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PRELIMINARY PHYTOCHEMICAL ANALYSIS OF *CLEOME VISCOSA* - A LESSER EXPLORED CROP OF ECONOMIC IMPORTANCE

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ABSTRACT

The present investigation reports the phytochemical analyses of *Cleome viscosa* L. leaves. The bioactive compounds were screened as per standard laboratory procedures and the results evaluated. Extracts of shade dried leaves were prepared in four solvents namely distilled water, methanol, acetone and petroleum ether. The phytochemical analyses revealed the presence of large range of bioactive compounds like alkaloids, flavonoids, tannins, saponins, phenols, sterols, anthocyanides, flavonols, carbohydrates and proteins. However, their intensity differs in each solvent. The results generated can help in extracting important bioactive compounds for consumption and medicinal usage.

KEYWORDS: **phytochemical, bioactive, *Cleome*, alkaloids,weed**

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INTRODUCTION

Multifaceted progress has been achieved by the researchers worldwide in utilization of medicinal plants for novel drug discoveries. The pressure on these plants in natural populations has thus increased enormously to the point of severely threatening their very survival. A substitute for these medicinal plants has increasingly become the need of the hour. Recently many strategies have been made to explore less utilized plants which are likely to be good sources of these bioactive compounds. Weeds are one such group of plants, many of which are traditionally known to have medicinal properties. But lack of proper knowledge, awareness and screening has limited their use in pharmaceutical sectors. Of late, many weed flora worked out include *Euphorbia helioscopia, Crotalaria retusa, Rumex dentatus, Parthenium hysterophorus, Chenopodium murale, Commelina benghalensis, Solanum nigrum, Sonchus oleraceus, Eclipta alba, Cynodon dactylon* and *Ricinus communis* [1,2]. *Cleome viscosa* L., the species under present investigation is a widely growing weed of the Indian sub-continent. Belonging to family Cleomaceae, it is traditionally known to be of considerable medicinal value. This property is conferred on it by its possessing antihelminthic, analgesic, antipyretic, anti-diarrhoeal, anticonvulsant, hepatoprotective, insecticidal, allelopathic, nematicidal and antimicrobial activities [3][4][5][6][7][8][9][10][11][12]. Despite so much of potential, the status of this species with respect to its usefulness is still debatable [13].For elevating its status in pharmaceutical sectors screening of bioactive compounds is the pioneer step. The present study was contemplated with this objective in mind.

MATERIALS AND METHODS

The seedlings of *C. viscosa* L. were collected from their naturally occurring sites of Jammu University Campus (J&K) and then transferred successfully to the experimental beds of Botanical Garden, University of Jammu and plants raised thereof (August, 2013). Fresh leaves were collected randomly from these plants during the growing season. The leaves were washed thoroughly under running tap water, blotted dry and then shade dried for 5-10 days at room temperature (30^{o}C) in the laboratory. The samples were stored in refrigerator till further analysis.

Extract preparation

Five gm of dried leaves was weighed and crushed in a mortar and pestle to obtain coarse powder. This powder was then added to the required quantity of solvent (water, methanol, alcohol and petroleum ether) and kept undisturbed for 24 hrs. These solutions were filtered using Whatman filter paper (number 40). The prepared extracts were then subjected to different phytochemical tests for qualitative analysis as described by Gupta and Kaul [14] and Kantamreddi *et al* 2010 [15] references therein. The detailed methodology of the tests applied is presented in Table 1.

Table 1
Protocol for analysis of phytochemicals in leaves of C. viscosa.

S. No.	Test	Procedure	Colour	Compound present
1	Sodium hydroxide test	i) Addition of 20% NaOH (2ml) to boiled extract (1ml) ii) Addition of few drops of 20% NaOH to extract	Yellow	i)Flavonoids ii)Flavonols.
2	Lead acetate test	Extract added to lead acetate a solution in a ratio of 1:2 (v/v)	Brown precipitate	Phenols
3	Ferric chloride test	1:2 (v/v) of extract to BSA	Precipitate	Tannins
4	Libermann Bruchard Reaction	Extract in petroleum ether	Blue	Sterols
5	Foam test	Add 1:2 (v/v) of extract to distilled H_2O and shake the resulting solution vigorously	Foam lasting for 10 min.	Saponins
6	HCl test	i)Add 1ml of extract to 5ml dillute HCl ii)Add few drops of 1% aqueous HCl to aqueous extract	i)Pale pink colour ii)Red precipitate	i) Anthocyanides ii) Phlobatannins
7	Isoamyl alcohol test	1:1 ratio of extract to isoamyl alcohol	Red colour formation in upper layer	Leucoanthocyanins
8	Dragendroff reagent test	Addition of 2ml of extract/filtrate to few drops of Dragendroff reagent	Orange brown precipitate	Alkaloids
9	Ninhydrin test	2ml of 0.2% Ninhydrin solution added to boiled extract	Violet	Proteins
10	Salkowski test	i) To 5ml of extract, add 2ml of chloroform and 3ml of H_2SO_4 ii)2ml each of extract, chloroform & conc. H_2SO_4 mixed and shaken well	i)Reddish brown precipitate ii) Chloroform layer shows greenish fluoresence	i)Terpenoids ii) Steroids
11.	Fehling's test	1:1 (v/v) of Fehling A and B reagent solution added to the extract and then heated	Brick-red precipitate	Carbohydrates

