Eduved
International Journal of Interdisciplinary Research
ISSN 2348-6775 (Online)
2349-5480 (Print)

MID DAY MEAL PROGRAMME IN STATES: A CRITICAL REVIEW

Navneet Kumar	**Department of Botany, K.R. College, Mathura**
D.K. Singh	**Department of Botany, K.R. College, Mathura**
H.N. Sharma	**Department of Environmental Toxicology, Dr. B.R. Ambedkar University, Agra**

ABSTRACT

Saline areas must have been familiar for a very long time. However, since plenty of glycophytic land was available, there has been no urge to utilize land that clearly was not favorable for plant growth. Consequently the problems forced by excess of salinity, have till now been primarily of academic interest. The growing world population coupled with vastness of saline areas in forcing this academic interest to become an important economic one. One of the most pressing problems therefore, is an economic appraisal of the total value of saline areas, so that firm recommendations can be made as the reclamation of such areas.

INTRODUCTION

In agriculture, salinity problem denotes the soil condition, when soil solution contains excessive amounts of neutral salts like chloride and sulphates of sodium. The electrical conductivity (EC) of the soil saturation extract of saline soil is more than 4 dS/m at 25°C, exchangeable sodium percentage is less than 15 and pH is not more then 8.5 (Richard, 1954). There are two major approaches towards solving the problem of salts affected soils, either to condition the soil to meet the requirements of different crop plants to grow tolerant cultivars, to suit various level of seed deteriorations. Land amelioration, by use of soil amendment along with appropriate leaching and drainage measures and proper management practices, is normally the first choice but there are clear situation where, it is not practicable or is not economically feasible, due to heavy agricultural inputs. In contrast to this if salt tolerant lines are available, the production costs can be drastically reduced. Although degrees of salinity, that are very much lower then that of sea water are usually deleterious to most of the crop plants (Richards, 1954) yet there is no fundamental biological incompatibility, between plant life and highly saline conditions; nevertheless, there is much variability in the sensitiveness of crop plants to salinity (Shannon,1979). The United States Salinity laboratory staff has conducted extensive research on salt tolerance of agricultural plant species and combined their results with those of other researchers throughout the world to compile salt tolerance listing for different plant species (Richard, 1954; Bernstein 1964). Plants generally are most sensitive to salinity during germination or early seedling growth. Some crops such as Rice, is sensitive during flowering and seed set (Pearson et.a1,1966). Therefore crops that may be highly

ISSN 2348-6775 (Online)
2349-5480 (Print)

tolerant at one growth stage may be sensitive during another stage (Carter, 1975). In view of the above, crop selection is an important management decision in salinity- affected areas. In this context Central Soil Salinity Research Institute, Karnal (India) have suggested that efforts should be directed towards locally adapted germplasm from already characterized salt affected areas within the country (Rana, 1978). Collection of wheat, cicer, rice, oil seeds, millets and forages deserve priority, in view of their proven value in the context. Besides a fundamental build up the knowledge of physiology of salt tolerance is important, to identify such physiological and biochemical responses, which render salt tolerance to a plant, so that, if inheritable, such characters can be incorporated for salt tolerance through an extensive breeding programme. Keeping in view, the present population of human and cattle, the food crops and green fodder production will have to be increased by 2.7 times the present production may have to further increased, since the human and cattle population increase 2.96 per year in our country (Annual report of Indian grassland and fodder research institute, 1971).

In view of the severity and magnitude of salinity and sodicity problem in salt-affected areas of the country in relation to the plant growth and the general shortage of food and fodder, coupled with the fact that salt tolerant grasses, legumes and cereals tend to improve soil structure in partially reclaimed soil through their incorporation in to the soil as green manure (Bernstien, 1975). The information on salt tolerance behaviour of different Indian crop species, which are released recently particularly cereal crops in quite meagre. Out of the total saline land of our country, U.P. share about 70% saline land. In India about 2 lacs acre land is affected with salinity. Agra region contains about 70 thousand acre salt affected land (Press Amar Ujala 1986). U.P. Govt. has organized a corporation to reclaim such land in to fertile one in 1981, however, USAR SUDH_AR NIGAM is not more affected to reclaim such sol due to the unavailability of required money and sources. The reclamation of such soil is too costly for India like, developing country. To screen and selection of salt tolerant varieties for such land is cheaper and feasible.

