

Trial EcoBac: Control of *Phytophthora* in Bell Pepper

Product:	EcoBac	Trial setting:	Commercial plantations
Crop:	Bell Pepper	Location:	Sinaloa, Mexico

Objective

Control of *Phytophthora capsici* in commercial plantations of Bell Peppers

Biocontrol of *Phytophthora capsici* using EcoBac was achieved in a previous study in jalapeño peppers fields inoculated with the pathogen. The next step was to evaluate the effect of EcoBac in biocontrol of *Phytophthora* in commercial bell peppers fields with a history of *Phytophthora* incidence. The area of Sinaloa (Mexico) was selected due to the prevalence of the disease and large pepper plantations. Bell peppers of the Commandant variety were used for the trial.

Methods

Twelve beds 100 meters (328 feet) in length were used for the test. Six beds were set per treatment. The beds were randomly selected and separated in pairs. Each pair of beds was considered a replicate, and three pairs of beds were set per treatment. Two treatments, a control treatment and an EcoBac treatment were evaluated. The field was set up with drip irrigation lines with independent valves for each bed, so that EcoBac could be applied to treated beds through the irrigation system.

EcoBac applications were carried out weekly, for eight weeks, starting on day 25 after planting. The volume of EcoBac applied each time was 4 liters per hectare. EcoBac was prepared at a concentration of 1×10^{11} cfu per liter (3.785×10^{11} cfu per gallon), so the amount of EcoBac added at each application was 4×10^{11} cfu per hectare (1.6×10^{11} cfu per acre). The amount of EcoBac inoculated each time to the six beds was diluted in 400 liters of water and applied in 15 minutes. Total amount of EcoBac added during the crop cycle was 32 liters per hectare (3.4 gallons per acre). EcoNutrient was dissolved in water and added with EcoBac. The proportion of EcoNutrient application was one pound per gallon of EcoBac.

Percent mortality was determined for each bed by calculating the proportion of dead plants from the initial number of plants. Production of peppers under both treatments was determined in four size categories (extra-large, large, medium and small) using the criteria established by commercial packing companies.

The data was analyzed by ANOVA to determine statistical differences between treatments.

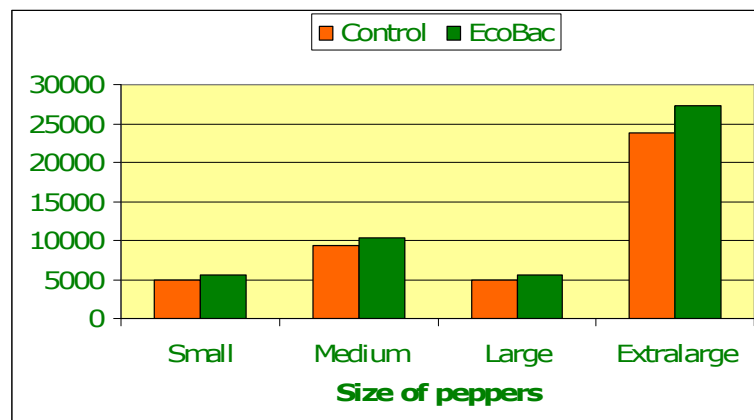
Results

Table 1.
Percent mortality of bell peppers under both treatments in the first farm.

Treatment	Control plots	EcoBac plots
% mortality	2.4% ± 0.88	8.34% ± 1.71

In the first farm, the mortality of pepper plants under the EcoBac treatment was 71% lower ($P < 0.05$) and the increase in total production was 14.8 % higher ($P < 0.05$) than in the control plot. There was a strong improvement in the quality of peppers grown with EcoBac as 31.7% more boxes were harvested in the extra-large category under this treatment (Graph 1).

Graph 1.
Number of boxes of peppers of different sizes, harvested per hectare under both treatments in the first farm.



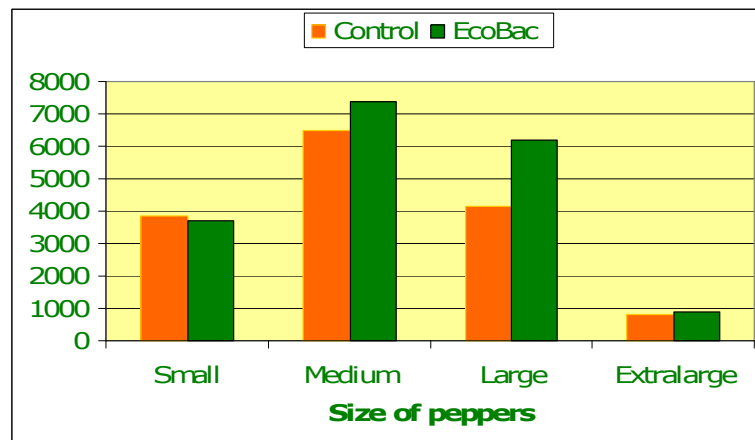
A second trial was carried out simultaneously in a second farm using a lower EcoBac dose rate equivalent to 2 gallons per hectare per cycle. The dose of EcoNutrient was also reduced to 2 pounds per hectare per cycle. The products were also applied through the irrigation system.

The results of plant mortality and total production under both treatments were quite similar to the ones obtained in the first farm, with 61% less mortality ($P < 0.05$) and 18.6% more production ($P < 0.05$) under the EcoBac treatment, compared to the control plot. Furthermore, the improvement in pepper quality with the EcoBac treatment was clearly shown in Graph 2. The number of boxes of peppers increased in the Medium (13.5%), Large (43.5%) and Extra-large categories (11%) in comparison with the control plots. However, only the increase in production of peppers in category Large under the EcoBac treatment was statistically significant different from the control treatment ($P < 0.05$).

Table 2.
Percent mortality of bell peppers under both treatments in the second farm.

Treatment	Control plots	EcoBac plots
% mortality	2.9% ± 0.56	7.5% ± 1.48

Graph 2.
Number of boxes of peppers of different sizes, harvested per hectare under both treatments in the second farm.



Although this year had a low incidence of disease, in both farms there was a statistically significant difference between untreated and EcoBac treated fields in percent mortality ($P < 0.05$) and total production ($P < 0.05$) in favor of the EcoBac treatment.