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# Performance of different *Ocimum* species for herbage and essential oil yield

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**Abstract**
Present investigation was carried out in Medicinal and Aromatic Plants Research Station, Sri Konda Laxman Telangana State Horticultural University, Rajendranagar, Hyderabad during Kharif 2016-17 and2017-18. Six *Ocimum* species namely *Ocimum sanctum* (Holy basil), *Ocimum basilicum* var. *purpurascens* (Sweet basil), *Ocimum basilicum* var. *glabratum* (Sweet basil), *Ocimum gratissimum* (Ramatulasi) *Ocimum gratissimum* (*Clove basil*) *Ocimum. Kilimandscharicum* (Camphor basil), were sown in nursery bed and transplanted in 3x4 m sige plots at a spacing of 50x30 cm The experiment was conducted in Randomized Block Design replicated four times to see the performance of six *Ocimum* varieties in the field. The fresh and dry herbage yield per hectare was highest (9.25 t and 1.78 t respectively) in *O. gratissimum* which was significantly superior to other species. The lowest yield (1.23t and 0.41t respectively) was obtained in karpura Tulasi. The oil yield of various *Ocimum* species also differ significantly among themselves. The highest oil yield per kilogram of herbage (5.1 ml) was obtained in *O. sanctum* followed by *O. gratissimum* (4.2ml). The findings suggested that the performance of different *Ocimum* species significantly differ in their herbage and oil yield.

**Keywords:** *Ocimum* sps, herbage, oil yield

## Introduction
There are about 160 species in genus *Ocimum* broadly dispersed over the warm regions of the globe. Among several aromatic and essential oil bearing plants grown in India, *Ocimum* plants occupy an unique place in India and are considered as sacred plants. In India six species are found commonly and they are *Ocimum americanum, Ocimum basilicum, Ocimum* canum, *Ocimum gratissimum, Ocimum kilimandscharicum, Ocimum sanctum*

Basil leaves containing essential oils of distinctive aroma can be used both fresh and dried to spice up various kinds of foods. Apart from culinary use, various parts of different species of *Ocimum* plants are used in the form of extracts, oils paste or leaves as such find diverse uses in indigenous system of medicine in many African and Asian countries including India. In Indian system of "Ayurveda", it finds extensive uses in the treatment of bronchitis, gastric diseases, malarial fevers, constipation, piles, sores and sinus diseases. Different parts of the *Ocimum americanum* plants are diuretic tonic and are used in preparation of cold drinks. It possess carminative, diaphoretic and stimulant properties. A decoction of the plant is used to cure cough and leaves are used in the treatment of dysentery. It is also used as mouth wash. Paste of leaves is used to cure skin infection. It is an important source of mainly essential oils and aroma chemicals having insecticidal, antifungal and medicinal activity which forms basis of its industrial importance particularly in cosmetics and perfumery products. Essential oil of *Ocimum basilicum* is widely used in high grade perfumes, aromatherapy, flavouring liquors, soups and sauces and as herbal spice. The industrial importance of *Ocimum* plants can be judged by the fact that essential oils of certain *Ocimum* are rich sources of camphor, citrate geraniol, linalool, linalyl acetate, methyl chavicol, eugenol. Thymol etc., which are used in wide variety of items of commercial significance. Out of the aroma chemicals mentioned above, the last four are in great demand in industry. In India the requirement of most of these are met by imports and the demand is increasing day by day. Studies on performance of different species of *Ocimum* with regard to herbage and essential oil yield is scarce. Hence the present study is proposed to study the performance of different species and to see the herbage yield and essential oil yield of different species of *Ocimum.*

## Materials and Methods

A field experiment was carried out in Medicinal and Aromatic Plants Research Station, Sri Konda Laxman Telangana State Horticultural University, Rajendranagar, Hyderabad during Kharif 2016-17 and 2017-18. Six *Ocimum* species namely *Ocimum sanctum* (Holy basil), *Ocimum. basilicum* var. *purpurascens* (Sweet basil), *Ocimum basilicum* var. *glabratum* (Sweet basil), *Ocimum gratissimum* (*Ramatulasi*) *Ocimum gratissimum* (*Clove basil*) *Ocimum. Kilimandscharicum* (Camphor basil) were sown in nursery bed and transplanted in 3x4 m sige plots at a spacing of 50x30 cm. The experiment was conducted in Randomized Block Design replicated four times. All the observations were recorded on growth parameters, yield and yield components of *Ocimum* species.

