SHORT COMMUNICATION

Oryza Vol. 48. No. 4, 2011 (378-379)

Chlorophyll mutation in M_2 as an indicator for recovering useful mutants in rice

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ABSTRACT

Rice variety Kalanamak KN3 was treated with 0.25% and 0.50% doses of Etyhl Methane Sulfonate. In M_2 generation single plant progenies were separated into two groups. Progenies showing chlorophyll mutation namely albina, xantha, chlorina, zebra etc. were put in first group and remaining ones in the second group. Progenies in M_3 generation emanating from the first group had much higher and broad spectrum of mutants and only M_2 progenies with any type of chlorophyll mutants should be advanced.

Key words: *rice, mutation breeding, chlorophyll mutants, selection efficiency*

It is well known and non-controversial fact that mutagens create all sorts of genetic variability in the treated population. But selecting economically useful mutants out of the induced genetic variability is a hard task to be performed by the plant breeders (Till, 2010). It is no less than searching a needle out of heap of straw. To help alleviate this situation an experiment was conducted. Dehusked seeds (kernel) of rice variety Kalanamak (Table 1) were treated with 0.50 % and 0.25 % doses of mutagen Ethyl Methane Sulfonate (EMS). Seeds treated for 8 hours were washed, first with running tap water followed by 1 % solution of chemical scavenger Sodium Thiosulphate (Chaudhary, 1979). M_1 was raised and seeds from first 3 panicles were collected to overcome chimeric effect (Chaudhary et al., 1978). These were bulked on individual plant basis. Out of all the progenies 98 in 0.50% and 25 in 0.25% showed various chlorophyll mutants. These were very visible for the first 2 weeks after germination and were marked. All the seedlings from these progenies were transplanted on individual plant basis. About 240 seedlings were transplanted from the progenies showing no chlorophyll mutation. Plants were observed through the growing season and observations were recorded. Single plants which appeared different from the normal Kalanamak KN 3 (Table 1) were selected. Seeds from the first 3 panicles were harvested and bulked on individual plant basis. These were advanced to M_3 generation.

Only economically useful mutants namely short statured, high tillering, good leaf colour and resistant to

Table 1. Morpho-agronomic characters of Kalanamak KN3

Agronomic trait	Description
Basal leaf sheath colour	Green
Seedling vigour	Vigorous
Seedling height (cm)	30.5 cm
Tillering ability	8-10 tiller/plant
Culm angle	Slightly Open
Leaf length	59 cm.
Leaf width	1.4 cm.
Culm length	111 cm.
Plant height	142 cm.
Panicle length	31 cm.
Maturity	145 days (Photoperiod sensitive)
Aroma (scent code)	Highly scented
Panicle type	Open
Panicle exertion	Well exerted
Apiculus colour	Brown (tawny)
Awning	Absent
Lemma, palea colour	Purplish Black
Stigma colour	Purplish Black
Husk colour	Black
Kernel length	5.76 mm.
Kernel width	2.18 mm.
L/B ratio	2.64 mm.
Grain type	Medium Slender
Kernel colour	White
1000 grain weight	15 gm.
Hulling	80%
Milling	75%
Head rice	70%
Alkali value	6-7
Volume expansion ratio	4.5
Gel consistency	80 mm.
Amylose content	22%

pests and diseases were selected in M3 generation. Selections were made throughout the life cycle of the plants in both the populations (Table 2).

Table 2. Type of economically important mutants isolated in M_3 and M_4 generations of the populations showing or not showing chlorophyll mutants in M_2

Mutant type	Chlorophyll mutant		Non-Chlorophyll mutant	
	0.50%	0.25%	050%	0.25%
Semi-dwarf (< 100)	7	1	3	0
Dark green leaf	2	1	0	0
Medium tiller (10-15)	9	3	0	0
High tiller (> 25)	1	1	0	0
Brown spot resistant	7	0	0	0
Bacterial blight resistant	2	1	0	0
Stem borer resistant	12	5	3	0
Leaf folder resistant	6	3	3	0

Based on the selections made in the progenies emanating in two groups separated in M_2 (Table 2), it may be concluded that selection may be done in progenies showing any type of chlorophyll mutants. Chlorophyll mutants indicate genetic change in the progeny and structure of rice plant being chimeric (Nanda *et al.* 1974, Chaudhary *et al.* 1978), agronomically useful mutants may be expected in such progenies. The M_2 progenies showing no chlorophyll mutation may be discarded as these are less likely to yield any economically useful mutants. Rejecting such progenies will save lots of time of the plant breeder and field resources (Till, 2010) and will make mutation breeding more efficient.

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