The Eurasia Proceedings of Health, Environment and Life Sciences (EPHELS)
ISSN: 2791-8033

The Eurasia Proceedings of Health, Environment and Life Sciences (EPHELS), 2022

Volume 5, Pages 88-92

ICMeHeLS 2022: International Conference on Medical, Health and Life Sciences

Tomato Powdery Mildew *Oidium Licopersicum* C.M. in a Greenhouse

Jabrayil AGHAYEV
Institute Dendrology of Azerbaijan National Academy of Sciences

Afaq HACIYEVA
Institute Dendrology of Azerbaijan National Academy of Sciences

Aynur MAMMADOVA
Institute Dendrology of Azerbaijan National Academy of Sciences

Abstract: This article is about spread of tomato powdery mildew (*Oidium lycopersicum* Cooke et Massee), features, microscopy analysis of pathogen, damage degree. It informs about specific changes and new specialized race in the morphological features of pathogen. It informs about perspective biological and chemical preparations (Qamair, Alrin-B, Kvadris, Strobi, Bayleton, and Topaz) tested in disease control.

Keywords: Greenhouse, Tomato, Disease, *Oidium licopersicum*, Biological control

Introduction

The vast majority of the population engaged in agriculture prefers only chemical control, as they have little information about the new achievements of plant protection science, advanced protection means and methods. This increases the volume of use of toxic chemicals. Compared to 1986-1988, in 2009-2020, the number of pesticides used in outdoor potato and tomato production increased from 2-4 to 6-8, and against pests from 2-3 to 7-9. When additional feeding fertilizers and soil fungicides are added, the number of sprayings with chemicals during the season to protect against diseases and pests reaches 12 in potato fields and 20 in tomato production. This situation leads to the pollution of the environment and the soil, and the residual amount of pesticides in the produced products is much higher than the allowed norm. In such a case, phytosanitary dangerous products multiply in markets and sales centers (Aghayev, 2012).

Potatoes, tomatoes, eggplants and peppers, which constitute the main part of human food in daily life, are cultivated with various agrotechnical methods in agriculture, so they are infected with viruses, bacteria, fungi, parasitic and non-infectious diseases (caused by nutritional deficiency, climatic factors, anthropogenic effects). Such diseases have a strong impact on productivity and cause a lot of damage to producers, and cause various pathological conditions in consumers.

In recent years, the greenhouse vegetable growing is expanded still more against the background of developing of agrarian reforms. Transportation and application of modern technologies to Azerbaijan and increasing of productivity of tomato and its marketable quality had caused changing of composition of diseases and pests and wide spread of individual pathogens. So, the phytosanitary analysis of Absheron Peninsula in last twenty years shows that wide spreading of powdery mildew (*Oidium lycopersici* Cooke et Masse) and phytopathogenic fungi (*Cladosporium fulvum* Cooke) lead to problems in the greenhouse site. Firstly, Powdery mildew on tomato in Azerbaijan was remarked by S.Abdullaev and V.Belousova (1989). In spite of different data about pathogen, it was identified by T.Tereshenkova. In her researches about fungi and specified it as *Oidium licopesici* Cooke et Massee However, in the last 25 years, the diversity of tomato plant variety composition, cultivation technology,

the change in the species composition of diseases on it, the introduction of new subspecies and races into the republic have resulted in its mass distribution, adapting to local conditions. In the existing conditions, it is necessary to clarify the species composition of diseases, to study newly unstudied and currently causing high crop losses, and to prepare integrated measures to combat them.

Species composition of disease vectors of tomato (*Solanum lycopersicum* L.), potato (*Solanum tuberosum* L.), eggplant (*Solanum melongena* L.) and pepper (*Capsicum annum* L.) belonging to the *Solanaceae* family in the territory of the Republic of Azerbaijan during 2001-2020 expeditions were held 3 times a year in Absheron, Jalilabad, Lankaran, Masalli Khachmaz and Shamkir regions for clarification. Pathological cases observed on the above-ground organs and root system of plants cultivated in open fields and greenhouse areas were recorded and visualized with photographs.

At this time, the symptoms of the samples collected from the fields were specified. Damaged organs were fixed, and the available materials were determined by systematic microscopy and laboratory analysis to be the causative agents of the disease mentioned below. These agents were registered by us for the first time in Azerbaijan. The vectors of this disease entered the country in different ways and spread in a limited area. Detailed information on the distribution area of pathogens has been published.

