



Effect Of Storage On The Phenol Content of Some Medicinal Plants

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ABSTRACT

Many drugs commonly used today are of herbal origin. The leaves of *Ocimum sanctum* L., *Ocimum basilicum* L., *Coriandrum sativum* L. and *Mentha viridis* L. are known to contain phenolic compounds. Many phenolic compounds found in plants have antioxidant effects. The aim of this investigation was to determine the effect of storage and seasons on the phenol content of four, very common medicinally important plants i.e. *Ocimum sanctum* L., *Ocimum basilicum* L., *Coriandrum sativum* L. and *mentha viridis* L. The maximum amount of phenol content was found in rainy season as compared to winter season. Storage period had an adverse effect on Phenol content. As the storage period in refrigerator increased the Phenol Content was found to decrease. The phenol content in all the plants studied showed a greater decrease in plants stored in refrigerator compared to plants stored in room temperature.

KEYWORDS

Medicinal plants, environmental botany, Phenol content, storage.

Introduction:-

The medicinal value of plants depends on bioactive phytochemical constituents that produce definite physiological action in the human body. Some of the most important bioactive phytochemical constituents include alkaloids, flavonoids, phenolics, essential oils, tannins and saponins (Krishnaiah et al., 2009). Phenolics are commonly found in medicinal plants and have been reported to have multiple biological effects, including antioxidant activity.

Ocimum sanctum L. (Tulsi) leaves are widely used in the preparation of Ayurvedic medicines. It contains vitamin C, vitamin A, phyto nutrients and the essential oils in Tulsi, are excellent antioxidants and protects the body from nearly all the damages caused by the free radicals.

Mentha viridis L. also known as Mint or pudina is one of the most common herbs and extremely popular in alternative medical treatments/ It contains menthol that facilitates good digestion. *Mentha viridis* L. has one of the highest antioxidant capacities of any food. It contains small amounts of potassium, magnesium, calcium, phosphorus, vitamin C and vitamin A.

Coriandrum sativum L. has ayurvedic properties and is rigorously used in aroma therapies for digestive problems. *Coriandrum sativum* L. has proved its worth as an important medicinal herb as studied by different herbal scientists.

Due to the abundant medicinal uses of these plants it was thought necessary to find out whether storage periods and seasons have an effect on medicinal properties of these plants. Thus in the present investigation, the effect of storage and seasons on the phenol content of four, very common medicinally important plants i.e. *Ocimum sanctum* L., *Ocimum basilicum* L., *Coriandrum sativum* L. and *mentha viridis* L. was studied.

Material and Methods:-

Four most commonly used medicinal plants that is *Ocimum sanctum* L., *Ocimum basilicum* L., *Coriandrum sativum* L., *Mentha viridis* L. were collected from Mumbai during the rainy and winter seasons and they were analysed for phenol content.

Parameter studied:-

Following parameter were studied on these four plants collected during rainy and winter season.

Phenol content

Folin-Ciocalteu reagent and sodium carbonate were used for total phenolic contents estimation. Gallic acid were used as standards for calibration curves.

Approximately 0.5 g of herb was weighed accurately on analytical balance and extracted by 150 mL of distilled water for 30 minutes at boiling temperature in water bath. The flask with water extract was cooled down by a stream of running water. A whole content of flask was quantitatively replaced into a calibrated flask and filled up to 250 mL with distilled water. After complete sedimentation of plant material, water extract was percolated through paper filter into another flask. First 50 mL of filtered liquid were rejected. The same procedure was applied for each sample.

Determination of total phenolic compounds

5.0 mL of extract were placed in calibrated flask and filled up to 25 mL by distilled water. 1.0 mL of Folin-Ciocalteu reagent, 10.0 mL of distilled water were added to 2.0 mL of diluted extract (from 25 mL calibrated flask) and filled up to 25 mL by sodium carbonate solution (290 g/L). An absorbance of prepared sample was measured by means of UV spectrophotometer at 760 nm after 30 minutes of incubation in darkness. The same liquid (with pure water instead of plant extract) was used as a blind test. All determinations were performed in triplicate.

II] Storage period

The leaves of the above mentioned four plants were collected and they were analyzed for phenol content after storing in the refrigerator and room temperature for varying periods i.e., after 1 day, 3 days and 6 days. The experiments were run in triplicate.

