Anthonomus santacruzi Hustache (Curculionidae), a new biological control agent for bugweed, Solanum mauritianum Scopoli, in South Africa, poses no risks to cotton production

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Management of the invasive South American tree, Solanum mauritianum Scopoli (Solanaceae) (bugweed, woolly nightshade), in South Africa will be greatly enhanced by the establishment of florivorous agents that reduce the weed’s excessive levels of fruiting (Olckers 1999). The flowerbud-feeding weevil, Anthonomus santacruzi Hustache (Curculionidae), was proposed for release in South Africa in 2003, based on host records and observations in its native range and on four years of host-specificity testing in quarantine in South Africa (Olckers 2003). During the review process, the South African cotton industry expressed concerns about possible risks posed by the weevil to cotton production (S.W. Broodryk, pers. comm.). This was because a related species, Anthonomus grandis Boheman (boll weevil), constitutes a major pest of cotton, Gossypium hirsutum L., (Malvaceae), in the Americas, but does not occur in South Africa and thus has a high quarantine priority. Earlier host-specificity tests were focussed on plants in the family Solanaceae and did not include cotton, since A. santacruzi and A. grandis are reportedly restricted to host plants in the families Solanaceae and Malvaceae, respectively (Cross et al. 1975; Clark & Burke 1996). As a precaution, the cotton industry requested that two non-transgenic cultivars (i.e. susceptible to insect pests in general) be tested to confirm that the crop is not susceptible to A. santacruzi. This paper discusses the results of these additional trials and their implications for the release of A. santacruzi in South Africa.

The culture of A. santacruzi was maintained in the quarantine laboratory of the Cedara Weeds Unit (ARC-Plant Protection Research Institute, Hilton, KwaZulu-Natal) as described previously (Olckers 2003). Additional host-specificity tests were carried out in 2004 and involved exposure of the weevils to two cultivars of non-transgenic cotton, Tetra and CA223. Two series of no-choice tests were used to determine the susceptibility of cotton to feeding by A. santacruzi. Because of the initial delay in flowering by the cotton plants and because the weevils can survive on non-floral material, notably apical leaflets and shoot tips, for several months (Olckers 2003), the first series of tests was carried out using potted plants with no floral material. The plants were covered with cylindrical plastic sleeves which were fitted into the pots and sealed with gauze tops. Ten adults were confined on each of the two cotton cultivars, and S. mauritianum as control, for three days and adult survival and foliar feeding damage (number of feeding scars) was recorded. Each plant species was tested on three separate occasions.

The second series of no-choice tests was carried out with bouquets containing flowers, mature and immature flower buds, and apical leaflets and involved the same plant species tested above. Bouquets were placed in glass vials filled with water and presented to the weevils in 4-litre plastic containers fitted with gauze tops. Ten reproduc-tively-active weevils were confined on the bouquets for three days. At the end of each trial, the number of feeding scars on the leaves was recorded and the flowers and flower buds were transferred to Petri dishes to allow the immature stages to complete their development. After 4–5 days, the floral material was dissected to record feeding and oviposition and developing larvae were transferred to fresh flower buds of the species on which oviposition occurred. Fresh flower buds were provided when necessary for the duration of larval development. Each plant species was tested on three separate occasions.

Finally, paired-choice tests involving potted plants of S. mauritianum and G. hirsutum cv. Tetra were carried out in cages (60 cm × 60 cm × 80 cm). The cotton plants contained floral material while the S. mauritianum controls had all their floral material removed to provide a more conservative assessment of host selection. Twenty reproduc-tively-active weevils were added to the cages and