

## Seasonal Variation of Proteins and Amino Acids Content in Various Parts of *Aegle Marmelos* (L.) Corr

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### Research Article

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### Abstract

Bael or *Aegle marmelos* is a spiritual, religious and medicinal plant, native of India and Bangladesh and spread throughout South East Asia. Bel has many benefits and uses such as to cure tuberculosis, hepatitis, dysentery, constipation, peptic ulcer, piles, cancer, blood purifier, skin rash, breast milk, useful in worm infestation and stomach related problems. The seasonal variation proteins and amino acids of leaves, wood, barks and roots of *Aegle marmelos* (L.) Corr. The comparative account of proteins contents of *Aegle marmelos* showed higher level in bark (range 5.647 to 6.194 mg/g dry wt.) than wood (range 3.196 to 4.435 mg/g dry wt.), leaves (range 4.264 to 5.964 mg/g dry wt.) and roots (3.288 to 7.950 mg/g dry wt.). Comparative account of amino acids contents of *Aegle marmelos* showed higher level in leaves (range 0.423 to 0.613 mg/g dry wt.) than wood (range 0.259 to 0.404 mg/g dry wt.), bark (range 0.388 to 0.506 mg/g dry wt.) and roots (0.257 to 0.330 mg/g dry wt.).

**Keywords:** Proteins; Amino Acids; *Aegle Marmelos*

Bael has great religious significance. In Hindu tradition, the leaves and the fruit of the plant are offered to god during prayer, especially god Shiva. Its leaves are also used to worship Parvati and Viva Rupra. The fruit is used in religious ceremonies and rituals and its mentioned is also seen in Vedas and Mahabharata. Plants are an important part of our everyday diet, their constituents and nutritional value has been intensively studied for decades. *Aegle marmelos* (L.) Corr. is slow growing, medium sized tree, 25 to 30 feet tall. The stem is short, thick, soft, flaking bark and spreading, sometimes spiny branches, the lower ones dropping. There are sharp, axial one inch long spikes on this tree. The leaflets are

oval or lancet shaped, 4-10 cm long, 2-5 cm wide. Leaves composed of 3-5 leaflets in it. The lateral leaflets are without petiole and the terminal one has a long one. The petiole is 1 to 2.5 inch long. Mature leaves emit a peculiar fragrance when bruised. Flowering occurs in April and May.

Pushpendra, et al. [1] evaluated the medicinal uses and pharmacological activity of the plant *Aegle marmelos* (L.) Corr. in India. The *Aegle marmelos* (L.) Corr. is beneficial in different health problems like cancer, heart related diseases, diabetes, increase in cholesterol level, constipation, respiratory infection, diarrhoea and

dysentery. Warriar, et al. [2] evaluated the in vitro propagation of *Aegle marmelos* (L.) Corr. The aim of study was to improve axillary branching by using nodal sector of plant. Remya, et al. [3] investigated antifertility effect of leaves of *Aegle marmelos*. Dhankar, et al. [4] reported the biological and phytochemical evaluation in the literature for the importance of *Aegle marmelos*. They reported it has used in ethanomedicine as a antidiabetic, antiulcer, antioxidant, antimalarial, anti-inflammatory, anticancer, radioprotective, antihyperlipidaemic, antifungal, antibacterial and antiviral activities. *Aegle marmelos* plant was used in the treatment of wide range of diseases in all Ayurved, Siddha and folk medicines Ariharan, et al. [5].

## Materials and Methods

1) The protein was quantitatively estimated by the Lowry, et al. [6] method.

Chemicals: 0.1% N NaOH - (4gm in 1000ml), 2% Na<sub>2</sub>CO<sub>3</sub> - (2gm in 100ml distilled water), 0.5% CuSO<sub>4</sub> - (0.5gm in 100ml distilled water), 1 % Na-K-tartrate and 5 % Trichloro acetic acid/per chloric acid.

Reagents: Lowry A-2% Na<sub>2</sub>CO<sub>3</sub> in 0.1% N NaOH, Lowry B-5% CuSO<sub>4</sub> in 1% Na-K-tartrate and Lowry C-98ml A and 2 ml B, Lowry D - Folin phenol reagent.

