



Original Research Article

Seeds Value of *Cephalocroton cordofanus* (Hochst) at Beila village, Gedaref State

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ABSTRACT

Keywords

Element components, Organic components, Seeds, Endangered species and shrub

The objectives of the research is to find out the elements and organic compounds of the seeds of *Cephalocroton cordofanus* and to find out means to know more about the shrub which is unknown by majority of people. The sample measured in the Near infra-Red Spectrometer (NIR) to find out the percentage of organic compounds of the seeds after three readings. Radioisotope ^{109}Cd with energy 22.1 KeV was employed as a primary source is used for measurement of (Ca, Cr, Cu, Fe, K, Mn, Ni, Sr, and Zn) in *Cephalocroton cordofanus* seeds. The analysis shows that Protein in the seeds is very high which is equal to 42.76% of the total composition of the seeds and Fat equals to 36.2%. For the elements Calcium comes in the second class by 1832 mg/kg and Ferrous element shows 148 mg/kg.

Introduction

Plant description: *Cephalocroton cordofanus* (Hochst), is a shrub of the family Euphorbiaceae, and known locally as Um gutnii in Kordofan State (Hashim, 1994) and Dingil in Gedaref State (Fangama et al, 2009). The shrub is perennial and widely distributed in central Sudan, including Southern parts of Gedaref, Blue Nile, Kordofan and Dar Fur (Andrews, 1952). Dingil is the main shrub species found in agricultural lands in clay soil. It constitutes patches in the farms and characterized by vegetative growth in the beginning of rainy seasons. Its diameter is about 8.8 cm (Hashim 1994). The branches finely stellate, pubescent, and sometimes glandular. The

leaves are ovate, acute or shortly acuminate at the apex, cordate at the base, crenate, $\frac{1}{2}$ - 2 inches. Long $\frac{1}{3}$ - $1\frac{1}{2}$ inches, broad, glandular or not, stellate-tomentose, at length almost glabrous on both surface and the flower-heads globose, terminal $\frac{1}{3}$ inch in diameter, peduncle stellate-pubescent, up to 1 inch long. The fruit is a tri-lobed capsule colour, and opens mechanically, and the seeds in grayish brown color and very light. Capsule scabrous stellate. Pubescent, deeply 3-sulcate, $\frac{2}{3}$ inch in diameter (Andrews, 1952).

Ecology of the shrub: The shrub grows in plain and in partially flooded low lying sites

in association with *Aciaca seyal*, *Aciaca polyacantha*, *Echinochloa colonum*, *Cyperus spp.* and *Occimum spp* (Andrews, 1952). The density of the shrub was 645.5 shrubs per hectare and the height is up to 4 feet. The shrub is naturally regenerated from seeds that scattered physically from mother shrub. Also it vegetates by coppice from stumps of cut shrub. Each shrub produces 9.8 gr. of forage each year on dry matter basis. Leaves showed high crude protein (CP) constituent, while leaves plus stems give low (CP). The shrub produces nutritious food at the end of the dry season in June (Hashim, 1994).

The shrub now is endangered due to the expansion of mechanized rainfed schemes, traditional cultivation, seasonal fires, droughts, extensive grazing and cutting down of *Cephalocroton cordofanus* by rural people. It is highly palatable to animals and the fruits are rich in fats and are also edible by man (Fangama, 2006).

Uses: The seeds are rich in fats (Fangama, 2006) and edible by hunters, farmers, herdsmen, pupils and local people. The roots are used by people as home remedy, especially for snakebites, also the green stem is used by rural people as firewood.

Objectives: The objectives of the research are as follows:

1. To find out the seeds value of *Cephalocroton cordofanus*.
2. To know the elements and organic compounds of the seeds that can be used in the future by people.
3. To raise awareness among people regarding importance of the shrubs in order to conserve them from disappearance.

Materials and Methods

Field survey: Mature tri-lobed capsules were collected from healthy shrubs just after ripening during the end of the rainy season in November and December in the year 2014 from Biela village at Gedaref State Fig 1.

Methods of measurement

1. **Analysis of seeds for organic compounds :** The capsules hand opened to free the seeds at Plant Laboratory, College of Forestry and Range Science, Soba, Khartoum Sudan, in January (2015). Then the seeds sample were coarsely powdered using mortar and ten grams of powdered seeds weighted using sensitive balance. The sample measured in the Near infra-Red Spectrometer (NIR) to find out the percentage of organic compounds of the seeds after weighting of three readings.
2. **Analysis of seeds for elements compounds**

Measurement of sample (2):
Sample drying and homogenizing: Samples were left at room temperature before transportation to the laboratory, and then put in the oven at the 110 centigrade for one hour to evaporate moisture content water in them; Aliquots of the plant material were grind and homogenized using a mortar and sieving. The resulting fine powder was used for analysis.

Sample preparation for X-Ray Fluorescence (XRF) analysis: 1 .0 g of the powdered sample was pressed by (15 ton/cm²). For quality control, Standard Reference Material of IAEA-V-10 (Hay powder) was used, and treated in the same manner.

