

ACTIVITY OF BESTCURE® AGAINST PHYTOPATHOGENIC FUNGI *Pythium ultimum* and *Alternaria porri*.

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INTRODUCTION

Many species of *Pythium* are plant pathogenic for important agricultural crops. *Pythium* damping-off is a very common problem in field and greenhouses, where the organism kills newly emerged seedlings and also crops in advanced growth stages (Jarvis, 1992). This disease complex usually involves other pathogens such as *Phytophthora* and *Rhizoctonia*.

The species of *Pythium* pose an unspecific wide range of hosts (Owen-Going, 2002). This makes *Pythium* species more harmful for harvest, as the crop rotation itself is not enough to eradicate the disease. Lying fallow is not either an efficient control practice, because *Pythium* is saprophytic and survives for a long time within vegetal organic matter in decomposition.

The damages caused by *Pythium* are usually limited to specific zones of crops due to low mobility of oospores, which need water to move, and to capillarity of soil particles that tend to act like a natural filter.



Figure 1. Pepper roots infected with *Pythium*.

Pythium goes into the roots blocking natural feeding and few days later colonizes all the vascular tissues and blocks sap movement

Alternaria porri is another phytopathogenic fungus worldwide distributed that affects several species of *Allium spp.* This fungus is the causal agent of white foliar lesions, with a characteristic purple spot (fig 2), which grows longitudinally in the affected leaves of onion plants. *Alternaria porri* invades the tissue through wounds, stomas or directly through epidermic cells.

The optimum conditions for development of this disease are long periods of high relative humidity (>90%) or dewdrops and temperatures between 20 and 25°C (Everts and Lacy, 1990). Under these conditions, the disease advances quickly and causes yield losses of around 30 - 50 % in the crops.

In fields heavily infested by this disease, crop rotation is necessary as well as elimination of harvest residues, because it is a saprophytic fungus able to survive and infect the new crops.



Figure 2. Onion leaf affected by *A.porri*.

The control with synthetic fungicides of this disease usually consists of alternate applications of Mancozeb, Chlorothalonil and Metiram to reduce the damages.

The new European regulation for the sustainable use of plant protection products obligates the use of alternative ecological approaches for the control of these plant pathogenic micro-organisms.

Some alternatives to the chemical control for these diseases are crop rotation and fallow, but the saprophytic nature of these pathogens reduces their efficacy. The biological control with antagonistic fungi or bacteria or the use of low risk natural derived products such as botanical extracts are novel efficient tools to reduce the damages of plant pathogenic fungi.

In this work the efficacy of BESTCURE® to suppress *Pythium ultimum* and *Alternaria porri* was evaluated

using a rapid *in vitro* test. BESTCURE® is a vegetal extract derived from *Citrus* species with proved biocide capacity against plant pathogenic fungi and bacteria like *Botrytis*, *Phytophthora*, *Fusarium*, *Plasmopara viticola*, *Ralstonia*, and *Xanthomonas*.

MATERIALS AND METHODS

The plant pathogens isolates selected for the study were *Pythium ultimum* from the Spanish Collection of Cultures (CECT) and *Alternaria porri* isolated from leaves of infected onions collected from a organic crop (Viladecans, Barcelona, Spain).

The evaluation of the fungicide activity of BESTCURE® was carried out using the "poisoned" medium technique. PDA broth (200 mL) was prepared and autoclaved for 20 min at 121°C. When the medium was at moderate temperature, BESTCURE® was added at its commercial dose (0,15%) and then it was distributed in 8 aseptic 90 mm plates under sterile conditions. Plates free of BESTCURE® were included as control treatment. Each treatment was repeated twice.

Plates of PDA and PDA with BESTCURE® were inoculated with a plug (5mmx5mm) of each pathogen, taken from the edge of a plate with fungal growth and were incubated in an oven (INCUDIGIT JP Selecta, Spain) at 26°C during 5 days. After the incubation period, the size of the colony of the pathogen in the plates with BESTCURE® was compared with that in the plates of the control.



Figure 3. BESTCURE®, plant strengthener based on citrus extract, natural plant defense activator against phytopathogenic fungi and bacteria.

RESULTS

The evaluation of the plates revealed a complete inhibitory action of BESTCURE® in the growing of both plant pathogenic fungi. Figures 3 and 4 show that the colonies of *A. porri* and *P. ultimum* were significantly smaller in the plates treated with BESCTURE® than in untreated plates.



Figure 4. Control of the phytopathogenic fungus *Pythium ultimum*. Left: Control. Right: Treatment with BESTCURE® at 0.15%.



Figure 5. Control of the phytopathogenic fungus *Alternaria porri*. Left: Control. Right: Treatment with BESTCURE® at 0.15%.

CONCLUSIONES

The results of this *in vitro* assay showed that:

- BESTCURE® when applied at its commercial dose (0.15%) poses an evident fungicide action against the soil borne fungus *Pythium ultimum* and the foliar fungus *Alternaria porri*.
- BESTCURE® can be a good alternative to the commercial synthetic fungicides commonly use to control soil pathogenic fungus (*Pythium ultimum*) and aerial (*Allium porri*).

BIBLIOGRAPHY

Jarvis, W.R. 1992. Managing diseases in greenhouse crops. APS Press, St. Paul, Minn.

Owen-Going, T.N. 2002. Etiology and epidemiology of *Pythium* root rot in bell pepper (*Capsicum annuum*) in commercial-scale and small-scale hydroponic systems. M.Sc. thesis, U. of Guelph.

Everts K.L., and Lacy M.L. 1990. The influence of dew duration, relative humidity and leaf senescence on conidial formation and infection of onion by *Alternaria porri*. *Phytopathology*, 80:1203-1207.