## Results and Discussion

The study on different *Ocimum* species on herbage and oil yield revealed that there was significant influence on performance of different species on growth and yields.

The plant height was observed to be maximum (97.18 cm) in *Ocimum* basilicum var. glabratum which was significantly superior to other species but on par with *Ocimum* basilicum purpurascence (92.70 cm). Significantly minimum plant height of 43.90 cm was recorded in *Ocimum* tenuiflorum.

Maximum number of primary branches (19.06) was recorded in *Ocimum sanctium* (Laxmi Tulasi) followed by *Ocimum gratissimum* (clove basil) recording 18.35 number of branches.

Fresh and Dry herbage yield per plant was highest in *Ocimum gratissimum* (423.83g) and 130.20 g) followed by *Ocimum basilicum* var. *glabratum* (362.35 g and 133.95 g).Fresh and Dry herbage yield per hectare was highest in *Ocimum gratissimum* (23.10 t and 6.14 t respectively) followed by *Ocimum basilicum* var. *glabratum* (22.69 t and 6.36 t respectively).

Significantly minimum fresh herbage yield (11.59 t / ha) was recorded in *Ocimum tenuiflorum* (Rama tulasi) and dry herbage yield in *Ocimum* kilimandcharicum (Camphor basil) recording 2.11 t/ ha. The herbage yields of *Ocimum* species varied and the reason mainly due to genetic and environmental factors that influence the genetic expression. The climatic and topographical conditions of the region affect the plant growth simultaneously which reflect on the yields of different species (Anilkumar *et al.*, 2015, Kuldeep Joshi *et al.*, 2018 and Zewdinesh *et al.*, 2018) [1, 3, 2].

The oil yields of various *Ocimum* species also differ significantly among themselves. The highest oil yield per kilogram of herbage (6.99 ml) was obtained in *Ocimum* sanctum (Krishna tulasi) followed by *Ocimum* sanctum (Laxmi tulasi) recording 6.26 ml oil.

Minimum oil yield (4.28 ml) per kilogram of herbage was recorded in *Ocimum* gratissimum (clove basil). The essential oil content of *Ocimum* species varied and is mainly due to genetic and environmental factors which influence genetic expression of the species. The oil content of different parts of plant also varies with developmental stage. (Sumathi *et al.*, 2012.) [5] Besides, oil content also influenced by the method of extraction and time spent between the harvests in this experiment. Flavengers apparatus is used for distillation of herbage in *Ocimum* species. The relative proportion of various constituents present in essential oil determine the quality and fragrance of essential oil which differ from species to species, variety to variety and also from plant to plant (Giri *et al.*, 2016) [4]. More over often different parts of plant produce radically different essential oils. The climatic and topographical conditions affect plants thus, can alter essential oil quantity and quality.

