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INDUCTION OF VARIATIONS FOR QUANTITATIVE CHARACTERISTICS IN *BRASSICA CAMPESTRIS* L THROUGH SODIUM AZIDE

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ABSTRACT:
*Brassicacampestris*L. is not the crop of Vidarbha region. Hence, efforts were taken for the acclimatization and creating variations in quantitative traits of this crop through induced mutation for first time in this region. Sodium azide was selected as mutagen. Physiologically similar seeds were treated with different concentrations of sodium azide. Dry and Pre-soaked seeds were utilized for mutagenic treatments. Mutagen doses were determined on the basis of LD_{50}.Treated seeds were used to raise M_1 generation. M_1 plant progeny was individually screened at vegetative and maturity state for morphological characters viz. number of leaves / plant , length and breadth of leaves, number of branches (primary, secondary and total) per plant, number of pods / plant, pod size, number of seeds / pod, seeds weight i.e. single and 100 seeds weight were carried out on plant wise basis. The Results obtained indicate that considerable variation with respect to growth and yield components of *B. campestris* control and treated plants. 0.04%, 0.06% and 0.08% SA was found to be more effective in creating variations in morphological characters and seed yield at M_1generation.

Keywords: *Brassica campestris L., Dry and pre-soaked seeds, Mutagen, Sodium azide.*

INTRODUCTION:

Mustard seeds / Rapeseed is the third leading source of vegetable oil in the world after Soybean and palmoil. Rape or mustard seeds was primarily used for human consumption because of low erucic acid and thus becoming desirable edible oil.[1] Availability of genetic variability is prerequisite for any breeding program. Besides conventional methods induced mutations has been extensively used for creating new genetic variations in crop plants. Literature reveled that more than 2200 mutant varieties of different crops with improved agronomic traits have been developed and released to the farmers for general cultivation all over the world [2]. Induction of mutation for low glucosinolate with ethyl methyl sulphonate (EMS),sodium azide (SA) and gamma radiations in *B. juncea* cv varuna had been demonstrated [3]. Induction of "00" characteristics in *B. juncea* cv. Pusa bold through induced mutation besides zero erucic acid and low glucosinolate level there were alteration of oil content, protein and crude fiber[4].Most demarcating feature of mutant $BJSNM_{200}$ showed presence trichomes which were originated from epidermal layer of leaf [5].Mutant line $BJSNM_{200}$ had low glucosinolate level (++), high oil (40.60%) and protein percentage (32.91%) [6]. It is known that various chemicals have positive or negative effects on living organisms. Chemical mutagen generally produce induced mutation which lead to base pair substitution especially GC:AT (guanine: cytosine. adenine: thymine) resulting in amino acids changes , which change the function of proteins but do not abolish their functions as deletions or frame shift mutations [7]. These chemo mutagens induced a broad variation of morphological and yield structure parameters in comparison to normal plants. Sodium azide (NaN3), which has been demonstrated to have these effects, is a mutagen and it has proved to be one of the most powerful mutagens in crop plants[8,9,10,11,12].

Brassica campestris L. yellow sarson is confined to very limited area in India and particularly is grown in Eastern Utter Pradesh, parts of Bihar, but is popular in West Bengal and other eastern states. *B. campestris* having yellow seed colour and peculiar shape of inflorescence; it might have been selected by farmers. Today all over the world different states and countries facing the problem of climate change. In this situation, existing regional crops gets failure due to drastic change in climate. There is need to search a new alternative crop for this region. Hence, present investigation was planned for the acclimatization and creating variations in quantitative traits of *B. camperstris* through sodium azide which may be suit to the agro climatic conditions of this region.

