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INFECTION OF THE COLORADO BEETLE IN FIELD CONDITIONS AND ISOLATION OF ENTOMOPATHOGENIC MICROORGANISMS FROM THEM

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ABSTRACT

This article presents the results of research on the isolation of the entomopathogenic fungus Beauveria bassiana Wuill strain and the bacterial Bacillus thuringiensis strain isolated from a total of 24 infected and 2.85 dead Colorado beetle samples collected from the potato planting areas of Samarkand region districts . Samples of diseased and dead pest larvae and imagos were collected from potato fields planted in different natural and climatic conditions of the Republic of Uzbekistan, without chemical treatment.

Keywords: Entomopathogen, strain, Colorado beetle, bacteria, fungus, microorganism, preparation, disease, insect.

INTRODUCTION

Potatoes are important in providing the country's population with food products. For this reason, the government's attention to this crop is increasing year by year. Resolution No. 462 of the Cabinet of Ministers of the Republic of Uzbekistan dated 06.06.2019 on "Measures to supply seed potatoes to growers of agricultural products for the 2019 harvest and ensure the domestic consumer market with socially important types of food products" and the President of the Republic of Uzbekistan dated 06.05. In order to ensure the implementation of Decision No. 4704 of 2020 on "Measures to expand potato cultivation and further development of seed production in the Republic", to provide quality seed potatoes to agricultural enterprises, farmers and farms involved in planting seed and consumer potatoes in the main and grain-free areas and domestic Important works are being carried out on guaranteed delivery of socially important types of food products to the market . In order to grow a rich harvest of potatoes, it is necessary to carry out measures to combat its pests. Although the chemical method is widely used in the world experience in the fight against potato pests, but most of such insecticides do not have a selective effect, they primarily have a negative effect on natural entomophages in the potato agrocenosis. Due to the frequent use of chemical protection agents, resistance to pests is developing. This makes the fight less effective. Therefore, environmental pollution, human and It is important to use biological preparations instead of chemical pesticides in the protection of plants that are harmful to warm-blooded animals. All this forces plant protection specialists to search for biological protection agents and use microbiological preparations in the fight against the Colorado beetle.

Since the 1950s and 1960s, scientists from many countries around the world have conducted research on the creation of microbiological preparations based on entomopathogenic bacteria and fungi to control the population of the Colorado beetle [1].

Currently, scientific works on entomopathogenic fungi are being recorded at a high rate in the world. Most of them are devoted to the biology of highly specialized members of the

anamorphic genera Metarhizium and Beauveria . There is a significant lack of publications devoted to the biology of telemorphic fungi, the ecology, life cycle, and virulence characteristics of these species have been poorly studied. Meanwhile, known telemorphic fungal species have been studied as insect developmental control [2].

Entomopathogenic microorganisms are an inexhaustible resource of natural and breeding strains that are not harmful to animals and humans. Therefore, the creation of microbiological insecticides has attracted interest in many countries of the world [3].

The territory of our republic is considered favorable for growing potatoes, especially in the months of April-May, the temperature of 25-30 $^{\circ}$ C is the most favorable for the development of the potato plant and its dangerous pest, the Colorado beetle. An increase in air temperature of 35-38 $^{\circ}$ C causes the beetle to go into a strong diapause. One of the pests that cause the most damage to the potato plant is the Colorado potato beetle. The Colorado beetle causes great damage to the yield in a short period of time and can completely destroy the crop. In the potato fields of our republic, the Colorado beetle population dies under natural conditions under the influence of infectious disease-causing microorganisms. Such microorganisms sometimes form epizootics in areas where the Colorado beetle is spread, limiting their number. Therefore, the study of entomopathogenic microorganisms that cause disease in the Colorado beetle is considered one of the urgent issues.

RESEARCH METHODS

The testing of pesticides in small and large field experiments was calculated based on the methods given by Sh.T. Khojaev [3]. Isolation of pure cultures of entomopathogenic fungi from natural substrates by V.I.Bilay and N.Yu.Geshtovt [5,6], their cultivation by T.I.Gromovykh [7] and study of the influence of environmental factors on them V.M.Goral [8] carried out using methods. A.A. Evlakhova, E.Z. Koval, M.A. Litvinov, N.M. Pidoplichko [9,10,11,12] identifiers were used to identify the types of entomopathogenic fungi. Methods of G.Ya.Bey-Bienko, S.M.Volkov, N.V.Bondarenko [13,14,15] were used to calculate the spread of the Colorado potato beetle, damage and sample collection.

