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# Effect of different concentration of nutrients on growth, yield and quality of sweet basil (*Ocimum basilicum*) in hydroponics system

**Vikas Kumar, Silky Bains and Krishan Kumar Singh**

**Abstract**
The present investigation entitled "Effect of different concentration of nutrients on Growth, Yield and Quality of Sweet Basil (*Ocimum basilicum*) In Hydroponics System" was carried out during 2021-2022 in Department of Horticulture, School of Agriculture, Om Sterling Global University, Hisar (Haryana). The experiment was laid out in Randomized Block Design with three replications and eight treatments including control. On the basis of results obtained, It is concluded that the treatment $T_3$:Epsom salts and micros (7.5ml/10L) ($MnSO_4$, $ZnSO_4$, $CuSO_4$, B, Common Salt) +Iron Chelate (7.5m1/10L) + Mono Ammonium phosphate (7.5ml/10L) +(N:P:K 11:48:00) + Calcium Nitrate (17.5ml/10L)+( N:P:K 15:00:00) + Pottasium Nitrate (17.5ml/10L) +(N:P:K 13:00:44) was found to be best in terms of growth parameters, herbage yield and dry herbage yield, quality parameters of sweet basis in hydroponics system. Maximum gross return (Rs. 2269.82.) and net return (Rs. 1249.45.) with maximum benefit cost ratio (2.22) was also observed in treatment $T_3$.

**Keywords:** Nutrients, growth, yield, quality, sweet basil, *Ocimum basilicum*, hydroponics system

## Introduction
Sweet basil (*Ocimum basilicum* L.) in the Lamiaceae is largely employed as a flavouring agent for food and is cultivated worldwide. Sweet basil is also used for cosmetical and pharmaceutical preparations, as it contains large amounts of essential oils. Basil contains many vitamins and minerals, as well as antioxidants such as lutein, zeaxanthin, beta-carotene, and beta-cryptoxanthin. Many of basil's health benefits come from these antioxidants, as well as its essential oils. These anti-inflammatory properties can help to lower the risk of inflammatory conditions such as arthritis. heart disease, and bowel issues. Basil has antibacterial properties. The oils in the herb may help to fight bacteria in people with respiratory, urinary, abdominal, and skin infections

The major constituents in Ocimum oil includes linalool, gereniol, citral, eugenol, methyl chavicoal, thymol, methyl cinnamate etc that can be harnessed to yield many commercial products. Cultivation of medicinal and aromatic plants for profit has attracted the attention of many growers. The production of aromatic plants for profit on commercial basis involves a number of factors. The value of such crops depends on their active principle content which makes it different from the principle of production of agricultural crops. Various species of this crop are commercialy cultivated in U.P., Jammu and Kashmir, Himachal Pradesh, Punjab and in small scale in Madhya Pradesh. In Madhya Pradesh Ocimum is cultivated commercially in Malwa region particularly in Neemuch, Mandsaur and Ratlam district which is increasing year after year. The export of this crop has increased in last decade. The seeds of this species of Ocimum are exported mainly to Arab countries from India.

Cultivation of this crop is also increasing in Madhya Pradesh at a very steady pace owing its uses and better yield and market potential. The approximate area of Ocimum production in MP is 1000 ha the most of which is in Mandsaur and Neemuch district.

## Materials and Methods
The Experimental work of "Effect of different concentration of nutrients on Growth, Yield and Quality of Sweet Basil (*Ocimum basilicum*) In Hydroponics System" was conducted at Department of Horticulture, School of Agriculture, Om Sterling Global University, Hisar (Haryana) during the year 2021-2022. The experimental soil was sandy loam in texture, slightly alkaline in reaction (pH7.6, 7.8), low in organic carbon (0.42, 0.43 %), low in

available nitrogen (226, 230 kg ha-1), low in available phosphorus (18, 20 kg ha-1). and high in available potassium (483, 521 kg ha-1) during 2021-22 respectively.

The Sweet Basil was grown under hydroponics (NFT-Nutrient Film Technique). 8 treatments with 3 replications each was carried out for a duration of 75 days after planting. The height of the randomly selected plants of all genotypes of amaranthus were measured, averaged and analyzed. Total leaves of all the plant in a structure were harvested and measured with the help of weighing balance. The total leaves of all plants in a structure were harvest and weight with the help of weighing balance in kg. After measuring total weight, it was divided by total number of plants in a structure. Total soluble solid was determined with the help of Erma hand refract meter (0.32 range), averaged and analyzed.

The economics of different treatments was calculated as under:

Net return = Gross return - Total cost of cultivation

$$\text{Benefit cost ratio (B : C ratio)} = \frac{\text{Gross return (Rs/ha)}}{\text{Cost of cultivation (Rs/ha)}}$$

## Result and Discussion

The present investigation entitled "Effect of different concentration of nutrients on Growth, Yield and Quality of Sweet Basil (*Ocimum basilicum*) In Hydroponics System" have been discussed under following heads:

### Effect of different concentration of nutrients on plant height (cm) of Sweet Basil (*Ocimum basilicum*) In Hydroponics System different days after transplanting

