



ISSN: 0975-833X

Available online at <http://www.journalcra.com>

International Journal of Current Research
Vol. 11, Issue, 01, pp.465-467, January, 2019

DOI: <https://doi.org/10.24941/ijcr.34194.01.2019>

**INTERNATIONAL JOURNAL
OF CURRENT RESEARCH**

RESEARCH ARTICLE

PRODUCTION OF MIXED MULTI MICRONUTRIENT (CHELATED FORM)

¹Harsh Chaudhari, ¹Dr. Trupti Parag Dharmarao and ²Womesh Bhole

¹Thadomal Shahani Engineering College, Bandra (W), Mumbai

²Vishwakarma Institute of Technology, Pune

ARTICLE INFO

Article History:

Received 10th October, 2018

Received in revised form

10th November, 2018

Accepted 29th December, 2018

Published online 31st January, 2019

Key Words:

Multi Micro-nutrients; Mixed; Powder;

Liquid; 2.5% moisture content powder.

ABSTRACT

Plants mainly require Nitrogen, Phosphorous and Potassium for their growth and development. Secondary required nutrients like magnesium, calcium and sulphur are also required along with other micro-nutrients like zinc, copper, ferrous, manganese, boron and molybdenum. The micro-nutrients depend on the type of soil and hence their requirement differs with changing geology. For the purpose of this paper, the state of Maharashtra regulations have been followed (Iron-2.5%, Zinc-3.0%, Copper-0.5%, Manganese-1.0%, Boron-1.0% to be at-least present in the product formulation). These micro-nutrients can be mixed and turned into a single product (liquid/powder) for normal use in agriculture.

Copyright © 2019, Harsh Chaudhari et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Harsh Chaudhari, Dr. Trupti Parag Dharmarao and Womesh Bhole, 2019. "Production of mixed multi micronutrient (chelated form)", *International Journal of Current Research*, 11, (01), 465-467.

INTRODUCTION

Nitrogen, Phosphorous and Potassium are the main requirements for healthy plant growth and development. However, certain micro-nutrients like magnesium, iron, zinc, copper, calcium and sulphur are still required for optimal growth. These micro-nutrients, however, if directly applied to soil, there are high chances of them converting into a form that cannot be accessed by the plants. Hence, it is helpful if we convert the micro-nutrients into a partial or complete chelated form. While the mix of micro-nutrients can be converted completely into the chelated form, a partial chelated with a mix of amino acids and ethylenediaminetetraacetic acid can help achieve optimal results.

MATERIALS AND METHODS

A mixture of micro-nutrients is taken in proportion such that the regulations set by the state of Maharashtra (Iron-2.5%, Zinc-3.0%, Copper-0.5%, Manganese-1.0%, Boron-1.0% to be at-least present in the product formulation) are followed. Up to 30% mixture of acetic acid with this mix of micro-nutrients is heated to 60°C. Ethylenediaminetetraacetic acid (3%) and citric acid is added while this mix is under constant stirring. This reaction is known as chelate reaction and it is continued till a clear solution is obtained. The pH of the reaction is checked and adjusted to 6.0 with the help of caustic potash. The reaction mass is then cooled to 40°C. The solution can then be withdrawn for standardization. The product solution is standardized by analyzing it through Atomic Absorption Spectroscopy. This liquid product can be converted into powder form by passing it through a spray drier under 260°C inlet temperature and residual air temperature to 110-115°C to get free flowing powder with 2.5% moisture content.

Comparative Analysis on Chilli Plant:

Crop: Chilli Variety: Tejaswini Dose: 625 gm/ha

Date of sowing: June 08, 2018

Date of transplanting: July 09, 2018

Dates of application: 1) July 28, 2018

**Corresponding author: Harsh Chaudhari*

Thadomal Shahani Engineering College, Bandra(W), Mumbai

2) August 14, 2018 Dates of Observation:

- August 12, 2018
- August 24, 2018 Number of treatment: One (1) Spacing: 60cm x 45cm

