



Entomopathogenic fungus to control *Capnodis tenebrionis*



Farmer's name

Kostadin Blagoev



Contact

ivanka.mihova@naas.government.bg



Name of the farm

Kostadin Blagoev's farm



Country

Bulgaria



Description of the farm context

The farm is located in an area with a transitional-continental climate and a diverse soil composition (mixed soil types). The farmer cultivates 31,000 dca of land with the following crops: Peaches – 9,500 dca, Cherries – 12,200 dca, Apples – 5,500 dca and Watermelons – 3,800 dca.

Partner Organization



AdvisoryNetPEST

The **AdvisoryNetPEST** project aims to create a **network** and **upgrade advisory services** across the EU to increase the sharing of knowledge and the **adoption of innovative solutions to reduce the use and risks of pesticides** (RURP) in all **EU Member States**, enabling the agricultural sector to achieve the targets proposed by the Farm to Fork Strategy.



[AdvisoryNetPEST](https://www.advisorynetpest.eu)



www.advisorynetpest.eu

The practices identified in this project are called 'Novel Approaches' and abbreviated as 'NA'

THE TECHNIQUE

Short Description:

Control of *Capnodis tenebrionis* and *Perotis lugubris* using the entomopathogenic fungus *Beauveria bassiana*

Crop Sector:

Orchard

Targeted pest and diseases:

Capnodis tenebrionis and *Perotis lugubris*

Objective of the NA:

Use of a microbial preparation based on the entomopathogenic fungus *Beauveria bassiana*. The spores of the fungus penetrate the body of the larvae of the *Capnodis tenebrionis* and cause its death.

The use of *Beauveria bassiana* fits into the wider context of integrated pest management. By combining biological methods with careful monitoring and appropriate timing of application, the farmer achieves more effective control of weevils while reducing the need for chemical preparations, which is consistent with sustainable agriculture.

Level of practice adoption across the country:

1 2 3 4



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Expectations regarding RURP

Beauveria bassiana is an alternative to chemical insecticides to prevent the development of resistance in the enemy and to ensure a more sustainable and ecological control.



Key success factors

For achieving high efficacy, the method of application, as well as the timing and dose of application of the preparation are important

The preparation should be applied at the base of the tree roots. The entomopathogenic fungus has almost no effect on the eggs or against the larvae that have already entered the root system. Also, its application at low soil moisture and high soil temperature does not affect the larvae of the enemy.



Methods/strategy of application in the farm

At first, an incorrect strategy was applied: the fungus was introduced in autumn, when soil moisture was higher. However, it was not effective then, since the larvae had already penetrated the root system. After this failure, application was carried out during June, July, and August. The main challenges were related to the method of applying the fungus into the soil and the key requirement of maintaining high soil moisture in these months.



Improvements of the NA

A special modification of the drip irrigation system is need by adding a module that allows dissolving and applying the fungus at the required concentration.



Resources and skills needed to adopt the NA

Apart from the modification of the drip irrigation system, no other changes were necessary.



Figure 1: *Beauveria bassiana*



Figure 2: Preparation of the solution

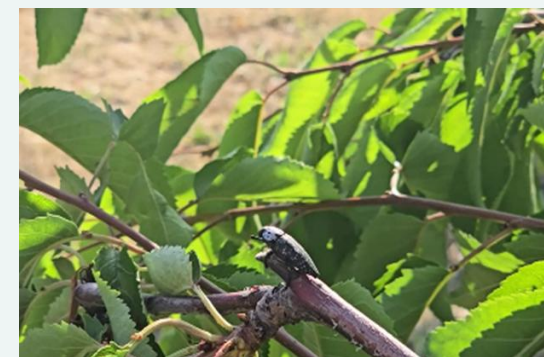


Figure 3: *Beauveria bassiana*



Advice from the Advisor

The advisor advised the farmer to continue using this natural product, as it poses a low risk to the environment and is effective at the same time.



Farmers Testimony

Practice is useful, but it is important to assess the available water flow. If only drip irrigation is possible, first irrigate the soil thoroughly using gravity flow, then apply drip irrigation with insecticide as a second step.



