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TO STUDY SALINITY INDUCED CHANGES IN PROLINE CONTENT AND ROLE OF IAA TO OVERCOME STRESS IN *VIGNA RADIATA*

Ritu Jain[1], Patel Ruby[1], Moses Kolet[1]

[1]*Department of Botany, G. M. Momin Women's College, Bhiwandi-421302, India.*

ABSTRACT: ***Principle objective was to evaluate effect of salinity on germination and salinity induced changes in Proline content and role of IAA to overcome stress. Percentage of seed germination decreases with increased concentration of salt. It is reduced from 70% to 32% at higher concentration. Proline content goes on increasing with increasing concentration of salt from 0.3%to 1.2%.It was observed that IAA helps to overcome from salt stress.***

Key words: *Vigna radiata, Indoleacetic acid, Proline content.*

INTRODUCTION

Primary salinity result from the accumulation of salt over long periods of time due to weathering and deposition of oceanic salt secondary salinization is from human activities that change hydrolytic balance of soil between water applied water used by crops. Global estimates are that more than 800 million hectares of land throughout the world are salt affected (Munns et al., 2008).

The most common causes are land clearing & replacement of perennial vegetation with annual crop irrigation schemes using salt rich irrigation water. Irrigated land accounts for only 15% of total cultivated land, but because irrigated land has at least twice the productivity of rain fed land, it produces one third of world's food (Munns R, M. Tester et al., 2008).

Salt stress causes reduction in plant growth because plant may suffer four types of stresses(Greenway & Munns1980) osmotically induced water stress, specific ion toxicity due to higher level of some ion to high reduce the uptake of other ion. Increase production of relative oxygen species which damage the macromolecules.

Germination is one of the most critical periods for a crop subjected to salinity (Fowler, 1991). Several researchers have observed a decrease in germination rate as salinity increase and the osmotic potential of the germination medium decreases (Greenway 1973; Redmann, 1974; Sharma 1976).

Research on effect of salinity on plant reveals the reduction in growth of root, stem, & dry weight (Naher & Malam 2010); Papiya Saha et al 2010; .; Manivannan, Jaleel, et al (2007) observed that 20-250% increase in free amino acid in *Zea* under salt stress. Protein is important constituents of all living organisms. Proline, an amino acid, plays a highly beneficial role in plants exposed to various stress i.e., conditions. Besides acting as an excellent osmolyte, Proline plays three major roles during as a metal chelator, an anti-oxidative defense molecule and a signaling molecule. Proline plays a role in plants under stress conditions. It tends to accumulate in response to metabolic stress.

Greenway & Munns 1980 observed that non-halophytic plant grown in a saline condition had higher content of ions in mature leaves & a low relative humidity in the developing tissues, both affecting the establishment of equilibrium necessary for normal metabolic reaction.

In this paper we have tried to unraveling inhibition mechanism induced by salinity. It would provide important information regarding role of IAA on germination; Proline content under salinity stress.

MATERIAL AND METHODS:

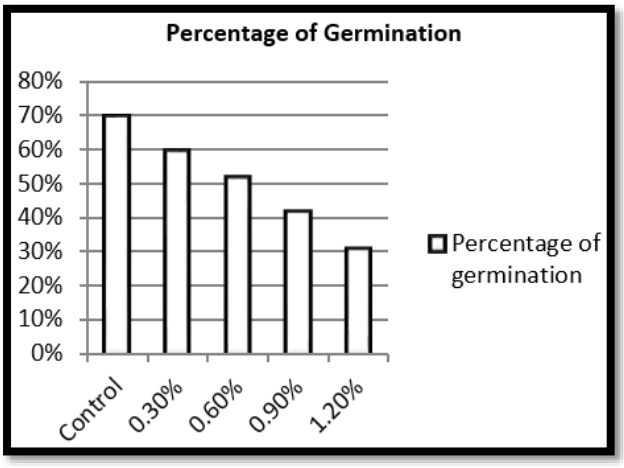
Plantlets and germinating seeds of *Vigna radiata* have been used for experiment 0.3%, 0.6%, 0.9%, 1.2% salt solution and blank solution prepared, seeds soaked in concentration given above. The number of seeds germinated in each concentration was counted and germination % was calculated by using following formula:

Germination% = No. Of seeds germinated x100 / Total no. of seed soaked.

