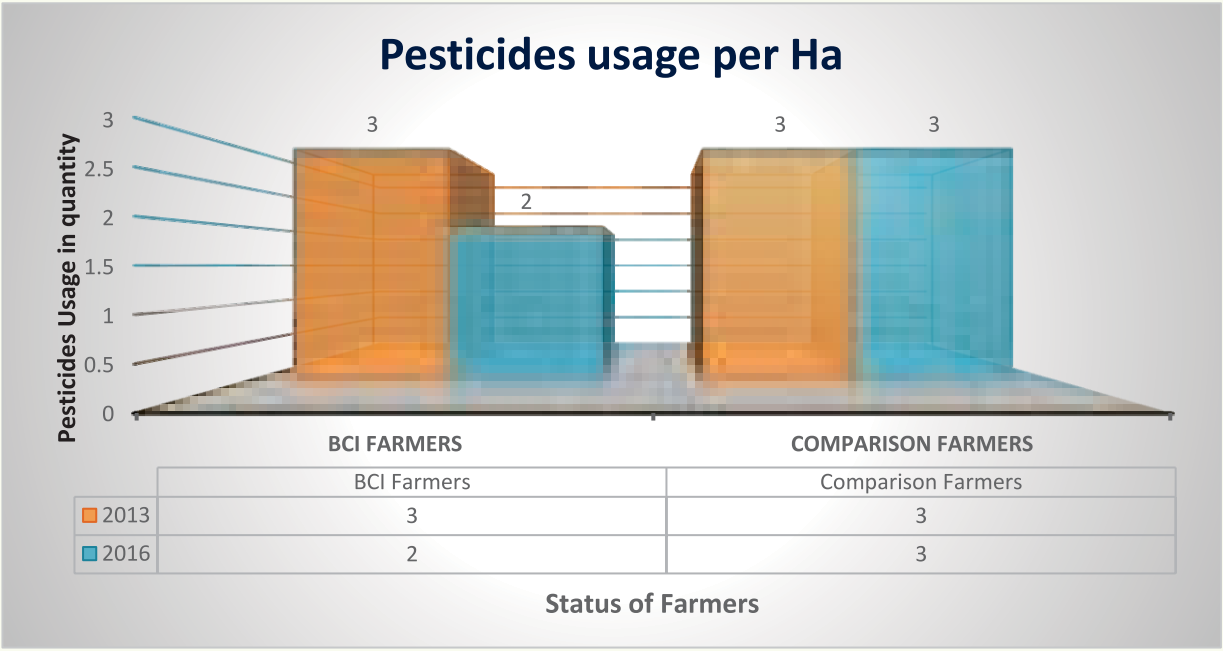
*Significant at 0.05 percent level of probability.

It was evident from table 3.29 that during the year 2013 the calculated Z value (2.1) was less than the table value. Hence, it can be concluded that there was no significant difference between BCI and Non BCI farmers.

But later there was a gradual increase in the Z values. during the year 2016 the calculated Z value (14.6) was more than the table value. Hence, it can be concluded that there was significant difference between BCI and Non BCI farmers with respect to increase in Net Income.

3.4.7. Changes in use of Pesticides and Fertilisers

Table 3.30 Pesticides usage per Ha in quantity



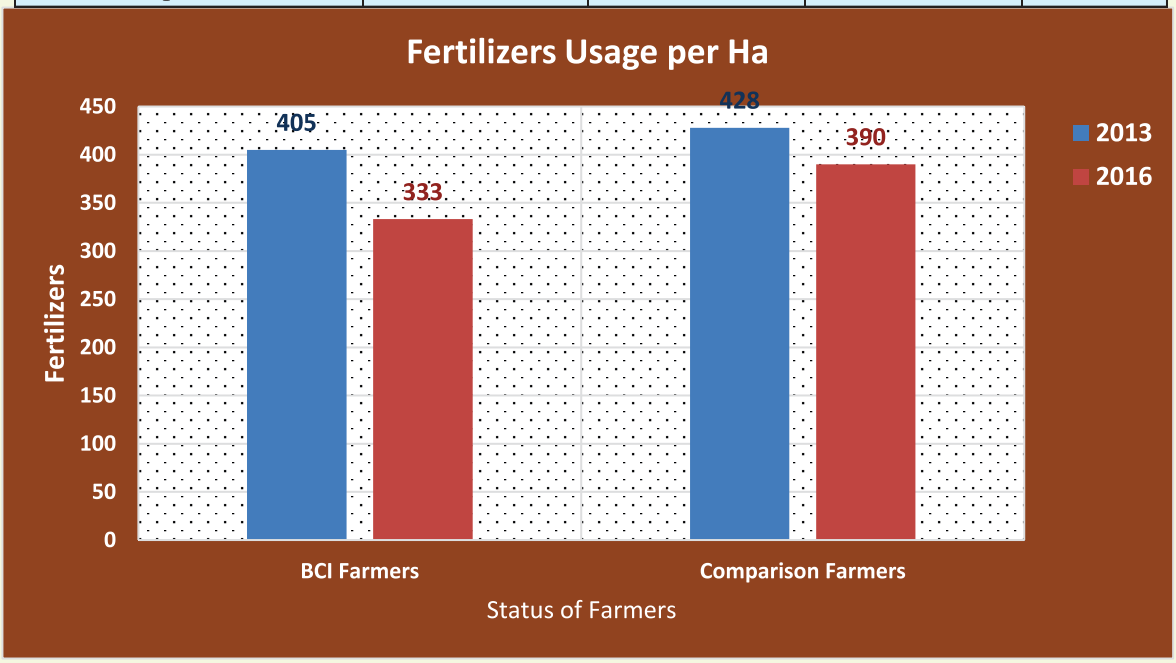
The table 3.30 and figure illustrates the changes in average usage of pesticides by BCI and comparison farmers. It is starling to note that there was 33% decrease in usage of pesticides

among BCI farmers where as statuesque, remains with comparison farmers. This was possible due to very intensive training and demonstration programmes organised by PRDIS under BCI programme to educate them about ill effects of pesticide usage on health and environment as well contributing to higher cost of cultivation.

It was also evident from interviews and focused discussion with BCI farmer in study area that there was increase in use of Botanical pesticides specially Neem Seed Kernal extract, Neem oil etc.,

Table 3.31. Fertilizers usage quantity (Kgs/Hect)

Category	BCI Farmers		Comparison farmers	
	2013	2016	2013	2016
Fertilizers per Ha	405	333	428	390
N per Ha	89	88	93	104
P per Ha	59	45	73	59
K per Ha	52	48	55	49



The table 3.31 shows the changes in fertiliser usage during the year 2013 and 2016. From the table it is clearly evident that there was decrease of 18% in usage of chemical fertilizers by BCI farmers and 9% decrease with comparison farmers. The interview with Non-BCI farmers confirmed that they have also reduced the use of chemical fertilisers by seeing their neighbour BCI farmers. With respect to `N` Management, generally farmers in study area were using optimum level of `N` based on soil test recommendations. However there was increase in use of `N` by comparison farmers hoping for more yields. The BCI farmers were

educated on `N` Management since excess dose of N even in different splits will enhance the sucking pest menace. The result is slight decrease in usage.

