PYRIMIDINE OLIGONUCLEOTIDES OF DNA FROM SHOOTS OF NORMAL COTTON PLANTS AND THOSE GROWN FROM IRRADIATED SEEDS

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At present, a considerable amount of information on changes in the nucleotide composition of the deoxyribonucleic acids after irradiation has accumulated. The change in the genetic code is determined not only by the composition of the bases but also by the sequence of the nucleotides in the DNA chain.

Isolation of the DNA from 7-day shoots of the cotton plant was carried out by a published method [1]. We used a cotton plant of the variety 108-F and its radiomutant obtained by γ-radiation with ^{60}Co (budding phase) at a dose of 2 kR, and also shoots from seeds irradiated with 25 kR. The preparations were fractionated as described by Kuzin et al. [2]. The first, low- polymeric fraction was taken for further investigations. The content of pyrimidine oligonucleotides was determined by the method described by Mazin and Vanyushin [3]. The compositions of the bases of the radiomutant and of the irradiated samples as compared with the control were as follows (GC pairs, mole-%): variety 108-F) 45.9, radiomutant) 46.9, after irradiation with 25 kR) 48.8. The separation of the nucleotides according to their degree of polymerization showed that neither the radiomutant nor the irradiated samples differed appreciably from the control. On studying the frequency of alternation of the individual pyrimidine oligonucleotides it can be seen that the deviations from the norm in the radiomutant amount to 10–15%, and after the irradiation of the seeds in individual cases reach 75–85% (table). We found no general rule whatever. However, it is known that the number of purine oligonucleotides corresponds to the number of pyrimidine oligonucleotides [4]. Consequently, we may assume that similar changes are possible in the purine content. The total amount of thymine and its isopleth content decreases (see figure). The thymine to cytosine ratio varies from 1.54 in the control to 1.50 in the radiomutant and 1.42 after irradiation of the seeds with 25 kR.

Thus, the changes in the composition and sequence of the pyrimidines take place mainly through reduction in the content of thymine which is apparently connected with its radiation-chemical degradation.

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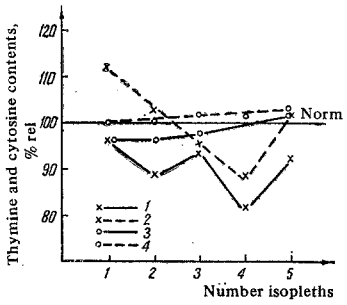

Change in the content of pyrimidine oligonucleotides of the DNA of the cotton plant in isopleths with respect to the control: 1) thymine, irradiated with 25 kR, 2) cytosine, irradiated with 25 kR, 3) thymine of the radiomutant, 4) cytosine of the radiomutant.

Content of Pyrimidine Oligonucleotides in the Low-Molecular-Weight Fraction of the Labile DNA of Cotton Shoots

Isopleths	Composition of the oligonucleotides	Content of oligonucleotides, mole-%		
		variety 108-F	Radiomutant	seeds irradiated with 25 kR
I	C_1p_2	4,99±0,19	5,01±0,26	5,67±0,12
	Tp_2	12,22±0,31	11,93±0,42	11,85±0,35
II	C_2p_3	2,31±0,11	2,23±0,09	0,98±0,03
	CTp_3	4,62±0,16	4,88±0,24	7,57±0,09
	T_2p_3	3,37±0,13	3,09±0,09	1,30±0,04
III	C_3p_4	0,49±0,03	0,46±0,04	0,18±0.01
	C_2Tp_4	3,22±0,09	3,68±0,09	3,08±0,06
	CT_2p_4	3,26±0,11	2,65±0,16	3,77±0,10
	T_3p_4	0,85±0,07	1,08±0,06	0,45±0,02
IV	C_3Tp_5	1,21±0,05	1,47±0,06	1,13±0,06
	$C_2T_2p_5$	2,77±0,12	2,44±0,08	1,98±0,09
	CT_3p_5	0,97±0,03	1,07±0,05	1,64±0,06
	T_4p_5	0,54±0,03	0,57±0,02	0,51±0,03
V	C_4Tp_6	0,31±0,01	0,38±0,01	0,52±0,03
	$C_3T_2p_6$	0,45±0,02	0,54±0,03	0,66±0,03
	$C_2T_3p_6$	1,44±0,05	1,23±0,02	0,73±0,02
	CT_4p_6	0,21±0,01	0,32±0,02	0,39±0,01
	T_5p_6	0,14±0,01	0,16±0,01	0,20±0,01