

Preliminary Phytochemical Screening And Ethno-Medical Importance of Sword Bean

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Abstract:

Canavalia gladiata (jacq)DC is a lesser-known bean commonly called sword bean. This study deals with the preliminary phytochemical screening and ethno-medicinal properties of sword beans. The phytochemical assessments of the sword bean seed show the medicinal value of the plant. Alkaloids, Tannins, terpenoids, flavonoids, Cardiac glycosides, Reducing sugars, Proteins, and Carbohydrates showed positive results in three types of solvents viz., water, Methanol, and Acetone solvents. The whole plant of sword bean used in many traditional and ethano-medicinal practices by their applications.

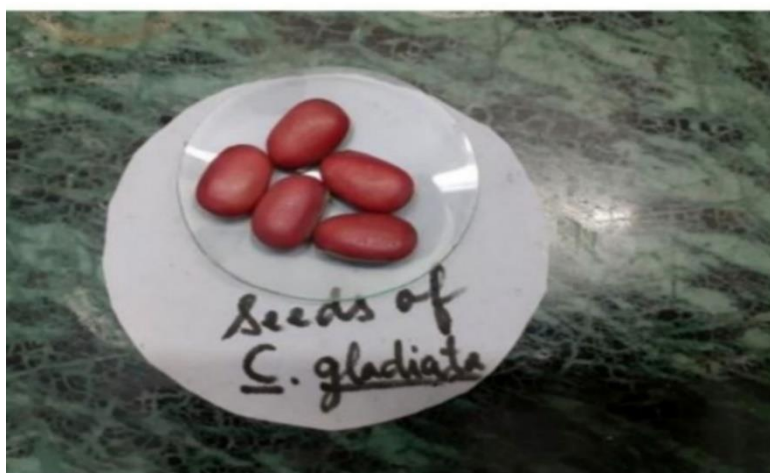
Keywords: Phytochemicals, solvents, seed extracts, sword bean, medicine.

I. Introduction:

Canavalia gladiata (Jacq.) D.C. is a domesticated vegetative crop belonging to Fabaceae, commonly called sword bean or schmitter bean. Sword bean widely distributed in South and Southeast Asia, it is an underutilized legume crop, rich in protein. The immature pods can be used as a vegetable in many countries, mainly sword beans propagated through their seeds planted as a forage and cover crop ((Youseff et al., 1989). *Canavalia gladiata* is an ornamental climber planted on fences and houses. Schmitter bean is rich in high protein and essential amino acid contents, vitamins, and minerals along with phytochemical compounds like alkaloids, tannins, flavonoids, cardiac glycosides, reducing sugars, proteins, and carbohydrates (Pasumarthi et, al.2011) which act culinary agents in many medical treatments and ailments.



Sword bean plant



Sword bean seeds

Plant morphology:

Canavalia gladiata is an annual or perennial climber grown near the trees, and houses (V.N. Pandey 2023). It grows up to 10 meters, Leaves are trifoliolate, leaflets are pubescent, racemose inflorescence consisting of 10- 20 flowers. Flowers are white or light purple colored m 3cm long, Fruits are pods, sword-shaped, 20 – 35cm long, and 3-6cm wide, each pod contains 10 seeds. Seeds are elliptical and measure around 3cm (V. N. Pandey 2023). Schimmter bean plant is drought resistant and flourishes in any type of soil, mainly it is a warm season crop. The present study deals with the phytochemical analysis and medicinal importance of the sword bean plant.

II. Materials and Methods:

Plant material: The sword bean seeds were collected in Maredmilly forest and Paderu areas. Seeds were directly collected from the local cultivars of Maredmilly and Paderu areas and stored in cloth bags. Then the seeds were subjected to pulverization to get coarse powder and stored in an airtight container.

Phytochemical tests: Phytochemicals can be separated from the plant material by various extraction techniques. The most commonly used conventional methods include maceration, ., percolation, infusion, digestion, decoction, soxhelt extraction etc. Solvents like water, methanol, and Acetone were subjected to soxhelt extraction 250gm of seed powder was used against 150ml of solvent. Fractions were collected after some rounds of successful extraction in the soxhelt apparatus (Rufus Auxiliaet.al., 2013). All three extracts were tested for phytochemicals using standard protocols and the results were listed in table 1

Table 1: Phytochemical analysis of various solvent extracts of *canavalia gladiata* seeds.

S. No	Test name	Extraction solvents		
		Water	Methanol	Acetone
1	Alkaloids	-	+	+
2	Tannins	+	+	+
3.	Terpenoids	+	+	+
4	Flavanoids	+	+	+
5	Cardiac-glycosides	+	+	-

6.	Reducing sugar	+	+	+
7	Proteins	+	+	+
8	Carbohydrate	+	-	+

1. Alkaloid test:

Mayer's test: A few drops of Mayer's reagent are added to 1ml of extract. A yellowish or brown precipitate was formed indicating the presence of alkaloids (Junaid R Shaikh and MK Patil.2020).

2. Tannins test:

10ml of aqueous extract was mixed with 0.1% Ferric chloride the positive results for the presence of tannin formed the green color to blue-black (Doss et.al, 2009).

