

## The effects of application of *Trichoderma* in the control of damping off disease in tobacco seedlings



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### Benefits of the application of *Trichoderma harzianum* in tobacco

- ❖ Provides plant protection from soil and foliar diseases, ensuring healthy and good quality seedlings and, ultimately, raw material without pesticide residues.
- ❖ Improves the root system of the seedlings. Well-developed root system means better rooting of tobacco and higher tolerance to drought.
- ❖ Provides better absorption of water and nutrients, strengthens the plants and, with proper growth and development, increases the predispositions for cultivation of healthy tobacco plants.
- ❖ Provides long-term protection. When properly used, *Trichoderma harzianum* grows in symbiosis with plant roots and thereby protects the plants from various soilborne diseases during the growth season.
- ❖ It is effective in different soil types and substrates, at wide temperature range and different pH values.
- ❖ It does not develop resistance - one of the many positive traits that put this fungus above other protection chemicals.
- ❖ The proper application model allows its application even when using a herbicide



Damping off disease in tobacco seedlings – different intensity of the disease

Application of *Trichoderma* – healthy tobacco seedlings

The application of *Trichoderma* in biocontrol of the causing agents of damping off disease in tobacco seedlings is effective, eco-friendly and long-term protective measure



PhD Biljana Gveroska

## Application of *Trichoderma harzianum* in tobacco seedlings protection



### What is *Trichoderma*

*Trichoderma* are avirulent soilborne fungi. They are plant symbionts that interact with roots, soil and leaves. They are characterized by strong bio-control activity on plant pathogens of different origin, thus participating in plant protection from diseases. They enhance the growth and development of the root system and the absorption of water and nutrients from the soil, having a positive impact on plant growth. They stimulate the defense mechanisms of the plants.

### Application in biological control

Fungi of the genus *Trichoderma* are the most powerful bio-control agents. They are widely used in the control of soilborne pathogens - causing agents of the seed and root rot and damping off diseases, but also in the control of leaf pathogens. They protect the root system from diseases caused by soilborne pathogens of the genera *Pythium*, *Rhizoctonia*, *Fusarium*, *Sclerotinia*, etc. The most effective species and strains of *Trichoderma* are used in modern technology of making commercial preparations.

*Trichoderma harzianum* – the most effective bio-control agent in tobacco

especially in the control of damping off disease caused by pathogenic fungi *Pythium debarianum* and *Rhizoctonia solani*.

### Application of *Trichoderma harzianum* in tobacco seedlings

#### Seed treatment

15 g preparation /4.5 g seed /10 m<sup>2</sup>

\* Sowing with water is recommended

#### Treatment of seedlings

15 g preparation /10 m<sup>2</sup> applied with min 25 l water

**Treatment of tobacco seed followed by at least 2-3 treatments of the seedlings is the best way for the effective protection**

\*Treatment should be done as soon as possible, especially if the seed is not treated

\* There is no adverse effect of the higher number of treatments

\* It is necessary to dissolve the preparation properly and to use adequate amount of water for a good and balanced intake of the biocontrol agent

\* All treatments should be performed at a moderate temperature in order to avoid both harmful effects of high temperatures and reduced activity at temperatures below 10°C



### Safe and environment-friendly application of *Trichoderma*

The application of *Trichoderma* is an important and effective ecological measure in agriculture:

\* Completely safe for humans, animals and plants

\* Provides effective disease control, thus minimizing the harmful effects of pesticides

\* *Trichoderma* strains do not induce formation of residues

\* No phytotoxic effects

\* Higher number of treatments has no adverse effects

\* Reproduction of *Trichoderma* in plant rhizosphere provides long-lasting positive effects

\* *Trichoderma* plays an important role in the bioremediation of environment contaminated with pesticides and harmful substances.