

Effect of Nova Tarak Plus (A Micro Nutrient Foliar Spray) on Growth, Yield and Quality of Water Melon (*Citrullus lanatus*)

**P. Ravichandra Reddy* , Y. Sambasiva Rao, A. Kiran Kumar,
Y. Srikanth and N. Basanth**

Nova Agri Tech Ltd. New Bowenpally, Secunderabad, Telangana – 500011, India.

**Corresponding Author*

Abstract

A study of investigation was carried out to evaluate the efficacy of Tarak Plus a micro nutrient foliar spray on the water melon. This study was conducted during the season *rabi*, in the year 2018-19. The experiment was conducted in Randomized Block Design (RBD) with six treatments; T₁: Control [No application of any fertilizer], T₂: Two doses of recommended fertilizers [RDF] @ 30 and 60 DAS, T₃: Three dose of recommended fertilisers @ 30 DAS, 60 DAS & 80 DAS, T₄: 3.5 gm/l of Tarak plus at 30 and 60 DAS, T₅: T₃ + 3.5 gm/l of Tarak plus at 30 and 60 DAS & T₆: 2 ml/l of Multiplex at 30 and 60 DAS. Experimental results revealed that treatment T₆ was found effective in increased yields and yield attributing characters as well as quality of melon fruit in terms of weight, total soluble solids and total sugar content over other treatments tested for the efficacy. The yield attributing characters of crop *viz.*, vine length, number of leaves, number of branches, number of flowers, Number of fruits per plant (NFP) with firmness and quality, Productivity per plant (kg.plant⁻¹), Commercial productivity (CP ≥ 5 kg), Transverse diameter (TD), Longitudinal diameter (LD), Total soluble solids (TSS) and Total sugars (TS) were found significant in the treatment T₅ compared to other treatments. The present study revealed micro nutrient foliar spray is important factor for contributing growth and higher yields in melons.

Keywords: Water melon, Tarak plus, micro nutrients, total sugars, foliar application, fruit yields

INTRODUCTION

Watermelon [*Citrullus lanatus* (Thunb.)] is one of the important fruit crop of Maharashtra state, comes under cucurbitaceae family. The crop is native of Africa and in India is widely grown in Rajasthan, Maharashtra and Uttar Pradesh. In Maharashtra, it is mostly grown in hot weather season under the irrigation command areas or assured sources of well water. Other important states like Tamil Nadu, Maharashtra, Andhra Pradesh, etc. watermelon cultivation is possible through out the year. The fruits of watermelon are good source of sugar, vitamin A, C, B₁, B₂ and B₆. Besides, it has important use in medicinal preceding unani and ayurveda. Its juice is used as antiseptic in Typhus fever Nadkarni 1927 [11]. In liquid fertilizers both water and fertilizer are at optimum rate in the vicinity of plant root zone, result in higher yield and better quality of watermelon.

In Andhra Pradesh the crop is grown in an area of 6.21 Million hectares with an annual production of 182.35 Million tonnes. It is cultivated as late *rabi* and summer crop in the state of Andhra Pradesh and particularly, most of the crop grown area is confined to the districts viz., Anantapur, Chittoor, Kadapa and Prakasam. (Horticulture glance (2017) [4]

Optimum NPK and foliar application of micro nutrients is essential for the good growth of watermelon. Fruit size is the main yield contributing factor in watermelon Karchi et al (1977) [6]. Besides yield in terms of the weight of fruit, quality aspect of fruit is also equally important. Fruit yield and quality of watermelon could be improved by providing proper dose of macro and micro nutrients

These nutrient elements are necessary not only for crop yield but for the maintenance of soil nutrient and quality of produce. Foliar feeding is an effective method of supplying nutrients during the period of intensive plant growth when it can improve plants mineral status and increase crop yield. Zinc is main composition of ribosome and is essential for their development. Zinc required for chlorophyll production, pollen function and fertilization. Boron is important in pollen germination and pollen tube growth, which is likely to increase fruit set. Watermelon flowers are viable for a short period so that it is most important that supply of boron are not limiting during pollination.

Micro nutrients are essential for plant growth, yield and quality in spite of all these also play a key important role for the nutritional value in terms of total soluble solids and presence of vitamins promotes good health for the melon consumers.

MATERIALS & METHODS

This study was conducted during the season *rabi*, 2018 at the Nova Agritech Ltd. Experimental farm, Kamareddy, Telangana, India. To investigate the performance of Tarak plus on the yield and quality parameters of watermelon. Field trials were laid out in Randomized block design (RBD) with six treatments replicated thrice. The Water melon cultivar Andaman with duration of 95-100 days was used for this study.

