

Resistance of New Hybrids of Cotton to Some Biotic Factors and the Results of Sorting Experiments

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Abstract. Based on the results of long-term experiments of the authors of the article, the tolerance of ridges formed as a result of simple and complex hybridization to fork diseases in an artificially infected environment with the bacterium *Xanthomonas malvacearum*, to homosis in a naturally infected environment with the fungus *Verticillium dahliae* Cleb was analyzed. It was found that Gommosis affects 12.5 percent, up to 21.9 percent, with a spring form, and 9.1 percent, up to 16.4 percent with an autumn form. It was noted that complex cotton hybrids with medium fiber F8 were infected with the spring form of gommosis from 7.9 percent to 14.7 percent and the autumn form from 18.7 percent. The S-6524 variety, taken as a template, was affected by the spring form of gommosa disease 15.2 percent and the autumn form 13.4 percent. The new ridge created as a result of research is 2.7 centners higher for the first crop than the template variety, 0.6 centners less for the second, and 2.1 centners higher for the total yield. During the growing season, the shoots open 3 days earlier than in the template variety. In terms of defects, the new T-300 comb weighed 5.8 grams, while the C-6524 sample weighed 5.3 grams. At the same time, it was found that the weight of the pieces exceeds 0.5 grams, and the fiber yield indicators exceed the reference ones by 5.6 percent. The fiber yield was 14.5 c/ha on the new T-300 ridge, which is 0.3 c/ha higher than that of the template variety. Thus, the new T-300 ridge, resistant to some biotic factors, surpassed the template variety in most features, demonstrating. Keywords: cotton, hybrid, ridge, yield, cocoon weight, yield, fiber yield, fiber yield, bacterium, fungus, fiber yield, 1000 seed weight, varietal test seedling.

1 Introduction

It is known that cotton is grown annually on a total area of 30 million hectares. The value of a selective cotton variety is determined by its quality and fiber yield. The continuous development of agriculture and technologies increases the demand for new varieties of agricultural crops [1-2]. For example, the new variety has high yield, good fiber quality and

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fast ripening, as well as being demanding of mineral fertilizers, suitable for mechanization and harvesting, and resistant to adverse environmental factors, including widespread diseases, pests, and many other features. should be distinguished. Such genetically complex quantitative traits are difficult to achieve in one place with different hybridization and selection techniques.

In addition to these methods, it is necessary to apply new digital technologies [3-10] and form a positive legal basis for their implementation [11-16].

To overcome this problem, extensive involvement in the selection process is necessary, that is, the best individual selections picked in the field are infected with the fungus *Verticillium dahliae* Kleb and *Xanthomonas malvacearum* bacteria, and it is possible to select complex resistant forms of cotton. It is important to increase the resistance of cotton varieties to wilt and gommosis diseases with the help of initial materials obtained as a result of simple and complex hybridization of cotton. Therefore, in the course of experiments, it is desirable to create varieties and initial materials resistant to these diseases as a result of natural infection with wilt fungi and artificial infection with gommosis bacteria.

According to D. Verderevsky [1938], Bird et al. [1981], gommoz is found in all cotton-growing countries of the world, but its distribution is different, with average annual occurrences in India, China, Korea, Guatemala, Sudan, Nigeria, Bulgaria, Yugoslavia, and the United States. Common in states with 250-700 mm or more rainfall. It is very rare in countries like Turkey, Egypt and Congo. According to M.A. Karimov, gommosis can be called bacteriosis because it is a bacterial disease. Cotton is infected at all stages of its development, from emergence (seed coat leaves) to the end of the growing season (the period of boll formation and fiber formation) [18].

In the studies of D.Verderevsky [19], M.Karimov [20] and U.Rasulov [21], the bacterium causing gommosis is specialized and infects *Gossypium* species and *Eriodendron anfractuosum*, a silk tree growing in tropical climates. 5 cultivated and 6 wild species of cotton are susceptible to the disease to varying degrees. Among the cultivated species, cotton (*Gossypium barbadense*) is the most affected, while woody and herbaceous species (*G. arboretum*, *G. barbaceum*) are less affected. It was noted that medium fiber cotton (*G. hirsutum*) is located between the above 2 groups in terms of morbidity.

In the experiments of I.Islomov [22], it is noted that measures to combat cotton wilt disease and eliminate it, to completely eliminate wilt disease, to plant rice a few years ago, level the edges of the field before finishing irrigation, and increase the last filling with water. necessary. In addition, he emphasized that it is necessary to sprinkle hot (boiling) water at 90-1000C after finishing cultivation and other tractor trailers, and together with experts, it is necessary to mark on the card how much the soil has been damaged by wilting fungi.

