Resistance of the variety diversity *Gossypium hirsutum* L. species to Verticillium wilt

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Abstract: *According to researchers' date, the word practices in the field of plant protection have shown that disease resistant plant varieties have been susceptible to disease due to patency elasticity over time. Therefore, it is important to choose new varieties of agricultural crops with high quality indices. Including identifying and selecting one of the most dangerous pathogens Verticillium dahliae* Kleb *in selecting new varieties of breastfeeding. In this article emphasizes that fast-track thin-layer chromatography Silufold-UV-254 of resistant pathogens belonging to diploid and tetraploid species of gene pool is one of the most radical methods in agriculture.*

Key Words: *Gossypium hirsutum, Verticillium dahliae, thin-layer chromatography, phytoalexins, of isohemigossypol (IHG) and gossypol equivalents (GE).*

1. INTRODUCTION:

Releasing and introduction of the resistant varieties into agricultural production to various pathogens of the plant diseases is one of the radical methods of combating in agriculture with different pathogens. World practice in the field of plant protection shows that previously plant resistant varieties will eventually become susceptible due to the large adaptive capacity of the pathogens. Therefore, continuous breeding is required to update commercial varieties, cultivated crops and increase their resistance to the most dangerous pathogens, including *Verticillium dahliae* Kleb. Studies have been carried out to study the genetic-molecular basis of resistance to wilt and the mechanism of induction of the phytoalexins in cotton plant [1, 2, 3]. Van der Planck called plant-pathogen-environmental interaction "disease triangle" [10]. Each component of this system in one way or another affects the result of their interaction - is the plant genotype capable in certain conditions to counteract of the pathogen genotype. Affections of cotton plant by the wilt breaks physiological-biochemical processes. However, the mechanism leading to the appearance of pathological changes remains insufficiently studied, therefore, the causes of wilting and death of diseased plants have not yet been fully revealed [8]. The disease resistance of plants is a genetically determined physiological and biochemical trait. Its manifestation depends on the biological state of the host plant, the aggressiveness of the pathogen, on the complex of internal and external environmental factors, among which an important role belongs to the infectious pressure of the causative agent of the disease. Increasing in the amount of *V.dahliae* fungus infection in the soil can contribute to decrease cotton resistance. The solution of this question is important both for the development of genetic breeding studies on the development of new wilt-resistant varieties, and for the development of measures to increase and prolong the keeping of the cotton resistance [5]. Physiological and biochemical studying of the germplasm representatives makes it possible to select out donor lines for applied cotton breeding with certain economic and useful traits, including resistant to various diseases [9].

2. MATERIALS AND METHODS:

In the research work was used cotton hypocotyls. The seedlings were grown at the thermostat in +24°C. The inoculum was released from the syringe as a drop of suspension at the end of the needle. The needle was inserted into the stem at an angle of 45°C. The drop was absorbed into the stem, and this gave a visible confirmation of the inoculation. Control over the germination of conidia on the tissues of the infected plant was carried out by the method of fluorescent diagnostics [7]. The qualitative composition of phytoalexins (FA) was determined by thin-layer chromatography on Silufol-UV-254 plates, and the number of isohemigossypol (IHG) and gossypol equivalents (GE) by [4, 6]. More than 150 samples of the cotton germplasm collection of the Institute of Genetics and Experimental Plant Biology (Tashkent region, Uzbekistan) were used in the investigations.

3. RESULTS AND DISCUSSION:

The damage degree of the cotton plant by Verticillium wilt was studied according to the usual method (control and experiment). It is known that the long duration of the incubation period to a certain extent reflects the resistance of the plant to the pathogen, the accumulation of which is slower.

In experimental plants, after infection, there is a rupture of the fluorescence zone, which indicates the cessation of propagation of the pathogen along the tissues of the plant. The accumulation of phytoalexins in control plants passes significantly more slowly, whereas in experimental plants 24,4 μg/g of crude tissue of IHG are found in the zone of xylem vessels 24 days later, which is much more than the pathogenic concentrations of the inhibitor for the pathogen. When cultivating cotton, there are significant differences in the functioning of the plant protective system in the case of artificial infection of plants with a pathogen (table). Proceeding from the foregoing, we performed immunological studies on the characterization of the resistance degree of different cotton germplasm lines and samples to *V.dahliae* Kleb. The obtained data showed that the following samples from Uzbekistan differed in the degree of resistance to wilt: A-1423 susceptible, sample A-1428 moderate susceptible, sample A-1431 moderate resistant, and sample A-1530 proved to be resistant. As can be seen from the data presented in the table, plants grown under identical conditions are characterized by a different response (by accumulation of IHG and GE) for infection of the pathogens. The minimal accumulation of phytoalexins was observed in susceptible plants (A-1423), and the maximum accumulation of phytoalexins was observed in samples A-1431 and A-1530 from Uzbekistan. The content of IHG and GE in the control and experimental variants of samples A-1423 and A-1428 decreased.

Table

The content of IHG in the GE cotton tissues in the dynamics of the incubation period

№	Experimental variants	Content of IHG and GE mg/g rude tissue	
		Isohemigossypol	Gossypol -equivalent
1	A-1423(UzSSR)-Control A-1423- *V.d.*–Experiment	- -	- -
2	A-1428(UzSSR)-Control A-1428- *V.d.*–Experiment	- 8,2	- 2,1
3	A-1431(ЎзССР)-Control A-1431- *V.d.*–Experiment	- 19.2	- 15,3
4	A-1530(UzSSR)-Control A-1530- *V.d.*–Experiment	- 29,4	- 24,0

According to the nature of the luminescence of the stem in UV rays after 2 days, in all variants, different degrees of symptoms of the wilt disease were revealed. The greatest manifestation of these symptoms was observed in the 4 version of the A-1530 Uzbek breeding. This fastens that resistance is largely determined by the rate of accumulation of FA, which prevents the progress of pathogen in the tissues of the plant.

