ASIAN J. EXP. BIOL. SCI. SPL. 2010: 115-117

ISSN 0975-5845
AJEBS
http://www.ajebs.com

SHORT COMMUNICATION

Effect of Organically Chelated Micronutrients on Growth and Productivity in Okra

Datir R.B.[1*] Dr. S. L. Laware[2] and Dr. B. J. Apparao[3]

[1]Swami Muktanand College of Science,Yeola. Tal-Yeola, Dist. Nashik- 423401 (MS)
[2]Fergusson College, Pune-411 004 (MS)
[3]Jijamata College of Science and Arts, Bhende, Tal-Newasa, Dist. Ahmednagar.414605

ABSTRACT

Soybean and mungbean seeds were germinated and extracted after 48 hours in glass distilled water. The homogenate was subjected to protein digestion with Aspergillus protease for 12 hours. After enzymatic digestion the content was filtered and centrifuged in refrigerated centrifuge. The supernatant was used as source of amino acids for chelating the micronutrients. The micronutrient were mixed with amino acid solution and kept on shaker for 4 hours. The amino acid micronutrient chelates were confirmed with FTIR. The seeds of okra var. Phule Utkarsha were obtained from MPKV Rahuri dist. Ahmednagar and used for filed experiments. The experimental plants were sprayed with 0.4 to 2.0 % solutions of organically chelated micronutrients on 15th day and 30th day after plantation. The control plants were sprayed with distilled water. The results of present investigation revealed that all the treatments showed significant increase in growth and productivity of okra. The plants treated with 1.2, 1.6 and 2.0 % sprays of chelated micronutrient solution showed higher yields as compared to control

KEYWORDS: *Amino acids, chelated micronutrients, productivity, okra*

INTRODUCTION

Okra is one of the most popular fruit vegetables grown throughout India and even in tropical regions of the world during all the seasons. The growth, yield and quality of okra are largely influenced by the application of fertilizers as it is a short duration vegetable crop. It requires proper and sufficient N and K and micronutrients for regular fruiting and subsequent pickings. Recent developments in intensive agriculture, though contributed immensely towards surplus food, caused degradation of fertile land. Recently problem of micronutrient deficiencies have been increased markedly due to intensive cropping, introduction of high yielding varieties, irrigation, greater use of chemical fertilizers, loss of top soil by erosion, loss of micronutrients by leaching, liming of soil and decreased availability and use of farm yard manure. It is realized that productivity of crops is being adversely affected due to deficiencies of micronutrients. Deficiency of essential mineral nutrients especially micronutrients in intensive cropping system is of general occurrence. Major parts of agricultural land have been found to be deficient in one or other micronutrients. Micronutrients are usually required in minute quantities, nevertheless are vital to the growth of plant. They improve general condition of plants and are known to act as catalysts in promoting organic reactions taking place in plant. Direct application of micronutrients like copper, iron, zinc, molebdenum, magnesium, manganese cause toxic effects in the plants, hence chelated forms of micronutrients are recommended for better yields. The chelating agents of the metal ions protect the chelated ions from unfavorable chemical reactions and hence increase the availability of these ions to plants. Large numbers of metal complexing agents are available to chelate micronutrients. The strongest metal chelating agents are mostly synthetic and these are very expensive. On the other hand natural organic chelating agents such as polyflavonoids, lignosulfonates, humic and fulvic acids, amino acids, glutamic acids, and polyphosphates do help the plant in translocating the micronutrients. They are easy to produce and are inexpensive. In the present study, an attempt has been made to study the effect of foliar application of organically chelated micronutrients on growth and yield of okra.

MATERIALS AND METHODS

Production of amino acid-micronutrient chelates

Soybean and mungbean seeds were germinated for 48 hours in the dark and homogenized in blender. The homogenate was subjected to protein digestion with *Aspergillus* protease (5 U/100 ml) for 12 hours. After enzymatic digestion the content was filtered and centrifuged in refrigerated centrifuge. The supernatant was used as source of amino acids for chelating the micronutrients. The micronutrient like Zinc as zinc sulphate, iron as ferrous sulphate, and copper as copper sulphate and manganese as manganese sulphate, each of 1 g were separately dissolved in 20 ml of 0.5 % boric acid solution and then mixed with 80 ml amino acid solution. The mixtures were then kept on shaker for 4 hours to form chelates. The amino acid micronutrient chelates were confirmed with FTIR. After confirmation all the solutions were mixed together to form composite chelate solution. Molybdenum was added at the end of preparation.

