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MAIN PESTS AND DISEASES OF CHICKPEA AND METHODS OF CONTROL

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Abstract
Chickpea grain plays a vital role in supplying food products to the population. Ensuring high yield and quality in chickpea cultivation requires effective protection against pests and diseases, which remains a significant challenge. This study investigates the distribution and damage caused by major pests and diseases affecting chickpea production, and evaluates the efficacy of both biological and chemical control methods against them.

Keywords: Disease, pest, grain, legume, fungicide, insecticide, pea.

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Introduction

Chickpea, as a grain legume crop, holds a crucial position in ensuring food security for the population of the Republic of Uzbekistan. Chickpea yields suffer considerable losses due to various pests and diseases. The natural geographical conditions, soil, and climate of Uzbekistan provide favorable environments for the development and spread of fungal pathogens and pests in leguminous crops. Without timely control measures, plant growth and development are impaired, yield decreases, product quality deteriorates, and in severe cases, entire crops can be lost.

One of the primary research priorities in protecting chickpea crops from diseases and pests is the development and implementation of effective control methods that safeguard environmental safety and biodiversity. This includes breeding resistant varieties, developing resource-efficient agro-technologies, and applying biologically diverse protection strategies.

Chickpea has become a key food source rich in nutritious protein for human consumption. During the study, various diseases such as root rot, fusarium wilt, powdery mildew, ascochyta blight, and yellow rust, alongside pests including chickpea aphid, pea weevil, spider mites, aphids, pod borers, and autumn moths, were identified in chickpea crops. Research indicates that without appropriate control measures, losses due to harmful organisms in grain legumes can reach 35–40%. Developing and implementing scientifically sound and effective pest and disease management strategies remains an urgent challenge.

Literature Review

Chickpea (*Cicer arietinum* L.) is cultivated worldwide on approximately 12 million hectares, with an average yield of 9.1 quintals per hectare. The protein content of chickpea can reach up to 40% (Merga and Haji, 2019). In India, chickpea production exceeded 11 million tons in 2021, making it the largest consumer with a consumption volume of 25.4 million tons; India is also a major importer (Ahlavat, 2016). In Pakistan, during 2021–2022, chickpea was sown on

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867 thousand hectares, yielding 319 thousand tons, accounting for 4.41% of the gross domestic product share of leguminous crops (Hussain, 2015).

Within the agro-biocenosis of leguminous crops, 34 pest species have been identified, with 10 being dominant. Primary pests include root-feeding cutworms, nodule weevils, aphids, grain feeders, and damaging insects such as chickpea aphid and pod borers (Kholliev, 2014). The pod borer *Helicoverpa armigera* is a major pest causing significant damage to chickpea yields (Gurjar, 2011). The chickpea leaf miner, *Liriomyza cicerina* Rond. (Diptera: Agromyzidae), is widespread globally and causes considerable damage to chickpea crops (Cikman & Civelek, 2006). Adult flies feed on plant sap, while larvae consume the mesophyll tissue of leaves (Sharma, 2007). Females pierce the leaf epidermis and lay 1 to 30 eggs; larvae hatch after about four days, creating white tunnels (mines) in the leaf tissue. Severe infestation disrupts photosynthesis and leads to leaf drop, causing yield reductions of up to 40% (Soltani, 2018).

Currently, under climate change conditions in Uzbekistan, wheat is mainly affected by yellow and brown rust, fusarium, yellow spotting, powdery mildew, black smut, and septoria diseases. Rust fungi are among the most widespread pathogens worldwide, primarily damaging cereal crops (Anikster & Wahl, 1979). The genus *Fusarium* was established by German mycologist Link for fungi with spindle- or sickle-shaped conidia, originally named *Fusisporium* and later changed to *Fusarium*. Initially monotypic, it contained only *Fusarium roseum* (Link, 1989).

