

## Mutagenesis in hundred seed weight of okra (*Abelmoschus esculentus* L. Moench).

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### Abstract:

The induced mutations display a pleiotropic effect due to which several features are changed only one of which however is desired by the breeder. The cross of two mutants can occasionally break undesired pleiotropic effect and valuable transgressions in other features can be achieved. Since majority of point mutations are recessive, the search for deviating phenotypes does not begin until the  $M_2$  generation. The determination as to whether a detected variant is a mutant or non-heritable modification can only take place in  $M_2$  generation after testing its progeny.

Datta (1994) has indicated the utility of mutation technique in producing large number of new promising varieties in different ornamentals like chrysanthemums and roses.

The major objective in employing induced mutations has been to increase variability within shortest possible period and to develop some such genotypes which could carry attributes of immense economic value. Due to mutation breeding okra varieties increased number of fruits per plant, seeds per fruit and seed weight

**Keywords: mutagenesis, Okra, hundred seed weight.**

### Introduction:

Mutation breeding has become an alternative to conventional breeding since the last three decades with the sole objective of developing better cultivars of economically important crops/vegetables. An increase in the mutation rate by mutagenic agents enhances the chance of getting desired variations and to help accelerate the breeding process as compared to the usual practice of developing novelties.

The ultimate improvement of any system largely depends on the quantum of genetic variability available within it. The mutagenesis helps to enhance natural mutational rate and to enlarge the genetic variability thereby generating added scope for making further selections.

Okra seeds are round, dark green to dark brown in colour with 5mm diameter. The seeds consist of seed coat and endospermous embryo.

### Materials and Method:

In the present investigation the two varieties of okra (*Abelmoschus esculentus* L. Moench.) namely Parbhani Kranti and Arka Anamika obtained from the Marathwada Agricultural University, Parbhani was used. These varieties of okra were treated by three mutagens. viz. physical mutagen, gamma rays and two chemical mutagens namely Ethyl methanesulphonate (EMS) and Sodium azide (SA).

The different concentrations used for chemical mutagenic treatments were 0.05%, 0.10% and 0.15% for EMS and 0.01%, 0.02% and 0.03% for SA, and 5kR, 10kR and 20kR gamma rays respectively. The weight of hundred seeds was taken from five pods of each treatment.

### Result:

#### Hundred seed weight: (Tables 1-4)

The mean values in regard to 100 seed weight showed negative shift at EMS (all concentrations), 10kR and 20kR gamma rays and 0.01% and 0.03% SA treatments. In variety Arka Anamika at 0.01%, 0.02% and 0.03% SA and 0.10%, 0.15% EMS treatments, positive shift in mean values could be seen, while at gamma rays and 0.05% EMS treatments, negative shift in mean values in  $M_2$  generation have been noticed.

In variety Parbhani Kranti, all the treatments showed positive shift in mean values except 20kR gamma rays, 0.10% and 0.15% EMS, 0.01% SA treatments in  $M_3$  generation, while in Arka Anamika negative shift in mean values could be noted except for 20kR gamma rays and 0.15% EMS treatments. It showed significant negative shift in mean values at 0.10% and 0.15% EMS in variety Parbhani Kranti, and 0.01% and 0.02% SA, 0.05% EMS, and 5kR and 10kR gamma rays in variety Arka Anamika, respectively.

### Discussion:

In the present investigation different mutagens induced long pod mutants with increased weight of seed in both the varieties of okra viz. Parbhani Kranti and Arka Anamika. An appreciable frequency of long pod mutants has been induced by lower and middle doses of DES and gamma rays in different plants (Jehangir and Chandrasekharan, 1978). Similar results were reported by Malani et al. (1993) in different varieties of okra.

These mutants possess high yield contributing characters viz. number of pods, thousand seed weight and total seed yield per plant. High yielding mutants were isolated in M2 generation. Such type of mutants were recorded earlier in mungbean [Auti], in chickpea [ Barshile.], in soybean [ manjaya, tambe & sagade], in urdbean .

The height of plant, nodes per plant, number of fruits per plant, green fruit yield per plant, per plot and per hectare was somewhat decreased with increase in the mutagenic doses. The observed variability in all the mutagenic levels for various characters studied, revealed the scope for improvement in this crop (Dalve et al 2010). Doses of gamma irradiations exposure was found to increase plant height, internode length, number of leaves/plant, pollen sterility, number of fruits/plant and fruit characters such as length, girth, weight, number of seeds/fruit and weight of 100 seeds. The resulted plants were identified as superior one based on their yield, yield attributing characters and disease rating of Yellow Vein Mosaic disease. In majority of cases the values of irradiated plants exceeded to that of control plants also (Pushparajan et al., 2014).

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**Table 01:** The effect of mutagens on 100 seed weight in M<sub>2</sub> generation in *Abelmoschus esculentus* (L.) Moench. Variety : Parbhani Kranti

Mutagen	Dose	Mean	Shift in Mean
Control	-	6.6	
Gamma rays	5kR	6.7	+0.1
	10kR	6.5	-0.1
	20kR	6.0	-0.6
EMS%	0.05	6.2	-0.4
	0.10	5.8	-0.8
	0.15	4.2	-2.4
SA%	0.01	6.5	-0.1
	0.02	6.9	+0.3
	0.03	6.2	-0.4

CV = 12.41%

+<sub>SE</sub> = 0.25

CD at 5% = 0.56

CD at 1% = 0.81

**Table 02:** The effect of mutagens on 100 seed weight in M<sub>2</sub> generation in *Abelmoschus esculentus* (L.) Moench. Variety : Arka Anamika

Mutagen	Dose	Mean	Shift in Mean
Control	-	6.2	
Gamma rays	5kR	5.9	-0.3
	10kR	5.8	-0.4
	20kR	5.1	-1.1
EMS%	0.05	6.1	-0.1
	0.10	6.4	+0.2
	0.15	6.5	+0.3
SA%	0.01	6.3	+0.1
	0.02	6.5	+0.3
	0.03	6.6	+0.4

CV = 7.33%

+<sub>SE</sub> = 0.15

CD at 5% = 0.32

CD at 1% = 0.48

**Table 03:** The effect of mutagens on 100 seed weight in M<sub>3</sub> generation in *Abelmoschus esculentus* (L.) Moench. Variety : Parbhani Kranti

Mutagen	Dose	Mean	Shift in Mean
Control	-	5.2	
Gamma rays	5kR	5.3	+0.1
	10kR	5.4	+0.2
	20kR	4.9	-0.3
EMS%	0.05	5.7	+0.5
	0.10	3.8	-1.4
	0.15	3.4	-1.8
SA%	0.01	5.1	-0.1
	0.02	5.8	+0.6
	0.03	5.9	+0.7

CV = 16.46%  
 +\_SE = 0.26  
 CD at 5% = 0.58  
 CD at 1% = 0.84

Table 04: The effect of mutagens on 100 seed weight in M<sub>3</sub> generation in *Abelmoschus esculentus* (L.) Moench. Variety : Arka Anamika

Mutagen	Dose	Mean	Shift in Mean
Control	-	5.3	
Gamma rays	5kR	4.7	-0.6
	10kR	4.3	-1.00
	20kR	5.4	+0.1
EMS%	0.05	4.8	-0.5
	0.10	5.2	-0.1
	0.15	5.7	+0.4
SA%	0.01	4.4	-0.9
	0.02	4.5	-0.8
	0.03	4.9	-0.4

CV = 9.47%  
 +\_SE = 0.15  
 CD at 5% = 0.35  
 CD at 1% = 0.48