Participatory cotton breeding for organic and low input farming in India

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Organic cotton production currently takes place in 22 countries resulting in 241'697 metric tons of fibre and 1.1% of the global cotton production (Truscott et al. 2010). Up to 80% of world's organic cotton is produced in India. However, this market is threatened due to the displacement of traditional cotton species and cultivars by genetically modified (GM) hybrids selected for high input farming. Organic cotton farmers are facing increased difficulties in finding suitable cultivars in India (Nemes, 2010). Moreover, there is a big risk of physical and genetic contamination of organic cotton with GM cotton and the loss of locally adapted genetic resources. Therefore fast action is needed to re-establish a GM-free seed chain and breeding programs for cultivars suited for organic and low input farming conditions.

Participatory plant breeding (PPB) offers a great opportunity for developing locally adapted cultivars as well as for maintaining and increasing genetic diversity (Kotschi, 2010). The close collaboration of farmers with breeders and extension agents in variety development allows the identification of cultivars that suit the actual circumstances of the resource-poor farmers where marginal production systems prevail (Gemuchu and Muhammad, 2010). The main goals of this study are (i) to introduce participatory breeding approaches, (ii) to test improved cotton cultivars in smallholders' organic cotton fields and (iii) to gain information about the suitability of different types of cotton cultivars for organic and low input farming conditions in Central India. The study is conducted in collaboration with bioRe India an organic cotton producer and the University of Agricultural Sciences (UAS) Dharwad. Different types of cotton cultivars are tested in replicated field trials at the research station of bioRe India (on-station) and at farmers' fields (on-farm) of an established network of farmers involved in participatory technology development (PTD). In experiment I, the dominating tetraploid *G. hirsutum* hybrids are compared with *G. hirsutum* varietal lines, native diploid *G. arboreum* varieties and interspecific hybrids under high and low input conditions on-station to test for genoytype x management interaction. In experiment II, five *G. hirsutum* hybrids are tested by 20 organic cotton farmers of the PTD network in their fields representing different soil fertility levels. Evaluation and selection process of the farmers are accompanied by detailed farmer's interviews and comparison with data obtained from the on-station trial. In experiment III, 20 *G. hirsutum* varietal lines, 5 intraspecific *G. hirsutum* hybrids, 6 interspecific hybrids, 5 *G. arboreum* lines, and 5 *G. hirsutum* compact hybrids are tested under organic farming with two replication at one location to identify the advantages and disadvantages of the different types of cultivars under organic farming conditions. In experiment IV, F_2 progenies derived from five different *G. hirsutum* crosses will be tested for genetic segregation with respect of plant architecture and other characteristics on single plant basis under organic conditions. First results of the on-going experiments will be presented at the meeting.

Literature cited.

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