Use of the Drug Zerox Vkr Against Fusarium and Bacterial Rot of Tomato

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Abstract: The publication discusses the use of the drug Zerox, v.k.r. (3000 mg/l colloidal silver) against fusarium and bacterial rot of tomato. Biological effectiveness of the drug Zerox, v.k.r. (3000 mg/l colloidal silver) when treating tomato seeds at a consumption rate of 50 ml / 1 l of water / 1 kg of seeds, in the fight against tomato fusarium was 94.9%, bacterial rot was 96.9 %.

1 INTRODUCTION

The exceptionally favorable soil and climatic conditions of Uzbekistan make it possible to grow here not only a high yield of vegetables, but also to obtain two harvests of different vegetable crops from the same area. Uzbekistan provides the earliest vegetable production, fully meets its needs and exports it outside the republic in significant quantities.

In this regard, a number of laws and decrees of the President of the Republic of Uzbekistan were adopted to deepen structural reforms and the dynamic development of agricultural production, further strengthen the country's food security, expand the production of environmentally friendly products, and significantly increase the export potential of the agricultural sector; further optimization of sown areas, aimed at reducing the sown area for cotton and cereal grains with the placement on the released lands of potatoes, vegetables, fodder and oilseeds, as well as new intensive gardens and vineyards; expansion of research work on the creation and introduction into production of new breeding varieties of agricultural crops that are resistant to diseases and pests and have high productivity.

The successful solution of the assigned tasks, in addition to the use of modern cultivation technologies and improvement of varietal characteristics, largely depends on measures to combat diseases that cause enormous damage to vegetable growing, because the development of diseases not only reduces the yield of vegetables, but also impairs their quality and consumer value.

Vegetables are a real storehouse of vitamins. Vegetables are also rich in organic acids; they contain citric, malic, tartaric, oxalic and other acids, which improve their taste and promote more complete absorption. They are produced only by plants and the human body receives them ready-made. Vitamins play an important role in human health.

No vegetable crop is used as widely and variedly as tomatoes. This is due to their high content of vitamins, sugars, acids and other minerals. Tomato fruits have a pleasant taste. They are consumed mainly in fresh and processed forms. Tomatoes are rich in almost all vitamins and mineral salts, including trace elements and organic acids (Jumanazarov et al., 2021).

The most widespread and harmful diseases of tomato in Uzbekistan are fusarium wilt and bacterial rot (Peresypkin, 1989), (Pestsova and Borisov, 1995), (Khasanov et al., 2009), (Khojanazarova et al., 2023).

Fusarium is a common and very dangerous fungal disease. This infectious disease can be caused by fungi of the genus Fusarium. It can manifest itself in almost all climatic regions. Fusarium affects the

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tissues and vascular system of vegetable crops. The plant withers, roots and fruits begin to rot. Another problem is the fact that the pathogen can remain in the soil for a long time, as well as on the remains of vegetation, after which it can infect newly planted crops with renewed vigor. Previously affected planting and seed material can also provoke the occurrence of the disease (Peresypkin, 1989), (Khasanov et al., 2009) (Allayarov et al., 2021), (Jumanazarov et al., 2023), (Jumanazarov et al., 2021).

The development of fusarium begins from the moment of emergence, in the form of root rot, and can continue until the end of the growing season. Fusarium begins with the root system rotting. The fungus initially penetrates from the soil into the smallest roots, after which it moves into larger ones as the plants develop. Then the disease penetrates the stem through the vessels and spreads to the leaves. The lower leaves quickly fade. The vessels of the petioles and foliage become weak, sluggish, and begin to sag along the stem. If the air temperature drops below 16°C, the plants will die quite quickly. If no measures are taken to treat the plant, the crop will be completely destroyed in 2–3 weeks. That is why it is very important to start fighting this disease as quickly as possible (Peresypkin, 1989), (Pestsova and Borisov, 1995), (Alimova et al., 2023), (Jumanazarov et al., 2022), (Nazarova et al., 2023).

