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THE EFFECTIVENESS OF INDUCED MUTAGENESIS IN COTTON BREEDING

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ABSTRACT
The article presents the results of induced mutagenesis in cotton breeding for a number of economically valuable traits.

KEYWORDS: cotton, radiation doses, variability, stability, productivity, fiber quality.

INTRODUCTION

Currently, early maturity is the most important sign for the northern cotton-growing countries of the world. The continuous growth of the world's population and the limited cultivated areas of irrigated agriculture require an intensive increase in the quality harvest. To solve this problem, scientists are working on creating varieties of crops that are resistant to various, extreme factors. Acting with various mutagens on zoned varieties and their intermutant hybridization, and on the basis of this, the creation of a new source material is an urgent task today [1,2].

At present, in most of the cotton-growing countries of the world, certain successes have been achieved and artificial mutagenesis is the most promising way of creating highly productive varieties of cotton, which are generally known in the scientific world [3,4]. Ionizing radiation is in the hands of scientists the finest tool that allows you to penetrate into chromosomal structures and the process of meiosis during chromosome conjugation, as a result of which 4-5% of the population are positive, and the rest in most cases is not of interest in practical selection. Therefore, breeders are faced with the task of creating early maturing and highly productive varieties and lines of cotton with high fiber quality on the basis of mutant forms.

The varieties created in our country should not only be early ripening, but also have high productivity, the quality of the fiber should meet the requirements of the world standard and be relatively resistant to major diseases and pests. To combine negatively correlated traits with high rates in one genotype, it is necessary to use not only radiation mutagenesis, but also intermutant hybridization of cotton.

MATERIALS AND METHODS

The object of the study was the mutant offspring obtained under the influence of CO60 and an electronic accelerator of medium-fiber cotton varieties S-2612, Sulton, Barkhayot, S-2615, L-20, L-707 in doses of 2, 3, 4 cr. created in the Research Institute of Breeding and Seed Production and Agricultural Technology of Cotton Growing.

The subject of the research is the analysis of the formation of early maturity, productivity, yield and quality of fiber, as well as, on their basis, the study of stabilization of the above-mentioned features in splitting generations.

Research methods. On a heavily infected wilt background, early maturity and wilt resistance were determined according to the method of D.G. Minko and P.V. Popov and P.V. Sodikov, laboratory and field conditions determined such signs as: plant height, number of sympodial and monopodial branches, number of bolls, early

maturity, productivity, fiber yield, weight of raw cotton per boll, seed weight and fiber quality. The data obtained were processed according to the "Method of field experiment" by BA Dospekhov (1985). The quality of the fiber was determined at the "Sifat" certification center and in the fiber technology laboratory of the research institute for selection, seed production and agricultural technology for growing cotton using HVI devices.

RESULTS AND DISCUSSION

The studies show the indicators of the heritability of traits in F1 - F3 hybrids. It was found that the coefficients of heritability for traits F1 - F2 turned out to be significantly lower than in hybrids of the F2 - F3 line. For example, according to the growing season in F1 - F2 hybrids, heritability ranged from 0.42 to 0.67, and in the next generation this figure rose to 0.61-0.72. And in terms of productivity, if the heritability in F2 was at the level of 0.22-0.35, then in F3 the heritability coefficient reached 0.39-0.55. According to the fiber index, which is less subject to paratypical variability, the heritability coefficient was slightly higher and the next year this indicator remained almost unchanged.

If in hybrids F1 - F2 h2 was 0.51-0.71, then in F2 - F3 it was at the level of 0.53-0.77. In terms of fiber yield, heritability was low and in F2 - F3 this figure reached 63%. In terms of fiber length, heritability in F1 - F2 was at the level of 0.38-0.51, and the next year this indicator increased by 25-30%. In all combinations, the coefficient of heritability was higher than 0.6, and this leads to a sharp increase in the efficiency of individual selection and stabilization of traits (Figures 1 and 2).

