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**PHARMACOGNOSTIC AND PHYTOCHEMICAL SCREENING OF  
THE INFLORESCENCE OF *COSTUS SPECIOSUS* (Koenig ex. Retz) J.  
E. Smith.**

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**ABSTRACT**

*Costus speciosus* is one of the most traditionally used plants for its various pharmacological activities it has been used as anti-diabetic as anthelmintic as contraceptives and aborting agents. Pharmacognostic and phytochemical studies have been conducted on the stems leaves roots and rhizomes but the inflorescence have not been much studied. The current study deals with the Pharmacognostic aspects (classification, distribution, microscopic study of *Costus speciosus* and the phytochemical studies performed for the determination of secondary metabolites present in the inflorescence of *Costus Speciosus* (Koenig ex. Retz) J. E. Smith.

**Keywords:** *Costus speciosus*, inflorescence, Pharmacognostic, phytochemical.

**INTRODUCTION**

*Costus speciosus*, an important medicinal and ornamental plant cultivated in India belongs to family *Costaceae* (*Zingiberales*). It is commonly called Creep ginger. Within the *Zingiberales*, *Costaceae* is easily recognized and distinguished from other families by well-developed and sometimes branched aerial shoots that have a characteristic monostichous (one-sided) spiral phyllotaxy. Formerly *Costaceae* was placed as a subfamily within the larger *Zingiberaceae* family due to broad similarities of inflorescence and floral character. Among the different genera, *Costus* is widely studied due to its medicinal and pharmacological properties. *Costus Speciosus* has a long series of synonyms primarily due to its distribution throughout the tropics as a horticulture plant of interest.

**MATERIALS AND METHODS**

**A. Pharmacognostic Study**

**1. Selection of Plant**

The plant selected is *Costus speciosus* (Koenig ex. Retz) J. E. Smith.

**2. Selection of plant part**

The plant part selected was the inflorescence of *Costus speciosus* (Koenig ex. Retz) J. E. Smith.

**3. Description of the selected plant [2, 4]**

Kingdom- Plantae

Phylum- Tracheophyta

Class- Liliopsida

Subclass- Zingiberididae

Order- Zingiberales

Family- Costaceae

Genus- Costus

Species- Speciosus

**4. Description of the selected plant part**

The inflorescence is terminal ellipsoid or ovoid 5-15 cm. The flower bracts are bright red or ovate with leathery pubescent and the apex is sharply pointed. Bracteoles are pale red 1.2 – 1.5 cm. The calyx is red leathery pubescent apex is 3 lobed, the lobes are reddish black rigid and densely sericeous at apex. The labellum is white trumpet shaped, 6.5-9.0 cm apex toothed and crisped with edges overlapping. The capsule is red globose slightly woody. Seed black glossy.

**4. Different Species of *Costus speciosus* [5]**

*Amomum arboreum* Lour., *Amomum hirsutum* Lam., *Banksea speciose* J.Koenig, *Cardamomum arboreum* (Lour.) Kuntze, *Cheilocostus speciosus* (J.Koenig) C.D.Specht, *Costus angustifolius* Ker Gawl, *Costus argyrophyllus* Wall., nom. nud., *Costus crispiflorus* Stokes, *Costus foeniculaceus* Noronha, *Costus formosanus* Nakai, *Costus glaber* (K.Schum.) Merr., *Costus glabratus* Rchb., nom. illeg., *Costus hirsutus* Blume, *Costus lamingtonii* F.M.Bailey, *Costus loureiroi* Horan., *Costus nipalensis* Roscoe, *Costus potierae* F.Muell., *Costus sericeus* Blume, *Costus speciosus* (J.Koenig) Sm., *Costus*

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*speciosus* var. *angustifolius* Ker Gawl., *Costus speciosus* var. *argyrophyllus* Wall. ex Baker, *Costus speciosus* var. *Dilnavaziaen* M.R. Almeida & S.M. Almeida, *Costus speciosus* var. *formosanus* (Nakai) S.S.Ying *Costus speciosus* var. *glaber* K.Schum., *Costus speciosus* var. *hirsutus* (Blume) K.Schum., *Costus speciosus* var. *leocalyx* Nakai, *Costus speciosus* var. *sericeus* (Blume) K.Schum., *Costus spicatus* var. *pubescens* Griseb., *Costus vaginalis* Salisb., *Hellenia grandiflora* Retz., nom. superfl., *Hellenia speciosa* var. *dilnavazii* S.R.Dutta, *Kaempferia speciosa* (J.Koenig) Thunb., *Planera speciosa* (J.Koenig) Giseke, *Pyxa speciosa* (J.Koenig) M.R.Almeida, nom. inval., *Pyxa speciosa* var. *dilnavaziae* (M.R.Almeida & S.M.Almeida) M.R.Almeida, nom. inval., *Tsiana speciosa* (J.Koenig) J.F.Gmel.

