*Int.J.Curr.Microbiol.App.Sci* (2024) *13*(10): 102-109

*International Journal of Current Microbiology and Applied Sciences*
*ISSN: 2319-7706* **Volume 13 Number 10 (2024)**
Journal homepage: http://www.ijcmas.com

**Original Research Article** https://doi.org/10.20546/ijcmas.2024.1310.014

# Effect of Foliar Application of PDKV Grade II Micronutrients on Growth and Yield of Watermelon

**Nikita S. Sharnagat[1]*, A. M. Sonkamble[1], A. P. Wagh[1], S. O. Bawkar[2], S. S. Hadole[3]**

*[1]Department of Vegetable Science, [2]Department of Horticulture,*
*[3]Department of Soil Science and Agricultural Chemistry, Post Graduate Institute,*
*Dr. P.D.K.V, Akola – 444104, Maharashtra (M.S.), India*

**Corresponding author*

**Keywords**

Watermelon, Micronutrients, Foliar application, growth, yield

**Article Info**

***Received:***
14 August 2024
***Accepted:***
22 September 2024
***Available Online:***
10 October 2024

**A B S T R A C T**

This experiment evaluated the impact of foliar application of PDKV grade II micronutrients on growth and yield of watermelon. The experiment was conducted in Factorial Randomized Block Design (FRBD) with three time of foliar applications(30, 40, and 50 DAT) and four levels of micronutrients (control, 2.5 ml/L, 5.0 ml/L and 10.0 ml/L) having twelve treatment combinations replicated thrice. Results found that the growth parameters *viz.,* maximum length of vine (236.47 cm), number of leaves per vine (238.33) and chlorophyll index (62.14), lowest node at which first male (2.53) and female (7.47) flower appeared, minimum days to first male (26.47 days) and female (36.13 days) flower appearance and narrow male to female flower ratio (9.11) were recorded significantly in foliar application of 5 ml/L micronutrients at 30 DAT ($D_1M_2$) and yield parameters *viz.,* maximum number of fruits per vine (2.90), average fruit weight (3.39 kg), fruit yield per vine (9.84 kg) and yield per hectare (492.07 q/ha)whereas minimum days required for edible maturity (71.91 days) were recorded in treatment combination of foliar application of 5 ml/L micronutrients at 30 DAT ($D_1M_2$). The lowest values for growth and yield parameters were recorded in control ($D_1M_0$).

## Introduction

Watermelon (*Citrullus lanatus* (Thunb.) is an important warm season vegetable crop belonging to the cucurbitaceae family grown in tropical and subtropical region having chromosome number 2n=22. It is eulogized as fruit of the 22nd century. Watermelon is indigenous to tropical Africa. In India, watermelon accounts an area 0.12 million ha with production 3.225 million metric tonnes. Andhra Pradesh rank first in area 17160 ha, Uttar pradesh rank first in production 0.6969 million tonnes whereas Maharashtra is eighth in number with area 4850 ha and tenth in production 0.11 million tonnes in India (Anonymous 2022-23). The sweetness of watermelon is mainly due to a combination of sucrose, glucose and fructose. Sucrose and glucose account for 20–40% and fructose for 30–50% of total sugar in ripe watermelon. It is an excellent source of 0.2% protein,

0.3% minerals, Vitamin C (8.1 mg), Lycopene (4530 ug), Calcium (7 mg) and 7% carbohydrate in 100 g edible flesh which reduce the risk of diseases like asthma, atherosclerosis, diabetes, colon cancer, arthritis, purifies the blood, good for sore eyes, astringent to the bowels, low in calories and have almost no fats, making them one of the healthiest fruits. Watermelon seeds are eaten as snack, used as a source of oilseed and tonic to the brain. Fruit is a rich source of beta-carotene, citrulline and powerful antioxidant known for its potential role in reducing risk of certain cancers and protecting against heart disease.

