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Research Paper

Variation in the Vitamin C and Essential Oil Content of Ocimum Sanctum, L. Growing in the Various Regions of Kerala and Maharahtra

Botany

KEYWORDS : Ocimum sanctum L., Vitamin C, essential oil, Ayurvedic medicines, environmental condition.

Jethmalani Megha	Dept. of Botany, S.S. and L.S. Patkar College, Goregaon (W), Mumbai, 400062
Palathingal Trisa	Dept. of Botany, S.S. and L.S. Patkar College, Goregaon (W), Mumbai, 400062
Sachin Bhagat	Dept. of Botany, S.S. and L.S. Patkar College, Goregaon (W), Mumbai, 400062

ABSTRACT

Herbal medicines are currently in demand and their popularity is increasing day by day. The leaves of Ocimum sanctum L. contains essential oils and alkaloids responsible for curing upper respiratory tract infections. Ocimum sanctum L. is the reservoir plant for therapeutic applications. This medicinal plant is highly valued for their medicinal and aromatic properties in the traditional as well as modern pharmacological system. In the present work plants of Ocimum sanctum L. were collected from various regions of Kerala and Maharashtra during summer and winter seasons and they were analyzed for Vitamin C content and essential oils. It was observed that in the plants of Ocimum sanctum L., the vitamin C content and essential oil was found to be maximum in plants collected from Kerala compared to Maharashtra. Both Vitamin C content and essential oil was found to be maximum in the plants of Ocimum sanctum L. collected from both Maharashtra and Kerala during the winter season.

Introduction:

From ancient times, medicinal and aromatic plants have been of great use for curing various diseases and ailments. *Ocimum sanctum L.* (Queen of Herbs) is found in tropical part of Asia and has been grown in India for more than 3,000 years. In India it is known as Tulsi and is considered the most sacred plant. Tulsi means "The incomparable one". Because of multifarious potentialities and fine aroma chemicals, *Ocimum sanctum* L. possess tremendous medicinal properties like anti-biotic, anti-stress, diaphoretic, diuretic, anti-pyretic, stomachic, anti-microbial, insecticidal, etc.

Ocimum sanctum L., commonly known as 'Sacred Tulsi', is among a few wonder herbs for having enormous medicinal properties. It is an indigenous South Indian species. The plant is pungent, bitter in taste and is reported to possess anti-tuberculosis, anti-septic, antibiotic, anti-stress and anti cancerous properties. The leaves have diaphoretic, stimulant and expectorant properties. Their juice is applied in catarrhal bronchitis, indigestion, cold, cough, throat and chest troubles. The oil is applied to reduce joint pains, inflammation and body rashes (Mala Bhasin 2012).

The present day information about the chemical properties is based on various studies that have been done in different parts of the world and it is likely that the chemical constituents may vary due to edaphic and geographic factors. Hence it was thought necessary to study if there were any variation in the amount of active constituent present in the plants, growing in different regions of India affecting their medicinal properties. Thus, the active constituents like vitamin C content and essential oils used extensively for various purposes of the two most common medicinal plants i.e. *Ocimum sanctum* L. were studied. Hence it was thought necessary to study if there were any variation in the amount of Vitamin C and essential oil present in the plants growing in different regions of India affecting their medicinal properties.

Materials and Methods:

Ocimum sanctum L. one of the most commonly used important medicinal plants was selected for the study. They were collected from five different regions of Maharashtra and Kerala during the summer and winter season and analysed for Vitamin C content and essential oil.

Vitamin C estimation

Vitamin C content was estimated by the following method:

Stock Standard Solution – 100mg ascorbic acid was dissolved in 100ml of 4% oxalic acid solution in a standard flask.

Working Standard – 10ml of stock solution was diluted to 100ml with 4% oxalic acid.

5ml of working standard solution was taken into a 100ml conical flask. Added 10ml of 4% oxalic acid and titrated against the standardized 2,6-dichloro phenol indo phenol dye solution ($v_{1\ ml}$). End point is appearance of pink colour which persists for a few minutes.

0.5gm of leaf sample was extracted in 4% oxalic acid and made up the volume to 100ml and centrifuged. 5ml of this supernatant was taken in a conical flask, added 10ml 4% oxalic acid and titrated against the standardized 2,6-dichloro phenol indo phenol dye solution (v2 ml).

