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Biotech company



Metawhite Beauveria

MICROORGANISMS FOR PROTECTION AGAINST SOIL-DWELLING INSECTS

Soil-dwelling insects



Elateridae (click beetles)



Elateridae larvae

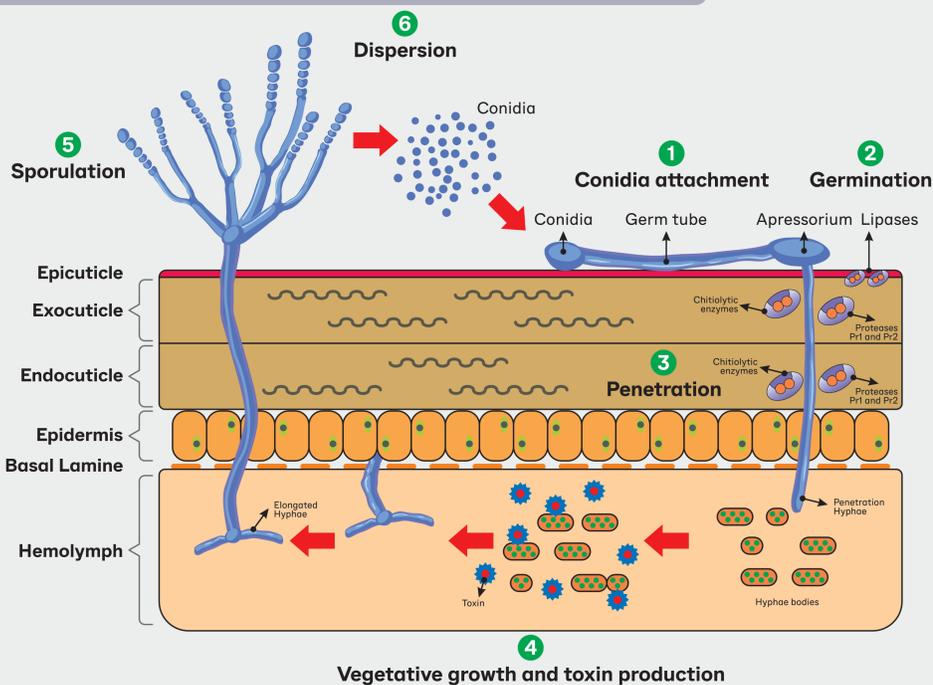


Diabrotica virgifera



Gryllotalpa gryllotalpa

Infection cycle of *Beauveria bassiana* in insects

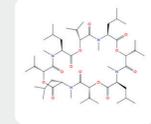


Problem statement

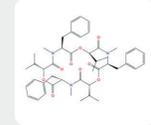
Soil insects present a complex challenge in modern agriculture. They damage crops, reduce yields, and pose significant difficulties for pest management. Soil-dwelling pests are often harder to reach with conventional pesticide treatments, as they reside below the surface and are protected by soil layers. The use of broad-spectrum chemical insecticides to control soil pests can harm non-target organisms such as earthworms, soil microflora, and beneficial predatory insects. All these challenges pave the way to use entomopathogenic fungi, natural enemies of various insects.

Beauveria bassiana is an entomopathogenic fungus widely used as a biopesticide, particularly effective against soil-dwelling insect pests. It exerts its insecticidal activity through a combination of direct infection mechanisms, toxic metabolites, and host immune suppression, making it a promising candidate for integrated pest management (IPM) strategies in agriculture.

Bioactive Secondary Metabolites with Insecticidal Activity



Bassianolide – cyclodepsipeptide insecticide. *In vivo*, the oral administration of bassianolide induces atony in the silkworm *B. mori* at a concentration of 4 ppm and is lethal at doses exceeding 8 ppm



Beauvericin – a depsipeptide with antibiotic and insecticidal effects belonging to the enniatin family



Beauverolide – bioactive peptide with moderate insecticidal properties

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Field trial results

Metawhite Beauveria. Study results of the product efficacy against soil pests on corn

Location	Ukraine	Sowing date	16.04.2020	Crop	Corn
Soil type	Chernozem podzolic	Date of Metawhite Beauveria treatment	16.04.2020	Hybrid	Kremin
Soil pH	4.8-5.0	Seedlings emergence	08-10.05.2020	Previous crop	Corn
Study area	0.5 ha				

