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Induced variability and character association in mutants of lentil (*Lens culinaris* Medik) in M_4 generation

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ABSTRACT
The present investigation was undertaken to study the heritability, genetic advance and character association in M_4 generation of selected induced mutants of lentil varieties K-75 and Pant L-406 for some quantitative and qualitative traits. Seeds of both the varieties were treated with gamma-rays (10, 15, 20, 25 & 30 kR), EMS (0.02, 0.03, 0.04 &0.05M) and combinations of doses of gamma-rays with EMS (0.03M). Promising morphological mutants in M_2 were carried to M_4 for variability study. Mutant lines MK-5 and MP-4 were judged as dwarf among all the mutants. MK-5 was an early maturing mutant. Mutant line MP-4 had 1.5 times more grain yield than the control along with normal maturity duration. Both the sets of mutant(derived from K-75 and Pant L-406) showed a wide range of PCV and GCV and genetic advance as per cent of mean for grain yield, number of nodules and number of pods per plant, whereas these were low for 100-grain weight. Genetic advance for protein and metheonine content ranged from 5.25% to 10.5%. Broad sense heritability ranged from 49.28% to 92.96%. Number of pods per plant had positive and significant association with number of nodules per plant and grain yield per plant except grain yield with number of pods in mutant lines of Pant L-406. The association of protein content with metheonine and grain yield was positive but non significant.

Key words : Lentil, Induced mutants, Correlation, Genetic advance

INTRODUCTION

Among the pulse crops, lentil has an old history. In India lentil is grown as winter crop all over the country either as a pure crop or as mixed crop. On the basis of seed size and cotyledon colour it has been divided as macrosperma and microsperma. This crop so far has not received sufficient attention from geneticist and plant breeders for its improvement. During its evolution, lentil has acquired a number of characteristics, but it ideotype does not suit to confer the required improved agronomic practices. Thus induced mutations can be used to ratify simple, specific undesirable traits of well adopted varieties without grossly disturbing its genetic constitution. Broad spectrum genetic variability is a prerequisite for any successful breeding programme. Besides the use of induced mutations in fundamental studies, it can be used to create additional genetic variability for qualitative and quantitative traits. Thus, the present investigation was under taken to study performance of selected mutants of lentil derived from more than one mutagenic treatment. Genetic variability in terms of mean, variances (PCV & GCV), heritability, genetic advance and character association were studied in M_4 generation.

MATERIALS AND METHODS

Healthy and dry seeds (250gm) of lentil variety K-75 (macrosperma) and Pant L-406 (microsperma) were subjected to treatments of gamma-rays (10, 15, 20, 25 & 30 kR), EMS (0.02, 0.03, 0.04 & 0.05 M) and combinations of all doses of gamma-rays with EMS (0.03 M). Treated seeds along with their control were sown (*rabi*-2001) to raise M_1 generation. The individual plant progeny were grown in M_2 generation. Morphological mutants (plant stature, maturity duration, pod types, leaf shape and size etc.) observed in M_2 generation were selected and raised M_3. The 12 mutant lines of K-75 and 9 mutant lines of Pant L-406 carried forward to raise M_4 generation. The seeds of these mutant lines were sown in Randomized Block Design with three replications along with their respective control in M_4 generation during *rabi*-2004 at Agriculture Research Farm, B.H.U. Varanasi. Observations on characters namely; plant height, days to maturity, secondary branches per plant, number of pods per plant, number of nodules per plant, 100-seed weight, grain yield per plant, protein and metheonine content were recorded on 10 randomly selected plants per mutant line. Standard statistical procedure and simple correlation coefficient were followed to estimate variability parameters. Genetic advance as per method given by Comstock and Robinson (1952) and broad sense heritability was calculated following Hanson *et al.* (1956). Protein content and metheonine content were estimated by using Micro-Kjeldahl method (Sadasivam and Manickam, 1996) and Colourimetric method (Horn *et al.*, 1946), respectively.

RESULTS AND DISCUSSION

Mean performance of various mutant lines in M_4 generation are presented in table 1&2. Mutant lines, namely, MK-5 and MP-4 were judged as dwarf among all the mutant derivatives of variety K-75 and Pant L-406, respectively. MK-5 was an early maturing mutant (10 days early compared to parent K-75) but had low mean performance for yield and yield components. This line seems to be a good source for transfer of earliness in lentil. On the other hand mutant MP-4 exhibited significantly higher (1.5 times more than control) yield per plant along with normal maturity duration. This mutant was also good performer for almost all the yield components. Number of nodules per plant and

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