MATERIALS AND METHODS

Ten varieties of gram were obtained from Rajasthan Agricultural Research Station, Durgapura, Jaipur, for screening their salt tolerance variability. The screening was conducted according to Garrard's technique modified by Sarin and Rao (1961) and data were collected on the basis of percentage germination and early seedling growth as percentage reduction in coleoptile length.

Name of Varieties: RS 4 865; RS 4 895 ; RS 4 959 ; RS 4 811; RS 4 807 ; RS 4 823 ; RS 4 256 ; RS 4 974 ; RS 4 931 ; RS 4 945. The influence of salinity levels of 2, 4, 6, 8 dS/m, EC (electrical conductivity), salt solutions (containing equimolar concentration of $CaC1_2$ and NaC1 on early seedling growth of 10 varieties of gram was investigated following Garrard's technique as modified by Sarin and Rao (1958). Test tubes of 30 ml were filled with rolls of filter folded at top in to cones to support the seeds. The seeds were surface sterilized with 0.1% $HgC1_2$. The test tubes were filled to one third with the test solution, so that the salt solution could be supplied to the roots through the capillary action of filter paper. Five replications were maintained for each treatment including control (distilled water). Three seeds were allowed to germinate between the paper roll and glass wall of each tube. The tubes were kept in dark at 35°C ± 2°C temp. Observations on the total length of the root and coleoptile were recorded at 24 hrs. intervals up to 96hrs under green safe light

ISSN 2348-6775 (Online)
2349-5480 (Print)

The data were analyzed statistically on factorial basis, following the analysis of variance. To eliminate, such differences that might be attributed to seed size, water absorption capacity and seed vigour, the growth of each variety was recorded as percent over control. two varieties, one tolerant and other susceptible were selected for further comparative studies.

The selected varieties were raised in Petri plates for various physiological and biochemical studies, after sterilizing and through washing, the seeds were transferred on moist filter paper in sterilized Petri plates. Deionised water were used as control and for treatments of seeds were irrigated with salt solutions of 2, 4, 6 and 8 dS/m (EC) Levels using same salt as in seedling growth. The replicates were placed in dark growth chamber at 28±2°C. Fresh samples of seedlings were drawn at every 24hrs after sowing, for the assay of various enzymes. Parallel samples were dried at 70±2°C in an oven till constant weight was reached. The dry matter thus obtained was maintained in desiccators, for various biochemical determinations. All estimations and assays were repeated thrice. All samples for various metabolic studies were drawn at random.

Penner and Ashton (1967) modified the method of combination of method of Lawry et al, (1951), was employed to estimate the protease activity (Annonymous, 1973). The essay was performed in whole seedlings. One gram sample was homogenized with 10 ml of 0.2M phosphate buffer pH 7.0 in a chilled mortar. Homogenate were passed through with chilled cloth and this filtrate was centrifuged at 10,000xg for 10 minutes at 4°C. The supernatant was used as enzyme preparations. To 1.0m1 enzyme, 3 ml of 0.2M phosphate buffer pH 7.0 and. 2.0 ml of substrate casein (0.5%) pH 7.0 were added. This mixture was kept in water bath at 30°C for an hour. To 2.0m1 of this reaction mixture, 2.0 ml of 15% trichloro acetic acid was added to stop the reaction. The casein precipitate was removed by centrifugation at 2500 xg for 15 minutes. The supernatant was collected. To 1.0 ml of supernatant, 4.0m1 of 0.5N NaOH and 1.0 ml of 1N folin phenol reagent (BDH) was added. The colour so obtained were read, immediately at 625 nm in a calcrimeter against blank. The protease activities were expressed as μg tyrosine was estimated using following regression formula. All parameters were analysed using standard procedure and protocols.

