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APPLICATIONS OF IN VITRO MUTAGENESIS FOR ENHANCING AGRO BIODIVERSITY FOR ADAPTATION TO CLIMATE CHANGE IN VEGETATIVELY PROPAGATED CASSAVA

Mutation induction has been a routine tool for the generation of genetic variation in crop germplasm and has played a significant role in plant breeding. Spontaneous mutations, which occur at a low frequency, can be enhanced using both in vivo and in vitro techniques in combination with physical and chemical mutagenesis. In vegetatively propagated plants, mutagenesis can be performed in vivo on different types of explants (stem, bulbs, tubers, corms, and rhizomes) as well as on in vitro explants/cells. Developments in in vitro mutagenesis have greatly improved the effectiveness of mutation induction and screening in vegetatively propagated crops. For example, in cassava, to identify the best in vitro mutagenic systems, we have tested different explants, such as stem cuttings, apical and axillary buds, embryogenic callus and suspension cells and found that embryogenic calli are the most suitable in generating non-chimeric mutants. We have used immature leaflets, to obtain embryogenic calli. These calli were irradiated and allowed to recover for about 4-5 weeks (M1V0). Pro-embryo proliferation occurred on the irradiated embryogenic calli (M1V1). These were sub-cultured in new medium every 3 weeks to obtain the M1V2 generation. Successive rounds of isolation and sub-culture (M1V3 - M1V5) were performed to reduce genotypic heterogeneity and the well-developed somatic embryos were transferred to a medium for plantlet formation. Well-developed rooted plants were transferred to the greenhouse for mutant screening/confirmation. A well-defined (validated and step by step process) protocol for in vitro mutation induction using irradiation, in cassava was developed. This system can be adapted for in vitro mutagenesis for wider application, including enhancing agro biodiversity for adaptation to climate change in other vegetatively propagated crops such as banana.

Country or International Organization

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