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# Screening of Total Phenolic and Flavonoid Content in Conventional and Non-Conventional Species of Curcuma

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The zingiberacea the largest family in zingeberales comprises generally 300 genera and 1000 species. The present study aim at comparing the TPC and TFC in conventional and Non-conventional species of curcuma. The TPC of all three species ranged from 92.30±0.05 to 260 ± 0.025 mg gallic acid equivalent/g and total flavonoid content ranged from 22.52±0.015 to 79.36±0.01 mg quercetin equivalent/g. The results of the study highlighted that conventional curcuma species had higher phenolic and flavonoid content.

*Keyword:* *Curcuma,* Total phenol, Gallic acid, Total Flavonoid.

## 1. Introduction

The genus *Curcuma* (Family: Zingiberaceae) comprises of more than 80 species of rhizomatous herbs. They occur in wild and cultivated forms and are widely distributed throughout the tropics of Asia, Africa and Australia. The most common species is *C. Longa* or turmeric, which is used as a natural food colourant and as an ingredient in various medicinal formulations[1] The medicinal properties of *C. Longa* have been attributed to the presence of curcumin, essential oils and phenolics[2]. The unutilized species, as well as *C. Caesia*, and *C. aamda* possess a wide range of medicinal properties. *Curcuma caesia* is commonly known as black turmeric which is a perennial herb found throughout the Himalayan region, North-east and central India. The paste of rhizome is used traditionally for the treatment of leucoderma, asthma, tumor, piles etc. Essential oil of *C. Caesia* has been known for its antifungal activity[3]. *Curcuma amada* Roxb., popularly known as mango-ginger is having characteristic odour similar to raw mangoes (*Mangifera indica* L.) And used as major ingredient in the pickles, candies, salads, sauces and chutneys[4] Therapeutically, mango ginger is used to treat a range of mood and medical disorders in traditional and *Ayurvedic* medicine[5]. *Curcuma* plants have a camphoraceous aroma and contain many functional compounds such as phenolics, flavonoids and different antioxidant enzymes [6]. The presence of phenolic compounds in medicinal plants are responsible for the antioxidant and anti-inflammatory activities of these species, allowing them to be used as potential chemopreventives[7] The present study to compare the total phenols, flavonoids in rhizomes of conventional (*C. longa*) and non-conventional (*C. amda and C. caecia*) species of in order to explore their pharmacological potential.

## 2 Materials and Methods

### 2.1 Chemicals Standards:

Gallic acid, sodium nitrite, aluminium chloride, sodium hydroxide, sodium carbonate, folin-ciocalteu reagent, Quercetin used were of the highest commercially available purity.

### 2.2 Collection and Preparation of Plant Material

Rhizome of *C. amada, C caesia and C. longa*, were collected from Vanita Ropani nursery Bhopal Rhizomes were washed thoroughly in tap water to remove soil particles followed by sterile distilled water. They were cut into small pieces, shade dried and ground to fine powder. Dried and powdered samples were soxhlet extracted with methanol for 48 hours and the solvent was evaporated to dryness using water bath set at 60°C. After that, the residues were weighed and stored at 4°C until use.

### 2.3 Instruments

UV/Vis double beam spectrophotometer (Techcomp UV-2310 spectrophotometer) and 1 cm quartz cells were used for all absorbance measurements.

### 2.4 Preparation of Standard Solution

Gallic acid and Quercetin 10mg were accurately weighed into a 10 ml volumetric flask, dissolved in 10ml methanol and the solution was made up to 10 ml with the same solvent [1mg/ml].

### 2.5 Determination of Total Phenolic Content

The amount of total phenolics in extracts was determined with the Folin- Ciocalteu reagent. Gallic acid was used as a standard and the total phenolics were expressed as mg/g gallic acid equivalents (GAE). For this purpose, the calibration curve of gallic acid was drawn (Figure II). 1ml of standard solution of concentration 0.01, 0.02, 0.03, 0.04 and 0.05 mg/ml of gallic acid were prepared in methanol. Concentration of 0.1 and 1mg/ml of plant extract were also prepared in methanol and 0.5ml of each sample were introduced into test tubes and mixed with 2.5ml of a 10 fold dilute Folin- Ciocalteu reagent and 2ml of 7.5% sodium carbonate. The tubes were covered with parafilm and allowed to stand for 30 minutes at room temperature before and the absorbance was at read at 760 nm spectrometrically[8].

### 2.6Determination of the Total Flavonoid

Aluminum chloride method was used for flavonoid determination[9]. In this method Quercetin was used as standard and flavonoid contents were measured as quercetin equivalent. For this purpose, the calibration curve of quercetin was drawn (Figure II). 1ml of standard or extract solution (20, 40, 60, 80,100 mg/l) was taken into 10ml volumetric flask, containing 4ml of distill water. 0.3ml of 5%$NaNO_2$ added to the flask. After 5min, 0.3ml 10%$AlCl_3$ was added to the mixture. At the 6$^{th}$ min add 2ml of 1M NaOH was added and volume made up to 10ml with distills water. The absorbance was noted at 510nm using UV-Visible spectrophotometer.

