European Journal of Agricultural and Rural Education (EJARE)
Available Online at: https://www.scholarzest.com
Vol. 6 No. 03 March 2025
ISSN: 2660-5643

APPLICATION OF SOIL ANTAGONISTS IN THE FIGHT AGAINST PLANT DISEASE AGENTS

Nigora Takhirovna Khakimova,
Rano Kadirovna Sattarova
Tashkent State Agrarian University.
Department of Agricultural Phytopathology

Article history:

Received: 20th January 2025
Accepted: 14th February 2025

Abstract:

V state predstavleno issledovanie deystviya neskolkikh bacterialnyx antagonistov na pathogeny nekotoryx selskohozyyastvennyx kultur. Bacterial antagonists Bacillus megatherium and Bacillus brevis appeared among the most active and controlling bacterial antagonists.

Keywords: Microorganism-antagonism - Bacillus megatherium, Bac. brevis, Bac.thuregensis, Streptomyces sp, Pseudomonas flurescens, phytopathogenic microorganisms - Fusarium oxysporium, F.solani, Verticillium dahliae, Xanthomonas campestris, X. campestris var malvacearum, X. campestris var phaseoli

The phytosanitary situation in Uzbekistan with regard to phytopathogens affecting both vegetative plants and seeds is far from optimal. Special attention should be paid to seed treatment. Currently, there is a large amount of material indicating the prospects of using antagonist microbes in the fight against plant diseases (1,2,3,4). In this regard, research into finding new microbes – antagonists used in this direction – is becoming increasingly relevant.

To study the antagonistic activity of 7 types of plant pathogens, five strains of soil saprophytic bacteria from the collection of museum cultures of the Institute of Microbiology of the Academy of Sciences of the Republic of Uzbekistan were used. The study of the antagonistic effect of microorganisms on phytopathogenic bacteria was carried out according to the method of Cooksey Moore (1980).

The studied microorganisms were grown on glucose agar, and the test culture on potato. The size of the growth inhibition zone of phytopathogenic bacteria was determined after 48 hours. The obtained results on the action of the studied 5 microorganisms - antagonists (*Bacillus megatherium, Bacillus brevis Streptomyces Sp, Pseudomonas flurescens, Bacillus thuregensis*) to 7 types of phytopathogenic microorganisms (*Fusarium oxysporium, Verticillium dahliae, Fusarium solani, Xanthomonas campestris, Erwinia caratovora, Xanthomonas campestris var malvacearum, Xanthomonas campestris var phaseoli*) are presented in Table 1.

The table shows that the *Pseudomonas fluorescens* and *Bacillus thuregensis* cultures showed a slight bactericidal effect only in relation to *Erwinia caratovora* and *Verticillium dahliae*. The best bactericidal effect was shown by the *Streptomyces* sp. culture. It had an inhibitory effect on two types of phytopathogenic microorganisms: *Verticillium dahliae* and *Xanthomonas malvacearum*, which cause verticillium wilt of cotton and gummosis of cotton.

Bacillus megatherium and *Bacillus brevis* showed good antibacterial properties against phytopathogenic microorganisms. These cultures had pronounced antagonism to *Verticillium dahliae, Xanthomonas phaseoli, Xanthomonas campestris, Xanthomonas malvacearum, Erwinia caratovora, Fusarium solani* and *Fusarium oxysporium*.

All the antagonists we studied did not exhibit antibacterial properties against all 7 tested phytopathogenic microorganisms, however, it should be noted that the strains *Bacillus megatherium* and *Bacillus brevis* have good antibacterial properties, since they have a broader spectrum of action.

Thus, the study of the antimicrobial effect of the studied microorganisms on phytopathogenic microorganisms showed that all 5 strains exhibited an antimicrobial spectrum to phytopathogenic microorganisms, but their spectrum of action and antibiotic activity were different.

Antagonistic spectrum of the studied microorganisms

Table 1

The studied antagonist microorganisms	Phytopathogenic microorganisms																				
	Fusarium oxysporium			*Verticillium dahliae*			*Fusarium solani*			*Xanthomonas campestris*			*Xanthomonas phaseoli*			*Xanthomonas malvacearum*			*Erwinia caratovora*		
	К	Z	Z /К	К	Z	Z /К	К	Z	Z /К	К	Z	Z /К	К	Z	Z /К	К	Z	Z /К	К	Z	Z /К
Bacillus megatehrium				5	1	2.4				10	22	2.2	9	28	3.1	10	26	2.6			
Bacillus brevis	7	12	1.7				8	13	1.6	6	12	2.0							5	20	4.0
Streptomyces sp				16	18	1.1										7	10	1.4			
Pseudomonas flurescens																			3	6	2.0
Bacillus thuregensis				12	18	1.5															

Designations:
К - diameter of antagonist colonies in mm.
Z - diameter of the zone of no growth in mm
Z/К - relative antagonism capacity of the absence of the zone of inhibition.

Based on the obtained results, it can be concluded that the antagonism of the studied bacteria towards phytopathogenic microorganisms was observed in some cases actively, in others weakly. In this regard, for further work we selected the most active antagonist bacteria (*Bacillus megatherium* and *Bacillus brevis*).
Data on the antibiotic activity of microorganisms indicate the possibility of using some of them to limit infections caused by phytopathogenic microorganisms and to develop biological methods for combating plant diseases.

CONCLUSIONS

1. The phenomenon of antagonism to phytopathogenic microorganisms manifested itself differently in all studied antagonist bacteria.
2. The highest antibiotic activity and a wide spectrum of action to the studied phytopathogens were found in the strain Bacillus megatherium and Bacillus brevis.
3. Bacillus megatherium and Bacillus brevis are the most active antagonists, which may be used in the future to develop biological methods for combating plant diseases.

LITERATURE

1. Askarova S.A. Use of antibiotics in the fight against bacterial plant diseases Moscow. 1960.
2. Kolomets E.I. et al. Biological preparations to replace chemical ones. J. Zashchita i karantin №6 Moscow, 2006 №10.
3. Mannonov R.N. Relationships of soil antagonists with some phytonutrients causing the main diseases of cotton (gummosis, root rot, fusarium and wheat blight (root rot) Author's dissertation for the degree of Doctor of Biological Sciences Tashkent 2010.
4. Norbekov Zh. et al. Effect of *Bacillus subtilis* 23 on the development of wheat under infectious background conditions J. Vestnik Agrarian Science of Uzbekistan №4 Tashkent 2013