C&A Foundation

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Environment, Social & Economic Impact Assessment of three cotton cultivation systems- BCI, Conventional & Organic Cotton

December 2018

Hosted By Textile Exchange

TextileExchange
Creating Material Change

Overview and Presenter's

- **Textile Exchange Welcome**

Liesl Truscott, European & Materials Strategic Director, Textile Exchange

- **Introduction to the Assessments**

Litul Baruah, Analytics Officer, C&A Foundation

- **Life Cycle Assessment**

Ulrike Bos, Senior Consultant, Thinkstep International

Ritesh Agarwal, Principal Consultant, Thinkstep International

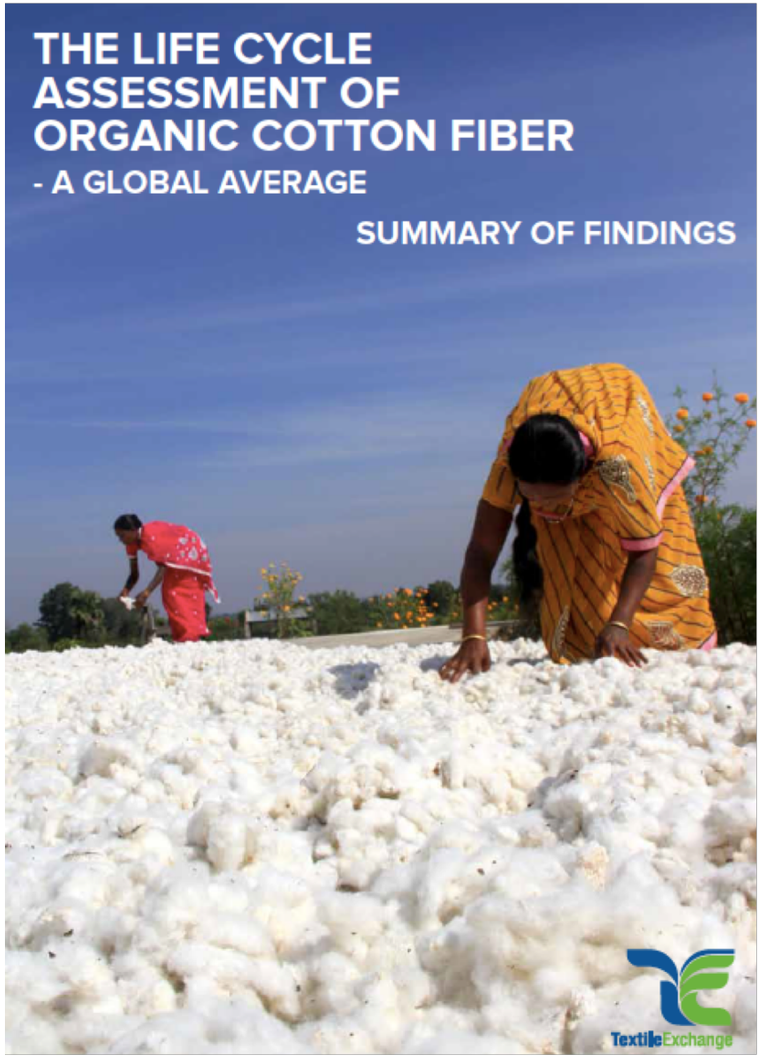
- **Socio-economic Impact Assessment**

Jamie McPike, Qualitative Researcher, American Institutes for Research (AIR)

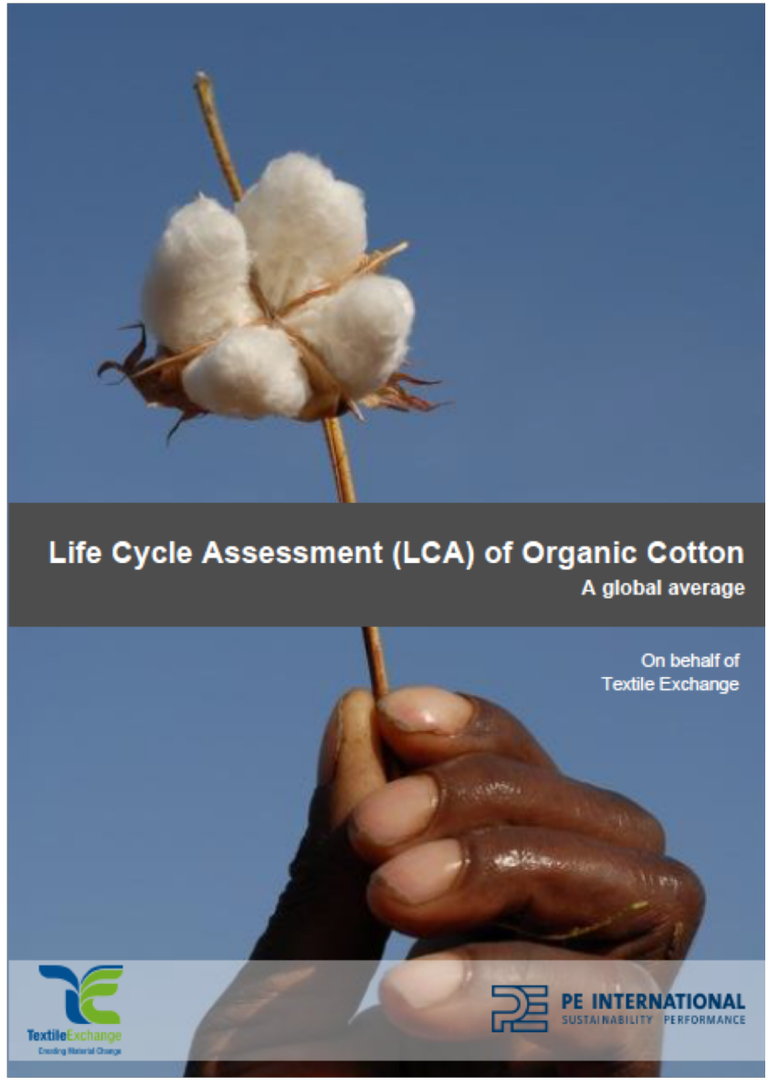
TEXTILE EXCHANGE INTERESTED IN…

- **India a Big Player in Cotton**
  - Engaged in a variety of market initiatives BCI, Organic and Conventional Cotton
- **Next Level of Leveraging Life Cycle Assessment**
  - Moving from a global average to regional assessment
  - Identifying hotspots, risk mapping and opportunities to identify regional interventions
- **Beyond LCA**
  - Moving beyond environmental impact to capture social and economic impacts
  - Opportunity for a more holistic understanding of sustainability, impacts and opportunities
- **Greater Harmonisation**
  - Shared vision
  - Shared measurement - aligning indicators and data aggregation
  - Shared learnings

