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## OUTBREAK OF *EACLES IMPERIALIS* (SATURNIIDAE) ON COCOA AND FRUIT TREES IN MILAGRO – ECUADOR

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**ABSTRACT.** The account represents the first record of *E. imperialis* (Drury) as cocoa pest. The moth was founded in Milagro - Ecuador producing prominent defoliation on cocoa and other fruit trees.

**Additional key words:** defoliation, host range

A marked eruption of larvae of the saturniid *Eacles imperialis* (Drury) occurred in late March 2010 in the Milagro Canton, Guayas Province, Ecuador. In Ecuador there are no official records of this moth on cocoa (*Theobroma cacao* L., clon CCN-51) or national or fine flavor cocoa (*T. cacao* L.), nor in other commercial trees, severe enough to cause major defoliation. According to local farmers, larval numbers erupted for the first time, causing up to 95% defoliation of commercial cocoa cultivars.

Relatively few groups of insects from Ecuador have been well studied (e.g. Papilionoidea (Lepidoptera) and Carabidae (Coleoptera)), and thus knowledge of other families lags far behind (Barrera 2008). Dangles et al. (2009) mentioned that the paucity of entomological knowledge was due to the great diversity of Ecuadorian species living in a wide range of habitats and the difficulty of identifying the majority of tropical insect species, and in spite of the national effort to gather information on the taxonomy and ecology of insects, progress has been slow (Jiggins et. al. 2006; Moret 2005). Due to this lack of knowledge of Ecuadorian insects and their biology, control techniques are often inappropriate.

It is likely that the saturniid that is the focus of this report, *E. imperialis*, was resident prior to the planting of commercial crops. Changes in factors such as relative humidity, temperature and photoperiod, as well as the excessive use of chemicals contributed to “seasonal” pest emergence in high population levels; according to some authors, those factors affect the population of Lepidopteran natural enemies (Tanada & Fuxa 1987; Carrero & Planes 2008). Below we describe an outbreak caused by *E. imperialis* larvae in Ecuadorian cocoa and fruit tree plantations.

### METHODS

Percentage of defoliation was estimated using the Townsend-Heuberger formula. Evaluation of defoliated trees was carried out using a scale from 0 to 5 (where 0 = 0% and 5 = 90–100% defoliation). Larvae were identified by Kirby Wolfe (personal communication), and compared to descriptions of Ferguson (1971) and Tuskes et al. (1996). In order to understand the current status of this pest in Ecuador as well as historical records of macrolepidopteran outbreaks, the official Ecuadorian registers of pests on economically important crops and available publications and newsletters were reviewed.

## RESULTS

The outbreak of *E. imperialis* larvae on cocoa and other fruit trees caused prominent defoliation (Figure 1A), reaching an average of 95% over 313.82 acres. High densities of larvae were found in plantations, with a minimum of more than ten individuals per tree. The use of expensive doses of chemicals to eliminate the pest provoked economic losses due to the increment of production costs and environmental damages not yet evaluated.

Macrolepidoptera larvae were collected in the “La Garganta” community (Milagro, Guayas Province), located at 2°06'52.66" south latitude and 79°34'12.30" west longitude (Figure 1B). Existing records do not document the presence of this insect in the province of Guayas.

According to Tuskes et al. (1996), the most frequent host plants of *E. imperialis* are pine (*Pinus*), oak (*Quercus*), box elder (*Acer negundo*), and other maples, sweet gum (*Liquidambar styraciflua*), and sassafras (*Sassafras albidum*). In addition, Ferguson (1971) cited that larvae of *E. imperialis* in North America have been reported to feed on many tree species: *Tabebuia*, *Juglans*, *Cupressus*, *Cedrus*, *Gleditsia*, *Rhus*, and *Fagus*. Other common hosts cited in Wagner (2005) include *Tilia*, *Acer*, *Betula*, and *Ulmus*. The recent outbreak of *E. imperialis* in Ecuador occurred in commercial cultivars of cacao (*Theobroma cacao*, clon CCN-51) and on national cocoa (“arriba” fine or flavor cocoa). In addition, we recorded the caterpillars feeding on several fruit trees species, including mango (*Mangifera indica* L.), plum (*Spondias purpurea* L.), zapote [*Quararibea*

