"Amuri"—an elixir from *Musa paradisiaca* L.

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Indian traditional systems of medicine like Ayurveda and Siddha offer medicines called Kayakalpa drugs for rejuvenation and for treating refractive diseases. Amuri is one such drug described in many Siddha texts and manuscripts. An unpublished Siddha palm leaf manuscript *Kanranadi Vakkiyam* describes preparation of Amuri from Banana tree. An attempt has been made in this work to extract Amuri from *Musa paradisiaca* L., standardize its yield and characterize the liquid using physico-chemical parameters.

**Keywords:** Siddha, Kayakalpa, Amuri, *Musa paradisiaca* L.

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Many wonder-medicines for alleviating refractive diseases and aging have been described in Indian Systems of Medicine like Ayurveda and Siddha. In Siddha System of Medicine recipes for anti-aging and therapies for rejuvenation like Kayakalpa preparations are described elaborately. Amuri, Muppu and Guru are the three fundamental Kalpa preparations that find esteemed place in various Siddha books and manuscripts. Of these three, Amuri is cardinal as it is used in the preparations of Muppu and Guru itself besides its singular and adjuvant use for various diseases of vatam, pittam, and kapham disorders. It is also specially indicated in various diseases like stomach disorders, hepatic disorders, urinary disorders, cough, headaches, sinusitis, eye diseases and in various toxic conditions. Since Siddha manuscripts were written in poetic and archaic dialect, different scholars interpret them differently. Therefore there is disagreement among the present day Siddha scholars on the identity of Amuri. Thus, urine of ass, goat, cow, and human beings, water from mist or deep-sea, liquor, white albumin of egg, mother's milk and some herbal juices have been understood to be Amuri. One of unpublished palm leaf manuscripts named *Kandamadi Vakkiyam* (*KV*) that was owned by late Dr. Mandyam Kumar of Bangalore refers to Amuri in detail and identifies it to a specially extracted liquid from the banana tree. The present work is an attempt to decipher and describe the characteristics of Amuri and the technique of obtaining it from *Musa paradisiaca* L. (Banana tree) as explained in *KV*.

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Amuri in Kandarnadi Vakkiyam

A brief description of Amuri as per KV follows. The authorship of the manuscript is attributed to sage Agastiar in the narration. In a stanza of the manuscript, "Kelappa pugalugindra Amuriathin sarigai girigai sarappa Vazhai neer thane..." the author solicits the listener to the theory and practicalities of Amuri and professes that it is indeed a liquid from banana. Here we highlight a few other essential stanzas from KV that characterize Amuri. From the lines, "Pancha bhoothamum niraindha porulam Amuri..."-we infer that Amuri contains all the five bhoothas and six tastes. The same information is also available in other classical literature like Agasthiar muppu vazhalai suttiram-12. The fact that the rays of moon have a strong role to play in the genesis of the founding waters of Amuri can be inferred from the lines in KV-"Candiran kalaiyinal jenithidum nee rum, Candiran kalaiyinal jenithidum uvarum...". Every drop of the ocean responds to the force of the moon. Banana tree, which is full of watery sap has been declared by KV as the source of Amuri. The connection of the genesis to lunar rays is thus not altogether incoherent. Even in other classical literature of Siddhar, it is noteworthy to observe that Amuri has been called "Chandira pushkarnineer" referring it to the moon11. In the following lines from Gnana Vettiyan,"Chandiran Kalaiinaal Janitta Nadam vinduvam, andhagan pol sutrinal agappaduvadillaiye..." relates the origin of Amuri to the lunar rays12. KV speaks of the following synonyms for Amuri in the context of its relation to the moon: Madineer, Paruva neer, Soma neer, Pirai neer, Madi paal, and Soma-rasa panam. In elucidating the uses of Amuri KV registers that, first and foremost, Amuri nourishes the "Aavi" meaning the "sookshuma sariram". The same idea is also conveyed in another Siddha text Nijanandabodam13 which pronounces the importance of moon's rays in the nourishment of shukshma sariram (etheric body). Thus Amuri is highly acclaimed by the Siddhars and is considered to incorporate moon's rays indirectly into our body. In addition to associating Amuri to moon's rays KV also associates it with other celestial periodicities. Thus it speaks of the different names of Amuri according to the month in which it is extracted as meda neer, kumbha neer, risabha neer, etc. The use of terms like rishaba neer for Amuri is also found in other literature. Thus Tiruvalluva nayanar says "Panamai Amuriyena Gangai than paril rishabha meenamaa koorvar... ". This has been interpreted to be ox's urine and the like by a few14. The distinction of Amuri obtained in different months is also alluded to in KV. Also the yield and quality of Amuri as per KV vary with the phase of the moon in any month. To gain the maximum of moon's rays, preparation of Amuri is advised only on full moon day and the post-processing of the liquid after collection is indicated for next consecutive five days. KV has an elaborate description of the uses of Amuri, some of which are as follows:

