

INDUCED MUTAGENIC STUDIES IN FRENCH BEAN (PHASEOLUS VULGARIS L.)

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ABSTRACT

Present study was undertaken with French bean, wherein mutation was induced through Sodium azide (SA). The SA treated seeds were sown to raise M_1 generation. Observations were recorded for days to seed germinating, germination percentage, seedling height, leaf morphological changes, chlorophyll chimeras, pollen sterility and survival of plants at maturity M_1 generation. The mutagen showed inhibitory effect on seed germination. However, the seedling injury decreased with increased concentration of sodium azide.

Key words: French bean, *Phaseolus vulgaris* L., induced mutation, Sodium azide (SA)

Introduction:-

Inducing genetic variability with the help of physical and chemical mutagens, and genetically improving the plant is called as mutation breeding. This technique has generated several mutants, which are being used as new cultivars (Gottschalk and Wolff, 1983). Kharkwal and Chaudhary (2004) reported that mutation breeding plays significant role in plant genomic research.

Materials and methods:

During present investigation French bean, variety Sheena, was employed for mutagenic studies. Seeds of this variety were procured from local market at Aurangabad. Sodium azide (SA) was used as chemical mutagen.

Healthy and well dried seeds with uniform size were surface sterilized with 0.1% mercuric chloride solution for about one minute and washed thoroughly with distilled water. The seeds were pre-soaked in distilled water for 6 hours. The mutagenic solutions were

freshly prepared by dissolving SA in water. Pre-soaked seeds were immersed in the mutagenic solution and shaken on electric shaker for 4 hours.

The concentrations used for chemical mutagenic treatment were 0.01%, 0.02% and 0.03%, while water served as control. Immediately after SA treatment, the seeds were washed thoroughly under running tap water and immersed in distilled water for 2 hours. The post soaked seeds were surface dried with filter paper. In all 330 seeds were used for each treatment, out of which 30 seeds from each treatment were kept on moist blotting paper, in petriplates, to record per cent germination, while remaining 300 seeds were sown in the field plots following randomized block design (RBD) with three replications, each consisting of 100 seeds along with control, for raising M_1 generation.

The plants emerged during M_1 generation were carefully observed and observations were recorded for per cent seed germination, seedling length, Chlorophyll chimeras, morphological changes in leaves, pollen sterility and survival of the plants till complete maturity.

Result and discussion:

The mutagen (SA) showed inhibitory effect on seed germination. With the increase in SA concentration seed germination decreased gradually from 75 to 13 per cent. Higher concentrations of SA showed maximum inhibition, hence, lowest seed germination was noticed due to the treatment with 0.03% SA. Similar results were earlier reported by Mahana et al. (1989), Afsar, et al. (1980), Gaibriyal et al. (2009), Mahamune and Kothekar (2012).

Mutagenic treatment enhanced seedling length from 19.6 to 21.3 cm due to the treatment of SA at the concentration of 0.01%. At higher concentrations it gradually decreased to 16.9 cm. Similar results have been recorded earlier by Singh and Yadav (1987).

During present study, various types of chlorophyll chimeras were observed in all mutagen treated plants. Different types of chlorophyll chimeras observed were *albina* (white), *xantha* (yellow), *chlorina* (yellow green) and *viridis* (dull green). All these chimeras were found to be affecting the leaflets partially and at die margins. Maximum reduction in chlorophyll chimeras (10.06%) was observed at 0.02% sodium azide treatment, while minimum (6.06%) was recorded at 0.03% SA concentration.

In the mutagenic treated plants, leaf morphological changes were observed. They exhibited variations in shape and size. In addition, leaf lamina was also affected due to the treatment with SA. Seeds treated with 0.02% SA showed maximum abnormalities in leaves. Different treatments of sodium azide, produced quadri-foliate and multifoliate leaves.

Pollen sterility decreased with increasing concentration of mutagen. Highest pollen sterility was observed due to the treatment with 0.01% SA. Reduced pollen sterility in M_1 generation due to mutagenic treatment was also reported by Khan and Wani (2005), Raychowdhury and Tah (2011).

No specific trend was observed

regarding the effect of SA on plant survival. Similar results have been earlier reported by Gaibriyal et al. (2009) and Raychowdhury and Tah (2011).

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Plate 1 : Chlorophyll chimeras in M_1 generation of French bean.

