

Effect of Jeevamrutha on Seed Germination of *Ocimum basilicum* L. under different Cadmium Concentrations

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ABSTRACT

The toxic effect of different concentrations of cadmium viz. 20, 40, 60 & 80 mg/L distilled water was evaluated on seed germination of *Ocimum basilicum* L. with and without organic liquid formulation jeevamrutha. The results of the present study showed that cadmium concentrations causes negative effect on seed germination of *Ocimum basilicum* L., as the concentration of cadmium increases the germination percentage was decreases. The seeds treated with jeevamrutha showed considerable increase in germination percentage. Jeevamrutha showed positive effect on the germination of seeds under cadmium stress.

Keywords: Cadmium, Seed germination, *Ocimum basilicum* L., Jeevamrutha.

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INTRODUCTION

Cadmium (Cd), a well-known, transitional metal is one of highly dispersed metals by human activities [5]. It is harmful for plants and causes various changes in their metabolism processes. The germination of seeds is an important stage of whole plant circle; it is also the most susceptible stage of plants [4]. The application of organic liquid formulations such as jeevamrutha is useful to improve germination of seeds. Sreenivasa *et al.*, [7] had observed the presence of different beneficial microorganisms viz., nitrogen fixers, phosphorus solubilizers, actinomycetes and fungi in jeevamrutha. *Ocimum basilicum* L. belonging to the family Lamiaceae is a very important aromatic plant. It's essential oil contains antifungal and antibacterial properties. The oil is mainly used as aromatic agents in food, perfumery and pharmaceutical industries [9]. Therefore the present study was designed to investigate the effect of jeevamrutha on seed germination of *Ocimum basilicum* L. under different cadmium concentrations.

MATERIAL AND METHODS

The present study was carried out at the Department of Biological Sciences, Sam Higginbottom University of Agriculture Technology and Sciences, Allahabad, in two different seasons. Healthy seeds of *Ocimum basilicum* L. were collected from CIMAP Lucknow. Seeds were surface sterilized using 0.5% HgCl₂ for 10 minutes, and then washed in double distilled water for three times. Seeds with similar size were cultured in petridishes (90 cm diameter) on filter paper to germinate at 25 °C room temperature. The filter paper was moistened with 10 ml of double distilled water contained cadmium concentrations of 20, 40, 60 & 80 mg/L distilled water and to check the effect of jeevamrutha, seeds were treated with, cadmium concentrations contained jeevamrutha. Each treatment had three replicates. Germination of seeds was recorded every day, and germination percentage was calculated after seeds were fully germinated, using the following formula:

Germination percentage = total number of seeds germinated/total number of seeds in all replicates× 100

Method for preparation of jeevamrutha: Organic liquid formulation jeevamrutha was prepared according to the method given by Palekar [6].