ORGANIC COTTON LCA



https://textileexchange.org/downloads/the-life-cycle-assessment-of-organic-cotton-fiber-summary-of-findings /



https://textileexchange.org/downloads/life-cycle-assessment-of-organic-cotton/

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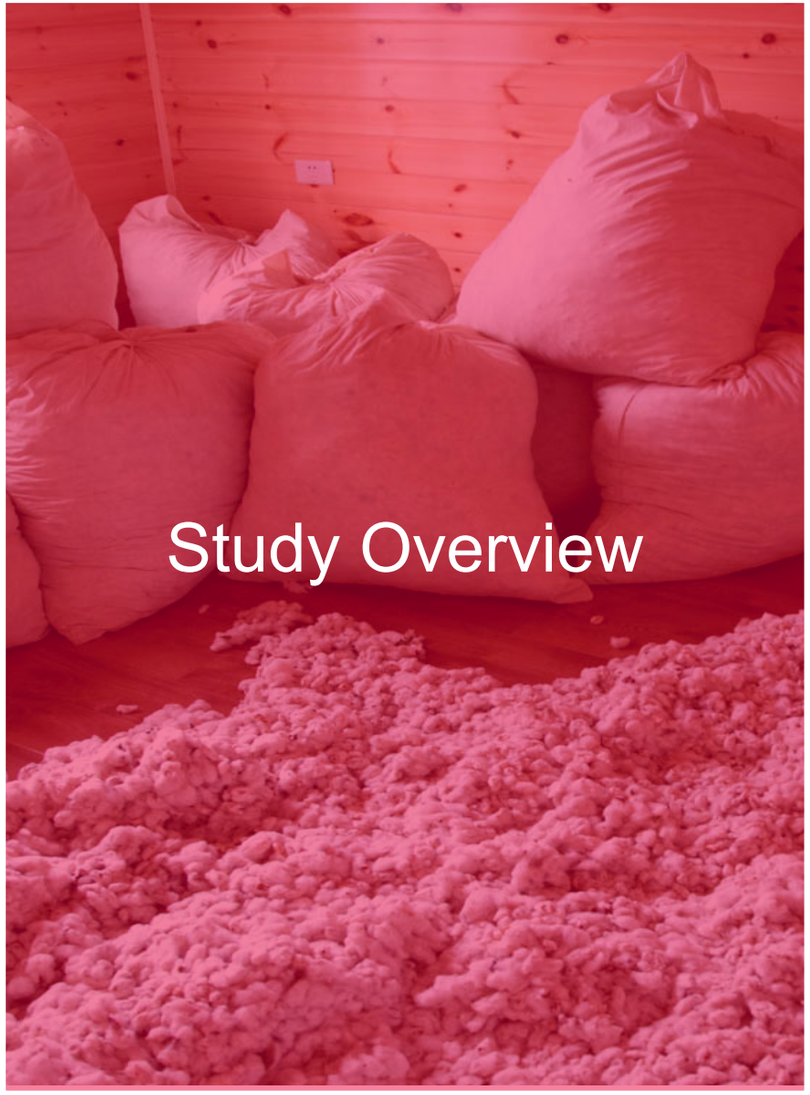
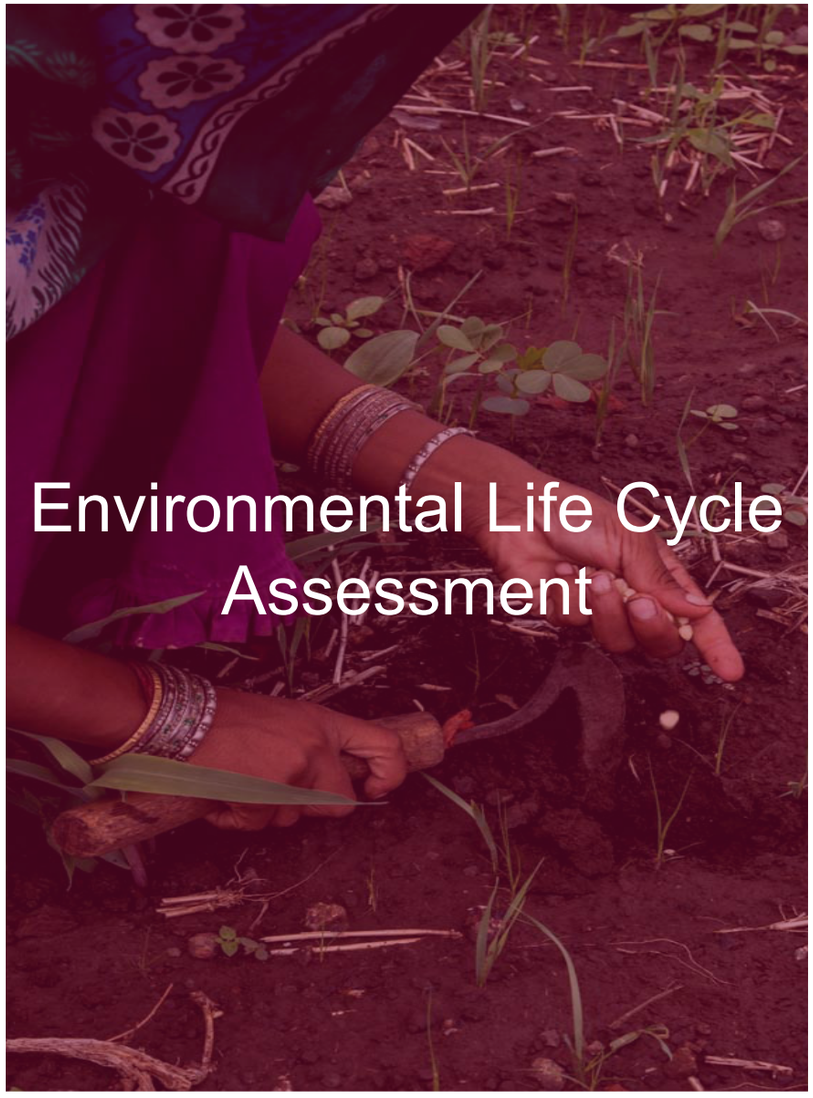

