IMPROVEMENT OF CASSAVA FOR RESISTANCE TO INSECT PESTS AND DISEASES

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Abstract

The African cassava mosaic virus and cassava mealybug are devastating the cassava crop in Uganda. Because of the severe and widespread occurrence of the virus and mealybug, *in vitro* cultured cassava plantlets instead of stem cuttings will be irradiated. In addition, the project has incorporated sweet potato. Installation of tissue culture laboratory at Namulonge was completed in early 1993. Work is in progress to establish efficient *in vitro* culture micropropagation techniques for the two crops. Small numbers of cassava plantlets of varieties 'TMS 30337' and 'TMS 4(2)1425' and sweet potato entry 39 are *in vitro* culture. Mass irradiation of plantlets is planned in future.

1. INTRODUCTION

Root and tuber crops continue to play a major and increasing role as basic food crops in Uganda. However, the crops have major production constraints. During the last three or four years, the status of pests has changed dramatically, especially in cassava. Although, green spider mite, *Mononychellus tanajoa* Bondar and cassava bacterial blight (CBB) are important (2,3,4), more attention is being given to African cassava mosaic virus (ACMV) and cassava mealybug *Phenacoccus manihoti* which are almost devastating the crop. The objective of the conventional cassava breeding is to select for resistance to ACMV by screening local and introduced breeding populations. In addition, the release of two natural enemies of the mealybug, *Epidinocarsis lopezi and Hyperaspis notata* was started in April 1992. Because of the high severity and widespread occurrence of ACMV and the presence of the mealybug, it was decided to use *in vitro* cultured plantlets as starting material for irradiation. Installation of the tissue culture laboratory was completed early 1993. Currently work is in progress to establish *in vitro* culture micropropagation techniques of cassava and sweet potato. Following the change in work plan the current objectives are: 1. To establish efficient micropropagation protocols of cassava and sweet potato, and 2. To induce genetic variation in cassava and sweet potato by X-ray irradiation of *in vitro* cultured plantlets for selection to pest and disease resistance in cassava and desirable root traits in sweet potato.

2. MATERIALS AND METHODS

Surface sterilization of two cassava varieties 'TMS 30337' and 'TMS 4(2)1425' and sweet potato entry 39 was done using a range of concentrations (10-80% V/V) of locally available sterilizing agents (Parazone, Domestos and Jif). Explants of deleafed, 1-3 nodded cuttings, grown in the screen house, were dipped in 70% alcohol for 2-5 seconds, rinsed in sterile distilled water and then soaked in the sterilizing agents with a few drops of Tween 20

for 10 to 30 minutes. The explants were rinsed three times in sterile distilled water. The explants were cultured on Murashige and Skoog medium (1) containing 3% sucrose and supplemented with 0.05 mg/l benzylaminopurine (BAP) and 0.01 mg/l naphthalene acetic acid (NAA) for cassava and 0.05 mg/l BAP for sweet potato. The pH was adjusted to 5.8 and the medium was solidified with 0.8% Difco-Bacto Agar. The cultures were maintained at about 27 °C under 16 h day length.

3. RESULTS AND DISCUSSION

Only a small numbers of plantlets of 'TMS 30337' and 'TMS 4(2)1425' and sweet potato entry 39 were produced *in vitro*. The main problem has been contamination of the cultures, frequently reaching 100%, especially in sweet potato.

Future plans

1. The material for irradiation will be *in vitro* culture plantlets, not mature stem cuttings as planned initially.

2. Establish efficient techniques for virus elimination by thermotherapy (35-38°C for 30-40 days) and culture apical meristem for micropropagation.

3. Carry out radio-sensitivity test on cassava 'TMS 30337' and 'TMS 4(2)1425' and sweet potato entry 39 by X-ray irradiation using 0, 1, 2, 3, 4, 5 krad on 4 plantlets per treatment to give 20 single node cuttings/treatment, and

4. Mass irradiate *in vitro* cultured plantlets after establishing optimum dose and subculture M_1V_1 through M_1V_5 plantlets.

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