EFFECTIVENESS OF THE APPLICATION OF TRICHODERMA FUNGUS AGAINST POTATO FUSARIOSA

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Abstract: This article provides information on the effectiveness of using Trichoderma fungus against potato fusariosis. According to this information, along with timely agrotechnical measures in potato cultivation, applying 100-120 kg of the biological preparation Trichoderma fungus per hectare before planting potatoes against fusariosis disease is effective.

Keywords*:* potatoes, fusariosis, Trichoderma, fungus, damage, biological effectiveness, yield.

INTRODUCTION

Relevance and necessity of the topic. Along with grain crops, the population's demand for potatoes is increasing day by day. Potatoes are also known as the second bread among our people. The root crops of the potato plant (Solanum tuberosum L.) are considered one of the main food crops in the world and are currently cultivated in more than 150 countries on a total area of 19.5 million hectares. According to FAO, the potato yield in 2019 was 376,826.9 thousand tons. Potatoes are grown on large areas in China, India, Russia, Ukraine, the USA, Germany and Bangladesh. The largest yield falls on China, accounting for 26.3% of the total yield.

The purpose of the study: to determine the spread, development, damage caused by soil fungi in potato farms of the Tashkent region, the bioecological characteristics of the pathogen, and to develop effective measures to combat it.

The object of the study is the regionalized varieties of potatoes "Rozara", "Picasso" and others grown in the fields of farms in the conditions of the Kibray and Parkent districts.

The subject of the study is the cultural-morphological, biological, ecological characteristics, distribution patterns, damage caused by phytopathogenic fungi that cause root rot and sprout diseases in potato fields in the conditions of the Kibray and Parkent districts, as well as the biological and economic effectiveness of the means used against this disease.

LITERATURE REVIEW

Potato and melon crops are of great importance in human life and play an important role in the food diet. At the same time, in many cases, during the growing season and later during storage of the crop in warehouses, a significant part of the crop is destroyed by various diseases and its quality decreases sharply. As a result of the lack of regular application of protective measures and other measures, diseases are common, especially in personal plots, and cause great harm.

One of the main conditions for ensuring a high and high-quality crop from potatoes is its protection from diseases. For this, it is necessary to correctly identify the causative agent of the disease, have

information about its development, spread, and how it is stored from one season to another, and on this basis, know the effective terms and methods of crop protection.

N.A. Nazarov noted that in the lower subtropical lands and in the gray soils of the steppe, mainly such species of fungi as F. oxysporium, F. solani, F. nivale are found [3].

The distribution of Fusarium fungi in the soil depends on when the land was developed. It was found that their number increased in spring and late autumn [2].

Pathogenic species of Fusarium fungi have the property of infecting most agricultural plants. Representatives of Fusarium fungi have the property of infecting more than 200 species of cultivated plants [5].

According to V.I. Kurilov, this number has been increasing in recent years. For example: F. oxsporium – causes wilt disease in 150 species of plants, F. moniliforme and F. solani – 50, F. gramimarum – 20, F. nivali – 15 species of plants [4].

According to A.S. Volovik, in order to reduce the incidence of potato disease, potatoes should be planted after cereals and legumes. When potatoes are infected with fusarium, if they are planted after alfalfa and peas, they will fully utilize mineral fertilizers and this will give a good result. In similar data, they recommend not to plow the land after crops such as cereals and soybeans, but to warm it up, and then plant crops belonging to the same family. They also studied the damage caused by Rhizoctonia solani and black leg (Pectobacterium phytophthora) on potatoes. It was found that the germination of potatoes under the influence of infectious rhizoctonia disease is 97.4-97.9%, and in the case of black leg disease, the germination of potatoes is 66.1-75.5%.

In Lithuania, the spread of rhizoctonia and fusariosis diseases during the storage period of potatoes was detected. As a result, seed germination decreases and 9-13% of seeds do not germinate. In contrast, the biological efficiency of seed treatment with 80% TMTD, 50% Fundazol and 80% Ditanam M-45 is 98% [1].

