

EXPLORATION OF SOME IMPORTANT NUTRIENTS FROM ANGIOSPERMIC PARASITIC PLANTS OF THAR DESERT OF RAJASTHAN

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Detection of nutritive contents were analyzed on different plant parts viz. root, stem and flower of *Cistanche tubulosa* (Orobanchaceae) and *Orobanche aegyptiaca* (Orobanchaceae) complete root parasite on *Calotropis procera* and *Brassica campestris*, respectively. Crude protein concentration on dry matter basis was found to be higher in flower of *Orobanche aegyptiaca* when compared with those of various plant parts of *Cistanche tubulosa*. Amount of ether extract, crude fibre, ash, nitrogen free extract, organic matter, total carbohydrates, calcium, and phosphorus showed considerable variation in the plant species studied. However, maximum amount of ether extract was found in stem of *Cistanche tubulosa*. The amount of crude fibre was very high in flower of *Orobanche aegyptiaca* as compared to other parts of same plant and *Cistanche tubulosa*. Maximum total ash value was observed in the root of *Orobanche aegyptiaca*. The amount of nitrogen free extract was comparatively high in the root of *Cistanche tubulosa*. Maximum amount of organic matter was found in the stem of *Orobanche aegyptiaca*. Total carbohydrate was found maximum in stem of *Orobanche aegyptiaca*. The amount of calcium and phosphorus was approximately equal in both the plants. However calcium was found maximum in stem of *Cistanche tubulosa*.

Keywords: *Brassica campestris*; Calcium; *Calotropis procera*; Crude protein; Crude fibre; *Cistanche tubulosa*; Drymatter; Ether extract; Nitrogen free extract; Nutritive contents; Organic matter; *Orobanche aegyptiaca*; Phosphorus; Total ash.

Introduction

The major problem of Indian desert is increasing livestock population at a rapid rate. The fodder sources here are much limited. The plants growing in the arid zone of Rajasthan are very useful for human being and cattle¹⁻⁶ and the parasitic Angiospermic plants of this region can also be used as food^{7,8} fodder and source of medicinally important salts and vitamins. Hence, attempts have been made to furnish information regarding nutritive content from root, stem and flower of *Cistanche tubulosa* and *Orobanche aegyptiaca*. Bains and Harsh^{9,10} reported free and bound amino acids and ascorbic acid from *Citrullus lanatus* and *Withania somnifera*. Yadav *et al.*¹¹, studied action of *Capparis decidua* against alloxan-induced oxidative stress and diabetes in rat tissues. Agrawal¹² also found minimum crude protein in the root of *Cistanche tubulosa* as compared to

other parts of same plant, which is parasite on *Calotropis procera*.

Material and Methods

Plant parts were collected during morning hours in the polythene bags. Bags were tightened immediately to have no loss of moisture. The samples were dried, powdered and then used for their nutritional value such as crude protein, ether extract, crude fibre, total carbohydrates, nitrogen free extract, calcium, phosphorus and total ash etc.

The powdered material was subjected to chemical analysis by A.O.A.C.¹³⁻¹⁵ procedure. For the estimation of the chemical constituents of plants 5 samples of each plant parts were taken for analysis.

Results and Discussion

The average or mean values of the nutritive contents in two test plant sps. *Cistanche* and *Orobanche* are presented (Table 1).

Table 1. Nutritive values of the flower, stem and root *Cistanche tubulosa* root parasite on *calotropis procera* and *Orobanche aegyptiaca* root parasite on *Brassica campestris*.

Plant Parts	Name of Plant Sps.	Moisture content Avg Values	Crude Protein Avg Values	Ether Extract Avg Values	Crude Fiber Avg Values	Total Ash Avg Values	N ₂ Free Extract Avg Values	Organic Matter Avg Values	Total Carbohydrate Avg Values	Calcium Avg Values	Phosphorus Avg Values
FLOWER	<i>Orobanche aegyptiaca</i> on <i>Brassica campestris</i>	94.91	13.56	3.41	67.52	8.2	7.31	91.8	74.83	3.6	0.47
	<i>Cistanche tubulosa</i> on <i>Calotropis procera</i>	94.84	12.25	2.72	16.92	12.7	55.41	87.3	72.33	3.6	0.39
STEM	<i>Orobanche aegyptiaca</i> on <i>Brassica campestris</i>	95.09	9.18	1.70	12.18	5.38	71.64	94.62	83.82	1.4	0.25
	<i>Cistanche tubulosa</i> on <i>Calotropis procera</i>	95.02	6.56	4.40	21.55	10.82	56.67	89.18	78.22	5.28	0.29
ROOT	<i>Orobanche aegyptiaca</i> on <i>Brassica campestris</i>	95.57	8.75	0.47	5.39	25.14	60.25	74.86	65.64	3.3	0.28
	<i>Cistanche tubulosa</i> on <i>Calotropis procera</i>	95.003	3.06	1.93	7.87	10.66	76.48	89.34	84.35	3.08	0.21

Mean values expressed in percentage on dry matter basis

Moisture content was found almost equal in all plant parts of both parasitic plants. However, maximum moisture content was found in root of *Orobanche aegyptiaca* and minimum was in flower of *Cistanche tubulosa*. It was found to be higher in the flower, stem and root of *O. aegyptiaca* as compared to *Cistanche tubulosa*. The maximum amount of crude protein was found in flower of *Orobanche aegyptiaca* and minimum amount was found in root of *Cistanche tubulosa*. According to Agrawal¹² minimum amount of crude protein is present in the root of *Cistanche tubulosa* as compared to other parts of same plant which was parasite on *Calotropis procera*.

