RESISTANCE OF COTTON HYBRIDS WITH DIFFERENT GENOTYPIC TRAITS TO CERTAIN FUNGAL PATHOGENIC MICROMYCETES

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Abstract:

The article describes the Fusarium oxysporum f of F_4 hybrids created with the participation of medium-fiber fiber varieties with different genotypes.sp.vasinfectum, Fusarium Salani, Verticollium dahlia Gleb. the results of studies on the damage of fungi by pathogenic micromycetes were analyzed. Topcross was created by hybridization F_4Andijon-36 x Andijon-37, F_4Andijon-36 x Namangan-77, F_4Andijon-36 x Bukhara-102, F_4Sulton x Andijon-37, F_4sulton x Namangan-34 of the combinations Verticullium dahlia Gleb. it was determined that the tolerance to the pathogen is 95%, and it was concluded that the wilt-resistant cotton varieties can be used as an initial material in selection.

Key words: Cotton, variety, hybrid, topcross, combination, genotype, pathogen, micromycete, mycotoxin, Fusarium oxysporum f.sp.vasinfectum, Fusarium Solani, Verticullium dahlia Kleb.

Introduction. It is known that today in cotton growing, which is one of the main branches of Agriculture in the world, there is a cotton (Gossypium L.) particular attention is paid to the creation of varieties of the crop that are genetically resistant to various stress factors, diseases and pests. That is, on the basis of the use of primary sources of agricultural crops with different genotypes, special attention

is paid to the creation of genetic materials with a positive complex of valuable economic signs, high fiber quality and disease-resistant.

In recent years, there has been significant economic damage to agriculture as a result of the damage of some varieties of medium-fiber cotton in production with fungi belonging to the genus Fusarium, the expansion of the distribution area of this disease, as well as the damage of plants belonging to different species. This situation is observed on farms in Jondor, Romiton, Karakul, Shafirkon, Olot districts of Bukhara region. As a result, it was observed that in some years, 65-75 thousand cotton of sprouts were preserved instead of 100-110 thousand seedlings on an area of 1 hectar as a result of drying out due to fuzariosis wilt disease during the period when 25 - 35% of cotton sprouts in the fields were 3-4 and 5-6 real leaves.

List of literature. Representatives of fungi belonging to the genus *Fusarium* infect more than 400 species of plants, and in our Republic-about 100 agricultural plants and weeds. According to Leslie and Summarell classification, fungi belonging to 70 species belong to the genus *Fusarium*, while the presence of 17 species and 10 species of the species specified in the conditions of the Republic of Uzbekistan was determined [5].

Fusarium wilt, are infecting cotton in Bukhara and Surkhandarya regions and wheat in Kashkadarya region, proving that new races are emerging among representatives of this group. In areals that are small, medium, or large in size in soils where populations of these new forms are found, there is an infestation of fiber and wheat [6].

Fungi belonging to the genus *Fusarium* are common in the soil, in addition to species belonging to the genus *Gossypium and Triticum*, causing the origin of wilt diseases such as Brassica, Raphanus, Matthiola [2; 4; 6] and in dozens of other higher plants.

However, some species of these fungi do not manifest pathogenicity, or are specialized disease-causing forms only in certain plant species, which can cause disease in certain crops or in certain varieties of them.

For example, *Fusarium axysparum f.sp. vasinfectum* is a common cotton-damaging species native to the American and Asian regions, which infest certain varieties of cotton [5]. This specialized form of the fungus has a genetic diversity, which has a number of physiological races [5; 6].

In the US, too, in the fiber crop, mainly *Fusarium oxysporum f. sp. vasinfectum* (FOV) is a fungal pathogen that is rapidly transmitted through the soil as well as the seed. Among the eight pathogenic races declared worldwide (Hillock, 1992) 1, 2, 3, 4 and several new genotypes have been identified in 8 races and US cotton [9; 11].

