COUNTRY PROFILE ON ORGANIC COTTON PRODUCTION IN INDIA

JICA

Development Alternatives

Members of the Project Team

Dr. K. Vijaya Lakshmi

Mr. Anand Kumar

Ms. Neelam Rana

Layout & Design

Motilal B. Soni

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The report, **"Country Profile on Organic Cotton Production in India"** presents a comprehensive information on Organic cotton farming practices in India and facilitate better understanding of Indian organic cotton supply chain (strengths, weaknesses, threats, and opportunities).

The project team at ***Development Alternatives*** (DA) acknowledges contributions of different stakeholders and actors involved in organic cotton production in India, for their significant inputs in preparation of this report.

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The project team expresses deep appreciation to the ***Japan International Cooperation Agency*** (JICA), for the technical and financial support and cooperation in the development of this report on "Country profile on organic cotton Production in India". We hope that this report will provide comprehensive information on organic cotton production in India.

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Executive Summary

India is bestowed with lot of potential to produce all varieties of organic products due to its various agro-climatic regions. In several parts of the country, the inherited tradition of organic farming is an added advantage. India is having 1.7 million hectares of area under certified organic farming. The organic market in the country is valued at Rs.100 crore with an annual growth rate steadily going up from 35% to 50% by 2010.

India is the largest producer of organic cotton by contributing more than 50 % of the global production. According to Organic Exchange's recent fiber report, the top five organic cotton producing countries in the 2007-2008 crop year were, in order of scale, India (51 percent), Syria (19 percent), Turkey (17 percent), China (5 percent) and Tanzania (2 percent).

Cotton is cultivated in three distinct agro-ecological zones of India viz. Northern Zone (Punjab, Haryana and Rajasthan), Central Zone (Gujarat, Madhya Pradesh and Maharashtra) and Southern zone (Orissa, Tamil Nadu, Karnataka and Andhra Pradesh) ; The type of cotton grown in different regions varies in species composition. In India, Madhya Pradesh leads in organic cotton production, followed by Maharashtra and Orissa. Although, Organic cotton production in India is just 1.4% of the total conventional cotton produced in the country, it is an excellent niche area for development.

Keeping in view the importance of cotton in our National Agriculture and Economic Scenario, Government of India has constituted Agricultural and Processed Food Products Export Development Authority (APEDA). The Authority attempts to shift the focus of farmers' lives from mere subsistence to strength and prosperity, especially in organic cotton industry. The Centre has also set up an Organic Cotton Advisory Board, while a National Centre for Organic Farming has been formed to improve farming practices and fund research through NGOs, universities and research institutes. Government has also constituted National Programme for Organic Production, National Organic Product Standards. Besides that various measures have been taken up by the Government such as IPM regulations, Certification and Accreditation regulations 2001 etc. for quality assurance, fair trade, and market development. To boost organic agriculture in general, the Planning Commission, Government of India, has proposed setting up a Rs 2,500 crore fund in the Eleventh Five-Year Plan (2007-12). Several institutions, agencies are also involved in R&D activities on organic agriculture. Apart from Government institutions various NGOs, CSOs are actively involved in capacity building of farmers, SHGs, traders etc.

The production and export of Indian organic products is progressing. The awareness about pesticide residues, presence of international and national certification bodies and support of government are to be considered as strength. Major weaknesses are on the level of information/awareness. Another weakness to be noted is that the organic market is not consumer demand -based, but supply driven. From this fact a lot of threats can be derived. However, a

bigger threat is that, all kind of products are offered under declarations like “without pesticides”, “eco-friendly” or even “organic”. In this sense most threats are related to the problem of faithful declaration, role of Government, and clarification of the term “organic”. These threats should be quickly overcome.

The organic cotton value chain in India is very complex and wide due to the large variety of final products from towels to sanitary napkins. But the farmers and the labourers are the weakest links in the chain driven by importers, exporters and retail chains. The ginning part of the chain suffers from child labour, poor working conditions, dirty surroundings and unfair wages and the chain drivers have very little control on these. Farmer organization and ownership issues are also involved. In fact, the contract is highly biased against the farmer as almost all the terms and conditions of the contract specify only farmer obligations in working with the company.

Currently several organic cotton projects are running in India. Most of them are funded by external funding agencies viz., Solidaridad (example: Chetna Organic) and some by Indian companies like Pratibha Syntex (Vasudha project).

To get a picture of current trends and practices of organic cotton production, its supply chain systems, a questionnaire was developed for getting the perceptions of the different stakeholders involved in the organic cotton production. This Questionnaire was sent to different actors/ stakeholders (NGOs, CSO, funding agencies, implementing agencies etc.) involved in organic cotton production in India. The data/information was analyzed and presented in different chapters of the report.

This report, on “Country Profile on Organic Cotton Production in India” is expected to provide comprehensive information on organic cotton farming practices in India and facilitate better understanding of Indian organic cotton supply chain (strengths, weaknesses, threats, and opportunities).

The report is comprised of five chapters and each of them provides comprehensive information on organic cotton production, framing practices, supply chain system in India.

Chapter – I gives the general profile of organic cotton production in India and position of Indian organic cotton exports in the global market. It also gives a brief account on opportunities and threats involved in organic cotton production value chain for different key stakeholders. This chapter entails Indian government’s past and current initiatives to promote organic farming.

Chapter – II provides the existing and recommended organic cotton farming practices with respect to soil management, crop nutrition, pest and disease management, weed management, harvest and post harvest operations etc. It also gives an overview of crop economy for conventionally and organically grown cotton.

Chapter – III appraises the prevailing organic cotton supply chain system in India. It provides information on existing procedure of inspection, certification, accreditation and different certification agencies, accreditation agencies certified by Government of India. This chapter also gives a list of cotton mills involved in organic cotton processing from raw cotton.

Chapter – IV gives a comprehensive overview of the earlier and on-going projects on organic cotton in different Indian states. For this few major projects were selected on the basis of scale in terms of money, acreage, number of farmers and states involved. The important lessons & findings from the past experiences have been described in detail. A state-wise list of local NGOs supporting the organic cotton farmers has also been enlisted.

Chapter – V describes the past research studies on organic cotton production in India focusing on issues such as farming practices, socio-economic assessment, bottlenecks in the supply chain. Some policy recommendations on supply chain based on research studies have also been incorporated. A state-wise list of researchers / institutions involved in the organic cotton researches has also been provided.

CHAPTER- I

Profile of Organic Cotton Production in India

INTRODUCTION

In India, nearly 50% of total pesticides produced are consumed by cotton alone. Prolonged and indiscriminate use of pesticides has left its marks on the ecosystems. Resistance to pesticides, poor soil health, polluted waters and health disorders in man and animals are only starting symptoms of an imbalanced ecosystem. This is in addition to the cost of production, which is inflated by the excessive use of pesticides, fertilizers and weedicides. Therefore, efforts have sprung up world over to grow cotton organically to attain the twin objectives of reducing the cost of production and minimizing pollution hazards.

India is bestowed with lot of potential to produce all varieties of organic products due to its various agro climatic regions. In several parts of the country, the inherited tradition of organic farming is an added advantage. This holds promise for the organic producers to tap the market which is growing steadily in the domestic market related to the export market. Currently, India ranks 33rd in terms of total land under organic cultivation and 88th position for agriculture land under organic crops to total farming area. In the financial year 2007-2008 the cultivated land under certification is 2.8 million Ha (approx.). This includes 1 million hectare under cultivation and the rest is under forest area (wild collection).

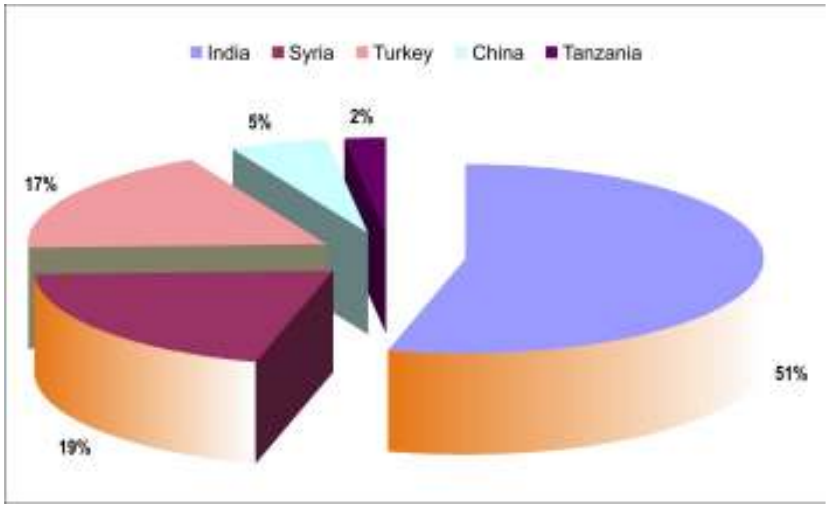
1.1 Indian organic cotton production and India cotton exports in the global market

India is having 1.7 million hectares of area under certified organic farming. The organic market in the country is valued at Rs.100 crore with an annual growth rate steadily going up from 35% to 50% by 2010. India is fast becoming a major base for production and supply of organically produced agricultural products to the world market. The global market for organic farm produce is expected to touch US$ 100 billion by 2010 *(Press release by Ministry of Commerce and Industry, Government of India)*.

Organic Cotton production in India holds tremendous potential since 65% of the area is rain-fed and characterized by the use of 20% fertilizers and 15% pesticides compared with conventional irrigated cotton. India is now the world leader in production of organic cotton.

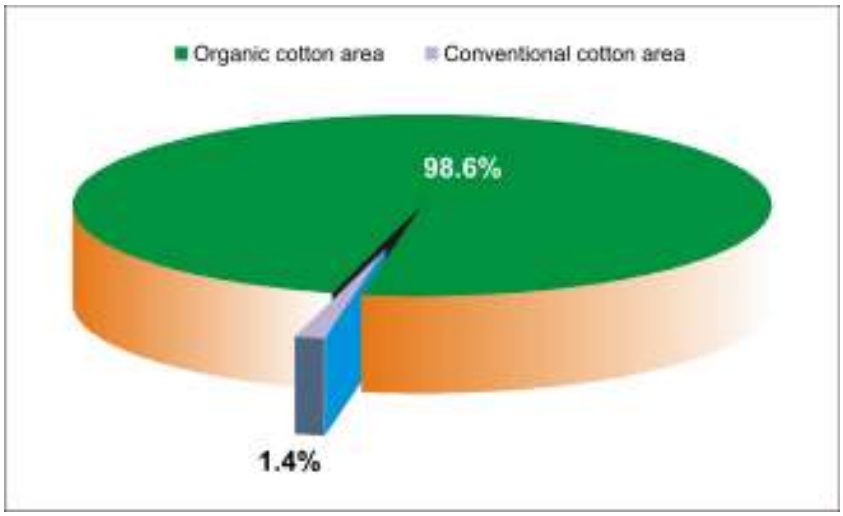
India is the largest producer of organic cotton by contributing more than 50 % of the global production. According to OE's recent fiber report, the top five organic cotton producing countries in the 2007-2008 crop year were, in order of scale, India (51 percent), Syria (19 percent), Turkey (17 percent), China (5 percent) and Tanzania (2 percent) (Figure 1 & 3). Together, these five countries accounted for 94 percent of world production. Nicaragua and South Africa were new arrivals, with their first certified organic cotton production in that year. Although, Organic cotton production in India is just 1.4% of the total conventional cotton produced in the country, it is an excellent niche area for development (Figure 2).

Figure 1: Top five organic cotton producing countries



Source: Organic Exchange Report, 2007-08

Figure 2: Area under organic cotton and conventional cotton production in India



Source: Cotton Association of India, 2008-09

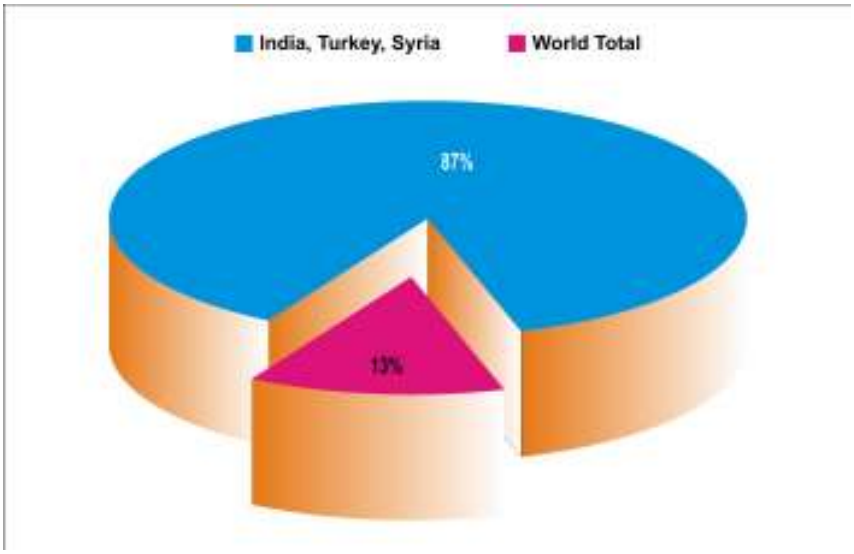
According to Organic Exchange's Fiber Report, 2007-2008, India is undeniably the world leader in this field and showing signs of continued increase in production. And, in turn, it has pushed global organic production by 152 percent to 1.46 lakh tonnes. This means India contributes exactly half of the world's organic cotton output.

Within the country, Madhya Pradesh leads in organic cotton production, followed by Maharashtra and Orissa. Although, Organic cotton production in India is just 1.4% of the total conventional cotton produced in the country, it is an excellent niche area for development.

According to the Organic Cotton Farm and Fiber Report 2008 released by Organic Exchange, organic cotton grown by farmers worldwide increased 152 percent during the 2007-2008. As a

result, organic cotton production reached 145,872 metric tons (MT), equaling 668,581 bales, grown on 161,000 hectares in 22 countries. India took over Turkey's long-standing position as the leader, seeing its production increase by 292 percent to reach 73,702 MT, or about half of world organic cotton production. Other leading organic cotton producers, according to rank, were Syria, Turkey, China, Tanzania, United States, Uganda, Peru, Egypt and Burkina Faso.

Figure 3: Organic cotton production share

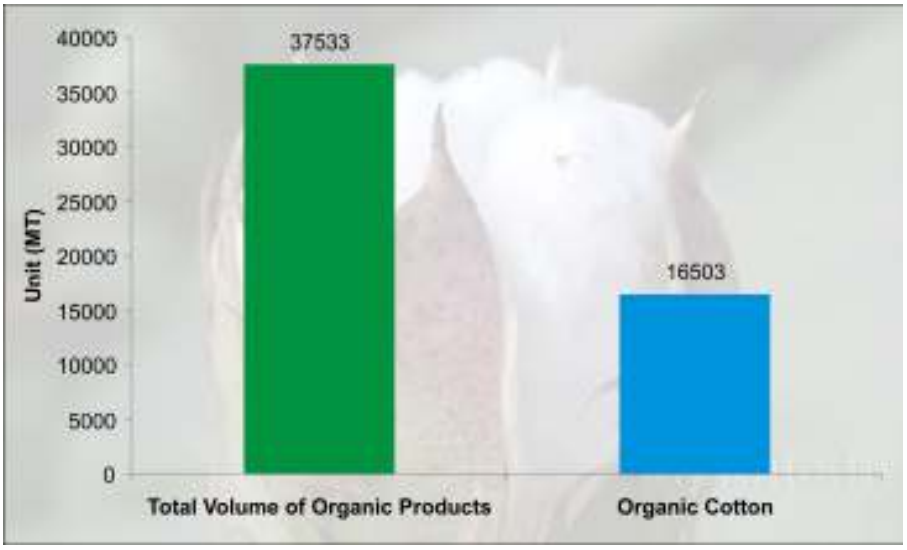


Source: Organic Exchange, 2008

Organic agricultural production is of high importance to India and cotton plays a key role in the country's move towards increasing organic production. India has become the largest producer of organic cotton in 2007-08, improving the livelihood of thousands of farmers. A large part of its production is consumed by local spinning mills. The established organic cotton production areas are mainly in the central zone of India, Maharashtra and Madhya Pradesh, with new projects having been launched in other areas. All cotton is handpicked and roller ginned. The staple is 1.1/8" to 1.5/32", micronaire ranges between 3.5 and 4.5., and strength is 27 gpt (HVI). Most organic cotton is of Mech-1 and Bunny Brama quality. India produced around 3, 96,997 Million tonnes of certified organic products which includes all varieties of food products namely Basmati rice, Pulses, Honey, Tea, Spices, Coffee, Oil Seeds,

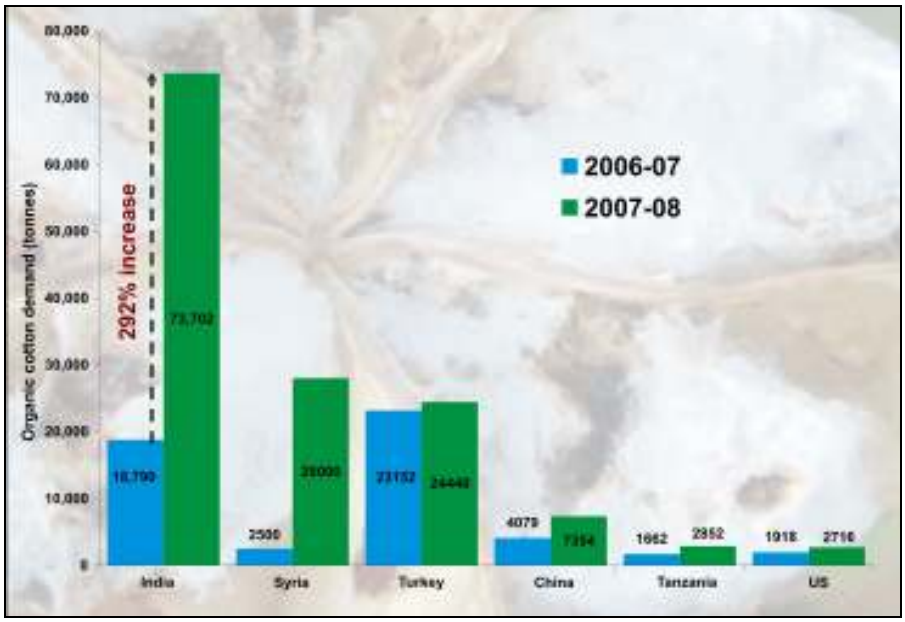
Fruits, Processed food, Cereals, Herbal medicines and their value added products. The production is not limited to the edible sector but also produces organic cotton fiber, garments, cosmetics, functional food products, body care products, etc. India exported 86 items in 2007-2008 with the total volume of 37533 Million tones (Figure 4). The export realization was around 100.4 million US $ registering a 30% growth over the previous year. Organic products are mainly exported to EU, US, Australia, Canada, Japan, Switzerland, South Africa and Middle East. **Cotton** leads among the products exported (16,503 MT). The rise in organic production is due to increased demand for organic cotton products (Figure 5).

Figure 4: Organic products exported from India, 2007-2008



Source: Agricultural and Processed Food Products Export Development Authority, Ministry of Commerce & Industry, Government of India

Figure 5: Worldwide organic cotton production, 2008



Source: Confederation of Indian Textile Industries

1.2 History of organic cotton production

Archeologists have found evidence, however, that people in India and in Central and South America were weaving cotton into fabric as long as 4,000 years ago.

India is the ancient home of the cultivated Asiatic species of *Gossypium*, particularly representing the origin and domestication of three geographical races of *G. arboreum,* namely bengalense,

cernuum and indicum, and also the race wightianum of *G. herbaceum* (Hutchinson et al. 1947). India has been growing diploid cottons since earlier than 3000 BC, and both perennial and annual forms are found widely distributed.

Throughout its four-thousand-year history, cotton had always been grown organically. Over 5-6 decades ago, cotton cultivation in India was organic, since no chemicals were used either as fertilizers or as pesticides. Even today, cotton is unintentionally grown as organic in many pockets as shown below. Inherent drought and pest resistance of the above varieties render them suitable for green farming.

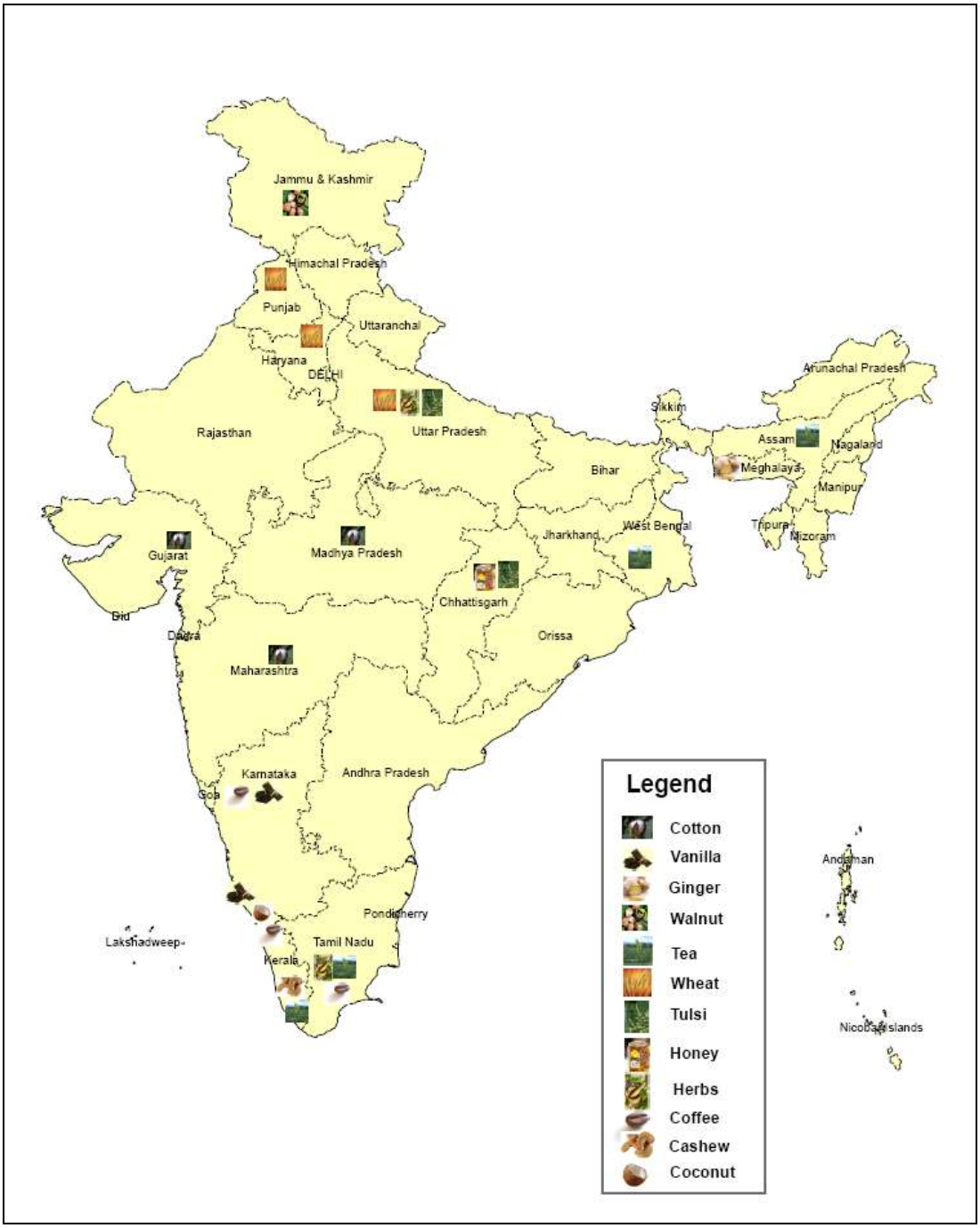
Then, as a result of the development of pesticides and chemical fertilizers during II world war, the cultivation of cotton changed dramatically. In the late 1950s-only ten years after their introduction-the environmental damage caused by DDT clearly demonstrated the negative potential of long-term use of agricultural chemicals. There is a more natural way to grow cotton. In recent years, many people have urged a return to more traditional cultivation methods. As per documented evidence, organic agriculture in India started long back in 1900 by Sir Albert Howard, a British agronomist, in local village of North India. Since then, farmers in some parts of India are practicing it either by default or in absence of resources.

1.3 Geographic distribution of organic cotton production

India is the only country to grow all the four species of cultivated cotton *Gossypium arboreum* and *G.herbaceum* (Asian cotton), *G.barbadense* (Egyptian cotton) and *G.hirsutum* (American upland cotton) besides hybrid cotton. *Gossypium hirsutum* represents 90% of the hybrid cotton in India and all the current Bt cotton hybrids are *G.hirsutum.*

Cotton is cultivated in three distinct agro-ecological zones viz. Northern (Punjab, Haryana and Rajasthan), Central (Gujarat, Madhya Pradesh and Maharashtra) and Southern zone (Orissa, Tamil Nadu, Karnataka and Andhra Pradesh) of the country; all having the different species composition and their zone specific problems (Figure 6). India is rapidly increasing organic cotton fiber, textile and garment production to meet growing customer demands. India also has a mature, global textile industry with links to major international markets as well as access to a potentially enormous domestic market.

Figure 6: India's organic products and production areas



Source: Agricultural and Processed Food Products Export Development Authority (APEDA), 2008

1.4 Government policies for organic cotton farming

Keeping in view the importance of cotton in our national agriculture and economic scenario, it received special attention of the Government earlier through Indian Central Cotton Committee and now through the Indian Council of Agricultural Research(Figure 7).. Further the research efforts under All India Coordinated Cotton Improvement Project. (AICCIP) were initiated by the Council in the year 1967. The establishment of AICCIP gave new fillip and direction in terms of multi- disciplinary and multi-centre approaches with the active involvement of State Agriculture Universities

With a view to develop a Centre of excellence for carrying out long term research on fundamental problems limiting cotton production and also to provide basic support to location specific applied research work being carried out in a network of cotton research centers in the country through the AICCIP system, the Indian Council of Agricultural Research has established the Central Institute for Cotton Research at Nagpur in April, 1976.

Organic Exchange's Organic Cotton Farm and Fiber Report 2008, attributes the rise in output of organic cotton to the efforts of the Agricultural and Processed Food Products Export Development Authority (APEDA). It was established by the Government of India under the Agricultural and Processed Food Products Export Development Authority Act passed by the Parliament in December, 1985. The Act (2 of 1986) came into effect from 13th February, 1986. The Authority replaced the Processed Food Export Promotion Council (PFEPC).

The Authority attempts to shift the focus of farmers' lives from mere subsistence to strength and prosperity, especially in organic cotton industry. Besides, the Centre has set up an Organic Cotton Advisory Board, while a National Centre for Organic Farming has been formed to improve farming practices and fund research through NGOs, universities and research institutes.

To boost organic agriculture in general, the Planning Commission, Government of India, has proposed setting up a Rs 2,500 crore fund in the Eleventh Five-Year Plan (2007-12). Earlier, it had provided Rs 100 crore to set up the National Centre for Organic Farming.

National Commission on Farmers has made a recommendation that 25,000 organic Villages with niche commodities should be developed in the hills during the next five years, and the local farm graduates and youth be involved in it. The Commission has observed the institutional infrastructure for promoting organic farming in the country is as yet far from satisfactory. Commission has recommended that a focused national movement on organic agriculture be launched, for mainstreaming organic farming in the national agriculture economy.

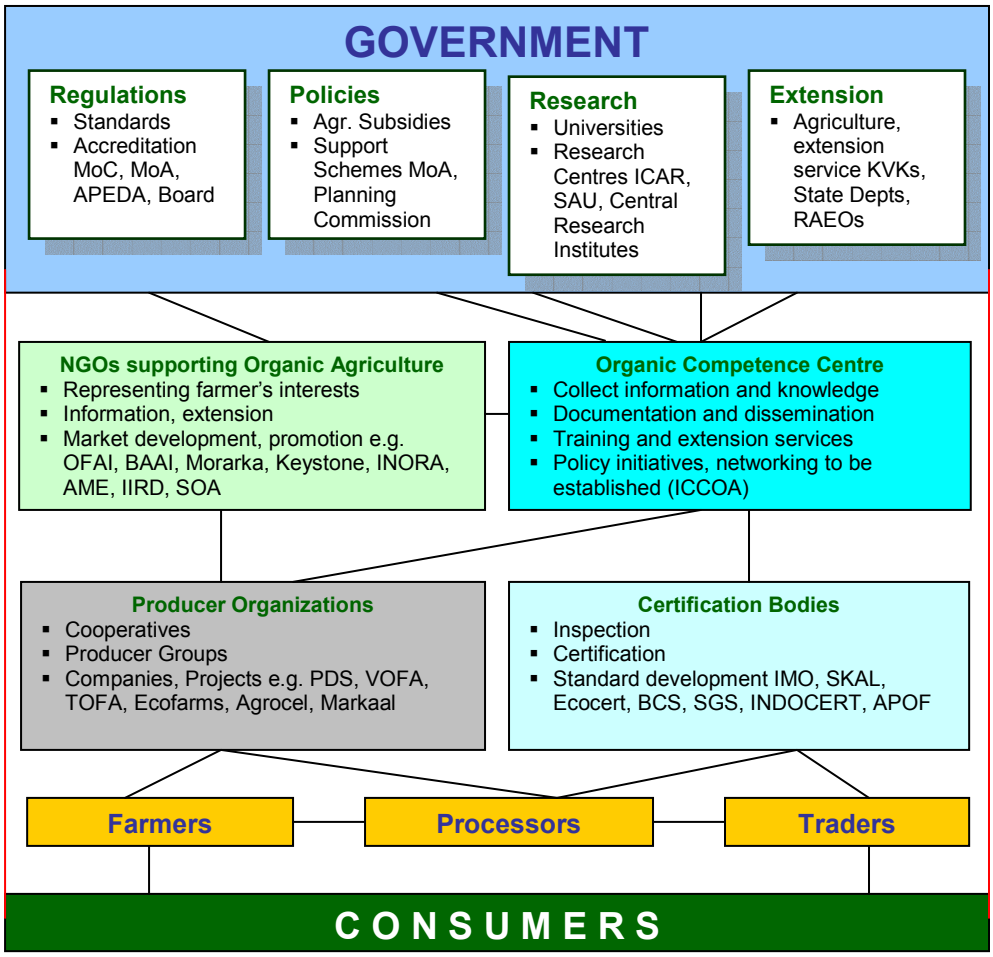
Investment of Rs 2500 crores is proposed during XI plan (2007-12) in organic sector, in the following four areas;

I. Farm conversion to organic and production processes
II. Developing organic supply chains for domestic market

III. Developing supply chains for export market

IV. Human resource development and institutional capacity building awareness promotion and developing policies, strategies, standards and regulations

Figure 7: Organic agriculture in India – Stakeholder's involvement



1.4.1 National Programme for Organic Production (NPOP)

In the year 2000, the Ministry of Commerce, Govt. of India, launched the National Programme for Organic Production (NPOP) to ensure a focused and well-directed development of organic agriculture. The programme includes ***policies*** for development and certification of organic products, ***national standards*** for organic products and processes, ***accreditation*** of programmes to be operated by Inspection and Certification Agencies and ***certification*** of organic products.

A National Steering Committee (NSC) comprising Agricultural and Processed Food Products Export Development Authority (APEDA), Spices Board, Coffee Board and various other government and private organizations associated with the organic movement was set up to formulate the National Programme for Organic Production (NPOP).

National Steering Committee is entrusted with the preparation and approvals of

- The National Standards on Organic Products (NSOP)
- Accreditation criteria for accrediting the inspection and certification agencies
- Accreditation procedure
- Inspection and certification procedures

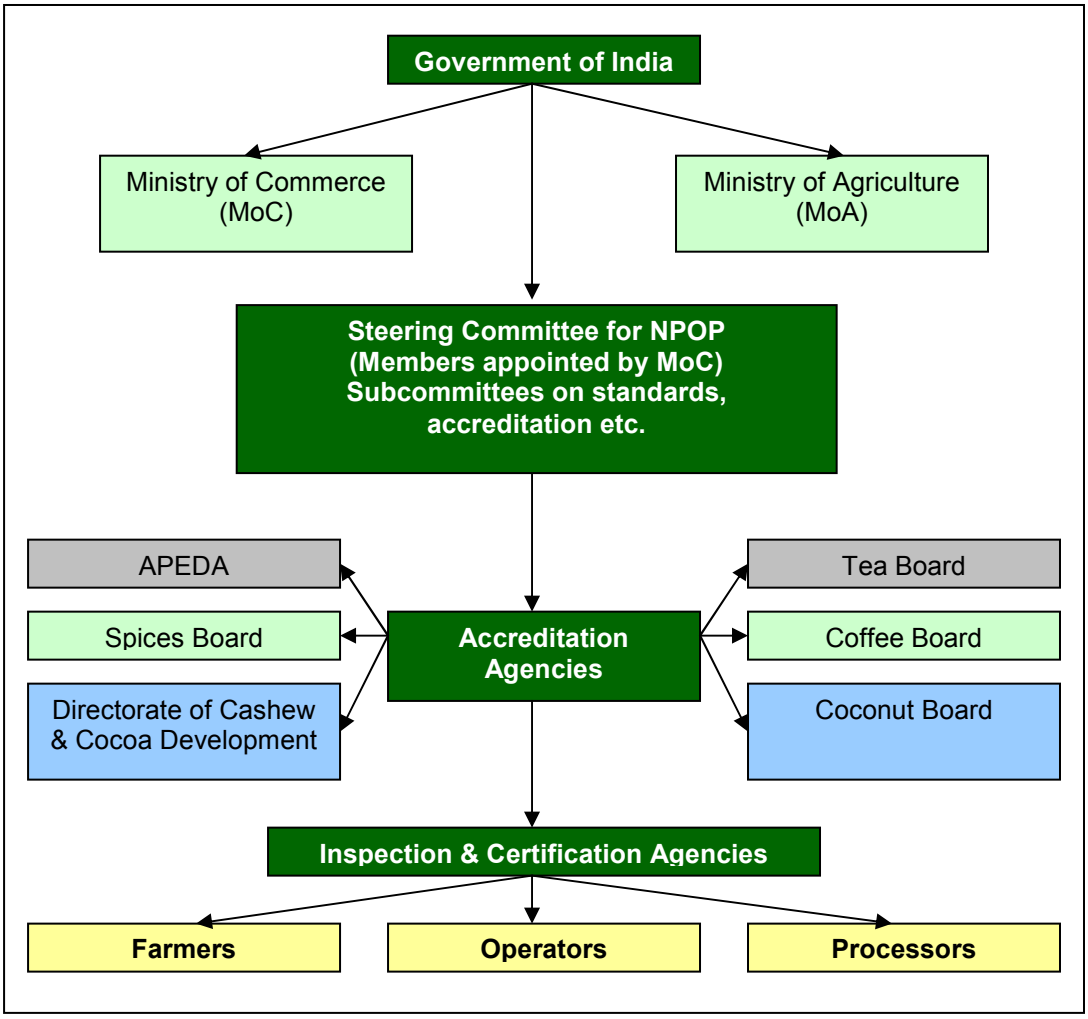
The NPOP standards for production and accreditation system have been recognized by European Commission and Switzerland as equivalent to their country standards. Similarly, USDA has recognized NPOP conformity assessment procedures of accreditation as equivalent to that of US. With these recognitions, Indian organic products duly certified by the accredited certification bodies of India are accepted by the importing countries.

a) Operational structure of NPOP

The operational structure of NPOP is given in the Figure 8. The programme was developed and implemented by the Government of India through its Ministry of Commerce as the apex body. The Ministry has constituted a Steering Committee for National Programme for Organic Production, whose members are drawn from Agricultural and Processed Food Products Export Development Authority (APEDA), Coffee Board, Spices Board and Tea Board and other government and private organizations associated with the organic movement. To advice the Steering Committee on relevant issues, sub-committees may be appointed whenever necessary.

