

Effect of drying technique on Nutritional and phytochemical of allium hookeri thwaites (LEAVES AND ROOTS)

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ABSTRACT

Various kinds of vegetables in the form of fresh and edible portions of herbaceous plants like roots, stems, leaves, fruits or seeds. A regular supply of vegetables fresh, frozen or canned should be an essential part of good living and good feeding of the meal. Dehydration is one of the feasible methods of preservation. These techniques for processing to minimize the losses and to make them available for consumption of the off season. Therefore these studies were made to assess the effect of drying on nutrient and phytochemical content of *Allium hookeri thwaites*. Leaves and Roots were selected for these studies. Different drying like sun drying and oven drying was applied to *Allium hookeri thwaites*. Sun dry leaves and sun dry roots are highly significant difference as compared to oven drying technique.

Key word: *Allium hookeri thwaites*, sun dry, oven dry, phytochemical and nutritional.

Introduction

Vegetables are a rich source of essential biochemicals and nutrients such as carbohydrates, carotene, protein, vitamins, calcium, iron, ascorbic acid and palpable concentration of trace minerals [1]. Consuming vegetables and fruits may reduce the risk of chronic diseases, including cardiovascular disease, stroke, neurodegeneration, and type II diabetes [2].

The *Allium* is the largest and the most important representative genus of Alliaceae family that comprises 700 species, widely in the Northern hemisphere, North America, North Africa, Europe and Asia [3]. The botanical name of *Allium hookeri Thwaites* is Liliaceae and locally known as "Maroi napakpi" in Manipuri. It is also known as Winter leek. *A. hookeri thw.* naturally distributed in Tibet and north west China, several non Chinese tribes in mountainous region from Bhutan to Yunnan and North west Thailand and Himalayan range including Nepal [4].

Allium hookeri Thw. is a wild herb growing in a wide range of soils. A cultivated marketable spicy herb without any significant bulb. It forms an ingredient in chicken and non other vegetarian preparation for adding taste, flavour, and scent [4]. Mainly the freshly roots but also the leaves are also used as vegetables and soup, fried or pickles [5].

The leaves of *A. hookeri* are thick evergreen, linear with prominent midribs, basal leaves membranous, and shorter than the subtrigonous scape. *A. hookeri* are different from onion and it's recognized as one of the vegetables/spices of daily importance in all the Manipuri households. The taste and aroma of this plant has been preferred over the use of onion in the preparation of recipes by the family members [4].

Leaf paste is applied on forehead in excessive body temperature and vertigo and reducing blood pressure. Salty leaf juice is consumed in stomach ulcer members [6]. It is also used in the treatment of Hypertension and coronary heart diseases, cough, parasites, colds, tuberculosis, dysentery, digestive

ailments, fungus, diabetes and heart stroke. They contain sulphur compounds (which give them their onion flavour) and , act as a tonic to the digestive system and also tonify the circulatory system and also used as a moth repellent. [7].

MATERIALS AND METHODS

Plant material: *Allium hookeri thwaites* were purchased from the local market of Manipur. Apply tow different drying method (sundrying, oventrying(60⁰C)) on both sample of leaves and root. . All completely sun and oven dehydrated leaves and roots were ground to get fine powder using grinder. Powder was used further analysis of Nutritional and Phytochemical.

Moisture: The moisture content was determined by AOAC 1984. The sample was weighed and dehydrated in sun dry and hot air oven at 60⁰c until the Constant assuming that the loss in weigh of the sample on drying is due to the loss of moisture. The moisture loss is expressed as

$$\text{Moisture (gm\%)} = \frac{\text{Initial sample weight} - \text{Final sample weight}}{\text{weight of sample}} \times 100$$

