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The presence of *Xylosandrus compactus* (Coleoptera: Curculionidae: Scolytinae) in the Sierra Negra of Puebla, Veracruz and Oaxaca, Mexico

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The black twig borer, *Xylosandrus compactus* (Eichhoff) (Coleoptera: Curculionidae: Scolytinae) is a highly polyphagous species described from Japan in the late of 19th century that is now distributed worldwide (Wood 2007). Globalization and climate change have favored the dispersal of *X. compactus* from its center of origin to other parts of the globe. The most recent invasions of this insect have occurred in ornamental and forest plants in countries of the European Mediterranean region such as France (2015), Greece (2019), and Spain (2019) since its initial detection in Italy in 2011 (Gallego et al. 2020; Faccoli 2021). In Brazil, since the report of the black twig borer attacking Robusta coffee (*Coffea canephora* Pierre ex Frohener; Rubiales: Rubiaceae) in Bahia in 1998 (Matiello et al. 2011), this insect has been reported in the neighboring states of Espírito Santo in 2005 and Minas Gerais in 2009, and more recently, it has been observed in the extreme west of the country, in Rondônia in 2019, a state that produces Robusta coffee (Túler et al. 2019). The objectives of this paper were to: i) report the presence of *X. compactus* in Mexico; ii) provide general information on this pest species and its implications for the coffee crop; and iii) understand the behavior and future impact of *X. compactus*, based on the information available on *Xylosandrus morigerus* (Blandford), a species that is already present in Mexico and attacks Robusta coffee.

Xylosandrus compactus was detected by coffee producers in Tepexilotla, a town in Zoquitlán, a municipality in the Sierra Negra of Puebla, Mexico in Nov 2021. The Sierra Negra is a region in the southeast of the state of Puebla that borders the state of Veracruz to the north and the state of Oaxaca to the south (Gobierno del Estado de Puebla 2019). Robusta and Arabica (*Coffea arabica* L.) coffee are grown on approximately 9,500 ha distributed between 100 and 1,700 m.a.s.l. in the municipalities of Zoquitlán, San Sebastián Tlacotepec, Eloxochitlán, and Ajalpan (CESAVEP 2022). A subsequent visit of the infested area and municipalities surrounding Zoquitlán, carried out in Jun and Jul 2022, showed that *X. compactus* was mainly infesting Robusta coffee but also to a lesser extent some Arabica coffee plants and trees of different species in the municipalities of Zoquitlán, San Sebastián Tlacotepec, and Eloxochitlán, Puebla (CESAVEP 2022). Likewise, in 2022, damage caused by this pest was detected in coffee plantations of Veracruz (municipality of Tezonapa) and Oaxaca (municipality of Santa María Chilchotla), close to the infested area in Puebla. Now, Mexico joins Brazil (Túler et al. 2019), Cuba (Wood & Bright 1992), French Guyana (Wood 2007), Virgin Islands (Wood & Bright 1992), Peru (Delgado & Couturier 2012),

and the United States (Chong et al. 2009) among the countries of the American continent with the presence of *X. compactus*.

The species *X. compactus* was formally identified by the Colegio de Postgraduados (Montecillo, Estado de México, Mexico), at the end of 2022 from samples of insects collected on branches of Robusta coffee in Zoquitlán by personnel from the Universidad Autónoma Chapingo (Centro Regional Universitario Oriente, Sochiapa, Veracruz, Mexico); the identified specimens were deposited in the insect collection of the Colegio de Postgraduados. It is worth mentioning that based on a research project carried out by the Colegio de Postgraduados for the Dirección General de Sanidad Vegetal (DGSV), whose objective was to identify Scolytinae and Platypodinae insects, including a selection of the specimens deposited in the Ambrosial Complex Monitoring System Collection, a list of identified species was delivered to the DGSV. This list included a collection of *X. compactus* made in coffee plantations in Coyuca de Benítez (Guerrero, Mexico) in 2017; this record is mentioned in a general way in the doctoral thesis of Pérez-Silva (2020). Although the presence of *X. compactus* dates back to collections in the state of Guerrero in 2017, it probably did not represent a serious problem as no significant impact was reported in that coffee region; however, the current situation in the Sierra Negra of Puebla, particularly in Robusta coffee, and its potential spread to other coffee-growing areas of the country is considered of regional importance.

Three species of *Xylosandrus* are now known in Mexico: *Xylosandrus curtulus* (Eichhoff), *X. morigerus*, and the recently introduced *X. compactus*, although of these 3 species, only *X. morigerus* and *X. compactus* have been reported as attacking coffee plants worldwide (Le Pelley 1968; Waller et al. 2007). In general, species of *Xylosandrus* are characterized by their association with branches of multiple hosts. The records in Mexico of *X. curtulus* and *X. morigerus* have never been related to aggressive behavior towards their host plants; however, studies carried out in the Soconusco region of Chiapas represent *X. morigerus* as an aggressive pest species in Robusta coffee (Barrera et al. 2002).

