

# INTERNATIONAL RESEARCH JOURNAL OF MULTI DISCIPLINARY STUDIES

Approved by University Grant Commission (UGC)

MONTHLY DOUBLE-BLIND PEER REVIEWED REFERRED OPEN ACCESS INTERNATIONAL JOURNAL

[www.irjms.in](http://www.irjms.in)

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Volume IV

Special Issue I

ISSN: 2455-8491

October 2018

Impact Factor : 1.3599(GIF), 0.679 (IIFS)



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**Diversity of *Ocimum* sp. (Lamiaceae) in Marathwada Region**

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**Abstract**

The present study, described the diversity of nine *Ocimum* sp. found in , Marathwada Region . Their diversity was determined on the basis of morphological characters, to determine the level of variation present in the genus *Ocimum*. Among nine *Ocimum* Sp six (*O.americanum*,*O. canum* *O. basilicum*, *O. gratissimum*, *O. kilimandscharicum* and *O. tenuiflorum*) are found to be different *Ocimum* species and the rest are as varieties. Significant variations were observed in the morphological traits except *O.canum* and *O. basilicum*species. Cluster generated from the morphological data showed two different groups viz. *basilicum*group and *sanctum* group. Chemical analysis did not show much variation between morphologically similar species [25] viz. *O. canum* and *O. basilicum*. Thus the combined analyses of morphological traits represent the best possible approach to confirm taxonomic delineation. / Inedification.

**Key Words:** Diversity,Lamiaceae, *Ocimum*Sp. Marathwada Region.

**Introduction**

*Ocimum* (Basil) most important plant of the FamilyLamiaceae. The word *Ocimum* is derived from the Greek word "ozo" meaning smell [1]and is called as "king of herbs" due to its immense use in traditional system of medicine, perfumery and pharmaceutical industry [2].Pushpangadan in 1995 has reported that the genus*Ocimum*has more than 160 species and is the largest genera in Lamiaceae family worldwide, of which about 65 species are native to *Ocimum* and the rest should be considered as synonyms [3].The maximum number of species is found in the tropical rain forests of Africa how-ever, few species of Basil are native to India [4]. In India, about nine species of *Ocimum* have been reported including three exotic species namely *O. americanum*L., *O. minimum* L., and *O. canum* Sims . [5].

Since the distinctness of an *Ocimum* species from another is always difficult to identify, several characters may need to be considered. Most of the genotypes identified by the earlier authors were based on morphological traits [6-8]. For morphological characterization taxonomists have formulated a descriptor list, such as leaf shape and colour, flower colour etc. for plants' taxonomic classifications. *Ocimum* species show enormous morphological variations as well as growth characteristics, reproductive behavior and chemical composition among their species that are affected by environmental factors [10]. *Ocimum* species are varied across India; however a few reports are available about the *Ocimum*diversity study. Moreover the contemporary literature is totally lack of similar morpho-chemical diversity study of different naturally growing *Ocimum* species. Diversity and relationship of nine *Ocimum* sp. including the natural hybrid *O. canum* based on morphological for their characterization.

**Materials and Method**

**Plant materials:-**Total nine of tulsi (*Ocimum* sp.) were collected from different places Out of the nine species two varieties from *O. tenuiflorum* L. (Purple and Green type, commonly known as Krishna and Radhatulsi respectively), two varieties from *O. basilicum* L. two varieties from *O. gratissimum* L. and single species from *O.canum*Sims (*O. americanum* L and *O. kilimandscharicum*Guerke. (Karpurtulsi) were for the present investigation. The brief morphological description, local names, medicinal uses, summarized in (Table 1)

**Morphological evaluation:-**

Morphological study was carried out in the year 2013–2015 during the flowering season between Septembers to January. Morphological data were recorded for each species (table no.1). The periodically recorded for variation of characters after an interval of fifteen days at peak of the vegetative and flowering period. All the vegetative morphological characters were recorded over the entire growth period but reproductive traits were considered for analysis during full blooming stage (August– November).

Table No-1 Name, Morphological description and Medicinal Uses of *Ocimum* Sp.

