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ANALYSIS OF SOME NUTRITIONAL AND QUALITY ATTRIBUTES OF SHADE DRIED LEAVES OF SOME WILD AND CULTIVATED PLANT SPECIES

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ABSTRACT:
The present study aimed to evaluate different nutritional and chemical compositions in shade-dried leaves samples of various plant species. No doubt fresh green leaves contain a high amount of nutritional and quality attributes. However, these fresh leafy materials are also highly perishable and after post-harvest, most of them are subject to goes waste. There are different methods of preservation among them; the shade drying method is most suitable as it retains all the nutrients and other mineral composition intact as suggested by various workers. Therefore in the present investigation shade dried leaves samples from seven different plant species which are underutilised viz. Berseem (*Trifolium alexandrium* L.), *Alysicarpus vaginalis* L. var. stocksii., *Alternanthera paronychioides* St. Hil., Cabbage (*Brassica oleracea* L. var. capitata), Radish (*Raphanus sativus* L.), Adulsa (*Adhatoda vasica* Nees.), and Bauchi (*Psoralia corylifolia* L.) were prepared and was assessed for various chemical composition viz. total carbohydrate, total chlorophyll, crude fat, crude fibre, total ash and acid insoluble ash. The results shows the prepared samples have 5.80% - 24.03% of total carbohydrate, 14.89 - 503.69mg/100g of total chlorophyll content, crude fat content ranges from 7.0% - 22.93%, crude fiber content ranged between 4.60% - 33.50% , total ash content was found to be 9.40% - 23.75% and acid insoluble ash content ranges from 0.43% - 4.87%.
Keywords: - Carbohydrate, Chlorophyll, Crude fat, Crude fibre, Shade drying etc.

INTRODUCTION :

Green leaves are the chief source of micronutrients, but in the past, it was considered that the utilisation of green leafy vegetables was allocated to the sign of poverty. It was supposed that the peoples who consume it were too poor to afford meat (Gladys, 2011). Although green leafy material constitutes the main component in the diets of most of the human and animal population. It can be consumed in various ways some of them can use as raw or it can be used by cooking. Green leafy materials have a variety of health benefits for consumers, due to their proximate content of minerals, vitamins, protein, fibres, chlorophylls, fats, carbohydrates and antioxidant compounds, etc. Their inclusion in daily diet can promote dietary diversity and reduce micronutrient deficiency (Garti, et al. 2018; 2019; Achimugu and Emmanuel, 2021). It adds flavour, taste, colour and aesthetics to the diet (Omah, et al. 2022).

Green plant leaves are prone to be more susceptible to fluctuating seasons, these are radially and abundantly available during the rainy season but there is a scarcity or less availability in the dry season. Secondly, after harvesting, they lose their moisture content very quickly, and due to this, the appetizing quality deteriorates rapidly. This rapid deterioration results in less shelf life of 3-5 days under normal

post-harvest handling at room temperature, this short shelf life is the significant cause of their utilization during the dry season (Oulai, et al. 2016). In addition to this other causes like a microbial infestation, improper handling, transportation, storage and marketing, most of this green biomass is wasted. Since this green biomass is the chief source of minerals and micronutrients which play a vital role in maintaining normal metabolic functions, an abundant source of nutrition has vanished especially in developing countries where it is mostly required (Abioye, et al. 2014).

In order to increase the shelf life of green leafy materials up to the period in which they are available, different drying methods have been advocated by various workers. According to Kolawole et al. (2010), drying fresh leafy material can remove moisture due to this the microorganisms like bacteria, fungi, yeast and moulds cannot grow. Food dehydration is the process of removing water by circulating hot air through it. The dehydrated leafy materials are generally tasty, nutritious, lightweight, and easy to store and use (Acho, et al. 2016). Drying is the most common use method for enhancing the life of green leafy material. The green leafy materials are mostly used in powder form, which reduced the volume required for storage and is easy to handle (Sonkamble and Pandhure, 2017).