Procedure: 1gm of plant material was homogenized with 10ml, 80% ethanol. The extract was centrifuged at 5000 rpm for 5 min. and the supernatant was discarded. 5%, 10 ml Trichloro acetic acid (TCA) or Per chloric acid (PCA) was added to residue and incubated at 80°C for 20 minutes. The pellet was centrifuged and the supernatant was discarded. Residue was washed with 10 ml distilled water and again recentrifuged. The supernatant was discarded. 2%, 10ml Na<sub>2</sub>CO<sub>3</sub> in 0.1 N NaOH was added to the residue and incubated for an hour at 30°C and again centrifuged and residue was discarded. The final volume of supernatant was measured and it was used as a sample for protein. 1ml of aliquot of sample was taken and 5ml reagent C was added to it mixed it thoroughly. The sample was incubated for 10 minutes and 1ml of reagent D was added to it. The colour intensity was read at 660 nm. Using Spectrophotometer. The protein concentration of an unknown sample was calculated by using standard graph.

2) The estimation of total amino acid was carried out by Krishnamurthy, et al. [7] method.

Reagents: Alcoholic ninhydrin. (100 ml alcohol + 400 mg ninhydrin) and Glycine (Std.) (10mg glycine + 100ml distilled water)

Procedure: 500 mg plant material was ground in mortar and pestle with few drops of cold 80% ethanol. Then 2.5ml of distilled water and 10ml of boiling 80% ethanol were added to it. The extract was centrifuged for 15 minutes at 10,000rpm. Residue was discarded the supernatant was collected and total volume was made 15ml with distilled water. Test tube was kept at 60°C for 20 minutes. The test tube was cooled and 1ml 50% ethanol was added. Read at 420 nm in spectrometer. Glycine was used as stand rand.

