

 <p>ISSN NO. 2320-5407</p>	<p>Journal Homepage: -<a href="http://www.journalijar.com">www.journalijar.com</a></p> <p><b>INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)</b></p> <p>Article DOI:10.21474/IJAR01/7917 DOI URL: <a href="http://dx.doi.org/10.21474/IJAR01/7917">http://dx.doi.org/10.21474/IJAR01/7917</a></p>	 <p>INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR) ISSN 2320-5407</p> <p>Journal Homepage: <a href="http://www.journalijar.com">http://www.journalijar.com</a> Journal DOI:10.21474/IJAR01</p>
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### RESEARCH ARTICLE

#### “NUTRITIONAL PROFILE OF SELECTED LEAFY VEGETABLES”.

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#### Manuscript Info

##### Manuscript History

Received: 13 August 2018

Final Accepted: 15 September 2018

Published: October 2018

##### Keywords:

Leafy vegetables, Nutritional factors, Carbohydrate, Protein, Vitamins.

#### Abstract

Leaf vegetables are also called leafy greens, vegetable green or simply greens are plant leaves eaten as vegetables, although they come from a very wide variety of plants. Leaf vegetables contain many typical plant nutrients, low in calories and fat, and high in protein dietary fiber, vitamin c and vitamin k. In this study, an attempt was made to estimate nutritional factors in selected leafy vegetables- *Allium chinense*, *Amaranthuscruentus*, *Amaranthusviridis*, *Apiumgraveolens*, *Brassica oleracea*, *Colocasiaesculenta*, *Coriandrumsativum*, *Lactuca sativa*, *Moringaoleifera* and *Murrayakoenigii*. Among the ten selected leafy vegetables, the highest amount of carbohydrate was found in *Brassica oleracea*(2.97mg/g) and lowest amount of carbohydrate was found in *Allium chinense*(2.54mg/g). Among the selected leafy vegetables, the highest amount of protein was found in *Moringaoleifera*(38.93mg/g) and lowest amount of protein was found in *Lactuca sativa* (38.93 mg/g).It was determined that among the selected leafy vegetables *Amaranthuscruentus* showed the highest value (0.063mg/g) for ascorbic acid and *Colocasiaesculenta*(0.012 mg/g) showed the least value. It was found that *Brassica oleracea*had the highest amount of amino acid content (0.74mg/g) and *Lactuca sativa* had the least amount of amino acid (0.12 mg/g). It was determined that the highest amount of fat was found in *Colocasiaesculenta*(0.070mg/g) andthe least in *Brassica oleracea*(0.023mg/g). From this preliminary study, it was clear that leafy vegetables are rich sources of many nutrients and form a major category of vegetable groups that have been designated as 'nature's anti-aging wonders'.

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#### Introduction:-

Leafy vegetables are a variable group of plants that can be defined as vegetables grown for their edible leaves. Leafy vegetables are adapted to the tropics, while other plants are adapted to the temperate climates. Leafy vegetables such as, lettuce and spinach are most tolerant of shade; in fact, in locations of hot and bright sun, they may need some shade for protection. These vegetables thrive in areas where the mean temperatures range between 15 and 18°C. They are intolerant to temperatures between 21 and 24°C, and tolerate weak frosts, (Fukuda *et al.*, 1994). Loose, fertile, moist, sandy loam soils are best for growing leafy vegetables. Many of leafy vegetables have shallow root systems and cultivation should be done carefully. All leafy vegetables, except lettuce, grow best in soils with a pH of 6, 0 to 6, and 8. Lettuce grows best at a pH of 6, 5 to7, 0, (Parker, B.L *et al.*, 1995).Nutrients are the substance

used by organisms to survive. The nutrients can be incorporated with the cells for metabolic purposes by cells to create non cellular structures.

### Material and methods:-

The following ten leafy materials are used for this preliminary investigation.

1. *Allium chinense*
2. *Amaranthuscruentus*
3. *Amaranthusviridis*
4. *Apiumgraveolens*
5. *Brassica oleracea*
6. *Colocasiaesculenta*
7. *Coriandrumsativum*
8. *Lactuca sativa*
9. *Moringaoleifera*
10. *Murrayakoenigii*

### Collection and preparation of sample

The fresh samples of the leafy vegetables were collected from world market of chakkai, Trivandrum district (Kerala state). Fresh vegetables were washed under running tap water, hand-peeled, cored, and deseeded and the pulp was macerated.