Social and Cultural Acceptance

The fungus is a natural living organism and does not pose a threat to local culture or traditions. No resistance or reluctance has been observed among other farmers or the community.



Policies and Regulatory Support

In Bulgaria, a special “Manual for Control of the Flatheaded Root Borer” has been developed by experts (usually from the Bulgarian Food Safety Agency and scientific institutes). This manual is an official basis for adoption and support of the practice.



BENEFITS

The main goals were prevention and control of the pest and avoidance of fruit tree dieback. Good results were achieved in this regard. Observations in orchards showed that the number of dried trees decreased after the practice was introduced. Pest monitoring showed that the beetle population also declined. This directly improved production results. Crop yields increased, and the quality of the final produce improved as well. More vigorous development of new shoots and vegetative mass on the trees was observed. The trees visibly appeared in better phytosanitary condition compared to previous years.



BOUNDARIES

No negative effects of the biological product were observed. The main challenge remains the dependence on soil moisture and temperature conditions.

To go further on NA replication:

The practice is easy to implement — it does not require many specific resources — the only thing needed is a drip irrigation system with a specific module to dissolve the preparation containing the entomopathogenic fungus. As mentioned, the most important condition for its application in any country and on any farm is that the soil is sufficiently moist.

In the future, the farmer intends to optimize the application schedule: instead of late August, to apply earlier (by July), when larvae are still active in the soil, before pupation.

Systemic Feasibility Analysis: Expert insights from Literature and Field Data

CRITERIUM	INDICATOR	INDICATOR SCORE	EVALUATION
Pesticide use reduction level	Reduction of the applied volume of pesticides	high reduction (>25%) moderate reduction (10-25%) low reduction (<10%) no reduction	😊
Effectiveness of controlling the target pest/diseases/weed	Percentage reduction of the target pest/weed infestation or of the damage caused by the target disease	high reduction (>60%) moderate reduction (30-60%) low reduction (<30%) no reduction	😊
Biodiversity	Impact on bees	--/-/0/+/++	😊
	Impact on arthropods other than bees	--/-/0/+/++	😊
	Impact on earthworms	--/-/0/+/++	😊
	Impact on non-target soil micro-organisms	--/-/0/+/++	😊
Water quality	Impact on pesticide losses to surface water (runoff)	--/-/0/+/++	😊
	Impact on nutrient losses	--/-/0/+/++	😊
Air quality	Impact on pesticide emissions	--/-/0/+/++	😊
	Impact on air pollutants emissions	--/-/0/+/++	😊
Working conditions	Knowledge requirements	high training level moderate training level low training level no training	😊
	Impact on working-time	no change	😊
	Impact on work peaks	--/-/0/+/++	😊
	Impact on human health	high risk moderate risk low risk no risk	😊
Costs	Required level of investment	> EUR 100.000 EUR 50.000 - 100.000 EUR 10.000 - 50.000 < EUR 10.000	😊
Outputs	Impact on yields (produced volumes)	no change	😐
	Impact on crop quality	--/-/0/+/++	😐

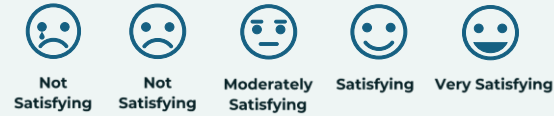
Impact Highlights

The novel approach using *Beauveria bassiana* to control *Capnodis tenebrionis* and *Perotis lugubris* offers notable advantages over conventional methods. By integrating biological control into pest management, it reduces chemical pesticide use, lowering runoff and environmental emissions, while posing low risk to human health and beneficial insects.

Efficiency is variable (30–60%) and strongly dependent on humidity, temperature during application, and residues of copper or chemical fungicides. Moderate training is required, with minimal additional labor or investment.

Potential drawbacks include negative impacts on soil microbiomes and earthworms under direct exposure. Overall, it provides sustainable, socially favorable pest control when carefully managed.

STWG Evaluation:



Find out more details:

[“Manual for Control of the Flatheaded Root Borer”](#)