Similarly due to advocacy on using phosphorous fertilisers (Dose, time, placement) specially use of single super phosphate; there was considerable decrease (23%) in its usage. The usage by comparison farmers was also decreased (19%) since they also learned from neighbours and friends and specially BCI farmers by Farmer to Farmer Extension.

Similar trend was observed with potash application. The BCI farmers followed recommendations therefore, slight decrease (8%) in usage whereas non-BCI farmers are still following little higher doses. It was also observed from interviews that BCI farmers were using organic manure, compost, organic fertilizers more and reduced the use of synthetic fertilisers.

3.5. CONSTRAINTS AND SUGGESTIONS BY THE BCI FARMERS (IN PARENTHESES).

Constraints:-

1. Non availability of inputs like yellow sticky traps, botanical pesticide like neem kernel extract etc., protective equipment, botanical pesticides etc(90%).
2. Middlemen exploitation in input supply and marketing(85%)
3. Less training emphasis in BCI on post harvest and market aspects (75%).
4. Drought and untimely rains (95%)
5. Difficult to maintain Farmer Field Book since they were illiterates (70%).

Suggestions:-

1. Majority of the farmers want to have organized input supply with in the village which could be taken up through SHGs and Community Based Organizations.(90%)
2. More exposure visits to successful farmer fields with in the state and outside the state.(85%)
3. Expecting extra price for licensed better cotton than conventional cotton(95%)
4. Creation of demand for better cotton to ensure ginners take the cotton directly from the village (95%).
5. Supply of Personal Protective Equipment, traps, seeds and other recommended equipment on cost sharing basis.(70%)

CHAPTER IV

Summary, Conclusions and Recommendations

CHAPTER IV

Summary, Conclusions and Recommendations

Cotton is the most important and ancient commercial crop grown in India. India ranks as second in the world in cotton production.

About 65 % of the area under cotton cultivation is rainfed. India also registers low productivity with an average yield of 3 to 10 quintals of lint/ Ha. Although cotton occupies about 7% of the cropped area it consumes more than 50% of pesticides used for crop protection. The indiscriminate use of pesticides and fertilizers has created serious environmental and health problems including resistance to pests. Although the Bt cotton introduction has initially solved the major pest problems, subsequently the sucking pest menace has increased.

Realizing the problems associated with cotton production, a group of visionaries have started a not for profit membership organization namely Better Cotton Initiative during the year 2005 which is based in Geneva. It has gradually grown attracting membership from farmers organizations, civil societies, ginners, spinners, manufacturers, brands and retailers. At present BCI is operating in about 23 countries aiming at 30% of world cotton production from 5 million farmers by 2020.

Keeping in view the magnitude of expansion based on the success of the programme, favourable response from all stakeholders, it was thought desirable to initiate an impact assessment study on BCI cotton growers in order to find out the increase in human capital in terms of extent of impact on knowledge, adoption of practices, economic capital in terms of yield, cost of cultivation, net returns and changes in the use of pesticides and fertilizers. Furthermore, the study also covered social, environmental and health issues. The results hopefully will be useful for making suitable modification in the standards for further use in expansion and implementation of the programme.

Participatory Rural Development Initiatives Society (PRDIS), a Professional NGO has approached Extension Education Institute, Hyderabad to undertake a study on the BCI implementation and impact to know the results and also make necessary changes in implementation based on the recommendations. Accordingly, the study was conducted in

Producer Unit (INTL07) of erstwhile Mahabubnagar district. The study was conducted with 360 randomly selected BCI farmers, 100 non BCI farmers and 50 farmers from villages where BCI was not implemented (Control Group). An interview schedule, focused group discussion with observation was used for collection of data. In addition, the secondary data of Result Indicators Reports (RIR) were also used. The data were analysed and presented in this report.

4.1. THE RESULTS OF THE STUDY ARE SUMMARIZED AND PRESENTED BELOW.

A. Personal and Socio Economic Profile

The majority of the respondents belonged to middle age group (36 to 55 Years), illiterates having mixed experience in farming and considerably low experience (below 15 Years) in cotton farming operating small and marginal farms.

B. Extension Contact

The major extension agency contacted by BCI farmers was PRDIS followed by dealers and government agency. However dealers were major source for extension contact for non BCI and control group of farmers. The source of information for BCI farmers was PRDIS followed by mass media, friends and relatives, whereas the non BCI farmers relied more on friends and relatives.

C. Risk taking ability

Majority of BCI farmers had high risk taking ability compared to other farmers.

D. Marketing facilities

Majority of the respondents depended on the middle men for purchase of cotton however

12 % of BCI farmers have directly sold to ginners.

E. Regarding opinion on market facility

Most of the farmers were dissatisfied since there was lot of exploitation of middlemen.

F. Social participation

Most of the BCI farmers were members of LGs and farmer groups, about 11 percent are office bearers and members in more than one group.

G. Human Capital

Training: Majority of the BCI farmers reported to have trained at LG level regularly where as other farmers did not attend any training programme.

Awareness on BCI objectives and principles: a large majority of the BCI farmers were aware completely about BCI objectives, principles and criteria. A small percentage were partially aware.

Knowledge level of respondents: Majority (86%) of BCI farmers had high level of knowledge on cotton farming where as non BCI farmers had medium level of knowledge. There was significant difference between the BCI and non BCI farmers with respect to knowledge at 0.5 level of probability.

Adoption: About 54 % BCI farmers are high adopters where as 10% farmers from non BCI and control groups belong to that category. There was significant difference between BCI and non BCI farmers with respect to extent of adoption.

Best practices- knowledge and adoption: a large majority of farmers of BCI were knowledgeable about best practices taught to them in BCI programme (both as minimum and Improvement criteria). However percentage of adoption of practices varied from practice to practice.

Skills

The majority of BCI farmers were partially confident about skills involved in ICM practices of cotton where as 40% reported that they were fully confident. The skills they learned were simple skills like placement of fertilizers, techniques of spraying, weeding and harvesting, complex skills like Agro Eco System Analysis (AESA), diagnostic skills, facilitation and communication skills.

Spread and multiplier effect

The majority of BCI farmers reported that they have spread of farm related information learned from facilitators to less than 5 farmers. They also reported that they were using the principles to other crops.

Decision Making

Majority of the BCI farmers were taking decisions on their own. Collective decisions in consultation with spouse and family members is also happening in some of the practices specially on storage and processing, crop management and labour requirements.

Awareness on health and Environment concerns: Majority of BCI farmers had awareness on health and environmental concerns and had favourable opinion

Opinion of PU Field Staff

Majority of the PU field staff had favourable attitude about the BCI programme and its usefulness. They have also suggested some measures including the need for strengthening supply chain and creating demand.

CHANGES IN ECONOMICS OF COTTON CULTIVATION

Yield: BCI farmers reported on an average of getting 11 % of yield increase, on the contrary comparison farmers reported 6% decrease in yields compared to the base year. The yield difference between the years and among BCI and comparison farmers were significant at 0.5% level of probability.

Cost of Cultivation: BCI farmers reported 11% decrease in cost of cultivation per hectare where as comparison farmers reported decrease of 8% of cost of cultivation compared to base year 2013.

There was also significant difference between BCI farmers and comparison farmers.

Net Income (Profit); The BCI farmers average net income per hectare increased by 55% compared to base year (2013) where as the increase of profit was about 30% with comparison farmers which means 25% profit was realized per hectare by BCI farmers by implementing the programme for 4 years.

