In vitro Mutagenesis of Sweet Potato (Ipomea batatas) Using Colchicine for Crop Improvement

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This study addresses Indonesia's demand for healthy and nutritional food supply by improving the productivity of sweet potato plants. Beta-carotene, anthocyanin, potassium, and vitamin C are impactful compounds that help reduce uric acid levels and are all found in sweet potatoes. This study involves the mutation induction of colchicine via in vitro culture to modify the plants genetically and morphologically. The resulting in vitro plants were acclimatized in soil media, then transferred to a field for four months. The mutation induction of colchicine in vitro resulted in six different sweet potato mutants: four red sweet potato mutants and two purple sweet potato mutants, with increased yield, genetic, and morphological changes. From the genetic aspect, results identified by the random amplified polymorphism DNA (RAPD) Technique suggest that the colchicine treatment indeed affected the plant’s genetic characteristics. Furthermore, the DNA cluster analysis presents samples from the treated plants that were mostly separate from their control. However, ploidy levels seem to be unchanged. From the morphological aspect, results show that the stomata number can increase from six to twelve. Moreover, results found that the tuber weight of the treated red sweet potatoes increased from 110 g to 755 g and purple sweet potatoes increased from 325 g to 520 g. Therefore, it is proven to successfully improve the productivity of sweet potatoes. Furthermore, the potential for further development of new high-yielding sweet potato varieties through plant propagation and testing of yield stability, exists in both red and purple sweet potato mutants.

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