KAUL, M.L.H. and BHAN, A.K. 1974. Studies on some genetic parameters of rice. **Theor. appl. Genet.**, **44**, 178-183.

LATIF, A., and ZAMAN, S.M.H. 1965. A study on heritability of four yield contributing characters of rice. **Pakist J. biol. agric. Sci.**, 8 : 219-225

NAGESHA, K, 1976. Biometrical studies in short duration types of rice (**Oryza sativa** L.) M.Sc. Ag. Thesis, Tamil Nadu Agrl. University, Coimbatore.

NATARAJAMOORTHY, K, 1979. Studies on the influence of three selection indices on yield and yield components of (**Oryza sativa**) M.Sc. (Ag) Thesis, Tamil Nadu Agrl. University, Coimbatore.

PANSE, V.G. and SUKHATME, P.V. 1961. **Statistical Methods for Agrl. Workers** 2nd Ed., ICAR, New Delhi.

RANGANATHAN, T.B., SREE RANGASAMY, S.R. and MADHAVA MENON, P. 1973. Genetic investigations on duration of flowering and yield in semi-dwarf varieties. **Int. Rice commn. Newsl.**, **22**: 31-43.

RAVINDRANATH, B., PERAIAH, A. SREE RAMA REDDY, N., SUBRAMANYAM, D., RAMAYYA, B. and MURTHY, K.R.K. 1983. Studies on Genetic variability, heritability and genetic advance for yield and its components in rice. **Andhra agric. J.**, **30**: (1): 26-28.

SHANMUGASUNDARAM, P. 1975. Studies in the inter-varietal crosses in Rice (**Oryza sativa** L.) M.Sc (Ag) Thesis Tamil Nadu Agrl. University, Coimbatore.

SIVASUBRAMANIAN, S. and MADHAVA MENON, P. 1973a. Genotypic and phenotypic variability in rice. **Madras Agric. J.**, **60**: 1093-96.

SIVASUBRAMANIAN, S. and MADHAVA MENON, P. 1973b. Inheritance of short stature in rice. **Madras Agric. J.**, **60**: 1129-1133.

SUKANYA SUBRAMANIAN and MADHAVA MENON P. 1973. Pattern of variation in plant attributes and yield in the hybrids of rice. (**Oryza sativa** L.) **Madras Agric. J.**, **60**: 1118-1124.

VERMA, A.K., CHANDRA, J.K. and HAQUE, M.F. 1977 Genotypic and phenotypic variability for quantitative characters in rice. **Proc. Bihar Acad. Sci., Silver Jubilee Issue**, **25**: 8-15.

Madras Agric. J. 77, (9-12): 501-504 (1990)

https://doi.org/10.29321/MAJ.10.A02006

# INDUCED DARK BROWN MUTANT IN MOTHBEAN

A. HENRY[1] and H.S. DAULAY[2]

Central Arid Zone Research Institute, Jodhpur - 342 003

## ABSTRACT

Seeds of 'Jadia' variety of mothbean (**Vigna aconitifolia** (Jacq) Marechal) were treated with aqueous solution of 0.3% Ethyl Methane Sulphonate (EMS). Four mutants having dark brown seed coat colour, increased number of pods and early in maturity with varying plant characteristics were isolated in M 2. The mutants were studied further upto M 6 generation and the segregation not conforming to the mutant plant types were discarded and tested during kharif along with parent and superior checks. It was observed that mutants JMM-DBS-1, JMM-DBS-2 and JMM-DBS-3 consistently maintained their superiority in early maturity, higher number of pods per plant and maintained dark brown seed coat colour as compared to its parent Jadia and check Jwala having buff seed coat colour under varying rainfall situations. It is suggested that these JMM-DBS mutants could be utilized as genetic marker in future hybridization programmes.

KEY WORDS : Moth bean, Mutant, Seed Coat.



Mothbean (*Vigna aconitifolia* (Jacq) Marechal) is one of the drought tolerant grain legumes grown mostly in arid zone of India. The seeds are rich in protein (22-24%) and used either whole or split, as a pulse. It is also a quality forage under arid and semi arid conditions (Henry and Singh, 1985). Existing varieties are chosen more for their survival under conditions of acute moisture stress of 'Thar desert' than for higher productivity. Smartt (1985) concluded that moth bean crop is still existing in undomesticated form. The technique of mutation breeding offers a wide scope for genetic improvement of mothbean in which limited narrow genetic variability is available (Henry and Daulay, 1983).