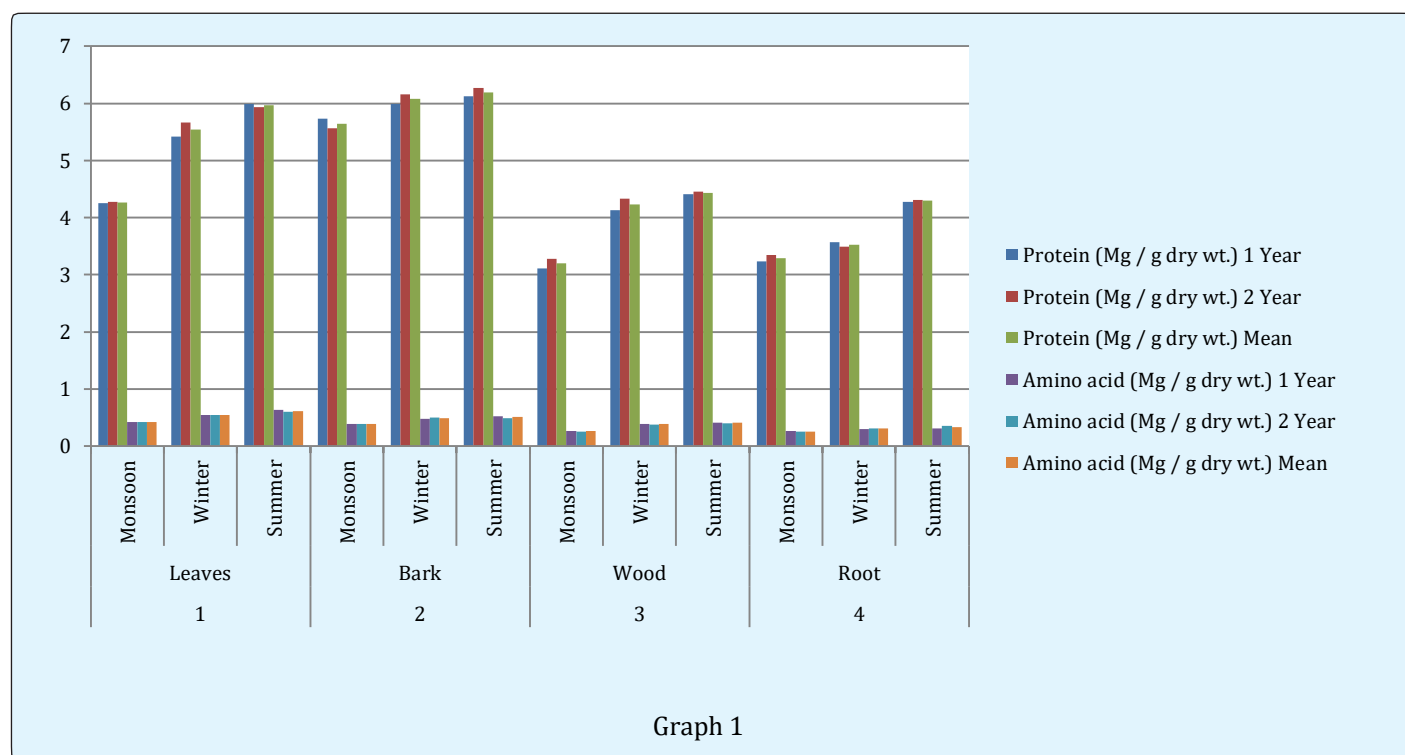
## Results and Discussion

The protein content of leaves was higher (5.964 mg/g dry wt.) in summer over than winter (5.546 mg/g dry wt.) and monsoon (4.264 mg/g dry wt.). The range of protein content of bark was noted from (5.647 mg/g dry wt. to 6.194 mg/g dry wt.). The ranges of protein content in wood were from (3.196 mg/g dry wt. to 4.435 mg/g dry wt.) and show higher in summer. The protein content of root was higher (4.295 mg/g dry wt.) in summer over than winter (3.529 mg/g dry wt.) and monsoon (3.288 mg/g dry wt.). The protein content of seeds was higher (26.648 mg/g dry wt.) as compared to leaves, stem and roots of all seasons. The protein content showed increasing order of root < wood < leaves < bark (Table 1 & Graph 1).

The amino acids content of leaves was 0.613 mg/g dry wt. in summer, 0.542 mg/g dry wt. in winter and 0.423 mg/g dry wt. in monsoon. Higher being observed during summer i.e. 0.613 mg/g dry wt. The range of amino acids content in bark 0.388 mg/g dry wt. to 0.506 mg/g dry wt. Maximum concentration of amino acids was noted during summer 0.506 mg/g dry wt. The range of amino acid content of wood from 0.259 mg/g dry wt. to 0.404 mg/g dry wt. The amino acids content of root was lower (0.257 mg/g dry wt. to 0.330 mg/g dry wt.) as compared to leaves, stem and wood of all seasons. Generally, the concentration of amino acids were found to be in increasing order of root < wood < bark < leaves (Table 1 & Graph 1).

Sr. No	Plant part	Season	Protein (Mg / g dry wt.)			Amino acid (Mg / g dry wt.)		
			1 Year	2 Year	Mean	1 Year	2 Year	Mean
1	Leaves	Monsoon	4.258	4.270	4.264	0.420	0.425	0.423
		Winter	5.423	5.668	5.545	0.544	0.539	0.542
		Summer	5.995	5.932	5.964	0.628	0.598	0.613
2	Bark	Monsoon	5.728	5.565	5.647	0.390	0.386	0.388
		Winter	5.995	6.158	6.077	0.480	0.496	0.488
		Summer	6.120	6.268	6.194	0.520	0.492	0.506
3	Wood	Monsoon	3.112	3.280	3.196	0.262	0.256	0.259
		Winter	4.128	4.330	4.229	0.386	0.380	0.383
		Summer	4.412	4.458	4.435	0.410	0.398	0.404
4	Root	Monsoon	3.228	3.348	3.288	0.264	0.250	0.257
		Winter	3.570	3.487	3.529	0.298	0.312	0.305
		Summer	4.278	4.312	4.295	0.310	0.350	0.330

**Table 1:** Seasonal variation of proteins and amino acid content of different plant parts of *Aegle marmelos*.



Graph 1

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