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# Seasonal Evaluation of Ascorbic Acid Content in Arid Zone Plants

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**ABSTRACT:** Plant parts stem, leaves and fruits of *Zizyphus mauritiana* and shoot and fruits of *Capparis decidua* were analyzed during summer and winter seasons separately. Ascorbic acid production was compared **quantitatively** in all plant parts. The amount of ascorbic acid was more during summer season than winter and less with respect of period in all the parts in both the plant species. Maximum amount was estimated in fruits of *Z.mauritiana* in summer and minimum in fruits of *C.decidua*.

**KEY WORDS:** Ascorbic acid, *Zizyphus mauritiana*, *Capparis decidua*.

### I.INTRODUCTION

The Indian arid zone covers an area of about 12 percent of country's geographical area and occupies over 320,000 sq. km. of hot desert located in parts of Rajasthan (62%), Gujrat (19%), Punjab and Haryana (9%), Andhra Pradesh and Karnataka (10%). Rajasthan covers most part of "Great Indian Desert" known as "Thar desert". Climatic conditions of desert are characterized by extremes of temperature, high solar radiations, high wind velocity, low relative humidity and scanty rainfall. The wind velocity is very high (110km/hr.)<sup>1</sup> which causes powerful winds and dust storms during summer season. There are only few plant species which can survive and withstand these environmental conditions of arid zone part of Rajasthan. The vegetation is sparse, plants with only xerophytic adaptations are able to establish themselves in these adverse conditions of desert<sup>2</sup>. Xerophytic vegetation includes stunted, thorny or prickly shrubs and perennial herbs like *Leptadenia pyrotehnica*, *Calligonum polygonoides*, *Cyperus arenarius*, *Aerva tersica*, *Crotalaria burhia* that are capable of resisting the drought.<sup>3</sup> Most of the trees and shrubs include *Salvadora oleoides*, *Prosopis cineraria*, *Capparis decidua*, *Maytenus emarginatus*, *Acacia nilotica*, *Tecomella undulata* and spp. Of *Zizyphus*. Besides climatic conditions foliage and natural endemic vegetation forms the chief source of fuel and fodder. Fodder trees like *Prosopis cineraria*, *Prosopis juliflora*, *Salvadora persica*, *Acacia arabica*, *Acacia tortilis* and *Dalbergia sisso* are Good sources of nutritionally and phytochemically important metabolites.<sup>4</sup>

**Ascorbic acid** also called antiscorbutic vitamin is an important primary plant product in plant metabolism. Ascorbic acid (**vitamin C**) is claimed as "cure all" for many human diseases and problems from cancer to common cold. It is well known for its property as an electron donor in photosynthetic photophosphorylation. It is important regulators of oxidation and plays significant role in germination, growth metabolism and flowering of plants.<sup>5</sup> It stimulates amylase, protease, RNA activity and RNA content in various crops and concerned with formation of cortical hormones as well as cholesterol metabolism. Ascorbic acid has been reported from various parts in different plant species.<sup>6</sup> All actively growing and differentiating organs show higher concentration of ascorbic acid and it is constantly utilized enzymatically. By taking into consideration all these characters of "Thar desert", scarcity of forage and importance of ascorbic acid, present study seasonal evaluation of free – endogenous ascorbic acid was undertaken.<sup>7</sup>

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### II.MATERIAL AND METHOD

Fresh and healthy plant parts ( stem, leaves and fruits) of *Zizyphus mauritiana* and *Capparis decidua* were collected from local areas of **Bikaner** in summer and winter seasons. Each plant part of both the plant species was cut into small pieces, dried, powdered separately and then used for estimation of endogenous ascorbic acid<sup>8</sup>.

#### EXTRACTION PROCEDURE

The quantitative estimation of ascorbic acid was carried out colorimetrically following the method of **Chinoy**(1962). The exactly weighed plant material was crushed in ice cold carbon dioxide (CO<sub>2</sub>) saturated water and the extract was made to definite volume. 3 ml of extract was mixed with an equal volume of buffered metaphosphoric acid at PH 3.6. A 2ml aliquot of this solution was mixed with 5 ml of distilled water and the turbidity produced was adjusted to zero with a spectronic – 20 colorimeter. Another 2ml aliquot was then mixed with 5ml of 2,6 di-chlorophenolindophenol prepared by dissolving 5mg in 100 ml of distilled water at 80° C and the optical density was measured.<sup>9</sup> The amount of ascorbic acid present in 1ml of the original extract was obtained by using the regression formula:

$$Y = 0.1103 - 0.14 X O.D.$$

Where, Y = Concentration of ascorbic acid in mg

O.D.= Optical density

From the content of 1 ml of the extract the ascorbic acid content per 100 gm. Dry weight was calculated.<sup>10</sup>

$$\text{Free Ascorbic Acid} = (A \times V) / W \times 1000 \times 100$$

Where, A = mg AA / 1 ml of original extract

V = total volume of original extract

W = weight of plant sample used for analysis

Five such replicates were examined and mean values were taken.