Pesticides: There was 33% decrease in usage of pesticides by BCI farmers where as statusquo continued with comparison farmers.

Fertilizer usage: There was decrease of 18% in the usage of chemical fertilizers by BCI farmers and 9 % decrease with comparison farmers. The Nitrogen management was generally observed in a recommended way, similarly as per the advice of the BCI farmers have reduced the use of phosphorus fertilizers and potash application.

Constraints: Majority of the farmers expressed the non-availability of IPM inputs and also reported Middlemen exploitation in input supply and marketing. Furthermore they felt that drought and untimely rains have affected the yields.

Suggestions: Majority of the farmers felt that there is a need for creation of demand for better cotton to ensure that they directly take the produce from the village to ginners and also added that they are expecting extra price for licensed better cotton than conventional cotton.

4.2. IMPRESSIONS OF FOCUSED GROUP DISCUSSIONS (FGD) CONDUCTED WITH BCI FARMERS BY STUDY TEAM

The FGD was conducted in 6 villages over a sample of 350 farmers selected randomly to assess the practice of six better cotton standard system components. The following are the observations and findings.

1. IPM related practices

- → All the farmers expressed that they are practicing border crop cultivation by sowing sorghum and bajra as border for cotton as main crop. Trap crops like marigold was also practiced by the BCI farmers.
- → Inter cultivation was done with redgram in the ratio of 10:1 in Serpalli and Gangaram villages by some farmers, while 6:1 ratio was followed by Kothamolgana and Gangaram village farmers
- → Use of neem based sprays was done by BCI farmers between 45-60 days after sowing of cotton crop. Accordingly the beneficial insects were protected from damage, which otherwise were affected by chemical sprays.
- → Almost all the farmers expressed that before BCI initiative they were using 6-8 chemical sprays during the crop period, and spent around Rs.10,000/crop. BCI initiatives taught them to reduce it to 2-3 sprays that too with neem based products. In Karukonda village it was observed that usage of granules was reduced drastically after the BCI intervention.
- → Precautionary methods like protective clothing, use of masks, gloves, socks etc., were listed while spraying chemicals. Also regular monitoring and management of pests and disease was done by ETLs and through Agro – Eco system analysis (AESA).

2. Soil related practices

- → Application of compost, FYM, deep ploughing practices etc; are followed
- → Incorporation of stubbles/crop residues was done using rotovator
- → Soil testing method by drawing soil in 'V' shape was followed by farmers in all the villages, but results were not given by the laboratories before sowing time.
- → Fertilizer application (N,P,K) was followed as per recommendations through split applications.

3. Water Management

- → All the villages were under rainfed cultivation

1. Conservation of National Habitat

The vacant lands were demarcated by Forest department by planting 'Nilgiri' saplings and hence were not encroached. Bio-diversity was maintained by Forest Department.

2. Quality of Fibre

Picking at early hours, grading of cotton, storing in neatly cleaned bags and piling them in separate rooms were some of the precautions followed.

3. Decent Work

1. Pregnant women and children (below 18 years) were not involved in any of the hazardous works.
2. Equal pay for equal work was followed in all villages.
3. Participation in BCI programme is low although special trainings are offered to them along with labour.
4. All the related production and marketing aspects of cotton cultivation were given as demonstration and trainings to BCI farmers by facilitators and PU Managers
5. In all the villages, marketing of produce was done at village level, where middle men buy the produce and supply to ginneries
6. Application of BCI principles to crops like paddy was done at Karukonda village.
7. All the farmers expressed favourable attitude towards BCI programme and felt that these principles can be replicated in other villagers.

8. BCI initiative had reduced the cost of cultivation and increased net profits among all the BCI farmers by their interventions like reducing chemical usage, combating environmental pollution there by preserving the health of humans and nature.
9. Crop Management Practices
10. The spacing of 90x90 and 90x45 was followed during cotton crop cultivation
11. Most of the farmers harvested between 6-7 quintals/acre. However, some farmers could harvest 12 quintals/acre.

4.3. RECOMMENDATIONS

1. The study demonstrated that there is considerable impact of BCI programme in terms of building human, social and economic capital of farmers besides addressing environmental and health concerns. Therefore it is recommended to expand the programme to the other parts of cotton growing areas in the country.

2. It is important to encourage SHG women groups or Special Interest Groups from BCI programme in the village to establish Agribusiness Enterprises such as preparation and marketing of NSKE, Botanical pesticides, Bio fertilizers, yellow/blue traps etc. This will ensure availability of quality inputs at affordable rates.

3. To avoid middlemen exploitation, there is a need to create demand for BCI cotton and encourage ginners to procure cotton directly from farmers/ farmer groups.

4. Encouraging women to be participants in the BCI training and demonstration helped them to accelerate the process of adoption of best practices, since it was found that in some of the cotton operations the decisions are made collectively between men and women.

5. It is equally important that BCI make more focused efforts on labour issues like training and providing safety measures to farmers.

6. In order to impart knowledge and training to all the members of the LG, it is recommended that individual and small group approach could be adopted. While doing so, the Lead Facilitator Centric and Farmer to Farmer extension approach should be promoted.

7. The use of ICT and mass media will help to reach and teach more farmers with less time span. It is powerful tool for dissemination of market and weather information.

8. Where ever possible, Farmer Field Schools have to be encouraged instead of following Demonstration approach to empower the farmers through discovery based learning. It is also possible to have testing of some innovations in water and soil management, crop management, biodiversity and climate change through experiments and discovery. Besides, Agro Eco System Analysis (AESA) could be taught to farmers for making rational decisions on crop production and protection practices.

9. For sustainability of BCI programme, it is recommended to organize farmers (Groups into farmer producer organization / farmer producer companies) who will be able to take up collectively technical input and marketing management with greater bargaining power. PRDIS has promoted successfully one farmer producer company (FPC) at Bijinepalli mandal. Similarly, FPCs can be formed in other BCI implementing areas.

10. There is a need to promote convergence with department of Agriculture, Agricultural universities, ginneries and any other private agencies. A consortium approach with a government agency leading the other stakeholders is ideal since BCI need to be embedded in the national strategy for mainstreaming.

11. The farmers need encouragement to apply the principles and criteria of BCI to other major crops so that farmers livelihoods can be improved.

12. Similar studies can be conducted by outsourcing external agencies by other implementing partners to know the impact and constraints. This will also be helpful to IP's and BCI for their visibility, credibility and mobilisation of resources

4.4. CONCLUSION

The Better Cotton Initiative Programme has come to stay in India. The BCI approach has great potential to increase the income and improve the livelihoods and lives of farmers and workers. The results of the study revealed that significant gain in knowledge, adoption of practices, yield and decrease in cost of cultivation and increase the net income. This programme has promise and potential for poverty alleviation by reducing the distress of cotton farmers in rainfed areas in India, besides helping in environmental conservation and health concerns. However there is a need for rationalizing and harmonizing with national Strategies and Goals.

“Mahatma Gandhi stated, recall the face of the poorest and the weakest man you have seen, and ask yourself, if the steps you contemplate are going to be of any use to him. Will he gain anything by it? Will it restore to him? Control over his own life and destiny?. This powerful statement by one of the greatest human beings the world has seen and produced must remain

embedded in our memory and be a guiding force in applying ICM for the benefit of mankind and sustainability of agriculture especially in backward and remote areas”.

