

## PHYTOTOXICITY PROPERTIES OF DISEASE-CAUSING FUNGI IN CHICKPEA

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**Abstract.** *The article reveals the negative effects of phytotoxins of pathogenic fungi found in chickpea on plant fertility, growth and development. Fungi causing root rot, fusarium wilt and ascochyta diseases of peas were studied experimentally. Phytotoxins produced by the fungi Rhizoctania solani, Fusarium oxysporum, and Ascochyta rabiei have all been found to have a negative effect on pea seed germination. It has been stated that if timely control measures are not applied to a chickpea plant infected with fungi, it will have a negative effect on productivity.*

**Keywords:** *rhizoctania solani, fusarium oxysporum, ascochyta rabiei, chickpea, plant, variety, yulduz, khalima, umid, zumrad, polvon, istiklol, bean, phytotoxin fungus.*

**Introduction.** Chickpea is one of the main vitamin-rich nutritious crops among legumes. Chickpea is mainly planted in the spring in dry and irrigated lands under the conditions of our republic. Yulduz, Khalima, Umid, Zumrad, Polvon, Istiklol varieties of chickpea are zoned for planting in the conditions of the republic. It is possible to obtain a high-quality and abundant yield as a result of the use of high-quality seeds, the correct application of agrotechnical measures, the planting of seeds in the prescribed periods and norms, and timely application of control measures against fungi that cause damage to productivity.

Pathogens that cause diseases in chickpeas live and develop mainly in the soil, plant residues and seeds. That's why before planting it is effective to treat the seeds with seed-dressing preparations in the fight against disease-causing microorganisms. Fungi are the main disease-causing microorganisms in chickpea. These are mainly root rot, ascochyta, fusarium wilt and powdery mildew diseases, and these diseases affect the plant in different phases of the growing season, from germination to the end of vegetation. Disease-causing fungi show disease symptoms in the plant due to the release of a toxin. Therefore, the study of phytotoxic properties of these fungi is of great importance.

### **Methods of research**

Biological, chemical and physical methods are used to study phytotoxins. Using chemical methods, it is possible to isolate some toxic substances and study their individual effects. However, in nature, when many toxic substances act together, its biological importance is fully revealed and studied. Therefore, the use of biological methods in the study of phytotoxins gives the correct and effective result.

Phytotoxin-producing properties of these isolated fungal strains were investigated by determining their effects on pea seed germination and development. Fungi were grown in Czapek liquid nutrient medium for up to 15 days. Conidia and mycelia were isolated by filtration in order to determine the formation of substances in the culture fluid that could manifest toxic properties for plants (Pimenova et al., 1971).

To study the biological effects of phytotoxins on plant seeds, chickpea seeds were soaked in the culture liquid of fungi for 24 hours. For each option, 5 seeds were used in 3 replications. Sterilized liquid Czapek nutrient medium without fungal growth was used as a control option. The soaked seeds were placed in humid chambers in Petri dishes to germinate for 24 hours. The ability of the fungus to produce phytotoxins has been determined by the reduction of seed germination, retardation of plant stalk and root growth. Phytotoxin-producing species include species that reduce seed germination by 30% compared to the control, retarding their growth (Mirchink, 1963, 1976; Berestetsky, 1978; Bilay, 1977).

### **Results of research**

Research was carried out in chickpea fields in dry and irrigated areas of our republic. In this case, disease-causing fungi were isolated from the parts of chickpea plant that showed disease symptoms during the growth period. To study the phytotoxicity of the isolated fungi, they were inoculated in liquid Czapek artificial nutrient media. After growing the fungi in the medium for 14 days, the mycelium was isolated using filter paper. Chickpea seeds were soaked for 24 hours in the liquid medium in which the fungus was grown. Then it was inoculated in a moisture chamber. In the control option, seeds was planted in a moisture chamber after being soaked in ordinary tap water. The experiment was observed every 3 days for a total of 21 days. The results showed that the toxins produced by pathogenic fungi had a negative effect on the germination, growth and development of peas. This phytotoxicity property was studied in comparison with the control option (Table 1).

**Table 1.**

***Effects of phytotoxicity of fungi on germination and growth of chickpea seeds (SRIPQP, Laboratory for the control of harmful organisms of grain and grain legumes, 2022.)***



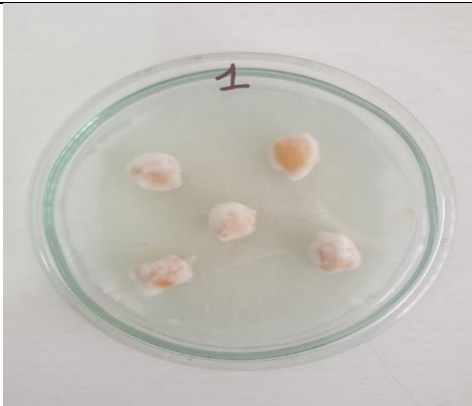



Pathogenic fungi	Disease-causing diseases detected	Planted seeds, pcs	Germinated seeds, pcs	Ungerminated seeds, %	Root length, cm	Stalk length, cm
Root rot	Rhizoctaniasolani	5	1	80	1	-
Fusarium wilt	Fusarium oxysporum	5	2	60	2	0,5
Ascochyta	Ascochyta rabiei	5	-	100	-	-
Control	-	5	5	-	17,5	10