The land ploughing is done until the soil becomes fine tilth. The land was prepared according to the type of sowing preferred in the main field. The type of sowing preferred was furrow sowing. The land was prepared with a plot size of 15 m and it was maintained a row to row spacing of 1.5 m and 1 m between the plants. The recommended package of practices were followed and care was taken to protect the crop from weeds, insects, pests and diseases during entire cropping season.

Data regarding vine length, number of leaves and branches were recorded at 5 WAS. The data with regard to the parameters like number of female flowers were recorded at the time of flowering stage. The yield data was recorded per plant and was calculated on hectare basis at the time of harvesting stage of the crop.

For recording the biometric observations five plants from each treatment plot were randomly selected, and the selected plants were labelled with proper notations. Total soluble solids were recorded with the help of hand refractometer and the values were worked out and expressed in $^{\circ}\text{B}$ A.O.A.C. (1975) [1]. The total sugars were estimated on fresh weight basis using Lane and Eynon (1923) [8].

The fruits were harvested at the time of maturity were collected and studied for the parameters considered to determine the yield and quality. The list of characters both in terms of yield and quality studied were Number of fruits per plant (NFP); Productivity per plant (PP): kg plant^{-1} ; Commercial productivity (CP): determined by the weight of fruits with commercial quality (≥ 5 kg and no visible damage and defects) kg. Plant^{-1} ; Longitudinal (LD) and transverse (TD) fruit diameters (cm).

Treatments

T1: Control (No application of any fertilizer).

T2: Recommended dose of fertilizers (RDF) with 2 splits at 30 and 60 DAS.

T3: Recommended dose of fertilizers (RDF) with 3 splits at 30,60 & 90 DAS.

T4: T2 + 3.5 gm/l of Tarak plus at 30 & 60 DAS.

T5: 3.5 gm/l of Tarak plus at 30 & 60 DAS.

T6: 2 ml/l of multiplex at 30 & 60 DAS.

RESULTS & DISCUSSIONS

Vine Length (cm)

In the present study of investigation treatment T₅ was recorded a vine length of 112.2 cm which was significantly higher than other treatments. The next treatment T₄ followed by T₆ which were recorded mean vine lengths of 100.6 cm and 97.1 cm, respectively. The data recorded in the experiment revealed minimum vine length in the control with 69.2 cm, which was not recommended of any fertilizer and T₂ is found much better than control by recording the vine length of 80.5 cm. The results are significant with regard to the vine length recorded and it is also one of the

important factor in contributing higher yields of the crop. The improvement in vine length as a result of foliar feeding of Tarak plus similar to the findings of Hatwar et al (2003) [3] which might be due to enhanced metabolic activities and increased photosynthetic activity. Integral approach of fertilizers with micro nutrients composition mixture (Tarak plus) resulted in increased vine length of the plants.

Number of Leaves

The obtained results shows more number of leaves were recorded in the the treatment plot (17.4) which was superior over other treatments. The significant variation among the treatments were found but not significant for the treatments T₄ which is on par with T₆ recorded mean number of leaves 16.6 and 16.1 respectively. The mean number of leaves minimum were noticed in the control plot (11.1). Essential nutrient elements applied in the form of foliar spray *i.e* Tarak plus promoted more number of leaves and growth of the plant, where the results are in agree with findings of John et al (2004) [5] who were reported poultry manure with essential elements is associated with high photosynthetic rate and thus promotes root and vegetative growth of watermelon.

Number of Branches

Similar to the mean vine length and number of leaves recorded, significant number of branches were found in the treatments T₅ (4.1) next followed by T₄ (3.8) is at par with T₆ (3.6) and the treatment T₄ was found noticed a least number of branches with 2.1 which is inferior among the treatments. More number of branches in the treatment T₅ is due to large availability of micro nutrients by the foliar spray of Tarak plus are proportionate to the reports given by Maya (1996) [9].

Number of Female Flowers:

Number of female flowers, an important yield attributing character of the water melon is significantly higher in T₅ (18.7) found superior over all other treatments. The lower number of female flowers were recorded in the treatment T₁ *i.e* control plot which is not recommended with any fertilizer or foliar application of Tarak plus. Foliar spray of micro nutrients Ca and Boron play an crucial role to enhance female flowering. The results showed in this study indicated that high number of flowers noted in the treatment T₅ is might be due to the foliar spray of Tarak plus (Ca, B) similar to Brantely and Warrem (1960) [2] who were reported that production of more number of flowers in watermelon by the application of calcium and boron in the GA assimilation.

Longitudinal fruit Diameter (cm)

The fruit diameter is one major important character of the study which indicates both yield and quality parameters of the water melon. The data obtained with reference to the longitudinal diameter is recorded significantly in the T₅ (48.1 cm) over other treatments. Comparative study of the diameter revealed a significant variation among the treatments and the control.

