

A new parasitoid species attacking carob moth in South Africa

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In South Africa, carob moth, *Ectomyelois ceratoniae*, is considered a minor pest on pomegranates (Giliomee and Barnes 2015), macadamia (Schoeman and de Villiers 2015), pecans (Fig. 1A), and citrus (Fig. 1B). Carob moth is usually only a pest on citrus where there are high levels of honeydew-producing insects such as mealybugs, or their residues (Catling 1970, Grout and Moore 2015), where there are favoured hosts, such as oak trees (acorns) in close proximity, or where the citrus fruit are already injured (Grout and Moore 2015).

There are a number of natural enemies of carob moth reported, including egg parasitoids, larval parasitoids, pupal parasitoids, and predacious species (Perring et al. 2015 and references therein). In South Africa only one species of parasitoid has been recorded: *Phanerotoma ornatulopsis* de Saeger, 1942 (Hymenoptera: Braconidae), which was reared from infested acorns in the Citrusdal area of the Western Cape (Honiball & Catling 1998). In this study, carob moth larvae were collected in 2015 and 2016 in the Loskop Valley (Mpumalanga, South Africa) and Vaalharts (Northern Cape, South Africa) from both citrus and pecan nuts. In the

laboratory larvae were placed individually onto artificial diet (Cox 1979; Thackeray et al., 2017) and left until either a parasitoid emerged, an adult carob moth eclosed or the larva died.

The lowest level of parasitism was recorded from the Loskop Valley ($2.16\% \pm 1.16$), which was significantly lower than parasitism recorded in citrus orchards in Vaalharts ($29.67\% \pm 1.55$) ($F_{1, 11} = 55.44$, $P = 0.000013$). However, when comparing levels of parasitism between pecans and citrus in Vaalharts, there was no significant difference ($F_{1, 3} = 0.066$, $P = 0.813$), being 27.92 and 29.67%, respectively.

Only one species of parasitoid was recorded, being a new species of *Phanerotoma*, which differed from all described Afrotropical and South Palearctic species according to the characteristics outlined by van Achterberg et al. (2017). The species was a larval-pupal parasitoid, whose adults were about 4.4 mm long (excluding the ovipositor in females), with antennae being 3.3 mm and the forewing 3.2 mm. The new species was named *Phanerotoma carobivora* (Fig. 3) - the species name after the popular name of its host ('carob moth') and 'voro' (Latin for 'devour'), because this new species devours the larvae of the carob moth.

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fungicide application as this helps the drying of fruit before waxing.

- Fruit must move evenly through the waxing unit and flow of fruit entering the packing line must be consistent.
- When fruit leaves the waxing unit, all parts of the fruit needs to be covered with a film of wax. Examine fruit after the waxing unit regularly.
- Brushes in the wax applicator must be in good condition and should rotate at a speed of about 90 rpm. The last brush in the wax applicator should always be wet, so as not to remove wax from the fruit.

Over application

- Inhibits the breathing (respiration) of the fruit.
- The movement of oxygen and CO₂ on the surface of the fruit is inhibited resulting in poor colour development and off-flavours caused by the process of an aerobic fermentation.
- Inhibits colour break.
- Encourages rind disorders on sensitive fruit.
- Unnecessary expense!!

Under application

- Excessive weight loss and shrinkage of fruit.
- Poor shelf life / storage.
- Susceptibility to chilling injury.

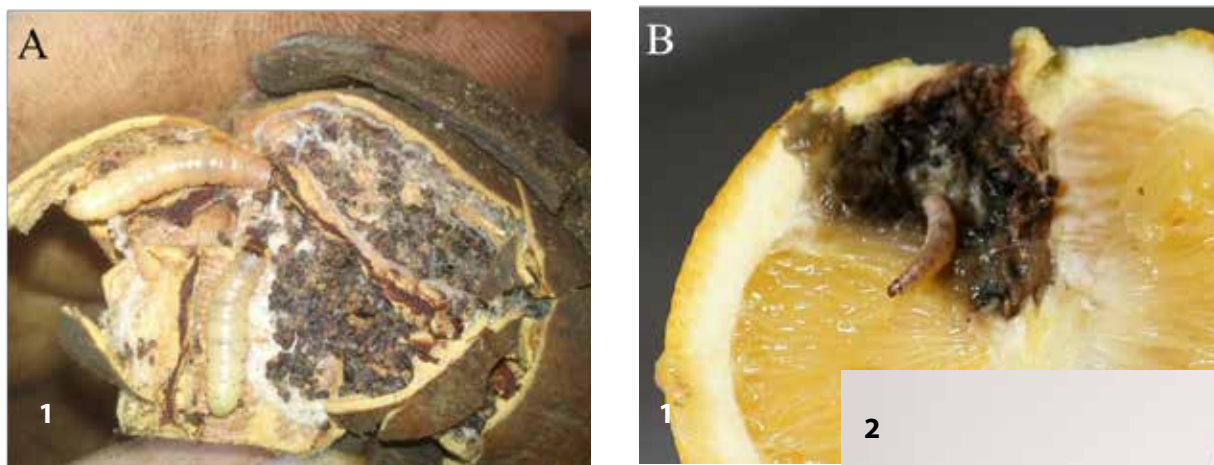


Fig. 1. Carob moth larva infesting A. a pecan nut, and B. an orange.

Opsomming

’n Nuwe spesie parasitiese wespe, naamlik *Phanerotoma carobivora*, is van karobmot in Suid-Afrika beskryf. Die parasiet is van karobmot op sitrus en pekanneute gekry teen ’n vlak van parasitisme wat van 2-30% gewissel het, afhangend van gasheerplant en perseel.

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Fig. 2. & 3. *Phanerotoma carobivora* lateral view (2), and dorsal view (3).

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