

## *Atta insularis*

### INTRODUCTION

*Atta insularis*, (Guérin), a serious insect pest found only in Cuba was first described by Guerin in 1845. It is one of several leaf-cutting ant species that cause destruction to pastures, food and orchard crops, ornamentals and forest trees (replants). A total of 15 *Atta* species has been described. Robinson and Cherrett (1974) considered them to be among the most serious general insect pests of the Americas. In addition to the destruction of most agricultural crops due to defoliation, large land surfaces are lost to agriculture as a result of large nests (30-600m<sup>2</sup>). The genus *Atta*, like *Acromyrmex*, occurs between 30°N and 30°S in the Americas (Wheeler, 1910), but has not crossed west of the Andes into Chile (Howse & Bradshaw, 1977).

### Identity

Authority	: Guerin
Classification	
Kingdom	: Animalia
Phylum	: Arthropoda
Class	: Insecta
Tribe	: Attini
Order	: Hymenoptera
Family	: Formicidae
Genus	: <i>Atta</i>
Species	: <i>insularis</i>
Synonyms	: <i>Atta (Archetta) insularis</i> (Gonçalves, 1942) and <i>A. fervens</i> subsp. <i>insularis</i> , (Bergmeier, 1939). Different forms. There is a level of plasticity within this caste, and there is no clear line.
Common name	: Hormiga cortadora
Role	: Pest

### Signs & Symptoms

Worker ants cut disc-shaped pieces of leaves from a wide range of trees including commercial species. Affected plants may be partially or completely defoliated, however, this species has the tendency to move to a new tree before completely defoliating its current host.

### Morphology

Polymorphism is well developed in the tribe Attini, with a sharp size differentiation between the queen and workers. Within the worker caste of the *Atta* genus there is a class of very large workers, which are known as soldiers; their function is to protect the colony from invaders. Also within the worker caste, there are small individuals known as “minima” (Weber, 1972) that function as “gardeners”. The medium size workers are

known as “media” and are approximately 7mm in length. The larger size “maxima” workers are about 11-12 mm long. Maxima workers act as “cutters” while media workers act as “porters”. In line drawing of the Male genitalia is provided (Fig. 1) to enable the identification of *Atta insularis*.

## **Biology & Ecology**

*Atta insularis*, like other *Atta* species, is a eusocial insect, living in large underground colonies. These colonies comprise a queen, sexual forms (males and females or virgin queens), and workers, each caste being responsible for a specific function. The species is a fungus grower and eater; the cut leaves, flowers and stems are used to make the fungus, which is the only food of the ants. Littleddyke and Cherrett (1976), however, observed that the ants drink juices, which are exuded from cut leaf surfaces. Cherrett (1969) also showed that leaf-cutting ants would drink water and various kinds of vegetable oils.

Each colony has one queen whose function is to lay eggs and perpetuate the colony. When the males and females become sexually mature they acquire wings and leave the nest to mate- the “nuptial flight”. Mating takes place in the air; one female may mate with several males and the sperm is stored in the spermatheca (fig. 1). Before the female leaves the nest, she packs a small piece of the fungus (mycelia) into her infrabuccal chamber, beneath the opening of the oesophagus just to the rear of the base of the labium. Following the nuptial flight the queen sheds her wings and burrows beneath the soil. The nest at this stage consists of a narrow entrance hole, which is just a few centimeters long. It is here that the piece of fungus is deposited, and immediately thereafter the queen begins to lay eggs.

It has been estimated that the first adult workers emerge sometime after 40 to 60 days (during all this time the queen cultivates and attends to the fungus garden herself). During the early stages of nest development, the queen subsists by consuming about 90% of her eggs and catabolizing fat body and wing muscles. When the larvae first hatch the queen feeds them with eggs until they become adults and begin feeding themselves on the fungus. The new workers eventually dig their way up through the, now, clogged entrance hole and begin to forage. At this stage the queen ceases attending the brood and garden and lives only to lay eggs.

The life cycle is completed in 43 days: incubation lasts 15-16 days; larval stage is completed in 17 days, while the pupal stage lasts for 11-15 days. The average longevity of queens is 10 years.

The worker caste, which is polymorphic, exhibits distinct division of labour among the of separation among the forms either in terms of morphology or function. Workers are labeled according to their size and function; the large “maxima” and the medium “media” workers are also known as cutters and porters, while the small or “minima” workers are regarded as gardeners.

Belt (1874) in *The Naturalist in Nicaragua* was the first to identify that the ants did not eat the cut vegetation, but rather used it to build the fungus, which they eat. The ants usually eat the spherical or ellipsoidal swellings at the tips of hyphae. Wheeler (1910) called these “gonglidia.”

### Dispersal / vectors

Dispersal of the species is achieved through the nuptial flight. By this means the species is able to colonize new areas and expand its range. Like other *Atta* species, they help in the dispersal of forest species, prune vegetation and stimulate new plant growth.

### Management

Preventing of destruction by the ants has depended on one of three strategies:

- a) Protecting the plant against damage by the ants with mechanical barriers.
- b) Finding nests and destroying them by physical or chemical means, and
- c) Exploiting the ants’ behaviour of fetching material into their nests.

Chemical and biological control are the methods used in Cuba to manage the pest. Mirex and Saubex baits were the products used in the chemical management programme.

### Biological control

Machado *et al.*, (1988) reported that inoculation of *Acromyrmex* with *Beauveria bassiana* and *Monilia anisopliae* resulted in ants abandoning their colonies and a reduction in foraging activity. Infection of hosts occurred through the germination of spores on the cuticle of the insects, followed by penetration of the germination tube in the haemocoel where hyphae develop until death of the insects.

The Institute of Plant Health Research (INISAV) developed MB-1, a strain of *B. bassiana*, which is reported to give 90% control of the pest 72 hours after treatment. Activity of treated nests ceased 30 days after inoculation.

### Natural Enemies

The entomopathogens *Beauveria bassiana* and *Monilia anisopliae* have been reported by Machado *et al.*, (1988) to cause colonies of ants to abandon their nests and reduce external activity.

### Host Notes

*A. insularis* is considered a pest of economic in Cuba, affecting agricultural crops, ornamentals and forest species. Major agricultural hosts include coffee and citrus, while *Pinus* species is the major forest tree affected.

### Distribution

*Atta insularis* is found only in Cuba.

## Pest Significance & Phytosanitary Risk

The pest, like all other *Atta* species, has the ability to attack many plant species, thus, once introduced into a favourable environment, it will become established. Establishment will however only occur if the introduced ants have among their numbers a queen and a piece of the fungus garden.

### Bibliography

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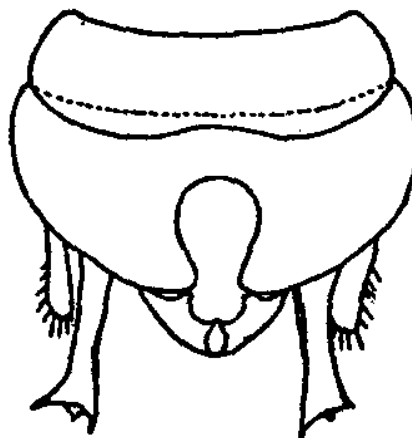


Fig. 1: Male genitalia of *Atta insularis*