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Estimation of Nutritive Content in Leaves of *Withania Somnifera* and *Ricinus Communis Linn.*

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ABSTRACT:
The nutrient analysis was done by A.O.A.C(1995) procedure for the estimation of moisture content, total Ash, crude fibre, ether extract, etc. Crude protein is higher in leaves of *Ricinus communis Linn*. then *Withania somnifera* leaves, percentage of total carbohydrate found higher in leaves of *Ricinus communis Linn*., the chemical Analysis of these plant species thus indicates that these are rich in nutrient. These plants do not show much variation in their chemical composition in different months of the year.

Key words: *Withania Somnifera*, *Ricinus communis Linn*, Nutrient Analysis

INTRODUCTION:

The vegetation in the desert region in very scanty. The increasing human population and live- stock population is a serious stress on the scanty vegetation cover of the region. Forest occupy only 2.5 % of the geographical area. The Botany of Indian desert in fairy well known mainly through the publication of Brandis (1874), Blatter and Halberg (1918-21), Bhandr (1978), Shah (1978), Majumdar (1979), Shetty and Singh (1987).

Withania somnifera (Linn.) Dunal which is commonly called Ashwagandha/Indian ginseng /Winter cherry one of the important ingredients in Ayurveda and other traditional systems of medicine. The genus Withania belongs to the family Solanaceae and consists of 23 species. Of the 23 species, only two Withania somnifera and Withania coagulans (Linn.) Dunal have been reported from India Withania Linn. Genus is distributed in the east of the Mediterranean regions and South Asia. Withania somnifera is a native of drier part of India and Africa and old world. It is cultivated in large scale as commercial crop in Madhya Pradesh, Gujarat and some parts of Rajasthan.

Castor (Ricinus communis Linn.) is one of the ancient oilseed crops of the world. India accounts for nearly 68 per cent of the world castor area and 76 per cent of world castor production and ranks first in both area and production in the world.

Plant body is composed primarily of carbohydrates, protein, amino acids, Nucleotides, lipids. The nutritive content are found in all green plants. The primary productivity of the green Autotrophic plants is the base for the existence of entire biosphere. It determine the carry capacity of earth for human beings, great importance is being laid on the rate of energy storage in diverse ecosystem. By green plants primary productivity is the gain of weight of organic matter generated by photosynthesis in a given period of time. Net production is the part of gross photosynthetic production which is accumulated in plant after metabolic activities and hence becomes available for

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utilisation as food with increasing demand for the natural drug and to fill the void in our knowledge regarding the chemistry of famine foods and plants of desert origin, there is urgent need to undertake a full scale photochemical survey of our indigenous plants to locate the potential source of pharmacologically active chemical compounds of alkaloids nature like tannin etc.

MATERIAL AND METHODS:

Experimental Fields

The present investigation is on the quantitative estimation of nutritive content of these two xerophytic plants species;

(a)Withania somnifera **(b)Ricinus communis Linn.**

Leaves of above mentioned species growing in natural condition in the different areas of desert of Rajasthan. Collected in the month of Oct. 16 to June 17. Plants part were collected during morning hours in the polythene bags. Bags were tightened immediately to have no loss of moisture. The sample were dried, powdered and then used for their nutritional value such as crude protein, ether extract , crude fibre, total carbohydrate, Nitrogen free extract, Calcium, and phosphorus, Ash, etc.

Analytical procedure-

The powdered material was subjected to chemical analysis by A.O.A.C (1995) procedure, leaves sample taken from each plant for analysis.

Dry Matters-

Samples weighing 25 mg of each plant part were taken in weighed petri dishes and kept in hot air oven for 24 hrs. After 24 hours, the dried matter cooled in desiccators and weighted till attain constant weight. The loss of weight wells considered as moisture content and moisture percentage was calculated. The percentage of dry matter was calculated by following formula:

$$\frac{W3-W1}{W2-W1} \times 100$$

Where,
W1= weight of empty petri dish (gm)
W2= weight of sample and petri dish before drying (gm)
W3= weight of sample and petri dish after drying (gm)

The over dried matter was used for further analytical procedure.

Crude protein-

2 gm of each oven dried plant part was taken in 500 ml kjeldahil's flask to which 10 gm of digestion mixture (9.5 gm of potassium sulphate 0.5 gm of copper sulphate) 20 ml of concentrated sulphuric acid were added. To check the bumping glass beads were added in the flask. The flask was heated on electric hot plate till the blue green solution was obtained. The flask cooled overnight distilled water was added to make the volume 250 ml this known as aliquot.