Micronutrients play a crucial role in agriculture, contributing to increased crop productivity and quality. Micronutrient such as boron, iron, copper, zinc, manganese, and molybdenum are vital for plant health. Micronutrients composition is Fe (2.5%), Zn (3.0%), B (0.5%), Mn (1.0%), Cu (1.0%), Mo (0.1%). It improves the chemical composition and general condition of vegetable crops and are known to acts as catalyst in promoting various organic reaction in plants. When micronutrients are applied *via.,* foliar spray, they are absorbed directly through the leaves, bypassing potential soil fixation issues. This method is particularly effective for correcting nutritional disorders, as it allows for the direct spray of micronutrients to the plant's foliage, where they can be rapidly absorbed and utilized. This can lead to improved growth and yield attributes such as length of vine, fruit size, color and fruit setting. Nowadays, foliar application of micronutrients is gradually gaining momentum among the vegetable growers because of their beneficial nutritional support, reduce environmental risk and ensure better harvest and returns. Applying foliar micronutrients is one way to enhance plant nutritional status and improve the growth and yield of vegetables. Dr. PDKV, Akola started production of PDKV grade II micronutrients (Fe, Zn, B, Mn, Cu, Mo) and watermelon requires different micronutrients during its growth period but no research work has been carried out to know exact quantity of PDKV grade II micronutrient required for better growth and yield of watermelon. Considering this, the present research work has been undertaken.

## Materials and Methods

The present investigation was carried out to study the "Effect of foliar application of PDKV grade II micronutrients on growth and yield of watermelon". The experiment was conducted at Instructional farm, Department of Vegetable Science, Dr. PDKV, Akola during *summer* season of 2022-2023. The experiment was laid out in Factorial Randomized Block Design (FRBD) with two factor and twelve treatment combinations with three replications.

The treatment combinations were created by combining three time of foliar application (30, 40 and 50 DAT) and four levels of PDKV grade II micronutrients (control, 2.5, 5.0 and 10.0 ml/L) *viz.,* $D_1M_0$ (Foliar spray 30 DAT + Control), $D_1M_1$ (Foliar spray 30 DAT + 2.5 ml/L), $D_1M_2$ (Foliar spray 30 DAT + 5.0 ml/L), $D_1M_3$ (Foliar spray 30 DAT + 10.0 ml/L), $D_2M_0$ (Foliar spray 40 DAT + Control), $D_2M_1$ (Foliar spray 40 DAT + 2.5 ml/L), $D_2M_2$ (Foliar spray 40 DAT + 5.0 ml/L), $D_2M_3$ (Foliar spray 40 DAT + 10.0 ml/L), $D_3M_0$ (Foliar spray 50 DAT + Control), $D_3M_1$ (Foliar spray 50 DAT + 2.5 ml/L), $D_3M_2$ (Foliar spray 50 DAT + 5.0 ml/L), $D_3M_3$ (Foliar spray 50 DAT + 10.0 ml/L). During experimentation regular irrigation, weeding and plant protection measures were followed as per need of crop. The data obtained on various parameters were statistically analyzed by Factorial Randomized Block Design by Panse and Sukhatme (1967).

## Results and Discussion

## Growth parameters

## Effect of time of foliar application

The data presented in Table 1, 2, 3 and 4 revealed that the growth of watermelon was significantly influenced by different time of foliar applications. Significantly maximum length of vine$^{-1}$ at 60 and 90 DAT (165.43 cm and 233.47 cm), number of leaves at 60 and 90 DAT (146.04 and 233.08), chlorophyll index at 45 DAT (58.12 spad units) and lowest node at which first male (3.15) and female (8.23) flower appeared, minimum days to first male (28.09 days) and female (37.65 days) flower appearance and narrow male to female flower ratio (10.35) were recorded in treatment $D_1$ *i.e*., foliar spray 30 DAT.

Foliar application at early stage of plant results in the production of chlorophyll and other metabolic activities which might have aided in cell division, favours apical tissue growth, meristematic activity and the development of new cell wall at vegetative stage. It enhanced photosynthetic area and more accumulation of carbohydrates at 15 days interval started after 30 days of

crop emergence. These results are in agreement with findings of Reddy *et al.,* (2019) in watermelon, Bommesh *et al.,* (2017) in cucumber.

## Effect of levels of micronutrients

Levels of micronutrients were recorded significant effect on growth of watermelon presented in Table 1, 2, 3 and 4. The levels of micronutrients in treatment $M_2$@ 5 ml/L recorded significant results in relation to maximum length vine at 60 and 90 DAT (166.09 cm, 234.18 cm), number of leaves at 60 and 90 DAT (146.49, 234.20), chlorophyll index at 45 DAT (58.38 spad units) and lowest node at which first male (3.02) and female (8.02) flower appeared, minimum days to first male (27.99 days) and female (37.64 days) flower appearance and narrow male to female flower ratio (10.31).