Amount of ascorbic acid mg/g sample:

$$= \frac{0.5mg \times v2\ ml \times 100ml}{v1\ ml \quad 5ml \quad wt.\ of\ sample}$$

ii] Essential Oil Content

Essential oil content was estimated from the dry powder using Soxhlet extraction method with Hexane as the solvent for extraction in mg/gm.

Observations:

It was observed that in *Ocimum sanctum* L. plants collected from Kerala, maximum amount of Vitamin C was observed in the plants collected from Trivandrum during the winter season. While the plants collected from Calicut showed minimum amount of Vitamin C content during the winter season (Table 1)

All the plants of *Ocimum sanctum* L. collected from Kerala during the winter season, showed a higher level of Vitamin C content as compared to the plants of *Ocimum sanctum*, L. collected during summer season (Table 1)

In case of the plants of *Ocimum sanctum* L. collected from Maharashtra, the maximum amount of Vitamin C was observed in the plants collected from Nashik during the winter season i.e.48mg/gm of plant material. While minimum amount of Vitamin C was seen in the plants collected from Mumbai during summer season i.e.12mg/gm of plant material (Table 2)

Another observation made was that from all the *Ocimum sanctum* L. plants collected from Kerala, maximum amount

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of Essential oil content was observed in plants collected from Trichur i.e. 0.45mgs/gm of plant material. While minimum amount of Essential oil content was observed in plants collected from Trivandrum during summer season i.e. 0.16gms/1 gm of plant material (Table 3)

However, it was observed that all the plants of *Ocimum sanctum* L. collected from Kerala during the winter season showed a higher level of essential oil content as compared to the plants of *Ocimum sanctum* L. collected during summer season (Table 3)

It was observed that in *Ocimum sanctum*, L. plants collected from Maharashtra, maximum amount of Essential oils was observed in the plants collected from Thane during the winter season i.e. 0.13gms/1 gm of plant material. Whereas, minimum amount of Essential oil content was observed in the plants collected from Mumbai during summer season i.e. 0.04gms/1 gm of plant material (Table 4)

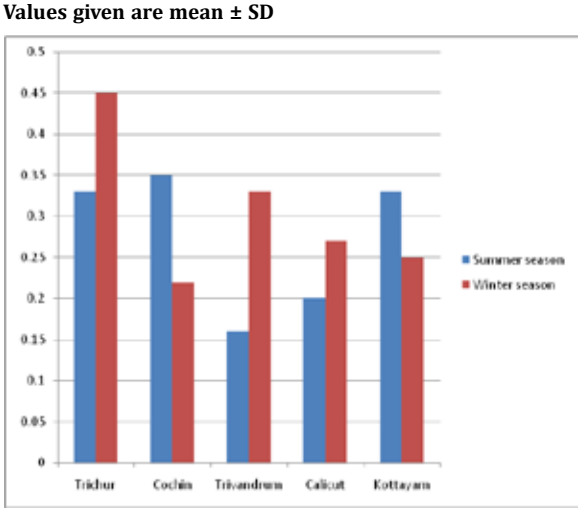
However, it was seen that from all the plants of *Ocimum sanctum L.* collected from Maharashtra during the winter season showed a higher level of Essential oil content as compared to the plants of Ocimum sanctum, L. collected during summer season (Table 4)

However, it was observed that all the plants of *Ocimum sanctum L.* collected from Maharashtra during the winter season showed a higher level of Vitamin C content as compared to the plants of *Ocimum sanctum* L. collected during summer season (Table 2)

Table 1: Effect of environmental conditions of various places of Kerala on Vitamin C content (mg/gm) of Ocimum sanctum, L.

Sites	Summer season	Winter season
Trichur	28±0.12	28±0.17
Cochin	32±0.12	38±0.17
Trivandrum	48±0.17	56±0.15
Calicut	32±0.42	12±0.27
Kottayam	20±0.41	24±0.42

Values given are mean ± SD



Effect of environmental conditions of various places of Kerala on Vitamin C content (mg/gm) of *Ocimum sanctum,* L.

Table 2: Effect of environmental conditions of various places of Maharashtra on Vitamin C content (mg/gm) of Ocimum sanctum, L.

