

ANTIMICROBIAL ACTIVITY AND PHARMACOGNOSTIC STUDY OF *LUFFA ACUTANGULA* (L) ROXB VAR *AMARA*  
ON SOME DEUTEROMYCETES FUNGI

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Received: 13.01.2012

Accepted: 08.03.2012

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**ABSTRACT**

*Luffa acutangula* (L) Roxb. Var. *amara* of family Cucurbitaceae considered as indigenous to India. It is found throughout India. In Maharashtra particularly in Melghat and Satpuda ranges it occurs frequently. The plant has a medicinal value. The fruits are used in Vatta, Kapha, Anaemia, Asthma, Leucoderma, Tumors. It is also useful as diuretic and in splenic enlargement. For this view the taxonomical, pharmacognostic studies, morphological characters, study were carried out. It has also some antimicrobial activity due to its bitter test.

**Key words:** *Luffa acutangula*. (L) Roxb.var. *amara*, Pharmacognostic study and antimicrobial activity.

## INTRODUCTION

*Luffa acutangula* (L) Roxb. Var. *amara* is a climbing herb with branched tendrils. Leaves broad ovate 5-7 lobed scabrous. Flowers yellow male racemose, female solitary<sup>11,12</sup> penduncle and furrowed. Ovary tomentose. Fruit more or less oblong 5-15 cm long. When mature shallowly furrowed. Seed broad ellipsoid. The nutritive compositions per hundred gram, edible portion of fruit vegetable is 54% protein 1.2 gm, fat 0.1 gm; carbohydrate 0.2 gm, dietary fiber 3.3 gm organic acid 0.11 gm as 0.6 gm minerals like Ca 14 mg; K 160 mg; Mg 14 mg; Na 0 gm; Zn 0.2 mg, thiamin 0.05 mg; riboflavin 0.01 mg; niacin 0.20 mg, C-18 mg<sup>3, 7, 8, 9,10,13,16,17</sup>. It is found in Western, Central and Southern India. In Satpuda range this species is running wild, specially found along the hedges, river and stream banks around the villages, forest areas<sup>22</sup>.

In Marathi it is called as Kadu dodaka, Ranturai, in Sanskrit Katukoshataki, while in Hindi karviturai. All parts of plants are bitter due to development of purgative chemical such as cucurbitacin B, luffin and colocynthin immature fruits are less bitter than the mature fruit. Smaller darker green type of fruits are very bitter than larger lighter green coloured fruits. Seed shows presence of saturated and unsaturated fatty acid, palmitic stearic, oleic, linoleic and traces of lignoceric acid. The plant possesses laxative and purgative property.<sup>2</sup> It shows presence of oleanane type triterpene saponins-acutoside A, B, C, D, E, F and G.<sup>1</sup> The tonic is used for intestinal problem. It can cure vatta, kapha, anaemia, asthma, jaundice, leucoderma, tumors. It is also useful as diuretic and in splenic enlargement. The dried fruit powder used in the form of snuff in jaundice.<sup>4</sup> The seeds possess emetic, expectorant and demulcent property. It is also used traditionally in insect bites by tribes of Western Maharashtra. A powder of the fruit is used for rubbing on the swollen hemorrhoids. Kernel of the seeds is soft smooth and efficient remedy for dysentery. Juice of roasted young fruit is applied to cure headache. Pulp of fruit is also applied to different kinds of bites. It causes vomiting and purging through which the poison is eliminated. Dried fruit is used as a snuff in jaundice or its watery extract is dropped in nostrils. Roots with other plant material used in gonorrhoea and leaf juice as a powerful diuretic. Many physiological<sup>14,15,18,19,21,23</sup> and cytogenetical studies<sup>24,25,26</sup> were done.

Presently it is planned to prepare aqueous extracts of the fruits of the plant and the investigation is under taken to evaluate pharmacognostic studies and antimicrobial activities of fruits<sup>6,20</sup>.

