

A Chemical Basis for Resistance in Sweetpotato *Ipomoea batatas* to the African Sweetpotato Weevil *Cylas puncticollis*.

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Abstract Sweetpotato (*Ipomoea batatas* (L.) Lam.) is a staple food crop in Africa. Sweetpotato weevils *Cylas brunneus* and *C. puncticollis* feed on the roots reducing product quality and marketable yield and are the single most important production constraint for sweetpotato. Root pests are difficult to manage with pesticides but host plant resistance offers an alternative pest management option. Farmers in Uganda report New Kawogo to be a resistant variety and studies reported here support this. Feeding punctures, oviposition and droppings were all lower on New Kawogo than a susceptible variety, Tanzania. Larvae also had shorter development periods on Tanzania. LC-MS analysis of the sweetpotato latex revealed higher levels of octadecyl and hexadecylcinnamate esters in New Kawogo. The compounds were synthesised to confirm identifications and incorporated into artificial diets for bioassays on *C. puncticollis*. High levels of mortality and developmental inhibition were recorded for larvae feeding on treated diets and the effect was dose dependent. In contrast to previous work on resistant African sweetpotato cultivars, resistance in New Kawogo appears to be more than simply escape; rather it is active, quantifiable and manageable for breeding. The inheritance of the root latex esters needs to be studied in new crosses, and mapped in new populations using QTLs being developed.

Keywords: Hexadecylcinnamic acid, caffeic acid ester, coumaric, root latex, *Ipomoea batatas*, *Cylas brunneus*, resistance.

INTRODUCTION

Sweetpotato (*Ipomea batatas* (L.) Lam.) is an important crop in East Africa where it is grown as a staple food. For some farmers the crop supplements family income and thus strategies to reduce losses to pests and diseases provide opportunities to enhance food security and improve livelihoods. In Africa the sweetpotato weevils *Cylas puncticollis* Boheman and *C. brunneus* Fabricius are the major production constraints whereas in North America *C. formicarius elegantulus* (Summers) is the major pest (Chalfant *et al.*, 1990). Technologies to manage weevils would boost production dramatically and impact positively on the livelihoods of millions of poor farmers across sub-Saharan Africa.

One approach that has been targeted is host plant resistance. Progress in breeding varieties with resistance to *C. puncticollis* and *C. brunneus* has, however, been slow (Taleker, 1987) largely due to the scarcity of varieties with significant levels of resistance. Where cultivar differences in susceptibility to *Cylas* spp. were observed (Stathers *et al.*, 2003a) the mechanism was reportedly escape. Specifically, the depth of roots, and tendency of shallow swollen roots to crack dry soil and so provide access for the insects were reportedly correlated with a root's tendency to be infested (Stathers *et al.*, 2003b).