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Penergetic p IZ
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Gerusa P. K. Steffen PhD. in Soil Science

Anwender/User:
Ricardo B. Steffen PhD. in Soil Science

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Evaluation on penergetic p IZ

Efficiency in caterpillar control

Introduction and objective

The grain production stands out in the agricultural market due to the great area of cultivation in the world. This results from the high demand for vegetable protein and the potential use as human nutrition, for animal feeding and also the use in the industry in general.
Although this whole scenario promotes soybean and bean crops, the crop has been attacked by several pests, which can occur throughout their cycle. Culture harbors an insect species, some of which cause serious and are considered as major pests. The attack of the caterpillar complex on soybean of the photosynthetic leaf area may occur throughout the plant development.
Among the pests that represent the greatest economic consequences for the production of oilseeds, we can highlight the looper caterpillar *Chrysodeixis includens* (WALKER, 1858) which before was only considered a secondary pest without great economic importance. *C. includens* does not destroy the veins of the leaves, it feeds only on the leaves, which gives them a lacy appearance. In the last harvests, due to significant losses, mainly in tropical and subtropical regions, it was newly considered a primary bean crops and soybean pest.
The objective of the of the study was to evaluate the penergetic p IZ prototype's efficiency regarding the caterpillar *Chrysodeixis includens* control on soybean and bean leaves.

Methodology

The study was carried out in two stages:

- first, the efficiency of penergetic p IZ in the control of *Chrysodeixis includens* in soybean leaves was evaluated in a controlled environment
- Subsequently, the efficiency of the product in the *Chrysodeixis includens* control in bean leaves in a greenhouse was evaluated.

For the controlled soybean study, soybean plants were grown in the organic system, without any application of chemicals, thus avoiding the residual chemical molecules in the leaves. After 40 days of soybean emergence, leaves were collected for the assemblage of the growth chamber evaluations. Two treatments were evaluated:
a) Control treatment, where the leaves were sprayed with distilled water and
penergetic p IZ. The with penergetic p IZ leaves were sprayed with the product in the concentration of 300 gr / ha (Figure 1A).
After being sprayed, they were stored in Gerbox plates (plastic boxes used in biological evaluations) and maintained in a growth chamber for 72 hours at 25°C and 12 hours photoperiod (Figure 2).
The study was conducted in the form of avoidance, where two soybean leaves were inserted in the Gerbox plate (one leaf sprayed with water and another leaf sprayed with p IZ). This methodology is used to evaluate the preference of the caterpillar to feed one or other leaf, demonstrating the effect of repellency. The Gerbox plaques were inoculated with three caterpillars of the *Chrysodeixis includens* species inserted between the soybean leaves.
For the evaluation in the greenhouse, bean plants were grown in pots in a organic system without any application of chemicals. After 35 days of emergence, the plants were divided into two groups. One group was sprayed with distilled water and the other group with penergetic p IZ in the concentration equivalent to 500 g / ha (Figure 1B). For this evaluation, the caterpillar pressure occurred naturally and was not inoculated in the plants.

Figure 1: Spraying scheme of leaves kept in controlled environment (A) and in greenhouse (B)

For the leaf damage evaluations, the scale of damage presented in figure 3 was used. The evaluations of the soybean leaves (controlled environment) was made 72 hours after the inoculation of the caterpillars. The evaluations of the bean leaves (greenhouse) occurred 10 days after spraying penergetic p IZ.