Ash: Ash content of the sample was determined according to AOAC 1984. 2gm of sample was taken in pre weight silica crucible. Sample was charred on a burner for 10-15 mins and kept in a muffle furnace at 600⁰c for 6 hrs .It was dissolved in 0.5 ml concentrated Nitric acid transferred to volumetric flask and make up volume (25 ml) with double distilled water. The ash solution was used for the estimation of mineral estimation. Ash content of the sample is expressed as

$$\text{Ash (gm\%)} = \frac{\text{Weight of Ash crucible} - \text{weight of empty crucible}}{\text{weight of gm sample}} \times 100$$

Calcium: Calcium was estimated by the tetrameter method of Clark and Collip (1925). 3ml of ash solution and 3ml 1N sulphuric acid was taken add Two drops of bromocresol green indicator and the pH was adjusted to 4.8 to 5 (blue colour) with saturated solution of sodium acetate. The calcium was precipitated as calcium oxalate by the addition of 4% Oxalic acid till the solution turned to yellowish green. The tubes were maintaining at 75⁰c in the sand bath for 45 minutes and allow settling overnight. Next day, the tube was centrifuge and the supernatant was drained out and the precipitate washed with 3ml of 2% ammonia solution to remove the excess oxalic acid and process repeat for 2-3 times until blue colour exist. 3ml of 1N sulphuric acid was added to the tube and kept in water bath at 60-80⁰C for 5min and treated against 0.01N KMnO₄ until a slight pink colour was obtained .1ml of 0.01N KMnO₄ = 0.2 mg of calcium. The calcium content is expressed by

$$\text{Calcium (mg \%)} = \frac{\text{Titervalue (sample - blank)}}{1} \times \frac{\text{Calcium contain in KMNO}_4}{\text{Aliquot taken}} \times \frac{\text{Vol. made up}}{\text{wt of Sample taken}} \times 100$$

Sodium and potassium: Flame Photometric determination of Sodium and Potassium. Prepare std Na solution that are 1, 5, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100 ppm of each metal ion. Follow the instruction for the collect operation of flame photometer available. Adjust the signal, using the Na filter, to zero using distilled deionized water. Read the signal for the Na set of standards and then that of the unknown sample. If the signal obtained for the sample is out range, dilute a portion of

the sample properly till a signal within the range is obtained. Construct a calibration curve for Na in the sample and report the result in ppm. Repeat step 2-5 for K and find the concentration of each species in the sample. Result should also be reported in ppm analyte.

Protein: Protein was estimated by the method given by Kjeldhal method in (1965). 0.5 gm of free fat sample was taken in a Kjeldhal digestion flask. 10 ml of concentrated sulphuric acid and a pinch of digestion mixture were added after that the sample was digested and make up vol.100 ml with distilled water. 10ml digested sample and blank 10ml sulphuric acid was taken in a Kjeldhal flask add 10ml 50% sodium hydroxide (NaOH) and 10ml distilled water and connected with distillation assembly. The sample was boiled for 10-15minutes. Liberated ammonia was collected in a flask containing 10ml of 2% boric acid with 2-3 drops of mixed indicator. This was titrated with 0.02 N sulphuric acid until pink colour appears. Protein content is expressed by

Protein (gm/100gm) = N2 content × 6.25

$$N_2 \text{ (gm \%)} = \frac{\text{titre value (sample - blank)}}{1} \times \frac{\text{No. of } H_2SO_4}{0} \cdot 0.02 \times 0. \frac{28}{\text{Aliquot taken}} \times \frac{\text{volume made}}{\text{wt of sample taken}} \times \frac{100}{1000}$$

Total Fat: Fat extraction was determined by the method given by Soxhlet method according to AOAC (1984) Fat content is expressed as Fat

$$\text{(gm\%)} = \frac{\text{weight of empty flask + fat} - \text{weight of empty flask}}{\text{weight of sample}} \times 100$$

