

Effectiveness of commercially available biocontrol products against *Verticillium dahliae* in strawberry production



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INTRODUCTION

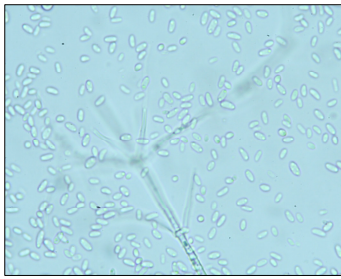


Fig.1 - Verticillate conidiophore of *V. dahliae*

Verticillium dahliae (fig. 1) is a soil-borne fungal pathogen causing vascular wilt in a wide range of crops, notably in strawberry (fig. 2). The disease induces an important reduction of productivity in strawberry production, even when affected plants do not show marked wilting symptoms. The control of *Verticillium dahliae* is a major challenge as the pathogen produces resting spores (microsclerotia) which are able to survive for several years in infested soils.

A study was undertaken in order to evaluate the effectiveness of different commercially available biocontrol products against *V. dahliae* in strawberry production.



Fig.2 - Wilt of strawberry plants caused by *V. dahliae*

TRIALS

RATING SCALE OF THE DISEASE

A first test conducted under controlled conditions aimed at establishing a rating scale of the disease which could be used in further trials to estimate symptoms severity.

Twelve strawberry plants 'Elsanta' were inoculated by dipping their root systems for 3 min. in a *V. dahliae* conidia suspension (10^6 conidia/ml). The root systems of twelve other plants (untreated controls) were dipped for 3 min. in raining water. All the plants were potted into compost and placed under controlled conditions (25°C - 12h day/12h night cycle). The symptoms evolution was regularly followed and a 1 to 6 rating scale of the disease was based on symptoms severity (fig. 3).

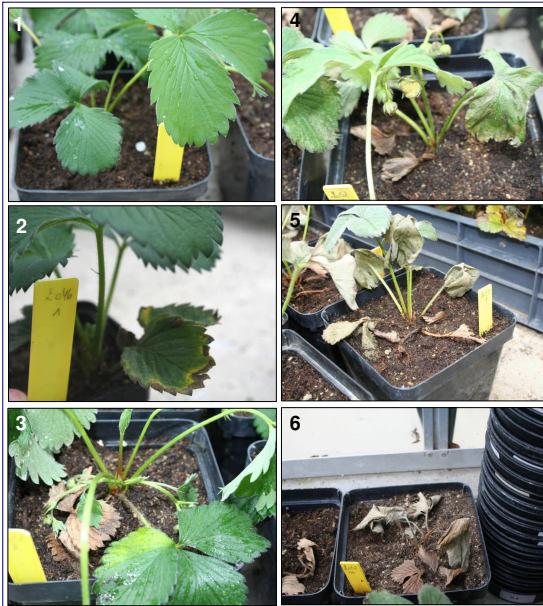


Fig.3 - Rating scale of *V. dahliae* on strawberry plants (1= healthy plant; 2= marginal yellowing of the leaves; 3= drying of the outer leaves; 4= wilting of the upper leaves; 5= drying of the upper leaves; 6= death of the plant)

EFFECTIVENESS OF BIOCONTROL PRODUCTS

A. UNDER CONTROLLED CONDITIONS

A second test was conducted to evaluate the effectiveness under controlled conditions of two commercially available biocontrol products. These two biocontrol products (Myc® 800 and Prestop®) were compared to a conventional fungicide (Topsin® M 500 SC) and to an untreated control. For each of the four treatments, 48 strawberry plants 'Elsanta' were potted into compost and products were applied by respecting the recommended doses (tab. 1).

Tab.1 - Applied treatment and dose

Treatment	Active ingredient	Applied dose
Myc® 800	mycorrhizal fungus <i>Glomus intraradices</i>	0.125g/l - 250 ml per plant
Prestop®	antagonistic fungus <i>Gliocladium catenulatum</i>	1g/l - 250 ml per plant
Topsin® M 500 SC	thiophanate-methyl	1.4g/l - 250 ml per plant
Untreated control	-	-

Two days after products application, the plants were watered with 150 ml of a conidial suspension (10^5 conidia/ml) of *V. dahliae* and placed under controlled conditions (25°C - 12h day/12h night cycle).

Symptom severity was scored after four weeks using the rating scale previously established (fig. 2). Mean symptom severity was significantly lower for the plants treated with the biocontrol products or with the conventional fungicide than for the untreated plants ($p < 0.01$). Indeed, mean symptom severity was 3.00 for plants treated with Myc® 800 and Prestop®, 3.42 for the plants treated with Topsin® M 500 SC and 5.56 for the untreated plants. Percentages of plants per rating level are also presented in tab. 2.

Tab.2 - Mean symptom severity and percentage of plants per rating level for each treatment at the end of the trial

Treatment	Mean symptom severity	Percentage of plants per rating level (%)					
		1	2	3	4	5	6
Myc® 800	3.00	0	0	100	0	0	0
Prestop®	3.00	0	0	100	0	0	0
Topsin® M 500 SC	3.42	0	0	79	0	21	0
Untreated control	5.56	0	0	0	0	44	56

B. IN THE FIELD

A complementary trial was established in August 2009 in a field with a natural infection of *V. dahliae* (fig. 4). The trial aims at comparing four programs based on the application of Myc® 800 and/or Prestop® at different cultural stages (tab. 3). The experimental design also includes a program based on the conventional fungicide Topsin® M 500 SC as well as an untreated control. First symptoms evaluation is forecast during the growing season 2010.

Tab.3 - Treatment program tested in the field

Treatment program	Application period		
	plantation (2009)	recovery (2009)	emergence (2010)
1	Myc® 800	-	-
2	Myc® 800	Myc® 800	-
3	Myc® 800	-	Prestop®
4	Prestop®	Prestop®	-
5	Topsin® M 500 SC	-	Topsin® M 500 SC
Untreated control	-	-	-



Fig.4 - Experimental design in the field

CONCLUSIONS

Results of a preliminary test underline the satisfactory behavior of two biocontrol products (Myc® 800 and Prestop®) against *Verticillium* wilt of strawberry. A complementary trial was therefore established in August 2009 in a field with a natural infection of *V. dahliae*. First results of this field trial are expected during the growing season 2010.

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