IDT7-025 | Advances in groundnut breeding for drought prone West and Central Africa

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The West and Central Africa region accounts for more than 70% of the groundnut production in Africa. The crop is challenged by various biotic and abiotic production constraints with drought being the main abiotic constraint. ICRISAT has been working with national breeding programs to develop improved groundnut varieties. The approach used included identifying sources of resistance, developing populations, evaluating in target environments and releasing improved farmer preferred varieties for production. The Tropical Legumes project initiated in 2007 has been instrumental in strengthening the breeding program in the region. Nine drought resistant/tolerant accessions were identified from evaluation of the mini core collections, and these accessions have been utilized as parents in crossing programs. Since 2007, ICRISAT distributed more than 1000 advanced breeding lines to national programs. Farmer participatory variety selection was found very useful for fast track release and adoption of improved varieties. Twenty two varieties have been released/registered across the region as a result of project efforts (4 in Ghana, 5 in Mali, 4 in Niger, 3 in Nigeria and 6 in Senegal). These varieties are high yielding (yield advantage of >20%) with resistance or tolerance to drought and major diseases. Currently, efforts are underway to improve the efficiency of breeding programs and to enhance genetic gain. These include designing product pipelines based on traits of breeding interest; reducing generation advancement process of breeding populations by growing 2 to 3 generations per year; integrating modern genomic tools; digitizing data collection, analysis, management and sharing by using BMS; and enhancing the skills of breeders and technicians.

IDT7-026 | Pyramiding of mega effect multiple QTLs and development of 'climate-resilient rice'

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Changing climate scenario accelerated the frequent occurrence of abiotic stresses where drought and salinity remain the devastating stresses affecting rice production and productivity. Developing climate-resilient crop varieties are of foremost importance to combat the effect of abiotic stress in order to ensure food security. The present investigation focused on the development of resilient Improved White Ponni (IWP) pyramided with mega effect drought and salinity QTLs from Apo and FL478 respectively. Inter-mated (pseudo-backcrossing F_1) progenies were identified and forwarded to F_2 generation. Forty five superior lines were selected based on the grain parameter and genotyped using foreground SSR markers. F_3 lines were grown under Rain out shelter (ROS) where terminal drought was imposed. The F_3 lines *viz.,* F_3-IWP-900, F_3-IWP-853, F_3-IWP-157, F_3-IWP-848, F_3-IWP-172, F_3-IWP-839 and F_3-IWP-859, recorded higher spikelet fertility, higher grain yield and harvest index than the parents and check which indicated the pronounced effect of introgressed QTLs (*DTY 2.2*, *DTY 3.1* and *DTY 6.1*) on grain yield under drought. Under salinity stress (100 mMNaCl) the F_3 lines harboring *SalT* QTL were found to possess lesser sodium/potassium ratio than the non-*SalT* lines. Graphical genotyping revealed that the pyramided F_3 line was found to be higher (>80%) recurrent parent genome recovery with medium slender kernel with intermediate gelatinization temperature. The overall study revealed that, the genotypes *viz.* F_3-IWP-747- 301, F_3-IWP-747- 304, F_3-IWP-747-338, F_3-IWP-747-339 and F_3-IWP-900-1096 were found to possess all positive grain quality traits of Improved White Ponni and, in addition, they exhibited enhanced level of tolerance against drought and salinity stresses.