**International Journal of Food Science and Nutrition**
**ISSN: 2455-4898**
**Impact Factor: RJIF 5.14**
**www.foodsciencejournal.com**
**Volume 3; Issue 3; May 2018; Page No. 11-14**

# Nutritional analysis of some uncommon vegetables of Odisha

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**Abstract**
Uncommon food stuffs plays an important role in eliminating food insecurity, enhancing quality life and improving nutritional status of children, adolescents and mothers in rural and tribal areas. The present research aims at obtaining nutritive value of four uncommon vegetables consumed in Mayurbhanj Districts of Odisha namely Narudu Dunka, Narada Leaves, Bitter Potato and Tulunka. The results of the study revealed that Narada leaves contain more protein i.e.3.76gm in comparison to other three. Bitter potato has more calorie content in comparison to other studied vegetables i.e.85.93 Kcal. However the ash content of the vegetables was found to be varied from 0.97 to 1.94 gm.so these may be good source of minerals such as calcium, iron, magnesium, sodium and potassium etc. Thus further in depth study may be carried out in this direction to find out nutritive value of many more uncommon vegetables which can be utilized to eliminate food insecurity and combating malnutrition and morbidity.

**Keywords:** uncommon vegetables, narudu dunka, narada leaves, bitter potato, tulunka

## Introduction
Even though government has implemented large food security and anti-poverty programmes, still there are critical gaps in terms of inclusion and exclusion errors. India shares a quarter of the global hunger burden with nearly195 million undernourished people. In between 2006 to2016 stunting in children below five years declined from 48% to 38%,yet India continues to have one of the World's highest child under nutrition rates, impacting the child's health and development performance in school and productivity in adult life.In this context use of indigenous foods in eradication of hunger and poverty as well as controlling stunting and diseases may be a new prospect in enhancing quality life and improving food and nutrition security in rural and tribal households. Studies showed that many rural and tribal communities have access to traditional crops that are rich in macro and micro nutrients, and can be used as a long term strategy to eliminate food insecurity. It is also recognized that indigenous foods and dietary diversity within an ecosystem can be powerful sources of nutrients and thus are conducive to good health. Besides this there is not enough information available regarding nutritional value of the indigenous vegetables. Therefore the present research is designed to study the nutritive value of some uncommon vegetables of Odisha. The objectives of the present study was to study different uncommon vegetables available in different season and to analyze proximate composition of four uncommon vegetables.

## Materials and Methodology
A survey was conducted in Udala Block of Mayurbhanj Districts of Odisha to find out availability of uncommon vegetables throughout the year. Out of these four vegetables which were commonly available and use by the people were selected for the present research namely Narada Leaves, Narudu Dunka, Tulunka and Bitter Potato. Those were analysed in the laboratory for their proximate compositions and compared with the common vegetables which has similarity with its taste and appearance.
A brief resume of the analytical methods employed is given below

### i) Estimation of Moisture Content
Determination of moisture content is one of the most important and widely used measurements in the processing and testing of foods. The moisture content is an index of stability and quality and is a measure of yield and quantity of food solids. The moisture content must be known in determining the nutritive value of any food and in expressing the results of the determination of the various nutrients in a uniform basis and in meeting composition standard.
For the estimation of moisture content, hot dry oven drying method was used. 50gms of each sample was weighed accurately and dried in oven at 100°C for 4-6 hour. After an interval of every half an hour, all samples were taken out of the oven, cooled in desiccators and then weighed again. This was continued till the samples give a concurrent constant weight, indicating that the samples were free from moisture. The moisture content was then calculated by subtracting the final weight of sample from initial weight taken.

### Calculations
$$\text{Ash Content} = \frac{\text{Weight of Ash}}{\text{Weight of Sample}} \text{ x } 100$$

### Determination of ash content
The term ash is used for the residue remaining an incineration in the oven under atmospheric pressure. Ash is the analytical term for the inorganic residue which remains after all organic matter, water and volatile constituents have been burnt away in the presence of oxygen when heated to a temperature of 500

$^0$C to 600 $^0$ C**.**

5 gm of dried sample was weighed into a porcelain crucible. The crucible was placed on a clay pipe triangle and heated first over a low flame until all the material completely charred followed by heating in a muffle furnace for about 5-6 hours at 550 $^0$ C. It was then cooled in a desiccators' and weighed. To ensure completion of ashing the crucible was again heated in a muffle furnace for 30 minutes cooled in desiccators' and weighed. This was repeated till two consecutive weights were got and ash was almost white or gray in color.

