

## COMPARATIVE PERFORMANCE OF F<sub>1</sub> AND PARENTS IN INTERVARIETAL CROSSES OF RICE

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Rice is one of the important cereals of the world. One of the means by which substantial increase in yield will be possible is through varietal improvement. The richness of varietal diversity in cultivated rice and the easy crossability between them are well recognised and these have helped in the development of a large number of improved strains through intervarietal hybridization.

In the present study Annapurna, a high yielding, short duration variety with red rice of good cooking quality, which is preferred in Kerala and Dee-Geo-Woo-Gen, the donor parent of the dwarf genes in indicas were selected as parents. A comparative study of the F<sub>1</sub>s and parents with reciprocal crosses was made with respect to six phenotypic characters.

**Ikeno** (1927) and **Paramasivan** (1975) observed that F<sub>1</sub> hybrids between two varieties were taller than the parents. **Chalam** and **Venkateswaralu** (1965) reported that the inheritance of height in many cases was governed by three genes each having differential effect in the manifestation of height. **Matsuo** (1961) reported the importance of flag leaf in the plants' physiological function. **Lal** and **Rao** (1950) observed that leaf area can be used as an index of crop growth and that it is related to physiological and economic characters. **Palani-swamy** (1968) obtained high positive correlation between ear length and length of boot leaf indicating that the boot leaf contributed much towards increased ear length and consequently to enhanced yield.

### Materials and Methods

Annapurna and Dee-Geo-Gen were selected for the study and were grown in pots during August to November 1970 for hybridization. Intervarietal crosses were effected in both direct and reciprocal combinations using the "wet cloth method of emasculation" as reported by **Chaisang** (1961). The behaviour of 5 hybrids along with the parents was studied during March to July 1971. The normal manuring schedule recommended for paddy was adopted. There was no incidence of pests or diseases to the crop. Observation on the following characters were recorded.

**Table 1.**

**Mean table showing the height, number of tillers number of nodes, area of flag leaf, area of 2nd leaf from top and angle of second leaf from top of parents and hybrids.**

Parents/Hybrids	Height in cms	No. of* tillers	No. of nodes	Area of flag* leaf in sq. cm	Area of 2nd leaf from top in sq. cm	Angle of 2nd leaf from top in degree
1. Dee-Geo-Woo-Gen	110.20	15.80	2.35	71.64	47.20	32.80
2. Annapurna	94.40	14.20	2.08	44.04	40.54	23.20
3. Dee-Geo-Woo-Gen X Annapurna	112.20	26.67	3.15	67.00	58.27	23.00
4. Annapurna x Dee-Geo-Woo-Gen	107.67	26.00	2.40	41.87	51.03	20.33

\* Data Significant at 0.05 level.

C. D. (Gross vs. parents)	9.33	1421
C. D. (Between crosses)	10.43	15.59
D. (Between parents)	8.08	12.31

*Plant Height:* Height measured from the base of main tiller to the tip of the panicle at maturity were recorded from five F1 plants and ten plants in each of the two parents.

*Number of tillers per plant:* Total number of tillers, in all the F1 plants and in ten plants from each of the parents, was counted separately and means for crosses and parents were worked out.

*Number of nodes:* Total number of nodes for 10 tillers selected at random from each plant was recorded at the time of harvest for all the available hybrids and from 10 tillers of 10 plants in each of the parent. The mean was worked out.

*Position of leaf:* The angle subtended by the leaf between the lamina and the stem was measured, in degrees at the time of flowering by a protractor. The observation was recorded for the 2nd leaf from the top of 10 plants in each of the parents and hybrids.

*Area of leaf:* Length and width of lamina of flag leaf and the one just below it were measured in cm in ten tillers selected at random from each of the

hybrids and from ten plants in each of the parents. This was recorded soon after heading. The leaf area was worked out using the formula  $\frac{\text{length} \times \text{width}}{4}$  (Vasanthi Devi, 1969).

### Results and Discussion

Stature and tillering are the two main aspects which decide the physical frame work of the plant. According to the modern concept desirable plant type must include short stature with erect and thick base, high tillering and dark green leaves. A comparison of the plant height of the hybrids with that of the parents revealed that the hybrid between Dee-Geo-Woo-Gen x Annapurna showed increase in plant height over the two parents while the hybrid from the reciprocal cross was superior to one of the parent, Annapurna as shown in the mean table.

The enhanced stature of the F<sub>1</sub> over the parent was attributed to its increased internodal length. This was a clear evidence of heterosis and the results agree with the findings of Ikeno (1927) and Paramasivan (1975). All the hybrids were significantly superior to both the parents with respect to the production of tillers. This was also a clear evidence of heterosis and the results agree with the findings of Paramasivan (1975). With regard to the number of nodes the hybrids did not show any significant difference over the parents as shown in the mean table.

The recent trend in plant breeding is to evolve plant types with broad dark-green leaves having erect growth habit along with the stem. In the present studies, the hybrids were compared with their respective parents, with reference to the above leaf characters based on the observation of flag leaf. A comparison of the means of parents and hybrids revealed that the hybrid between Dee-Geo-Woo-Gen x Annapurna showed significant superiority over the parent Annapurna while the other hybrid showed little heterosis. The parents also exhibited significant difference among themselves in flag leaf area. With regard to the area of 2nd leaf from top, the hybrids did not show any superiority over the parents. A comparison of the leaf angle of the second leaf from top of the parents and hybrids revealed that the hybrids possessed the desired trait of reduced angle unlike the parent.

### Summary

The behaviour of six characters on direct and reciprocal hybrids of two intervarietal crosses in rice was studied along with their parents and the following conclusions were drawn. There was a clear evidence of positive heterosis in plant height. The hybrids showed increase in plant height over the two parents. All the hybrids are significantly superior to both of the

parents with respect to the total number of tillers produced. With regard to the number of nodes the hybrids did not show any significant difference over the parents. In the area of flag leaf the hybrids between Dee-Geo-Woo-Gen x Annapurna manifested positive heterosis while the reciprocal hybrids showed little heterosis. As regards the area of second leaf from the tip both the hybrids were not superior over the parents. But for the character of second leaf angle the hybrids were superior to their parents with reduced leaf angle.

In general hybrids were better than the parents with respect to plant height, number of tillers, area of flag leaf and leaf angle.

സംഗ്രഹം

ഡി ജി ഓറു ജെൻ, *raiDomnArifm* എന്നീ നെൽ വിത്തിനങ്ങളും അവ തമ്മിലുള്ള സങ്കരയിനവും തമ്മിൽ ഒരു താരതമ്യ പഠനം നടത്തുകയുണ്ടായി. *rarottniraj* സങ്കരയിനങ്ങൾക്കു മാത്രം പിതൃ ഇനങ്ങളേക്കാൾ കൂടുതൽ പൊക്കവും, ചിനപ്പുകളും ഉള്ളതായി കാണപ്പെട്ടു. കൂടാതെ കൊടിയലയുടെ വിസ്തീർണ്ണത്തിലും, ഇലക്കോണുകളുടെ സ്വഭാവത്തിലും സങ്കരയിനം മാത്രം പിതൃയിനങ്ങളേക്കാൾ *rfbSrairoft* മെച്ചപ്പെട്ടവയാണെന്നു കാണാൻ കഴിഞ്ഞു. മുട്ടുകളുടെ എണ്ണത്തിലും, മുകളിൽ നിന്നും *rosneomsxtjiroi* ഇലയുടെ വലിപ്പത്തിലും സങ്കരയിനങ്ങൾ വലിയ വ്യത്യാസം പ്രകടിപ്പിക്കുന്നില്ല.

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