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Figure 1: Coffee bean weevil adult and larva Figure 2: Coffee bean weevil larva Figure 3ab: Coffee bean weevil larva entering fruit at the calyx

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The first report of CBW infesting citrus in Southern Africa was in 1992, in Tambankulu, Eswatini.

Eggs are most often laid underneath the fruit calyx, where hatching larvae then enter the fruit, leading to conspicuous premature abscission of fruit (**Figure 3**). Upon inspection of fallen fruit, the penetration hole and larvae can be seen inside the abscission zone. The larvae will feed on the albedo and pulp of the orange and complete their life cycle in the fruit (**headline image**). The presence of CBW in citrus will result in the fruit being destroyed, either due to direct damage to the fruit by the weevil – often leading to fruit drop – or the larvae being mistaken for lepidopteran larvae by scouts or inspectors at the packhouse (Grout et al., 2001). If the fruit does not drop in the field, infestation sites on the fruit appear as dry, brown patches and if the beetle has emerged, there will be a conspicuous hole in the fruit. These infestation sites seldom rot like those caused by false codling moth (FCM) or fruit flies.

PHOTOS: TIM GROUT | b-c: DAVID TAYLOR

Figure 4: Differences between beetle larvae and lepidopteran larvae. Image a: The coffee bean weevil larvae with the characteristic C-shape. Image b: False codling moth larva, and Image c: Carob moth larva, showing the elongate shape of lepidopteran larvae.

The misidentification of CBW larvae as lepidopteran larvae is a common mistake, and one that can be easily rectified to avoid unnecessary culling of fruit (Grout et al., 2001). A reliable diagnostic feature characteristic of the CBW larva (and other beetle larvae), is the distinctive C-shape of the body (Butel & Lawrence 2011). When larvae are removed from the fruit and placed on a flat surface, the larva will curl into this characteristic C-shape, assuming a grub-like appearance, whereas lepidopteran larvae will remain elongated and often crawl away (**Figure 4**).

It is important for growers to be aware of an apparent increase in infestation of citrus fruit by CBW around SA, and to avoid misidentification of the weevil.

References:

Alba-Alejandre, I., J. Alba-Tercedor, and F.E. Vega. 2018. Micro-CT to document the coffee bean weevil, *Araecerus fasciculatus* (Coleoptera: Anthribidae), inside field-collected coffee berries (*Coffea canephora*). Insects. 9 (100): 1-9.

Butel, R.G., and J.F. Lawrence, 2011. Chapter 4: Coleoptera, Morphology. In: Kükenthal, W., Beier, M., Fischer, M., Helmcke, J.G., Starck, D and Wermuth, H. *Handbook of Zoology, A Natural history of the Phyla of the Animal Kingdom*. Walter de Gruyter, Berlin, New York.

Childers, C.C. 1982. Seasonal attack patterns on "Hamlin" orange by the coffee bean weevil (Coleoptera: Anthribidae) in Florida. *Florida Entomologist*. 65 (1): 136-143.

Childers, C.C., and Woodruff, R.E. 1980. A bibliography of the coffee bean weevil *Araecerus fasciculatus* (Coleoptera: Anthribidae). *Entomological Society of America*. 26 (3): 384 - 394.

Grout, T.G., G.J. Begemann, and P.R. Stephen. 2001. Monitoring and control of the coffee bean weevil, *Araecerus coffeae* (Coleoptera: Anthribidae), in Southern African citrus orchards. *African Plant Protection*. 7 (2): 67-72.

Yang, S., X. Mei, X. Zhang, Y. Li, D. She, T. Zhang, and J. Ning. 2017. Attraction of coffee bean weevil, *Araecerus fasciculatus*, to volatiles from the industrial yeast *Kluyveromyces lactis*. *Journal of Chemical Ecology*. 43: 180-187.

The misidentification of CBW larvae as lepidopteran larvae is a common mistake that can be easily rectified to avoid unnecessary culling of fruit.

Fruit infested with a coffee bean weevil larva

PETER STEPHEN

SPILLING THE BEANS

The coffee bean weevil on citrus

The coffee bean weevil was first reported to feed on citrus in 1885. By **Tamryn Marsberg**, **Sean Moore**, **Wayne Mommsen** and **Tim Grout** (CRI, Gqeberha)

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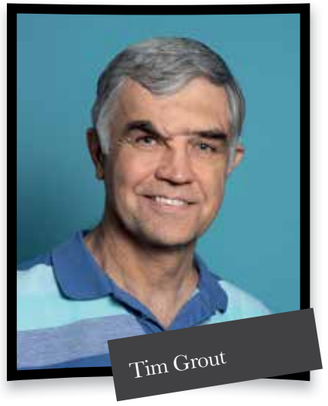

Tim Grout

Araecerus fasciculatus (Coleoptera: Anthribidae), commonly known as the coffee bean weevil (CBW), is a cosmopolitan pest of stored tropical and subtropical produce (Grout et al., 2001; Yang et al., 2017). CBW has a global distribution and has been known to infest over 100 different host plants (Alba-Alejandre et al., 2018). Common stored produce hosts include maize, coffee beans, cassava, sweet potatoes and dry ginger. CBW has also been recorded to infest citrus and sugar cane (Yang et al., 2017).

The adult CBW is approximately 4 - 5 mm long (**Figures 1**). The female weevil will insert a single egg 1 - 2 mm deep into a food source and in some cases has been known to oviposit six eggs at a time (Figure 3). The larva will emerge and complete its life cycle, which consists of five instars in the fruit, feeding on the albedo, pulp and seeds (**Figures 1 and 2**) (Alba-Alejandre et al., 2018). Depending on the temperature and type of produce, CBW can have between eight and 10 generations per year (Alba-Alejandre et al., 2018).

CBW was reported to feed on citrus in 1885, when larvae and adults were collected from dried oranges in Jacksonville, Florida in the USA (Childers 1982). However, it wasn't until the 1970s that citrus growers became concerned about CBW infestation. In 1971, fruit from an orchard of "Hamlin" oranges in Lake County, Florida, were reported to be infested with CBW. Subsequently, CBW extended its cultivar palate to Washington Navels, Valencias, pineapple, oranges and Marsh grapefruit (Childers & Woodruff 1980; Childers 1982). CBW was never considered as a primary pest of citrus but sporadically caused significant incidental damage in many orchards (Childers & Woodruff 1980).

The first report of CBW infesting citrus in Southern Africa was in 1992, in Tambankulu, Eswatini, where weevils were found in hail-damaged fruit (Grout et al., 2001). Further reports recorded CBW becoming problematic in citrus orchards in the Mpumalanga lowveld of SA (Grout et al., 2001). CBW was not reported outside of this region until recently. Since 2018 infestation of citrus by CBW has been reported periodically in the Sundays River Valley in the Eastern Cape, Letsitele in Limpopo, and elsewhere in the country.

Traditionally, female CBW have been found most likely to oviposit eggs in damaged citrus fruit (Grout et al., 2001). During a study conducted by Childers in 1982, there was a correlation between the number of split fruit and numbers of CBW adults. However, females have also been recorded to oviposit on clean fruit (Grout et al., 2001). Of late, Incidents of CBW infestation in citrus seem to have become more common and widespread, with more occurrences appearing to be primary, rather than secondary infestation.