According to A. Marupov [23], cultivation of the same type of cotton without rotation caused wilting of the plant every year from 5.1 to 6.6 percent during the picking period, and from 38.3 to 41.1 percent during the ripening period. P.V. Popov [24] investigated the dependence of resistance to wilt and early ripening in the family of F3 hybrids, infected with the 1st and 2nd races of the wilt, in the environments not affected by the wilt, which did not affect the growing season. The data of the experiments carried out by them in the environment infected with race 1 show that there is a relationship between wilt resistance and quick ripening in the hybrids with Tashkent-1, L-4736 varieties with the R-gene in the genotype. Among the F3 families, the relationships between the length of the growing season and resistance to wilt, as well as the possibility of achieving a high level of resistance to wilt, a high level of rapidity, were noted.

According to U. Rasulov [21], gommoz is distributed in all regions of Central Asia and Azerbaijan. In Uzbekistan, the disease usually occurs in 2-2.5% of the total cotton area each season, but in some years (for example, 1998) the disease affected 5-6% of the cultivated

area. Based on the analysis of the spread of the disease in 1995-1999, the regions of Uzbekistan can be divided into the following 3 approximate regions.

1. The region where gommoz is likely to spread every year. Andijan, Namangan, Fergana and Tashkent regions.

2. A region with moderate prevalence of gommosis. Republic of Karakalpakstan, Samarkand, Kashkadarya, Surkhandarya regions.

3. A region where gommoz is rare or very rare. Bukhara, Navoi, Jizzakh, Syrdarya and Khorezm regions.

A lot of research is also being carried out on geographically distant hybridization to create cotton disease-resistant starters. S. Egamberdieva and T. Seytnazarova conducted studies on wilt disease tolerance of geographically distant hybrids of cotton. Namangan-77 and S-6524 varieties were studied as model varieties. According to the experimental observations, the general level of damage was from 0% to 55.2%, and the severe level of damage was from 0% to 22.6% in distant geographical G'3 hybrids. Sample Namangan-77 had 68.9% damage, severe damage 42.6% and S-6524 variety 62.4% damage, severe damage 29.1%. In G'3 hybrids, some combinations are highly resistant to wilt disease (not affected at all) and have been recommended as donors in the development of cultivars resistant to this disease [25].

Bird et al. [26] identified 18 physiological races of bacteria using differential strains. It has been studied that when cotton varieties with only one resistance gene are planted in the regions where gommosis develops strongly, races of the pathogen that damage those varieties soon appear, and the bacterial strains distributed in some regions are very variable in terms of virulence, and therefore it is very difficult to identify their race.

Australia takes one of the leading places in terms of fiber productivity of cotton. D. J. Luckett [27] conducted several years of research on medium fiber cotton varieties in Australia. Based on the results of research, some genotypes were recommended as donors. For example, the variety Akala C-1 increased the weight of one pod, the fiber length of the Coker 315 variety meets the requirements of the world standard, the variety McNain 220 has a high fiber yield, and the varieties Reva p-279 and Sikora have the characteristics of tolerance to certain diseases, especially gommosis bacteria. they cited that it is high.

P.C. Fahy, C. Paulline [28] studied 18 races of cotton disease *Xanthomonas campestris* pv *malvacearum* and identified resistant and resistant varieties. It turned out that races 7-10 cause the most damage. Every year, high damage of varieties by various races causes great damage to productivity. Of the studied varieties, only 101-102 V was found to be resistant to many races, and this variety was recommended for use in breeding programs.

The causative agent of cotton verticilliosis is a fungus of the genus *Verticillium*. *Verticillium* wilt was first isolated from diseased potato plants by Reinke L and Berthold T [29] in Germany and was described by them as *Verticillium albo-atrum* Reinke et Berthold.

In this case, the causative agent of the disease, according to him, is another type of fungus, *Verticillium dahliae* Kleb. In addition, sometimes in cotton *V. nigrescens* Pethybr. and *V.fumosum* Seman is shown. Each type of fungus has its own color and type of mycelium, spore-forming properties and pathogenicity.

2 Materials and methods

In the research, the resistance of the lines created by simple and complex hybridization to gommosis in an environment artificially infected with the bacterium *Xanthomonas malvacearum* and to wilt diseases in an environment naturally infected with the bacterium *Verticillium dahliae* Kleb was studied. A specially prepared bacterium was used to evaluate the resistance to Gommoz disease. The bacteria were grown on a specially prepared potato glucose agar medium and used to infect the seed. In the researches, damage to seeds was

carried out according to the method published in the scientific literature in the analysis of Yu.N. Fadeeva (1979).

