Oryza australiensisとO.ridleyiとの種間雑種

誌名	The Japanese journal of genetics
ISSN	0021504X
著者	片山, 平
巻/号	67巻5号
掲載ページ	p. 415-417
発行年月	1992年10月

Jpn. J. Genet. (1992) **67**, *pp.* 415–417

Intersectional hybridization between *Oryza australiensis* Domin and *O. ridleyi* Hook

Taira KATAYAMA

1-8-3, Miwadai, Higashi-Ku, Fukuoka, Japan

(*Received 26 May 1992*)

ABSTRACT

One hybrid embryo of intersectional origin between *Oryza australiensis* Domin (W008, 2n=24) and *O. ridleyi* Hook. (W0001, 2n=48) was successfully obtained. The F1 hybrid had the expected chromosome number of 36 in the somatic cells. The average of meiotic chromosome pairing was 0.24II+34.27I. Meiotic irregularities, such as bridge, laggards and unequal separation of univalents were observed at almost all PMCs. This analysis leads to the conclusion that the two genomes of *O. ridleyi* differ from the EE genome of *O. australiensis*.

Oryza australiensis Domin is a diploid species with 2n=24 and the genome symbol EE for this species was given by Li et al.(1963). On the other hand, *O. ridleyi* Hook. belonging to Section *Ridleyanae* is a tetraploid species with 2n=48, and the genomic constitutions are not yet clear.

Based on these results obtained from the interspecific hybrids between *O. ridleyi* and the other *Oryza* species, the author concluded that the tetraploid species, *O. ridleyi*, has different genomic constitutions from AA (Katayama and Onizuka, 1979), BBCC (Katayama et al. 1981) and CCDD (Katayama, unpublished).

In this paper, meiotic chromosome pairing and morphological aspects in the hybrid, *O. australiensis*×*O. ridleyi* are presented along with other relevant data.

The cross between *O. australiensis* and *O. ridleyi* was made in summer of 1989. Heading was advanced under a day-length of 8h and emasculation was made by clipping method.

From 91 spikelets of *O. australiensis* pollinated with pollen grains of *O. ridleyi*, three seeds were obtained. The seeds were imperfect caryopsis which developed to various degrees. The seeds were collected about 15 days following pollination. After sterilization of seeds, they were cultured on MS medium. Two seeds were germinated but only one embryo developed into a seedling.

Root-tips pretreated with 0.002 M 8-oxyquinoline at 4°C for 24 h and young panicles were fixed in acetic alcohol (1:3) as usual. Preparations were made by the aceto-carmine technique.

As expected from the both parental species, the F1 hybrid had 2n=36 chromosomes. At the metaphase I (MI) of pollen mother cells (PMCs), almost all chromosomes failed to pair as shown in Fig. 1b-d and Table 1. From this result,

