

# Field efficacy of the entomopathogenic fungus *Beauveria bassiana* to control major cabbage pests in Eastern Democratic Republic of Congo

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## INTRODUCTION

The diamondback moth (DBM) *Plutella xylostella* L. (Lepidoptera: Plutellidae) and the cabbage aphid *Brevicoryne brassicae* L. (Homoptera: Aphididae) are among the major limiting pest of cabbage in the Democratic Republic of Congo (DRC). While chemicals are widely used to control pests, harmful effects make them inadvisable. *Beauveria bassiana* (Bals.) Vuill. (Hypocreales: Cordycipitaceae) is an entomopathogenic fungus (EPF) that can infect over a hundred insect species. The aim of this study was to assess the potential of *B. bassiana* to control cabbage aphid and DBM, while comparing it to a conventional insecticide under the field conditions of eastern DRC.

## MATERIAL AND METHODS

Field trials were carried out in eastern DRC, province of North-Kivu, about 15 km north of Goma city (01.60541°S, 029.25799°E, 1822m alt; 01.60445°S, 029.24775°E, 1798m alt) during two cropping seasons in 2022 (long rainy season A) and 2023 (short rainy season B). Three treatments each with three replicates were assessed: the fungal treatment based on *B. bassiana*, strain GHA (62.5g/100l of water), the chemical treatment (5% Cypermethrin, 100ml/100l of water) and the control plots sprayed with water. Insecticide applications occurred every 15 days from 15 days after transplanting. Data were collected every 7 days by counting the DBM larvae and cabbage aphids per plot (Fig. 1).



Figure 1. Monitoring insect pests on the left, insecticide application using a backpack sprayer on the right (© Niyibizi Gakuru P.)

## RESULTS

There were significant differences ( $p < 0.001$ ) between the treatments studied regarding the number of DBM larvae (Fig. 2) and the number of aphids (Fig. 3) for the two crop seasons. There was also a significant interaction between inspection date and treatments ( $p < 0.001$ ). Overall, the EPF and chemical insecticide plots showed similar results, in contrast to the control plots, which suffered the most pest infestations.

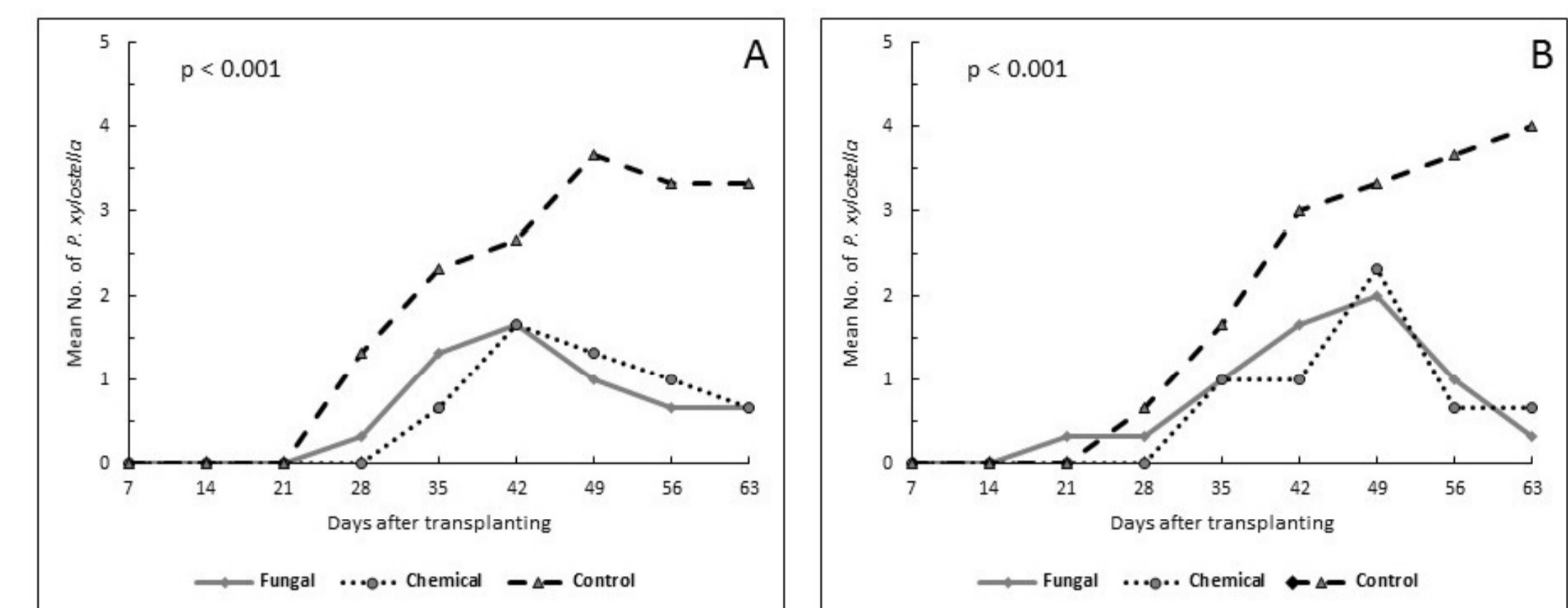


Figure 2. Effects of treatments on weekly mean number of *P. xylostella* per plant during 2022 (A) and 2023 (B)

