

INDUCTION OF RICE PLANTS FROM HYBRID ANTHERS
OF *INDICA* AND *JAPONICA* CROSS⁽¹⁾SHIU-CHU WOO and ING-JIUNN TUNG⁽²⁾

Rice varieties of both *indica* and *japonica* types are of commercial importance in Taiwan. The *indica* varieties are in general more resistant to drought and blast disease but susceptible to bacterial leaf blight compared to *japonica* type. Because they are more resistant to bacterial leaf blight than *indica* type, *japonica* varieties can be grown in highly fertilized paddy. Hybrid progeny developed from *indica* × *japonica* crosses are usually carrying sterility and giving continuous segregation in the subsequent generations. These two barriers reduce the possibility of breeding intersubspecific variety which may carry promising characteristics of both parental types.

To overcome the barriers, attempt is made to induce plants from hybrid anthers thereby obtain homozygous progenies. This note reports our first success in such attempts.

Hybrid plants (F₁) from the cross of IR-8 (*indica*) and Chianung 242-d₃ (mutant, *japonica*) were used in this study. Both parents have semidwarf genes from various origins. Matured anthers from the F₁ plants were explanted on synthetic medium (Nitsch and Nitsch, 1969) supplemented with yeast extract (1 mg/1), coconut milk (100 ml/1), and 2,4-D (4 mg/1) in test tubes, and incubated at 30°C in complete darkness for 30-60 days. Four thousand anthers were explanted in May, 1971. Seventy-six callus tissues were induced within two months after explantation. The callus tissues were then transferred to flasks with a new medium whose composition was identical with the aforementioned one except 2,4-D was omitted. The flasks were set under fluorescent light (1800 lux) for 16-hour a day. Only callus tissues in four flasks showed the development of chlorophyll. Six plantlets emerged from the callus were successfully transplanted to pots. All six plants developed normally, and their pollen mother cells were determined to be diploid. However, their phenotypes differed from one plant to the others (Table 1).

1 Paper No. 121 of the Scientific Journal Series, Institute of Botany, Academia Sinica, This research is partially supported by the National Science Council of the Republic of China, and the International Atomic Energy Agency (Contract, 1032/RB), Vienna, Austria.

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Table 1. Comparison of phenotypic characters of the induced plants

No. of plants	Culm length cm	Sheath length cm	Flag leaf length cm	Ratio*	Reaction bacterial leaf blight**	Ave. tiller no.
1	80.4	59.3	34.3	0.58	R	27
2	90.7	71.7	19.8	0.28	MS	12
3	80.6	62.7	26.0	0.41	MS	11
4	79.1	58.9	24.2	0.41	S	9
5	86.0	64.5	56.5	0.87	HS	2
6	51.7	46.5	36.2	0.78	R	6

* Ratio of flag to sheath lengths.

** Resistance. Moderately susceptible, susceptible, highly susceptible.

The results (Table 1) indicated that the induced plants varied in culm length as well as ratio of flag leaf to sheath lengths. They also responded differently to bacterial leaf blight infections. The difference in bacterial susceptibility suggested that the plants might be initiated from the haploid pollens where genotypic segregation took place. However the possibility that the diploid plants were initiated from the somatic cells of the anthers could not be entirely excluded. This result is comparable with those of Kohhar *et al.* (1971). They reported the induction of diploid tobacco plants from haploid callus tissues. However, it differed from the results of Niizeki and Oono (1968) who reported the induction of only haploid plants from the pollens of rice, Norin 20 and Toride 2. Wu (personal communication) of the Institute employing the same material used in this study, however, obtained one haploid and two diploid plants. The haploid and one of the two diploid plants were sterile, while the other diploidy did not head soever. The genetic homogeneity of the induced plants will be examined in the next generation. If the plants were induced from the germ cells, they should be homozygous. Thus no segregation should be observed. On the other hand, if they were induced from the somatic cells, the progenies would be similar to that of F_1 hybrid. Genetic segregation would ensue in the subsequent generations.

籼粳稻第一代雜種花藥之培養

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臺灣栽培稻可分為：印度型，及日本型兩類。一般情形，印度型較日本型耐旱，抗稻熱病，但是容易感染，白葉枯病，兩型稻之雜種後代，通常有不稔性，及發生繼續分離之現象，這兩種現象使兩型間雜交育種發生困難。

本簡文報導用花藥培養法，育成同質雜種後代的可能性。使用的材料是 IR—8 × 嘉農 242 號（矮生誘變種— d_3 ），第一代雜種之成熟花藥，經過人工培養已得到六株成長之水稻，經花粉母細胞檢查之結果，都是 $2n=24$ 的二倍體，該六株水稻，外表略有不同，對白葉枯病感染的程度亦不一致，是否由性細胞或體細胞引變而來，即將由後代分離情形判別之。

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