Newly registered disease agents spreading in a limited area in the territory of the Republic of Azerbaijan:

1. Striped mosaic / Potato virus X
2. Wart mosaic - Tobacco Etch. Virus (TEV)
3. Wrinkled mosaic / Alfalfa mosaic virus (AMV)
4. Potato leafroll virus (PLRV)
5. Stem bacteriosis / *Pseudomonas corrugata* (Roberts and Scarlett).
6. Bacterial spotting-Xanthomonas sp.
7. Root rot / *Phytophthora* sp.
8. Powdery mildew / *Oidium lycopersici* (Cooke and Massee)
9. Brown spot - *Cladosporium fulvum* Cooke. (*Passalora fulva* (Cook) U.Br. & Cro.)
10. Stem rot / *Didymella lycopersici* (Klebahn)
11. Red spot / *Stemphylium botryosum* f.sp. lycopersici (Wa, Neeg.)
12. Red spot / *Stemphylium solani* (G.F. Weber)
13. Gray and brown spot / *Stemphylium* sp.
14. Linear rot in fruits / *Geotrichum condidum* (Link)
15. Throat and trunk rot - *Sclerotinia rollfsii* (*Athelia rolfsii*) (Curzi) C.C. Tu& K.)
16. Soft rot in fruits - *Rhizopus* sp.

The role of environmental factors in the prevention of powdery mildew is great. If the planting scheme is not followed correctly, if the inter-plant and inter-row spacings are close, the aeration-aeration balance is disturbed, and conditions for the development of pathogens are created as humid air remains continuously in the dense parts of the plants. The temperature and humidity balance should be normal. Cool, dewy and foggy evenings, the condition created after evening watering in the covered area, the relative humidity increase is one of the main conditions that cause the disease. Therefore, watering should be done in the morning. The air-aeration conditions are improved by timely cleaning of the leaves in contact with the ground and the lower layers. It should be controlled that the nutritional environment and the macro and microelements in the soil are normal. Before each planting, the soil should be analyzed and the missing nutrients should be brought to the normal level. The composition of irrigation water is also of great importance. When acidic or alkaline water is used for irrigation, the metabolism of the tomato plant is disturbed and the overall durability decreases, the plant becomes weak. Weak plants are more susceptible to powdery mildew.

Method

Disease occurs mostly in Absheron Peninsula of Azerbaijan. At first, on the tomato grown in the greenhouse appear white-grey little covers on the down layer leaves. *O. lycopersicum* covers all leaf surface under favorable conditions. The disease is spread in most of polyethylene-covered greenhouses in Absheron Peninsula. Progression of the disease on the tomato leaves of model plants continues from first observation till quantity of vegetation. Conidiums and carriers of conidiums of pathogen have been studied properly by the systematic microscopy of taken samples. Conidiums have egg-shaped, elliptic and cylindrical forms (pic. 1).

Results and Discussion

Figure 1. The carriers of conidiums' micelles are short, septas are observed. Fledgling elliptic conidiums are elliptic form with sharp head.

Figure 2. This sign was found by us first and was made visual

The main reason of spreading of disease in 2014 is development of new pathogenic race specialized on tomato. Dynamic of disease on seedlings of tomato for Durinta have been studied until the end of vegetation period in the polyethylene covered greenhouse condition. Pathogen continues its development until the end of the vegetation (pic 2). Referring to the results from the registrations it was found that 20-32 ^{0} C temperature and 55-85 % relative humidity had been favourable for optimal development of *O. lycopersicum*. As can be seen from the result the condition like that exists in all greenhouses. If the pathogen has resources, its spread is inevitable. During the disease period, power mildew spreads and as the result the leaves turn yellow, their parenchima turn yellowish-brown, if there is a lot humidity begin deformation of leaves, turgor disappears and occurs early leaf fall. Contaminating fruit with the disease is not observed. İn spite of it the stalk, receptacle and sepal are infected. In addition, you can see powdery mildew on the tomato growing in open conditions, but it has not economic importance. In summer period, after foggy and drizzly on the weather appears dew, as the result of it the disease spreads too quickly. if in the sowing area the aeration among the plants is very little and the agrotechnical conditions aren't met, the infection kills down leaves. The disease spreads on leaves of middle layer quickly under favorable conditions, which leads to aging, and leaf falling. *Oidium lycopersicum* Coke et Mass. besides tomato infects other sweet and bitter plants, wild nightshade and other weeds. N.Pidoplichko (1977) considered that ascigerous form of *Levellula taurica* Arnaud is indicated as Yachevsky (2).

