

Sweetpotato Whitefly

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SCIENTIFIC NAME: *Bemisia tabaci* biotpe A (Gennadius)

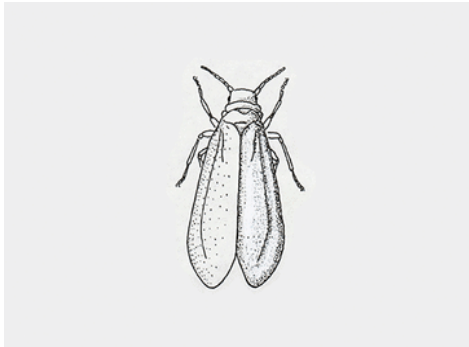
CLASS: Insecta

ORDER: Hemiptera

FAMILY: Alerodidae



Sweetpotato whitefly nymphs (David Riley, Bugwood.org)



Sweetpotato whitefly adult (John Davidson, Univ. Maryland)

Description

Adults

Adult sweetpotato whiteflies are small, approximately 1/25 inch in length, with a pale-yellow body and two pairs of white wings and covered with a white waxy powder. At rest, wings are held in an inverted V position. Their compound eyes are red.

Eggs

Female whiteflies deposit pear-shaped eggs into the mesophyll or inner tissue of the leaf from the lower surface. Eggs are attached to the leaf by a stalk-like process. Eggs are white when first laid and become brown prior to hatching. They are generally laid on the underside surface of the younger, upper leaves of the plant.

Nymphs

The first nymphal stage is called crawlers and the last stage is often referred to as the pupa. After hatching the crawlers move a short distance and settle to feed. Once settled, the subsequent three nymphal stages are scale-like and sedentary. Nymphs are cream white to light green and oval in outline. The total nymphal period lasts about 2-4 weeks.

Pupae

The pupa or fourth nymphal instar will be somewhat darker beige-yellow and opaque and 0.6 to 0.8 mm long. Pupae are relatively more plump compared to previous nymphal stages. The apex of anterior and caudal spiracular furrows have small amount of white waxy deposits. The caudal setae are prominent, and the caudal end is somewhat acute. Dorsal spines are present when the host leaf is hairy, and absent when the host leaf is smooth.

Biology

Distribution

In addition to Hawaii, the sweetpotato whitefly has been reported as a serious pest of cultivated crops in tropical and subtropical areas including Africa, Asia, Central America, South America, and the West Indies where it is also known as the tobacco whitefly and cotton whitefly. In North America, it has been reported from Arizona, California, District of Columbia, Florida, Georgia, Maryland, Texas and Mexico (Cock, 1986).

Host Plants

The sweetpotato whitefly has an extremely wide host range. It attacks more than 500 species of plants (Greathead, 1986) from 63 plant families (Mound and Halse, 1978). In Hawaii, the sweetpotato whitefly has been found on the following crop plants: annona (cherimoya, atemoya, sugarapple), avocado, broccoli, cauliflower, Chinese cabbage, Chinese wax gourd, cucumber, Dendrobium (flowers), edible gourds, eggplant, fig, green bean, guava, hibiscus, hotan, lettuce, luffa, plumeria, poinsettia, pumpkin, rose, soybean, squash, sweetpotato, tomatillo, tomato, ong-choi, watermelon, arlong beans and zucchini. Although not yet reported in the state, other crop hosts include cabbage, chrysanthemum, beans, bittermelon, dishrag squash, pepper, pea, and radish (Mau & Tsuda). Weeds often serve as alternate hosts of crop pests.

Damage

Direct feeding damage is caused by the piercing and sucking sap from the foliage of plants. This feeding causes weakening and early wilting of the plant and reduces the plant growth rate and yield (Berlinger, 1986). It may also cause leaf chlorosis, leaf withering, premature dropping of leaves and plant death. Infestations of sweetpotato whitefly nymphs are associated with the occurrence of irregular ripening of tomatoes and silverleaf of squash. Indirect damage results by the accumulation of honeydew produced by the whiteflies. This honeydew serves as a substrate for the growth of black sooty mold on leaves and fruit. The mold reduces photosynthesis and lessens the market value of the plant or yields it unmarketable (Berlinger, 1986). Damage is also caused when sweet potato whitefly vectors plant viruses. A small population of whiteflies is sufficient to cause considerable damage (Cohen and Berlinger, 1986). Plant viruses transmitted by whiteflies cause over 40 diseases of vegetable and fiber crops worldwide. Among the 1,100 documented species of whiteflies in the world, only three are recognized as vectors of plant viruses. The sweetpotato whitefly is considered the most common and important whitefly vector of plant viruses worldwide. It is also the only known whitefly vector of viruses categorized in the geminivirus group.

Life Cycle

Whiteflies have six life stages - the egg, four nymphal stages, and the adult. The development time of this insect from egg to adult may range from 15-70 days dependent upon temperature and plant host. Development occurs in temperatures ranging from 50 to 89.6°F (10 to 32°C). 80.6°F (27°C) appears to be the optimal temperature for development. Under control conditions on cotton, the pest completes its development in 17 days at 86°F (30°C). Within the continental U.S. development from egg to adult under field conditions varies with the season; development varies from 25 to 50 days. Adults usually emerge from their pupal cases in the morning hours and may copulate a few hours later. Oviposition occurs from 1 to 8 days after mating. Adult life span ranges from 6-55 days dependent on temperature. Females live only 10-15 days under southern continental U.S. summer conditions but can live several months during the winter. In this species, reproduction can occur with or without copulation. Unmated females can reproduce by parthenogenesis in which the females produce only male progeny. Females lay 80 to more than 300 eggs in their lifetime. The plant host reportedly plays an important role in female fecundity.

Management Strategies

High reproductive rate and multiple host sequences provide optimal conditions for sweetpotato whitefly population development. The varied habitats, seasonal population development and intra and inter-crop and wild host movement present an extremely complex and difficult challenge requiring new and innovative approaches for formulating control and suppression methodology. There is no easy way of controlling the sweetpotato whitefly. Egg mortality is usually minimal. Weather and predation may cause high mortality rates during the crawler and first nymphal stages but has only moderate effects on the later nymphal stages. In the past adults were easily killed with insecticides but pesticide resistance in sweetpotato whitefly populations is a common problem faced by many growers today. Sweetpotato whitefly has become resistant to chemical insecticides quite rapidly in other parts of the world, and the wisdom of relying only on chemical insecticides is questioned. Moreover, regular insecticide applications can result in resurgence of other pests. We believe that a combination of cultural practices and chemical application would provide the best chance of controlling this pest. The use of sound cultural practices that may avoid, delay, or lessen the severity of the sweetpotato whitefly infestation is a good foundation to begin with. Careful selection of insecticides can help regulate sweetpotato whitefly populations to reduce losses not due to pathogenic organisms. Little can be done to reduce losses due to virus diseases, but we are fortunate that none have been introduced.

