

PATHOGENIC FUNGI DISTRIBUTED IN WALNUTS (*JUGLANS REGIA L.*) IN NAMANGAN REGION

Jo'rayev G'.S. *, To'raboyev M.B., Teshaboeva A.Sh., Jo'raqulov J.J.

Institute of Botany, Academy of Sciences of the Republic of Uzbekistan, Tashkent, Uzbekistan

e-mail: salimjonj880@gmail.com

Abstract. During 2021-2023, fungal diseases of economically important plants, especially walnuts, were studied in the districts of Namangan region. As a result of our studies, 4 types of fungi belonging to 2 sections, 3 classes, 3 orders, 4 families, and 4 genera were identified. These are marssoniosis, powdery mildew, white rot of stem core, cytosporosis diseases.

Walnut (*Juglans regia L.*) is a nut-bearing tree belonging to the walnut family that originated in Iran, and from there it spread throughout the world (Mudasir Hassan, Khurshid Ahmad 2017). It grows wild in Asia Minor, the Balkan Peninsula, the Caucasus, Iran, China, the Korean Peninsula, and Afghanistan (<https://www.agro.uz/yong-oq-2/>). In Uzbekistan, walnut forests are widespread on an area of about 4,000 hectares. They grow on the slopes of the Western Tien-Shan and Pamir-Aloy mountains at an altitude of 800 to 2300 m above sea level (Baty'r Achilovich Khasanov 2017). It is 15-30 m tall and 1.5-2 m thick. The branches are thick, wide spherical or dome-shaped, the root network is strong, goes to a depth of 4 m or more. Vegetation period is 165-210 days. It blooms in April-May, the fruit ripens in September-October (Boymurodov H.T.2022). According to 2021 data, the total area of walnut groves in the republic is 11,672 hectares, and this is 3.4 of the total area of fruit crops. percentage means. Of these, 5,738 hectares are harvested, and 5,934 hectares do not bear fruit, which is 50.8 percent. In Andijan regions (1244 ha). The smallest areas are recorded in the Khorezm region and the Republic of Karakalpakstan. In Samarkand region, more than 50 percent of the total area is not yielding, but there is an opportunity to increase the gross yield. The same situation is in Tashkent region, i.e. more than 53 percent of the walnut area will begin to bear fruit in the coming years (<https://uz.wikipedia.org/wiki/Yong%CA%BB%20q>).

Currently, 4 types of walnuts are grown in our country, these are the Bostandisky variety, the ideal variety, the Tonkoskorlupiy variety, and the Jubilee variety. Today, walnut products grown in our country are sold in Austria, Azerbaijan, Afghanistan, Germany, Georgia, India, Iraq, Iran, Italy, Kazakhstan, Kyrgyzstan, Latvia, Lebanon, Mongolia, Netherlands, UAE, Russia, Tajikistan, It is exported to countries such as Turkmenistan and Turkey (<https://www.agro.uz/yong-oq-2/>).

Herbarium specimens collected as a result of mycological research in Namangan region during 2021-2023 served as a source for writing this thesis. Infected plants were photographed using a Canon EOS 750D digital camera. Identification of the type of fungus and study of its morphological features was carried out using a binocular microscope with a Motic 5 N-300M camera. Infected plant parts are placed on a glass slide with a mixture of lactic acid and water, and then covered with a cover glass. After that, fungal spores are magnified through the 4, 10, 40, lenses of the microscope. Fungal spores were photographed using Scope Image 9.0 software and spores were measured.

The modern systematic nomenclature of the studied fungi was given based on indexfungorum.org (Index Fungorum) and host plant names powo.science.kew.org (Kew Science Plants of the World online).

In our research, 4 types of fungi belonging to 2 divisions, 3 classes, 3 orders, 4 families, and 4 genera were identified in Namangan region. These fungi are pathogenic in different parts of the nut. The fungus *Ophiognomonia leptostyla* (Sogonov) has been found in almost all districts of Namangan region, causing Marssoniosis. It was found that the disease is strong in walnuts at an altitude of 900-1200 m above sea level (70%), compared to the previous years, it was found that the productivity decreased by 20-25%. The reason for this is that there was a lot of precipitation in early summer. was observed (25%). As a result of powdery mildew, young seedlings lag behind

in development and become weak. The fungus *Inonotus hispidus* causes white rot disease in walnuts. This disease was mainly observed in mature trees. The fungus *Cytospora juglandina* caused cytosporosis (infectious build-up) disease, and it was observed that the bark and wood parts of the stems and branches were damaged, but the leaves and fruits were not damaged. As a result of this disease, a significant decrease in the yield of walnuts was observed in many regions of Namangan region.

