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**Archana AM**
Ph.D. Scholar, Department of Plant Pathology, College of Horticulture, Bagalkot, Karnataka, India

**Lokesha MS**
Special officer Seeds Seed Unit, University of Horticultural Sciences, Bagalkot, Karnataka, India

**Manjunath Hubballi**
Assistant Professor, Department of plant Pathology, COH, Bagalkot, Karnataka, India

**Corresponding Author:**
**Archana AM**
Ph.D. Scholar, Department of Plant Pathology, College of Horticulture, Bagalkot, Karnataka, India

# Qualitative phytochemical analysis of Datura (*Datura metel* Linn.)

**Archana AM, Lokesha MS and Manjunath Hubballi**

**Abstract**
Natural products have been an integral part of ancient traditional medicine systems. The main objective of the study was to investigate the various phytochemical constituents of Datura (Datura metel) extracts using the laboratory method. The qualitative phytochemical screening of Datura metel aqueous extracts indicated the presence of alkaloids, terpenoids, flavonoids, steroids, phenols, saponins, tannins, and glycosides. The presence of these secondary metabolites plays a major role in its antifungal and antimicrobial properties.

**Keywords:** phytochemical, Datura, qualitative, secondary metabolites

## 1. Introduction
*Datura metel* Linn., a member of the Solanaceae family, can be found across the world. The family possesses 85 genera and over 2,800 species. There are about twenty-five species of Datura in the world; they are commonly referred to as "thornapple" or Jimson weed. The term Datura is derived from the early Sanskrit word dahatura, or Dustura (Mann, 1996) [1]. There are several common names for Datura; Reving Nightshade, Thorn Apple, Stinkweed, Devil's Apple, Jimsonweed, and Angel's Trumpet are a few of the most commonly used (Heiser, 1969; Avery, 1959) [2, 3]. The plant known as *Datura metel* Linn. Grows all over India (Pandey, 2003; Variers, 1997) [5]. It is indigenous to Africa and Asia. Widely cultivated and naturalized in tropical It can be found at garbage sites all over India (Bhattacharjee and Supriya Kumar, 1998) [6].
One of the most intriguing herbs with hallucinogenic qualities is datura. The leaves of the plant are both narcotic and antispasmodic (CSIR, 1992) [8], while the entire plant is antiseptic, narcotic, sedative, and beneficial for asthma (Bhattacharjee and Kumar, 1998) [6]. Even though it has a reputation for being one of the more dangerous hallucinogens, people who are interested in the plant's ethnobotanical uses throughout the world still use it today. It has been extensively utilized by society historically, in both the old and new worlds.
Datura has few commercial applications, but it's an interesting topic nonetheless. The plant's alkaloid content has been in high demand in the past, and its application as a subject for botanical research is extensive. From obnoxious weeds to exquisite ornamentals, this genus is full of contrasts (Heiser, 1969) [2]. The current study was conducted to analyze D. metel Linn qualitatively.

## 2. Materials and Methods
### 2.1 Phytochemical analysis of effective botanicals
Phytochemical screening was applied to the *D. metel* extracts using Singh's (2012) [9] methodology.

### 2.1.1 Preparation of plant samples
Plant material (leaf/bulb) of *D. metel* was washed thoroughly under tap water and then air dried under shade for a week and oven dried for 24 hrs at 40 ºC. The dried plant materials were grounded to form a fine powder and filtered through sieve of 345-micron pore size. The ground plant materials were stored in a refrigerator at 4 ºC.
Ten grams of finely ground plant material was soaked in 200 ml of distilled water for 30 min. The macerate was first filtered through double layered muslin cloth and then centrifuged at 5000 rpm for 15 min. the supernatant was filtered through Whatman no.1 filter paper and heat sterilized. The extracts were then stored aseptically in falcon tubes at 4 ºC for further use.

**2.1.2 Preparation of reagents**

**2.1.2.1 Dragendorff's reagent**

In an empty beaker, 0.5 grams of bismuth nitrate was placed and 10 ml of concentrated hydrochloric acid was added. In another beaker, 4 grams of potassium iodide was added with a little water and thoroughly mixed until the KI was dissolved. The two solutions were thoroughly mixed and the formation of a dark solution was observed.