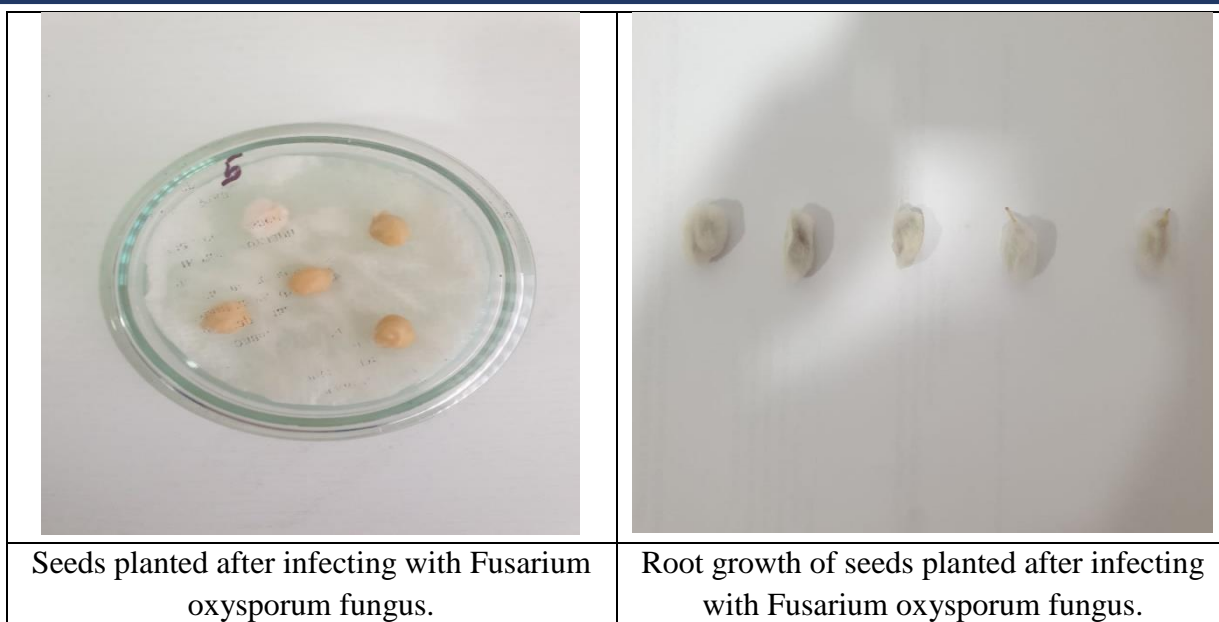
All the pathogenic fungi tested in the experiment were found to have phytotoxic properties. In the control option, when a total of 5 chickpea seeds were sown after soaking in water, out of which 5 seeds germinated, and a total of 17.5 cm roots and 10 cm stems were formed from the 5 seeds. When the seeds infected with fusarium wilt fungus (*Fusarium oxysporum*) were planted in the experiment, 2 out of 5 seeds germinated showing 60% result and 3 seeds did not germinate. These 2 plants were found to have a root length of 2 cm and a stem length of 0.5 cm. In the experiment, it was found that when the seeds infected with the root rot (*Rhizoctania solani*) fungus were planted, 1 out of 5 seeds germinated and accounted for 80% result. It was observed that the root length of this 1 plant was 1 cm, and the stem did not germinate at all. When a total of 5 seeds planted with phytotoxins of *Ascochyta rabiei* fungus, it was found that the seeds did not germinate at all.

From the results of these studies, we can see that the fungus that causes ascochyta has a very strong phytotoxicity for the plant. That is, we can call these species aggressive pathogens for plants.

*Figures.*

***The effects of phytotoxic properties of fungi on seed germination***

	
<p>Control - germination of water soaked seeds in a moisture chamber.</p>	<p>Control - root growth of seeds sown in a moisture chamber after soaking in water</p>
	
<p>Seeds planted after infecting artificially with <i>Ascochyta rabiei</i> fungus.</p>	<p>Root growth of seeds planted after infecting with <i>Ascochyta rabiei</i> fungus.</p>
	
<p>Seeds planted after infecting with <i>Rhizoctania solani</i> fungus.</p>	<p>Root growth of seeds planted after infecting with <i>Rhizoctania solani</i> fungus.</p>



In conclusion, it was found that all 3 types of fungi studied in the experiment are the main pathogen of the chickpea plant. In order to prevent the infection of plants with pathogens, it is recommended to use proper agrotechnical measures, to select disease-resistant varieties, to plant crops on prescribed time, and to apply timely biological and chemical control measures against diseases.

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