### Biochemical analysis

The following nutrients were quantitatively estimated using standards procedure.

1. Carbohydrate- the carbohydrate content was estimated using the method of Hedge *et al.*, (1962).
2. Protein- The protein content was estimated using the method of Lowry *et al.*, (1951)
3. Ascorbic acid -The Ascorbic acid content was estimated using method of Harris *et al.*, (1933)
4. Amino Acids- The Amino acid content was estimated using the method of Moore and Stein (1948)
5. Fat- The fat content was estimated in the study materials (John *et al.*, 1973)

### Results and Discussion:-

An attempt was made to quantitatively estimate some selected nutrients in ten leafy vegetables and the results are given in the form of figures (Fig 1-5).

#### Estimation of carbohydrates

The total carbohydrate content of selected leafy vegetables was given in the table 1. Among them, the highest carbohydrate content was found in *Brassica oleracea* (2.97 mg/g) and lowest amount of carbohydrate was found to be in *Allium chinense* (2.54mg/g). The remaining results in the rest of leafy vegetables are *Amaranthuscruentus* is 2.96(mg/g), *Amaranthusviridis* 2.95(mg/g), *Apiumgraveolensis* 2.96(mg/g), *Colocasiaesculenta* is 2.90(mg/g), *Coriandrumsativum* is 2.80(mg/g), *Lactuca sativa* is 2.94(mg/g), *Moringaoleifera* is 2.76(mg/g), and *Murrayakoenigii* is 2.86(mg/g). Carbohydrate content in *Amaranthuscruentus* is same as that in the carbohydrate content in *Apiumgraveolens*, followed by *Lactuca sativa* and then *Colocasiaesculenta*.

As per the earlier observations, the carbohydrate content of *Brassica oleraceae* had determined as  $6.00 \pm 0.56$  gm/gdw, (Deepalatha Sharma *et al.*, 2013). Earlier researchers suggested that *Brassica oleraceae* has been used in ancient times both as food and as medicine. It is helpful for the management and treatment of several diseases, (Ogbede *et al.*, 2015). In the earlier investigation the carbohydrate content in *Brassica oleraceae* was found to be  $4.52 \pm 0.22\%$ , (Ogbede *et al.*, 2015).

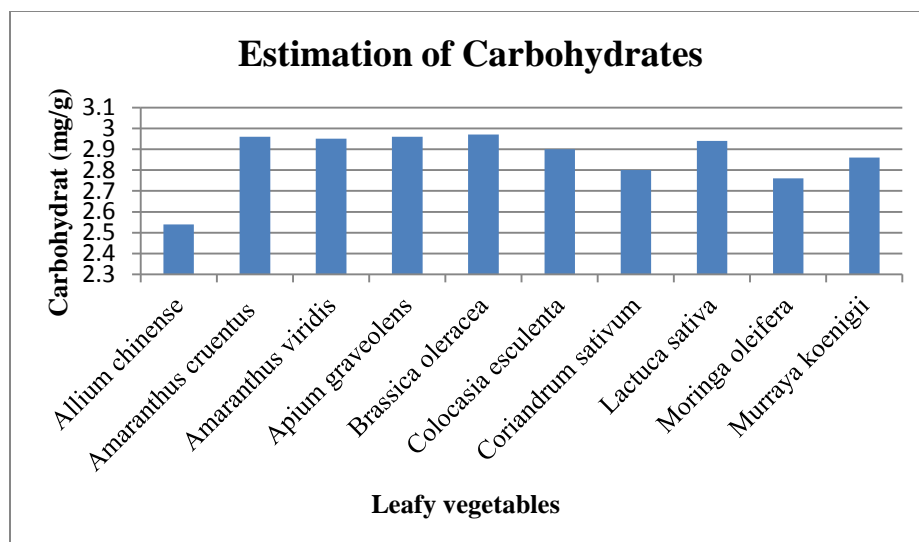


Fig 1:-Estimation of carbohydrate

### Estimation of Protein

The protein content of leafy vegetables was given in the table 2. Among the selected leafy vegetables, it was found that *Moringaoleifera* had the highest value (38.93 mg/g) for the protein content and, *Lactuca sativa* showed the least value (15.99mg/g). The remain results are *Allium chinense* 18.39 (mg/g), in *Amaranthuscruentus* is 21.06(mg/g), *Amaranthusviridis* 20.26(mg/g), *Apiumgraveolens* is 22.66(mg/g), *Brassica oleracea* is 26.66(mg/g), *Colocasiaesculenta* is 18.39(mg/g), *Coriandrum sativum* is 25.59(mg/g), *Lactuca sativa* is 15.99(mg/g), *Moringaoleifera* is 38.39(mg/g), and *Murrayakoenigii* is 17.86(mg/g).