In chickpeas, Ascochyta blight is caused by *Ascochyta rabiei*, while in lentils and mung beans, it is caused by *Ascochyta boltschauseri* and *Ascochyta phasolorum*, respectively. These fungi produce grayish-brown to dark brown or black elongated or round spots on leaves, stems, pods, and seeds (Hasanov, Ochilov, Gulmurodov, 2009). Nigmanova (1965) reported that *Ascochyta imperfecta* causes Ascochyta blight in alfalfa (*Medicago sativa*). Musaev (1967) found that *A. pisi* and *A. pinodes* are common in irrigated Russian chickpea fields and cause damage to mung bean, vetch, sainfoin, and grass pea.

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Jerbele (1959) noted that over 500 *Ascochyta* species occur on cultivated and wild plants worldwide. Initially identified as unicellular colorless conidia named *Zythia rabiei*, later discoveries of bicellular conidia led to reclassification under *Ascochyta*. Subsequently, *Ascochyta rabiei* (Pass) Labr. was recognized as belonging to this species (Khachatryan, 1963). Kotova (1992) observed that *Fusarium* species severely damage seedlings when soil moisture is optimal at 60%, penetrating roots and stems. Minimum fungal accumulation occurs at 20-30% moisture. Optimal temperatures are 24–28°C for *F. oxysporum* and 20–25°C for *F. solani*. In India's diverse climatic and soil conditions, seed treatments with Bavistin, Captan, Thiram, and Brosicol (2.0–3.0 kg/ha) are recommended in crop rotation systems involving wheat and chickpea in Punjab, Rajasthan, and Haryana, often using Aldrin (Ali, 1988). Chickpea seeds (variety JG 361) treated with liquid Triforine (4.0 kg/t) and Rhizobium (4.4 g/kg) showed increased biomass and grain yield when fungicides such as Carbendazim, Triforine, Metalaxyl, and Thiram were applied (Kaach & Weltzien, 1983; Thomas & Vyas, 1984; Internet, 2012).

Research Methods

Pest occurrence timing and population assessments in grain legumes followed methodologies by Polyakov et al. (1984), Osmolovsky & Bondarenko (1976), Golub et al. (1980), Sokolov et al. (1981), Dorokhova (1995), Yaroslavtsev (1930), Paliy (1970), Fasulati (1971), VIZR (1972), and Tansky et al. (2002). Biological efficacy of chemicals was calculated using the Henderson and Tilton formula (1955) as described by Püntener (1981). Disease spread monitoring in chickpea, bean, and mung bean crops was conducted from sprouting to harvest using methods from Chumakov (1974), Khokhryakov, Polozova, and Vakhrusheva (1984). Fungicide efficacy was calculated using Abbott's formula (1925). Data were statistically analyzed based on Dospekhov's guidelines (1985).

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Research Results

Chickpea yield is substantially reduced by pod borer (*Helicoverpa armigera*), leaf miner fly (*Liriomyza cicerina*), and chickpea aphids. Monitoring conducted from 2023 to 2025 assessed pest distribution and infestation in chickpea crops in Tashkent, Samarkand, and Jizzakh regions. At the Institute of Plant Genetic Resources' experimental field (Qibray district, Tashkent), a 4.2-hectare chickpea field was surveyed for leaf miner fly and pod borer damage. Each chickpea plant averaged 674.5 leaves, with 268.2 damaged and 406.3 healthy leaves, indicating 39.7% leaf damage. Pod borer population and damage per 100 plants were 23.5 individuals and 24.7%, respectively.

At the "Qorovultepa Jurgom Dala" farm (2.0 hectares, Bulungur district, Samarkand), plants averaged 622.5 leaves each, with 262.4 damaged (42.1% damage). Pod borer population and damage were 21.6 individuals and 22.5%.

At the "Sarimsoq Ota" farm (2.6 hectares), plants averaged 683.6 leaves, with 308.3 damaged (45.1% damage). Pod borer counts averaged 19.4 individuals, with 20.0% damage. At the "Gold Chandler" farm (1 hectare, Jomboy district), plants had 521.4 leaves each, with 193.6 damaged (37.1% damage). Pod borer larvae averaged 22.8 per 100 plants with 23.3% damage.