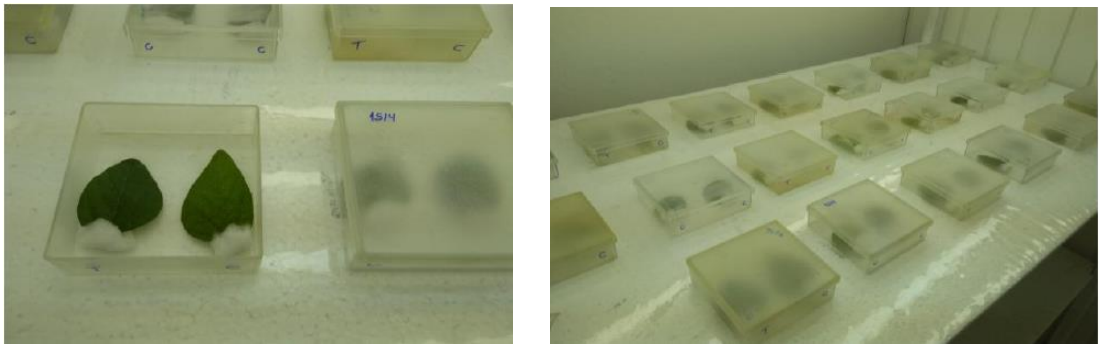

Figure 2: Gerbox plates kept in a controlled environment

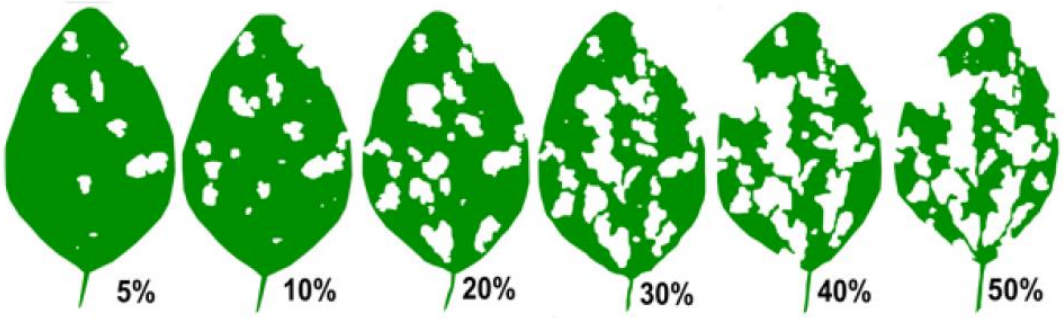

Figure 3: Scale of leaf damage caused by caterpillar action

Source: Ohnesorg and Hunt, Institute of Agriculture and Natural Resources, UNIVERSITY of NEBRASKA – LINCOLN

Results

The use of penergetic p IZ resulted in caterpillar *Chrysodeixis includens* repellency, as can be seen in the photographs of the leaves at the time of the evaluations (Figure 4).

In evaluations in a controlled environment using Gerbox plates, the pressure of the caterpillar on the leaves is intense, due to the impossibility of the caterpillar leaving the environment. In this condition, it was found that even though the penergetic p IZ exerts a repellency, there was damage to the leaves treated with the product too. However, these damages were lesser in comparison to the leaves that were not treated with penergetic p IZ (Figure 5).

The percentage of reduction of the damages caused by the action of the caterpillar in a controlled environment demonstrates the efficiency of the product and shows the potential use of this technology in commercial grain crops (Figure 5).

The dark spots visible on the soybean leaves are microbial pathogens. During the test, no other products were used to control the pathogens as they would falsify the result.

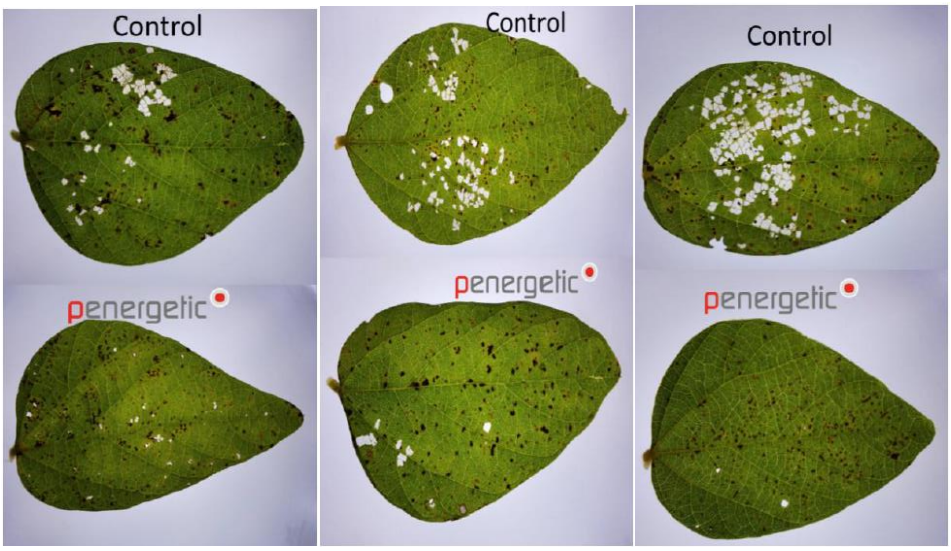

Figure 4: Soybean leaves kept in a controlled environment; control and with penergetic p IZ treatment.