Study Overview

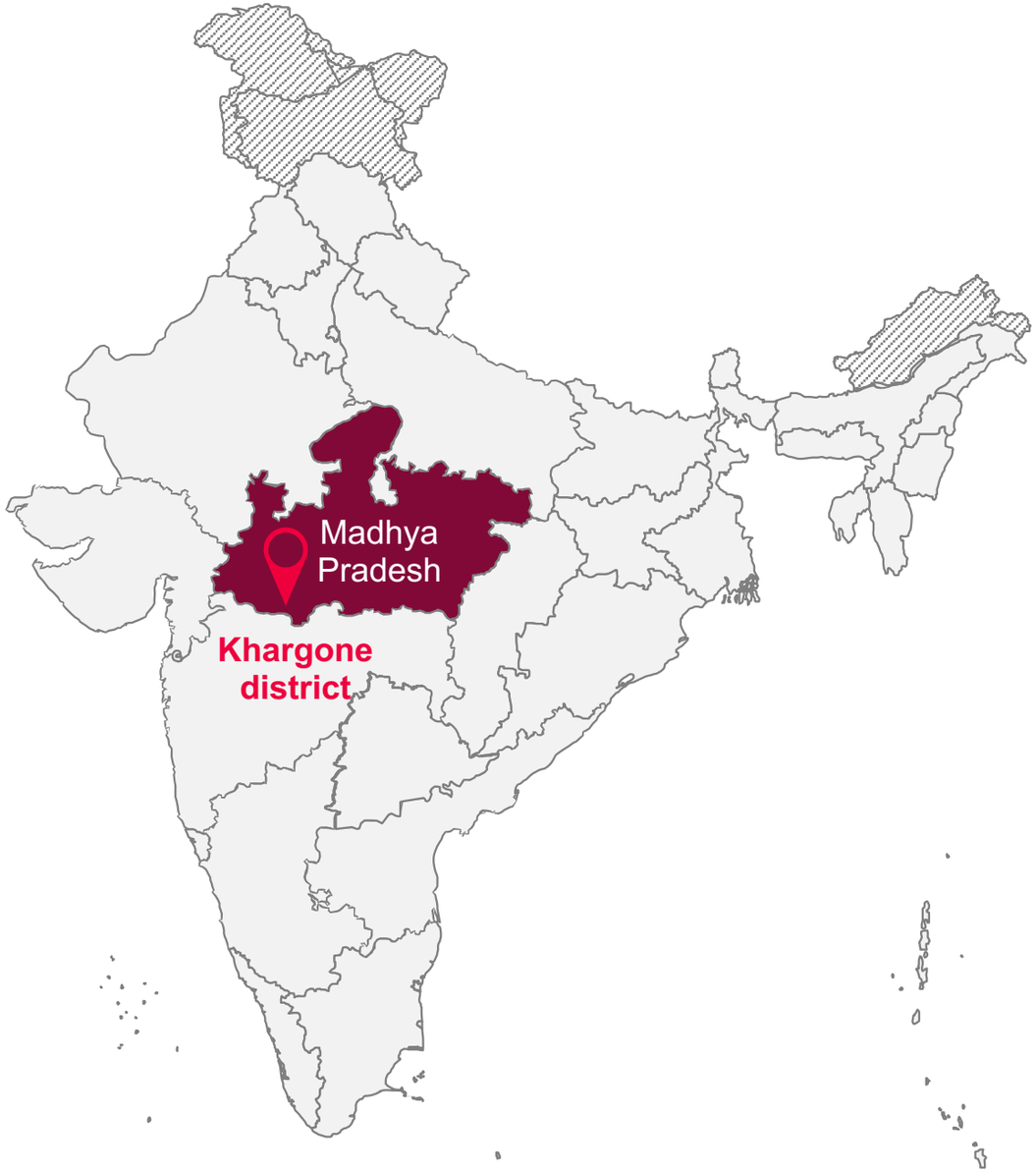

Environmental Life Cycle Assessment


Socio-economic Impact Assessment

Study Overview

- Little understanding of characteristics of cotton farmers who adopt standards-based farming
- Existing research relies on small, non-representative samples, limiting external validity
- India is the largest producer of cotton globally, and MP is a significant producer of organic cotton (43%) in the country

What are the characteristics, experiences, and social, economic & environmental outcomes of conventional, BCI, and organic farmers in Madhya Pradesh, India?



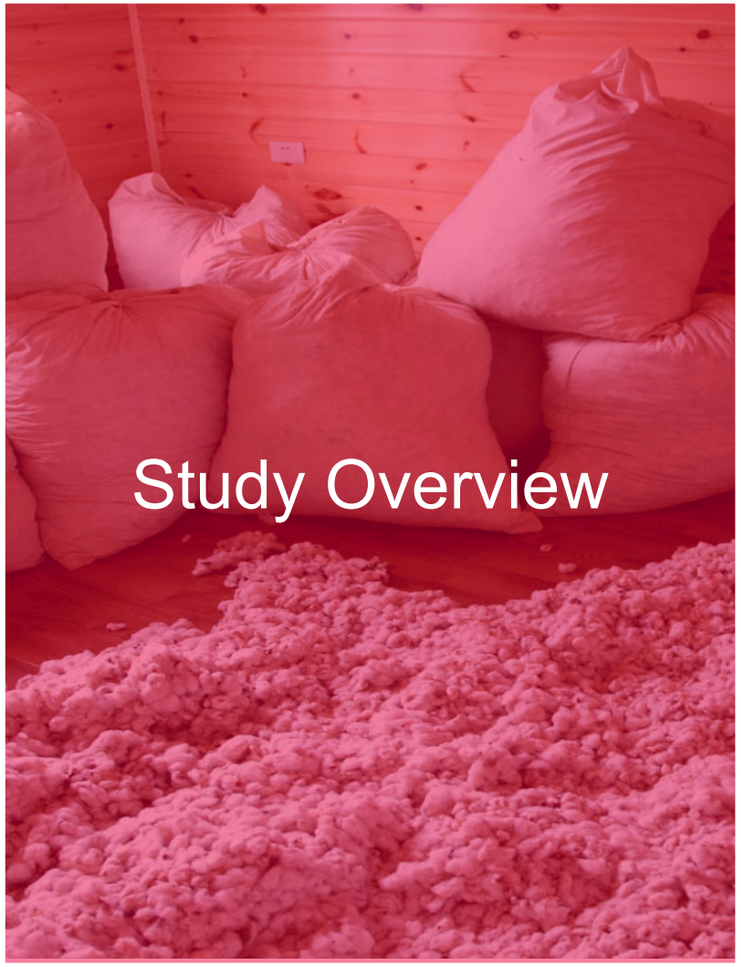
Review - Panel

Advisory panel was constituted to provide guidance and oversight to the study

- Textile Exchange- Ms. Liesl Truscott, Mr. Amish Gosai
- Better Cotton Initiative-Ms. Kendra Pastzor
- C&A-Ms. Charline Ducas
- C&A Foundation- Ms. Anita Chester
- Cotton Expert- Simon Ferrigno

LCA review panel

- Dr Matthias Fischer, HoD, Fraunhofer Institute for Building Physics- Review Panel Chair
- Dr. Senthilkannan Muthu, Sustainability Manager, Lidl Hong Kong- Panel Member
- Mr. Simon Ferrigno, Cotton and Sustainability Expert- Panel Member
- Mr. Rajeev Verma, Project Manager, Cotton Connect, India- Panel Member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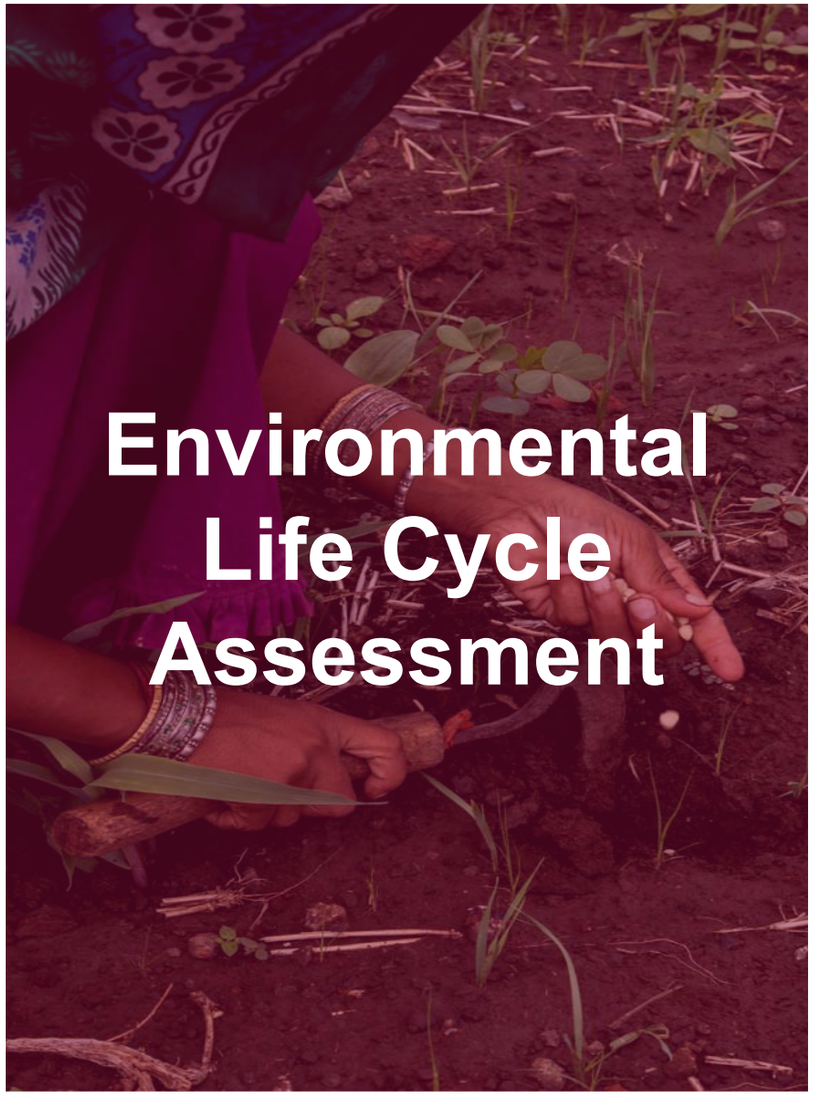