Earlier published reports have focused on the nutritive potential of these fresh leafy materials and the emphasis given to the present research was to establish the effect of shade drying methods on their nutritive properties.

MATERIALS AND METHODS

During the present investigation, seven different plant species are underutilised viz. Berseem (*Trifolium alexandrium* L.), *Alysicarpus vaginalis* L. var. stocksii., *Alternanthera paronychioides* St. Hil., Cabbage (*Brassica oleracea* L. var. capitata), Radish (*Raphanus sativus* L.), Adulsa (*Adhatoda vasica* Nees.), and Bauchi (*Psoralia corylifolia* L.) were chosen as the source of different nutritional constituents. These plant materials were authenticated at the Department of Botany, RTM Nagpur University, Nagpur. The plant material was collected early morning at one kg of green foliage and dried in the laboratory at room temperature i.e. by shade drying method.

The batches of freshly harvested green foliage were kept for drying in the morning and a decrease in weight was recorded every two days till these gave constant weight. These dried samples were pulverized and sieved through 65 mesh screens, packed in polythene bags and stored under a dry cool place until used for various biochemical analyses.

Determination of Total Carbohydrate: - Total carbohydrate content was estimated in terms of glucose equivalents by the standard Anthrone reagent method given by Sadasivam and Manickam (1996).

Estimation of chlorophylls: - The chlorophyll estimation of dried leaves was done by the method illustrated by Sadasivam and Manickam (1996).

Determination of crude fat (CF), Crude fibre, total ash and acid insoluble ash (AIA), was determined by applying the method given by Mungikar (1999b).

Results and Discussion:- The chemical compositions of the shade-dried materials of selected plant species (Illustrated in fig. 1, 2 and table no. 1.). The maximum value for crude fat content was found in *Psoralia corylifolia* L. (22.93%), followed by *Adhatoda vasica* Nees. (17.39%). The minimum values were reported in *Sorghum bicolar* L. (7.00%). The remaining plant species showed crude fat content in the range of 8.64% - 10.92%. The maximum content of total carbohydrate was obtained in *Brassica oleracea* L. (24.03%) and minimum in *Alternanthera*

paronychioides St. Hil. (5.80%) whereas the remaining plant species gives a carbohydrate content between 6.51%-12.18%. Significantly higher amounts of total chlorophyll, chlorophyll-a and chlorophyll-b content were reported in *Alysicarpus vaginalis* L. which was 503.69, 307.27 and 196.55 mg/100g respectively as against minimum content observed in *Sorghum bicolar* L which was 14.89, 9.09 and 5.80 mg/100g. The remaining plant species have an appreciable amount of chlorophyll content. The crude fibre and acid insoluble ash content were quantified higher in *Sorghum bicolar* L. (33.50% and 4.87% respectively), whereas total ash content in *Alternanthera paronychioides* St. Hil. (23.75%). The lower amount of crude fibre (4.60%), total ash (9.405) and acid insoluble ash (0.43%) were estimated in *Psoralia corylifolia* L., *Alysicarpus vaginalis* L. and *Trifolium alexandrium* L. respectively. The remaining plant species contains crude fibre in the range of (5.10%-19.70%), total ash (10.25%-16.02%) and acid insoluble ash (0.63%-1.80%).