As per the earlier observations the protein content of *Moringaoleifera* had determined as 8.1g/100g, (Rasha Khalid abbas *et al.*, 2018). In earlier research, Rasha Khalid *et al.*, (2018) suggested that *Moringaoleifera* plant is used in the semiarid, tropical, and subtropical areas as food and medicinal compounds. Both dried and fresh leaves appear to contain a substantial amount of the magnesium, iron, foliate, and vitamins B-6, A, C, and E young children need. In the earlier investigation the protein content of *Moringa oleifera* was found to be 24gm/100gm (Booth *et al.*, 1988). As per earlier observation variable protein contents ranging between 16, 22.42 and 23.27, (Gidamis *et al.*, 2003; Sarwatt *et al.*, 2004; Noula *et al.*, 2006). This level of crude protein content is of particular nutritional significance as it may meet animal's protein and energy requirements and boost the immune system against diseases. *Moringa* leaf is reported to have high protein content which can easily digested and also can influenced by the quality of its amino acids (Foidlet *et al.*, 2001).

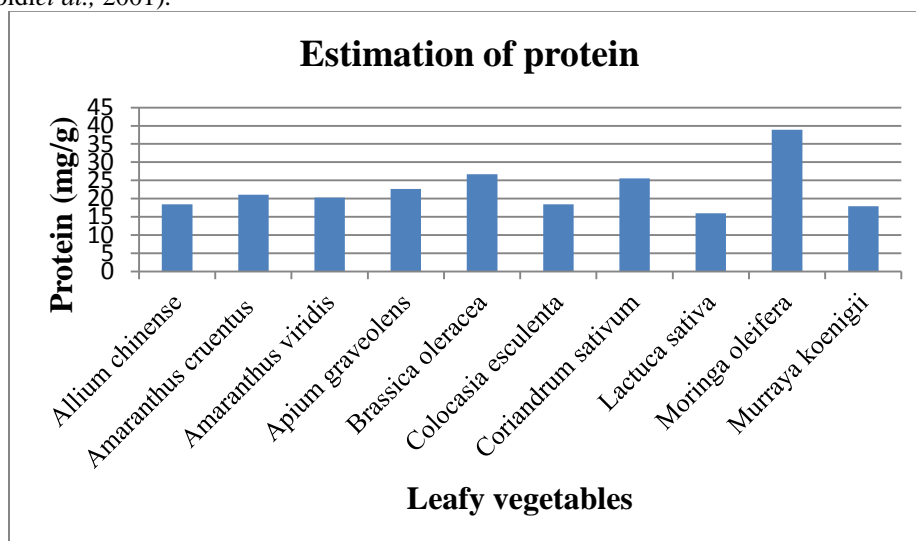


Fig 2: Estimation of Protein

### Estimation of Ascorbic acid

The Ascorbic acid content of leafy vegetables was given in the table 3. Among the selected leafy vegetables, it was found that *Amaranthuscruentus* had the highest value for Ascorbic acid content (0.063 mg) and, *Colocasiaesculenta* showed the least value (0.012mg). The remaining results are *Allium chinenseis* 0.036(mg/g) , in *Amaranthuscruentus* is 0.063(mg/g), *Amaranthusviridis* 0.014(mg/g), *Apiumgraveolens* is 0.060(mg/g) , *Brassica oleracea* is 0.024(mg/g), *Colocasiaesculenta* is 0.012 (mg/g), *Coriandrumsativumis* 0.023(mg/g), *Lactuca sativa* is 0.036 (mg/g), *Moringaoleifera* is 0.022 (mg/g), and *Murrayakoenigii* is 0.060(mg/g).

As per the earlier observations the Ascorbic acid content of *Colocasiaesculenta* had determined as 52mg, (Huang *et al.*, 2007). They are good for managing and fighting cancer. *Colocasiaesculenta* is one of the six most important root and tubers crops worldwide, (Jennings *et al.*, 1987) Corms of cocoyam are known to supply easily digestible starch, substantial amount of protein, thiamine, vitamin C, riboflavin, niacin, as well as significant amounts of dietary fiber. Leaves of taro are eaten as vegetable by human, having b carotene, iron, protein, vitamins and folic acid which protects against anemia.