In our researches, common fungal diseases of walnut trees were studied. As a result of our studies, it was found that the fungus *Ophiognomonia leptostyla* Sogonov causes brown spotting (marssoniosis) of walnuts in Namangan region and districts (1 picture). This disease was first discovered by Malkov in Bulgaria (1905, 1906) and studied in the following years (Veselin Arnaudov 2014). The disease mainly causes circular brown or gray-brown spots on the leaves, which later merge with each other and are surrounded by a dark ring. The fungus forms small brown pads, that is, pycnidia of the fungus, from the back of the spot. As a result of the disease, long, elliptical black spots appear on the leaf, leaf bands, and the middle thick veins of the leaf. Infected leaves do not develop and fall off. In addition, young branches are also affected and form gray sores. Brown spots also appear on the fruit, and the affected part stops developing, dries up and cracks. Such fruits often fall off. The disease-causing fungus overwinters on fallen leaves and infected branches. In autumn, fungal bags and haltaspores begin to form in them. By spring, the 2-cell sac of spores is ripe.



Figure 1 - Walnut leaves and fruits affected by Marssoniosis disease.

Powdery mildew disease of walnut. In Namangan region, during our research, it was found that powdery mildew disease of walnut (Fig. 2) and this disease was caused by the fungus *Erysiphe juglandis* Golovin) U. Braun & S. Takam (*Microsphaera juglandis* Golovin). Powdery mildew mainly damages the leaves, as a result of which the leaves lag behind in growth and development. The surface of the damaged leaf is covered with oozing dust, and the conidia formed there quickly disappear. On the surface of the diseased leaf, the black colored fungal fruiting body produces cleistothecia. There are also cases of yellowing and drying of leaves due to dew. The source of infection of this disease is the overwintering fruiting bodies-fungus cleistothecia present on the infected leaves.



Figure 2 - Powdery mildew disease on walnut leaves.

White rot disease of walnut. As a result of our study of fungal diseases of Namangan region and districts, *Inonotus hispidus* Bull. P. Karst. 1879, the fungus was identified (Fig. 3). There are 101 species of this fungus worldwide (Masoomah Ghobad-Nejhad 2008). For the first time in Uzbekistan, A.A. Petrova (1989) in Zomin Mountain Forest Reserve, Later, in 2005, during the study of macromycetes of the Fergana Valley, it was detected in walnut (*Juglans regia*) trees. (Iminova M.M. 2009). During our scientific trips, it was found that the *Inonotus hispidus* fungus can be found in the districts of Namangan region from the middle of summer. It is distinguished by a dark brown border. Due to the decay of the woody part of the stem, in some cases, the entire part dries up.



Figure 3 - White rot disease of walnut

Due to the development of the fungus, holes are often formed in the stem. With the formation of fruit bodies, an oily layer, which is a source of food for the fungus, occurs between wood and bark. The fruit body of the fungus can be formed in different parts of the tree stem. In the lower part of the fruit bodies formed on the tree trunk of the walnut, there are hymenophores, from which mature basidiospores spread around, that is, these fruit bodies are the main source of infection that spreads the disease. (A.O. Mahmatmurodov 2021). They grow in spring, summer, autumn and parasitize many trees. They cannot be eaten (Iminova M.M 2009).

Walnut: Cytosporosis (infectious build-up) disease. During our scientific trip to Yanigurgan District, Namangan Region, it was found that the fungus *Cytospora juglandina*, which causes cytosporosis, is widespread in walnuts. Cytosporosis of walnut affects the bark and wood parts of the stems and branches, leaves and fruits are not damaged. In the damaged shell, red or reddish-brown spots appear in the middle. They grow into large (up to 50-75 cm long) ellipse or elongated wounds. The tissue at the base of the wounds dies down to a woody part, hardens or becomes mortised, erosive. shaped stroma is formed. If the wounds surround the stem or branch, these branches or the tree will die. The fungus overwinters in wounds in the form of mycelium and pycnidia. Trees are affected mainly in spring or autumn, in warm weather. In spring, when the buds begin to write, the conidia of the pathogen come out of the pycnidia, they fall on healthy branches and branches by rain and wind, and enters the tissues through various mechanical injuries (cold spots, broken branches, scabs caused by insects and diseases). New sores appear in damaged azos 1-3 years after damage. Ulcers grow in spring and early summer, and their growth slows down in summer and winter. The bark of the stem, branches and twigs, and later the woody parts also die and dry up. Compared to healthy trees, weakened trees for various reasons are more affected.

