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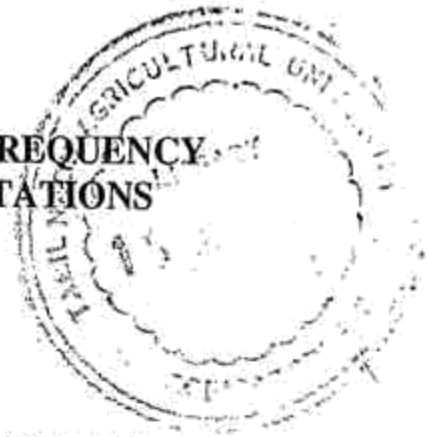

# INDUCED MUTATIONS IN FIELD LABLAB: FREQUENCY AND SPECTRUM OF CHLOROPHYLL MUTATIONS

A. LOURDUSAMY and R.RATHNASWAMY
School of Genetics
Tamil Nadu Agricultural University
Coimbatore 641 003

**ABSTRACT**

Mutations were induced in three genotypes (CO 2, DPI 1281 & DL 3196) by gamma rays (10,20 and 30kR). Four different chlorophyll mutations were observed in M2 generation *viz., albina, chlorina, viridis* and *xantha*. The rate of chlorophyll mutation increased with increase in dosage of gamma rays both in M1 plant basis and M2 seedling basis except in CO 2 where the rate of chlorophyll mutation showed a slight decline at the higher dose of 30 kR on M1 plant basis.

KEY WORDS: *Lablab purpureus* (L.) Sweet var. *lignosus*,Frequency and Spectrum of Mutations, Gamma Rays

The mutagenic efficiency of any given mutagen is fully explicit only from the frequency of induced mutations (Gustafsson, 1963; Swaminathan *et al.*, 1967). For effective comparison, the rate of chlorophyll mutation also indicated the sensitivity of organism to the mutagen (Natarajan, 1964). In the present study, varietial sensitivity to the gamma rays has been observed in field lablab, *Lablab purpureus* (L.) Sweet var. *lignosus*

## MATERIALS AND METHODS

Seeds of three lablab genotypes (CO 2, DPI 1281 and DL 3196) were irradiated with 10,20 and 30 kR gamma rays at the cobalt-60 intensive gamma source installed at the school of Genetics, Tamil Nadu Agricultural University, Coimbatore. For each dose, 160 seeds in each of the three genotypes were irradiated. The treatments were given for various durations depending on the dose desired, the duration of irradiation being 12.3 seconds/KR. Treated seeds were sown during August-December, 1988 in the field adopting a spacing of 45 cm x 30 cm in four replications using single seed per hill. Seeds of M1 plants were sown for scoring chlorophyll mutations. The treatments and controls were raised in a randomised block design, replicated thrice. Mutation frequency per 100 M1 plants was calculated. The total number of mutants and normal seedlings were counted both segregating and non-segregating M1 families to compute the mutation frequency per 100 M2 seedlings. The number of plants segregating for single and multiple mutational events were counted and the number of segregating families in M2 was computed. The chlorophyll mutants were classified according to the system proposed by Gustafsson (1940) and Blixt (1961). The various classes of chlorophyll mutants were scored separately for the computation of the spectrum of relative percentages of different types of mutants.

## RESULTS AND DISCUSSION

Mutation frequency was highest in lablab on M1 plant basis and was lowest on M2 seedling basis. In the genotype CO 2, the chlorophyll mutation frequency showed an increasing trend and it reached and maximum at 20 KR and slightly decreased at 30 KR in M1 plant basis. But in M2 seedling basis, the rate of chlorophyll mutation showed an increasing trend with the increase in doses. In DPI 1281 and DL 3196, the rate of chlorophyll mutation on the basis of both M1 plant basis and M2 seedling basis increased with increase of dosage of gamma rays (Table 1 ). The highest mutation frequency obtained in the present study on M1 plant basis was in concurrence with the results of Rathnaswamy (1975).

Multiple mutation has been reported in various plant species such as rice (siddiq, 1967) and barley (Hansel, 1967). As the dosage increased, the frequency of plants segregated for two types of mutations decreased, but the frequency of single mutation increased (Table 2 ). In CO 2 only three types *viz. xantha, chlorina* and *viridis* appeared at the doses of 10 KR and 20 KR while only at 30 KR all the four types occurred. The occurrence of *albina* in higher dose of gamma rays was in accordance with the reports in bengal gram

Table 1. Frequency and spectrum of different chlorophyll mutants in various treatments of field lablab varieties in $M_2$ generation

| Genotype and Dose (kR) of Gamma rays | Mutation frequency (%) | | Spectrum of chlorophyll mutations (%) | | | |
|---|---|---|---|---|---|---|
| | segregating M1 plants | M2 seedlings | *albina* | *xantha* | *chlorina* | *viridis* |
| CO 2 | | | | | | |
| 10 | 40.00 | 2.54 | - | 8.57 | 82.86 | 8.57 |
| 20 | 54.06 | 3.47 | - | 5.26 | 73.68 | 21.05 |
| 30 | 47.62 | 4.77 | 2.56 | 17.95 | 76.92 | 2.56 |
| DPI 1281 | | | | | | |
| 10 | 32.65 | 2.37 | - | 12.50 | 62.50 | 25.00 |
| 20 | 33.87 | 3.10 | - | 25.45 | 70.91 | 3 64 |
| 30 | 66.67 | 5.34 | - | 15.25 | 61.02 | 23.73 |
| DL 3196 | | | | | | |
| 10 | 53.42 | 3.80 | 8.45 | 8.45 | 43.66 | 39.44 |
| 20 | 58.18 | 4.40 | - | 15.07 | 46.58 | 38.44 |
| 30 | 59.09 | 5.38 | 2.08 | 20.83 | 41.67 | 35.42 |