RESULT AND DISCUSSION

Similar results on crude fibre and total ash content were reported by Gladys, (2011) in two vegetables i.e.*Amranthus aquatica* and *Telfairia occidentalis* by sun and shade drying methods. He obtained 17.00 and 17.70 mg/100g of total ash content in sun and shade-dried leaves of *Amranthus aquatic* whereas 18.20 and 18.30 mg/100g of total ash content in sun and shade-dried leaves of *Telfairia occidentalis.* Similarly, the crude fibre values were reported by 19.70 and 19.39 mg/100g in sun and shade-dried leaves of *Amranthus aquatica.* Whereas, 18.81 and 19.44 mg/100g of crude fibre content in sun and shade-dried leaves of *Telfairia occidentalis.* These values obtained are considerably higher than the fresh leaves samples. However the results on crude fat were found to be higher in the present investigation, these differences might be due to the species variation and different drying methods adopted in the present study. Abioye, et al. (2014) also found quite similar results on crude fibre and total ash content i.e. 8.13% in shade-dried leaves samples of *Adansonia digitata L.* which is comparable with the present findings. However, they have reported higher values of total carbohydrates and lower values of crude fat content as compared to the present investigation. Oulai, et al. (2016) have obtained slightly elevated values of total carbohydrate, total ash, and crude fibre content in five vegetables i.e. *Amaranthus hybridus, Andasonia digitata, Ceiba patendra, Hibiscus sabdariffa* and *Vigna unguiculata* than the results obtained during the present study. This variation might be due to they adopted deferential shade drying methods i.e. they dried the leaf samples for 5days, 10days and 15days duration whereas in the present investigation the leaves sample dried till it gives constant weight. Secondly, the variation might be due to species variation.

Acho, et al. (2016) studied the different chemical constituents in dried leaves samples of *Basella alba, Colocasia esculenta, Corchorus olitorius, Solanum melongena* and *Talinum triangulare* and reported the values of total ash (8.30 -19.16%), crude fibres (11.43 – 21.27%), and carbohydrates (32.45 – 51.74%) which is analogous with the present study. Sonkamble and Pandhure, (2017), studied the total ash and acid insoluble ash in the shade-drying leaf samples of *Spinacia oleracea* (spinach), *Raphanus sativus* (Radish), *Rumex vesicarius,* (Chuka), *Vigna unguiculata* (cowpea) and *Cyamopsis tetragonoloba* (Guar) they reported total ash in the ranged between (7.5% - 24.5%) and acid insoluble ash (1.25% -4.55%) which was comparable with the present findings obtained in the range of 9.40% -23.75% and 0.43% - 4.87% of total ash and acid insoluble ash respectively. However, Garti, et al. (2018; 2019), reported lower values of total

carbohydrate, total ash, crude fat and crude fibre content in shade drying leaf samples of Hibiscus *cannabinus* and Hibiscus *sabdariffa* as against the present investigation. Achimugu and Emmanuel, (2021) also quantified the carbohydrate, ash, crude fibre and crude fat content as 6.345%, 5.350%, 2.450% and 0.920 % respectively in shade dried leaf samples of *Vigna unguiculata*. Omah, et al. (2022) studied the chemical composition in shade drying leaves sample of *Bryophyllum pinnatum* and reported ash, crude fibre and crude fat content as 13.81%, 6.86% and 2.06% respectively which was comparable with the results obtained during the present investigation.

CONCLUSION:

From the results of this research, it was evident that shade drying caused a significant increase in nutritional constituents. The shade-dried leaves having high nutritional composition can be used to supplement food during food preparation and it can fulfil the requirement of human as well as animal populations.

Conflict of Interests: - The authors declare that there is no conflict of interests regarding the publication of this paper.

