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Molecular characterization and assessing genetic diversity of potato (*Solanum tuberosum*) accessions

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Potato (*Solanum tuberosum* L) is one of the most important and widely grown vegetable crops in Eritrea contributing significantly to food security. Despite its importance, no study has been undertaken to understand their genetic diversity and hence the present study was proposed. A total of 63 potato accessions from Eritrea, 24 from Kenya and 13 from Rwanda were characterized using a set of 12 highly polymorphic SSR markers. Freshly harvested leaves were used for DNA extraction. Allelobin yielded a total of 91 alleles with an average of 7.83 alleles per marker. 97.8% of the markers were polymorphic with an average PIC value of 0.80 (0.41-0.93). Samples from Eritrea showed highest genetic diversity as explained by the diversity index (h). The first three axes of PCoA analysis explained a cumulative of 27.29% variation among the population. AMOVA indicated that about 90% of the variation was within population while the rest 10% variation was observed among populations. The cluster analysis generated three classes corresponding to the PCoA findings. Cluster I consists of 25 accessions, Cluster II consists 29 accessions while cluster III consisted of 46 accessions with 4 sub clusters. It was noted from the current study that microsatellites markers are efficient for characterization and analyzing genetic distances between potato cultivars. Cluster II and III corresponded to the late emerging and intermediate maturing groups as identified from morphological study. A combination of the morphological and molecular characterization will help to understand the genetic distances between accessions and make concrete and informed decision.

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Deciphering selenium mediated physiological and biochemical mechanisms for improving drought tolerance in wheat

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Drought stress is a major environmental problem that severely restricts plant distribution and crop production worldwide. Water shortage, due to frequent droughts requires future farming and food systems to be better adapted to a range of environmental stresses. Selenium (Se) is considered an essential element for humans, animals and plants. The notion that Se helps to protect plants against abiotic stresses needs to be further explored by addressing the question of whether improved stress tolerance is directly due to regulation of various physiological and biochemical mechanisms by Se. The study was planned to evaluate the effects of exogenous Se supply in wheat under drought stress conditions. We report that Se mitigates drastic effects of water stress through maintenance of turgor, enhanced gas exchange characteristics, accumulation of osmoprotectants and increased activity of antioxidant machinery. The detection by ICP-OES showed that Se regulated processes facilitated the uptake of nutrients such as iron (Fe), potassium (K), zinc (Zn), magnesium (Mg), sodium (Na) and calcium (Ca) that ultimately improved the yield and quality of wheat grains under water deficit conditions. Moreover, the experiments with different methods of exogenous Se supply viz., Se seed priming, fertigation and foliar spray demonstrated that seed priming is only effectual at early stages of crop growth, whereas Se foliar spray is the most effective method for Se translocation and accumulation within water stressed wheat plants. These data suggest the usefulness of Se in improving drought tolerance in crop plants.

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