METHOD AND MATERIAL:

The research work was conducted in the Cytogenetic and Molecular Biology laboratory of Department of botany Government Vidarbha Institute of Science and Humanities, Amravati during the year 2009-2010. Secondly, subsequently seeds were sown in Agriculture field in Tumsar. Pure and homogenous seeds of B. campestris were exposed to different concentrations of chemical mutagens sodium azide (SA). For treatments dry as well as presoaked seeds were utilized. Mutagen doses were determined on the basis of LD_{50}. For dry seeds treatment uniform seeds were directly soaked in the mutagenic solution, for 18 hrs. Whereas, in case of pre-soaked treatments seeds were first soaked in distilled water for 12 hrs. then exposed to mutagenic solution for 6hrs.All treatments were carried out in triplicates at 24± 0.5^{0}C in Remi cooling incubator. After completion of treatment seeds were thoroughly washed with running water for 3-4 times. Treated seeds then sown in experimental field to raise M_1 generation. M_1 plants were individually screened for morphological characters such as number of leaves /plant, length and breadth of leaves, number of branches (primary, secondary and total) per plant, number of pods / plant , pod size, number of seeds/ pod, weight of seeds 100 seeds weight & yield (gm) were carried out on plant wise basis.

Statistical analysis :The pooled data of at least three independent replications of each experiment were used for determining standard error[13].

RESULT & DISCUSSION

Ten leaves/plants were recorded in control as well as from 0.004, 0.006 and 0.01%SA, treatments. Length & breath of leaves recorded in control was 14.86 cm & 6.50 cm. Number of leaves, length of leaves & breadth of leaves were reduced in all treatments as compared to the control(Fig. I). In control 4 primary branches, 2secondary branches & 6 total branches/ plant was recorded. There is decrease in the number of primary, secondary and total branches/plant in treatments as compared to control (Fig. II).In control, higher 27 siliquae/ plant was recorded. In 0.006% higher length of siliquae 6.03 cm was recorded.26 seeds/ siliquae were recorded in control. Higher number of siliquae, length of siliqua and seeds per siliqua were recorded in control (Fig. III). 0.004% shows higher 100 seeds wt. & yield are 0.314 gm and 1.015 gm respectively (Fig. IV).Yadava *et al* demonstrated that seed/pod & 1000 seeds wt. directly influenced the seed yield in mustard[14].

In control 19 leaves/plant, 6.24cm breadth of leaves was recorded from control. 18 leaves/plants were recorded in all dry SA treatment. Higher length of leaves (11.09cm.) recorded in 0.08%which was higher in all treatments (Fig. V). More number of primary, secondary and total branches per plant was recorded in 0.02% these were 3, 3 & 5, respectively(Fig. VI). More number of Siliquae 40 &seeds/siliqua 29 were recorded in 0.06%whereas higher length of siliqua5.88was recorded in 0.02% (Fig. VII). Mutants with increased siliqua length have also been reported in rapeseed by Shah et al. [10] the mutants with more number of grains/siliqua than control have been isolated by Shah *et al.* [10]. Higher seeds/pod 29.03 was recorded in 0.06%. In control more 100 seeds wt. 0.352gm was recorded (Fig. VIII). Beg reported the grains yield in rapeseed & mustard depends upon number of siliqua /plant, number of grains/siliqua & grain weight[15].

CONCLUSION:

The present study induced mutations and their use to generate genetic variability in *Brassica campestris* in M_1 generation after treating with sodium azide. Thus the variability induced through mutation can be utilized successfully for the acclimatization of *B. campestris* first time in the Vidarbha region, though this crop require cold climatic conditions 20-30^{o}C for growth and development. Further improvement can be possible with this crop in different agronomic traits in successive generation in future with different regional trials.

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Fig I: Variation in number of leaves, length of leaves, breadth of leaves per plant in *B. campestris* control and treatments (SA dry18 hrs.).