The location of the study

In May 2023, in Samarkand region, 6.8 hectares of " Kelajak Yol Uzumzori" farm, 2.4 hectares of " Arif Melliyev" farm and 6.2 hectares of "Gren Agro Zarafshon" LLC, planted with potatoes, Jomboy district, Bulung'ur district 2.7 hectares of the Turdiyev Dilshod zamin farm , 1.6 hectares of the Orif Agro Zamin farm, 2.5 hectares of the Fayz obod field farm , 3.7 hectares of the Ikhtiyor Mamatmurad field farm of Tayloq district. hectares, 1.6 hectares of the farm "Ilm Agro Rivoj", 1.3 hectares of the planted potato area of the farm "Butiboy Obad Erlari", 1.75 hectares of the farm "Kelajak oltyny turi" of Urgut district , 2 hectares of the farm "Sultan Rahimov" , 3 hectares, "Farkhod Dilsuz" 1.3 hectares of the farm and 7.5 hectares of the potato fields of the "Islombek Muzaffarbek" farm were observed.

Diagnostic studies of the collected pathogens (fungi and bacteria) were conducted in the laboratories of the Institute of Plant Quarantine and Protection " Combating against harmful organisms of grain and grain legumes ".

The grasslands of Bulungur, Jomboy Tailak and Urgut districts are sandy soil, and the mechanical composition is medium sand. Because the soil and climate conditions of these districts are favorable for growing potatoes, potatoes are grown a lot. There are food crops and favorable climatic conditions necessary for the development and reproduction of the potato beetle, which is a dangerous pest.

Research Result

Research was carried out on June 14-21, 2023, in order to monitor the colorado beetle and conduct field experiments in potato clusters and farms of Samarkand region . During the observations, samples from infected and dead insects were collected for laboratory analysis (Table 1). As can be seen from the table, in the districts of Samarkand region, the incidence of the colorado beetle is higher than when we monitored the deaths of natural infections in the potato fields. In the farm of O. Meyliev, Bulung'ur district, an average of 3.6 units were infected and 0.33 units died in 1 plant, in the field of Turdiev Dilshod farm in Jomboy district. On average, 4.2 infected and 0.66 dead units were observed in 1 tumor. A total of 24 infected and 2.85 dead samples were found from 10 farm fields.

Table 1. Analysis of diseased and dead Colorado beetle samples collected from potato fields of farms in Samarkand district (June 14-21, 2023).

T/ r	Biological material collection sites i.	Area , ha.ha	Collected samples , on average 1 plant	
			Ill	Dead has been
1.	**Bulungur district**			
A.	O rif Melliyev f/h.	2 , 0	3.6	0.33
B.	Erfanali intelligence source f/h.	2.0	2.6	1,2
2.	**Jomboy district**			
A.	T urdiyev Happy land f/x.	2.7	4.2	0.66
B.	Faiz Abad dalasi f/h.	2.5	0	0
3.	**It's a joke district**			
A.	Habib Javlon Nazarov f/h.	0.6	0	0
B.	Ilm Agro Rivozh f/x.	1 ,6	2,2	0
WITH.	Butiboy rim erlari f/x.	1 , 3	3 ,4	0
4.	**Urgut foggy .**			
A.	Sanakul bobo f/h.	1.0	2.4	0.66
B.	Sultan Rahimov f/h.	2,3	3,4	0
S.	Farhad Dilsuz f/h.	1.3	2.2	0
	Total:		**24**	**2.85**

Infected and dead Colorado beetles collected in nature were subjected to microbiological analysis in laboratory conditions. Adults and larvae of the Colorado beetle were collected, and those that died from the disease were observed under a microscope. A Colorado beetle with signs of fungal disease was observed to be hard, smelly, and sometimes the upper part of its body was covered with fungal mycelia. It is possible to see that the color of larvae infected with bacteria changes to dark color with a simple fall.

The top coat of the body of the Colorado beetle was sterilized with 96.0% alcohol. Colorado beetles infected with fungal diseases were placed in Petri dishes with sterilized wet special paper (vlajnaya kamera) and grown at room temperature.