Estimation of Proline according to Bates et.al (1973) 200mg of plant material was homogenized in 3% aqueous sulpho -salicylic acid, supernatant was used for free Proline estimation. 1ml of aliquot was mixed with 2ml of glacial acid and 2ml ninhydrin reagent. The test tubes were placed in boiling water for 45 minutes and then transferred to ice bath; 4ml of toluene was added to each test tube which was then thoroughly shaken. The upper pink coloured organic phase was removed by separating funnel. Optical density was recorded at 540nm.Standard curve was prepared using pure Proline. Graph was plotted of OD against concentration.

Table 1: Germination Percentage of *Vigna radiata* seeds with Different Salt Concentrations

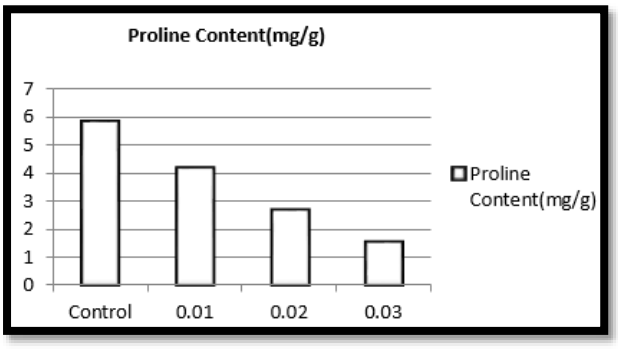
Concentrations of salt solution	Percentage of germination
Control	70%
0.3%	60%
0.6%	52%
0.9%	42%
1.2%	31%



Graph 1: Germination Percentage of *Vigna radiata* seeds with Different Salt Concentrations

Table 2: Proline Content of *Vigna radiata* plantlets Treated with Different Salt Concentration

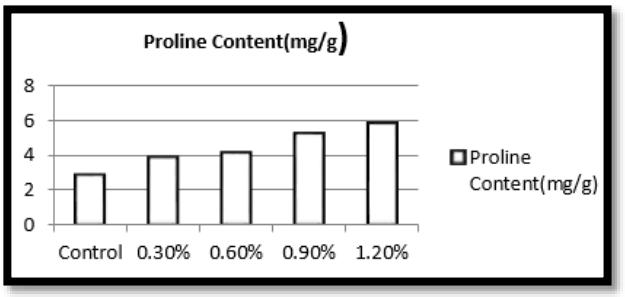
Concentrations of salt solution	Proline Content
Control	2.85
0.3%	3.87
0.6%	4.15
0.9%	5.19
1.2%	5.80



Graph 2: Proline Content of *Vigna radiata* plantlets Treated with Different Salt Concentration

Table 3: Proline Content of *Vigna radiata* plantlets Treated with Salt & Supplemented with Different Concentration of IAA

Concentrations of IAA	Proline Content(mg/g)
Control	5.80
0.010	4.15
0.020	2.67
0.030	1.55



Graph 3: Proline Content of *Vigna radiata* plantlets Treated with Salt & Supplemented with Different Concentration of IAA

RESULT AND DISCUSSION:

Percentage of germination decreases with increased concentration of salt 1.2% salt concentration treated seeds show minimum germination with respect to Table 1 & Graph 1 i.e.31%.Kaifi and Galdani 2001 Jamil and Rho 2004 reported low germination due to salinity.

Proline content significantly increased in plants exposed to increased sodium chloride levels. Dracup (1991) reported that Proline levels increase with increasing salt concentrations. The important properties of salinity were the affectation of the dominance of protein and some of amino acids, especially Proline on the plants. These organic compounds increased according to the increase of salinity (Abo-Zaid, 2000) .In our result, amount of Proline in plantlets increased as the concentration of salt increased from 0.3% to 1.2%. The 1.2% salt treated plantlets shows maximum concentration of Proline i.e. 5.80mg/g with respect to Table 2 & graph 2.The incurrence of plants to salt stress leads to the accumulation of some organic solutes as sugar, Proline, betaine, amino acid, proteins and carbohydrates which are important for the osmo-regulation (Gorham *et al*., 1981; Bolarin *et al*., 1995; Serrano *et al*., 1999; Saffan , 2008).

When 1.2% sodium chloride treated seeds supplemented with different concentration of IAA, Proline content decreases as comparison to control; minimum Proline content was found in 3ppm of IAA supplemented seeds was 1.55 mg/g in comparison to 5.80mg/g .with respect to Table 3 & Graph 3 Kaya et al. 2009 reported same.

CONCLUSIONS:

The present study suggested that the salinity cause stress on plant. To survive under stress plant accumulates proline. It was found that suitable concentration of IAA can significantly overcome the stress caused by salinity. It could effectively be utilized for growing crops at salinity affected areas.

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