Journal of Advanced Zoology
ISSN: 0253-7214
Volume 44 Issue S-7 Year 2023 Page 895:898

Intensity, Yield, Will Resistance And Fiber Quality Are The Main Criterion Of Modern Cotton Breeding

Babaev Yashin Amanovich[1]*, Orazbaeva Gulmira Egamberganovna[1]

[1]*Research Institute of Breeding, Seed Growing and Agrotechnology of Cotton Growing, Republic of Uzbekistan*

***Corresponding Author: -** Babaev Yashin Amanovich*
Research Institute of Breeding, Seed Growing and Agrotechnology of Cotton Growing, Republic of Uzbekistan

Abstract

The article presents selection studies of cotton lines obtained by intervarietal and interline intraspecific hybridization based on geographically distant forms of cotton. In the breeding nursery, the precocity, the weight of raw cotton of one boll, the weight of 1000 pieces, was determined. seeds, yield and fiber quality, as well as wilt resistance of cotton lines obtained through various hybridization methods. The zoned cotton variety C-6524 was used as a standard.

Key words. cotton, variety, line, family, hybrid, intensity, early ripening, yield, wilt resistance, fiber quality, boll size.

Introduction

The diversity of soil and climatic conditions in Central Asia poses extremely difficult problems for cotton growing. Their peculiarity lies in the fact that in the nature of the distribution and intensity of manifestation of meteorological factors, there is significant instability from year to year and during the growing season, which is acutely felt at present due to the drying up of the Aral Sea. The soil is also characterized by great diversity and the predominance of saline and sandy, infertile lands. Therefore, these factors create certain difficulties in the cultivation of cotton.

As an analysis of the sown areas occupied by different varieties shows, in most cotton-growing farms in the region, the issue of optimizing the varietal structure, taking into account fiber quality and early ripening, has not yet been resolved. This is explained primarily by the lack of a sufficient number of varieties that satisfy agricultural production in terms of productivity, resistance to diseases and pests, characterized by high yield and quality of fiber, high oil content in seeds, adapted to intensive cultivation technology and ensuring maximum use of agroclimatic resources in each natural zone.

Success in developing varieties and the required parameters depends, first of all, on the availability of source material for breeding. The problem of source material is becoming even more important at the present stage, when intensive selection work has largely used the genetic potential of the cultivated species G. hirsutum L. and G. barbadense L. In addition, many useful genes of wild relatives of cotton have been lost in the process of long-term selection – increasing cultivation of selected varieties. (M. Pulatov, Kim R.G., [3]).

All this makes it necessary to look for new genetic forms with traits useful for breeding, such as resistance to diseases and pests, high technological properties of fiber, deciduousness, short stature, drought resistance and other economically valuable traits and properties for the creation of intensive varieties.
Academician of the Russian Academy of Agricultural Sciences V.S. Shevelukha [5] notes that "Selection and seed production provide in modern conditions at least 30-40% increase in agricultural yields." Therefore, in solving the problem of increasing the productivity of lands in cotton-growing regions, the main place belongs to the variety, as a dynamic biological system that has the ability to realize productivity potential under certain environmental conditions.
The experience of domestic and foreign selection based on interspecific hybridization shows that one of the most effective sources of new form and speciation is distant hybridization.
Many wild forms of cultivated species and wild diploid species of cotton have unique characteristics, such as immunity to diseases and pests, drought and cold resistance, deciduousness, high fiber quality (strength and fineness) and others. Therefore, the desire to transfer valuable traits of wild species to cultivated forms generates great interest in distant hybridization, as one of the most highly effective methods of creating new source material for selection and replenishment of the gene pool.
Therefore, it is necessary to introduce cotton varieties into production that have high early maturity, intensity, wilt resistance, the return of an early harvest of raw cotton, high quality fiber and seeds is a pressing issue of modern breeding.