RESULTS AND DISCUSSION

Protease: ANOVA for protease activity indicated that the main effects varieties, salinity levels and seedling age were significant at 0.01 probability and their interaction i.e. variety with salinity level and variety with seedling age were significant at 0.05 probability. However the interaction of seedling age and treatment was not significant. Table 1.1a indicated higher levels of protease activity in RS4-865 than the salt sensitive cultivar RS4-807. With increase in the salinity levels of the medium, the protease activity decrease significantly irrespective of variety and seedling age (Table-1.1b). A significant enhancement in protease activity was recorded with increasing age of cicer seedling till 96 hrs, which later declined at 120 hrs (Table-1.1c). The interaction of variety with salinity level is depicted in Table 1.1d. It is recorded from the data that both the varieties show a decline in the enzyme activity with increasing salinity levels, and it was observed to be statistically significant. However, the varieties differed in their degree of inhibition. The salt tolerant variety RS4-865 showed only 18%

ISSN 2348-6775 (Online)
2349-5480 (Print)

Table 1.1: Effect of Salinity on Protease Activity of two Gram Varieties (μg tyrosin libratede/gm f.wt)

(a) Main Factor: Varieties

RS4-807	RS4-865	SEM±	C.D. at 5% P
33.40	50.66	5.28	15.87

(b) Main Factor: Salinity Level

Control	2EC	4EC	6EC	8EC	SEM ±	C.D. at 5% P
51.4	42.11	39.8	35.5	30.1	3.42	9.30

(c) Main Factor: Seedling Age

24 Hrs.	48 Hrs.	72 Hrs.	96 Hrs.	120 HRs.	SEM ±	C.D. at 5% P
17.4	21.7	45.3	63.4	51.9	3.42	10.60

(d) Interaction V × T

S.No.	Variety	Control	2EC	4EC	6EC	8EC
1.	RS4-807	47.65	33.58	27.19	22.53	14.14
2.	RS4-865	55.31	52.73	50.59	48.65	45.93

S.E.M. ± 0.2.74 C.D. at 5% P 6.61

(e) Interaction V × D

S.No.	Variety	24 Hrs.	48 Hrs.	72 Hrs.	96 Hrs.	120 Hrs.
1.	RS4-807	11.17	14.27	26.49	56.87	38.29
2.	RS4-865	23.89	29.21	64.21	70.31	65.58

S.E.M. ± 3.26 C.D. at 5% P 7.869

(f) Interaction "Seedling Age × Salinity Level"

Seedling Age	Control	2EC	4EC	6EC	8EC
24 Hrs.	20.10	19.21	18.17	15.65	14.49
48 Hrs.	29.70	24.00	19.53	18.62	16.67
72 Hrs.	63.45	44.56	42.79	38.81	36.97
96 Hrs.	76.41	70.60	68.62	58.30	43.81
120 Hrs.	67.85	58.23	49.93	64.40	37.86

S.E.M. ± 1.65 C.D. at 5% P (N.S.)

inhibition at 8 EC salinity levels, whereas, the salt sensitive variety RS4- 807 showed a marked inhibition right from 2 EC salinity level onwards (41% to 74% over control). Table 1.1e depicted the interaction of variety with seedling age, and was found to be statistically significant irrespective of salinity levels. The cicer seedling registered an increase in enzyme activity with an advancement of age in both the varieties till 96 hrs, however, they differed in degree. RS4-865 shows greater activity than RS4-807 right from the 24 hrs of duration. At 120 hrs, RS4-807 registered a fall in the enzyme activity from 96 hrs by 33% and by 8% of control in RS4-865. The interaction of seedling age with salinity level is depicted in table 1.1f. At different salinity levels a decrease in protease activity was recorded at all duration. Whereas, with increasing age the activity was recorded maximum at 96 hrs and then it declined at 120 hrs.