CASE STUDIES

Case - 1

Improving Water Efficiency through Composting and Mulching With Green Manure Ensured Higher Productivity in Rainfed Area

A Case of a Better Cotton Initiative by a Small Scale Farmer

G. Sreesailam S/o Pedda Buchanna is a small scale farmer and belongs to Polepalli village of Bijenepalli mandal of Mahabobunagar District of Telangana State. He owns about 6 acres of land. He cultivates Cotton and maize in Kharif Season and Groundnut and Paddy in Rabi season. Most of his land is rainfed except one acre which is irrigated dry with access to bore well water. He has a family of two children and his wife also works on farm along with him. He has been using pesticides and fertilizers indiscriminately before introduction of BCI programme. However with the introduction of BCI programme during 2012, he has considerably reduced the use of chemicals and follows IPM based Technology. He is a lead farmer and enthusiastic to disseminate technologies to neighbouring farmers.

Mr. Srisailam was selected as a demonstration farmer during 2014 with support from **Solidaridad net work – HUF Programme for "Water efficiency and sustainability in Agri supply chain: Project**

The main aim of the programme was to demonstrate the water use efficiency specially through application of compost, intercropping and mulching with green manure crops like sun hemp & Diancha besides other practices advocated under BCI, which will lead to soil health improvement and sustainable higher productivity.

Demonstration plot with compost unit

A unit of one hectare (2.5 acres) was earmarked by farmer for demonstration over 3 years period while two (2) acres was used as experimental field and 0.5 acres as control. In his experimental field one acre was used for two major interventions namely compost application (5 tons / acres) and mulching with sunhemp green manure and the other acre was left with only composting. The principal crop grown in the field was cotton with red gram as intercrop. All the BCI principles and criteria including production practices were followed by the farmer. Gravimetric method of soil analysis for testing the soil moisture before and after mulching (In 15 days interval from Aug-Oct) was done. The results show that there was about 40 to 50% retention of moisture for two months period in the plot where composting and mulching was done where as it was 25% in the plot where only compost was applied. There was no significant difference in control plot. The mulched crop after drying was treated with Trichodermaviride for quick decomposition in soil for organic matter. In addition, moisture meter was used for measuring the soil moisture retention to validate the analysis. Thus the composting and mulching plots had higher soil moisture retention during Aug, Sep and Oct when the rainy days were 9,9 and 2 respectively and temperatures ranging from 20 to 30° C. This has contributed for higher productivity in experimental field. The farmer could get an net income of about 20,000 (compost and mulching plot of 1 acre) and Rs. 15,000 in the plot applied only compost and Rs. 13,000 in control plot.

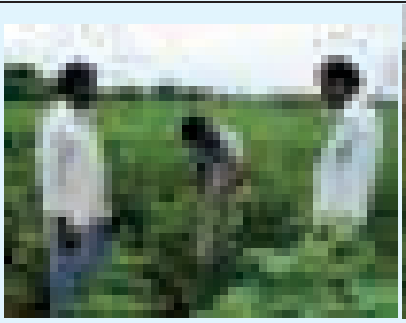
Sunhemp crop and mulching with sunhemp in the cotton field can be seen in the pictures

The farmer was very happy with the results and he encouraged neighbouring farmers also to apply compost and mulching to their fields. As a result in the same village during this season (2015) 10 more farmers have adopted the same. The demonstration farmer has used the technology of mulching to maize crop which he has cultivated during this season. The results are under process. The farmer appeals that compost and mulching could save farmers distress in rainfed areas. He promised to bring a silent revolution in the area.

Case - 2

High Density Planting System - A Case for Sustainable Production

<table>
<tr><td>Title</td><td>PRIDS-BCI-High Density Planting System led to Sustainable Productivity in rainfed areas</td></tr>
<tr><td>Location and Geographic coverage</td><td>In Telangana state, Mahabubnagar District, Bhoothpur, Bijenpally and Kesampet mandals the climate is hot and rainfed. Soils are mostly sandy loam low in `N` and moderate to high in `P` and `K` in experimental sites.</td></tr>
<tr><td>Introduction</td><td>An outstanding new technology is the “high-density cotton planting system evolved by Nagapur-based central Institute for Cotton Research (CICR) to overcome the low productivity of cotton-in-law rain-reliant and post moisture paucity at critical stage of formation.
The challenge is to get sustainable yield with local varieties and with less impact on environment in cotton under rainfed conditions for the betterment of farming communities.</td></tr>
<tr><td>Stakeholders and Partners</td><td>Participatory Rural Development Initiatives Society (PRDIS) Cotton Growing farmers, CICR, Nagpur, Prof. Jayashankar Telangana Agriculture University, RARS, State Department of Agriculture were engaged right from getting seed to harvesting.</td></tr>
<tr><td>Methodological approach</td><td>Three sites (Bhoothpur, Bijinepally, Kesampet) were selected during the kharif of 2014-15. Shiva Nandini variety was sown at the onset of the monsoons during 2nd week of June at 60x20 cm spacing having high density population around 33000 plants per acre.</td></tr>
<tr><td>Validation</td><td>Series of field days were organized with all stake holders including farmers, officials from department of agriculture, CIPMC, GoI Scientists from Prof. JSTAU and PRDIS technical staff. The result were analyzed in term cultivation methodology, cost of cultivation, output, cost analysis and fiber quality.</td></tr>
<tr><td>Economic Analysis (per acre)</td><td>
<table>
<tr><td>1.</td><td>Total cost of cultivation</td><td>15940</td><td rowspan="5">Cost Benefit Ratio :1:2.60</td></tr>
<tr><td>2.</td><td>Yield in kgs / acre</td><td>10.30 qts</td></tr>
<tr><td>3.</td><td>Gross Income from Cotton</td><td>Rs.40170</td></tr>
<tr><td>4.</td><td>Boarder crop income</td><td>Rs 1500</td></tr>
<tr><td>5.</td><td>Net Income</td><td>Rs. 25530/a</td></tr>
</table>
</td></tr>
<tr><td></td><td>
<table>
<tr><td colspan="4">Fiber analysis</td></tr>
<tr><td>Variety</td><td>Staple Length</td><td>Strength gm/tex</td><td>Micronair Value</td></tr>
<tr><td>Sivanandini</td><td>28.90</td><td>26.96</td><td>4.07</td></tr>
</table>
</td></tr>
</table>

	(NDLH 1755)
Impact	Produced encouraging results despite of erratic monsoon rainfall. Reduced seed costs and average cotton production in the demonstrations is between 9 to 10 quantal per acre.
	Innovation in planting method
Observations	• Sivanandini (NDLH 1755) variety has drought tolerance • Plant height is good • Boll size is equal to Bt (Jadu) • More seeds per locule • No diseases noticed • Less sucking pest incidence • Bollworm incidence is around 4% •
Constraints	Problem while picking
Lessons learned	• Growing cotton with local Varity HDP technique is the way forward to get sustainable yields • Can preserve cotton local varieties developed by regional research station socially acceptable
Sustainability	• Reduced cost in seeds and easy to adapt the technology in terms of knowledge and skills. • Less impact on environment
Images	 

Case - 3

Empowerment of Farmers through Farmer Field School

- A Case Study of BCI Lead Farmers

The objective of FFS approach is to impart quality education, build the capacity & empower the farmers through discovery based learning. The FFS enables to develop skills among farmers where in they practically learn skill oriented operations based on the principal of learning by doing. Since inception of BCI Programme, FFS as a new extension method are being organized in different villages to educate the farmers.