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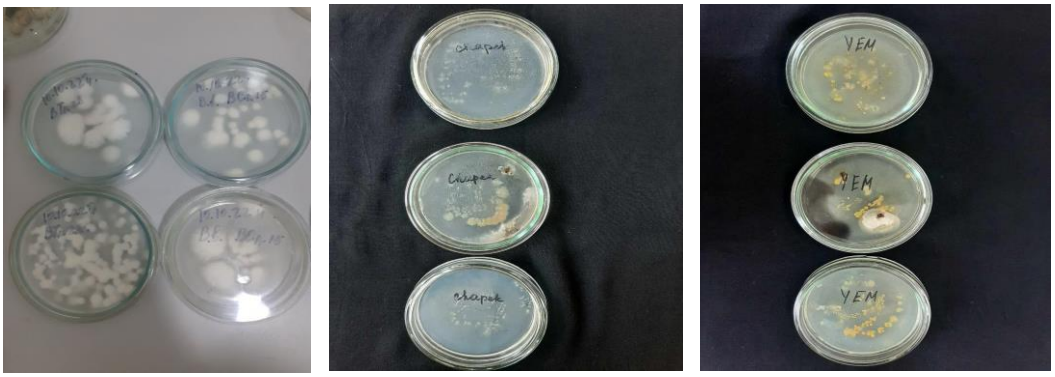
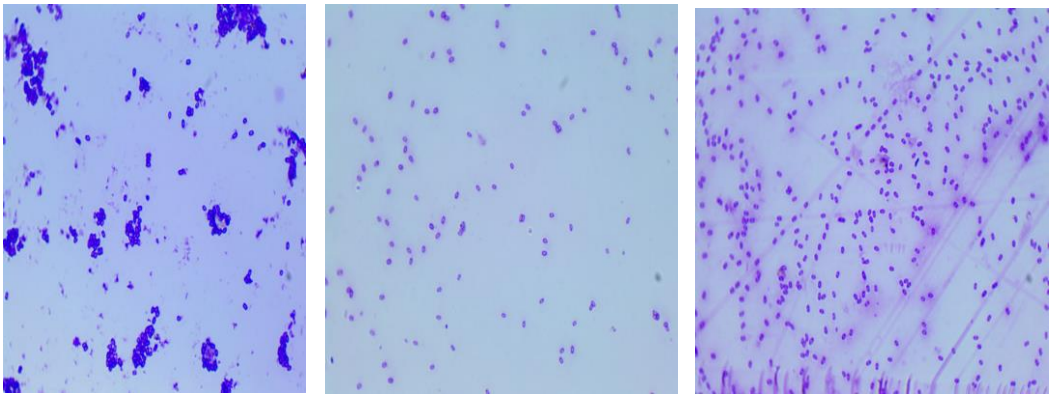


Figure 1. Cultivation of isolated bacteria and fungi in different nutrient media



A B S

Figure 2. Microscopic view of bacteria (A- Bacillus simplex , B-E scherichia coli , C-Arthrobacter monumenti) isolated from the Colorado beetle .

Samples of the Colorado potato beetle were collected from the potato field to isolate entomopathogenic microorganisms. In this case, healthy, diseased and dead samples of insects were taken. In order to determine the types of biological materials collected in laboratory conditions, entomopathogenic microorganisms were isolated , grown in different nutrient media. The necessary solutions were prepared from the biological materials and the types of bacteria and fungi were identified through a microscope. The species composition, cultural, morphological characteristics, and biological properties of the cultivated samples were studied. Beauveria bassiana Vuill from biological materials collected under laboratory conditions . fungus and Bacillus thuringiensis bacteria strains were isolated. Isolated microorganism strains B. thuringiensis -26, Bacillus thuringiensis 1Fo and B. bassiana as BTq-28 was named.

Summary. The Colorado beetle is infected with entomopathogenic microorganisms in nature and has been observed to die. Beauveria bassiana Vuill from material from a naturally collected insect specimen . belongs to the fungus and Bacillus thuringiensis species of bacteria B. thuringiensis -26, Bacillus thuringiensis 1Fo and B. bassiana BTq-28 entomopathogenic strains were isolated.

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