## MATERIALS AND METHODS

### Collection of materials:

For the pharmacognostic investigation of *Luffa acutangula* (L) Roxb. var. *amara* we have collected material from the tribal region of Akola district where the plant is used for edible purpose in October and it was authenticated by Dr. S. P. Rothe Taxonomist, Shri Shivaji college of Akola Maharashtra India. A herbarium is maintained in Department. The fresh fruits were separated and used for the study of anatomical characters where as dried leaf fruit powder was used for the determination of antimicrobial study of the plant.

For anatomical study the free hand thin transverse section of fruit were treated with different staining agent and mounted on a glass slide.

### Extraction:

For antimicrobial activity leaf and fruit were collected, air dried and then powdered in a homogenizer and 5gm was added with 100 ml sterile distilled water. It was macerated for 10 minutes and then filtered through double layer muslin cloth. It was centrifuged at 4000 rpm for 30 minute. The supernatant filtered which was formed then filtered through Whatman No 1. filter paper. It was then heated at 120 °C for 30 min. This extract was preserved at 5 °C for the further studies.

**Test fungi and bacteria:**

Four different fungi were studied for antifungal activity. For that infected crop, vegetable and fruit plant parts were collected from cultivated field, 10 km from Akola city. The diseased crop plant parts were collected separated in polythene bags and symptoms on different host were recorded. Completely dried plant parts were avoided for isolations, as they contain mostly secondary infection. Slides were prepared and isolation was made by cutting small fragments of disease spot along with healthy region. The diseased tissues were surface sterilized with 90% alcohol and transferred aseptically to Asthana and Hawker's medium "A" (5 g glucose, 3.5 g KNO<sub>3</sub>, 1.75 KH<sub>2</sub> PO<sub>4</sub>, 0.75 g Mg SO<sub>4</sub>.7 H<sub>2</sub>O and 15 g agar agar). The slants were completely sterilized to avoid the secondary and bacterial infection. Inoculation were carried out in sterilized inoculation chamber at the temperature 27°C (±2). After 2 or 3 days of inoculation the mycelium coming out of the diseased tissue was picked up and transferred to another fresh slant. The pure cultures maintained in the laboratory for further studies. These fungi were identified from the available literature i.e. with the help of H.L Barnett, Barry B Hunter-"Illustrated Genera of imperfect Fungi" and some already identified cultures in laboratory.

**Table no.1**

| Sr. No. | Strain                        | Specimen                                      |
|---------|-------------------------------|---|
| 1       | <i>Curvularia lunata</i>      | <i>Abelmoschus esculentus</i> (L.) Moench     |
| 2       | <i>Drechslera hawaiiensis</i> | <i>Terminalia catappa</i> L.                  |
| 3       | <i>Fusarium equiseti</i>      | <i>Lycopersicon lycopersicum</i> (L.) Karsten |
| 4       | <i>Phoma sorghina</i>         | <i>Citrus aurantium</i> L.                    |

**Fungal activity:**

15 ml of the Asthana and Hawker's medium "A" was used into Petri plates, allowed to cool and solidify 5 mm disc of 7 days old culture of the test fungi were placed at the center of the Petri plates and aqueous 20 ml fruit and leaf extract added into it. It was then incubated at 25°C (±2°C) for 7 days. After incubation the antifungal activity were studied.

**Bacterial strain:**

Three bacterial strain i.e. *Escherichia coli*, *Staphylococcus aureus* and *Pseudomonas aeruginosa* were isolated from UTI (Urinary Tract Infecting Microflora). Slides were made and then it was transferred to Nutrient agar. Inoculations were carried out in sterilized inoculation on chamber at the temperature at 27°C (±2). After 1 day of inoculation the colonies was picked up and transferred to another fresh slant. The pure culture maintained in the laboratory for further studies. These cultures were identified from the stock culture.

**Anti bacterial activity:**

15 ml Nutrient agar media was poured in petri plates allowed to cool and solidify. 5 mm disc of 7 days old culture of the test bacteria were placed at the center of the Petri plates and aqueous 20 ml fruit and leaf extract added into it. It was then incubated at 25°C (± 2°C) for 7 days. After incubation the antibacterial activity were studied.

**Observation and Result:**

Transverse section of a fruit shows all the general microscopic characteristic of fruit<sup>5</sup> i.e. presence of epicarp, mesocarp and endocarp which are well differentiated.

