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Induced Mutations for Pale Yellow Flower colour in *Brassica juncea* (Linn.)Coss & Czern. Cv. Varuna

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ABSTRACT:
Brassica juncea (Linn.)Coss & Czern. Cv. Varuna belongs to family brassicaceae of dicotyledons. It is a major oil yielding crop plant, commonly known as Indian mustard. Since, it contains about 35-40 % oil, it has great importance to Indian economy and stood third rank in oilseed production. In order to induce variabilities, mutations study was undertaken on *B. juncea* cv. Varuna. Both chemical and physical mutagens were used. Ethyl methane sulfonate , sodium azide and gamma radiations were used as chemical and physical mutagen,respectively.Dry and water pre-soaked (PSW) seeds were treated with different doses of EMS and SA. Dry seeds were exposed to different doses of gamma radiations. Among many induced mutants , Pale Yellow Flower colour was prominent and was recorded in 0.02% M2 mutation frequency in 18h PSW + 6h 0.01% SA treatment dose. Pale Yellow Flower colour mutant was linked with yellow seed coat colour character in *B. juncea* cv. Varuna . Pale Yellow Flower colour mutant had more proteins and reduced crude fibre, however, the level of glucosinolate and erucic acid remains unchanged . In M3 generation, Pale Yellow Flower colour mutant breeds true.

KEY WARDS: Induced Mutations, Pale Yellow Flower colour, EMS , SA & gamma radiations , *Brassica juncea* (Linn.)Coss & Czern. Cv. Varuna , yellow seed coat colour.

INTRODUCTION :-

Brassica juncea (Linn.) Coss & Czern. CV. Varuna belongs to the family Brassicacea of dicotyledons. It is major oil yielding crop plant grown extensively as oilseed crop in India. *Brassica juncea* commonly known as Indian mustard. In India, it ranks third in production as edible oilseed. It yields about 35 to 40% oil. In addition to oil, it also contains protein, which is of no use since it contains cyanogenic compound, glucosinolate. The usages of mustard is restricted due to the presence of higher content of glucosinolate in mustard meal and high percentage of erucic acid in oil. During improvement programme attempts, were made through induced mutagenesis to improve varuna variety of *B. juncea* for its quality & quantity. Many morphological and bio-chemical mutants were also induced. Among morphological mutants yellow seed coat colour, Appressed pod\, good plant type, chlorophyll deficient, waxy bloomless, early flowring and pale yellow flower colour, were induced in different frequencies in M_1 & M_2 generation, respectively. Pale yellow flower colour mutant first time induced in *B. juncea* cv. Varuna. This trait is linked with yellow seed coat colour characters. In the present presentation different parameter associated with pale yellow flower colour are discussed.

MATERIALS AND METHODS :-

In order to create variabilities in *B. juncea* cv. Varuna both chemical and physical mutagens were used. Ethyl methane sulfonate (EMS) and sodium azide (SA) were used as chemical mutagens while gamma radiations as physical mutagen. Genetically pure and physiologically active dormant, uniform sized seeds of diploid (2n=36) *Brassica juncea* cv Varuna were used as experimental material. Dry and water pre-soaked (PSW) seeds were treated with different doses of EMS and SA (table- 01). Dry seeds with 3.24% moisture content were used for chemical mutagen treatments as well as for different doses of gamma radiations. All mutagen doses were based on pre LD 50 determination. Water pre-soaked and mutagen treatments were carried out at $24^0 \pm 2^0{}_c$ temperature with continuous shaking in growth chamber. Glass double distilled water was used for water pre-soaking. The water pre-soaking period was 12 hr and 18 hr .Water pre-soaked seeds were surface dried and transferred to freshly prepared mutagen solution for mutagen treatments. Every mutagen doses maintains with control (non-treated) seeds. At the termination of mutagen treatment, seeds were washed in running water and soaked in 100ml of glass double distilled water for 1hr under continuous shaking. After post treatment washing, seeds were sown to raise M_1 generation. M_1 population was screened for different morphological variants during growing period, at maturity M_1 population was harvested plant wise. The M_1 population seeds were sown to raise M_2 generation, during growing period of

M_2 population different morphological variants were recorded. At maturity, M_2 population was harvested plant wise and these seeds were subjected to biochemical analysis for proteins; fiber content, oil percentage, glucosinolate level and erucic acid content. Selected promising plants of M_2 population for morphological and biochemical variants were sown to grow M_3 generation.True breeding nature of these variants were studied in M_3 generation and those breeds true in M3 generation were recognized as mutants. Various recognized mutants are, different chlorophyll deficient , Yellow seed coat colour, Appressed pod , Waxy bloomless, early flowering and pale yellow flower colour ,good plant type ,high protein content and low fibre content.

RESULTS AND DISCUSSION :

Pale yellow flower colour was recorded in the present investigation in 18 hr water pre soaked ,6 hr SA treatment , only lower concentration of SA (0.01%) was found to be effective (Table -01) No other treatment of EMS and gamma radiations induced such type of mutation. The frequency of Pale yellow flower colour mutation was 0.02 %. The flower colour deviates from normal to pale yellow with yellow seed coat colour. Association of flower colour mutation with yellow seed coat colour in the present study is interesting . Fowler and Stefansson (1975) reported the flower colour mutation in *B. napus* for yellow to white in EMS treated population. Pale yellow flower colour is of great importance in plant breeding, particularly to determine the out crossing (Pandey and Singh ,1971) as well as for genetic marker for yellow seed coat colour . This mutant was investigated for different morphological and bio-chemical characteristics . It appeared little improved in respect of quality, however, had considerably high yield compared to control. Pale yellow flower colour mutant had more protein and reduced crude fibre, however , the level of glucosinolate and erucic acid remain unchanged.

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Treatments/doses	Total No. plants harvested	Pale yellow flower colour M2 mutant scored
Dry control	4500	-
Dry 18hr SA 0.004%	4290	--
0.006%	4470	-
0.008%	4380	-
Dry control	4500	-
Dry 18hr EMS 0.006%	4230	-
0.008%	4350	-
0.01%	4290	-
12hr PSW control	4500	-
12 hr PSW+6hr SA 0.01%	4425	-
0.02%	4410	-
0.03%	4500	-
12hr PSW control	4500	-
12hr PSW+6hrEMS 0.01%	4425	-
0.02%	4410	-
0.03%	4500	-
18hr PSW control	4500	-
18 hr PSW+6hr SA 0.01%	4500	01(0.02)
0.02%	4455	-
0.03%	4410	-
18hr PSW control	4500	-
18 hr PSW+6hr EMS 0.01%	4425	
0.02%	4305	-
0.03%	4395	-
Dry control		
10kR	6000	-
20kR	4455	-
30kR	4500	-
40kR	4410	-
	4425	-

Table -01. Showing the mutagen treatments and M2 mutation frequency .

Characteristics	Control Varuna	Pale yellow flower colour mutant
Days to flower	45	42
Plant height (cm)	110	134
Branches per plant	11	13
No. of siliqua per plant	160	175
Siliqua length(cm)	5	6
Seeds per siliqua	10	12
Seed colour	Brown	Yellow
1000 seed weight(gm)	3	3.3
Glucosinolate level	+++	++
Erucic acid present/Absent	P	P
Crude protein content(%)	35	36.7
Crude fibre content(%)	9-10	8.8

Table 02: Showing the characteristics of control and pale yellow flower colour mutant.

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