- Amuri is paramount in the preparations like Muppu and Guru.
Can be used as vehicle or adjuvant therapy in all diseases.

- Tones up the *sthula* (physical body) and *shukshma sareeram* (etheric body —*Aavi*).

- *Amuri dharanai* is important for people doing *dhyanam*, *yogam*, *gnanam*, *sarakalai*, and *vaasi yogam* (meditation and breathing techniques). Amuri can be prepared suiting these requirements. Thus *vaidhya Amuri* (for therapeutic purpose), *Vata Amuri* (in drug preparations), *Yoga Amuri* and *Karpa Amuri* (for rejuvenation) are distinctively spoken of.

- It is used in purification and preparation process of *pashanams* (minerals) and *ulogams* (metals).

- It is used to tone up the *saptha dhathus* (plasma, blood, muscle, adipose tissue, bones, marrow, and semen).

- It clarifies the mind and improves mental alterness.

*KV* has an elaborate description of how Amuri is to be extracted from the banana tree. The present work was carried out with a view to obtain Amuri from *Musa paradisiaca* L. as described in *KV* and to standardize the yield. This work is a prelude to screening of Amuri for therapeutic effects.

**Materials and Methods**

Amuri is prepared as per the text in *KV*. Well-grown banana trees are selected just before flowering. On the 10th lunar day a window is cut open in the neck region of the tree by cutting off small rectangular sheath layers to a depth that reaches the trunk core. Three teaspoonful of *Guruchunnam* (GC) (30 gm), a Siddha drug, is then kept inside the window as shown in Fig. 1. The cut sheath slices are then placed back and tied. The tree is
well-irrigated. After 5 days, on the day of full moon the tree is cut 30 cm above ground level. The cross-section of the stump is scooped to create a cup-like hollow. A small hole is drilled. A rubber tube is inserted through this hole. The outside end of the tube is guided into a collecting can (Fig. 1). Juice accumulates and trickles down the tube into the collecting can. This is a slow process. A few liters of the juice collects overnight. Juice is collected for five days continuously. The liquid is filtered and exposed to lunar rays during night.

**Preparation of Guruchunnam (GC)**

GC is prepared according to *KV*. 50 gm of copper-sulphate is mixed with 30 gm of *sangu parpam* (calcined conch shell powder). It is ground with lemon juice for 3 hours and subjected to pudam (calcification process) with 100 cow-dung cakes. The resultant powder is again ground with *thulasi* leaf juice (*Ocimum sanctum*) and subjected to pudam. The same process is repeated to get fine powder. Around 30 gm of calcined powder is needed for an average well-grown banana plant.

**Yield and Quality**

To bring out a drug of the present type is a multidimensional problem. Many factors from different fields—soil and irrigation related, celestial factors alluded to in the nadi, like the phase of the moon, solar month, etc., factors from the plant point of view like the type of the tree, the age of the tree, girth and number of leaves, factors brought in by the method like medication of the tree and the post-processing variables, and finally the pharmacological and toxicological studies of the exuded liquid make it a complex endeavor. The present paper reports the preliminary work undertaken as per the method discussed above to verify if any liquid can be collected at all using the materials as per the nadi and if it is possible to collect enough quantity of liquid as given in the nadinool. The purpose of the undertaking was to get familiar with the nuances of the method before any systematic experiments could be planned to study the effects of the very many variables on the quantity and quality of the juice that exudes. The effect of application of GC on the yield and characteristics of the exuding liquid are also reported in this paper.