Mr.T.Chenna Reddy, S/o Narayana Reddy of Maddigatla village of Bhoothpur (Md), Mahaboobnagar (Dist) is one of the Lead Farmer's in a learning group. He has 5 acres of land in which he cultivates cotton crop in 3 acres by rotation. He was a cooperative farmer and has provided one acre of land for FFS. He is able to obtain 8 qunital per acre during 2016 with reduction in cost of cultivation Rs.4000. His net profit has increased to additional Rs. 10,000/- compared to the many farmers in the village. However, 20 farmers in his group has also been benefited by practicing the knowledge and skills learnt through FFS. He is an ardent admirer of Agro Eco Systems Analysis (AESA), adopted in FFS for crop and post management decisions. He has thought the same to 20 farmers of his group who in turn spread the knowledge of AESA to other group members.

Besides, the culture of experimentation the element of decision making was also imbibed to other farmers by Mr. T.Chenna Reddy. In a way he has turned to be an able facilitator to steer BCI Programme and imparting knowledge to other farmers through farmer to farmer extension.

This case demonstrates the power of FFS and lead farmers centric Extension programme

Case - 4

The Bijinepally Farmers' Producer Organization & Producer Company

– A Case Study

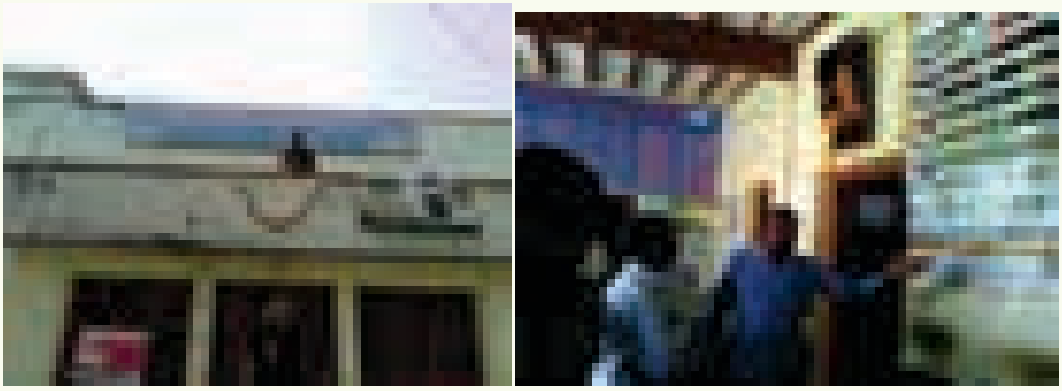
Bijinepally - a Mandal in Nagarkurnool District is having an inspiring story of farmer mobilization and empowerment. In this mandal, the PRDIS has initiated BCI programme in 12 villages with about 2500 farmers. The farmers hardly make a profit despite hard work and efforts put into growing agricultural crops specially cotton. The exploitation tactics of middlemen ate into their margins and barely left them with any returns. As the nature of their produce was perishable and hence they had no option but to sell it off at whatever price was offered. The middlemen, who would transport their produce to the local markets, would give them wrong information on the market price of products, delay their payments and even take money for accidental losses that would occur during transportation besides the dealers who supply inputs also exploit the farmers by lending inputs and credit with higher rate of interest and recover after harvest of cotton. They also supply poor quality inputs with higher prices. To put an end to this exploitation, PRDIS took initiative to unite the farmers to form the company through the PU manager Mr.Pratap Reddy who has become the leader of the Farmer Producer Organization (FPO) movement in Bijinepally. Through sheer grit and determination, Mr.Pratap Reddy was able to collect all farmers to form an FPO and PC, namely The Bijinepally Farmers' Producer Organization and Producer Company with the Corporate ID - U01403TG2015PTC090197 in the year 2014-15.

The Chairman of the company is Mr.M.Tirupathi Reddy and Mr.G.Kasanna, is the Secretary. They are supported by another 8 more Directors. The number of members are about 500 with the share capital of Rs.10 lakh.

The company has made turn over to more than Rs.50 lakhs in this year (2016-2017).

The company is performing the following activities for the benefit of their members in Bijinepally Farmer Producer Organization

- Providing B.t cotton seed, fertilizers and pesticides directly from companies
- Marketing of cotton to Ginners directly avoiding Middleman
- In addition, they are also marketing Maize



The Chairman, Mr.Thirupathi Reddy says that all the farmers in his company were benefitted by this process and they get technical guidance from PRDIS through the CEO. Thanks to BCI and PRDIS.They intent to take up BCI cotton implementation in that area in 2018 with about 3500 farmers as local partner through cost sharing intially, wanted to hire a gin and progressively own the Gins, establish a spinning mill and garment making unit. Though the farmers dream big, they are confident to win over and fulfill. The sustainability of BCI programme rests with FPOs and this case will be replicated in all PUs of BCI.

Case – 5

Sucking Pest Management by using Botanicals

(Neem Seed Kernel Extract)

A Case for Promoting Biodiversity of Beneficial Insects

The indiscriminate use of synthetic pesticides in Pest Management is causing harmful effect to the health and environment. So the use of botanicals for protecting the crops from pest damage has gained importance because of low external input cost for sustainable pest management practice (LEISA) as a part of Integrated Pest Management to minimise the synthetic Pesticide use.

In Hasanapur village of Boothpur mandal (110 farmers in 158 hectares) and Karkonda of Bijenepally mandal (175 farmers in 218 hectares) are cultivating cotton under rainfed condition in Telangana State of India. The farmers in the above 2 villages in habit of indiscrimate use of synthetic pesticides i.e. 4 sprays in the crop season for sucking Pest Management (Aphids, *Whitefly*). The cost of chemicals inclusive of spraying cost is 85 Euros / ha which is about 25% of the cultivation cost /ha. By this the beneficial insects population in the ecosystem was reduced considerably besides causing health and environmental damage.

Hence the farmers of the BCI project area were advised to spray botanical extract i.e Neem Seed Kernel Extract (NSKE) for sucking pest management in the early stages of the crop. NSKE is prepared by collecting welripend neem seed which is grinded to powder form. 10 Kgs of powder is tied in a muslin cloth and soaked in 20 lit of water over night. Next day it is squeezed to get the decoction from the soaked powder. It is made to 200 liters which can be used per acre (0.4 Ha),by mixing water and 200 grams of detergent powder is added before spraying. The readymade solution is sprayed in the evening hours for getting better results.

Azadiractitin compound in the extract of Neem Seed acts as a repellent, antifident, effects the growth of insects, reduction in egg laying of the insect. Some of the farmers adopted this practice of preparing and spraying 5% NSKE after regular monitoring. As it is time consuming, the women, youth Self Help Group (SHGs) were simentenously encouraged to take up the preparation of NSKE as on enterprise. This advocacy has resulted in Livelihood improvement of unemployed women's and youth while contributing to health, environment and Biodiversity.

Futhermore, there is 20% reduction in cost of pest management and Farmers noticed increase in beneficial insects in the ecosystem besides reduction in pest population by avoiding synthetic pesticides. The conservation of beneficial insects and increase in their number has helped in keeping pest buildup below ETL in subsequent years.