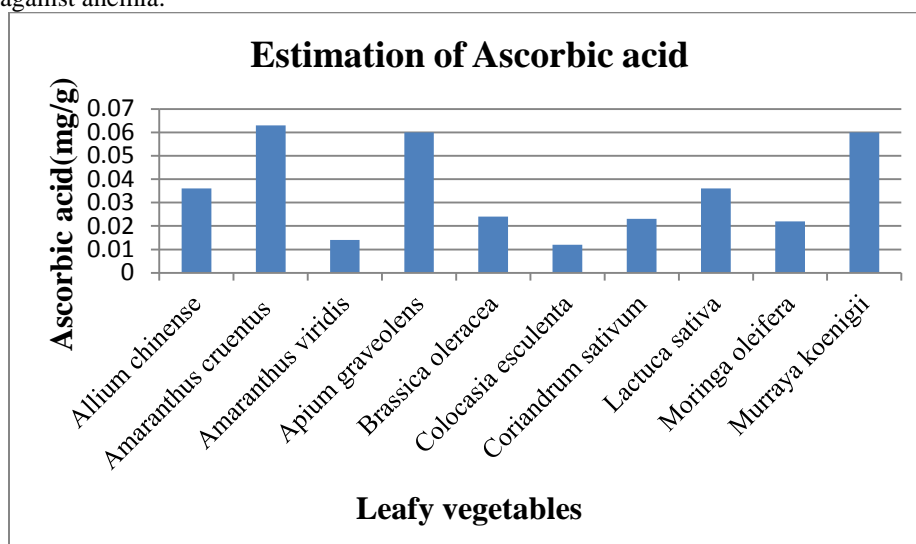


Fig 3: Estimation of ascorbic acid

### Estimation of Amino Acids

The Amino acid content of leafy vegetables was given in the table 4. Among the selected leafy vegetables, it was found that, *Brassica oleracea* has the highest value for amino acids content (0.74mg) and *Lactucasativa* showed the lowest value (0.12mg). The total amino acids content in *Allium chinenseis* 2.54 (mg /g), in *Amaranthuscruentus* is 2.96(mg /g), *Amaranthusviridis* 2.95(mg /g), *Apiumgraveolens* is 2.96(mg /g), *Brassica oleracea* is 2.97(mg /g), *Colocasiaesculenta* is 2.90(mg /g), *Coriandrumsativumis* 2.80(mg /g), *Lactuca sativa* is 2.94(mg /g), *Moringaoleifera* is 2.76(mg /g), and *Murrayakoenigii* is 2.86(mg /g).

According to the earlier researchers, *Brassica oleracea* possess significant amount of Amino acids, vitamins, minerals and dietary fibre, with low fat and calorie contents, revealing it as a vegetable of promising nutritional value. It has the ability to accumulate high concentrations of metals in its edible leaf and it exploited in pharmaceutical industries to make capsules or tablets. It can also be exploited in industries for the removal of toxic and heavy metals found in high concentration in contaminated soils, (Ogbede *et al.* , 2015) .As per the earlier observations Cruciferous vegetables (*Brassicaceae* or *Cruciferae* family) which include, cabbage, broccoli, cauliflower etc. provide the rich sources of glucose in the human diet. They have reasons for that because based on one of the largest and most detailed reviews of diet and cancer, the World Cancer Research Fund in USA concluded that a diet rich in crucifers' family is helps to protect humans against colon, rectum, and thyroid cancers.