[1]Scientist S-2 (Plant Breeding) [2]Scientist S-4 (Agronomy)

Table 1. Details of the mutants isolated in M 2.

| Mutant Number or parent | Description | Peduncle length (cm) | Mean number of pods per plant | Seed yield per plant (g) | Maturity (days) |
|---|---|---|---|---|---|
| Jadia (parent) | Spreading plant type, late maturity, buff seed colour | Short | 20.3 | 3.0 | 75 |
| JMM-DBS 1 | Semi-spreading plant type, early maturity,dark brown seed | Short | 39.6 | 5.9 | 68 |
| JMM-DBS 2 | Semi-spreading, early maturity,dark brown seed | Intermediate | 38.4 | 5.7 | 69 |
| JMM-DBS 3 | Semi-spreading, medium maturity, dark brown seed | Long | 37.2 | 5.5 | 70 |
| JMM-DBS 4 | Spreading, medium maturity, dark brown seed | Long | 36.3 | 5.4 | 72 |

The present mutation breeding programme was taken up to identify mutants with high yield potential, early maturity besides possessing drought resistance and distinct marker genes to identify the same from the parental type. Such a diversified genetic variability could be a valuable source in future breeding programme.

## MATERIALS AND METHODS

Seeds of Jadia selection, a well adapted cultivar of the region were treated with 0.3 percent aqueous solution of EMS for six hours after 14 hours presoaking in water. The M 1 derived plant progeny were raised as M 2 generation progeny rows. The individual variants were isolated in M 2 generation for various desirable attributes. Deviants with alteration in seed coat colour (dark brown), varying peduncle length, higher number of pods and early maturity were advanced to M 3 (1983) to M6 (1986). The segregants not conforming to the mutant plant types were discarded from the mutant population in each generation. The mutants were tested during kharif along with parent and other local type in these generations (1984-1986) in RBD replicated 4 times. The plot size intra row spacing of 50 and 10 cm, respectively. The crop received a basal dressing of 20 kg N and 40 kg $P_2O_5$ per hectare during all the seasons.

## RESULTS AND DISCUSSION

The population in the M 2 generation was 16,130. Four plants characterized by (a) dark brown seed coat colour with short peduncles (1-1.5 cm), (b) dark brown seed coat colour with intermediate peduncle length (2-3 cm), (c) and (d) dark brown seed coat colour long peduncles (3.1-5.0 cm) were isolated. All these plant types had higher number of pods per plant, early in flowering and in maturity except the last one. Though alteration in above mentioned traits was observed in M 2 population, complete stabilization of the induced changes could be achieved through selection in subsequent generations. The salient features of the variants isolated in the M 2 generation and parent are presented in Table 1. The selected mutant plant types showed a shift in the growth habit of plant from spreading to more compact plant type together with an increase in number of pods per plant and change in seed coat colour from buff to dark brown. However, the frequency of these mutant plant types was low considering the large size of the M 2 population raised. The data on the relative performance of different mutants with higher number of pods, early in maturity and dark brown seed colour selected, in the succeeding M3, M4, M5 and M6 generations based on their superiority over the parent

**Table 2. Relative performance of the mutants, parent and high yielding check.**

| Mutant or check | M 3 1983 (373 mm)* | | | M4 1984 (231 mm) | | | M5 1985 (138 mm) | | | M6 1986 (194 mm) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | pod number / plant | Seed yield (kg/ha) | Maturity (days) | Pod number / plant | Seed yield (kg/ha) | Maturity (days) | Pod number / plant | Seed yield (kg/ha) | Maturity (days) | Pod number / plant | Seed yield (kg/ha) | Maturity (days) |
| JMM-DBS 1 | 42.2 | 720 | 81 | 25.2 | 440 | 83 | 15.6 | 105 | 73 | 29.5 | 420 | 64 |
| JMM-DBS 2 | 35.4 | 730 | 79 | 26.4 | 450 | 81 | 13.6 | 92 | 72 | 28.6 | 410 | 66 |
| JMM-DBS 3 | 37.6 | 697 | 83 | 22.6 | 400 | 84 | 14.0 | 80 | 75 | 27.3 | 380 | 68 |
| JMM-DBS 4 | 32.2 | 620 | 85 | 20.2 | 370 | 85 | 13.2 | 70 | 77 | 25.3 | 365 | 67 |
| Jadia (parent) | 23.6 | 551 | 87 | 14.5 | 312 | 87 | 10.1 | 58 | 80 | 19.5 | 303 | 72 |
| Jwala (high yielding check) | 25.3 | 580 | 89 | 16.3 | 329 | 86 | 8.9 | 49 | 79 | 18.5 | 289 | 70 |
| SEm± | 0.7 | 29.7 | | 0.5 | 17.0 | | 0.6 | 2.8 | | 0.8 | 12.8 | |
| CD 5% | 2.1 | 86.1 | | 1.3 | 49.4 | | 1.7 | 8.1 | | 2.2 | 37.8 | |

* Rainfall received

the Jwala, a high yielding check variety (Henry and Singh, 1985), are presented in Table 2. All the four mutants maintained their superiority over the parent and check variety under fluctuating environmental conditions. However, the mutants JMM-DBS 1 and JMM- DBS 2 exhibited more pronounced effect on increase in pod number, earliness in maturity and seed yield than the other two. The performance of the mutants was very impressive during kharif 1985 and 1986 when the rainfall quantum as well distribution were very less and erratic. Moreover, drought conditions prevailed during these years provided a good selection sieve for screening the material for tolerance to high degree of moisture stress.

