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Preliminary phytochemical screening of foliar extract of *Prosopis juliflora*

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Abstract

Prosopis juliflora is a herb which is well known for its ethanobotanical importance in Tribals. In present, study preliminary phytochemicals screening was performed to identify different classes of metabolites by using various organic solvents viz. petroleum, ether, chloroform, acetone, ethanol, methanol and distilled water also. The test was performed for tannins, saponins, phenols, flavonoids and terpenoids. The results revealed the presence of these phytochemicals with different intensity depends upon various solvents. Ethanol show best results for the screening of it is very polar molecules and can dissolve both polar and non polar substance. The bioactive compounds present in the plants are responsible for medicinal properties of the plants. Hence, by the efforts that should be geared upto exploit the biomedical applications of the screened plant due to presence of certain classes of bioactive compounds for their full utilization.

Keywords: Phytochemical screening, *Prosopis juliflora*

Introduction

The Genus *Prosopis* belongs to the family Leguminosae and commonly known as mesquite or Jungli Keekar in Hindi and found in arid and semi arid regions.

It is one of the most invaded species of India because of its high competitive nature. This a fast growing, thorny, deciduous, drought resistant plant. It grows in all soil conditions including waste lands at altitude ranging from 0 to 1.5 meter above sea level (1)

This herb is well known because of its ethnobotanical importance. The plant has been reported to treat oral ailments like toothache (hebbar *et al.* 2004) [2]. The leaves were used against asthma, *bronchitis conjunctivitis* (agra *et al.* 2008) [3] as well as against skin diseases, blood and venereal diseases and act as an insecticide (Senthil Kumar *et al.* 2009) [4] more over the leaves were found to be effective in reduction or eradication of the Phyto Pathogenes like *Xanthomonas campestris* and *Agrobacterium rhizogenes* in an eco-friendly way (Sheikh *et al.* 2012) [5]. Fruit pods are high in sugar and protein and are rich food source for man and beast. *Prosopis* honey is of the highest quality and exudates gum (sathiya and muthuchelian 2008) [22]. It has also been reported that aquous and ethanolic extract from plant used in allopathic medicine are potential source of antiviral, antitumoural and antimicrobial agents (Chung *et al.* 1996, Vietinck *et al.* 1995).

The nutrient concentration in component of *Prosopis juliflora* are quite high as compared to many temperate trees. leaves and small branches together accounted for less then 29% of the biomass in small trees, They contains 60%,57%, 63%,31% and 63% of the total tree N,P,K, Ca and Mg respectively. Fast growing legumes like *Prosopis juliflora* have high litter fall and fixes atmospheric nitrogen (Jumanne *et al.* 1983) [7].

Phytochemicals are a large group of plant desired compound hypothesized to be responsible for the disease protection conferred from diet high in fruits, vegetables, beans, cereals. (karrie 2008).

Phytochemical screening refers to the extraction, screening and identification of the medicinally active substances found in plants.

Some of the bioactive substances that can be derived from plant are flavonoids, alkaloids, carotenoids, tannins, antioxidants and phenolic compounds preliminary screening of phytochemical is a valuable steps, in the detection of bioactive principles present in medicinal plant and subsequently may lead to drug discovery and development. Medicinal plants have bioactive compounds which are used for curing of various human diseases and play an important role in healing (Karande *et al.* 2016) [23].

The plant chosen for study that is *Prosipis juliflora* has several properties that are useful in various fields. In studies several have reported the presence of allelopathic compounds i.e *Prosipis juliflora*. (Nakano *et al.* 2001). Therefore the present study deals with the preliminary screening of phytochemical present in leaf, stem, pod, and stem of *Prosipis juliflora* to evoked it's significance in medicinal plant.

Materials and Methods

For the present study leaves of *Prosipis juliflora* were collected from botanical garden of ITM university campus, Gwalior. Collected leaves were washed and dried at room temperature. Dried leaves were powdered using mixer-grinder and subjected to Soxhlet extraction of chloroform, ethanol, methanol and distilled water. The obtained crude extract was dried in rotatory evaporator and stored in air tight container in refrigerator. These condensed extracts were used for the presence of various bioactive compounds by following standard methods (Kalahotla *et al.* 2004, Sarojini *et al.* 2011).

