Efficacy of different fungicides for the control of early blight

Heremans B., De Lange L., Carrette J. & Haesaert G.

University College Ghent, Faculty of Biosciences and Landscape Architecture, Voskenslaan 270, 9000 Ghent, Belgium

Introduction

Early blight caused by two species of the genus *Alternaria* occurs commonly worldwide on potato crops and other Solanaceae. *A. solani* and *A. alternata* are destructive pathogens, particularly in regions with high temperature and alternating dry and high humidity periods. Early blight results in premature dying of foliage and yield losses.
Early blight was normally controlled by fungicide treatments against *Phytophthora infestans*, but in the last years the disease gained in importance. This change is due to several reasons: reduction of nitrogen supply to the crop, climatic change, the growing of more susceptible potato varieties and the use of new fungicides against late blight with less efficacy against early blight. In recent years some specific fungicides against early blight were developped.
In this study the effecacy of several fungicides was tested against *A. solani* and *A. alternata* in *in vitro* tests.

Materials and methods

Isolates of *Alternaria* species were collected in Flanders, Belgium at the end of the growing season of 2009. Two *A. alternata* and two of *A.* solani isolates were included in this study, as well as a German isolate for both *Alternaria* species.
Isolates of *A. solani* and *A. alternata* were maintained on potato dextrose agar (PDA). Plugs of one week old fungal mycelium were inoculated on PDA containing different fungicides in different doses. The tested fungicides are summarized in table 1. Fungicides were applied at 3 doses: dose recommended for field application and a 10 and 100 times lower dose. Criterium for assessment was the colony diameter whereby the different fungicide treatments were compared to the control (% growth after 10 days).

Results and Discussion

The tested fungicides showed differences of efficacy in controlling the two *Alternaria* species (Fig 1 and 2). *A. alternata* 101 and 103 were more sensitive to the fungicides tested than the German isolate and than the *A. solani* isolates.
Azoxystrobine (Amistar) and boscalid plus pyraclostrobine (Terminett) were developped for the control of *Alternaria* species in potatoes. Azoxystrobine (Amistar) and boscalid plus pyraclostrobine (Terminett) completely inhibited the mycelium growth of *A. alternata* 101 and 103. Nevertheless, an efficiency of 70 % and 50 % was observed for respectively the field dose of boscalid plus pyraclostrobine (Terminett) and azoxystrobine (Amistar) on the German isolate of *A. alternata*. For azoxystrobine (Amistar) a mean inhibition of 32 % was observed for the *A. solani* isolates. Boscalid plus pyraclostrobine (Terminett) completely controlled the growth of the tested *A. solani* isolates.
The other fungicides tested are fungicides used to control late blight in potatoes. These fungicides controlled very well *A. alternata*. Only the treatment whereby the field dose was reduced 100 times was less efficient on the German isolate: the efficacy fluctuated between 18 and 74 % with a mean efficiency of 61 %. The field dose of these fungicides completely inhibited the growth of all the *A. solani* isolates tested. The Belgian isolates were less sensitive to the lower doses of these fungicides then the German isolate. The efficiency of the 10 times lower dose fluctuated between 32 and 100 %. The efficiency of the 100 times lower dose fluctuated between 27 and 58 %.

Table 1: Dose of the tested fungicides

Product	Active ingredient		Dose product	Dose active ingredient
Amistar	azoxystrobine	250 g/l	0,25 l/ha	62,5 g
Terminett	boscalid	267 g/kg	0,2 kg/ha	53,4 g
	pyraclostrobine	67 g/kg		13,4 g
Dequiman	mancozeb	750 g/kg	2,1 kg/ha	1575 g
UnikatPro	mancozeb	667 g/kg	1,5 kg/ha	1000,5 g
	zoxamide	83 g/kg		124,5 g
Acrobat Extra	dimethomorf	75 g/kg	2 kg/ha	150 g
	mancozeb	667 g/kg		1334 g
Curzate M	cymoxanil	45 g/kg	2 kg/ha	90 g
	mancozeb	680 g/kg		1360 g
Sereno	fenamidone	100 g/l	1,25 kg/ha	125 g
	mancozeb	500 g/l		625 g
Tanos	famoxadone	250 g/kg	0,5 kg/ha	125 g
	cymoxanil	250 g/kg		125 g
Valbon	benthiavalicarb	17,5 g/kg	1,6 kg/ha	28 g
	mancozeb	700 g/kg		1120 g

Conclusion

Fungicides may be less efficient on different isolates in an *Alternaria* population and *Alternaria* isolates may develop resistance to some azoxystrobine.

