Scientific Note

First record of *Phidotricha erigens* Ragonot, 1888 (Lepidoptera: Pyralidae) as a pest in coffee plants in the world and *Cryptoblabes gnidiella* (Millière, 1867) (Lepidoptera: Pyralidae) in Amazonian Robusta in Brazil[1]

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ABSTRACT

In the coffee farming of the Rondônia state, Brazil, population outbreaks and economic losses associated with the rosette caterpillar have been increasingly frequent. Two species of rosette caterpillars [*Phidotricha erigens* Ragonot, 1888 (Lepidoptera: Pyralidae) and *Cryptoblabes gnidiella* (Millière, 1867) (Lepidoptera: Pyralidae)] have been found infesting Amazonian Robusta coffee plants in the Rondônia state. *Cryptoblabes gnidiella* was recorded for the first time in coffee plants in the Rondônia state, whereas *P. erigens* was identified for the first time as a pest in coffee plants (*Coffea* sp.) in the world. In the sampled areas, *P. erigens* predominated over *C. gnidiella*, being probably the species that has caused the greatest damage to coffee in Rondônia. Both species cause similar injuries to coffee plants, as they consume flower buds, flowers, peduncle of the flower buds and fruits, and fruits in formation.

KEYWORDS: *Coffea canephora*, rosette caterpillar, insect-plant interaction.

RESUMO

Primeiro registro de *Phidotricha erigens* Ragonot, 1888 (Lepidoptera: Pyralidae) como praga em cafeeiros no mundo e *Cryptoblabes gnidiella* (Millière, 1867) (Lepidoptera: Pyralidae) em Robustas amazônicos no Brasil

Na cafeicultura rondoniense, surtos populacionais e perdas econômicas associadas à lagarta-da-roseta têm sido cada vez mais frequentes. Duas espécies de lagarta-da-roseta [*Phidotricha erigens* Ragonot, 1888 (Lepidoptera: Pyralidae) e *Cryptoblabes gnidiella* (Millière, 1867) (Lepidoptera: Pyralidae)] foram encontradas infestando cafeeiros Robustas amazônicos no estado de Rondônia, Brasil. *Cryptoblabes gnidiella* foi registrada pela primeira vez em café no estado de Rondônia, enquanto *P. erigens* foi identificada pela primeira vez como praga em cafeeiro (*Coffea* sp.) no mundo. Nas áreas amostradas, *P. erigens* predominou em relação a *C. gnidiella*, sendo, provavelmente, a espécie que tem causado maiores danos no cafeeiro em Rondônia. As duas espécies causam injúrias semelhantes no cafeeiro, por consumirem os botões florais, as flores, o pedúnculo dos botões florais e dos frutos e os frutos em formação.

PALAVRAS-CHAVE: *Coffea canephora*, lagarta-da-roseta, interação inseto-planta.

Brazil stands out on the world stage as the main producer and exporter of coffee (*Coffea arabica* L. and *Coffea canephora* Pierre ex Froehner) (Rubiaceae), being responsible for the production of 54.21 million bags in 2024; however, when only *C. canephora* is considered, this contribution is limited to 14.62 million bags (Conab 2025), behind Vietnam (Embrapa 2025). Of the total Conilon and/or Robusta coffee produced in Brazil, the states of Espírito Santo, Rondônia and Bahia stand out as the largest producers, respectively, being responsible for 95 % of the national production (Conab 2025).

The rosette caterpillar, *Cryptoblabes gnidiella* (Millière, 1867) (Lepidoptera: Pyralidae), is a polyphagous species, native to the Mediterranean basin, occurring on all continents, except Antarctica (Singh & Singh 1997). It has become a pest in several agricultural crops in the world, standing out as one

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of the main pests on grapevine in Italy, France and Israel (Velez-Gavilan 2023).