At the "Aktan ros" farm (5 hectares), plants had 702.3 leaves each, with 344.1 damaged (48.9% damage). Pod borer numbers were 25.2 individuals per 100 plants with 26.2% damage. At Lalmiqor Agricultural Research Institute experimental fields (0.25 and 0.5 hectares), leaf damage ranged from 25.3% to 36.1%, and pod borer larvae ranged from 17.3 to 24.5 per 100 plants, with damage rates of 18.4% to 25.6% (see Table 1).

Fungicide Trials Against Chickpea Diseases. Fungicide trials were conducted at the institute's experimental lysimeter field and in Payariq (Samarkand), Nurata (Navoi), and Forish (Jizzakh) districts. Chickpea seeds were treated with:

Maxim Bek 19.5% suspension concentrate (Tiabendazol 150 g/l+Fludioxonil 25 g/l+Mefenoxam 20 g/l) at 0.8–1.0 l/t. Raxil Gold 6% emulsifiable concentrate (Tebuconazole 60 g/l) at 0.4–0.5 l/t. Maxim XL 035 FS 3.5% suspension concentrate

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(Fludioxonil 25 g/l+Mefenoxam 10 g/l) at 0.8 l/t (dosage variant). At Mustang farm (Payariq district), Maxim Bek showed 85.9–87.2% efficacy against chickpea root rot at 0.8–1.0 l/t, while Raxil Gold showed 80.2–83.9% efficacy at 0.4–0.5 l/t. In irrigated fields in Nurata district, Maxim Bek exhibited 83.9–88.4% efficacy, while Raxil Gold efficacy ranged from 72.3–78.6%. At the Institute of Plant Genetic Resources lysimeter field (Qibray district), Maxim Bek efficacy was 82.3–84.5%, while Raxil Gold efficacy was 86.2–87.9% (see Diagram 1).

