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REGULAR ARTICLE

GERMINATION AND GROWTH OF *ECHINOCHLOA FRUMENTACEA* L. UNDER VARIOUS LEVELS OF NaCl STRESS

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ABSTRACT

An investigation was conducted to assess the effect of NaCl on vegetative growth of Barnyard Millet (*Echinochloa frumentacea*) were germinated in petri-dishes lined with blotting paper. The seeds were treated with 25, 50, 75 and 100 mmol NaCl, with distilled water as control. The germination percentage and the growth parameters were observed. The obtained result showed that the germination rate germination percentage, root length, shoot length of the (*Echinochloa frumentacea*) were gradually decreased with increased concentrations of NaCl stress. The highest inhibitions of germination and morphological parameters observed in 50 mmol NaCl concentration treated seedlings. The highest germination and growth parameters recorded in control of seedlings. Result showed that the lowest concentrations of treatments were increased in all the analyzed parameters. Moreover, increasing concentration the negative effect of results was obtained. Further study to be studied with effect of NaCl on biochemical and enzymatic activities of Barnyard millet.

Keywords: *Echinochloa frumentacea,* Salt stress, Germination and seedling growth

INTRODUCTION

Throughout the world the soil salinity problems are causing great threat to irrigated agriculture. The salinity spread through irrigation water is also alarming in many countries. The crop loss due to salinity is increasing in many parts of India. Saline areas throughout the world is estimated to be millions of hectares. Thus, tolerant species and screening the crop cultivars for salt tolerance is of high significance [1, 2]. In semi-arid and arid zones, salinity is the primary abiotic stress which lowers the germination, seedling establishment and even yield of crop plants [3]. The osmotic adjustment and compatible organic solute accumulations in tolerant varieties are main contributors towards salt stress tolerance [4-7].

Barnyard millet (*Echinochloa frumentacea*) is one among the important fodder crop grown in USA and Japan. In India, Japan and China this crop is cultivated in paddy fields at the time of failure with paddy yields as a substitute. This is highly nutritious millet species and relatively tolerant to diseases. The present study was to investigate the response of seed Barnyard millet germination to different salinity concentration of NaCl.

MATERIALS AND METHODS

Salt treatments and germination characteristics test

The seeds of accessions Co(kv1) Barnyard Millet (*Echinochloa frumentacea*) were obtained from TNAU, Coimbatore, Tamil Nadu. The seeds were surface sterilized with 2.0% aqueous sodium hypochlorite for 15 min at room temperature and then rinsed thoroughly with distilled water and germinated on moistened.

Salt stress

The effect of salt stress on plant growth was studied using different concentrations of NaCl solutions *viz.,25* mmol, 50 mmol, 75 mmol and 100 mmol. The experiment was carried out under a completely randomized design at four replications and 100 seeds per replication. Seeds of Barnyard Millet (*Echinochloa frumentacea* L.) were treated by different concentrations of NaCl (0, 25,50,75 and 100 mmol) control treatment was distilled water. Germination percentage and morphological traits such as: root length and shoot length were measured on 5, 7 and 9th days of sampling.

RESULTS AND DISCUSSION

Germination percentage (%)

The highest germination percentage was recorded in 25 mmol NaCl concentration treated seedlings when compared to other treated seedlings. The highest inhibitions of germination percentage were observed in 100 (Mm) NaCl concentration treated seedlings. The results of this research is in accordance with the previous reports [8,9]. Our results are in agreement with previous findings [10-12].

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Shoot length

The shoot length gradually increased 5th, 7thand 9th days in 25 mmol NaCl concentration treated seedlings when compared to other treated seedlings. The highest inhibitions of shoot length observed in 100 (Mm) NaCl concentration treated seedlings.

Root length

The root length gradually increased 5th, 7thand 9th days in 25 mmol NaCl concentration treated seedlings when compared to other treated seedlings. The highest inhibitions of root length observed in 100 (Mm) NaCl concentration treated seedlings. Generally, any type of stresses reduces the plant growth and productivity [14]. The shoot and root length are among the important variables for salt stress as the roots are in touch with soil the main organ for absorption [15, 16].

CONCLUSION

The germination percentage was increased lowest concentration (25 mmol NaCl) treated seedlings. However, increasing concentration of NaCl was negatively affecting the seed germination. Similar results were obtained in both root length and shoot length of NaCl treated seedlings. Obtained result shows that the lowest concentrations of treatments were increased in all the analyzed parameters. Moreover, increasing concentration the negative effect of results was obtained. Further study to be studied with effect of NaCl on biochemical and enzymatic activities of Barnyard millet.