Transverse fruit Diameter (cm)

Similar to longitudinal diameter, findings of the study revealed transverse diameter is much significantly high noticed in T5 (36.2 cm) which is superior among all the treatments. The least diameter was noticed in the control (15.6 cm) indicates inferiority with much variation from other treatments.

Total Soluble Solids (° Brix)

Total soluble solids is one of the important characteristics used to assess the quality of fruits in terms of yield. The data recorded pertaining to total soluble solids was presented in the table. Significant results showed TSS of water melon fruit recorded in the T5 which was found superior among the treatments. TSS recorded in the T4 was closely found with T3 which indicates non significant variation among them. Minimum TSS of fruit was noticed in T1 (7.8) which is far below over other treatments. The highest TSS content was recorded in the treatment T5 which was due to increase in assimilation of photo synthates by the application of foliar spray of Tarak plus. These results are in agreement with Meenakshi et al [] stated the accumulation of micro nutrients by the foliar spray of mixture of all micro nutrients boosted the assimilates resulted in better quality parameters of bitter gourd. Application of recommended fertilizers and the foliar effect of Tarak plus (Zn, B) which might have increased the TSS of fruits, as similar to the reports given by Khade et al (1995) [7].

Total Sugars (%)

The data pertaining to total sugars was presented in the table . As similar to the TSS, total sugar content estimated was varied from 9.25 to 7.95%. The highest sugar content was observed in T5 which was showed its significant difference over the rest of treatments. The next maximum sugar content was recorded in T4 which is at par with T6. Among the combinations tested for total sugar content T5, T4 and T6 were shown their superiority with the foliar spray solution which is a mixture of micro nutrients. Foliar spray of Tarak plus and the essential major nutrients NPK are made available through fertilizer recommendations subjected to increase the total sugar percentage of fruits. These reports in the present study are in accordance with Shivashankaramurthy et al (2007) [14] who found that increased potassium levels showed a good response on the fruit quality by promoting high sugar content in fruits in gherkin.

Fruit Yield (t. ha⁻¹)

The impact of yield was studied with regard to the variables listed as they showed influence on the crop yield and quality. The fruit yield components were studied in terms of plant productivity (PP) and commercial productivity (CP). This productivity was in terms of weight (121 t. ha⁻¹). The maximum total yield was obtained in the treatment plot (T5) which was treated with schedule of recommended fertilizers along with Tarak plus foliar spray. The significance influence of yield was obtained in T5 which showed superiority over rest of the treatments. The minimum yield was noticed

in the control plot (33.5 t. ha⁻¹). The treatment variation was not that much significant in T4 (97.6 t.ha⁻¹) and T6 (94.1 t.ha⁻¹) as the yield difference is close to each other. Similar case was observed in T3 and T2 which were recorded a total yields of 72.3 and 64.1 t. ha⁻¹ respectively.

The significant yield obtained in the treatment T5 is due to the combined effect of Tarak plus and the dose of recommended fertilizers. The schedule of spray given with T5 made the essential nutrients are available to the plants. Treatment T5 was effective in producing higher fruit weight, longer and wider fruit with more longitudinal and transverse diameter thus more crop yields were obtained. The retention of more number of flowers and heavy fruits lead to increased production. These results are similar to the findings of Satpute et al (2013) [13] who reported mixture of foliar micro nutrients increased the flowers and fruit set leading to more production in Okra. In the present study results obtained are also similar with the findings of Narayanamma et al (2009) [12] as she reported that increase in yield and yield attributed characters is due to foliar feeding of micro nutrients. The increase in yield attributing characters viz., vine length, number of leaves, branches, female flowers, fruit diameter and yields due to foliar effect of Tarak plus.

Plant Productivity (kg. plant⁻¹)

Highest fruit yield was recorded by T5 receiving foliar spray of Tarak plus and fertilizers. The fruit yield was recorded in T5 (30.3 kg.Plant⁻¹) and was showed significant impact on the yield among the treatments. The minimum fruit yield was obtained in the control plot (8.4 kg. Plant⁻¹) which was free from foliar spraying and fertilizer application. The next better after T5, T4 and T6 recorded yields of 24.4 and 23.5 kg. Plant⁻¹ respectively.

Commercial Productivity (kg. plant⁻¹)

The data presented in the table is representing the commercial yield showed that maximum fruit yield was registered in the T5 (22.3 kg. Plant⁻¹) which was significantly superior over the rest of the treatment combinations. The treatments T4 and T6 were recorded closer yields of 17.7 and 16.4 kg. Plant⁻¹ respectively. The non significant impact of fruit yield was noticed in the control plot (5.13 kg. Plant⁻¹) as it does not receive any fertilizer.

