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GREEN COTTON

Participatory Cotton Breeding for
Organic and Resource Efficient
Cropping Systems in India



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Outreach

We are interested to enlarge our network and to build up further participatory breeding programs in various cotton-growing regions and countries (Tanzania, Uganda, Benin, Mali, Burkina Faso) by South-South transfer relying on mutual partnership and trust.

Rebuilding the seed sovereignty of organic smallholder cotton farmers

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Background

Organic cotton is a healthy, resource efficient, and viable alternative to conventionally grown cotton. Organic farming strives for closed nutrient cycles, improved soil fertility and refrains from chemical inputs, thus, making farmers less dependent on loans for increasingly expensive inputs. Combined with fair trading it enhances sustainability of production, improves income security and empowers farming communities in rural areas. Up to 80 % of the global organic cotton has been produced in India. However, the organic cotton production is severely threatened by the widespread distribution (>90%) of genetically modified (GM) Bt cotton in India. Organic cotton farmers have serious problems to find suitable non-GM cultivars. Physical or genetic contamination of GM cotton leads to complete rejection of organic cotton harvests. In addition most cotton cultivars were bred for high input production systems, and might not be suitable for low external input organic conditions.

Already in the season 2011/12, the area under organic cotton production decreased by about 20% in India. Similarly the cultivation of traditional diploid cotton species (Desi cotton) has dropped within 10 years from 20% to less than 5%. However, these cotton species might be specially suited for low external input conditions under organic farming as they show high tolerance against pest and diseases as well as drought tolerance.

Dharwad Declaration

A National Workshop was held in 2011 in Dharwad to address the disappearance of non GM cotton and counteract the seed crisis. This was jointly organized by bioRe India Ltd., FiBL Switzerland, the University of Agricultural Sciences (UAS) Dharwad and other cotton stakeholders and resulted in the Dharwad declaration to join forces for immediate action.

Objectives

The short term aim of the project is to provide organic cotton farmers with high quality of non-GM cotton seeds. In the mid-term, new cultivars need to be developed that fit the needs of organic cotton farmers and processors. Seed sovereignty and autarky of smallholder cotton farmers shall be improved by capacity building and establishing decentralized participatory breeding initiatives. Farmers' experience and breeders' knowledge is combined to develop cotton cultivars adapted to local conditions of organic cotton farmers. To achieve these goal following objectives are defined:

- > Improving collaboration among stakeholders in the organic cotton value chain to foster coordinated action
- > Identifying genotypes of different species and plant types that are suitable for organic farming under various conditions (irrigated, rainfed, heavy soil, sandy soil,..)
- > Establishing decentralized participatory cotton breeding programs among organic cotton growers organizations
- > Empower female and male farmers in seed multiplication, crossing and cultivar selection
- > Re-establishing the non-GM seed chain

Participatory plant breeding is a proven method to develop locally adapted cultivars and to maintain and to increase the genetic diversity



Current activities

- > Screening of over 80 different non-GM breeding lines provided by the UAS Dharwad under organic farming systems and contrasting soil types (on-station trials) at bioRe and Chetna Organic. Different cotton species (*Gossypium hirsutum*, *G. arboreum*, *G. barbadense* and interspecific crosses) are evaluated for yield stability, resistance traits, and fiber quality according to market demand.
- > Determining the optimal planting density for the different cultivar types.
- > Utilization of farmers knowledge to define most important traits and ideal cotton genotype under different growing conditions.
- > New crossings between different plant ideotypes suited for organic farming.
- > Farmer workshops on cultivar testing, crossing techniques, cultivar evaluation, single plant selection and seed propagation.



- > Farmer managed on farm cultivar testing in different soil types with and without irrigation.
- > Socioeconomic evaluation of different models for the establishment of a seed supply chain for non-GM cotton in India.
- > National and international workshops about breeding and supply of non GM cotton seeds.

Plant breeding is a long term project and a continuous race to counteract emerging pests