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EVALUATION OF THE BIOLOGICAL EFFICACY OF PERVATIN 72.2% EC AGAINST POTATO LATE BLIGHT: EXPERIMENTAL RESULTS

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Abstract: This article highlights the economic importance of potato and one of its most harmful diseases – late blight (*Phytophthora infestans d By*, Oomycetes, *Peronosporales*), describing its development conditions and control measures. The disease may reduce potato yield by up to 30–70% due to leaf, stem, and tuber damage. The main objective of the study was to evaluate the efficacy of **Pervatin 72.2% s.e.**, a fungicide produced by "AGRIMATCO GENERAL" LLC in Uzbekistan. Pathogen identification was carried out using the method of M.K. Khokhryakov (1980), and biological efficacy was calculated according to Abbott (1925). The results showed that Pervatin 72.2% s.e. demonstrated **71.4–89.1% biological efficacy**, which was comparable to or even higher than the standard fungicide Prevent 72.2 s.e.c.

Key words: potato, late blight, *Phytophthora infestans*, fungicide, Pervatin 72.2% EC, biological efficacy.

As a food crop, potato has great importance as a raw material for several industrial sectors in our country. Potato tubers are rich in potassium and phosphorus salts. It is also classified among protein-rich crops.

However, achieving high yields is seriously constrained by numerous diseases affecting the crop. Therefore, appropriate control measures must be applied based on the specific development characteristics of each disease.

The causal agent of late blight is *Phytophthora infestans* de Bary (Oomycetes, order Peronosporales). In recent years, late blight has become one of the most widespread diseases of potato crops.

Disease development is favored by frequent rainfall or dew formation and air temperatures of 10°C or higher, while 20–25°C is considered optimal for pathogen development. Infected potato tubers serve as the primary source of infection. The pathogen exists in different physiological races, and potato cultivars show varying levels of susceptibility to these races. Yield losses caused by late blight may reach up to 70% globally and 30–40% under the conditions of Uzbekistan.

Symptoms of late blight on potato leaves in the experimental field.

Various control methods used against it do not always provide rapid and effective results. It should be acknowledged that the chemical method remains the most radical approach. In the context of environmental protection and the demand for a safe human environment, the negative impact of this method can be reduced through the rational and well-regulated use of pesticides in potato cultivation.

In recent years, these products have been considered among the most effective, low-toxicity, and fast-acting chemical agents.

In 2024, the objective of the assigned task was to evaluate the fungicide Pervatin 72.2% EC, produced by "AGRIMATCO GENERAL" LLC, for its efficacy against potato late blight.

Literature Review

The causal agent of late blight, *Phytophthora infestans* de Bary (Oomycetes, order Peronosporales), exists under natural conditions as a population composed of physiological races that differ in parasitic ability, virulence, incubation period, sporulation intensity, and other biological characteristics.

The pathogen affects potato leaves, stems, roots, and sprouts. Initially, indistinct light-brown marginal spots appear on the lower leaves of potato plants, surrounded by a characteristic whitish-pink ring of sporulation.

Spores of the fungus, washed from leaves and other plant organs into the soil by rainfall, infect potato tubers. On infected tubers, clearly visible grayish-brown lesions appear, which later become sunken and dark brown necrotic spots. When the tuber is cut, decay of tissues can be observed in the peripheral regions. Such tubers are rapidly destroyed during storage due to the activity of secondary microorganisms, resulting in complete rotting and the formation of dark-brown necrotic lesions.

On stems and leaves, the disease appears as continuous, elongated brown streaks. Under dry weather conditions, disease development is temporarily halted, and the lesions become dry and brittle, whereas in humid conditions they continue to expand and rot.

The disease affects all newly formed stems and leaves, eventually leading to complete plant desiccation. Infection foci develop in the field, and under favorable conditions for pathogen development, an entire field can be destroyed within 7–10 days.

On roots, small lesions are formed, which penetrate into the tuber tissue as irregular brown spots. A significant portion of the yield is lost during storage. The harmfulness of the disease is expressed through premature death of infected plants during the most active tuber formation period, resulting in a reduction in both number and size of tubers, as well as damage to tubers and a decline in their storage quality.

