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Sweetpotato Weevil Resistance in Sub-Saharan Africa: a Viable Mechanism for Reducing Cylas Damage

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Abstract

Sweetpotato (*Ipomoea batatas,* L) is the third most important crop in Sub-Saharan Africa contributing significantly to food security, nutrition and income. Weevils, *Cylas* spp., are the most important insect pest of the crop. The weevils damage both vines and roots, causing unacceptable odour, discoloration, and bitter taste making them unfit for consumption. Depending on conditions, weevils can cause complete losses of the harvestable crop. Host plant resistance seems to be the only viable option for management of the pest. Studies in Uganda reveal existence of active resistance in some sweetpotato genotypes. Field and laboratory experiments show that clones HMA 519, ARA 230, LIR 302, APA 356, ARA 228, RAK 865 (local), and New Kawogo (improved), have varying levels of resistance compared to the susceptible varieties NASPOT1, Kakamega, and Tanzania. The resistant clones were evaluated for field resistance against the susceptible checks; root and vine damage was less in the resistant clones. No-choice bioassays using roots conducted in the laboratory to show that feeding and oviposition was less on the resistant clones indicating that the observed field resistance was not simply escape. The resistance has been linked to some hydroxycinnamic acid esters which occur in higher concentrations in the roots of resistant compared to the susceptible clones. The compounds were extracted from the roots, analysed and synthetic derivatives used to conduct toxicity & deterrence tests. Different concentrations (0.001, 0.01, 0.1mg/ml) of synthetic derivatives of the compounds were applied to the root surfaces of the susceptible variety (NASPOT 1) and showed that weevil species from both Uganda and Malawi fed less and laid fewer eggs on the treated roots compared to the untreated ones confirming the activity of the compounds against weevils. Preliminary studies indicate that the compounds have an additive effect with Cry7a proteins which are the target for the development of clones transformed with the Bt toxin. The findings have important implications for the breeding program in Uganda and will be used to map QTLs in segregating populations from a cross between the US variety Beauregard and the Ugandan variety New Kawogo.

Keywords: *Cylas spp*, Hydroxycinnamic acid esters, resistance, sweetpotato varieties, weevil damage.