CONCLUSIONS

The overall performance considered for the yield and yield attributing characters and the quality described in the present study showed a significant impact of higher yield was noticed in the treatment T5 among all the treatment combinations. This study revealed yield attributing characters were played a crucial role for getting higher productivity. Thus it can be concluded that farmers would be recommended with the treatment T5 as it is responsible for improving growth and higher yields with good quality.

Table: Quality and yield attributing characters of water melon with response to the foliar spraying of micro nutrient formulated products and fertilizers

Sl. No	Treatments	Vine Length (cm)	No. of leaves	No. of branches	No. of female flowers	TD (cm)	LD (cm)	TSS (° Brix)	TS (%)	PP (kg.plant ⁻¹)	CP (kg.plant ⁻¹)	Fruit yield (t.ha ⁻¹)
1	T ₁ -Control	69.2	11.1	2.1	8.0	15.6	31.8	7.8	7.95	8.36	5.1	33.4
2	T ₂ -RDF @ 30 & 60 DAS	80.5	13.7	3.1	13.3	25.8	40.1	8.3	8.46	16.0	10.9	64.1
3	T ₃ - RDF @ 30,60 & 80 DAS	88.3	14.0	3.3	14.0	27.4	42.3	8.7	8.53	18.0	12	72.2
4	T ₄ - 3.5 gm/l of Tarak plus @ 30 & 60 DAS	100.6	16.6	3.8	17.7	33.3	45.7	10.2	8.66	24.4	17.7	97.6
5	T ₅ - T ₂ + 3.5 gm/l of Tarak plus @ 30 & 60 DAS	112.2	17.4	4.1	18.7	36.2	48.1	11.4	9.25	30.3	22.3	121.3
6	T ₆ - Multiplex @ 2 ml/l	97.1	16.1	3.6	16.7	32.5	45.6	10.0	8.71	23.5	16.3	94.1
	Sem (±)	1.422	0.258	0.04	0.593	0.7	1.11	0.255	0.127	1.052	0.515	
	C.D. at 5%	4.539	0.823	0.13	1.839	2.1	3.53	0.814	0.404	3.357	1.664	
	C.V. %	2.697	3.014	2.14	6.979	4.1	4.54	4.702	2.552	6.716	4.676	

*Longitudinal (LD) and Transverse diameter (TD); Total soluble solids (TSS); Total sugars (TS); Productivity per plant (PP); commercial productivity (CP).

REFERENCES

- [1] AOAC, 1975. Official method of analysis of the Association of Official Analytical Chemists, Washington. Eleventh edition.
- [2] Brantley B. B., and Warren G. F., 1960. Effect of nitrogen on flowering, fruiting and quality of the watermelon. *Proceedings of American Society Horticulture Science*. 75: 644-649.
- [3] Hatwar, GP. et al., 2003. Effect of micro nutrients on growth and yield of chilli. *Soils and Crops*. 13(1):123-125.
- [4] *Horticultural Statistics at a Glance.*, 2017, Water melon. 7(4): 325
- [5] John, L.W. et al., 2004. Soil Fertility and Fertilizers: *An Introduction to Nutrient Management*. Pearson Education, India. 106-153
- [6] Karchi Z, et al., 1977. Comparative effect of organic manure and N,P fertilizers on yield parameters of honeydew melon. 57(9):1671-1675
- [7] Khade, VN., et al., 1995. Effect of irrigation, mulch, nitrogen and potassium on fruit yield and economics of watermelon. *Journal of Maharashtra Agricultural University*. 20(1):40-43.

- [8] Lane, and Eynon, 1923. Determination of reducing sugar by Fehling's solution with methylene blue as internal indicator. *Journal of society of Chemical Industry, India*. 39 (3):16-20.
- [9] Maya P, 1996. Studies on the effect of sapling cum nitrogen and phosphorus on growth and quality of sweet pepper. *California Wonder. M. Sc. (Ag.) Thesis* submitted to *Tamilnadu Agricultural University, Coimbatore*.
- [10] Meenaksh N, et al., 2007. Response of bitter gourd on fruit yield and quality traits as influenced by Fertigation levels. *The Asian journal of Horticulture*. 2(2):126-130.
- [11] Nadkarni, K. M., 1927. *Indian Material Medica*, Nadkarni and Company Private Limited, BOMBAY (INDIA).
- [12] Narayanamma M, et al., 2009. Effect of foliar application of micro nutrients on the yield components, yield and nutrient content of bitter gourd. *The Orissa*
- [13] Satpute, NRLB., et al., 2013. Response of summer okra (cv. Phule Utkarsha) to Iron, zinc and boron in inceptisols. *Asian Journal of horticulture*. 8(2):542-546. *Journal of Horticulture*. 37 (2).
- [14] Shivashankaramurthy, TC., et al., 2007. Influence of nitrogen, phosphorus and potassium on the yield and quality of gherkin. *Indian Journal of Horticulture*. 64(2):228-230.