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A CASE OF COMPLETE INTER-VARIETAL HYBRID STERILITY IN RICE (*ORYZA SATIVA* L.)

HYBRID sterility of varying degrees is commonly observed in crosses where parents are not completely related. The interspecific hybrids generally show sterility of higher order. But, in general, inter-varietal hybrids are fertile due to genetic and chromosomal coherence. In rice, the hybrids of three subspecies (*Indica*, *Japonica* and *Javanica*) show varying degress of sterility. The nature of differentiation in these sub-species is not clearly understood. It is believed that differentiation in the sub-species of this taxon is largely through translocations, deficiencies and inversions in chromosomes (Sastry and Misra, 1961). More recently, mutational evidence to explain this was put forth with experimental evidence (Swaminathan *et al.*, 1969). Although interracial hybrid sterility is common in rice, the intervarietal or intraracial crosses normally result in fertile hybrids. But an exception to this phenomenon was noticed in our hybridisation programme.

An intensive crossing programme in rice was undertaken in 1970 involving local cultivars representing different agroclimatic regions of Mysore State with IR 8 and Jaya as female parents at the Regional Research Station, Mandya. The important male parents used are Ch 2, S. 317, J. 192 and C. 435 (Jeerigesanna). While J. 192 and Ch 2 crosses showed normal (88% and 78%, respectively) seed setting, crosses involving S. 317 and C. 435 failed to do so. Jaya × S. 317 showed 2·4% seed setting while IR 8 × C. 435 did not set any seed.

The F_1s of IR8 and C. 435 were planted in January 1971. The emergence of panicle was prolonged perhaps due to the dominance of photo-sensitivity of the male parent C. 435. However even after the emergence of panicles, there was no seed setting. The F_1 stubbles were again planted in 1971 *Kharif*. Even in this season there was no seed setting and the spikelets were hundred per cent chaffy.

This peculiar nature of hybrid was puzzling and tempted the authors to study the pollen sterility and meiosis. The study of pollen fertility by acetocarmine stainability test revealed that hybrid was complete sterile. Meiosis in the hybrid was studied by fixing flower buds of appropriate size in the acetic alcohol (1 : 3). This revealed that meiosis was completely normal with 12 II both in diakinesis and Metaphase I. The later stages of meiosis revealed normal disjunction in Anaphase I and Anaphase II. This suggested that sterility in the present case is not due to aberrent meiosis. Similar results have also been obtained at IRRI in a cytological study of sterility in *indica* × *indica* hybrids (Anon., 1969). When dusted with outside pollen in *Rabi* (1971–72) season, a few seeds were set indicating that the female side is fertile.

Shinjyo and Omura (1966) and Shinjyo (1969) demonstrated in rice that the *indica* variety, Chinsurah Boro II, possesses a sterile cytoplasm. Erickson (1969) reported that another *indica* variety PI 279120 (Biro-co), is a source of sterile cytoplasm. It is also shown by Athwal (1971) that the semi dwarf variety, T (N) 1, is also a source of male-sterile cytoplasm. Hence, it is possible that IR 8 may possess a similar male-sterile cytoplasm which, in certain hybrid combinations, as in the present, may lead to sterile hybrids due to possible cytoplasmic-genic interaction. However, repeated crossing and back crossing is needed to determine whether the cause is due to cytoplasmic or cytoplasmic gene interaction.

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