ANNEXURES

ANNEX 1

VILLAGE WISE SELECTED RESPONDENTS

Category	Village	BCI Farmers	Non BCI Farmers
Bhoothpur	Velkicherla	60	7
	Hasnapur	60	3
	Kothamolgara	60	3
	Madhigatla		5
	Pothulamadugu		3
	Annasagar		4
	Karwina		7
	Tatikonda		4
	Seripalli		4
	Ippulapalli		3
Bijinepally	Gangaram	60	6
	Karukonda	60	6
	Mahadevnpet	60	3
	Kanapur		7
	Gudlanarva		7
	Vattim		6
	Vasanthpur		5
	Latupalli		5
	Polepalli		4
	Velagonda		4
	Lingasanipalli		4
Total		360	100
&			
Control Farmers	Bininepally	Mammaipally	30
	Boothpur	Manganur	30
Total			60

ANNEX 2

PROFILE OF BOOTHPUR AND BIJINEPALLY MANDALS

About Bijinepally Mandal

Bijinepally is a Town in Bijinepalle Mandal in Nagarkurnool District of Telangana State, India. It belongs to Telangana region. Total population of Bijinapalle Mandal is 61,989 living in 12,292 Houses, Spread across total 54 villages and 20 panchayats . Males are 31,629 and Females are 30,360

Villages of Bijinepally

Allipur, Anekhanpalle, Bijinepalle, Boyapur, Dharmapur, Gangaram, Gouraram, Gundlanarva, Karukonda, Kanapalle, Latpalle, Lingasanipalle, Mahadevpet, Mammaipalle, Manganur, Palem, Polepally, Salkarpet, Shainpalle, Vaddemanu, Vasanthpur, Vattem, Velgonda, Venkatapur

Major Crops grown

Rice, Jowar, Maize, Red Gram, Green Gram, Black Gram, Bengal Gram, Groundnut , Sunflower, Chillies, Onion, Sugarcane, Cotton are the major crops grown in the area.

About Bhoothpur

Bhoothpur is a Town in Bhoothpur Mandal in Mahbubnagar District of Telangana State, India. It belongs to Telangana region . It is located 10 KM towards East from District head quarters Mahabubnagar. It is a Mandal head quarter. Total population of Bhoothpur is 5110. Males are 2746 and Females are 2,364 living in 902 Houses. Total area of Bhoothpur is 1414 hectares.

Villages of Bhoothpur

AmistapurAnnasagar, Bhoothpur, Goplapur, Hasnapur, Ippalapalle, Kappeta, Karvena, Kothamolgara, Kothur, Maddigatla, Pathamolgara, Pothulamadugu, Ravalpalle, Tadikonda, Tadipatri, Yelkicherla

Major Crops grown

Paddy, Cotton, Castor, Raagi, Bajra, Pulses, Jowar, Maize, Ground Nut and Sun flower are the major crops grown in the area.

ANNEX 3

MAPS OF THE STUDY AREA

Map Showing the Location of Study area in Erstwhile Mahabubnagar District of Telangana State

Bhoothpur

Bijinepally

Study Area in Newly Carved District

Study Area in Newly Carved District

ANNEX 4

EXTENSION EDUCATION INSTITUTE (EEI)
GOVERNMENT OF INDIA (SOUTHERN REGION)

Professor Jayashankar Telangana State Agricultural University
RAJENDRANAGAR, HYDERABAD-500030

INTERVIEW SCHEDULE

"A STUDY ON THE IMPACT OF BETTER COTTON INITIATIVE ON COTTON GROWING FARMERS IN MAHABOOBNAGAR DISTRICT OF TELANGANA STATE"

1. Respondent no.:
2. Name of the respondent :
3. Village :
4. Mandal/block :
5. District :
6. Mobile no. :

PART-A

I.INDEPENENT VARIABLES

Profile characteristics of beneficiaries and non beneficiaries of Better Cotton Initiative (BCI) programme.

1. Age :……..years (in completed years)
2. Education: please indicate the formal schooling possessed by you on the following categories.

		SCORES
a) Illiterate	( )	1
b) Primary school	( )	2
c) Middle school	( )	3
d) High school	( )	4
e) Diploma	( )	5
f) Intermediate	( )	6
g) Under graduation	( )	7

3. a) Farming experience :…….years

   b) Farming experience in cotton…….years

4. Farm size:

Wet land ……..acres
Dry (Rainfed) land …….acres
Irrigated Dry _____ area
Total …….acres

5. Extension agency contact:

How often do you meet the following officials?

S.NO	OFFICIALS	Always(4)	Occasionally (3)	Rarely(2)	Never (1)
1	PRDIS Facilitator				
2	PRDIS PU Manager				
3	VEO/VDO				
4	A.O				
5	ADA				
6	K.V.K Scientists				
7	DAATTC Scientists				
8	Research stations scientists				
9	NGO officials				
10	Input dealers				

6. Information seeking behavior:

Please indicate whom do you contact more frequently for getting information pertaining to cotton cultivation.

S.NO	Sources	Frequently(3)	Less frequently(2)	Never(1)
A	INFORMAL SOURCES			
1	PRDIS facilitator			
2	PRDIS PU Manager			
3	Family members			
4	Neighbours/relatives			
5	Friends			
6	Local progressive farmers			
7	PRDIS literature			
8	PRDIS farmer field book			
B	FORMAL SOURCES			
1	News paper			
2	T.V			
3	State department officials			
4	Agril. Scientists			
5	University publications			
6	Marketing office			
7	Other Institutions			

7. Risk taking ability:

A set of statements are given below with respect to risk orientation. Please state whether you agree (A) or undecided (UD) or disagree (DA) about each statement.

S.No	Statements	Response Categories		
		A (3)	UD (2)	DA (1)
1.	A farmer should grow large number of crops to avoid greater risk in growing two or more crops			
2.	A farmer should take more of changes in making a big			

	profit than to be content with smaller profits			
3.	A farmer who is willing to take greater risks than the average farmer usually have better financial conditions			
4.	It is good for a farmer to take risks when he knows his chances of success are fairly high			
5.	It is better for a farmer not to try new farming methods unless most others have used them success fully			
6.	Trying an entirely new practice in farming by a farmer involves risk and wasting of resources			
7	Try and try in facing risk and you can get success in cotton cultivation			

8. Labour utilisation: (M: Male, F:Female)

S.No	Particulars	Labour availability	Family labour		Hired Labour		Cost/8hrs	
			M	F	M	F	M	F
1.	Land preparation							
2.	Application of manures							
3.	Seed treatment							
4.	Sowing							
5.	Application of fertilizers							
6.	Weeding / inter cultivation Hand weeding Chemical weeding							
7.	Plant protecting							
8.	Harvesting							
9.	Transport							

10. Training undergone: YES (1) / No (0)

A) If No, What is the reason?

B) If YES,

a) Number of Training under gone_____

b) Topics covered under LG training _____

b) Please give details of your training programme attended

S.No	Statement	(3)	(2)	(1)	SCORES
1.	Conducted by when	KVK / University	PRDIS Facilitator (NGOs)	Input dealers	
2.	Venue of training programme	In village	Field	State Head quarters	
3.	Duration	7-10 days	1 day	1-3 days	

c) What you have learned from the training programme?

d) What do you think about the training programme whether it is useful to you or not?