3. Flavanoids test:

2ml of each extract was added to 2ml of water and 5ml of 20% NaoH positive results of flavonoids (Moab, et.al, 2013).

4. Terpenoids:

Salkowski's test: 5ml of each extract was mixed in 2ml of each chloroform and 3ml of concentrated H₂SO₄ was carefully added to form a layer. A reddish brown color shows the presence of Terpenoid (Doss et al., 2009).

5. Cardiac-glycosides (Keller – Kiliani test):

1ml of glacial acetic acid was added to the 1ml of extract containing one drop of Ferric chloride subjected with concentrated sulphuric acid formed ring ranging from green to brown according to the type of cardiac –glycosides presented (Maobe et, al. 2013).

6. Reducing sugar test:

The extract was treated with 5.0ml of Fehling's solution and kept in a boiling bath water bath. The formation of a yellow and red color precipitate indicates the presence of reduced sugar (Thenmozhi et, al.2011).

7. Protein test:

Ninhydrin test: Two drops of 0.2% freshly prepared Ninhydrin solution added to 1ml of extract production of purple color shows the presence of protein ((Junaid R Shaikh and MK Patil.2020).

8. Carbohydrate test:

Fehling's test: 2ml of extract and an equal volume of Fehling's (A &B) solution were added and heated for 5 minutes the result was a red precipitate indicating the presence of carbohydrates. (Junaid R Shaikh and MK Patil.2020).

9. Medicinal importance of sword bean:

Canavalia gladiata is cultivated primarily for the beans consumed by urban people and some tribal communities. Sword bean indicated the presence of phytochemicals of Alkaloids, tannins, terpenoids, flavonoids, cardiac glycosides, reducing sugars, proteins, and carbohydrates. These phytochemicals show some biological activities viz.. antimicrobial, antioxidant, anti-inflammatory activities, etc. The whole Fruits and root paste are used to treat wounds, kidney stones, ulcers, and liver enlargement problems (XIA et, al., 2017). By using leaves to treat Cough, hernia, dysentery (Durant., 2006;Sabjan et.al, 2014), rhinitis, hiccups, pertussis, and gonorrhoea. The plant of *C. gladiata* showed a wide range of applications in traditional medicine. In Korea, traditionally the extract of sword bean is being used in soap for the treatment of athlete's foot and acne. In Malaysia, the leaves of sword bean is used by Malays people for

treating gonorrhoea besides these the leaves are also squeezed into the eyes along with other extract which acts as a magic tonic for the eyes. Japanese used for treating atopic dermatitis, boils, cancers, hemorrhoids, inflammatory diseases, otitis media, ozena, and pyorrhoea (Lim 2011).

III. Results:

Alkaloids play a vital role in metabolism, catabolism, and in plant protection. A yellowish-brown precipitate formed in the Methanol and Acetone solvents, whereas the water solvents reported negative results. Tannins are an important component in the plant phytochemicals that act as astringent. A green color formation was there due to the addition of a few drops of 1% ferric chloride, confirming tannin presence in the seeds of sword bean. A positive color formation appeared in all three solvents viz., Water, Methanol, and, Acetone. Salkowski's test is for terpenoid identification (D Sai kumari and Dr Neeti Saxena.,2019) for all three extracts brown rings formed in the interface between chloroform and sulphuric acid. This is a positive indication of terpenoids in the seed extracts. Flavonoids are a major group of phytochemicals present in plants. Whereas extracts like water, methanol, and acetone extracts formed a yellow color which showed positive results for flavonoids. The cardiac glycosides test is otherwise called as Keller – kiliani test to find out the type of sugar present in the extracts. Water and Methanol solvents showed color indication, absent in Acetone. Reducing sugars were tested against Fehling's solution, and the precipitate formed in water, methanol, and acetone positive indication. Proteins or lipids play a structural and functional role in the plants and act as storage medium to help in growth and development. A purple color observation in the three solvents indicates the presence of proteins in the schmitter bean seeds (Shiva et.al.,2007). Carbohydrates serve as a source of energy and are involved in cell signaling and defense mechanisms. Fehling's test reported positive by forming red precipitation in the water and Acetone extracts. Negative results in Methanol solvent. Water, Methanol and Acetone solvents equally showed the polarity of all the plant compounds.

IV. Discussion:

Phytochemicals are secondary metabolites. They not only protect the plant from different environmental challenges but also act as medicines to treat diseases in various organisms. Extracting the particular compound with suitable solvents can cure numerous diseases, for these extraction processes we used three types of solvents (Azwinda NN.,2015; Dhani et al., 2015) Characterization and evaluation of plants and their phytochemicals can explore evidence to support therapeutic claims of these plants against various ailments. These conventional techniques are easy, affordable a good choice for preliminary phytochemical screening. However, sword bean has high protein underutilized legumes with more nutritional value along with many bioactive properties. There is a huge need to isolate, purify, and evaluate the bioactive components to combat ailments.

V. Conclusion:

Phytochemical analysis is very important to evaluate the possible medicinal utilities of plants and their bioactive principles responsible for known biological activity. Extraction of a phytochemical from the plant mainly depends upon the type of solvent. The test which was applied for phytochemical analysis determines the presence or absence of a phytochemical in the sample. Hence there is a need of more tests should be performed for accurate results.

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