### 5. Vernacular names [6]

Total 188 Vernacular names found in 7 languages.

Hindi- kebu, Kannada- aarathikundige, Malayalam- cannakkilannu, Marathi- pushkarmula, Sanskrit- bramhatirtha, Tamil- cekarappati, Telugu- bogachchikadumpalu.

### 6. Microscopic Characters

a. Transverse section of the inflorescence was taken and cleaned with Potassium hydroxide or dilute hydrochloric acid and then treated with few drops of Phluroglucinol and after 1 minute added dilute Hydrochloric acid and mounted on the slide with glycerine and observed under 10x magnification using binocular microscope.

b. Powdered plant crude drug was taken and boiled with dilute sulphuric acid and boiled for 1-2 minutes and washed with distilled water till a clear solution is obtained and taken the powdered material and stained with Phluroglucinol and dilute hydrochloric acid and the other slide containing the powder with strong iodine solution and observed under binocular microscope.

### B. Phytochemical Screening

#### 1. Method of Extraction

Hot Soxhlet Extraction [7]

200 g of the shade dried and powdered inflorescence was taken and extracted in a soxhlet apparatus using ethanol 1.2 litres as solvent at 70°C for a time period of 72 hr and other for cold extraction technique using ethanol for 7 days with intermittent mixing.

The diluted extracts obtained were concentrated using rotary vacuum evaporator at a temperature of 20°C.

### Maceration

200 g of the powdered plant material was taken and 1.5 litres of ethanol was added and kept for 7 days with intermittent shaking, filtered and concentrated using rotary vacuum evaporator. The dried extracts were weighed and the percentage yield obtained

Phytochemical Screening of the hot/cold extract [8-11]

#### Procedure

Alkaloids (Mayer's Test) Mix 2ml of reagent with 2ml of filtrate of plant drug extract.

Steroids (Liebermann-Burchard test)- Mixed extract solution with Chloroform, Added Acetic anhydride and concentrated sulphuric acid from the side of the test tube.

Cardiac Glycosides (Keller-killani test)-The sugar is dissolved in acetic acid containing a trace of Ferric Chloride and transferred to the surface of concentrated sulphuric acid.

Deoxysugars (Keller-killani test)- The sugar is dissolved in acetic acid containing a trace of Ferric Chloride.

Flavanoids (Shinoda test)- Add magnesium powder and a few drops of conc. HCL or sulphuric acid to 2ml of sample solution.

Sesquiterpenes (Salkowski reaction)- To 2ml of extract add 2ml of chloroform and 2ml of concentrated sulphuric acid shake well.

Tannins- Extract shaken with tannic acid.

Saponins- Extract shaken with water.

Gums and mucilage- Extract shaken with water and absolute alcohol added.

## RESULTS AND DISCUSSION

### Pharmacognostic study

Morphological study indicates that the inflorescence is non aromatic having leathery pubescent texture with bright red bracts and trumpet shaped labellum with capsule containing black seeds. Microscopic study shows the presence of lignified vascular bundles and seeds with lignified Trichomes and endosperm with Allurone grains. Stomata and Stigma are also seen. Powder microscopy shows starch grains on staining with iodine and gums and mucilage along with pollen grains are also seen.

### Phytochemical study

The phytochemical study of both extracts obtained from Soxhlet and cold extraction were compared the extract obtained from soxhlet showed the absence of alkaloids and steroids

**Table 1: Organoleptic Characters [8-9]**

Colour	red
Odour	odourless
Taste	Tasteless
Shape	Ellipsoid or Ovoid
Size	5 - 15 cm
Surface	Leathery Pubescent
Bract	bright red or ovate, ca. 2 cm, leathery pubescent, apex sharply pointed
Bracteoles	pale red 1.2- 1.5 cm
Calyx	red, 1.8-2 cm leathery, pubescent, apex 3-lobed; lobes reddish black, rigid and densely sericeous at apex.
Corolla	Tubular 1.0 cm

Lobes	Oblong, elliptical, apex toothed and crisped, with edges overlapping.
Labellum	white, trumpet-shaped, 6.5-9 cm, apex toothed and crisped, with edges overlapping
Stamen	petaloid white with orange yellow base, urceolate, 4.5 * 1.3 cm, pubescent
Capsule	red, globose, ca 1.5 cm, slightly woody. Seeds black glossy, 3mm