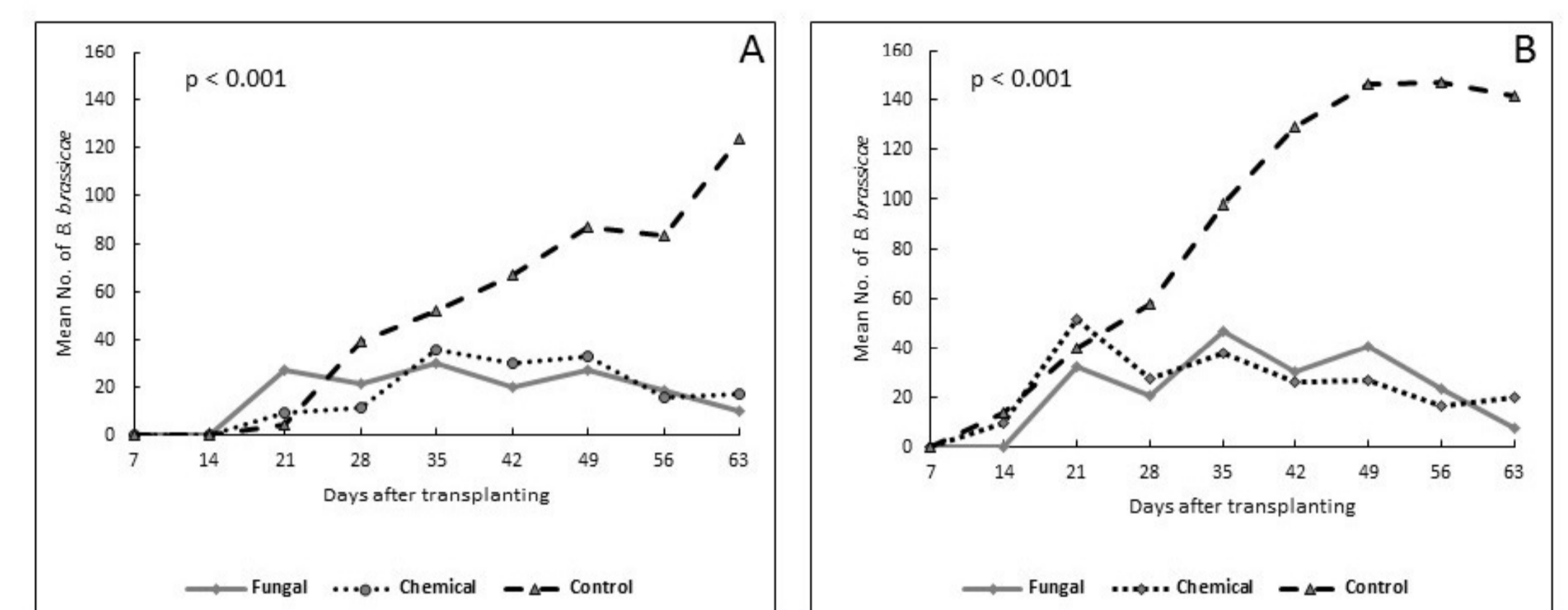


Figure 3. Effects of treatments on weekly mean number of *B. brassicae* per plant during 2022 (A) and 2023 (B)

## DISCUSSION AND CONCLUSION

• Findings show that *P. xylostella* and *B. brassicae* remain cabbage insects of economic importance in the east of the DRC (Fig. 4).



Figure 4. Diamondback moth larva on the left and cabbage aphids on the right (© Niyibizi Gakuru P.)

• *B. bassiana* was more effective in the long rainy season (A) compared with the short rainy season (B). Field efficacy of EPF is strongly influenced by abiotic factors including rainfall, temperature, humidity and exposure to sunlight (Jaronski, 2010; Mweke et al., 2018).

• The fungal application was found to be as effective as the chemical insecticide against *B. brassicae* and *P. xylostella*, in open field conditions as observed by Nouh et al., (2022).

• The *B. bassiana*-based mycoinsecticide, is a sustainable alternative as an environmentally friendly control method that is harmless to human health.

## REFERENCES

- JARONSKI S. T., 2010, Ecological factors in the inundative use of fungal entomopathogens, *BioControl*, 55, 159-185. <https://doi.org/10.1007/s10526-009-9248-3>.
- MWEKE A., ULRICHS C., NANA P., AKUTSE K. S., KOUUMA K., FIABOE M., MANIANIA N. K. & EKESI S., 2018, Biological and Microbial Control Evaluation of the Entomopathogenic Fungi *Metarhizium anisopliae*, *Beauveria bassiana* and *Isaria* sp, for the Management of *Aphis craccivora* (Homoptera : Aphididae), *Journal of Economic Entomology*, 111(4), 1587-1594. <https://doi.org/10.1093/jee/toy135>.
- NOUH G. M., EID A. E., KAMEL H. M. & ADLY D., 2022, Efficacy of the entomopathogenic fungus, *Beauveria bassiana* and certain insecticides on some cabbage insects in field, *Egyptian Journal of Agricultural Research*, 100(4), 499-510. <https://doi.org/10.21608/ejar.2022.149858.1249>.

