



RESEARCH ARTICLE

PHYTOCHEMICAL ANALYSIS OF LEAF POWDER EXTRACTS OF *Rhodomyrtus tomentosa*

\*Gayathri, V. and Kiruba, D.

Department of Botany, Avinashilingam Institute for Home Science and Higher Education for Women,  
Coimbatore – 641043, Tamilnadu, India

ARTICLE INFO

Article History:

Received 09<sup>th</sup> February, 2014  
Received in revised form  
06<sup>th</sup> March, 2014  
Accepted 18<sup>th</sup> April, 2014  
Published online 20<sup>th</sup> May, 2014

Key words:

*Rhodomyrtus tomentosa*, Uses,  
Phytochemical, Fluorescence, Analysis.

ABSTRACT

The plant *Rhodomyrtus tomentosa* is native to Southern and Southeastern Asia. The variety *parviflora* occurs in India and Srilanka. *Rhodomyrtus tomentosa* has been employed in traditional Thai medicine to treat colic diarrhea, dysentery, abscesses, haemorrhage and gynecopathy. The present study was carried out to evaluate the phytochemicals present in the leaf powder and also to study the fluorescent characters of the leaf powder. The phytochemical study showed the presence of terpenoids, quinones, oil&fats and phenol in water, chloroform and ethanol extracts of the leaf powder. Flavonoid was present only in chloroform and benzene extracts. The fluorescence analysis of leaf powder of *R.tomentosa* showed varied colour with the treatment of different chemicals.

Copyright © 2014 Gayathri, V. and Kiruba, D. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Medicinal plants were used by people of ancient cultures, without the knowledge of their active ingredients. Some medicinal plants are used for remedy at household level. Medicinal plants have proved to be effective for prevention and cure of various disorders. Their use against digestive disorders is very common at household level. Usually herbal medicines are widely perceived by the public as being natural, healthful and free from side effects (Mordi and Akanji, 2012). In rural areas, people suffer from common digestive disorders such as diarrhea, dysentery and food poisoning. The extract of medicinal plants in these cases raises the body's immune system and lowers the allergies (Sidhu *et al.*, 2007). It is generally known that the consumption of a variety of local herbs and vegetables by man contributes significantly to the improvement of human health, in terms of prevention and or cure of disease because plants have long served as useful and natural source of therapeutic agents (Chevellier, 1996).

*Rhodomyrtus tomentosa*

*Rhodomyrtus tomentosa* comes under the family Myrtaceae. The plant has been employed in traditional Thai medicine. This plant is an ornamental, evergreen shrub that grows up to four meters height (Lavanya *et al.*, 2012). In this plant, all the parts of the plant are used to treat various digestive problems and diseases. The Chinese use the leaves as a pain killer, root to treat heart burn and seeds as a tonic for digestion and to treat

snake bites. In traditional Thai medicine, it is also used to treat colic diarrhea, dysentery, abscesses, haemorrhage and gynecopathy (Wei, 2006; Ong and Nordiana, 1999). In addition, it has been used to formulate skin whitening, anti-aging and skin beautifying products. Ethnomedicinal activities of this plant may be due to its antioxidant property. Phytochemicals are responsible for medicinal activity of plants and they have protected human from various diseases (Savithramma *et al.*, 2011). Phytochemicals are basically divided into two groups i.e., primary and secondary metabolites (Kumar *et al.*, 2009). Phytochemicals are defined as bioactive non-nutrient plant compounds found in fruits that have been attributed to reduce the risk of major chronic diseases (Blessy *et al.*, 2012). The major constituents of phytochemical consist of carbohydrates, aminoacids, proteins and chlorophylls, while, secondary metabolites consist of alkaloids, saponins, steroids, flavonoids, tannins, etc. (Kumar *et al.*, 2009).

MATERIALS AND METHODS

In the present study, dry sample of the medicinal plant, *Rhodomyrtus tomentosa* leaf is used. A study was carried out on the phytochemical aspects of the plant using different solvent extracts. Fluorescence analysis of the leaf powder was also carried out.