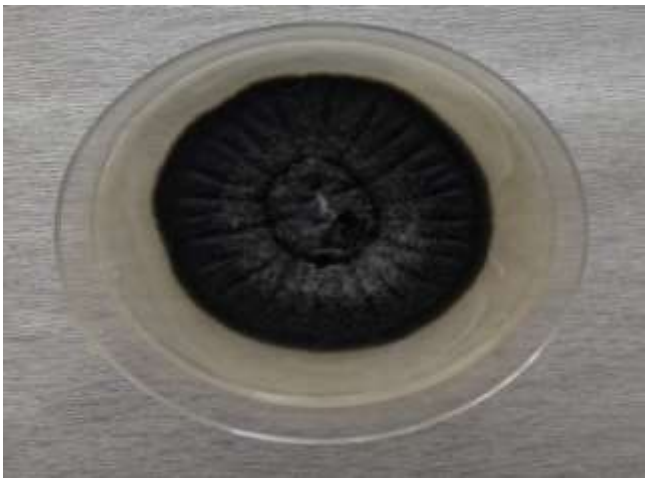
Mycotoxins are considered secondary metabolites produced by pathogenic fungi, and some species of the *Fusarium* genus synthesize potent mycotoxins [8].

Therefore, they are divided into different and toxico-biologically different groups. *Fusarium poae forms toxins HN-2, Fusarium sporotrichioides* T-2, *Fusarium graminearum* deoxinivalenol (fiber), vomitoxin, zearalenone, *Fusarium tricinctum* trichotetsen. Scientists have shown in their further data that fungi belonging to the genus Fusarium, in the process of living life in the soil, form substances such as Fusarium acid, lycomarasmine, coulmomarasmine, diacetoxystsirpintol, stsirpentiol, ennitianin, fuzarin, fuzarubin, yavanicin, martitsin and isomartitsin, which cause the origin of the soil's toxicity property and play a key role in plant pathogenesis [7].

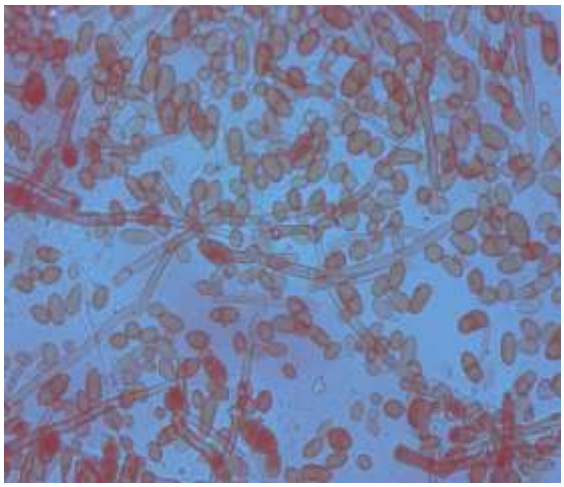
In recent years, scientists of the Republic have been conducting a number of scientific researches on the creation of selection materials resistant to fungal potogenous microorganisms. In particular, mycotoxins from aggressive strains of fungi that cause fusariosis and verticillosis wilt diseases are isolated in the cotton, which is kept in the “Colllexia of a unique scientific object of phytopathogenic microorganisms”of the UzR Institute of genetics and Experimental Biology of plants, and scientific research in the creation of selective objects that are resistant to wiltt disease by damaging (inoculation) in artificial environments of

As the object of the study, it was included in the “State Register of agricultural crops recommended for planting in the territory of the Uzbek Respusblika” at different times from hybrid combinations created by crossing varieties Andijan-36, Andijan-37, Sultan, Jarqo‘rg‘on, O‘zPITI-201, Namangan-34, Namangan-77, C-6524, Omad, Turon, Kelajak, Buxoro-102, C-6524, as well as the Institute of Experimental Biology of *Verticillium dahliae* Gleb from the collection “collection of phytopathogenic microorganisms – a unique scientific object”, *Fusarium oxysporum f.sp.strains of the vasinfectum* and *Fusarium solini* species were used.

Research methods. Kiray K on the identification of cotton plants affected by Fusarium disease. И др., Методы фитопатологии (1974), Литвинов М.А. Методы изучения почвенных микроскопических грибов (1969), Khasanov B.A. Фузариозный вилт хлопчатника и современные методы идентификации грибов рода Fusarium. (Identified through 2017 Styles.)



