

Experiments on the Resistance of Pepper Cultivars to *Macrophomina phaseolina*

Kadlicskó S.¹, Kovács J.², Horváth J.¹ and Kazinczi G.¹

¹University of Veszprém, Georgikon Faculty of Agriculture, Institute for Plant Protection, Department of Plant Pathology and Virology,

²Department of Horticulture,
H-8361 Keszthely, P.O. Box 71, Hungary

INTERNATIONAL
JOURNAL OF
HORTICULTURAL
SCIENCE

AGROINFORM
Publishing House, Hungary



Key words: ashy stem blight, *Macrophomina*, pepper, resistance

Summary: The ashy stem blight of pepper (*Capsicum annuum*) is often caused by *Macrophomina phaseolina*. Serious wilt disease occurred between 1994 and 1996 of pepper plants in Hungary. In 1996–98 screening experiments were made on many pepper cultivars. Culture (Knopp) solution experiments, pot experiments, greenhouse and field trials were carried out. We determined the incidence of disease by visual examinations, testing on PDA culture, and light microscope. There were significant differences in susceptibility of cultivars and breeding materials.

Introduction

Macrophomina phaseolina causes severe losses mainly in tropical and subtropical regions, though its damage is often considerable in areas with temperate climate. The pathogen causes serious damages in dry warm summers. Wilting, decay or total destruction are often the last symptoms. The fungus has more than 300 host plants including paprika (*Capsicum annuum*). Martin (1917) isolated the microsclerotial form of the pathogen (*Sclerotium bataticola*) from rotting paprika fruits. Its persistent structures formed in large numbers on the inside wall of the fruit and on the seeds. Small (1926) & Conners (1934) gave account of infected paprika plants in North America. In Yugoslavia, Ačimović (1964) studied the host range of the pathogen and found, that pepper is also a host plant of the *Macrophomina*. Thirumalachar et al. (1977) have shown that isolates obtained from *Capsicum* were pathogenic also on potato tubers. Raut et al. (1989) isolated the fungus from half ripe and ripe paprika fruits. Fischl et al. (1995a) were the first in Hungary who reported on the occurrence of the pathogen in paprika (Figure 1). Later, several publications appeared in this subject in Hungary (Dula, 1995; Fischl et al., 1995b; Kovács et al., 1996).

Protection against the pathogen is very difficult and not enough successful. The possibilities of agrotechnical control have also been investigated.

In Hungary the resistance of paprika varieties and propagation materials was investigated only recently by Kadlicskó & Kovács (1999).



Figure 1 Symptoms on pepper plant infected by *Macrophomina phaseolina*

Material and methods

As a first step small-plot culture, pot and liquid (Knopp) culture solution experiments were started in 1996 and continued in 1997/98 in the nursery of the Institute for Plant Protection. The seed- and seedling material of the plant stand to be tested was supplied by the Department of Horticulture of the Georgikon Faculty of Agriculture. The experiments included inoculation- and control treatments in several replicatons. With the 7-day-old culture of the fungus artificial inoculation was carried out in the culture pot- and culture solution experiments in 1996, and in the small plot-, culture pot- and culture solution experiments in 1997/98.

In the field and in the culture pots plants were grown to the end of the vegetation period. We followed their state of health, determined the extent and rate of wilting, the infection of stem and root-system, the microsclerotium coverage, which served as a basis for determining the susceptibility of the different varieties and propagation materials and placing them in groups.

Results and conclusions

Results of the tested pepper cultivars is given in *Table 1*. In 1996 most of the tested cultivars and propagation materials were divided into medium and severally infected groups. The 19/2 line did not, while the pepper cultivar 'Gambo' was only slightly infected. In 1997, similar to the previous year more than 50% of the tested cultivars and propagation materials were medium and severely infected. The healthy and low-infected cultivars and lines were the following: '19/10', '33/9', 'Rezisztens keszthelyi fehér DH line 2', '19/5', 'Csipke (mass)', '1/96'. In 1998 we couldn't find healthy cultivars. A few breeding lines belonged to low infection group.