Collection of Plant sample

The fresh leaves of *Rhodomyrtus tomentosa* was obtained from Kengarai village in Nilgiri District of Tamil Nadu, India.

\*Corresponding author: Gayathri, V. Department of Botany, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore – 641043, Tamilnadu, India.

### Preparation of Leaf Powder

The leaves of the plant taken for the present study were collected, cleaned and air dried under shade for about three weeks. After drying, the leaves were then blended using a household electric blender. This fine powder was used for phytochemical and fluorescent analysis.

### Preliminary Phytochemical Analysis

The leaf powder was dissolved in various solvents and the preliminary phytochemical tests were carried out using Harborne (1984).

#### Test for Alkaloids

##### Mayer's Reagent

To 1ml of the extract, 2ml of Mayer's reagent was added. Appearance of dull white precipitate indicated the presence of alkaloids.

##### Test for Flavonoids

To 1ml of extract, 1ml of neutral ferric chloride was added. The formation of brown colour confirmed the presence of flavonoids.

#### Test for Steroids

##### Lieberman-Burchard's Test

The extracts were dissolved in 2ml of chloroform to which 10 drops of acetic acid and five drops of concentrated sulphuric acid were added and mixed. The change of red colour through blue to green indicated the presence of steroids.

#### Test for Terpenoids

##### Salkowski Test

Five ml of each extract was mixed in 2ml of chloroform and concentrated sulphuric acid (3ml) was carefully added to form a layer. A reddish brown precipitate of the interface indicated the presence of terpenoids.

#### Test for Quinone

To 1ml of extract, a few drops of concentrated hydrochloric acid were added. A yellowish brown colour was observed that showed the presence of quinone.

#### Test for Phenols

To 1ml of extract, lead acetate solution was added and the precipitate formation indicated the presence of phenolic compounds.

#### Test for Starch

To 1ml of extract, a few drops of iodine solution were added. Any characteristic colour change showed the presence of starch.

#### Test for Anthocyanin

##### NaOH Test

A small amount of extract was treated with 2ml of NaOH and observed for the formation of blue green colour.

#### Test for Proteins

##### Ninhydrin Test (Acetone)

Ninhydrin was dissolved in acetone. The leaf extract was treated with ninhydrin and observed for the formation of purple colour.

#### Test for Carbohydrates

##### Molisch's Test

Two drops of Molisch reagent was added to an aqueous or hydrochloric acid solution of the extract and two ml of concentrated sulphuric acid was added by the side of the test tube. The formation of reddish violet ring at the junction of the liquids indicated the presence of carbohydrates.

#### Test for Cellulose

To 1ml of extract, a few drops of iodine solution were added followed by a few drops of sulphuric acid. Dark brown (or) red colour observed, showed the presence of cellulose.

#### Test for Fixed Oil and Fat

To 1ml of extract, a few drops of Sudan III solution were added. A shining orange colour obtained showed the presence of fixed oil and fat.

#### Fluorescence Analysis

The behaviour of the leaf sample with different chemical reagents and fluorescence characters of *Rhodomyrtus tomentosa* were observed under ordinary and long ultra violet light.

## RESULTS AND DISCUSSION

The experiments conducted in *Rhodomyrtus tomentosa* for phytochemical constituents and fluorescence analysis showed the following results.

### Preliminary phytochemical analysis of leaves of *R. tomentosa*

In the present study, a preliminary phytochemical analysis was carried out to identify the active constituents such as alkaloids, flavonoids, sterols, terpenoids, quinones, oil and fat, phenol, starch, anthocyanin, protein, carbohydrate and cellulose present in the leaves of *Rhodomyrtus tomentosa*. Preliminary phytochemical analysis of different extracts (ethanol, chloroform, benzene and water) of *R. tomentosa* showed the following results. The dried and powdered leaves of