3 Results and discussion

In the experiments, the resistance of simple and complex hybrids to *Xanthomonas malvacearum* bacterium in artificially infected environment and *Verticillium dahliae* Kleb fungus in natural infected environment was studied. In this case, 76 to 108 plants in simple hybrids, and 112 to 148 plants in complex hybrids were studied. C₈ simple hybrids with the spring form of Gommoz disease from 12.5 G'8 (S-9085xBarhayot) to 21.9 C₈ (S-9083xAndijon-35) and with the autumn form from 9.1 C₈ (S-9085x6730) to 16.4 G'8 (S-9083xAndijon-35) damage up to percent was determined. C₈ complex hybrids of medium fiber cotton with spring form of gommoz from 7.9 C₈ [(S-9083xAndijon-35)x(S-8292xS-6771)] percent, to 14.7 C₈ [(Jarqorgonx Barhayot) x (S-9083xS-6771)] percent, autumn 18.7 percent of cases were observed with the form. The variety S-6524, taken as a model, was affected by 15.2% spring form of gommosis disease, and 13.4% by autumn form.

Common damage of C₈ simple hybrids by wilt is from 4.2 percent of C₈ (S-9085xBarhayot) to 12.6 percent of C₈ (S-8292xBarhayot), and severe damage is from 1.4 percent of C₈ (S-9085xBarhayot) to 5.6 percent, the amount of total damage in C₈ complex hybrids is from 5.3 percent, 12.5 percent, and severe damage was found to be from 1.9 percent to 5.4 percent. T9 from simple hybrids and T-50 from complex hybrids were highly resistant to wilt disease. S-6524, which was taken as a model, had 41.1 percent wilt damage and 19.6 percent severe wilt damage (Fig. 1).

As a result of the research, it was released due to the high rate of infection with gommosis and wilt diseases compared to simple and complex hybrids. In the following years, new families and lines were separated in order to create a new line and variety with complex characters, which are resistant to certain biotic factors, fast growing, productive combinations.

The new T-300 range was created as a result of complex hybridization, resistant to some biotic factors, high in most valuable economic traits, and the fiber quality indicators meet world standard requirements. This row was studied in 2021 in a small variety trial nursery by comparing T-300 [T-53(JarqorgonxBarhayot)x(S-9083xS-6771)] with the new cotton row pattern S-6524 variety.

The new ridge was 2.7 centners higher than the model variety in the first harvest, 0.6 centners less in the second harvest, and 2.1 centners higher in total yield. According to the vegetation period, the pods were opened 3 days earlier than the model variety. The size of the new T-300 range was 5.8 grams, while the size of the sample S-6524 was 5.3 grams. It was found that the size of the samples was 0.5 grams higher and the fiber yield was 5.6% higher than the standard variety. The fiber yield in the new line T-300 was 14.5 t/ha, which is 0.3 t/ha higher than the model variety. Thus, the new T-300 line, which is resistant to some biotic factors, is higher than the model variety in most of the characters and showed its superiority in terms of speed (Table 1). This line was put to the test in 2022 in the institute's large variety testing nursery.

