



UDC:633.34:632.4:632.9

TYPES OF FUNGAL DISEASES IN MUNG BEAN CROPS AND MEASURES TO CONTROL THEM

Kamola Shamsiddinova

Plant Protection and Quarantine Scientific-Research Institute, Independent Researcher

Annotation: *This article presents the types of fungal diseases found in mung bean crops and their distribution. Widespread mung bean anthracnose was monitored, three types of promising fungicides were tested at two different application rates, their biological efficacy was studied, and conclusions were drawn.*

Key words: *Mung bean, fungus, anthracnose, application rate, Fusarium wilt, Fusarium root rot, powdery mildew, biological efficiency, fungicide, active substance.*

INTRODUCTION

Interest in protein-rich leguminous crops worldwide—particularly mung bean (*Vigna radiata* L.) - is steadily increasing. According to Food and Agriculture Organization and other international sources, the global area under mung bean cultivation currently amounts to approximately 7.3 million hectares, with an annual production of around 5.3 million tons.

The average yield is 0.5–0.7 t/ha; however, when advanced agronomic practices are applied, it can reach 1.8–2.5 t/ha. The high nutritional value of mung bean, its short growing period, and its ability to improve soil fertility further enhance its importance as a key crop in ensuring global food security.

In Uzbekistan, mung bean cultivation plays an important role in diversifying agriculture, making efficient use of freed irrigated lands, and expanding export potential. According to statistical data, in 2018 the area under mung bean cultivation in the country amounted to 317.2 thousand hectares, and in some years yields reached up to 1.5 t/ha. In 2024, Uzbekistan exported a total of 123.4 thousand tons of mung beans, generating revenue of 99.4 million US dollars, with the main share of exports directed to China (112.1 thousand tons).

In countries where mung bean is widely cultivated, several researchers have reported the occurrence of major diseases such as anthracnose (*Colletotrichum lindemuthianum*), Fusarium root rot (*Fusarium solani*), Fusarium wilt (*Fusarium oxysporum*), powdery mildew (*Erysiphe communis* f. *phaseoli*), and rust (*Uromyces phaseoli*).

To increase mung bean yield, it is essential to properly follow agronomic practices, apply water and fertilizers at recommended rates, and implement effective preventive measures against diseases. At the same time, the integrated use of chemical and biological protection methods ensures high productivity and quality.

To prevent the accumulation of fungi and other pathogens in the soil, it is recommended to practice crop rotation by planting cotton, wheat, or other cereal crops after mung bean. In soils with low water permeability, establishing an effective drainage system and preventing waterlogging are also important. Additionally, the application of phosphorus and potassium fertilizers at a rate of 30–40 kg/ha is effective, as phosphorus



strengthens the root system, while potassium increases the plant's resistance to external stress factors [3].

Leguminous crops, including mung bean, face various ecological stresses during cultivation, and drought—a pressing issue of the 21st century—currently poses a serious obstacle to the stability of agricultural crop yields on a global scale [4;5]. According to climate change projections, the drought problem is expected to persist and intensify, and by 2050, the demand for irrigation water is projected to increase sharply [6].

Drought stress affects plants morphologically, physiologically, and biochemically due to the generation of reactive oxygen species (ROS). Various approaches, such as conventional breeding and genetic engineering, have been applied to enhance drought tolerance; however, these methods have certain limitations in agricultural practice [7]. In this context, drought-tolerant plant growth-promoting rhizobacteria (PGPR) are proposed as an effective solution for sustainable agriculture in water-limited areas. *Vigna radiata* (mung bean), widely cultivated in tropical regions, is a nutritionally rich crop known for its detoxifying properties and effectiveness in protecting the plant from heat stress [8].

Repeated and continuous use of fungicides, as well as the constant application of products with the same mode of action, can lead to the development of virulence in phytopathogens, reducing their effectiveness in subsequent applications. To prevent disease, a key prophylactic measure is the destruction of crop residues from the previous harvest, which prevents fungal spores from persisting in the soil. It is also essential to use high-quality seeds that are resistant to diseases.

Rhizobacteria, often known as plant growth-promoting rhizobacteria (PGPR), play a crucial role in plant development, nutrient management, and biocontrol [9;10]. These PGPR colonize the plant's rhizosphere or endorhizosphere and stimulate plant growth either directly or indirectly through various mechanisms. They also enhance the plant's resistance to biotic and abiotic stresses. In mung bean roots, rhizobacteria form nodules and provide molecular nitrogen to themselves and the surrounding rhizosphere soil by fixing atmospheric nitrogen [3].

Observations conducted in the experimental fields of the Scientific Research Institute of Sericulture in Orta Chirchiq District, Tashkent Region, revealed the simultaneous occurrence and development of several major diseases in mung bean crops. The highest incidence was recorded for *Fusarium* root rot at 18.1%, with a development rate of 9.3%. The incidence of anthracnose was 15.4%, with a development rate of 8.1%. Rust disease showed an incidence of 14.1% and a development rate of 7.2%, while powdery mildew had an incidence of 12.5% and a development rate of 6.4%. The high incidence of *Fusarium* root rot is attributed to the cultivation of plants under conditions of high soil moisture and soil warming, with prolonged retention of soil moisture after irrigation.

