



FUNGI THAT CAUSE DISEASE IN ALMONDS (STIGMINA CARPOPHILUA (LEV), MONILIA CINEREA (SCHROET)) IN THE CONDITIONS OF UZBEKISTAN AND SOME OF THEIR BIOLOGICAL CHARACTERISTICS

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Annotation

During 2019-2021, scientific research work was carried out in Uzbekistan on the study of diseases caused by fungi and the development of measures to combat them. During the monitoring, 7 fungal diseases such as hole spotting, moniliosis burn, powdery mildew, red spotting of leaves, phytophthora, cytosporosis, root rot were detected in almonds, of which hole spotting and moniliosis burn diseases were found to be the most dangerous. Some biological features of these two diseases were studied..

Keywords: almonds, fungus, diseases, Stigmina carpophilua, Monilia Cinerea.

Introduction

Almond is a very ancient and traditional fruit crop for many countries, which is mainly grown in mountainous and sub-mountainous regions. In Uzbekistan, large orchards of almonds are grown in the mountainous regions of the Tashkent region in Bostonliq, Parkent, Okhangaron, and Tashkent districts; in Denov, Termiz districts of Surkhandarya region; in the Kattakorgan district of the Samarkand region, on the South-Eastern slopes of the Zarafshan Valley; in Dehkanabad, Shakhrisabz, Kitab districts of Kashkadarya region; in Yangigurgan, Koson districts of Namangan region; The highlands of Fergana region are formed on the southern slopes (Vadil, Sokh, etc.).

Methods

A method of determining the spread of diseases. The spread of the disease in almond trees was expressed as a percentage and was determined based on the following formula:





$$P = \frac{n \times 100}{N} ,$$

P - spreading of disease, %;

n - the number of infected plants in the sample;

N - total number of plants in the sample.

The prevalence of the disease was found by the following formula:

$$P_{\bar{y}} = \frac{s \times p}{S} ,$$

$P_{\bar{y}}$ - the average prevalence of the disease in the farm or district, %;

sp - the sum of the multiples of the prevalence of the disease in each orchard tested for disease;

S – the total area from which the account is taken (Чумаков, Захаров, 1990).

A method of determining the development of the disease

The degree to which the leaves of almond trees are affected by a certain disease was determined according to the following scale:

- 0 – healthy;
- 1 – the surface is damaged up to 10%;
- 2 – the surface is damaged from 11 to 25%;
- 3 – the surface is damaged from 26 to 50%;
- 4 – more than 50% of the surface is damaged.

The development of diseases in almond trees was found based on the following formula:

$$R = \frac{(a \times b) 100}{N \times K}$$

R - disease progression, %;

(a · b) - the sum of the number of control plants multiplied by the incidence rate;

N – total number of counted plants;

K – the highest score [1].

Consideration of the hole spot disease of almond. 10 almond trees from up to 50 ha of almond orchards were examined for almond hole spot disease. If the area of the almond grove was more than 50 hectares, two more almond trees were examined for each additional 10 hectares. One branch was selected from four sides of each tree, and 25 leaves from each branch, i.e. 100 leaves per tree, were examined and counted.



The spread and development of the disease was determined by taking the account in this way. The following scale was used to determine the development of the disease:

- 0 – the leaves are healthy;
- 1 – there are several spots on the leaves that are not noticeable;
- 2 – there are 1-3 spots up to 0.5 cm in diameter visible on the surface of the leaves;
- 3 – on the surface of the leaves there are noticeable spots with a diameter of 0.5-1 cm;
- 4 – the surface of the leaves is covered with so many spots that it is difficult to count [2].

Results

Hole spotting. Hole spotting or klyasterosporiosis is caused by the fungus *Stigmina carpophila* (Lev.) M.B.Ellis. This fungus belongs to the group of fungi Deuteromycetes, order Hyphomycetales, family Dematiaceae, genus *Stigmina*.