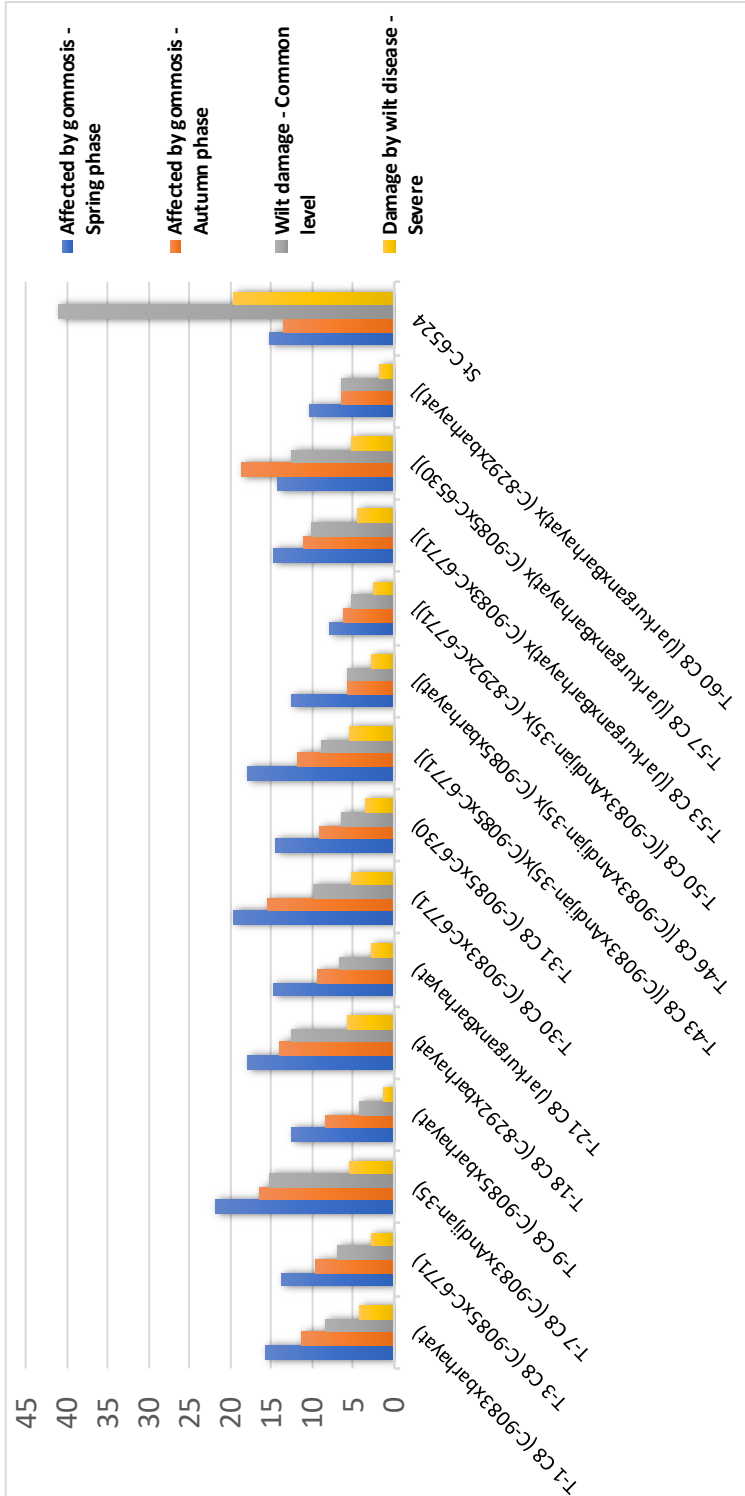


Fig. 1. Tolerance of simple and complex hybrids to certain biotic factors.

Table 1. The result of ridges in a small variety trial nursery.

Varieties and ridges	Plant height, (cm)	Harvest, first harvest, (ts/ha)	Standard- relative difference to (%)	Tezpi-shartlik, (day)	Fertility, second harvest (ts/ha)	Difference relative to standard, (%)	Total yield (ts/ha)	Stan- difference to dart, %	Bag weight, gr	Fiber output whether (%)	Fiber yield, (ts/ha)	Stan- difference to dart, (%)
C-6524 st.	114	29,4		116	8,4		37,8		5,3	37,6	14,2	
T-300 [T-53 (JarkurganxBarhayat)x (C-9083xC-6771)]	111	32,1	109,2	113	7,8	92,8	39,9	105,5	5,8	40,2	14,5	102,1
ЭКХФ (0.5)		1,3			0,8		1,2					

4 Conclusion

In the research, the ridges created as a result of simple and complex hybridization were artificially infested with gommosis bacteria, and the resistance to these diseases was studied in the environment naturally infested with wilt fungi. As a result of the researches, most of the simple and complex hybrids were 3-4 times more resistant to the disease of gommosis in the spring and autumn phases compared to the model variety, and in terms of wilt disease damage, based on several years of different selections.

Wilt damage was found to be 3-4 times more resistant in the ridges created as a result of simple and complex hybridization compared to the template variety. In the experiments, it was observed that most of the families of C₈ simple hybrids T-3 and T-31, and complex hybrids T-43 and T-46 from other hybrids and model varieties were in a positive state according to morphological characteristics.

Based on the analysis of fiber quality indicators, fast-ripening, productive, large-celled, high-yielding and fiber-quality parameters, resistant to some biotic factors, new lines and starting materials were isolated in the following years.

As a result of several years of different selections in the research, a small variety with high economic characteristics in the trial nursery T-300 [(T-53) (Jarqur'gonxBarhayot)x(S-9083xS-6771)] is superior to the new cotton ridge model S-6524 in most of the characteristics. it happened.

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