

Path analysis of qualitative and quantitative characters in slender grain rice (*Oryza sativa* L.)

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SUMMARY

The path analysis with grain yield as dependent variable, indicated that the high direct effects were observed for plant height, grain length and head rice recovery; while the indirect effects were predominant for panicle length, test weight and grain breadth. The path analysis for quality components with kernel length after cooking, showed high direct effects of kernel length and kernel elongation ratio; whereas selection for kernel L/B ratio, water uptake, alkali score (gelatinization temperature) and cooking time can indirectly improve the cooking quality.

Key words : *Oryza sativa*, Coefficient, Direct effects

Rice (*Oryza sativa* L.) is one of the most important staple food crops of the world. The direct and indirect effects were studied for different yield and quality traits, in different genotypes of slender grain rice. As yield is a complex character, direct selection would not provide true picture of relative importance of direct and indirect influence of component traits towards yield. Path-coefficient analysis helps in examining the relative contribution of both direct and indirect effects of component traits on yield. As the consumers are mainly concerned with post-cooking quality of rice, the path analysis was also carried out to know the direct and indirect contribution of component traits in quality of slender grain rice. The present study was undertaken to estimate direct and indirect effects of various grain yield and quality components by partitioning total components through path coefficient analysis.

MATERIALS AND METHODS

The present study was undertaken during *Kharif* cropping season 2004 at Main Rice Research Station, Anand Agricultural University, Anand, Nawagam (Gujarat). The experimental material comprised 49

genotypes of slender grain rice. These materials were sown in an individual small plot under suitable nursery condition on June 14, 2004. After the development of seedlings up to suitable height, selected healthy seedlings were transplanted in two replications, with 15 x 20 cm² spacing, 4.35 x 2.0 m² gross plot size in Randomized Block Design on July 15, 2004. All the recommended cultural and plant protection practices were followed to the crop from sowing to the harvesting stage. The estimates of direct and indirect effects were calculated by the path coefficient analysis method as suggested by Wright (1921) and illustrated by Dewey and Lu (1959).

RESULTS AND DISCUSSION

Path coefficient analysis showing direct and indirect effects of various traits on grain yield in slender grain rice is presented in Table 1. The path analysis revealed the improvement in grain yield through plant height, grain length and head rice recovery, as they registered high direct effects. These results are in confirmation with Raju *et al.* (2004), Janardhanam *et al.* (2001), Sarawgi *et al.* (2000) and Deb Choudhary and Das (1998). The indirect effects were predominant for panicle length, test weight and grain breadth. So, selection for panicle length, test weight and grain breadth, can simultaneously improve the yield. The path analysis for the grain yield showed higher magnitude of residual effect (0.7576), which indicated the need for inclusion of more yield contributing traits in further studies.

The correlation analysis indicated the importance of plant height and grain breadth for the advancement of grain yield. Nevertheless, increasing plant height and grain breadth beyond certain level is not desirable for rice; the optimum balance of these traits should be maintained.

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Besides these traits, panicle length, test weight and grain length were identified as interrelated yield component traits. Kernel length is an important trait from traders' viewpoint. It showed association with other traits like grain length, grain L/B ratio, kernel L/B ratio and KLAC.

Path coefficient analysis showing direct and indirect effects of quality traits on kernel length after cooking in slender grain rice is presented in Table 2. The path analysis for the quality components with kernel length after cooking as dependent variable, showed that the kernel length and kernel elongation ratio were important traits to improve slender grain rice quality, as they showed high direct

effects. The selection for kernel L/B ratio, water uptake, alkali spreading value (gelatinization temperature) and cooking time will also indirectly improve kernel length after cooking.

The correlation analysis indicated for the important post-cooking quality characters viz., WU and KER revealed the importance of KLAC, AS (GT) and cooking time. From the nutritional point of view, high protein per cent and intermediate amylose is more preferable in rice. Protein content and water uptake showed significant negative association; whereas amylose content was independent trait in slender grain genotypes studied.

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