A comparative account of mutant JMM-DBS 1, parent Jadia and check variety Jwala is given in Table 3 based on 4 years data (1983- 1986). It is clear that mutant JMM-DBS 1 attained maturity earlier than the parent besides recording 37 per cent increased yield. This is due to 66 percent increased pod number than the number. However, there was slight reduction in the 1000 grain weight of the mutant over the parent Jadia. Subramaniam (1980) and Henry and Daulay (1983) also reported significantly higher grain yield in pyramid shaped mutant of mothbean evolved through gamma irradiation and JMM 60, JMM 211 and JMM 259 through chemical mutagen, EMS.

The present investigation that Jadia moth mutants having induced dark brown seed coat colour consistently maintained its superiority in early flowering and maturity, higher number of pods per plant

**Table 3. Mean performance of JMM-DBS, Jadia and Jwala under dryland conditions (Mean of 4 years 1983- 1986)**

| Mutant / variety | Days to 50% flowering | Days to maturity | Pods per plant | 1000 seed weight (g) | Seed yield (Kg/ha) |
|---|---|---|---|---|---|
| JMM-DBS 1 | 42.5 | 75.3 | 28.1 | 27.0 | 421 |
| Jadia | 49.3 | 81.5 | 16.9 | 28.7 | 306 |
| Jwala (IPCMO 926) | 47.5 | 81.0 | 17.3 | 27.9 | 312 |

and purity in dark brown seed coat colour compared to its parent Jadia. It is suggested that these mutants, JMM-DBS, could be used as genetic marker in future genetic improvement programmes in mothbean.

ACKNOWLEDGEMENT

The authors are grateful to (late) Director Dr. K.A. Shankarnarayan, Central Arid Zone Research Institute, Jodhpur for providing necessary facilities.

REFERENCES

HENRY, A. and DAULAY, H.S. 1983. Performance of induced mutants in mothbean. **Indian J. Genet.** 43: 342-344.

HENRY, A. and SINGH, R.P. 1985. Mothbean. In **"Efficient Management of Dryland Crops"** Ed V. Balasubramanian and Venkateswarlu, J Central Research Institute for Dryland Agriculture, Hyderabad (AP), India, pp 199-207.

SMARTT, J. 1985. Evolution of grain legumes III Pulses in the genus Vigna. **Expl. Agric.**, 21: 87-100.

SUBRAMANIAM, D. 1980. Effect of gamma radiation in Vigna. **Indian J. Genet.**, 40: 187-194.

Madras Agric. J. 77, (9-12): 504-505 (1990)

# STABILITY OF YIELD IN FOXTAIL MILLET

R.H. PATEL, B.M. NAIK, M.S. DESAI and K.G. PATEL

ABSTRACT

Variety x environmental components was highly significant indicating differential response of varieties over environments in foxtail millets. Stability analysis indicated SIA-9, Arjun and Co 5 had better adaptation to unfavourable environment while SLA 2566 and SLA 326 had high performance and adapted to favourable conditions.

KEY WORDS : Foxtail millet, stability, correlation.

In India, Karnataka, Tamil Nadu, Uttar Pradesh, Andhra Pradesh, Maharashtra, Bihar, Orissa and Gujarat are the main minor millets growing states. Other millets such as *Vari, Banti, Kang* and *Cheeno* occupy about 58000 ha in Gujarat with a productivity ranging from 380 to 540 kg/ha. These small millets are mainly grown as kharif rainfed crop in the less fertile hilly soils by tribals and areas adjoining to hilly tracts. The breeding work for foxtail millet is very scanty. However, phenotypic stability in certain varieties of foxtail millet was worked out by Appadurai *et al.* (1978) Thus, attempt has been made to assess the productivity of some promising genotypes of foxtail.

## MATERIALS AND METHODS

Six genotypes of foxtail millets including check (local) were evaluated from 1984-85 to 1986-87 at Hill Millet Research Station, Gujarat Agricultural University, Waghai. The experimental design was randomized block with three replications. All the genotypes were grown in 10 row plots spaced at 22.5 cm, and plant-to-plant distance was 7.5 cm. Basal dose of fertilizers of 20:10:00 NPK/ha and top dressing with 20 kg N/ha was applied. Data on yield were averaged over replications. In first step of analysis, data were analysed following standard statistical analysis for RBD (Singh and Chaudhari, 1977). Stability parameters were estimated following the methods proposed by Eberhart and Russell (1966).

## RESULTS AND DISCUSSION

Stability analysis was carried out since variety x environmental component was highly significant indicating differential response of the varieties over environments.