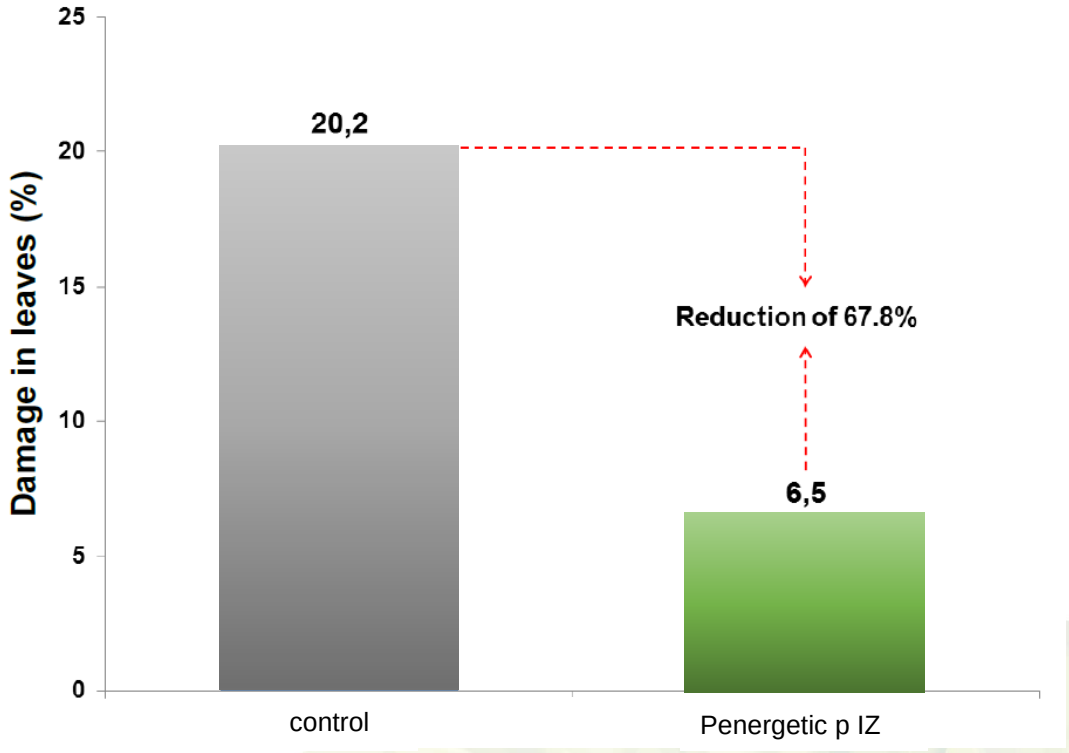

Figure 5: Damage on soybean leaves caused through caterpillar *Chrysodeixis includens* in percentage.

The efficiency of penergetic p IZ in a non-controlled environment (greenhouse) was higher than that in the controlled environment. Because in the greenhouse the caterpillars were not restricted, and the dosage was of 500 g/ ha in the greenhouse instead of 300 g/ h in the controlled environment.

Under the conditions in the greenhouse, the effect of penergetic p IZ was well observable. The caterpillars remained on the leaves of the control section and avoided the ones treated with penergetic p IZ. This could already be observed in the Gerbox plate (when evaluated in a controlled environment).
The application of penergetic p IZ did not kill the caterpillars, it only provoked their displacement.

Figure 6: Caterpillar damages in bean leaf

Figure 7 and 8 shows the appearance of the leaves after the evaluation period. Plants treated with penergetic p IZ had a low incidence of damage compared to plants sprayed only with distilled water.