Sample analysis: XRF measurement

An energy dispersive XRF spectroscopy equipped with Si (Li) detector (ORTEC) with a resolution of 180 keV. Radioisotope 109Cd with energy 22.1 KeV was employed as a primary source is used for measurement of (Ca,Cr, Cu, Fe, K, Mn, Ni, Zn,Pb,Br,Rb and Sr) in *Cephalocroton cordofanus* seeds. Plant pellets were presented to the XRF spectrometer system, where each of them was measured for 3000 seconds. The spectra obtained as results of x ray excitation using Cd-109 x-ray source were transferred to a computer. The spectra were then analyzed and concentration of the elements present in the samples was obtained using AXIL – XRF software available in the computer. For quality control, a standard reference of Hay powder was used and treated in the same

manner. Two readings have taken, one is 0.2g sample and the second is 0.8g covered with starch. Then measured and recorded the percentage of element into mg/kg. The second measurement is also has two readings one is 0.8g sample and the second is 0.2g covered with starch. Finally the average of two different samples was obtained (Ibrahim, 2012).

Results and Discussion

Organic compounds of the seeds of *Cephalocroton cordofanus* : The analysis of seeds shows that, the average percentage of protein in the seeds is very high which is equal to 42.76% of the total composition of the seeds. The fat equals to 36.2% while FAH gives 32.92% of the total composition of the seeds. On the other hand sugar, Starch and NDF give the lower compositions which are equal to -1.16%, -1.95% and -3.62% respectively (Table 1). The result explains that the seeds are rich in fats and are also edible by people that are the same as reported by (Fangama, 2006).

Table.1 Organic compounds of the seeds of *Cephalocroton cordofanus*

N0.	Organic compound	Value % -1	Value % -2	Value % -3	Total	Average %
1	Acid detergent fibers (ADF)	4.87	5.43	5.51	15.81	5.27
2	Ash	3.30	3.59	3.84	10.73	3.58
3	FAH	33.00	32.86	32.91	98.77	32.92
4	Fat	36.26	36.13	36.20	108.59	36.20
5	Fiber	5.28	5.39	5.94	16.61	5.54
6	Moisture	2.00	1.97	1.93	7.89	2.63
7	NDF	-3.85	-3.93	-3.09	-10.87	-3.62
8	Protein	42.51	42.45	42.62	127.58	42.76
9	Starch	-0.09	-0.20	-5.56	-5.85	-1.95
10	Sugar	-1.20	-1.14	-1.15	-3.49	-1.16

Source: Researcher, 2015

Table.2 Analysis results of seeds sample (0.2 g and 0.8 g starch)

No.	Elements	mg/kg	mg/kg	Total	Average
1	K	9180	220	9400	4700
2	CA	6430	223	6653	3326
3	CR	3.79	3.61	7.40	3.70
4	MN	2.21	2.76	4.97	2.48
5	FE	109	188	297	148
6	NI	5.04	4.24	9.28	4.64
7	CU	9.57	9.48	19.06	9.53
8	ZN	3.18	2.42	5.60	2.80
9	PB	2.02	1.61	3.63	1.82
10	BR	0.38	0.529	0.909	4.54
11	RB	1.46	0.373	1.833	0.914
12	SR	43.8	40.10	83.90	41.95

Table.3 Analysis results of seeds sample (0.8 g and 0.2g starch)

No.	Elements	mg/kg	mg/kg	Total	Average
1	K	9190	220	9410	4705
2	CA	652.0	225	877.0	438
3	CR	38.8	40.7	79.5	39.7
4	MN	20.2	28.6	48.8	24.4
5	FE	96.6	194	290.6	145.1
6	NI	4.40	4.39	8.79	43.9
7	CU	8.37	9.81	18.18	9.9
8	ZN	27.90	25.0	52.90	26.95
9	PB	1.83	1.66	3.49	1.74
10	BR	1.43	2.20	3.63	2.86
11	RB	5.05	1.41	6.46	3.23
12	SR	41.1	41.0	82.1	41.5

Table.4 Summary of results analysis of seeds sample in table 2 and table 3

No.	Elements	Avr.Result-table 2/mg/kg	Avr.Result-table 3/mg/kg	Total-Avr.	Average
1	K	4700	4705	9405	4702
2	CA	3326	438	3764	1832
3	CR	3.70	39.7	43.46	21.73
4	MN	2.48	24.4	26.88	13.44
5	FE	148	145.1	293.1	146.5
6	NI	4.64	43.9	48.54	24.27
7	CU	9.53	9.9	19.43	9.71
8	ZN	2.80	26.95	29.75	14.87
9	PB	1.82	1.74	3.58	1.79
10	BR	4.54	2.86	7.40	3.70
11	RB	0.914	3.23	4.144	2.07
12	SR	41.95	41.5	83.45	41.72

Fig.1 Seeds of *Cephalocroton cordofanus*



B. Element components of the seeds of *Cephalocroton cordofanus*

The analysis of seeds components revealed that Potassium element shows the highest ratio which is equal to 4702 mg/kg and Calcium comes in the second class by 1832 mg/kg. On the other hand ferrous element shows 148 mg/kg. This explains that the seeds of this shrub enrich with those elements (Tables, 2, 3 and 4).

The study explained that the seeds of *Cephalocroton cordofanus* are rich in Proteins and Fats as organic substances and Potassium, Calcium and Ferrous as elements. All these organic and elements are essential to the human being and animals.

Recommendations

The research has come up with some recommendations, which are as follows:

1. The shrub should be protected from being cut down through the expansion of mechanized and traditional cultivation and repeating burning.
2. The high percentage of Proteins, Fats, Potassium, Calcium and Ferrous encourage conducting further researches to know more about the seeds compositions.

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