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# GREEN COTTON

## Participatory Cotton Breeding for Organic Farming at bioRe association in Madhya Pradesh



Fig 1. Observation in the field.



Fig. 2: On farm Cultivar evaluation of farmers.

### Objectives

The objective of the participatory cotton breeding is the selection and development of locally adapted cotton varietal lines and hybrids to improve the organic farming practices. (Organic) farmers and researchers collaborate in identifying and addressing their problems and challenges in order to define important breeding goals of male and female farmers but also quality requirements of the textile industry need to be considered. Based on the outcome of the on station trials the best cultivars were immediately tested in farmers fields.

### Participatory Cotton Cultivar Evaluation Trials

#### Season 2011-12:

- On station trial of 53 cotton cultivars including different species and cultivar types as 1 row plots
- On Farm trial of 5 cotton hybrids at 20 farmers

#### Season 2012-13:

- On station trial of 50 new cotton cultivars, 5 row plots with 2 reps on heavy soil & light soil
- On Farm trial of 5 best cultivars from 2011-12 at 8 farms including *G. arboreum* cotton

#### Season 2013-14:

- On Station trial of 78 cotton cultivars, plus 30 *G. hirsutum* and 30 *G. arboreum* varietal lines at 4 row plots with 2 reps on heavy soil & light soil
- On Farm trial of 7 best genotypes from selection of 2012-13 compared to hybrid at 24 farms

#### Season 2014-15:

- On Station trial of 60 cotton cultivars, 4 row plots with 2 reps on heavy soil & light soil
- On Farm trial of best 20 varieties and hybrids at 24 farms
- Multi-location trials of best 12 cultivars for heavy and light soil, respectively
- Multiplication of seed of best genotypes

### Participatory Cotton Breeding

#### Season 2011-12 till 2014-15:

- Single plant selection of F3 progenies of 5 *hirsutum* crosses by researcher, breeder and farmers in each generation till F6 generation before it is stable enough to enter cultivar evaluation trials

#### Season 2014-15:

- Single plant selection of F2 progenies of 15 new *G. arboreum* and 10 new *G. hirsutum* crosses developed at UAS Dharwad in Madhya Pradesh, Odisha and Karnataka

Table 1: Important traits identified by farmers at workshop in November 2013

Desirable Characteristics of cotton	21 male farmers	12 female farmers
Medium height (4 feet)	48%	8%
Large number of branches	29%	0%
Less space between 2 bolls	14%	0%
<b>Big boll size</b>	62%	75%
4-5 compartment per capsule	10%	17%
Deep roots	24%	33%
<b>Boll opening fully</b>	29%	83%
<b>Easy picking</b>	29%	67%
<b>Easy release of lint from bolls</b>	24%	50%
<b>Continuous flowering and flush</b>	43%	33%
Hairy leaf (less pest attack)	19%	0%
Strong stems	5%	0%
Early varieties	24%	25%
Proportionate foliage for flowers	24%	25%
No wilting problem	24%	8%
<b>Good germination</b>	38%	25%
Good fiber quality	24%	0%
<b>Less pest and diseases</b>	33%	50%

### First results

Male and female farmer identified characteristics of cotton which have been underestimated by breeders like the full boll opening, easy release of lint and easy picking (Tab. 1). This was of special importance for female farmers who are involved in the cotton harvest, while male farmers were more concerned about cotton boll size, medium plant height and good germination. Because of the higher labor demand for picking the tested *G. arboreum* cotton, these varieties were not approved by farmers despite their good yield and high fiber quality. Therefore selection for easy picking is an important trait to be considered during selection.

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