25 ml of this aliquot was taken in kjeldahil's flask 80 ml saturated sodium hydroxide solution was introduced and flask was immediately connected by a trap to the condenser. The lower end of the condenser was dipped in a solution of 25 ml of 2 % boric acid and Toshiro's indicator (Methyl red 80mg, methylene blue 20 mg and methanol 100 mg) in a beaker. The flask was heated for 45

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minutes during which all the among a released was trapped and the content of breaker become double with the change of colour from violet to green. This distillate was titrated against N/17 sulphuric acid. The percentage of nitrogen of calculated by the formula:

$$\text{Percentage of Nitrogen} = \frac{\text{ml of N/17H2SO4} \times 0.02 \times 100 \times 10}{\text{Gm of Sample Taken}} \times 100$$

The percentage of crude protein was calculated by multiplying the nitrogen by 6.25.

Ether Extract-

For the estimation of fat or ether extract soxhalt's apparatus was used. The known quantity of each oven dried plant part was taken in Thimble of what man filter paper. This thimble was taken in soxhalt's extraction tube, which was connected above with condenser and below with weighted oil flask. Petroleum ether (B.P. 40-60^{o}C) was poured into extraction tube in the amount of 100ml more than required.

The oil flask was placed on the heater. Extraction was done for 6 hrs at rate of 6-8 extraction per hours. The false was then disconnected, dried in a hot air oven (100 ± 500^{o}C) until all the ether had evaporated and cooled in desiccator flask was then weighted and percentage of fat or ether extract was obtained by following formula;

$$\frac{W2-W1}{W} \times 100$$

Where,
W1= weight of oil flask and petroleum ether (gm)
W2= weight of the oil flask after ether Extract (gm)
W = weight of sample (gm)

Content of the thimble was dried and further used for analysis of crude fibre.

Crude Fibre-

The residue after extraction of ether was transferred from thimble to 500 ml beaker. 200 ml of 1.25 percent sulphuric acid solution was poured into beaker. The contents were boiled within a minute by placing the beaker on the electric hot plate under a round bottom reflex condenser flask to ensure effective condensation of the solution. Running cold water was allowed to flow through flask. After 30 minute this solution was cooled, washed and filtered through muslin cloth in Buckner's funnel. Material on the cloth was washed to remove the acid and again boiled with 200 ml of 1.25 percent sodium hydroxide for 30 minute. This was again cooled l, washed and the filtered. The residue was transferred to crucible and kept in a hot air oven at 100 ± 50C for drying. The crucible was cooled in desiccator and weighted till it attain constant weight. The dried content was ignkioned in a muffle furnaces and again weighted.

The loss in weight during Ashing was the weight of crude fibre and percentage of fibre was calculated as follows;

$$\text{Percentages of crude fibre} = \frac{W1-W2}{} \times 100$$

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W

Where,
W1= weight of crucible before Ashing(gm)
W2= weight of crucible after Ashing (gm)
W= weight of dried sample (gm)

For the estimation of ash, 5gm dried plant parts were taken in weighted crucible and it was placed in a muffle furnace for ashing at 600°C when the contents attained uniform ash colour (free of black particles) the crucible was cooled in a desiccator and weighed percentage of ash was calculated by

$$\text{Percentage of crude Ash} = \frac{W1-W2}{W} \times 100$$

Where,
W1= Weight of crucible (gm)
W2= Weight of crucible + ash (gm)
W= Weight of dried sample (gm)

Nitrogen Free Extract-

The conventional weend's method was following for the calculation of nitrogen free extract. It was calculated by following Formula;

Percentage of nitrogen free extract = 100-(%CP + %CF + %ASH)

Organic Matter-

The organic matter of each dried plant part was estimated by following Formula;

Organic matter = CP + CF + NFE

Total Carbohydrate-

Total carbohydrate of each dried plant part is equal to the sum of crude fibre and nitrogen free extract;

Total carbohydrate = CF+NFE

Mineral Contents-

For the estimation of Calcium and phosphorus 100 ml of 50 percent hydrochloric acid was added to the ash in crucible were heated in water bath for 10 minutes. The contents were transferred to 250 ml beaker along with the washing till the crucible was free of acid. The content were heated for 30 minutes and after cooling filtered through ashes what-man's filter paper number 42. The volume of filtered solution was made to 250 ml distilled water and keep it as a stock solution for the analysis of calcium and phosphorus.

Calcium-

For the estimation of calcium, method given by Talpatra et.al (1994) was followed.