12.Information on Decision Making

A. How do you take decisions while attending different operations?

S.No	Operation	Own	Spouse	Any others
1.	Crops to be grown			
2.	Seed selection			
3.	Labour requirements			
4.	Crop Management practices			
5.	Pest Management practices			
6.	Making observation and interpretations			
7.	Making observation and interpretations			
8.	Crop harvesting			
9.	Storage and processing			
10	Marketing			

Note: Please specify any other

11 a) Social Particulars of farmers trained in BCI

a) Membership in any organization / association / crops

S.No	Organization	Office Bearer (2)	Member (1)	How often you meet
1.	Cooperative Society			
2.	LGs			
3.	Farmer Groups			
4	SHGs			
5.	Youth Clubs			
6.	Any other			

b) Please indicate your social behaviour / capital through your responses

1. Are you interested to work in groups Y/N
2. Are you responsible for organizing any groups? Y/N
3. Have you initiated any group activity in your village? Y/N
4. Do you attended any meetings with BCI staff Y/N
5. Do you consult AOs for any farm information Y/N
6. Are you benefited by working in groups Y/N

c) Do you think your social status and recognition has improved as a result of undergoing training in BCI Y/N

If yes, please mention an example?

Spread Effect by BCI Farmer (Farmer to farmer extension)

1. How many farmers you have told about BCI

   < 5 farmers / 5 farmers / 10 farmers / > 10 farmers

2. How many farmers you have influenced with new practices learnt in BCI

   < 5 farmers / 5 farmers / 10 farmers / > 10 farmers

3. How many farmers have adopted new practices as a result of your effort?

   < 5 farmers / 5 farmers / 10 farmers / > 10 farmers

4. How many yield and income the other farmers got on an average as a result of your effort after training in BCI.

   < 5 farmers / 5 farmers / 10 farmers / > 10 farmers

5. Are you interested to be a facilitator in BCI Y/N
6. Do you want to convince more farmers about BCI Y/N
7. Do you encourage your village farmers to attend the BCI
8. If yes, How many farmers you have influenced? _____
9. How many farmers do you think have benefited by participating in BCI directly indirectly in your village and neighbouring village?
10. What type of benefit (yield, income, knowledge, skills etc) the farmers derived?

Health and Environmental Concern

1. Have you under taken pesticides spraying by your self Y/N

   If yes, will you experience eye and skin irritation? Y/N

2. Do you think that organically produce vegetable / farm produce

   have more taste? Y/N

3. Did you think that animals like organic byproducts than inorganic

   Produces? Y/N

4. Did you think that spraying of botanicals (Neem seed kennel extract etc) Protect natural enemies? Y/N

5. Are you aware that pesticides application contaminates air/water/farm produces? Y/N

6. Do you practices proper disposal of pesticide containers for healthy environment? Y/N

PART B

II. DEPENDENT VARIABLES:

Level of knowledge of beneficiaries and beneficiary on recommended package of practices in cotton cultivation

Following are the item intended to measure the level of knowledge of cotton growers under BCI programmes.

Please specify your agreement on the given response categories with a tick (√) mark for all the listed items.

A. Select the correct answer from the given alternatives.

1) Important trap crop grown in cotton field

a) pulses b) castor c) bhendi d) marigold

2) Intercropping ratio of short duration pulses and cotton

a) 1:3 b) 1:6 c) 3:1 d) 2:1

3) Rootrot diseases can be control by using ?

a) copper oxychloride b) carbendezim c) acephate d) chlorophyriphos

4) The criteria for pesticides preparation put forth by BCI

a) Healthy, skilled, trained and > 18 years b) Anybody c) Healthy, skilled, trained and < 18 years d) none

5) What are the better cotton initiative principles?

1) Crop protection 2) water management 3) soil management 4) conserving natural habitat

5) improving fiber quality and measures taken during storage 6) Decent work

a) 1,2,3 b) 4,5,6 c) 2,3, d) all the above

6) Lady bird beetle is the predator on

a) whitefly b) Jassid c) aphid d) none of the above

7) The main objective of BCI

1) Better to environment 2) Better to Health 3) Better to sector 4) to get maximum yields

a) 1,2 b) 3,4 c) 2,3 d) all the above

8. State any two measures taken while spraying?

➢

➢

9. Give the name of the boll worm appearing now a days in cotton crop

Fill in the blanks

1. For cotton cultivation soil samples collected at a depth of _____ cms in V shape for soil testing

2. Before sowing of cotton seed to be treated with Trichoderma viridae @ _____ gm/ kg seed

3. Important border crop grown around the cotton field is _____ maize

4. Recommended spacing for cotton in black soil is _____

5. In the last ploughing the recommended dose of FYM @ _____ to be incorporated into the soil

6. Intercropping of redgram with cotton improves the _____

7. Spraying of 5% of _____ controls the hatching of insect eggs and 1st instar larvae

8. Recommended dose of NPK / acre in cotton is _____

9. Minimum age of children that is required for non hazardous work in cotton is _____

10. Give the names of Beneficial insect's _____

PART C

Extent of adoption of recommendation package of practices of cotton cultivation by farmers

The following are the recommended management practices in cotton cultivation. Please indicate your response as either Fully Adopted (FA) , Partially Adopted (PA), or Not Adopted (NA)

S.No	Recommended practices	Extent of Adoption		Fully adopted (FA) (3)	Partially adopted (PA) (2)	Not adopted (NA) (1)
		Have knowledge Y/N	Adopting Y/N			
A	**Land Preparation**					
1.	Deep summer ploughing with mould board plough or disc harrow					
2.	FYM @ 6-8t / acre should be incorporated into the soil at last ploughing					
B.	**Sowing:**					
1.	Seed treatment with Trichoderma viridi @ 8 gm / kg seed					
2.	Optimum spacing is in black soils is 90 X 45					
3.	Gap filling should be done at 10 days after sowing					
4.	Sowing of refuge crop around the main crop					
C	Irrigation management / soil moisture management					
1.	Growing intercrop like green gram / black gram between cotton rows to retain soil moisture					
D)	**Fertilizer management**					
1.	Soil test based application is economical					
2.	N-P-K: 48-24-24 kg / acre Application of Nitrogen and Potassium is applied in 4 equal splits each at 20.40,60 and 80 DAS and Entire P205 should be applied as a basal dose at last ploughing					
3.	Application of tank silt will improve the soil fertility					
4.	Incorporation of cotton stubbles will add biomass to soil					

