SUMMARY

The objective of the present work is to study the effect of various levels of salinity (0, 50, 100 and 200 ppm) on growth and some related metabolic activities of *Zea mays* (single cross 10). Also, the present investigation was focused on the effect of grain soaking in/and shoot spraying with one of the two vitamins (100 ppm) nicotinamide (vit.pp) or ascorbic acid (vit.c) to test whether these vitamin treatments and any of their application method can alleviate or at least modify the pattern of changes induced by the salinization treatment.

The main experimental results can be briefly summarized in the following points:

1- The obtained results revealed that all growth criteria (shoot and root length, leaf area, number of adventitious roots, fresh and dry weights of both shoot and root system) were markedly reduced with increasing salinity levels, and the inhibitory effect of salt stress was much more pronounced at the highest level of salinity.

Applications of the two vitamins (vit. PP or vit. C) by grain soaking or shoot spraying led to a significant increase in the above growth characteristic of salt stressed *Zea mays* plant, whatever the level of NaCl used. The result showed that treatment with vit. pp was more effective than treatment with vit.C.

2- Increasing the salinity levels caused marked decreases in the contents of IAA and GA_3, and marked increases in the contents of ABA. Application of vitamins (vit. PP or vit. C) by any of the two methods (spraying or soaking) resulted in a marked and progressive increase in the IAA and GA3 levels and a decrease in ABA content.

3- The contents of photosynthetic pigments (chlorophyll a, chlorophyll b and carotenoids) were significantly reduced with increasing the salinity levels when compared with those of the non-salinized plants. Grain soaking in or shoot spraying with any of the two vitamins (vit. PP or vit. C) can alleviate the damage effects of salt stress on pigments content as compared with those of the reference controls.

4- It has been found in the present work that the soluble sugars were sharply increased by increasing salinity levels while the insoluble sugars and the total carbohydrates in saline stressed *Zea mays* plants were sharply decreased as compared with the control. Application of vitamins (vit. PP or vit.C) by any of the two methods led to a highly significant increase in the contents of carbohydrate fractions.

5- Salt stress induced highly stimulatory effect on the production of TSN while protein-N and TN consistently decreased with rise of salinity level in *Zea mays* plants. Application of the two vitamins (vit. PP or vit.C) by grain soaking or shoot spraying led to a highly significant increase in the biosynthesis of TSN, protein N and TN of salt stressed *Zea mays* plants as compared with those of the reference controls.

6- The accumulation of both amino-N and proline contents in tested plant were highly significantly increased with rise of salinity levels especially at the highest level of NaCl. On the other hand, treatments with one of the two vitamins (vit PP or vit. C) either by grain soaking or shoot spraying under salinity levels were associated with either highly significant increases in the amino-N content or highly significant decreases in the proline levels.

7- The activities of proteases and amylases enzymes of *Zea mays* plants were, in most cases, significantly stimulated in response to salt stress, but they were highly significantly decreased as a result of application of vitamin PP or vitamin C, whatever the level of NaCl used, and the method of vitamin applied.

8- Activity levels of superoxide dismutase and peroxidase enzymes showed a progressive significant increase with the increase in the concentration of NaCl, while the behavior of catalase enzyme showed an opposite response resulting in the accumulation of H_2O_2 as compared with those of the non-salinized plants.

It has been also observed that the activities of SOD and peroxidase of salt stressed *Zea mays* plants were mostly significantly decreased as a result of applications of vit. PP or vit. C by either grain soaking or shoot spraying method, while catalase activity showed a highly significant increase as compared with those of the reference controls.

9- Salt stress induced highly significant increases in lipid peroxidation as indicated by accumulated MDA content and

highly significantly decreases in glutathione contents as compared with the non-salinized control plants. Nicotinamide (vit. PP) or ascorbic acid (vit. C) treatments, either by grain soaking or shoot spraying induced highly significant reduction in lipid peroxidation (MDA) and a highly significant increase in glutathione in salinized *Zea mays* plants as compared with the reference controls.

10- In the present work, three prominent types of modification are noted in the protein patterns of maize leaves; some proteins were disappeared, certain of other proteins were selectively increased, and synthesis of a new set of protein was induced, some of these responses were observed under vitamin and salinity treatments, while others were found to be specific to either vitamin or salinity.

11- Sodium ion contents were significantly increased with increasing the salinity levels, while K^{+}, Ca^{+2} and Mg^{+2} contents decreased as compared with the non-salinized plants. Application of vitamins (vit. PP or vit. C) induced a beneficial effects, since they led to a reduction of Na^{+} accumulation concomitantly with increases in K^{+}, Ca^{+2} and Mg^{+2} contents as compared with those of the reference controls.

12- The obtained results were discussed in the light of those recorded by other investigators.