Symptoms manifest themselves in a bottom-up direction. At first, the disease can be noticed on the lower leaves of the tomato. After some time, fusarium affects the remaining parts of the bush. The foliage turns pale or yellow, the veins begin to lighten. The petioles of the leaves become deformed, and the leaves themselves curl into tubes and then fall off. The top shoots of the tomato begin to fade. After some time, the plant dies completely. The last stage of the disease is the death of the root system. In humid weather, a light-colored coating may appear on the roots, and in hot weather the symptoms intensify even more. Signs of Fusarium wilt can only be noticed during the flowering and fertilization period of tomatoes. It is at this time that the main phase of Fusarium wilt occurs. Basic prevention methods that will help reduce the likelihood of fusarium blight in tomatoes. Importance is given to pre-planting seed treatment to protect plants from fusarium disease, where it is recommended to treat seeds before sowing (Pestsova and Borisov, 1995), (Khasanov et al., 2009), (Sanin, 2003), (Korolev et al., 2011).

Bacterial fruit rot of tomato is caused by several types of bacteria. Bacterial rot is characterized by the formation of gray, usually flat, weeping spots at the top of the fruit, accompanied by softening of the tissue. This type of lesion is common mainly in open ground, more often on already ripening (rather than young) fruits. Mostly those fruits that come into contact with the soil or lie on it with their apical part for a long time rot, where bacteria (Pseudomonas lycopersicum, etc.) enter from the soil and cause rotting (Dementieva, 1985), (Peresypkin, 1989), (Tyuterev et al., 2000), (Jumanazarov, 2022).

In some cases, bacteria settle (as a secondary phenomenon) on fruits affected by physiological blossom end rot. The causative agent of bacterial wet rot is Erwinia carotovora. The first symptoms appear in the form of depressed spots with a color ranging from light to dark. As the disease progresses, the affected area increases in size, mucus rot forms, and bacterial mucus may leak through cracks in the epidermis.

Phytopathogenic bacteria enter plants through natural openings, such as where the fruit attaches to the stalk, or through cracks formed during growth and wounds caused by insects and mechanical damage. Warm weather and high air humidity usually favor infection of fruits by pathogenic bacteria (Melnikova, 1988), (Khasanov et al., 2009), (Mamiev et al., 2020), (Buriev and Zokirov, 2023), (Buriev and Zokirov, 2023), (Zokirov and Sullieva, 2023), (Mirsaidov et al., 2024).

2 MATERIALS AND METHODS

A production test of the drug Zerox, VKR (300 mg/l colloidal silver) was carried out on the field of the Yahyo Khozhi farm, Parkent district, Tashkent region, on tomatoes of the Sulton variety.

The experiment involved 3 options according to the scheme:

1. Zerox, VKR - 50 ml / 1 l of water / 1 kg of seeds
2. Maxim 2.5% potency at a consumption rate of 0.2 ml per 1 kg of seeds (standard)
3. Control - without processing

Seed treatment was carried out on April 15. Examination of tomato seedlings for wilting and rot was carried out during the development of the second pair of leaves. In the surveyed area, 10 samples of 0.25 m rows were taken. In each sample, all plants were dug up and disease damage was taken into account on the following scale (in points):

0 - healthy plants;

1 - weak damage (brown stripes are noticeable on the crust and cotyledon);

2 - moderate damage (the beginning of the formation of root constriction);

3 - severe damage (the constriction covers more than half of the root);

4 - death of the seedling.

After thinning, another census was carried out using the same method and the percentage of plants with a constriction at the root neck was determined.

Isolation of pathogens of tomato diseases was carried out in laboratory conditions according to the method of V.D. Poliksenov, A.K. Khramtsov, S.G. Piskun (Poliksenova et al., 2004) using a humid chamber.

The percentage of disease development was determined using the following formula:

$$P = \frac{a - b}{a} * 100$$

Where: P is the percentage of disease development,

E (a * b) is the sum of the product of the number of affected plants (a) by the corresponding damage score (b),

N is the total number of counting plants,

K is the highest damage score on the scale.