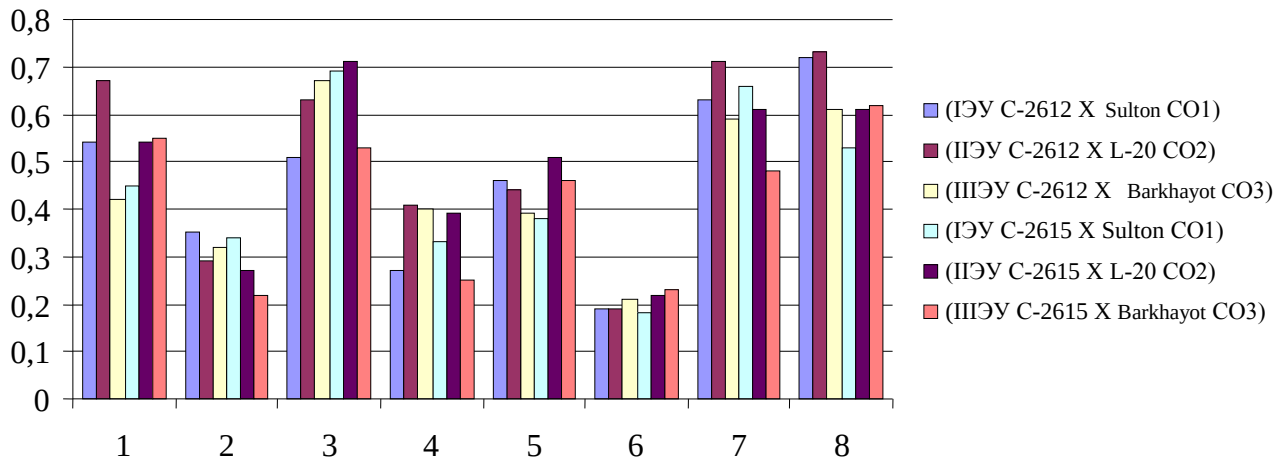

Figure 1. Heritability of economically valuable traits in hybrids F1 - F2
1-growing season, days; 2-productivity, g / plant; 3-fiber index, g; 4-fiber yield,%; 5-fiber length, mm; 6-plant height, cm; 7-weight 1000 pcs. seeds, g; 8-number of sympodial branches, pcs.

Below are the results of the covariance analysis for F2 intermutant hybridization. The phenotypic correlation of the length of the growing season with a number of economically valuable traits was determined. A weak and medium positive correlation was observed between the height of the first fruit branch and the growing season. The same picture was observed between the budding phase and the growing season, the correlation coefficient was 0.38-0.51. There is a negative relationship between productivity and early maturity, since in plants with a short growing season, the number of open bolls increases accordingly, and therefore such a negative picture should be considered a positive phenomenon.

