An evaluation method to minimize the effect of environmental heterogeneity in selection of environmental heterogeneity in selection of plants

This study was conducted at Rice Research and Development Institute, (RRDI) Bathalagoda to develop a new plant evaluation method to overcome environmental heterogeneity in experimental fields. Two genetically homogenous rice varieties (BG 304 & BG 357) and one genetically heterogeneous population (F2 of, AC 212 / IR 65600-95-24-511 BG358 cross) were alternatively planted in rows and columns at the experimental fields at RRDI. Observations were made on number of tillers and plant height in four weeks after transplanting and number of days to flowering. These observations were made on individual plants. The results revealed that fair amount of environmental heterogeneity existed within the plot. This may mask or enhance the performance of individual plants of genetically heterogeneous population, leading to selection of wrong plants. Therefore the following evaluation method was developed to minimize this problem. Average deviation of a particular character between genetically heterogeneous population and homogeneous varieties were computed as follows.

Average value of variety l = M1
Average value of variety 2 = M2
Average value of genetically heterogeneous population = N
Average deviation of genetically heterogeneous Population from variety 1 = (N - M1) = D1
Average deviation of genetically heterogeneous Population from variety 2 = (N - M2) = D2
Deviation of a particular character between genetically heterogeneous population and homogeneous varieties in a microenvironment were computed as follows.
Value of the plant of variety I in the microenvironment = rn1
Value of the plant of variety 2 in the microenvironment = m2
Value of the plant of genetically heterogeneous population in the microenvironment = n
Deviation of genetically heterogeneous population from variety 1 = (n — m1) = d1
Deviation of genetically heterogeneous population from variety 2 = (n — m2) = d2
One plant of the population subject the selection (Genetically heterogeneous population) and two plants of two homogeneous varieties planted at both side of the above plant in a row forms a microenvironment.

The plants showing higher micro environmental deviations than average deviations (d1 > D1or d2> D2) will be selected. This could also be applied to select plants for lower values (d1 < D1or d2 < D2) depending on the character.