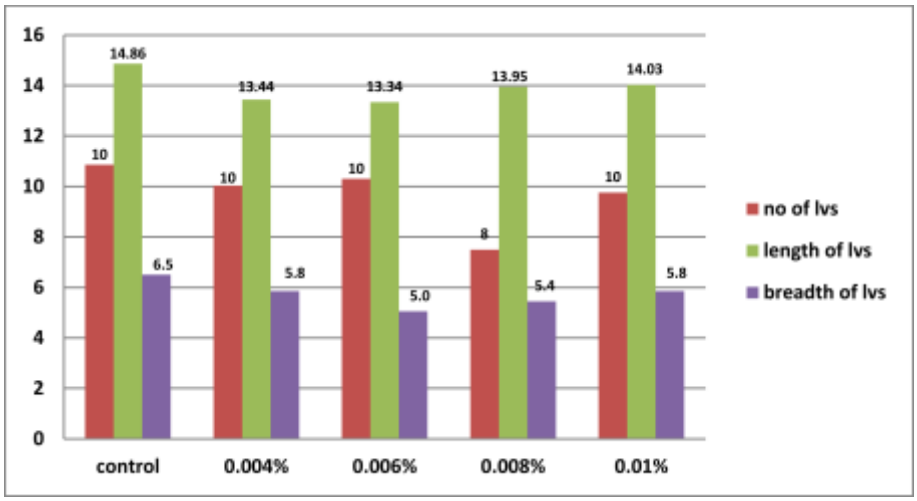

Fig.II .Variation in number of primary, secondary and total branches per plant in *B. campestris* control and treatments (SAdry18 hrs.).

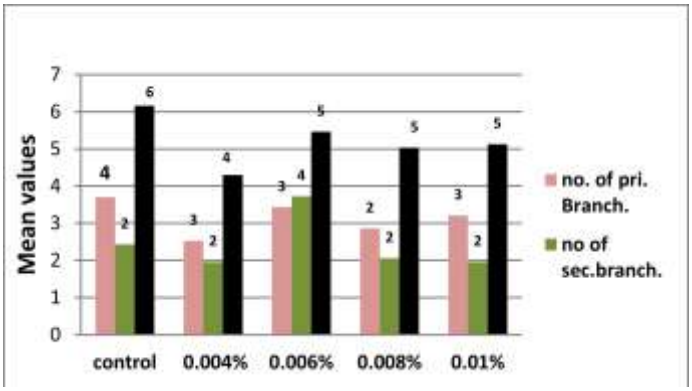

Fig.III : Variation in number of siliquae, length of siliqua and seeds per siliqua in *B. campestris* control and treatments (SAdry18 hrs.).

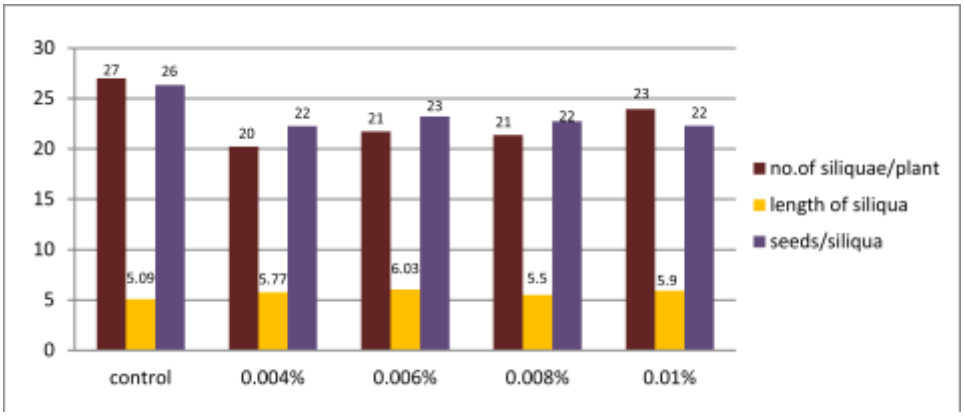

Fig.IV :Pod characters in *B. campestris* control and treatments (SAdry18hrs.).

