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Effectiveness of Three Cycles of Honeycomb Pedigree Selection for Yield and Four Quality Characters in an F₂ Rice Population (*Oryza sativa* L.)

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Abstract. The effectiveness of a combined honeycomb selection for yield and four quality characters (i.e., milling yield, vitreosity, grain length and the length/width grain ratio) was studied in an F₂ rice population. A significant improvement was observed for all quality characters studied as the population progressed from the F₂ to the F₅ generation. The F₅ generation surpassed the control variety by 56.4% for grain vitreosity, 21.4% for the ratio control, 1.4% for milling yield and 0.5% for grain length. It is concluded that the combined honeycomb selection for yield and four quality characters was effective for the improvement of the aforementioned quality characters.

Introduction

Rice varieties cannot be considered successful unless they incorporate high yielding ability together with quality characteristics. The four quality characters that affect directly the rice prices in the market are: milling yield, vitreosity, grain length and the length/width grain ratio (Juliano, 1985). Thus, the rice breeder should always take into consideration the aforementioned quality characters from a segregating rice population. Thus, we decided to study the effectiveness of honeycomb pedigree selection for yield and quality characters in an F₂ population.

I – Materials and Methods

The F₂ generation used was obtained from the American rice hybrid (No 1992) grown at the experimental station of Kalochori. During the first year (1989), 1,607 F₂ plants were grown in a honeycomb design with an interplant distance of 1 m. Application of honeycomb selection for yield (i.e., 5.3%) resulted in the selection of 79 plants. These plants were evaluated for quality characters and the evaluation continued only plants with a good yielding ability and good quality characters in the next generation. The F₃, F₄ and F₅ generations were made up from the progenies of 30 F₂, 28 F₃ and 30 F₄ plants respectively. The rice variety Stry monas, of Japonica type was used as a control (C).

The quality evaluation was carried out on grains with 14% moisture content. The milling yield at each high yielding plant was estimated from 100 g samples of pure rough rice. The vitreosity was estimated on 30 white grains. For this, the grains were placed on a glassy table lighted with a 60 W light intensity. Grains with short spots of pearls were considered as chalky. The above characters were expressed in percentages. The grains length and width were calculated from a sample of 30 white grains with a micrometer. Thus, the ratio length/width was finally obtained. The coefficient variability of the aforementioned characteristics was estimated by the F criterion. The realized annual progress of the selection programme applied was estimated as a percentage of the control variety.

II – Results and discussion

The variance observed in milling yield, vitreosity, grain length and in the length/width grain ratio was reduced as the plant material progressed from the F2 to the F generation (Fig. 1 and 2). This is in agreement with results reported by other researchers (Simmonds, 1979).

The coefficient variability (C.V.) for milling yield ranged from 1.8 (F4) to 3.7% (F2). This was significant ($P : 0.05$) only in the case of F2 with the other generations. A more distinctive difference among the generations was observed for the other three characters. Thus, the coefficient of variability ranged from 4.6% (F2) to 2.2% (F5) for grain length, from 44.5% (F2) to 12.3% (F5) for grain vitreosity and from 7.7% (F2) to 2.4% (F5) for the length/width grain ratio. The coefficient of variability was significantly different from generation to generation for all three characters with the exception of the following: between F3 and F4 for the length/width grain ratio. Although a significant progress was observed for all characters studied (Fig. 3 and 4), yet the F5 generation was behind control by 1.4% for milling yield and 0.5 % for grain length/width. The best performance of the F5 generation during the control led for the aforementioned two characters might be due to the smaller grain width observed in the F5 generation. This is in agreement with results reported by other researchers stating that decreasing grain width was as a result of increasing vitreosity (Bhashyam *et al.*, 1985).

It is concluded that a combined honeycomb selection for yield and four quality characters from an F2 population was effective. It remains to be seen, however, whether yield-wise these lines are comparable to the control variety. Such a study is under way.

References

- Bhashyam, M.T.K., Srinivas and. Khan, T.A (1985). Evaluation of grain chalkyness in rice. *The Rice Journal*, vol. 1, 88, n°7.
- Jullano, B. (1985). *Rice chemistry and technology*. Amer. Assoc. of Cereal Chem., Inc. Minnesota, USA, 2nd Edition, p. 775.
- Simmonds, N.W. (1979). *Principles of crop improvement*, Longman Group Limited, London, p. 368.



