SHORT COMMUNICATION

Development of New Rice Ideotype

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In rice, ideotype breeding is believed to offer great opportunities to enhance the yield potential (Khush, 1984). Since the release of the semi-dwarf high yielding rice variety IR8 by the International Rice Research Institute (IRRI), Philippines, rice yield potential has remained constant (Singh, 1998). The narrow genetic base of the varieties used in breeding progammes seems to be the most important reason for the yield plateau. So broadening the genetic base of future rice varieties is imperative in breeding programmes.

A research programme was carried out in the Department of Plant Breeding and Genetics, College of Horticulture, Kerala Agricultural University with an objective to develop a rice ideotype through distant hybridization. Initially 56 high yielding diverse rice genotypes representing various eco-geographical conditions prevailing in Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Philippines and Srilanka were evaluated for 32 different quantitative and qualitative characters and grouped into nine clusters using Mahalanobis D^2 statistics. The design was RBD with three replications.

Twelve genetically diverse photo insensitive genotypes representing the nine clusters were selected as parents for hybridization programme. They are Mattatriveni, Bhadra, Hraswa, Mahsuri, Vytilla 3, Karthika (Kerala), IR36, IR62030-18-2-2, IR60133-184-3-2-2 (IRRI), Kachsiung SenYu338 (Taiwan); PK335-5-1-4 (Pakistan) and S-9768-PN-25-1 (Indonesia). The selected 12 genotypes were subjected to full diallel crossing (including reciprocals). Twenty two good performing F_1 hybrids were advanced to F_2 generation.

Out of 22 F_2 generations evaluated, the F_2 progenies of the cross combination Karthika x Bhadra showed very little segregation with respect to all phenotypic characters. Most of the progenies of this particular cross combination were similar to F_1 progenies. This was the case in the later generations also. The parents Karthika and Bhadra belong to clusters of the minimum inter cluster distance. Closer relationship between parents together with tight linkage between favourable characters might have resulted in the evolution of an excellent recombinant with early stabilization. Figure 1 shows the panicle vigour of the culture compared to its parents.

The newly developed rice culture (Culture 34) exhibited most of the ideotype features proposed by IRRI. The essential features of the new ideotype in rice proposed by IRRI (Khush, 1984) are low tillering capacity with 3-4 panicles/plant when direct seeded, no unproductive tillers, 200-250 grains/panicle, 90-100 cm height, sturdy stem, vigorous root system, multiple disease and insect resistance, 110-130 days growth duration, harvest index of 0.6 leading to an yield potential of 13-15 ton per hectare. The variety Karthika is a medium duration variety with medium height, straw-coloured lemma and palea and with red kernel. The grain shape is elongate. The variety Bhadra is a long duration variety with short stature, lemma palea colour is brown furrows on straw background, grain shape is bold and with red kernel. The Culture 34 (Karthika x Bhadra) is with medium height, medium duration, straw-coloured lemma palea, long bold grain with red kernel. The yield performance of this line is 7.5 t/hectare which can be increased to the proposed ideotype level of 13-15 ton per hectare by adopting best management levels recommended for yield potential threshold. The average yield performance of most of the popular high yielding varieties in Kerala is 3.3 ton per hectare. Harvest index of the newly developed culture is 0.594 with 224 grains per panicle, 28 tertiary branches per panicle, 10 panicles per plant (for transplanted crop), 1000-grain weight is 26.1 g, duration is 124 days with height 88 cm. One peculiar character of this newly identified rice ideotype is the persistence of dark green colour of leaves even at the time of harvest which shows the extended period of its photosynthetic efficiency and efficient source sink relationship till the time of maturity. This particular nature in turn will help in the increase of grain weight and ultimately the production. Erect stature with non-lodging character is another peculiarity of this culture. Moreover, the art of plant breeding was clearly seen in this culture with beautifully oriented panicles

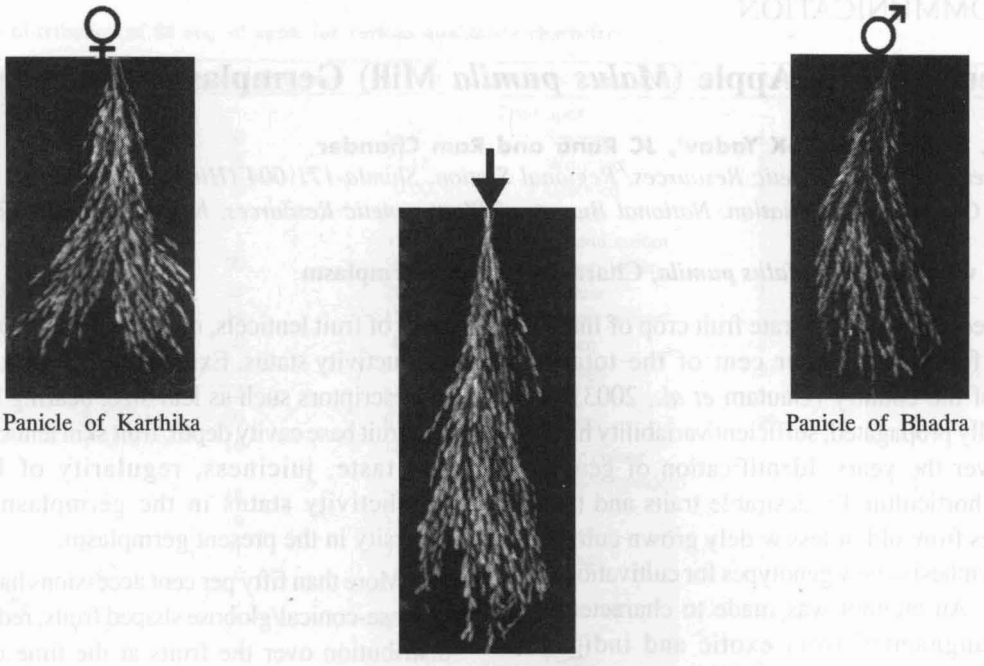

***Fig. 1:** Panicle vigour of the culture 34 compared to its parents*

***Fig. 2:** The newly developed rice culture 34*

and leaves (Fig. 2). The presently developed new rice ideotype have good quality characters like intermediate amylose content (24.2 %), red kernel colour and long bold size which are the quality aspects preferred by the people of Kerala. This culture showed tolerance to stem borer and thrips. This culture is in the pipe line of variety release.

References

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