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Practical Application of Marker-assisted Selection for High-oleic Peanut Breeding Program

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[Introduction]

High-oleate content is an economically important trait among oilseed industry for its properties in oxidative stability and functionality whereas the analysis of fatty acids in peanut consists of tedious processes like homogenization and wet analysis. With the progress of molecular insight of high-oleate trait in peanut, the application of selection markers in breeding is now available. In this study, we analyzed the breeding lines in F2 generation and compared the efficiency between marker-assisted selection (MAS) and conventional method of high oleic peanut breeding.

[Materials and Methods]

Ten crosses between normal oleic and high oleic accession, from 128 to 544 F_2 seeds per cross, were analyzed in SNP genotyping. We sampled out 50-80 mg of disc using razor blade from the cotyledon of dried seed. Two KASP assays were used for genotyping the *ahFAD2* gene mutant in each genome, and high-throughput analyses from prep to calling were operated in Seed Industry Center (Gimje). Near-Infrared Spectroscopy, soxhlet extraction, methylation, and gas chromatography were used for analysis of oleic acid composition.

[Results and Discussion]

Out of 3,968 seeds from ten crosses of F_2 generation, 24.2% of sample showed the high-oleic mutant allele (aa) in *ahFAD2A* and 23.7% showed the mutant allele (bb) in *ahFAD2B* genotyping excluding 35 sample which were failed in calling. Samples showing high-oleic genotype in both genome was 4.5%. In the goodness-of-fit test, observed numbers of sample in each allele followed the expected segregation ratio showing independently inherited by single allele at two genome. Comparing MAS and conventional selection, MAS recorded only 8% of time, 45% of cost, and 15.6% of field dimension of the conventional method. Even though the application of MAS in high-oleate peanut associates the additional management of selected seeds and the embracing of undesirable-agronomic traits during F2, MAS for high oleate would be a cost and time-saving method which could accelerate the efficiency of selection.

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