

BIOSTATIC ACTIVITY OF ALFOSITOL® ON *Ralstonia solanacearum*

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INTRODUCTION

Ralstonia solanacearum (Smith) Yabuuchi *et al.* (formerly *Pseudomonas solanacearum* (Smith)) is the causal agent of brown rot of potato and bacterial wilt in potato, tomato and other solanaceae species (Hayward, 1991). The plants become withered and produce small fruits of poor quality. As a result, yields are severely affected leading to commercial losses for growers.

Chemical and cultural control of this disease in infested soils is a hard task (Grimau *et al.*, 1993). Crop rotation using resistant varieties was considered as an effective alternative, but the large number of hosts has reduced its effectiveness (Ji *et al.*, 2005). The reduction in availability of authorized fungicides has reactivated the interest on plant resistant stimulators, such as phosphytes and other elicitors.

ALFOSITOL® is a foliar fertilizer manufactured by FUTURECO BIOSCIENCE containing potassium phosphite and 100% EDTA-chelated copper. Applications of this product strengthen natural plant resistance against several fungal and bacterial diseases. The advanced formulation of ALFOSITOL® eases and accelerates absorption of nutrients throughout the foliage and translocation within plant tissues towards buds, fruits and roots. Besides, the content of copper provides additional fungicide-bactericide effect on crops.

The biocide capacity of ALFOSITOL® on *R. solanacearum* was assessed in this study through a quick *in vitro* test (Lara *et al.*, 2007) using a strain from the microbial culture collection of FUTURECO BIOSCIENCE. The objective of this study was to demonstrate the control capacity of this product when applied at commercial rates.

MATERIALS AND METHODS

This study consisted of next treatments:

- CONTROL (T₁): two 250 mL flasks containing 100 mL of nutritive broth were inoculated with *R. solanacearum* 1.0x10⁶ CFU/mL (initial concentration).
- ALFOSITOL (T₂): two 250 mL flasks containing 100 mL of nutritive broth were inoculated with *R. solanacearum* 1.0x10⁶ CFU/mL (initial concentration) and immediately were dosed with half the lowest commercial rate of ALFOSITOL® (0.1% v/v).
- ALFOSITOL® (T₃): two 250 mL flasks were inoculated as T₁ as above and immediately dosed with the minimum commercial rate (0.2%).
- ALFOSITOL® (T₄): Two flasks inoculated as above and ALFOSITOL® added at 0,4% .

The mixtures were prepared under sterile conditions and flasks were incubated in a shaker (Gallenkamp) at 250 rpm, 26 °C during 72 hours. Then, each flask was analyzed to determine the quantity of biomass produced and the viable count of filtrates (CFU).

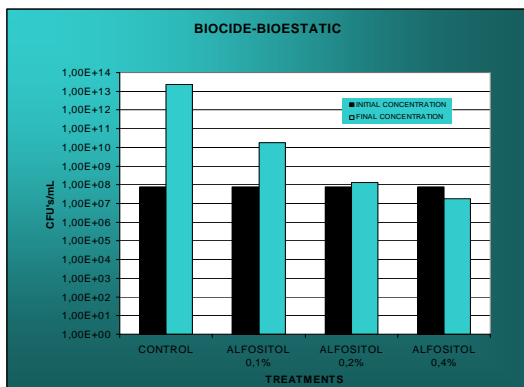


Figure 1. Flasks of different treatments after incubation for 72h in a shaker.

RESULTS

Untreated cultures reached 2.25×10^{13} CFU/mL at the end of incubation period, which was seven fold the initial population of pathogen (logarithmic units). Concentration in treatment T₁ was three logarithmic units (1.8×10^{10} CFU/mL) higher than initial population, suggesting certain biocide effect (3 fold less population respect to control), but not enough for field applications. In the treatment at the minimum commercial dose (T₃) the concentration of the pathogen at the end of the incubation was the same as the initial population, suggesting a biostatic effect rather than biocide. Finally, treatment T₄ showed a slight decrease in population of pathogen respect to control, but not enough to evidence biocide action.

Although the assay should be repeated under *in vivo* conditions, the results of this work suggest a biostatic effect of ALFOSITOL® on *Ralstonia solanacearum*. It can be inferred that applications of ALFOSITOL® may stop, under special conditions, the spreading of pathogen although it does not show the same antagonist activity as showed on other pathogen bacteria in previous works (*Phytophthora citrophthora* or *Erwinia carotovora*).



Graphic 1. CFU/mL of *R. solanacearum* after 72 hours of contact with ALFOSITOL®.

CONCLUSIONS

ALFOSITOL® when applied at minimum and maximum commercial rates inhibits growth of *R. solanacearum* in liquid cultures (biostatic effect). At the maximum application rate ALFOSITOL® shows a slight biocide effect on the pathogen. Rates below the minimum recommended (0.2%) do not show biocide or biostatic effects on the pathogen.

The plant growth promotion activity of ALFOSITOL® is enriched with the biocide and or biostatic action evidenced on certain foliar and soil pathogens. As a consequence plants treated with ALFOSITOL® would have a better development of root and vascular systems with increased resistance, leading to a better growth and biomass production

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