**Epicarp:**

It is the outermost layer of fruit, made up of thin rectangular cells with a thick cuticle and stomata are seen at regular intervals. In mature fruits and there are layers of sub epidermal collenchymas.

**Mesocarp:**

It is made up of many layers of thin compactly arranged parenchymatous cells, shows lignified fibers and sclerenchymatus cells and layer of lignified cells below epicarp are present in parenchyma; vascular tissue is also observed in parenchymatus region which is partially covered with lignified fiber. Starch grain are also present. The lignified fibers are scattered in mesocarp.

**Endocarp:**

It is made up of simple large polygonal parechymatous cell, which envelops the seeds. These are partially lignified and sclerenchymatus cells are scattered.

**Table 2** -Antibacterial activity of fresh dried leaves extract and fruit extract of *Luffa acutangula* (L) Roxb. var.*amara*.

| Sr. No. | Bacterial strain              | Leaf extract | Fruit extract |
|---------|-------------------------------|--------------|---------------|
| 1       | <i>Escherichia coli</i>       | 2.9 cm       | 3.2 cm        |
| 2       | <i>Staphylococcus aureus</i>  | 1.7 cm       | 2.0 cm        |
| 3       | <i>Pseudomonas aeruginosa</i> | 1.2 cm       | 1.8 cm        |

**Table 3** -Antifungal activity of fresh dried leaves extract and fruit extract of *Luffa acutangula* (L) Roxb. var.*amara*.

| Sr. No. | Fungi                         | Leaf extract | Fruit extract |
|---------|-------------------------------|--------------|---------------|
| 1       | <i>Curvularia lunata</i>      | 2.2 cm       | 3.1 cm        |
| 2       | <i>Drechslera hawaiiensis</i> | 2.0 cm       | 2.8 cm        |
| 3       | <i>Fusarium equiseti</i>      | 1.0 cm       | 0.4 cm        |
| 4       | <i>Phoma sorghina</i>         | 0.9 cm       | 1.3 cm        |

**DISCUSSION**

Medicinal plants have been an important source of drugs for the treatment of diseases for thousands of years. Ayurveda is traditional system of medicine widely practice in India. Ayurveda was most popular before the advent of modern medicine. *Luffa acutangula* (L) Roxb.var.*amara* was also used in medicine. Every part or the plant is remarkably bitter and the fruit is violently cathartic and emetic. Many antibiotics of microbial origin and other chemotherapeutic agent are employed for the treatment of bacterial diseases in modern medical science. Modern medical science considered that microbes are believed to be the primary causative agent of various diseases. Micro-organisms have remarkable resistance capacity to survive under unfavorable condition. The major critical problem in the development of antibiotic drug resistant especially in bacteria .Many antibiotic produces adverse effects on human health. Multi drug resistant also occur in bacteria. The antibiotic drugs are expensive particularly for economically poor class.

The entire above problem associated with the need of alternative effective drug and restrict the extensive uses of currently available antibiotics. Therefore required to treat the trival infections and keeping the antibiotics for emergency use knowledge of herbal medicine could be explored for the purpose, considering the development of drug resistant in bacteria an adverse effect of currently available antibiotic and high cost. With these problems development of alternative antibacterial and

antifungal drugs are required to introduce. As a preliminary steps towards this the present investigation undertaken with the species of *Luffa*.

Fruit extract of *Luffa acutangula* (L) Roxb. was found more potent antibacterial and antifungal activity than leaf extract. *E.coli* showed high sensitivity than *Staphylococcus aureus*, *Pseudomonas aeruginosa* species to leaf and fruit extract of *Luffa*. Among fungi *Curvularia lunata* was found highly sensitive to leaf and fruit extract of *Luffa* while to same extract *Phoma sorghina* showed poor sensitivity.

The anatomical study<sup>14</sup> will be providing useful information in regard to its correct identity and help to differentiate from the closely related other species and varieties of *Luffa acutangula*. Around the vascular tissues sclerenchymatous fibers occurs as bundle sheath is a characteristic feature of *Luffa acutangula* (L) Roxb. var. *amara*.

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