**2.1.2.2 Mayer's reagent**

1.36 grams of mercuric chloride in 60 ml of distilled water was dissolved and added to a solution of 5 grams of potassium iodide in 20 ml of distilled water, making a final volume of 100 ml with distilled water.

**2.1.3 Test for alkaloids**

a. **Dragondroff's test:** To 1 ml of extract, 6 drops of Dragondroff's reagent were added. The appearance of an orange precipitate indicates the presence of alkaloids.
b. **Mayer's test:** After slowly adding drops of Mayer's reagent by the test tube's side to 2 ml of extract, the presence of alkaloids is indicated by the production of a white or creamy precipitate.
c. **2.1.4 Test for flavonoids (Alkaline reagent test)**: To 2 ml of the extract, 2 ml of 2 percent sodium hydroxide solution was added. The presence of flavonoids is indicated by the presence of yellow precipitation.

**2.1.5 Glycoside detection test (Keller-Kilani test)**

Ten ml of the extract were mixed with one drop of 2 percent $FeCl_3$ and four ml of glacial acetic acid. Following this, 1 ml of concentrated $H_2SO_4$ was added. The presence of cardiac glycosides is shown by the formation of a brown ring between the layers.

**2.1.6 Saponin test (Frothing test)**

After shaking a test tube containing 2 ml of extract and 10 ml of distilled water for five minutes, stable foam was observed, which suggests the presence of saponins.

**2.1.7 Test for phenols and tannins using ferric chloride**

When two ml of the extract are combined with a few drops of a 10% ferric chloride solution, the extract turns dark blue or green, signifying the presence of catechol and gallic tannins.

**2.1.8 Terpenoid test (Salkowski's test)**

The presence of triterpenoids is indicated by the formation of a yellow color at the lower layer after adding 1 ml of chloroform to 2 ml of extract and shaking the test tube thoroughly.

**2.1.9 Test for steroids (Salkowski's test)**

2ml filtrate was dissolved in chloroform (10 ml) and added concentrated sulphuric acid (1 ml) into the test tube slowly by wall sides. The colour of the upper layer turned red and the sulphuric acid layer showed yellow with green fluorescence. This indicated the presence of steroids.

**2.1.10 Test for sulphur (Lead Acetate test)**

In a test tube, 2 ml of the extract was added along with 3–4 drops of lead acetate and 2–3 drops of 40 percent sodium hydroxide. The mixture was then stirred until the precipitate was gone. The test tube was heated for two minutes and cooled. A brownish black precipitate appearance confirms the presence of sulphur in the extract (Singh *et al*., 2001) [11].

## 3. Results and Discussion

Table 1 revealed that qualitative analysis of secondary metabolites in *D. metel the presence of* Alkaloid, terpenoids, flavonoids, steroid, phenol, saponin, tannin and glycoside. Datura extract revealed higher concentrations of alkaloids (Drangandroff's test and Mayer reagent test), flavonoids (Alkaline reagent test), glycosides (Keller-Kilani test), saponins (frothing test), phenols and terpenoids (Salkowski's test). Steroids were observed to be in moderate concentrations and tannins were at their lowest concentrations. The results are supported by Muthusamy *et al.* (2014) [10] who revealed that *D. metel* has an antimicrobial activity due to the presence of phytochemical compounds such as alkaloids, terpenoids, steroids, flavonoids, saponins, phenols and tannins.

**Table 1:** Qualitative analysis of phytochemicals in *D. metel* extract

| Sl. No. | Phytoconstituents | *Datura metel* |
|---|---|---|
| 1. | Alkaloid | |
| | a. Drangandroff Test | + + + |
| | b. Mayer Reagent Test | + + + |
| 2. | Flavonoids (Alkaline reagent test) | + + + |
| 3. | Glycoside (Keller-Kilani test) | + + + |
| 4. | Saponin (Frothing test) | + + + |
| 5. | Tannins (Ferric chloride test) | + |
| 6. | Phenolic | + + + |
| 7. | Terpenoids (Salkowski's test) | + + + |
| 8. | Steroids | + + |

+; low concentration, ++; moderate concentration, +++; high concentration, -; absent

## 4. Conclusion

In the present investigation, Qualitative phytochemicals were tested in Datura extract for further study of their antifungal activity *in vitro*.

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