The data on plant height (cm) of (*Ocimum basilicum*) in Hydroponics System in each treatment is presented in table (1) and 2. The data shown that soil less application of different concentration of nutrients *viz*., $MnSO_4$, $ZnSO_4$, $CuSO_4$, B, Common Salt, Iron Chelate, Mono ammonium phosphate, Calcium Nitrate and Pottasium Nitrate have significant effect on plant height (cm) at 15, 30, 45, 60 and 75 Days after transplanting as compared to control ($T_8$). Treatment $T_3$:Epsom salts and micros (7.5ml/10L) ($MnSO_4$, $ZnSO_4$, $CuSO_4$, B, Common Salt) +Iron Chelate (7.5m1/10L) + Mono Ammonium phosphate (7.5ml/10L) +(N:P:K 11:48:00) + Calcium Nitrate (17.5ml/10L)+( N:P:K 15:00:00) + Pottasium Nitrate (17.5ml/10L) + (N:P:K 13:00:44) gave the maximum plant height (cm) at 15, 30, 45, 60 and 75 days

### Effect of different concentration of nutrients on number of leaves plant$^{-1}$ of Sweet Basil (*Ocimum basilicum*) In Hydroponics System different days after transplanting.

The data shown that soil less application of different concentration of nutrients *viz*., $MnSO_4$, $ZnSO_4$, $CuSO_4$, B, Common Salt, Iron Chelate, Mono Ammonium phosphate, Calcium Nitrate and Pottasium Nitrate have significant effect on number of leaves plant$^{-1}$ at 15, 30, 45, 60 and 75 Days after transplanting as compared to control ($T_8$). Treatment $T_3$:Epsom salts and micros (7.5ml/10L) ($MnSO_4$, $ZnSO_4$, $CuSO_4$, B, Common Salt) +Iron Chelate (7.5m1/10L) + Mono Ammonium phosphate (7.5ml/10L) +(N:P:K 11:48:00) + Calcium Nitrate (17.5ml/10L)+( N:P:K 15:00:00) + Pottasium Nitrate (17.5ml/10L) +(N:P:K 13:00:44) gave the maximum number of leaves plant$^{-1}$ at 15, 30, 45, 60 and 75 days after transplanting (20.41, 26.00, 35.26, 40.97 and 45.57) which was followed by T6:Epsom salts and micros (15ml/10L) ($MnSO_4$, $ZnSO_4$, $CuSO_4$, B, Common Salt) + Iron Chelate (15m1/10L) +Mono Ammonium

### Effect of different concentration of nutrients on number of branches plant$^{-1}$ of Sweet Basil (*Ocimum basilicum*) In Hydroponics System different days after transplanting.

The data shown that soil less application of different concentration of nutrients *viz*., $MnSO_4$, $ZnSO_4$, $CuSO_4$, B, Common Salt, Iron Chelate, Mono Ammonium phosphate, Calcium Nitrate and Pottasium Nitrate have significant effect on number of branches plant$^{-1}$ at 15, 30, 45, 60 and 75 Days after transplanting as compared to control ($T_8$). Treatment $T_3$:Epsom salts and micros (7.5ml/10L) ($MnSO_4$, $ZnSO_4$, $CuSO_4$, B, Common Salt) +Iron Chelate (7.5m1/10L) + Mono Ammonium phosphate (7.5ml/10L) +(N:P:K 11:48:00) + Calcium Nitrate (17.5ml/10L)+( N:P:K 15:00:00) + Pottasium Nitrate (17.5ml/10L) +(N:P:K 13:00:44) gave the maximum number of branches plant$^{-1}$ at 15, 30, 45, 60 and 75 days after transplanting

**Table 1:** Cost benefit ration of nutrient in horizontal hydroponics system

| Treatment No. | Herbage yield structure$^{-1}$ | Selling price (Rs. g$^{-1}$) | Gross return | Total cost structure (Rs.) | Net return | Benefit cost ratio |
|---|---|---|---|---|---|---|
| T1 | 214.44 | Rs. 7 | 1501.08 | 898.07 | 603.01 | 1.67 |
| T2 | 199.4 | Rs. 7 | 1395.8 | 958.8 | 437 | 1.46 |
| T3 | 324.26 | Rs. 7 | 2269.82 | 1020.37 | 1249.45 | 2.22 |
| T4 | 163.6 | Rs. 7 | 1145.2 | 1081.9 | 63.3 | 1.06 |
| T5 | 180.6 | Rs. 7 | 1264.2 | 1136.27 | 127.93 | 1.11 |
| T6 | 279.28 | Rs. 7 | 1954.96 | 1204.2 | 750.76 | 1.62 |
| T7 | 193.8 | Rs. 7 | 1356.6 | 1264.97 | 91.63 | 1.07 |
| T8 | 123.84 | Rs. 7 | 866.88 | 741.5 | 125.38 | 1.17 |

**Table 2:** Variable cost of structure horizontal hydroponics system

| S. No. | Particulars | Quantity | Per unit price | Amount |
|---|---|---|---|---|
| 1 | 4 inch PVC pipes of 5 feet | 2.5ft | 400 | 200 |
| 2 | 3 inch PVC pipes of 5 feet | 2.5ft | 350 | 175 |
| 3 | End caps and connectors | 1 and 2 | Rs. 50each cap Rs. 20 each Contor. | 90 |
| 4 | Net cups | 12 | 2 | 24 |
| 5 | Submersible pump | 1 | 90 | 90 |
| 6 | Cocopeat | 500g | 25kg | 12.50 |
| 7. | Bucket | 1 | 150 | 150 |
| | | Total cost of structure | | 741.5 |

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