1- image**.** *Verticillium dahliae* fungus



2- image**.** *Verticillium dahliae* fungus cones (x 400 times enlarged image)

Analysis of results. In our 2022 study, we separated the leaves using the accepted method from each of the F_4 hybrid combinations planted in the experimental farm of the Research Institute of cotton selection, seed and cultivation agrotechnologies. Laboratory experiments were carried out at the Institute of genetics and Experimental Biology Of Plants of the UzR FA by inoculation of young

leaves, not infected and not overripe, of 3 pieces. To carry out this experiment, in his laboratory, initially samples of lilies were grown for 3 days at a temperature of 250 ml to 25-270 C in a tube of 500 ml of size for the preparation of biomaterial. 7 drops of the substance “Tween80” were added to the prepared biomaterial. For use in the experiment, healthy leaf samples of the cotton plant were harvested from artificial-damaged backgrounds. n laboratory conditions, the samples were washed under running water for 2 hours, then, to sterilize the samples, the leaves were first caught in 1.5% sodium hypochloride for 5-6 minutes, in the next turn they were thoroughly washed 3 times, holding for 2 minutes in sterilized water. The leaves were placed on sterile filter paper and dried. Leaf specimens were placed in this Petri dish. *F.axysparum f.sp. vasinfectum* and *Verticillium* were dripped from the liquid - state biomaterial of the dahliae fungus into leaf samples of the 1st and 2nd experimental repeat. Also an inoculant was instilled into the leaf samples of the 3rd experimental repeat, but the substance “Tween80” was not used in this. The next leaves were placed on the Perti saucer, dressing in a damp chamber. The lid of the Petri dish was closed and hermetically wrapped with a paraphilm. Then the sunium was grown in a climate chamber with a temperature of 25-26 ^{0}C in conditions of Light-Darkness 16 hours/8 hours.

Strong resistant-0-30% undamaged

Resistant-31-50% weakly damaged

Medium resistant-51-70% medium damaged

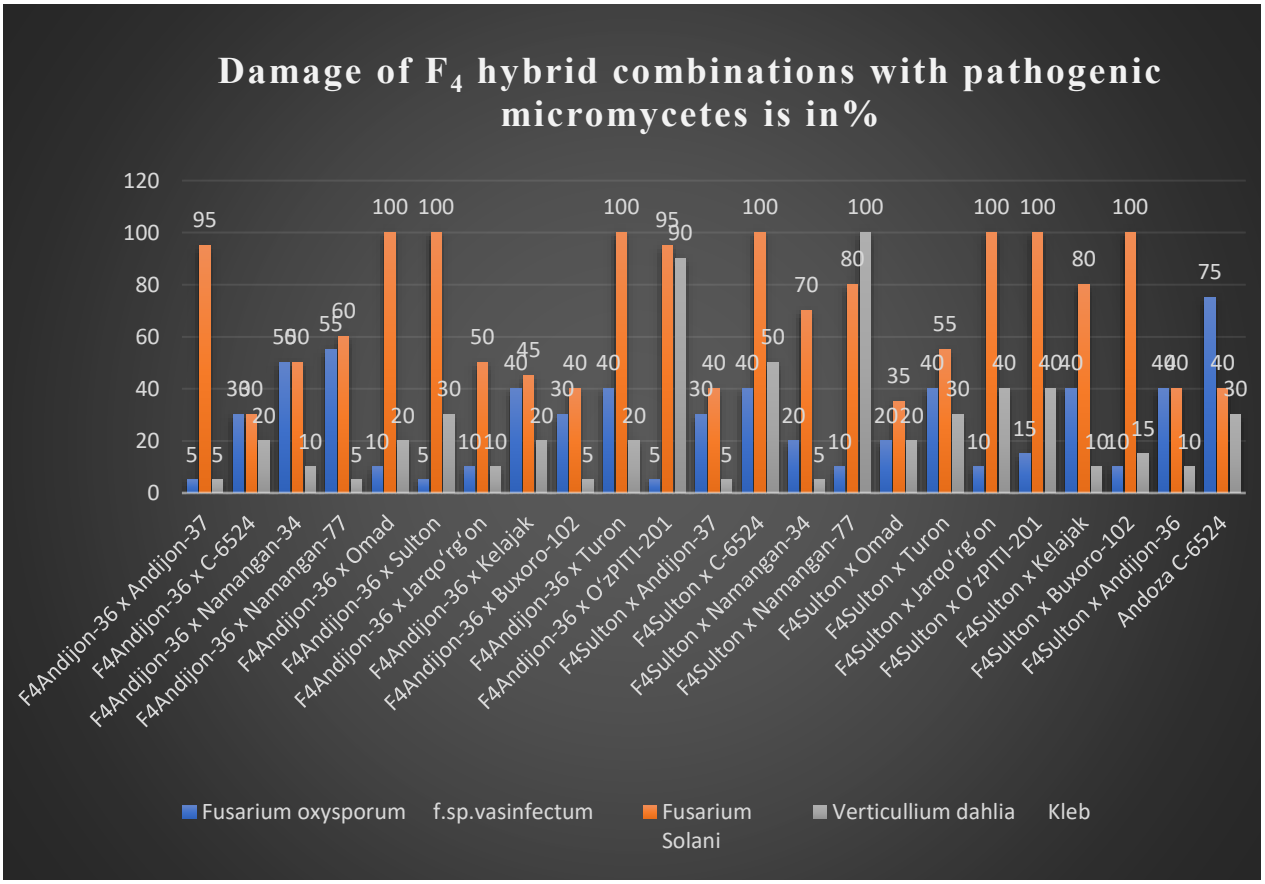
Strong resistant-71-100% strongly damaged

