

ASSOCIATION OF *VERTICILLIUM LECANII* WITH
POPULATION REDUCTION OF RED RICE ROOT
APHID (*RHOPALOSIPHUM RUFIABDOMINALIS*)
ON AEROPONICALLY GROWN SQUASH

RICHARD W. ETZEL AND FREDERICK L. PETITT
The Land, EPCOT Center
P.O. Box 10,000
Lake Buena Vista, FL 32830

The red rice root aphid, *Rhopalosiphum rufiabdominalis* (Sasaki), has a worldwide distribution and a large host range including many cereal crops (Doncaster 1956). The species reproduces parthenogenetically, averaging 55 generations per year under laboratory conditions. In Taiwan, neither diapause nor male aphids have ever been observed (Hsieh 1970).

The red rice root aphid was collected in Lake Buena Vista, Florida from rice (*Oryza sativa* L.) crops in 1985. Since then, it has caused sporadic damage on the roots of squash (*Cucurbita pepo* L.) and pepper (*Capsicum annum* L.) plants at The Land. Both of these cultivars are grown with their roots suspended in air and moistened by a nutrient mist system (referred to as "aeroponics"). During the summer of 1990, the aphid became a major pest on roots of the squash cultivar 'Butterstick'. Populations were so dense that the root systems were discolored and rotting. During the last four months of 1990, the aphid populations suddenly declined to non-damaging levels, apparently due to a fungal epizootic. The fungus was collected and identified as *Verticillium lecanii* (A. Zimmerm.) Viegas.

Verticillium lecanii was described originally in the genus *Cephalosporium*, but later reassigned to the genus *Verticillium* (Gams 1971). This fungus has been isolated from soil, foodstuffs, and moldy organic matter (Donsch et al. 1980, Samson et al. 1980). It is hyperparasitic on various fungi and is a facultative parasite on many arachnids and insects (commonly being associated with aphids), but has not been observed as a pathogen of mammals (Samson & Rombach 1985). The fungus, which requires temperatures between 15 and 25 °C and relative humidities of at least 85% for 10 to 12 hours per day to initiate infection (Hall & Burges 1979), may grow as a saprophyte, possibly on excreted honeydew, before entering the host intersegmentally and through natural orifices (Samson & Rombach 1985).

In early 1991, an increase in the root aphid population was observed after a large-scale replacement of squash plants in the greenhouse. On 5 February 1991, fifteen infected rice root aphids were removed from the roots of a pepper plant (cultivar 'Hungarian Wax') and introduced into the aphid population infesting a 20 cm section of squash root. Six days later, fungal sporulation was observed on the aphids in the inoculated areas. By two weeks after inoculation, the aphid population had declined dramatically on the inoculated plant and *V. lecanii* had spread to aphids on many squash plants in the greenhouse. Within a month of the initial inoculation, the fungus had killed nearly all of the aphids in the greenhouse. This procedure has been repeated several times since and is now routinely implemented whenever red rice root aphid populations are detected. Squash roots have not been damaged by the red rice root aphid since this procedure has been implemented. The *V. lecanii* isolate is catalogued under accession number UFL 5815 at the University of Florida in Gainesville. *Verticillium lecanii* was reisolated from infected root aphids in September 1991.

Our observations over the last two years strongly suggest that declines in the red rice root aphid populations were due to *V. lecanii*. It would be necessary to perform Koch's postulates for confirmation.



Fig. 1. 'Butterstick' squash roots showing dead rice root aphids colonized by *Verticillium lecanii*.

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