25 ml of stock solution was taken in 250 ml Beaker of distilled water and 10 ml of saturated ammonium oxalate was added. Two drops of alcoholic methyl red and 10 ml of concentrated hydrochloric acid were also added. Acidity of solution was adjusted at the pH 4.6 by adding concentrated ammonia solution drop by till a brown coloured precipitate began to appear and them dilute ammonia solution was added till white coloured precipitate appeared. The content of the beaker were kept overnight allowing the precipitate to settle down and on the next day the solution was filtered through whatman filter remove excess oxalate. Precipitate was dissolved in 100 ml of

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distilled water and 10 ml of concentrated sulphuric acid. This solution was heated at 600- 700C for 30 minutes and filtered against N/10 potassium permanganate solution. The filtration was carried out until a stable pink colour appeared. The calcium content were calculated as follows;

$$\text{Percentage of Nitrogen} = \frac{\text{ml of } KMnO_4 \times 0.002 \times 10 \times 100}{\text{Gm of Sample Taken for ashing}}$$

where, 10 are the dilution factor.

Phosphorus-

From the stock solution of acid soluble ash 25 ml aliquot was taken in 250 ml beaker in which 10 ml of concentrated nitric acid and 10 ml freshly prepared saturated ammonium molybdenum solution was added for precipitation. Yellow coloured precipitation of ammonium molybdenum to appear. The beaker was kept overnight allowing the precipitate of settle down. Next day supernatant was filtered through whatman filter paper number 42. The precipitate was washed with 2 percent nitric acid and then several times 3 percent potassium nitrate solution for the remove of acid. The precipitate was dissolved in ml of N/17 sodium hydroxide solution and excess of sodium hydroxide was titrated against N /17 standard nitric acid solution. Phenolphthalein was used as indicator.
Phosphorus contents were calculated as follows;

$$\text{Percentage of Phosphorus} = \frac{\text{ml of N/17 NaOH used x10 x 0.0001925}}{\text{Gm of Sample Taken for Ashing}} \times 100$$

Where, 10 are the dilution factor.

RESULTS AND DISCUSSION

As we know that before coming of IGNP in Rajasthan, the people of Rajasthan depends on livestock to fulfil there need and requirements. In arid and semi-arid zone of Rajasthan, a large number of tree leaves, herbaceous plants and shrubs as an important food resources for livestock. The leaves of the plants are rich in protein, carbohydrate and minerals, which supports the animals for the maintenance of health.

Several types of fodder plants are available in the desert region like Salvedora oleoides, Salvedora persica, Prosopis cineraria, Azardirachata indica, Acacia arabica, Albania lebbek, Parkinsonia aculeata, etc. Some exotic trees are also introduced in the desert and they also serve the purpose of fodder production. This trees are Leucaena leucocephal, Zizyphus nummularia, Prosopis juliflora, etc.

(a) Withania Somnifera-

The average chemical composition of leaves of Withania somnifera on percentage dry basis was found to be moisture 11.20, Total ash 18.50, Dry matter 88.82, Crude protein 20.85, Crude fibre 10.15, Ether extract 1.5, Organic matter 80.50, Nitrogen free extract 49.5, Total Carbohydrate 59.65, Calcium 2.25, Phosphorus 0.32, Nitrogen 3.33,

Leaves NFE= 100-(CP+CF+ASH) =100-(20.85+10.15+18.5) = 49.50
Organic matter = CP+CF+NF =20.85+10.15+ 49.5= 80.50
Carbohydrate =CF+NFE =10.15+49.50 = 59.65 Whereas,

(b) Ricinus Communis Linn.-

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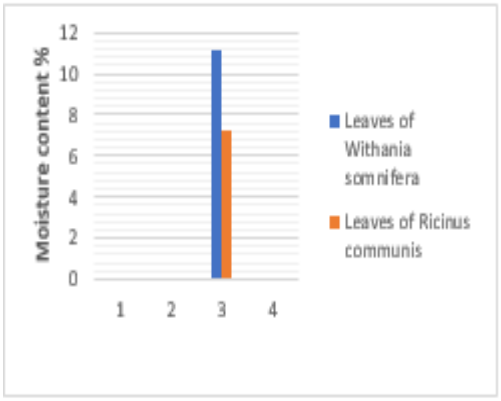
The average chemical composition of leaves of Ricinus communis Linn. On percentage dry basis was found to be moisture 7.20, Total ash 11.80, Dry matter 65.57, Crude protein 24.90, crude fibre 11.30, Ether extract 11.90, Nitrogen free extract 52.00, Organic matter 88.20, Total Carbohydrate 63.30, Calcium 2.59, Phosphorus 0.42 Nitrogen 3.99,