Table 1. Preliminary Phytochemical Analysis of *Rhodomyrtus tomentosa*

| Test         | H <sub>2</sub> O | Ethanol | Chloroform | Benzene |
|--------------|------------------|---------|------------|---------|
| Alkaloids    | +                | -       | +          | +       |
| Flavonoids   | -                | -       | +          | +       |
| Terpenoids   | +                | +       | +          | -       |
| Quinones     | +                | +       | +          | -       |
| Oil&fat      | +                | +       | +          | +       |
| Sterols      | -                | -       | -          | -       |
| Phenol       | +                | +       | +          | +       |
| Starch       | +                | +       | +          | +       |
| Anthocyanin  | -                | -       | -          | -       |
| Protein      | +                | +       | -          | -       |
| Carbohydrate | +                | +       | -          | +       |
| Cellulose    | +                | +       | +          | +       |

'+' - Present '-' - Absent

Table 2. Fluorescence Analysis of *Rhodomyrtus tomentosa*

| Treatment      | Leaf Powder | Treatment with chemical reagent | Observation   |                  |
|----------------|-------------|---------------------------------|---------------|------------------|
|                |             |                                 | Visible light | UV light (245nm) |
| T <sub>1</sub> | Leaf Powder | Acetic acid                     | Pale Green    | Pale Green       |
| T <sub>2</sub> | Leaf Powder | Picric acid                     | Yellow        | Green            |
| T <sub>3</sub> | Leaf Powder | H <sub>2</sub> SO <sub>4</sub>  | Dark brown    | Green            |
| T <sub>4</sub> | Leaf Powder | FeCl <sub>3</sub>               | Pale Brown    | Dark Green       |
| T <sub>5</sub> | Leaf Powder | 1N HCl                          | Pale Green    | Pale Green       |
| T <sub>6</sub> | Leaf Powder | As such powder                  | Green         | Green            |
| T <sub>7</sub> | Leaf Powder | HNO <sub>3</sub>                | Pale Orange   | Brown            |
| T <sub>8</sub> | Leaf Powder | NaOH                            | Brown         | Dark Green       |
| T <sub>9</sub> | Leaf Powder | H <sub>2</sub> O                | Pale Green    | Pale Green       |

*R. tomentosa* were dissolved in different solvents viz., water, ethanol, chloroform and benzene and the extracts thus obtained were analyzed for the presence or absence of secondary metabolites. In *R. tomentosa*, among the four solvents used for extraction, water, chloroform and ethanol showed the presence of terpenoids, quinones, oil & fats and phenol. Starch and cellulose were found in all the four solvent extracts of leaves of *R. tomentosa*. The sterols and anthocyanin were completely absent in all the four solvent extracts. Alkaloids were observed in water, chloroform and benzene extracts, but flavonoids were observed only in chloroform and benzene extracts (Table-1). Protein was observed in water and ethanol extracts, whereas, out of the four solvent extracts, carbohydrate was observed in three solvent extracts except chloroform. The phytochemical screening of crude methanol extract of *Cinnamomum mercadoi* indicated the presence of saponins, condensed tannins and leucoanthocyanins (Rosalinda *et al.*, 2003). The phytochemical constituents play a significant role in the identification of crude drugs and also to evaluate drugs derived from the plant sources (Moses *et al.*, 2013). The phytochemical screening of leaf of *Phyllanthus amarus* revealed the presence of flavonoids, tannins, alkaloids, terpenoids, saponins and cardiac glycosides (Obianime and Uche, 2008). Phytochemical analysis is very useful in the evaluation of some active biological components of some vegetables and medicinal plants (Oloyed, 2005).

### FLUORESCENCE ANALYSIS

The leaf powder of *R. tomentosa* was extracted in acetic acid, picric acid, H<sub>2</sub>SO<sub>4</sub>, FeCl<sub>3</sub>, 1N HCl, HNO<sub>3</sub>, NaOH and H<sub>2</sub>O. The fluorescence analysis of these leaf extracts were observed under ordinary visible light and also under UV light (245 nm) and recorded in Table-2.