The ether extract amount showed considerable variation in the plant sps. studied. Maximum ether extract was found higher in stem of *Cistanche tubulosa* as compared to stem of *Orobanche aegyptiaca*, whereas in flower of *Orobanche aegyptiaca* ether extract amount was higher as compared to *Cistanche tubulosa*. Minimum amount of ether extract was found in root of

Orobanche aegyptiaca. Agrawal¹² reported higher amount in stem of *Cistanche tubulosa*.

The crude fibre concentration was maximum in the flower of *Orobanche aegyptiaca* and minimum in root of same plant. Agrawal¹² did his research work on *Cistanche tubulosa* with different hosts and he reported maximum amount of crude protein in stem of *Cistanche tubulosa*.

A huge variation showed in the total ash value between the plant sps. observed in present investigation. Maximum ash value was found in *Orobanche aegyptiaca* root and minimum ash value was reported in the stem of *Orobanche aegyptiaca*.

The amount of nitrogen free extract was higher in the root and flower of *Cistanche tubulosa* as compared to *Orobanche aegyptiaca*. Whereas in the stem of *Orobanche aegyptiaca* the amount of nitrogen free extract is higher as compared to *Cistanche tubulosa*. Agrawal¹² reported maximum amount in flower of *Cistanche tubulosa* root parasite on *Calotropis*

procera.

Concentration of organic matter were found higher in flower and shoot of *Orobanchae aegyptiaca* as compared to other plant. It was found maximum in the stem of *Orobanchae aegyptiaca* and minimum in the root of same plant.

Total carbohydrate value observed maximum in the root of *Cistanche tubulosa* and minimum in the root of *Orobanchae aegyptiaca*.

The amount of calcium was maximum in the stem of *Cistanche tubulosa* and minimum in the stem of *Orobanchae aegyptiaca*. The flower of *O.aegyptiaca* contained higher amount of the phosphorus while the roots of *C.tubulosa* have minimum amount of it. The data thus indicates these terrestrial parasitic plants growing in the Indian Thar desert may be useful for cattle as well as for human being as nutritive food which support the earliar findings of Maberley⁷ and Rubiales⁸ in Spain (Europe).

The total carbohydrate contents of the flower, shoot and root of the *Orobanchae aegyptiaca* and *Cistanche tubulosa* were observed in a very considerable high amount and the rich quantities of protein in all the plant parts studied indicates that these plants are not only provide energy and nourishment to the live stock of the area but also calcium & phosphorus rich food (milk and flesh etc.) for human beings and for the carnivores animals dependent on the herbivores of the Thar desert which is a very important event for the flow of energy and recycling of minerals in the food chain and food web of the desert ecosystem.

Hence, it has been concluded that our present investigation on these plant *sps.* are very useful as far as the food and fodder habits of the live stock of the desert area is concerned and these plants can serve as alternate source for the local habitants in adverse climate conditions.

Acknowledgement

The authors thankfully acknowledge Dr. Tribhuvan Sharma (Department of Animal nutrition and college of Veterinary and Animal Science, Bikaner, Rajasthan) for providing us his valuable time, suggestions and laboratory facilities and grateful to UGC for financial

assistance.

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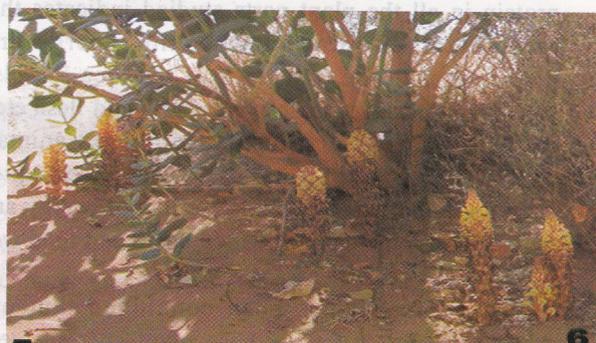
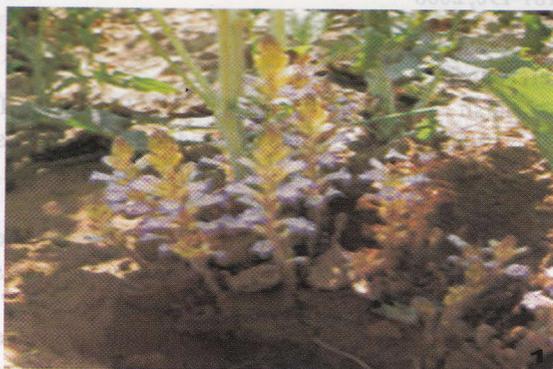


Fig.1. *Orobancha aegyptiaca* root parasite on *Brassica campestris*; **Fig.2.** Showing root association with host of *Orobancha aegyptiaca*.; **Fig.3.** *Cistanche tubulosa* root parasite on *Calligonum polygonoides* and *Aerva tomentosa*; **Fig.4.** Showing root association of *Cistanche tubulosa* with host; **Fig.5.** *Cistanche tubulosa* with their host on Sand dunes; **Fig.6.** *Cistanche tubulosa* root parasite on *Calotropis procera*.

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