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Positive Effect of Pseudomonas Chlororaphis On Mung Bean Germination

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Abstract: In this article, we can see that the bacterium Pseudomonas chlororaphis had a very positive effect on germination when exposed to two different varieties of mung bean plants using two different dilutions of this strain. We observed that the most effective results were obtained from the dilutions of the bacterial strain at 1:19 and 1:49, with the 1:19 dilution being the most effective.

Keywords: Fusarium solani, Aspergillus ochraceus, Fusarium culmorum, Pseudomonas chlororaphis, Cladosporium sp., Aspergillus flavus, Fusarium verticillioides, Alternaria tenuissima, Navro'z, Kahrabo, Inhibition zone, phytopathogenic fungi.

Introduction: Phytopathogenic fungi cause significant damage to plants. Phytopathogenic fungi are a serious problem in agriculture, negatively affecting crop quality and productivity [1]. The activity of phytopathogenic fungi in plants is difficult to control, causing significant losses for many crops [2]. Bacterial strains that combat such phytopathogenic fungi and stimulate plant growth are very useful. On this basis, we aimed to observe the positive effect of the bacterium Pseudomonas chlororaphis on the vegetative period of mung bean plants and the high antagonistic activity of this bacterial strain against phytopathogenic fungi such as Fusarium

solani, Aspergillus ochraceus, and Fusarium culmorum[3].

The research used a strain of the bacterium Pseudomonas chlororaphis from the collection of the Microbiology Laboratory and phytopathogenic fungi such as Fusarium solani, Aspergillus ochraceus, and Fusarium culmorum. Two widely cultivated varieties of mung bean, Navruz and Qahrab, were used in agriculture. In laboratory conditions, phytopathogenic fungi and bacterial strains were grown on Mpa and Chapek nutrient media. Antagonistic activity was assessed using the well-diffusion method. Agar medium was placed in Petri dishes, phytopathogenic fungi were sown using the lawn method, and bacterial culture fluid was placed in the well. Incubation was continued for 3-7 days at 30°C, and the affected zones were measured in millimeters, and the bacterial strain showed a high level of antagonistic activity against these phytopathogens. When seeds from two different varieties of mung bean were exposed to a liquid-based method, germination was significantly affected compared to the control. Two different varieties of this mung bean plant are widely cultivated in our country. This had a positive effect on both varieties, and it was especially effective on the Navruz variety. When seeds were treated with a liquefied solution of this bacterial strain, we can see that the 1:19 ratio produced the most effective results when the liquefied solution was prepared in two different ratios, 1:19 and 1:49. We can see that there was a significant difference in the germination of mung bean plants when treated with a dilution of the bacterial strain compared to the control. (figure 2.)

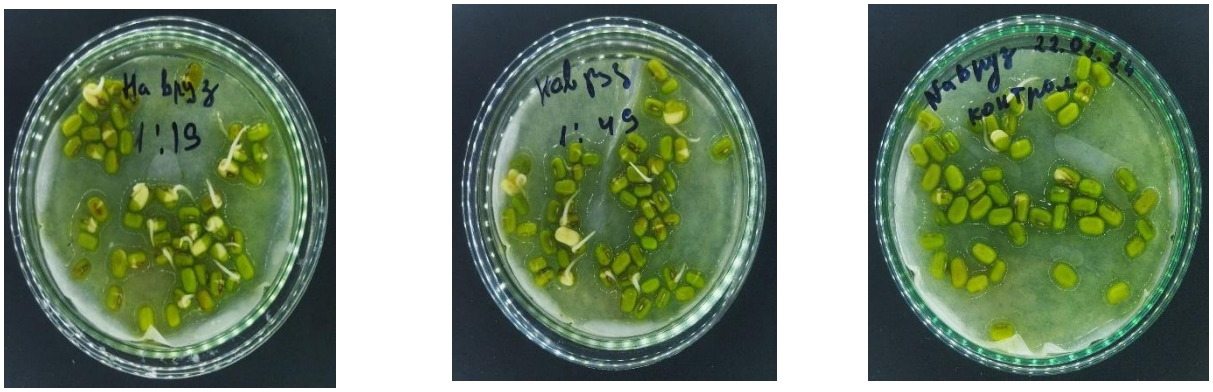

Figure 2. Effect of bacterial strain on mung bean germination

We can see that the germination of the mung bean plant was positively affected by the dilution of the bacterial solution at a ratio of 1:19. When seed germination was monitored compared to the control, we observed that 1:19 and 1:49 were also very effective. According to the results, the P. chlororaphis strain formed inhibition zones of 28–34 mm against Fusarium solani, Aspergillus ochraceus, and Fusarium culmorum. It had moderate antagonistic activity against Penicillium sp., Fusarium oxysporium, and Alternaria alternata, and no significant antagonistic activity was observed against Cladosporium sp., Aspergillus flavus, Fusarium verticillioides, and Alternaria tenuissima.

Figure 1. Effect of Pseudomonas chlororaphis on phytopathogenic fungi

Phytopathogenic fungi	Diameter of the inhibition zone, mm
Fusarium solani	34
Aspergillus orchaceus	29
Fusarium culmorium	28
Penicillium sp.	15
Fusarium oxysporium	14
Alternaria alternata	13
Cladosporium sp.	-
Aspergillus flavus	-
Fusarium verticillioides	-
Alternaria tenuissima	-

table 1.

The result observed when the zone of inhibition of phytopathogenic fungi under the influence of the bacterium Pseudomonas chlororaphis was measured in diametric mm. In an experiment conducted on the Navruz and Qahrab varieties of mung bean, dilutions of P. chlororaphis strain at 1:19 and 1:49 had a positive effect on seed germination. In particular, the Navruz variety produced 14–19 seeds at a ratio of 1:19, which was a significant result. The highest result (12) was recorded in the Kahraba variety at a ratio of 1:49. In conclusion, the study results showed that the Pseudomonas chlororaphis strain has high antagonistic activity against some phytopathogenic fungi. When applied to mung bean plants, seed germination rates increased. This bacterium is considered promising as a biological control agent and as a biofertilizer.

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