Assessment of Genetic Purity of Commercially Cultivated Peanut Varieties in Ghana

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Simple Sequence Repeat (SSR) markers were used to determine the genetic purity of two commercially cultivated peanut varieties in Ghana using farmer-saved seeds. Twenty-eight farmer-saved seeds comprising twenty 'Chinese' and eight 'Yenyawoso' seeds, collected from farmers across five regions of the country were assessed in this study. A sample of the 'Chinese' variety collected from CSIR-SARI while samples of the 'Yenyawoso' variety collected from CSIR-SARI and CSIR-CRI, were used as the controls for this study. DNA was extracted from 10 individual plants of each sample and bulked for PCR amplification. After screening 25 pairs of SSR markers for their ability to discriminate between the two varieties, 4 polymorphic primer pairs were subsequently selected to test for genetic purity. Amplified products from 5µl of the PCR reaction were separated by a 6% polyacrylamide gel electrophoresis run for 75 minutes at 80 V and 300 amh. After electrophoresis, the gels were stained with ethidium bromide (10 mg/ml) for 30 minutes and visualized using an Alpha Imager TM 2200 gel documentation system. All genotypes were scored for the presence (1) and absence (0) of SSR bands manually and the band scores were used to generate a similarity data matrix using Simple Matching (SM) coefficient. Subsequently, the pair-wise similarity coefficients were used to construct a dendrogram following the unweighted pair-group method with arithmetic average (UPGMA) in NTSYS-pc version 2.20v. The Sequential Hierarchical and Nested (SAHN) method was adopted. Genetic similarity values ranged from 43% to 100%. Overall, cluster analysis put the seed lots into one group at 43% similarity but subsequently separated them into two clusters at 60% coefficient of similarity. At 60% similarity index, the 2 'Yenyawoso' seed lots from SARI and CRI were grouped in a cluster along with 8 farmer-saved 'Yenyawoso' seed lots and 1 farmer-saved 'Chinese' seed lot. Similarly, the 'Chinese' seed lot obtained from SARI, 19 farmer-saved 'Chinese' seed lots and one 1 farmer-saved 'Yenyawoso' seed lot were grouped in one cluster. Out of the 20 seed lots reported by the farmers to be the 'Chinese' peanut variety in this study, only 5 were found to be 100% genetically similar to the reference 'Chinese' seed in Cluster I. With regards to 'Yenyawoso' farmer-saved seeds, only 2 of them were found to be 100% similar to the reference 'Yenyawoso' seed samples in Cluster II. The results showed that there is a significant deterioration in the genetic purity of these two peanut varieties in the hands of farmers.