Environmental
Life Cycle
Assessment


Socio-economic Impact
Assessment

Goal of the study

Quantifying the **environmental impacts** associated with production of Better Cotton, Conventional Cotton and Organic Cotton using LCA approach representation of India production

Seeking additional **reliable scientific information** to communicate the environmental performance of Better Cotton, Conventional Cotton and Organic Cotton cultivation to various stakeholders including government, customers, retailers, suppliers, and non-governmental organizations.

What is **Life Cycle Assessment**?

A systematic set of procedures for compiling and examining the inputs and outputs of materials and energy and the associated environmental impacts directly attributable to the functioning of a product or service system throughout its life cycle.

System boundary

Life Cycle stages

Cotton Cultivation

Life Cycle sub-stages

Field Preparation	Planting	Field Operations	Harvesting
Collecting the stubble (land cleaning) and ploughing and harrowing the land i.e. land to be prepared for the planting.	Input Preparation and seed sowing, spraying of bio-pesticides/pesticide and nutrients and irrigation (if available & needed)	In this sub-stage of life cycle irrigation, weed and pest control, and fertilization are included	Harvesting the cotton crop

Agriculture LCA Model

Functional unit- 1 ton of seed cotton at farm gate

INPUTS

Field Preparation
(Tractor diesel consumption)

Generic field operations
(Sowing, nutrients, harvesting)

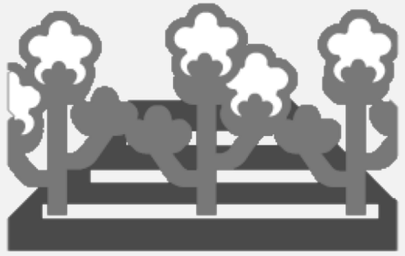
Water input, Rain water
Irrigation from well/river, electricity for pumping

Pesticide production
(Imidacloprid, Mono, Polo, Acephate, etc)

Fertilizer Production
(DAP, Urea, Potash, KCL)

Pesticide & fertilizer transport

Organic inputs: cowdung, compost, farm yard manure, sudarshan kadha, etc



Cotton field

OUTPUTS

Functional output-
1 ton seed cotton

Crop residue,
Cotton Stalk

Emissions
- To land/soil
- To Air
- To Water

Approach

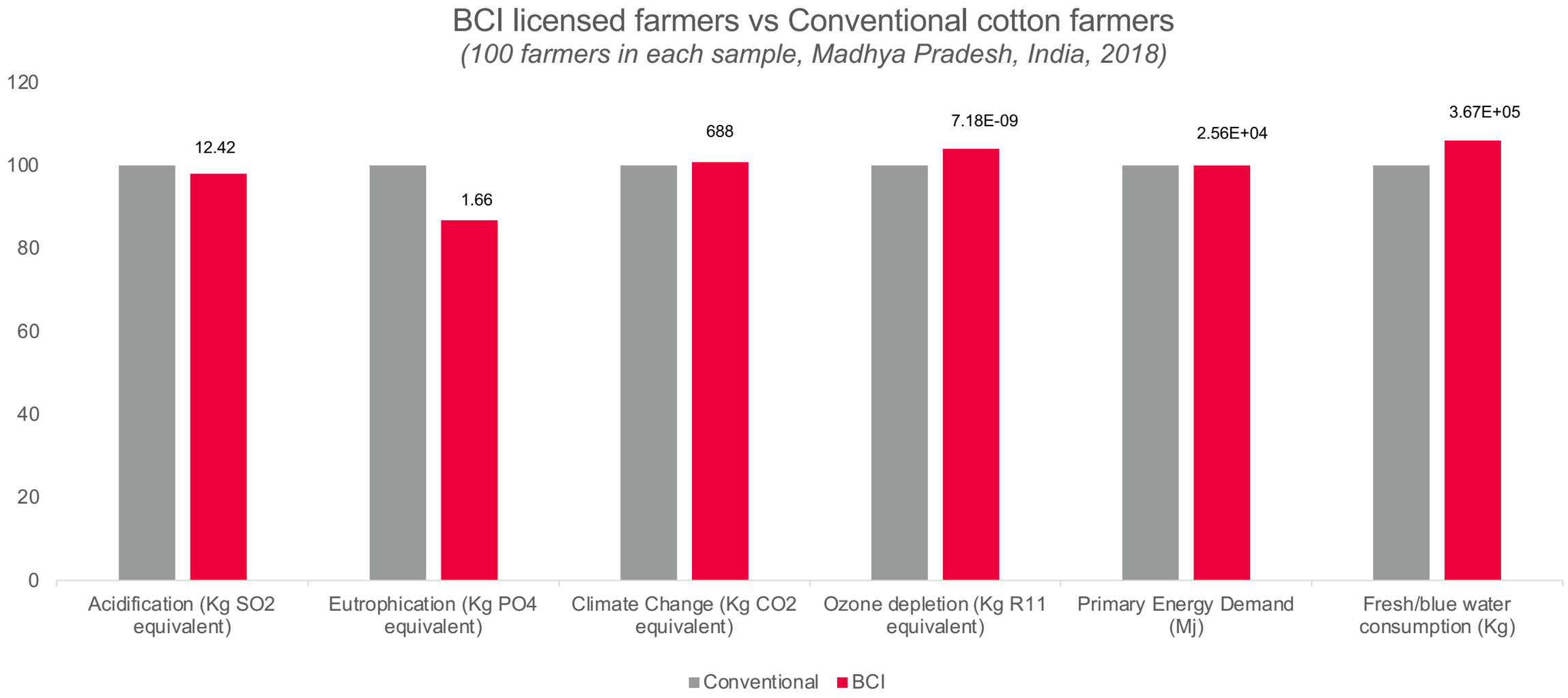
Selected Impact Categories

Impact Indicator	LCIA Method	Unit
Acidification	CML	kg SO_2 equivalent
Eutrophication	CML	kg PO_4 equivalent
Climate Change	CML	kg CO_2 equivalent
Ozone Depletion	CML	kg R11 equivalent
Photochemical Ozone Creation	CML	kg Ethene equivalent
Primary Energy Demand	-	MJ
Fresh/ Blue Water Consumption	-	m^3
Fresh/ Blue Water Consumption (including rain water)	-	m^3
Eco-toxicity	USEtox	CTUe*
Human Toxicity	USEtox	CTUh*