The fluorescence analysis of leaf powder of *R. tomentosa* showed different colour with the treatment of chemicals. When the powder was used as such without any chemical, it was green in colour under both visible and UV light. The leaf powder in treatment with acetic acid, 1N HCl and water showed pale green colour under UV and visible light. When the leaf powder was treated with picric acid and H<sub>2</sub>SO<sub>4</sub>, it showed green colour under UV light. The leaf powder showed brown, pale brown and dark brown under visible light in treatment with NaOH, FeCl<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub> respectively. Yellow and pale orange colour was observed under visible light when the leaf powder was treated with picric acid and HNO<sub>3</sub> respectively (Table-2).

The present study is only a qualitative analysis of the medicinal plant. Further studies on the quantitative analysis of the various bioactive compounds present in the medicinal plant could contribute significantly to the health management of man and could be recommended in our daily need of nutrition.

### REFERENCES

- Blessy B Mathew, Suresh K Jataw and Archana Tiwari. 2012. Phytochemical analysis of *Citrus limonum* pulp and peel. *Int. J. Pharma. Pharma Sci.*, 4(2): 269 – 371.
- Chevellier, A. 1996. The Encyclopedia of medical plant. London. Dorling Kindresley Ltd. (online).http : // www. Chclibrary.org / plant. html.
- Harborne, J.B. 1984. Phytochemical methods II. Ed. In Chapman and Hall, New York. pp. 21 - 26.
- Kumar, A., Ilavarasan, R., Jayachandran T., Decaraman, M., Aravindhan, P., Padmanaban, N. and Krishnan, M.R.V. 2009. Phytochemical investigation on a tropical plant. *Pak. J. Nutr.*, 8(1): 83-85.

- Lavanya, G., Voravuthikunchai, S.P. and Towatan, N.H. 2012. Acetone Extract from *Rhodomyrtus tomentosa*. A potent Natural Antioxidant. Hindawi Publishing Corporation, Evidence Based Complementary and Alternative Medicine: pp. 1-8.
- Liu, R.H., 2003. *Am.J.Clin. Nutr.* 78 : 517 S – 520S.
- Mordi, J.C. and Akanji, M.A. 2012. Phytochemical screening of the dried leaf extracts of *Cnidioscolus aconitifolius* and associated changes in liver enzymes induced by its administration in Wistar rats. *Curr. Res. J. Bio. Sci.*, 4(2) : 153 – 158.
- Moses, A.G., Maobe., Gatebe, E., Gitu, L. and Rotich, H. 2013. Preliminary phytochemical screening of eight selected medicinal herbs used for the treatment of diabetes, malaria and pneumonia in kisii region, Southwest Kenya. *Eur. J. Appl. Sci.*, 5(1): 01-06.
- Obianime, A.W. and Uche, F.I. 2008. The phytochemical screening and the effects of methanolic extract of *Phyllanthus amarus* leaf on the biochemical parameters of male guinea pigs. *J. Appl. Sci. Environ. Manage.*, 12(4) : 73 – 77.
- Oloyed, O. I. 2005. Chemical profile of unripe pulp of *Carica papaya*. *Pak. J. Nutr.*, 4: 379 – 381.
- Ong, H.C. and Nordiana, M. (1999). Malay ethno – medico Botany in Machang, Kelantan, Malaysia. *Fitoterapia*.70(5) : 502 – 513.
- Rosalinda, C., Torres, Fe M. Sison and Mafel C. Ysrael. 2003. Phytochemical studies on the crude methanol extract of *Cinnamomum mercadoi*, *Vidal Philipines J. Sci.*, 132(1) : 27-32.
- Savithramma, N., Linga Rao, M. and Suhurulatha, D. 2011. Screening of medicinal plants for secondary metabolites. *Middle- East J. Sci. Res.* 8:579-584.
- Sidhu, K., Kaur, J., kaur, G. and Pannu, K. 2007. Prevention and cure of digestive disorders through the use of medicinal plants. *J. Hum. Ecol.*, 21(2) : 113-116.
- Wei, F. 2006. Manufacture of oral liquid containing traditional Chinese medicine, extract for treating gynecopathy. *Guangxi Huahong Pharmaceutical Industry, China, Beijing*.

\*\*\*\*\*