



## **Monitoring of the Citrus Blackfly in Brazil**

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### **Article History**

Published on: 26 February 2026

### **Introduction**

Brazil is currently the world's largest producer of citrus fruits, with over one million hectares planted. Most of Brazil's orange production is destined for the juice industry. This production is basically concentrated in the state of São Paulo, which alone is responsible for 70% of the national orange production and 98% of the juice production<sup>1</sup>.

The presence of pests in citrus crops increases production costs and threatens the maintenance of the activity. The citrus blackfly (*Aleurocanthus woglumi* Ashby) originated in Southwest Asia and is currently widespread in tropical and subtropical regions of Africa, the Americas, Asia, and Oceania. In Europe, only the species *A. spiniferus* is found in restricted areas of Italy and Greece, where it is under official control<sup>2</sup>.

In Brazil, the pest was first recorded in the state of Pará in 2001<sup>3</sup>. Its spread to other states was facilitated by the transport of orange fruits to concentrated juice industries in different consumer markets<sup>4</sup>.

Until 2007, the pest was considered a quarantine pest in Brazil, meaning that because it was not widely disseminated in the country, it was still considered under control. Currently, due to its wide spread, it is no longer considered an A-2 quarantine pest, representing a threat to Brazilian citrus farming, requiring rigorous phytosanitary measures for its control<sup>5</sup>.

### **Dispersal, Host Plants and Damage**


Although citrus plants are its primary host, the pest can infest more than 300 different plant species, both cultivated and wild. Infestations have already been observed in avocado, cashew, grapevine, guava, among others. The main form of dispersal of the black fly occurs through the use of infested seedlings or ornamental

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Doi: <http://dx.doi.org/10.12944/CARJ.14.1.1>

plants transported by humans. In addition, it can occur naturally through infested leaves carried by the wind or natural dispersal due to the population growth of the pest<sup>6</sup>.

The female lays her eggs on the underside of the leaves, in a spiral, in groups of 35 to 50 eggs. A female can lay an average of 100 eggs during her life cycle. The biological cycle can vary from 45 to 103 days, depending on the temperature, and up to four generations can occur per year<sup>7</sup>.

The direct damage caused by the black fly is due to the fact that it feeds on a large amount of sap, leaving the plant weakened, leading to wilting, and, in many cases, death. Both adults and immature forms of the black fly cause damage by feeding on the plant's phloem<sup>8</sup>. Furthermore, they cause indirect damage because, during feeding, they eliminate a sugary excretion on the leaf surface, facilitating the appearance of sooty mold (*Capnodium* sp.). The sooty mold that develops on the blackfly's excretions can completely coat the leaf, leading to reduced photosynthesis, decreased nitrogen levels in the leaves, and preventing plant respiration. In high concentrations, sooty mold interferes with fruit formation, harming production and reducing its commercial value. A severe infestation can impair fruiting by up to 80%<sup>9</sup>.

### Monitoring

Monitoring should be done through weekly inspections of new shoots, examining the underside of the leaves, looking for signs of blackfly oviposition (eggs, nymphs, pupae, and adults)<sup>10</sup>. Three general guidelines should be observed for the detection of citrus blackfly:

- 1) the preferred area for infestation is the lower half of the plant;
- 2) *A. woglumi* eggs are clustered on the leaves, and these, in turn, form groups of infested leaves;
- 3) The control level is indicated by visualizing the association of the citrus blackfly with the presence of sooty mold on the leaves.

Yellow sticky traps should also be used to detect adult pests and should be installed on the plant at a height of 1.5 meters. If in doubt, if necessary, collect material (nymphs and adults), preserving them in 70% ethyl alcohol for sending to laboratories for identification. Monitoring should be recorded on official forms, which will be sent to the laboratory, including the identification of the collection point with GPS<sup>11</sup>.

Detection surveys in the country

Normative Instruction 45/2018 stipulates that each Federative Unit (UF) of the country must identify possible outbreaks in their initial stage, which would allow for their rapid eradication. Thus, the agricultural defense agencies of the Brazilian states must carry out detection surveys every six months, communicating their results to the Ministry of Agriculture, Livestock and Supply (MAPA) through detailed reports.

### Pest Detection

#### In case of pest detection, the following should be done

- Inform MAPA immediately;
- Eliminate the infested parts of the plant;
- Install yellow traps, replacing them every 7 days;
- Perform chemical control of affected plants using products registered with MAPA.

### Chemical Control

After the occurrence of the citrus blackfly in the orchard has been confirmed through monitoring, chemical control can be initiated with insecticide applications targeting adult pests, combined with growth regulators and mineral oil application to control the sooty mold fungus that occurs on the surface of leaves and fruits. However, application is only recommended at high population levels of pest infestation.

The application method, concentrations of the indicated products, and commercial names for pest control should be determined with the support of an Agricultural Engineer, aiming for a correct technical indication of the safest commercial products for the environment, humans, and animals, based on the environmental and toxicological class of the active ingredient, as well as the indication of precautions during application and the correct use of protective equipment for the applicator<sup>12</sup>.

### Biological Control

Biological control is quite effective in controlling the citrus blackfly. The pest has several natural enemies, among which the most effective are the wasps *Encarsia opulenta* (Silvestri) and *Amitus hesperidum* Silvestre<sup>13</sup>.

In addition to the wasps, it has been found that the entomopathogenic fungi *Aschersonia aleyrodes*, *Fusarium* sp. and *Aegerita webberi* parasitize the nymphs of citrus blackfly<sup>14</sup>.

### Final Considerations

The use and regulation of the measures recommended in Normative Instruction 45/2018 and the application of phytosanitary control rules are necessary and must be complied with in order to mitigate the risk of the pest spreading throughout the national territory. In addition, the necessary control measures must be applied in order to eradicate the pest from the country's producing areas.

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