Alkaloids: Presence of alkaloid was tested by Wagner's reagent. For this 2ml of extracts was mixed with 2ml of Wagner's reagent (1.27gm of Iodine and 2gm of KCl in 100ml distilled water). Formation of brownish- red precipitate indicates the presence of alkaloids.

Phenols: Phenols were tested by Ferric – chloride test. 2ml of test extracts was treated with 2ml of 5% ferric chloride

solution. Formation of blue colour indicated the presence of phenol.

Flavonoids: Flavonoids were tested by performing alkaline reagent test. 2ml NaOH was added in 100microlitre extract, instant yellow colour appeared which become colourless on addition of few drops of dilute acid (H_2SO_4). This change indicated that the extract possess flavonoids in it.

Terpenoids: Salkowski test was performed to test terpenoids in sample. 5ml extract was mixed with 2ml chloroform. Then 3ml H_2SO_4 was added carefully to form a layer. A reddish-brown colour at the lower level shows the presence of terpenoids in it.

Saponins: Saponins were tested by Froth formation test. For this 2ml extract was diluted with distilled water to 20ml and shaken vigorously in a graduated cylinder for 15 seconds. Formation of persistent foam layer of approximately 1cm at the surface indicate the presence of saponins in the extract. This froth become stable for 1 minute.

Tannins: For tannins ferric chloride test was conducted by using solvent extract. Crude extract (1ml) was taken in a test tube and added with 500 microlitres of $FeCl_3$ solution (2%), an intense green, purple, blue or black colour developed which is an evidence for the presence of tannins in foliar extract.

Table 1: Plant metabolites (in grams) extracted by various solvents from 50gm dry plant material.

Plant parts	Solvents					
	Petroleum ether	Chloroform	Acetone	Methanol	Ethanol	Distilled water
Leaves	1.21	2.23	1.0	4.0	4.02	4.01
Flowers	2.04	1.08	2.01	2.02	3.02	3.02
Pods	1.23	1.09	2.8	3.4	3.9	3.4
Stem	0.82	1.0	0.68	2.2	2.01	2.0

Table 2: Phytochemicals analysis of different solvent extracts in leaves of *Prosipis juliflora*

Phytochemicals	Petroleum ether	Chloroform	Acetone	Methanol	Ethanol	Distilled water
Alkaloids	+++	++	++	+++	+++	+++
Flavonoids	++	-	-	++	+++	+++
Saponins	-	+	-	-	-	+
Tannins	+	-	-	++	++	+++
Terpenoids	+	++	-	+	-	+++
Phenols	++	-	+	-	++	+++

+: Less concentration,
 ++: Moderate concentration,
 +++: High concentration,
 -: Absent

Table 3: Phytochemicals analysis of different solvent extracts in pods of *Prosipis juliflora*

Phytochemicals	Petroleum ether	Chloroform	Acetone	Methanol	Ethanol	Distilled water
Alkaloids	+	+	-	-	+++	+++
Flavonoids	-	-	++	+	+++	+
Saponins	-	-	-	-	+	++
Tannins	-	+	-	+	+	+
Terpenoids	+	-	-	-	++	+
Phenols	-	-	-	+	+++	-

Table 4: Phytochemicals analysis of different solvent extracts in flowers of *Prosipis juliflora*

Phytochemicals	Petroleum ether	Chloroform	Acetone	Methanol	Ethanol	Distilled water
Alkaloids	+	+	-	-	++	++
Flavonoids	+	++	++	+	+++	++
Saponins	-	+	-	-	-	+
Tannins	-	+	-	++	-	-
Terpenoids	+	+	++	++	-	++
Phenols	-	-	+	++	+++	++

Table 5: Phytochemicals analysis of different solvent extracts in stem of *Prosipis juliflora*