Research methods

The experiments were carried out on a naturally infected wilt background in the experimental farm of NIISSAVH. During the cotton growing season, censuses and phenological observations were carried out. The wilt was counted according to the generally accepted method in research institutes, i.e. visually, by leaf necrosis, in a general and severe degree, every 15 days from August 1 to September 15. The general degree category includes plants that have single necrotic spots on the leaves and are completely dead, and the severe category includes plants in which 80% of the leaves or more have fallen off and are dead.
The natural infectious background was formed as a result of long-term cultivation of various varieties, forms, species and hybrid populations of cotton and the associated evolution of host and parasite plants (hybridization and mutation of the fungus).
In the fall, test samples were collected from all counting plants for laboratory determination of the weight of raw cotton per boll, yield, fiber length and quality, and other analyses. Statistical processing of morphoeconomic data was carried out by B.A. Dospehov [1].
One of the most classic methods of selecting couples is to select them according to the principle of geographic and genetic distance. In breeding work, we widely use geographically distant forms in crosses to obtain hybrids characterized by increased vitality and their adaptability to growing conditions.
The source material for breeding work was domestic varieties and lines, as well as geographically distant intraspecific and interspecific hybrids.
The object of the research was the cotton lines L-526, L-2016, L-1335, L-1435, L-1642, L-1993, L-888, L-155 and L-45/573, which were obtained through intervarietal and interline hybridization on database of geographically distant (American cultivar population 02, ruderal forms ssp. punctatum (05152) and 06422 ssp. mexicanum) forms of cotton. The zoned cotton variety C-6524 served as the standard.

Research results

Insufficient implementation of early-ripening varieties in production is the main reason that the share of the first and second industrial varieties of raw materials is still very low and amounts to no more than 50-60% of the total volume of preparations in the Republic, hence the decrease in fiber yield and oil content of seeds. It is known that during processing, the yield of fiber from cotton of the first industrial grade is 1-1.5% higher than from the second, 1.5-2% higher than from the third and 4-5% higher than from the fourth grade. Moreover, seeds obtained from processing the first two industrial varieties, as a rule, contain 1.5-4.9% more oil than low-grade ones. If we achieve an increase in the yield of fiber and oil content of cotton seeds by 1%, then on a national scale we will receive an additional 40-45 thousand tons of fiber and 20-22 thousand tons of oil annually without additional costs.
There is a close relationship between the number of leaves on plants and the length of the growing season in cotton. A positive correlation also exists between the yield of raw cotton and the number of leaves on the

plant. This allows the number of leaves to be used as an indicator of the duration of the growing season when selecting specimens for early ripening.

Early ripening characterizes the duration and pace of plant ontogenesis and is the dominant of the main economically valuable characteristics of cotton, determining the level of raw cotton yield and fiber quality, guaranteeing early harvesting before the onset of autumn rains and frosts. The most complex characteristic of cotton, determined by the number of bolls on the plant, the mass of raw cotton of one boll and the number of plants per unit area by the end of the growing season, is productivity (A.T. Sadikov [4]).

In this regard, in the breeding nursery we determined the precocity, the weight of raw cotton of one boll, the weight of 1000 pieces. seeds, yield and fiber quality, as well as wilt resistance of cotton lines obtained through various hybridization methods. The zoned cotton variety C-6524 was used as a standard (Table 1).

The length of the growing season was mainly characterized by the period from germination to ripening in average values. By early maturity all lines.