The overall effect at different salinity levels and seedling age on the two varieties i.e. RS4-807 and RS4-865 is portrayed in Table 1.1. With increase in salinity levels the protease activity decreased in both the varieties, however RS4-807 showed greater reduction at 120 hrs (80.2%) in 8 EC dsm-1 than RS4-865 (14.32% over control), whereas, with seedling age the increase in activity was recorded till 96 hrs only than declined at 120 hrs.

ISSN 2348-6775 (Online)
2349-5480 (Print)

Total Proteins: As evident from ANOVA for total protein levels the main effect i.e. salinity levels and seedling age were found to statistically significant. Variety RS4-807 had higher levels of total protein than tolerant, RS4-865 (Table 1.2a, 1.2b) indicate that the effect of salinity levels on total protein irrespective of variety and seedling age was found to be significant. The total proteins increased with salinity levels, whereas with seedling age (Table 1.2c) total proteins decreased up to 96 hrs and then showed slight increase at 120 hrs. The interaction of variety with salinity levels (EC) has been shown in table 1.2d. Irrespective at seedling age variety RS4-865 showed higher level of protein than RS4-807 in control, whereas, in 8 dSm-I the difference was very little. Table 1.2e portrayed the interaction of variety with seedling age and in table 1.2f, the interaction of seedling age with salinity levels, both of them were found to be not significant. Thereby, indicating that there has been no deviation due to interaction at the two factors and they behaved in the same manner as the main effects. A gradual decrease in total proteins was recorded in the interaction of seedling age with salinity levels (EC).

Table 1.2: Effect of Salinity on Total Protein of two Gram Varieties (μg tyrosin libratede/gm f.wt)

(a) Main Factor: Varieties

RS4-807	RS4-865	SEM±	C.D. at 5% P
9.71	9.18	1.15	N.S.

(b) Main Factor: Salinity Level

Control	2EC	4EC	6EC	8EC	SEM ±	C.D. at 5% P
5.19	8.26	9.89	9.93	10.60	0.96	2.88

(c) Main Factor: Seedling Age

24 Hrs.	48 Hrs.	72 Hrs.	96 Hrs.	120 HRs.	SEM ±	C.D. at 5% P
11.83	9.96	8.92	7.71	8.26	0.91	2.73

(d) Interaction V × T

S.No.	Variety	Control	2EC	4EC	6EC	8EC
1.	RS4-807	5.71	8.81	11.39	11.28	11.8
2.	RS4-865	6.24	7.90	9.30	10.57	11.12

S.E.M. ± 0.66 C.D. at 5% P (N.S.)

(e) Interaction V × D

S.No.	Variety	24 Hrs.	48 Hrs.	72 Hrs.	96 Hrs.	120 Hrs.
1.	RS4-807	12.56	9.87	9.24	8.12	7.76
2.	RS4-865	10.69	10.00	8.21	7.66	8.36

S.E.M. ± 0.63 C.D. at 5% P (N.S.)

(f) Interaction "Seedling Age × Salinity Level"

Seedling Age	Control	2EC	4EC	6EC	8EC
24 Hrs.	8.70	10.65	12.20	13.26	13.85
48 Hrs.	6.45	9.81	10.90	11.56	11.80
72 Hrs.	5.83	7.85	9.15	10.50	10.93
96 Hrs.	4.50	6.70	7.87	9.80	10.30
120 Hrs.	4.64	6.79	9.03	9.60	10.42

S.E.M. ± 0.43 C.D. at 5% P (N.S.)

the protein level increased with increasing salinity at all the duration with increasing seedling age a consistency in the depletion of total protein level as- were recorded at different varying level of salinity (Table 1.2f). Table 1.2 gives an inside picture at the overall effect of salinity at different stages of

ISSN 2348-6775 (Online)
2349-5480 (Print)

seedling growth in the varieties RS4-807 and RS4-865 with respect to salinity. It was observed that due to salinity, total proteins level increased in both the varieties however, it was more prominent in RS4-807 than RS4-865.