First, *L. taurica* is observed with light-green and yellow patches on the leaves. It covers the surface of the leaf as powdery coating under favorable conditions. Whitish-grey coating are conidiums and micelles of pathogen. Conidiums spread intensively by wind, raindrops, irrigating water drops and mist. In mass spread years the leaves of tomato fall, fruits are little, as the result of intensive sun streams can be observed the burns on the fruit. Conidiums can migrate to the far distance by mist and wind. It can spread in large range climate conditions. It develops intensively in 13-32^{o}C temperature 50-85% relative humidity.

Measures: First, to control biological and chemical measures developed by *Oidium lycopersicum* or *Levellula taurica* against diseases must be identified the pathogen.

After determination of presence of pathogen must be used, the biological preparation received from its natural antagonist for fighting against it. In 2012-2014, it was studied and tested the applied schedule of the preparations as Gampir (*Bacillus subtilis*, ştamm M22 VİZR) and Alrin-B (*Bacillus subtilis* strains B-10 VIZR) against *Oidium licopersicum*.

When Gamair was applied the titre was ^{11} KYO/gr. From the tests, carried out on efficiency of influence to development and spread of disease under different expenses, the results showed that the biological efficiency of preparation was by 68% in 0,3 kg/ha variant. During the application process the titre of Alrin was 10^{11}KYO/gr. Alrin-B had been applied during fruit ripening time of the first and second flower clusters of tomato and efficiency was by 65% in 0,2 kg/ha application rate.

Sharing of Alrin-B and Gamarin was effective by 72% in 0,2 +0,2kg/ha application rate. Based on the results, use of Gamair and Alrin-B is promising in green food production, so there were no pesticide remains in the ripening period (1).

In years, when powdery mildew was common on tomato for fighting against it and rational organisation it is useful for 85-90% of applying 0,3-0,5 kg/ha of Strobi (krezoksin-metil), 0,4-0,6 litr/ha of Kvadris SK (Azoksistrobin) 20 days before yield collecting. If these preparations are absent, they can be changed with Topaz (Penkonazol) and Bayleten (Triadimefon).

Ecological factors play key role in fight against Powdery Mildew. If sowing scheme is broken, the space between plants and rows is close aeration balance is disturbed, because of damp air persists among dense part of plants continuously it is suitable for developing of pests. Temperature and damp balance must meet to quota. Main reasons of disease emergence are cool, dewy and foggy evenings, and in the greenhouse is increasing of relative humidity after evening watering. Therefore watering must be carried out in the morning. The aeration will be better, if the leaves closer to the ground and understory will be cleaned in time. the macro and microelements in the ground must be under control. Before each sowing, the ground must be analyzed and the food elements must be reached to normal level. Irrigation water also plays an important role. The metabolism of tomato plant is interrupted and common sustainability decreases, the plant gets weak, if during the irrigation it is used water with sour or alkali reaction, also hard water and as the result, the weak plants are infected with powdery mildew rapidly.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPHELS journal belongs to the authors.

Acknowledgements or Notes

* This article was presented as an oral presentation at the International Conference on Medical, Health and Life Sciences (www.icmehels.net) held in Baku/Azerbaijan on July 01-04, 2022

References

Aghayev J.T. (2012). *Diseases and pests on the plants grown in the greenhouse in Absheron economic conditions, treatment and applying of new preparations against main harmful species* (p.20). Baku. Final report of SRI.

Abdullayev S.G., Beluousova, V. V. (1989). Powdery mildew in solanaceous crops in Azerbaijan. *Newsletter of GNU VIZR, 74*, 30-36.

Pidoplichko N.M. (2015). Fungus are cultivars pests. *Identification Guide 2*, 22 .

Tereshonkova T.A. (2002). *Powdery mildew on tomato. Abstract of c.a.*s,(p.11). Moscow.

Author Information

Jabrayil Aghayev
Institute Dendrology of Azerbaijan National Academy of Sciences, Baku, Azerbaijan
Contact e- mail: cabrailagaev@gmail.com

Afaq Haciyeva
Institute Dendrology of Azerbaijan National Academy of Sciences, Baku, Azerbaijan

Aynur Mammadova
Institute Dendrology of Azerbaijan National Academy of Sciences, Baku, Azerbaijan

To cite this article:

Aghayev, J., Haciyeva, A. & Mammadova, A. (2022). Tomato powdery mildew *Oidium Licopersicum* c.Mm in a greenhouse. *The Eurasia Proceedings of Health, Environment and Life Sciences (EPHELS), 5,* 88-92.