The relatively high incidence of rust and anthracnose was exacerbated by elevated air humidity and temperature during flowering and pod-setting stages, whereas powdery mildew developed under conditions of increased nighttime humidity and high daytime temperatures.



These results indicate that, under the conditions of Orta Chirchiq District, complex diseases can develop simultaneously in mung bean crops and have a significant impact on yield.

During 2022–2024, at the experimental plots of the Scientific Research Institute of Sericulture in Tashkent Region, the effectiveness of fungicidal treatments against anthracnose in mung bean was evaluated. In the variants containing Tebucanazole+ where Marshal Duo 40% EC was applied at 0.2–0.25 l/ha, disease incidence ranged from 6.6–7.0%, and disease development was 1.5–2.2%, demonstrating a biological efficacy of 84.5–89.4%. For Pilarviva 34% EC (Propiconazole+Pyraclostrobin) applied at 0.5–0.6 l/ha, biological efficacy reached 81.7–86.0%. Impakt Super (Flutriafol+Tebucanazole) applied at 0.5–0.6 l/ha showed efficacy of 79.6–82.4%. In the plot variet, Tor 22.5% EC (Tebuconazole+Triadimefon) applied at 0.3 L/ha exhibited a biological efficacy of 85.2% (Table 1).

Based on the conducted studies, it can be concluded that the use of fungicides Marshal Duo 40% EC, Pilarviva 34% EC, and Impakt Super in mung bean fields effectively prevents the damage caused by anthracnose and ensures the preservation of yield.

Table 1
Biological efficacy of fungicides used against anthracnose during the growing period of mung bean
(Tashkent Region, Orta Chirchiq District, Scientific Research Institute of Sericulture, 2022–2024)

№	Variets	“Fungicide / Pesticide Application rate, kg/ha or l/ha”	Disease incidence, %	Disease severity, %	Biological efficacy, %
1.	Marshal Duo 40% EC	0,2	7,0	2,2	84,5
		0,25	6,6	1,5	89,4
2.	Pilarviva EC	0,5	7,8	2,6	81,7
		0,6	6,2	2,0	86,0
3.	Impakt super	0,5	9,0	2,9	79,6
		0,6	7,7	2,5	82,4
4.	Torso 22,5% EC (plot variet)	0,3	8,5	2,1	85,2
5.	Control (untreated)	-	26,5	14,2	-
LSD ₀₅					2,5

REFERENCES:

1. Чумаков А.Е. Грибные болезни. Основные методы фитопатологических исследований. – Москва, 1974. «Колос». - С.70-106.
2. Abbot W.S. A method of computing the effectiveness of an insecticide//J. Econ. Entomol. – Vol. 18. – 1925. – №3. – R.265-267.
3. Wang Y., Selvamani V., Yoo I.-K., Kim T.W., Hong S.H. A Novel Strategy for the Microbial Removal of Heavy Metals: Cell-surface Display of Peptides. Biotechnology and Bioprocess Engineering. – 2021. Vol. 26, pp. 1-9.
4. Asfa Rizvi., Bilal Ahmed., Almas Zaidi., Mohd Saghir Khan. Heavy metal mediated phytotoxic impact on winter wheat: oxidative stress and microbial management of toxicity by Bacillus subtilis BM2. RSC Advances. – 2019. Vol. 9, pp. 6125-6142.
5. Shahid M., Ahmed B., Khan M.S. Evaluation of microbiological management



strategy of herbicide toxicity to greengram plants. *Biocatal. Agric. Biotechnol.* – 2018. Vol. 14, pp. 96-108.

6. Michel Le Page., Younes Fakir., Lionel Jarlan., Aaron Boone., Brahim Berjamy., Saïd Khabba., Mehrez Zribi. Projection of irrigation water demand based on the simulation of synthetic crop coefficients and climate change. *Hydrology and Earth System Sciences (HESS)*. – 2021. Vol. 25: pp. 637-651.

7. Chandra Shekhar Nautiyal., Sudha Srivastava., Puneet Singh Chauhan., Karishma Seem., Aradhana Mishra., Sudhir Sopory K. Plant growth-promoting bacteria *Bacillus amyloliquefaciens* NBRISNI3 modulates gene expression profile of leaf and rhizosphere community in rice during salt stress. *Plant Physiology and Biochemistry.* – 2013. Vol. 66, pp. 1-9.

8. Tang D., Dong Y., Ren H., Li L., He C. A review of phytochemistry, metabolite changes, and medicinal uses of the common food mung bean and its sprouts (*Vigna radiata*). *Chemistry Central Journal.* - 2014. Vol. 8, pp. 1-9.

9. Kim Y.J., Lim J., Sukweenadhi J., Seok J.W., Lee S.W., Park J.C., Taizhanova A., Kim D., Yang D.C. Genomic characterization of a newly isolated rhizobacteria *Sphingomonas panacis* reveals plant growth promoting effect to rice. *Biotechnology and Bioprocess Engineering.* – 2019. Vol. 24, pp. 119-125.

10. Zaidi A., Khan M.S., Rizvi A., Saif S., Ahmad B., Shahid M. Role of phosphate-solubilizing bacteria in legume improvement. In *Microbes for Legume Improvement*; Springer: Cham, Switzerland. – 2017. - Pp. 175-197.