Observation:-

The maximum amount of Phenol content was observed in rainy season in the plants of *Ocimum sanctum* L. (31.75 µg/gm), *Ocimum basilicum* L. (37.04 µg/gm) and *Mentha viridis* L. (26.46 µg/gm) and minimum amount of phenol was found in

Coriandrum sativum L.(21.16 µg/gm). (Table 1)

When they were stored for 3 days at room temperature, the maximum amount of phenol was observed in Mentha viridis L. and minimum amount was observed in Coriandrum sativum L. After 6 days of storage the phenol content went on decreasing. (Table 2)

It was also observed that the minimum amount of phenol content in the plant was observed during winter season. Among all the four plants the maximum amount of phenol content is observed in Ocimum basilicum L.(21.16 µg/gm) and minimum amount was observed in Coriandrum sativum L. (10.58 µg/gm) (Table 3)

When the plants were stored at room temperature for same period of time i.e 1 day, 3 days and 6 days. The maximum amount of phenol was observed in Ocimum sanctum L. and Menthaviridis L. and minimum amount was found in Coriandrum sativum L. (Table 4)

Table 1: Phenol content in the plants collected fresh (Rainy season)

Plant selected	Phenol content (µg/g)
Ocimum sanctum L.	31.75±1.16
Ocimum basilicum L.	37.04±2.23
Mentha viridis L.	26.46±1.20
Coriandrum sativum L.	21.16±1.36

*Values given are mean ± SD

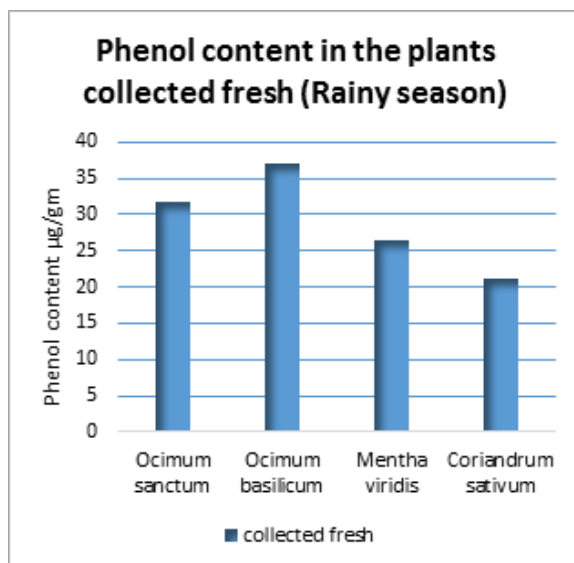


Table 2: Effect of storage period on phenol content in the plants stored at room temperature (rainy season).

Plants selected	Day 1	Day 3	Day 6
Ocimum sanctum L.	10.58±1.23	5.29±1.10	5.29±1.10
Ocimum basilicum L.	10.58±1.02	10.58±1.87	5.29±1.33
Mentha viridis L.	15.87±1.31	10.58±1.55	5.29±1.98
Coriandrum sativum L.	10.58±1.02	5.29±1.21	5.29±1.67

*Values given are mean ± SD

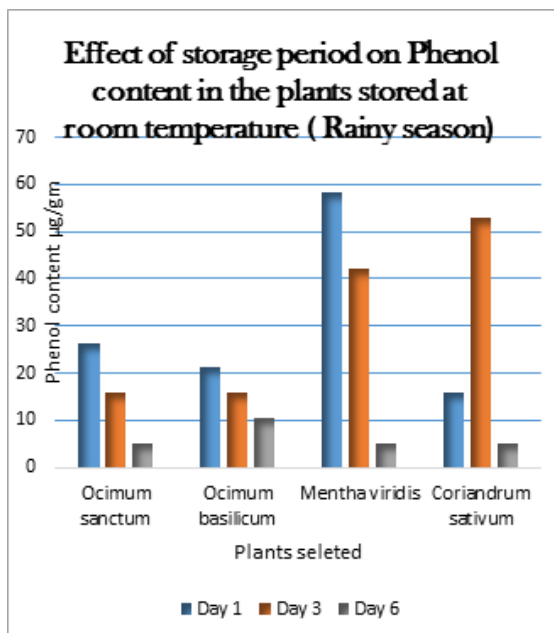


Table 3: Effect of storage period on phenol content in the plants collected fresh (winter season)

Plants selected	Phenol content
Ocimum sanctum L.	21.16±1.99
Ocimum basilicum L.	26.46±2.78
Mentha viridis L.	15.87±1.03
Coriandrum sativum L.	10.58±1.01