The Steering Committee has formulated a *National Accreditation Policy and Programme* and drawn up *National Standards for Organic Products (NSOP)*, which include standards for organic production and processes. National Accreditation Policy and Programme is administered by the Accreditation Agency, which define the overall policy objectives for the accreditation programmes and operations. The Steering Committee may amend the accreditation procedures whenever it deems fit. The National Accreditation Policy and Programme is subjected to periodic internal review, which is conducted by the members of Accreditation Agency who shall advice the Steering Committee on such amendments.

Figure 8: Operational structure of NPOP



Source: Agricultural and Processed Food Products Export Development Authority, Ministry of Commerce & Industry, Government of India

b) Accreditation agencies

The Accreditation Agencies was constituted by the Government on the recommendation of the Steering Committee. APEDA, Coffee Board, Tea Board and Spices Board have already been recognized by the Government of India as Accreditation Agencies. Any other Government agency engaged in organic farming, which wants to be accredited, may also apply to the Steering Committee for recognition as Accreditation Agency for the product dealt with by them. The work of the Accreditation Agency involve drawing up procedures for evaluation and certification of the products, and formulating procedures for evaluation of the agencies implementing the programmes.

c) Evaluating agency

Eligible Inspection and Certification Agencies implementing certification programmes have been identified by the Accreditation Agency with the help of an Evaluating Agency. Evaluating Agency was appointed by the Accreditation Agency, which consist of persons from within their organization or experts from outside. The evaluating agency is required to designate a Programme Manager for receiving and screening applications from certification programmes, for arranging evaluation visits etc. to ascertain the credentials of the programmes and of the implementing agencies. The Programme Manager is required to submit an evaluation report along with their recommendation to the Accreditation Agency for considering accreditation.

d) Accredited inspection and certification agencies

Based on the recommendations of the Evaluating Agency, suitable Inspection and Certification Agencies have been accredited by the Accreditation Agency. These agencies are well versed with the operating procedures, the NSOP and the international standards and their programmes have been in operation for at least one year.

e) Inspectors

The inspectors appointed by the accredited Inspection and Certification Agencies will carry out inspection of the operations through records maintained by the operators as per specified formats and also by periodic site inspection. Based on compliance to the standards and programmes, accredited Inspection and Certification Agencies will certify the organic status of products and operations, indicating their conditions along with their recommendations.

1.4.2 Regulations

Accreditation Regulation 2001

These regulations are applicable to all certifying agencies in India which propose to engage, or are already engaged before the commencement of these regulations, in the certification of production and processing of organic crops/products under these accreditation agencies as organic.

No certificate granted by a certifying agency in respect of products as organic shall be valid unless the agency if accredited by the respective Accreditation Agencies. The Accreditation Agencies follow the approved accreditation criteria for inspection and certification as specified under the regulations.

1. Committee for Accreditation

A committee for accreditation of the respective Accreditation Agencies is constituted separately by the Govt. of India. This committee shall have the authority to conduct random or surprise field inspections, including analysis of samples drawn from the certified operators' (producer groups) farms.

2. Application for Accreditation

Applicants seeking accreditation as an agency or renewal thereof shall submit an application to the authorized officer in the form prescribed, available with Accreditation Agency along with fee prescribed for the purpose and specified in the regulations. When the Certifying Agency apply for accreditation from one of the Accreditation Agencies to cover multiple projects, some of them covered under different Accreditation Agencies, then that Accreditation Agency while considering such application will also associate technical expert from other Accreditation Agency under whom the particular products are covered.

An applicant shall deposit an accreditation fee along with the application form for accreditation. The Certificate of Accreditation will be valid for a period of three years. For renewal of Certificate of Accreditation, there shall be a renewal fee, which shall be remitted with the application for renewal. All accredited Inspection and Certification Agencies shall be allotted a specific accreditation number, which cannot be transferred or reassigned. On receipt of the application duly filled in all respects, together with the prescribed fee, the Accreditation Agency shall conduct a preliminary screening of all the applications. If the application is found in order, the Accreditation Agency shall arrange for field evaluation by a competent evaluator nominated by the Accreditation Agency. The Committee for Accreditation shall consider the application, along with the evaluation report. In case the applicant fulfills the prescribed criteria, the Committee shall give approval to the Certifying Agency.

The Committee may, if considers appropriate, give opportunity to the applicant to fulfill/rectify any deficiencies found during the evaluation. In the case of non-approval, the same shall be intimated to the applicant in writing along with reasons thereof. On approval of Accreditation, the respective Accreditation Agencies shall intimate the Certifying Agency about the approval along with a copy of the prescribed Accreditation Contract. The Certifying Agency shall execute the contract on a non-judicial stamp paper of the value intimated to the applicant, within fifteen days, from the date of receipt of approval. On receipt of the contract duly signed by the authorized person of the Certifying Agency, the Accreditation Agency shall issue the Certificate of Accreditation within a period of fifteen days, from the date of receipt of the contract.

3. Updating and Renewal of Accreditation

Application for renewal of accreditation along with the fees prescribed shall be submitted by the Certifying Agency to reach the Authorized Officer 30 days before the expiry of accreditation period. The Chairman of the Accreditation Agency shall, however, have the power to condone any delay in submitting the said renewal application, in the events of a reasonable cause shown for the same. The renewal of the certificate for accreditation shall be based on the past performance of the Inspection and Certifying Agency and the Accreditation Agencies shall have the right to renew or reject such applications, at their absolute discretion. In the event of rejection of an application for renewal, the Accreditation Agency shall furnish the reasons for such rejections, in writing. The Chairman of the respective Accreditation Agencies shall be the Appellate Authority for deciding any appeal filed on account of any such rejection. The Ministry of Commerce, Govt. of India, is the competent Authority for entertaining all appeals. Decisions on such appeal shall be final and binding on both the parties.

4. Power to Issue Guidelines

The Accreditation Agencies shall have the powers to issue necessary guidelines to the Certifying Agencies for inspection and certification programmes, from time to time.

5. Logo

The logo used under the certification programme is called “India Organic”. India Organic etched over the surface, is the seal that the product is organically produced and comes from India (Figure–9). All Accredited Agencies shall be entitled to use this logo for certified organic products. Use of the logo will be based on the fulfillment of the terms and conditions, contained under these regulations. Products marketed by any person can bear the National Organic Logo, only if the necessary certification is done by an Inspection and Certification Agency accredited by the Accreditation Agency.

Figure 9: India Organic Logo

Source: APEDA

6. Termination of Accreditation

The Certificate of Accreditation granted to an agency shall be liable to be suspended for a specific period or permanently terminated in the event of violation of any of the clauses under these regulations and of such other directions issued by the Accreditation Agency or Govt. of India from time to time. Provided that in case of suspension, the Accreditation Agency shall have the powers to nominate any other Certification Agency to continue the work of certification in order to protect the interest of the operators. An appeal, if any, in respect of such suspension and/or termination of the Certificate of Accreditation may be filed with the Chairman of the respective Accreditation Agency within a period of 30 days from the date of issue of suspension/termination by the Accreditation Agency. The Ministry of Commerce, Govt. of India is the competent Authority for revision of the decision of the Appellate Authority. The revision should be filed within 30 days from the date of issue of award on the appeal. However, the said periods for filing an appeal / revision can be condoned by the respective authority, in the event of a reasonable cause being shown.

7. Categories for Accreditation

Accreditation can be granted for each category of products as follows: Organic agricultural production, organic processing operations, wild products, forestry, organic animal production and processing. The Certifying Agencies applying for accreditation should be actively engaged in programmes related to organic agriculture movement/production and their programmes should have been in operation for at least one year.

8. Reciprocity

National: Products certified by any accredited Certifying Agency will be accepted as organic by the other Certifying Agencies also.

International: For imported organic products, the authority for approval will be the Accreditation Agencies. It will decide on the approval of Inspection and Certification Agencies accepted in other countries. It will notify a list of such Inspection and Certifying Agencies.

Any Inspection and Certification Agency which wishes to re-certify any imported product or products with imported certified ingredients may apply to the respective Accreditation Agencies for inclusion of such products and the procedure for their certification in the certification programmes.

1.4.3 The National Standards for Organic Products (NSOP)

Ministry of Commerce Under the "National Programme for Organic Production" has prescribed National Standards for Organic Production. Inspection and Certification Agencies shall follow the national standards for organic products notified under the National Accreditation Policy and Programme. These standards are grouped under following six categories:

1. Conversion
2. Crop production
3. Labeling
4. Storage and transport
5. Animal husbandry
6. Food processing and handling

1. Conversion Requirements

The time between the start of organic management and cultivation of crops or animal husbandry is known as the conversion period. The whole farm including the livestock should be converted to the standards over a period of time. All standard requirements should be met during conversion period. If the whole farm is not converted then the two must be separate and dissectible. Regular inspections during the conversion period should be carried out.

Simultaneous productions of conventional or in conversion and\or organic which can not be distinguished clearly are not allowed. To ensure clear separation the certification programme

shall inspect the whole production system. Full conversion period is not required where organic farming practices are already in use. But this has to be verified by the inspection agency.

- ***Maintenance of organic management***

Organic certification is based on continuance. The certification programme should certify the production, which is likely to be maintained on a long term basis. The converted land and animals shall not get switched back and forth between organic and conventional management.

- ***Landscape***

Organic farming should contribute beneficially to the ecosystem. Areas which should be managed properly and linked to facilitate biodiversity are:

a. Extensive grassland
b. All areas which are not under rotation and are not heavily manured
c. Pastures, meadows, orchards, hedges, hedgerows etc
d. Ecologically rich fallow land or arable land
e. Ecologically diversified field margins
f. Waterways, pools, springs, ditches, wetland, swamps

The certification programme shall set standards for a minimum percentage of the farm area to facilitate biodiversity and nature conservation.

2. Crop Production

- ***Choice of crops and varieties***

All seeds and planting materials should be certified organic, well adapted to local climatic conditions and resistant to pests and diseases. If certified organic seed or planting material is not available then chemically untreated conventional material can be used. Uses of genetically engineered seeds, pollen, transgenic plants are not allowed.

- ***Duration of conversion period***

The minimum conversion period for plant products, produced annually is 12 months prior to the start of the production cycle. For perennial plants (excluding pastures and meadows) the conversion period is 18 months from the date of starting organic management. Depending upon the past use of the land and ecological situations, the certification agency can extend or reduce the minimum conversion period.

- ***Diversity in crop production***

Diversity in crop production is achieved by a combination of (a) versatile crop rotation with legumes and (b) by appropriate coverage of the soil with diverse plant species during the year of production that, taken into account pressure from insects, weeds, diseases and other pests, while maintaining or increasing soil health and fertility.

- ***Fertilization policy***

Biodegradable material of plant or animal origin produced on organic farms should form the basis of the fertilization policy. Fertilization management should minimize nutrient losses, avoid accumulation of heavy metals and maintain the soil pH[1]. Emphasis should be given to generate and use own on-farm organic fertilizers. Brought in fertilizers of biological origin should be supplementary and not a replacement. Over manuring should be avoided. Manures containing human excreta should not be used on vegetation for human consumption.

In case of deficiency mineral fertilizers can be used as supplementary source and should be applied in their natural composition. Minerals containing high concentrations of heavy metals should be avoided. Biofertilizers can be used safely under all ecosystems and in all the crops.

- ***Pest disease and weed management including growth regulators***

Weeds, pests and diseases should be controlled by a number of preventive cultural techniques, such as suitable rotations, green manures, a balanced fertilization programme, early and pre-drilling seed bed preparations, mulching, mechanical control and the disturbances of pest development cycles.

Botanical pesticides prepared at farm from local plants, animals and microorganisms are allowed. Thermic weed control and physical methods for pests, disease and weed management are permitted. Use of synthetic chemicals such as fungicides, insecticides, herbicides, synthetic growth regulators and dyes are prohibited. Use of genetically engineered organisms or products is prohibited.

- ***Contamination control***

All attempts should be made to minimize contamination from outside and with in the farm.

- ***Soil and water conservation***

Soil and water resources should be handled in a sustainable manner to avoid erosion, salination, excessive and improper use of water and the pollution of surface and ground water. Cleaning of land by burning (e.g. slash and burn and straw burning) should be restricted. Clearing of primary forest for agriculture (jhum or shifting cultivation) is strictly prohibited.

3. Packaging

Material used for packaging shall be eco-friendly. Unnecessary packaging material should be avoided. Recycling and reusable systems should be used. Packaging material should be biodegradable. Material used for packaging shall not contaminate the food.

4. Labeling

When the full standard requirements are met, the product can be sold as “Organic”. On proper certification by certification agency “India Organic” logo can also be used on the product.

1 pH is defined as minus the decimal logarithm of the hydrogen ion activity in an aqueous solution.

5. Storage and transport

Products integrity should be maintained during storage and transportation of organic products. Organic products must be protected from co-mingling with non-organic products and must be protected all times from contact with the materials and substances not permitted for use in organic farming.

Table 1: Products for use in fertilization and soil conditioning in organic farming

Items	Conditions for use
Material from plant and animal origin	
Matter produced on an organic farm unit	
• Farmyard and poultry manure, slurry, urine	Permitted
• Crop residues and green manure	Permitted
• Straw and other mulches	Permitted
• Composts and Vermicompost	Permitted
Matter produced outside the organic farm unit	
• Blood meal, meat meal, bone meal and feather meal without preservatives	Restricted
• Compost made from plant residues and animal excrement	Restricted
• Farmyard manure, slurry, urine	Restricted
• Fish and fish products without preservatives	Restricted
• Guano	Restricted
• Human excrement	Prohibited
• Wood, bark, sawdust, wood shavings, wood ash, wood charcoal	Restricted
• Straw, animal charcoal, compost and spent mushroom and vermiculate substances	Restricted
• Compost from organic household	Restricted
• Compost from plant residues	Restricted
• Sea weed and sea weed products	Restricted
By products from the industries	
• By-products from the food and textile industries of biodegradable material of microbial, plant or animal origin without any synthetic additives	Restricted
• By products from oil palm, coconut and cocoa (including fruit bunch, palm oil mill effluent, cocoa peat and empty cocoa pods.	Restricted
• By-products of industries processing ingredients from organic agriculture	Restricted
• Extracts from mushroom, Chlorella, Fermented product from Aspergillus, natural acids (vinegar)	Restricted
Mineral Origin	
• Basic slag	Restricted
• Calcareous and magnesium rock	Restricted
• Lime, limestone, gypsum	Permitted
• Calcified sea weed	Permitted
• Calcium chloride	Permitted
• Mineral potassium with low chlorine content (e.g. sulphate of potash,	Restricted

kainite, sylvinite, patenkali)	
• Natural phosphates (rock phosphate)	Restricted
• Trace elements	Permitted
• Sulphur	Permitted
• Clay (bentonite, perlite, zeolite)	Permitted
Microbiological origin	
• Bacterial preparations (biofertilizers)	Permitted
• Biodynamic preparations	Permitted
• Plant preparations and botanical extracts	Permitted

Source: Agricultural and Processed Food Products Export Development Authority, Ministry of Commerce & Industry, Government of India

Table 2: Products for plant pest and disease control

Items	Conditions for use
Material from plant and animal origin	
• Plant based repellents (Neem preparations from Azadirachta *indica*)	Permitted
• Algal preparations (gelatin)	Permitted
• Casein	Permitted
• Extracts from mushroom, chlorella, fermented products from Aspergillus	Permitted
• Propolis	Restricted
• Beeswax, natural acids (vinegar), plant oils, Quassia	Permitted
• Rotenone from Derris elliptica, Lonchocarpus, Thephrosia spp.	Restricted
• Tobacco tea (pure nicotine is prohibited)	Restricted
• Preparation from Ryania species	Restricted
Mineral origin	
• Chlorides of lime/soda	Restricted
• Burgundy mixture	Restricted
• Clay (bentonite, perlite, vermiculite, zeolite)	Permitted
• Copper salts / inorganic salts (Bordeaux mix, copper hydroxide, copper oxychloride)	Not allowed
• Quick lime	Restricted
Mineral origin	
• Diatomaceous earth	Permitted
• Light mineral oils	Restricted
• Permangnate of potash	Restricted
Insects origin	
• Release of parasites, predators of insect pests	Restricted
• Sterilized insects	Restricted
• Sterilized insect males	Not allowed
Microorganisms used for biological pest control	
• Viral, fungal and bacterial preparations (biopesticides)	Restricted
Others	

• Carbon dioxide and nitrogen gas	Permitted
• Soft soap, soda, sulphur dioxide	Permitted
• Homeopathic and ayurvedic preparations	Permitted
• Herbal and biodynamic preparations	Permitted
• Sea salt and salty water	Permitted
• Ethyl alcohol	Not allowed
Traps, barriers and repellants	
• Physical methods (e.g. chromatic traps, mechanical traps)	Permitted
• Mulches, nets	Permitted
• Pheromones – in traps and dispensers only	Permitted

Source: Agricultural and Processed Food Products Export Development Authority, Ministry of Commerce & Industry, Government of India

1.4.4 National Policy for Farmers, 2007

Government of India approved the National Policy for Farmers in 2007 with the aim to stimulate attitudes and actions which should result in assessing agricultural progress in terms of improvement in the income of farm families, not only to meet their consumption requirements but also to enhance their capacity to invest in farm related activities.

National Policy for Farmers, 2007 has special interventions for special categories of farmers (tribal framers, Organic farmers, urban farmers, plantation framers etc.). The organic farming movement in India suffers from a lack of adequate institutional support in the areas of research, extension, certification and marketing and it requires more scientific support than chemical farming. Some of the policy interventions under National Policy for Farmers are following:

- KVKs (Krishi Vignan Kendra) would be equipped to provide training in organic agriculture.
- Internationally accepted certification procedures would be strengthened to make them farmer friendly and affordable.
- Organic farming zones would be identified, like the hill areas, islands where chemical fertilizer use is low, and for medicinal plants where the use of chemical pesticides and fertilizers is not advisable.
- Organic farming would also be encouraged in selected rainfed areas backed up by required supports, including marketing. It would also be supported through contract farming.
- Farmers engaged in organic farming should be linked to niche markets where they will obtain a premium price.
- Progressive farmers and farm graduates would be supported for establishing agri-clinics and agri-business centers for organic farming.
- Bio-fertilizers, organic manures and bio-pesticides would be treated at par with the chemical fertilizers for support and promotion.

1.4.5 Integrated Pest Management

Cotton cultivation has been a pesticide-intensive activity worldwide. The quest for alternative and supplementary means to combat pests has been a research priority for farm scientists who have evolved several eco-friendly ways of cultivating cotton. Seized of the problem of atmospheric pollution and health hazards due to pesticide residues in cotton, the Government of India has banned the use of 25 pesticides and 6 formulations.

The Indian Council of Agricultural Research (ICAR) has promoted researches in pest management through Institutes under its tutelage and through Agricultural Universities in cotton growing States. These researches have yielded location-specific IPM packages.

IPM is being promoted by the Government through the following instruments:

(i) ***Technology Mission on Cotton (TMC):*** Under Mini Mission – II of TMC launched in 2000, financial assistance is given for setting up demonstration plots to enlighten farmers on crop protection through IPM.

(ii) ***All India Co-ordinated Cotton Improvement Project (AICCIP) of the ICAR:*** The AICCIP conducts over 1000 FLD programmes to demonstrate new farm technologies including IPM.

Participants in the above schemes include ICAR Institutes, State Agricultural Universities (SAUs), Krishi Vigyan Kendras (KVKs), State Departments of Agriculture, the Cotton Corporation of India Ltd. and Non-Government Organizations (NGOs). Significant contribution to popularization of IPM is also made by private bodies like Conference of Indian Textile Industry (CITI), Southern India Mills Association (SIMA), South India Cotton Association (SICA) and many textile mills and voluntary organizations.

As a result of the above, the pesticide use on cotton seems to have significantly come down in the last few years. Analysis of pesticide consumption in India shows a marked decrease in consumption in cotton growing states. It would appear safe to conclude that pesticide application on cotton is indeed declining and that the Government's efforts to educate the Indian farmers.

Table 3: Pesticides consumption (metric tones)

Sl. No.	Particulars	2001-02	2002-03	2003-04	2004-05	2005-06 (Est.)
1	Total for cotton growing states	33741	35548	27702	27218	24672
2	Total for all states in India	47020	48350	41020	40672	39773
3	Total for non cotton growing states	13279	12802	13318	13454	15101

Source: Sudripta Roy; Ministry of Textiles, 2006

1.4.6 Promotion of Bio-Fertilizers

With a view to promote the use of bio-fertilisers as an environment-friendly and cheaper source of plant nutrients, Government of India had earlier taken up a 'National Project on Development and Use of Bio fertilisers' during the Sixth Plan and was continued till Ninth Plan. The Scheme provided for setting up National Bio-fertiliser Development Centre at Ghaziabad and its Six Regional Bio-fertiliser Development Centres (RBDCs) at Jabalpur, Nagpur, Bangalore, Bhubaneswar, Hissar and Imphal for promotion, extension, training and demonstration of bio-fertilisers. Under the Scheme, assistance for setting up of bio-fertiliser production units was also provided. Presently, there are around 125 bio-fertilisers production units in the country with an annual capacity of 18,000 tonnes of different types of bio-fertilisers and the annual production is about 10,000 tonnes.

This scheme has been subsumed under a new Central Sector Scheme "National Project on Organic Farming" from October 2004. To undertake the new activities, the names of NBDC and RBDCs have been changed to National Centre of Organic Farming (NCOF) and Regional Centers of Organic Farming (RCOF).

1.4.7 Cotton Gene Bank

The National Centre for Cotton Genetic Resources with more than 9000 accessions of the 4 cultivated species of *Gossypium* and 24 wild species, 20 perennials, 6 races of *G.arboreum* and 7 races of *G.hirsutum*, 1 race of *G.barbadense*, 1 race of *G.herbaceum* and 32 inter-specific hybrids are maintained in the species garden at CICR, Nagpur. Germplasm lines were screened and number of lines with good agronomic traits, superior fiber quality and resistance to pests and diseases were identified and distributed to end-users.

1.5 Opportunities and threats of organic cotton production for farmers, traders / exporters, manufactures, retailers and consumers

According to Organic Exchange's Organic Cotton Farm and Fiber Report 2008 the challenges in India related to organic cotton production are following:

1. Lack of strong scientific research and development
2. Unavailability of non-treated seeds
3. Shortage of organic fertilizers
4. Disorganized dissemination of information
5. Difficulty in providing advance payments for production and
6. Lack of adequate information sharing and communication down the supply chain

Between 2003 and 2007, 8,263 farmers have committed suicide in 9 states, Maharashtra, Karnataka, Kerala, Madhya Pradesh, Andhra Pradesh, Tamil Nadu, Orissa, Punjab, and Gujarat (Ghosh, 2007). It is not surprising that Gujarat, Maharashtra, Madhya Pradesh, Orissa, and Andhra Pradesh are the states experiencing mass cotton farmer suicides connected to failure of

their GM crops are also the leading states converting to organic cotton cultivation. The smallholder farms found throughout India are much more ideally suited for conversion to organic when compared to large corporate farms. However, it is too early to say if organic cotton farming can become a sustainable solution, both in terms of small farmer's livelihoods and environmental impact. Much is dependent on the global and India's local organic textile market. The problem that Indian organic cotton farmer are still facing are namely difficult access to crop finance, the need for improved policy lobbying and market communication, extreme global competition (especially from China) and costly certification.

Organic cotton is often grown by smallholders in marginalized areas on poor soil and without irrigation. The development of new cotton varieties is targeting high yields and fiber production with good fiber quality parameters. But they need big amounts of agro-chemicals and favourable conditions for a good performance. These varieties are not suitable for organic farming systems and there is a lack of resources to develop proper alternatives. Another problem for certified organic cotton production is the introduction of genetically modified varieties because it causes high risks and additional costs for the projects.

In India there are many seed companies offering different cotton varieties. Farmers are used to buy their cottonseeds from traders and having a big choice of different varieties. The farmers normally mix three or more varieties even on the same plot in order to reduce the risk of failure. This habit is a big obstacle for the assessment of varieties under farmer conditions. The challenge is to get high quality cottonseeds for organic cotton production systems that are suitable for the unfavourable agro-ecological conditions under which the majority of the smallholders are cultivating. Unfavourable means no or very limited irrigation to compensate irregular rainfall, lack of labour and poor soil fertility.

1.5.1 Indian Organic Cotton Farming ……. SWOT Analysis

1. *Strengths*

The export of Indian organic products is progressing. Four facts that can be considered as strengths of organic agriculture in India are:

i. Support of Indian government to organic agriculture;
ii. Awareness of harmful effects of pesticides, presence of their residues in agricultural products;
iii. Presence of international and national certification bodies in India

The supply (quantity, not considering the quality) is certainly not the bottle neck for further development of organic agriculture in India.

2. *Weaknesses*

Major weaknesses are on the level of information/awareness: most farmers have only small holdings and quality consciousness is low besides lack of marketing skills (e.g. disjointed sector

for the domestic market). Another weakness to be noted is that the organic market is not consumer demand -based, but supply driven. From this fact a lot of threats can be derived. For the success of the organic market, powerful, well organized and consumer based farmer organizations are certainly very important.

3. *Opportunities*

To quantify the potential of the organic products is not simple because the fast development of the Indian society and economy. For further progress, more information should be gathered on the market opportunities. Nevertheless, the need assessment shows that on the level of the opportunities, a considerable potential for the organic market exists, even though the size of the potential can not be quantified exactly. There is a consensus within the Indian organic agriculture sector (private and government) that an interface organization is needed to provide information and services.

4. *Threats*

The awareness about pesticide residues is to be considered as strength. However, a bigger threat is that all kind of products are offered under declarations like “without pesticides”, “eco-friendly” or even “organic”. In this sense most threats are related to the problem of faithful declaration, role of government, and clarification of the term “organic”. These threats should be quickly overcome.

Table 4: SWOT-Matrix of Indian Organic Agriculture

STRENGHTS	WEAKNESSES
1. Successful exporters ; proof of capability and technical know-how 2. Growing health awareness in population ; related to contaminated food and pesticides 3. International CBs (Certification Bodies) are in place 4. Export promotion bodies in place (APEDA, Commodity Boards) 5. Notable increase in organic production in wide range of products 6. Large number of NGOs promoting Organic Agriculture 7. NPOP; standards, accreditation system, national label 8. Experience and expertise available in various fields (production, processing , marketing) 9. Div.: Organic farming in India can be economically viable without much premium; quality testing laboratories available; A variety of crops possible to be produced organically. Wide climate range; Comparative advantages for export comparatively low production cost, some products only in India; Support from aboard (FiBL, SECO, SDC, Hivos, Oxfam, HEKS, GTZ, Swissaid).	1. Lack of information : markets (domestic and export) suppliers, buyers, sellers 2. Poor quality management in agricultural production and processing: awareness, system 3. Certification costs too high for small farmers(need for organizational solutions) 4. Few (but growing)media coverage , but low awareness and knowledge among journalists 5. Few capable advisors on ICS, processing, marketing 6. Disjointed sector (producers, processors, traders, etc.) : vast country, few networks 7. Lack of general strategy for development of organic market. 8. large number of small farms, but weak organizational building and know-how 9. Most NGOs are weak in marketing skills 10. Organic market is not consumer –based , but supply driven 11. Lack of consumer information on OA and on added value 12. Div.: no mutual recognition of certified inputs among CBs; Lack of know-how

	for input assessment; Lack of national organic farmers association (ICCOA); Few know how on organic processing; No coordination of offer, Processing technologies not known.
OPPORTUNITIES	**THREATS**
1. Founding of ICCOA (platform, services, information) 2. Big and growing market potential 3. India is a growing economy : technological process, growing purchasing power 4. Traders willing to invest in marketing of organic products 5. trends to : healthy food, be slim, supermarkets, convenience food 6. National and State Government support for Organic Agriculture 7. Large number of NRIs exposed to Organic agriculture abroad : promote awareness when returning home on vacation 8. Pesticides scandals, hormone scandals etc. 9. Div.: Increasing interest of research in Organic Agriculture	1. Term ' Organic' is used in fraudulent way also due to lack of (enforcement of regulations) 2. Govt. pushing for organic production without caring development of the market 3. Frustrated farmers because expectations on premium is not fulfilled 4. Traditional production : difficult to communicate the added value of Organic Agriculture 5. General belief: Organic agriculture cannot feed India 6. Chemical free products make the market instead of organic products 7. Generic promotion, but non-availability of products/points of sale

The rising demand for organic cotton textiles boosts the development of organic cotton projects in many developing countries. However it is a big challenge to organize the cultivation in a profitable way. An important factor is the quality of the cottonseeds and the availability of suitable varieties. Important quality parameters are not only the natural resistance against pests and diseases but also the GOT and the fiber quality, because they affect the price that can be paid to the farmers. The majority of the smallholders work under unfavorable conditions. The modern cotton varieties are not appropriate for these conditions. Better-adapted varieties could improve the profitability of cotton production for the majority of the smallholders. But much more qualified research on organic cotton production and specific seed breeding is required to identify and to develop suitable varieties for organic cotton and further improvement of the yield potential.

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CHAPTER-II

Farming Practices

2.1 Brief description of cotton

Cotton is a soft, staple fiber that grows in a form known as a boll around the seeds of the cotton plant (***Gossypium sp***.), a shrub native to tropical and subtropical regions around the world, including America, India and Africa. The fiber most often is spun into yarn or thread and used to make a soft, breathable textile, which is the most widely, used natural-fiber cloth in clothing today.

2.1.1 Botanical Features

Table 5: Taxonomic classification of cotton

Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Malvales
Family	Malvaceae
Genus	Gossypium
Scientific Name	*Gossypium* sp (Gossypium *hirsutum, Gossypium barbadense, Gossypium herbaceum, Gossypium arboretum)*
Common Name	Cotton

Cotton is a vegetable fiber grown on the cotton plant. The contents of cotton fiber can be broken down into the different components.

Table 6: Components of cotton fiber

Sl. No.	Components of cotton fiber	Percentage content
1	Cellulose	80 – 90
2	Water	6 - 8
3	Waxes and fats	0.5 - 1
4	Proteins	0 - 1.5
5	Hemi cellulose and pectin	4- 6
6	Ash	1- 1.8

Table 7: Distinguish features of different Gossypium species

Sl. No.	Feature	*G. hirsutum*	*G. barbadense*	*G. arboreum*	*G. herbaceum.*
1	Chromosome number	2n=52	2n=52	2n=26	2n=26
2	Ploidy	Tetraploid	Tetraploid	Diploid	Diploid
3	Origin	Central America, Mexico (New World)	South America (New World)	Africa (Old World)	India and East Asia (Old World)
4	Popular names	American cotton, Upland cotton, Combodia cotton.	Egyptian cotton, Sea Island cotton, Pima cotton.	Asiatic cotton, *Desi* cotton	Asiatic, *Desi* cotton. Lavant
5	Habit	Small, Annual, sub-shrub 1.5m tall	Perennial, shrub/annual, sub-shurb. 1-3m tall	Perennial, branched, shrub/annual, sub-shrub 1.5-2m Tall	Sub-shrubs 1-1.5 m tall.
6	Stem	Green or brown sparsely hairy or glabrous, fruiting branches many jointed.	Green glabrous and rarely hairy, fruiting branches many jointed.	Green, brown, hairy, fruiting branches two jointed.	Green, rarely pigmented, hairy, rarely glabrous and fruiting branches many jointed.
7	Leaves	Large cordate, 1/2 cut or less, 3-5 lobes not constricted, also overlapping lobes.	2/3 cut into 3-5 lobes, sinuses thrown into folds, lobes long and tapering.	2/3 to 4/5 cut into 5-7 lobes long and narrow	1/2 cut or less, 3-7 lobes only slightly constricted at the base.
8	Bracteole	Triangular, 4-12 long teeth, longer than broad.	10-15 acuminate teeth, as long as broad	3-4 teeth closely invested to bud flower, longer than broad.	6-8 teeth, flaring widely from the buds, flower and capsule.
9	Petal	White, yellow and purple	White to yellow	Cream, light yellow to yellow and purple	Sulphur Yellow, deep yellow.
10	Petal spot	Absent	Prominent, large dark	Present, prominent	Present in the form of bright eye rays.
11	Stamen/Anthers stigma	Staminal column short, Anthers closely arranged, stigma united throughout, rarely divided at tip.	Staminal column long, antheriferous, closely packed, filaments short.	Staminal column long, antheriferous, short anthers, short style, united stigma.	Staminal column throughout antheriferous, filament short style short, united top.
12	Boll (capsules).	Rounded to moderately tapering 3-5 loculi, 4 common smooth to moderately pitted.	Tapering longer than broad 3-4 but usually 3 loculi, deeply pitted and glanded often rough.	Moderately rounded to tapering, 3 to 4 loculi (3 common), smooth to deeply pitted, rough.	Rounded, smaller 3-5 loculi smooth to moderately pitted.
13	Seeds	5-11 Large size seeds/locule, moderately, large, Fuzzy to rarely naked	5-8 long size seeds/locule, tuft of frizz on seeds, seeds often without coat of fizz. very long fiber.	6-17, medium seeds/locule rarely naked, Fuzzy.	8-11 medium size seeds/locule Fuzzy.
14	Fibers	Moderate to long fiber	Very long fiber	Short to medium fiber	Short to medium fibers.

