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**AB Khade**

Department of Botany,  
Vivekanand Arts, Sardar  
Dalipsingh Commerce and  
Science Collage, Samarth  
Nagar, Aurangabad,  
Maharashtra, India

**AS Bhuktar**

Department of Botany,  
Vivekanand Arts, Sardar  
Dalipsingh Commerce and  
Science Collage, Samarth  
Nagar, Aurangabad,  
Maharashtra, India

## Preliminary phytochemical analysis of the three species of genus *Zingiber* Boehm

**AB Khade and AS Bhuktar**

**Abstract**

The medicinal plants are useful in Pharmaceutical cosmetic, agricultural and food industry. Many plants are used as herbal medicines against various diseases such as diarrhoea, bronchitis, rheumatism, skin diseases, urinary disorders. The present study deals with phytochemical analysis of methanolic extract of three different species of genus *Zingiber*. The phytochemical analysis reveals the presence of alkaloids, flavonoids, glycosides, tannins, saponin, phenols, terpenoids, phytosterol.

**Keywords:** *Zingiber officinale*, *Z. zerumbet*, *Z. neesatum*, methanolic extract, phytochemistry

**Introduction**

The use of herbal medicines to treat a variety of different diseases is universal and exist in every human culture. Plants are the rich source of these medicines. According to WHO 80% of human population is dependent on herbal medicines. Zingiberaceae is the largest monocotyledons family in India. Zingiberals group has 52 genera and 1400 species concentrated in Indo-Malaysian region of Asia. Out of these 22 genera and 178 species are available in North-eastern and peninsular region of India. Maharashtra state 11 genera and 32 species are found in wild and cultivated state. genus *Zingiber* (L) from family zingiberaceae has medicinal properties hence used in ayurvedic preparation in ancient time. The genus is represented by 121 species reported from tropical and sub tropical regions of Asia, India represents 11 species (J.D. Hooker 1872-1897.)<sup>[1]</sup> distributed in south east India, North east India, Andaman and Nicobar (M Sabu 2006) In Maharashtra 5 species are reported along western ghats in Konkan, Kolhapur. Satara, Ahemadnagar, in semi evergreen forest (S.R. Yadav, M.M.Sardesai) The genus *Zingiber* is medecinally important genus. Therefore the present study was aimed to investigate the phytochemical constituents of three different species of the genus *Zingiber*.

**Material and method**

**Plant collection and preparation**

Fresh rhizome of three species like *Zingiber officinale*, *Z. neesatum*, *Z. zerumbet* were collected from areas of southern western ghats of Maharashtra like Kolhapur, Satara and Ratnagiri districts in monsoon (Sept. to Oct.) The collections were identified taxonomically using flora of Maharashtra, flora of Presidency of Bombay and flora of Kolhapur district. They were washed with tap water, and then with distilled water, cut in to small pieces, shade dried and ground to fine powder, the powder was filtered and kept in air-tight container for further phytochemical analysis.

**Crude extraction**

25 grams of the ground rhizome material were extracted with methanol 300 ml using soxhlet apparatus for 18 hrs and solvent was evaporated to dryness at constant temperature of 72 °C at reduce pressure. The extract were filtered through whatman filter paper no. 42 and concentrated at 40 °C by using an evaporator and stored in amber colour bottle at 4 °C for further use.

Identification test are carried out for various active chemical constituents such as alkaloids, flavanoids, glycosides, tannins, saponin, phenols, terpanoids, phytosterol.

**Correspondence**

**AB Khade**

Department of Botany,  
Vivekanand Arts, Sardar  
Dalipsingh Commerce and  
Science Collage, Samarth  
Nagar, Aurangabad,  
Maharashtra, India

## Identification Test

### 1. Test for carbohydrate

- a. **Benedict's test:** 2 ml of plant extract was taken in the test tube and little amount of Benedict's reagent was added, formation of orange colour indicate the presence of carbohydrates.
- b. **Fehling's test:** 2 ml of plant extract was taken in a test tube and a little amount of Fehling's reagent A and Fehling's reagent B were added formation of reddish brown colour indicates the presence of carbohydrates.
- c. **Molish's Test:** 2 ml of plant extract was taken in a test tube and little amount of Molish's reagent and  $H_2SO_4$  was added in it, formation of violet ring indicate that the presence of carbohydrates.

**2. Protein:** 3 ml of plant extract was taken and 1 ml of 3% of NaOH and few drops of  $CuSO_4$  were added, the solution turns from blue to violet or pink indicate that the presence of protein.