Total Carbohydrate: Total Carbohydrate is done by Hedge, JE and Hood Reiter, BT (1962). Carbohydrates sample(100mg) are first hydrolyzed with 5ml of 2.5 N for 3 hr into simple sugars using dilute hydrochloric acid. In hot acidic medium glucose is dehydrated to hydroxymethyl furfural. This compound forms with 4ml anthrone reagent a green colour product with an absorption maximum at 630 nm in spectrophotometer. Prepare the standards by taking 0, 0.2, 0.4, 0.6, 0.8 and 1 ml of the working standard. Draw a standard graph by plotting concentration of the standard on the X-axis versus absorbance on the Y-axis. From the graph calculate the amount of carbohydrate present in the sample tube. Carbohydrate content is calculated by

$$\text{Carbohydrates (mg\%)} = \frac{\text{mg of glucose}}{\text{volume test sample}} \times 100$$

Crude fiber: About 2-5 gm of moisture and fat free sample is weighed into a 500 ml beaker and 200 ml of boiling 0.255N (1.25%w/v) H₂SO₄ added. The mixture is boiled for 30 mins keeping the volume constant by the addition of water, the mixture is filtered through a muslin cloth and residue washed with hot water till free from acid. The material is then transferred to the same beaker and 200ml of boiling 0.313N (1.25%) NaOH added. After boiling for 30 mins filtered through muslin cloth. The residue is washed with hot water until free from alkali, followed by washing with some alcohol and ether. It is then transferred to a crucible, dehydrated overnight at 80-100^oc and weighed (We). The crucible is heated in muffle furnace at 600^oc for 2 to 3 hrs, cooled and weighed again (Wa). The difference in weights (We-Wa) represents the weight of crude fiber. Crude fiber is expressed as

$$\text{Crude fiber (g/100g sample)} = \frac{\{100 - (\text{moistur} + \text{fat})\} \times (W_e - W_a)}{\text{wt. of sample taken (moisture and fat free)}}$$

Ascorbic acid: Ascorbic acid estimation done by method of Roe and Kurther (1943). Take 2 gm sample; add 15 ml of 4% oxalic acid. Crush in a mortal pestles. Then centrifuge it for 10-15 minutes. Collect the supernatant then make up the volume of extract up to 25 ml with 4% oxalic acid and treat with a pinch of charcoal and filter with whatman filter paper no.1. Pipette out of 5 ml of working standard solution. Add 10 ml of 4% oxalic acid. Then titrate it against dye. The end point is the appearance of pink colour which persists for few minutes. For blank take 5ml of 4% oxalic acid.

The ascorbic acid content is calculated by Dye factor = $\frac{\text{std conc}}{\text{std O.D}}$,

$$\text{Ascorbic acid (mg \%)} = \frac{\text{Titer Value Of Sample}}{\text{Aliquote Taken}} \times \text{dye factor} \times \frac{\text{Vol. Made Up}}{\text{Sample Taken}} \times 100$$

Total Phenol: Total phenol estimation is done by the method of Hagerman and Makkar (2000). Sample preparation: sample 5 gm was weighted and extracted with 30 ml of 70% methanol and keep in a shaker 2 hrs at 3000rpm. Centrifuge for 5 mins and collect the supernatant. Repeat the procedure 2-3 times and measure the final volume. For standard, take 0.1, 0.2, 0.3, 0.4 and 0.5 ml of standard galic acid solution, now make up the volume 8ml with D/W. Then add 0.5ml of folin ciocalten and 1.5ml of sodium carbonate solution. Now cyclomix the tubes and incubates for 2 hrs at room temperature. Take the reading at 765nm on UV Spectrophotometer. For samples, take 0.5 of extracted sample.

$$\text{Total Phenol (mg \%)} = \frac{\text{Conc. Of Std.}}{\text{O.D Of Std.}} \times \frac{\text{O.D Of Sample}}{\text{Aliquote Taken}} \times \frac{\text{VODL. Made Up}}{\text{wt of Sample Taken}} \times \frac{100}{1000}$$