This might be due to foliar application of levels of micronutrients increased the photosynthetic activity, chlorophyll formation, nitrogen metabolism and auxin contents in the plants which ultimately help in improving length of vine, number of leaves. The improvement in node number to first female and male flower emergence as a result of feeding of micronutrients enhances photosynthetic activities which lead to increase in various plant metabolites responsible for cell division and elongation. These results are in close conformity with the findings studied by Sakshi *et al.,* (2023) in bittergourd, Meshram *et al.,* (2020) in watermelon, Yadav *et al.,* (2019) in bottlegourd.

## Interaction effect on time of foliar application and levels of micronutrients

The data regarding interaction effect on time of foliar application and levels of micronutrients presented in Table 1, 2, 3 and 4. The interaction effect of time of foliar application and levels of micronutrients were recorded significant for growth of watermelon.

The maximum length of vine at 60 and 90 DAT (170.40 cm and 236.47 cm), number of leaves at 60 and 90 DAT (152.73 and 238.33), chlorophyll index at 45 DAT (62.14 spad units) and lowest node at which first male (2.53) and female (7.47) flower appeared, minimum days to first male (27.99 days) and female (36.13 days) flower appearance and narrow male to female flower ratio (9.11) recorded in treatment combination $D_1M_2$ *i.e*., foliar spray 30 DAT+ 5 ml/L micronutrients. Minimum days to first male and female flower appearance might be due to foliar application of micronutrient involves zinc which increased the rates of photosynthesis and photosynthates supply nutrients and accelerate endogenous auxin during flowering period. These findings similar with Bharathi *et al.,* (2018) in bitter gourd, Trinadh *et al.,* (2022) in ivy gourd, Tayade *et al.,* (2022) and Jayshri *et al.,* (2019) in watermelon.

## Yield parameters

## Effect of time of foliar application

The data presented in Table 5 and 6 revealed that the yield parameters *viz.,* number of fruits per vine (2.47), average fruit weight (3.00 kg), fruit yield per vine (8.26 kg) and yield per hectare (413.03 q/ha) were found significantly maximum and minimum days required for edible maturity (74.49 days) recorded in treatment $D_1$ *i.e*. foliar spray 30 DAT. The number of fruits per vine found to be non significant. Foliar applications at early stage provide nutrients during the yield potential determining time frame of plant development, which influenced the post-reproductive development stages. These outcomes are similar to findings of Patil *et al.,* (2013) in bitter gourd, Bommesh *et al.,* (2016) in cucumber, Tayade *et al.,* (2022) and Jayshri *et al.,* (2019) in watermelon.

## Effect of levels of micronutrients

From the data Table 5 and 6 showed that the effect of levels of micronutrients on yield parameters. Yield attributing parameters *viz.,* number of fruits per vine (2.79), average fruit weight (3.08 kg), fruit yield per vine (8.62 kg) and yield per hectare (430.97 q/ha) were found significantly maximum whereas minimum days required for edible maturity (73.86 days) recorded in treatment $M_2$ @ 5 ml/L micronutrients.

There was increase in yield per hectare due to foliar application of micronutrients which promotes root growth and increased higher yield per hectare. Foliar application attributed to improved photosynthesis, carbohydrate accumulation, cell wall development and cell differentiations boosting the overall vegetative growth, biological activity of the plants, which led to increased yield. Similar results were obtained by Bommesh *et al.,* (2017) in cucumber, Zahed *et al.,* (2021); Tayade *et al.,* (2022) in watermelon.

