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PHYTOCHEMICAL STUDY ON LEAVES OF *CORDIA OBLIQUA* WILLD

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ABSTRACT
Cordia obliqua Willd is an important plant belongs to the family Boraginaceae. It is considered as one of the controversial drug in ayurveda since more than one botanical source is assigned to the drug. Protein, crude protein, ether extract, crude fibre, ash insoluble silica, carbohydrate, sugar, reducing sugars, minerals, trace elements and amino acids were found in the leaves of the *cordia obliqua* plant.

KEYWORDS: *Cordia obliqua*, Protein, Carbohydrate, Mineral, Amino acids.

INTRODUCTION
Plants have been used to treat or prevent illness since before recorded history and plant-based medicaments are the basis of many of the modern pharmaceuticals we use today for our various ailments.[1] Phytochemical studies have attracted the attention of plant scientists due to the development of new and sophisticated techniques. They played a significant role in giving the solution to systematic problems on the one hand, and in the search for additional resources of raw materials for pharmaceutical industry. Nutrient contents are the important fodder trees of Eastern Himalyas.[2-4]

Cordia obliqua Willd

Cordia oblique Willd is also known as lasora, chhota, lasora (Hindi), ***Cordia*** is a genus of flowering plants in the borage family, Boraginaceae. It contains about 300 species of shrubs and trees, which are found worldwide mostly in warmer regions. Many of the species are commonly called **manjack**, while ***bocote*** may refer to several Central American species in Spanish.

Cordia obliqua seeds and leaves extracts were evaluated for antimicrobial activity against some oral pathogenic strains of Gram-positive (*Streptococcus mutans, S. mitis and S. sanguis*) and Gram-negative (A. actinmycetemcomitans, P. gingivalis and B. forsythus) bacteria and fungal stain (Candida albicans).The present study covers the phytochemical study on leaves of Cordia oblique Willd.

MATERIALS AND METHODS
Fodder tree leaves were collected from Kotdwara terai, bhabar and hilly region of Uttrakhand. The collection of plant samples was done in different feeding seasons in which the farmers use to feed their livestock.

Plants were identified as fodder by applying them to the grazing animals in the field and by observation on farmers' collection who regularly collect fodder from the forest. The information about local names, quality and availability of fodder plants were recorded with the help of local experienced farmers. Fodder leaves were collected in polythene bags and kept air-tight till the fresh weight was taken. The plants were then allowed to air-dry. Fodder tree leaves were kept in hot air oven at 60- 70^0C for 48 hours and then the dry samples were kept at 90^0C temperature for 8 hours to determine dry matter content. Oven dried fodder samples were powdered and packaged in air- tight small polythene bags for further chemical analysis.

EXPERIMENTAL
Leaves of the *C**ordia obliqua*** plant were collected and analyzed for protein, amino acids, and carbohydrates, sugars, reducing sugars, minerals and vitamin contents. Protein was analyzed by micro-Kjeldahl procedure.[5] Plant material was defatted with solvent ether and was

macerated with 5 mL 80 % absolute alcohol in a mortar. The extract was filtered in a separating funnel and four volume of acetone was added into it and the separating funnel was shaken for few minutes. After keeping it an upright postion two layers appeared separately. The lower layer was discarded. Upper layer was used for the analysis of free amino acids.[6,7] Qualitative and quantitative estimation of free amino acids were performed by paper chromatography and spectrophotometer method.[8,9] The solvent system used for the development of chromatogram and *n*-butanol : acetic acid: water (4:1:1 v/v)[10] and *n*-butanol:acetic acid: pyridne:water (15:3:10:12).[11] Developed and dried chromatograms were sprayed with 0.1 % solution of ninhydrin and products were visualized by the appearance of distinct coloured spots. These spots were cut with forceps and eluted with distilled water. The concentration of eluted complex was determined by spectrophotometer at 570 nm. Unknown with that of the known (standard) and thus concentration was determined. Carbohydrates[12] are first hydrolyzed into simple sugar using dilute hydrochloric acid. In hot acidic medium glucose is dehydrated to hydroxyl methyl furfural. This compound forms with anthrone a green coloured product with adsorption maximum at 630 nm. A standard graph was plotted between concentrations of the standards on the X-axis *versus* absorbance on the Y-axis. With the help of this graph the concentration of carbohydrate in the samples were calculated. The complete extraction of sugars from plant materials without solubilizing polysaccharides and protein and dissolving other interfering substances was accomplished by 80 % ethanol.[13] Extraction was performed by means of a Soxhlet. The sugar solution was then heated in a water bath, centrifuged and then clarification was performed. The sugar solution gave blue-green colour with anthrone reagent. Its intensity was determined by spectrophotometer at 760 nm. It was compared with the standard and thus the concentration was determined. Benedict's quantitative regent method was used for the estimation of reducing sugars.[14] Analysis of minerals was done by the methods reported by Misra.[15] Iron content was determined by using 2, 2′-dipyridyl reagent, copper by cupron reagent, managanese by formaldoxime reagent and zinc by quinalidinic acid, respectively. Vitamin A was determined by antimony trichloride reagent[16] and vitamin C was determined by using 2, 4-dinitrophenyl hydrazine (DNPH) reagent.[12]

RESULTS AND DISCUSSION

Table-1 indicates that sugars (4.56 %), reducing sugars (1.42 %), non-reducing sugars (3.14 %), Crude fiber (19.88 %), ether extract (2.74 %), crude protein (15.46 %), carbohydratres (32.66 %), vitamin A (++), vitamin C (+++) and Ash (13.91) contents were found in month of June.