Figure 1. Variance in milling yield and vitreosity observed among the selected high yielding plants in four successive generations

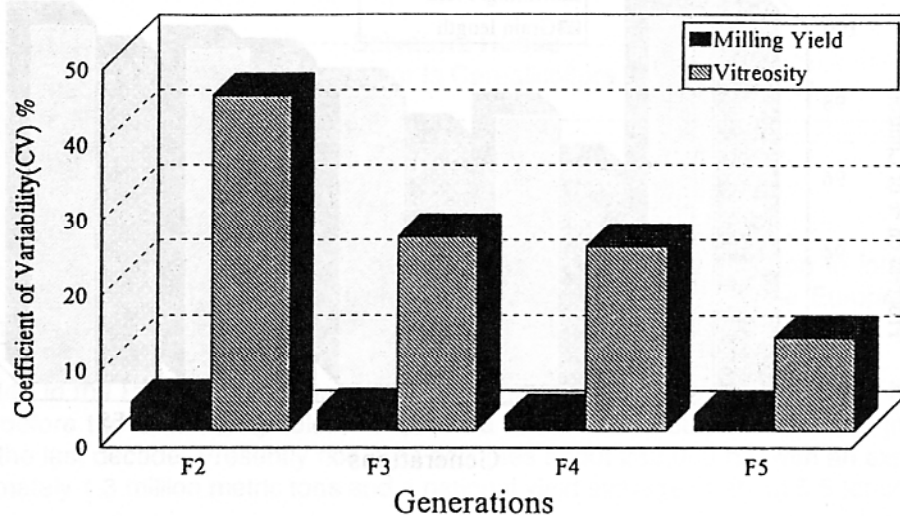


Figure 2. Variance in grain length and ratio length/width observed among the selected high yielding plants in four successive generations

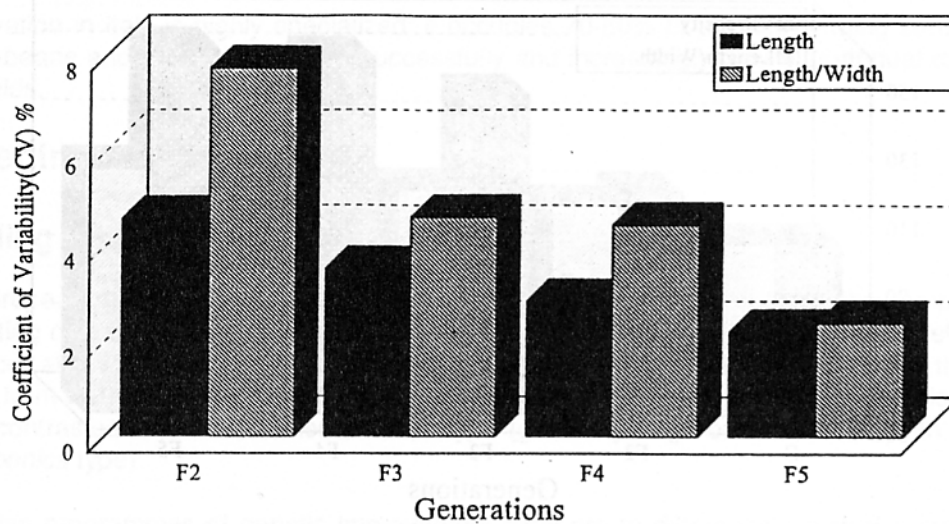


Figure 3. Progress observed after selection for milling yield and grain length in four successive generations

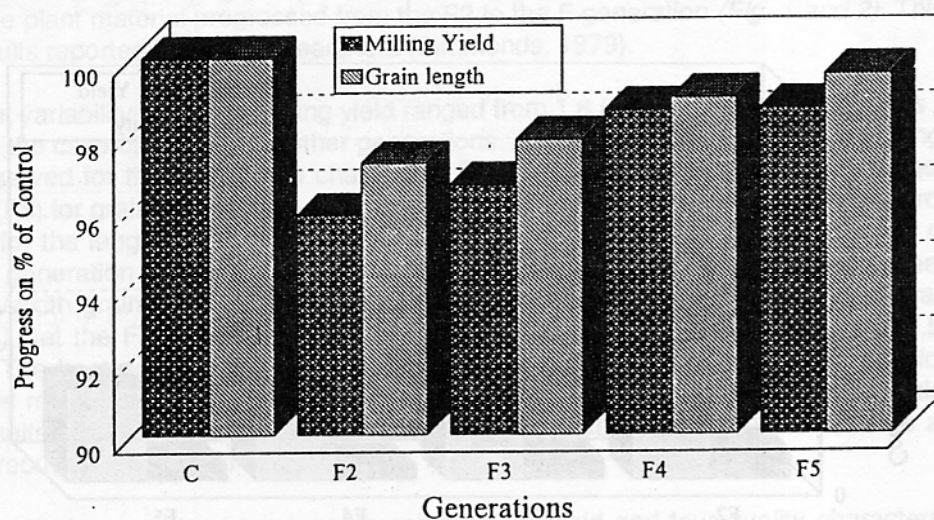


Figure 4. Progress observed after selection for vitreosity and ratio grain length/width in four successive generations

