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ALTERNARIA DISEASE OF TOMATO AND ITS CONTROL MEASURES

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---------- **ABSTRACT**----------

Alternaria disease is one of the most widespread and economically damaging diseases of the Solanum lycopersicum L. tomato plant. Under the influence of the disease, productivity can decrease up to 78%, and in epiphytotia up to 100%. The disease infests the leaves, branches and fruits of the plant. This article presents the results of the studies carried out on the application of the fungicide Previkur Pro72,2% w.s.p.

KEY WORDS: ***tomato, disease, Alternaria, fungus, A. solani, disease control, fungicide, biological efficacy.***

INTRODUCTION

Tomato is the second most important vegetable crop in the world and the main branch of agriculture [5]. Alternaria disease, caused by fungi *Alternaria solani* (Ell. Et Mart.) J. et G. (sin. *Macrosporium solani* Ell. Et Mart.) and *Alternaria alternate* Keissler (sin. *Alternaria solani* Sor.), occupies an important place among the most harmful and widespread diseases of tomatoes. Disease can cause damage to the leaves, branches and fruits of the tomato plant [26].

In recent years, the quantity and quality of agricultural crops has been decreasing due to the influence of harmful organisms. The reason for this is the adaptation of pathogenic microorganisms to climatic conditions and the failure to take effective measures against them in time. The development and implementation of modern control measures against pathogenic microorganisms allows to obtain a high and quality harvest from agricultural crops [16; 17].

LITERATURE REVIEW

It is known that representatives of the genus Alternaria are polyphagous, and year by year they are becoming aggressive in crops such as tomatoes, potatoes, sweet peppers, cucumbers, winter cereals, corn, sunflowers, apple trees, etc. [23; 25].

In tomatoes, the damage of this disease is observed in the form of premature drying of the leaves of the infected plant or the entire tomato bush and, as a result, the ripening of underdeveloped small fruits or their general wilting [25].

The genus Alternaria is part of the phylum Ascomycota (family *Pleosporaceae*) and consists of species with diverse habitats [20]. Small-spored species of Alternaria, such as *A. alternata*, can cause leaf spot and other diseases on various host plants [21]. *A solani* is found mostly in plants belonging to the *Solanaceae* family, usually in cultivated tomatoes [7; 18]. In addition, besides *A.solani*, *A.tomatophila* can also cause Alternaria disease of tomato. Three species of fungi *A.alternata*, *A.solani* and *A.linariae* can cause similar damage in potato and tomato [1]. The first symptoms of the diseases appear in the form of small dark necrotic spots [12].

Woudenberg et al (2013) argue that the genus Ulocladium is synonymous with the genus Alternaria, as a phylogenetic analysis identified multiple *Ulocladium species* within Alternaria [20]. The fungus Ulocladium atrum, now Alternaria atra, regularly infects potato species [4; 9; 12].

A.solani (Ellis va Martin) Sorauer is an important pathogen that causes Alternaria disease in tomatoes. Due to the wide range of host plants, the high variability of pathogen isolates and the long active phase of the disease cycle,

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it is very difficult to control the disease. When the intensity of disease development was 78%, the loss of tomato yield was observed up to 72%. This disease is also one of the most common causes of damage or damping-off of tomato seedlings, causing black spots on the roots [2; 6].

One of the most famous and economically important representatives of this species, the causative agent of tomato alternaria, is the fungus *A.solani*. Its conidia are dark gray, pale olive, smooth, usually 150–300 μm long and 15–19 μm thick, with 9–11 transverse and 1–4 longitudinal or oblique setae at widest part; sometimes branched, 2.5-5 μm thick, with gradually narrowing form [3].

Morphological and pathogenetic variability among isolates of *A. solani* has led to claims of the existence of races, but this remains unproven [8;10; 19].

High levels of genetic diversity among 69 isolates of tomato black mold pathogen were reported using RAPD analysis of genetic variation among isolates of *A. solani* [7].

At the current level of science and agricultural production, the main method of protecting the yield of many crops potentially from the most harmful fungal diseases is the method of chemical control. Recently, many vegetable growers and farmers believe that some recommended fungicides are ineffective against Alternaria disease under production conditions [26]. In this regard, the main goal of our research is to evaluate the effectiveness of the most commonly used drugs and preparations to control it.

THE METHODS OF THE RESEARCH AND EXPERIMENTAL SITE

We conducted our experiments in 2023, in the fields of the SUE "Extension Center" at Tashkent State Agrarian University. The application of the fungicides on the open tomato fields where Alternaria was spread was carried out on June 10, 25 and 10, 2023 by spraying at the consumption of 300 liters of working solution per hectare. Air temperature was 25ºC and wind speed was 1-2 m/sec.