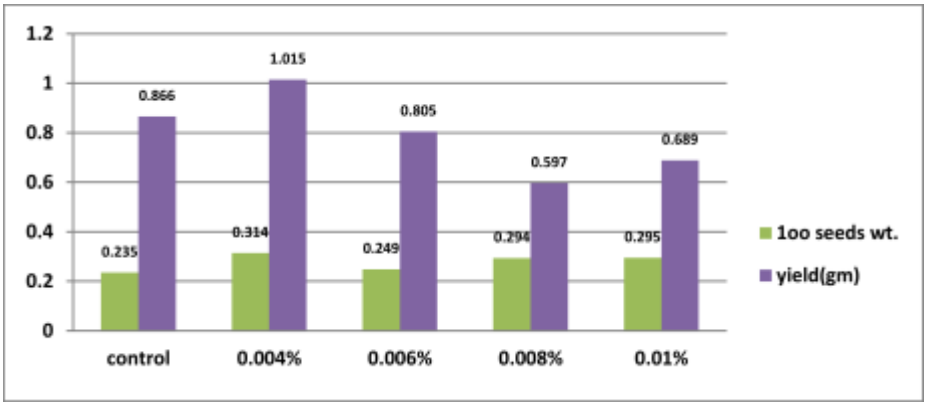

Fig V:Variation in number of leaves, length of leaves and breadth of leaves per plant in *B. campestris* control and treatments (12hrs.PSW+6hrs. SA) .

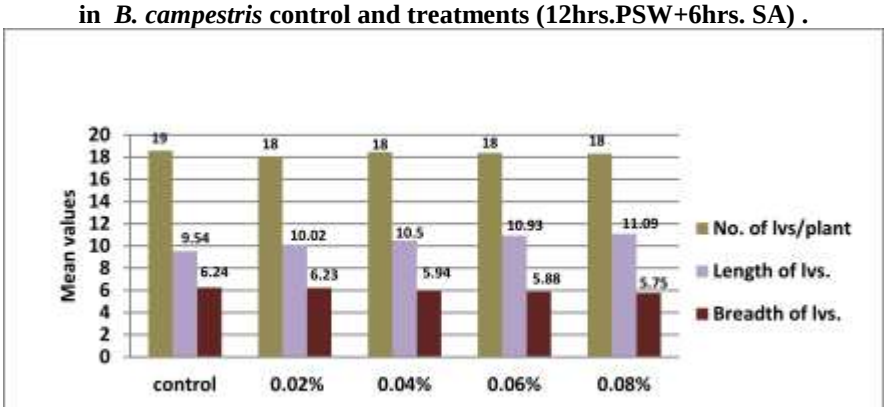

Fig. VI: Variation in number of primary, secondary and total branches per plant in *B. campestris* control and treatments (12 hrs.PSW+6 hrs. SA)

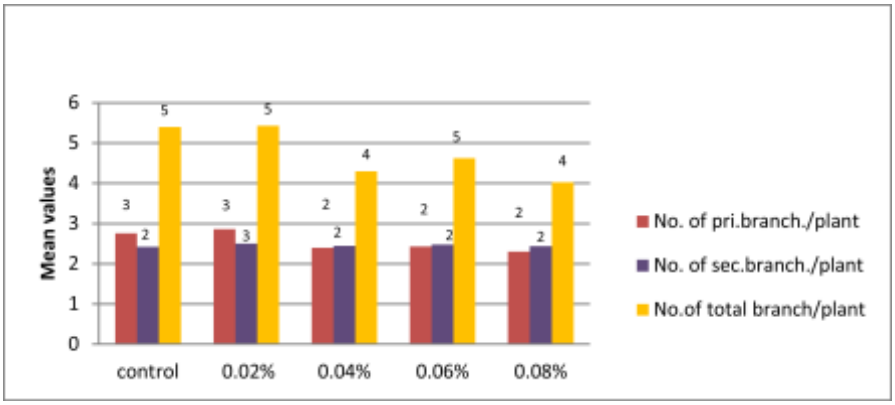

Fig.VII : Variation in number of siliquae, length of siliqua and seeds per siliqua in *B. campestris* control and treatments (12 hrs.PSW+6hrs.SA).