N O T E

Abandoned Papaya (*Carica papaya*) Orchards: A Potential Reservoir for *Rhynchophorus palmarum* (Coleoptera: Curculionidae) in Western Mexico[1]

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Rhynchophorus palmarum L. (Coleoptera: Curculionidae) is a widely distributed Neotropical beetle found throughout the Americas and is considered a major economic pest in oil palm (*Elaeis guineensis* Jacquin) and coconut palm (*Cocos nucifera* L.) plantations in Central and South America (European and Mediterranean Plant Prot. Org. [EPPO] 2020 [https://gd.eppo.int/taxon/RHYCFE/datasheet, 11 August 2025]; Alpizar et al. 2002, Fla. Entomol. 85(3): 426–430). In addition to the direct feeding damage caused by larval and adult *R. palmarum*, it acts as a vector for the nematode *Bursaphelenchus cocophilus* (Cobb), the causal agent of red ring disease, which can be more lethal than the insect itself (Esparza-Díaz et al. 2013, Fla. Entomol. 96(4): 1513–1521). To prevent its spread, infected palms must be removed (Chinchilla and Escobar 2007, ASD Oil Palm Papers [Costa Rica] 30: 1–13).

In Mexico, the interaction between *R. palmarum* and *B. cocophilus* has caused economic losses in the coconut industry (Secretaría de Agricultura y Desarrollo Rural 2019 [https://www.gob.mx/cms/uploads/attachment/file/561808/COCOTERO.pdf, 11 August 2025]); Rodríguez 2019, La Jornada [https://www.jornada.com.mx/2019/10/14/estados/029n1est, 11 August 2025]). This beetle has been reported attacking at least 35 plant species across 12 families, primarily within the Arecaceae. However, it also has been found in fruits of avocado (*Persea americana* Miller), mango (*Mangifera indica* L.), papaya (*Carica papaya* L.), and banana (*Musa* spp.), although these plants are not officially recognized as hosts (EPPO 2020; Hoddle et al. 2021, Fla.

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Entomol. 104(2): 143–144). Nevertheless, recent observations in Colima, Mexico, have shown that *R. palmarum* can complete its life cycle in papaya stems (Mora-Jiménez et al. 2024, Southwest. Entomol. 49(1): 520–522) and very likely in banana pseudostems as well (Castrejón et al. 2023, Southwest. Entomol. 48(3): 741–744).

In February 2025, two papaya orchards in western Mexico were surveyed for *R. palmarum*. The first site (18°43′6.5551″N, 103°38′22.3574″W) had been abandoned approximately 1 mo before sampling. Papaya trunks (−50 cm in height) were still standing in the planting rows, some of which showed clear signs of insect infestation (Fig. 1A). The second orchard (18°55′35.861″N, 103°54′7.052″W) had been without standing plants for 3 weeks, although remnants of decaying trunks remained. In the first orchard, lateral excavations were carried out along the planting rows to expose the roots of the trunks (Fig. 1B).

Numerous larvae were found within the plant tissues (Fig. 1C), and several puparia were discovered ∼60 cm deep near the roots (Fig. 1D). In the second orchard, inspections were carried out beneath the plant debris, where scarabaeiform larvae were located. Some of these larvae were placed in a cage at the collection site and checked periodically, successfully confirming the emergence of adult beetles.

All weevil specimens were collected and transported to the laboratory. The puparia were opened, revealing exarate, whitish pupae ∼4 cm in length, with morphology characteristic of coleopterans. These pupae were placed in an incubation chamber set at 27 ± 2°C until adult emergence. The adults were preserved and identified as *R. palmarum* by using dichotomous keys (EPPO 2007, Bull. OEPP 37(3): 571–579). Larvae were killed by immersion in hot water (90°C) and preserved in 70% ethanol for subsequent taxonomic identification (Vásquez-Ordóñez et al. 2020, Pap. Avulsos Zool. 60: e202060-si).

Evidence indicates that herbivorous insects may undergo changes in their feeding behavior and host plant preferences, driven by environmental pressures or resource availability (Anderson and Anton 2014, Plant Cell Environ. 37(8): 1826–1835; Panizzi 2000, Ann. Soc. Entomol. Bras. 29(1): 1–12). These behavioral shifts, which often precede host range expansion, can be assessed through assays designed to measure attraction for feeding or oviposition based on specific host plant characteristics such as chemical profile or physical structure (Knolhoff and Heckel 2014, Annu. Rev. Entomol. 59(1): 263–278). Understanding these adaptations is essential for addressing key questions in ecology and evolution, including plant–insect interactions, ecological plasticity, and the eventual formation of specialized host relationships (Courtney et al. 1989, Oikos 55(1): 55–65; Berlocher and Feder 2002, Annu. Rev. Entomol. 47(1): 773–815). This knowledge also has practical implications for integrated pest management because it enables anticipation of behavioral shifts in economically important insect species (Fang et al. 2013, Sci. Rep. 3(1): 2876; Sun et al. 2013, Bull. Entomol. Res. 103(3): 344–353).

In the state of Colima, the availability of natural and cultivated palm hosts susceptible to *R. palmarum* has declined in recent years. By contrast, short-cycle crops with high economic value, such as papaya, have significantly expanded their cultivated area in the region (Servicio de Información Agroalimentaria y Pesquera 2024 [https://nube.agricultura.gob.mx/avance_agricola/], Last accessed 17 June 2025). This shift in the agricultural landscape may be generating new ecological opportunities for insects such as *R. palmarum*, which appear to be exploiting papaya crops and their residues as an alternative habitat.

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Fig. 1. Papaya (*Carica papaya*) trunk with damage caused by curculioniform larvae of *Rhynchophorus palmarum* (A). Excavation around a papaya trunk remnant (B). Curculioniform larvae at the base of a papaya trunk (C). Puparium (D).

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Although the number of individuals collected in this study was limited, the adaptability exhibited by this species should not be underestimated. The presence of pupae and larvae in papaya residues suggests that *R. palmarum* can use decaying plant material, such as stems and roots, to complete its development. Notably, the plant fibers found in the root zone were observed to be used—together with soil particles—as structural material for puparium formation, representing a relevant adaptive behavior in the absence of the palm host. These findings constitute an important warning for the papaya production sector in the region. Proper sanitary measures should be implemented at the end of the crop cycle to prevent the establishment and proliferation of *R. palmarum* in abandoned or poorly managed orchards. Recommended actions include the removal, collection, and complete destruction of plant residues, especially those that are partially buried or decomposing, because they could serve as shelter or a food source for this pest.

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