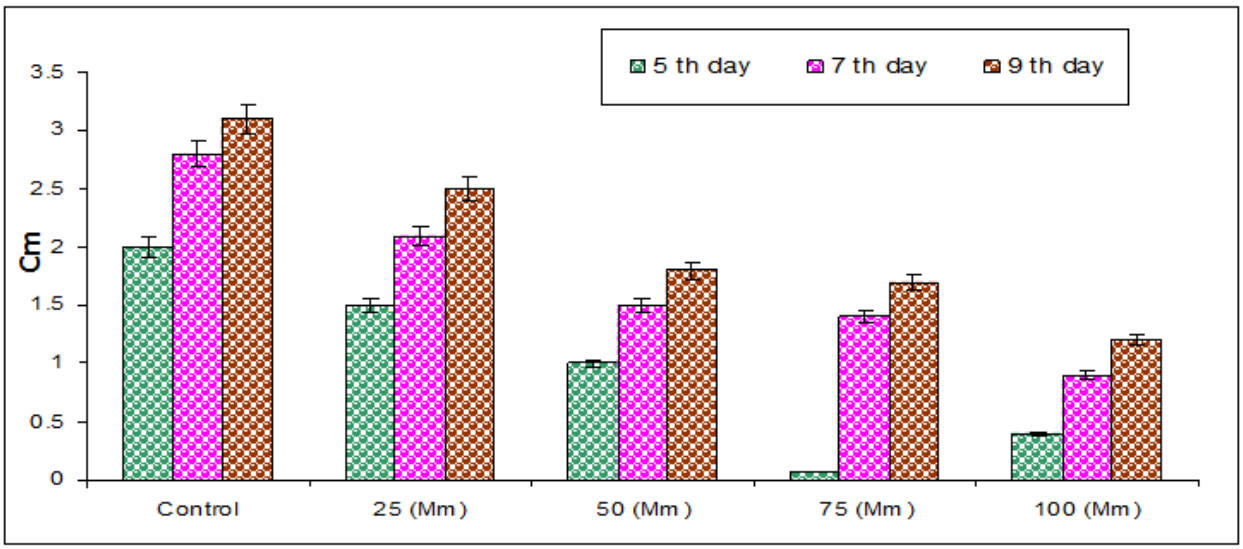

Fig. 1: Effect of Nacl treatments on shoot length of Barnyard Millet (*Echinochloa frumentacea*) The application of salinity in plants can reduce the growth [13]

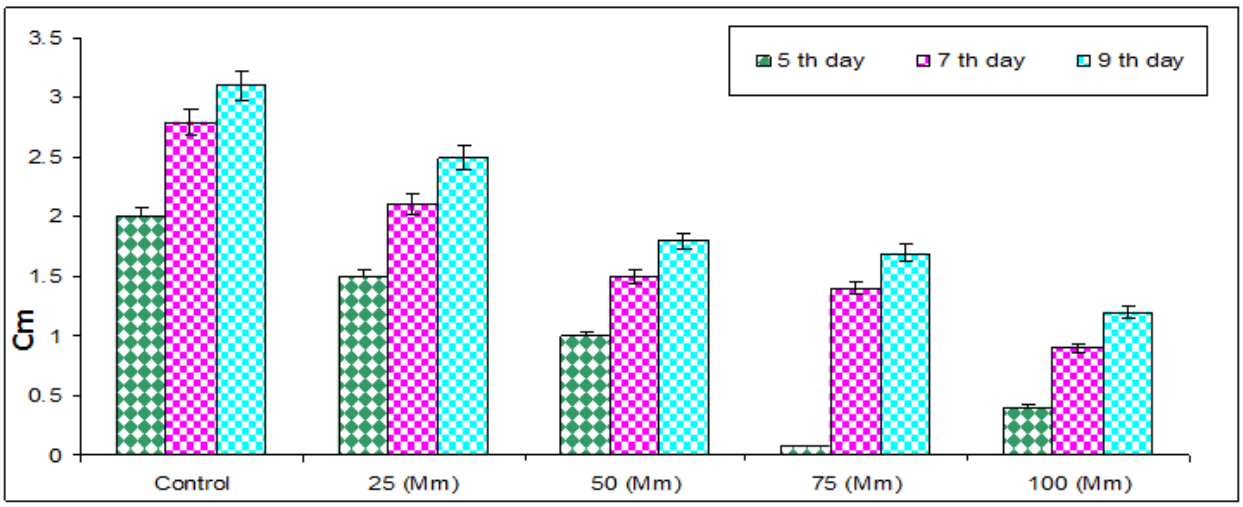

Fig. 2: Effect of Nacl treatments on root length of Barnyard Millet (*Echinochloa frumentacea*)

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