**Table.1** Length of vine as influenced by time of foliar application and levels of micronutrients in watermelon

| Length of vine (cm) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 60 DAT | | | | | 90 DAT | | | | |
| Treatment | Micronutrients (M) | | | | | Micronutrients (M) | | | | |
| Foliar spray DAT (D) | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean |
| $D_1$ | 160.47 | 165.60 | 170.40 | 165.27 | 165.43 | 228.93 | 233.67 | 236.47 | 234.80 | 233.47 |
| $D_2$ | 160.47 | 167.53 | 162.93 | 165.80 | 164.18 | 228.80 | 235.40 | 232.60 | 234.80 | 232.90 |
| $D_3$ | 161.27 | 164.53 | 164.93 | 163.80 | 163.63 | 229.40 | 232.87 | 233.47 | 232.00 | 231.93 |
| Mean | 160.73 | 165.89 | 166.09 | 164.96 | | 229.04 | 233.98 | 234.18 | 233.87 | |
| | D | | M | | D × M | D | | M | | D × M |
| F test | Sig. | | Sig. | | Sig. | Sig. | | Sig. | | Sig. |
| SE (m) ± | 0.31 | | 0.36 | | 0.62 | 0.31 | | 0.31 | | 0.61 |
| CD at 5% | 0.91 | | 1.05 | | 1.82 | 0.90 | | 0.90 | | 1.80 |

**Table.2** Number of leaves as influenced by time of foliar application and levels of micronutrients in watermelon

| Number of leaves | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 60 DAT | | | | | 90 DAT | | | | |
| Treatment | Micronutrients (M) | | | | | Micronutrients (M) | | | | |
| Foliar spray DAT (D) | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean |
| $D_1$ | 140.40 | 145.33 | 152.73 | 145.70 | 146.04 | 228.67 | 231.93 | 238.33 | 233.40 | 233.08 |
| $D_2$ | 142.27 | 150.27 | 142.87 | 146.53 | 145.48 | 228.53 | 237.80 | 233.60 | 231.27 | 232.80 |
| $D_3$ | 141.87 | 142.13 | 143.87 | 145.60 | 143.37 | 228.33 | 230.33 | 230.67 | 230.20 | 229.88 |
| Mean | 141.51 | 145.91 | 146.49 | 145.94 | | 228.51 | 233.36 | 234.20 | 231.62 | |
| | D | | M | | D × M | D | | M | | D × M |
| F test | Sig. | | Sig. | | Sig. | Sig. | | Sig. | | Sig. |
| SE (m) ± | 0.49 | | 0.56 | | 0.97 | 0.50 | | 0.58 | | 1.00 |
| CD at 5% | 1.43 | | 1.65 | | 2.85 | 1.46 | | 1.69 | | 2.92 |

**Table.3** Chlorophyll index, node at which 1st male and female flower appeared as influenced by time of foliar application and levels of micronutrients in watermelon

| | Chlorophyll index | | | | | Node at which 1st male flower appeared | | | | | Node at which 1st female flower appeared | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 45 DAT | | | | | | | | | | | | | | |
| Treatment | Micronutrients (M) | | | | | Micronutrients (M) | | | | | Micronutrients (M) | | | | |
| Foliar spray DAT (D) | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean |
| $D_1$ | 53.82 | 58.93 | 62.14 | 57.58 | 58.12 | 3.60 | 3.33 | 2.53 | 3.13 | 3.15 | 9.13 | 8.20 | 7.47 | 8.13 | 8.23 |
| $D_2$ | 54.73 | 60.16 | 55.97 | 54.89 | 56.44 | 3.40 | 2.73 | 3.13 | 3.47 | 3.18 | 9.00 | 8.07 | 8.33 | 8.47 | 8.47 |
| $D_3$ | 56.57 | 55.57 | 57.05 | 58.07 | 56.82 | 3.40 | 3.33 | 3.40 | 3.33 | 3.37 | 8.80 | 8.53 | 8.27 | 8.40 | 8.50 |
| Mean | 55.04 | 58.22 | 58.38 | 56.85 | | 3.47 | 3.13 | 3.02 | 3.31 | | 8.98 | 8.27 | 8.02 | 8.33 | |
| | D | | M | | D × M | D | | M | | D × M | D | | M | | D × M |
| F test | NS | | Sig. | | Sig. | Sig. | | Sig. | | Sig. | Sig. | | Sig. | | Sig. |
| SE (m) ± | 0.63 | | 0.72 | | 1.26 | 0.05 | | 0.06 | | 0.10 | 0.06 | | 0.07 | | 0.13 |
| CD at 5% | - | | 2.13 | | 3.68 | 0.15 | | 0.17 | | 0.30 | 0.19 | | 0.22 | | 0.38 |

