# Phytochemical analysis of *Capsicum annuum longum* stalk as low cost adsorbent for waste water treatment

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**Abstract**

Plants are natural sources of bioactive compounds. Being rich in biocomponents they have tremendous applications in various fields. The main objective of this study is to evaluate the phytochemical contents present in the stalk of *Capsicum annuum longum* by qualitative analysis. Phytochemical screening reveals the richness of the plant extract in terms of various biocomponents like flavonoids, tannins, steroids, etc. Results were positive for tannins, flavonoids and terpenoids in the stalk of Capsicum annuum *longum* and negative for quinones and steroids. Result suggests that stalk of *Capsicum annuum longum* can be used as a bioadsorbent for the waste water treatment.

**Key words:** Phytochemicals, qualitative determination, terpenoids, flavonoids, bio-components.

## 1. Introduction

Water is the most ubiquitous liquid on our planet which is vital to all life forms. In today's scenario, availability of pure drinking water has decreased drastically. Due to industrialization and urbanization various heavy metals are being discharged directly in water bodies which are causing water pollution. Water pollution ultimately leads to environmental degradation. Heavy metals like cadmium, zinc, mercury, lead, etc. are widely used in various industries such as chemical processing, electroplating, tanning etc. [1]. Mercury, lead, chromium, arsenic, nickel are the most toxic heavy metals and major water pollutants posing serious threat to the flora and fauna. In human beings consumption of these heavy metals can cause serious diseases like neurological disorders, damage to liver and kidney, loss of memory, malformed bones in children, premature birth, abortions, cancer, mutations etc. [2]. Therefore it is the need of the hour to focus more on removal of heavy metals from waste water. Number of techniques available for the treatment of water is mainly three types - physical, chemical and biological. All these methods have some kind of merits and demerits. Main demerits are high cost, energy demanding, non eco friendly, disposal problems etc. [3] So there is a requirement of some alternative method which can overcome all these problems.

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In recent years, bioadsorption has attracted much attention due to its environment benign and green nature. Bioadsorbent can be defined as ability of biomaterials to adsorb heavy metals from waste water. Bioadsorbent and the process of bioadsorption offer low operating cost, minimum usage of chemicals, environmental friendly process, less energy consumption, green treatment etc. [4].

*Capsicum annuum longum* is a genus of plants belonging to the family *Solanaceae*. Some species of the genus *Capsicum* are grown for their fruits, which can be consumed fresh, cooked, in dry form or processed forms [5]. In any type of consumption stalk of *Capsicum annuum longum* is of no use.

Research work has been reported on the fruit of *Capsicum annuum longum* as an antioxidant, antibacterial or other medicinal purposes [6-11]. There is a paucity of literature using *Capsicum annuum longum* as bioadsorbent.

Present work proposes the phytochemical screening of the stalk of *Capsicum annuum longum.*

## 2. Materials and methods

Guntur Sannam chilies were collected from Nelamangala farm and identified. All used reagents were of AR grade and procured from Sigma Aldrich.Used sieve was of 150$\mu$ mesh (Consal ISS: 460). For the extraction of stalk of *Capsicum annuum longum* Soxhlet apparatus (BST/SXM-1) was used. For grinding the stalks of *Capsicum annuum longum*, Prestige Elegant 750 Watt mixer grinder was used. Rotavaporater (PBV-70) was used for the evaporation of solvent.

### 2.1 Preparation of green adsorbent

Firstly, stalks were removed from collected *Capsicum annuum longum* and washed thoroughly with distilled water. Stalks of *Capsicum annuum longum* were allowed to dry under the sun for 10 days. After complete drying, stalks were grinded to form a fine powder. Later powder was

sieved using 150µ mesh in order to separate coarser and finer particles. Prepared adsorbent was stored in air tight containers with label [12].

### 2.2. Preparation of stalk of *Capsicum annuum longum* extract

10g of prepared green adsorbent was taken in Soxhlet apparatus. In a round bottom flask, equal ratio of ethanol and distilled water were taken. The powdered green adsorbent was extracted for 48 hours [13]. After 48 hours of extraction, solvent ethanol was removed using Rotavaporater and samples were stored in air tight bottles for qualitative phytochemical tests.

### 2.3. Qualitative phytochemical screening

The prepared extract of *Capsicum annuum longum* was subjected to numerous chemical tests for the detection of the presence or absence of different phytochemical components as per the standard procedures [14].

#### 2.3.1. Test for Tannins

1ml of the sample was taken in a test tube and then 1ml of Potassium ferricyanide was added. After some time 1ml of Ferric chloride containing 0.1N HCl was added. Blue – black colour appeared in the test tube [15].

#### 2.3.2. Test for Flavonoids

5ml of dilute ammonia solution was added to a portion of the crude extract of prepared bio adsorbent followed by addition of conc. sulphuric acid. A yellow colouration observed in the extract which disappeared on standing [16].

#### 2.3.3. Test for Steroids

2ml ofacetic anhydride and 2ml of sulphuric acid was added to 1ml crude extract of plant sample**.** Color changed from violet to blue or green [17].

#### 2.3.4. Test for Quinones

Dilute NaOH was added to the 1ml of crude extract. Appearance of blue green or red coloration in test– tube [18].

#### 2.3.5. Test for Terpenoids

5ml of prepared extract was mixed with 2ml of chloroform. Afterwards 3ml of conc. sulphuric acid was carefully added to form a layer. A layer of reddish brown colouration obtained [19, 20].

## 3. Results and Discussion

Phytochemical screening was carried out on the extract of stalk of *Capsicum annuum longum* for the wide range of phytochemical constituents mainly tannins, flavonoids, steroids, quinones and terpenoids.

In phytochemical screening tannins, flavonoids and terpenoids were found to be present in the stalk of *Capsicum annuum longum* whereas steroids and quinones were absent. Table 1 reflects the results of phytochemical screening of the stalk of *Capsicum annuum longum.*

**Table 1: Qualitative Phytochemical analysis of stalk of *Capsicum annuum longum***

| Serial No. | Phytochemicals | Result |
|---|---|---|
| 1. | Tannins | + |
| 2. | Flavonoids | + |
| 3. | Steroids | - |
| 4. | Quinones | - |
| 5. | Terpenoids | + |

## 4. Conclusion

Phytochemical screening of ethanolic extract of stalk of *Capsicum annuum longum* had revealed the presence of tannins, flavonoids and terpenoids. Results obtained in this investigation indicate that *Capsicum annuum longum* stalk extract is rich in tannins, flavonoids and terpenoids can exhibit reducing activities. To quantify the above phytochemicals, spectroscopic and further heavy metal adsorption studies are under progress.

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