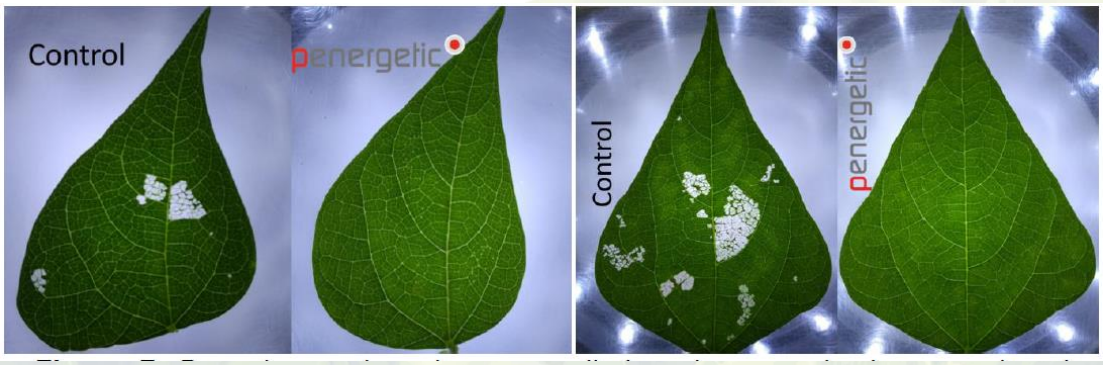

Figure 7: Bean leaves kept in a controlled environment: control and treated with penergetic p IZ

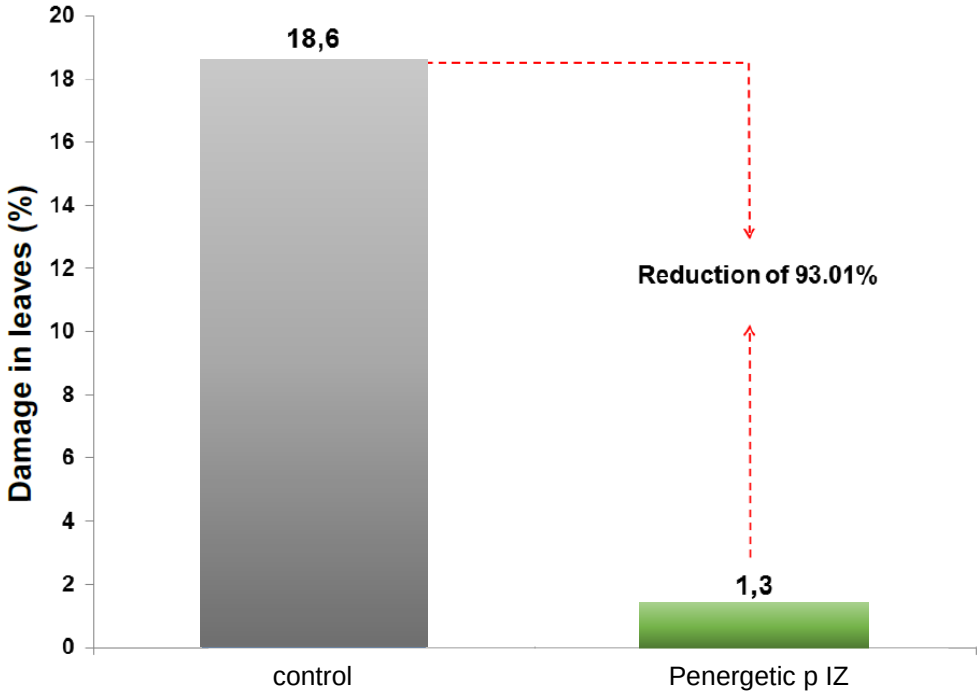

Figure 8: Damage caused to bean leaves by the presence of the caterpillar *Chrysodeixis includens* in percentage.

Preliminary conclusions

Penergetic p IZ efficiently protects soy and bean leaves from caterpillar *Chrysodeixis includens*. The product works without killing the caterpillars. Penergetic p IZ does generally not affect the insect negatively. This is especially useful as other, useful insects such as bees are not negatively affected either.