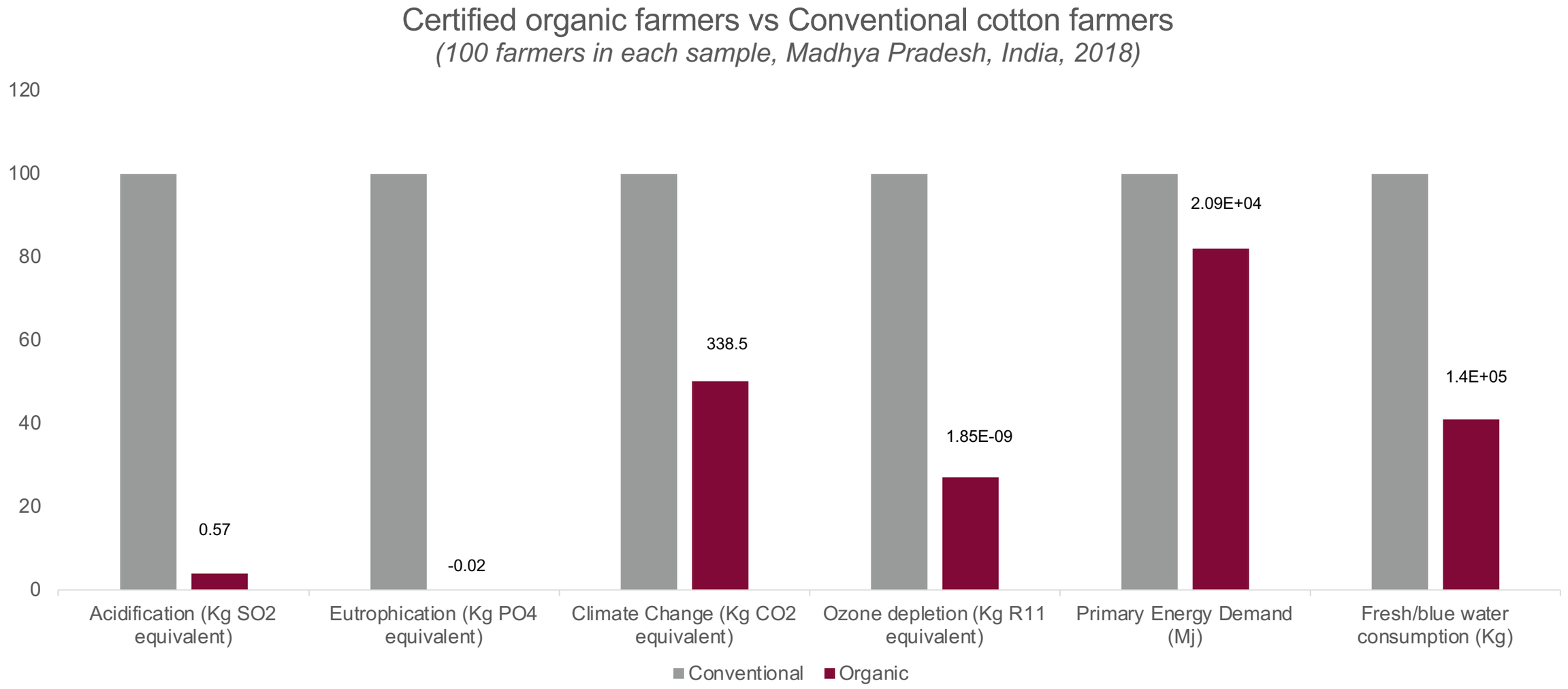
Data Collection From Farmers (October to November)

- Implementing partner provided details of Better Cotton, Conventional Cotton and Organic Cotton farmers
- The 100 farmers for each type of cotton were shortlisted on the basis of data collection criteria of the study farms with more than 3 years of conversion maturity
  - ✓ type of irrigation
  - ✓ mechanization of farming
  - ✓ farm size