Table-1: Basic morphoeconomic indicators of the line in the breeding nursery

№	Varieties and lines	Precocity, days	Box size, g.	Weight 1000 pcs. seeds, G.	Fiber output %	Fiber quality				Wilt damage, %.	
						Mic.	Str.	Len	SCI	General degree	Strong degree
1	S-6524 (standard)	112,9	5,5	117,5	35,9	4,6	28,3	1,05	141	45	28
2	**L-526** F_9(F_1S-8284 x LS-6595) x L-030) x (F_1 Omad x LS-6595) x L-030	108,8	6,8	129,5	37,6	4,0	31,5	1,16	157	10	3
3	**L-2016** (S-8288 x L-175/245) x L-175/245	103,4	6,7	131,3	36,6	4,1	29,6	1,15	142	15	7
4	**L-1335** (S-8284 x L-44)	102,9	6,2	119,0	35,7	4,1	30,0	1,14	145	21	8
5	**L-1642** (F_1Omad x LS-6592)	105,7	6,3	123,0	36,3	4,0	30,2	1,15	149	10	3
6	**L-1435** (L-303xL-175/245)	104,8	6,6	127,1	35,4	4,4	28,6	1,16	154	10	4
7	**L-1993** (L-155 x L-5)	102,2	6,3	116,1	36,5	4,4	28,5	1,17	131	20	8
8	**L-888** [F_1S-6530xLS-6595)xL-030)x[(F_1S-8284 x LS-6593) x L-030]	107,3	6,6	126,8	36,5	4,3	29,8	1,16	156	5	1
9	**L-115** (S-8288 x L-5)	105,1	6,5	125,5	38,0	4,3	30,1	1,18	154	8	3
10	**L-45/573** (L-155 x L-175/245)	104,5	6,3	122,6	37,4	4,5	31,0	1,20	158	10	4
NSR_{05}		0,13	0,36	7,85	2,11	0,41	1,91	0,05	12,45		

showed superiority over the standard variety; between the lines it ranged from 102.2 to 108.8 days. For the standard it was 112.9 days. The highest early maturity was observed in the lines L-1993, L-1335, L-45/573 and L-115. This suggests that correct selection of initial forms and effective selection of plants based on traits makes it possible to obtain early ripening forms.

The mass of raw cotton of one boll and the mass of 1000 pcs. seeds are the main characteristics determining the yield of cotton. Breeding materials that combine these traits will have high yields of raw cotton plants.

The weight of raw cotton per boll in the lines showed a different character of manifestation of the trait, and all the studied lines were superior in this trait to the standard variety S-6524 (5.5g). A relatively high indicator was observed in the lines L-526, L-2016, L-1435 and L-888, in which the weight of raw cotton per boll was in the range of 6.6-6.8 g. For the remaining lines, the weight of raw cotton per boll boxes was in the range of 6.3-6.5 g, respectively.

In terms of the weight of 1000 seeds, the new breeding lines are superior to the standard variety S-6524, and they also differed from each other in this trait. The highest results were observed for the lines L-526, L-2016, L-1435, L-888 and L-115, in which the weight of 1000 seeds was from 125.5 to 131.3 g, and for the standard it was 117 .5 g. In other lines, this trait was between 119.0-123.0 g.

The fiber yield of the lines varies from 35.4 to 38.0%. All created lines except the L-1335 and L-1435 lines exceed the yield of S-6524 fiber by 0.4-3.1%. Lines L-526, L-115 and L-45/573 have a high fiber yield, for which it is 37.6-38.0%. For other families it varies from 35.4 to 36.6%. A relatively low fiber yield is observed in the L-1335 and L-1435 lines, for which it is 35.4-35.7%.

Modern trends in fiber quality requirements are such that the fiber must satisfy the consumer not only in terms of the main mandatory parameters used for sale, but also in terms of additional indicators obtained instrumentally using the HVI system. Based on the fact that the modern textile industry needs pure cotton fiber, Uzbekistan over the past years has been taking a number of measures aimed at reducing the degree of contamination of Uzbek cotton. Timely implementation of agrotechnical techniques reduced harvesting time,