RESULTS AND DISCUSSION

The preliminary analyses using standard procedures reveal the presence of phenols, flavonoids, sterols, tannins, saponins, anthocyanides, alkaloids, flavonols, carbohydrates and proteins in the leaves of *C. viscosa*. On the contrary, phlobatannins, terpenoids, leucoanthocyanins and steroids tested negative. Of the compounds present, majority tested positive in both aqueous and methanolic extracts. Except phenols, all others marked their presence in almost all solvents with differences in their colour intensity. Phenols were present only in aqueous extract which points towards the high phenol leaching potential of water than other solvents studied. Intensity of alkaloids and flavonols were greater in aqueous extract (Table 2). This study reveals the leaves of *C. viscosa* to be a fairly good source of natural antioxidants like phenols, flavonoids, tannins and anthocyanides. These antioxidants confer a variety of pharmaceutical properties and assist in curing several cardiovascular and neurological disorders. Moreover, flavonoids and alkaloids provide antimicrobial activity. Alkaloids, saponins and tannins also act as an analgesic and as anti-inflammatory, anti-

spasmodic and antibacterial agents [16]. Many local communities in Rajasthan, Odisha, J&K, Himachal Pradesh, Chhattisgarh and Kerala depend largely on traditional vegetables which provide food and nutritional security to them. One such species is *C. viscosa,* whose leaves are consumed as a vegetable. The locals though are not aware of the rich elemental composition of its fresh leaves. These contain considerable amounts of water, protein, calcium, phosphorus, iron, ascorbic acid, sugar and fat [17] [18] [19] [20] [21] [22]. Coupled with a range of antioxidants, the species can be recommended for better and wider usage. However, for this, knowledge and awareness of the benefits of the said species need to be propagated and improvement undertaken. Further, the species must have evolved these bioactive compounds to carry out several important ecological functions. As already mentioned, the plants grow naturally and luxuriantly in diverse areas of unproductive (like roadsides, fallow lands and disturbed sites) and productive (agricultural fields) nature and have in all likelihood evolved various surviving strategies to ensure its survival in these highly competitive environments. Plants exhibit high fecundity, high reproductive potential and vigorousness [23] which qualifies them as weeds. Production of secondary metabolites i.e., bioactive compounds aids in their survival by equipping them with chemical defences. For example, tannins and alkaloids act as allelopathic agents and fight against herbivory and insect pests [24]. These added advantages can be exploited in future in many industrial sectors particularly the pharmaceuticals. It will help in lessening the pressure on the present-day plants of economic importance.

Table 2
Phytochemical constituents in leaves of C. viscosa in different solvents and intensity thereof.

S.No	Compound	Intensity in different solvents			
		Distilled water	Methanol	Acetone	Petroleum-ether
1.	Phenols	+	-	-	-
2.	Flavonoids	++	++	+	-
3.	Tannins	++	++	-	-
4.	Sterols	-	-	-	++
5.	Saponins	+	+	-	-
6.	Anthocyanides	++	++	-	-
7.	Alkaloids	+++	+	+	-
8.	Phlobatannins	-	-	-	-
9.	Terpenoids	-	-	-	-
10.	Flavonols	+++	+	-	-
11.	ucoanthacyanins	-	-	-	-
12.	Steroids	-	-	-	-
13.	Carbohydrates	+	+	-	-
14.	Proteins	+	+	-	-

Where +, ++, +++ signs indicate presence of low, average, high intensity and – absence of color respectively.

CONCLUSION

Use of different parts of different parts of *Cleome viscosa* in the traditional medicinal practices is already known. The present investigation, though preliminary is a stepping stone to undertake substantive work at a larger scale in this direction. Together these can unravel the actual potential of the species as a pharmaceutical crop*.*

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