ISSN 2310-4090

International Journal of Scientific Footprints Open Access

Investigating Phenotypic Correlation and Path Analysis in Rice (Oryza sativa L.) Under Irrigated and Rain-fed Conditions

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Abstract

To develop a breeding programme to improve drought tolerance of a crop, it is necessary to gain an understanding on how the crop reacts to drought. This is best done under field conditions in the area, where the crop is grown, since the seasonal timing of drought stress varies from one location to another. While selecting a suitable plant type, correlation studies would provide reliable information on nature, extent and direction of selection, especially when the breeder needs to combine high potentials with desirable agronomic traits and grain quality characters. Path coefficient analysis on the other hand is an efficient statistically technique specially designed to quantify the interrelationship of different components and their direct and indirect effects on grain yield. This approach is more important to comprehend genetic makeup of dependent trait when the determining component characters are correlated. The experimental material for the present study comprised of 25 entries (6 parents + 9 F1's + 9 F2's + 1 check), planted in a compact family block design with three replications. HUR 3022, HUR 105 and Sarjoo 52 were planted as lines and Nagina 22, Anjali and Birsa Gora were treated as testers. The experiment was conducted in two water regimes: irrigated and rainfed conditions, respectively. All experimental materials were tested under both the conditions. Recommended agronomic practices were followed to grow a healthy crop. Observations were recorded on 20 randomly selected plants per replication for eleven characters viz., seedling height (SH), plant height (PH), stomatal behavior (SB), leaf rolling (LR), stay green (SG), panicle weight (PW), percent filled grains (PFG), spikelet per panicle (SPP), thousand grain weight (TGW), yield per plant (YPP) and proline content (PC). The mean values recorded for eleven characters in F2 generation were used for statistical analysis. The results of this research showed that indirect selections for increasing the number of SPP and decreasing SH and PH under both the conditions can be suitable to improve paddy yield of rice in breeding programs. The component traits such as, PC, SB, LR, SG, PFG, TGW and YPP singly or in combinations appear to be most important towards enhancing seed yield and also drought tolerance in transgressive sergeants.

Keywords: Rice; phenotypic correlation coefficient; path coefficient; irrigated; rain-fed water regimes.