SHORT COMMUNICATION

CYTOGENETICS ON THE GENUS *ORYZA*

—CHROMOSOME PAIRING IN THE INTERSPECIFIC HYBRID BETWEEN DIPLOID *O. PUNCTATA* AND *O. OFFICINALIS*—

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Since genome of *Oryza officinalis* was designated as CC by Morinaga and Kuriyama (1959) from cytogenetical view points, many workers have studied the relationship among diploid species belonging to *O. officinalis* complex.

Sharma and Shastry (1965) considered Ceylonese *officinalis* to be a distinct species from the morphological aspects, and named it as *O. collina* (Trimen) Sharma et Shastry com. nov. Before this, Sampath (1962) also assumed from the morphological aspects that B genome is present in Ceylonese *officinalis*, and that diploid *O. punctata* has the same C genome of *O. officinalis*. Based on the cytogenetical investigations, Morinaga and Kuriyama (1960) reported that Ceylonese *officinalis* has a homologous genome with *O. officinalis*. Katayama (1967) postulated that the genome of diploid *O. punctata* should be fixed as B, while later Hu (1970) proposed that the genome of this species can not be decided definitely whether A, B or C.

In 1972 and 1973, the authors succeeded to produce the F_1 hybrids between diploid *O. punctata* and diploid species having C genome except *O. officinalis* under low temperature condition (about $25\pm 5^\circ\text{C}$ in maximum and about $15\pm 5^\circ\text{C}$ in minimum) in winter (Katayama and Ogawa 1973, 1974).

However, the results mentioned above are not based on the F_1 hybrid from diploid *O. punctata* and *O. officinalis*, because of difficulty of crossing the two species. Recently however, the authors were able to obtain the true F_1 hybrids from the crosses between the two species under low temperature condition in winter described above. The present paper deals with the results of the crosses and of the cytological observations of the F_1 hybrids (Table 1).

As presented in Table 1, 4 true F_1 hybrids (6.45%) were obtained out of 62 panicles crossed in 3 cross-combinations between diploid *O. punctata* and *O. officinalis*. The plant type and quantitative characters of the F_1 hybrids were intermediate of both parents, but the other characters such as panicle shape, spikelet color and awn length expressed dominancy of the paternal parent. Number of bivalents per cell at MI of PMCs ranged from 0 to 9 with a mean of 2.9 in the F_1 hybrid of W1515 $\times$ W0561 and 0 to 8

Table 1. Results of cross-pollinations between *O. punctata* (2n) and *O. officinalis* under low temperature condition

Cross-combinations	Number of flowers pollinated	Number of grains obtained	Number of grains cultured	Number of plants survived	Number of true F ₁ hybrids
<i>punctata</i> × <i>punctata</i>					
W1515×W1474	12	5	5	3	3
W1515×W1514	8	1	1	1	1
<i>punctata</i> × <i>officinalis</i>					
W1515×W0561	15	2	1	1	1
W1474×W0561	38	4	4	4	3
W1514×W0561	9	0	0	0	0

Table 2. Chromosome configurations at MI of PMCs of the F₁ hybrids between *O. punctata* (2n) and *O. officinalis*

Cross combination	No. of bivalents per cell														Total
	12	11	10	9	8	7	6	5	4	3	2	1	0	mean	
W1515×W0561	0	0	0	1	0	3	0	2	12	18	14	10	5	2.9	65
W1474×W0561															
1	0	0	0	0	1	0	3	7	18	17	12	5	0	3.4	63
2	0	0	0	0	1	1	3	4	9	19	16	3	0	3.2	56
3	0	0	0	0	0	0	6	6	7	15	8	6	2	3.2	50
W1515×W1474															
1	53	4	0	0	0	0	0	0	0	0	0	0	0	11.9	57
2	44	7	0	0	0	0	0	0	0	0	0	0	0	11.9	51
W1515×W1514	46	7	2	0	0	0	0	0	0	0	0	0	0	11.8	56

with a mean of 3.2–3.4 in those of W1474×W0561, respectively (Table 2, Figs. 1–4). On the other hand, chromosome pairing in the 3 F₁ hybrids within diploid *O. punctata* was near complete as shown in Table 2.

Table 3. The genome constitutions of diploid species or strains belonging to *O. officinalis* complex designated by the authors

Species or strain	Genome constitutions					
	Morinaga and Kuriyama (1959, 1960)	Sampath (1962)	Katayama (1967)	Hu (1970)	Katayama and Ogawa (1973)	Present results
<i>O. officinalis</i>	CC	CC	—	CC	CC	CC
Ceylonese <i>officinalis</i>	CC	BB	—	—	CC	CC
<i>O. eichingeri</i>	—	—	—	CC	CC	CC
intermediate	—	—	—	—	CC	CC
<i>O. punctata</i>	—	CC	BB	AA, BB or CC	BB	BB

Figs. 1-4. MI stage of PMCs of the F_1 hybrids between *O. punctata* ($2n$) and *O. officinalis*.

1. W1474 $\times$ W0561, showing $3_{11} + 18_1$
2. W1474 $\times$ W0561, showing $8_{11} + 8_1$
3. W1515 $\times$ W0561, showing $9_{11} + 6_1$
4. W1515 $\times$ W0561, showing $1_{11} + 22_1$

As reported in previous papers (Ogawa and Katayama 1973; Katayama and Ogawa 1973, 1974), the genomes of *O. eichingeri*, intermediate form of the *punctata-eichingeri* and Ceylonese *officinalis* was homologous with that of *O. officinalis*. Similar results were described by Morinaga and Kuriyama (1960) and Hu (1970).

These facts suggest that there is a distinct barrier on the chromosome pairing between diploid *O. punctata* and other diploid species having the C genome.

Based on these results, the authors again propose that the genome of diploid *O. punctata* should be fixed as B, and that of the other diploid species or strains, *O. eichingeri*, intermediate form and Ceylonese *officinalis*, is homologous to C genome of *O. officinalis*. The results are summarized in Table 3.

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