Findings-Better Cotton Initiative

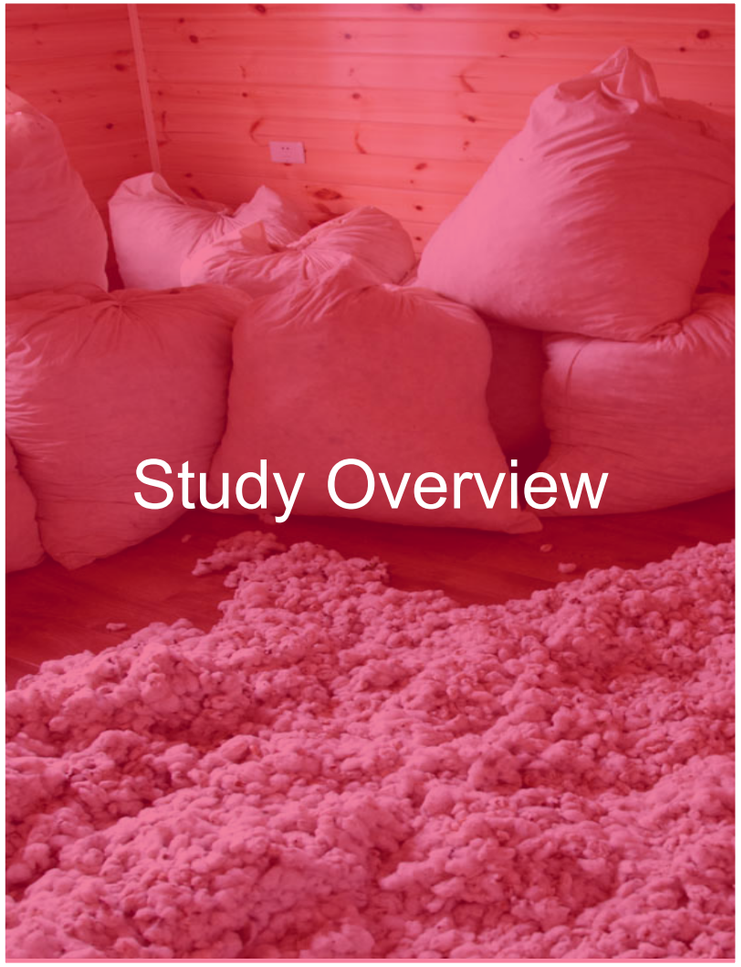


Findings-Organic Cotton



Interpretation

- Hotspots for BCI: irrigation, fertilizer
- Hotspots for organic cotton: water demand
- All cotton farming systems will benefit from increasing yields
- Other critical environmental factors depend upon geographical region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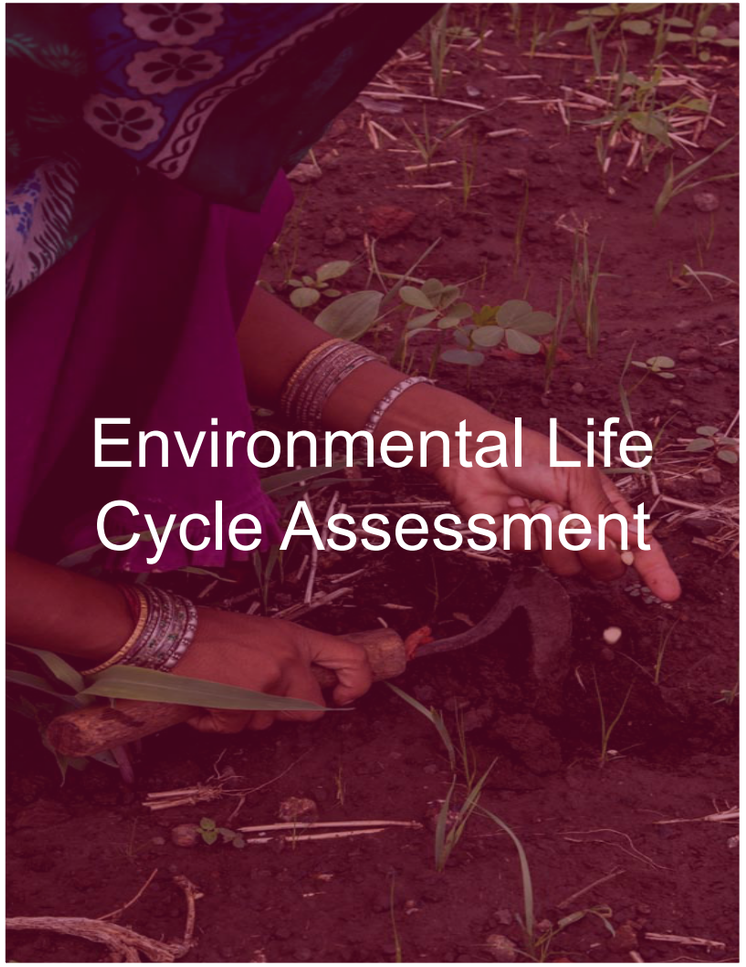

Environmental Life
Cycle Assessment


Socio-economic
Impact
Assessment

Study Approach

Quantitative: Large-scale survey of 3,628 households

Indicators:

- Wealth,
- Debt,
- Consumption,
- Income,
- Physical well-being,
- Female empowerment,
- Child labour and welfare,
- Material and labor inputs,
- Cotton cost, revenue, and profit

Qualitative: 47 key informant interviews

Themes:

- Farmer experiences,
- Farmer knowledge,
- Perceptions of different forms of farming

Participants: Male and female (conventional, organic, and BCI) farmers, shopkeepers, traders, cotton experts, and extension service providers

Findings-Better Cotton Initiative

All BCI farmers are not exclusively doing BCI

- Exclusive Better Cotton Farmers: **51%** makes a profit
- Non-Exclusive Better Cotton Farmers: **45%** makes a profit
- Conventional Farmers: **44%** makes a profit

Both exclusive and non-exclusive BCI farmers experienced a loss, on average, in the last cotton farming season

Farmers choose to farm BCI for economic reasons – *more profits, less expenditure*

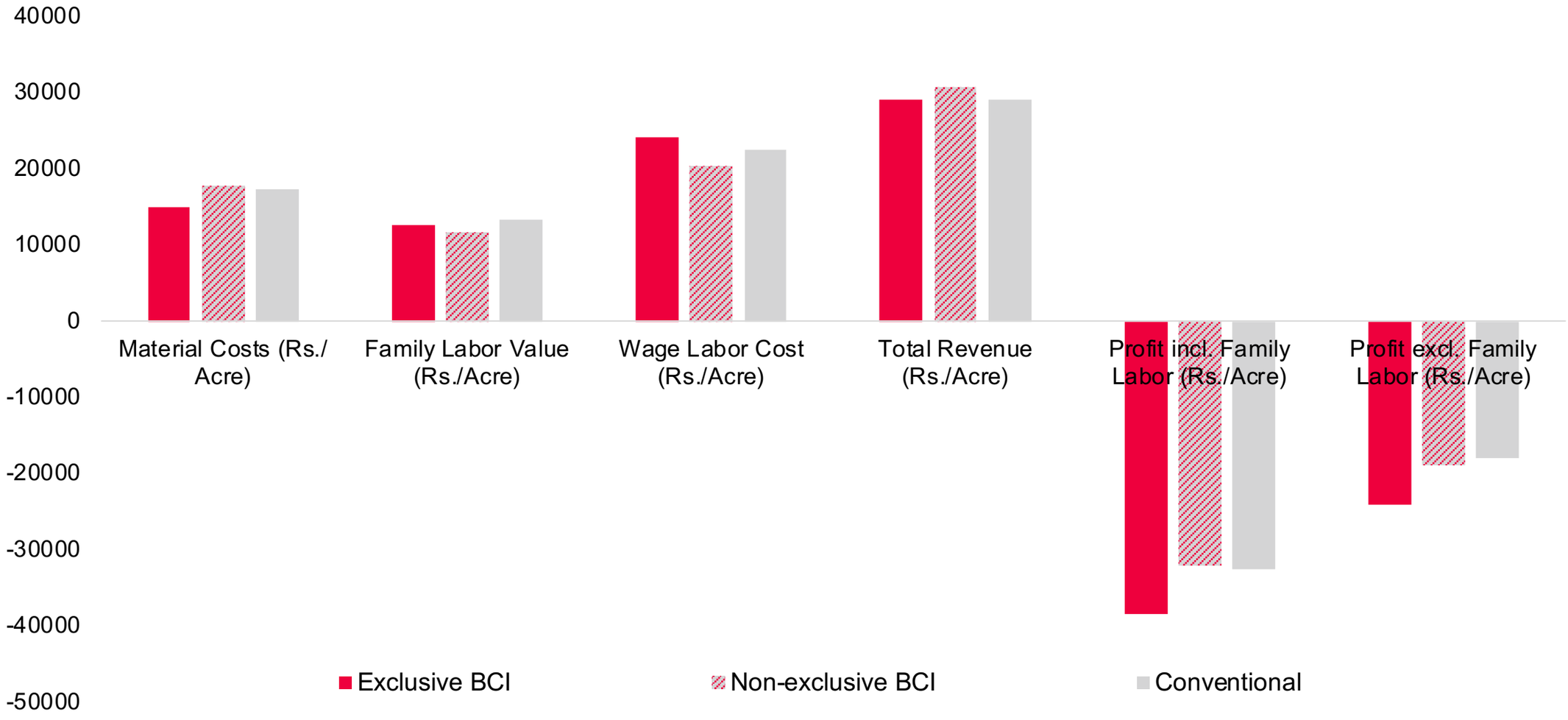
BCI farmers are more likely to be in debt than conventional farmers

BCI farmers reported significantly lower yields than conventional farmers

More than **80%** of the labour is from the women of the household, however in **95%** of the households decisions about agriculture is taken by the man and the monetary transactions are also done by the men.

