

Chapter 6

Summary

&

Conclusion

SUMMARY AND CONCLUSION

The present investigation was carried out to study the mutagenic effect of ethylmethane sulphonate (EMS) and methylmethane sulphonate (MMS) on cytomorphological characters of chickpea (*Cicer arietinum* L.) varieties GNG-469 and BG-372.

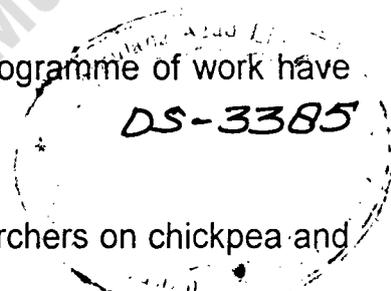
The main objectives were

1. To study the effect of different mutagenic treatments of two alkylating agents i.e. EMS and MMS on various biological parameters of chickpea vars. GNG-469 and BG-372 in M_1 generation.
2. To study the meiotic behaviour of chromosomes after treatment with chemical mutagens.
3. To evaluate induced mutations and
4. To find out the mutagenic potentials of two alkylating agents i.e. EMS and MMS.

The induced mutagenic effects were studied in two varieties of chickpea and compared with control plants. The populations raised from untreated seeds were taken as controls. The chemical treatments showed various changes in different biological characters of plants. The biological damage was studied with respect to seed germination, seedling height, plant survival at maturity, pollen fertility, number of branches per plant, number of pods per plant, number of seeds per pod, days to flowering and fruiting, 100-seed weight, total seed yield per plant and chromosomal aberrations during meiosis. The effects of EMS

and MMS on cytomorphological characters of two varieties of chickpea namely GNG-469 and BG-372 were extensively studied and summarized below.

1. A brief introduction regarding chickpea (*Cicer arietinum* L.) and its cultivation, production, economic importance and the scope of induced mutagenesis in the improvement of crop have been given.
2. Materials and methods used in present programme of work have been explained.
3. The investigations by various earlier researchers on chickpea and induced mutagenesis have been reviewed and presented in the review of literatures.
4. The effect of EMS and MMS on seed germination, seedling height, plant survival and pollen fertility showed a dose dependent reduction. Methylmethane sulphonate (MMS) showed maximum inhibitory effect on various biological parameters of both the varieties as compared to EMS and var. BG-372 was found to be more sensitive to both the mutagens and showed maximum damage in most of the characters except in case of seed germination, where highest inhibition was observed in var. GNG-469.
5. The meiotic chromosomal aberrations studied in pollen mother cells showed a dose dependent increase in both the varieties. The various chromosomal abnormalities induced by EMS and MMS were univalents, multivalents, laggards, bridges, cytomicis,



micronuclei, non-orientation of chromosomes, non-disjunction, unequal separation, stickiness and disturbed polarity. The frequency of chromosomal anomalies was more at metaphase as compared to anaphase and telophase stages. MMS caused maximum abnormality in both the varieties as compared to EMS and variety BG-372 appeared to be more sensitive to the mutagenic treatments.

6. Days to flowering and maturity showed a positive correlation with the increasing concentrations of EMS and MMS. Almost all the treatments caused delay in flowering and maturity with a few exceptions where a negative shift was observed in some lower concentrations.
7. The lower doses of both EMS and MMS exhibited a stimulatory effect on the various quantitative traits studied. There was a significant increase in plant height, number of branches per plant, number of pods per plant, number of seeds per pod, 100-seed weight and total yield per plant in both the varieties. The intermediate doses were found more efficient in enhancing the quantitative traits. However, the higher doses of mutagenic treatments caused a marked reduction in all these traits in both the varieties. EMS was found better than MMS in inducing favourable changes resulting in an increase in various characters and variety GNG-469 showed better response than BG-372.
8. The results obtained in the present studies have been discussed in the light of earlier investigations.

9. The statistical analysis of the cytomorphological characters carried out to find out the extent of variability induced by mutagens revealed that all the mutagenic treatments induced greater variability as compared to control.
10. The overall result of the present studies indicated that MMS caused maximum biological damage in both the varieties and the lower doses of EMS caused marked increase in many polygenic traits.
11. Out of two varieties in the present investigation, var. BG-372 was found more sensitive to both the chemical mutagens.