**Physical nature of the extract**

Physical parameters	Soxhlet Extraction	Cold Extraction
Colour	Black	Black
Form of Extract	Smooth and oily	Smooth and oily
Odour	Characteristic	Pleasant
Taste	Bitter	Bitter


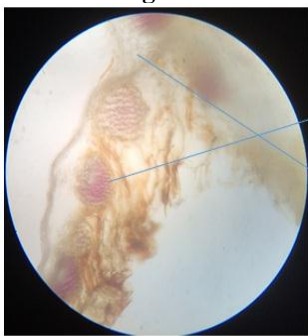
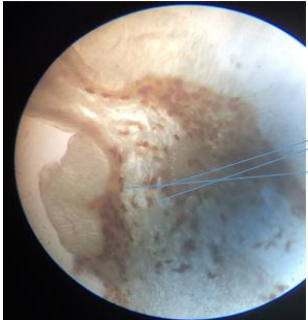



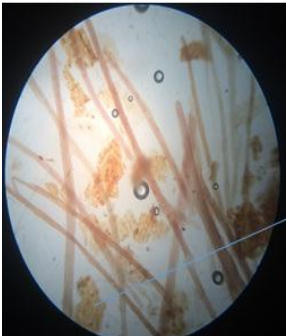
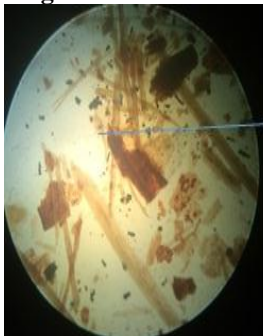
<p><b>Figure 1: Inflorescence of <i>Costus speciosus</i></b></p> 	<p><b>Figure 2: Transverse section</b></p>  <p>Lignified vascular bundles</p> <p>Parenchymal cells</p>
<p><b>Figure 3: Transverse section</b></p>  <p>Stigma</p> <p>Stomata</p>	<p><b>Figure 4: Transverse section</b></p>  <p>Endosperm with Allurone grains</p> <p>Trichomes</p> <p>Figure4</p>
<p><b>Figure 5: Powder Microscopy</b></p>  <p>Stiema</p>	<p><b>Figure 6: Transverse section</b></p>  <p>Lignified Phloem Fibres</p> <p>Pollen Grains</p>
<p><b>Figure 7: Powder microscopy</b></p>  <p>Endosperm with Allurone Grains</p>	<p><b>Figure 8: Powder microscopy iodine stained</b></p>  <p>Starch granules stained purple with iodine</p>

Figure 9: Soxhlet Apparatus

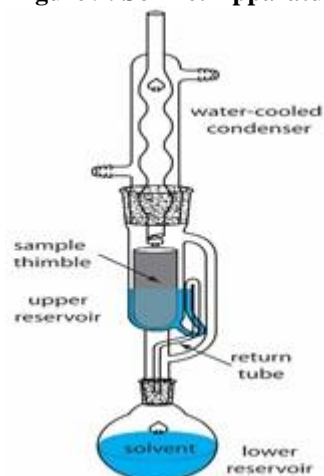


Table 2: Percentage Yield

Soxhlet	4.5 % w/w
Cold extraction	4.62 % w/w

Table 3: Chemical Test

Constituents Tested	Soxhlet extraction		Cold extraction	
	Observation	Inference	Observation	Inference
Alkaloids	No creamy white precipitate	-	Creamy white precipitate	+
Steroids	Purple colour not formed at the junction	-	Purple colour formed at the junction	+
Cardiac Glycosides	Initially the red brown layer changes to blue green	+	Initially the red brown layer changes to blue green	+
Deoxysugars	A reddish brown colour formed at the junction of the two liquids which gradually turns blue	+	A reddish brown colour formed at the junction of the two liquids which gradually turns blue	+
Flavanoids	purple colour	+	purple colour	+
Sesquiterpenes	Chloroform layer appears red and acid layer shows greenish fluorescence.	+	Chloroform layer appears red and acid layer shows greenish fluorescence.	+
Tannins	Buff colour	+	Buff colour	+
Saponins	Stable foam produced	+	Stable foam produced	+
Gums and Mucilages	Cloudy precipitate present	+	Cloudy precipitate present	+

+ = constituent present, - = constituent absent

## CONCLUSION

From the phytochemical studies it reveals the presence of Alkaloids Steroids, Cardiac glycosides, Flavanoids, Sesquiterpenes, Tannins, Saponins, Gums and mucilages as active constituents, the pharmacological activities may be due to the presence of these constituents. This information may help for the production of various formulations using these inflorescence as traditional crude drug for various cardiac diseases.

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## CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

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