Child labour is still prevalent, however **16%** of BCI households admitted to child labour in the community compared to **31%** in conventional cotton farming households

Cost, Revenue and Profits for Better Cotton Farmers



Sample of 1,237 BCI farmers and 1,200 conventional cotton farmers from Khargone district, Madhya Pradesh, India, 2018

Findings-Organic Cotton

All organic farmers are not exclusively doing organic

Both exclusive and non-exclusive organic farmers experienced a loss, on average, in the last cotton farming season

- Exclusive Organic Farmers: **45%** makes a profit
- Non-Exclusive Organic Farmers: **38%** makes a profit
- Conventional Farmers: **44%** makes a profit

Organic farmers have a higher socio-economic status than conventional cotton farmers

Farmers often learn of organic cotton through social networks-*neighbours, family*

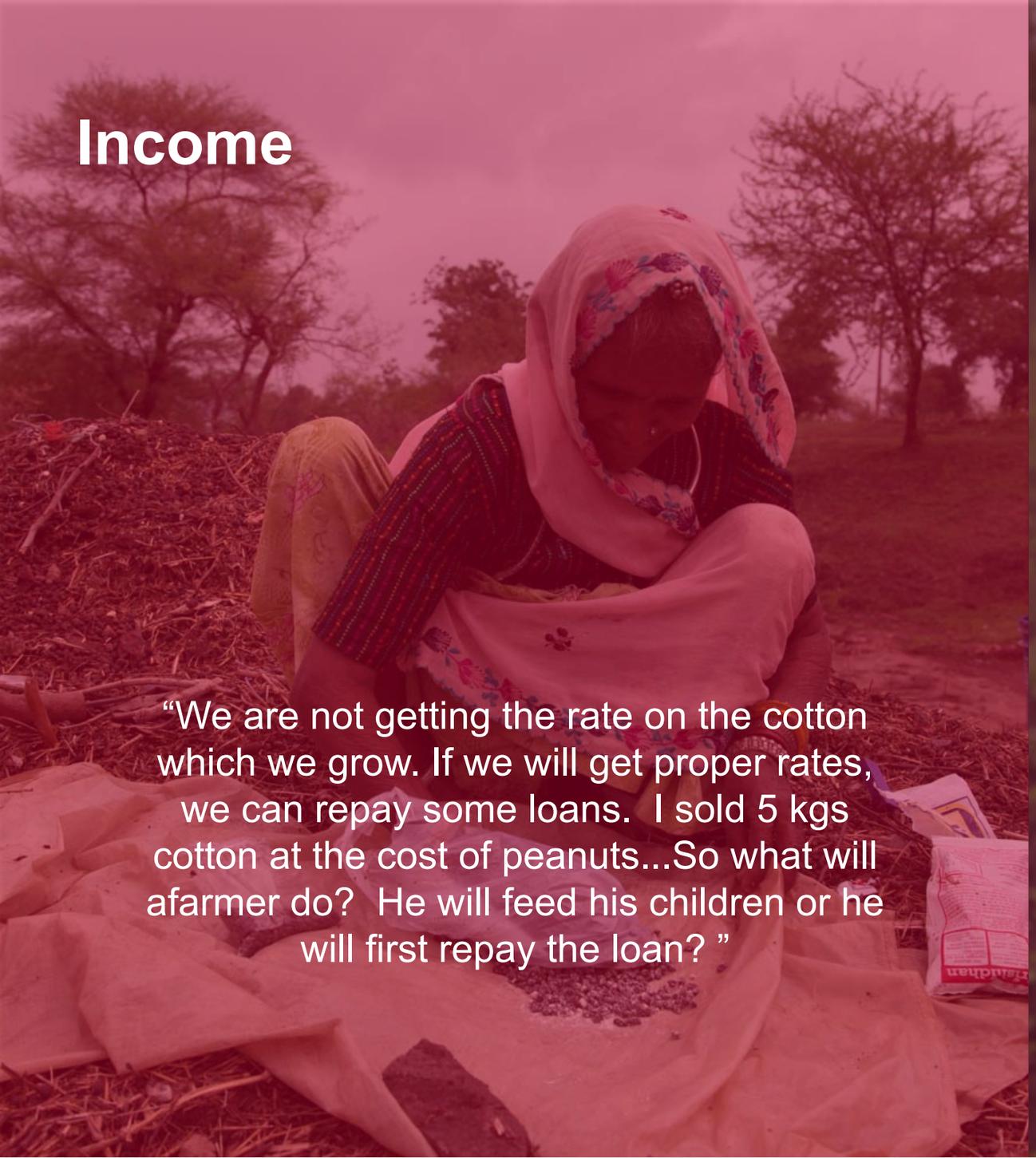
Not much evidence for differences in child labor between organic and conventional. **22%** of organic cotton households admitted to child labour in the community compared to **31%** in conventional cotton farming households<

Exclusive organic less likely to use pesticides, but some self-reported use- *one-third of organic farmers reported usage of chemical inputs*

More than **80%** of the labour is from the women of the household, however in **94%** of the households decisions about agriculture is taken by the man and the monetary transactions are also done by the men.

Cost, Revenue and Profits for Organic Cotton Farmers

Sample of 1,191 Organic cotton farmers and 1,200 Conventional cotton farmers from Khargone district, Madhya Pradesh, India, 2018



Income

“We are not getting the rate on the cotton which we grow. If we will get proper rates, we can repay some loans. I sold 5 kgs cotton at the cost of peanuts...So what will afarmer do? He will feed his children or he will first repay the loan? ”

Indebtedness

“Farmers don’t want to be forgiven for their loans, he only asks for good rates for his crops, 90 percent are requesting only this. If we get decent rates for our crops then we don’t have to beg, it’s like entire world is being fed by farmers, and we are the ones in crisis… what has a farmer done wrong?”

Conclusions & Recommendations

Majority of organic and better cotton farmers adopt these practices for economic reasons

Cyclical nature of debt for cotton farmers in Madhya Pradesh

Reduced use of chemical fertilizers and pesticides among Organic farmers

Reduced use of child labor among Better Cotton farmers

Increased debt among both organic and Better Cotton farmers

Farmers choose to farm BCI and organic cotton for expected higher price premiums, yet often do not receive higher premiums for their cotton

- ✓ Stronger economic incentives are needed to increase farming of BCI and organic cotton
- ✓ Increase oversight in the supply chain (primarily at the local level) to maintain quality control (and to understand how cotton quality and price is determined)
- ✓ Enhance oversight of farming practices to ensure compliance with BCI and organic farming standards

Q&A

Q1. Why are we talking about environmental impact related to LCA only, why not in terms of CO2 emission during transportation of BCI & Organic cotton giving CO2 footprint?

The system boundary of the LCA study was cultivation and production of seed cotton in which upstream transportations of raw materials, fuel, fertilizers etc. were considered and the various environmental impacts (including GWP) were assessed.

Q2. Why do water and climate change impacts seem higher in BCI vs Conventional?