**Table.4** Days to 1st male and female flower appearance and Male to female flower ratio as influenced by time of foliar application and levels of micronutrients in watermelon

| | Days to 1st male flower appearance | | | | | Days to 1st female flower appearance | | | | | Male to female flower ratio | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Treatment | Micronutrients (M) | | | | | Micronutrients (M) | | | | | Micronutrients (M) | | | | |
| Foliar spray DAT (D) | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean |
| $D_1$ | 30.04 | 27.95 | 26.47 | 27.90 | 28.09 | 40.13 | 37.07 | 36.13 | 37.27 | 37.65 | 11.95 | 10.15 | 9.11 | 10.20 | 10.35 |
| $D_2$ | 27.91 | 26.96 | 28.67 | 29.22 | 28.19 | 38.27 | 37.73 | 38.33 | 38.13 | 38.12 | 11.31 | 9.61 | 10.46 | 10.11 | 10.37 |
| $D_3$ | 28.63 | 29.08 | 28.81 | 29.05 | 28.89 | 38.93 | 38.53 | 38.47 | 38.60 | 38.63 | 11.20 | 11.38 | 11.35 | 11.63 | 11.39 |
| Mean | 28.86 | 28.00 | 27.99 | 28.72 | | 39.11 | 37.78 | 37.64 | 38.00 | | 11.48 | 10.38 | 10.31 | 10.65 | |
| | D | | M | | D × M | D | | M | | D × M | D | | M | | D × M |
| F test | Sig. | | Sig. | | Sig. | Sig. | | Sig. | | Sig. | Sig. | | Sig. | | Sig. |
| SE (m) ± | 0.19 | | 0.22 | | 0.37 | 0.25 | | 0.28 | | 0.49 | 0.21 | | 0.25 | | 0.43 |
| CD at 5% | 0.55 | | 0.63 | | 1.10 | 0.72 | | 0.83 | | 1.45 | 0.63 | | 0.72 | | 1.25 |

**Table.5** Days required for edible maturity as influenced by time of foliar application and levels of micronutrients in watermelon

| Treatments | Days required for edible maturity | | | | |
|---|---|---|---|---|---|
| | Micronutrients(M) | | | | |
| Foliar spray DAT (D) | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean |
| $D_1$ | 78.91 | 73.77 | 71.91 | 73.35 | 74.49 |
| $D_2$ | 77.31 | 73.16 | 74.53 | 76.20 | 75.30 |
| $D_3$ | 77.28 | 75.46 | 75.13 | 76.78 | 76.16 |
| Mean | 77.83 | 74.13 | 73.86 | 75.44 | 75.32 |
| | Factor A D | | Factor B M | | Interaction D × M |
| F test | Sig. | | Sig. | | Sig. |
| SE (m) ± | 0.30 | | 0.34 | | 0.59 |
| CD at 5% | 0.87 | | 1.01 | | 1.74 |

**Table.6** Number of fruits per vine, average fruit weight (kg), fruit yield per vine (kg) and yield per ha (q/ha) as influenced by time of foliar application and levels of micronutrients in watermelon

| | Number of fruits per vine | | | | | Average fruit weight (kg) | | | | | Fruit yield per vine (kg) | | | | | Yield per ha (q/ha) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Treatment | Micronutrients (M) | | | | | Micronutrients (M) | | | | | Micronutrients (M) | | | | | Micronutrients (M) | | | | |
| Foliar spray DAT (D) | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean | $M_0$ | $M_1$ | $M_2$ | $M_3$ | Mean |
| $D_1$ | 2.53 | 2.73 | 2.90 | 2.80 | 2.74 | 2.79 | 2.97 | 3.39 | 2.86 | 3.00 | 7.06 | 8.13 | 9.84 | 8.02 | 8.26 | 352.87 | 406.40 | 492.07 | 400.80 | 413.03 |
| $D_2$ | 2.70 | 2.87 | 2.63 | 2.73 | 2.73 | 2.81 | 3.10 | 2.99 | 2.88 | 2.95 | 7.60 | 8.89 | 7.87 | 7.88 | 8.06 | 379.77 | 444.33 | 393.70 | 394.13 | 402.98 |
| $D_3$ | 2.60 | 2.70 | 2.83 | 2.67 | 2.70 | 2.84 | 2.91 | 2.87 | 2.90 | 2.88 | 7.39 | 7.85 | 8.14 | 7.74 | 7.78 | 369.33 | 392.47 | 407.13 | 387.15 | 389.02 |
| Mean | 2.61 | 2.77 | 2.79 | 2.73 | | 2.81 | 2.99 | 3.08 | 2.88 | | 7.35 | 8.29 | 8.62 | 7.88 | | 367.32 | 414.40 | 430.97 | 394.03 | |
| | D | | M | | D × M | D | | M | | D × M | D | | M | | D × M | D | | M | | D × M |
| F test | NS | | Sig. | | Sig. | Sig. | | Sig. | | Sig. | Sig. | | Sig. | | Sig. | Sig. | | Sig. | | Sig. |
| SE (m) ± | 0.03 | | 0.04 | | 0.06 | 0.02 | | 0.02 | | 0.04 | 0.11 | | 0.13 | | 0.23 | 5.87 | | 6.77 | | 11.73 |
| CD at 5% | - | | 0.10 | | 0.18 | 0.05 | | 0.06 | | 0.11 | 0.33 | | 0.38 | | 0.66 | 17.20 | | 19.86 | | 34.41 |

