

Sustainable control of internal fruit rot in bell pepper: a multidisciplinary approach

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An internal fruit rot disease of sweet peppers, first reported in Canada in 2000, later emerged as a significant disease of greenhouse-grown bell pepper worldwide. It is caused primarily by members of the *Fusarium lactis* species complex (FLASC) and to a lesser extent by *Fusarium oxysporum* and *Fusarium proliferatum*. After infection via the flowers, the fungus stays latent in the fruit until maturity. During ripening, the fungus starts to proliferate on the inside of the fruit. Later, sunken lesions appear on the outside. Nearly all growers are confronted with this problem to some extent, with an average annual yield loss estimated at 5% and seasonal peaks up to 20%. Despite the importance of the disease, particularly during years with high disease incidence, efficient control is lacking. A multidisciplinary approach is clearly needed. Here we report on the potential use of Biological Control Agents (BCA) and plant resistance elicitors as well as susceptibility trials of pepper varieties.

Seven BCAs were active *in vitro*. These were tested under conventional greenhouse conditions. First, one-day-old flowers were separately inoculated with BCAs. One day later they were inoculated with FLASC. The infection incidence in two-week-old fruits and mature fruits was determined using surface disinfection and plating techniques. Two BCA isolates (one commercially available and one KUL isolate) reduced the number of infected fruits by 50%.

Another strategy to reduce the initial infection of the flowers was tested, i.e. inducing plant resistance using elicitors. Three commercial elicitors were tested twice under greenhouse conditions and applied at recommended dose. The infection incidence was determined at 4 time points during fruit development. Surprisingly, no decline in the infection rate was observed.

To evaluate the difference in susceptibility between pepper varieties, fruits of 12 varieties were pin-wounded and inoculated with a mycelium plug of FLASC. The lesion size on the yellow varieties was significantly larger than those on the red varieties. In addition, controlled *in situ* flower inoculations with FLASC were conducted on different varieties. Fruit infection was determined two weeks after inoculation and at harvest. Red and yellow cultivars were equally susceptible to infection but the final percentage of symptomatic fruit was significantly different between some varieties. Although no variety showed complete resistance, some had significantly less disease. The results were consistent with those of the previous year, suggesting these assays may give a good indication of varietal susceptibility.

These studies showed that both BCAs and pepper variety can contribute to the multidisciplinary control of *Fusarium* internal fruit rot. When used with other measures (e.g. climatic control) yield loss may be reduced to a commercially acceptable level.

Keywords: *Capsicum annuum*, BCA, elicitor, varietal susceptibility