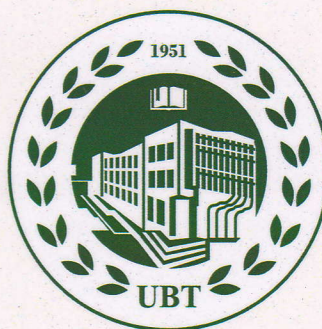
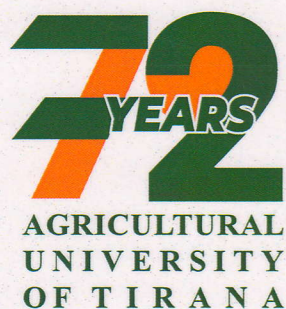


4rd INTERNATIONAL CONFERENCE on Agriculture and Life Sciences (ICOALS 4)



PROCEEDINGS

Tirana 2023



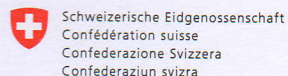
**PROCEEDINGS OF
INTERNATIONAL CONFERENCE ON AGRICULTURE AND LIFE SCIENCES
(ICOALS 4)**

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SUSTAINABLE MANAGEMENT OF THE DAMPING OFF DISEASE WITH THE USE OF BIOPRODUCTS IN TOBACCO SEEDLINGS PROTECTION

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Abstract

According to the agroecological concept of sustainable agricultural production, effective protection of tobacco as well as the environment can be achieved by applying the natural resources.

There are number of bioproducts who expressed the fungicidal effect through multiple action, in which the strengthening of the defense system plays a major role.

Tobacco seedlings protecting from the damping off disease (caused by *Pythium debarianum* and *Rhizoctonia solani*, often double infection) by using them will reduce the risk of inappropriate and excessive use of chemical fungicides. Also, this is the only way to have long lasting positive effects.

The aim of this study was to examine the effectiveness of several bioproducts on the intensity of the damping off disease in tobacco seedlings.

They are: SoftGuard (Chitosan - oligosaccharide from sea crabs), Vacciplant (Laminarin -polysaccharide from brown algae), Timorex gold (extract of *Melaluca alternifolia*), Myelfos (hydroxy methyl merkaptan phosphoric acid) and Cuore Crystal (organic complex of Cu-Zn-Vanila). Biopreparations were applied in appropriate doses for each of them (1-2 kg or l / ha). All of them (except Timorex gold) showed satisfactory fungicidal effect. The highest effectiveness (83.92 and 80.40%) had SoftGuard and Vacciplant.

The results of this study confirm the effectiveness of biofungicides in control of the damping off disease in tobacco seedlings. At the same time, they emphasize the ecological principle, security in protection of tobacco and the positive impact on the environment. Thus, they are an acceptable option in the management of sustainable production of tobacco seedlings.

Key words: agroecological concept, bioproducts, effective protection, sustainability

Introduction

The production of tobacco seedlings can be seriously threatened, mainly by fungal diseases, like the damping off disease. Protection is difficult (presence of the two causing agents of this disease, soil parasites) and inadequate choice of fungicides. Hence, the use of biological control, and especially the strengthening of the plant's defense responses, can be the only acceptable measure.

The World Health Organization (WHO) advocates reducing the use of chemical pesticides, and increasingly applying environmentally safe preparations. Following EU legislation and strict criteria for environmental safety, such bioproducts are increasingly being introduced in Macedonia.

Bioproducts, beside microorganisms, can include numerous natural substances as active substances: plant extracts, hormones and various other products of plant or animal metabolism. They show a stimulating effect on the plants, but also affect the defense mechanisms. Hence, these bioproducts can (with a correct application model) be used in the protection against plant diseases.

The aim of these researches was to determine the fungicidal effect of some such bioproducts in the protection of tobacco seedlings from the damping off disease and further inclusion in the IPM programme for tobacco.

Materials and methods

The study of the fungicidal action of some bioproducts against the causing agents of the damping off disease in tobacco seedlings were carried out under seedling production conditions (Table 1).

The beds were sown with 6.75 g/10 m² ie. 0.67 g/m². The herbicide Gamit (a.i. clomazone) was used in a dose of 1 ml/ m², over the mulch. All variants were placed in 3 replications (3,33 m² each) in a randomized block system.

Table 1. Investigated bioproducts

Bioproducts	Active ingredient	Dose
SoftGuard	Chitosan oligosaccharide from marine crustaceans	1-2 l / ha
Vacciplant	Laminarin - a polysaccharide from brown algae	1,5-2 l / ha
Timorex gold	Tea tree extract (<i>Melaluca alternifolia</i>)	2 l / ha
Myelfos	Hydroxy methyl marcaptan phosphoric acid	0,1-0,2 l / ha
Cuore Crystal	Organic complex Cu-Zn-Vanila	1,5-2 kg l / ha

Application of bioproducts

according to the dose (1 to 2 l or kg / ha), were applied by applying 0,7 ml (g) /3.33 m². Each replication was treated

Determining - determining the intensity of the disease

After 15-20 days of each treatment, the infected area in each replication of the variant was measured. The results are expressed in percentages, as well as the mean value of the replication, per variant.

The efficiency of the treatments (variants) was calculated according to Abbott's method, from the mean values in

For assessment, the damping off disease in the check has an attack intensity of 1.83%. In the Timorex Gold the lowest value has also been determined. Such a value is particularly affected by the strong attack intensity in the second replication. The lowest intensity of attack was determined when treating the seedlings with Soft Guard and Vacciplant.

