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THE EFFECT OF GAMMA RAYS ON DISTRIBUTION OF CHIASMATA IN THREE VARIETIES OF *LATHYRUS SATIVUS* L.

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PRASAD and Godward[1] after irradiating seeds with X-rays have reported no significant correlation of distribution of chiasmata between and within nuclei in diploid (*Phalaris canariensis*) and tetraploid (*Phalaris minor*). Reduction in the number of chiasma per cell as a consequence of irradiation has also been found by them. The purpose of the present experiment is to compare the varietal response to gamma radiation on chiasma frequency and distribution in the microsporogenesis of plants grown from the irradiated seeds.

Dormant "dry" seeds of *Lathyrus sativus* L. ($2n = 14$) var. P_{293}, P_{585} and LC_{76} whose diagnostic features have already been described by Das and Prasad[2] were irradiated with 10–50 kR gamma-rays. Doses were delivered from 1675 curie gamma cell at the dose rate of 330 kR/h. Germinated seeds (untreated and treated) were sown in the field. Randomly collected flower buds were fixed in 1 : 3 aceto-alcohol. Chiasma per bivalent were scored from temporary squash preparation of anthers stained with 2% aceto-carmine.

In contrast to control (positive), both positive and negative correlation as a result of mutagenization (Table I) have been found in each of the varieties. Variance ratios (*F*), though differ between varieties, indicate the existence of non-significant correlation of chiasma distribution between and within nuclei either

TABLE I

Analysis of variance of chiasma frequency at diakinesis in Lathyrus sativus *L. grown from gamma rays irradiated seeds* (M_1)

Total cells observed in each case = 50.

Doses in kR	Mean chiasmata per cell	Item: Mean sq. between nuclei	Item: Mean sq. within nuclei	Variance ratio (*F*)	Correlation
		(A) P_{293}			
0	9·70	0·92	0·49	1·87	+
10	11·32	1·29	1·39	0·92	+
20	12·48	5·92	1·54	3·84	−
30	13·16	1·87	1·27	1·47	+
40	14·48	7·72	3·89	1·98	−
50	14·56	0·16	2·27	0·07	−
		(B) P_{585}			
0	10·94	2·23	1·36	1·96	+
10	11·18	5·70	1·11	5·11	+
20	11·42	7·92	2·56	3·09	−
30	12·36	4·88	3·12	1·56	−
40	13·04	0·47	3·28	0·16	−
50	14·70	4·04	1·58	2·55	−
		(C) LC_{76}			
0	10·58	0·38	0·50	0·77	+
10	10·74	1·73	1·47	1·17	−
20	10·94	1·45	0·48	3·55	+
30	12·10	11·15	4·70	2·37	−
40	12·12	43·09	9·28	4·64	−
50	12·66	0·11	3·82	0·03	−

TABLE II

Frequency of different kinds of chiasma per cell at diakinesis in Lathyrus sativus L. *following seed irradiation* (M_1 *generation*)

Total cells observed in each case = 50

Doses in kR	Interstitial chiasmata per cell	Terminal chiasmata per cell	Total chiasmata per cell	Terminalization coefficient per cell
		(A) P_{293}		
0	1·18	8·12	9·70	0·84
10	2·54	8·98	11·32	0·79
20	2·96	9·52	12·48	0·75
30	3·86	9·30	13·16	0·70
40	3·76	9·92	14·48	0·68
50	4·61	9·90	14·56	0·68
		(B) P_{585}		
0	2·70	8·60	10·94	0·77
10	2·14	9·04	11·18	0·81
20	2·50	8·88	11·42	0·77
30	4·38	7·78	12·36	0·63
40	4·66	7·62	13·04	0·58
50	5·88	8·81	14·70	0·59
		(C) LC_{76}		
0	2·02	8·98	10·58	0·85
10	2·14	8·60	10·74	0·80
20	2·34	8·60	10·94	0·78
30	3·06	8·66	12·10	0·71
40	3·26	9·06	12·12	0·74
50	3·70	9·06	12·66	0·71

in control or irradiated samples. The number of interstitial chiasmata per cell (Table II), although differ between varieties, has been noted to depend on dose and variety. So far as terminal and total chiasma and terminalization coefficient are concerned, the main difference has not been recorded between treated and untreated samples but between varieties as expected. The increase in terminalization coefficient per cell with increase in dose indicates variation between varieties.

Positive, negative and non-significant correlation of chiasma frequencies between bivalents have been ascribed to the effect of environment by Mather[3] and to ploidy by Prasad and Godward.[1] Since in the present experiment, control and irradiated plants were grown under similar environments, the variation encountered for distribution of chiasmata between and within nuclei and the frequency of interstitial, terminal and total chiasma may be the consequence of genotypic differences of varieties and doses of gamma-rays. Irradiation is known to affect pairing properties of homologous segment of chromosomes through altering chromosomal structure. Observation of bridges and fragments at M_1 meiosis in the present case (Das[4]) indicates the persistent nature of induced cryptic changes in somatic chromosomes. The dependence of the rate of elimination of chromosomal aberrations on dose and variety (Das and Prasad[2]), may be considered as a probable cause of difference in the occurrence of interstitial, terminal and total chiasmata between varieties. The occurrence of non-significant correlation is similar to that reported by Prasad and Godward[1].

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TEMPERATURE RESPONSES TO SEED GERMINATION IN TWO CLOSELY RELATED TREE SPECIES OF *SCHIMA*, REINW

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A NUMBER of studies on germination ecology of species are available wherein germination requirements are closely related to their adaptation and distribution pattern in space[1-3] and in time[4]. Temperature requirement is one such factor which has received considerable attention[3-6]. However this aspect of the problem in relation to adaptive strategy of tree species has not received much attention[7]. The present study is concerned with temperature responses of the seeds of *Schima khasiana*, Dyer and *S. wallichii*, Choisy, two closely related and economically important timber tree species of north-east India, which are also extensively distributed in Meghalaya, on an altitudinal basis. The former is restricted to higher elevations (1600 to 1900 m), whereas the latter occurs at lower elevations (300 to 1600 m).

Seeds of *S. khasiana* and *S. wallichii* were collected from upper Shillong (1800 m) and Mawlai (1300 m) respectively during February-March 1978, which were separated out from fruits by air drying. Germination