Sr. No	Botanical Name	Local name	Morphological Characters	Medicinal Uses
1	<i>Ocimum tenuiflorum</i> L.	Krishanatulsi	Annual to biannual , herb, 70-150 cm tall, leaf, ovate-obovate , elliptic-oblong , surface patently hairy to clothed with soft, spreading hair, Inflorescence purple, Flowers purplish, calyx purple, patently hairy to densely pubescent, seed brown, globose, non-mucilaginous.	Fresh Leaf used in common cold and fever , inflammation and diabetes, root used as sexual stimulant
2	<i>Ocimum tenuiflorum</i> L.	Radhatulsi	Annual to biannual , herb, 70-160 cm tall, leaf, ovate-obovate , elliptic-oblong , surface patently hairy to clothed with soft spreading hair, inflorescence green-greenish purple , flowers purplish, calyx green, patently hairy to densely pubescent, seed brown, globose, non-mucilaginous.	Leaf used in cold and cough, bronchitis , fever, fungal skin infection, rheumatic pain and in poisonous insect bites.
3	<i>Ocimum americanum</i> L.	Ban tulsi	Annual, herb, 20-60 cm tall, leaf elliptic-lanceolate, leaf surface glabrous except hairy midrib, vein lets and margin , inflorescences greenish, flowers white, calyx green with sometimes purplish stripe, long hairy seed black , narrowly ellipsoid, mucilaginous.	Leaf used in flatulence, sexual disabilities , mole and mosquito repellents.
4	<i>Ocimum canum</i> Sims	Camphor basil	Annul , herb, 20-40 cm tall, leaf elliptic-lanceolate broadly , obovate , glabrous except hairy midrib , vein lets and margin inflorescence	Fresh leaf and seed used for curing on different types of skin disease including sores and

			greenish, flowers white, calyx green, long hairy, seed brownish black, ellipsoid mucilaginous	boils and insect on the skin.
5	<i>Ocimum basilicum</i> L.	Rantulsi	Annual, herb, 45-100 cm tall, leaf ovate-lanceolate to oblong-lanceolate, glabrous except hairy midrib, veinlets and margin, inflorescence greenish, flowers whitish, pink calyx green, long hairy, seed brownish black, ellipsoid, mucilaginous.	Leaf used in common cold and cough, headache and in sexual problems.
6	<i>Ocimum basilicum</i> L.	Subja (Ram tulsi)	Annual, herb 55-100 cm tall leaf elliptic-lanceolate, glabrous on both sides of the leaf, inflorescence purple, flowers pinkish-white, calyx greenish purple-purple smooth except sides, seed black, ellipsoids, mucilaginous.	Fresh leaf juice used in gastric problem.
7	<i>Ocimum gratissimum</i> L.	Ganga Tulsi	Perennial, under shrub or shrub, 140-200 cm tall, leaf lanceolate, ovate or ovate-lanceolate, glabrous except hairy midrib, inflorescence greenish purple, flowers yellowish white, Calyx greenish purple, hairy, seed brown, sub-globose, mucilaginous.	Leaf used in fever, common cold and cough, gastrointestinal problem.
8	<i>Ocimum gratissimum</i> L.	(Ajowan Tulsi, Ganga Tulsi)	Perennial, under shrub or shrub, 12-260 cm tall, leaf lanceolate, ovate or elliptic-ovate, glabrous except hairy midrib and wavy, inflorescence greenish, flowers yellowish white, calyx green, hairy, seed brown, sub-globose, mucilaginous.	Leaf used in fever, common cold and cough, gastrointestinal problem. And poisonous insect stings.
9	<i>Ocimum Kilimandscharicum</i> Guerke	Karpurtulsi	Perennial, herb, 60-120 cm tall, leaf ovate-oblong, leaf-surface pubescent with white hairs on both sides, much denser and longer on veins	Leaf used in headache and sinus problem.

			beneath, inflorescence greenish-grayish, flowers white, calyx greenish - grayish, densely hairy, seed black, narrowly ellipsoidal, mucilaginous.	
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## Results and Discussion