Soluble Nitrogen: The ANOVA for soluble nitrogen indicates that the main effect varieties, salinity level (EC) and seedling age as well as the interaction varieties with salinity levels, varieties with seedling age and seedling age with salinity level were found to be statistically significant at 0.01 probability. Table 1.3a showed the varietal behaviour under salt stress irrespective of salinity levels and seedling age. It was observed that variety RS4-807 has higher amount of soluble nitrogen than the salt tolerant variety RS4-865. Data presented in Table 1.3b clearly demonstrated an increase with soluble nitrogen level which was found to be statistically significant irrespective at the variety or-seedling age. With increase in seedling age the soluble nitrogen level decreases (Table 1.3c). The reduction was by 38% over control at 120hrs.

The interaction of variety with salinity level is portrayed in Table 1.3d irrespective at seedling age and was found to be statistically significant. With salinity levels the soluble nitrogen level increased in both the varieties, however they differed in degree. RS4-807 showed higher level of soluble nitrogen at 8 EC than RS4-865.

Table 1.3: Effect of Salinity on Soluble Nitrogen of two Gram Varieties *(% dry weight)*

(a) Main Factor: Varieties

RS4-807	RS4-865	SEM±	C.D. at 5% P
9.24	8.93	0.16	0.49

(b) Main Factor: Salinity Level

Control	2EC	4EC	6EC	8EC	SEM ±	C.D. at 5% P
5.87	7.69	9.94	10.56	10.97	0.12	0.36

(c) Main Factor: Seedling Age

24 Hrs.	48 Hrs.	72 Hrs.	96 Hrs.	120 HRs.	SEM ±	C.D. at 5% P
11.03	9.64	8.79	7.63	7.88	0.11	0.33

(d) Interaction V × T

S.No.	Variety	Control	2EC	4EC	6EC	8EC
1.	RS4-807	5.27	8.40	9.86	10.68	11.00
2.	RS4-865	5.78	7.73	9.63	10.04	10.54

S.E.M. ± 0.81 C.D. at 5% P 0.24

(e) Interaction V × D

S.No.	Variety	24 Hrs.	48 Hrs.	72 Hrs.	96 Hrs.	120 Hrs.
1.	RS4-807	11.91	9.59	8.36	7.47	6.93
2.	RS4-865	10.54	9.70	8.11	7.03	7.00

S.E.M. ± 0.81 C.D. at 5% P 0.24

(f) Interaction "Seedling Age × Salinity Level"

Seedling Age	Control	2EC	4EC	6EC	8EC
24 Hrs.	8.24	9.93	11.67	12.66	13.26
48 Hrs.	5.97	9.52	10.26	10.97	11.00
72 Hrs.	5.81	7.50	10.91	9.87	10.59
96 Hrs.	4.55	6.42	7.76	9.61	9.80
120 Hrs.	4.49	6.78	8.71	9.44	9.91

ISSN 2348-6775 (Online)
2349-5480 (Print)

S.E.M. ± 0.0022 C.D. at 5% P 0.006

Table 1.3e portrayed the interaction of variety with seedling age and found to be significant soluble nitrogen in cicer gradually decreases with an advancement of seedling age in both the varieties. i.e. RS4-807 and RS4-865. The overall decrease was by 45% and 29% over control in RS4- 807 and RS4-865 respectively. The interaction of seedling age with salinity levels (Table 1.3f) registered an increase in soluble nitrogen in different salinity levels at all duration, whereas, with increasing seedling age, the level of soluble nitrogen depleted. The overall effect of salinity at different stages at seedling growth on the two varieties is portrayed in Table 1.3.

It was observed that salinity caused an increase in the soluble nitrogen level and was high in the salt sensitive variety RS4-807 as compared to tolerant variety RS4-865. The increased was prominent till 4 EC salinity level with seedling age. The two varieties registered a decreased in soluble nitrogen level.

