

SFIAR Team Award 2021, Green Cotton/ Seeding the Green Future - Research Description

What is it all about?

The project's overall objective is to secure the availability of cotton seed free of genetic modification (GM) for organic cotton farmers, develop a portfolio of new cotton cultivars of diverse species with improved performance, strengthen the collaboration among the actors, and thus improve the integrity of the organic cotton value chain. Main goal is the empowerment of farmers to achieve seed sovereignty. This also strengthens the income security of smallholder organic cotton farmers and foster rural development. The project is in phase II and builds on and scales up Green Cotton Project Phase I (2013-2016). The whole value-added chain is integrated to develop cotton varieties that show a high adaptability to local organic cultivation conditions and increase genetic diversity in an innovative participatory approach. A particular focus is on the adaptation to low-input conditions and drought resistance since climate change is likely to result in unreliable monsoon rainfall. The conservation and use of genetic diversity, especially the native, more robust Desi cotton varieties, is a project's fundamental goal. New breeding activities of Desi cotton cultivars is also an important strategy to avoid GM-contamination as they have morphologically distinct leaf shapes from transgenic *Bacillus thuringiensis* (Bt) *Gossypium hirsutum* hybrids and different chromosome numbers making cross pollination extremely rare.

Achievements in nutshell

- 62 different cultivars of *G. hirsutum* and *G. arboreum* have been screened in over 430 trails for different agroecological zones for their adaptability to local environment, improved yield meeting industrial fiber parameters
- 15 new cultivars have been bred under organic conditions and 8 of these have already been introduced to farmers for pilot cultivation and seed multiplication
- 215 trainers/experts and 425 farmers including 16% females have been trained to train the fellow farmers in various aspects of plant breeding and management of cotton production
- Digital Training materials for Knowledge transfer e.g [SGF process Explainer](#) videos and [Participatory plant breeding manual](#) for South-South knowledge transfer in other geographies.

Social challenges addressed in the project

The organic cotton production is severely affected by the overdominance of Bt-cotton in various ways: (i) organic farmers can't buy non-GM seed from local traders any more since the non-GM cotton seed market has become completely eroded, (ii) only a few F1 hybrids and varietal lines of *G. hirsutum* selected for high input conditions are available as non-GM seed on prepayment basis, (iii) pre-ordered non-GM cotton seed of commercial seed companies might be contaminated with Bt (despite a non-GM certificate) or of spurious seed quality (e.g. old seed, mixture of F1 and F2 seed), (iv) public institutions, universities and seed agencies can only provide small amount of non-GM cotton seed of older cultivars, and (v) even breeders seed might already be contaminated by Bt-cotton. While physical or genetic contamination of Bt-cotton leads to complete rejection of organic cotton harvests and destroys the reputation of Indian's organic cotton sector, non-adapted cotton cultivars will limit the performance and fibre quality of the organic cotton production. Desi cotton also disappeared from organic production, although their stress tolerance is critical to address extreme weather events due to climate change. Fast action is needed to re-establish non-GM seed supply chains and initiate breeding programs of *G. hirsutum* and traditional cotton (*G. arboreum*) to support organic and low input cotton farmers in India. The Organic Cotton Accelerator (OCA) as representative of textile brands, have identified three crucial drivers where collective action is needed to improve the business case of organic cotton farmers: 1. Leveraging buying practices to the benefit of the farmer, 2. Investing in improving access to quality organic seeds, 3. Securing the integrity of organic cotton throughout the supply chain. The Seeding the Green Future project address the last two points.

How we are doing it (Approach)

In close collaboration with 4 organic cotton growers associations, 3 State Agriculture Universities of India (SAU), research institutes, 1 Non-government organizations (NGO) and 1 non-profit cotton sourcing organization for sustainable cotton, we are scaling up the decentralized cotton breeding initiatives, which remain GMO-free and meet the need of organic and low-input farmers as well as the fibre quality requirements of the textile industry. Voice and needs of Global brand (like C&A) is represented and by Organic Cotton Accelerator (OCA); a multi-stakeholder platform which also financial support this project together with Mercator Foundation Switzerland.

The project is addressing all major steps from crossing, selection, cultivar testing, multiplication, up to the distribution of cotton seed (Fig 1).

In addition to these more technical aspects, special emphasis is given to the multi-actor approach, the socio-economic assessments of bottlenecks for adaption of new cultivars by farmers, dissemination and knowledge transfer to reach many organic cotton farmers in India and beyond. Through active participation in international Workshops and Conferences project supports the

South-South knowledge transfer and the development of a global organic seed movement For example, 2nd participatory research Symposium was organized in 2019 in Switzerland to motivate students and young researchers to get engaged in participatory research and a " Green Line Exhibition 2019 "public exhibition was organized to create awareness for the added value of organic cotton textiles for the general public in Switzerland was organized with the close collaboration of Plant Science Center, botanical garden and University of Zurich.

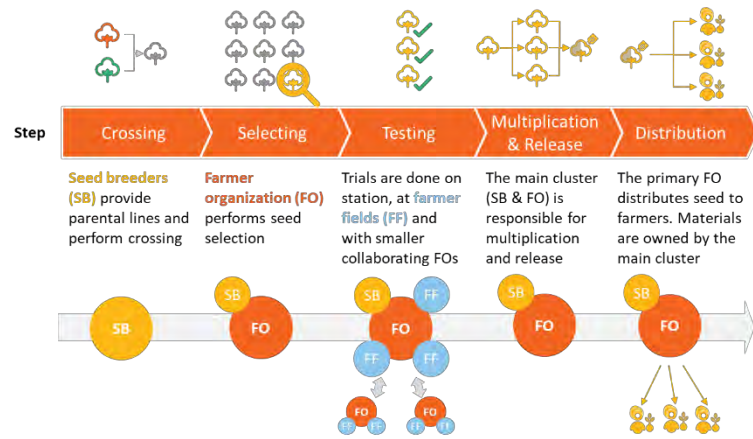


Figure 1: Simplified overview of breeding process and actor involved (cluster approach)

Sustainable development Goals and Seeding the Green Future project:

The participatory organic cotton breeding approach applied in Seeding the Green Future project has potential to address 12 SDGs; in the current phase, SGF's explicit focus is on 6 SDGs (Figure2): SDG1: End poverty in all its forms everywhere; SDG 3: Ensure healthy lives and promote well-being for all at all ages; SDG4: Ensure inclusive and quality education for all and promote lifelong learning; SDG5: Achieve gender equality and empower all women and girls; SDG13: Take urgent action to combat climate change and its impacts; SDG 17: Revitalize the global partnership for sustainable development. It indirectly contribute to: SDG2: End hunger; SDG 6: Ensure access to water and sanitation for all; SDG8: Promote inclusive and sustainable economic growth, employment and decent work for all; SDG10 Reduce inequality within and among countries; SDG12: Ensure sustainable consumption and production patterns; SDG 16 Promote justice, peaceful and inclusive societies.



Figure 2: Participatory organic cotton breeding can contribute to 12 SDGs with explicit focus on six SDGs.

For further information, please visit <https://www.sgf-cotton.org>