In Brazil, *C. gnidiella* is known as 'traça-dos-cachos' (grape cluster moth), being one of the main pests in grapevine (Botton et al. 2013). In coffee farming, the species is known as 'lagarta-da-roseta' (rosette caterpillar), due to the damage caused to coffee rosettes, being one of the pest species that often cause significant damage to the coffee crop, especially Conilon in the north of Espírito Santo (Caixeta et al. 2024). Caterpillars occur from the emergence of flower buds to the establishment of fruits (pinhead berry and/or rapid expansion) (Costa 2011), damaging the skin of the base and the peduncle of the fruits, causing their premature fall (Caixeta et al. 2024).

In Rondônia, the presence of the rosette caterpillar has been increasingly frequent in Amazonian Robusta coffee plants (*C. canephora*) (Costa 2011). In the region, population outbreaks of caterpillars have appeared suddenly, requiring more and more attention from coffee growers, in addition to the adoption of rational and/or sustainable strategies regarding the integrated management of the pest, in order to avoid economic damage.

However, field observations indicate that, during population outbreaks of *C. gnidiella*, another species of rosette caterpillar, not yet identified, may occur together. Examples of this joint occurrence include infestations with rosette mealybugs, which have been observed together with *Ferrisia dasylirii* (Cockerell, 1896) (Hemiptera: Pseudococcidae), when infesting coffee trees in Rondônia in the form of a complex (Rondelli et al. 2018).

This study was carried out with the objective of assessing the occurrence and identifying the species of caterpillars that infest rosettes of Amazonian Robusta coffee plants.

The sampling of caterpillars in coffee rosettes was carried out in three commercial crops, located in the eastern mesoregion of Rondônia, where the average altitude is 277 m, the climate is classified as Aw - tropical rainy climate (Köppen), and the annual rainfall, temperature and average relative humidity are 2,250 mm, 26 ºC and 85 %, respectively (Alvares et al. 2013).

The crop A (11º48'15.7"S, 61º47'50.3"W) is four years old, where the genotypes 06, 08, LB015, 25 and BG180 are cultivated in an area of 1 ha, and the crop B (11º49'37.1"S, 61º48'14.0"W) is seven years old, with the genotypes 08, 25, BG180 and AS2, in an area of 6 ha, both located in Rolim de Moura (Rondônia state, Brazil). The crop C (11º41'39.6"S, 62º05'06.6"W) is eight years old, with the genotypes 08, 25, BG180 and R22, in an area of 30 ha, located in Novo Horizonte do Oeste (Rondônia state).

Samples of caterpillars in coffee rosettes were collected manually in the crops B and C, on November 20, 2022, and the development to the adult stage occurred inside pots containing coffee flowers in the laboratory, at a temperature of approximately 26 ºC. Emerged moths of the two species were sent for identification, which was carried out by the taxonomist Dr. Vitor Osmar Becker, from the Uiraçu Institute, in Camacan, Bahia state, Brazil.

To assess the frequency of each of the rosette caterpillar species, a sampling was carried out in the three aforementioned crops only on September 3, 2025, when they were in the flowering stage. To do this, a plagiotropic branch of the middle third on the east side of 30 plants per crop was tapped on a white plastic tray measuring 53.2 (length) x 37.3 (width) x 8.6 (height) cm, and then the number of caterpillars of each species was counted based on the identified species. Means of the caterpillar species in the three crops were compared by t-tests performed for the number of caterpillars per branch, using the statistical software R, version 4.3.1 (R Core Team 2023).

Based on the obtained results, two rosette caterpillars species were found in Amazonian Robusta coffee crops. The species identified were *C. gnidiella* and *Phidotricha erigens* Ragonot, 1888 (Lepidoptera: Pyralidae). The frequency of *P. erigens* was much higher than that of *C. gnidiella* in the crops A and B (Rolim de Moura), being 100 and 90.5 %, respectively. However, in the crop C (Novo Horizonte do Oeste), the frequency of *P. erigens* (65 %) did not differ significantly from that of *C. gnidiella* (Figures 1 and 2).