## Interaction effect of time of foliar application and levels of micronutrients

The data pertaining to interaction effect of time of foliar application and levels of micronutrients on yield parameters is given in Table 5 and 6. Yield parameters *viz.,* number of fruits per vine (2.90), average fruit weight (3.39 kg), fruit yield per vine (9.84 kg) and yield per hectare (492.07 q/ha) were recorded significantly maximum whereas minimum days required for edible maturity (71.91 days) in treatment combination $D_1M_2$ *i.e*., foliar spray 30 DAT+ 5 ml/L micronutrients. Essential micronutrients like boron, zinc and iron play an important role in enzymatic reactions and act as catalysts in plant which responsible for increasing fruit set. Foliar application of micronutrients at vegetative crop stage involves in metabolic function efficiency leading to increased protein assimilation and carbohydrate which resulted in increased yield. These findings similar with Bharathi *et al.,* (2018) in bitter gourd, Trinadh *et al.,* (2022) in ivy gourd, Patidar *et al.,* (2017) in cucumber, Vasantkumar *et al.,* (2012); Tayade *et al.,* (2022) and Jayshri *et al.,* (2019) in watermelon.

In conclusion, on the basis of findings, it can be concluded that, the growth parameters *viz.*, length of vine (60 and 90 DAT), number of leaves vine$^{-1}$ (60 and 90 DAT), chlorophyll index (45 DAT) were recorded significantly maximum in foliar application of 5 ml/L micronutrients at 30 DAT. Lowest node at which first male and female flower appeared, minimum days to first female and male flower appearance and narrow male to female flower ratio were found significant due to interaction effect of foliar application of 5 ml/L micronutrients at 30 DAT.

Yield parameters *viz.*, number of fruits per vine, average fruit weight, fruit yield per vine and yield per hectare were recorded significantly maximum whereas minimum days required for edible maturity recorded in treatment combination of foliar application of 5 ml/L micronutrients at 30 DAT. Therefore, it can be inferred that foliar application of 5 ml/L PDKV grade II micronutrients at 30 DAT are beneficial in mitigating nutritional problems and improving the better growth and yield of watermelon.

## Author Contributions

Nikita S. Sharnagat: Investigation, formal analysis, writing—original draft. A. M. Sonkamble: Validation, methodology, writing—reviewing. A. P. Wagh:—Formal analysis, writing—review and editing. S. O. Bawkar: Investigation, writing—reviewing. S. S. Hadole: Resources, investigation writing—reviewing. Khushali Dahule: Validation, formal analysis, writing—reviewing.

## Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Declarations

**Ethical Approval** Not applicable.

**Consent to Participate** Not applicable.

**Consent to Publish** Not applicable.

**Conflict of Interest** The authors declare no competing interests.

## References

Anonymous, 2022-2023, Area and production. www.nhb.gov.in

Bharathi, D. K., Verma R. B., Singh V. K., Ravi Kumar, Superna Sinha, and S. K. Sinha. 2018. Response of bitter gourd (*Momordica charantia* L.) to foliar Feeding of Micronutrient on the Growth, Yield and Quality. *Int.J.Curr.Microbiol.App.Sci.* 7(2): 2341-2346. https://doi.org/10.20546/ijcmas.2018.702.284

Bommesh, J. C., P. Irene Vethamoni, Sunil Kumar, Kattula Nagaraju, Revati Goudar, Ajay Kumar Pandav. 2017. Effect of Boron Levels on Physiology and Quality Characters of Greenhouse Parthenocarpic Cucumber (*Cucumis sativus* L.), Environment & Ecology, 35 (2): 676—680.

