The present study was undertaken by using three different chemical mutagens viz., ethylmethane sulphonate (EMS), Sodium azide (SA) and hydrazine hydrate (HZ) on mungbean (*Vigna radiata* (L.) wilczek). The chief objective of this study was to explore the possibility of inducing genetic variability for eight quantitative characters in the two varieties namely, Asha and K-851 of mungbean. Various other aspects of this current study were: (1) biological damage in *M*_1 generation; (2) meiotic studies; (3) effectiveness and efficiency of the mutagens; (4) chlorophyll and morphological mutation frequency and spectrum (5) estimation of mean and genetic parameters in *M*_2 and *M*_3 generations and (6) total seed protein content of high yielding mutants isolated in *M*_3 generation.

Biological damage in *M*_1 generation increases as the seed germination, seedling height and pollen fertility decreases with the increase in concentrations of the mutagens doses. Chromosomal aberration like univalents, trivalents, multivalents, bridges laggards and micronuclei are induced by mutagenic treatments. In *M*_1 generation of both the varieties of mungbean, there is a dose dependency in the frequency of different types of meiotic abnormalities, is exhibited by both the mungbean varieties.

Morphological investigation of *M*_1 plants exhibit anomalies occur in cotyledonary and vegetative leaves; and their frequency was greater at the higher concentrations of mutagens in
both the varieties. In general, SA treatments failed to produce anomaly in the cotyledonary and vegetative leaves in both the varieties.

A wide spectrum of chlorophyll mutants was obtained in M\textsubscript{2} generation. The frequency of chlorophyll mutations was dose dependent and increased with the mutagen concentrations. EMS treatments induced the highest frequency of chlorophyll mutations. This was followed by HZ and SA in both the varieties.

The mutagenic effectiveness as measured by the percentage of mutated plant progenies divided by the unit dose of the mutagen was higher at lower doses of the mutagens. HZ was found to be most effective and the order of the mutagens based upon effectiveness was HZ > SA > EMS. The mutagenic efficiency worked out on the basis of seedling injury (Mp/I), pollen sterility (Mp/S) and meiotic abnormalities (Mp/Me), showed a declining trend with the increasing concentrations of mutagens. The EMS treatments were found to be more efficient in comparison to the others mutagens (SA and HZ) in both the varieties.

A broad range of morphological mutants, exhibiting altered morphological features, were identified in M\textsubscript{2} populations. The highest frequency was noted in the EMS treated population and lowest with SA, while HZ treatments were intermediate. Compared to var. Asha the range of such mutants was highest in the var. K-851. Morphological mutants, showed a negative selection value. However, a few of them can be improved through selection by eliminating some of the undesirable characters.
The genetic variability induced by three chemical mutagens for eight quantitative characters was studied in each generation. The quantitative parameters studied were, days to flowering, plant height (cm), days to maturity, number of fertile branches, number of pods per plant, seeds per pod, 100 seed weight (g) and total plant yield (g). Means for all the eight quantitative characters in M₁ generation remained unchanged in the treated populations. The coefficient of variation (CV) differed from character to character and high CV over control was recorded for fertile branches per plant (55.28 %) and pods per plant (46.88 %). The mean number of fertile branches, number of pods, seeds per pod, 100 seed weight (g) and total yield of the plant increased in all the mutagenic treatments with few exceptions. The exceptions occurred in M₂ generation, whereas M₃ generation showed a complete positive shift.

The genotypic coefficient of variation, heritability (broad-sense) and the genetic advance (as percentage of mean) increased in the treated populations. The genetic parameters were dose independent and varied from trait to trait in M₂ and M₃ generations. High heritability estimates coupled with high genetic advance occurred for yield and yield components. Estimates of heritability and genetic advance suggest that the induced polygenic variability can be utilized in plant improvement programmes.

Certain mutants, much superior to the others in their performance for seed yield per plant, were evaluated in order to find
out their selection response in M₃ generation. Increase in the mean values of yield and yield components was noticed. Estimates of the genetic parameters for yield and yield components were also recorded to be higher, suggesting the scope for further selection.

The M₃ seeds of high yielding mutants were also analysed for total seed protein content. Various mutants isolated from the two varieties of the mungbean have exhibited considerable range of variation in their total seed protein content. The increase in the mean protein content in some treatments and decrease in others suggest that mutants with positive and negative effects were induced in different proportions with various treatments.

At the end it can be concluded from the present study, that the lower concentrations of the mutagens are more effective and efficient in inducing polygenic variability in the two varieties of mungbean than the higher doses; the latter induced high genetic damage via genotoxicity and lethality.