Aknowledgements

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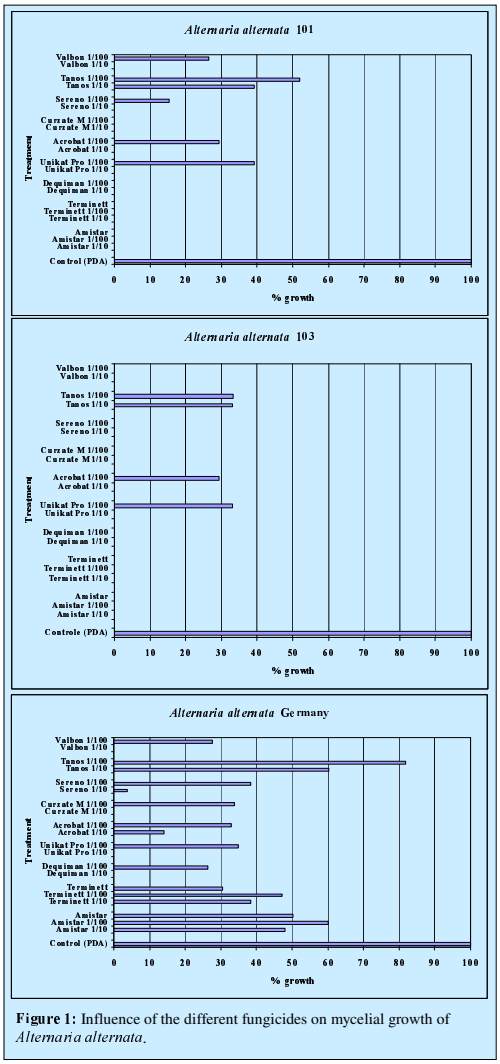

Figure 1: Influence of the different fungicides on mycelial growth of *Alternaria alternata*.

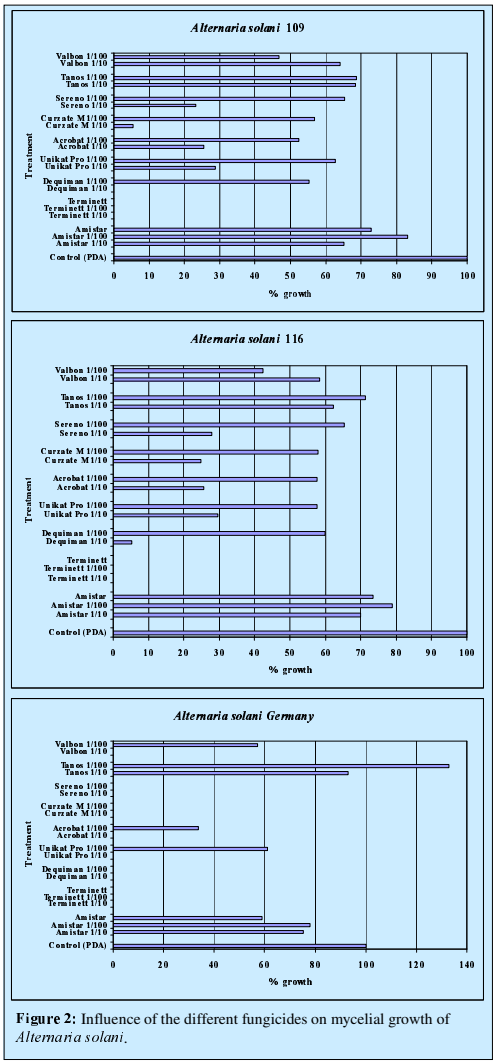

Figure 2: Influence of the different fungicides on mycelial growth of *Alternaria solani*.