VARIABILITY OF GREATER YAM (*Dioscorea alata* L.) CULTIVARS IN MALAYSIA

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To my beloved family, friends and to those who had been involved in making this thesis a success

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Dioscorea alata L. or greater yam is one of the old and highly variable tuber crop in Malaysia. Genetic variation of this species is poorly documented, which is becoming a hindrance in optimizing the use of its genetic resources available in this country. Hence, a study on the assessment of the morphological traits and molecular marker variations in the germplasms of *D. alata* collected in Malaysia was carried out in order to identify the most variables characters and to assess the genetic relationship among the variants.

Seventy accessions of *D. alata* germplasm collected from nine states in Malaysia were maintained at the experimental plot in KUSTEM for morphological analysis and RAPD marker study. Forty seven morphological variables and fifty seven polymorphic RAPD bands were recorded and subjected to the computer for principal component (PC) and cluster analysis (CA) study.

All together, eighteen morphological characters which are having correlation coefficient values > 0.6 in the principal components (PCs) with eigenvalues ≥1.0 were identified as the significant character and subsequently used in distinguishing groups of *D. alata* variants. The result of PCA analysis indicated that the most variable characters in yam germplasm were mostly associated with tuber shape and the flesh colour. The two-dimensional plot of the first two PCs showed a clear separation between accessions of the purple tuber and those of the white tuber groups. In the CA study, the dendrogram of taxa relationship constructed from the Jaccard's similarity coefficient through UPGMA revealed four major clusters of *D. alata* at the dissimilarity distance = 6.54.

Result of RAPD study revealed eight primers, namely OPB-07, OPD-03, OPG-02, OPG-03, OPG-05, OPG-06, OPG-08 and OPG-13, out of twenty primers tested that are capable producing RAPDs amplification. The two-dimensional scatter plot of the first two PCs, clearly indicated the separation between the purple tuber cultivars from the white tuber cultivar along the first PC. This dispersion is highly associated with the RAPDs marker identified as OPB-07.1500bp, OPG-02.3000bp, OPG-02.2625bp, OPG-02.2375bp, OPG-02.1275bp, OPG-03.966bp, OPG-05.1073bp, OPG-06.3250bp, OPG-06.966bp, OPG-06.650bp, OPG-06.450bp, and OPG-03.1031bp. Meanwhile the characteristics related to the tuber shapes and sizes are dispersed along the second PC which was highly associated with the marker identified as OPG2.800bp and OPG13.2500bp. The CA of the RAPD data has revealed a dendrogram containing four groups of *D. alata* accessions.

The result of this study exhibited that *D. alata* germplasms in Malaysia consists of numerous genotypes that need to be evaluated for utilization in genetic improvement of the crop. It was found that the cultivated *D. alata* in Malaysia could be divided into several groups according to the tubers shape and flesh colour. The presence of vast genetic resources of *D. alata* in Malaysia would provide a better prospect in promoting the use of *D. alata* genetic resources in this country.