

## *Atta sexdens*

### Introduction

*Atta sexdens* Linnaeus, is a serious general insect pest of the Neotropics. 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) consider them to be among the most serious general insect pests of the Americas. In addition to the destruction of most agricultural crops, large land surfaces are lost to agriculture due to the very large nest sizes (30-600 m<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	: Linnaeus
Classification	
Kingdom	: Animalia
Phylum	: Arthropoda
Class	: Insecta
Tribe	: Attini
Order	: Hymenoptera
Family	: Formicidae
Genus	: <i>Atta</i>
Species	: <i>sexdens</i>
Synonyms	: <i>Atta flavicornis</i> (F.), <i>A. sexdentata</i> (Latr.), <i>A. coptophylla</i> (F. Sm.), and <i>A. abdominalis</i> (F. Sm.).
Common names	: Leaf cutters, leaf cutting ants, acoushi ants, cushi ants, parasol ants, bachac, and sauva.
Role	: Pest

This species was first described in 1758 by Linnaeus, as *Formica sexdens*. Fabricius subsequently described it in 1804 as *Atta sexdens*.

The ants are given a variety of names in the countries where they occur.

### Signs & Symptoms

Workers 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 the current host.

## Morphology

Polymorphism is well developed in the tribe Attini, with a sharp size differential between the queen and workers. Within the worker caste of the genus *Atta* there is a class of very large workers, called regarded as “soldiers”. They are about 15 mm in body length, and their function is to protect the colony from invaders. Also within the worker caste, there are small workers known as “minima” (Weber 1972) that function as “gardeners” (Mariconi, 1970). The medium-sized workers are known as “media” and the large size as “maxima” workers. Between them, they act as “cutters” (maxima) and porters (media).

## Biology & Ecology

*Atta sexdens*, like other *Atta* spp., is eusocial, 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. All *Atta* spp. appear to have basically the same colony life cycle.( Fig 1)

### Cultivate

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. This is regarded as the “nuptial flight”, which in this species occurs in the afternoon. It appears that this action coincides with the onset of the rainy season. Before the female (queen) leaves the nest, she packs a small piece of the fungus (mycelia)



Fig. 1 : *Atta sexdens* workers near nest

into her infrabuccal chamber, beneath the opening of the oesophagus just to the rear of the base of the labium. Mating takes place in the air; one queen may mate with several males, and the sperm is stored in the spermatheca. Following the nuptial flight the queen sheds her wings and burrows beneath the soil (Autuori, (1950) observed that the survivorship of *A. sexdens* at this stage was only 2.5%). The nest at this time consists of a narrow entrance hole, which extends to about 25-30 centimeters below ground and ends in a single chamber about 6 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 to the brood and garden and lives only to lay eggs. Fowler *et al.*, (1986) estimated that an *A. sexdens* colony might contain between 5-8 million workers.

The worker caste, which is polymorphic, exhibits distinct division of labour among the different forms. There is a level of plasticity within this caste, and there is no clear line 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 known as gardeners (fig. 3).

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 ate. The ants usually eat the spherical or ellipsoidal swellings at the tips of hyphae; Wheeler (1910) named these “gongylidia”.

*A. sexdens* is a forest species, that generally nests in sands (Weber, 1946).

### Dispersal / vectors

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

### Management

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

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

Tree crops may be protected against damage from the ants by placing mechanical barriers around individual plants. This may be in the form of grease bands, and metal or PVC bands.

Over the years farmers have destroyed nests by applying various chemicals in liquid, dust, vapour or smoke, directly to them. Chemicals, *e.g.* Organochlorines and Organophosphates, were poured directly into nests. In the 1930s Carbon bisulphide, a highly inflammable, very volatile liquid whose vapour explodes when ignited was used to destroy nests. Fogging of nests with various contact poisons is still practised.

The use of poisoned baits in the early 1970s proved successful in managing the pest without having to locate their nests. Baits using Aldrin and Mirex, two highly persistent chemicals, have now been replaced by products using less persistent chemicals *e.g.* sulfuramide and Fipronil. In order to elicit a fast pick up response, attractive matrices *e.g.* dried citrus pulp are used, or, known attractants *e.g.* Soya oil are added to the matrix to improve the bait’s attractiveness. Baiting has proved to be successful from two perspectives; it is an effective and efficient method and is not labour intensive as previous strategies.

## Host Notes

*A. sexdens* attacks forest species, agricultural crops, ornamentals and pastures. The host range is expansive since the cut vegetation is not consumed directly but is instead used to make the only food that it eats, the fungus. Some of the preferred commercial crop species are citrus, cassava, grain legumes, avocado and maize.

## Distribution

*A. sexdens* northern most range is Mexico, and extends through Central America (Panama, Costa Rica, Guatemala, Nicaragua), into South America (Ecuador, Columbia, Peru, Bolivia, Venezuela, Guyana, Brazil, Surinam) and Trinidad and Tobago.

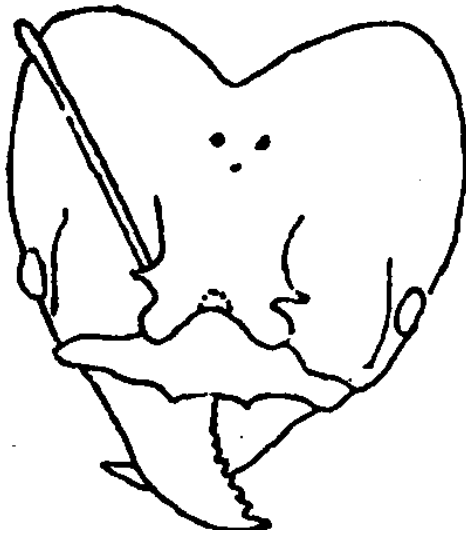
## Pest Significance & Phytosanitary Risk

Leaf cutting ants on a whole are of enormous economic significance. as they impact on agriculture in several ways, losses are suffered through the They have been estimated to cause about \$1,000 million annually (Cramer 1967). Cherrett (1968) opined that losses of about 12% due to ant damage have been reported in the Caribbean.

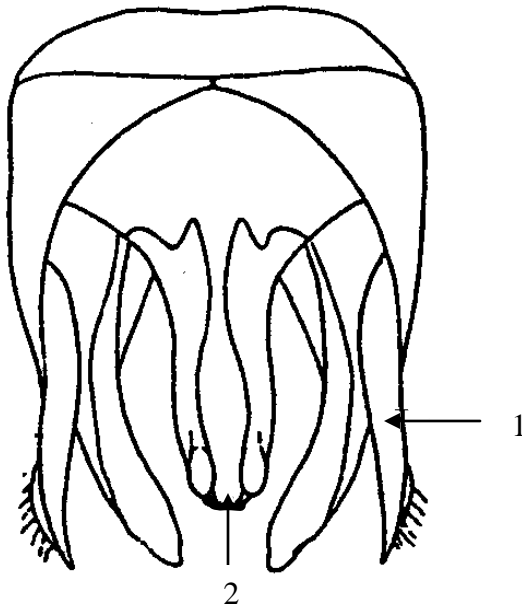
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**Fig. 2: Head capsule of *Atta sexdens* (Source: Borgmeier**



**Fig. 3: Genitalia of *Atta sexdens* (Source: Borgmeier 1959)**  
**Legend:**  
1. Stipes  
2. Sagittens