

Investigation on hybrid fitness for gene flow and germplasm conservation of cotton in the lake zone, Tanzania

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To increase cotton production, Tanzania is considering the introduction of Bt cotton, a genetically modified (GM) *Gossypium hirsutum* cultivar as an integrated pest management (IPM) strategy. GM crops pose environmental concerns warranting ecological risk assessment (ERA) be done prior to their introduction. National Biosafety regulations require ERA to be conducted prior to GM crop introduction. ERA inputs include baseline information on diversity and distribution of wild/feral relatives of cotton and reproductive mechanisms that Tanzania is presently lacking. It is revealed that *G. barbadense* is compatible to cultivated cotton and is widely distributed in Southern highland of Tanzania. This study aimed to investigate germplasm conservation strategy by communities; diversity and distribution of feral cotton in Lake Zone using a field survey and mapping, and establish hybrid fitness between cultivated *G. hirsutum* of Tanzania. This study aimed to investigate germplasm conservation strategy by communities, diversity and distribution of feral cotton in Lake Zone using a field survey and mapping, and establish hybrid fitness between cultivated *G. hirsutum* and feral *G. barbadense* through controlled hybridization to assess gene flow between the two species from parents to second filial generation (F₂). The field survey, identification and clustering revealed that *G. barbadense* is present in the Lake Zone area. In this area, the species is used as medicine, local fibre, border and ornamental plant suggesting that the species has social-economic value to communities. Morphological markers showed variation in *G. barbadense* plants collected in the Lake Zone suggesting interspecific hybridization with *G. Hirsutum*. Simple sequence repeats (SSR) markers confirmed the occurrence of natural hybrids between the two species. The fitness of F₂ hybrids was found to be near fit as their parents, suggesting that there is potential for gene flow between two species in the absence of appropriate management strategies.