MEIOTIC ANALYSIS OF THE CROSS, BRASSICA JUNCEA x BRASSICA CARINATA

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Abstract

B.juncea c.v. RLM 619 was prickle pollinated with B. carinata c.v. C 6501. Out of the 15 seeds obtained of 250 pollinated buds, only five were of hybrid origin, the rest being matromorphs. The hybrid plants were very vigorous, midway in morphology and late in maturity /like C 6501/. Anthers were small, pollen size was highly variable and upto 85 per cent pollen was sterile. The meiotic studies revealed the presence of 13-16 bivalents in majority of the cells /> 94 per cent/ with a mean bivalent frequency of 14.4. Trivalents were observed in about 24 per cent of the cells. Seed setting was less /1-2 seeds per pod/. The F_2 generation will be evaluated for introgression of desirable genes.

Introduction

Hybridization between Brassica juncea /AABB/ and B. carinata /BBCC/ is desirable to introgress genes for insect and disease resistance from B.carinata to B.juncea. The perusal of the relevant literature indicates that such a hybrid was previously produced by U /1935/ and Harberd /1950/.

Material and methods

The best regional variety of B.juncea, cv. RLM 619 was prickle pollinated with B.carinata cv. C 6501. The pollen application was repeated after 24 hours. Potential hybrid plants were examined cytologically by squashing anthers in 2% acetocarmine.

Results and discussion

Fifteen well developed seeds were obtained from 250 pollinated buds. Of the resultant 12 plants only five were of hybrid origin, the rest being matromorphs. The hybrid plants were very vigorous /Table 1/ and midway in morphology. They were also late in maturity /like C 6501/. Anthers were smaller in size and upto 85 per cent of pollen was sterile. Pollen size was highly variable.

The meiotic studies revealed the presence of 13-16 bivalents in majority of the cells with a mean bivalent frequency of 14.4. In the previous reports, 8-16 /U,1935/ and 13-17 /Harberd, 1950/ bivalents have been reported. Theoretically 8 bivalents are expected between 16 chromosomes belonging to B genome; the rest of the bivalents could be due to auto or allo pairing between A and C genomes. Upto 9 bivalents have been observed /U, 1935/, in the F_1 /AC/ of B.campestris /AA/ x B.oleracea /CC/. Muzushima /1980/ also reported exclusive occurrence of allopairs in AC hybrids. The overall frequencies of the PMC's showing various pairing behaviour are presented in Table 2. Trivalents were observed in about 24 per cent of the cells examined. Chromosomal movement was irregular during meiosis, as alignment at metaplate was not normal. Anaphase distribution was not normal. Anaphase distribution was asynchronous and laggards were present invariably. Monads, dyads and unequal division of tetrads was observed during pollen development.

References

Harberd D.J., 1950. A cytological study of species relationship in Brassica. M.Sc.Thesis, Univ. College of Wales, Aberystwyth.

Mizushima V., 1980. Genome analysis in Brassica and allied genera. In Brassica crops and wild allied ed. S.Tsunoda, K.Hinata and C.Gomez-Campo, pp 89-105.

U.N., 1935. Genome analysis in Brassica with special reference to experimental formation of B.napus and peculiar mode of fertilization.Jap.J.Bot.7,389,

Table 1. Comparative morphology of *juncea* x *carinata* hybrid with its parents.

	Plant height /cm/	Primary branches	Days to maturity	Grains/pod
RLM 619 /*juncea*/	150.0	51.4	146	10.56
C 6501 /*carinata*/	153.0	24.8	180	9.67
F_1 /RLM 619 x C 6501/	173.2	67.25	171	0.62

Table 2. Meiotic configuration and their frequencies.

Total PMC's observed	Configuration III + II + I	Frequency
68	0 + 16 + 3	16 /23.5%/
	0 + 15 + 5	14 /20.6%/
	0 + 14 + 7	10 /14.7%/
	0 + 13 + 9	8 /11.7%/
	0 + 12 + 11	4 /5.9%/
	1 + 13 + 6	2 /2.95%/
	2 + 13 + 3	4 /5.9%/
	1 + 14 + 4	6 /8.8%/
	1 + 15 + 2	4 /5.9%/

Mean bivalent frequency: 144