*Values given are mean ± SD

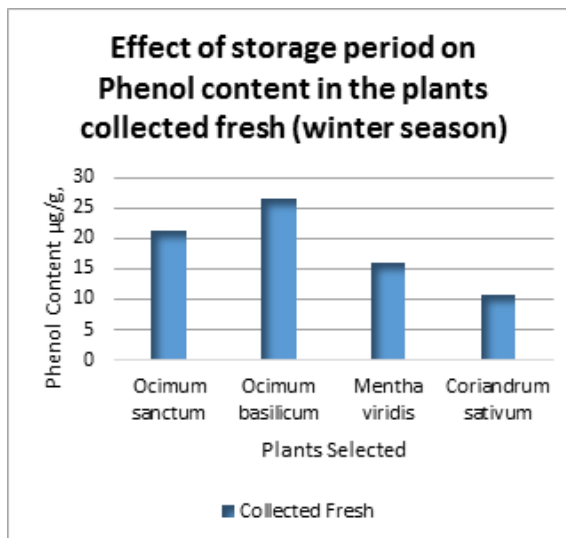
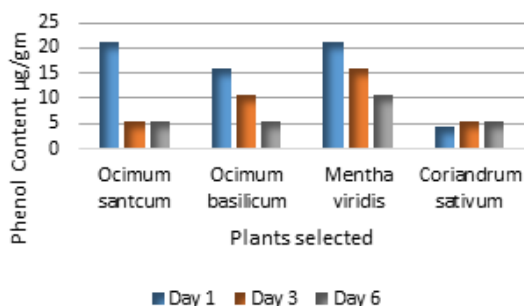


Table 4: Effect of storage period on Phenol content on the plants stored at room temperature (winter season).

Plants selected	Day 1	Day 3	Day 6
Ocimum sanctumL.	21.16±1.80	5.29±1.02	5.29±1.10
Ocimum basilicum L.	15.87±1.65	10.58±1.34	5.29±1.03
Mentha viridisL.	21.16±2.55	15.87±1.32	10.58±1.26
Coriandrum sativumL.	10.58±1.86	5.29±1.09	5.29±1.09

*Values given are mean ± SD

Effect of storage period on Phenol content in the plants stored at room temperature.



Result and discussions:-

In the present investigation it was observed that as the storage period increases, the amount of phenol content decreases. This was observed when stored under refrigerator as well as in room temperature. Deepanjan Banerjee et al. (2013) have reported that antioxidant activity is mainly related to production of chemical agents that are used for the protection of plants. Phenolic compounds are well known for antioxidant activity. It has been reported that plants accumulate phenolic compounds under various stress conditions. Mangroves and some halophytic herbs are grown under such stressful condition that are characteristic to estuarine ecosystem. It has been found that phenolics are the major compounds present in the mangroves that are responsible for antioxidant activity. Qayoom Mir et al. (2009) have reported that changes in concentrations of total flavonoids and phenolics in "Catharanthus roseus L." and "Ocimum sanctum L." may serve as biomarkers of urban auto pollution as both the parameters showed a positive relationship with the vehicular pollution load across the different site.

In the present work, Phenol content is was found to be more in the plants stored at room temperature compared to the plants stored in refrigerator. Mirela Kopjar et al. (2009) reported that during storage the total phenol content decreased in Olive leaves, pine bark, red grape and red wine samples regardless of exposure to light or darkness at room temperature.

The amount of phenol in the plants collected in winter season was less compared to the plants collected in the rainy season. This is in accordance with the observation made by Kandasamy Selvam et al. (2013) who have reported that the plant samples which were collected from hill area possess more secondary metabolites than the dry and wet land.

Conclusion:-

The maximum amount of phenol content was found in rainy season as compared to winter season.

In all the plants studied storage period had an adverse effect on Phenol content.

As the storage period in refrigerator increased the Phenol Content decreased.

The phenol content in all the plants studied showed a greater decrease in plants stored in refrigerator compared to plants stored in room temperature.

The Phenol content is best preserved in room temperature. These aspects can be thus utilized while preparing herbal medicines.

Recommendation:-

It is recommended that when these plants are used for medicinal purposes they should not be stored for a longer period because as the storage period increases the Phenol content decreases.

In case of *Ocimum sanctum* L., *Ocimum basilicum* L., *Mentha viridis* L. and *Coriandrum sativum* L. storage in room temperature is recommended as it was observed that there was more decrease in phenol content when the plants were stored for varying periods of time in the refrigerator as compared to room temperature

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