Cytologic Observations of Sterility in Interspecific F1 Hybrid from *Leymus chinensis* and *Leymus cinereus*

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Key words : cytologic observations , sterility , interspecific hybrid

Introduction *Leymus chinensis* and *Leymus cinereus* belong to *Leymus* genus of Trib triticeais ,both are allotetraploid (2n=28) rhizomegrass . Cross between two species is known as Geographically distant and the complement of advantages and disadvantages . But the interspecific F_1 hybrid is totally sterile . In order to understand the cytologic mechanism of hybrid F_1 sterility and fertility restoration further , In this study , the meiosis of PMCs and the development of pollen and embryo sac of *L .chinensis* ,*L . cinereus* and their F_1 hybrid .were observed .

Materials and methods *L . chinensis* was collected from north China ,*L . cinereus* was collected from north America . Spikes of *L . chinensis* served as female parent were coverd with parchment paper sleeves following emasculation . Pollination was achieved by shaking pollen-bearing spike of *L . cinereus* in the top of the sleeve . Seedings were established from germinated seed without the aid of embryo culture . Spikes for cytological analysis were fixed in Carnoy's solution for 24h and then stored in 70% ethanol in a refrigerator .Pollen grains were stained with 2% acetocarmine solution to estimate their viability . Florets for analysis of embryo sac development were fixed in FAA and then were dehydrated ,embedded ,sectioned ,stained using standard methods .

Results Data on pairing at metaphase-Ⅰ of PMCs in the parents and their F_1 hybrid are listed in Table 1 . Chromosome pairing , pollen stainability and seed set under open pollination in the parents were very high ,and univalents were occasionlly observed . chromosome pairing was also relative high in *L . chinensis* × *L . cinereus* .
And the Chromosome configuration at MⅠ was 2 .29 Ⅰ + 12 .39 Ⅱ . Furthermore , most associations was 2 Ⅰ + 13 Ⅱ ,and majority of bivalents were rings . Multivalents were not observed . Pollen stainability were 86 .8 ,12 .0 and 0 .9% at 1-nucleated pollen stage ,2-nucleated pollen stage and 3-nucleated pollen stage , respectively . The F_1 hybrids did not set seed under open pollination . The development stages of embryo sac in *L . chinensis* and *L . cinereus* were observed . But abortive embryo sac observed at meitosis Ⅰ in F_1 hybrid turned into trace which was stained darkly(Figure 1) following the megaspore mother cells developing dichod .

Table 1 *Meiotic behavior in the L . chinensis , L . cinereus and their hybrid .*

Materials	No .of chrom .	No .of cells	Chromosome pairing at MI				stainable pollen(%)			Seed sets (%)
			I	II						
				Rod	Ring	Total	1-nucleated pollen	2-nucleated pollen	3-nucleated pollen	
L . chinensis	28	147	0 .24 (0—4)	2 .73 (0—13)	11 .12 (1—14)	13 .85	97 .3	86 .7	81 .9	51 .2
L . cinereus	28	100	0 .14 (0—2)	0 .20 (0—1)	13 .70 (13—14)	13 .90	97 .9	89 .3	84 .8	64 .9
F_1 hybrid	28	151	2 .29 (0—10)	0 .21 (0—4)	12 .18 (8—14)	12 .39	86 .8	12 .0	0 .9	0

Conclusions The lack of stained pollen ,absence of seed set under open pollination ,and high frequency bivalents in F_1 hybrid indicated that its sterility was genic rather than genomic . Pollen abortion was mainly occurred between late 1-nucleated pollen and early 2-nucleated pollen in F_1 hybrid . Embryo sac abortion in F_1 hybrid initiated after the megaspore mother cell developeing dichod .

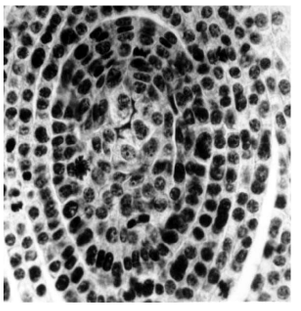

Figure 1 *The abortive embryo sac(indicated by arrow) of F_1 hybrid .*

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