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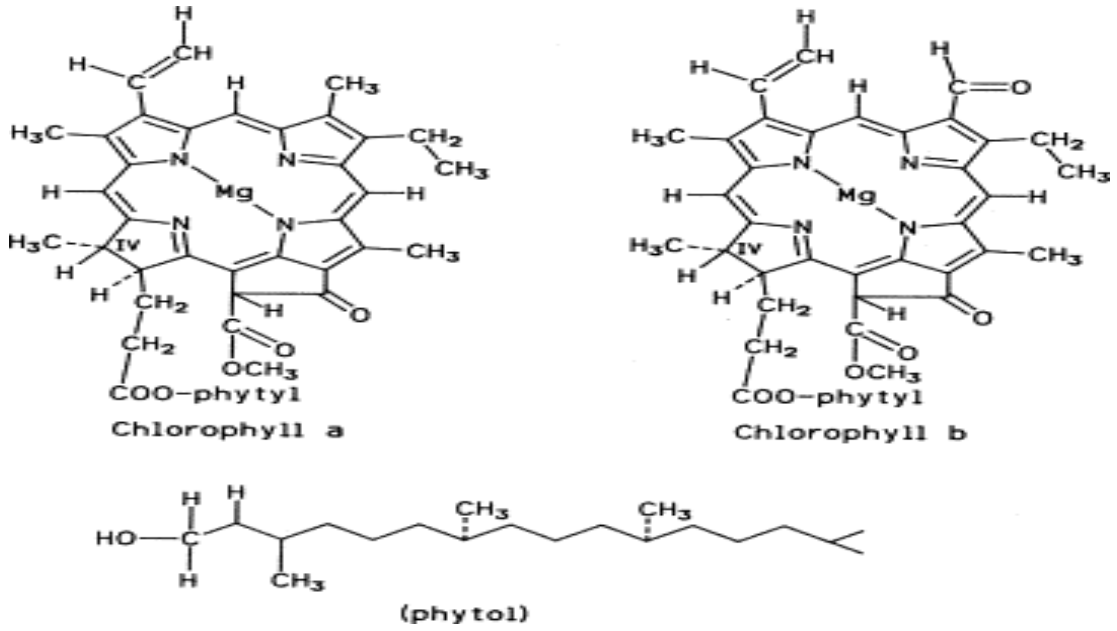
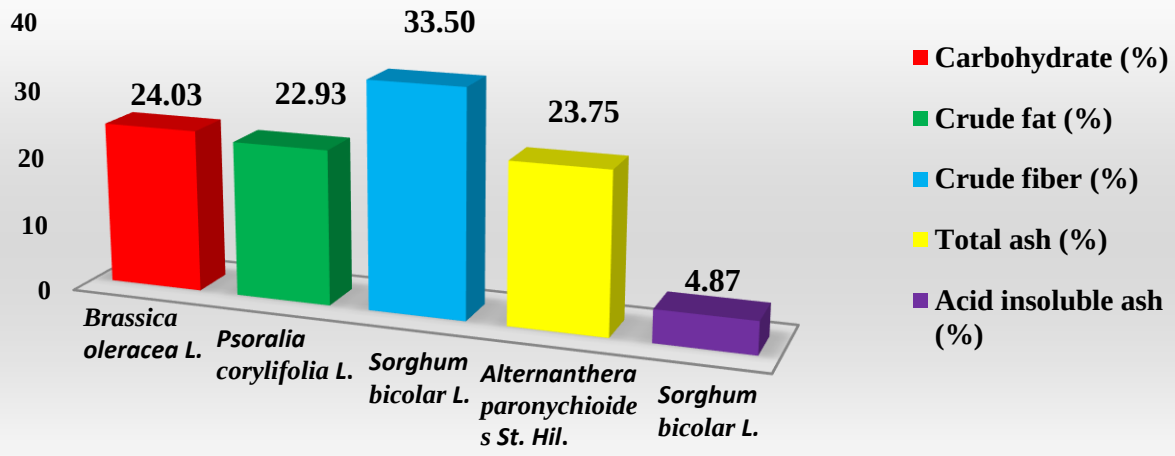