Source: APEDA

2.1.2 Site Requirements

Since organic cotton production warrants the cultivation in the absence of agro-chemicals, it involves a careful selection of components of farming system keeping the local resources, agro-climatic features and socio-economic structure for the formation of a suitable package as follows:

1. Selection of site

Fields with high degree of soil erosion and heavily infested with perennial weeds should not be put under organic farming. Organic farming is not farming by neglect or arm-chair cultivation and so, fertility levels of less fertile soils should be improved through organic means before opting for this type of cultivation.

2. Varietal Selection

High yielding varieties, which respond well to chemical inputs, may not always be suitable for organic farming. Instead, varieties which are hardy and capable of giving acceptable farming especially in the early phase of conversion are ideal. Varieties, which are jassid-tolerant *(Amrasca devastans)*, can be preferred over susceptible ones. Early maturing varieties are less exhaustive and will also help the crop to escape heavy bollworm damage.

Table 8: Drought and pest resistant Cotton varieties suitable for organic farming

Sl. No.	Variety	Location
1	Wagad/V-797	Gujarat
2	Y-1	Khandesh, Maharashtra
3	Maljari	Madhya Pradesh
4	Jayadhar / Suyodhar	Karnataka
5	Nandicum	Andhra Pradesh

Source: Central Institute of Cotton Research, 2006

3. Seed Selection

As organic cotton growers are not allowed to use any seeds with chemical treatments the hairy varieties with a higher natural resistance against sucking pests are more suitable.

4. Seed rate and sowing

Acid delinted seeds cannot be used according to international norms [International Federation of Organic Agriculture Movements (IFOAM)] for organic cultivation for the purpose of certification of the fiber. However, those farmers who pursue organic farming for reducing the cost of cultivation and to increase the profitability could use acid-delinted seeds in order to avoid seed borne pathogenic infections and achieve optimum plant stand. If fuzzy seeds are used, however, higher seed rate is to be used in order to achieve the same goal. About 25 kg/ha of seeds at 75x15 cm spacing ensures a final plant population of 85-90 thousand plants/ha. One row of fodder cowpea

(*Vigna unguiculata*) should be drilled between two rows of cotton. This crop could be ploughed down and buried in soil just before its flowering.

2.1.3 Production Schedule

Cotton Field

The sowing season of cotton varies considerably from tract to tract and is generally early (April-May) in northern India and is delayed as we proceed to down south. Cotton is a kharif crop in the major parts of the country viz. Punjab, Haryana, Rajasthan, Uttar Pradesh, Madhya Pradesh, Gujarat, Maharashtra and parts of Andhra Pradesh & Karnataka. In these areas, the irrigated crop is sown from March-May and the rain fed crop in June-July with the commencement of the monsoon. The pre-monsoon dry sowings practiced in parts of Gujarat and Madhya Pradesh in the end of May or in early June have been found to give an early start with the resultant increased yields.

In Tamil Nadu, the major portion of the irrigated and rain fed crop is planted in September-October, whereas the sowing of the rain fed crop in the southern districts is extended up to November. In parts of Karnataka and Andhra Pradesh, the desi cotton is usually sown in August-September. Early sowings done in the Dharwad and Gadag area in the beginning of September have been found to give better yields. In addition, summer sowings in Tamil Nadu are done during February- March. The sowings of cotton in the rice fallows of Andhra Pradesh and Tamil Nadu extend from the second half of December to the middle of January.

Sowing Time

- The sowing time of the crop vary depending upon the agro-climatic zone. It must adjust accordingly.
- For kharif[2] crop, sowing is done from mid-February to April.
- For rabi[3] crop, sowing is done from second half of December to middle of January.

2.2 Soil management

2.2.1 Soil Properties

Cotton can be successfully grown on all types of soil except purely sandy, saline or water logged soils. Heavy clay soils, ideally black cotton soils (vertisols) are preferable. Cotton germinates at a soil temperature of 61° F at a depth of about 2 inches. Ideal climatic conditions for cotton

2 The Kharif crop is the autumn harvest (also known as the summer or monsoon crop) in India and Pakistan. Kharif crops are usually sown with the beginning of the first rains in July, during the south-west monsoon season. The term Kharif means "autumn" in Arabic. Major Kharif crops are: Millets, Rice Maize, Sugarcane etc.

3 The Rabi crop is the spring harvest (also known as the "winter crop") in India and Pakistan. The term Rabi means "spring" in Arabic, which is reflected in two months which usually span mid/late April to mid/late June when the crop is harvested. Major Rabi crops are Wheat, Barley, Mustard, Sesame, Peas etc

production include ample sunshine, dry climate, minimum 500 mm rainfall or irrigation and high temperature.

2.2.2 Methods of Soil Management

Organic matter, which only accounts for 0.5 to 5 % of the soil, is of crucial importance for a soil's fertility and water retention capacity. It ensures a good porosity and good infiltration of water. Organic matter particles keep the soil moist for a long time and retain essential nutrients for plants. Moreover, organic material hosts numerous beneficial soil organisms that improve soil fertility. Many soils on conventional farms lack organic matter due to intensive cultivation and an overuse of mineral fertilizers.

In order to obtain good and stable soil fertility, organic farmers ensure a continuous supply of organic material to the soil. The most important source are residues of the crops grown on the field itself, such as leaves, stalks and roots, and they are applied to the soil in the form of green manure, mulch or compost. Other sources include organic manures, oil cakes and liquid fertilizers such as (biogas) slurry.

Composting transforms organic material from the farm, such as crop and fodder residues, weeds, leaves, and dung or kitchen waste, into high-value natural manure. Compost, applied to the field as basal application or as a top dressing, provides the crop with well-balanced nutrient-sand helps increase soil organic matter content. Cotton stalks are burnt as fuel after picking of seed cotton is over. This residue together with farm wastes from other crops and weeds can effectively be utilized for preparing compost, through the use of beneficial fungi like *Trichoderma viride.* In the span of four months, most of the cotton stalks are converted into compost, the rest (20%) being black, brittle, semi-decomposed stalks. This compost is comparable to well-decomposed vermicompost. It could be used for nutrient recycling, antagonistic fungus against certain soil-borne pathogens, viz*., Fusarium spp., Rhizoctonia spp*. etc.

Integrating animal husbandry into cotton production provides the farm with high-quality manure. Correct storage of the manure (not too moist, not too dry) is essential in order not to lose nutrients. The manure should preferably be integrated into the compost along with other organic materials. Lots of peasant families use cattle as their farm "mechanization".

1. Cover Cropping

Cover crops are crops grown to provide soil cover and erosion protection. At the same time, cover cropping may accomplish a number of other objectives, including providing nitrogen to the subsequent cotton crop when tilled into the soil, improving tilth by adding organic matter, and serving as a catch crop when planted to reduce nutrient leaching following a main crop.

Fast, dense-growing cover crops are sometimes used to suppress problem weeds as a "smother crop" or allelopathic cover. Some cover crops that have been used successfully for weed suppression include small grains (particularly grain rye), several Brassica species, hairy vetch, and forage sorghums.

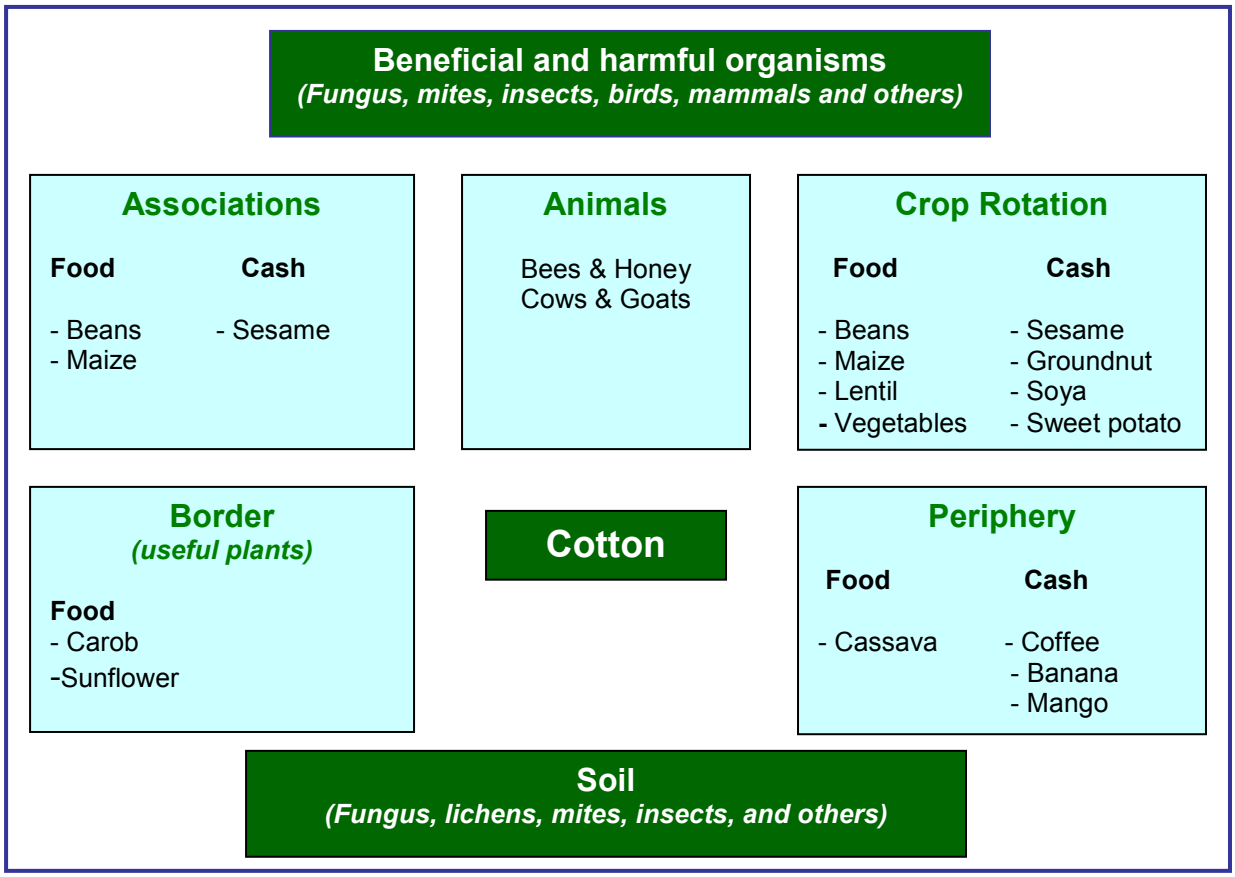
2. Strip Cropping

Strip cropping takes place when harvest-width strips of two or three crops are planted in the same field. The most common strip crop grown with cotton is alfalfa (*Medicago sativa*). Increased diversity of crops increases stability in the field, resulting in fewer pest problems, due to natural biological controls. Crop rotation is one means of introducing diversity over time. Strip intercropping creates biodiversity in space. Strip cropping cotton fields with alfalfa generally increases beneficial arthropod populations.

3. Border cropping

Grassy weed species harbor lepidopterous pests generally. A specific weed, wild geranium, is an important spring host of tobacco budworm and should be discouraged in border areas. More diverse field borders with habitat plant species support some crop pests but also sustain beneficial insects that prey on pest populations, particularly during non-crop seasons. Managing the vegetation in these areas as habitat for beneficial insects counterbalances the threat from insect pests.

Figure 10: Example of an organic cotton farming system



2.2.3 Crop Rotation and Mixed Cropping

Crop rotation is essential elements in organic cotton production in order to maintain soil fertility and ensure balanced nutrient content in the soil. Crop rotation helps prevent leaching from soils, a build-up of critical pest populations and also diseases and weeds. As the organic cultivation method dispenses with mineral nitrogen fertilizers, it is important to grow cotton in rotation with leguminous plants such as beans, peas or soya beans. They fix nitrogen from the air and make it available to the plant, thus improving soil fertility.

Rotation is an important means of controlling a number of cotton pests, including nematodes. Even basic corn-cotton rotations have been found effective in reducing some species of nematodes. A minimum of two years planted to non-host species is the standard recommendation.

2.3 Crop Nutrition

Organic cotton is grown in living-soil fields which have been free of synthetic pesticides, herbicides and fertilizers for at least three year. Organic cotton is produced with animal or vegetables matter fertilizers and is free from toxic chemicals. Organic farming relies on crop rotation, mechanical cultivation and botanical or biological controls.

2.3.1 Maintenance of Soil Fertility for Organic Cotton Production

Vertisol are swell-shrink type soils with high water retentively, low infiltration rate and high cation exchange capacity. Improvement and maintenance of the organic matter these soils is an essential precondition to sustain reasonable levels of organic cotton production as this would increase water infiltration, reduce erosion, improve soil structure and aggregate stability, besides enhancing the supply of nutrients, particularly, N, P and S.

Hence, a good organic matter management programme is needed for fertility management under organic production system. Rainfed cotton crop in Central India removes around 5.8 kg N, 2.0 kg P and 6.6 kg K per 100 kg seed cotton produced. With many such alternate used of FYM (Farm Yard Manure), such huge quantities required to meet the crop's nutrient requirement is generally not available. Hence, a combination of sources with different biological properties must be resorted.

1. *Manures*

Manures are plant and animal wastes that are used as sources of plant nutrients. Manures can be grouped into bulky organic manures and concentrated organic manures based on concentration of the nutrients.

1. Bulky Organic Manures

Bulky organic manures contain small percentage of nutrients and they are applied in large quantities. Farmyard manure (FYM), compost and green manure are the most important and widely used bulky organic manures.

Uses of bulky organic manures have several advantages:

- They supply plant nutrients including micronutrients,
- They improve soil physical properties like structure, water holding capacity etc.;
- They increase the availability of nutrients,
- Carbon dioxide released during decomposition acts as a CO_2 fertilizer, and
- Plant parasitic nematodes and fungi are controlled to some extent by altering the balance of microorganisms in the soil.

2. Farmyard Manure

Farmyard manure refers to the decomposed mixture of dung and urine of the farm animals along with litter and left over material from roughages or fodder fed to the cattle. On an average well decomposed farmyard manure contains 0.5 per cent N, 0.2 per cent P_2 O5 and 0.5 percent K_2O.

The present method of preparing farmyard manure by the farmers is defective. Urine, which is wasted, contains one per cent nitrogen and 1.35 per cent potassium. Nitrogen present in urine is mostly in the form of urea which is subjected to volatilization losses. Even during storage, nutrients are lost due to leaching and volatilization. However, it is practically impossible to avoid losses altogether, but can be reduced by following improved method of preparation of farmyard manure. Trenches of size 6m to 7.5m length, 1.5m to 2.0m width and 1.0m deep are dug. All available litter and refuse is mixed with soil and spread in the shed so as to absorb urine. The next morning, urine of the trench from one end should be taken up for filling with daily collection. When the section is filled up to a height of 45 cm to 60 cm above the grow level, the top of the heap is made into a dome and plastered with cowered earth slurry. The process is continued and when the first trench is completely filled, second trench is prepared. The manure becomes ready for use in about four to five months after plastering.

3. Compost

A mass of rotted organic matter made from waste is called compost. The compost made from farm waste like sugarcane trash, paddy straw, weeds and other plants and other waste is called farm compost. The average nutrient contents of farm compost are 0.5 per cent N, 0.15 per cent P_2O_5 and 0.5 per cent K_2O. The compost made from town refuses like night soil, street sweepings and dustbin refuse is called town compost. It contains 1.4 per cent N, 1.00 per cent P_2O_5 and 1.4 per cent K_2 O. Farm compost is made by placing farm wastes in trenches of suitable size, say 4.5 m to 5.0 m long, 1.5 m to 2.0m wide and 1.0 m to 2.0m deep. Waste is placed in the trenches layer by layer. Each layer is well need by sprinkling cow-dung slurry or water. Trenches are filled up to of 0.5 m above the ground. The compost is ready for application five to six months.

4. Sewage and Sludge

In the modern system of sanitation adopted in cities and town, human excreta if flushed out with water which is called sewage. The Solid portion in the sewage is called sludge and liquid portion is sewage water. Both the components of sewage are separated and are given a preliminary fermentation and oxidation treatments to reduce bacterial contamination and offensive smell.

5. Green Manure

Green, un-decomposed plant material used as manure is called green manure. It is obtained in to ways: growing green manure crops or by collecting green leaf (along with twigs) from plants grown in wastelands, field bunds and forest. Green manuring is frown in the field plants usually belonging to leguminous family and incorporating into the soil after sufficient growth. The most important green manure crops are sunhemp, dhaincha, pillipesara, clusterbeans and Sesbania rostrana.

Table 9: Nutrient Content of Green Manure Crops and Green Leaf Manure

Sl. No.	Plant	Scientific Name	Nutrient content (%) air dry basis		
			N	P_2O_5	K_2O
	Green Manure Crops				
1	Sunhemp	*Crotalaria juncea*	2.30	0.50	1.80
2	Dhaincha	*Sesbania aculeate*	3.50	0.60	1.20
3	Sesbania	*Sesbania speciosa*	2.71	0.53	2.21
	Green Leaf Manure				
4	Forest tree leaf	-	1.20	0.60	0.40
5	Green weeds	-	0.80	0.30	0.20
6	Pongamia leaf	*Pongamia glabra*	3.31	0.44	2.39

Source: CICR, Nagpur

Application to the field, green leaves and twigs of trees, shrubs and herbs collected form elsewhere is known as green-leaf manuring. The important plant species useful for green-leaf manure are neem, mahua, wild indigo, glyricidia, Karanji (Pongamia glabra) calotropis. avise (Sesbens grandiflora), subadul and other shrubs.

Several advantages accrue due to the addition of green manures. Organic matter and nitrogen are added to the soil. Growing deep rooted green-manure crops and their incorporation facilitates in bringing nutrients to the top layer from deeper layers. Nutrient availability increases due to production of carbon dioxide and organic acids during decomposition. Green manuring improves soil structure, increases water-holding capacity and decreases soil loss by erosion. Green manuring helps in reclamation of alkaline soils. Root-knot nematodes can be controlled by green manuring.

6. Sheep and Goat Manure

The dropping of sheep and goats contain higher nutrients than farmyard manure and compost. On an average, the manure contains 3 per cent N, 1 percent P_2O_5 and 2 percent K_2O. It is applied to the field in two ways. The sweeping of sheep or goat sheds are placed in pits for decomposition and it is applied later to the field. The nutrients present in the urine are wasted in the method. The second method is sheep penning, wherein sheep and goats are allowed to stay

overnight in the field and urine and fecal matter is added to the soil which is incorporated to a shallow depth by running blade harrow or cultivar.

7. Poultry Manure

The excreta of birds ferment very quickly. If left exposed, 50 per cent of its nitrogen is lost within 30 days. Poultry manure contains higher nitrogen and phosphorus compared to other bulky organic manures. The average nutrient content is 3.03 per cent N, 2.63 per cent P_2O_5 and 1.4 per cent K_2O.

8. Concentrated Organic Manures

Concentrated organic manures have higher nutrient content than bulky organic manure. The important concentrated organic manures are oilcakes, blood-meal, fish manure etc. These are also known as organic nitrogen fertilizer. Before their organic nitrogen is used by the crops, it is converted through bacterial action into readily usable ammonical nitrogen and nitrate nitrogen. These organic fertilizers are, therefore, relatively slow acting, but they supply variables nitrogen for a longer period.

9. Oilcakes

After oil is extracted from oilseeds, the remaining solid portion is dried as cake which can be used as manure. The oil-cakes are of two types:

1) Edible oil-cakes which can be safely fed to livestock, e.g.: Groundnut cake, coconut cake etc.
2) Non-edible oil cakes which are not fit for feeding livestock e.g.: Castor cake, neem cake, mahua cake etc.

Both edible and non-edible oil-cakes can be used as manures. Nutrients present in oil-cakes, after mineralization, are made available to crops 7 to 10 days after application. Oil-cakes need to be well powdered before application for even distribution and quicker decomposition. The average nutrient content of different oil-cakes is presented in Table 10.

Table 10: Average nutrient contents of oil-cakes

Sl. No.	Oil cakes	Nutrient content (%)		
		N	P_2O_5	K_2O
	Edible oil-cakes			
1	Coconut cake	3.0	1.9	1.8
2	Cotton seed cake (Decorticated)	6.4	2.9	2.2
3	Ground nut cake	7.3	1.5	1.3
4	Linseed cake	4.9	1.4	1.3
5	Niger Cake	4.7	1.8	1.3
6	Rape seed cake	5.2	1.8	1.2
7	Safflower cake (Decorticated)	7.9	2.2	1.9
8	Sesamum cake	6.2	2.0	1.2

Source: CICR, Nagpur

10. Other Concentrated Organic Manures

Blood-meal when dried and powdered can be used as manure. The meat of dead animals is dried and converted into meat-meal which is a good source of nitrogen.

11. Crop residues

Substantial quantities of crop residues are produced in India every year Major crops like rice, Wheat Sorghum, Peal mullet and Maize alone yield approximately 236 m.t straw per year. The nutrient potential of cereal straw/residue from five crops comes to 1.13 m.t N. 1.41 t + P_2O_5 and 3.54 m.t. K_2O. Crop residues can be recycled either by compositing or by way of mulch or direct incorporation in the soil (Table 11).

Table 11: Potential of farm residues and plant-nutrients

Sl. No.	Crop	Residue production (mt)	Percent over dry basis		
			N	P_2O_5	K_2O
1	Rice straw	106.01	0.58	0.23	1.66
2	Wheat straw	80.99	0.49	0.25	1.28
3	Sorghum	21.04	0.40	0.23	2.17
4	Pearl millet	15.58	0.65	0.5	2.50
5	Maize	12.50	0.59	0.31	1.31
6	Total pulses	13.70	1.60	0.15	2.00
7	Pigeonpea	6.65	1.10	0.58	1.28
8	Chickpea	5.05	1.19	NA	1.25
9	Sugarcane	40.92	0.35	0.04	0.50
10	Oilseeds	35.78	-	-	-

Source: CICR, Nagpur

2. *Role of Biofertilisers in Cotton*

Biofertiliser is one of natural and sustainable nutritional input. Mainly there are two types of biofertilizers which are used on mass scale. These are nitrogenous and phosphatic biofertilizers.

The nitrogenous biofertiliser for cotton are *Azotobacter (A.chroococcum)* and *Azospirillum* (*A. braazilense*). These organisms with the help of nitrogenase enzyme fix atmospheric nitrogen known as biological nitrogen fixation. The phosphorus biofertilizers consist of several bacteria (*Bacillus megatherium, Pseudomonas striata*) and fungi (*Aspergillus awamori* and *Penicillium digitatum*). It has been estimated that 1 ton *Azotobacter/ Azospirillum* is equivalent to 40 ton Nitrogen @ 20 kg N fixed/year/ crop at 500/g dose and 1 tom PSM is equivalent to 24 ton Phosphorus (P_2O_5).

The use of *Azotobacter* enhances the yield of cotton depending on variety and strain efficiency. Pandey and Kumar (1989) reported 7 to 28% increased yield in cotton with *Azotobacter* inoculation.

Response of Azospirillum

It is reported that *Azospirillum* has positive response in increasing seed cotton yield and better dry matter production (Marappan and Narayanan, 1993). The application *Azospirillum* recorded 430 kg/ha has increased yield over the control. Further, the residual effect of *Azospirillum* was also found positive in terms of yield and population.

2.4 Pest and disease management

2.4.1 Potential damages caused by pests and diseases

The estimated crop losses due to diseases could range between 15-25%. The cotton diseases are caused by pathogens, which may be fungi, bacteria, or virus. In most of the semi-arid tropical regions, diseases are not a big problem in organic cotton. Diseases that occasionally occur are given below:

1. ***Damping-off***

Several pathogens cause damping-off whose symptoms are seed rot during germination, root rot and collar rot of the young seedlings.

2. ***Black arm***

It can be identified by (canker) black/brown lesions on cotton plant followed by desiccation of the top part from the area of infestation.

3. ***Fusarium wilt***

This is general wilting of the plant, it occurs at any time during the cotton cycle. Fusarium wilt is often related with root-knot nematodes and application of fresh manure without decomposing it.

2.4.1 Life Cycle of Pests

1. ***Pectinophora gossypiella (Pink bollworm)***

Pink bollworm, ***Pectinophora gossypiella*** – or pinkies, as they are commonly called – is a significant cotton pest in the Southwest.

Description of Insect stages

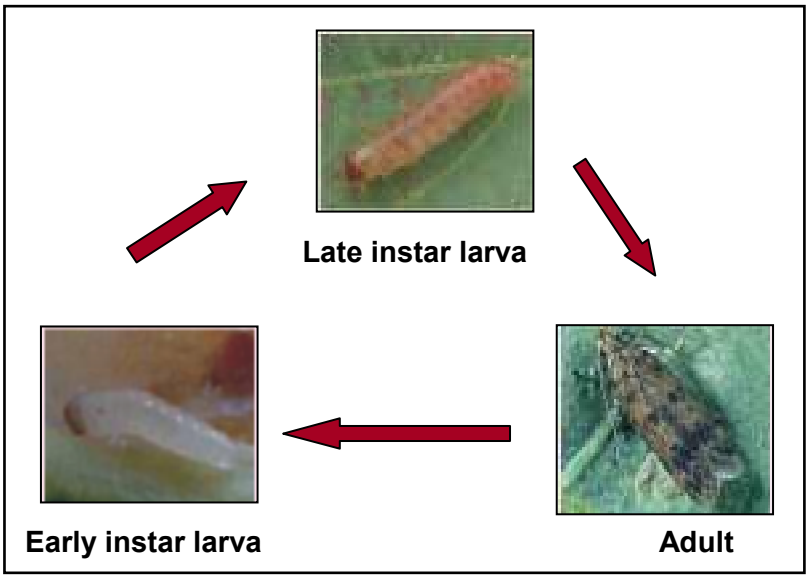
Egg: Eggs are pearly iridescent white, flattened, oval measuring approximately 0.5 mm long, 0.25 mm wide and sculptured with longitudinal lines. Eggs are laid singly or in groups of four to five (Figure 11).

Larva: First 2 instars are white, while from third instar pink colour develops. The larvae have the characteristics dark brown head due to the scelerotised prothoracic shield.

Pupa: Pupae are light brown when fresh, gradually become dark brown as the pupation proceeds. Pupa measures up to 7mm in length.

Adult: The adult moth is grayish brown with blackish bands on the forewings and the hind wings are silvery grey. Moths emerge from pupae in the morning or in the evening, but are nocturnal, hiding amongst soil debris or cracks during the day.

Figure 11: Life cycle of pink bollworm



Source: Central Institute of Cotton Research, Nagpur

Nature of damage

Pinkies damage cotton by feeding on buds and flowers and on developing seeds and lint in bolls. Under dry conditions, no measurable yield reduction occurs until 25 to 30% of the bolls are infested; at this level the infested bolls have more than one larva. With high humidity, it takes only one or two larvae to destroy an entire boll, because damaged bolls are vulnerable to infection by fungi that cause boll rot. Damaged bolls will have a pimple or wart that develops around the hole where pinkies have entered. Unlike cotton bollworm or tobacco budworm, pinkies do not deposit frass or feces at the base of the entrance hole (Figure 12).

Figure 12: Cotton boll infected with pink bollworm

Source: Central Institute of Cotton Research, Nagpur

Pest Management

Pink bollworm eggs are very small, making them susceptible to many natural enemies, including mites, spiders, minute pirate bugs, damsel bugs, bigeyed bugs, and lacewing larvae. A number of parasitic wasps such as *Trichogramma bactrae*, *Microchelonus blackburni*, *Bracon platynotae*, and *Apanteles ornone* attack pink bollworm. Studies have shown that the use of the insect-feeding nematodes *Steinernema riobravis* and *S. carpocapsae* on pink bollworm larvae in the fields achieved a larval mortality rate of 53 to 79%.

Cultural practices to reduce pink bollworm numbers consist of ceasing irrigation sooner than normal, early crop harvest, shredding crop residue after harvest, plowdown of cotton residue to six inches, and winter irrigation if cotton will follow cotton on the same field (not a wise practice in organic production). Okra and kenaf are alternate hosts to pink bollworm and must also be eliminated from an area.

The success of insect-killing fungi like *Beauveria bassiana* depends on the timing of the application to correlate with hatching and early stages of development of the pink bollworm, as well as optimum humidity for the fungi to infect. Other strategies to reduce pink bollworm populations include the use of mating pheromone disruptors. Several products, such as Biolures®, Checkmate®, Frustrate®, and PB Rope®, are available in the U.S. Pink bollworm mating disruption trials recorded higher yields (1864 pounds/acre) than control fields with no mating disruption (1450 lbs/acre).

2. *Aphis gossypii* (Cotton aphid)

Description of Insect stages

Nymphs: Nymphs are small, yellowish or brownish on the undersurface of the leaves and on the terminal shoots and are mostly wingless (Figure-13).

Figure 13: Aphid nymphs

Source: Central Institute of Cotton Research, Nagpur

Adults: These are yellowish brown to black, 1.25mm long with black cornicles and yellowish green abdominal tip. Both apterates (0.9 – 1.8 mm) and alates (1.1 – 1.8 mm) occur together.

Nature of damage

Aphids are phloem feeders, causing direct leaf crumbling curling with severe attack. Indirectly decreases cotton fiber quality as a result of sticky cotton due to deposits of honeydew on open bolls. Younger plants suffer more attack than older plants. Aggregating population is seen at the terminal buds and largest population is found below leaves of lower third of plants where they are partially protected from sunlight and higher temperature (Figure 14 and 15).

Figure 14: (a) Deposits of honey dew (b) Lint contamination with sooty mould

Source: Central Institute of Cotton Research, Nagpur

Figure 15: Infected flower bud of cotton

Source: Central Institute of Cotton Research, Nagpur

Pest Management

Management of aphids during very early crop growth sate should be attempted with a view to maintain optimum plant stand. Assessment of overall field conditions is necessary before opting for management against aphids. The aphidophagous coccinellids and syrphids, and the generalist predator *Chysoperla carnea* offer significant control of aphids during early crop growth period. Spray of 5% neem seed kernel extract prepared on farm or crude neem oil spray @1% suppresses also the aphid population in addition to other sucking pests during pre squaring crop stage. While using neem products, detergent/soap powder @1gm/litre of spray fluid is to be added for getting uniform spray suspension.

3. *Helicoverpa armigera* (American bollworm)

Description of Insect stages

Egg: Eggs are spherical with a flattened base laid on the tender foliage and calyx of squares and stem of the cotton plants. Surface is sculptured with longitudinal ribs colour is white to creamy white after ovipostion. As the embryo develops reddish brown band is seen centrally which gradually darkness and together with rest of egg becomes brown before hatching (Figure 16).

Figure 16: Eggs on tender leaf

Source: Central Institute of Cotton Research, Nagpur

Larva: Newly hatched larvae are translucent yellowish white brown to black head capsules. The thoracic and anal shields, spiracles, thoracic legs, setae and their tubercle bases are also brown to black , giving the larva a spotted appearance Second instar is essentially similar but with darkened ground colour and lightened sclerotized head capsule, thoracic and anal shields and thoracic legs. The third instar has a predominantly brown ground colour. The characteristics patterning becomes more prominent and colouring generally darker in later instars. Considerable variations occur with shades ranging from green, fawn yellow to brown and their combinations. Host diet also plays a role to some extent in determining the colour of the larvae. There are usually 6 larval instars (Figure-17).

Figure 17: Colour forms of larval *H. armigera*

Source: Central Institute of Cotton Research, Nagpur

Pupa: Pupa is smooth surfaced, brown, rounded both anteriorly and posteriorly with two tapering parallel spines at posterior tip. Females are on an average heavier than males. Pupae are formed at a depth of 2.5 – 125 cm in the soil.

Adults: Adults are stout bodied moth, greenish yellow to buff to brown with darker brown or blackish markings. Males are light brown with greenish cast. Females are darker than males. Moths have circadian rhythm starting at dusk, continues through midnight after which it virtually ceases. Moths disperse over long distances to suitable crops from source hosts (Figure-18).

Figure 18: Adult moth

Source: Central Institute of Cotton Research, Nagpur

Nature of damage

The larvae feed on the leaves initially and then bore on the leaves initially and then bore on to the squares/bolls and seeds with their head thrust into the boll, leaving the rest of the body outside. Larvae show preference for feeding on squares and flowers when present however feed on young bolls also. A single larva can damage 30-40 fruiting forms during its development period. The entry holes are large and circular at the base of the boll. Feeding on bolls can be extensive or only brief. These larvae spread Boll rot microbes, and the damaged bolls rot resulting in yield loss.

Pest Management

Adoption of closed seasons, discouraging mono-cropping and advocating crop rotation with non-host crop reduces the food supply and shelter to H. armigera. Preplanting clean up measures during off-season to keep the fields, their bunds and borders free of weed hosts are a must to break the link for the pest between cotton and alternate host crop. Pheromone traps of H. armigera can be set up @ 2 per ha that attract males moths to indicated the initiation and the degree of population development. The pheromone lures in the form of septa are to be changes ones in 45-60 days with the trap height adjusted to 1 meter above crop canopy in the late season. The mechanical removal and destruction of the larvae during outbreak years is more successful than the insecticidal management wherein the control failure occurs.

Practice that attracts more attack by bollworm through increased vegetative growth such as closer spacing should be avoided. Mechanical collection and destruction is advised when all the sizes of larvae occur simultaneously. Hymenopterous and tachinid parasitoids (e.g. *Eriborus argenteopilosus, Campoletis chlorideae, Microchelonus spp., Palexorista laxa, Carcelio illota* and *Goniopthalmus halli)* are common on *H. armigera* .