Table 1. Taxonomic analysis of pathogenic fungi distributed in walnut (*Juglans regia*) plant of Namangan region

Section	Class	Order	Family	Category	Genera
Asco-mycota	Leotio-mycetes	Erysiphales	Erysiphaceae	<i>Microsphaera</i>	<i>M. juglandis</i>
		Diaporthales	Valsaceae	<i>Cytospora</i>	<i>C.juglandina</i>



	Sordario -mycetes		Gnomoniaceae	<i>Ophiognomoni a</i> (Sacc.)	<i>Ophiognomoni a leptostyla</i> M.
Basidio - mycota	Agarico- mycetes	Hymenochaetale s	Hymenochaetacea e	<i>Inonotus</i>	<i>I. hispidus</i>
2	3	3	4	4	4

During our scientific trip to the Namangan region, brown spotting, powdery mildew, rotting of the stem core, and infectious diseases were detected in the walnut plant. As a result of our studies, 4 types of fungi belonging to 2 sections, 3 classes, 3 orders, 4 families, and 4 genera were identified. Of these, the disease of Marssoniosis appears on the leaves at first round brown or gray-brown spots, which later merge with each other, surrounded by a dark ring. Powdery mildew disease is mainly observed in seedlings and young plants. and mainly damages the leaves, as a result of which the leaves lag behind in growth and development. Due to the white rot disease, the base of the walnut tree has a yellowish-white rot. In case of cytosporosis, the bark and wood parts of the stems and branches are damaged. In the damaged bark, red or reddish-brown spots appear in the middle. As a result of seasonal observations during research, it became clear that the development of the disease. At the beginning of June, it became known that the disease of brown spotting (Marssoniosis) developed strongly in walnuts.

References

Finnish Museum of Natural History, Botanical Museum, P.O. Box 7, FI-00014 University of Helsinki, Finland (e-mail: ghobadne@mappi.helsinki.fi) The genus *Inonotus* sensu lato in Iran, with keys to *Inocutis* and *Mensularia* worldwide.

Veselin Arnaudov¹, Stefan Gandeov¹, Milena Dimova² Susceptibility of Some Walnut Cultivars to *Gnomonia leptostyla* and *Xanthomonas arboricola* pv. *juglandis* in Bulgaria UDK: 634.5:632.4(497.2)

Mudasir Hassan, Khurshid Ahmad and N A Khan Disease Prevalence and Evaluation of Fungitoxicants against *Marsonina juglandis* Causing Anthracnose of Walnut (*Juglans regia* L.).

Batyr Achilovich Khasanov^{1*}, Asqar Asadullaevich Safarov¹ and Fozil Mukhammadievich Boyjigitov² (Fungal Diseases of Persian Walnut in Uzbekistan and their Control).

Абдуразаков А.А., Дхандеви Пем, Ғаффоров Ю.Ш. ФАРҒОНА ВОДИЙСИ ДАРАХТ ВА БУТАЛАРИНИНГАСКОМИЦЕТ-МИКРОМИЦЕТЛАРИ УДК 581.2.582.28.

Iminova M.M. Farg'ona vodiysi makromitsetlari (O'zbekiston Respublikasi hududida): Dissertatsiya avtoreferati. dis.

Mahmatmurodov A.O'., Nishonov N.T., Eshmurodova M.Q., Sharifov K.F. FITOPATOLOGIYA. O'quv qo'llanma. - Samarqand: "Samarqand davlat chet tillar instituti" nashriyoti. 2021 yil. – 190 bet. UO'K 581.16:635.621 KBK 42.8 F 64.

Boymurodov X.T. Yong'oqning biologik ta'rifi va foydali xususiyatlari. <https://econferencezone.org>.

<https://www.gbif.org/species/7256834>

<https://www.indexfungorum.org/names/Names.asp>

powo.science.kew.org (Kew Science Plants of the World online.)

<https://uz.wikipedia.org/wiki/Yong%CA%BBoq>

<https://www.agro.uz/yong-oq-2/>