**Table 1:** Performance of different *Ocimum* species for herbage and essential oil yield during 2016-17, 2017-18.

| S. No | Plant Height (cm) | | | Number of Primary branches | | | Fresh herbage /Plant yield (g) | | | Dry herb yield / plant (g) | | | Fresh herb yield (t/ha) | | | Dry herb yield (t/ha) | | | Oil yield (ml/Kg) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 2016-17 | 2017-18 | Means | 2016-17 | 2017-18 | Means | 2016-17 | 2017-18 | Means | 2016-17 | 2017-18 | Means | 2016-17 | 2017-18 | Means | 2016-17 | 2017-18 | Means | 2016-17 | 2017-18 | Means |
| $T_1$ –Laxmi Tulasi, *Ocimum* sanctum | 70.17 | 69.86 | 70.02 | 18.11 | 20.00 | 19.06 | 243.72 | 269.43 | 256.58 | 59.88 | 60.76 | 60.32 | 12.94 | 13.45 | 13.19 | 2.94 | 3.01 | 2.98 | 5.71 | 6.80 | 6.26 |
| $T_2$ - Krishna Tulasi, *Ocimum* sanctum | 54.30 | 52.86 | 53.58 | 14.93 | 15.73 | 15.33 | 255.83 | 250.20 | 253.02 | 65.79 | 68.66 | 67.23 | 11.35 | 12.50 | 11.93 | 3.26 | 3.43 | 3.35 | 6.92 | 7.06 | 6.99 |
| $T_3$-Sweet basil *Ocimum* basilicum purpurascence | 87.40 | 98.00 | 92.70 | 12.30 | 15.13 | 13.72 | 366.52 | 346.76 | 356.64 | 82.10 | 90.66 | 86.38 | 15.11 | 17.30 | 16.21 | 4.21 | 4.53 | 4.37 | 4.87 | 5.26 | 5.07 |
| $T_4$ – Sweet basil *Ocimum* basilicum glabratum | 92.90 | 101.46 | 97.18 | 12.70 | 13.53 | 13.12 | 316.50 | 408.20 | 362.35 | 128.03 | 139.86 | 133.95 | 19.97 | 25.40 | 22.69 | 5.74 | 6.98 | 6.36 | 4.65 | 6.40 | 5.53 |
| $T_5$- Rama Tulasi *Ocimum*. tenuflorum | 46.40 | 41.40 | 43.90 | 9.70 | 11.66 | 10.68 | 221.95 | 244.86 | 233.41 | 64.94 | 72.76 | 68.85 | 12.23 | 10.96 | 11.59 | 3.61 | 3.74 | 3.68 | 5.93 | 6.03 | 5.98 |
| $T_6$ - Clove basil *Ocimum* gratissimum | 75.80 | 78.93 | 77.37 | 17.3 | 19.40 | 18.35 | 355.32 | 492.33 | 423.83 | 120.03 | 140.00 | 130.02 | 21.60 | 24.60 | 23.10 | 5.32 | 6.96 | 6.14 | 3.79 | 4.76 | 4.28 |
| $T_7$ – Camphor basil *Ocimum* Kilimandcharicum | 47.95 | 59.13 | 53.54 | 12.65 | 14.06 | 13.36 | 269.52 | 392.33 | 330.93 | 91.37 | 107.33 | 99.35 | 16.09 | 19.60 | 17.85 | 1.86 | 2.36 | 2.11 | 3.95 | 5.20 | 4.58 |
| SEM | 7.44 | 3.47 | 5.46 | 1.66 | 1.68 | 1.67 | 4.04 | 5.21 | 4.63 | 9.36 | 2.59 | 5.98 | 1.22 | 0.26 | 0.74 | 0.51 | 0.13 | 0.32 | 0.71 | 0.13 | 0.42 |
| CD at 5 % | 12.07 | 10.82 | 11.44 | 4.98 | 5.25 | 5.12 | 12.31 | 16.24 | 14.28 | NS | 8.07 | 4.03 | 3.98 | 0.83 | 2.41 | 1.626 | 0.40 | 1.01 | 2.29 | 0.42 | 1.36 |

## Conclusion

The performance of different *Ocimum* sps significantly differred with each other by recording highest values in growth, yield and quality parameters.). Fresh and Dry herbage yield per hectare was highest in *Ocimum gratissimum* (23.10 t and 6.14 t respectively) the highest oil yield per kilogram of herbage (6.99 ml) was obtained in *Ocimum sanctum* (Krishna tulasi) followed by *Ocimum sanctum* (Laxmi tulasi) recording 6.26 ml oil.

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