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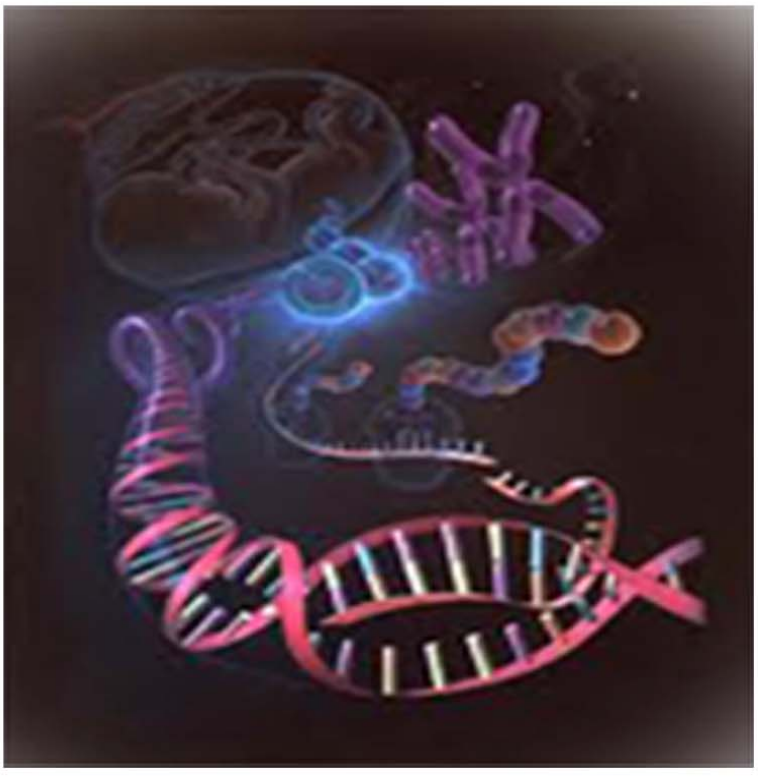

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Research Paper

PHYTOCHEMICAL ANALYSIS OF TWO HIGH YIELDING *CURCUMA LONGA* VARIETIES FROM ANDHRA PRADESH

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Curcuma longa is a major crop spice grown abundantly in India and other tropical countries. Andhra Pradesh is the largest turmeric producer in India. Prathiba and Erragunturu are high yielding *curcuma longa* varieties in Andhra Pradesh. Yield parameters are playing a vital role for cultivation of these two varieties. A qualitative phytochemical analysis was performed for the detection of carbohydrates, aminoacids, starch, glycosides, steroids, terpinoids, alkaloids, tannins, saponin, flavonoid and phenols. Phytochemical analysis revealed specific constituents that might show the protective and disease preventive properties of *curcuma longa* varieties.

Keywords: Phytochemical, *Curcuma longa*, Plants extracts, Antimicrobial

INTRODUCTION

Turmeric (*Curcuma longa*) is a rhizomatous herbaceous perennial plant of the ginger family, Zingiberaceae (Purseglove, 1972). It is native to tropical South Asia and needs temperatures between 20 °C and 30 °C and a considerable amount of annual rainfall to thrive. Turmeric is commonly called *Pasupu* in Telugu, *Kaha* in Sinhala, *Manjal* in Tamil, *Arisina* in Kannada, *Haridra* in Sanskrit and *Haldar* or *Haldi* in Hindi. The continuing research indicates that turmeric and its active principle curcumin have unique antioxidant, antimutagenic, antitumorigenic, and anticarcinogenic, antiinflammatory, antiarthritic, antimicrobial, and hypocholesterolemic properties as reviewed elsewhere (Majeed *et al*., 1995; and Miquel *et al*., 2002). When not used fresh, the rhizomes are boiled for several hours and then dried in hot ovens, after which they are ground into a deep orange-yellow powder commonly used as a spice in curries in India and other South Asian countries (Salvi *et al.,* 2000; and Shirgurkar *et al.,* 2001). In medieval Europe, turmeric known as Indian saffron, since it was widely used as an alternative to the far more expensive saffron spice.