A higher frequency of *P. erigens*, when compared to *C. gnidiella* in Rolim de Moura (crops A and B), and the absence of statistical difference between these species in Novo Horizonte do Oeste (crop C) may be related to the presence of natural enemies, coffee genotypes and management. In addition, the natural vegetation in the different areas can interfere with the frequency of these species, by hosting these caterpillars and allowing development and reproduction after the end of the flowering and pinhead stages of the coffee tree, enabling survival throughout the year, since rosette caterpillars were

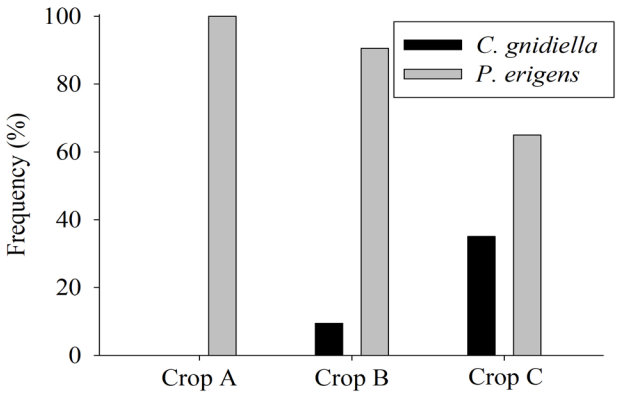


Figure 1. Frequency of occurrence of *Cryptoblabes gnidiella* and *Phidotricha erigens* caterpillars in plagiotropic branches of coffee plants, in three crops (n = 30 branches per area), in the Rondônia state, southwest Amazonia, Brazil.

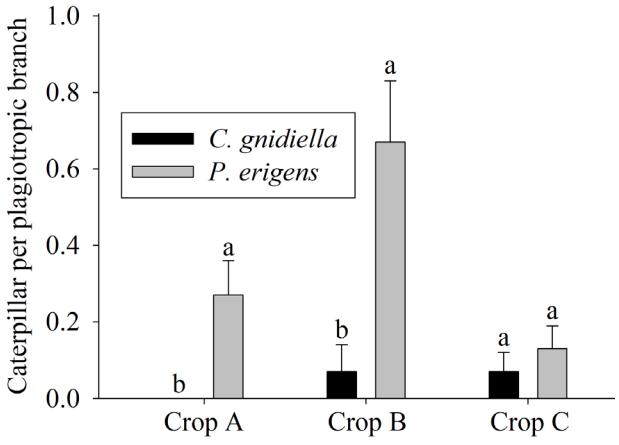


Figure 2. Average number (± SE) of *Cryptoblabes gnidiella* and *Phidotricha erigens* caterpillars per plagiotropic branch of coffee plants, in three crops, according to t-tests (n = 30 branches per area), in the Rondônia state, southwest Amazonia, Brazil. Crop A: t = -2.80; d.f. = 29; p = 0.0089. Crop B: t = -3.43; d.f. = 29; p = 0.0014. Crop C: t = -0.85; d.f. = 29; p = 0.3989.

not found in the coffee trees from February to June in Rondônia, according to Costa (2011). The average number of *P. erigens* and *C. gnidiella* caterpillars in the three crops were 0.36 and 0.05, respectively, which are considered high, at least for the former pest, since only one plagiotropic branch per plant was evaluated. According to these results, *P. erigens* may be the predominant species in flower and fruit rosettes in Amazonian Robusta coffee plants in Rondônia, and consequently may have caused a greater damage (Figure 2).

