protoplasts of various sources on the basis of agglutinating nature.

*September* 12, 1980.


1. Gamborg, O. L. and Miller, R. A., *Can. J. Bot.*, 1973, **51**, 1795.
2. Glimelius, K., Wallin, A. and Eriksson, T., *Physiol. Plant.*, 1974, **31**, 225.
3. Burgess, J. and Linstead, P. J., *Planta*, 1976, **130**, 73.
4. Larkin, P. J., *Plant Physiol.*, 1978, **61**, 626.
5. Murashige, T. and Skoog, F., *Physiol. Plant.*, 1962, **15**, 473.
6. Takebe, I., Otsuki, Y. and Aoki, S., *Pl. Cell Physiol.*, 1968, **9**, 115.
7. Street, H. E., In *Plant Tissue and Cell Culture*, Blackwell Sci. Publications, 1973.
8. Takebe, I., *Ann. Rev. Phytopathol.*, 1975, **13**, 105.
9. Wallin, A. and Eriksson, T., *Physiol. Plant.*, 1973, **28**, 33.
10. Ghosh, B. N., "Phytolectins", *Ph.D. Thesis*, University of Calcutta, 1980.
11. —, Dasgupta, B., and Sircar, P. K., *Plant Biochem J.* (Communicated).
12. —, — and —, *Ind. J. Biochem. and Biophys.* (Communicated).


## THE PRODUCTIVITY IN INDUCED MUTANTS OF MOONG BEAN


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*In recent years, induced mutants have been directly* released as improved varieties in a wide group of crop plants. The 93 registered mutant crop varieties released[1] so far, indicate the increasing popularity of adopting mutation breeding technique for crop improvement. The present study deals with the performance of some of the important mutants in moong bean.

Two inbreds of moong bean (*Vigna radiata* (L.) Wilczek), *viz.*, Pusa Baisakhi and S-8, obtained from Genetics Division, I.A.R.I., New Delhi, were treated with ethyl methane sulphonate (0·1%, 0·2%, 0·3%), nitroso methyl urea (0·01%, 0·02%, 0·03%), gamma-rays (20, 40, 60 kR) and their combinations (20 kR gamma-rays + 0·1% EMS and 20 kR gamma-rays + 0·01% NMU in the variety Pusa Baisakhi only) and directly sown in the field. Seeds from each of the $M_1$ plant were collected on the individual plant basis and sown in the field in randomized block-single row design to raise the $M_2$ generation. Similarly $M_3$ and $M_4$ generations were raised. Some true breeding mutants, isolated in $M_2$ generation, were carried over to $M_4$ generation to study the stability in the superiority of their productivity. The description of these mutants has already been presented[2]. The experiment was designed in replicates of two. The protein content in the grain was determined by modified Kjeldahl's method[3]. Two essential amino acids namely methionine and tryptophan were analysed by colorimetric methods[4,5].

The data, on total grain yield, protein, methionine and tryptophan contents studied in induced mutants are summarised in Table I.

*Grain yield per plant*

All the mutants were high yielding and the yield per plant ranged from 5·4 (g) to 10·1 (g) in the variety Pusa Baisakhi and 5·7 (g) to 14·0 (g) in variety S-8. This increase in grain yield ranged from 55·5% to 191·4% in the variety Pusa Baisakhi and 0·6% to 146·9% in the variety S-8 as against their respective controls.

*Protein Contents*

In Pusa Baisakhi, all the mutants except two, showed an increase in protein content ranging from 0·2% to 23·7% whereas in S-8, the increase ranged from 8·5% to 27·3% over their respective controls. It is interesting to find that most of the mutants in both the varieties have shown simultaneous increase in grain yield and protein content as well.

*Methionine Content*

Out of the 20 mutants, 18 showed an increase in methionine eontent ranging from 4·5% to 93·0% in Pusa Baisakhi and 48·3% to 135·5% in S-8 compared to their respective controls.

*Tryptophan Contents*

Only 13 mutants out of the 20 were found with increased tryptophan contents as compared to their respective controls. This increase in the tryptophan contents ranged from 3·9% to 108·4% in Pusa Baisakhi and 9·7% to 22·7% in S-8.