Table 12: Insects and disease symptoms

Sl. No.	Insects	Symptoms
1	***Pectinophora gossypiella*** (Pink ball worm)	• Infestation of flower buds causes its shedding. • Formation of 'rosette' flower. • Once inside the ball, larvae feed on seeds and fiber leading to retardation of lint development.
2	***Aphis gossypii*** (Cotton aphid)	• Colonize on the undersurface of the young leaves or shoots and suck the sap resulting in crinkling and curling of the leaves. • Honey dew excreted by the insects make the leaves shiny, on which the sooty mold grow and give black coating to leaves.
3	***Peridroma saucia*** (Variegated cutworm)	• Larvae feed at night on the leaves and crown and may cut off plants near the soil line. During the day, they are found hiding in holes, under debris, or under thatch near the surface of the soil.
4	***Helicoverpa armigera*** (American bollworm)	• Larvae bore into squares, flowers balls and locules, usually with their head inserted inside and the remaining part of the body outside. • Affected squares show "symptoms of flaring up" with bracts spreading out. • Internal tissues are hollowed out by the larval feeding. • Holes can be seen on squares, balls or locules.

Table 13: Diseases & their symptoms

Sl. No.	Diseases	Symptoms
1	***Xanthomonas axonopodis pv. Malvacear*** (Bacterial Blight)	• Initially deep green and water soaked, which later turn drying to brown, lesions on cotyledons. • Lesions on hypocotyls are black, elongate cankers often kills the seedlings. • Foliar phase is called 'angular leaf spot' which appear as water soaked lesions that are angular in outline. • Severely affected leaves falls. • Lesions also appear on stems, known as 'black arm'. • 'Ball blight' show lesion which are water soaked, sunken at first and brown to black with age.
2	***Fusarium oxysporum f.sp. vasinfectum*** (Fusarium wilt)	• The browning and blackening of the vascular tissues. • The transverse section of the affected branch shows discolored ring in the woody tissues.
3	***Colletotrichum gossypii*** (Anthracnose)	• Balls initially show small water soaked, circular, and sunken, reddish brown spots appear later on. • Lesions with black centre. • Lesions coalesce to form large patches. • Lint become yellow or brown and gets clumped into a mass of fiber. • Balls fail to grow to normal size, become black and crack. • Poor development of seeds and fail to germinate.

Table 14: Seasonal occurrence of major insect pests of cotton in India

Insect pest	North	Central	South
Jassids	July – Sep	July – Nov	Nov – Jan
Aphids	October	July – Feb	Nov – Jan
Thrips	July	Sep – Oct	Aug – Sep
Whiteflies	July	Sep – Oct	June – Aug & Dec – Jan
Spotted & Spiny bollworms	July – Sep	Sep – Jan	Nov – Jan
American bollworm	Aug – Oct	Aug – Oct	Nov – Dec
Pink bollworm	Aug - Nov	Oct - Nov	Dec – April
Stem weevil	--	--	Aug – Sep
Semi – looper	Aug – Sep	Aug – Sep	--
Leaf roller	--	Aug – Sep	--
Red cotton bug	--	Nov - March	--
Dusky cotton bug	--	Dec – April	--

2.4.2 Pest Control in Organic Cotton Cultivation

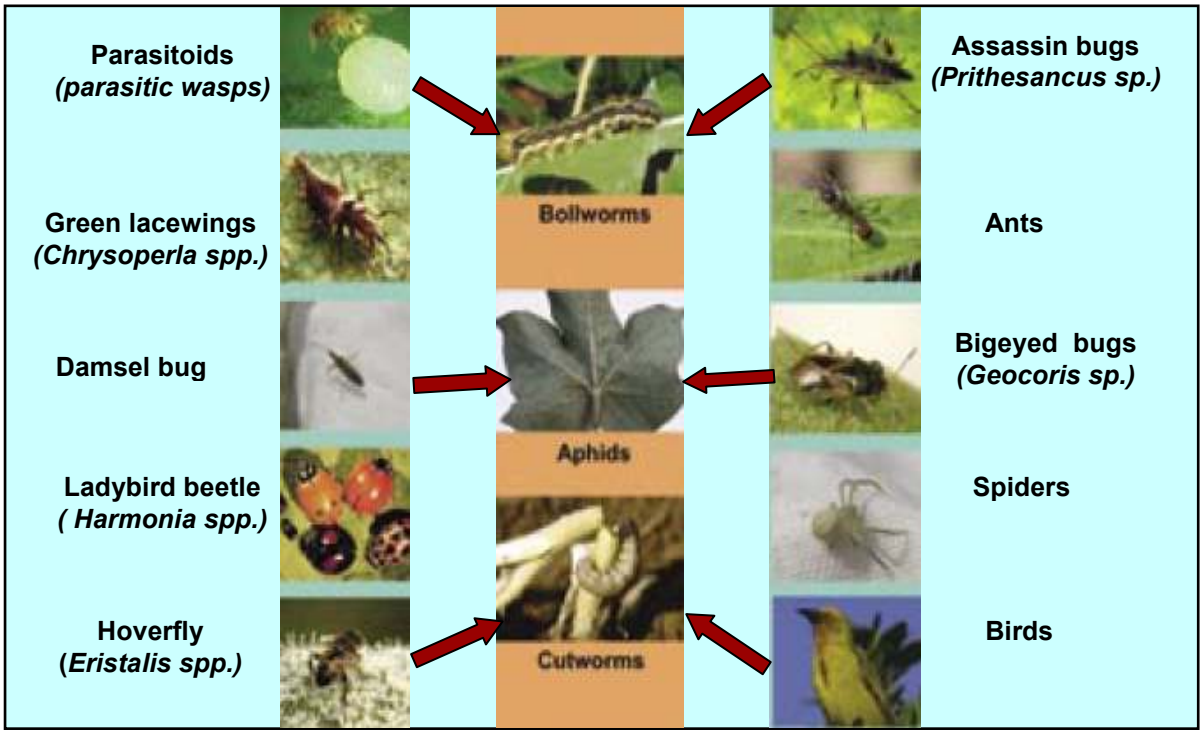
1. Selection of varieties and time of planting

In organic cotton cultivation selection of resistant / tolerant varieties and time of planting will help the plants to tolerate the pest attack or will help to escape from harmful insect pests. LRA 5166, Surabhi and Sumangala are tolerant to sucking pests and Supriya, Kanchana and LPS 141 are resistant to whitefly. The variety Abhadita is tolerant to bollworms. Synchronized sowing in a contiguous block at proper time will reduce aggravating pest problem particularly stem weevil and pink bollworm.

2. Biological control

Biological control uses living organisms or germs to affect the pests. By promoting the natural enemies (Figure-19) of the pests through the planting of intercrops the farmer can perform some form of biological control by collecting "farmer's friends" and releasing them into the field. In Uganda, organic cotton farmers rear and promote ants of the Acantholepis family for controlling a number of pests. Growing trap crops (e.g. Mustard with cabbage; Maize around cotton). Use of microbial pesticides and biological agents like ***Heliothis, Spodoptera, Trichogramma, Trichoderma*, etc.**

Figure 19: Important natural enemies of some major cotton pests



Source: Organic cotton Crop Guide, FiBL, 2005

Parasitoids and predators are effective in suppressing the pest population. The parasitized eggs of *Corcyra* glued on a paper strip (Trichocard) have to be pinned and the lower surface of the

cotton leaves. The emerging *Trichogramma* adult searches and parasitizes the eggs of bollworms and perpetuate to some extent in nature to suppress the bollworm population. Two to three releases of egg parasitoid *Trichogramma chilonis* @1.5 lakh / ha during peak egg laying of *Helicoverpa* and other bollworms will help to reduce the bollworms infestation significantly Release of *Chrysoperla* sp. @ 500-1000 / ha according to the intensity of jassid damage between 20 – 25 days of crop growth will reduce the jassid population.

Other bio-control methods involve microbes and viruses attacking the pests:

Bt spray: Bt (Bacillus thuringiensis) is a microbe that is effective against leaf feeding caterpillars. Therefore, it is only effective against bollworm in its early stage, before it enters the bolls. Night time spraying increases exposure to Bt, since sunlight breaks it down. NPV (nuclear polyhedrosis virus) attacks American bollworm and causes its death. To multiply the NPV preparation locally, spray NPV on a cotton field, collect caterpillars affected by NPV, grind them and dilute with water. Commercially available fungal sprays can also control bollworm.

Insect pathogen: Entomopathogenic viruses are widely prevalent in nature and are specific to pests hence NPV effective against *H. armigera* was used. Spraying of H-NPV @ 500 LE / ha will be targeted against young larvae of *H. armigera*. Occasionally, the virus affected larvae will be seen hanging head downwards with shriveled body. This can be repeated after 15 days for retaining good inoculum of the pathogen. This may be alternated with commercial Bt formulations @ 1.51 / ha.

3. Natural Pesticides

There are a number of natural pesticides that can be used in organic cotton cultivation, and organic farmers continuously try out new ones. But little scientific research has been done on the efficiency of most of the locally prepared formulations. Therefore, farmers are encouraged to do their own experiments and trials to find out which natural pesticides are most suitable for their farms. A list of some of the natural pesticides used by farmers in India and Africa has been given here.

However many natural pesticides also affect beneficial insect populations and thus should be used only when really necessary. Some plant extracts are also toxic to humans and animals and should be used with care. It should also be noted that any botanical insecticides and release of biological control (parasites, predators and microbial pesticides), require prior approval of the certification organization in order to maintain certification eligibility.

Table 15: Various natural pesticides

Sl. No.	Name	Ingredients	Target pests	Remarks
1	Pyrethrum	Powdered flower heads or liquid extracts of a daisy like chrysanthemum (commercially available).	Red cotton bug, cutworms, grasshoppers	Pyrethrum causes immediate paralysis or death to most insects, but also affects beneficial insects
2	Garlic onion chili repellent	2.5 kg garlic, 2.5 kg onion, 7.5 kg green chili. 10 liters water	Bollworm, sucking pests	This repellent does not kill the insects but deters pests from the crop. Repelling effect.
3	Coriander seed spray (*Coriandrum sativum*	200g coriander seeds, water	Spider mites	Repelling effect.
4	Flour spray	2 cups of fine white flour; half cup of soap (sticker), water	Aphids, spider mites, thrips, whitefly.	Repelling effect
5	SoO soap spray	SoF soap, water	Aphids, jassids, whitefly, thrips	SoF soap sprays also affect beneficial insects and should only be used as the last resort.
6	Neem spray (*Azadirachta indica)*	Neem kernel extract, containing azadirachtin	Sucking pests, jassids, bollworms, thrips	Sprays from neem seed or leaf extract do not kill the insects directly but reduce their normal activities like feeding, moving. The main advantage of using neem is that it is not harmful to most beneficial insects.

4. Mass trapping

Traps can help reduce the population of certain pests, especially of moths (the adults of caterpillars). If used at an early stage, they can prevent mass multiplication.

There are several types of traps:

- Light traps attract night active flying pest insects.
- Sticky traps of yellow color.
- Pheromone traps attract the male moths that get stuck in the trap

Light traps: To catch night flying insects. Electric or kerosene lamps can be used. The tripod stand can be used. The tripod stand is anchored on the ground and the light source is hung on the middle of three poles and a shallow bowl (dish) filled with water is placed underneath.

Sticky traps: There are numerous ways of making and using sticky traps. Yellow sticky trap. Yellow is one of the colors liked by insects and it can be seen from a distance (it's easily identified

5. Mechanical measures

- **Topping:** Removal of terminals of cotton crop ("Topping") at 80-90 days of growth should be made to reduce *Helicoverpa* oviposition and also to encourage sympodial branching which bears more fruiting bodies.
- **Bird perches:** Erection of bird perches (@ 10 / ha) encourages the predation by carnivorous birds.
- **Hand picking of larvae:** Hand picking of grown up larvae should be done in the morning between 6.30 to 10.0 am and in the evening hours. It will eliminate the possible development of insecticide resistance. It also helps to minimize heavy build up of future population.

6. Scouting, monitoring and crop protection decisions

Regular field scouting / monitoring is a vital component of any pest management programme because it is the only way by which reliable information can be obtained to decide if and when pest reaches the economic threshold level. It will determine the pest density and damage levels through the use of standardized sampling techniques. Control measures should be taken in time when pest population reaches a level at which further increases would have resulted in losses beyond sustainable level.

Pheromone monitoring: A sex pheromone released by one sex only triggers off a series of behavioral patterns in the other sex of the species. It is referred to as sex attractant or sex lure. Generally females produce sex pheromone which attracts males. The sex pheromones are specific in their biological activity, the males responding only to a specific pheromone of the female of the same species. Pheromone traps @ 5 / ha helps to identify the brood emergence for synchronization of insecticide application and release of parasites.

7. Crop diversity

- **Trap cropping:** Small plantings of a susceptible or preferred crop may be established near a major crop to act as a trap. After the pest has been attracted to the crop, the pest is destroyed or the infested plant parts or plants may be removed. Growing castor surrounding the cotton will attract *Spodoptera* for egg laying. Pigeon pea and marigold mask the odour emanated from volatile compounds of cotton and offer less preference for oviposition by *Helicoverpa* in cotton (Table -16).

Table16: Trap crops used for pest management in cotton

Sl.No.	Pests	Trap Crops
1	Spodoptera	Castor, Sunflower
2	Helicoverpa	Marigold
3	Spotted bollworm	Okra

Source: Krishi Vigyan Kendra (Farm Science Centres), 2003

- **Intercropping:** Intercropping with blackgram and chilies will reduce the intensity of bollworms infestations in cotton.
- **Bund cropping:** Cowpea planted as a bund crop encourages predators such as coccinellids, syrphids etc. which will keep the sucking pests under check.
- **Ecofeast crop:** Maize grown along the border provides food and shelter for number of lepidopteran parasites and thus serves as ecofeast crop. It also acts as barrier crop for sucking pests. Cowpea is also a good ecofeast crop encouraging multiplication of coccinellids and other predators.

8. Agronomic practices

- **Crop rotation:** Crop rotation minimizes pest infestation to a greater extent. Cotton should be followed body crops which are not favorable or less preferred by cotton pests. Cotton followed by cereals like maize / sorghum reduce the incidence of whitefly, bollworms, soil born insects and nematodes.
- **Cotton free period:** Cotton should be grown only once in a year. Cotton double cropping and ratooning should be avoided to prevent carry over population as they provide continuous food supply for the pest multiplication.

9. Cultural practices

- **Proper spacing:** Close spacing and dense canopy will encourage the faster rate of multiplication of bollworms and other pests of cotton. Hence optimum spacing and density are to be maintained.
- **Field sanitation:** Summer ploughing destroys the resting stages of insects in the soil should be followed. Removal of alternate weed hosts which harbour cotton pests. Collection and destruction of affected squares, dried flowers and grown up larvae will significantly reduce the pest intensity and buildup. Timely harvest and stalk destruction are among the most effective method managing pink bollworm. These practices reduce the habitat and food available to the pink bollworm, *Helicoverpa* and *Spodoptera*. Efforts should be made to destroy the green bolls, cracked bolls and other plant debris left at the end of the season.

2.5 Weed management

Cotton germinates at a soil temperature of 61° F at a depth of about 2 inches. With planting delayed until the soil temperature reaches 66°, the crop emerges rapidly and uniformly and is more vigorous, giving it a competitive edge on weeds. The delay in operations also allows additional growth of winter cover crops where used. The downside of this strategy may include risks of increased damage from certain insect pests such as boll weevil, tobacco budworm, and cotton bollworm.

2.5.1 Methods of Weed Management

Fields not infested with perennial weeds such as *Cyperus* sp. (Motha), *Cyanodon dactylon* (Doob) and *Sachharum* sp. (Kans) are preferred for organic farming as these are difficult to control. However, if such weeds occur in patches, their underground propagatory structures (stolons, rhizomes etc.) must be exposed by summer cultivation and manually removed. Mechanical/manual weeding as per existing practice may be adopted. Composting can recycle the weeds removed. It must be ensured that the FYM, compost added is completely decomposed, otherwise many seeds of annual weeds, introduced through FYM, will germinate and aggravate the weed problem. Growing a crop of cowpea between 2 rows of cotton will also suppress the early emerging weeds.

10. Cultivation

Tillage and cultivation are the traditional means of weed management for organic crops. Some specific tillage techniques for weed management include the following:

- **Preplant tillage**. Where weeds such as Johnson grass (*Sorghum halepense)* are a problem, spring-tooth harrows and similar tools can be effective in catching and pulling the rhizomes to the soil surface, where they desiccate and die. Disking, by contrast, trends to cut and distribute rhizomes and may make the stand even denser.

- **Blind tillage**. Blind cultivation employs finger weeders, tine harrows, or rotary hoes during the pre-emergent and early post-emergent phase. These implements are run at relatively high speeds (6 mph plus) across the entire field, including directly over, but in the same direction as, the rows. The large-seeded crops like corn, soybeans or sunflower survive with minimal damage, while small-seeded weeds are easily uprooted and killed. Post-emergent blind tillage should be done in the hottest part of the day when crop plants are less turgid, to avoid excessive damage. Rotary hoes, not harrows, should be used if the soil is crusted or too trashy. Seeding rates should be increased 5-10% to compensate for losses in blind cultivation.

- **Inter-row cultivation**. When annual weeds are the concern, cultivation is best kept as shallow as possible to bring as few weed seeds as possible near the soil surface. Where perennial, rhizomaceous weeds are a problem, the shovels set furthest from the crop row may be set deeper on the first cultivation to bring rhizomes to the surface. Tines are more

effective than sweeps or duck feet for extracting rhizomes. Later cultivations should have all shovels set shallow to avoid excessive pruning of crop roots. Earliest cultivations should avoid throwing soil toward the crop row. As the crop canopy develops, soil should be thrown into the crop row to cover emerging weeds.

Inter-row cultivation is best timed to catch weeds as they are germinating – as soon as possible after rain or irrigation, once the soil has dried enough to avoid compaction or surface crusting.

11. Mulching

Mulching is another weed control method. A mulch blocks light, preventing weed germination and growth. The materials that can be used as mulches are varied, and include plastics and organic materials such as municipal yard waste, wood chips, straw, hay, sawdust, and newspaper. To be effective, mulch need to block all light to the weeds, and some mulch materials require a thicker application layer that others to accomplish this. The most common color for weed – control plastic is black, since it completely blocks light.

Organic mulches can be grown in place of plastic. These mulches (or living mulches, as they are sometimes termed) must die or be killed before or shortly after crop planting in order to avoid excessive competition with the crop.

2.6 Irrigation

Water requirement

The irrigated cotton crop is mostly sown after a preliminary heavy irrigation and second light irrigation is given three to four weeks after germination. Subsequent watering depends upon the nature of the soil and the weather conditions. Flowering and ball formation are the critical stages with regard to irrigation. Inadequate irrigation schedule during these stages leads to a heavy shedding of flower buds and bolls. Generally cotton crop needs 6-8 irrigations and 600-800 mm of water during its lifetime.

Irrigation

- Furrows should be made in between the rows of standing crop during the course of interculture for the economical and optimum use of irrigation water.
- Flowering and fruiting stage of the crop are critical when irrigation is must.
- Last and final irrigation should not be given after the opening of one-third of balls.

Drip irrigation, also known as trickle irrigation or micro-irrigation is an irrigation method which minimizes the use of water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing, and emitters (Figure 20)

Figure 20: Drip irrigation in cotton filed

Modern drip irrigation has arguably become the world's most valued innovation in agriculture since the invention of the impact sprinkler in the 1930s, which replaced flood irrigation. Drip irrigation may also use devices called micro-spray heads, which spray water in a small area, instead of dripping emitters.

In India some farmers have even access to simple drip irrigation systems. However the investment costs are 40 times higher compared to the furrow irrigation system. A research work is under way to check if this high investment can be cost effective.

2.7 Harvest and post harvest operations

2.7.1 Harvest Methods

1. Cotton picking

The quality of the cotton fiber depends on the length of the cotton fiber, on the degree of contamination, with non fiber material such as leaves, twigs. Good quality raw material helps to yarns and garments of high quality and thus contributes to the market success of the cotton.

Measures taken to improve the quality of the harvest:

a) Allow the cotton ball to fully ripen and open.

b) Pick the cotton after the morning dews have dried up so that the cotton is dried and less prone to fungus contamination.

c) Pick the cotton into clean cotton cloth material never into nylon or any synthetic materials.

d) Removes leaves, capsules and damaged bolls from the cotton harvest.

e) Keep cotton of lesser quality separate into another bag.

f) It is important that no unripe cotton is picked, as it will not absorb the dye well enough and thus is priced low.

2. Harvesting care

a) Seed cotton should be collected from fully opened bolls only.

b) The practice of collecting half open bolls, drying them and then removing the seed cotton should be discouraged; as such a practice results in lower grade and quality of fiber.

c) Picking should be avoided in hot mid-day, as there is a possibility of collecting dried leaf-bits, etc. It is advisable not to do picking when the weather condition is wet. Picking should be done early in the morning & Evening.

d) It is preferable to keep seed cotton from last picking separately for marketing's this is generally lower in quality.

e) Before transport to the market, seed cotton should be heaped on a cloth or gunny or paper spread in a corner. It is advisable that care should be taken that seed cotton should not come into direct contact with the soil to avoid increase of trash content.

f) After picking, the seed cotton should be allowed to dry in the shade. The excessive exposure to sun should be avoided as it lowers the grade due to yellowing.

g) The seed cotton should be fully covered to protect it from sun and rain as well as to avoid contamination by wind during transport to the market. This will also prevent loss of seed cotton either due to pilferage or due to being blown away by wind.

2.7.2 Post Harvest Methods

3. Storage

If farmers try to store cotton before selling it, they should take care to prevent it from fungus contamination especially fertilizers, pesticides and petroleum. The storage place needs to be clean and dry. Damp conditions can lead to the growth of fungus with significant loss of cotton quality.

4. Processing and trade

Throughout the processing chains of organic cotton it is important to avoid contamination and to separate organic from conventional cotton. As most spinning mills and processing entities process organic and conventional cotton on the same machinery, it is important to clearly separate the equipment before processing organic cotton.

2.8 Crop Economy

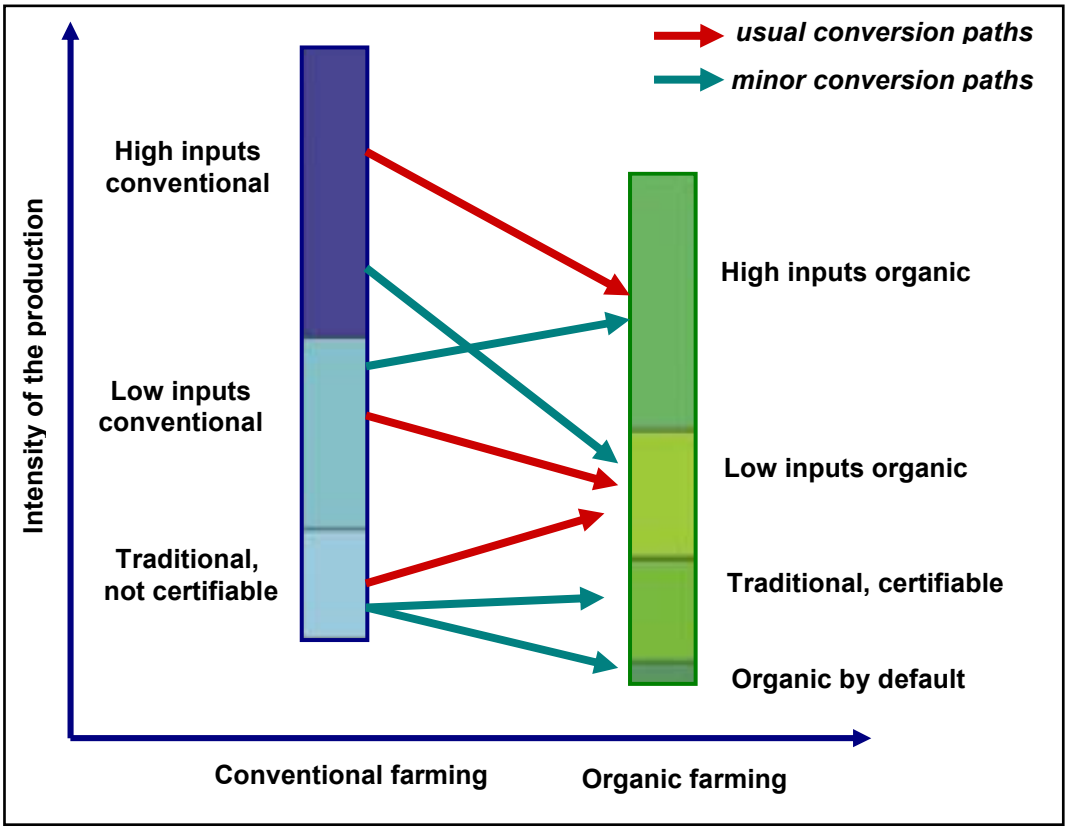
Studies have proven that by cultivating organic cotton the country economy can be flourished. Present global market demands for health rather than money. People of effluent class are ready to pay more for clothing which are not harmful for their health.

The yields and profits of organic cotton production vary to a great degree among different farms and different regions, and it is not easy to make a general statement on how organic cotton

production compares with conventional production in economic terms. Even if the conditions of two farms were to be the same (climate, soil, irrigation sources etc.), the skills and practices of the farmers will have a great impact on the results.

Further, the results of a comparison depend on the production intensity of the conventional and organic farms. Similar to conventional farming, organic cotton production can also be more or less intensive regarding input use and productivity. While conversion of organic farming usually means a reduction in intensity (i.e. fewer external inputs, smaller yields), in some cases it can also lead to higher intensity – with intensive organic nutrient and pest management (Figure-21).

Figure 21: Farming intensities in conventional and organic cotton production
(arrows indicate the conversion paths from conventional to organic farming)



Source: Organic cotton crop guide, FiBL, 2005

Most organic projects in the tropical countries like India report that after going through a conversion period of 2-3 years, the cotton yield on organic farms reach roughly the same level as on conventional farms (20% lower to 10% higher yields.) Costs for inputs (plant nutrition and pest management) are usually 20-80% lower, depending on whether organic manures and pest management items are purchased from outside (e.g. compost, liquid manures, botanical pesticides). While organic cotton production usually involves more work in plant nutrient management (preparation of compost, application of organic manures), labour required for

spraying and weeding is usually less. Thus, labour costs usually are about the same in organic and conventional cotton farming.

With similar yields, lower production costs (inputs) and a premium price (usually 10-20% over market prices); organic cotton farming can be far more remunerative compared to conventional cotton farming. However, for a comprehensive of the performance of organically and f conventionally managed cotton farms, the yields and production costs of the intercrops and crops grown in rotation with cotton also need to be taken into consideration.

A study was conducted by Swiss Agency for Development and Cooperation in India (2005) to assess the economic performance of organic cotton. Results of the study are given below (Table- 17):

1. Labour and material inputs

Total labour inputs are not higher in organic cotton fields. They need to spend more time for weeding and less time for pest management. Application of organic manure is double in organic cotton fields.

2. Production costs

Production cost will be 13% to 15% lower in organic cotton fields. This will be mainly due to 40% lower cost for inputs (seeds, manures, organic pest management Items).

Table 17: Input output - statement for one hectare area for cotton crop with chemical & organic inputs

Sl. No.	Particulars	Chemical Inputs		Organic Inputs	
		Irrigated Cotton	Rainfed Cotton	Irrigated Cotton	Rainfed Cotton
1	Cost of Cultivation (Rs)	25090	18090	19006.5	15376.5
2	Production (Qtls/Ha)	18	10	16	9
3	Rate (Rs/Qtls)	2700	2700	3000	3000
4	Total Income (Rs)	48600	27000	48000	27000
5	Net Income (Rs)	23510	8910	28993.5	11623.5
6	Labour Input Cost	11860	8040	10790	7910
7	Material Input cost	13230	10050	8216.5	7466.5

Source: Action for Agricultural Renewal in Maharashtra

3. Yields

In the beginning the yield may be low when compared to conventional cotton but after 2 years of observation in various countries show that there is an increase in the yield 4-6%.

4. Gross margin in cotton

Due to slight higher cotton yields, 20% organic price premium and lower production costs, gross margins in organic cotton fields were 30-43% higher.

5. Efficiencies

Per Kg of seed cotton harvest, the organic farms require less labour than conventional cotton farms. However organic farm requires more water for irrigation.

6. Economic impact on farms

Average yields as well as production costs for rotation crops are less in organic cotton farms.

7. Energy Consumption

The energy consumption within the production of organic cotton, such as “Green Cotton" was reported to be at the same level as within the production of traditional cotton, even if pesticides and fertilizers are not used (Table 18).

Table 18: Life Cycle Assessment - inventory analysis on fiber production

	Unit/kg	Polyester	Cotton	Organic
Parameter				
Energy consumption:	**MJ**	**97,4**	**59,8**	**53,6**
Electricity	MJ	15,2	12,1	13
Fossil fuel	MJ	82,2	47,7	40,6
Non-renewable resources:	**kg**	**2,4**	**1,4**	**1,3**
Natural gas	kg	0,36	0,35	0,14
Natural gas, feedstock*	kg	0,29	-	-
Crude oil	kg	0,41	0,53	0,57
Crude oil, feedstock*	kg	0,87		
Coal	kg	0,14	0,52	0,56
Coal, feedstock*	kg	0,37		
LP gas	kg	-	0,03	0,03
Hydro power (MJ)	MJ	0,4	1	1
Natural uranium	**mg**	**-**	**14**	**15**
Fertilizers	**g**	**-**	**457**	**-**
Pesticides	**g**	**-**	**16**	
Water	**kg**	**17,2**	**22200**	**24000**
Emission to air:				
CO_2	g	2310	4265	3913
CH_4	g	0,1	7,6	6,1
SO_2	g	0,2	4	4
NOx	g	19,4	22,7	22,7
CH	g	39,5	5	5
CO	g	18,2	16,1	17,2
Emissions to water:				
COD	g	3,2	-	-
BOD	g	1	-	-
Tot-P	g	0	-	-
Tot-N	g	0	-	-
** Feedstock values included to the energy consumption values*				
NK = not known				
Note: Organic = Organic cotton				

Source: Eija M.Kalliala, and Pertti Nousiainen, 1999, AUTEX Research Journal

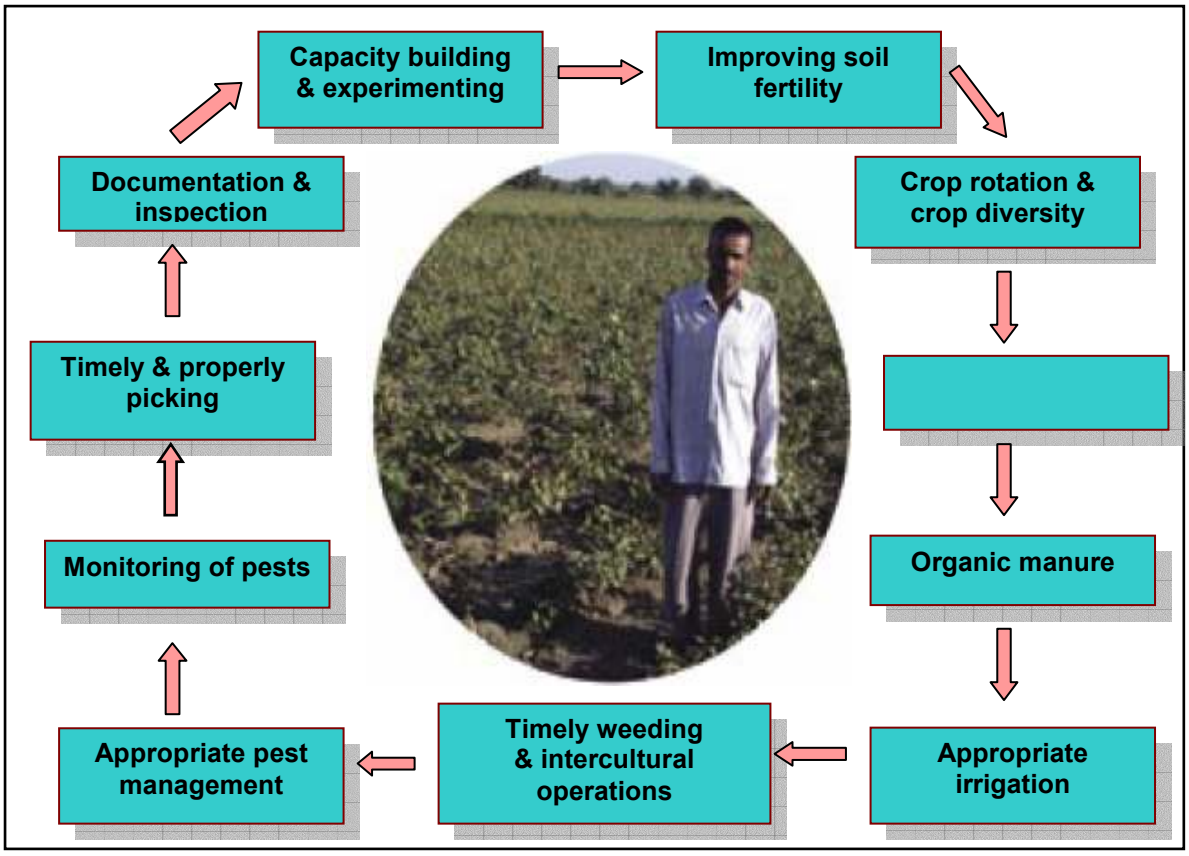
2.9 Organic cotton farming – A systematic approach

Converting a farm to organic production does not imply mean replacing chemical fertilizers and pesticide with organic ones. Organic cotton must be grown in a diverse and balances farming system that also includes the other crops. Instead of troubleshooting, organic farmers should try to prevent problems and avoid substitutes to conventional inputs as far as possible. This requires a through understanding of nutrient and pest management and the ability to continuously observe and learn.