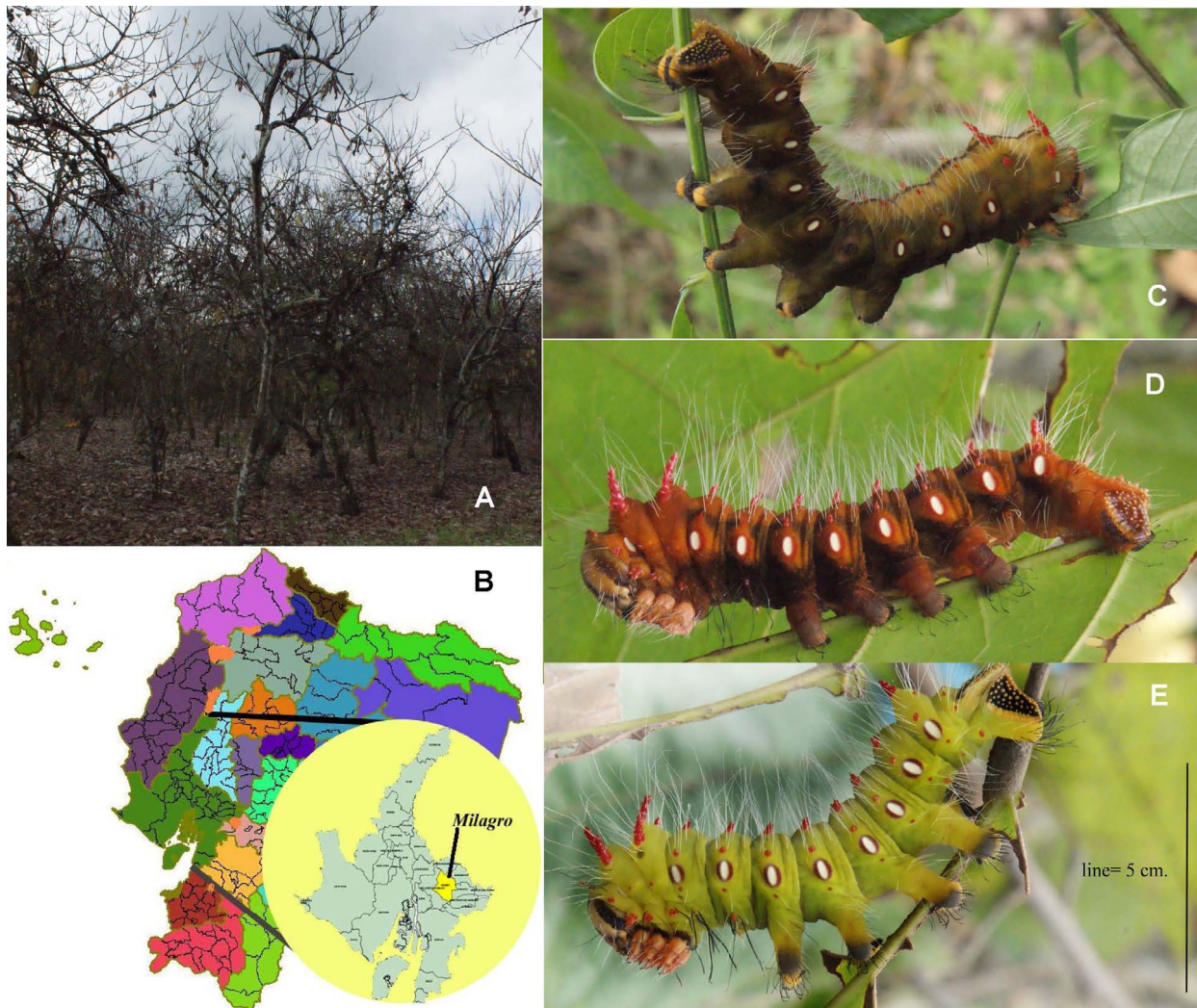


FIG. 1. (A) Defoliation caused by *E. imperialis*. (B) Location of outbreak. Region affected by defoliator presence indicated in yellow. Polymorphism of *E. imperialis* larvae: (C) brown, (D) reddish brown, (E) light green, 2010 CIBE - ESPOL©



*cordata* (Humboldt & Bonpland) Vischer], guava (*Psidium guajava* L.), “guaba” (*Inga edulis* Mart) and banana (*Musa* sp.). Severe defoliation, of at least some individual plants, was noted on all of these hosts.

#### DISCUSSION

This report may show how the effect of global warming and other factors including agronomic practices could contribute to new pest emergence. On the other hand, the information about the status of the pest in Ecuador is characterized by the lack of official records of this pest species on cocoa cultivation and other fruit trees. INIAP, Ecuador's agricultural research institution, mentioned in its “Guide for cocoa cultivation in the Amazon” (2001) that pests such as *Apatelodes costariseni*, *Dimorpha quaesita* and *Eacles masoni* cause defoliation damage on cocoa crops in the Ecuadorian Amazon region. Barrera (2008) listed *E. masoni* and *E. imperialis* as coffee pests in Brazil. The Andean inventory of pests and plant diseases (1996) includes *E. masoni* as a cocoa defoliator with a limited distribution in certain regions, that is sometimes responsible for moderate levels of impact and which sometimes requires obligatory control (=application of pesticides).

Racheli & Racheli (2006) indicated the presence in Ecuador of two subspecies of *E. imperialis*: *E. i. cacicus* (Drury, 1773) in the provinces of Sucumbíos, Orellana, Napo, Tungurahua and Morona-Santiago; and *E. i. anchycayensis* (Lemaire, 1971) in the provinces of Esmeraldas, Manabí and Pichincha. In addition, two subspecies of *E. masoni* have been recorded in the Coastal provinces, mountains, and Eastern Ecuador: *E. m. tyrannus* (Draudt, 1930), in Pichincha, Manabí and Cañar, and *E. m. fulvaster* (Rothschild, 1907), distributed in Sucumbíos, Orellana, Napo and Morona-Santiago. None of these have been previously recorded in Guayas.

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