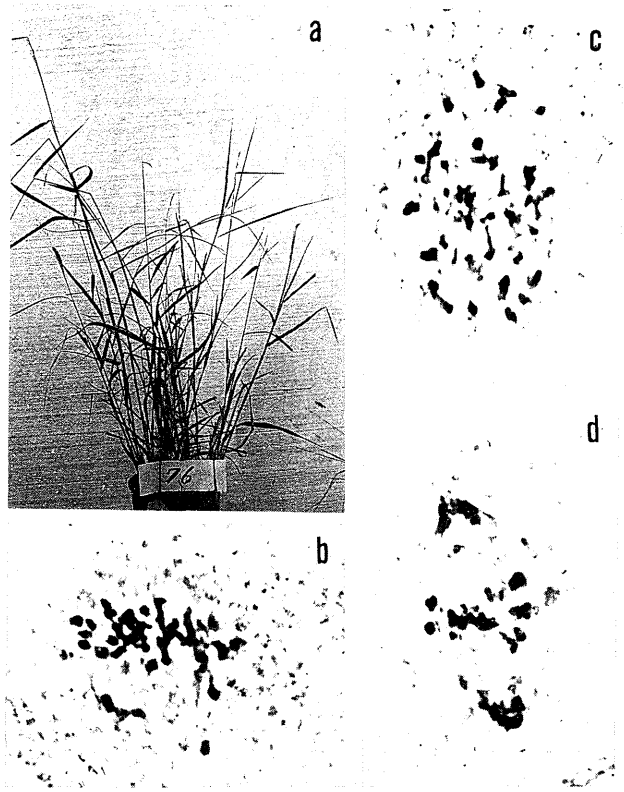

Fig. 1. Morphology of adult plant and chromosome pairing of PMCs in F1 76. a) Morphology of F1 76. b) M1, showing univalents and loosely associated bivalents (4II+28I). c) AI, splitting of univalents in the equatorial plate. d) Late AI, showing chromosomes.

Table 1. Chromosome pairings of the parents and their F1 hybrid

Parents and F1 plant	No. of PMCs observed	Chromosome pairing				Fertility (%)	
		II		I			
		Range	Mean	Range	Mean	Pollen	Seed
O.australiensis (W008)	20	—	12	—	—	normal	normal
O.ridleyi (W0001)	20	—	24	—	—	normal	normal
F1 76	30	0–6	0.24	27–36	34.27	0	0

meiotic abnormalities including anaphase bridges, laggards and unequal separation of univalents were often observed (Fig. 1b-d).

O. australiensis shows several morphological differences, such as growth habit, number of tiller, spikelet shape, length of flag leaf, awn length, color of stigma and flowering time etc., from *O. ridleyi* (Table 2). In the F1 hybrid, shattering habit

Table 2. Morphological observations of the parents and their F1 hybrid

Characters	*O. australiensis*	*O. ridleyi*	F1 76
Growth habit	normal	semi-spreading	semi-spreading
Flag leaf	long	short	short
Tiller	few	many	many
Spikelet shape	oblong	slender	oblong
Shattering habit of spikelet	shattering	shattering	shattering
Awn length	long	short	semi-long
Stigma color	white	light purple	deep purple
Flowering time	afternoon	forenoon	forenoon

of spikelet showed similarity to both parents, spikelet shape and awn length to the female parent and growth habit, tiller, flag leaf and flowering time to the male one.

The pollen and seed sterilities were caused by these chromosomal aberrations. Furthermore, as already reported by Li et al. (1961), the bivalents observed at MI of the F1 hybrid may also be accounted as the results of autosynthesis of both inter- and intragenomic pairings of *O. ridleyi*.

The present study suggests that the genome constitutions of *O. ridleyi* differ from that of *O. australiensis* (EE).

The author wishes to express his thanks to Dr. Y. Sano, National Institute of Genetics, Mishima, for his kind gifts of wild rice seeds.

REFERENCES

Katayama, T. and Onizuka, W. (1979). Intersectional F1 hybrids from *Oryza sativa*×*O. ridleyi* and *O. sativa*×*O. meyeriana*. *Jpn. J. Genet.* **54**, 43–46.

Katayama, T., Onizuka, W. and Shin, Y. B. (1981). Intersectional F1 hybrids obtained from the crosses, *Oryza minuta* Presl.×*O. ridleyi* Hook. and *O. officinalis* Wall.×*O. ridleyi* Hook. *Jpn. J. Genet.* **56**, 67–71.

Li, H. W., Weng, T. S., Chen, C. C. and Wang, W. H. (1961). Cytogenetical studies of *Oryza sativa* L. and its related species. 1. Hybrids *O. paraguaiensis* Wedd.×*O. brachyantha* Chev. et Roehr., *O. paraguaiensis* Wedd.×*O. australiensis* Domin. and *O. australiensis* Domin.×*O. alta* Swallen. *Bot. Bull. Acad. Sinica* **2**, 79–86.

Li, H. W., Chen, C. C., Weng, T. S. and Wuu, K. D. (1963). Cytogenetical studies of *Oryza sativa* L. and its related species. 4. Interspecific crosses involving *O. australiensis* with *O. sativa* and *O. minuta*. *Bot. Bull. Acad. Sinica* **4**, 65–74.