To get satisfactory yields and income in organic cotton farming it is necessary to adopt a number of integrated measures in a system approach, ensuring that the interaction among soil, plants, environment and people is well balanced (Figure 22). The 'ingredients for success' all need to apply together:

- Suitable measures to improve and maintain soil fertility.
- Establishment of crop rotation and crop diversity; fostering natural balance;
- Selection of varieties suitable to the conditions (soil, availability of irrigation, market requirements),
- Appropriate types and amounts of manures at the right time;
- Timely crop management such as intercultural operations, weeding and irrigation;
- Careful monitoring of the crop and sufficient protection against pests according to the concept of economic threshold level;
- Timely and proper picking of the cotton;
- Sufficient documentation for inspection and certification;
- Capacity building and experimenting for continuous improvement.

Figure 22: Successful Organic cotton farming with a system approach



Source: Organic cotton Crop Guide, FiBL, 2005

2.10 Conventional cotton to organic cotton: *the conversion process*

Probably the most important hurdle for organic cotton production is the challenge of getting through the conversion process. During the phase, most farmers experience a drop in yields (10-15%, depending on the level of previous yields and the method used), while at the same time measure to re-establish soil fertility require additional efforts and labour. With proper organic management implemented, yields usually recover after 2-3 years, as the soil builds up organic matter and populations of soil organisms increased. Pest problems are also usually higher in the initial years, as the eco-system that got disturbed through the continuous application of chemical pesticides first needs to get into balance and populations of beneficial insects need to build up. It is also obvious that organic farming requires new skills, and, therefore, training and experimenting. With increasing experience, the performance of the farmer will improve, too.

Conversion to organic farming usually results in more diversity; in crops grown, in types of activities and in the solution of problems. Organic farming is knowledge-intensive type of production, and thus competent extension services play an important role. Especially during the conversion period, it is crucial that farmers get competent and timely advice.

Organic cotton projects could consider organizing trainings for farmers interested in conversion, in which they prepare for the conversion process. Rather than only promoting organic farming, extensions staff should openly address the necessity if working hard during the conversion period and the possible problems to be expected.

Appropriate measures can help to reduce problems encountered during the conversion process. The initial drop in yields, for example, can be reduced through sufficient application of organic manures (if necessary brought in from outside the farm). It is also advisable to intercrop cotton with pulses (e.g. moong bean, cow pea), which supplies nitrogen to the soil and provides additional income.

Success factors in the conversion process are:

1. Adequate training in organic agriculture and organic cotton production
2. Involve the family in decision making
3. Develop strategies to cope with initial drop in yields and higher labour requirement
4. Competent and timely advice on organic crop management.
5. Regular exchanges with experienced organic farmers.
6. Try out technologies on small plots to gain experience
7. Indentify suitable crop rotation , green manures an intercrops
8. Ensure sufficient input of organic matter (if necessary from outside the farm)

2.11 Merits of organic cotton cultivation

2.11.1 Environmentally Friendly Technology

a. Due to excessive use of fertilizers and insecticides, all the elements of the agro-eco system get polluted by the conventional method. Organic cotton production relies on non-chemical inputs and will decrease pollution hazards.

b. Pesticides residues in fiber may cause carcinogenic damage to users. The use of bio-rational products and biocontrol agents for pest management in organic farming will cause no such effects.

c. Large scale discharge of untreated and unprocessed effluents by textile industry and dyeing units has not only caused health problems to man, cattle and fish in the rivers and canals, but yields of cotton are reported to be affected due to polluted water that is used for irrigation.

d. Destruction of beneficial soil organisms may cause damage to soil health creating imbalance in the natural population of predators/parasitoids of cotton pests. Organic farming helps to restore or preserve the natural equilibrium between different components of the ecosystem.

2.11.2 Reduction in Cost of Cultivation

Modern production technology has lowered the cost-benefit ratio of cotton production. Farmers in Andhra Pradesh, Punjab, and Maharashtra etc. are reported to have committed suicide due to escalation of production cost without occurring commensurate profit from cotton cultivation. On the other hand, organic farming creates rural employments and uses of on-farm resources to make it more cost-effective.

2.11.3 Management of Insecticide Resistance

Due to indiscriminate use of hazardous insecticides for controlling cotton pests, the resistance of insects against the insecticide hiked up and in turn compelled the use of more number of sprays, and thus a vicious cycle is created, escalating cost of cultivation. Organic farming will help in reversing this trend. Evidences on poorer choice of multiplication rate of pests on organically grown cotton are encouraging factors to pursue this protocol.

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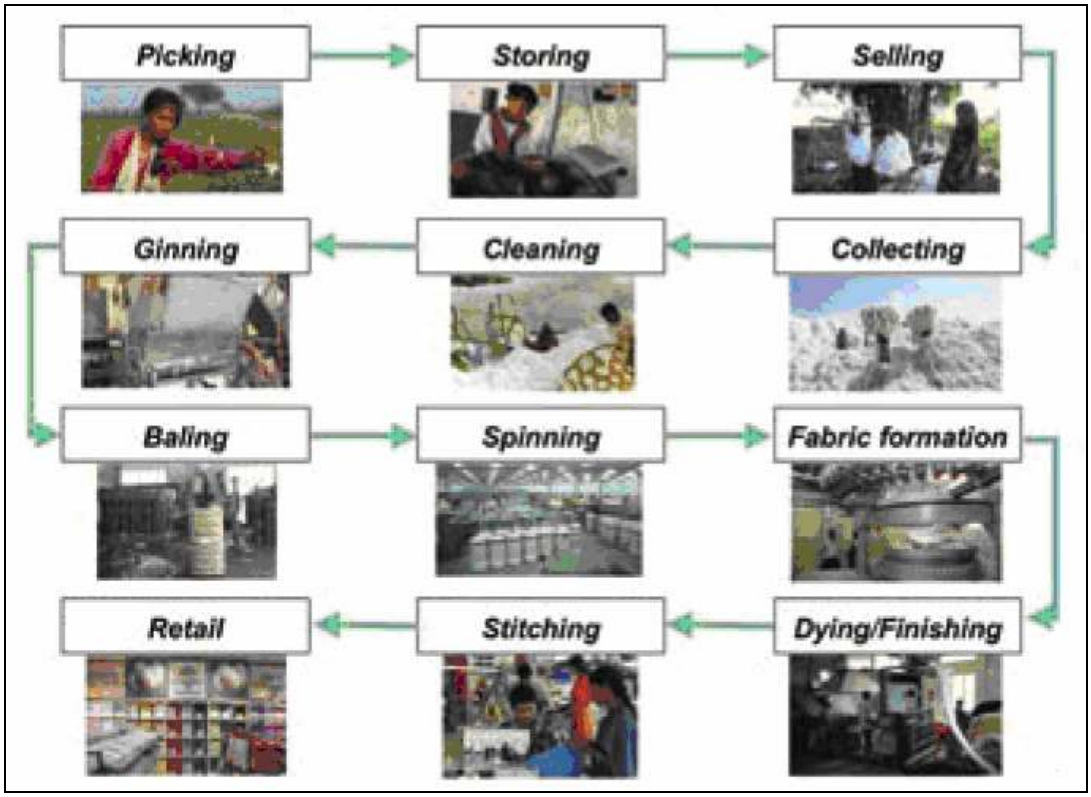
CHAPTER-III

Supply Chain

3.1 Overview

The organic cotton value chain in India is very complex and wide due to the large variety of final products from towels to sanitary napkins. But the farmers and the labourers are the weakest links in the chain driven by importers, exporters and retail chains.

Figure 23: Cotton processing chain



Source: Organic cotton Crop Guide, FiBL, 2005

3.1.1 Problems and Governance Issues in Organic Supply Chain

In India various textile companies are also involved in wheat and soybean production other than organic cotton, due to the need for giving an entire crop cycle of organic crops to the farmers but companies could not market the produce of these organic crops due to small volumes and high costs of processing and packaging.

1. Organic cotton Market

- The major problem in the organic market is lack of regular supply and quality besides the problem of storage. As far as institutional markets are concerned, they want a whole range of food items. The problem of multiple certifications for domestic and international markets and for different buyers also raises the cost and delays deliveries.

- The processors need longer staple cotton with lint length more than 30 mm and need bigger volumes. At the gin level, they need stronger packing material, no ink labeling but stickers and clean trucks.
- The traders and processors face problems of: inconsistent supplies, insufficient volumes, lack of quality storage, lack of market information, under developed domestic market, and high quality conditions for export. Finally, it is the ginning which determines the quality of cotton in terms of length of lint which cannot be undone.
- There is also a need to improve yields of rotation crops, develop market options for these crops and create/organize common storage and processing facilities to tackle the problems of small volume and high cost.
- Non-existent of any pricing policy for organic products

2. Socio-Economic Problems

- The ginning part of the chain suffers from child labour, poor working conditions, dirty surroundings and unfair wages and the chain drivers have very little control on these.
- Children constitute about 60% of the total work force, 70% of them are girls. Girls are supposed to be easier to control, work intensive and are cheaper. Girls working in the fields today will be mothers with no education in the future. No other industry in India has this high level of child work. On the other hand, adult woman are kept from work. Long term contracts, debt bondage, low wages, long working hours (10 to 13 hours/day) are frequent. According to a study of Venkateswarlu D . and da Corta L. (2005) "The price of Childhood", India Committee of the Netherlands, International Labour Rights Fund and Eine Welt Netzwerk NRW, the children working in the cotton fields in Andrah Pardesh, in total 100.000 children under 18, are often bonded by loans given to their parents. More than 85% of the children that work in cotton fields are not attending school.
- In the 2006-07 cultivation season, nearly 416,460 children under the age of 18, the majority of them (54%) younger than 14, were employed in cottonseed farms in Gujarat, Andhra Pradesh, Tamil Nadu and Karnataka states which account for nearly 92% of the total production area in the country.
- Ginning, where labour cost is only 2-3 per cent of the total cost of the final product, is known for very poor labour standards, work conditions, and living conditions, especially in Gujarat and Madhya Pradesh. There is also a practice of child labour in ginneries in Madhya Pradesh. It is also not possible to implement minimum and equal wage in India due to the larger dynamics of society. The women may lose work or may face higher exploitation due to higher payment.

3. Fair Trade Issues

- It is also difficult to ensure fair trade standards in ginning as the nature of work is seasonal. Therefore, there is a need to create alternative jobs within or outside the gin like cleaning, white washing, and compost making.
- Making farmers comply with fair trade standards is an issue as they cannot be monitored and there is an adversary relationship between the farmer and the labour. Therefore, there is a need to maintain a separate fair trade fund with the farmer organization for the welfare of the labour community. There have to be individual farm contracts with groups or farmer organizations under fair trade standards and a guaranteed price for the farmer.
- There is no pressure for fair trade in textiles. The fair trade issues in cotton include child labour in picking, women labour and their work conditions and gender gap in wages.

4. Quality Assurance Issues

- The contaminants (foreign matter, e g, human hair) are different from trash (leaves and twigs), and cannot be removed by machine. Therefore, quality improvement in terms of contamination control requires picking cotton with covered heads, not eating in cotton fields and in the cotton store area or market. At the farmer level, quality could be improved by not picking cotton early in the morning to avoid moisture and separating infected balls from good ones.
- Contamination from conventional growing cotton or Bt cotton: In organic agriculture the use of genetically modified organisms (GMO) is not allowed. Organic farmers find it more and more difficult to get cottonseed material that is guaranteed GMO-free.

Box 1: Bt Cotton

In organic agriculture the use of genetically modified organisms (GMO) is not allowed. For some years, seed companies have been promoting genetically engineered 'Bt cotton'. It contains genes of the same micro-organisms, *Bacillus thuringiensis that* is used in bio-control against a number of insect pests, also by organic farmers. The Bt cotton plant thus continuously produces insecticides that are to prevent bollworms from feeding on it. However, bollworms frequently develop resistance, forcing the seed companies to develop new varieties of Br cotton. Also, there is a risk that the development of resistance makes Bt sprays less effective, thus harming organic farmers.

The cultivation of Bt cotton involves higher financial risk, since the seeds are considerably more expensive and usually the crop is grown with high inputs of fertilizers and pesticides against sucking pests. In India, many conventional farmers who tried Bt cotton complained about crop failure, due possible to inappropriate verities, unfavorable climatic conditions, or adultured seeds. Despite the benefits promised by its promoters, growing Bt cotton seems to be a high – risk strategy.

Organic farmers find it more and more difficult to get cottonseed material that is guaranteed GMO-free. Some certification bodies use test stripes to check whether cotton plants contain GMO.

5. Ownership Issues

- Farmer organization and ownership issues are also involved as the organic certification is with the sponsor or organizer, not the grower. In fact, the contract is highly biased against the farmer as almost all the terms and conditions of the contract specify only farmer obligations in working with the company.
- The company's only responsibility as per the contract agreement is to procure certified organic/in-conversion cotton at 15 per cent premium over the market price for conventional cotton and try to sell the non-cotton produce of the grower.
- The contract has very detailed and strict conditions for the farmer. For example, the farmer agrees to keep the spray pump required for organic farming separately and not use it for any other chemical pesticide or fertilizer. The lending/borrowing of the spray pump to/from non-organic farmers is considered a default and the pump has to be subjected to testing by the company from time to time. Similarly, a farmer is to maintain a one meter border crop, as a buffer between the organic and the non-organic crops if the entire farm is not under organic farming. The buffer crop has to be one meter high and should be there for at least four months. Even the crops meant for this purpose are specified by name. Further, the farmer is not supposed to interact with any media and give any information about the project without the written permission of the company.
- The contract protects the company interest at all costs to the farmer and does not cover the farmer's production risk, e g, crop failure, and offers prices which are based on open market prices of conventional cotton/produce. This is a serious issue and it is against the spirit of contract farming and partnership as even a significant premium over market price may not help a farmer if open market prices go down significantly, which is not uncommon in India. Therefore, a minimum contract price is a must to reduce the vulnerability of cotton growers due to fluctuations in market prices, not market-based premiums.

3.1.2 Response / Initiatives

1. Government Initiatives

- ***Child Labour (Prohibition & Regulation) Act*** was enacted by Government of India in 1986. The Act prohibits employment of children in certain specified hazardous occupations and processes and regulates the working conditions in others.
- Compared to 2003-04, there was an increase in the wage rates paid to both children and adult labour (20 to 30% increase since 2003-04) in 2006-07 in some districts of Andhra Pradesh .The increase in wage rates was largely due to the introduction of ***National Rural Employment Guarantee Scheme*** by ***Government of India*** which ensures 100 days of employment for each person against official minimum wages which is significantly higher than local market wages. NREGA, also known as National Rural Employment Guarantee Scheme, (NREGS) is Indian legislation enacted on August 25, 2005. The NREGA provides a legal guarantee for one hundred days of employment in every

financial year to adult members of any rural household willing to do public work-related unskilled manual work at the statutory minimum wage. This act was introduced with an aim of improving the purchasing power of the rural people, primarily semi or un-skilled work to people living below poverty line in rural India. It attempts to bridge the gap between the rich and poor in the country.

- To promote and to ensure quality assurance in organic agriculture, Government of India has initiated many schemes / programes such as National programme for Organic Production, National Standards for Organic Products, Accreditation Regulations.

2. Support from NGOs

- Though the efforts made by a few NGOs like MV Foundation (M. Venkatarangaiya Foundation) special projects implemented by ILO-IPEC, UNICEF and initiatives by few individual seed companies in the state of Andhra Pradesh had some positive impact, due to their limited coverage these efforts have had a very minimal impact on the overall magnitude of child labour in the cottonseed industry. The response from seed industry as a whole to address the problem of child labour in cottonseed industry has also not been very encouraging.

- Both UNICEF and ILO-IPEC paid special attention to the problem of child labour in cottonseed farms in Andhra Pradesh. Since 2005, UNICEF with the support of IKEA, and ILO-IPEC with the support of DFID UK, have been implementing special projects in collaboration with Andhra Pradesh government to address the problem of child labour in Kurnool and Mahaboobnagar districts where cottonseed production is concentrated in Andhra Pradesh. Under the UNICEF project, 139 villages in five mandals in Kurnool namely Gonegandla, Nandavaram, Kosigi, Manthralayam and Peddakadubur are covered. The activities covered under the UNICEF supported project include community motivation and mobilization against child labour, improving the quality of education in government schools, running short term bridge course centers for working children and mainstreaming them in schools.

- Recently few NGOs in Gujarat and Rajasthan (DISHA, South Rajasthan Mazdoor Union) started active campaign against employment of child labour in cottonseed farms in Gujarat.

- There are several NGOs in organic cotton growing states that are involved in capacity building of farmers, traders, exporters, marketing executives on various aspects of organic farming (marketing, child lablour, fair trade, quality assurance).

3. Academic and Research support

- The Agricultural Universities of Guwahati (Assam), Bangalore (Karnataka), Coimbatore (Tamil Nadu) and Hisar (Haryana) are known to have at least an informal section on natural or organic farming. Recently Indira Gandhi National Open University (IGNOU) in collaboration with the Agricultural and Processed Food Products Export Development

Authority (APEDA) has initiated a 6-month duration course on Certificate in Organic Farming. The programme would be made available to students, progressive farmers and certifying personnel.

- Research institutions like CICR, CRICOT etc. are also involved in research and development activities.

3.1.3 Strategies for Better Governance

Marketing of organic cotton needs to take into account local markets, developing niche markets, generic promotion of the organic textiles market, government applying environmental criteria to its own buying policies for institutions such as police forces, schools, army, air force, navy, railways and so on, blending organic cotton with conventional cotton in textile production, working with environmentally sensitive companies; and linking with local industries geared to making organic products (such as the hand-loom industry in India which contribute 20 per cent of the Indian textile production and where handmade and custom-made designs of fabrics can easily be handled).

Major conditions for successful interlocking between agribusiness firms and small producers include increased competition for procurement instead of monopsony, guaranteed market for farmer produce, effective repayment mechanisms, market information for farmers to effectively bargain with companies, large volumes of transactions through groups of farmers, for lowering transaction costs, cooperation among genuine agribusiness firms in the area, and no alternative source of raw material for firms.

Further, for the sustainability of company-farmer partnership schemes, it is important that the company is able to successfully market its products so that farmers do not suffer from lack of markets. Building relationships of trust with farmers through company reputation rather than marketing gimmicks is crucial. This requires mutual respect, fair and transparent negotiation processes, realistic assessment of benefits, long-term commitment, equitable sharing of risk, and sound business plans. Innovative pricing mechanisms like bonus at the end of the processing cycle, shares in company equity, dividends, producer's fixed price, and quality-based pricing, which reward performance, can help contract performance.

Market access for small producers depends on:

(a) Understanding the markets,

(b) Organization of the firm or operations,

(c) Communication and transport links, and

(d) An appropriate policy environment.

So far as the role of the government in the commodity chain is concerned, it can proactively help the stakeholders in the chain to identify the opportunities and threats in the global commodity chains. It can also assist producers in entering the chains (Kaplinsky 2000).

3.2 Inspection and certification

1. Accreditation

Accreditation is the procedure by which an authoritative body evaluates and gives a formal recognition that a certification programme is in accordance with the standards of the authoritative body. The Government of India has initiated the process of setting up indigenous certification programmes to solve the problems arising out of non existence of domestic certifying agencies and the high fee being charged by certifying agencies of foreign origin. As per the national accreditation policy under the National Programme for Organic Production (NPOP) being implemented by the Government of India through the Ministry of Commerce, all the certifying agencies operating in the country have to obtain accreditation from anyone of the four accrediting agencies appointed by the Government of India, viz., Spices Board, Coffee Board, Tea Board and APEDA for spices, coffee, tea and other agricultural crops

2. Certification

Certification of organic products is an essential prerequisite for marketing of the produce and to attract premium in the international markets. Certification is one way of ensuring that the products claimed to be organic are actually produced according to organic farming principles. It is a way of protecting consumers, producers and traders against the use of misleading or deceptive labels. It is also a marketing instrument enabling producers to access markets for organic products and obtains premium prices. Certification tracks and controls the flow of products from primary production at farm level to each stage of manufacturing right to the final product that reaches the consumer.

Broadly the certification process consists of two main steps:

a) **Inspection** (Control) to verify that production and handling are carried out in accordance with standards against which certification is to be done.

b) **Certification** to confirm that production and handling conforms to standards.

The documents to be maintained include field map, field history sheet, activity register, input record, output record, harvest record, storage record, sales record, pest control records, movement record, equipments cleaning records and labeling records. It may be prudent to obtain certification for export by the certification bodies of the importing countries. In such a case, the advantage for the exporter is that the logos of these bodies are well known and trusted by consumers in their countries, thus giving the product a better visibility and commercial advantage.

The major drawback is that this type of certification can be very expensive. In order to reduce costs to producers and exporters, international certification bodies have started establishing branches in producing centres utilising the services of local organic inspectors. International certification bodies such as Ecocert have established local branches in producing countries. Organic certification can also be carried out by local certification bodies accredited by the

authorities of the importing countries (refer annexure II for list of certification agencies operating in India)

3.3 Certification procedures in India

1. Accreditation Agencies

National steering committee of the NPOP has appointed following boards / authorities as accreditation agencies

- Agricultural and Processed Food Products Export Development Authority (APEDA)
- Coffee Board
- Spices Board
- Tea Board
- Coconut Development Board
- Directorate of Cashew and Cocoa Development

2. Evaluating Agency

The evaluating agency is appointed by the accreditation agency, consist of persons from the accreditation agency or experts from outside. The evaluating agency receives and screens the applications from the inspection and certification agencies for their certification programmes, The evaluating agency submits an evaluation report along with its recommendation to the accreditation agency for considering accreditation for the particular inspection and certification agency.

3. Inspection and Certification Agencies

Based on the recommendations of the evaluating agency suitable inspection and certification agencies are accredited by the accreditation agency. The inspectors are appointed by these accredited inspection and certification agencies. They carry out inspection of the land and maintain records as per specified formats and also carryout periodic site inspection. Based on compliance to the standards and programmes, accredited inspection and certification agencies will certify the organic status or products and operations, indicating their conditions along with their recommendations.

4. Inspection and Certification Process in India

The following steps are to be followed by a person for organic inspection and certification process

- Select an accredited inspection and certification agency
- The selection of agency is to be based on the acceptability of the exporter or exporting country and the standards prescribed by that country and other factor such as proximity of the agency to the farms, quotations for costs of the inspection and certification
- File application form detailing preliminary information about the size of the farm/ units, location of units, company activities, etc. to determine the cost of inspection and certification and based on application a cost of inspection and certification is determined and a contract regarding the same is signed between the producer and the agency.

- Based on the information provided by the producer, the agency carries out farm inspection on a mutually convenient day and time.
- The inspection includes:
    - Interviews with persons responsible for production
    - Physical inspection of fields, premises, processing equipment, storage area, etc
    - Inspection of paper work, book keeping, etc
    - Testing for residue analysis is carried out if the inspector feels the need for the same.
- After fulfilling the necessary inspections, the agency provides the report of inspection and testing (if carried out). Based on the findings of the report, the agency decides whether or not to grant a certification.
- If certification is not granted then the agency provides the reasons for rejection. If only certain parts of the business can be certified, the agency does so, providing the producer with certain recommendations for the remaining parts of the business which could not be certified.
- Each year following the official certification, the agency performs inspections to determine whether the requirements for certification are still met.

Following table 19 shows the approved / standard charges for certification by NPOP

Table 19: Approve maximum tariff structure for certification

Object of control	Details	Fees (Rs.)
Small Farmers and Co-operatives	Travel and Inspection Report preparation Certification	12000/- per day 5000/- (consolidated) 5000/- per certificate
Small Farmers and Cottage Industry	Travel and Inspection Report preparation Certification	12000/- per day 5000/- (consolidated) 5000/- per certificate
Estate Manufactures and Exporters	Travel and Inspection Report preparation Certification	19200/- per day 5000/- (consolidated) 5000/- per certificate
Large and Medium Sized Processors	Travel and Inspection Report preparation Certification	16800/- per day 5000/- (consolidated) 5000/- per certificate

Source: APEDA, Ministry of Commerce & Industry, Govt. of India

5. Leading Inspection and Certification Agencies in India

Following are the leading international inspection and certification agencies, which have so far been approved by most of the accreditation agencies in India (Table – 20).

Table 20: List of accredited certification bodies under NPOP

(National Programme for Organic Production)

Sr. No	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
1	Bureau Veritas Certification India Pvt. Ltd. (Formerly known as BVQI (India) Pvt. Ltd.)	**Contact Person**: Mr. R. K. Sharma Director **Address :** Marwah Centre, 6th Floor Opp. Ansa Industrial Estate Krishanlal Marwah Marg Off Saki-Vihar Road Andheri (East), Mumbai-400 072 (Maharashtra) Phone No.: 022-66956300, 56956311 Fax No. 022-66956302 / 10 Email: scsinfo@in.bureauveritas.com	NPOP/NAB/ 001	14-09-2009	NPOP USDA NOP	
2	ECOCERT India Pvt. Ltd	**Contact Person:** Dr. Selvam Daniel Country Representative **Address :** Sector-3, S-6/3 & 4, Gut No. 102, Hindustan Awas Ltd. Walmi-Waluj Road Nakshatrawadi Aurangabad – 431 002 (Maharashtra) Phone No.: 0240-2377120, 2376949 Fax No.: 0240-2376866 Email: ecocert@sancharnet.in	NPOP/NAB/ 002	22-08-2008 (Extended till next NAB meeting)	NPOP USDA NOP	

Sr. No	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
3	IMO Control Pvt. Ltd.	**Contact Person:** Mr. Umesh Chandrasekhar Director **Address:** No. 3627, 1st Floor, 7th Cross, 13th ' G ' Main, H.A.L. 2nd Stage, Bangalore-560 008. Tel: 0091-80-25285883, 25201546 and 25215780 Fax: 0091-80-25272185 Email: imoind@vsnl.com Web: www.imo.ch	NPOP/NAB/ 003	27-09-2010	NPOP USDA NOP	
4	Indian Organic Certification Agency (INDOCERT)	**Contact Person:** Mr. Mathew Sebastian Executive Director **Address :** Thottumugham P.O. Aluva-683 105, Cochin, (Kerala) Telefax:0484-2630908-09/2620943 Email: Mathew.Sebastian@indocert.org	NPOP/NAB/ 004	24-10-2008 (Extended till next NAB meeting)	NPOP USDA NOP	
5	Lacon Quality Certification Pvt. Ltd.	**Contact Person:** Mr. Bobby Issac Director **Address :** Chenathra, Theepany, Thiruvalla - 689 101., (Kerala) Telephone: 0469 2606447 Fax: 0469 2631902 Email: info@laconindia.com Web : www.laconindia.com	NPOP/NAB/ 006	31-09-2008 (Extended till next NAB meeting)	NPOP USDA NOP	

Sr. No	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
6	Natural Organic Certification Agency (NOCA)	**Contact Person:** Mr. Sanjay Deshmukh Chief Executive Officer **Address :** Chhatrapati House Ground Floor Near P. N. Gadgil Showroom Pune-411 038, (Maharashtra) Tel.: 020-25457869, 56218063 Fax: 020-2539-0096 Email: contact@nocaindia.com, nocaindia29@rediffmail.com, nocaindia@gmail.com	NPOP/NAB/ 007	23-05-2009	NPOP USDA NOP	
7	OneCert Asia Agri Certification Pvt. Ltd.	**Contact Person:** Mr. Sandeep Bhargava Chief Executive Officer **Address:** Plot No. 8, Pratap Nagar Colony (Near glass factory and Gopalpura bypass), Tonk Road, Jaipur - 302017 (Rajasthan) Telefax No: - 0141-2701882 Email: info@onecertasia.in	NPOP/NAB/ 008	26-10-2009	NPOP USDA NOP	

Sr. No	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
8	SGS India Pvt. Ltd.	**Contact Person:** Dr. Manish Pande Head – Food Services **Address:** 250 Udyog Vihar Phase – IV, Gurgaon – 122 015 (Haryana) Phone No.: +91 124-2399990 Mobile No: +91 9871794640 Fax No.: +91 124-2399764 Email: manish.pande@sgs.com	NPOP/NAB/ 009	01-05-2011	NPOP USDA NOP	
9	Control Union Certifications (Formerly known as Skal International (India))	**Contact Person:** Mr. Dirk Teichert Managing Director **Address:** "Summer Ville" 8th Floor 33rd – 14th Road Junction Off Linking Road, Khar (West) Mumbai –400052 (Maharasthra) Phone 022-67255396/97/98/99 Fax 022-67255394/95 Email: cuc@controlunion.in cucindia@controlunion.com controlunion@vsnl.com	NPOP/NAB/ 0010	28-05-2008 (Extended till next NAB meeting)	NPOP USDA NOP	

Sr. No	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
10	Uttarakhand State Organic Certification Agency (USOCA)	**Contact Person:** Dr.B.S Bisht Director **Address:** 12/II Vasant Vihar Dehradun-248 006, (Uttarakhand) Phone No.: 0135-2760861 Fax: 0135-2760734 Email: uss_opca@rediffmail.com	NPOP/NAB/ 0011	13-11-2009	NPOP USDA NOP	
11	APOF Organic Certification Agency (AOCA)	**Contact Person :** Mr. K. Dorairaj Chief Operating Officer **Address:** 141 / 7, 1st floor, Munireddypalya, J.C. Nagar, Opp : Fun world, Bangalore – 560006 Phone No:080-23537888/65369888 Email: aocabangalore@yahoo.co.in Web-site:www.aoca.in	NPOP/NAB/ 0012	09-01-2010	NPOP	
12	Rajasthan Organic Certification Agency (ROCA)	**Contact Person:** Mr. Yashpal Mahawat. Director **Address:** 3rd Floor, Pant Krishi Bhawan, Janpath, Jaipur 302 005 (Rajasthan) Phone No: 0141-2227104, Tele Fax: 0141-2227456 Email: rocajpr.cb@gmail.com	NPOP/NAB/ 0013	09-10-2010	NPOP	

Sr. No	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
13	Vedic Organic Certification Agency	**Contact Person:** Dr. (Mrs.) M. Usha Managing Director **Address:** Plot No. 55, Ushodaya Enclave, Mythrinagar, Miyanagar, Hyderabad – 500 050 Mob.: 9290450666, Tele.:040-65276784, Fax: 040-23045338 **e.mail :vedic_org@yahoo.com**	NPOP/NAB/ 0014	30-09-2011	NPOP	
14	ISCOP (Indian Society for Certification of Organic Products)	**Contact Person:** Prof: Dr. K. K. Krishnamurthi President Address: Rasi building, 162/163, Ponnaiyarajapuram Coimbatore – 641 001 Tamil Nadu Mob. No.: 94432 43119 Ph. No.:0422-2544199; 0422-6586060 Web site: iscoporganiccertification.com E-mail: profdrkkk@yahoo.com; iscopcbe@yahoo.co.in	NPOP/NAB/ 0015	30-11-2011	NPOP	

Sr. No	Name of the Certification Agency	Contact Person & Address	Accreditation No.	Validity of Current Accreditation	Scope of Accreditation	Certification Mark
15	Food Cert India Pvt. Ltd	**Contact person:** Mr. Srihari Kotela Director Address: Quality House: H. No. 8- 2- 601/P/6, Road No. 10, Banjara Hills, Panchavati Colony, Hyderabad – 500 034 Tel : 91- 40-23301618, 23301554, 23301582 Fax: 91-40-23301583	NPOP/NAB/ 0016	30-09-2011	NPOP	
16	Aditi Organic Certifications Pvt. Ltd	**Contact person:** Mr. Narayan Upadhyaya Director No. 305, 1st floor, 6th Main, Mahalakshmi layout, Bangalore – 560 086 Ph. No.: 080-32537879	NPOP/NAB/ 0017	30-09-2011	NPOP	

Source: APEDA

3.4 Cotton mills

Table 21: Contact details of Cotton mills involved in organic cotton base product manufacturing

Sl. No.	Cotton Mill	State	Address	Contact Details
1	Asarwa Mills	Gujarat	Asarwa Road, Ahmedabad - 380016, Gujarat, India	Mr. Raj Kumar Basotia (General Manager (Exports) Mobile:+919824012125 91-79-22125719 91-79-22125494(Fax)
2	Satya Cotton Mills	Andhra Pradesh	D.N.4-15-110/16, Postal Colony, 3rd Lane, Amaravathi Road, Guntur, Andhra Pradesh	Mr. Cheedella Satyanarayana Email: Satyacottonmills@Yahoo.Com.Sg +91-863-2265814 +91-09440082031 +91-863-2324931
3	Manjeet Cotton Pvt.Ltd	Maharashtra	318, Opp. Hotel President Park, N-3, Cidco, Aurangabad - 431003, Maharashtra, India	91-240-2473363/2481763/2474463 Mobile : +919422222263 Fax : 91-240-2473563/2486463
4	P. Govinda Rao Cotton & Yarn Indenting Agents	Tamil Nadu	Aishwarya Complex, Flat No. 34, 3rd Floor, 196, Thiru Venkatasamy Road (West), R.S. Puram, Coimbatore - 641002, Tamil Nadu, India	91-422- 2540793 / 2540795 / 2550115 / 2644189(R) Mobile : +919843033471 Fax : 91-422-2550115/2540793
5	Sri Anantha Lakshmi Spinning Mills (P) Ltd.	Andhra Pradesh	Boyapalem Edalapadu Mandali, Chilakaluripet, Guntur - 522233, Andhra Pradesh, India	91-863-2288664/2288666 Mobile : +919912344288 Fax : 91-863-2288665
6	Yash Polytex	Maharashtra	14, Rayfreda, M.C. Road, Andheri (East), Mumbai - 400093, Maharashtra, India	91-22-26871898 Mobile : +919322210608 Fax : 91-22-26871829
7	Orgofab Exim	Gujarat	218, Vanijya Bhawan, Near Kankariya Yard, Ahmedabad - 380022, Gujarat,	91-79-25454548/32942055 Mobile : +919327520555

			India	Fax : 91-79-25432591
8	Sunrisethangam Spinning Mills Pvt. Ltd.	Karnataka	#98, 5th Main Road, Sriramapuram, Sunrise Arunachalam Circle, Bangalore - 560021, Karnataka, India	91-80-23120336/23125928 Mobile : +919845012538 Fax : 91-80-23123523
9	Unitech Cotspin Limited	Gujarat	At. Village Himatpur, Himatnagar - Idar State Highway, Dist-Sabarkantha, Himatnagar - 383001, Gujarat, India	91-2772-221603 Mobile : +919924540185 Fax : 91-2772-221602
10	Vive Impex	Tamil Nadu	C-229, Cheran Colony, Thudiyalur, Coimbatore - 641034, Tamil Nadu, India	91-422-2642298 Mobile : +919345881895
11	Rajvir Industries Ltd.	Andhra Pradesh	Surya Towers, 1st Floor, 105, Sardar Patel Road, Secunderabad - 500003, Andhra Pradesh, India	91-40-27845628/27845650/27846841/42 Mobile : +919848623585 Fax : 91-40-27840656
12	Silver Enterprises	Delhi	878/A/3, S.P. Mukherjee Marg, Shyam Market, Delhi - 110006, India	91-11-23954148 Mobile : +919810013491 Fax : 91-11-23954315
13	Garex Fashions Pvt. Ltd.	Maharashtra	Plot No. O-2, Cama Mun. Indl. Est., Walbhat Road, Goregaon (E), Mumbai - 400063, Maharashtra, India	91-22-26852196 Mobile : +919820137193 Fax : 91-22-26853792
14	Cotton Tradelink	Gujarat	801, Shiti Ratna Complex, Opp. Panchwati Appts., Panchwati Circle, C.G. Road, Ahmedabad - 380006, Gujarat, India	91-79-26441332 Mobile : +919879918118 Fax : 91-79-26441332
15	Singhal Spintex	Uttar Pradesh	A-22, Partapur Industrial Area, Udyog Puram, Meerut - 220001, Uttar Pradesh, India	91-121-2420050 Mobile : +919837355510 Fax : 91-121-2423364
16	International Fashion Fabrics	West Bengal	6/25, Nilmoni Halder Lane, Kolkata - 700013, West Bengal, India	91-33-22262794 Fax : 91-33-22262794

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- Sukhpal Singh, Organic Cotton Supply Chains and Small Producers Governance, Participation and Strategies, seventh international conference on management in agriFood chains and networks, June 1- 2 , 2006, Ede, The Netherlands.
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CHAPTER-IV

Earlier and On-going Projects and the Lessons Learned

EARLIER AND ON-GOING PROJECTS AND ACTORS

4.1 Earlier projects

1. Agrocel Organic Cotton Farming Project in Gujarat, India, 2001-2004

Overview: Agrocel Industries, Ltd. is a joint venture company of Shroff Group and Gujarat Agro Industries Corp. based in the Kutch district of Gujarat, India. The company works with more than 20,000 farmers across India through 18 service centers to provide agricultural inputs, technology support, market support, and training for both organic and conventional crops. In the course of these activities, Agrocel became concerned with the plight of smallholder cotton growers in the Kutch and Surendranagar districts of Gujarat, who were struggling for survival. In response, they conceived of a project to promote organic cotton cultivation in these areas, entered into relationships with Vericott U.K. and Traidcraft Exchange U.K to assist with manufacturing, processing, and marketing, and secured funding for the project from Shell Foundation U.K.