5.	Spraying 2% potassium nitrate at flowering and boll formation stages increases the yields					
6.	Foliar spraying of urea 2%, 19:19:19 1% and potassium nitrate 1% facilitates early recovery of plants under stress conditions					
F	Weed Management					
1	Timely intercultural operations will reduce the weeds					
F	Pest Management					
1.	Growing of 3-5 rows of maize, sorghum as border crop will reduce the migration of pest from one field to another field					
2.	Growing of castor, bhendi, marigold as trap crop					
3.	Intercropping of short duration pulses with cotton in ratio of (1:2) Improve the beneficial insects					
4.	Installation of short duration pulses with cotton in ratio of (1:2) improves the beneficial insects					
5.	Growing of non bt around the cotton crop decreases the incidence of Boll worms					
6.	Spraying of botanical pesticides like vitavax dection will effectively controls the sucking pests					
7.	Spraying of 5% NSKE controls the hatching of insect eggs. 1st instar larvas and sucking pests					
G	Disease management					
1.	Removal and destruction of weeds which serves as alternate host					
2.	Destroy or burnt the disease affected plants immediately					
3.	Application of Trichoderma viridi culture (2) kg Trichoderma viridi in 100 kg FYM) at the time of sowing under optmum moisture conditions for reducing wilt incidence					
4.	Soil drenching with copper oxy chloride @ 3 gm / lt of water or carbondiexim @ 1 gm / lt of water for reducing wilt incidence					
H	Harvesting					
1.	Picking should be done generally in the morning hours so that kapas will be free from dust and leaf hits					
2.	Bolls with bad opening, yellow stains, insect attacked and rottened should be					

	picked separately					
3.	While picking proper care should be taken to avoid the contaminated of hairs, gunny bag threads and colours					
H	Post harvest management					
1	Harvested cotton should be fill with in clean cloth bags (do not use fertilisers bags, moisture bags)					
2.	Never store harvested cotton along with chemicals and pesticides to avoid contamination					
3.	Grading and storing of seed cotton in heaps in dry and well ventilated godowns					
4.	Proper packing has to be done to maintain high quality					

PART-D **(B-Beneficiaries, NB-Non beneficiaries)**

YEAR	Cost of cultivation (Rs/ha)		Reduction in cost of cultivation		Yields (Q/ha)		Increased yields	Market value (Rs/Q)		Difference in Market value	Net returns (Rs/ha)	
	B	NB	B	NB	B	NB		B	NB		B	NB
2012-13												
2013-14												
2014-15												
2015-16												

S. no		Before BCI programme	After Implementation of BCI Programme
1	The percentage of decrease in usage of pesticides		
2	Usage of fertilizers(Nitrogen)		

PART-E

Please enlist the constraints and suggest the solutions for effective implementation of BCI programme in cotton cultivation.

PROBLEMS	SUGGESTIONS
1	
2	
3	
4	
5	

Please indicate whether the statement is TRUE/FALSE and YES/NO

S.No		Yes/no
1	Incorporation of cotton stubbles will add more biomass and improve soil fertility	Yes/no
2	Foliar spray of urea 2%,19:19:19 1% and pottassium nitrate 1% facilitates early recovery of plants under stress conditions	Yes/no
3	Spraying of 2% pottassium nitrate at flowering and boll formation stages increases the yields	Yes/no
4	Destroying or burning the disease affected plants will reduce the disease incidence	Yes/no
5	For cotton picking use clean cloth bags only	Yes/no
6	Cock tails pesticide mixtures can be used for spraying	Yes/no
7	Timely intercultural operations will reduce the weeds	Yes/no
8	We can take cotton from immature and not fully opened bolls	Yes/no
9	Equal wages for equal work for both male/female	Yes/no
10	Cost of cultivation details is entered in farmer field book	Yes/no
11	Pregnant women and breast feeding mothers can mix the pesticide mixtures	Yes/no
12	Following the instructions and reading the lables of pesticide containers	Yes/no
13	Using the empty pesticide containers for household purposes	Yes/no
14	Providing the drinking water and other facilities for workers	Yes/no
15	Do you have idea of the age of child labour	Yes/no
16	Do monocrotophos can be used in cotton field	Yes/no
17	Using the protective equipment while spraying	Yes/no
18	Do you have women self-help groups in your village	Yes/no
9	Do you have membership in any group in the village	Yes/no

ANNEX 5

FOCUSED GROUP DISCUSSION

Check List

1. Awareness about BCI, components (Principles) and its usefulness

2. Practices followed in Better Cotton Initiatives and their usefulness

   IPM related : Broader Crop, Trap Crops, Not using chemical upto 60 days, use of Neem and Botanical Pesticides, not to use Banned and WHO classified. A grade pesticides, regular monitoring, common pests and management, diseases, beneficial insects, reduction in pesticides use, persuasions while spraying, etc.,

   Soil Related : Application of compost / FYM, deep ploughing, fertiliser application as per recommendations, reduction in complex fertiliser use, nitrogen management (not to use excess) use of phosphorus fertilisers, application of K.

   Water Management : Ploughing across the slope, drainage, mulching

   Conservation of Natural Habitat: Biodiversity, not encroaching the forest and vacant lands

   Quality of fibre: Precautions to be taken while harvesting, elimination of contamination by storing cotton in coloured bags and not using polypropylene

   Decent Work : Child labour, freedom of association, pregnant women and below 18 years not to do hazards works etc.,

3. Trainings given by Field facilitators and PU Manager to Farmers
4. Demonstrations, literature, farmers field books
5. Women and Labour
6. Health and environment
7. Marketing
8. Application of principles of BCI to other crops
9. Attitude towards BCI programme
10. Cost of cultivation and Yield
11. Benefits as pursued by farmers – Reduction in Pesticides and Fertilisers, Cost of Production, More Net Income, Health Environment and safety issues
12. Suggestions for improvement the programme

Annex - 6

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Action Photographs

Interview by study team of Extension Education Institute in selected villages

Karukonda Village

Hasnapur Village

Kothamulgara Village

Gangaram Village

Velkicharla Village

Mahadevunipeta Village

About Extension Education Institute (EEI)

The Extension Education Institute, Rajendranagar, Hyderabad established in 1962, is a premier regional training institute financed by Directorate of Extension, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India under the administrative control of Professor Jayashankar Telangana State Agricultural University (PJTSAU).

The institute is specialized to cater to the training needs of middle level extension functionaries of Southern region line departments of client states viz., Telangana, Andhra Pradesh, Tamil Nadu, Karnataka, Kerala, Odisha, Union Territories of Puducherry, Andaman & Nicobar and Lakshadweep Islands. Besides this, the trainers of training institutes like FTCs, KVKs, SAMETIs are also trained at this institute. EEI is bestowed with experienced faculty in different areas of training with excellent knowledge and communication skills. The institute is provided with a well equipped training environment to meet all the training needs of the clientele.

EEI, one of the India's four regional training institutes, stands out as a notable premier training provider in Southern India with efficient, reliable and cost effective solutions to meet the emerging challenges in agriculture and allied sectors. EEI designs and fine tunes need based training programmes for the line department officials of client states that enable to capitalize on their strengths and work towards facing the current challenges in the respective fields.

EEI as a guiding force shapes the personal and professional outlook of the extension officers of various line departments of client states and never stops going that extra mile ahead in providing greater value to the training in terms of quality, quantity and promoting client satisfaction by following a highly application oriented and participative style of training. Only after understanding the quality and skilled work force requirement of the sector, the institute designs the course content. The institute created a record of hundred percent client coverage and satisfaction with respect to quality and quantity.

Apart from the prescheduled programmes, EEI also coordinates with esteemed organizations like MANAGE, SAMETIs, ICRISAT, DRR, NAARM, NGOs, Farmer Federations etc., to provide training to extension functionaries and lead farmers on recent advancements in agriculture and allied sectors.

Since inception up to March, 2016, the institute trained 25,589 officers of development departments of client states, union territories in addition to targetted the farmers. To meet current demands, EEI also undertakes consultancy services viz., monitoring & evaluation and impact studies on development programmes of the state and centre besides consultancy trainings.