### Morphological characterization:

Understanding the diversity of a plant species or genus is of great significance, primarily because of its connection to many branches of biological sciences. Morphological studies on *Ocimum* species showed a high level of variability in recorded traits. For identification of *Ocimum* species morphological traits including leaf colour, stem, inflorescence, flower and seed; leaf shape, stem and seed play the major role [6]. In the qualitative traits a considerable variability were observed on stem pubescence, stem colour, leaf surface, leaf margin, leaf shape, inflorescence type, flower colour, anther colour, seed shape and seed colour (Table 1). However, two traits namely, plant growth habit (erect) and their mode of reproduction (sexual) are found to be monomorphic for all the species and varieties under consideration. Some of the species have pubescent on the stem but with their uneven occurrence. Sparse type of stem pubescent was observed on *O. gratissimum* (Ajowantulsi), *O. americanum*, *O. basilicum* (Babutulsi) and *O. canum* but *O. kilimandscharicum* and *O. tenuiflorum* (Krishna and Radhatulsi) have dense type of stem pubescent. *O. basilicum* (Sabja) and *O. gratissimum* (Ram tulsi) on the other hand showed glabrous stem. Stem colour was also varied from species to species and their varieties. *O. gratissimum* (Ram and Ajowantulsi) have brownish stem colour whereas *O. kilimandscharicum*, *O. americanum* and *O. canum* have light green stem colour. Purple green stem colour was found on *O. basilicum* (Ram tulsi) and a distinct deep purple stem colour was observed on *O. basilicum* (Sabjatulsi) and *O. tenuiflorum* (Krishnatulsi). S

Leaf surface showed significant level of variations viz. glabrous except hairy midrib, veinlets and margin [23] [*O. basilicum* (ram tulsi), *O. canum* and *O. americanum*], sparse and wavy or undulated *O. gratissimum* (Ajowantulsi), patently hairy to clothed with soft spreading hairs [*O. tenuiflorum* (Purple and Green type) and *O. kilimandscharicum*], while *O. basilicum* (sabja) showed glabrous leaf surface. Notably, most of the species showed same colour of leaf (Light green) except *O. gratissimum* (Ajowantulsi) (Deep green) and *O. tenuiflorum* (Krishna tulsi) (Purple colour). In the present study, *O. tenuiflorum* showed purple and green type of leaf colour. The existence of three types of *O. tenuiflorum* viz. green, purple and purple-green however, recently, Mondello et al. 2002 in their report have claimed the existence of five different types of leaf color [21].

Leaf margin varied from serrate [*O. gratissimum* (Ajowanand Ramtulsi), *O. kilimandscharicum*, *O. americanum*, *O. basilicum* (Ram and Sabjatulsi) and *O. canum*] to dented [*O. tenuiflorum* (Krishna and Radhatulsi)]. *O. gratissimum* (Ajowan and Ram tulsi) showed acute leaf tip and broad ovate-lanceolate leaf shape. *O. kilimandscharicum*, *O. americanum* and *O. basilicum* (Ran tulsi and Sabja) on the other hand showed acute leaf tip with elliptic leaf shape. But *O. tenuiflorum* (Krishna and Radhatulsi) have obtuse to acute leaf tip with ovate leaf shape.

Variation was also observed in inflorescence type. Out of nine genotypes *O. gratissimum* (ganaga and Ram tulsi), *O. tenuiflorum* (Krishna and Radhatulsi) and *O. kilimandscharicum* showed branched inflorescence and rest of the species showed unbranched or simple type of inflorescence. There are four types of flower colour observed in the studied species. These are yellowish white [*O. gratissimum* (ganga and Ram tulsi)], white (*O. kilimandscharicum*, *americanum* and *O. canum*).

whitish pink [*O. basilicum* (ran tulusi and Sabja)] and purple [*O. tenuiflorum* (Krishna and Radhatulusi)].

So far we have discussed different morphological traits to evaluate the morphological diversity of *Ocimum* species. Very recently, few reports are available where people used seed morphology to differentiate morphologically close *Ocimum* species. Seeds of all the species vary from brown to black in colour. Seed shape also showed significant difference among the species studied. The observed seed shapes were sub-globose-globose [*O. gratissimum* (Ajowan and Ram tulusi)], globose [*O. tenuiflorum* (Krishna and Radhatulusi)], small elliptic (*O. kilimandscharicum* and *O. americanum*) and broadly elliptic [*O. basilicum* (Sabja and ran tulusi) and *O. canum*]. It was observed that all plants seeds were mucilaginous [*O. basilicum* (Ram and Sabjatulusi), *O. canum*, *O. americanum* and *O. kilimandscharicum* etc.]