**Calculations**

The ash content was calculated by using the following formula

$$\text{Ash Content} = \frac{\text{Weight of Ash}}{\text{Weight of Sample}} \text{x } 100$$

Where: (gm/100gm of sample)

**Estimation of protein Content**

Nitrogen is the most distinguishing chemical element present in proteins which in turn is the most ubiquitous organic compound among food stuffs and all living matter. The total nitrogen content of various proteins is variable depending on the amino-acid content.

The modified micro kjeldhal method was used for protein estimation. For determination of total nitrogen first the sample was heated with concentrated sulphuric acid in a long necked digestion flask. The reaction rate was accelerated by adding potassium sulphate, to raise the boiling point. First the nitrogen content was estimated which was based on the determination of amount of ammonia present in the sample. The various nitrogenous compounds were converted into ammonium sulphate by boiling with concentrated sulphuric acid. The ammonium sulphate was decomposed with an alkali solution (sodium hydroxide and sodium thiosulphate) and the ammonia liberated was absorbed in excess of natural boric acid solution and titrated with standard 0.0l N HC1 solution.

1) **Digestion Apparatus**
   Apparatus:
   i) Kjeldhal flask
   ii) Glass funnels
   iii) Heating device
2) **Distillation**
   i) Conical flasks
   ii) Burette for titration

**Reagents**

i) Conc. sulphuric acid
ii) Catalyst - Kelpac
iii) Sodium hydroxide & sodium thiosulphate solution,
iv) Saturated Boric acid solution
v) Methyl red and blue indicator.

**Procedure**

100 mg of dried sample was weighed and transferred in to 50 ml digestion flask, taking care that no portion of the sample clinged to the neck of the flask. To this 2 gm catalyst and 2 ml conc. $H_2SO_4$. Was added. Then a clean glass bead was added and placed in an inclined position at an angle of 45$^o$ on the digestion chamber and digested. The flask was heated until the initial frothing ceased and the mixture boiled briskly at a moderate rate. Heating was continued until the colour of the digest was pale and clear. Digestion was continued for another 30 minutes after they become clear to ensure the complete decomposition of organic matter. After the digestion was completed, it was cooled down, and the sides of the flask were rinsed with 10 ml of distilled water and it was cooled under tape water.

**Distillation**

The distillation apparatus was prepared while digestion was taking place. The stopcocks were greased properly. The large steam flask was half filled with water to which 2 ml of conc. $H_2SO_4$ acid and 2 drops of 0.2% methyl red indicator was added. Every time before use, the water was heated to boiling and steamed out the apparatus for 10-15 minutes. The end of the condensed was washed with distilled water.

Then the digested material was transferred quantitatively to distillation flask by 5 successive washings with water.

The 5 ml of saturated Boric acid solution was taken in a 150 ml conical flask and 1-2 drops of indicator was added to it.

Then 10 ml of Sodium hydroxide - Sodiumthiosulphate solution was added slowly to the distillation flask through stop-cock. Then the distillation was carried out for 30-45 minutes, till 15-20 ml of distillate collected in the flask. The first drop of distillate containing $NH_3$ should change the indicator to bright green. Then the tip of the condenser tip was washed and washings were collected in the flask and diluted to about 50 ml.

Then the distillate was titrated with 0.01 N HCl to get the end point. Two blank determinations were done by digesting and distillating a sample of water in the same way as the sample.

$$\%\text{N} = \frac{(ml\ titrated - ml\ blank) \times Normality \times 14 \times 100}{mg\ sample}$$

Where: Protein % = Nitrogen % x 6.25

**Determination of crude fat by Gravimetric method**

**Apparatus:** Volumetric flask, beaker, water bath; funnel, filter paper - No.41.

**Reagents:** Acetone, Ethanol

**Procedure:** 10 gm of oven dried sample was transferred to a volumetric flask and 20 ml of acetone alcohol (1:1) mix was added to it. Then the solvent was kept for overnight. Then next day the solvent was filtered through filter paper No. 41 and the filtrate was collected in a dry weighed beaker. Then the filtrate was evaporated from the beaker by keeping beaker on wire gauze kept on boiling water bath. Then the fat residue was weighed along with beaker.

$$\%\ \text{Fat} = \frac{\text{Wt.of beaker with fat residue} - \text{wt.of empty beaker}}{\text{Weight of sample}} \times 100$$

**Determination of carbohydrate content**

The total carbohydrate was calculated as follows:

After determining the % of moisture, protein, crude fat and total ash.