Intensity of the damping off disease (1st estimation)

Variant	Replication			Average value
	I	II	III	
Check Ø	1,09	1,84	2,57	1,83
SoftGuard	0,01	-	0,34	0,12
Vacciplant	0,02	0,21	0,25	0,16
Timorex Gold	0,003	3,03	0,56	1,20
Myelfos	0,38	1,80	0,91	1,03
Cuore Crystal	-	0,64	0,68	0,50

Table 3. Intensity of the damping off disease (2nd estimation)

Variant	Replication			Average value
	I	II	III	
Check Ø	1,57	1,98	2,91	2,15
SoftGuard	0,48	0,64	0,43	0,52
Vacciplant	1,11	0,33	0,45	0,63
Timorex gold	0,47	3,44	0,55	1,48
Myelfos	0,68	0,74	0,51	0,55
Cuore Crystal	0,36	0,91	0,61	0,64

At the second evaluation, the percentage of infected area ranged from 0.52% for SoftGuard to 1.48% for Timorex Gold (Table 3). The improvement of the condition is evident, that is, the second treatment had a positive effect. Such is the situation with Myelfos. Such an improvement in the situation during the second evaluation has an impact on the overall evaluation of the fungicidal effect of the tested biopreparation.

According to Fig. 1, the lowest efficacy was achieved when the seedlings was treated with the biopreparation Timorex gold. These results are in accordance with the findings of Mihajlović et al. (2013) [5].

SoftGuard and Vacciplant bioproducts showed the greatest efficiency in protection against the damping off disease. Similar results are highlighted in the research of Гвепоска (2023) [4]. The obtained results are in accordance with the facts highlighted by Arysta LifeScience (2019) [2] and Аррохемија (2019) [3]. Values around 80% efficiency are quite satisfactory for a bioproducts, and hence, these biopreproduct showed a satisfactory fungicidal effect in these tests.

Also, for Cuore Crystal it can be said that the results are justified and within the limits of expectations as a biopreparation. Myelfos showed better results in the second evaluation, which changed the picture of its effectiveness, but even so, its results in these trials are somewhat weaker. However, it (as well as the other tested preparations) has generated interest for further trials. (Agricom, 2023) [1].

These biopreparations with the different nature and content of active substance showed a satisfactory fungicidal effect. In addition to the stimulating role, they strengthen the plant's immune system and natural protection against phytopathogens. Hence, in addition to being biostimulators, they can be used as biofungicides in the protection of seedlings and planted tobacco, certainly supported by other studies and the application model (Гвепоска, 2023) [4].

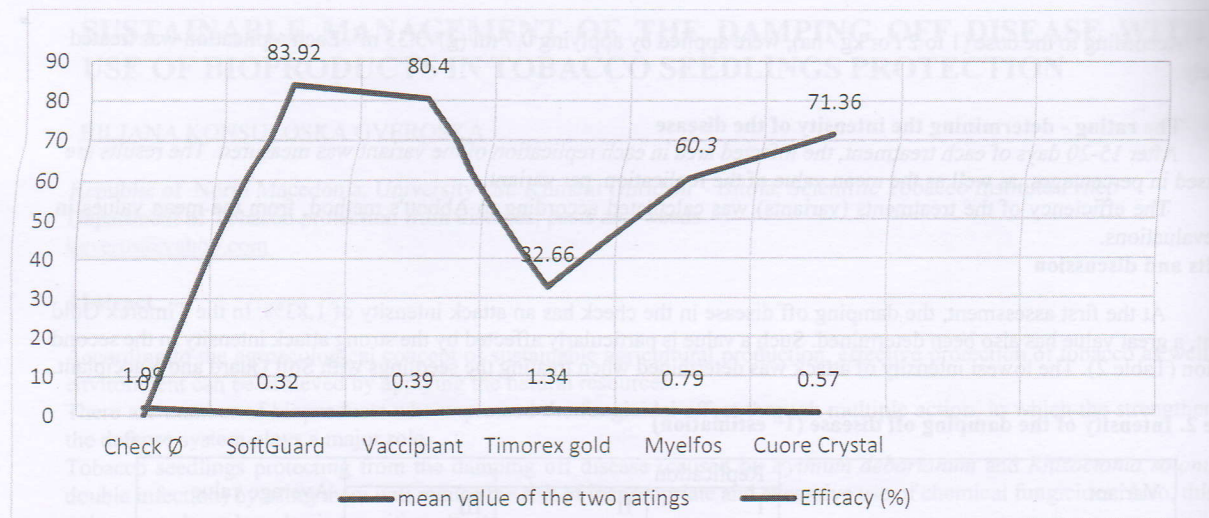


Figure 1. Efficacy of variants

Conclusions

- * The investigated bioproducts showed a satisfactory fungicidal effect against the causing agents of the damping off disease in tobacco seedlings.
- * The results are in line with the efficacy expected from a biofungicide.
- * Bioproducts SoftGuard and Vacciplant showed the highest efficiency in the tobacco seedlings protection from the damping off disease.

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Soft Guard		
Vacciplant	Latamir - a natural active substance	1.5-2.5 l/ha
Timorex gold	Tea tree extract (Melaleuca alternifolia)	2 l/ha
Myelfos	Hydroxy methyl mercaptan phosphoric acid	0.1-0.2 l/ha
Cuore Crystal	Organic complex Cu-Zn-Vanil	1.3-3 kg/ha