Protein Nitrogen: As evident from ANOVA for protein nitrogen the main effects i.e. variety, salinity level and seedling age were found to be statistically significant at 0.01 probability, the interaction of variety with seedling age was significant at 0.05 probability and the other two i.e. interaction of variety with salinity level and seedling age with salinity level were found to be non-significant. Table-1.4a shows the varietal behaviour irrespective of salinity levels and seedling age. Variety RS4-807 registered more protein nitrogen than RS4-865. The effect of salinity level is depicted in Table 1.4b. The protein nitrogen level is registered an increase at different salinity levels, the increase was sharp till 6 EC salinity levels. With duration (Table 1.4C) the seedlings showed a decreased up to 96 hrs, 41% over control which was regulated by the level at 120 hrs. Table 1.4d portrayed the interaction of variety with salinity levels irrespective of seedling age. The salt sensitive variety RS4-807 registered more protein nitrogen at 8EC salinity levels than the salt tolerant variety RS4-865. However, both the variety clearly indicated an increase in protein nitrogen at different salinity levels.

Table 1.4: Effect of Salinity on Protein Nitrogen of two Gram Varieties *(% dry weight)*

(a) Main Factor: Varieties

RS4-807	RS4-865	SEM±	C.D. at 5% P
0.48	0.45	0.024	0.066

(b) Main Factor: Salinity Level

Control	2EC	4EC	6EC	8EC	SEM ±	C.D. at 5% P
0.26	0.40	0.50	0.57	0.60	0.016	0.048

(c) Main Factor: Seedling Age

24 Hrs.	48 Hrs.	72 Hrs.	96 Hrs.	120 HRs.	SEM ±	C.D. at 5% P
0.61	0.51	0.44	0.637	0.39	0.16	0.048

(d) Interaction V × T

S.No.	Variety	Control	2EC	4EC	6EC	8EC
1.	RS4-807	0.24	0.43	0.54	0.59	0.61
2.	RS4-865	0.27	0.38	0.46	0.55	0.58

S.E.M. ± 0.012 C.D. at 5% P (N.S.)

(e) Interaction V × D

S.No.	Variety	24 Hrs.	48 Hrs.	72 Hrs.	96 Hrs.	120 Hrs.
1.	RS4-807	0.66	0.50	0.48	0.39	0.37

2.	RS4-865	0.57	0.51	0.40	0.35	0.41

S.E.M. ± 0.02 C.D. at 5% P 0.06

(f) Interaction "Seedling Age × Salinity Level"

Seedling Age	Control	2EC	4EC	6EC	8EC
24 Hrs.	0.42	0.54	0.65	0.71	0.76
48 Hrs.	0.28	0.50	0.56	0.60	0.61
72 Hrs.	0.25	0.37	0.46	0.55	0.57
96 Hrs.	0.17	0.30	0.39	0.51	0.52
120 Hrs.	0.17	0.33	0.45	0.49	0.53

S.E.M. ± 0.00006 C.D. at 5% P (N.S.)

The interaction of variety with seedling age is depicted in Table 1.4e irrespective of salinity level. Both the varieties showed a decrease in protein nitrogen level RS4-865 showed a slight increase at 120hrs. Variety RS4-807 had more protein nitrogen than RS4-865 at 24 hrs of seedling age. The reduction was 45% at 120 hrs in RS4-807 and by 41% at control at 96 hrs in RS4-865. Table-1.4f depicts the interaction of seedling age with salinity levels. A consistency in the increasing pattern at protein nitrogen was absented with increasing salinity at different seedling age. However, protein nitrogen fall with advancement at seedling age by 38%, 60%, 70%, 69% and 69% in control, 2, 4, 6 and 8EC salinity levels respectively. The overall effect at salinity at different stages of seedling growth in the varieties with respect to salinity is portrayed in Table 1.4. It was observed that salinity caused an increase in the protein nitrogen level in both the varieties, however, the increase did not show much differences (Figure-10). With seedling age the protein nitrogen declined in both the varieties.

Table-1.6f showed the interaction of seedling age with salinity level. The RNA content decreased with increasing salinity level of the media, which was sham till 4 EC salinity levels, whereas with seedling age prominent increase in the RNA content was recorded at different salinity levels. Table 1.4 depicted the overall effect of salinity at different stages of seedling growth in different varieties with respect to salinity. It was observed that salinity caused a decrease in RNA content in both the varieties however they differed in their degree (Figure 12). Variety RS4-865 contained more RNA contents than the salt sensitive variety RS4-807.