According to our experiments only those cultivars can be separated from each other which show big differences in their susceptibility. According to our results we are of the opinion that the non-infected cultivars can be considered as tolerant, which are only regarded as partially resistant. Tolerant cultivars can be used widely only when their other agricultural property values are satisfactory.

References

- Ačimović, M. (1964):** The occurrence of *Sclerotium bataticola* Taub. on some agricultural crops and morphological and ecological properties of the parasites. *Sovr. Poljopr.* 12, 55–56.
- Connors, I.L. (1934):** 13th Annual Report of Canadian Plant Disease Survey, 1993. pp. 1-75 and pp. 103–128.
- Dula B. (1995):** Ashy stem blight of paprika caused by the *Macrophomina phaseolina*. *Kertészet és Szőlészet* 38, 16–17.
- Fischl G., Kadlicskó S. & Kovács J. (1995a):** Wilt of pepper caused by *Macrophomina phaseolina* (Tassi) Goid. *Plant Protection Days, Budapest 1995*. p. 83. (in Hungarian).
- Fischl G., Kadlicskó S. & Kovács J. (1995b):** Wilt of pepper caused by *Macrophomina phaseolina* (Tassi) Goid. *Növényvédelem* 31, 589–592.
- Kadlicskó S. (1989):** Examinations of host range of the *Macrophomina phaseolina*. *Növényvédelem* 25, 311.
- Kadlicskó S. & Kovács J. (1999):** Data on the resistance of pepper and bean cultivars to *Macrophomina phaseolina*. *Acta Phytopath. et Entomol. Hung.* 3, 219–224.
- Kovács J., Fischl, G. & Kadlicskó S. (1996):** Data about etiology of ashy stem blight in pepper. "Lippay János" Scientific Symp. Budapest, 1996. p. 327.
- Martin, W.H. (1917):** *Sclerotium bataticola*. The cause of a fruit rot of peppers. *Phytopathology* 7, 308–312.
- Raut, I.G., Gahukar, K.B. & Deshmurkh, R.N. (1989):** Fungi causing fruit rot of chilli in Vidarbha. *PKV Research Journal* 13, 78–79.
- Small, W. (1926):** *Rhizoctonia bataticola* (Taub.) Buttler. *Trop. Agriculturist* 67, 237–241.
- Thirumalachar, M.L., Neergaard, P. & Fakir, G.A. (1977):** Methods for pathogenicity test of seed-borne *Macrophomina phaseolina* isolated from different hosts. *Phytopath. Z.* 88, 234–237.

Table 1 Degrees of the susceptibility of pepper cultivars to *Macrophomina phaseolina*

Years	No infection ¹	Extent of infection		
		Low	Medium	Severe
Cultivars				
1996	19/2	Pepper Gambo	Belecskai zöldpaprika Csipke Rezisztens keszthelyi fehér Rotund Zelena Greygo Piknik Sari	Botond Piroska Bolla Tam Jalapeno
1997	19/10	33/9 Rezisztens keszthelyi fehér DH-line (mixed) 2 19/5 Csipke (mass) 1/96	33/7 68/83 47/87	Botond (40/84) DH-(hot) Botond (40/84) DH-(mass) Belecskai zöldpaprika (mass) Rezisztens keszthelyi fehér DH-line (mixed) 4 Piknik Rezisztens keszthelyi fehér DH-line
1998		33/7 1/96 407 529	47/87 19/9 19/5 26/2 26/5 423 Rezisztens keszthelyi fehér 2DH-line	68/82 (L2 gene) 421 422 Piknik Belecskai zöldpaprika Csipke Botond DH-line Rezisztens keszthelyi fehér DH-line

¹Symptoms were not seen, therefore the lines could be considered tolerant