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Estimation of free endogenous ascorbic acid in different plant parts of *Moringa Oleifera*

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Abstract
Moringa oleifera Lamk is the most widely cultivated species of a monogeneric family, the 'Moringaceae' which is native to the sub-Himalayan tracts of India, Pakistan, Bangladesh and Afghanistan. All parts of the *Moringa* tree are edible and have long been consumed by humans. *Moringa* has an impressive range of medicinal uses with high nutritional value. Plants of same age group were collected from three selected sites (60-70 Km range) of Bikaner region. Fresh plant parts (root, stem, leaves, flowers and fruits) were collected in summer as well as winter (flowering and fruiting takes place only in winter) were analyzed for production of endogenous ascorbic acid. Ascorbic acid production was compared quantitatively in all plant parts collected from three selected sites.

Keywords: Ascorbic acid, medicinal plants, *Moringa oleifera*, *M.oleifera*

1. Introduction
Plants have been an integral part of traditional medicine across the continents since time immemorial. Medicinal plants have their values in the substances present in various plant tissues with specific physiological action in human body. *Moringa oleifera* (family- Moringaceae) has been selected for present study of ascorbic acid estimation.
M.oleifera is considered as highly nutritious plant but along with nutritional values it has medicinal values also. Leaves are used in the treatment of fever, bronchitis, eye and ear infection, inflammation of mucous membrane, diarrhoea and gastric ulcer. Flower juice is useful in urinary infections. Roots and bark are used for cardiac and circulatory problems as tonic. Bark is appetizer and digestive.
Ascorbic acid (vitamin C) a primary plant product is claimed as a 'cure all' for many human diseases and problems from cancer to common cold. It is readily absorbed and excreted in urine and apparently concerned with formation of cortical hormones as well as cholesterol metabolism. Deficiency of ascorbic acid causes scurvy disease.

2. Material and Method
Fresh plant parts (root, stem, leaves, flowers and fruits) of *M.oleifera* were collected from local areas (Dungargarh, Nokha and Kolayat) of Bikaner in summer and winter seasons (flowering and fruiting takes place only in winter). Plant parts were separated, dried in shade and analyzed for estimation of endogenous ascorbic acid.

2.1 Extraction Procedure
Ascorbic acid was estimated by Chinoy (1962) method. Dried plant parts were weighed separately, crushed in a mortar in 2% Meta Phosphoric Acid (MPA) (100 mg tissue and seed sample in 1 ml of MPA) and allowed to macerate for one hour. These were then centrifuged separately at low speed (2500 r.p.m.) for fifteen minutes, the residues were discarded and the supernatants were used for the estimation of ascorbic acid following the procedure of Jensen (1962).
Each of the 1 ml test solutions were mixed with 2ml of 5% MPA and kept for 30 minutes without stirring at room temperature. 5ml of n-amyl alcohol and 3.2 ml of dye (5mg/100ml, 2, 4-dichlorophenol indophenol) were added and air bubbled through the lower layer. Each of the test tubes was stoppered tightly, the mixture was shaken vigorously and the upper layer was used for the estimation of ascorbic acid.
The Spectronic-20 colorimeter (Bausch and Lomb) was adjusted at wavelength of 546nm and set at 100% transmittance using a mixture of 1ml of the extract, 2 ml of 5% MPA, 5 ml n-amyl alcohol and 3.2 ml distilled water (bland solution) before taking test samples. Ascorbic acid content present in 1ml of extract was measured by using the regression formula:

$Y = 0.1103 – (0.14 \times O.D.)$

Where, Y = Concentration of ascorbic acid in mg, O.D. = Optical Density
Ascorbic acid content per 100 gm dry weight was calculated as follows:

$$\text{Free ascorbic acid} = \frac{(A \times V)}{W} \times 1000 \times 100$$

Where A=Y = mg ascorbic acid / ml of original extract
V = total volume of the original extract (in ml)
W = weight of the plant tissue sample (in mg) used for analysis

3. Results and Discussion
The quantitative estimation of endogenous ascorbic acid was observed in order of root < stem < leaves < flowers < fruits among plant parts of selected plant species. Maximum amount was observed in fruits amongst all analysed plant parts with comparatively highest amount in ***M.oleifera*** fresh pods (77.67 mg/100g.d.w.). The highest percentage of

ascorbic acid in fruits (77.67mg/100g.d.w.) can be related to the reservoir nature of fruits, while ascorbic acid content of leaves (58.53 mg/100g.d.w.) may be the result of their metabolic activity.

As the flowering and fruiting of *M. oleifera* occurs only in winters, the amount could not be estimated and compared with summer season. But the vegetative parts (roots, stem and leaves) were compared for ascorbic acid content and it was observed that amount of ascorbic acid is nearly same in all parts in summer as well as in winter season with negligible variation. Amount of ascorbic acid in *M. oleifera* plant parts, collected from three different sites, was compared and it was found that amount was nearly same in each plant part of all three sites of Bikaner region (Dungargarh, Nokha and Kolayat). Amount of ascorbic acid is sufficiently high in all parts of *M. oleifera.*

4. Conclusion

The amount of ascorbic acid in *M. oleifera* is maximum in fruits, but even then it is sufficient and high amount present in flowers, root, stem and leaves. As the ascorbic acid content is nearly similar in plant parts of *M. oleifera* collected from different sites, it shows that there is not much variation in climatic conditions of three selected regions.

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6. References

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