#### TABLE 1.1

Ascorbic acid content of *Capparis decidua* and *Zizyphus mauritiana*

Mean value expressed in mg/100 gms dry matter basis

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(Five samples of each plant part)

Season	<i>C. decidua</i>		<i>Z. mauritiana</i>		
	Shoot	Fruits	Stem	Leaves	Fruits
Summer	124	93	100	123	132
Winter	120	90	96	117	128

### III.RESULTS AND DICUSSION

Ascorbic acid was estimated from shoots and fruits of *C. decidua* as well as stem, leaves and fruits of *Z. mauritiana* ( Table 1.1 ). Both the plant species showed maximum amount of ascorbic acid in all parts during summer season than winters. Quantitative estimation of endogenous ascorbic acid content observed in order of stem  $\leq$  leaves  $\leq$  fruits in *Z.mauritiana* while in *C.decidua* order as fruits  $\leq$  shoot. On comparing the ascorbic acid content of two species, maximum amount was found in fruits of *Z. mauritiana* (132mg/100g.d.w.) during summer and minimum (90mg/100g.d.w.) in *C. decidua* fruits during winters as well as less with respect of period.<sup>11</sup>

Production of free endogenous ascorbic acid and seasonal variation in its contents have been reported from leaves of *Lycium chinense*.They have reported higher concentration of ascorbic acid in the month of May and November. Similar results have been reported in other species also by various workers. Goyal and Amardeep (1977) in *Lasiurus indicus*, *Abutilon pannosum*, *Ocimum americanum* and *Gossypium cultivars*, Singh observed changes in ascorbic acid level in fruits of *Artocarpus integrifolia* during maturation stages of its formation. Nag *et al.* have reported endogenous ascorbic acid from Zygophyllaceous plants and reported higher concentration in fruits of *Seetzenia orientalis* (130mg/100g.d.w.) and *Zygophyllum simplex* (110mg/100g.d.w.) while minimum in roots of *Tribulus terrestris*(40mg/100g.d.w.)<sup>11</sup>

### REFERENCES

1. Aberg, B. Ascorbic acid (Formation, storage and transformation of carbohydrates) . In Encyclopedia of plant physiology , (Ed, W. Ruhland), Springerlag, Berlin. 1958; 6, 479-499.
2. Chinoy, JJ. Role of ascorbic acid in crop production. Poona Agri Coll Mag. 1967, 1-6.
3. Chinoy jj. Formation and utilization of ascorbic acid in the shoot apex of wheat as factor of growth and development Ind. J. Plant Physiol. 1962;5:172-201.
4. Chandra SS, Arora SK. An estimation of protein, ascorbic acid and mineral matter content in some indigenous and exotic varieties of gram (*Cicer arietinum* L.) Curr Sci. 1968; 37:237-238.
5. Mapson, L. W. The ascorbic acid system in leaves. Further observation on photo-oxidation and photo-reduction. Photochem. 1964; 3:429-445.
6. Isherwood, F. A. ,Mapson, L. W. Ascorbic acid metabolism in plants. Part 2. Biosynthesis. Ann. Rev. Plant Physiol. 1962; 13: 329-350.
7. Mapson, L. W. The ascorbic acid system in leaves. Further observation on photo-oxidation and photo-reduction. Photochem. 1964; 3:429-445.

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8. Mizobunchi, K., Taniguchi, H., Kita, T. Chemical composition of Boxthron VI. Seasonal variation of vitamin C and rutin content in the leaves of Japanese *Lycium chinense*. Tokushine Doijakin Yakugapu Kenkyu, Nepno, 1969; 18:27-30.
9. Nag, T. N., Harsh, M. L. *Citrus colocynthis* and *Corchorus depressus*. A new source of ascorbic acid. Bangladesh, J. Bot. , 1983;12. (1): 93-95.
10. Singh V., Nag T.N. Production of ascorbic acid from *Solanum nigrum* tissue cultures. Ind. J. Bot. 1991;2:42-44.
11. Singh , P. L. Changes in level of ascorbic acid during fruit maturation of *Artocarpus integrifolia* L. 1985; 72<sup>nd</sup> Indian Sci. Cong. Abstr. 1985; 177.