**Table 1:** Absorbance of Standard Compound (Gallic Acid)

| Concentration (µg/ml) | Absorbance (Mean) λmax =760 nm |
|---|---|
| 0.9 | 0.0444 |
| 1.5 | 0.0511 |
| 3.14 | 0.0572 |
| 6.6 | 0.0786 |
| 12.4 | 0.1134 |
| 25 | 0.1944 |

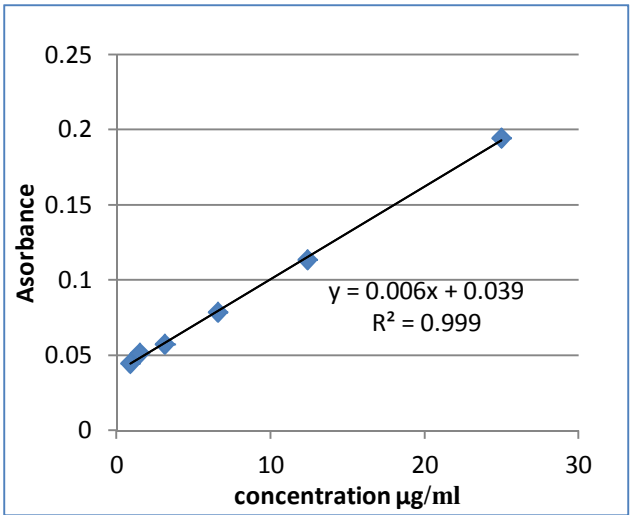


**Fig 1:** Standard Curve of Gallic Acid

**Table 2:** Absorbance of Standard Compound (Quercetin Acid)

| Concentration (µg/ml) | Absorbance (Mean) λmax=510 nm |
|---|---|
| 2 | 0.234 |
| 4 | 0.448 |
| 6 | 0.658 |
| 8 | 0.869 |

**Table 3:** Total Phenolic and flavonoid content in different species of curcuma

| Different Plant Extracts | Total phenol (mg/g) | Total flavonoid (mg/g) |
|---|---|---|
| ***C. longa*** | 260 ± 0.25 | 79.36 ± 0.01 |
| ***C. caesia*** | 134.47 ± 0.06 | 40.6±0.1 |
| ***C. aamda*** | 92.30 ±0.05 | 22.52±0.015 |

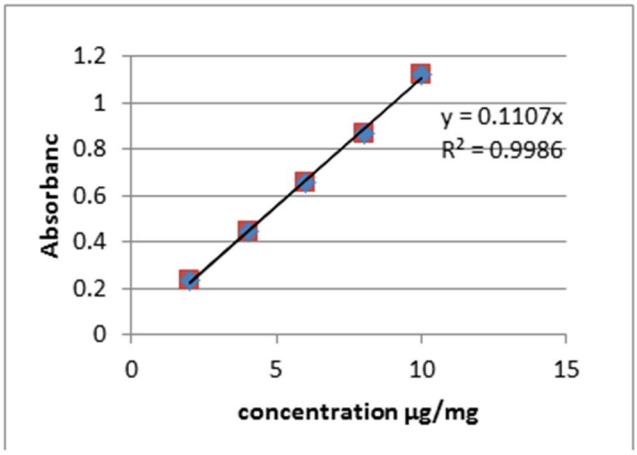


**Fig2:** Standard curve of Quercetin acid

## 3. Results and Discussion

Phenolic compounds are a class of antioxidant agents which act as free radical terminators and their bioactivities may be related to their abilities to chelate metals, inhibit lipoxygenase and scavenge free radicals[10]. The amount of total phenol was determined with the Folin-Ciocalteu reagent. Gallic acid was used as a standard compound and the total phenols were expressed as mg/g gallic acid equivalent using the standard standard curve equation: y = 0.006x + 0.038, $R^2$= 0.999, Where y is absorbance at 760 nm and x is total phenolic content in the extracts of C longa, C. amada & C. caecia expressed in mg/gm. Table.1 shows the variation of mean absorbance with concentration of Gallic acid. Table.3 shows the contents of total phenols that were measured by Folin Ciocalteu reagent in terms of gallic acid equivalent. The total phenol varied from 92.30±0.05 to 260 ± 0.025 mg/g in the extracts.

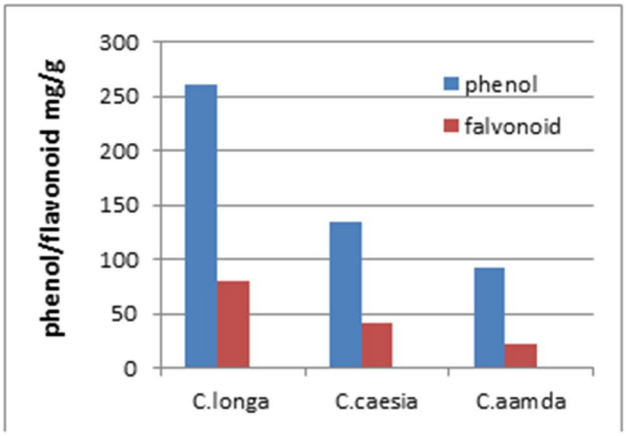


**Fig 3:** TFC & TFC of Curcuma species

The maximum phenolic content was found in the metholic extract (260 ± 0.025) of *Curcuma longa* The amount of total falvanoid was determined with the Quercetin reagent. Quercetin was used as a standard compound and the total falvanoid were expressed as mg/g Quercetin equivalent using the standard curve equation: y = 0.110x, $R^2$= 0.998, Where y is absorbance at 510 nm and x is total flavonoid content in the extracts of *C longa, C. amada & C. caecia* expressed in mg/gm. Table.2 shows the variation of mean absorbance with concentration Quercetin reagent. Table.3 shows the contents of total Falvonoid that were measured by $AlCl_3$ reagent in terms of Quercetin acid equivalent. The total flavonoid varied from 22.52±0.015 to 79.36±0.01 mg/g in the extracts. The maximum flavanoid content was found in the methanol extract (79.36±0.01 mg/g) of *C. longa*. The results obtained from present study showed in Figure III that the extract of *C. longa*, which contain highest amount of flavonoid and phenolic compounds, exhibited the greatest antioxidant activity and among non-conventional species *C. Caecia* species contain the highest phenol and Falvonoid thus can be used to explore new drugs.

## 4 Acknowledgements

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