Table 2. Frequency and percentage of M1 plant progenies segregating for single and multiple chlorophyll mutations

| Genotype and Dose (kR) of Gamma rays | Total No. of M1 plants segregating two type | Total No. of chlorophll mutants | Plant progenies segregating for mutation of | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Frequency | | | Relative percentage | | |
| | | | One Type | Two Type | More than Two Type | One Type | Two Type | More than Two Type |
| CO 2 | | | | | | | | |
| 10 | 18 | 35 | 1 | 17 | - | 5.56 | 94.44 | - |
| 20 | 20 | 38 | 8 | 12 | - | 40.00 | 60.00 | - |
| 30 | 10 | 39 | 8 | 2 | - | 80.00 | 20.00 | - |
| DPI 1281 | | | | | | | | |
| 10 | 16 | 32 | 4 | 12 | - | 25.00 | 75.00 | - |
| 20 | 21 | 55 | 12 | 9 | - | 57.14 | 42.86 | - |
| 30 | 22 | 59 | 14 | 8 | - | 63.64 | 36.36 | - |
| DL 3196 | | | | | | | | |
| 10 | 39 | 71 | 33 | 5 | 1 | 84.62 | 12.82 | 2.56 |
| 20 | 32 | 73 | 28 | 4 | - | 87.50 | 12.50 | - |
| 30 | 13 | 48 | 12 | 1 | - | 92.31 | 7.69 | - |

(Vadivelu, 1979). In DPI 1281, only three types of chlorophyll mutations appeared in all the three doses. *Albina* occurred in CO 2 and DL 3196 and not is DPI 1281. In general *chlorina* was found to be maximum followed by *viridis* and *xantha*. Occurrence of more *chlorina* in this study was in agreement with the earlier reports.

The spectrum of chlorophyll mutations in all the three genotypes differed considerably from each other. In CO 2 , higher dose of 30 KR induced wider spectrum where as in DL 3196 the spectrum was wider both at lower and higher doses. In DPI 1281 *albina* was not noticed. Spectrum of chlorophyll mutations were wider for genotypes CO 2 and DL 3196. However, chlorophyll mutation frequency was lower in CO 2. Spectrum was narrow for DPI 1281. However, the frequency of chlorophyll mutation was higher in DPI 1281. The particular type of chlorophyll mutants were predominant in certain genotype. For instance *albina* occurred only in DL 3196 and CO 2. This indicated genotype specificity in producing a particular mutant type in lablab as in black gram (Soundrapandian, 1978).

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# PHENOTYPIC STABILITY IN RICE

L.D. VIJENDRA DAS, N. SHUNMUGAVALLI and P. VELUSWAMY

Department of Agricultural Botany
Agricultural College and Research Institute
Killikulam, Vallanad 627 252

**ABSTRACT**

A field study was conducted for four metric traits with 15 genotypes of rice in four significantly different environments *viz kar* 1989, *kar* 1991, *Pishanam* 1991 and advance *kar* 1992. The genotype ACK 85 which is a natural mutant from IR 50, could be recommended for favourable environments in view of its above average stability for plant height, productive tillers and grain yield.

KEY WORDS : Rice, Phenotypic Stability

Phenotypically stable varieties are usually sought for commercial production of crop plants. In any breeding programme, it is necessary to screen and identify phenotypically stable genotypes which could perform more or less uniform under different environmental conditions with high mean performance. Rice is grown under widely different edaphic and environmental conditions in Tamil Nadu and it is known to exhibit a high degree of genotype- environment interaction. There is, therefore, a need to develop varieties with stable performance over a wide range of environmental conditions. The present study was taken up to evaluate promising breeding lines and varieties of rice in four different environments to identify high yielding and stable genotypes.

## MATERIALS AND METHODS

A total of ten promising breeding lines and five cultivated varieties of rice was raised in four seasons *viz., kar* 1989, *kar* 1991, *pishanam* 1991 and advance *kar* 1992 at the Agricultural College and Research Institute, Killikulam under randomised block design with three replications. The plot size was 5 x 4 m with the spacing of 15 x 10 cm. Stability parameters were worked out using Ebehart and Russell (1966) and Katiyar (1988) models with the means of four metric traits *viz.*, plant height, days to maturity, productive tillers and grain yield.

## RESULTS AND DISCUSSION

Pooled analysis of variance revealed the existence of significant genetic differences among the genotypes for all the four metric traits. The environment appeared to be significantly different from one another as the mean square component due to environment was highly significant (Table 1). The genotypes interacted significantly with the environment. The results were in confirmity with the earlier reports of Ganesh and Soundara Pandian (1988).