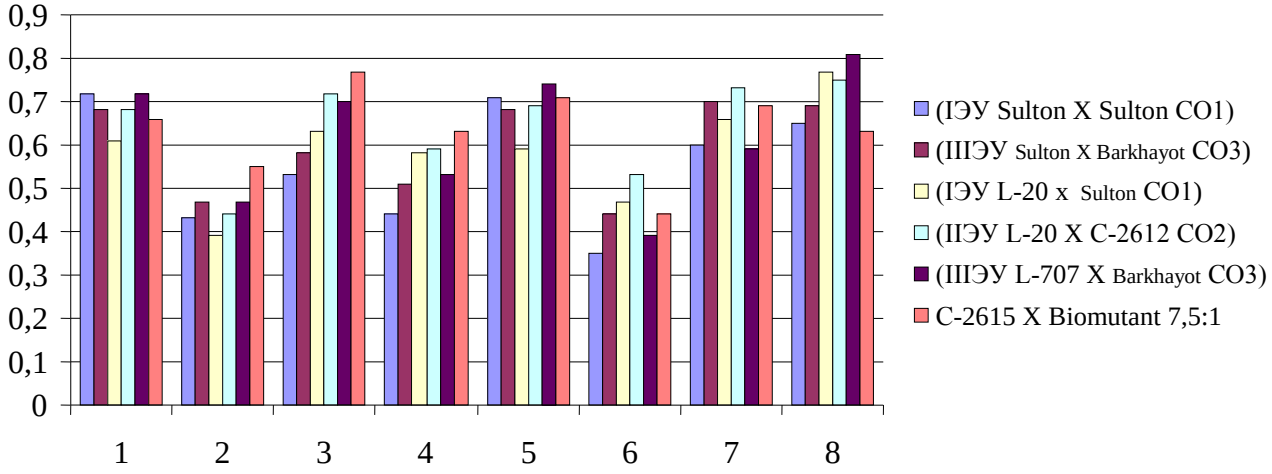

Figure 2. Heritability of economically valuable traits in hybrids F2 - F3

1-growing season, days; 2-productivity, g / plant; 3-fiber index, g; 4-fiber yield,%;
5-fiber length, mm; 6-plant height, cm; 7-weight 1000 pcs. seeds, g;
8-number of sympodial branches, pcs.

Along with this, the indicators of vilt resistance of the new breeding material are given. In the experiment, 53-64 plants were studied for each family. It was found that the total paralysis of intermutant hybrids was 13.5-28.0%. The most vilt-resistant were S-25, S-75, S-63 and S-39. The total yield of wilt in this material did not exceed 20%, and the susceptibility to a strong degree was insignificant. According to the assessment of this disease in points, wilt resistance in all families was 3 times higher than that of the standard cultivar C-6524. Here it is necessary to highlight the C-26, C-25, C-14, C-63 and C-75 (table 2).

Table 2. Vilto resistance of some new lines created as a result of research

Origin of mutant lines	Number of plants, pcs	General susceptibility to wilt		Affected by wilt in strong degrees		Wilt damage
		pieces	%	pieces	%	point
C-14 (ІЭУ C-2612 × Sulton CoI)	57	11	19,2	5	8,7	1,6
C-19 (IIЭУ C-2612 × L-20 CoII)	56	9	16,0	4	7,1	1,8
C-25 (IIIЭУ C-2612 × Barkhayot CoIII)	59	8	13,5	6	10,1	1,4
C-26 (ІЭУ C-2615 × Sulton CoI)	50	12	24,0	3	6,0	1,3
C-32 (IIЭУ C-2615 × L-20 CoII)	61	13	21,3	5	8,1	1,5
C-37 (IIIЭУ C-2615 × Barkhayot CoIII)	57	16	28,0	4	7,0	1,7
C-39 (ІЭУ Sulton × Sulton CoI)	53	11	20,7	6	11,3	2,0
C-51 (IIIЭУ Sulton × Barkhayot CoIII)	54	14	25,9	4	7,4	1,8
C-63 (ІЭУ Л-20 × Sulton CoI)	64	12	18,7	3	4,6	1,7
C-75 (III ЭУ Л-707 × Barkhayot CoIII)	55	9	16,4	3	5,5	1,9
St C-6524	54	16	29,6	7	12,9	4,2

Thus, the wilt-resistant material combined early maturation, productivity, index and fiber quality. And this selection material can be recommended for the application of cotton selection. In addition, it was revealed that:
Along the length of the growing season in F2 hybrids (M1 × M1), a wide range of variability of this trait is observed, as a result of which plants emerged with the opening of the first capsule in 104-105 days;

The earliest ripening plants were isolated when exposed to an electron accelerator, the resulting mutants ripened 13-14 days earlier than the standard cultivar C-6524;

It was found that as a result of a phased selection of families for economically valuable characteristics, 10 families were selected that exceeded the standard variety in terms of a set of characteristics, which were transferred to the leading breeders of our country for the implementation of state programs. Four of them L-19, L-25, L-32 and L-37 are recommended as donors for improving economically valuable traits.

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