

**ASSESSMENT OF GENETIC VARIABILITY IN RECOMBINANT INBRED LINES OF CHILLI (*CAPSICUM ANNUUM* L.)**

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**EXTENDED ABSTRACT**

Chilli is an economically important condiment in Sri Lanka and cultivated mainly for green and dry chilli. In 2014, 13,978 ha of chilli was cultivated with the production of 71,767 t. In the same year, 46,422 t of dry chilli was imported with the value of 7,578 million rupees (DOA, 2014). Even though green chilli production is sufficient to fulfil local demand, dry chilli production is not sufficient. Performance of available open pollinated chilli varieties has not sufficient to increase the productivity of chilli cultivation. Local farmers prefer to cultivate imported chilli hybrid varieties with the purpose of achieving higher yield. But, these hybrid varieties do not perform well under local farming condition. Therefore, development of superior hybrid chilli varieties and open pollinated chilli varieties adapted to local condition is very important to increase the productivity of chilli cultivation in the country. Recombinant inbred lines are developed mainly for the heterosis breeding. Genetic variability among inbred lines are very important to select better parents to develop superior chilli hybrids. Open pollinated chilli varieties can be developed using the inbred lines through hybridization and selection. Coefficients of variation assess the magnitude of variability present in a population. Estimates of heritability and genetic advances are important preliminary steps in any breeding program as it provides information needed in designing the most effective breeding program (Jalal and Ahmad, 2012). As an initial step of developing new high yielding open pollinated and hybrid chilli varieties, this study was conducted to assess the genetic variability of recombinant inbred lines considering the mean performance, genotypic and phenotypic variance, coefficients of variation, heritability and genetic advance.

This study was conducted during *Yala* 2015 and *Maha* 2015/16 at the Field Crop Research and Development Institute (FCRDI), Mahailuppallama. Sixty-eight recombinant inbred lines developed at the FCRDI were used in this study. Thirty days old seedlings of inbred lines were planted during *Yala* 2015 in a randomized complete block design with two replicates with plot size of 6.0 x 1.8 m consisted of five rows of plants at

the spacing of 60 x 60 cm and two plants per hill. Each plot contained 100 plants. Five plants were randomly selected per treatment and observations were recorded on plant height, canopy width, pod length, pod diameter, pericarp thickness. Number of days which was taken to start the flowering of 50% plant from each treatment was taken as days to 50% flowering. Harvesting was started 75 days after field planting and continued at 10 day intervals. Number of pods and fresh green chilli yield of each treatment were recorded at each harvesting. Same procedure was followed during *Maha* 2015/16 season. Variability among genotypes was ascertained by SAS. Mean separation was done by Duncan Multiple Range Test. Genotypic variance ( $\sigma^2_g$ ) and phenotypic variance ( $\sigma^2_p$ ) were obtained from analysis of variance table according to Comstock and Robinson (1952).

Significant difference among the recombinant inbred lines was observed for all the tested characters other than number of pods/plant. There was a significant effect on season for the tested agronomic characters other than plant height. Interaction between season and treatment was significant for pod length, pod diameter, plant height, canopy width and days to 50 % flowering. Mean, maximum and minimum values on agronomic characters confirmed the variability associate with the inbred lines. None of the inbred lines performed well for all the tested characters during both season indicating the high environmental effect on the expression of tested agronomic characters. Performance of the inbred lines on tested characters was varied depending on the season. Among the recombinant inbred lines, highest yield was recorded in MICH PL 35, MICH PL 37 and MICH PL 38 exhibiting the stability over seasons. Profound effect of environmental factors on quantitative traits of chilli was observed by Chaim and Paran (2000).Larger reduction on mean performance of yield was observed during *Maha* season for all the inbred lines. Phenotypic variance showed a higher value than genotypic variance indicating greater influence of environment for the tested quantitative characters. High genotypic coefficient of variance (GCV) and phenotypic coefficient of variance (PCV) were observed for characters, yield, number of pods/plant, pod length, pod diameter and pericarp thickness. This indicates the high variability of these characters that offer good scope for selection of parents for the development of chilli hybrids. Moderate GCV and PCV values were observed in plant height and canopy width suggesting that these traits have less potential for selection. Therefore, heterosis breeding is a good option to increase plant height and canopy width. The lowest GCV and PCV were observed for days to 50% flowering. Similar result was reported by Manju and Sreelatha Kumary (2002). High heritability, high genetic advance and high GCV were exhibited for pod characters indicating the presence of fixable additive genetic effect. Therefore, pod characters can be improved through hybridization and selection. High heritability for pod

characters indicated that large proportion of phenotypic variance due to genotypic variance. This further confirms the reliability of selection for these traits on the basis of phenotype of chilli.

There was high genetic variability among the recombinant inbred lines. There is greater potential of utilizing the developed inbred lines for the development of superior chilli hybrids and open pollinated varieties. Characters such as yield, number of pods/plant, pod length, pod diameter and pericarp thickness that exhibited high genotypic coefficient of variance and phenotypic coefficient of variance offer good scope for selection of parents for the development of chilli hybrids. Mean performance of agronomic character indicated that inbred lines, MICH PL 35, MICH PL 37 and MICH PL 38 can be exploited for further testing to release directly as open pollinated varieties.

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