We conducted experiments by spraying the fungicide Previkur Pro 72,2 % w.s.p containing 722 g/l propamocarb hydrochloride at consupmtion rate 0,8 - 1,0 l/ha and as a standard fungicide Bravo 50% sus.c. containing 500 g/l chlorothalonil at consumption rate 3,0 l/ha against Alternaria disease of tomato.

0,8 – 1,0 l/ha with 72.2% (s.e.c) fungicide and 3.0 l with Bravo 50% (sus.c) fungicide containing 500 g/l chlorothalonil as a standard We carried out an experiment by spraying during the growing season at a rate of.

Prevalence of the disease was found according to the following formula:

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

P - prevalence of disease,% ;
n - number of infected plants, piece;
N - total number of sampled plants, piece [11; 13; 15; 16; 17; 22; 24].

Disease progression was calculated by the following formula:

$$R = \frac{\Sigma(a \times b) \bullet 100}{N \bullet K}$$

here, R – disease progression %; Σ(a • b) – the sum of the number of plant parts affected by the disease multiplied by the number of their points; N – total number of observed plant parts; K – the highest point in the scale [11; 13; 15; 16; 17; 22; 24].

The disease index was determined according to the following empirical formula:

$$К_и = T \bullet P/100$$

here, $К_и$ – disease index;
T – disease prevalence, %;
P – disease progression, %.

Biological efficiency of fungicides was determined by the following formula:

$$C = \frac{(Ab - Ba)}{Ab} * 100$$

here,
C – biological efficiency of fungicides, %;

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Ab – disease progression in control option, %;
Ba – disease progression in experimental option, % [11;13;15;16;17;22; 24].

THE RESULTS OF THE RESEARCH AND DISCUSSIONS

According to the results of our research, the prevalence of Alternaria in the control variant was 36,8% in the leaf, 22,1% in the stem, 35,5% in the fruit, and the development of the disease was 14,2% in the leaf, 13,4% in the stem, 15,7% in the fruit. (Table 1).

In the experimental variant, the highest biological efficiency was observed in the variant treated with Previkur Pro 72,2% (w.s.p) fungicide at a consumption rate of 1,0 l/ha. In this case, the development of the disease was 1,6% in the leaf, 1,2% in the stem, 1,2% in the fruit, and the biological efficiency was 88,7% in the leaf, 91,0% in the stem, and 92,4% in the fruit. In the variant treated with this fungicide at the consumption rate of 0,8 l/ha, biological efficiency was 81,7% in leaves, 81,3% in stems, and 82,8% in fruits. The spread of the disease was 16,3% in the leaves, 14,4% in the stem and 15,8% in the fruit. The development of the disease was 2,6, 2,5, 2,7%, respectively.

Table-1

Biological efficiency of preparations used against tomato Alternaria disease. (Tashkent State Agrarian University "Extension center" SUE. Tomato variety "Sultan", 2023).

№	Options	Consumption rate, l/ ha	Infected Part	Disease Prevalence, %	Disease Development, %	Biological Efficacy , %
1	Previkur Pro 72,2% w.s.p.	0,8	Leaf	16,3	2,6	81,7
			Stem	14,4	2,5	81,3
			Fruit	15,8	2,7	82,8
2	Previkur Pro 72,2% w.s.p.	1,0	Leaf	**15,7**	**1,6**	**88,7**
			Stem	**13,9**	**1,2**	**91,0**
			Fruit	**15,1**	**1,2**	**92,4**
3	Bravo 50% sus.c. standard	3,0	Leaf	15,7	1,8	87,3
			Stem	14,3	1,6	88,1
			Fruit	15,6	1,4	91,1
4	Control	-	Leaf	36,8	14,2	-
			Stem	22,1	13,4	-
			Fruit	35,5	15,7	-

In the variant treated with the fungicide Bravo 50% (sus.c) as a standard option at a consumption rate of 3,0 l/ha, the disease development was 1,8% in the leaf, 1,6% in the stem, 1,4% in the fruit, and the biological efficiency it was 87,3% in the leaf, 88,1% in the stem and 91,1% in the fruit.

CONCLUSION

Alternaria disease is considered one of the most dangerous diseases of tomatoes, and if timely control measures are not taken, the yield can be significantly reduced. As a result of the conducted experiments, it can be concluded that when the first symptoms of Alternaria disease appear in the tomato fields, the initial treatment with the fungicide Previkur Pro 72,2% (w.s.p) at the consumption rate of 1,0 l/ha and the second treatment after 15 days, the third treatment after 30 days stops the development of the disease. Using this fungicide against tomato Alternaria disease, it is possible to achieve a high yield of tomatoes.

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