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EFFECT OF SALT STRESS ON PRODUCTION OF PROLINE IN *CELOSIA ARGENTEA* L. PLANT FROM TWO DIFFERENT ECOLOGICAL LOCATIONS#

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Abstract

The productivity of plant is greatly affected by various environmental stresses. Soil salinity is a major abiotic constraint affecting crop yield, much research has been conducted to developed plants with improved salinity stress impacts many aspects of a plants physiology, making it difficult to study, instead it is more tractable to dissect the plants response into traits that are hypothesized to be involved in the overall tolerance of the plant to salinity. In this present work the crop plant *Celosia argentea* L. leaf extract have been taken into consideration for estimation of proline as the indicator for salt stress. Plants from different locality were collected for the study and proline was used as the indicator for salt stress. Plants from different locality were collected for the study and proline was estimated by spectrophotometer. The difference in the two leaf extract concentration was significant. The plant from normal soil condition show optical density of 0.182nm and the plant collected from sea shore show 0.346nm. There is considerable difference in the reading at 520nm. This shows the presence of salinity stress in the plant from sea shore. Proline indicates salinity stress.

Key words: Abiotic stress, Salinity stress, Proline, *Celosia argentea* L., Crop Plant

#Short Communication

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Introduction

Plant stress refers to any unfavorable conditions that affect the plant metabolism, reproduction, root development or growth (Hartmut K. Lichtenthaler 1996). When under salt stress, plants maintain a high concentration of K+ and a low concentration of Na+ in the cytosol (Jian-Kang Zhu 2003). Salt stress, like many other abiotic stresses inhibits plants growth(Jian-Kang Zhu 2001). High concentration of salt cause ion imbalance and hyperosmotic stress in plant (JK Zhu 2003).When exposed to stressful conditions, plants accumulate an array of metabolites, particularly amino acids (Shamsul Hayat 2002). Proline, an amino acid plays a highly beneficial role in plants exposed to various stresses condition (Shamsul Hayat 2002). A large body of data suggests a positive correlation between proline accumulation and plant stress (Shamsul Hayat 2002). Proline accumulation has been reported during conditions of drought, high salinity, heavy metals, and oxidative stress (L Szabados et al.2010). Proline degradation can provide, carbon, nitrogen and energy source after stress. The *celosia argentea* plant is an edible in rural areas (G Szekely 2004).Plants constitute a major part of our nature and fulfill the human and animal need.

Soil salinity restricts plant growth in deserts and also in many temperate regions of the world (Greenway and Munns, 1980).

Salinity is the basic environment factor accounting for decreased crop productivity in many geographical areas, mainly in arid and semiarid region (Greenway and Munns, 1980).

Problems of salinity arise when the concentration of chloride, sodium carbonate, sulphate, salts of sodium or magnesium are present in excess. Champman (1966, 1974) has suggested 0.5% of the salts in the soil solution as the limit where halophytic condition start.

Materials and Methods

Celosia argentea L. was collected from two different Ecological areas. One from the sea shore of Ladghar Tal Dapoli and another is the Botanical Garden at Dapoli Urban Bank Senior Science College Tal Dapoli.

Details of the Garden Plant:

On Aug. 2019 the plant *Celosia argentea* L. was collected from garden area.

Details of the Sea Shore Plant:

On Aug. 2019 the plant *Celosia argentea* L. was collected from Ladghar beach. Plant was located 45m away from the tidal area.

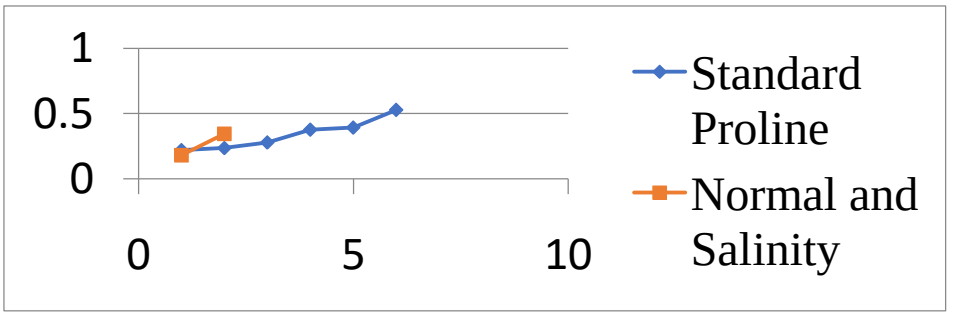
Determination of Proline

Proline was measured as described by Bates et al. (1973).

1) Extract 0.5gm of plant material by homogenizing in 10ml of 3% sulphosalicylic acid.
2) 50µl plant extract was reacted with 2ml glacial acetic acid and 2 ml acid ninhydrin (1.25g Ninhydrin warmed in 30ml glacial acetic acid and 20ml 6 M Phosphoric acid until dissolved) for 1 hour at 100 °C and the reaction was then terminated in an ice bath.

3) The reaction mixture was extracted with 4 ml Toluene.
4) The chromophore containing toluene was warmed to room temperature and its optical density was measured at 520 nm.
5) The amount of proline was determined from a standard curve in the range of 20-100 µg.

Result



Above Graph is plotted as Concentration of Proline on Y axis against number of Standard and experimental test tubes.

Discussion

Salinity is one of the major limitations on crop productivity and quality in the world, Katerji et al.(1998) and Hoorn et al. (2002) has shown that the negative effects of salinity are reducing the growth rate, biomass reduction, shorter stature, smaller leaves, osmotic effects, nutritional deficiency as well as mineral disorders. Many plants accumulate proline as a nontoxic and protective osmolyte under saline conditions (Jain et al., 2001; Pujol et al., 2001; Parida et al.2002) .In this study the concentration of proline increased significantly. Wang et al. (2004) reported that proline accumulation in plants may be a symptom of stress in less salinity tolerance species.

Conclusion

When a plant is selected and tested in two ecological differences, it appears that the ratio between normal plant and stress plant which is a stress plant is higher than that of proline. The proline content increase in stress plant as compare to normal plant.

References

Bapu R Thorat "Review on *celosia argentea* L. plant" Research journal of parmacognosy and phytochemistry, 2018;10(1):109-119.

Bates et al., "Rapid determination of free proline for water stress studies". Plant and Soil, 1973;39(1):205-207.

C Abdul Jaleel, R Gopi, B Sankar, P Manivannan, A Kishorekumar, R Sridharan, R Panneerselvam. "Study on germination, seedling vigour, lipid peroxidation and proline metabolism in *Catharanthus roseus* seedling under salt stress". South Africa Journal of Botany, 2007;73(2):190-195.

Gyongyi Szekely, "The role of proline in Arabidopsis thaliana osmotic stress responses". Acta Biological Szegediensis, 2004;48(1-4):81-81.

Hartmut K. Lichtenthaler,"Vegetation Stress: an Introduction to the stress concept in plant". Journal of plant physiology, 1996;148(1-2): 4-14.

Jian-kang zhu. "Plant salt Tolerance". Trends in plant science, 2001;6(2):62-71.

Jian-kang zhu. "Regulation of ion homeostasis under salt stress." Current opinion in plant biology, 2003;6(5); 441-445.

Laszo Szabados and Arnould Savoure, "Proline: a multifunctional amino acid". Trends in plant science, 2010;15(2):89-97.

Shamsul hayat, "Role of proline under changing environment." Plant signalling and Behaviour, 2012;7(11):1456-1466.