Objective: The project—Straight From the Cotton Fields—aimed to address the problems of bankruptcy, rural-urban migration, deteriorating soil and water quality, crop vulnerability to pest attacks, and market access in an effort to create economically, environmentally, and socially sustainable livelihoods for smallholder cotton farmers. The objective of the project was to create more vertical supply chains to open the market for organic fair trade cotton. The implementing agencies aimed to develop a transparent and global supply chain where consumers are in a position to interact consistently with the producers on the ground.

Activities: Secondary research, field survey of program participants, interviews with managers and staff

Sponsors: Agrocel, Shell Foundation, Traidcraft, Vericott Ltd

Partners: Agrocel, Traidcraft, Vericott Ltd

Achievements: Of the 59 participating farmers surveyed (out of 620 farmers recruited for the program), 90% reduced their indebtedness, 98% experienced less financial hardship, 58% saw a check in urban migration, and 100% attributed reduced incidences of illness in their families to the adoption of organic cultivation. The project also succeeded in establishing organic standards, securing organic certification from SKAL, registering the Agrocel brand, and launching an Agrocel website.

Current status: After its successful result this project has been completed within the specific period.

2. Growing organic cotton under groundwater stress-Maikaal project in , Madhya Pradesh, India

Overview: In 1991, the Swiss yarn trader Remei AG and the Indian spinning mill Maikaal Fibres (India) Ltd. initiated the Maikall bioRe organic cotton project in Madhya Pradesh. What had started as a non- commercial experiment to help cotton producers find a way out of debt and secure a sustainable livelihood has meanwhile developed into an enterprise that joins social responsibility and ecology with economic profit. The project region was located in the Nimar Valley in Madhya Pradesh, central India that spreads on both sides of the Narmada River. The region is pat of the central Indian cotton belt and is home to several dozens of spinning mills. This project was active in 75 villages if Khargone and Badwani district.

Objectives:

- To assess and analyze the social. Economical and ecological impact of organic production methods and low drip irrigation in cotton production.
- To gain insight in the mechanism of the dissemination of these approaches.
- To improve the production system and to develop tools for facilitating extension work (like training manual and tool kits).

Activities:

- A socio economic photo of the farms in the maikaal area.
- Monitoring and analysis of agronomic parameters.
- Analysis of the dissemination process.
- Improving the technology and developing extension tools (like training manual and tool kits).

Sponsors: Swiss agency for development and cooperation (DEZA)

Partners:

- Research institute for organic agriculture (FiBL) Frick, Switzerland.
- International water management institute (IWMI), Anand, India
- Maikaal bioRe, Madhya Pradesh, India

Achievements:

- Successfully improved the development technologies.
- Provided guidelines for the smallholders certification.
- ***'Organic Cotton Crop Guide – A manual for practitioners in the tropics'*** was developed as part of the research project 'Growing Organic Cotton under Groundwater Stress; Lessons from the Maikaal bioRe Project (2002-2005).

Current status: It was successfully completed in 2005.

'Impact of Organic Cotton Farming on the Livelihoods of Smallholders'……. *A case study* (Maikaal bioRe project in central India)

To investigate the economic viability if organic cotton farming and the impact conversion in the livelihoods of the involved farmers, the Swiss Agency for Development and Cooperation (SDC) and the World Wide Fund for Nature (WWF), Switzerland, asked the Research Institute of Organic Agriculture (FiBL) to conduct a research study on organic cotton farming in the Maikaal bioRe project.

This study assessed the impact of conversion to organic cotton farming on the livelihoods of smallholders in the Maikaal bioRe organic cotton project in ***Madhya Pradesh***, central India. For that purpose, it compares farm profile data, material and financial input/output and soil parameters of organic and conventional farms over two cropping periods (2003 – 2005).

The results show that organic farms achieve cotton yields that are on a par with those in conventional farms, though nutrient inputs are considerably lower. With less production costs and a 20% organic price premium, gross margins from cotton are thus substantially higher than in the conventional system. Even if the crops grown in rotation with cotton are sold without organic price premium, profits in organic farms are higher. In the perception of most organic farmers, soil fertility significantly improved after conversion. However, the analysis of soil fertility parameters in soil samples from organic and conventional cotton fields has shown only minor differences in organic matter content and water retention.

The research indicates that organic cotton farming can be a viable option to improve incomes and reduce vulnerability of smallholders in the tropics. To use this potential it is important to find suitable approaches to enable marginalised farmers managing the hurdles of conversion to the organic farming system.

'Organic Cotton Crop Guide – A manual for practitioners in the tropics' was developed as part of the research project. The information documented in this guide is based to a large extent on the experience and know-how of the Maikaal biioRe extension team. This was complemented by experiences with other cotton projects in India and in Africa and with information available from literature and the Internet. The guide aims to provide useful information and guidance to organic cotton farmers and to extension workers involved in organic cotton production on smallholder farms in the tropics.

4.2 Ongoing projects

1. Chetna Organic & FT Cotton Supply Chain Intervention Project, Solidaridad

Background: Operational in 11 rainfed districts, some of which are tribal dominated, across the states of Andhra Pradesh (Telengana), Maharashtra (Vidarbha & Dhule), Orissa (Kalahandi & Bolangir) and Madhya Pradesh (Dewas) this program supports farmers to convert from conventional (High External Input Dependent) to organic (Low External Input Depenedent)

farming, aimed at balancing the safety of natural environment. COFA holds the Organic & Fairtrade certificates for its project. An Internal Control System is maintained with detailed documentation and track & trace procedures for all its inputs & outputs. Farmers are extensively trained on all aspects of quality control to comply with certification standards.

Technical knowledge is shared with the farming communities right from the sowing stage to a contamination free post harvest management. There is a special focus on seed research to develop varieties and reduce costs of cultivation. This is not just to meet market demands by homogenizing seed varieties but to work towards a diversification that is customized to local conditions.

Objectives: Improving livelihood options for smallholding cotton growers in rain fed regions of India through socio-technical extension services and collective marketing interventions

Activities: Socio technical extension, Institution building (SHGs/Cooperatives) training, certification, marketing

Sponsors: Dutch government, Solidaridad & ICCO

Partners: FFID-COFA (mail implementing agency)

Local Partners: VISION, VIKAS GANGA and other NGOs + 7 farmer coops

Project area: Andhra Pradesh (Adilabad & Karim Nagar districts in northern Telangana), Maharashtra (Vidarbha – Yavatmal, Akola, Amravati & Washim districts) & Orissa (Kalahandi, Bolangir & Nuapada districts).

Beneficiaries: Small holder cotton growers (<3 ha land)

Achievements:

1. Chetna Organic Farmers Association (COFA) registered in 2007.
2. Chetna Producers Company (CPC) incorporated in 2009.
3. Chetna farmers certified as SFO (FLO)- Fairtrade & Organic (Control Union) at primary level.
4. Garmenting / textile partners which buys chetna cotton are also certified under SA 8000 standards- RCML – Mid Level.
5. Finished products linked to Made-By label for sustainable clothing and sold to final customers at retail brands affiliated by Made-By- e.g. Jackpot- End level

Current Status

Table 22: Chetna project in numbers

Sl. No	State	Number of Villages	Groups	Farmers	Total organic Land (Ac)	Total cotton acres (Ac)
1	Andhra Pradesh	112	143	1476	8356.64	4340.7
2	Maharashtra	103	185	2061	11793.44	3626.81
3	Orissa	50	124	1594	6307.03	3010.24
Total		**265**	**452**	**5131**	**26457.11**	**10977.75**

Chetna with the support of NABARD/IGWDP is implementing a watershed program in 6 villages of the Chetna project areas under the tribal belt in Adilabad. The aim is to support the member cotton farmers in these villages to enhance their productivity through watershed development.

Project Replications

- Livestock & Field Infrastructure Development Project
- Expansion of Chetna project in Madhya Pradesh
- Non Pesticide Management (NPM) Labeling Initiative
- National Rural Employment Guarantee (NREGA) Network
- India Brazil South Africa Knowledge Exchange Project (IBSA)

Lessons learned

- Organic Cotton farming would require investments in terms of time and building human resources and cannot happen overnight.
- Fair price is an important factor.
- Bt is a major/critical factor/challenge

Questionnaire survey

To get a picture of current trends and practices of organic cotton production, its supply chain systems, a questionnaire survey developed for getting the perceptions of the different stakeholders involved in the organic cotton production. This Questionnaire was sent to different actors/ stakeholders (NGOs, CSO, funding agencies, implementing agencies etc.) involved in organic cotton production in India for providing information on organic cotton related issues.

Solidaridad's '**Chetna Organic & FT Cotton Supply Chain Intervention Project'** was studied and findings of study/survey are being compiled and given below. This project is commencing in three states viz. ***Andhra Pradesh, Maharashtra*** and ***Orissa***. Cooperative Farming (making producers owners) - model was adopted for organic farming in this particular project.

1. 41 % (10,910.63 acres) of the total agricultural land area is under organic cotton production.
2. For more then 5 years (on an average) farmers in the region are practicing organic cotton farming.
3. Organic cotton is the major crop farmers cultivate. Other than cotton, Soya is also been cultivated organically by the farmers (about 50% farmers of Chetna in Vidarbha farmers are into Soya).
4. Reasons for switching of farmers to organic farming are not only governmental subsidy, more profit but also environmental and health concerns (while the choice for switching to organic cotton may be different for different farmers.
5. Organic cotton is the livelihood option for the majority of the farmers in the region.
6. About 50-80 % of the farmers have taken loan to grow organic cotton.
7. Average amount of loan is in the range of 10000 to 20000 Rs at 5-10%.interest rate for the period of 6-8 months.
8. Most of the farmers take loans from government agencies or bank while many conventional farmers who are not organized into common interest groups take loans from money lenders.
9. Majority of the farmers follow the practice of plucking with the frequency of 3 times in a plant (cotton) life cycle.
10. In the region very few farmers have excess to external irrigation source.
11. Farmers use sprinklers, well, and tube well for irrigation purpose (if not rainfed) and irrigation frequency is more then 3 times a day.
12. Most of the farmers have proper storage facility.
13. In the region majority of the farmers practice multicropping as it is more economical. Crops used for multicropping in between cotton are wheat, rice (rabi) and red gram, soya, maize (kharif) etc.
14. 2 – 4 tonnes (average) of organic manure (FYM) is added per hectare of agricultural field for organic cotton farming
15. Farmers feel that organic cotton farming requires more water than chemically grown cotton.
16. ***Rate at which farmers buy manure:*** One tractor load of Farm Yard Manure comes to about INR 400 – 500 (3-3.5 tonnes). Cow dung, vermicompost, crop residues are all available at farmer households (generated by self). Farmers only invest in buying vermin compost. Farmers buy poultry manure at the rate of Rs. 1/kg. (incl. transport).
17. ***Labour requirements***: Cotton in itself is a labor intensive crop. Even a smallholder farmer would need some external labor support during the season. 35-50 person (labour) days per acre in a crop cycle is required. Labour is hired at the rate of 100-150 Rs. per person per day.

Production

1. Total area under organic cotton cultivation was 10,911 acre and the yield per unit area was 2.0 – 2.5 Quintals.
2. ***Sales:*** About 10,000 Quintals of organic cotton at the rate of 3,350 INR.
3. About 7,000 quintals was sold by farmers to the government agency (CCI) – Chetna facilitated the sale and that farmers received the money on time.
4. ***Transportation Cost:*** 30-100 INR (depending on the distance from the contracted gin) per quintal.

2. Project 'Vasudha' by Pratibha Syntex

Overview: Vasudha is Hindi for The Earth. The Project has its roots in village Karhi, about 80 kms from Indore city in the Indian state of Madhya Pradesh. The Vasudha project of Pratibha Syntex for organic cotton operational since 1998-99 intends a clean and eco-friendly cotton production and has a separate supply chain with a leased in ginning mill and separate storage at farm level to avoid contamination. Pratibha Syntex's organic project is a completely ***vertically coordinated supply chain*** from raw cotton production to garment manufacture.

The project has grown multifold since its inception. In the year 1998, when it began, with 10000 farmers it covered the land area of 6000 acres. Today with 28000 farmers and total 125,000 acres of farmland its largest organic farming project in India. Experts like agricultural scientists, technical consultants and extension supervisors regularly monitor farming activities and guide the farmers on complete waste management, recycling and adopting better farming practices. They train the farmers on preparing natural fertilizers, human and animal health care and pest management.

Background: Organic cotton is a core part of 'Pratibha Syntex' business model, and a perfect reflection of their goals and values, and Pratibha's commitment extends right back to the farms. The Vasudha Project is the organic farming project initiated and run by Pratibha. Vasudha translates to 'Mother Earth', and represents Pratibha's deep commitment to helping people and the environment. The Vasudha Project covers 125,000 acres and touches the lives of thousands of farmers, their families and their communities. The project growers are certified by SKAL International, Netherlands, and the per acre cost of group certification is Rs 80-100.The company has its own ICS and its production standards meet the norms of NOP of USA, IFOAM, European Guidelines, Soil Association, UK, Oeko Tex 100, WRAP, SA8000 and IMO Switzerland.

The ***farmer*** has to make an ***application*** to the company to ***join*** the ***organic project*** as a grower stating the area proposed to be put under organic production and availability of organic manure and then annual contract farming agreements are signed with the growers. The farmers are also given regular training and technical guidance for organic produce quality.

Objectives: Through Project Vasudha, Pratibha seeks to achieve a pollution free world, restore ecological balance, improve soil fertility and water holding capacity and make the world greener and safer. The project is also committed to improving the farmer's standard of living.

Project area: Indore (Madhya Pradesh), Surat (Gujarat).

Achievements: Today with 28000 farmers and total 125,000 acres of farmland its largest organic farming project in India.

Table 23: Organic cotton projects in India, 2008

Sl. No.	Organization	States / UT	Contact Person	E-mail	Telephone
1	Agrocel Mandvi	Gujarat	Dr. CS Pawar	Hyd2_pawarcs@sancharnet.in pawarcs@hotmail.com vrtiad@sancharnet.in	040-23733028, 27813273
2	Prathibha Syntex Ltd Pithampur	Madhya Pradesh	Nina Abhyankar	nina@pratibhasyntex.com	07292-504362-64
3	Maikaal bioRe India Ltd. Mhow,	Madhya Pradesh	Rajeev Baruah	mbil@sancharnet.in	07324-272714
4	Eco Farms Pvt. Ltd. Yavatmal	Maharashtra	Omprakash Mor	ecofarms@vsnl.ngp	07232-242222
5	VOFA Yavatmal,	Maharashtra	Ram Kalashpurkar	ram_kalaspurkar@rediffmail.com	07232-243999
6	OCGrA	Andhra Pradesh	Arun Ambatipudi	Arunambi_ocgra@sify.com arun@etcindia.org	040-23511083
7	Mahima Organic Technology	Madhya Pradesh	Rohit Doshi	rohitdoshi@rediffmail.com	0731-521021
8	Amit Green Acre Pvt. Ltd	Gujarat	B.J. Joshi	bjjoshi@amitgroup.com	0231-2676106/08/10

Source: International Competence Center for Organic Agriculture

Table 24: List of CSOs consulted

Sl. No.	Name of CSO	Activities
1	Mr. Subhash M. Tamboli Executive Director Action for Agricultural Renewal In Maharashtra (AFARM), Raisoni Park, Bldg No. 2/23, A-B Market Yard, Pune – 411 037 Maharashtra Tel: 020-24264641, 24268302 Mob: 9822752054 Email: afarm@vsnl.com Exe_dir@afarm.org admin@afarm.org	Capacity building of farmers, local CSOs
2	Mr. Arun Ambatipudi, Team Leader. Organic Cotton Programme India 12-2-417/34, 'Mohan Nivas', Ushodaya Colony Gudimalkapur, Hyderabad – 500 028, Andhra Pradesh Tele fax: +91-40-2351 1083 (Off) Mob: +91-9440626144 E-mail: info@indianorganicproducers.org	Involved in entire value chain of organic cotton
3	Mr. Gagan Mehta Senior Programme Officer Solidaridad Regional Expertise Center Ist Floor, A-5, Shankar Garden Main Najafgarh Road, Vikas Puri New Delhi-110018 Mob: 9911866809 gagan@solidaridad.in	Involved in entire value chain of organic cotton
4	Mr. Dilip Gode Vidarbha Nature Conservation Society (VNCS) Tidke Ashram, Ganeshpeth, Nagpur – 440018, Maharashtra Tel: 0712- 2728942, 2246274 Mob: 9822664737 E-mail: vncs_ngp@sancharnet.in	Engaged in promotion of organic farming

Table 25: List of NGOs / CSOs engaged in promotion of organic farming in Maharashtra state

Sl.No.	Name of Organization	Address of Organization	Town	Block	District	Contact Person
	State Level					
1	AFARM (Action for Agricultural Renewal In Maharashtra	2/23, A-B, Raisoni Park, Market Yard, Pune	Pune	-	Pune-411037	Mr. S.M. Tamboli
2	Maharashtra Organic Farmers Association (MOFA)	Sunrise, Near Chaturshringi Temple, Senapati Bapat Road, Pune-16 Tel: 020-25659090 Mob: 94228689949 moffpune@gmail.com	Pune		Pune – 16	Dr. Kishore Moghe
3	Institute of Natural Organic Agriculture	11-B, Kulkarni Bungalow, 5th Lane. Shikshak nagar, Paud Road, Pune - 411 038 Tele Fax : 20-25390096, 20-25393045 Email:inora@vsnl.com info@inoraindia.com Web: www.inoraindia.com	Pune	Pune-411038	-	-
	Akola					
4	Satpuda Agriculture Society	Vanashri Apartments, Prashant Colony, Akola Road	-	Akot	Akola-444101	Dr.Pravin P. Bhise
5	Shri Datta Gramin Va	Patil Market,	-	-	Akola-	Prof. Vijay Mhaisne

	Shahari Vidya Prasarak Mandal	Wankhadenagar,			444001	
	Amaravati					
6	Vanarai Mitra Mandal	Vanarai Marg, Prashant Nagar,	Amaravati		Amaravati-444606	Mr. M. D. Gharad
7	Community Action for Rural Development	Ladole Bhavan	Anjangaon Surji		Amaravati-444705	Mr. Vijaykumar Ladole
8	Voluntary Institute Of Social Action &	Village Academy (VISAVA) Sanstha		Tiwasa	Amaravati-444902	Mr. Sujitkumar Dindekar
9	Unity Development Youth Association	DHAMANGOAN GADI	DHAMANGOANGADI	Achalpur	Amaravati-444717	PRAVIN VANKHEDE
10	Apeksha Homoeo Society	Gurukunj,	Mozari	Teosa	Amaravati-444902	Dr. Madhukar Gumble
	Aurangabad					
11	Late Babasaheb Naik Shikshan Prasarak	Mandal, Plot.No.6, Agasthi Colony,	Aurangabad	-	Aurangabad-431003	Mr. Arun Dabkekar
12	Speed Multiaid Association	N-6, F 26/9, Sambhaji Colony,	CIDCO	-	Aurangabad-431005	Ashwini Chaudhari
13	Krushikranti Sevabhavi Bahuddeshiya Vikas Sanstha	At/post- Sonwadi	-	Kannad	Aurangabad-431146	Mr.Kiran Pawar
14	Institute for Integrated Rural Development	Kanchan Nagar, Nakshatra Wadi, P.Box. No. 12	-	-	Aurangabad-431002	Secretary
15	Marathwada Sheti Sahayak Mandal	C/o. Ajay Engineering Company, 5-12-42, Adalat Road	Aurangabad	-	Aurangabad-431005	Mr. J.M.Gandhi
16	Paryay	J-Sector, CIDCO N-2, Sant Rohidas Health Center	Mukundwadi	-	Aurangabad-431210	Mr. Vishwanath Todkar
	Buldana					
17	Krushi Vikas Va Gramin Prashikshan Sanstha	C/o Amit Traders, Opp. Bus Stand,	-	-	Buldana-443103	Mr. Dilip Naphade
18	Laxmibai Bahuuddeshiya Shikshan Sanstha	Sambhajinagar, Ward No. 10,	Chikhali	Chikhali	Buldana-443201	Ad. Chandrakishor P. Ingale

19	Savatamali Samaj Vikas Shaikshnik Va Bahuddeshiya Mandal	Onkar Nivas, Opp Sanjivani Hospital,	-	-	Buldana-443001	Shri Jalandhar A. Budhavat
	Dhule					
20	The Shirpur Vishwa Mandal Sevashram	Post. Shirpur	-	-	Dhule-425405	Chairman
21	Susham Rural Development Society	Kharde Bk	-	Shindkheda	Dhule-425408	Shri.Suresh More
22	Amrutvel Gramin Vikas Bahuuddeshiya Sanstha,	c/o Dr. Vinod Amrut Patil, 3 A, Mayur Colony,	Devpur	-	Dhule-424002	Mr. Shaligram Patil
23	Sant Tukaram Samajik Sanstha	Ekmat Nagar, At Post Sakri	-	Sakri	Dhule-424304	Mr. Pravin P. Sonawane
24	Life Line Social Society	A/P - Chhadwel (Korda)	-	Sakri	Dhule-424305	Dr. Dadaji Hiraman Khairnar
	Hingoli					
25	Maharashtra Paryavaran Shikshan wa Jan Arogya Sanvardhan Mandal	Behind Hanuman Mandir,	Hingoli	Hingoli	Hingoli-431513	Shri. Nilkanth Keshav Gaikwad
	Jalgaon					
26	Bhausaheb Shamrao Shivram Patil Mandal	At Post Chahardi	-	Chopda	Jalgaon-425434	Shri Sharad Patil
27	Rashtriya Krushi Ani Gramin Vikas Sanstha	'Anatashram', Vijaywadi, Hirapur Road	-	-	Jalgaon-424101	Mr. Kamlakar Samant
28	Matrubhumi Sarvangin Vikas Sanstha	Plot-8/2, Gat no.480/1, Parvatinagar, Nr.	-	-	Jalgaon-425002	Mr. Sanjay Badgujar
29	Insitute for Rural Development And Social Services	Plot.No.28/29, Jivram Nagar, Near Khote Nagar	-	-	Jalgaon-425001	Dr. Suresh Patil
30	Rashtravikas Agro Education Sanstha	10, Ramkunj Shivparvati Colony, Near Surbhi Colony	Amalner	-	Jalgaon-425401	Mr. Bhupendra Mahale
	Latur					

31	Gramin Shramik Pratishthan	A/P - Budhoda	-	Ausa	Latur-413520	Mr. H. B. Sude
32	Manav Vikas Sanstha	At Post Katgaon,	Latur	-	Latur-413512	Mr.Sheshrao Chavan
33	Agrowet Shetisahayya Gramvikas Mandal	Bhimnagar, At Post Ausa	-	Ausa	Latur-413520	Mr. Jairaj Jadhav
34	Pragati Bahuuddeshiya Sevabhavi Mahila Mandal	At Masalga(Khu.), Post Tungi (Bu.)	-	Ausa	Latur	Mrs. Nandabai Gaikwad
35	Shri Sankalp Bahuddeshiya Sevabhavi Sanstha	At/P- Aalmal, Tal-Aaosa	-	Aaosa	Latur	Ravikiran Kichade
36	Vichardhara Gramin Vikas Sanstha	C/o-Manavlok Upkendra,	Par	Aausa	Latur-413512	Smt.Chhaya Maslage
37	People's Institute of Rural Development	Karad Nagar, Nanded Road	Ahmedpur	Ahmedpur	Latur-413515	Mr. Macchindra Gojme
	Nanded					
38	Sanskruti Samvardhan Mandal	Shardanagar,	-	-	Nanded-431731	Mr.Pramod Deshmukh
39	Gramin Vikas Mandal	A/P Barhali	-	Mukhed	Nanded-431815	Mr. Tukaram M. Waghmare
40	Jan Vikas Pratisthan, Naigaon(bk)	Vyankatesh Nagar, (Wadgaonkar Nivas)	Naigaon (khai)	-	Nanded-431709	Mr. D. G. Wadgaonkar
41	Jeevan Vikas Sevabhavi Sanstha	A/P Shri Shivaji Chowk, Loha	-	Loha	Nanded-431708	Mr. Jairam Chavan
	Nandurbar					
42	Krushi wa Gramin Vikas Sanstha	350, Hudco Colony,	Nandurbar	-	Nandurbar-425412	Smt. J.D. Bachhav
43	Gayatri Foundation, Nandurbar	Plot No.21, Raghuvanshi Nagar, Near Telephone Office, Khodai Mata Road	-	-	Nandurbar-425412	Mr. B.K. Patil
44	Jan Seva Mandal	Korit Road	Nandurbar		Nandurbar-425412	Fr. Godfrey Dlima
	Osmanabad					

45	Devghar Bahuudeshiya Samajik Va Gramin Vikas Sanstha	Wadgaon Wadi, Sangappa Gunjare Niwas	Vadgaon Vadi	Lohara	Osmanabad-418608	Bhujwal Parmeshwar
46	Navjeevan Vikas Sanstha	A/P. Kasabe Tadvale,	-	Osmanabad	Osmanabad-413407	Mr. Ramchandra Pathak
47	Tuljai Bahuddeshiya Vikas Sanstha	At/Post- Nagur,	-	Lohara	Osmanabad-413608	Smt. Nirmala Chikundre
	Parbhani					
48	Suyojini Sevabhavi Sanstha	At Post Ghatangra	-	Gangakhed	Parbhani-431536	Mr. Sambhaji Pawar
49	Samaj Prabodhan Gramin Vikas Kendra	Dewade Niwas, Main Road	-	Pathari	Parbhani-431506	Mr. Shantilinga A. Kale
50	Rajashri Shau Samajprabhodhan Va Krida Mandal	A/P Kolha,	-	Manvat	Parbhani-431505	Prof. Ramchandra M. Bhise
51	Socio Economic Development Trust	Dreamland,	Kerwadi	Palam	Parbhani - 431720	Mr. Suryakant Kulkarni
	Wardha					
52	Dharamitra	Wardha Bank of India Colony	-	-	Wardha-442001	-
53	Center of Science For Village	Dr. Devendrakumar Campus	Dattapur	-	Wardha-442001	Mr. Soham Panday
	Washim					
54	VIKALP Sanshta	At Ladegaon	-	Karanja (Lad)	Washim	-
	Yavatmal					
55	Prerana Institute Of Rural Development	Opposite Radhakrishna Talkies	Ralegaon	-	Yavatmal-445402	Mr. Gajanan Dakhore
56	Asmita Institute for Development	Agrawal Layout, Plot No. 49,	Yavatmal	-	Yavatmal-445001	Mrs.Sangita Gaikwad
57	Dilasa Sanstha	Nehrunagar	Yavatmal	-	Yavatmal-445301	Shri. Madhukar Dhas
58	Krishi Jeevan Sanstha, Maregaon	Post - Sonbardi	-	Pandharkavada	Yavatmal	Mr.Kishor M. Pandhare
59	Krushi Seva	C/o V. M. Chiddarwar , Gadde Complex,	Pusad	-	Yavatmal-445204	Mr. Vilas Chiddarwar

60	Datta Seva Samiti	21, Vardhaman Nagar, Darva Road,	-	-	Yavatmal-445001	Mr. Ramesh Bhanave
61	Vaishvik Vikas Sanstha	At - Mulava	-	Umarkhed	Yavatmal-445211	Shri. Ajay V. Zarekar
62	Raja Shiv Chhatrapati Kala Krida Shikshan Gramin Vikas Sanstha	Rajhans Society, Near Hanumannagar	Yavatmal	-	Yavatmal	Shri Rajesh Deshmukh
63	Gramin Samsya Mukti Trust	16, Sadhankarwadi,	Wani	-	Yavatmal-445303	Dr. Kishore Moghe
64	Gramjyot Samajsevi Sanstha	Saibaba Nagar, Elora Tiles, Behind Factory	At/Post- Juna Umarsara	-	Yavatmal-445001	Mr. Manohar Gade
65	Bhartiya Gramin Vikas Sanstha	Shital Nagar, Wadgaon Road,	-	-	Yavatmal-445001	Mr. Shailesh Pisalkar

Source: AFARM, Maharashtra, 2008

Table 26: List of NGOs working on organic farming in Andhra Pradesh state

Sl. No.	Name of Organization	Address	Contact Details	Email / Website
1	Action for Welfare and Awakening in Rural Environment	5-9-24/78, Lake Hill Road, Hyderabad-500463	Tel: 040 - 236311 Fax: 040 - 236369	aware@hdl.vsnl.net.in
2	Amma Rural Development Society (ARDS)	Rolugunta (M), Naidupalem (village), Kovvuru (Post Office), Visakhapatnam-531114	Mob: 9247515501	NA
3	ASSIST	G.T. Road, Chilakaluripet, Guntur - 5222616	Tel: 08647 - 254934 Fax: 08647 - 254815	assist@sancharnet.in assistranga@rediffmail.com www.assist-india.org
4	Community and Rural Education	Behind Prem Theater, Santhipet,	Mob: 9885419853	Cares-p@yahoo.com

	Society (CARES)	Pairangipuram (P.M), Guntur		
5	Deccan Development Society (DDS)	101. Kishan Residency, 1-11242/11 Street No.5, Begumpet, Hyderabad - 500016	Tel: 040 - 27764744 Fax: 040 - 27764722	ddshyd@hdi.vsnl.net.in
6	Guide for Rural Agriculture Development and Education Society (GRADES)	D. No. 2-79. Nehru Street, Bangarupalyam, Chittor-517416	Mob: 09441450480	gradesseshu@yahoo.com
7	Karnthi Society	Plot No. D-13, Near Annadatha Rice Mill, K.V. Palli, Kadiri, Anantapur - 515591	Mob: 09440386757	NA
8	Manovikas Women Voluntary Organization	House No. 5-11-264, Shanti Nagar, Nalgonda-508001	Mob: 9396611423	manovikas_nlg@yahoo.com
9	Navjeevana	Nivagam – 532457, Kotturu Mandal, Srikakulam District	Mob: 9490042538	gajapathiktr@gmail.com
10	Peoples Education and Rural Life Society (PERALS)	4-5-10/1, Errakunta, Nacharam, Ranga Reddy - 500076	Mob: 9849070180	pearls_org@redifmail.com pearls_org@hayoomail.com
11	Welfare Organization for Rural Development (WORD)	18-1-293 H/3, Bhavani Nagar, Tirupati, Chittoor - 517501	Tel: 0877 - 2259873	wordngotpt@rediffmail.com
12	Vanitha Vikasa Kendram	Dimmidijola, Bhamini Mndal, Srikakulam District	Mob: 9490085363	NA
13	Vision (A Rural	House No.14-8/3,	Tel: 08452 - 233151	vkallas_vission@yahoo.com

	Development Society)	Siddipet Road, Ramayampet, Medak - 502101	Mob: 9866433601	kallasam_nj@yahoo.com
14	Spandana Swatchanda Seva Sangham (SSSS)	Kopparavalasa Village, Rushingi Post, Vangara Mandal, Srikakulam District - 532461	Mob: 9441024110	Venkata-2007@yahoo.co.in
15	Society for Integrated Development Services (SIDS)	House No. 5-3-318, Vidya Nagar Colony, Kamareddy, Nizamabad - 503111	Mob: 9397321656	Ids_org@rediffmail.com
16	KRUSHI	2-9-119, Mukarampura, Karimnagar – 505001	Tel: 0878 - 2265103 Fax: 0878 - 2233056	krushingo@rediffmail.com krushingo@yahoo.com www.krushiindia.org
17	Centre for Environment Concerns	3-4-142/6, Barkatpura, Hyderabad-500027	Tel: 40-27564959; 27563017; Res.: 40 - 27564912	hyd2_cenvicon@sancharnet.in; cechyd@eth.net
18	The Participatory Rural Development Initiatives Society (PRDIS)	Plot.No.230, Shivanagar Colony, Besides Donald High School, Hyderguda, Hyderabad – 500048	Tel: 40-24016771,24010544 Fax : 40-24016771	prdis@hotmail.com, prdis1999@yahoo.com
19	BASIX	3rd floor, Surabhi Arcade, Bank Street, Troop Bazar, Koti, Hyderabad-500001	Tel: 40-30512500/01 Fax: 40-30512502	www.basixindia.com

Table 27: List of NGOs working on organic farming in Madhya Pradesh state

Sl. No.	Name of Organization	Address	Contact Details	Email / Website
1	Centre for Rural Development and Environment (CRDE)	170, arvind Vihar, Bagh Mugalia, Bhopal - 462043	Tel: 0755 - 2480272 Fax: 0755 - 2480272	crde_bpl@sancharnet.in
2	Disha - Samvad	Post Office Rohna, Hoshangabad District - 461001	Tel: 07574 - 227608	dishasamvad@yahoo.com
3	Society for Human Welfare and Environment Protection (SHWEP)	F-2, Hill View Homes, Near St. Joseph's Convent School, Idgah Hills, Bhopal - 462001	Tel: 0755 - 2542870 Mob: 9893250180	iqbalojc@yahoo.com

Table 28: List of NGOs working on organic farming in Gujarat state

Sl. No.	Name of Organization	Address	Contact Details	Email / Website
1	Narottam Lalbhai Rural Development Fund (NLRDF)	Anandji Kalyanji Blocks, Nr. Asarwa Railway Station, Naroda Road, Ahmedabad - 380025	Tel: 079 - 2121288 Fax: 079-2148999	NA
2	Paryavaran Suraksha Samiti	C/o 37, Patrakar Colony, Tandalja, Vadodara - 390020	Tel: 0265 - 2320349	rt_manav@sancharnet.in

References:

- Action For Agricultural Renewal in Maharashtra, www.afarm.org
- Agrocel Industries Ltd., Mumbai, www.agrocel.co.in
- Chetna Organic Farmers Association ,www.chetnaorganic.org.in
- Eyhorn, Frank; Mäder, Paul and Ramakrishnan, Mahesh (2005) , 'Impact of Organic Cotton Farming on the Livelihoods of Smallholders'
- International Competence Center for Organic Agriculture, www.iccoa.org
- Solidaridad, www.solidaridad.nl
- www.pratibhasyntex.com

CHAPTER- V

Review of Research Efforts on Organic Cotton Production

LITERATURE REVIEW OF THE PAST RESEARCH IN INDIA

5.1 Farming practices

Biswas et al (1971) earlier and Kanwar and Prihar (1992) reported that continuous application of Farm Yard Manure increased the organic carbon content as well as nitrogen contents. Yadav (1995) reported that pressmud application increases the organic carbon content.