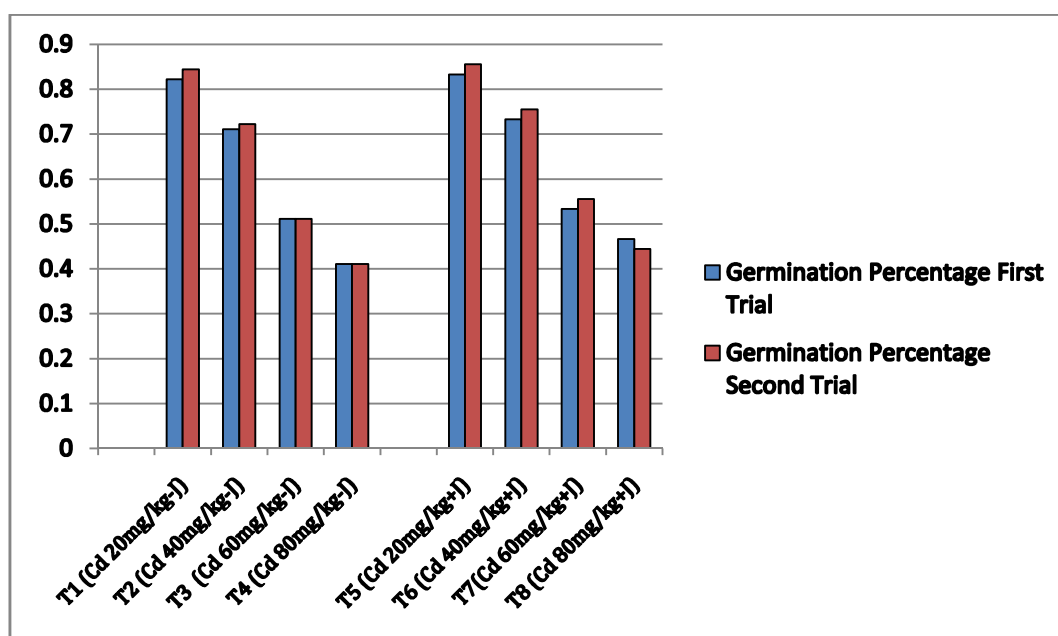
Ingredients: 10 kg cow dung, 10 litre cow urine, two kg jaggery, two kg of gram or any pulse flour, rhizospheric soil and 200 litre water. All these materials were mixed well in a container with the help of wooden stick. The mixture was stirred regularly twice a day and kept for fermentation for 5 to 7 days. The prepared organic liquid formulation was used for the treatment of seeds.

RESULTS

The results presented in Table 1. and graphical illustration presented in Figure 1. revealed that cadmium in different concentrations causes negative effect on germination of seeds, as the concentration of cadmium increases the germination percentage was decreases in all the treatments. In jeevamrutha treated, cadmium concentrations germination percentage was considerably higher in comparison to untreated seeds. The study clearly shows that jeevamrutha was able to enhance the germination of seeds under cadmium stress.

Table 1. Effect of different dosages of Cadmium with & without Jeevamrutha on Germination percentage of *Ocimum basilicum* during first & second trials

Treatments	Germination Percentage First Trial	Germination Percentage Second Trial
T1 (Cd 20mg/kg-)	82.22%	84.44%
T2 (Cd 40mg/kg-)	71.11%	72.22%
T3 (Cd 60mg/kg-)	51.11%	51.11%
T4 (Cd 80mg/kg-)	41.11%	41.11%
T5 (Cd 20mg/kg+)	83.33%	85.56%
T6 (Cd 40mg/kg+)	73.33%	75.55%
T7 (Cd 60mg/kg+)	53.33%	55.55%
T8 (Cd 80mg/kg+)	46.67%	44.44%
C. D. (P= 0.05)	4.224778	3.339283



*-]=without jeevamrutha +]= with jeevamrutha

Figure 1. Effect of different dosages of Cadmium with & without Jeevamrutha on Germination percentage of *Ocimum basilicum* during first & second trials

DISCUSSION AND CONCLUSIONS

In the present study cadmium showed a strong inhibitory effect on germination; root elongation and coleoptile growth of seeds, especially at high cadmium concentrations. High levels of cadmium supply can inhibit seed germination, and subsequent, seedling growth [8]. The results, similar to this study were obtained by Zhang *et al.*, [10], Guilherme *et al.*, [3].

Jeevamrutha treated seeds were found to be significantly superior in comparison to untreated seeds. This must be due to their composition by plant and animal products, which have anti-pathogenic properties. It protects the seeds from seed borne pathogens, which could affect them during the germination processes. Cow dung and cow urine would provide the nutrition for seeds which could give good germination and seedling length [1]. The similar results were also reported by Gadewar *et al.*, [2], Dhapke, *et al.*, [1].

The results of the present study clearly showed that organic liquid formulation, jeevamrutha causes positive effect on seed germination of *Ocimum basilicum* L. under cadmium stress in comparison with untreated seeds. Jeevamrutha contains various types of microorganisms, which improves germination of seeds.

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