Table 1. Comparative Analysis of Treated versus Controlled Area

Sr. No.	Parameter	Treated Area Observation		Controlled Area Observation	
1	Soil condition	1	Porous	1	Compact
		2	Increase water holding	2	Water holding not increases
		3	Good aeration	3	No increase in aeration
		4	Increase humus content	4	Lower humus content
2	Leaf Curl and Virus Disease Resistance	Plant No.1	Very Good	Plant No.1	Good
		Plant No.2	Very good	Plant No.2	Poor
		Plant No.3	Excellent	Plant No.3	Poor
		Plant No.4	Good	Plant No.4	Poor
3	Vegetative Growth (Height in cm.)	Ht.Plant No.1	59.6	Ht.Plant No.1	52.2
		Ht.Plant No.2	63.2	Ht.Plant No.2	61.3
		Ht.Plant No.3	58.3	Ht.Plant No.3	56.2
		Ht.Plant No.4	64.3	Ht.Plant No.4	58.9
3A	Plant Spread (cm)	Plant No.1	29.4	Plant No.1	28
		Plant No.2	30.3	Plant No.2	28.3
		Plant No.3	31.5	Plant No.3	28.9
		Plant No.4	30.6	Plant No.4	29
4	Number of tillers(Bran ches)	Tillers in Plant No.1	108	Tillers in Plant No.1	101
		Tillers in Plant No.2	119	Tillers in Plant No.2	99
		Tillers in Plant No.3	122	Tillers in Plant No.3	98
		Tillers in Plant No.4	126	Tillers in Plant No.4	89
4A	Number of Leaves (per branch)	Leaves in Plant No.1	8	No.of Leaves in Plant No.1	8
		Leaves in Plant No.2	9	Leaves in Plant No.2	8
		Leaves in Plant No.3	11	Leaves in Plant No.3	9
		Leaves in Plant No.4	12	Leaves in Plant No.4	10
5	Overall Crop Vigour		Very Shiny and Green		Dull in colour
6	Flowering Time	50% flowering at	42 days	50% flowering at	48 days
6A	Number of Flowers	Average of 4 tagged plants	83	Average of 4 tagged plants	63
7	Fruiting	50 % Fruiting at	58	50 % Fruiting at	71
7A	Average Number of Fruits (per 100 plants)		80	Average	52
8	Fruit size	Length(cm)	21	Length(cm)	15
		Girth (cm)	7	Girth (cm)	5.5
9	Average Weight of fruit (per 100 fruits)		28 gm		20 gm
9A	Average Weight of seed (per 100 seeds)		10 gm		8 gm
9B	Days to first Picking		75		88
10	Yield	Quintal/ha	196	Quintal/ha	148
11	Keeping Quality		Good keeping quality. It stays fresh even after 4 days.		Poor keeping quality. Rot sets in after 4 days.
12	Market Rates change	Due to its freshness, Vigour, Boldness, Colour, it has Good market rates; 10 -12 % higher than controlled area			Average Market rates
13	Conclusion	Overall 28-30% yield increase recorded with lesser number of agricultural sprays and good market rate which results in good cost : benefit ratio.		Lesser Yield with more number of agricultural sprays and average market rates	



Fig. 1. Dark green chilli (immature) (Treated)



Fig. 2. Dark green (immature) and Red chilli (mature) (Treated)



Fig. 3. Treated Area



Fig. 4. Treated Chilli Plants (variety-Tejaswini)

RESULTS AND CONCLUSION

- Multi Micro-nutrient mixed with fertilizer powered by amino acids (chelated form) gives full utility of nutrients to plant.
- Tested product has Multi micro-nutrients in chelate form with the following composition:
 - Iron (Fe) - 2.5% w/w,
 - Manganese (Mn) - 1.0%w/w,
 - Zinc (Zn) - 3.0% w/w,
 - Copper (Cu) - 0.5%w/w,
 - Boron (B) - 1.0% w/w)
- Tested product releases chelated micro-nutrients along with N in organic form which can be easily absorbed by plants
- Components of tested product accelerates respiratory action due to availability of nutrients for chlorophyll content results in good photosynthesis and more food production for good flowering and fruiting.
- Tested product fulfill Micro-nutrient demand which results in disease and pest resistance develop in treated plants
- Tested product having components required in energy production system of plants which boosts up energy metabolism.
- Tested product provides balance nutrients supply, hence lesser flower drops and fruit drops and resists stress of biotic and abiotic factors.
- Tested product corrects micro-nutrient deficiencies.
- Tested product is compatible with most insecticides and fungicides; no need to spray separately which saves extra expenses on sprays.
- Cost: Benefit ratio is good.
- Fe-Iron is necessary in photo synthesis and chlorophyll synthesis,
- Mn-Manganese is necessary in photosynthesis and in building of chloroplast.
- Zn- Zinc is required in large number of enzymes and plays role in DNA transcription.
- Cu - Copper is necessary in photosynthesis and its absence shows chlorosis. It is involved in many enzyme processes and manufacture of cell walls. It is hard to find in some soil conditions.
- B - Boron has many functions within a plant. It affects flowering, fruiting, pollen germination, cell division, and active salt absorption. The metabolism of amino acids and proteins, carbohydrates, calcium, and water are strongly affected by boron. Many of those listed functions may be embodied by its function in moving the highly polar sugars through cell membranes by reducing their polarity and hence the energy needed to pass the sugar. If sugar cannot pass to the fastest growing parts rapidly enough, those parts die.

REFERENCES

- Engel, R.E. 1993. Winter wheat response to chloride fertilizers. Fertilizer Fact #3. Montana State University Extension.
- Havlin, J.L., J.D. Beaton, S.L. Tisdale, and W.L. Nelson. 1999. Soil Fertility and Fertilizers. 6th Edition. Prentice Hall. Upper Saddle River, NJ. 499 p.
- Sekhon, B S. Chelates for Micronutrient Nutrition among crops, University of Ludhiana.
- Subrahmanian, K., Alaiselvan, P.K., Manickam, G., Arulmozhi, N., 2000. Spacing and fertilizer requirement for confectionery groundnut varieties. Crop Research. 19(2), 210-212