Plant infection occurs at approximately 75% relative humidity and moderate temperatures of 15–20°C, while at 20–25°C the incubation period lasts about 3 days (Golovin P.N., Arsenyeva M.V., Khaleeva).

Materials and Methods

The evaluation of Pervatin 72.2% EC was conducted under field conditions using a sprayer at a rate of 1.0 L/ha with multiple replications on potato plants.

The experiments were carried out in 2024 in the “Bagdod Zamini” farm located in Bagdod district, Fergana region, Uzbekistan, on the potato cultivar ‘Makiz’, in order to assess the effectiveness of control measures against potato late blight. Each experimental plot covered an area of 0.5 ha, and each treatment was replicated four times.

Identification of potato disease pathogens was performed using the moist chamber method according to M.K. Khokhryakov et al. (1980). The experimental design and implementation were conducted in accordance with the methodological guidelines issued by the State Chemical Commission (1994 and 2004), while biological efficacy was calculated using Abbott’s formula (1925).

Experimental Scheme:

1. Untreated control
2. Prevent 72.2% EC — 1.0 L/ha (standard)
3. Pervatin 72.2% EC — 1.0 L/ha

Results and Discussion

Field experiments were conducted in a 0.5 ha potato plantation at the “Bagdod Zamini” farm, Bagdod district, Fergana region. The fungicide Pervatin 72.2% EC was applied under replicated conditions. On May 21, 2024, the average incidence of potato late blight in the experimental field was 13.6%, while disease severity reached 10.8% (Table 2).

Taking into account disease development, assessments conducted on June 19, 2024 showed that the biological efficacy of Pervatin 72.2% EC against potato late blight ranged from 71.4% to 89.1% in the tested variant.

In the standard treatment with Prevent 72.2% EC (1.0 L/ha), disease development was reduced to 4.1%, and biological efficacy reached 88.2%.

Chemical treatment of potato plants against late blight using Pervatin 72.2% EC.

Table 1.

Biological efficacy of the fungicide Pervatin 72.2% EC against potato late blight, 2024.

Treatments	Application rate (L/ha)	21.05.2024 (Before treatment) Disease incidence (%)	05.06.2024 After 1st treatment		19.06.2024 After 2nd treatment	
			Disease development (%)	Biological efficacy (%)	Disease development (%)	Biological efficacy (%)
Untreated control	-	15,4	31,6	-	42,1	-
Prevent 72.2% EC (standard)	1,0	12,5	7,3	76,1	4,1	88,2
Pervatin 72.2% EC	1,0	13,6	10,8	71,4	3,7	89,1

Conclusions and Recommendations

1. The fungicide Pervatin 72.2% EC, applied at a rate of 1.0 L/ha, demonstrated a biological efficacy of 89.1% against potato late blight.
2. The product readily dissolves in water to form a stable working solution, is convenient to use, and no phytotoxic effects were observed under field conditions.
3. The application of Pervatin 72.2% EC at a rate of 1.0 L/ha is recommended for the control of potato late blight.

References

1. Bilay, V.I. (1973). *Methods of Experimental Mycology*. Naukova Dumka Publishing House, Kyiv.

2. Grushevoy, S.E. (1965). *Agricultural Phytopathology*. Kolos Publishing House, Moscow.

3. Golovin, P.N., Arsenyeva, M.V., Khaleeva, Z.N., & Shestiperova, Z.I. (1980). *Phytopathology*. Kolos Publishing House, Leningrad.

4. Kiray, Z., Klement, Z., Shoimoshi, F., & Zeresh, I. (1974). *Methods of Phytopathology*. Moscow.

5. Orekhovskaya, M.V., & Korganova, N.N. (1989). *Diseases of Vegetable Crops and Control Measures*. Rosagropromizdat, Moscow.

6. Semenov, A.Y., Abramova, L.P., & Khokhryakov, M.K. (1980). *Identification Guide of Parasitic Fungi on Fruits and Seeds of Cultivated Plants*. Kolos Publishing House, Leningrad.

7. Khodjaev, Sh.T. (1994). *Methodological Guidelines for Testing Insecticides, Acaricides, Biologically Active Substances, and Fungicides*. State Chemical Commission of the Republic of Uzbekistan, Tashkent.