### Conclusion

The present study described the diversity of nine *Ocimum* genotypes grown naturally in the India. All the species are wide spread across the region. Their diversity was described in terms of morphological analyses. From above study clear distinction has been made between *O. basilicum* (ran tulusi) *O. basilicum* (Sabja), *O. gratissimum* (Ram tulusi) *O. gratissimum* (ganga tulusi) and *O. tenuiflorum* (Krishna tulusi) *O. tenuiflorum* (Radhatulusi). Among nine *Ocimum* genotypes six (*O. americanum*, *O. canum*, *O. basilicum*, *O. gratissimum*, *O. kilimandscharicum* and *O. tenuiflorum*) are different species of *Ocimum* and the rest are varieties. This study strongly recommended that morphological characters could be used as complementary in describing the diversity of /their correct identification and taxonomic classification. And believe that the present work will shed a clear light in the diversity of *Ocimum* sp. in this region.

### References

1. S. Hereman, Paxton's Botanical Dictionary, Bradbury Evans and Co., London, 1868.
2. B.B. Simpson, O.M. Corner, Economic Botany-Plants in our World, McGraw-Hill Book Company, Hamburg, 1986.
3. P. Pushpangadan, B.L. Braáu, in: K.L. Chadha, R. Gupta (Eds.), Advances in Horticulture, Malhotra Publishing House, New Delhi, 1995.
4. D. Mishra, A. Awasthi, P. Mishra, Sci. Secure J. Biotechnol. 3(2014) 188-197.
5. S.S. Balyan, P. Pushpangadan, PAFAI J. 10 (1988) 13-19.
6. P. Malav, A. Pandey, K.C. Bhatt, S.G. Krishnan, I.S. Bisht, Genet. Res. Crop Evol. 62 (2015) 1245-1256.
7. B.J. Conn, Telopea 17 (2014) 169-181.
8. C. Agarwal, N.L. Sharma, S.S. Gaurav, Ind. J. Fund. Appl. Life Sci. 3 (2013) 521-525.
9. L. De Masi, P. Siviero, C. Esposito, D. Castaldo, F. Siano, B.
10. K. Carovi'c-Stanko, Z. Liber, V. Besendorfer, B. Javornik, B. Bohanec, I. Kolak, Z. Satovic, Plant Syst. Evol. 285 (2010) 13-22.
11. R.S. Verma, R.C. Padalia, A. Chauhan, S.T. Thul, Ind. Crops Prod. 45 (2013) 7-19.
12. S. Sundaram, S. Purwar, K.S. Singh, P. Dwivedi, J. Med. Plants Res. 8 (2014) 640-645.
13. R.P. Patel, R. Singh, K.S. Saikia, B.R.R. Rao, K.P. Sastry, M. Zaim, R.K. Lal, Ind. Crops Prod. 77 (2015) 21-29.
14. R.F. Vieira, P. Goldsbrough, J.E. Simon, J. Am. Soc. Hort. Sci. 128 (2003) 94-99.
15. S. Lal, K. Mistry, R. Thaker, S. Shah, P. Vaidya, Int. J. Adv. Biol. Res. 2 (2012) 279-288.
16. B. Bernhardt, G. Fazekas, M. Ladanyi, K. Inotai, E. Zambori-Nemeth, J. Bernath, K. Szabo, J. Appl. Res. Med. Aromat. Plants 1 (2014) 23-29.
17. S. Saha, A. Kader, C. Sengupta, P.D. Ghosh, Am. J. Plant Sci. 3(2012) 64-74.
18. P. Jaccard, Bull. Soc. Vaud. Sci. Nat. 44 (1908) 223-270.

19. F.J. Rohlf, *Numerical Taxonomy and Multivariate Analysis System, version 2.1*, Exeter Publications, New York, 2000.
20. J.A. Anderson, G.A. Churchill, J.E. Auriague, S.D. Tanksley, M.E. Sorrells, *Genome* 36 (1993) 181-186.
21. L. Mondello, G. Zappia, A. Cotroneo, I. Bonaccorsi, J.U. Chowdhury, M. Yusuf, G. Dugo, *Flavour Fragrance J.* 17(2002) 335-340.
22. K.R. Kritkar, B.D. Basu, *Indian Medicinal Plants*, Lalit Mohan Pub, Allahabad, India, 1984.
23. A.N. Dharasurkar, 2002. *Morphological studies in Some Lamiaceae*. Ph.D thesis. Dr. B.A.M. University, Aurangabad.
24. Naik V.N. 1998 "Flora of Marthwada" Amrut Prakshan Aurangabad
25. G.L. Pachkore 2007 *Pharmacognostical Studies in Some Lamiaceae* Ph.D thesis Dr. B.A.M. University, Aurangabad.