Sites	Summer season	Winter season
Aurangabad	12±0.27	20±0.47
Jalgaon	16±0.17	20±0.47
Nashik	40±0.27	48±0.07
Thane	20±0.42	20±0.17
Mumbai	12±0.08	28±0.48

Values given are mean ± SD

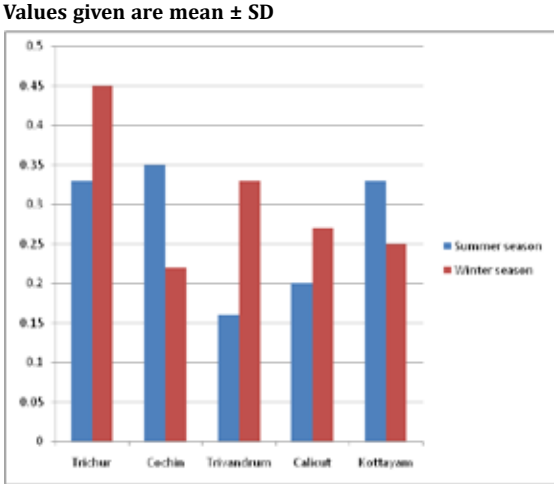
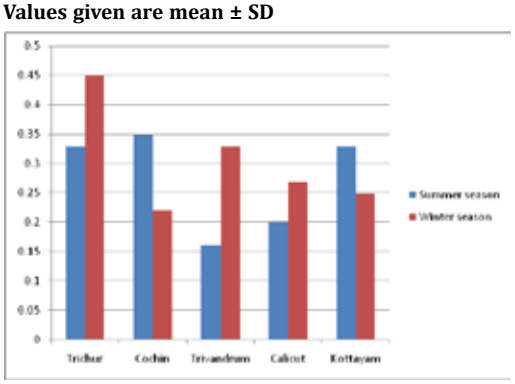


Table 3: Effect of environmental conditions of various places of Kerala on Essential oil content of Ocimum sanctum, L.

Sites	Summer season	Winter season
Trichur	0.33±0.12	0.45±0.87
Cochin	0.35±0.18	0.22±0.27
Trivandrum	0.16±0.17	0.33±0.48
Calicut	0.20±0.28	0.27±0.41
Kottayam	0.33±0.47	0.25±0.41

Values given are mean ± SD

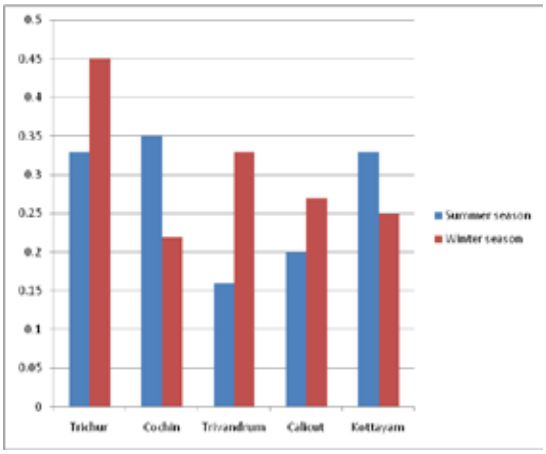


Effect of environmental conditions of various places of Kerala on Essential oil content of Ocimum sanctum, L.

Table 4: Effect of environmental conditions of various places of Maharashtra on Essential oil content of Ocimum sanctum, L. in gm/g of plant

Sites	Summer season	Winter season
Aurangabad	0.06	0.09
Jalgaon	0.05	0.1
Nashik	0.06	0.12
Thane	0.07	0.13
Mumbai	0.04	0.05

Values given are mean ± SD



Results and discussions:-

The chemistry of essential oils is influenced by the local geography and weather conditions, as well as the season and time of day when the plants are harvested, how they are processed, and how they are packaged and stored. Each plant is unique in its chemistry so essential oils are never exactly the same.

There was variation in the Essential oil content in the plants of *Ocimum sanctum* L. collected during summer and winter seasons. The variation was also noticed in the essential oil content of the plants collected from the various regions of Maharashtra and Kerala. It was observed that a slight increase in the essential oil content was observed during the winter season (December-January). Ram Swaroop Varma *et. al*, 2011 have reported that the essential oil content of Ocimum *gratissimum* and *O. kilimandscharicum* during spring-summer cropping season was less compared to the essential oil content of these plants collected during the rain-autumn cropping season.

