Damage to Garlic Crops Caused by *Erwinia herbicola*

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Garlic (*Allium sativum* L.) plants in an experimental field at Bet Dagan developed a whitish leaf tip dieback in late November 1993. Infected plants were smaller and produced smaller bulbs than healthy plants. Yields were reduced by 35% compared with similar plots which were not affected. *Erwinia herbicola* (Lohnis) Dye was identified as the causal organism. The very warm winter and the overhead sprinkler system used in the field are thought to have caused the outbreak. Similar but milder symptoms were observed in the 1994/95 and 1995/96 crops, in which only leaf tips were affected and no major yield losses occurred. *E. herbicola* was isolated from lesions on infected plants in both years.
KEY WORDS: Garlic; *Allium sativum; Erwinia herbicola*; leaf dieback.

Garlic (*Allium sativum* L.) planted in October 1993 at Bet Dagan, Israel, developed leaf tip dieback from late November on. Water-soaked lesions extended slowly *via* the midrib to cover as much as one-third of the leaf; dried leaf tips often had a characteristic whitish color (Fig. 1). The symptoms resembled the normal dying off of mature leaves, but all leaves of a plant except the most immature central ones were affected. The Israeli cv. 'Shani' and the French cv. 'Germidour' were especially affected.

Heavily infected plants were smaller and matured earlier than healthy plants. Bulbs harvested from severely infected plants weighed 35% less than those harvested from healthy plants of the same cultivar, but were otherwise symptomless.

Streak isolations from lesions onto Czapek-Dox agar yielded smooth, light yellow colonies. Determination by the Microbial Identification System of whole cell fatty acid analysis by gas chromatography (Midi Corporation, Newark, DE, USA) identified the causal organism as *Erwinia herbicola* (Lohnis) Dye.

Similar but much less severe symptoms of tip dieback were observed during the 1994/95 and 1995/96 seasons in our experimental field and in commercial garlic plots in the south of the country. Mainly older, lower leaves of the plants exhibited symptoms; yields were not affected in 1995. It is thought that the very mild and warm weather in November and December of 1993 led to the severe symptoms and yield loss described above.

Bacteria were isolated in December 1995 from garlic plants grown in the south of Israel (Kibbutz Ze'elim) and grown on Czapek-Dox agar. A single colony isolate of the bacteria was grown on nutrient agar at room temperature for 5 days. Bacteria were suspended in sterile water and diluted to a final concentration of $4x10^8$/ml. Garlic plants were grown in an unheated greenhouse in 16-cm-diameter plastic pots filled with sterile soil mix, two plants per pot. Plants with five or six green leaves were inoculated in January 1996 by two methods: (i) On six plants, the top 2 cm of fully extended leaves were clipped with a scissor dipped in bacterial suspension; and (ii) six other plants were sprayed to run-off with the suspension. An equal number of plants were similarly inoculated with sterile water. Plants were covered overnight with plastic bags to increase relative humidity and then grown without cover as before.

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One week after inoculation, lesions similar to those described above began to extend downward from the site of clip inoculation. On the edges of mature leaves on three of the plants inoculated by spraying, narrow lesions were seen 12–14 days after inoculation. *E. herbicola* was recovered from leaves showing symptoms and was not recovered from leaves inoculated with sterile water.

The symptoms of the disease resemble the damage caused by *E. herbicola* to leaves and seeds stalks in an onion seed crop and reported by Hattingh and Walters (1). They also stressed that suitable but unusual environmental conditions were critical for the occurrence of the disease. Stalk blight of onion by *E. herbicola* has also been reported in Israel (2), and recently in Cuba (3). Both research groups mention the susceptibility of the flower stalk to this disease. To the best of our knowledge, this is the first report of leaf necrosis caused by *E. herbicola* in garlic.

Fig. 1. Leaf wilt symptoms on leaves of garlic cv. 'Shani' caused by *Erwinia herbicola.*

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