and as a result of improved storage and processing conditions for raw cotton and a radical reconstruction of cotton gin plants, the quality of Uzbek cotton improved significantly (N.B. Egamova et al. [6]).
In this regard, we conducted a number of studies to analyze the fiber quality of the studied cotton lines. The results of analyzes of the fiber quality of the line show different differences between each other. In terms of micronaire, all lines have a high result. Especially for the lines L-526, L-2016, L-1335 and L-1435, whose micronaire indicator is 4.0-4.1. In terms of fiber quality complex, L-526, L-1642, L-1335, L-1435, L-888, L-115 and L-45/573 had high results, which are superior to the standard grade S-6524. It should be noted that the fiber quality of the listed lines fully meets the requirements of type IV.
Fork resistance. The development of methods for obtaining new starting material and the creation on this basis of donors of resistance to diseases and agricultural pests is one of the urgent tasks of modern breeding of cultivated plants.
It is known that different types, forms and varieties of cotton have different genetic nature of wilt resistance. The degree of damage to plants depends on the phase of plant development, the aggressiveness of the fungal strains, the living conditions of the host plant and the parasite, the activity of enzymes - which can vary depending on external environmental factors (light, mineral nutrition, water availability and temperature, etc.), as well as the action of the enzymatic apparatus in the processing of various substances and the synthesis of the entire complex of compounds necessary for the life of the host and parasite plants: proteins, non-clunic acids, vitamins, sugars, fats, etc. (Kim R.G. [2]).
We carried out censuses and observations of selection lines for resistance to Verticillium wilt under field conditions in the Kizil-Ravat department of the Namangan Scientific Experimental Station and in the Kashkadar Scientific Experimental Station.
When analyzing the degree of wilt damage to plants against a natural background, different genotypic resistance of the studied breeding lines is observed. Wilt disease in the line was observed in a general degree from 5% to 21%, in a severe degree from 1% to 8%. It should be noted that almost all lines showed a higher resistance result than that of the standard, the incidence of which in the standard variety S-6524 was a total of 45% and a strong 28%. High resistance to wilt was observed in the lines L-526, L-1642, L-1435, L-888, L-115 and L-45/573.
Among the studied lines, L-526, L-2016, L-1435 and L-888 showed a high result in terms of a complex of morphoeconomic traits, which have great breeding value for creating early-ripening, highly productive, wilt-resistant cotton varieties with type IV fiber quality.

Therefore, the results obtained indicate:
1. The lines L-526, L-2016, L-1435 and L- have the greatest breeding value in terms of a complex of morphoeconomic traits such as early ripening, yield, fiber yield and quality, boll size, weight of 1000 seeds, as well as resistance to wilt. 888.
2. Based on the results obtained, we recommend that selected lines be involved in the breeding process for hybridization and studying the genetic potential for wilt resistance, early ripening, yield and fiber quality, as well as the weight of raw cotton per boll.

References:

1. Dospehov B.A. Field experiment methodology. // M., Kolos, 1973. – P. 336.
2. Kim R.G. “Selection of early ripening and wilt-resistant varieties of Goss cotton. hirsutum L. with a complex of economically useful traits.” //Dissertation for the degree of Doctor of Agricultural Sciences in the specialty 01/06/05 - selection and seed production. Tashkent, 2009, p. 396.
3. Pulatov M, Kim R.G. "Genetic potential of interspecific hybrids of the genus Gossypium for the creation of highly productive cotton varieties." //Monograph. Tashkent, 2014 514 pp.
4. Sadikov A.T. “Study of the collection and selection of highly productive cotton genotypes based on the attracting ability of bolls and photosynthetic test traits for the selection of new varieties.” Abstract of the dissertation for the scientific degree of Candidate of Agricultural Sciences in the specialty 06.01.05 – Selection and seed production of agricultural plants. Russia, Krasnodar, 2021 P. 25.
5. Shevelukha V.S. “Selection and seed production at the brink of new challenges.” // “Breeding and seed production”, 1989, No. 1, p. 2-10.
6. Egamova N. B., Bondarchuk M. M. “Analysis of modern breeding varieties of cotton in the Republic of Uzbekistan.”