Table-2 indicates that calcium (2.27 %), Phosphorus (1.48 %), Magnesium (2.30 %), Potassium (2.06 %), iron (0.070 %), Copper (++), Manganese (++) Zinc (+) were found in month of June.

Table-3 shows amino acids composition of the leaves of the fodder tree ***cordia obliqua***. Fourteen amino acids were identified and estimated in found in June. The concentration of alanine (2.02%), arginine (1.15%), cystine (2.70%), glycine (1.40%), histidine (1.52%), isoleucine (0.16%), leucine (0.12%), lysine (0.20%) methionine (-), phenylalanine (0.16%), Proline (++), serine (0.40%), tyrosine (++), valine (+) were found in month of June.

Table. 1: Chemical Composition and Nutritive value Of *Cordia obliqua* Willd.

S. No	Dry matter basis (%)	(% in DM)
1	Sugar	4.56
2	Reducing sugar	1.42
3	Non reducing sugar	3.14
4	Crude fiber	19.88
5	Ether extract	2.74
6	Crude protein	15.46
7	Carbohydrates	32.662
8	Vitamin A	++
9	Vitamin C	+++
10	Ash	13.91

*DM= Dry matter

Table-2: Elements composition of *Cordia obliqua* Willd.

S. No	Dry matter basis (%)	(% in DM)
1	Calcium	2.26
2	Phosphorus	1.05
3	Magnesium	2.06
4	Potassium	1.24
5	Iron	0.052
6	Copper	++
7	Manganese	++
8	Zinc	+

Table. 3: Amino acid composition of *Cordia obliqua* Willd.

S. No	Dry matter basis (%)	Chemical Formula	(% in DM)
1	Alanine [2-Aminopropanoic acid]	$C_3H_7NO_2$	2.02
2	Arginine [2-Amino-5-guanidinopentanoic acid]	$C_6H_{14}N_4O_2$	1.15
3	Cystine [2-Amino-3-sulfhydrylpropanoic acid]	$C_6H_{12}N_2O_4S_2$	2.70
4	Glycine [2-aminoacetic acid]	$C_2H_5NO_2$	1.40
5	Histidine [2-Amino-3-(1*H*-imidazol-4-yl)propanoic acid]	$C_6H_9N_3O_2$	1.52
6	Isoleucine [2-Amino-3-methylpentanoic acid]	HOCCH(NH)CH(CH)CHCH	0.16
7	Leucine [2-Amino-4-methylpentanoic acid]	$C_6H_{13}NO_2$	0.12
8	Lysine [2,6-diaminohexanoic acid]	$C_6H_{14}N_2O_2$	0.20
9	Methionine [2-amino-4(methylthio)butanoic acid]	$C_5H_{11}NO_2S$	-
10	Phenylalanine [2-Amino-3-phenylpropanoic acid]	$C_9H_{11}NO_2$	0.16
11	Proline [Pyrrolidine-2-carboxylic acid]	$C_5H_9NO_2$	++
12	Serine [2-Amino-3-hydroxypropanoic acid]	$C_3H_7NO_3$	0.40
13	Tyrosine [2-Amino-3-(4-hydroxyphenyl)propanoic acid]	$C_9H_{11}NO_3$	++
14	Valine [2-amino-3-methylbutanoic acid]	$C_5H_{11}NO_2$	+

From the above discussion, it is concluded that the fodder shrub leaves of the plant contains adequate nutrients and can be used as a good fodder. The leaves can be profitably fed in combination with dry roughages such as straw and hay, which are poor in protein contents. From chemical analysis results, it is concluded that the Vol. 21, No. 6 (2009) Chemical Analysis of a Fodder Tree Leaves (*Cordia Obliqua* Willd) 4181 nutritive value of the leaves is more in the month of June followed by September. In reality farmers face problem in collecting tree fodder in hot and dry summer, fodder tree leaves are the best solution to feed and fodder scarcity. Therefore, farmers should propagate and cultivate best fodder trees in the community land of the village. In Himalayan region there are many villages where grazing is degrading, the knowledge of good quality fodder trees and their plantation is urgently needed for better use of such potential as well as in the present context of environmental degradation, which is affecting the earth.

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