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## Induced mutagenesis of short duration rice variety- Onam

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### Abstract

This work highlights the potential of Ethyl Methane Sulphonate (EMS) as a powerful chemical mutagen that can be used to induce genetic diversity in the rice variety Onam. A definite inverse association between treatment period and germination percentage was found by treating seeds with 1.6% EMS for varied lengths of time. In comparison to the control group, which had germination rates of 88%, the germination rates dropped dramatically from 72% after 2 hours to 20% at 5 hours. This decrease in germination percentage confirms EMS's function in mutant breeding by highlighting its dose-dependent effect. Thus, EMS-induced mutagenesis can be used as technique for creation of variability in already existing germplasm for producing novel varieties with distinguishing characters.

**Keywords:** Sulphonate, breeding, technique

### Introduction

Plant breeding and genetic research have benefited greatly from the use of gamma rays and other physical and chemical mutagens in mutation techniques, which have produced a great deal of genetic diversity (Hajos, 2009) [1]. It is well known that variation can be induced through the use of ionizing radiation (X-rays, gamma rays, neutrons) and chemical mutagens (EMS, ethyl methane sulphonate) (Ahloowalia and Maluszynski, 2001) [2]. According to a study by Okagaki *et al.* (1991) [3], EMS typically results in point mutations in plants. Enhancing practical implementation of EMS is necessary due to its strong mutagenesis effectiveness and efficiency in higher plants (Konzak *et al.*, 1972) [4] and its comparatively low toxic and having high genetic consequences (Gaul, 1970) [5]. According to Alyoshin *et al.* (2001) [6], *in vitro* chemical mutagenesis in rice produced lines with better characteristics.

### Materials and Methods

The study made use of Onam rice, which was released from the Onattukara Regional Agricultural Research Station. This variety has a short duration of 90-95 days duration and an yield potential of 3.5 t/ha. The variety was exposed to 1.6% EMS for varying lengths of time in order to determine the mutagen's lethal dose. The germination percentage of Onam variety seeds was initially determined before treating it with chemical mutagen. For the investigation, 50 grams of clean, healthy seeds from the variety with a moisture content of 12-13% were employed.

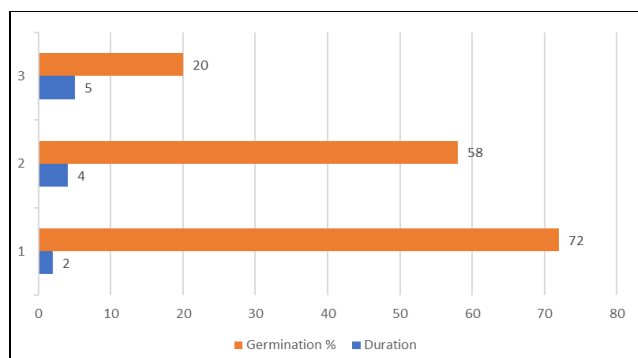
### Germination test

The Onam variety seeds were treated with 1.6% of EMS for two, four, and five hours, in order to conduct a germination study. For every treatment, two distinct replications of 100 dried seeds of the variety were chosen and subjected to EMS treatment. Care was taken to keep the seeds moist throughout the experiment. Germination percentage was determined on fourth day after mutagen treatment. On the basis of germination percentage, the counts were taken as germinated and non-germinated.

### Result

From the study it was noted that the germination per cent decreased with increase in treatment dose and duration for the variety. Significant reduction was noticed for higher doses compared to the control.

Dose	Duration	Number of seeds	Germination %
1.6%	2 hrs	100	72
1.6%	4 hrs	100	58
1.6%	5 hrs	100	20
Control		100	88



**Graph 1:** Comparative evaluation of germination percentage in connection with EMS treatment dosage



**Fig 4:** Germination after 2 hours



**Fig 5:** Germination after 4 hours



**Fig 6:** germination after 5 hours

**Discussion**

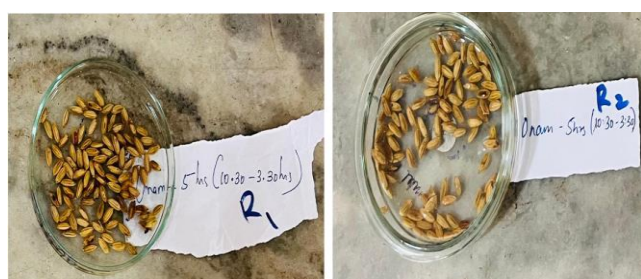
Chaudhuri's (2002) [7] observed that, the germination percentage decreased as radiation dose and duration increased, but it did not differ significantly from the control at lower doses. The germination percentage significantly decreases with an increase of treatment period. To change the characteristics that restrict a feature in otherwise superior types, EMS can be employed as an induced mutagen.



**Fig 1:** Incubation of rice variety for 2 hours



**Fig 2:** Incubation of rice varieties for 4 hours



**Fig 3:** Incubation of rice varieties for 5 hours

**Conclusion**

This work shows that Ethyl Methane Sulphonate (EMS) can be used as a powerful chemical mutagen for causing genetic diversity in the rice variety Onam. A distinct inverse association between treatment period and germination percentage was found by treating seeds with 1.6% EMS for varied lengths of time. In comparison to the 88% germination rates in the control group, the germination rates dropped dramatically from 72% at 2 hours to 20% at 5 hours. The dose-dependent effect of EMS is emphasized by this decrease in germination percentage, confirming its function in mutation breeding. Thus, EMS-induced mutagenesis can be used as a viable technique for induction of mutagenesis in crop varieties for creation of variation.

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