Fig.1. Nutritional Parameters of Various Plant species



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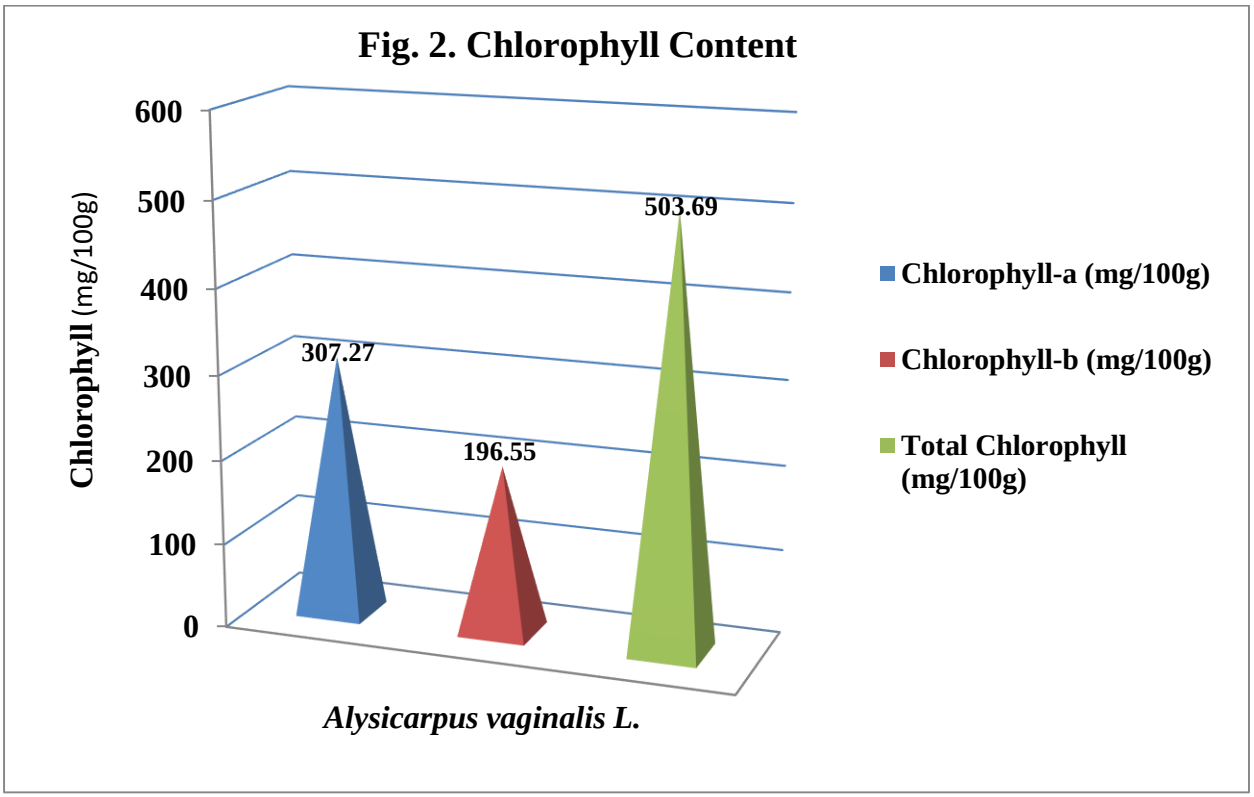

Table No. 1:- Nutritional Composition of Shade Dried Leaves Sample of Various Plant Species.

Name of the Plants	Crude Fat (%)	Total carbohydrate (%)	Total chlorophyll (mg / 100g)	Chlorophyll-a (mg / 100g)	Chlorophyll-b (mg / 100g)	Crude fiber (%)	Total ash (%)	Acid Insoluble ash (%)
Alysicarpus vaginalis L.	10.83	9.87	503.69	307.27	196.55	19.70	9.40	1.76
Trifolium alexandrium L.	10.87	7.07	216.71	163.89	52.87	13.00	12.75	0.43
Alternanthera paronychioides St. Hil.	8.64	5.80	371.79	247.87	124.01	12.50	23.75	1.80
Raphanus sativus L.	9.65	11.20	312.07	201.85	110.30	6.70	15.42	0.63
Brassica oleracea L.	10.92	24.03	17.68	10.31	7.37	5.10	10.25	0.55
Psoralia corylifolia L.	22.93	12.18	259.25	205.59	53.71	4.60	12.72	1.00
Adhatoda vasica Nees.	17.39	10.52	340.26	219.44	120.91	12.20	16.02	0.82
Sorghum bicolar L.	7.00	6.51	14.89	9.09	5.80	33.50	11.25	4.87
Mean	12.30	10.90	255	171	83.90	13.4	13.9	1.48
Std. Deviation	5.26	5.80	170	108	65.70	9.54	4.58	1.47
Std. Error	1.86	2.05	60.00	38.00	23.20	3.37	1.62	0.52
Coefficient of variation	42.82%	53.20%	66.65%	63.05%	78.25%	71.14%	32.88%	98.84%