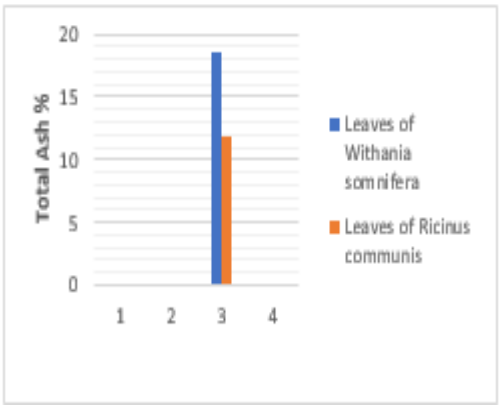
Leaves NFE = 100-(CP+CF+ASH) =100-(24.90+11.30+11.80) = 52.00

Organic matter = CP+CF+NFE = 24.90 + 11.30 +52.00 = 88.20

Carbohydrate = CF+NFE = 11.30 + 52.00 = 63.30

S. No.	Plant constituent	Leaves of *Withania somnifera* (In %)	Leaves of *Ricinus communis* (In %)
1.	Moisture content	11.20	7.20
2.	Total Ash	18.50	11. 80
3.	Dry matters	88.82	65.57
4.	Crude protein	20.85	24.90
5.	Crude fibre	10.15	11.30
6.	Ether Extract	1.50	11.90
7.	Nitrogen free Extract	49.50	52.00
8.	Organic Matter	80.50	88.20
9.	Total Carbohydrate	59.65	63.30
10.	Calcium	2.25	2.59
11.	Phosphorus	0.32	0.42
12.	Nitrogen	3.33	3.99





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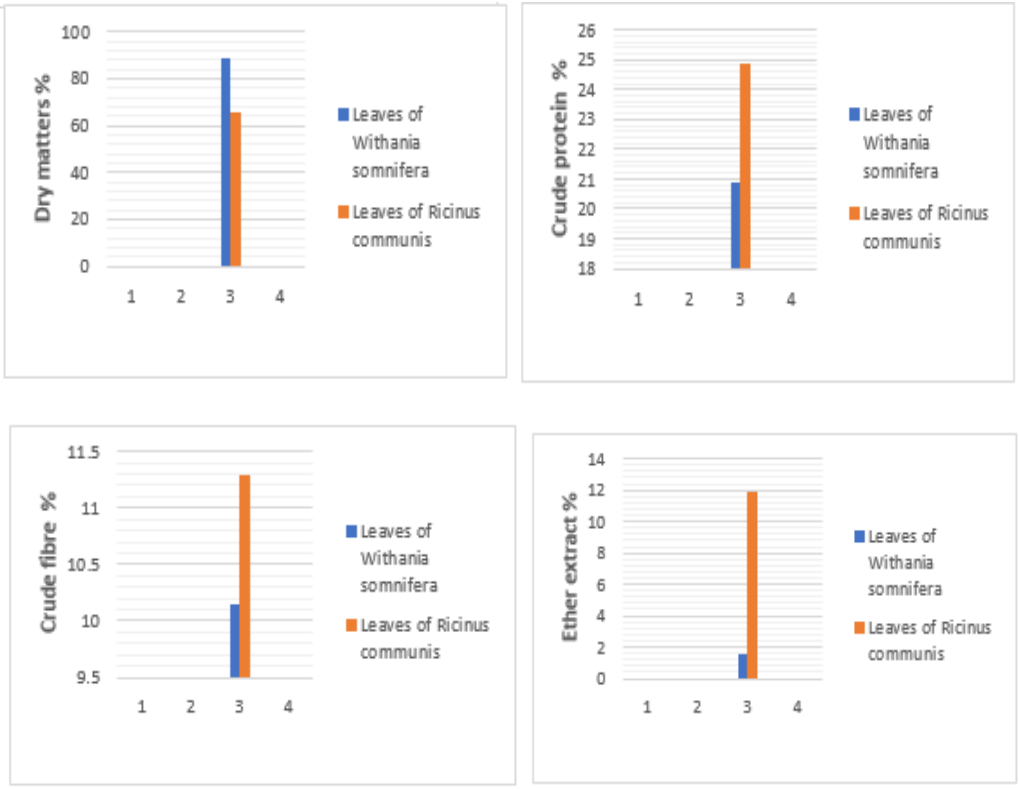

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