Two sets of experiments were carried out, one at the National Research Center on Banana (NRC), Trichy and the other at Pallivayil, Trichy. In each experiment 6 banana plants of cultivar 'Poovan' were used. In both the experiments fully-grown banana plants (*Musa paradisiaca* L.) just before emergence of stipe were taken. The first set of experiment conducted at NRC constituted six plants treated with GC (application on the 10th lunar day) and six plants of the same age and type but without treatment. Window cut was also made in the untreated plants to ensure the same mechanical stress as the treated plants. Cutting, collecting and post-processing were all done in the same manner for all the plants.

A second set of experiments was conducted at Pallivayil with six plants treated and six plants untreated (i.e., without GC) as above. Table 1 lists the details of these two sets of the
The yield of the liquid was measured in each case. The physical characteristics like colour, odour, pH, specific gravity for liquids from treated and untreated plants was observed. Mineral assay (Table 2) was determined for both the liquids through atomic absorption spectroscopy and UV spectroscopy. Mineral assay was carried out to assess the effect of GC, soil, and water irrigation on the yield of the liquid.

**Results**

Yield of liquid from treated and untreated trees at the two locations is shown in Fig. 2. Yield of liquid at both locations was two folds higher in the case of treated trees. Though individual difference in the yield of liquid was observed within a group, the yield in general was higher at Pallivayil field than that at NRC. Total liquid yield for 5 days per tree varied from 17 liters to 45 liters in treated group and from 6 liters to 28 liters in untreated group. Liquid from untreated group developed a very mild foul smell that could be reduced by filtration followed by post-processing i.e. exposing it to lunar rays during night hours. Freshly collected Amuri is usually straw coloured. After filtration and Madhi pudam (exposing to lunar rays for 3 to 5 days) the liquid becomes crystal clear. It is observed that maximum yield is obtained during night hours. It is noted that if scooping is not done properly, thick, gummy mucilage obstructs the flow of the liquid. The yield gradually tapers

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**Table 1—Physico-chemical characteristics of Amuri from banana trees**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Parameter</th>
<th>Treated</th>
<th>Untreated</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colour</td>
<td>Colourless</td>
<td>Slightly yellowish/brownish</td>
</tr>
<tr>
<td>2</td>
<td>Taste</td>
<td>Tasteless</td>
<td>Slightly astringent taste</td>
</tr>
<tr>
<td>3</td>
<td>Odour</td>
<td>Odourless</td>
<td>On long standing foul smelling</td>
</tr>
<tr>
<td>4</td>
<td>Solubility</td>
<td>Miscible with water and alcohol</td>
<td>Miscible with water and alcohol</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Miscible with water and alcohol</em></td>
<td><em>Miscible with water and alcohol</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Immiscible with chloroform/ether</td>
<td>Immiscible with chloroform/ether</td>
</tr>
<tr>
<td>5</td>
<td>pH</td>
<td>7.83</td>
<td>4.68</td>
</tr>
<tr>
<td>6</td>
<td>Electrical conductivity-in m</td>
<td>0.54</td>
<td>0.51 Mho</td>
</tr>
<tr>
<td>7</td>
<td>Specific gravity</td>
<td>1.0071</td>
<td>0.99962</td>
</tr>
<tr>
<td>8</td>
<td>Refractive index</td>
<td>1.328</td>
<td>1.358</td>
</tr>
<tr>
<td>9</td>
<td>Total hardness</td>
<td>200 ppm</td>
<td>190 ppm</td>
</tr>
<tr>
<td>10</td>
<td>Total solids</td>
<td>418 ppm</td>
<td>440 ppm</td>
</tr>
<tr>
<td>11</td>
<td>Total dissolved solids</td>
<td>408 ppm</td>
<td>421 ppm</td>
</tr>
<tr>
<td>12</td>
<td>Suspended matter</td>
<td>10 ppm</td>
<td>19 ppm</td>
</tr>
<tr>
<td>13</td>
<td>Loss on ignition</td>
<td>104 ppm</td>
<td>135 ppm</td>
</tr>
<tr>
<td>14</td>
<td>Ignited residue</td>
<td>314 ppm</td>
<td>305 ppm</td>
</tr>
<tr>
<td>15</td>
<td>Acid insoluble</td>
<td>18 ppm</td>
<td>24 ppm</td>
</tr>
</tbody>
</table>
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from its maximum on full moon day and the following it to scanty levels in the next five days. It is observed that the liquid extracted during first few hours is generally dark in colour.