Total carbohydrate = 100 - (A + B+ C + D)
Where as
A = % of w t. of moisture
B = % of wt. of protein
C = % of wt. of crude fat
D = % of wt. of total ash.

## Results and Discussion

### i) Nutritive Value of Uncommon Vegetables

Four uncommon vegetables selected for the present study were analysed in the laboratory for their proximate composition and the results were discussed below.

**Table 1:** Nutritive value of Uncommon Vegetables.

| Sl. No. | Name of Vegetable | Edible Portion gm | Moisture Content gm | Protein Content gm | Fat Content gm | Ash Content gm | CHO Content gm | Total Energy Content (KCal) |
|---|---|---|---|---|---|---|---|---|
| 1. | Narada leaves | 100 | 77.56 | 3.76 | 0.55 | 1.94 | 16.14 | 84.55 |
| 2. | Narudu dunka leaves | 100 | 89.9 | 2.2 | 0.28 | 1.06 | 6.57 | 37.60 |
| 3. | Tulunka | 80.7 | 78.29 | 0.75 | 0.35 | 1.08 | 19.52 | 84.23 |
| 4. | Bitter Patato | 95.5 | 77.86 | 1.44 | 0.25 | 0.97 | 19.48 | 85.93 |

It was seen from the Table no-1 that the moisture content of the vegetables was more in comparison to other nutrients which varies from 77.56 to89.9gm. Protein content of Narada leaves is 3.76gms which is more than other studied vegetables. Ash content of the vegetables was also good, which shows that those may be rich source of calcium, phosphorus and iron. Fat content of the vegetables was found to be very negligible which rangs from0.25gms to 0.55gms.Seal (2016) found similar type of result in his study on nutritional analysis of wild plants.

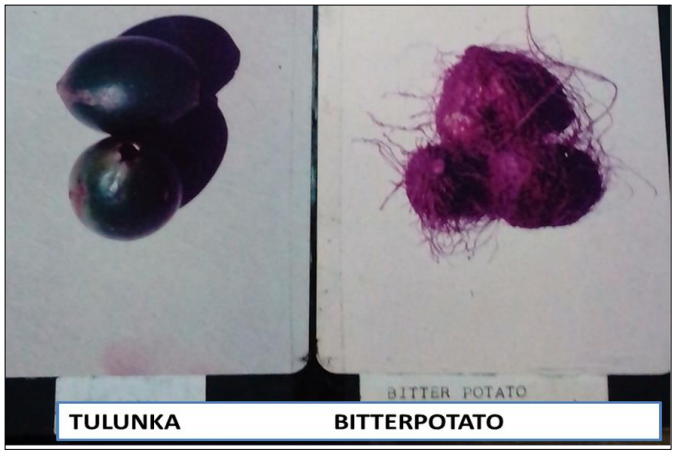


**Fig1**


**Fig 2**

### ii) Comparative Statement of Nutritive Value of Uncommon Vegetables with Common Vegetables

The nutritive value of common vegetables whose taste and appearance was similar to the uncommon vegetables was taken in to consideration for comparison.

**Table 2:** Comparison of nutritive value of common vegetables with uncommon vegetables

| Sl. No. | Name of vegetable | Edible portion gm | Moisture content gm | Protein content gm | Fat content gm | Ash Content gm | CHO content gm |
|---|---|---|---|---|---|---|---|
| 1. | Narada leaves | 100 | 77.56 | 3.76 | 0.55 | 1.94 | 16.14 |
| i | Knol-khol greens | 100 | 86.7 | 3.5 | 0.4 | 1.2 | 6.4 |
| 2 | Narudu dunka leaves | 100 | 89.9 | 2.2 | 0.28 | 1.06 | 6.57 |
| ii | Beet greens | 100 | 86.4 | 3.4 | 0.8 | 2.2 | 6.5 |
| 3 | Tulunka | 80.7 | 78.29 | 0.75 | 0.35 | 1.08 | 19.52 |
| iii | Plantain | 90.5 | 83.2 | 1.4 | 0.2 | 0.5 | 14.0 |
| 4 | Bitter potato | 95.5 | 77.86 | 1.44 | 0.25 | 0.97 | 19.48 |
| iv | Wildyam | 90 | 70.4 | 2.5 | 0.3 | 1.4 | 24.4 |

