



Institute of Crop Science
Crop Physiology of Specialty Crops

Master's thesis

Effects of natural cytokinins on the efficacy of macro-propagation techniques in plantain

Supervisor:

Prof. Dr. Jens Wünsche
Prof. Dr. Folkard Asch

Written by

Paul Melichar
Weißdornweg 13
33617 Bielefeld
melichar@uni-hohenheim.de
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Abstract

Three experiments were conducted to ascertain the effect of cytokinin containing treatments obtained from coconut water on the proliferation rate of plantain (*Musa* spp. 'AAB') under two macro-propagation techniques. These experiments were conducted from June to November 2014, in humidity chambers at the research fields of the CSIR-Crops Research Institute in Kumasi, Ghana. Two major plantain cultivars 'Apantu' and 'Oniaba' were used for the studies. The cytokinin containing treatments were coconut water (CW), unripe papaya blended in coconut water (CWP), coconut flesh blended in coconut water (CWF), unripe papaya and coconut flesh blended in coconut water (CWFP) and Benzylaminopurine (5×10^{-3} M; BA). These treatments were applied to plantain corms in comparison to the control (corms without any hormonal treatment). In the first experiment, corms of sucker plants of 'Apantu' were subjected to the PIF (Plantlets obtained from stem fragments) technique, where the leaf sheaths are removed and apical dominance is broken by a cross-cut through the apical meristem. Corms were immersed into the treatments for 30 min or 60 min. In the second experiment, corms of mother plants of 'Apantu' were subjected to the decorticated corm technique, where the leaf sheaths are removed, and immersed into the treatments for 60 min. In the third experiment corms of sucker plants from the cultivars 'Apantu' and 'Oniaba' were subjected to the PIF technique and the apical meristem was drilled, creating cavities into which 8 ml of the treatments were applied. The experiments were laid in a randomized complete block design (RCBD). Parameters such as number of plantlets, number of manipulated plantlets, days to plantlet emergence, number of roots, plantlet height, girth and chlorophyll content of leaves were taken and analyzed using ANOVA. Significant differences were not observed with regards to the number of plantlets obtained from corms in the first two experiments and the growth parameters. Significantly more plantlets were obtained from 'Apantu' ($\mu=19.2 \pm 1.3$ s.e) than 'Oniaba' ($\mu=10.8 \pm 1.4$ s.e.) in the third experiment. The cultivar-treatment interaction was significant in terms of days to emergence of the first plantlet. Only CW and CWF of 'Oniaba' emerged significantly earlier than the cultivar specific control. The differences between mean emergences of plantlets ranged within 7 days, while harvesting was done on a weekly basis. The macro-propagation techniques, notably the PIF technique, were found as good means for rapid plantlet production of good quality. Cytokinins can increase plantlet production, but the application needs to be further improved.

Keywords: cytokinin coconut water decorticated PIF meristem humidity chamber papaya plantain macro-propagation