Winter Collapse of Pepper in the Arava: Identification of the Cause and the Relationship between the Appearance of the Disease and Environmental Conditions

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Abstract

The phenomenon of winter collapse of pepper (*Capsicum annuum* L.), the wilting of mature plants from December through February, has been known in the Arava for many years. Over the years, the use of methyl bromide as a soil fumigant kept the phenomenon at negligible levels. Winter collapse of pepper appeared on a wider scale during the 2004/5 and 2006/7 growing seasons. The phenomenon is seen primarily in the cooler areas of the Arava, in Paran and Tzofar and, to a lesser extent, in Ein Yahav.

In experiments that were conducted in controlled growth chambers at the Yair Research Station during the 2007/8 growing season, pepper plants were infected with pythium isolated from wilted plants. The plants were grown at average temperatures of 25, 14, 10.5 and 8.6ºC. At temperatures of 14 and 25ºC, no damage was observed on the infected plants, as compared with control plants. In contrast, at 8.6ºC, we observed the death of many plants, beginning two weeks after the infection date. At 10.5ºC, many plants were damaged, but not completely killed. This damage was not seen until many weeks after the inoculation date. The pythium isolate used in this study was sent to a laboratory abroad for identification. It was identified as a new species of *Pythium*, previously unknown to science. The results of this study provide a good explanation of the relationship between the appearance of the disease, the type of structure used in the cropping system (i.e., net-house or greenhouse) and environmental conditions. In the last decade, relatively high levels of collapse were observed in the 1999/2000, 2004/5 and 2006/7 growing seasons. In each of these seasons, temperatures during December and January were below average for extended periods of time. The move from net-houses to greenhouses in areas that have suffered from winter collapse in previous years has led to a noticeable decrease in the level of collapse. Measurements of soil temperature collected last season in greenhouses and net-houses explain this phenomenon. In areas with similar climates, minimal soil temperatures in greenhouses are higher than those in net-houses.