Nizamabad, a city in the south Indian state of Andhra Pradesh, is the world's largest producer

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and most important trading center of turmeric in Asia. For these reasons, Nizamabad in history is also known as "Turmeric City" (Rajan singh jolly). Prathiba and Erragunturu are high yielding *Curucuma longa* varieties in Andhra Pradesh. Prathiba has now ventured up on the task of popularizing the variety in the entire state of Andhra Pradesh.

MATERIALS AND METHODS

Plant Collection and Preparation

The pure and sterilized rhizomes of *Curcuma longa* plant varieties were collected from Turmeric research center in kammerpally, Nizamabad district, Andhra Pradesh, India. The collected rhizomes were washed thoroughly in pure water and dried under shade in open air. The dried rhizomes were placed in mechanical grinder to get the powdered rhizomes. To each 100 mL of ethanol, 100 g powder of dried rhizomes was added separately into two conical flasks and stirred under rotary magnetic shaker for 72 h. Then this mixture was filtered with no 42 Whatman filter paper to get the extracts. These filtered extracts were stored in refrigerator at 4 °C in sterilized air tight labeled bottles until it is required for further use. The extracts were filtered under reduced pressure using rotary flash evaporator and subjected to further preliminary phytochemical tests. Different tests were conducted for the identification of phytochemicals, by using the methods described by Edeogal *et al.* (2005).

IDENTIFICATION TESTS

Various chemical tests are conducted to identify represence of different phytochemicals in both the cultivars (Iyengar, 1995; and Siddique and Ali, 1997).

Test for Carbohydrate

To 2 mL test solution 2 drops of the Molish reagent is added (a solution of α-napthol in 95% ethanol). The solution is then poured slowly into a tube containing 2 mL of concentrated sulfuric acid so that two layers are formed. The formation of a purple product at the interface of the two layers indicates the presence of Carbohydrates.

Test for Amino Acid

To 5 mL of test sample solution, a few drops of 40% NaOH and 10% lead acetate are added and boiled. Formation of black precipitate show the presence of amino acid.

Test for Starch

Mix 3 mL test solution and few drops of dilute iodine solution. Blue color indicates the presence of starch. Color disappear on boiling and reappears on cooling.

Test for Glycoside

To the solution of the extract glacial acetic acid, few drops of 5% ferric chloride and concentrated sulphuric acid are added, and observed for a reddish brown coloration at the junction of two layers and the bluish green color in the upper layer (Siddique and Ali, 1997).

Test for Steroid

To 2 mL of extract 2 mL chloroform and 2 mL conc sulphuric acid are added. The solution is Shaken well. Chloroform layer appears red and acid layer shows greenish yellow florescence (Siddique and Ali, 1997).

Test for the Terpenoids

1 mL of the extract was dissolved in 1 mL of chloroform; 1 mL of acetic anhydride was added following the addition of 2 mL of concentrated

sulphuric acid. Formation of reddish color indicates the presence of terpenoids.

Test for Alkaloid

To 0.5 g of each extract 5 mL of 1% aqueous hydrochloric acid is added and kept in water bath. 1 mL of the filtrates is to be treated with Mayer's reagent (Potassium Mercuric Iodide) . Formation of a yellow colored precipitate indicates the presence of alkaloids.

Test for Tannin

To 0.5 mL of extract solution, 1 mL of water and 1-2 drops of ferric chloride solution is added. Blue color will be observed for gallic tannins and green black for catecholic tannins (Iyengar, 1995).

Test for Saponin

To 1 ml extract 2 mL of distilled water is added and shaken well. Persistent foam formation indicates presence of Saponins.

Test for Flavonoid

To 4 mL of extract 1.5 mL of 50% methanol solution is added. The solution was warmed and metal magnesium is added. To this solution, 5-6 drops of concentrated hydrochloric acid is added, red color will be observed for flavonoids and orange color for flavones (Siddique and Ali, 1997).

Phenols

Phenols are tested by adding 2 mL of ferric chloride solution to 2 mL of plant extract, appearance of bluish green color solution indicates the presence of phenols.