It is evident from the results that protease activity increases with increasing age of seedling till 96 hrs, therefore it tends to decline. The decrease in the protease activity after a certain period of plant growth has also been reported by several workers (Jain, 2002; Amirjani, 2010, Mehboobeh and Akbar 2013). As evident from the results, the protease enzyme activity declined with increasing salinity level in both salt sensitive and salt tolerant varieties, however, maximum inhibition was recorded in salt sensitive variety RS4-807. It is indicated that the bio-chemical mechanism responsible for inhibition of seed germination and subsequent seedling growth is due to altered nitrogen metabolism (Parihar and Baijal, 1983). The present findings are incorporate with previous report (Weimberg 1967, Sandhya, 1992, Jain, 2002) that the activity of enzyme responsible for the mobilization at the protein reserves of cotyledon (i.e. protease) is inhibited under saline environment. The decreased protease activity resulted in a slower depletion at reserve proteins; delayed mobilization of reserve proteins ultimately affected the plant growth. Ryan (1973) had reported that proteolysis is the primal), but essential step towards the synthesis of newer proteins. Enzymatic proteins are synthesized by the newly formed amino acids,

ISSN 2348-6775 (Online)
2349-5480 (Print)

which came into metabolic pathway by the breakdown of protein. It is interesting to note that RS4-865 showed higher protease activity as well as total protein content and at this stage no direct relationship could be drawn by the loss of protein due to hydrolysis.

The ratio of protein nitrogen to soluble nitrogen was higher in saline condition as compared to non-saline media (control) which reflect upon the moisture content retained by the growing seedling.. The fresh weight of RS4-865 (salt tolerant) was also more as compared to RS4-807 (salt sensitive) variety. There is a lock of agreement among different laboratories on the effect of salinity enzymes levels in plants. Some investigator believe that the level of several key enzymes are lower in salt damaged plants than in control plants, which other have reported either or no difference in the activity of enzymes extracted from such plants (Weimberg 1970, 1975).

Under normal condition several changes in RNA metabolism occur during seed germination, the present findings showed an enhancement in the RNase activity with different salinity levels in both the cultivars, however, the susceptible variety showed higher activity than the tolerant one, Sheoran and Garg (1978) have reported slower Hydrolysis of RNA under salt treatment, the increased activity may be attributed to increased water saturation deficit, the RNase activity increases with increasing seedling age up to 72 hrs and later declines, similar findings have been reported in different crop plant by several authors.

While RNase activity increased in both the varieties the RNA content depleted. Susceptible - variety RS4-807 registered greater RNase activity and lower RNA content than the tolerant variety RS4-865 which may be directly related to RNA hydrolysis. A decrease in RNA was attributed to intensified activity of cytoplasm RNase. Total protein depletion may be related to reduce level of RNA contents with greater RNase activity. The interaction between nucleic acid and protein is more important as far as growth is concerned. The stimulation of DNA and RNA Synthesis is accompanied by inhibition of protein Synthesis in the cytoplasm. There is evidence to believe that salinity alters the native's properties of RNA in plants, but has no corresponding effect of DNA.

The data presented here suggested that a major aspect of the passage from the quiescent to the active stage in seed germination is the formation or activation at RNA. The quiescent state may be characterized by a fully active protein synthesizing system needing only the messenger RNA to trigger its function. The decrease in RNA content is RS4-807 (Susceptible) may be attributed to intensified activity of cytoplasm RNase as compared to RS4-865 (tolerant), and this being also responsible for the overall higher enzymes activity and increased protein content of the variety.