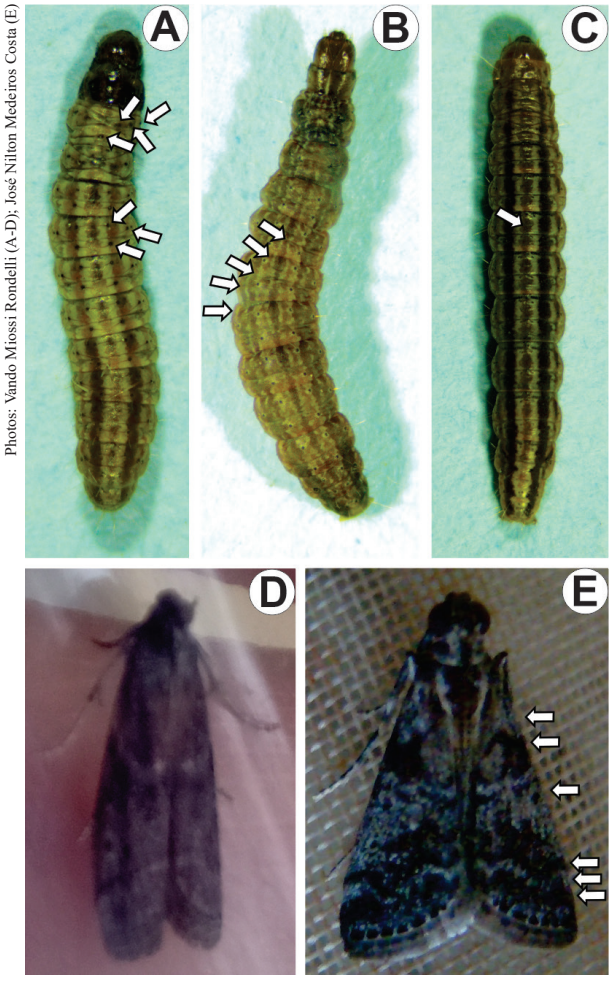
It is worth mentioning that insecticides had not been applied in the crops A and B during the flowering period of the year 2025; however, in the crop C, two applications of insecticides were carried out to control rosette caterpillars, at 7 and 30 days before sampling.

After the identification of the species, the first record of *P. erigens* as a pest in coffee plants in the world and the first record of *C. gnidiella* in coffee plants cultivated in the Rondônia state were reported. The two species cause similar injuries to the coffee plants, as they consume reproductive structures, such as flowers and fruits in formation.

The identification of *C. gnidiella* and *P. erigens* caterpillars in the field is not easy, but it can be performed using a magnifying glass with 10x magnification. Both species have five larval instars and reach 12 mm in length; however, the main differences between the two species are that the *C. gnidiella* larvae have small, black rounded spots on the thorax and abdomen, from which setae (Figure 3A) and dark brown longitudinal stripes originate (Figure 3B); whereas the *P. erigens* larvae have a dorsal, medial, longitudinal line, from the prothorax to the end of the abdomen (Figure 3C). The moths of these species measure approximately 14 mm in wingspan, with *C. gnidiella* being predominantly grayish-brown in color (Figure 3D), whereas *P. erigens* have light-gray forewings, with black spots and transverse lines of distinct colors (Figure 3E) (Ragonot 1888, Martinez et al. 2019, Velez-Gavilan 2023).

Phidotricha erigens has been found hosted by *C. arabica* (Martinez et al. 2019) and coffee leaves and beans in Brazil (Silva et al. 1968). Thus, previously to this report, there was no record of this insect as a pest in coffee plants (*Coffea* sp. L.). The species was observed in 1888 in Puerto Rico, and is also found in Colombia and Peru (Ragonot 1888) feeding on reproductive parts and leaves of several plant families (Cock & Burris 2013, Martinez et al. 2019), including major agricultural crops such as maize, sorghum, lima bean, and tropical fruit plants such as tamarind and loquat (Solis 1993, Bolzan et al. 2012).

In Brazil, *P. erigens* was considered a pest in citrus in several regions of the São Paulo state, because it feeds on shoots and fruits (Nava et al. 2006), and in pequi (*Caryocar brasiliense* Camb.) (Caryocaraceae) in the Goiás state, with a frequency of 81.75 % (Ferreira et al. 2009). In Venezuela, it is



Photos: Vando Miossi Rondelli (A-D); José Nilton Medeiros Costa (E)

Figure 3. Differences between caterpillars and adults of *Cryptoblabes gnidiella* and *Phidotricha erigens*. A) *C. gnidiella* caterpillar of yellowish color, with small black rounded dots (arrows); B) *C. gnidiella* caterpillar of light brown color, with dark brown longitudinal stripes (arrows); C) *P. erigens* caterpillar in the fifth instar, with a dorsal, medial, longitudinal line from the prothorax to the end of the abdomen (arrow); D) *C. gnidiella* adult; E) *P. erigens* adult, with transverse lines on the forewings (arrows).

a pest of *Agave cocui* Trelease (Agavaceae), known as inflorescence worm, due to the damage caused during the reproductive stage in the Falcón state (Velázquez et al. 2010, Capote-Luna et al. 2017), in addition to having been observed in wild plants, in Venezuela (Arcayal et al. 2012). In Colombia, *P. erigens* damaged the reproductive structures of *Furcraea* spp. (Agavaceae) in the Rionegro Antioquia state (Vásquez et al. 2021).