Jayshri, B. Kadu, Dhopavkar R. V. and Sanjivani P. Gondane. 2019. Effect of soil application of potassium and foliar spray of zinc and boron on available nutrient content in soil at different growth stages of watermelon [*Citrullus lanatus* (Thunb.)]., IJCS; 7(5): 934-939.

Meshram, L. T. , A. M. Sonkamble, S. R. Patil and L. Z. Dahake. 2020. Effect of Plant Growth Regulators

on Growth and Yield of Watermelon Int.J.Curr.Microbiol.App.Sci (2020) Special Issue-11: 529-534.

Panse, V. G. and P. V. Sukhatme. 1967. Statistical Method for Agriculture Works, Indian Council of Agricultural Research, pp 100-174.

Patidar, D. K., I B Maurya, Pravin Singh, Vikas Kumar Khatik and Bhim Singh. 2017. Effect of micronutrients on yield and economics of gynoecious cucumber (*Cucumis sativus* L) var Kian under naturally-ventilated polyhouse, *International Journal of Farm Sciences*;7(2): 29-32.

Patil B C, Padanad A, Laxman Yashvant, Kumar K H, Gopali JB and Shetty Soumiya 2013. Response of foliar application of micronutrients on yield and economics of bitter gourd (*Momordica charantia* L.). The Orissa J. Horticulture, 18 (2): 677-679.

Reddy, P. R., Sambasiva Y. R., Kiran K. A., Srikanth Y. and N. Basanth. 2019. Effect of Nova Tarak Plus (A Micro Nutrient Foliar Spray) on Growth, Yield and Quality of Water Melon (*Citrullus lanatus*), *International Journal of Applied Agricultural Research*,14; pp.;23-30.

Sakshi S. D., Wagh A. P. and S. O. Bawkar. 2023. Effect of fertigation levels and foliar application of micronutrients on growth, yield and quality of bitter gourd, *The Pharma Innovation Journal*,12(9): 2883-2887.

Tayade, V. D., Sonkamble A. M., Ramteke P. R., Jawarkar A. K., and V. S. Kale. 2022. Effect of Irrigation and Fertigation Levels on Soil Fertility and Yield of Watermelon (*Citrullus lanatus* Thunb.). *International Journal of Plant & Soil Science* 34 (22):85-95. https://doi.org/10.9734/ijpss/2022/v34i2231358

Trinadh, P., Usha Kumari K., Uma Jyothi K., Sujatha R. V., Paratpara Rao M. and V Sekhar. 2022. Effect of foliar application of growth regulators and micronutrients on growth, reproductive yield and yield attributes of ivy gourd (*Coccinia grandis* L.), *The Pharma Innovation Journal*; 11(8): 1290-1293.

Vasanthkumar, A. M., Shirol., Ravindra Mulge., Thammaih, N. and Prasad Kumar. 2012. Genotype x environmental interaction in watermelon (*Citrullus lanatus* Thunb) genotype for yield and quality traits, Karnataka J. Agric, Sci., 25(2):248-252.

Yadav, G. K., Prasad V. M., Samir E Topno. 2019. Effect of micronutrient and NPK on growth, yield and quality of bottle gourd cv. Pusa hybrid-3. *Pharma Innovation*;8(8):405-409.

Zahed, Z., Kumar, S. S., Mahale, A. G., Krishna, J. R. and S. Mufti. 2021. Foliar Micro nutrition of Vegetable Crops: A Critical Review. J Hortic. 8(4): 292. https://doi.org/10.9734/CJAST/2021/V40I731322

**How to cite this article:**

Nikita S. Sharnagat, A. M. Sonkamble, A. P. Wagh, S. O. Bawkar and Hadole, S. S. 2024. Effect of Foliar Application of PDKV Grade II Micronutrients on Growth and Yield of Watermelon. *Int.J.Curr.Microbiol.App.Sci.* 13(10): 102-109. **doi:** https://doi.org/10.20546/ijcmas.2024.1310.014