T.P. Rajendran (CICR, Coimbatore, 2004) concluded that there is no loss of productivity by organic farming adoption, contrary to this it gives better production; it is cheaper, labour intensive and provides opportunities to increase rural employment. However there are challenges for adoption of this technology, as it requires scientific explanation, formulation of package and practices, post harvest technology for organic produce, quality of its inputs, consumer's awareness, and formulation of standards for inputs and produce, certification of farms, produce and process.

According to a research carried out by T. Surulivelu (CICR, Coimbatore, 2004) on "**Pest control in organic cotton**"; selection of resistant and tolerant varieties and the time of planting helps the cotton plant to tolerate the pest attack or help in escaping the harmful pests. LRA 5166, Surabhi and Sumangala (different cotton varieties) are tolerant to sucking pests and Supriya, Kanchana and LPS 141 are resistant to whitefly. The variety Abhadita is tolerant to bollworms. Synchronized sowing in a contiguous block at proper time will reduce aggravating pest problem particularly stem weevil and pink bollworm.

It is reported that *Azospirillum* has positive response in increasing seed cotton yield and better dry matter production (Marappan and Narayanan, 1993). The application *Azospirillum* recorded 430 kg/ha has increased yield over the control. Further, the residual effect of *Azospirillum* was also found positive in terms of yield and population. The use of *Azotobacter* enhances the yield of cotton depending on variety and strain efficiency. Pandey and Kumar (1989) reported 7 to 28% increased yield in cotton with *Azotobacter* inoculation.

Skyrocketing cost of chemical-based cotton cultivation stimulated interest in the search for alternative means of pest suppression such as by use of bio-agents and bio- pesticides. The results of a study at the Central Institute for Cotton Research (CICR), Nagpur, India using a hirsutum variety LRA-5166 demonstrate the relative merits of organic farming vis-à-vis agro-chemical farming. Although in the initial years, the organic farm gives lower yield than nonorganic, after a few years of cultivation, the situation is reversed. It has also been reported that in successive years the soil in organic farm gets richer in carbon and phosphorus. Results were similar for a hirsutum hybrid also (Table 29).

Table 29: Yields (quintal/ha) for variety LRA 5166 in organic cotton farming

Sl. No.	Year	Organic	Non-Organic
1	1993-94	4.64	11.59
2	1994-95	5.30	6.52
3	1995-96	8.49	6.51
4	1996-97	8.98	6.223

Source: Sudripta Roy; Ministry of Textiles, 2006

5.2 Fiber quality

Recently, a pilot study was conducted by SITRA (South India Textile Research Association) on the spinning behaviour of organic cotton. In this study, organic-ELS cotton and normal-ELS cotton were spun and compared for yarn quality. There is not much of a difference in the quality attributes of organic and normal cottons taken for this study. However, organic cottons have distinctly higher level of maturity (matured fibres - 70% to 75%) as compared to normal cotton (matured fibers - 55% to 60%). Studies have established the fact that cow or sheep dung based manures with top dressing have beneficial effects on fibre maturity. Hence, it may be deduced that the better fiber maturity of organic cottons may be due to the type of manures (cow dung with top dressing) generally used for cultivation.

While strength and elongation do not differ much between organic and conventional yarns, imperfections in the former are lower by as much as 40%. Fewer imperfections in organic yarns could be mainly due to the better maturity of fibers. Hence, organic cottons in addition to preserving ecological balance, helps to produce high quality yarns as well.

5.3 Socio – economic analysis of the organic cotton farmers

In a field study by the Research Institute of Organic Agriculture (RIOA) it was found that organic cotton farming improves families livelihoods, has the potential for more sustainable use of natural resources, and reduces overall vulnerability of farm households (EYHORN, F. et al., 2005, p. 60).

1. Economics of organic cotton over the Years

The financial viability and the risk analysis of organic cotton production have been studied in detail by the National Bank for Agriculture and Rural Development (NABARD) with the Yavatmal district as a case study. The NABARD's data are adopted in this economics analysis of organic cotton over the years. It is understood that the first year of organic cotton the yield will be very poor. But over the years yield will buildup with the increase of organic strength of the soil. From the NABARD analysis the data are computed and presented in the following Table 30.

Table 30: Economics of organic cotton over the different years

Sl. No.	Year	Yield (Q/ha)	Gross Income (Rs.)	Premium (20%)	Total (Rs.)	Net Income (Rs.)	Surplus/deficit conventional cotton (Rs.)
1	Conventional	10	20000	0	20000	9000	0
2	First year	5	10000	0	10000	750	(-) 8250
3	Second year	5.75	11250	0	11250	3750	(-) 5250
4	Third year	6.25	12500	2500	15000	7000	(-) 1500
5	Fourth year	7.50	15000	3000	18000	10500	1500
6	Fifth year	8.75	17500	3500	21000	13500	4500
7	Sixth year	10.00	20000	4000	24000	16500	7500

Source: Central Institute of Cotton Research, 2005

The above Table (27) reveals that by the conventional system of cotton production the yield realized is 10 quintal per hectare, the gross income is Rs. 20000 and the net income is Rs. 9000. In the first year of organic cotton cultivation the yield declined to 5 quintals and the farmer incurred a loss of Rs. 8250 per hectare. In the subsequent years the organic cotton yield started increasing and from the fourth year onwards the organic system started yielding profits. In the sixth year the yield of organic cotton regained to the conventional system's yields level.

2. Role of Women in Cotton Cultivation…….A research study by FiBL

The strength of a society is decided by the status and role of its womenfolk. Rural India has had a long tradition of women's participation in agriculture, and cotton cultivation is no exception. Women play a major role in almost all the operations in the cotton farm. Except land preparation operations such as ploughing, harrowing, manure spreading, etc. which involve the use of bullocks or tractors, most of the other farm operations are carried out by women.

Although on many farms, especially in India, most decisions are still taken by men, women play an important role in organic farming. In India, their traditional responsibilities in cotton farming include looking after the animals and the dung, sowing, weeding, and the picking. Men usually are responsible for soil cultivation, application of manures and sprays, and intercultural operations. Shifting to organic farming can therefore mean a shift in workload between men and women: The time needed for compost preparation and perhaps for weeding might increase as well, while the time needed for spraying pesticides usually decreases. Proper plant nutrition, timely weeding and careful picking, however, are crucial for getting good results in cotton.

Conversion to organic cotton farming is not only a question of production techniques; it has equally important implications for the social and economic level of households. Thus the different perceptions and needs of the family, members should be taken into consideration when thinking about conversion.

As ***women*** are involved in ***farming, cotton picking, manufacturing, design***, and ***retailing*** of organic cotton products, the gender issues in organic cotton production include the role of women in decision to go organic, workload on women due to organic input preparation and use, lower wages for women and social cost of certification. So, the organization of chains (extension, documentation) from their perspective is required with more gender sensitivity.

Organic cotton projects should ensure that women are included in decision –making processes, especially concerning the conversion process. For this, they should be encouraged to participate in training activities and meetings. Extension services of the project should always give special consideration to gender issues and also reach out to women. Having female farmer representatives in the organization, can help organic cotton projects to achieve these aims.

3. Child Labour

Children constitute about 60% of the total work force, 70% of them are girls in cotton supply chain in India. Girls are supposed to be easier to control, work intensive and are cheaper. Girls working in the fields today will be mothers with no education in the future. No other industry in India has this high level of child work (Susan Haffmans, 2007).On the other hand, adult woman are kept from work. Long term contracts, debt bondage, low wages, long working hours (10 to 13 hours/day) are frequent.

According to a study of Venkateswarlu D . and da Corta L. (2005) "The price of Childhood", India Committee of the Netherlands, International Labour Rights Fund and Eine Welt Netzwerk NRW, the children working in the cotton fields in Andrah Pardesh, in total 100.000 children under 18, are often bonded by loans given to their parents. More than 85% of the children that work in cotton fields are not attending school.

Case study on organic cotton farming in Amravati District, Maharashtra by Community Action for Rural Developments (CARD)[4] & Maharashtra Organic Farmers Association (MOFA)[5]

While Maharashtra state is having largest area and highest production of cotton in India, but the productivity is very low. Low level of irrigation, varying soil fertility, unassured rainfall pattern and topography are the major factors for low yields of the crop. It is grown as a major commercial crop on a rainfed area of Vidarbha region in the state.

Amravati district of this region is famous for cotton production and its marketing from centuries. Farmers were growing high yielding varieties (HYV) of cotton before introduction of hybrids. At

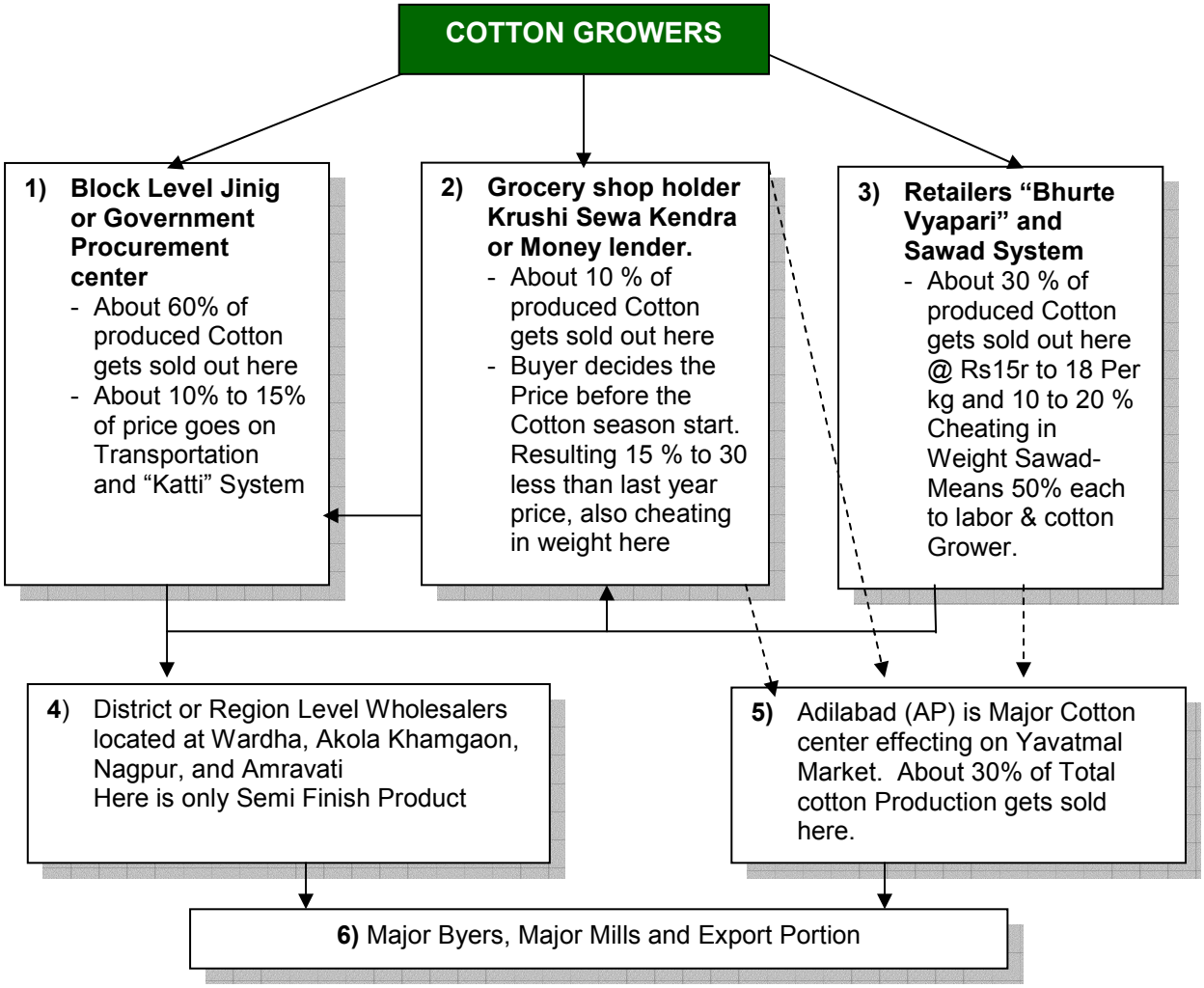
4 V. B. Ladole, Coordinator, Community Action for Rural Developments (CARD); Anjangaon-Surji P.O., Amravati District, 444 705.

5 D. V. Shinde, Secretary, Maharashtra Organic Farmers Association (MOFA); Anjangaon-Surji P.O., Amravaati District, 444 705

that time cotton was a major crop in the crop mix, in which pulses like pigeonpea, green gram, black gram and cereals like sorghum, and pearl millet were major components.

For this study the green farmers in this particular district were interviewed. Village where highest number of organic farmers registered with the Maharashtra Organic Farmers Association was selected.

Figure 24: Organic cotton value chain in Maharashtra



Source: AFARM

Results of the study

The discussion with green farmers started with the components of the system, they have narrated the following and evaluated on 1-5 scale as follows (table 31):

Table 31: Organic farming matrix

Sl. No.	Component / Farmer	A	B	C	D	E	F	Total
1	Less Expenditure	4	3	3	5	4	3	22
2	Increase Soil Fertility	5	5	3	4	5	5	27
3	Clean environment	3	2	4	1	2	3	15
4	Biodiversity	2	3	5	2	3	4	19
5	Easy Management	2	4	3	3	2	3	17
6	Healthy Food	1	2	2	2	2	3	12
	Total	**17**	**19**	**20**	**17**	**18**	**21**	**112**

- Green farmers have given more importance to increase in soil fertility because it reduces the risk of crop failure or instability in crop yields. They said the enhancement in crop yield was possible due to allocation of appropriate acreage under leguminous crop every year. They also applied FYM, whatever available with them. They are not inclined to purchase it from outside. They have no expenditure on chemical fertilizers. They also said that they have to apply incremental doses of chemicals to keep the yields constant on their fields.
- Inorganic farmers have given more importance to chemical fertilizers. They spend from Rs. 2200 per hectare on these chemicals. Beside, they also used FYM either their home maid or purchased, but the quantity was not fixed. They also raised the leguminous crops, with the main object of crop production and fertility management.
- Second importance, organic farmers have given to less expenditure than the inorganic system. They said that the modern inputs are related to each other. If we put fertilizers then one has to apply plant protection, and also require more labors for weeding. Whereas organic farmers spend 35 per cent less expenses for weeding than inorganic system. They said nature can take care of the insect pests. Non green farmers spend Rs. 3700 per hectare on weeding and Rs. 4400 on plant protection. At least three weeding and three to four times plant protection measures were required.
- Third importance, organic farmers give to biodiversity. They are growing leguminous crops such as green gram, black gram, some times used as green manuring, where as pigeonpea and chickpea were also used for maintaining the fertility. These crops also provide food security to farm families. On the other hand, inorganic farmers mainly grow these crops to supplement their farm income.
- Easy management was the major criteria told by organic farmers. They did not have to worry about the farm labor in peak farm employment time. These worries were expressed by inorganic groups.
- Clean environment i.e. pollution free air, water, and soil are also the point of consideration by organic groups. They complained that lot of body ailment happened

during chemical insecticide application. Also they have to take utmost care suddenly after the plant protection measures, such as restricted entry to their children. These worries were also expressed by inorganic farmers, but they said chemicals were necessary for healthy growth of plants.

- Healthy food was also considered as an important component by green farmers for healthy life.
- Inorganic farmers have given first importance to the increase in production. Secondly, the healthy growth of crops and the satisfaction is the third component put forth by them.
- Regarding crop variety, both groups had given same ranking to the suitability to their farm, resistance or tolerance to insect pests, and third and last rank given to high yield. Even inorganic group expressed the difficulty to manage the insects and pests.

Except the expenditure on chemical fertilizers, weeding, and plant protection measures all other expenses were the same. The average per hectare expenditure at actual cost are given below (Table 32).

Table 32: The average per hectare expenditure, yield & net profit of cotton crop

Sl. No.	Head \ Farming Type	Organic	Chemical
1	Chemical Fertilizer (Rs)	0	2200
2	Weeding (Rs)	2400	3700
3	Plant Protection (Rs)	0	4400
4	Other than above heads (Rs)	2660	3160
5	Total per hectare cost (Rs)	5060	13460
6	Normal Cotton Yield (97-98) in qtl.	5.96	10.28
7	Total Income @ Rs. 1877 per qtl.	11187	19296
	Net income to farmer	6127	5836

It is interesting to note that, even though the cotton yield difference between organic and chemical farming is 1.7 time more, but the difference between average net profit is not much impressive in organic i.e. only Rs. 291, even though, the premium prices offered by MOFA mitigate the differences exist at individual level and encourage to grow the crops in eco - friendly way and keep the environment clean and green. This is the great contribution of MOFA and organic farmers towards the society for not borrowing the opportunities and resources from the children. Continued efforts towards green farming on wide area will definitely lead Indian agriculture on the path of Sustainable development which is the need of the day for healthy and bright future.

5.4 Bottlenecks in the supply chain and policy recommendations

The problem with cotton organic farming (other crops) is that it is swimming against the tide, particularly in India (Darryl D'Monte, 2009). Even if it has been a good year for organic cotton, there's the question of certification. Organic cotton is a niche market and its price is determined by supply and demand. Since small farmers can't hold stocks, they tend to undersell in a good year to dealers. Bottlenecks in Indian organic cotton supply chain are:

1. The huge push for GM cotton in States such as Gujarat and Andhra Pradesh continues to hamper adoption of organic cotton,
2. Lack of strong scientific research and development,
3. Unavailability of non-treated seeds,
4. Shortage of organic fertilizers,
5. Disorganized dissemination of information,
6. Difficulty in providing advance payments for production and
7. **Lack of adequate information sharing and communication down the supply chain:** Another drawback is that there is poor knowledge about the international market, and the government provides no support. The catalyst for this agriculture comes entirely from outside the country.
8. In general, after three years of switching over to organic farming, samples of the soil are randomly tested to ensure that no chemicals are present. However, since agencies are competing in the trade, they tend to favour their own producers and genuine small producers are harassed as a result.
9. **Unavailability of organic dyes:** Another problem here is that even when cotton is organically grown, there is a shortage of lasting organic dyes, without which no fabrics can be certified. Thus, India will remain a raw material producer for textile manufacturers around the world until such time as it gets its act together.

There have been some attempts at making lasting dyes out of vegetable products in Rajasthan. The irony of this situation is inescapable: a few centuries ago, India was the dyeing centre of the world, with indigo ruling the roost until synthetic substitutes were found. *Not many are aware that the word 'dungaree' -- an old name for jeans -- is derived from the Mumbai area of Dongri, which was a famous dyeing centre.*

The overall picture for organic cotton looks bright though the immediate future appears uncertain, given the tendency to go in for high-input -- and in particular genetically modified -- cotton. With cotton farmers in India experiencing deep structural problems, it will be a long time before they are convinced that organic agriculture could be a way out. With no help from the government and research agencies, it's difficult to see where the push will come from.

- **Policy Recommendations**

1. The yield and price of the organic cotton is highly volatile. Hence the loss of yield and income to the farmers must be compensated with the suitable policy.
2. Certification system for organic cotton may be simplified and transparent to protect both the producer and the consumer.
3. Quality control of Bio Fertilizer and Bio-Pesticides needs Government attention.
4. A separate organic cotton mission may be created to promote cultivation and the processing of organic cotton at the F.A.O.
5. To encourage the cultivation of eco-friendly cotton an effective organic cotton insurance programme may be launched so as to ensure the income and employment opportunity for the farmers.
6. A special co-operative organization may be created for producing, processing, marketing and trading of organic and colorganic cotton.
7. Organic cotton projects may be streamlined to co-ordinate supply and demand for a healthy international trade.

5.5 List of research institutes involved in the organic cotton research

Figure 25: Research institutions working on organic farming / organic cotton farming

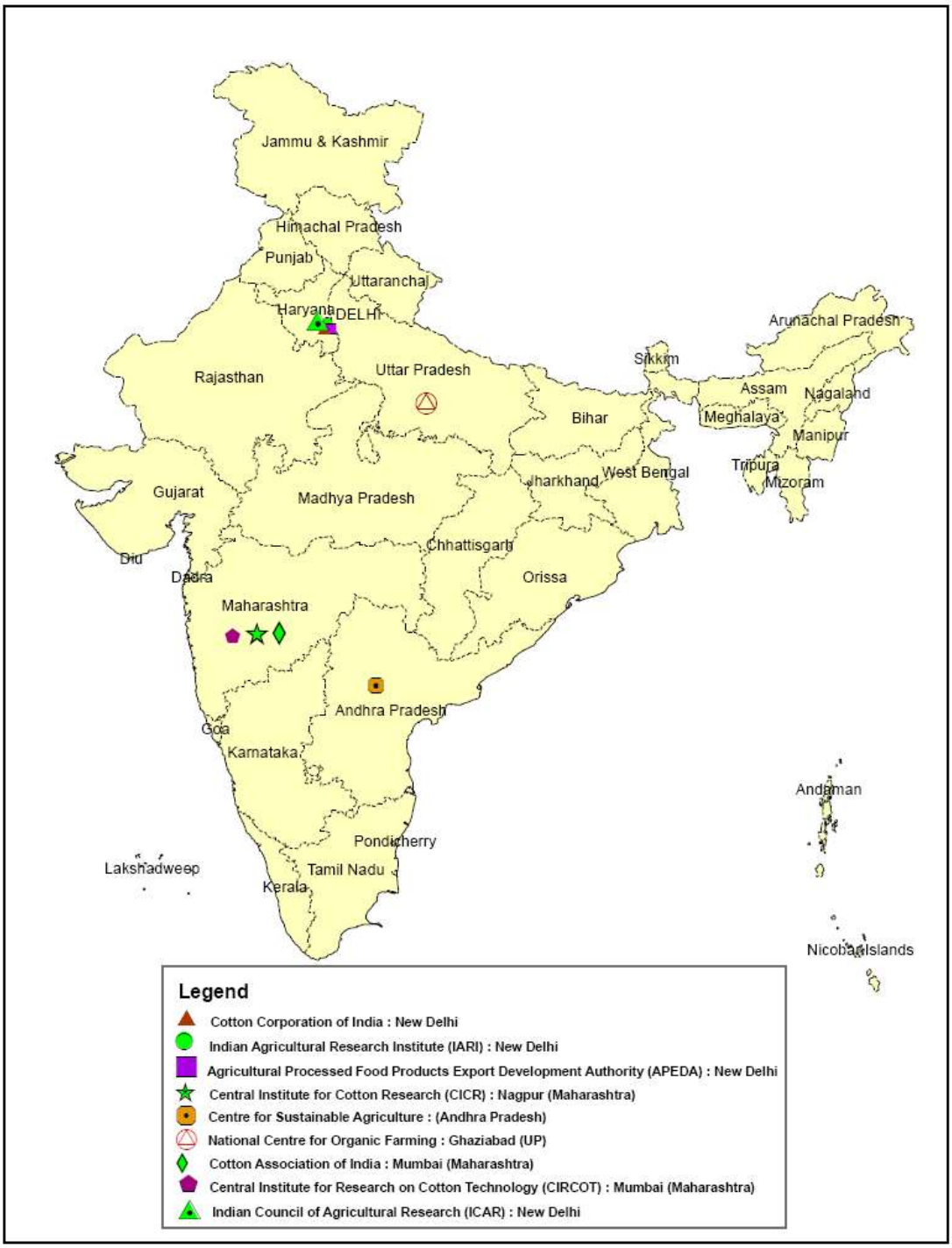


Table 33: List of institutions working on organic farming / organic cotton farming

Sl. No.	Institutions	State/ UT	Contact details
1	Indian Agricultural Research Institute (IARI)	New Delhi	Pusa, New Delhi Tel: 25843719, 25842490, 25841255 E-mail: head_usi@iari.res.in
2	Indian Council of Agricultural Research (ICAR)	New Delhi	Indian Council of Agricultural Research, Krishi Bhavan, Dr. Rajendra Prasad Road, New Delhi-110 114, http://www.icar.org.in/
3	Agricultural and Processed Food Products Export Development Authority (APEDA)	New Delhi	NCUI Building 3, Siri Institutional Area, August Kranti Marg, New Delhi - 110 016, India Tel: 91-11-26513204, 26514572, 26534186 Fax : 91-11-26526187 Email: headq@apeda.com
4	The Cotton Corporation of India	New Delhi	16, Ansal Bhavan, 19 Kasturba Gandhi Marg New Delhi - 110 011, India Tel: 23725660, 23324081 Fax: 23324081 Email: newdelhi@cotcorp.com
5	Central Institute for Cotton Research (CICR), Nagpur,	Maharashtra	Post Bag no.2, Shankar Nagar Po, Nagpur - 440010 Tel: 07103 – 275536, 275549 Fax: 07103 – 275529 Email: cicrngp@rediffmail.com
6	Central Institute for Research on Cotton Technology (CIRCOT), Mumbai	Maharashtra	Adenwala Road, Matunga, Mumbai -400 019 Tel :91-022-24127273,76 Fax: 91-022-24130835/24157239 E-mail: circot@vsnl.com
7	Cotton Association of India, Mumbai	Maharashtra	Cotton Exchange Building, 2nd Floor Opp. Cotton Green Railway Station

			Cotton Green Mumbai - 400 033 Maharashtra, India Tel. No: +91-22-2370 4401/02/03 Fax No: +91-22-2370 0337 Email: eica@eica.in
8	National Center for Organic Farming, Ghaziabad, (Regional Center for Organic Farming ,Bangalore, Bhubaneshwar, Hisar, Imphal, Jabalpur, Nagpur)	Uttar Pradesh	Kamla Nehru Nagar, Ghaziabad-201 001, India Tel: 0120-2721896 Fax: 0120-2721896 Email: nbdc@nic.in
9	Centre for Sustainable Agriculture	Andhra Pradesh	12-13-445, Street No - 1, Tarnaka, Secunderabad-500 017, India Tel:+91-(40)-27017735, +91-(40)- 27014302 Fax :+91-40-27005342 E-mail : csa@csa-india.org

Table 33: List of ongoing projects at Central Institute for Cotton Research (CICR), Nagpur, India

Sl. No.	Project Name	Name of Project Leader (L) & Associate (A)	Year of Start	Year of Completion
1	Comparative analysis of conventional, biotech and organic cotton production systems in India	Dr. S. Usha Rani (L) Dr. S.M. Wasnik (A) Dr. K. Sankaranarayanan (A)	2008	2011

- **List of Publications by CICR, Nagpur**

i. Praharaj, C.S., Rajendran, T.P. and Sankaranarayanan, K. (2006). Comparative performance of irrigated hirsutum cotton in conventional and organic packages in black clay loam soils of Tamil Nadu.J.Ind.Soc.Cotton Improv., 31(2):99-104.

ii. Tarhalkar,PP, Venugopalan, MV., Rajendran TP., Bambawale, OM., Kairon,MS., Generation and evaluation of appropriate technology for organic cotton cultivation in rainfed vertisols. J. Indian Soc. Cotton Improv., 1996 21(2):123-130

iii. Venugopal, K., Rajendran TP., Ramamoorthy,K., Natarajan K., Khan KH., Organic cotton : Present status and future prospects in India. J.India soc., Cotton Improv., 1996,111-112.

iv. Natarajan, K., Ramamoorthy, K., Venugopal. K., Insect pest management for organic cotton production. National seminar on century of cotton in India. GAU, Surat Dec.,19-21,1996.

v. Tarhalkar, PP., Venugopalan, MV., Rajendran, TP., Bambawale, OM., Kairon, MS., Generation and evaluation of appropriate technology for profitable organic cotton cultivation in rainfed vertisole. National seminar on eco-friendly cotton. Mumbai, June 8, 1996.

vi. Venugopal, K., Rajendran, TP., Ramamoorthy, K., Natarajan, K., Khan HH. Organic cotton present status and future prospects in India. National seminar on eco-friendly cotton. Mumbai July 8-9, 1996.

vii. Ramamoorthy,K., Venkataswamy,R., Economics of organic cotton cultivation. Dina Mani, Tamil Newpaper, 1997,dec 8th.

viii. Bambawale,OM., Rajendran, TP., Tarhalkar, PP., Sheo Raj., Kairon, MS., Bio-agents mass production as a logistic for organic crop production. Third IFOAM-ASIA scientific conference 'Food security in harmony with nature'. Pp.148-149 Bangalore, Dec. 1-4, 1997.

ix. Tarhalkar, PP., Venugopalan, MV., Rajendran, TP., Bambawale, OM., Kairon,MS., Soil fertility management in organic cotton cultivation. Third IFOAM-ASIA scientific, pp.7-8 conference 'Food security in harmony with nature.' Bangalore, Dec.1-4,1997.

x. Venugopal, K., Natarajan, K., Khan, HH., Ramamoorthy, K., Production technology for organic cotton. Third IFOAM-ASIA scientific conference 'Food security in harmony with nature'. Bangalore, Dec. 1-4, 1997.

xi. Gajbhiye, H.L., European Union Law on organic farming: Inspection and Certification. Workshop on Organic cotton production. Nagpur, Spril12, 1995.

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- Organic Cotton Crop Guide – A manual for practitioners in the tropics, 2005, FiBL, http://www.fibl.org/en
- Pilot study on spinning behavior of organic cotton by SITRA January 8, 2008, http://www.agricultureinformation.com
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- www.fibl.org/english/index.php
- www.organiccottondirectory.net by PAN and O.T.A. 2001.