Changes in leaf samples, in which experimental objects were calculated, began to be observed after 1 day, and further observation work was carried out daily. Withered leaves were moistened with sterilized water. After the experiment was carried out for 12 days, the affected leaves were clearly separated.

Depending on the degree of morbidity of the plants studied, it was divided into the following groups: according to *Fusarium oxysporum f.sp.vasinfectum* potogen showing 10-30% damage to fungi disease F_4Andijan-36 x Andijan-37,

F_4Adijan-36 x C-6524, F_4Andijan-36 x Omad, F_4Andijan-36 x Sultan, F_4Andijan-36 x Jarqo‘rg‘on, F_4Andijan-36 x Buxoro-102, F_4Andijan-36 x O‘zPITI-201, F_4Sulton x Andijan-37 while F_4Sulton x Namangan-34, F_4Sulton x Namangan-77, F_4Sulton x Omad, F_4Sulton x Namangan-77, F_4Sulton x Omad, F_4Sulton x Jarqo‘rg‘on, F_4Sulton x O‘zPITI -201, F_4Sulton x Buxoro-102 hybrids showed strong endurance while the remaining hybrids suffered damage from 31.0% to 50.0% *Fusarium oxysporum f.sp.vasinfectum* potogen showed low resistance to fungal disease, while the template C-6524 variety showed strong damage, showing 71-100% damage. (Image-3).

Image-3



The template C-6524 variety for fungal disease *Fusarium solani* showed weak damage, when we observed our hybrids, the following hybrids were damaged by 0.0-30.0%, and the F_4Andijon-36 x C-6524 hybrid showed strong endurance. Some more hybrids, including F_4Andijon-36 x Jarqo‘rg‘on, F_4Andijon-36 x Kelajak,

F_4Andijon-36 x Buxoro-102, F_4Andijon-36 x Namangan-34, F_4Sulton x Andijan-37, F_4Sulton x Omad, and F_4Sulton x Andijan-36 hybrids showed less durability, with damage from 31.0% to 50.0%. Another group of hybrids, F_4Sulton x Turon, F_4Sulton x Namangan-34 and F_4Andijon-36 x Namangan-77 hybrids showed average durability with damage of up to 51.0-70.0% while the remaining hybrids with damage of up to 71.0-100% can see that *Fusarium solani* is resistant to fungal disease.