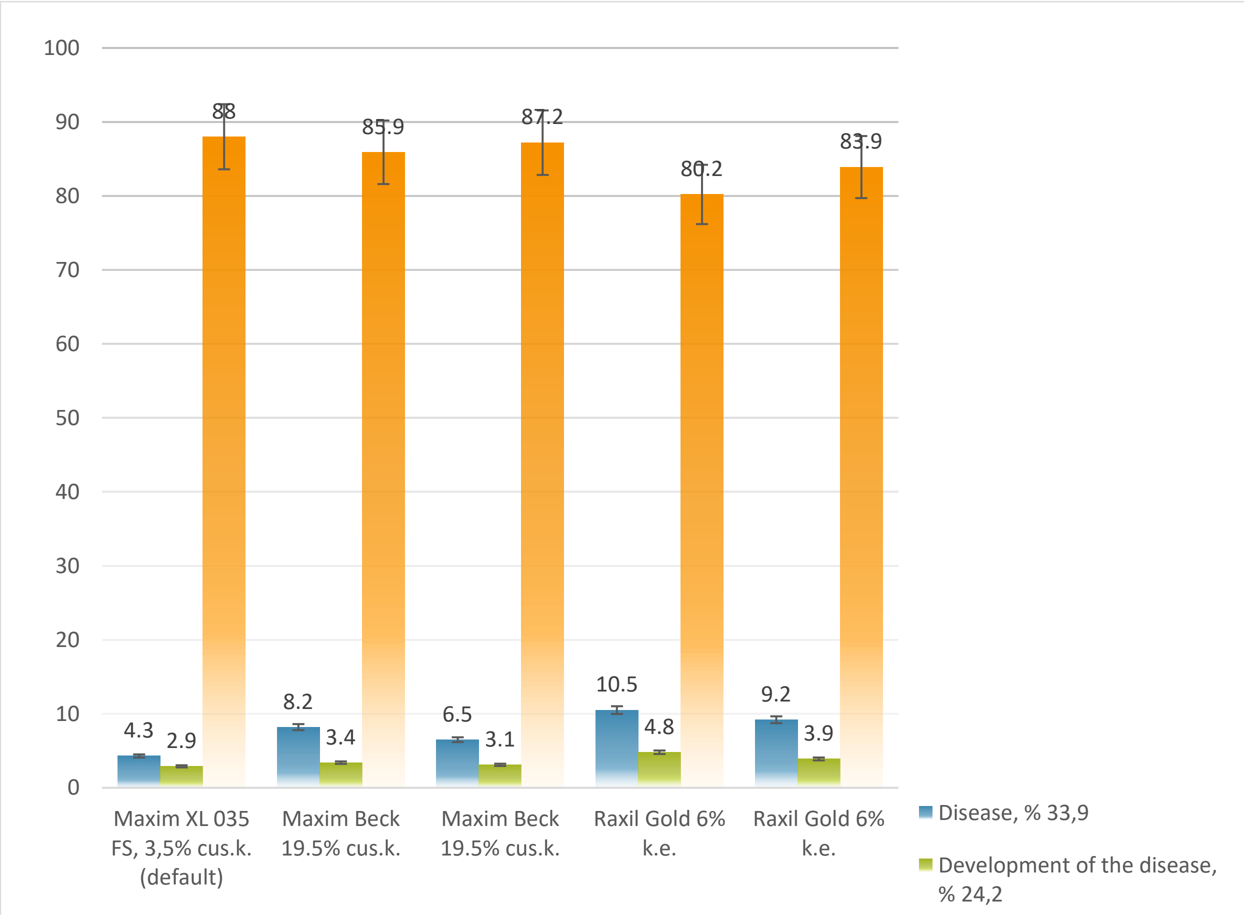

Figure 1. Biological Effectiveness of Seed Treatment Fungicides Against Chickpea Root Rot
(Samarqand Region, Payariq District, "Mustang" Farmer Farm, 2023-2025)

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Conclusions:

Based on studies conducted during 2023-2025 on pests and diseases of grain legumes under the soil and climate conditions of the Republic of Uzbekistan, the following conclusions were made:

In chickpea, pests such as pod borer, aphids, spider mites, and chickpea flies were widespread. The lowest damage level from chickpea fly was observed in Gallarol district at 25.3%, while the highest was 48.9% in Jomboy district. The damage level from pod borer ranged from 18.4% to 26.2%.

For chickpea root rot, when Maksim Bek 19.5% suspension concentrate was applied at a rate of 0.8-1.0 l/t, biological effectiveness reached 85.9-87.2%. When Raksil Gold 6% emulsifiable concentrate was used at 0.4-0.5 l/t, biological effectiveness was 80.2-83.9%.

Table 1 Distribution and harm of major writing pests
(Tashkent, Samarkand and Jizzakh regions, 2023-2025).

№	regions	Districts	Name of the test site	hectare of territory	Number of leaves infected with Lyriomis cicerina and extent of damage				Helicoverpa armigera count and infection rate in 100 nov	
					Total Leaves	of them: Damaged sheet	of them: Healthy leaf	Degree of contamination, %	quantity (pcs.)	degree of infection,%
1.	Tashkent	Qibray	Institute of Plant Genetic Resources Research	4,2	674,5	268,2	406,3	39,7	23,5	24,7
2.	Samarkand	Bulungur	Qorovultepa Jurgom Field	2,0	622,5	262,4	360,1	42,1	21,6	22,5
3.			Sarimsok Ota Farm	2,6	683,6	308,3	375,3	45,1	19,4	20,0
4.		Jomboy	Gold Chandler Farm	1,0	521,4	193,6	327,8	37,1	22,8	23,3
5.			Aktan Ros Farm	5,0	702,3	344,1	358,2	48,9	25,2	26,2
6.	Jizzakh	Gallarol	Lalmikor Farming Scientific Research Institute	0,25	468,6	118,5	350,1	25,3	17,3	18,4
7.				0,5	566,3	204,7	361,6	36,1	24,5	25,6

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