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Annexure -I

Table 35: List of exporters of organic cotton products for the year 2007- 08

Sl. No.	Exporter Name	State / UT	Organic Product
1	**Globe Cotyarn Private Limited** Mr.Sajjan Jhunjhunwala, Sanjay Building No.7, 1st Floor, Mittal Industrial Estate, Sakinaka, Andheri Kurla Road, Andheri (E) Mumbai-400059 Tel : 0091-22-28505062/28505082 Fax-0091-22-28501402 Email-exports@globecot.co.in	Maharashtra	Cotton
2	**Kalpvraksh Impex Pvt. Ltd.** Mr. Praresh Kanani, 307, Balarama Building, Bandra kurla Complex, Mumbai - 400051 Tel: 022-26592999 Email:trading@navjyotintl.com	Maharashtra	Cotton
3	**Mahima Organic Technology** Mr. Rohit Doshi 202, Kuber House, 162, Kanchan bagh, Indore- 452001 Tel :- 0091 731-2521021 Email:rohitdoshi@rediffmail.com	Madhya Pradesh	Cotton
4	**Suminter India Organics** Mehra, Mr. S. (Sameer) Indiana House, Makwana Road Marol Naka, Andheri-East, Mumbai - 400 059 Tel :022-26743685/26743415 Email: suminterindiaorganics.com	Maharashtra	Raw cotton
5	**Sunny Trexim Pvt. Ltd.** 813 / 814, Marshall House, 33/1, N.S. Road, Kolkata – 1 Tel:033-22301219 /22311724/22809896 Fax: 033-22102953/22876431 Email: sunexim@vsnl.in	West Bengal	Cotton
6	**Mahima Purespun**. Plot NO. 73-74, Sector II, Pithampur, Dist: Dhar Tel: 0731-2521021, 2514125 Email: mahimaaccounts@yahoo.com	Madhya Pradesh	Cotton
7	**Shree Sanjay Trading Company** A-7, Majithia Apartments, S.V. Road, IRLA, Ville Parle, (West) Mumbai Tel:+91- 22 23724243 : +91- 22 23772896 Fax:+91- 22 26714024 Email:admin@cottonin.com	Maharashtra	Raw cotton

8	**Mittatex Exports Pvt. Ltd. 4,** Crossgate, Lokhandwala Complex Andheri (W), Mumbai-400053 Tel: +91- 22-23710599 Fax:+91- 22-23781025 Email:anujmittal@mepcotton.net	Maharashtra	Cotton bales
9	**Atmaram Maneklal Export (Pvt.) (Ltd)** 806, Aakruti Complex 8th Floor, Nr. Stadium Circle Navrangpura, Ahmedabad. 380 009 Tel:+91- 22--30486003/04 Fax:+91- 22-30486001 Email:amil@bom3.vsnl.net.in	Gujarat	Cotton
10	**Gill & Co. Pvt. Ltd.,** N.T.C. House , Narottam Mararjee Marg, Ballard Estate, P.O. Box. No. 86, Mumbai – 400 001 Tel:+91- 22-22615001/2/3/4 Fax:+91- 22-22620598/22655069 Email:gillco@gillcot.com, rishabh@gillcot.com	Maharashtra	Cotton
11	**Alok Industries Ltd** Penninsula Towers, Peninsula Cooperate Park, G. K. Marg, Lower Parel, Mumbai 400 013, Tel: +91- 22-24996200 Fax:+91- 22-24936078 Email:anilnair@alokind.com	Maharashtra	Cotton
12	**G. Jawahar Enterprises Geejay** Arcade No. 121, Thiruvenkatasamy Road (West) R. S. Puram, Coimbatore – 641 002 Tel: 0422-2554969 E-mail: jawahar99@satyam.net.in	Tamil Nadu	Cotton bales
13	**Saptasati Organic Agriculture Project** Garden No. 106, Sindhi Colony, Luniapura, Mhow- 453 441	Madhya Pradesh	Cotton bales
14	**Saptasati Organic Agriculture Project** 188, Pul Bogda, Jinsi Square, Bhopal Tel: +91- 755-2765506, Fax: +91- 755-2765506 Email: sktiwariin2001@yahoo.com	Madhya Pradesh	Cotton bales
15	**Golden Assembly India Enterprises** Flat No. B-3, Subhasri Apartments, No.2 Lakshmi Narasimhan Street, T.Nagar, Chennai – 600 017. Tel: 044 42129919, 28142765/95	Tamil Nadu	Cotton bales
16	**KayteeCorporation Private Limited** 51, Sakhar Bhavan 5th Floor, Nariman Point, Mumbai – 400 021	Maharashtra	Cotton bales

	Tel:022-22837121/22837124 Fax: 022-22842243 Email: mer@kayteeind.com / rajni@kapexindia.com		
17	**Chunilal Pranjivandas Cotton Co.** Pvt. Ltd. Indian Globe Chambers, 6th Floor, 142, Walchand Hirachand Marg, Mumbai – 400 001. Tel:022-22616035, Fax:022-2610532, Email:cpc.cotton@vsnl.com	Maharashtra	Cotton bales
18	**Bhaidas Cursondas & Co. Sir** Vithaldas Chambers, 4th Floor, 16 Bombay Samachar Marg, Fort, Mumbai – 400 001. Tel: +91-22-2204 1207/1163 Fax:+91-91-22-2204 1368 Email:bhaidas@vsnl.com	Maharashtra	Raw cotton

Source: Agriculture & Processed Food Products Export Development Authority, Ministry of Commerce and Industry, Government of India

Table 36: List of organizations working in the area of organic cotton products marketing

Sl. No	Organization	Address	State / UT	Category	Contact Details
1	Akl Soft Infosys India Ltd	325 Patel Road , 641009 Coimbatore India	Tamil Nadu	Organic Cotton Products, Cotton Processing, Yarns	www.Picasaweb.Google.Com /Softtex/Homefurnishinga
2	AMIT Spinning Industries LTD.	GAT NO. 47 & 48, VILLAGE : SANGAWADE, KOLHAPUR-HUPRI ROA- 416 202	Maharashtra	Cotton Processing, Organic Cotton Project, Yarns	www.Amitgroup.Com
3	Amrut Biotech Pvt. Ltd.	101 Bajrang Apts Plot No 3 Wardha Road Somalwada Nagpur, 440025 Nagpur India	Maharashtra	Organic Cotton Products, Cotton Processing, Organic Cotton Project, Agricultural Supply, Crude Fibers, Yarns, Fabrics, Accessories, Other, Baby, Baby Accessories, Blankets And Mattresses, Home Textiles, Gentlemen, Children, Night- And Underwear	----
4	Bhaiya Fibers LTD.	1 R. N. MUKHERJEE ROAD , SUITE52, 5TH FLOOR, 700 001 KOLKATA India	West Bengal	Organic Cotton Products, Cotton Processing, Yarns, Fabrics, Other, Baby, Ladys, Health Article, Home Textiles, Gentlemen, Children, Outdoor, Sports Goods, Soft Toys, Night- And Underwear	---

5	Centex Clothing	Cheratta House, Mupliyam, Trichur- 680312.	Kerala	Organic Cotton Products, Yarns, Fabrics, Baby, Ladys, Blankets And Mattresses, Gentlemen, Children, Sports Goods, Night- And Underwear	---
6	COT EXPORT PVT. LTD.	BK Super Market, Detroj Road, , 382715 KADI India	Gujarat	Organic Cotton Products, Cotton Processing, Organic Cotton Project, Crude Fibers	www.Cotindia.Com
7	Cotex Crews India	506, Municipal Colony, College Road, 641602 Tiruppur India	Tamil Nadu	Baby, Baby Accessories, Ladys, Gentlemen, Children, Outdoor, Sports Goods, Night- And Underwear	---
8	Cottony Fashions	No.2, Mullai Nagar, Karumarampalayam, Mannarai P.O Tirupur, 641 007 Tirupur India	Tamil Nadu	Crude Fibers, Yarns, Fabrics, Accessories, Other, Baby, Baby Accessories, Ladys, Blankets And Mattresses, Health Article	www.Cottony.Net
9	Eaternal Health & Organic Foods Pvt Ltd	B2 Rustom Baug, S.S Marg, Byculla, 400027 Mumbai India	Maharashtra	Crude Fibers, Yarns, Fabrics, Baby, Home Textiles, Children, Night- and Underwear	www.Eaternal.Com
10	ECOCERT	Sector 3, Hindustan Awas, Nakshetrawadi, Aurangabad- 431002	Maharashtra	**Certifier**,Crude Fibers,Yarns,Fabrics,Accessories,Other,Baby,Baby Accessories, Mattresses, Health Article, Home Textiles, Gentlemen, Sanitary Products, Yard Goods, Outdoor Sports Goods, Soft Toys, Night- and Underwear	www.Ecocert.In
11	ENCON, Div Of DECP Pvt. LTD	Kanchan Nager, Nakshetrawadi,, 431 002 Aurangabad India	Maharashtra	Consultant, Research, Agricultural Supply, Crude Fibers, Yarns	----
12	Gem Merchandising Corporation	8/34 Appachi Nagar, 641607 Tirupur India	Tamil Nadu	Organic Cotton Products, Designer, Yarns, Fabrics, Baby, Ladys, Home Textiles, Gentlemen, Children, Night- And Underwear	Teeaar.En.Ec21.Com
13	Green India Organic	117 Nx Chetak Centre, 452001 Indore India	Madhya Pradesh	Cotton Processing, Organic Cotton Project, Crude Fibers	----
14	Greeneem-K.Sivaram Bros	108/3/A., Ramamoorthy Road,	Tamil Nadu	Agricultural Supply,	www.Greeneem.Com

		Virudhunagar - 626001			
15	Hues India Pvt. Ltd	6J (C1&C2) Malviya Industrial Area, 302017 - Jaipur	Rajasthan	Organic Cotton Products, Ladys, Children, Night- And Underwear	www.Huesindia.Com
16	INDOCERT[Indian organic Certification Agency]	Thottumugham P.O. Alwaye - 5 Ernakulam	Kerala	Certifier	Tel:/fax:0484-2630908, 2620943 Email:info@indocert.org www.indocert.org/
16	Kadri Wovens	Plot # NN1, SIPCOT Industrial Growth Center, P.V.Palayam Post, 638052 Perundurai	Tamil Nadu	Organic Cotton Products, Crude Fibers, Yarns, Fabrics, Home Textiles	Kadriwovens.Com
17	Made By India	F-38 Sector-8 Noida- 201301	Uttar Pradesh	Organic Cotton Products, Cotton Processing, Designer, Yarns, Fabrics, Accessories, Other, Baby, Baby Accessories, Ladys, Blankets And Mattresses, Home Textiles, Gentlemen, Children, Yard Goods, Outdoor, Soft Toys, Night- And Underwear	www.Madebyindia.Com
18	Mahima Organic Technology (MOT)	15/1, South Tukoganj, 452001 Indore	Madhya Pradesh	Cotton Processing, Organic Cotton Project, Agricultural Supply	----
19	Maikaal Biore (India) Ltd.	14, Signal Vihar Mhow-453442	Madhya Pradesh	Organic Cotton Project	www.Remei.Ch
20	Narandas Jethalal Chudgar	2nd & 3rd Floor, Chinubhai House, Saradar Patel Stadium Road,Opp.Hindu Colony, Navarangpura, Ahmedabad-380014	Gujarat	Organic Cotton Products, Cotton Processing, Organic Cotton Project,Consultant,Fair Organisers, Crude Fibers, Yarns, Fabrics, Blankets And Mattresses, Home Textiles, Gentlemen, Children, Sports Goods	www.Njchudgar.Com
21	Organic & More	A-38K Sector 64, Noida-201301	Uttar Pradesh	Organic Cotton Products, Consultant, Designer, Fabrics, Baby, Baby Accessories, Ladys, Blankets And Mattresses, Home Textiles, Gentlemen, Soft Toys, Night- And Underwear	www.Organicandmore.Com

22	Parker India Inc	56-A Vasudevan Nagar , Jafferkhan Pet, Chennai-600 083	Tamil Nadu	Organic Cotton Project, Agricultural Supply,	www.Parkerindia.Net
23	Pasand Exports Pvt Ltd	201, Narayan Complex, Opposite Havmor Restaurant, Near Navrangpura Busstand, Navrangpura., Ahmedabad-380009	Gujarat	Organic Cotton Products, Cotton Processing, Organic Cotton Project, Agricultural Supply, Crude Fibers, Yarns, Fabrics, Health Article, Home Textiles, Gentlemen	www.Rawcottonexports.Com/ Www.Allspiceexports.Com
24	Raj Ecofarms	No.2, Pournima, Mahatma Phule Road, Mulund (East), Mumbai-400081	Maharashtra	Cotton Processing, Organic Cotton Project, Crude Fibers, Yarns, Fabrics	----
25	Roomi Fabrics	416/14, Zakir Nagar, Jamia Nagar, New Delhi-110025	Delhi	Organic Cotton Products, Cotton Processing, Agricultural Supply, Crude Fibers, Fabrics	www.Roomifabrics.Bloombiz. Com/
26	Samkit Bio Farms Pvt. Ltd.	212-BM Tower, Opp. Lotus, Sapna-Sangeeta Road, Indore-452009	Madhya Pradesh	Organic Cotton Products, Cotton Processing, Organic Cotton Project, Crude Fibers, Yarns, Fabrics, Baby, Baby Accessories, Ladys, Health Article, Home Textiles, Gentlemen, Night- And Underwear	www.Samkitbiofarms.Com
27	Seth Mangalchand Champalal	20,Mahaveer Bazar, 305901 Beawar	Rajasthan	Cotton Processing, Organic Cotton Products, Associations, Crude Fibers	www.Smccotton.Com
28	Silver Apparels	B-17 Sector 59, Noida - 201301	Uttar Pradesh	Cotton Processing, Organic Cotton Products, Designer, Fabrics, Home Textiles, Ladys, Gentlemen, Children, Baby, Yarns, Home Textiles, Outdoor, Accessories, Sports Goods, Other, Health Article, Soft Toys, Night- And Underwear	www.Silverapparels.Com
29	Solidaridad-ETC India	12-2-416/34, Ushodaya Clny, Gudimalkapur, Hyderabad-500 028	Andhra Pradesh	Organic Cotton Products, Organic Cotton Project, Development Organisation, Research, Fair Organisers, Associations, Crude Fibers, Yarns, Fabrics, Accessories, Baby, Ladys, Blankets And Mattresses, Health Article, Home Textiles, Gentlemen,	www.Indianorganicproducers. Org

				Sanitary Products, Children	
30	Sree Venkata Sai Medicinal Crops Dealars (India) Pvt. Ltd.	No.25, P.V.K. Naidu Market, Opp. Gandhi Park, Guntur-522 003	Andhra Pradesh	Organic Cotton Project, Agricultural Supply, Consultant	----
31	Suminter India Organics	308, Oberoi Chambers-1, New Link Road, Andheri (W),\, 400053 Mumbai India	Maharashtra	Organic Cotton Project, Consultant, Crude Fibers	Http://www.Suminterindiaorganics.Com
32	Sunstar Overseas Ltd	24 B Alipur Road, Civil Lines, New Delhi-110054	Delhi	Organic Cotton Products, Cotton Processing, Crude Fibers	Http://www.Sunstaroverseas.Com
33	The West Coast Weaving Establishment	PB No.2, Chovva, Cannanore-670006	Kerala	Organic Cotton Products, Other, Blankets And Mattresses, Home Textiles, Children, Yard Goods, Night- And Underwear	Http://www.Westcoast-India.Com/
34	Trio Impex	136, East Ponnurangam Street. R S Puram, 641002 Coimbatore India	Tamil Nadu	Organic Cotton Products, Cotton Processing, Organic Cotton Project, Crude Fibers	---
35	Vijav Pratisthan	5, Kanchan Baug Main Road, Indore - 452001	Madhya Pradesh	Organic Cotton Products, Crude Fibers	----
36	Vijayoverseas	104,Chamundeswari Towers,D.K.Road ,Ameerpet, Hyderabad-500016	Andhra Pradesh	Organic Cotton Products, Yarns, Fabrics, Ladys, Home Textiles, Gentlemen, Children	----
37	Wearology Ltd	Unit 3-5, Neeru Silk Mill, Mathuradas Mill Compound, 126 NM Joshi Marq, 400 013 Lower Parel (W) India	Maharashtra	Organic Cotton Products, Cotton Processing, Organic Cotton Project, Crude Fibers, Yarns, Fabrics, Ladys, Gentlemen, Children, Night- And Underwear	Http://www.Wearology.Com
38	Zameen Organic	B 44, 1-8-450/ B44, First Floor, Lane 4 Indian Airlines Colony Begumpet Hyderabad-500026	Andhra Pradesh	Marketing company for Fair Trade, Organic and Pesticide Free cotton in India	http://www.zameen.org

Source: Agriculture & Processed Food Products Export Development Authority, Ministry of Commerce and Industry, Government of India

Annexure – II

Questionnaire Survey

Date: 23 March 2009

Region of operation	1. Andhra Pradesh (Adilabad & Karim Nagar districts in northern Telangana) 2. Maharashtra (Vidarbha – Yavatmal, Akola, Amravati & Washim districts) 3. Orissa (Kalahandi, Bolangir & Nuapada districts)	Name of NGO: **Chetna Organic Farmers Association (COFA)** *(Solidaridad Organic & Fair Trade Supply Chain Project India)*
Village:	More than 300 (265) villages in the three states	Name of respondent/s ARUN CHANDRA AMBATIPUDI (COFA) RAMA KRISHNA. Y (COFA) GAGAN MEHTA (Solidaridad) Address: COFA, 12-2-416/34, 1ST Floor, Mohan Nivas, Ushodaya Colony, Gudimalkapur, Hyderabad. India – 500028 **Solidaridad** Email id: arunambi_ocgra@sify.com rkrishnay@gmail.com gagan@solidaridad.in
Block:	More than 25 (28) blocks/talukas/mandals	Mobile Number: +91-9440626144 (Arun) +91-94914-63559 (Rama) +91-99118-66809 (Gagan)
District:	9 districts	
State:	3 states	

1. What percentage of the total agricultural land area is under organic cotton production?

Sl. No	Area	Units
1	41% (10,910.63)	Acres
2	41% (4365)	Hectares
3		Bigha
4		others (specify)

2. For how long farmers in the region are practicing the organic cotton farming?

Sl. No	Time period	Please Tick (✓)
1	Less then 1 year (months)	
2	1-2 years	✓

3	2-5 years	✓
4	More then 5 years	✓

Project operational since 2004 and every year new farmers join the program. However, more than 5,000 farmers are into organic since the past 3 years.

3. Is cotton (organic) the major crop farmers cultivate?

	Please Tick (✓)
Yes	✓
No	

4. If No then what are other crops they grow? *(Please specify)*

Sl. No	Crop Name
1	Soya *(about 50% farmers of Chetna in Vidarbha farmers are into Soy)*
2	Redgram (intercrop)
3	Greengram, Bengalgram
4	Maize
5	Paddy

5. In the region which crop was cultivating before taking up organic cotton?

Sl. No	Name of crop	Please Tick (✓)
1	They were into conventional cotton cultivation	---
2	Any other (please specify)	---

We basically do not push and promote cotton farming. We support existing cotton farmers from traditional cotton growing regions of India (mainly smallholder farmers from rainfed regions) engaged in high extensive input driven cotton cultivation to move towards sustainable/organic & FT cotton production.

6. What is the type of field soil in the region?

Sl. No	Type of soil	Please Tick (✓)
1	Clayey	✓ (~75%)
2	Sandy	✓ (~12.5%)
3	Loamy	✓ (~12.5%)
4	Rocky	---
5	Any other	---

7. Was previous crop also cultivated organically? .

	Please Tick (✓)
Yes	✓
No	---

8. If **Yes** than which crop? (Specify Name)

Sl. No	Crop Name
1	All the crops mentioned in Section 5.
2	---

9. Reasons for switching to Organic Cotton?

Sl. No	Reason	Please Tick (✓)
1	Environmental concerns	✓
2	More profit	✓
3	Government Subsidy	✓
4	Not able to rebate the loan taken for the previous crop	✓
5	Any other (please specify)	Personal health concerns

All the above are true to some sense or the other. While the choice for switching to organic cotton may be different for different farmers.

10. What is the reason for switching from other crop to organic cotton or farming?

Sl. No	Reason	Please Tick (✓)
1	Environmental concerns	---
2	More profit	---
3	Government Subsidy	---
4	Any other (please specify)	---

Farmers have not switched from other crops to organic cotton. They were traditional cotton growers and Chetna has no mandate to switch farmers from non-cotton crops cultivation to adopting cotton cultivation. Infact, Chetna encourages some farmers to move out of cotton cultivation (based on local conditions) and hence many farmers in Vidarbha have started to go for organic soy cultivation. Infact Chetna only proposes that farmers should adopt organic & FT practices in farming (any crop).

11. Do farmers grow Organic cotton under :

Sl. No	Organic cotton grown under	Please Tick (✓)
1	Company	✓ (Chetna Producer Company)
2	Independent	
3	Local NGOs	✓ (NGO – COFA)
4	Government	
5	Any other (please specify)	Farmers Cooperatives/Societies & SHG

12. Is organic cotton cultivation a livelihood option for the majority of the farmers?

	Please Tick (✓)
Yes	✓ (More of a cash economy)
No	---

13. What percentages of farmers in the region have ever taken loan to grow organic cotton?

Sl. No	Amount	Please Tick (✓)
1	<10%	---
2	10-20%	---
3	20-50%	---
4	50-80%	✓
5	80-100%	---

14. On an average what was the amount of loan?

Sl. No	Amount	Please Tick (✓)
1	<10k	✓
2	10-20K	✓
3	20-50k	---
4	50-100k	---
5	more than 100k (please specify)	---

15. What was the rate of interest (%)?

Sl. No	Amount	Please Tick (✓)
1	<5	✓
2	5-10	✓
3	10-15	---
4	15-20	---
5	>20 (please specify)	---

16. What was the duration for which the loan was taken?

Sl. No	Time period	Unit
1	---	Weeks
2	06-08	Months
3	---	Year

17. What was the purpose of taking the loan?

Sl. No	Purpose	Please Tick (✓)
1	Implements	---
2	Recurring inputs	✓
3	Irrigation	---
4	Personal	✓
5	Any others (please specify)	Labor

18. What was the source for the loan?

Sl. No	Time period	Please Tick (✓)
1	Local money lender	*
2	Bank	✓
3	Government agency	✓
4	Any others (please specify)	---

* Many conventional farmers who are not organized into common interest groups take loans from money lenders. While some organic farmers still continue to keep their relationship with money lenders

19. From where do farmers buy organic cotton seeds?

Sl. No	Source	Please Tick (✓)
1	From normal retailer	---
2	From government shop	---
3	From NGOs	---
4	Any other (please specify)	From seed company dealers/distributors (collective indenting & procurement)

20. Which production schedule farmers follow for sowing organic cotton?

Sl. No	Time period	Please Tick (✓)
1	April - May	✓ (sowing happens in Jun/Jul and harvesting takes place (end Oct to early Feb – different pickings & different batches)
2	September - October	---

21. Frequency of plucking (PICKING)

Sl. No	Time period	Please Tick (✓)
1	2 times in plant life cycle	---
2	3 times in plant life cycle	✓

22. Do farmers irrigate or rainfed their cotton crop?

Sl. No	Water requirement	Please Tick (✓)
1	Irrigated	*
2	Rainfed	✓ (mostly)

* Very few farmers have access to external irrigation

23. If irrigation then what methods / sources farmers use?

Sl. No	Method / Source	Please Tick (✓)
1	Drip irrigation	---
2	Sprinklers	✓
3	Well	✓

4	Tube well	---
5	Tank	✓
6	Canal	---
7	Check dam	---
8	Any other (please specify)	---

24. Number of times farmers irrigate farm?

Sl. No	No of times	Please Tick (✓)
1	2 times	---
2	3 times	✓
3	More than 3 times	✓

25. What is the source for manure or organic fertilizer?

Sl. No	Source of manure	Please Tick (✓)
1	Cow dung (& urine)	✓
2	Poultry	✓
3	Piggery	---
4	Vermi-compost	✓
5	Crop Residues	✓
6	Any others (please specify)	Composting, Bio-dynamic composting, sheep penning and Panchagavya

26. If it is vermi-compost then from where farmers get that?

Sl. No	Source of Vermi-compost	Please Tick (✓)
1	Farmers make on their own	✓
2	Buy from Govt. suppliers	Govt. subsidy for taking up vermiculture production
3	Facilitated by local NGOs	✓
4	Any others (please specify)	---

27. How do farmer till fields for organic cotton farming?

Source	Please Tick (✓)
Bullock	✓ (most of the farmers)
Tractor	✓ (very few)
Any other (please specify)	---

28. Do they have proper storage system?

	Please Tick (✓)
Yes	---
No	✓

29. Do farmers in the region practice multiple cropping with organic cotton?

	Please Tick (✓)
Yes	✓
No	---

30. If yes then which crops do they grow along with organic cotton under multi-cropping system?

Sl. No.	Crop name	
	rabi	kharif
1	Wheat	Red gram
2	(Paddy)	Green gram
3	---	Bengal gram
4	---	Maize
5	---	Soy
6	---	Sesame, etc
7	---	Paddy

31. What is the model for organic farming you have adopted?

Sl. No	Model	Please Tick (✓)
1	Contract farming	---
2	Normal farming	---
3	Give away your land on lease to other companies, farmers, labours or any other please specify	Cooperative Farming (making producers owners)

32. Do you find any difference between cotton grown organically and conventionally?

	Please Tick (✓)
Yes	✓
No	---

33. If yes then in what terms?

a. Water requirements for organic farming of cotton

Sl. No	Water requirement (liters per hectares)	Please Tick (✓)
1	More	✓
2	Less	---
3	No difference	---

b. On average what amount of organic manure (FYM) is added per hectare of agricultural field for organic cotton farming?

Sl. No	Amounts	Units
1	---	kilograms
2	5-8 (2 – 4 tonnes normally)	tonnes
3	---	quintals
4	---	Any others (please specify)

c. What is the rate at which farmers buy manure?

Sl. No	Source of manure	Price (Rs / unit)
1	Cow dung	---
2	Poultry	Re. 1/kg. (incl. transport)
3	Piggery	---
4	Vermi-compost	---
5	Crop Residues	---
6	Any others (please specify)	---

One tractor load of FYM comes to about INR 400 – 500 (3-3.5 tonnes). Cow dung, vermin compost, crop residues are all available at farmer households (generated by self). Farmers only invest in buying vermins

d. Do you feel the need of hired labour for organic cotton farming?

	Please Tick (✓)
Yes	✓
No	---

Cotton in itself is a labor intensive crop. Even a smallholder farmer would need some external labor support during the season

e. If yes then how many people did you hire (please specify)?

Sl. No	Number of people hired on an average in one cycle of the crop	Number of days for which labour was hired one cycle of crop
1	35-50 person days per acre in a crop cycle (difficult to extrapolate to exact number of persons)	25-30 days in one crop cycle.

f. Wages paid per person are:

Sl. No	Amount (Rs.)	Unit
1	100 – 150	Paid per day
2	---	Paid per month

g. Time period required for a single standing crop to harvest (period between seed sowing to harvesting)

Sl. No	Time period	Please Tick (✓)
1	Minimum 3 Months	---
2	More then 3 Months	✓
3	Any other (please specify)	It is a 150-180 days crop cycle (depending on various agro-climatic factors)

h. In terms of yield

PRODUCTION

How much area was planted with organic cotton?		
Sl. No.	**Amount**	**Units**
1	10,911	Acres
2	---	Hectares
3	---	Bigha
4	---	Any others (please specify)
What was the yield per unit area?		
Sl. No.	**Amount**	**Units**
1	---	Kilograms
2	---	---
3	2.0 – 2.5	Quintals
4	---	Any others (please specify)

SALES

How much did they sell?		
Sl. No.	**Amount**	**Units**
1	---	Kilograms
2	~10,000	Quintals
3	---	Any others (please specify)
Price per unit sells?		
Sl. No.	**Amount**	**Units**
1	INR 3,350	Per quintal of Organic cotton
2	INR 3,150	Per Quintal of in-conversion cotton
3	INR 400 – 700	Extra as support costs per quintal for admin costs, transport, FT premium, insurance, grading, bags, etc

Sl. No.	To whom or where did they sell it?	Please Tick (✓)
1	To direct customer	---
2	Local market	---
3	Trader in village	---
4	Regional market	---
5	Government agency	*
6	Local NGOs	----
7	Specific company	Chetna Value Chain (to organic & FT brands under Made-by label through Spinner + Garmenting Factory)
8	Any other (please specify)	---

About 7,000 quintals was sold by farmers to the government agency (CCI) – Chetna facilitated the sale and that farmers received the money on time (cotton that could be sold through the chain)

Sl. No.	Cost of transport incurred (Rs)	Time taken to take cotton to point of sale
1	30-100 INR (depending on the distance from the contracted gin) per quintal	6 hrs max

i. Do you think that Organic farming gives overall benefit?

	Please Tick (✓)
Yes	✓ *
No	---

However, price is an issue. Farmers need both support and protection from vagaries and yield losses in the initial 3-5 years (during conversion). This is a critical period. A lot of expenditure is incurred on organic manures and labor during the initial year to build soil health back. Farmers would need to put in more than 6-8 tonnes of organic matter in the soil to bring it back to a good state (as these soils have been exploited by over use of fertilizers since the past many years)

34. Out of the two which one is more susceptible to pest, organically grown cotton or conventionally grown cotton? *Please Tick (✓)*

Sl. No	Method of farming	More susceptible to pest
1	Organically grown cotton	---
2	Conventionally grown cotton	✓

The term pest is a myth in cotton. Cotton eco-system (CESA) has more than 250 varieties of insects dependent (more than any other crop) and hence rich in bio-diversity. These can be classified as predators/natural enemies/friendly insects and pests. In organic cotton farming the ecological balance is either maintained or restored, while in conventional cotton farming pest resistance and resurgence are major issues.

35. There is any difference in the fiber quality - *please Tick (✓)*

Fiber Quality	Organic Cotton			Conventionally grown (Inorganic) Cotton		
	Good	Bad	No difference	Good	Bad	No difference
Fiber length			✓			✓
Fiber strength			✓			✓
Colour			✓			✓
Any Other (please specify)						

The above mentioned characteristics are more dependent on the SEED variety, soil health and condition and agro-climatic conditions of a particular region. It is not so much about the cotton is grown organically or conventionally.

36. Out of total number of farmers that grow organic cotton how many have got certified there raw cotton or product? (give the number for the region)

    All 5,500 farmers under Chetna Supply Chain

37. Specify the certifier's name in that region?

Sl. No	Certifier				
	Name	**Address**	**E-mail Id**	**Telephone**	**Fax**
1	Control Union Certifications	SUMMER VILLE, 8thfloor, 33rd-14th Road Junction, Khar (W), Mumbai- 400 052	cuc@controlunion.in	+91-22-67255390	+91-22-67255394/95
2	ADITI Organic Certifications Pvt.Ltd.	No.305, 1st floor, 6th Main Road, Mahalaxmi Layout, Bangalore-560086 Karnataka, India	aditiorganic@gmail.com	+91-80-32537879	---

38. Is there any fee involved in registration or certification?

	Please Tick (✓)
Yes	✓
No	---

39. If yes then what amount they charge and for how long (weeks, months, years) certification is valid?

Sl. No	Certifier's Name	Amount (Fee) In Rs.	Time period of valid certification)
1	Control Union Certifications	INR ~ 10 Lakhs	One year
2	ADITI Organic certifications Pvt.Ltd.	INR ~ 3.5 Lakhs	One year

40. Are farmers in the region involved in any other organic cotton product manufacturing (Cloths etc)?

	Please Tick (✓)
Yes	---
No	✓

41. If yes then please specify

Nil

42. Are farmers satisfied with the amount they get for raw organic cotton / product?

	Please Tick (✓)
Yes	✓
No	---

Farmers are happy with the price received from Chetna value chain. However, they are unhappy that certain quantities of cotton had to be sold outside for lower price. At the same time, price of cotton will be a major issue in the long run and farmers need to be paid fairly for ensuring sustainability and that farmers do not go back to un-sustainable farming practices for short term benefits (through higher yields).

43. If no then please specify the reasons.

Nil

44. Name few cotton mills in the region that are using organic cotton fibers as a raw material. *(use extra page if needed)*

Sl. No	Cotton mills				
	Name	Address	E-mail Id	Telephone	Fax
1	Rajlakshmi Cotton Mills	Kolkata	rajat@rajlaksmi.com	---	---
2	Super Spinning Mills	Coimbatore	rajasekaran@ssh.saraelgi.com	---	---

45. Any other information that you want to share regarding organic cotton farming and supply chain.

Nil

Annexure –III

LIST OF FIGURES

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USEFUL LINKS

www.apeda.com

www.cicr.org.in

www.chetnaorganic.org.in

www.organicexchange.org

www.cotcorp.gov.in

www.caionline.in

www.afarm.org

www.commerce.nic.in

www.iari.res.in

www.icar.org.in

www.nba-aicte.ernet.in

www.circot.res.in

ABBREVIATIONS

AFARM	Action For Agricultural Renewal in Maharashtra
AICCIP	All India Coordinated Cotton Improvement Project
APEDA	The Agricultural and Processed Food Products Export Development Authority
ATTRA	National Sustainable Agriculture Information Services
BOD	Biological oxygen Demand
BOD	Biological Oxygen Demand
Bt	*Bacillus thuringiensis*
CICR	Central Institute of Cotton Research
CO	Carbon mono oxide
CO_2	Carbon dioxide
COD	Chemical Oxygen Demand
COFA	Chetna Organic Farmers Association
CSOs	Civil Society Organizations
DDT	Dichlorodiphenyltrichloroethane
DFID	Department for International Development
EU	Europe
FAO	Food and Agriculture Organization
FYM	Farm Yard Manuring
GOT	Ginning outturn
gpt	Grams Per Tex
Ha / ha	Hectare
HVI	High Volume Instrument
ICAR	Indian Council of Agricultural Research
ICCOA	International Competence Center for Organic Agriculture
IFOAM	International Federation of Organic Agriculture Movements
IFOAM	International Federation of Organic Agriculture Movements
IGWDP	Indo-German Watershed Development Programme
ILO	International Labour Organization
INR	Indian Rupee
IPEC	International Programme on the Elimination of Child Labour
IPM	Integrated Pest Management
kg	Kilogram
KVKs	Krishi Vignan Kendra
LCA	Life Cycle Assessment
LPG	Liquefied Petroleum Gas
MJ	Mega Joule
MoA	Ministry of Agriculture
MT	Metric Ton
N	Nitrogen
NAB	National Accreditation Body
NABARD	National Bank for Agriculture and Rural Development
NGOs	Non- Governmental Organizations

NOx	Nitrogen Oxides
NPOP	National Programme for Organic Production
NPV	Nuclear Polyhedrosis Virus
NRIs	Non Resident Indians
NSC	National Steering Committee
NSOP	*National Standards for Organic Products*
OA	Organic Agriculture
P	Phosphors
pH	Power of Hydrogen
Qtls	Quintal
Rs	Rupees
S	Sulphur
SAU	State Agriculture Universities
SHGs	Self Help Groups
SO_2	Sulphur dioxide
SWOT	Strength Weakness Opportunity Threat
TMC	Technology Mission on Cotton
Tot-N	Total Nitrogen
Tot-P	Total Phosphorus
UNICEF	The United Nations Children's Fund
UP	Uttar Pradesh
US	United States
USDA	United States Department of Agriculture

Japan International Cooperation Agency
2F, Dr. Gopal Das Bhawan
28, Barakhamba Road New Delhi-110001, INDIA
Tel: 011 47685500
Fax: 011 47685555

Development Alternatives

111/9-Z, Kishan Garh, Vasant Kunj
New Delhi – 110070, INDIA
Tel: 011 26134103, 26890380
Fax: 011 26130817
E-mail: akumar3@devalt.org, nrana@devalt.org
Website: www.devalt.org