In the study, it was found that BCI cotton has a slightly lower yield and slightly higher water consumption as compared to Conventional cotton, since water irrigation requires electricity, GWP impacts were also slightly higher. Besides, as the yield was lower for BCI farmers that season, the climate change impact, which is calculated per kg of cotton produced, appears slightly higher than for conventional. However, the life cycle assessment approach does not determine definitive long-term system-wide differences between BCI and conventional on any parameter due to inherent limitations in length of study (one season's data for agriculture is insufficient) and the small number of farmers surveyed. The design of the approach itself is meant to highlight areas of potential impact. This does enable prioritisation of programme activities to strengthen improvements.
BCI overall is having a positive impact on climate change and water. Potential climate change impact is measured in GHG emissions. For agriculture in India, the majority of those impacts come from the application of synthetic fertiliser and electric consumption for irrigation. BCI's own performance monitoring data indicate that, on average, across India in the 2016-17 season, synthetic fertiliser application (kg/ha) by BCI Farmers was 17% lower than the volumes applied by Comparison Farmers while BCI Farmers' yields were 8% higher, on average, than Comparison Farmers' operating in the same areas. (Source: Farmer Results 2016-17). In that same season, in India, BCI Farmers used 5% less water for irrigation than Comparison Farmers. Below is further information on what BCI and its Implementing Partners are working on with regards to water and climate change.

Q&A

Q3. Water demand has been marked as hotspot for organic, does it mean that organic cotton need more water/electricity than conventional?

For organic cotton, water demand is a hotspot for GWP impact- here it means pump's electricity consumption for water contributes to GWP.

Q4. Why isn't there any information about pesticides poisoning of farmers and families for conventional and BCI?

At the moment there are only a few anecdotal studies evaluating the effect of pesticide use in cotton farming on human health. The main reason for this is the disconnect between data on pesticide usage and data from health services, making it impossible to have reliable statistics on the issue. Nonetheless, BCI considers the use of Highly Hazardous Pesticides (HHPs) an area of great concern, especially in the smallholder farming context in developing and emerging economies. BCI prioritises interventions aimed at the progressive elimination of HHPs.

BCI is currently supporting the launch of an ambitious and ground-breaking new project aimed at developing and piloting a monitoring approach to the health effect of pesticides in cotton production in India and other countries.

In its standards, BCI has included several criteria to reduce pesticide poisoning and prevent the use of the most harmful products; for example, by making the systematic use of Personal Protective Equipment mandatory and by prohibiting active ingredients that present the most toxicity hazard for human health. In the past, BCI contributed to the eradication of the pesticide endosulfan in cotton production before it became targeted for eradication by the international community. Now, BCI and its partners are investing tremendous efforts to eradicate the use of the other HHPs that are still widely used in conventional farming, such as monocrotophos and triazophos.

Furthermore, BCI is rolling out its Toxic Load Indicator monitoring system, which aims to support farmers make better informed decisions in relation to the use of pesticides. A recent independent review of BCI's extensive Result Indicator data demonstrated that BCI's interventions have led to significant reduction in Toxic Load per Hectare across India, in effect reducing the hazard to both cotton communities and their environment.

Q&A

Q5. Can you explain further the child labour findings in organic cotton farming?

As indicated on page 8 of AIR and ThinkStep's report ("Social, Economic & Environmental Impact Assessment of Cotton Farming in Madhya Pradesh"), the results do not show much evidence for differences in child labour or education outcomes between organic and conventional cotton farmers. We do not find statistically significant differences between the children of organic and conventional cotton farmers in the number of school days missed due to working on the household farm or the number of days missed due to working on another farm or business. We also do not find differences in education attendance and enrolment between the children of organic and conventional cotton farmers. 96 percent of organic cotton farmers reported that children in their household (between 5 and 14 years old) were enrolled in school, compared to 95% of conventional farmers. This difference is not statistically significant. Most farmers interviewed as part of the qualitative portion of the study reported that they do not employ children, but some farmers reported that their own children help with routine farming tasks, such as weeding and picking. They do not perceive this assistance as "child labour", but instead view children's help on the farm as part of their role as members of the household. The majority of the child labour is allocated to picking in the form of wage labour and picking and weeding in the form of family labour. For organic farmers that do report child labour days, 0.36 days are spent picking in the form of wage labour, 0.28 days are spend on picking in the form of family labour, and 0.22 days are spend on weeding in the form of family labour.

Q6. How was the question asked for child labour? Was the same question asked in both qualitative manner and indirectly?

To measure child labour, we asked direct and indirect questions about child labour in the farmer survey as well as in the qualitative interviews with farmers. For instance, in the quantitative survey we asked: "How many days a child in the household had missed school due to work?" and we inquired about the number of total child labour days hired for various farm activities such as land preparation and sowing, among others. We also asked an indirect question to measure child labour in the survey. Specifically, we asked: "Generally, do any children below 14 years of age work on the farms?" in an attempt to account for the social desirability bias associated with self-reporting child labour. For the qualitative portion of the study we asked a similar question about how common it is for children in the community to work on farms in order to assess community-level perceptions of child labour. Members of the study's advisory panel provided advice on how to frame these questions to obtain the most reliable data on child labour.

Q&A

Q7. Do we know the reasons why farmers with better socio-economic status choose to do BCI and organic farming?

We surveyed the reasons farmers provided for adopting BCI and organic cotton farming. These can be found in tables 17 and table 37 in AIR and ThinkStep's report and in more detail in the sections titled "Reasons for Adoption." Farmers reported adopting organic cotton farming for three main reasons: 1) they believed their income would remain the same, but organic farming would require fewer inputs (36%); 2) they believed their income would be higher under organic farming as opposed to conventional farming (33%); and 3) they expected higher future profits as a result of organic farming (32%). The top three reasons BCI farmers adopted this approach to farming cotton include: 1) farmers' friends and neighbours grew BCI (41%); 2) they perceived BCI cotton to be of "better quality" (39%); and 3) they believed that they would receive a higher income farming BCI as opposed to farming conventional cotton (36%). Qualitative data confirms these findings.

Q8. To whom are the cotton farmers indebted?

Our study shows that a significant percentage of farmers get their agricultural inputs on credit. The lenders in this case include shopkeepers (48% of organic farmers, 68% of BCI farmers and 58% of conventional farmers), co-operative societies (15% of organic farmers, 15% of BCI farmers and 1% of conventional farmers), money lenders (2% of organic farmers and 1% of BCI farmers) and implementing partner (4% of organic farmers, 1% of BCI farmers and 14% of conventional farmers). We also have information on the reasons farmers need credit. These results are found in the "Indebtedness" sections of AIR and ThinkStep's report (page 59 and page 86 of the "Social, Economic & Environmental Impact Assessment of Cotton Farming in Madhya Pradesh").

Q&A

Q9. How has BCI responded to these findings?

BCI values the findings of this study and will use them to deepen its understanding of cotton farming practices and their potential environmental and socio-economic outcomes in Madhya Pradesh, India.
The LCA approach to environmental assessment identifies hotspot areas within the complex agricultural system for attention and further analysis. Because it sampled just 100 farmers per cotton production system in the state of Madhya Pradesh, India during one season, it was not designed for absolute values to be directly compared; production decisions cannot be made based on this in isolation. The environmental results do support BCI's understanding that, for example, synthetic fertiliser use and the power source for irrigation are key factors in climate change impact. The study results indicate that BCI farmers may have room for improvement in those areas, and therefore, should be priorities, when promoting improvements with cotton producers.
The socio-economic findings highlight the importance of economics and social networks as key drivers for participation in sustainable cotton programmes. They also indicate the many challenges present for cotton farmers in the region, such as indebtedness and the reliance on loans for farming inputs. This understanding will inform programmatic focus areas.

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Thank You!

Questions?