Phytochemicals	Petroleum ether	Chloroform	Acetone	Methanol	Ethanol	Distilled water
Alkaloids	-	-	++	+++	-	-
Flavonoids	+	+	+++	+	+	++
Saponins	-	-	-	-	-	++
Tannins	-	+	+	++	-	++
Terpenoids	+	+	-	++	+	-
Phenols	+	+	++	++	+	++

Result and Discussion

Preliminary phytochemical investigation reveals the presence of alkaloids, saponins, tannins, flavonoids, terpenoids & phenols as indicated in table 1. The presence of some of these selected bioactive compounds has been demonstrated previously by other researchers. All five solvent extract show variation in their results. As Tannins were strongly present in all extracts of *Prosopis* but they were significantly supported by the finding of Laxhmbai and Amistham 2018, in which they reported their presence in aqueous extract. A similar study also supported that *Prosipis juliflora* leaves showed the presence of tanins, flavonoids& alkaloids in the preliminary phytochemical screening (Sathiya & Muthuchelian, 2008) [22]. A very high flavonoids of *Prosipis juliflora* makes it a potential candidate bearing antioxidant and anticancer properties (Ibrahim 2013) [19] as it was strongly present in chloroform, methanolic, ethanolic and aqueous extract. However saponins in trace amount in them.

Such type of analysis was also conducted by patil *et al.* 2016 in which they observed the presence of many phytochemical such as terpenoids, flavonoids, saponins, phenols and alkaloids etc. with different intensity of their concentrations. In present study it was observed that among all five solvent extract ethanolic extract gives the presence of almost all selected bioactive compound than others. Tannins were most prominent as it indicate its presence in almost all solvent extracts. The high efficiency of ethanol can be attributed to its intermediate polarity leading to extraction of both polar and non-polar compounds (Sofowara 1993).

All of these selected group possess their own property to be significant in various ways. As natural antioxidant mainly come from phenolic compounds (Ali *et al.* 2008) [11]. Tannins binds to proline rich protein and interfere with protein synthesis flavonoids and hydroxylated phenolic substances known to be synthesized by plant in response to microbial impaction and they have to antimicrobial substance against wide array of microorganism (Masjorie 1996). Saponins are known to produce inhibitory effect on inflammation (Just *et al.* 1998) [13].

Terpenoids are reported to have anti-inflammatory, antiviral, antimalarial, inhibition of cholesterol synthesis & antibacterial properties. The result obtained from the present study indicated the existence of different important bioactive compound in the crude extracts of *Prosopis* leaves and indicated a good co-relation between the reported use of the plant in traditional medicine.

Phytochemical study of Ahmed 1989, revealed the presence of certain metabolites not only present in leaves but in other plant parts such as tannins on roots, alkaloids in leaves, flowers and pods and flavonoids in most parts of plant.

Leaves and pods were found to contain high concentration of plant metabolites (Table 1) followed by flowers, leaves and stem. This intensity of result was also observed by Sachi Singh 2012.

The screening of plant parts of *Prosipis juliflora* showed that the leaf, pod, flower, and stem contain most of the

secondary metabolites analyzed. Foliar extract was found to be the richest source of secondary metabolites followed by pod, flowers and stem. These findings were analysed with selected different solvents.

Conclusion

Qualitative Phytochemical screening of crude extracts confirms that this plant is a rich source of active chemical constituents. It was found that ethanolic aqueous leaf extracts of *Prosopis juliflora* exhibited significant activity.

There are three broad categories of plant Secondary metabolites as natural products; terpenes and terpenoids (in 25,000 types), alkaloids (in 12,000 type) and phenolic compounds (in 8,000 type) (Croteace *et al.* 2000). Therefore the present study suggested these important parameter to be studied in future researches and the plant can be proved as a valuable source of medicinal treatment which can be used for the treatment of various diseases. The bioactive metabolites present in *Prosipis juliflora* might serve as leads for development of new drugs source these compounds can be isolated and used as alternate source for synthetic drugs.

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