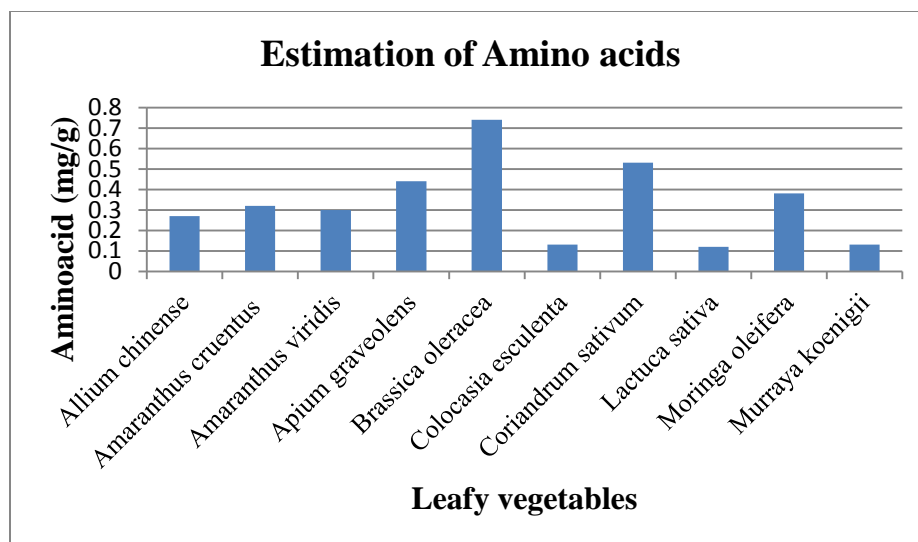


Fig 4:-Estimation of amino acids

### Estimation of Fat

The fat content of leafy vegetables was given in the table 5. Among the selected leafy vegetables *Colocasia esculenta* has the highest value for fat content (0.070mg) and *Brassica oleracea* has the lowest amount (0.023mg). The total fat content in *Allium chinense* is 0.032 (mg/g), in *Amaranthus cruentus* is 0.053(mg/g), *Amaranthus viridis* is 0.049(mg/g), *Apium graveolens* is 0.062(mg/g), *Brassica oleracea* is 0.023(mg/g), *Colocasia esculenta* is 0.070(mg/g), *Coriandrum sativum* is 0.058(mg/g), *Lactuca sativa* is 0.036(mg/g), *Moringa oleifera* is 0.043(mg/g), and *Murraya koenigii* is 0.046(mg/g).

As per the earlier observations fat content in *Colocasia esculenta* had determined as 0.7g/100g, (Huang *et al.*, 2007) and in *Brassica oleracea* had 0.1g/100g, (Deepalata Sharma *et al.*, 2013). According to Ogbede *et al.*, (2015) the low amount of fat indicates that the vegetable is not a good source of lipid accumulation which can cause atherosclerosis and aging. According to the earlier researchers the nutritional composition of taro corm like other root crops is low in protein and low in fat, but high in the carbohydrate. It is a good source of potassium and provides moderate level of Phosphorus. It is low in vitamin C and deficient in the vitamins A. Taro leaf is a good source of minerals and vitamins and a small granule size of its starch helps increase the bioavailability of its nutrients due to efficiency of digestion and absorption.

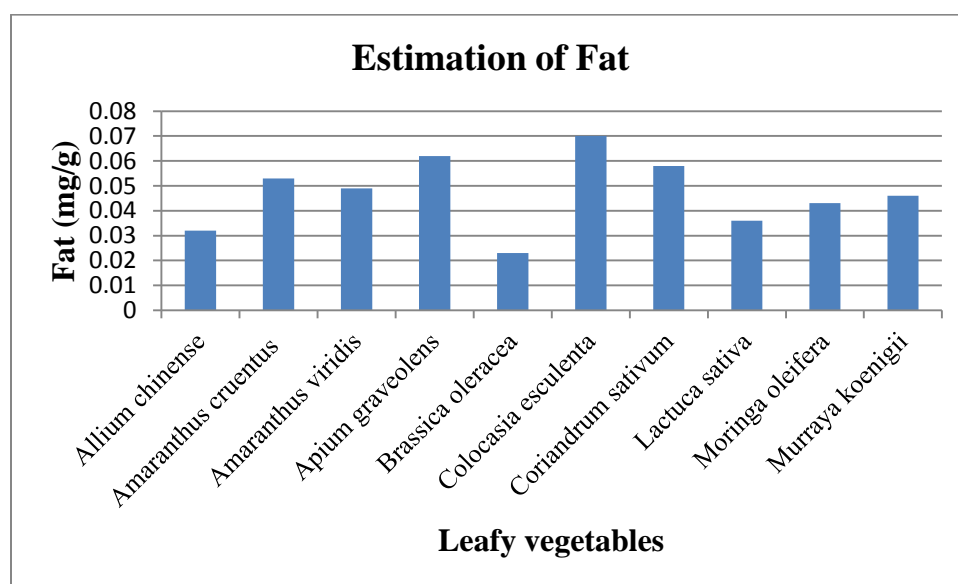


Fig 5:-Estimation of fat

## Conclusion:-

The results suggest that the leafy vegetables if consumed in sufficient amount would contribute greatly towards meeting the nutritional requirement for normal growth and also could provide adequate protection against diseases arising from malnutrition. Leafy vegetables are rich sources of many nutrients and form a major category of vegetable groups that have been designated as 'nature's anti-aging wonders'.

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