In the conditions of Uzbekistan, all above-ground organs of almonds are affected by the hole spotting disease. Infected leaves are characterized by dark spots, often with a reddish-brown border, first reddish-brown, then light brown spots. These spots are scattered irregularly on the surface of the leaf. Especially the recent rain accelerates their appearance. In 7-12 days, the spots become larger and due to their shedding, the leaves become holes. This is due to the death of the tissue cells in the affected part of the leaf and the rapid division and reproduction of healthy tissue cells adjacent to it. Shedding spots on the leaf edges make the edges look like insect gnawing. If the leaves are severely damaged, they turn yellow. If their leaf bands are not damaged, they remain on the tree without shedding, and conversely, if the leaf bands are damaged, the leaves break off and fall due to the breakdown of the conducting tissue tubes.

On the surface of infected young fruits, round nodules of reddish color are formed. Such nodules are observed to be more on the surface of the fruit facing upwards. As the fruits get bigger, the tubers also get bigger, turn light brown and slightly sunk into the fruit. The shape of such fruits changes.

The nodules on the surface of strongly affected fruits coalesce, cracks are formed on their surface, and in some cases glue flows from the cracks. But they remain on the tree without spilling.

Fruits at the bottom of the almond tree are more affected by the disease than those at the top.

On the surface of the young branches of the almond tree, at the same time as the leaves and fruits, due to the disease, round red spots are formed in the middle. The formation





of such spots on branches is observed less often than on leaves and fruits. Such spots become larger, cracks appear on the surface, and in some cases glue is formed in these cracks. These spots do not heal after years, and the stem becomes dark due to the disease. When the disease is severe, almond buds are also damaged. The glue released by the disease gives the affected shoots a shiny color. Such shoots will dry out.

Conidia of the disease-causing fungus *S.carpophila* are formed on the surface of affected parts of almonds during heavy rainfall. Conidiabands of the fungus on the plant are cylindrical or bottle-shaped, $14-45 \times 3-11 \mu\text{m}$ in size. Conidia are cylindrical, ellipsoidal or lanceolate, depending on age, they have 1 to 6, in most cases 3-4 barriers. It is colorless when young, later turns yellow, light brown, and the size of conidia varies depending on age, on average $17-58 \times 9-16 \mu\text{m}$.



Figure 1. Hole spotting on the leaf and fruit of almonds

The disease-causing fungus hibernates in infected branches and cracks formed in them, in immature leaves with the help of mycelia, conidia and chlamyds spores (Fig. 1).

Moniliosis blight disease of almonds

The anamorph of the fungus that causes moniliosis blight of almonds belongs to the Deuteromycetes group of fungi, order of Hyphomycetales, family of Moniliaceae, order of Monilia, species of *M. sinerea* Bonordj, and its telomorph belongs to the phylum of Ascomycota, class of Eusascomycetes, order group of Discomycetidae, order of Helotiales, family of Sclerotiniaceae, order of Monilinia.

This type of fungus occurs in almond blossoms, flower buds, stems and fruits showing symptoms of the disease in the form of burns.

The disease is observed in the spring from the period of almond blossoming. Due to the disease, almond flowers suddenly turn brown and wither. After that, the leaves also wither and dry up. Then it is observed that young fruit-bearing branches dry up to one-year stems. This appearance of the disease is reminiscent of burns caused by fire. For this reason, this disease is called moniliosis burn: When there is a lot of



precipitation, it is possible to observe the formation of dark gray pads consisting of conidia and mycelia of the disease-causing fungus on dried almond flowers, inflorescences, leaves and its bundles. Later, such pads and cracks appear on dried branches and stems.

The mycelia and conidia of the fungus *M. cinerea*, which causes monilial burn disease, are small, dense, gray and irregular. Conidia are often lemon-shaped, $12-13 \times 9-10 \mu\text{m}$ in size. They are gray or colorless and arranged in chains. Its sac period is called *Monillinia cinerea* (Bonord.) Honey. But in our research, the period of formation of the sac was not determined (Fig. 2).



Figure 2. Moniliosis burns of almond

Conclusion

As a result of the conducted research, among the fungal diseases detected in almonds, hole spotting and moniliosis were recorded in all almond orchards, and it was found that these diseases are widespread in the conditions of Tashkent region and have a negative effect on the almond yield and its quality.

References:

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