Verticullium dahlia Kleb according to the results of the study on tolerance to fungal disease, the template C-6524 variety and F_4Andijan-36 x Andijan-37, F_4Andijan-36 x Namangan-77, F_4Andijan-36 x Buxoro-102, F_4Sulton x Andijan-37, F_4Sulton x Namangan-34 hybrids were distinguished from other hybrids by the fact that they were not damaged at all. In addition, F_4Sulton x Kelajak, F_4Sulton x Buxoro-102, F_4Sulton x Andijan-36, F_4Sulton x Omad, F_4Sulton x Turon, F_4Andijan-36 x Turon, F_4Andijan-36 x Kelajak, F_4Andijan-36 x Omad, F_4Andijan-36 x Sultan, F_4Andijan-36 x Jarqo‘rg‘on, F_4Andijan-36 x C-6524 and F_4Andijan-36 x the Namangan-34 hybrids showed strong endurance with a incidence of 0.0-30.0%. F_4Sulton x C-6524 and F_4Sulton x jargon, F_4Sulton x O‘zPITI-201 hybrids showed low durability with damage of up to 31.0-50.0%. The remaining hybrids are F_4Sulton x Namangan-77 (100% damage) and F_4Andijan-36 x O‘zPITI-201 (90% damage) *Verticullium dahlia* Gleb. the fact that it is resistant to fungal disease was reflected in the results of the study. In a summary way, it is worth noting that the following of our hybrids, *Fusarium oxysporum* f, originating through this topcross method.sp.vasinfectum potogen to the disease of fungi F_4Andijan-36 x Andijan-37, F_4Andijan-36 x Sultan, F_4Andijan-36 x O‘zPITI-201 hybrids, *Verticullium dahlia* to the disease of the fungus F_4Andijan-36 x Andijan-37, F_4Andijan-36 x Namangan-77, F_4Andijan-36 x Buxoro-102, F_4Sulton x Andijan-37, F_4Sulton x Namangan-34 hybrids showed tolerance of 95%. Our combinations embody the potential for resistance to the effects of the above agricultural diseases in their karyoplasm, adding a tremendous bias in increasing the effectiveness of selection as a donor

(source) of useful signs in genetic-selective research on the creation of new varieties and improvement of economic signs of existing varieties.

List of used literature

1. Low A. Cotton cultivars in Australia. // Cotton Growing Review 1974. 51. P. 26-34.

2. Бабушкина И.Н. Почвенные микроскопические грибы хлопчатника (*G.hirsutum* L) сорта 108-Ф, здорового и пораженного вертицилезным вилтом // Микология и фитопатология. 1973. Т. 8. Вып. 7. - С. 525-528.

3. Шералиев А., Азимджанов И., Стрежевская А. Ксиланазные свойства разных видов *Fusarium Lk.et Fr*, поражающих шелковицу в Узбекистане // еколого-флористическое изучение водорослей и грибов в Средней Азии. Ташкент: Фан. 1978. - С.149- 153.

4. Brown N.A., Urban M., Meene A.M., Hammond-Kosack K.E., The infection biology of *Fusarium graminearum*: defining the pathways of spikelet to spikelet colonisation in wheat ears // Fungal biology. – 2010. - №114. – R. 555.

5. Khasanov B.A. *Fusarium* wilt of cotton: can *Fusarium moniliforme* Sheldon be a cause. // Turkish Soil-Water Journal, 2013, vol. 2, No. 2 (2), - P. 2299-2306.

6. Von Bargen KW, Lohrey L, Cramer B, Humpf HU. Analysis of the *Fusarium mycotoxin* moniliformin in cereal samples using 13C2-moniliformin and high-resolution mass spectrometry. // J Agric Food Chem. 2012 Apr 2012 Mar 28.

7. Sherimbetov A. G. Fusarium link. identification of species of the genus using morphological-cultural and molecular-genetic methods reports of the UZR FA. - Tashkent, 2019. – №1. P-72-79.

8. Sherimbetov A. G., Namazov Sh. E., Ruzmetav D. Fusarium oxysporum f to pathogenic micromycetes of New simple and complex hybrid combinations.sp.determination of endurance by vasinfectum inoculation method Bulletin of the agrarian science of Uzbekistan. Tashkent, 2020 №4 (82). B-102-107.

9. USDA Economic Research Service (2022). Available online at: https://www.ers.usda.gov/topics/crops/cotton-wool/cotton-sector-at-a-glance

10. Hillock R. J..(1992). “Fusarium wilt,” in *Cotton Diseases*, ed R. J.Hillocks (Wallingford: CAB International ;), 127–160.

11. Davis R. M., Colyer P. D., Rothrock C. S., Kochman J. K. (2006). Fusarium wilt of cotton: population diversity and implications for management. *Plant Dis.* 90, 692–703. 10.1094 / PD-90-0692