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Agro-Morphological Traits Based Genetic Diversity Analysis of 'Ethiopian Dinich' Plectranthus edulis (Vatke) Agnew Populations Collected from Diverse Agro-Ecologies in Ethiopia

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Abstract : 'Ethiopian dinich' also called 'Ethiopian potato' is one of the economically important 'orphan' edible tuber crops indigenous to Ethiopia. We evaluated the morphological and agronomic traits performances of 174 samples from Ethiopia at multiple locations using 12 qualitative and 16 quantitative traits, recorded at the correct growth stages. We observed several morphotypes and phenotypic variations for qualitative traits along with a wide range of mean performance values for all quantitative traits. Analysis of variance for each quantitative trait showed a highly significant ($p<0.001$) variation among the collections with eventually non-significant variation for environment-traits interaction for all but flower length. A comparatively high phenotypic and genotypic coefficient of variation was observed for plant height, days to flower initiation, days to 50% flowering and tuber number per hill. Moreover, the variability and coefficients of variation due to genotype-environment interaction was nearly zero for all the traits except flower length. High genotypic coefficients of variation coupled with a high estimate of broad sense heritability and high genetic advance as a percent of collection mean were obtained for tuber weight per hill, number of primary branches per plant, tuber number per hill and number of plants per hill. Association of tuber yield per hectare of land showed a large magnitude of positive phenotypic and genotypic correlation with those traits. Principal components analysis revealed 76% of the total variation for the first six principal axes with high factor loadings again from tuber number per hill, number of primary branches per plant and tuber weight. The collections were grouped into four clusters with the weak region (zone) of origin based pattern. In general, there is high genetic-based variability for 'Ethiopian dinich' improvement and conservation. DNA based markers are recommended for further genetic diversity estimation for use in breeding and conservation.

Keywords : agro-morphological traits, Ethiopian dinich, genetic diversity, variance components
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