Phidotricha erigens eggs are yellow with black spots soon after oviposition and pale yellow prior to hatching. The larval stage has five instars. From the first to the third instar, it is reddish-orange with a long yellowish-white line dorsally (Figure 4B), the fourth instar is reddish-brown with the same yellowish-white line, and the fifth instar is dark brown with a yellowish-orange line (Martinez et al. 2019), with the caterpillars in the last instar being approximately 12 mm long (Figures 4C and 4D). The pupa is elongated, dark brown, and similar in size to the last larval instar. Figures 4G and 4H show the pupa of *P. erigens* enclosed in the puparium of silk threads. The thorax and abdomen of adults are gray dorsally and light gray ventrally (Martinez et al. 2019).

The adult has a wingspan of 14 mm, with the forewings light gray, finely speckled with black, with distinct transverse lines, the first being whitish, almost straight, and the second purplish-gray, representing a strong angle posteriorly. The posterior half is purplish-brown and the outer edge is gray, with a thick black line interrupted at the veins. Hindwings are whitish, with the veins and outer margin very distinctly marked in brown (Figures 4J and 4K) (Ragonot 1888).

Cryptoblabes gnidiella caterpillars pass through five instars, the last one being 10-12 mm long, yellow to light brown in color, with dark brown longitudinal stripes and small black areas at the base of the bristles, thorax and abdomen, with reddish-brown head (Figure 4A). The pupa measures 5-6 mm in length and is initially greenish, becoming reddish-brown to dark red and with fine hairs on the body (Figures 4E and 4F). The moth has a wingspan of 11-20 mm and is predominantly grayish-brown in color. Forewings have reddish-brown scales, and hindwings are bright white, with light grayish-brown veins. The abdomen is bright grayish-white and the antennae are simple, finely ciliated (Figure 4I) (Velez-Gavilan 2023). The duration of the egg, caterpillar and pupal stages of *C. gnidiella* under artificial diets are, on average, 3.6, 28.4 and 7.2 days, respectively, at a temperature of 26 ºC (Ringenberg et al. 2005).

Cryptoblabes gnidiella and *P. erigens* caterpillars are sheltered in small groups among the silk webs they weave, flower buds, dried flower remains and coffee fruits. They cause injuries to the coffee plant by consuming the flower buds, flowers and peduncle of the flower buds and fruits, which can cause the drying and fall of these reproductive structures, in addition to feeding on the fruits in