METHODS AND MATERIALS

Taking into account the spread of the disease. If the disease was evenly distributed in the examined fields, samples were taken diagonally or lengthwise, and if it was uneven, samples were taken in a checkerboard pattern in several parallel rows. The spread of the disease was determined using the following formula:

$$P = \frac{n \ 100}{N},$$ here

P - disease prevalence, %;

n - number of diseased plants in the sample, pcs;

N - total number of plants in the sample, pcs.

Taking into account the development of the disease. The progression of Fusarium disease was determined using the following 5-point scale:

The progression of the disease was determined using the following formula:

$$C = \frac{\Sigma(a \times b)}{n}$$

C – average disease rate, %;

$\Sigma(a \times b)$ - The sum of the number of plants multiplied by (a) their corresponding disease scores or percentages;

n – number of diseased plants.

score	**percentage**
0 -	0% healthy plant;
1 -	up to 10% diseased plant;
2 -	up to 11 – 25% diseased plant;
3 -	up to 26 – 50% diseased plant;
4 -	more than 50% diseased plant.

Determining the damage of the disease. The yield loss in potato crops due to Fusarium wilt was calculated based on the formula below.

$V = \frac{(A - a)\ 100}{A}$, here

V – lost yield, %

A – yield of healthy plants, q/ha

a – yield of diseased plants, q/ha.

Determining the biological effectiveness of fungicides against diseases. The following formula was used to determine the biological effectiveness of fungicides used against Fusarium wilt.

$$Be = \frac{(Dc - De)}{Dc} \cdot 100$$

Be – biological effectiveness of drugs, %;

Dc – disease development in the control variant, %;

De – disease development in the experimental variant, %.

The economic efficiency of chemical and biological agents used against fusarium wilt of potatoes was carried out using the methods of A.F. Chenkin and Sh.T. Khojaev (2004).

RESULTS AND DISCUSSION

One of the main conditions for ensuring high and high-quality potato yields is its protection from diseases. For this, it is of great theoretical and practical importance to correctly identify the pathogen, have information about its development, spread, and damage to tubers during storage.

The use of biological control methods in the fight against diseases of agricultural crops is considered the most effective method for growing ecologically pure food products.

Biological control against microorganisms that cause diseases of agricultural crops, especially microorganisms living in the soil, is 75-80% effective.

The use of species belonging to the Trichoderma genus, which are antagonists against pathogenic fungi living in the soil, gives good results. Trichoderma fungi are widespread in various soils and exhibit antagonistic properties against soil pathogens. Trichoderma fungus produces gliotaxin, viridin taxin and other volatile antibiotics.

Table 1

Biological effectiveness of Trichoderma fungus against potato fusarium wilt

№	Options	Infection wi Fusarium, %	Biological efficiency, in %			Yield, q/ha
			Flowering period	The period of tuber formation	Harvesting period	
1	Control (fungus-free)	30,0	0,0	0,0	0,0	67,3
2	Strain - 3a/17	10,0	100,0	10,0	66,6	117,3
3	Strain - 18	7,5	18,5	44,8	75,0	90,5
4	Strain - 19	12,5	41,1	60,0	58,3	80,8
5	Chinese strain	25,0	70,0	40,0	16,6	76,3
Average		13,7	57,4	38,7	54,1	91,2

Data on the use of various strains of Trichoderma fungus against fusariosis of potatoes on the G. Abdullaev farm in the Tashkent district of the Tashkent region are presented in Table 12.

As can be seen from the data in the table, during the vegetative period of potatoes, 30% of plants in the control variant were infected with fusariosis, while in the experimental variants, an average of 13.7% of plants were infected with fusariosis. This indicator was 25% for the Chinese strain of Trichoderma, and in the remaining strains it was from 7.5 to 12.5%.

The biological effectiveness of the use of Trichoderma fungus against fusariosis was maintained even during the flowering, budding and harvesting periods of the plant, and it was on average from 38.7% to 57.4%.

As a result, the yield in the control variant was 87.3 q/ha, while in the experimental variants it was an average of 91.2 q/ha.

CONCLUSION

In addition to timely agrotechnical measures in potato cultivation, applying 100-120 kg of the biological preparation Trichoderma fungus per hectare before planting potatoes in the field against fusarium disease is effective.

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