Physico-chemical characteristics of liquid from treated and untreated trees (Table 1) revealed differences in most of the parameters observed. Amuri from treated trees is colourless, tasteless and odourless whereas that from untreated trees is brownish astringent and foul smelling on long standing. Amuri from treated trees is slightly alkaline whereas that from untreated trees is acidic in nature. Analysis of minerals in liquid from treated and untreated banana trees is given in Table 2. The content of potassium, molybdenum and phosphorus in liquids from treated trees is higher whereas amounts of calcium, sodium, and sulphur are lower as compared to liquid from untreated trees. Presence of iron and mercury in liquid from treated trees and their absence in liquids from untreated trees is noteworthy.

**Discussion**

The two-fold increase of liquid from GC treated banana trees justifies the use of GC for good yield of Amuri. However, the mechanism by which GC induces
increased yield remains to be studied. At NRC, in general lower yield was obtained in both treated and non-treated groups as compared to plants at Pallivayil. This could be attributed to the second crop at NRC while at Pallivayil the plants belonged to first crop. Physico-chemical characteristics of liquid from treated banana trees are different from that of liquids from untreated trees. The variation in mineral composition like presence of iron, potassium, phosphorus and sodium is of therapeutic significance. Earlier works suggest that phosphorus is antisteoporotic, immunostimulant and osteogenic\textsuperscript{15}. Potassium serves crucial physiological functions. It is essential for smooth flow of communication signals from cell to cell and its deficiency can contribute to diseases like stroke, heart problem, diabetes, and hypertension\textsuperscript{16}. The presence of molybdenum, sulphur and nickel in the treated liquid is significant. The complimentary effect of molybdenum and sulphur on inhibition of copper retention in cells is a scientifically established fact\textsuperscript{17}. Nickel deficiency on metabolism leads to decreased iron absorption and numerous changes in enzyme activities\textsuperscript{18}.

Influences of moon on water bodies and on human and animal metabolism are already recognized\textsuperscript{19-22}. In the present method of extraction of Amuri from banana tree, lunar rays are useful both during exudation and post-processing stages.

Traditionally banana stem juice is used in various diseases like hysteria, epilepsy, insomnia, dysentery, jaundice, burns, snake bite\textsuperscript{23}, bleeding from lungs due to tuberculosis or from rectum due to piles,
alcoholic or opium intoxication, leucorrhoea, cystitis, gonorrhea, biliousness, goitre, ascites, haematurea and anaemia. It is used as a tonic in myalgia. It prevents pittam disorders. But the common traditional use is of the liquid obtained after the fruit is harvested and the whole plant cut and liquid squeeze-extracted. KV technique explained in this paper is however unique and novel.

The following distinctive features of the KV technique are worth noting:

1. The timing of extraction is from full-grown tree when it is just about to flower. This is perhaps because of abundance of all secretions during such a phase.

2. The day of extraction starts on a full moon day. This perhaps ensures the abundance of the yield of the liquid. Such quantity of liquid exuding from a single plant within a span of five days itself is an astonishing fact.

3. Usually Guruchunnam is used in Siddha system of medicine to extract juices/latex from very dry-natured plants like Virali (Dodonea viscosa), Kuppayimeni (Acalypha indica) and Erukku (Calotropis gigantea). But use of GC in extracting juice from a moist tree is unique technique described in KV.

From the present experiment it has been confirmed that the use of GC is useful in increasing the yield of liquid (Amuri) from banana tree. By following the methods described in KV it is possible to obtain higher yield of liquid from banana tree and the liquid can be kept for longer period. Further studies on the yield of Amuri in different cultivars of banana tree and its pharmacological effect are in progress.

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