It was observed that Narada leaves were rough in texture and thick to touch.so the leaves of knol-khol was choosen to compare with the nutritive value of Narada Leaves. It was observed that the moisture content of konl-khol was more than Narada leaves. Protein and fat content of both the leaves was found to be almost same with very little difference between the two. Ash and Carbohydrate content of the Narada leaves was more in comparison to knol kohl greens.

Similarly nutritive value of Narudu dunka leaves was compared with Beet greens. It was interesting to note that the moisture and carbohydrate content of both the leaves were almost same. It was noted that protein and fat content of beet greens was more than narudu dunka leaves i. e 1.2gms & 0.52gms respectively.

Tulunka is a local grown seasonal vegetable which has a green covering like plaintain and when cut inside it is white in color and turns black if exposed to air like raw banana.Taste is almost same like raw banana.It was interesting to note that the

protein content of tulunka was about half less than paintain where as fat content was almost same. Again the ash content of tulunka was 0.58gm more than plaintain which shows that it may be a good source of minerals. The carbohydrate content of tulunka was also more than plaintain.

Another most commonly used wild potato in that area was bitter potato which is bitter in taste and looks like yam.Its nutritive value was compared with wild yam.It was observed that the protein,fat,ash and carbohydrate content of the studied sample was less than wild yam i.e. less by1.06 gm, 0.05,0.43 and4.92gm respectively.

The Calorie content of uncommon vegetables was calculated by taking into consideration of protein, fat and carbohydrate content of the food stuffs. It was observed that the Calorie content of bitter potato was more than other studied vegetables i.e.85.93Kcal whereas Calorie content of Narada leave was 84.55Kcal, Tulunka was 84.23Kcal and Narudu dunka was 37.60 Kcal. The protein content of studied vegetables varied from 0.75to 3.76 gm, fat content varies from0.25 to 0.55gm, ash content varies from 0.97 to 1.94gm and carbohydrate content varies from 6.57to 19.52gm. Since these are rich in ash, it is asumed that those vegetables may be good source of minerals like iron, iodine, calcium, sodium, potassium etc. Raghuvanshi et.al.(2001)found in their studies on nutritional composition of uncommon foods that crude protein 1.74 to4.93%,crude fat 0.23 to1.38%,minerals 0.46 to3.02%,carbohydrate 1.46 to14.46%, energy content15 to 76 Kcal.

## Conclusion

Thus it can be concluded that as the protein content of Narada leaves is more than other studied sample which can be extracted and utilised for prevention of protein calorie malnutrition.The calorie content of bitter potato was more than other studied vegetables.Looking into the ash content ofstudied vegetables it is assumed that those may be rich source of minerals and may be rich in calcium, iron, potasium and sodium.Thus further indepth study is required in this direction to utilise uncommon source of food, to provide food security and preventing malnutrition and morbidity.

## References


1. Ali Alimas. Food habits,Nutrition and Health Status of the Lanjia Saoras-A Primitive Tribe of Odisha. Proceedings of Nutrition Socirty of India. 1987; 33:56-57.
2. Raghuramulu N, Nair Mahvan, Kayanasundaram. A Manual of Laboratory Technique. National Institute of Nutrition, Hyderabad. 1985, 85-100.
3. Raghuvanshi RS, Singh R, Singh R. Nutritional composition of uncommon foods and their role in meeting micronutrient needs. Journal of Food Science Nutrition. 2001; 52(4):331-335.
4. Seal Tapan, Kausik Chaudhuri. Nutritional Analysis of Some Selected Wild Edible Plants Consumed by the Tribal People of Meghalaya State in India. International Journal of Food Science and Nutrition. 2016; 1(6):39-43.
5. http://wwwo.sun.ac.za/vivus/vivus-4November-2016/general/Indigenous foods can contribute to food security-html
6. www.sciencedaily.com/releases/2011/05/110509150742.htm
7. Availability of local food key to improving food security. Science Daily. 2011.