Foliar application of organically chelated micronutrient

The present investigation was carried out in farmers filed at Village Pimpri Tal Sangamner Dist-Ahmednagar to find out the effect of organically chelated micronutrients on growth and yield of Okra. Total five treatments involving 0.4 %, 0.8 %, 1.2 %, 1.6 % and 2.0 % composite of chelate solution along with distilled water control was planned in Randomized Block Design with three replicates. The solutions were applied in the form of foliar sprays at two growth stages that are 15 and 30 days after seed sowing. The experimental plots were of size 4 x 3 m with ridges 60 cm spacing. The recommended doses of NPK were applied uniformly in all the plots. Intercultural operations and crop management were followed as per the schedule. The growth characters like plant height, number of leaves, leaf area, and yield per plant were recorded from 10 randomly selected plants from each treatment

RESULTS AND DISCUSSION

As evident from table the growth characters viz, plant height, number of leaves per plant, leaf area per plant were increased significantly with the application of chelated micronutrients. Among the different treatments of organically chelated micronutrients, 2.0% treatment showed better results than the other treatments through improved characters. The maximum plant height of 42.04 cm over control 20.64 cm was recorded in 2.0 % treatment. The number of leaves per plant was maximum with the spray of 2.0 % over control. Similarly maximum leaf area per plant 3380.97cm^2 was recorded in 2.0 % treatment. Yield of marketable fruits per plant was also recorded maximum 25.75 g. in 2.0 % treatment over 11.81g.in control. All the treatments of organically chelated micronutrients proved superior over control through growth and yield characters.

Boron is associated with the development of cell wall and cell differentiation and hence, helps in root elongation and shoot growth of plant. The need of boron has been emphasized earlier for normal growth of tomato plant. Boric acid is essential for better growth and development in plant. Application of micronutrients like Zn, Cu, Fe, Mo, etc is essential for increase in yield, quality and ascorbic acid content in tomato fruits. The photosynthesis enhanced in presence of zinc and boron was also explained that presence of zinc activates the synthesis of tryptophan, the precursor of IAA and it is responsible to stimulate plant growth. Iron plays an important role in promoting growth characters, being a component of ferrodoxin, an electron transport protein and is associated with chloroplast. It helps in photosynthesis might have helped in better vegetative growth. Response to applied micronutrients like zinc, copper, ferrous, molybdenum etc. for better crop growth and yield of several filed crops have been reported from almost all the part of country. All the micronutrient treatments were found significantly effective in increasing fruits per plant and fruit weight. Improvement in growth characters as a result of application of micronutrients might be due to the enhanced photosynthetic and other metabolic activity which leads to an increase in various plant metabolites responsible for cell division and elongation. Application of appreciable quantities of magnesium might have helped in chlorophyll synthesis which in turn increased the rate of photosynthesis. The results are in agreement with the findings of [1, 2]. Average fruit yield per plant were significantly influenced by different treatments with the foliar application of micronutrients. The maximum fruit yield per plant with application of 2.0 % mixture of micronutrients was recorded 25.75 g over control 11.81 g.

Table 1 Showing plant height, no.of leaves, leaf area and yield per plant

Treatments	Plant height (cm.)	No. of leaves Per plant	Leaf area per plant (cm^2)	Yield Per Plant (g)
Control	20.64	21.64	1786.05	11.81
0.4 %	27.62	18.84	2361.28	14.24

0.8 %	28.08	20.62	2759.37	17.90
1.2 %	33.36	24.02	3380.97	21.38
1.6 %	35.82	25.10	3650.40	22.10
2.0 %	42.04	28.22	4893.00	25.75

Increased yield due to micronutrients application may be attributed to enhanced photosynthesis activity and increased production and accumulation of carbohydrates and favorable effect on vegetative growth and retention of flowers and fruits, which increased number of fruits per plant. Similarly the increased dry matter production may be attributed to greater accumulation of photosynthates by vegetative parts and fruits in okra. These findings are in conformity with the observations of previous study, who obtained maximum cost benefit ratio with mixture of micronutrients.

CONCLUSION

The results revealed that among the different treatments of organically chelated micronutrients, Okra responded well to the 2.0% treatment. The growth characters as well as the yield of Okra were significantly enhanced by the application of 2.0% organically chelated micronutrients. The results of present investigation has given insight in application of chelated micronutrients in immiediate rectification of micronutrient deficency in fruit vegetable and also in organic farming.

REFERENCES

[1]. Nehra, A.S., I.S. Hooda, and K.P. Singh (2001). Effect of integrated nutrient management on growth and yieldof wheat (*Triticurn aestivum L.*) Indian J. Agron, 45: 112-17.

[2]. Sanwal, S.K., K. Lakminarayana, R.K. Yadav, N. Rai, D.S. Yadav, and B. Mousumi (2007). Effect of organic manures on soil fertility, growth, physiology, yield and quality of turmeric. Indian J. Hort., 64(4): 444-449.

Correspondence to Author: **Datir R.B**, Swami Muktanand College of Science,Yeola. Tal -Yeola, Dist. Nashik- 423401 (MS). E-Mail: rajbdatir@rediffmail.com