In the present work, Essential oil content in plants growing in Maharashtra was found to be less compared to the plants growing in Kerala (Table 1-4). This could be due to the prevailing environmental conditions in these areas. E.Cyhan and M. Onder (2012) reported that the seed oil content and fatty acids in plants vary depending on the environmental conditions. They stated that environmental factors especially the minimum temperature and sunlight has a significant influence on the concentration of sunflower oleic acid.

S. Gerald (1986) has also observed that the Linoloic acid content of sunflower is affected negatively by minimum temperature and sunlight.

In the present work it was observed that the Vitamin C content in the plants collected from different places was more during the winter season as compared to the Vitamin C content of the plants collected during the summer season(Table 1,2,3 and 4). Carol Reiss in 1993 has reported higher Vitamin C content in cabbage placed in cold water as compared to the Vitamin C content of cabbage placed in boiling water. He stated that when cabbage was placed in cold water, and the temperature was slowly raised, the total amount of Vitamin C decreased as the temperature rises. Hence in the present investigation also, the vitamin C content was found to be more during winter season when the temperature is much lower.

In the present investigation, a slight variation in the essential oil content was observed in *Ocimum sanctum* L. plants collected during winter and summer seasons. Such observations were also found by Shadia E.et.al (2007). They have observed that the oil content was higher in the seeds of *Ocimum americanam* L. collected from NY,USA during the month of July compared to the oil content obtained in the month of October. They have stated that these differences could be probably attributed to environmental factors. Morales *et.al*(1993). have stated that the environmental factors appear to exert a greater influence on the accumulation of total oil rather than on the chemical composition of basil plants.

Khalid (2006) have noted a change in the essential oil content in the plants of *Ocimium basilicum* L. and *Ocimum americanam* L. when grown with different soil moisture levels.

Conclusion:-

Maximum amount of vitamin C was observed in plants of *Ocimum sanctum* collected from Kerala compared to plants collected from Maharashtra. In Kerala, the plants collected from Trivandrum showed maximum Vitamin C content. It was also observed that maximum amount of Vitamin C was observed in plants collected during the winter season.

The amount of Essential oil was also observed to be maximum in plants of *Ocimum sanctum* collected from Kerala compared to plants collected from Maharashtra. In Kerala, the plants collected from Trichur showed maximum Essential oil content.

Essential oil content was also observed to be maximum in *Ocimum sanctum* plants collected during the winter season.

REFERENCE

Carol Reiss (1993) Measuring the Amount of Ascorbic Acid in Cabbage Vol 7/8; 85-96. | | E. Ceyhan, A. Kahraman, and M. Onder (2012) The Impacts of Environment on Plant Products International Journal of Bioscience, Biochemistry and Bioinformatics, Vol. 2, No. 1 | Gerald S.(1986) Analysis of the relationships of environmental facors with seed oil and fatty acidconcentraions of wild annual sunflower. Field Crops Research. 15 (1): 57-72 | | Khalid (2006) Influence of water stress on growth, essential oil, and chemical composition of herbs (Ocimum sp.) Int. Agrophysics, 20, 289-296 | | Mala Bhasin (2012) Ocimum - Taxonomy, medicinal potentialities and economic value of essential oil Journal of Biosphere 1:48-50. | Morales, S.M.R, J.E Simon and D.J. Charles (1993) Composition of essential oil content and comparison between field and green house grown notypes of methyl cinnamate basil (Ocimum basilicum, L). J. Herbs, Spices and Medicinal Plants, 14: 25-30. | Ram Swaroop Verma, Pawan Singh Bisht, Rajendra Chandra Padalia, Dharmendra Saikia, Amit Chauhan (2011) Chemical composition and antibacterial activity of essential oil from two Ocimum spp grown in sub-tropical India during spring-summer cropping season Journal of Traditional Medicines, 6 (5) | Shadia E, Abd 1 El-Aziz, 2Elsayed A. Omer and 2Aly S. Sabra (2007) Chemical Composition of Ocimum americanum Essential Oil and Its Biological Effects Against, Agrotis ipsilon, (Lepidoptera: Noctuidae) Research Journal of Agriculture and Biological Sciences, 3(6): 740-747 |