



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(2): 705-707
Received: 27-01-2018
Accepted: 28-02-2018

Ankit Samuel Singh
Department of Biological
Sciences, Sam Higginbottom
University of Agriculture
Technology & Sciences,
Allahabad, Uttar Pradesh, India

PW Ramteke
Department of Biological
Sciences, Sam Higginbottom
University of Agriculture
Technology & Sciences,
Allahabad, Uttar Pradesh, India

Anupriya Paul
Department of Mathematics,
Sam Higginbottom University of
Agriculture Technology &
Sciences, Allahabad, Uttar
Pradesh, India

Arun A David
Department of Soil Sciences,
Sam Higginbottom University of
Agriculture Technology &
Sciences, Allahabad, Uttar
Pradesh, India

Pradeep Kumar Shukla
Department of Biological
Sciences, Sam Higginbottom
University of Agriculture
Technology & Sciences,
Allahabad, Uttar Pradesh, India

Eugenia P. Lal
Department of Biological
Sciences, Sam Higginbottom
University of Agriculture
Technology & Sciences,
Allahabad, Uttar Pradesh, India

Correspondence

Ankit Samuel Singh
Department of Biological
Sciences, Sam Higginbottom
University of Agriculture
Technology & Sciences,
Allahabad, Uttar Pradesh, India

Influence of Jeevamrutha on Seed Germination of *Ocimum basilicum* L. under NaCl salinity stress

Ankit Samuel Singh, PW Ramteke, Anupriya Paul, Arun A David, Pradeep Kumar Shukla and Eugenia P Lal

Abstract

In the present study *Ocimum basilicum* L. (Sweet Basil) seeds were treated with different concentrations of NaCl viz. 25, 50, 75, 100 mM with and without organic liquid formulation jeevamrutha, to check the influence of jeevamrutha on seed germination of basil. The results shows that germination was severely affected by the increasing concentration of NaCl on the other hand, jeevamrutha treated seed were showed significantly higher germination percentage in comparison to untreated seeds. The maximum germination percentage was also showed in seeds treated individually with jeevamrutha. The present study explored the potential of organic liquid formulation jeevamrutha, to enhance the germination of seeds under NaCl salinity stress.

Keywords: Seed germination, NaCl, *Ocimum basilicum* L., Organic liquid formulation, Jeevamrutha

Introduction

Seed germination is an essential trait that intensely affects plant growth and productivity. Proper seed germination is directly affecting the crop productivity so it is one of the major factors for high-quality production. Salinity is an important abiotic environmental factor having great effects on plant growth and development (Barnawal *et al.*, 2014) [1]. It is one of the major environmental stress factors adversely affecting uniform germination (Demir *et al.*, 2003) [2].

The use of organic liquid manures, such as jeevamrutha is beneficial for the proper seed germination. Jeevamrutha contains beneficial micro-organisms, which are helpful in phosphate solubilization; nitrogen fixation etc. Application of organic liquid formulations will enhance the soil microbial activity and population to a larger extent. This in turn has a positive effect on growth and yield of crops. Jeevamrutha promotes enormous biological activity in soil and makes the nutrients available to crop and it also improves seed germination (Devakumar *et al.*, 2008) [3].

Ocimum basilicum L. (Sweet Basil) is an important aromatic plant, widely cultivated in many countries. It is also a medicinal plant used for several purposes. Basil essential oil has been used extensively in the food industry as a flavouring agent, in perfumery and medical industries (Simon *et al.*, 1999) [5]. The objective of the study was to investigate the effect of NaCl caused salinity and influence of jeevamrutha on seed germination of sweet basil.

Material & Methods

Ocimum basilicum L. CIM-Saumya seeds were collected from Central Institute of Medicinal & Aromatic Crops Lucknow. Seeds were surface sterilized using 0.5% Mercuric Chloride for 10 min, and then washed in sterilized double distilled water for three times. Seeds with similar size were cultured in petridishes on filter paper to germinate at 25 °C. The filter paper was moistened with 10 ml of water contained NaCl concentrations of 25, 50, 75, 100 mM and jeevamrutha treated NaCl concentrations of 25, 50, 75, 100 mM were used to check the influence of jeevamrutha, double distilled water and jeevamrutha without NaCl treatment were used as control. The experiment was repeated in two seasons, thirty seeds of uniform size were allowed to germinate on a filter paper in 9 cm diameter petridishes each treatment had three replicates. In order to prevent evaporation, the edges of the petridishes were tightly sealed with parafilm. Germination of seeds was recorded every day, and germination percentage, was then calculated after seeds were properly germinated. Germination percentage was calculated using the following formula:

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

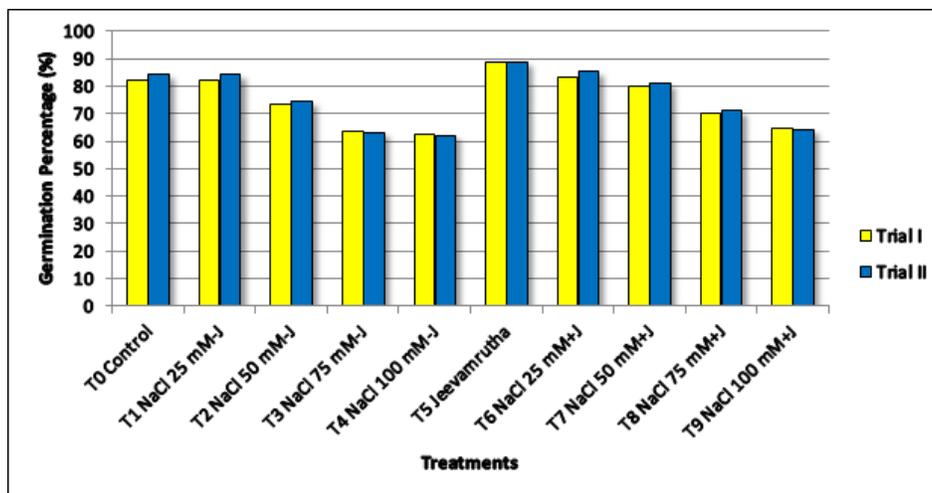
Method for preparation of jeevamrutha: Organic liquid formulation jeevamrutha was prepared according to the method given by Palekar (2006) [4].

Ingredients: 10 kg cow dung, 10 litre cow urine, two kg jaggery, two kg of gram or any pulse flour, hand full of

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.

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

Treatments	Germination Percentage Trial I	Germination Percentage Trial II
T ₀ Control	82.22 %	84.44 %
T ₁ NaCl 25 mM-J	82.22 %	84.44 %
T ₂ NaCl 50 mM-J	73.33 %	74.44 %
T ₃ NaCl 75 mM-J	63.33 %	63.33 %
T ₄ NaCl 100 mM-J	62.22 %	62.22 %
T ₅ Jeevamrutha	88.89 %	88.89 %
T ₆ NaCl 25 mM+J	83.33 %	85.56 %
T ₇ NaCl 50 mM+J	80.00 %	81.11 %
T ₈ NaCl 75 mM+J	70.00 %	71.11 %
T ₉ NaCl 100 mM+J	64.44 %	64.44 %
C. D. (P= 0.05)	3.982876	4.217767



*-J=without jeevamrutha +J= with jeevamrutha

Fig 1: Effect of different dosages of NaCl with & without Jeevamrutha on Germination percentage of *Ocimum basilicum* during first & second trials

Results & Discussions

The results of germination percentage of *Ocimum basilicum* L. were presented in Table 1. and graphical illustration in Figure 1. The overall results showed that low NaCl concentration causes no effect on seed germination and as the concentration of NaCl increases, germination percentage was reduced. Maximum germination was found in seeds treated individually with jeevamrutha. The NaCl concentrations with jeevamrutha showed significant increase in germination due to the influence of jeevamrutha on seed germination.

(Srinivas *et al.*, 2010) have reported the presence of many beneficial microorganisms' viz., nitrogen fixers, phosphorus solubilizers, actinomycetes and fungi in jeevamrutha. It also contains micro & macronutrients essential for plant growth & development. Due to the presence of growth enhancing substances, jeevamrutha is able to enhance the germination percentage of seeds in presence of NaCl salinity stress and showed positive results.

Thus from the present study, it can be concluded that jeevamrutha had a positive effect on seed germination of *Ocimum basilicum* L. under NaCl salinity stress. The seeds treated with jeevamrutha showed higher germination

percentage in comparison with untreated seeds. Jeevamrutha is helpful to enhance the germination of seeds under stress.

Acknowledgement

I am grateful to Prof. (Dr.) P. W. Ramteke, Head Department of Biological Sciences for providing me laboratory facilities, which makes this work possible. I am also thankful to all the faculty members of my Department for their support & encouragement.

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