Total Flavanoid: The sample extraction of flavanoid is same as total phenol. from that supernatant take 20 ml and evaporate it and dilute with 2 ml of 70% methanol. For standard, take 1, 2, 3, 4 and 5ml of catechin as a standard solution containing 4 ml of D.D/W in the test tube. Add 0.3ml 5% NaNo₂, 0.3 ml of 10%AlCl₃ and 2ml of Noah in each test tube. Then, make up the volume up to 10 ml with D.D/W and read at 510nm on spectrophotometer. For sample: Pipette out 0.1 ml of sample and treated same as standard and for Blank D.D/W. flavanoid content was expressed as Total

$$\text{flavanoid (mg\%)} = \frac{\text{Conc. Of Std.}}{\text{O.D Of Std.}} \times \frac{\text{O.D Of Sample}}{\text{Aliquote Taken}} \times \frac{\text{VODL. Made Up}}{\text{wt of Sample Taken}} \times \frac{100}{1000}$$

RESULTS AND DISCUSSION:

Table 1 show the prepared powder was Nutritional and Phytochemical give the range between, the Moisture (94.166 to 73.06gm%). The reduction in the nutrient content may be due to the nature and sensitivity of the nutrient to the level of heat during the drying process. The sun drying method retained more nutrient than oven drying method [8]. Carbohydrates (0.045 to 1.100 gm%), Fat (0.102 to 1.030 gm%), Protein (2.660 to 6.303 gm%), Crude fiber (0.173 to 1.066 gm%), Ash (0.973 to 1.780 gm%), Calcium (265.41 to 411.66 gm%), Sodium (31.600 to 260.00 gm%), Potassium (142.50 to 351.00 gm%), Ascorbic acid (14.500 to 0.000 gm%), Total phenol (78.69 to 433.35 gm%) Total flavanoid (1.73 to 7.17 gm%).

CONCLUSION

In comparison of SDL, ODL, SDR and ODR all nutrients like Fat, Protein, Ash, Crude Fibre, and Ascorbic acid shows higher in SDL. Nutrients such as Moisture were higher in ODL. In SDR content higher nutrients like Carbohydrate, Calcium, Sodium, Potassium, and Total Phenol. Whereas in ODR Total Flavanoid were higher phytonutrient content. In conclusion of the study our result suggest that SDL and SDR are content good source of nutritional and phytochemical most acceptable compared to ODL and ODR. Thus it can be concluded that different drying techniques retains nutrients content which can applied to different foods for making it available in off-seasons.

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Table 1 nutrients and phytochemical content of dry leaves and roots of *Allium hookeri thwaites*
 Mean \pm Standard deviation

NUTRIENTS	Sun dry leaves (SDL)	Oven dry leaves (ODL)	Sun dry roots (SDR)	Oven dry roots (ODR)
Moisture	90.50 ± 0.28	94.16 ± 1.83	83.96 ± 2.05	73.06 ± 3.58
Carbohydrates	0.045 ± 0.00	0.06 ± 0.00	1.10 ± 0.10	0.07 ± 0.00
Fats	1.03 ± 0.00	0.16 ± 0.00	0.71 ± 0.06	0.10 ± 0.00
Protein	6.30 ± 0.14	4.75 ± 0.42	3.17 ± 0.03	2.56 ± 0.19
Crude fiber	1.06 ± 0.06	1.00 ± 0.02	0.17 ± 0.00	0.34 ± 0.04
Ash	1.78 ± 0.00	0.97 ± 0.05	1.57 ± 0.00	1.29 ± 0.15
Calcium	353 ± 16.1	265 ± 5.4	411 ± 32.9	270 ± 14.3
Sodium	47.50 ± 0.28	31.60 ± 0.87	260 ± 3.46	100 ± 1.15
Potassium	323 ± 3.46	142 ± 0.34	351 ± 2.59	201 ± 0.57
Ascorbic acid	55.58 ± 2.41	35.00 ± 0.00	21.75 ± 0.00	14.50 ± 0.00
Total phenol	148.0 ± 18.1	78.69 ± 5.66	433.3 ± 38.1	406.1 ± 45.7
Total flavanoid	3.22 ± 0.14	1.73 ± 0.30	5.71 ± 0.64	7.17 ± 0.62

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