Studies on *X. compactus* in other regions of the world regard it as an important pest species (Gugliuzzo et al. 2021). Its association with plant pathogenic fungi (Vannini et al. 2017) and its high number of registered host species (Ranger et al. 2021) should be considered in Mexico. Recent observations by growers, researchers, and DGSV personnel from Puebla, Veracruz, and Oaxaca indicate that the black twig

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borer can establish itself on other cultivated and non-cultivated plants (CESAVEP 2022).

Xylosandrus morigerus is another Asian ambrosia beetle that, according to Wood (1982) and Wood and Bright (1992), is distributed on the American continent from Mexico (Veracruz) to Brazil (Paraná). This branch borer has been a pest of Robusta coffee in Soconusco (Chiapas, Mexico) since the 1980s and is currently widely distributed on coffee plantations in this region. Below is information generated by Barrera et al. (2002, 2006, 2019) on the bioecology and behavior of *X. morigerus* on Robusta coffee plantations in the Soconusco region that can help us to understand the future impact of *X. compactus* on coffee plantations in Mexico.

Field studies with artificially infested Robusta coffee branches at 22.4 ± 0.2 °C showed that the duration of developmental stages of *X. morigerus* was: egg 7 d, larva 12 d, pupa 7 d, and egg to adult 26 d. Thirty-five days after the female entered the branch, there were 11.57 adults per gallery, of which 1.47 were males (1 male for 7.87 females). The total population per gallery was 26.9 ± 4.5 individuals at 28 d, with a maximum of 44 individuals. Branch sampling in a Robusta coffee plantation showed that the greatest number of new boreholes by *X. morigerus* founder females occurred between Mar and Oct, with 50% of the boreholes accumulated between May 20 and Jun 20. During monitoring with ECOIAPAR traps baited with a mixture of ethanol: methanol (1: 3) (Barrera 2008), a greater flight activity of *X. morigerus* was observed in the rainy season of the year, particularly between Sep and Nov. Subsequent studies showed that ethanol-baited traps captured more *X. morigerus* adults than traps baited with the ethanol: methanol mixture. In addition to the loss of young branches due to rot caused by the microorganisms inoculated by the insect when it entered the branch, this insect also affected the harvest by favoring the breaking of branches due to their weakening through the point where the perforation and the gallery were made by the founding female. It was found that the breaking and death of branches can also be caused by up to 8 different species of opportunistic ants, most of the genus *Pseudomyrmex* (Hymenoptera: Formicidae), which use the abandoned galleries of *X. morigerus* as nests. Another way in which *X. morigerus* affected the harvest was by perforating the branches as it was found that the number of fruits per branch decreased as the number of perforations per branch increased; thus, with 1, 2, and 3 perforations per branch, a loss of 6.1, 12.2, and 18.3 fruits per branch was estimated, that is, a loss of 4.4, 8.9, and 13.3% of the fruits, respectively.

In conclusion, now there are 2 species of the genus *Xylosandrus* as pests of coffee crops in Mexico: *X. compactus* and *X. morigerus*.

We thank the coffee farmers and plant health authorities of Oaxaca, Puebla, and Veracruz for inviting us to visit the affected area, providing us with specimens for identification, and sharing information on this problem in inter-institutional coordination meetings.

Summary

The black twig borer, *Xylosandrus compactus* (Eichhoff), was detected in Tepexilotla, town of Zoquitlán, municipality of Sierra Negra de Puebla, Mexico in Nov 2021. A subsequent visit of the infested area and the municipalities surrounding Zoquitlán, carried out in Jun and Jul 2022, showed that *X. compactus* infested mainly Robusta coffee but also to a lesser extent some Arabica coffee plants. In 2022, the insect pest was detected in coffee plantations in communities in the municipality of Tezonapa, Veracruz and in communities in the municipality of Santa María Chilchotla, Oaxaca, close to the infested area in Puebla. Now, with this report, there are 3 species of the genus *Xylosandrus*

in Mexico: *X. curtulus*, *X. morigerus*, and *X. compactus*; of these, *X. morigerus* and *X. compactus* are economically important pests for coffee crops.

Key Words: black twig borer; coffee; *Coffea canephora*; *Coffea arabica*; insect pest

Sumario

El taladrador negro de las ramas, *Xylosandrus compactus* (Eichhoff) fue detectado en Tepexilotla, localidad de Zoquitlán, municipio de la Sierra Negra de Puebla, México en Noviembre de 2021. Una revisión posterior del área infestada y de los municipios aledaños a Zoquitlán, realizada en junio y julio de 2022, mostró que *X. compactus* infestaba principalmente café Robusta, pero también algunas plantas de café Arábica. En 2022, el insecto plaga se detectó en cafetales de comunidades del municipio de Tezonapa, Veracruz y en comunidades del municipio de Santa María Chilchotla, Oaxaca, cercanas a la zona infestada en Puebla. Ahora, con este reporte, existen 3 especies del género *Xylosandrus* en México: *X. curtulus*, *X. morigerus* y *X. compactus*; de estas, *X. morigerus* y *X. compactus* son plagas económicamente importantes para el cultivo del café.

Palabras Clave: taladrador negro de las ramas; coffee; *Coffea canephora*; *Coffea arabica*; insecto plaga

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