**3. Starch:** 3 ml of plant extract was taken and few drops of dilute iodine solution were added, blue colour appears and disappears on boiling and reappears on cooling showed the presence of starch.

**4. Steroid:** 2 ml of plant extract was taken and 2 ml of chloroform and few drops of conc.  $H_2SO_4$  were added and shake well. Chloroform layer appears red and acid layer shows the greenish yellow florescence indicate the presence of steroid.

**5. Glycoside:** 1 ml of plant extract was taken and 0.5 ml of glacial acetic acid along with few drops of 5%  $FeCl_3$  and conc.  $H_2SO_4$  were added, reddish brown colouration at the junction of two layers and bluish green colour in the upper layers shows the presence of glycoside.

**6. Flavonoids:** 5 ml of plant extract was taken and it was hydrolyzed with 10%  $H_2SO_4$  and allowed to cool and extracting with and divided into 3 equal portions in separate test tubes, 1 ml of 0.1 N sodium hydroxide, 1 ml of diluted sodium carbonate and 1 ml of strong ammonia solution were added in I, II, and III test tube respectively. The development of yellow colour indicates the presence of flavanoid.

**7. Alkaloid:** Plant extract was taken and dil. HCl was added and filtered; filtrate was treated with different alkaloid reagent.

- a. **Mayer's reagent:** 1 ml of filtrate was treated with Mayer's reagent; appearance of cream colour shows the presence of alkaloid.
- b. **Dragon draff's reagent:** 1 ml of filtrate was treated with Dragon draff's reagent, reddish brown colour precipitation indicate the presence of alkaloid.

**8. Tannin:** The plant extract was treated with 10% lead acetate solution; formation of white colour shows the presence of tannin.

**9. Saponin:** 1 ml of plant extract was taken along with 2 ml of distilled water, shake well, persistent foam was observed indicate the presence of saponin.

**10. Phenol:** Ferric chloride test: 2 ml of plant extract was treated with 3-4 drops of ferric chloride solution formation of bluish black colour indicate the presence of phenol.

**11. Terpanoids:** Salkowski's test: To 5 ml of plant extract 2 ml conc. Sulphuric acid ( $H_2SO_4$ ) were carefully added to form a layer, reddish brown colour of inner face indicate the presence of terpanoids.

**12. Phytosterol:** Salkowski's test: Plant extract was treated with chloroform and filtered; the filtrates were treated with few drops of concentrated sulphuric acid shake and allow to stand, golden yellow colour shows the presence of phytosterol.

**13. Test for fixed oil and fat:** Spot test: Press small quantity of extract between two filter papers, oil strains on the filter paper indicate the presence of fixed oils.

## Result Discussion

Table show the result of phytochemical screening for three different *Zingiber* species considered in this study. The result indicate that quantitative chemical analysis was useful for preliminary phytochemical characterization of *Zingiber* species and possible predication which have the more bioactive compound. The result provide an empirical basis for the potential use of these plants in making new drugs. The extract from *Zingiber officinale* revealed the presence of carbohydrate, flavanoid, phenol alkaloid, tannin, glycoside compounds and absence of steroid. The extract from *Zingiber zerumbet* revealed the presence of carbohydrate, glycoside, flavanoid, saponins, phenols, terpanoids and absence of tannins and alkaloids. The extract from *Zingiber neesatum* revealed the presence of carbohydrate, glycoside, flavanoid, phenols, terpanoids and absence of saponins and tannins.

## Conclusion

The methanolic extracts of studied plants showed the presence of bioactive compounds in all the three species are known to have curative activity against various diseases producing pathogens. It could be used pharmacologically for development of new drugs. Therefore the methanolic extract of these species is subjected to further HPLC-MS analysis to investigate various chemical components which can constitute the novel drug for benefits of human health care.

Table 1

S. No.	Phytochemical constituent	<i>Zingiber officinale</i>	<i>Z. neesatum</i>	<i>Z. zerumbet</i>
1.	Carbohydrate	+	+	+
2.	Protein	+	+	+
3.	Starch	+	+	+
4.	Steroid	-	-	-
5.	Glycoside	+	+	+
6.	Flavanoid	+	+	-
7.	Alkaloid	+	+	-
8.	Tannin	+	+	-
9.	Saponin	+	-	+
10.	Phenol	+	+	+
11.	Terpenoid	+	+	+
12.	Oils and fats	+	+	+

'+' = present, '-' = absent

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