As noted above, the creation of optimal conditions has beneficial effect on the course of many physiological processes, including protective mechanisms, which is manifested in the rate of accumulation of pathogen inhibitors (Figure).

In plant tissues, grown according to the conventional technology, its quantity is much less.

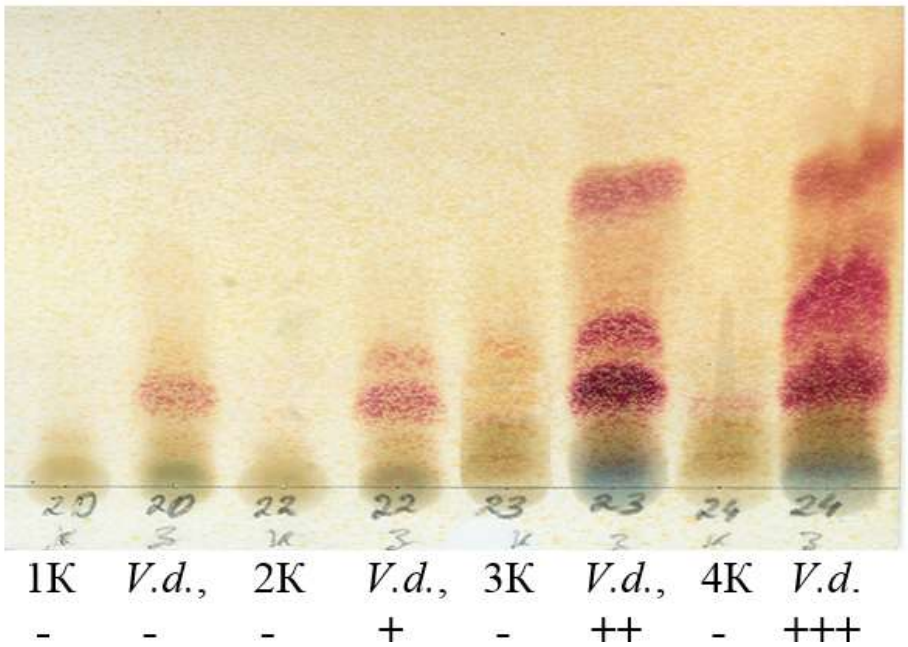

Figure. Thin layer chromatography on SilyfolUV-254 plates. Developed by fluroglucin.

4. CONCLUSION:

1. Thus, it can be concluded that environmental conditions play an important role in the manifestation of plant immunity, as well as the pathogenicity of the parasite.

2. Creation of favorable conditions for growth: in this case sowing along the bads (improving the agrophysical properties of the soil, temperature and water regime) and combining the crops of cotton with legumes (enrichment of the soil with useful microflora) contribute to more complete realization of the potential possibilities of the immune system of the plant.

REFERENCES:

1. Agaev G.M., Avazkhodjaev M.Kh., Usmanov R.M., Kurbanbaev I.D. Use of eliciter and suppressor pathogens to determine resistance to cotton diseases. Materials of the International conference devoted to the 80th anniversary of Academician A.A. Abdullaev, August 5-6, 2010 in Tashkent, Uzbekistan.C.51-53.
2. Agayev G.M., Hatamov M., Kurbanbaev I.D., Rizaeva S.M., Usmanov R.M. Use of cotton germplasm to assess the expression of wilt disease. Materials of the International conference devoted to the 80th anniversary of Academician A.A.Abdullaev, August 5-6, 2010 in Tashkent, Uzbekistan. P. 230-232;
3. Akhunov A.A., Golubenko Z., Beresneva Yu.V., Ibragimov F.A., Abdurashidova N.A., Mustakimova E.S, Bokov A.F., Stypanovych R. The role of acid isoformoperoxidase in the infection of the phytopathogen in plants of the family *Malvaceae*. Materials of the conference of young scientists dedicated to the memory of Acad. S.Yu.Yunusov. 2005, P.124.
4. Avazkhodjaev M.N., Zeltser S.S. Phytoalexins as a Factor in the Wilt Resistance of Cotton // Handbook of Phytoalexin Metabolism and Action - edited by M.Daniel R.P. Purkayastha. Marcel Dekker. New York, 1995. P.129-160.
5. Avazkhodzhaev M.Kh., Abdukarimov V.Kh., Seltzer S.Sh. Influence of the infectious load of the fungus *Verticillium dahliae* on the physiological processes of cotton. The influence of internal and external factors on the physiological and biochemical processes of cotton. UzSSR "FAN", 1981. P.45-57.
6. Dzhumaniyozov I. Peculiarities of phytoalexin formation and ways of its intensification in cotton tissues when afflicted with a verticillium wilt: Dissertation Abstract of Candidate of Biological Sciences. Tashkent, 1985. -20 p.
7. Guseva N.N., Lanetsky V.P. Speed of promotion fluorescing front as an indicator of wilt resistance // Cotton. 1966. P. 10-12.
8. Imamaliev A.I., Avazkhodjaev M.Kh., El-Samra I.A. Free amino acids in cotton during the incubation period of Fusarium wilt. Agricultural Biology, №4. Moscow, 1972. P.594-597.
9. Kurbanbaev I.Z., Agayev G.M., Khotamov M., Kamilova E.V, Yunuskhanov Sh. Characteristics of some cotton germplasm samples for resistance to wilt disease. The Uzbek Journal of Biology, №2, 2011. P.49-51.
10. Van der Plank J.E. Diseases of plants: epidemics and control. Moscow: Kolos, 1966. -359 p.