IDT8-033 | Soil water conservation strategies effects on maize yields in farmer managed trials in the central highlands of Kenya

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Farmers in the central highlands of Kenya have experienced a decrease in crop yields in recent decades as a result of low water availability in the area, caused by low and erratic rainfall, low inherent water storage (by the soils) and poor water harvesting techniques. On-farm trials were set up to determine the effects of soil water conservation strategies (mulching (MC), tied ridging (TR) and minimum tillage (MT) on maize yields. The research was carried out in Mbeere South and Meru South sub-counties for four consecutive cropping seasons: short rains 2011, long rains 2012, short rains 2012, and long rains 2013. The experimental design was an incomplete randomized complete block design with the SWC treatments replicated four times and a control (CT) practised by each farmer. Data was subjected to analysis of variance using general linear model in SAS 9.2 and mean separation done using least significant difference at p=0.05. Compared with the CT, results showed that in Mbeere South grain yields significantly increased under TR and MC during LR12, SR12 and LR13 seasons. In Meru South, yields significantly increased under all the tested SWC strategies during SR11, LR12 and SR12 seasons. Maize grain yields were more stable under TR and MC, with residual variances of 0.107 and 0.183 Mg ha^{-2}, respectively in Mbeere South. Mulching, MT and TR strategies indicated yield stability with residual variances of 0.017, 0.039 and 0.155 Mg ha^{-2}, respectively, in Meru South. Findings highlight the importance of SWC strategies for stable maize yields.

IDT8-034 | Performance of marker assisted backcross breeding (MABC) elite chickpea lines under drought conditions in Kenya

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Drought is the most important constraint affecting production of chickpea and other crops as well. Quantitative traits like drought tolerance are multigenic and their inheritance is difficult to predict hence the need to explore more precise breeding techniques like maker assisted selection. The aim of this study was to introgress the identified root trait QTLs into Kenyan adapted cultivar to enhance drought tolerance through marker assisted backcrossing. Four varieties *Chania Desi* 1 (ICCV 97105), ICCV10, ICCV 92318, and *Saina K*1 (ICCV 95423) were selected as a recurrent parents for improvement among ten agronomically superior elite cultivars after exhibiting high polymorphism with SSR markers. Five molecular markers (CaM1903, CaM1502, TAA 170, NCPGR21 and GA11) were validated for use in MABC deployed in this study. Crosses were made between the four parents and ICC 4958 followed by marker screening of the F1 seedling progenies for the QTL of interest. Identified true heterozygotes were used as donors and backcrossed to the recurrent parent to obtain BC1F1 seeds. The process was repeated to obtain BC2F1 and finally BC3F1 with molecular marker identification of seedlings carrying the QTL region at each step. Results of evaluation in one trial site in Kenya semi-arid area (Koibatek ATC) of MABC lines for the four parents ICCV10 (24 lines), ICCV 92318 (8lines), ICCV 97105 (12 lines) and Saina K1-ICCV 95423 (10 lines) showed that the best progenies with higher levels of drought resistance and yield were ICCMABCD-21, 9, 20, 23, 15, 22, 5, 14, 16, 19 and 6 with yields > 2.5 tons/ha. The results indicated that it is possible to transfer QTL that confers drought tolerance using MABC. The best progenies are undergoing further evaluation to validate the contribution of the introgressed QTL in improving drought tolerance and yield.
Key words: Marker Assisted Backcross (MABC), Drought tolerance, Donor parent, Recipient parent, Quantitative trait loci (QTL)