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Extended Abstract

The Beneficial effect of bio-fertilizer together with ascorbic acid on roselle plants grown below different kinds of soil

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Abstract:

This study was conducted to evaluate the impact of bio fertilizers namely, Azotobacterine (Azotobacter chroococcum) and phosphorein (Bacillus polymyxa) and mineral N, P and K fertilizers at the rates of 25, 50 and 100% for each fertilizer (from the doses recommended by Ministry of Agriculture) as well as ascorbic acid at the rate of 400 ppm on growth (plant height, number of branches and herb fresh and dry weights/plant), yield (dry weight of sepales/plant and feddan and weight of seeds/plant and feddan) of roselle plants (Hibiscus sabdariffa, L.) under different soils (clay soil at Dar El-Ramad farm, sandy loam and saline loamy sand soil at Demo farm, Faculty of Agriculture) at El-Fayoum governorate conditions. The data obtained showed that, bio and mineral (NPK) fertilizers increased the above characters of roselle plants under different soils of experiment. The maximum increase of these characters was obtained by the treatment clay soil × 100% NPK + bio-fertilizers × 400 ppm ascorbic acid, followed by clay soil × 50% NPK + bio-fertilizers × 400 ppm ascorbic acid as compared to saline loamy sand soil × non fertilizer × zero ascorbic acid treatment, although, the differences between these treatments and mineral fertilizer at the rate of 100% NPK alone were insignificantly. Therefore, it is economically and environmentally recommended to inoculate roselle seeds with mixture of Azotobacter + Bacillus and fertilize these inoculated plants with 50% plus 400 ppm ascorbic acid improve the vegetative growth and augment the yield components of roselle plants under clay soil with spraying 400 ppm of ascorbic acid were obtained the best results of this work study.

Introduction:

Roselle (Hibiscus sabdariffa, L.) is cultivated mainly in Upper Egypt and grows well under different environmental conditions such as high temperature. Roselle requires a permeable soil, a friable sandy loam with humus being preferable. The cultivated area of roselle plants at El-Fayoum goveronrate reached to more than 100 feddans. The new reclaimed soils can be cultivated with such plants, which are able to grow under different climatic and soil type conditions. Plants need certain amount of bound nutrients in specific type at acceptable time, for her growth and development. Recently, great efforts have been done on the use of bio-fertilizers instead of chemical ones to produce clean and healthy crops. The use of mineral fertilizer is the major cost in plant production and causes the environmental pollution, as well as, contaminates the underground water. Bio-fertilizers mainly consist of beneficial microorganisms that can release nutrients and make them available in the soil for growing economical plants. Besides, bio-fertilization has the advantages of avoiding environmental pollution and being cheap. Soil microorganisms which convert the insoluble form of phosphorus to soluble for play an important role in supplying the plants with the available phosphorus. Phosphorein is a bio-fertilizer product containing active microorganisms hydrolyzing the insoluble phosphorus into soluble one. Also, phosphate solubilizing bacteria solubilize insoluble P by producing various organic acids. This available P is taken up by plants. In addition, Azotobacterine, Microbiene, Nitrobiene, and Biogen as new bio-fertilizers have greater amount of symbiotic and no symbiotic bacteria responsible for fixation of nitrogen by atmosphere. Application of them achieved the following merits (According to reducing plant requirement of N by 25%, and increasing the availability of various nutrients, stimulating growth of roots, enhancing the resistance of plants to root diseases, reducing the environmental pollution, and improving the productive performance of the fruits crops.

Ascorbic acid is an important antioxidant defense in plant cells. It protects plant cells against damage by oxygen free radicals, which may be produced as a result of a disturbance of electron transfer processes or via autooxidation. It also stimulated respiration activities, cell division and many enzymes activities. Recently, a great attention has been focused on the possibility of using natural and safety substances i.e. vitamins, amino acids and yeasts in order to improve plant growth, flowering, capsule setting and resistance against

unfavorable environmental conditions and pathogens. However, lack of information about the physiological roles of such factors is still exists. Foliar application of ascorbic acid to different plant species was found to have stimulative effects on the growth, dry matter accumulation and yield components.

A general reduction in growth and yield due to salinity is widely documented. Growth and yield of roselle plants were decreased with increasing soil salinity. The drastic influence of salinity on plant growth and metabolism was attributed, principally, to the enhanced Na+ uptake which causes ion excess in plant tissues. One of the primary effects of increasing salinity in the growth medium is the inhibition of K+, Ca++ and NO3- uptake by plant roots. In addition it is well established that salinity stress damages plant cells through production of reactive oxygen species including superoxide, hydrogen peroxide, hydroxyl anins and single oxygen. On the other hand, some trials have been made to alleviate the disturbances in plant metabolism excreted by salinity stress. It has been suggested that some antioxidants (to which belongs ascorbic acid) may help to overcome some of these inhibitory effects.

The objective of this work is to investigate the response of roselle plants (Hibiscus sabdariffa, L.) to different levels of mineral, bio fertilization, ascorbic acid as well as, their interactions on plant growth, yield and chemical composition in order to figure out the possibility of eliminating or/and decreasing the amount of major chemical fertilizers by substitution with bio-fertilizers and ascorbic acid under El-Fayoum governorate conditions.

Material and methods:

A field experiment were conducted throughout the 2 sequential seasons of "2007" and "2008" to check the result of bio, nitrogen, phosphorus and potassium fertilizers on growth, yields and its part of roselle plants (Hibiscus sabdariffa, L.) underneath completely different soils at El-Fayoum governorate conditions. Three completely different soils in two experimental stations of the Faculty of Agriculture, particularly clay soil at the Dar El-Ramad farm, a saline loamy sand and sandy loam soil at Demo farm.

Bio-fertilizers specifically Azotobacterine (Azotobacter chroococcum) as nitrogen fixing bacterium and phosphorein (Bacillus polymyxa) as a phosphate dissolving bacterium were obtained from Agricultural Center, Ministry of Agriculture, Egypt. The seed of roselle cv. Sabahia 17 were obtained from the Research Center of Medicative and Aromatic Plants, Ministry of Agriculture, Egypt. Seeds were immersed in Arabic gum solution (16%) as a protrusive agent, then, the seeds were mixed with the powder of mixed bio-fertilizers; inoculated seeds were allowed to dry before sowing. Application of N, P and K fertilizers were a hundred, fifty and twenty fifth for every fertilizer from that counseled doses by the Ministry of Agriculture, five hundred weight unit ammonia salt (20.6% N), one hundred fifty weight unit calcium superphosphate (15% P2O5) and fifty weight unit potassium sulfate/fed (48% K2O). Nitrogen fertilizer was applied in 2 equal doses, the primary dose throughout sowing and before the primary irrigation, and therefore the second dose once one month from sowing. Phosphorus and potassium fertilizers were applied throughout soil preparation.

Application of mineral fertilization	N	P	K
	Ammonium sulfate (20.6% N)	Calcium superphosphate (15% P_2O_5)	Potassium sulfate (48% K_2O)
100%	500 kg/fed	150 kg/fed	50 kg/fed
50%	250 kg/fed	75 kg/fed	25 kg/fed
25%	125 kg/fed	37.5 kg/fed	12.5 kg/fed