REFERENCES

- Abrol, I. P., Darga; K.S. and Bhumla, D.R.(1973): REclaiming alkali soils Central Salinity Research Institute (I.C.A.R.) Karnal, Bulletin 2,p.4.
- Alrnansouri J M and S Lutts (2004):Effect of salt and osmotic stresses on germination in durum wheat.J Of Plant Research Vol-113(3),P-239-243.
- Amirjani M R (2010)Effect of NaCl on some physiological parameters of Rice EJBS 3(1):6-16

- Ansari, R.;Naqui, S.M. and Azmi, A.R.(1977): Effect of salinity on germination, seedling growth and Amylase activity in wheat. Pakistan J. of Botany.9(2):163-166.
- Anwar M, Hussain, I, Alam, S S., Baig DF (2001) Effect of salinity on seed germination growth & yield of two veriety of cicer. pak. J. Biol. Sci. 4(2) 124-27
- Carter,D.L(1975): Problems of salinity in agriculture, In: PojakoffMayber and Gale(Ed.) plants in saline environmental Springer-Verlag New York, 1975.
- Jain R and Parihar, J.S. (2002) Impact of salt stress on germination and seeding growth of Sorghum. Paper accepted for publication in Indian J. of Bot. Soc.23;265-71
- Kerepesi, I and Galiba, G. (2000). Osmotic and salt induced alteration in soluble carbohydrate contents in wheat seedlings. Crop Sci. America. Vol 40(2) P 482-487.
- Lowery,O.H.; Rosenborough,N.J.L Farr,A.L. and Randell, R.J.(1951): Protein nrieasurment with folinphenol reagent.J.Bioi, Chern., 193:265-275.
- Mahboobeh R and Akbar E.A. (2013) Effect of salinity on growth chlorophyll, carbohydrate and Protein contents of N. plumbaginifolia over expressing P5CS gene. J.of Env. Res. and management 4(1);163-170
- Manshour, M.M.F.; Salama, K.H.A.; Al-Mutava, M.M.;Hadid Abou, A.F.(2002). Effect of NaCl and polyamines on plasma membrane lipids of wheat roots. Biologia Plantarum. V 45(2) P 235-239.
- Parihar-JS and Baijal-bD. (1982): Effect of salinity on germination and seedling growth of Berseern. Agra Univ. J. of Research Sci. Vol.31, pt-1;475-80.
- Penner, D. and Ashton, F.M. (1967). Hormonal control of protienase activity in Squash cotyledons. Plant Physiol. 47: P 691-696.
- Richards,I.A.(1954):Diagnosis and improvement of saline and alkali soils. Agricultural Handbook No. Co. USDA, washington, D.C.
- Rizvi,A. and Sirohi,G.S.(1974): A comprative study of the growth response of gibberellic acid and auxin in the response of gougerotin.Ind.J.Plant Physiol.,17:9598.
- Ryan,C.A.(1973):Proteolytic enzymes and their inhibitors in plants. Annu. Review Plant Physio 1.24:173-286.
- Sarin, M.N. and Narayanan,A.(1968):Effects of soil salinity and growth regulators on germination and seedling metabolism of wheat. Physiol. Plant.21:1201-1209.
- Sarin, M.N. and Rao,I.M.(1958):Physiological studies on salt tolerance in crop plants.111. Influence of sodium. sulphate on seedling respiration in wheat and gram. Indian J,Plant Physiol.1:30-38.
- Sharma,S.k. and Gupta,R.k(1971):Effect of salts on seed germination of some desert grasses. Annu.Arid.Zone.10:33-36.
- Sheoran,I.S. and Garg,O.P.(1978)Effect of salinity on the activities of RNase, Dnase and protease during germination and early seedling growth of mung bean. Physiologia plantarum 14(3):171-174.

ISSN 2348-6775 (Online)
2349-5480 (Print)

- Somogyii ,M.(1952): Notes on sugar determination.J.Biol.Chem.195:19-23.
- Weimberg,R,(1970):Enzyme levels in pea seedling grown on highly salinized media.Plant Physio 1.46:466-470.
- Weimberg,R.(1975)Effect of growth in highly salinized media on the enzymes of the photosynthetic apparatus in pea seedling. Plant Physiol 56:8-12.