RESULTS AND DISCUSSION

Table 1 shows yield parameters of the varieties of *curcuma longa* in Andhra Pradesh. Prathiba variety of *Curcuma longa* is having high resistance power with low dry recovery, Erragunturu in contrary to that shows low resistance power and more dry recovery than former one.

Table 2 shows the result of phytochemical screening for two different *Curcuma longa* varieties considered in this study. The results indicate that the quantitative chemical analysis was useful for preliminary phytochemical characterization of the *Curcuma longa* varieties and possible predication which have the more bioactive compound. Phytochemical constituents like starch, terpenoids, tannins, saponins, phenols are absent in Prathiba. Test for glycoside constituent could not show positive for the Erragunturu in contrast to variety. Prathiba which showed positive result for glycosides. Both

Figure 1: Prathiba Plant

Figure 2: Erragunturu Plant

Figure 3: Prathiba Rhizome

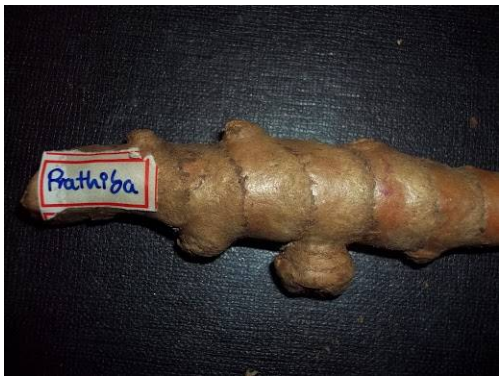

Figure 4: Erragunturu Rhizome

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Figure 5: Rhizome Extracts

Figure 6: Phytochemical Screening Test of Two Varieties of *Curcuma longa*

Table 1: Yield Parameters of Prathiba and Erragunturu

S. No.	Variety	Mean Yield (fresh t/ha)	Crop Duration(days)	Dry recovery(t/ha)	Rizome Size(cm)	Color
1.	Prathiba	39.1	188	18.5	8-13	Oarange yellow
2.	Erragunturu	37.5	190	20.5	9-15	Red orange

Source: Spices board of India, Kerala & IISR, Kozhikode.

Table 2: Phytochemical Screening of Two Varieties of *Curcuma longa*

S. No.	Phytochemical Constituents	Prathiba	Erragunturu
1.	Carbohydrates	+	+
2.	Amino acid	+	+
3.	Starch	–	–
4.	Glycoside	+	–
5.	Steroid	+	+

Table 2 (Cont.)

S. No.	Phytochemical Constituents	Prathiba	Erragunturu
6.	Terpenoids	–	–
7.	Alkaloid	+	+
8.	Tannin	–	–
9.	Saponin	–	–
10.	Flavonoid	+	+
11.	Phenols	–	–

varieties could not show positive response to starch, terpenoids, tannins, saponins and phenols indicating the absence of these phytochemicals.

Presence of varied nature of phytochemicals in three species of curcuma, i.e., *Curcuma longa, Curcuma amda, Curcuma caesia* were also reported by Saxenajyoti and Sahurajeshwari (2012). They also reported that the species *Curcuma caesia* showed more number of phytochemical compounds compared to other two species.

CONCLUSION

Phytochemical analysis revealed the presence of compounds like carbohydrates, amino acids, glycosides, steroids, alkaloids, flavonoids and absence of starch, terpenoids, tannins, saponins and phenols. The presence of more amount of phytochemicals like carbohydrates, amino acid, glycoside, steroid, alkaloid, flavonoid, in Prathiba variety when compared to Erragunturu may show more bioactivity pharmologically. Presence of more bioactive compounds in Prathiba may be correlated to it's resistance power than Erragunturu, since these compounds are known to have curative activity against disease producing pathogens.

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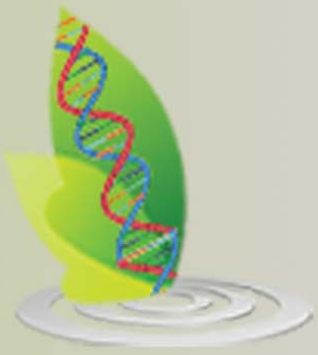

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