It was interesting to note that some of the mutants, *viz.*, bigger grain size in Pusa Baisakhi, large number of pods per plant in Pusa Baisakhi and S-8 (isolated from 40 kR gamma-ray treatment) and long pod mutants in both the varieties have shown simultaneous increase in grain yield, protein, methionine and tryptophan contents. The studies are in progress to establish, at least, a few top ranking mutant strains as varieties in this important pulse crop.

*September* 29, 1980.

TABLE I

*The Productivity in induced mutants of Moong bean*

| Variety and mutant type | Total grain yield per plant (g) Mean | Cv | Protein content | Methionine content | Tryptophan content |
|---|---|---|---|---|---|
| *Variety Pusa Baisakhi* | | | | | |
| *Synchronously maturing mutants* | | | | | |
| 0·02% NMU | 7·3** | 27·27 | 24·7* | 2·3 | 0·9 |
| *Bigger grain size mutant* | | | | | |
| 0·02% NMU | 9·1** | 27·89 | 24·7* | 2·6 | 1·5 |
| 20 kR gamma-rays + | | | | | |
| 0·1% EMS | 5·4* | 22·35 | 27·2** | 3·6** | 2·0* |
| *High yielding mutants* | | | | | |
| 0·3% EMS | 10·1* | 31·57 | 24·2 | 3·0* | 1·3 |
| 20 kR gamma-rays + | | | | | |
| 0·1% EMS | 10·1** | 29·77 | 24·2 | 2·4 | 1·4 |
| *Large number of pod mutant* | | | | | |
| 0·1% EMS | 8·8** | 31·66 | 28·2** | 4·0** | 2·8** |
| 0·01% NMU | 9·2** | 31·59 | 29·7** | 4·8** | 2·8** |
| 0·02% NMU | 8·0** | 32·65 | 28·9** | 3·8** | 2·3** |
| 0·03% NMU | 9·0** | 32·40 | 28·8** | 4·0** | 3·0** |
| 20 kR gamma-rays + | | | | | |
| 0·1% EMS | 9·2** | 32·59 | 29·9** | 4·6** | 1·8* |
| 20 kR gamma-rays + | | | | | |
| 0·01% NMU | 8·2** | 36·72 | 27·1** | 3·0* | 1·6* |
| *Long pod mutant* | | | | | |
| 0·02% NMU | 8·9** | 33·07 | 29·0** | 4·9** | 2·9** |
| 0·1% EMS | 6·9** | 17·93 | 27·0** | 3·2** | 1·7* |
| 20 kR gamma-rays + | | | | | |
| 0·1% EMS | 6·8** | 19·46 | 26·0** | 3·1** | 1·8* |
| Control | 3·5 | 24·71 | 24·2 | 2·5 | 1·4 |
| *Variety* S-8 | | | | | |
| *Bigger grain size mutont* | | | | | |
| 60 kR gamma-rays | 5·7 | 17·35 | 24·1** | 2·3** | 1·5 |
| *High yielding mutant* | | | | | |
| 40 kR gamma-rays | 14·0** | 15·91 | 21·9* | 1·7* | 1·9 |
| 60 kR gamma-rays | 9·5** | 21·18 | 22·1** | 1·6** | 1·5 |
| *Large number of pod mutant* | | | | | |
| 40 kR gamma-rays | 13·0** | 17·28 | 25·7* | 2·8** | 2·4** |
| 60 kR gamma-rays | 9·9** | 20·02 | 24·1** | 2·3** | 1·8 |
| *Long pod mutant* | | | | | |
| 60 kR gamma-rays | 10·0** | 18·87 | 25·0** | 2·0* | 2·1* |
| Control | 5·7 | 18·51 | 20·2 | 1·2 | 2·0 |

* Significant at 5%, ** Significant at 1%.
Yield value represents average of twenty plants.
Estimations represent average of five samples.

1. Sigurbjornsson, B., *IAEA*, Vienna, 1972, p. 3.
2. Singh, V. P. and Chaturvedi, S. N., *Genetica Agraria*, 1980, **34**, 331.
3. *A.O.A.C.*, 130, Washington, DC 20044, 1975.
4. McCarthey, T. E. and Pallle, M. M., *Biochem. Biophys. Res. Commun.*, 1959, **1**, 29.
5. Spices, J. R. and Chamber, D. C., *Analytical Chemistry*, 1949, **21**, 1249.