The biological effectiveness of the drug was calculated using the formula:

$$B_{ef} = \frac{(a * b) * 100}{N * K}$$

Where: B_{ef} is biological effectiveness,

a is the development of the disease in the control,

b is the development of the disease in the experiment.

3 RESULTS AND DISCUSSION

Drug Zerox, v.k.r. (3000 mg/l colloidal silver) was tested in the fight against fusarium and bacterial rot of tomato.

The surveys carried out on the susceptibility of tomato to Fusarium root rot in the farm "Yakhyo Khozhi" show that in the control the susceptibility was 35.4%, with the development of the disease 7.8%.

In the case of using Zerox, v.k.r. (3000 mg/l colloidal silver) at a rate of 50 ml/1l of water/1 kg of seeds, the incidence of Fusarium root rot of plants was 2.5%, the development of the disease was 0.4%, where the biological efficiency was 94.9% (Table 1).

Conducted surveys on the susceptibility of tomato to bacterial rot of tomato show that in the control the susceptibility was 7.1%, with the development of the disease 3.1%, Zerox, v.k.r. (3000 mg/l colloned silver) at a rate of 50 ml/1 l of water/1 kg of seeds, the incidence of bacterial plant rot is 0.3% and the development of disease is 0.1%, where the biological efficiency was 96.9% (Table 2).

Table 1: Biological effectiveness of fungicide Zerox, v.k.r. (3000 mg/l colloidal silver) against fusarium root rot disease of tomato (Production experience, Tashkent region, Parkent district, farm “Yakhyo Khozhi”, Sulton variety).

Experience Options	Consumption rate	Plant susceptibility, %	Development of plant disease, %	Biological effectiveness, %
Zerox, v.k.r.	50 ml / 1 l water / 1 kg seeds	2,5	0,4	94,9
Maxim 2.5% k.s (standard)	0.2 ml per 1 kg of seeds	3,1	0,7	91,0
Control - no processing	–	35,4	7,8	–

Table 2: Biological effectiveness of fungicide Zerox, v.k.r. (3000 mg/l colloidal silver) against bacterial rot disease of tomato (Production experience, Tashkent region, Parkent district, farm “Yakhyo Khozhi”, Sulton variety)

Experience Options	Consumption rate	Plant susceptibility, %	Development of plant disease, %	Biological effectiveness, %
Zerox, v.k.r.	50 ml / 1 l water / 1 kg seeds	0,3	0,1	96,9
Maxim 2.5% k.s (standard)	0.2 ml per 1 kg of seeds	0,4	0,2	93,8
Control - no processing	–	7,1	3,2	–

The biological effectiveness of the reference biological product Maxim 2.5% K.S (fludioxonil) at a consumption rate of 0.2 ml per 1 kg of seeds was 91.0%, with plant infestation of 3.1% and disease development of 0.7%.

The biological effectiveness of the reference biological product Maxim 2.5% K.S (fludioxonil) at a consumption rate of 0.2 ml per 1 kg of seeds was 93.8%, with plant infestation of 0.4% and disease development of 0.2%.

Thus, the drug Zerox, v.k.r. (3000 mg/l colloidal silver) is highly effective in treating tomato seeds against fusarium disease and bacterial rot at a consumption rate of 50 ml/1 liter of water/1 kg of tomato seeds.

4 CONCLUSIONS

Biological effectiveness of the drug Zerox, v.k.r. (3000 mg/l colloidal silver) when treating tomato seeds at a consumption rate of 50 ml / 1 l of water / 1 kg of seeds, in the fight against tomato fusarium was 94.9%, bacterial rot was 96.9%.

Drug Zerox, v.k.r. (3000 mg/l colloidal silver) showed high efficiency when treating tomato seeds at a consumption rate of 50 ml/1 l of water/1 kg of seeds.

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