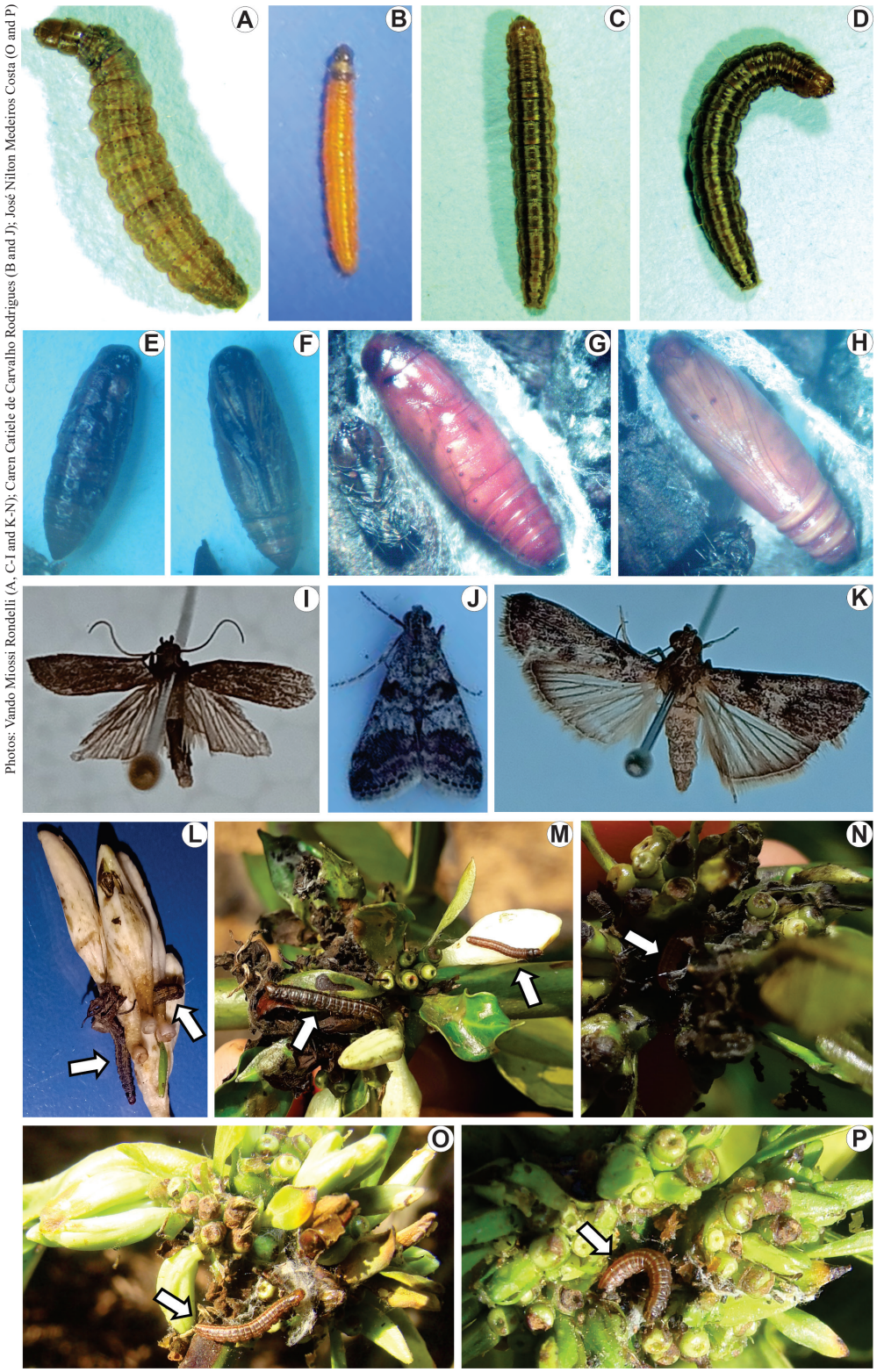


Figure 4. *Cryptoblabes gnidiella* and *Phidotricha erigens* occurring in coffee rosettes in the Rondônia state, southwestern Amazonia, Brazil. A) *C. gnidiella* caterpillar; B) characteristics of *P. erigens* caterpillars from the first to the third instar; C-D) *P. erigens* caterpillars in the fifth instar; E-F) dorsal and ventral views of a *C. gnidiella* pupa, respectively; G-H) dorsal and ventral views of a *P. erigens* pupa, respectively; I) *C. gnidiella* adult; J-K) *P. erigens* adult; L) *C. gnidiella* caterpillars (arrows) on damaged coffee flowers (perforated flower); M-P) *P. erigens* caterpillars (arrows) on coffee rosettes with damage (perforated flower, consumed fruits in formation and silk web).

formation (Figures 4L to 4P). Figure 4N shows a *P. erigens* caterpillar inside a coffee rosette severely damaged by this insect. *Phidotricha erigens* caterpillars can produce a lot of silk web on coffee rosettes (Figures 4O and 4P).

Extensive and periodic monitoring of caterpillars and adults should be carried out and additional studies should be conducted on the frequency, seasonality and bioecology of these caterpillars, especially *P. erigens*, in coffee rosettes in Rondônia, including their natural enemies, to develop strategies for the management of these pest insects in coffee plants.

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