Dynamics of the *Elateridae* larvae number in corn crops

Application method	Product	The number of pest specimens / m ²		Efficiency, %
		Before sowing	Before harvest, 12.09	
Untreated	Control	16	18	-
Pre-sowing soil treatment	Metawhite Beauveria	16	6	62.5
	LSD ₀₅		0.58	

Dynamics of the *Gryllotalpa gryllotalpa* imago population in corn

Application method	Product	Efficiency on the 7th day, %	Efficiency on the 14th day, %	Efficiency on the 21st day, %	Efficiency on the 28th day, %
Untreated	Control	-	-	-	-
Pre-sowing soil treatment, 10 l/ha	Metawhite Beauveria	15.6	60.8	70.2	74.5

This trial evaluated the effectiveness of Metawhite Beauveria against *Elateridae* (click beetle) larvae and *Gryllotalpa gryllotalpa* (mole cricket) imago on maize (hybrid Kremin). The previous crop was also maize, and the application was conducted via pre-sowing cultivation. The product showed increasing pest suppression over time compared to the control. The treatment reduced the number of *Elateridae* larvae from 16 to 6 specimens per square meter, achieving an efficiency of 62.5%. Regarding *Gryllotalpa gryllotalpa*, on day 7 after application, suppression was 15.6% in treated plots versus 0% in the control. By day 14, suppression reached 60.8% (vs. 25.3% control), 70.2% by day 21 (vs. 32.8%), and peaked at 74.5% by day 28 (compared to 35.6% in the control).

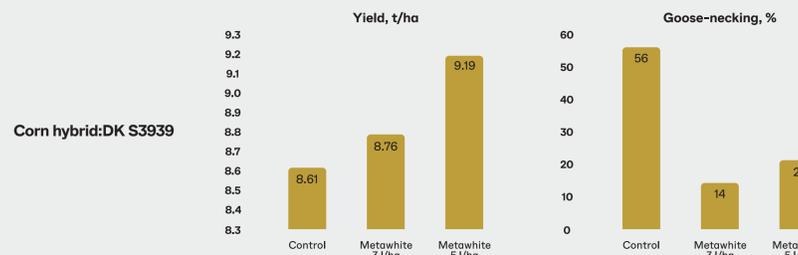
Conclusions

Metawhite Beauveria's mechanism of action involves the fungal pathogen's ability to suppress pest populations through infection, with *Beauveria bassiana* targeting the pests' exoskeletons and causing mortality.

Metawhite Beauveria demonstrated significant pest suppression over time, effectively reducing the number of *Elateridae* larvae and providing substantial control over *Gryllotalpa gryllotalpa*.

Metawhite Beauveria improved maize yields by reducing pest infestation, with treatments at 3 L/ha and 5 L/ha yielding 8.75 t/ha and 9.18 t/ha respectively, compared to 8.6 t/ha in the untreated control.

Diabrotica – Multi-Year Study: Corn after Corn for 3 Years (2020–2022)



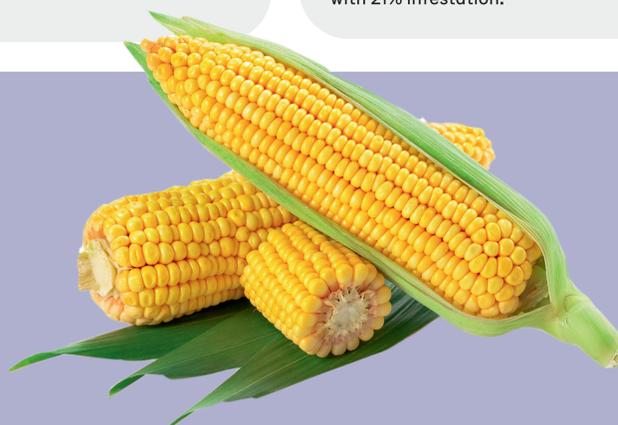
Field trials were conducted from 2020 to 2022 to assess the effectiveness of Metawhite Beauveria on maize (*Zea mays*) infested with *Diabrotica virgifera virgifera* (Western corn rootworm). The product was applied at rates of 3 L/ha and 5 L/ha. Compared to the untreated control (which yielded 8.6 t/ha with 56% pest damage), Metawhite-treated plots showed improved outcomes: the 3 L/ha treatment resulted in a yield of 8.75 t/ha with only 14% infestation, while the 5 L/ha treatment yielded 9.18 t/ha with 21% infestation.

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