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Study on Taxonomy, Socio-economy and Medicinal Uses of *Imperata cylindrica* (L.)P. Beauv.

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Abstract

Several species of the family Gramineae are cosmopolitan in Hinthada Township area. In these plants *Imperata cylindrica* (L.) P. Beauv (Myanmar name - Thekke) is widely distributed in this area. The detailed taxonomic description of collected species is thoroughly studied and fully described. In this area, local people have been operating the thatching in many villages about 20 centuries. This study comprises three parts: harvesting, processing and marketing about " Thekke" plants and profusely illustrates with photographs. The preliminary phytochemical tests and the determination of extractive values were determined by using the powdered rhizomes. The elemental analysis (ED-XRF) was tested from powdered sample.

Key words: *Imperata cylindrical* (L.) P. Beauv, Taxonomy, Socio-economy, Medicinal uses, ED-XRF

Introduction

The grasses or Gramineae comprise some 9,000 species grouped into about 650 genera. The grasses also make a major contribution to much of the world's landscape (Benson, 1959 and Heywood, 1978).

Imperata cylindrica is one of the species of Gramineae family. The genus ***Imperata*** belongs to the subfamily **Panicoideae**, supertribe **Andropogonodae** and tribe **Andropogoneae**. It is widely distributed in open, rather dry land, throughout tropical and subtropical regions in Myanmar.

Many rural people have traditionally used thatch-panel to cover the roofs of their houses. The thatch-panels are more popular and important than the others in many villages in Hinthada Township in which the thatch-making, as mostly family business, supports the local people for extra earning, though not of primary.

In this paper, preliminary phytochemical tests and energy dispersive X- rays Flurorescence (ED-XRF) obtained from the powdered samples of *Imperata cylindrica* (L.) P. Beauv have been carried out.

Materials and Methods

The specimens of *Imperata cylindrica* (L.) P. Beauv used in this research were collected from some villages of Hinthada Township. The project area was visited several times for collection of data from April, 2008 to March, 2009.

In taxonomical study, the vegetative and reproductive parts (flower -bearing parts) of *Imperata cylindrica* were collected, pressed and dried at the times of their flowering period for identification. For easy identification, colored photographs of habit, inflorescence and flower types are also included. The identification was done by using of keys given by Backer (1968), Dassanayake (1994) and Kress *et al*. (2003).

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The plants were thoroughly studied and fully described. The collected specimens were prepared for herbarium sheets and kept in Department of Botany, University of Hinthada.

Socio-economical data were presented based on interviews with informants and local people and on own observations during several trips to the region. (Pandey, 2000) Shwe-nyaung-pin, Nyaung-waing and Na-be-khon villages were chosen as the study area because almost all the villagers of these villages are involved in this work. Field work was done in many villages in February, June, August and November.

The harvesting, processing and marketing about thatch-making were described and recorded with photographs. The main equipments are sickle, knife and rake for procedures of the thatch-making.

The fresh rhizomes were washed with water, then cut into small pieces and air dried at room temperature. These were then ground and stored in air-tight bottles for further uses. Preliminary phytochemical tests were conducted in the laboratory of Pharmaceutical Research Department, Myanmar Scientific and Technological Department. The energy dispersive X-rays fluorescence spectrometer (ED-XRF) were conducted in Universities' of Research Centre.

Results

Description

Scientific name : ***Imperata cylindrica*** (L.) P. Beauv.

Synonyms : *Imperata arundinacea* Cyrillo. PL. Rar. Neap. Fasse.

Imperata pedicellata Stead in Flora, 29:22, 1846.

Common name : alang- alang, blady grass,cogon grass, japgrass, satintail, speargrass and carrizo, (English) , paille de dys (French), Bluteras (German).

Myanmar name : Thekke

Perennial rhizomatous herbs, 1.0 - 1.5 m high, tillering occur mainly at ground level, bladeless sheath present at the base of culm; the roots fibrous. Subterranean rhizomes, horizontal in cylindrical 4.0 - 23.5 cm long and 0.2 - 0.4 cm in diameter, creamy white, several nodes covered with scale dry leaves. Leaves equitant (overlapping in two ranks) , the leaf-sheaths 16.5 - 30.0 cm long and 0.5 - 0.8 cm wide, the joint of leaf-sheaths 16.5 - 30.0 cm long and 0.5 - 0.8 cm wide, the joint of leaf - sheaths and leaf blades with ligule, the leaf blades linear-lanceolate, 77.5 - 130.0 cm long and 0.8 - 1.5 cm wide, the bases gradually attenuate, the margins slightly denticulate, spiculate, the tips long acute, the both surfaces glabrous. Infloresence panicle racemes, develops inside the uppermost leaf-sheath, 21.0 cm – 37.0 cm long, hairy at the base of peduncle, the spikelets arises alternately along an rhachialla. Lower glume and upper glume present, similar, lower glume slightly larger than upper one, lanceolate, about 3.0 mm long and about 1.0 mm wide, creamy white, hyaline, 3-nerved, silky long white hairs arises from the base of the glumes. The floral parts are enclosed by the lemma on the outside and palea on the inside. Lemma 1 ovate- oblong about 2.0 mm long and about 1.0 mm wide, white, hyaline, the margins entire, the tips irregularly dentate, glabours, the lemma 2 slightly smaller than lemma 1; palea 2, lanceolate, about 1.5 mm long and about 0.5 mm wide, hyaline. Florets lanceolate, about 3.0 mm long and about 1.0 mm wide,

creamy white, some florets bisexual and some unisexual. Male florets: stamens 2, free, about 4.0 mm long, the filament about 1.5 mm long, white, the anthers oblong, about 2.5 mm long, golden yellow, basifixed, longitudinal dehiscence, introrse. Female florets: ovary superior, ovoid, about 1.0 mm long and about 0.5 mm wide, bicarpellary, syncarpous, unilocular, the placentation basal, one ovule in the locule, the style 2, about 4.0 mm long, white, the stigma bifid, plumose dark purple.

It is found growing in open fields and semi-shading area, land-slide, sand and gravel- banks of rivers and on suitable soil; it forms extensively (secondary) vegetation, kept- up and promoted by fire.

Flowering and fruiting time are from December to March.

Socio- economical study

The socio-economical study included three parts: harvesting, processing and marketing.

Harvesting

The thekke harvesting by using sickle is done once a year from January to April. After dried, the stems with leaves were bundled as shown in Figure 1 and this bundle is locally called " Taball".

Processing

The cut stems with leaves or thatch-spindles (Taball) contained the bundle which collected from the own field and purchased from the others are mixed with other rubbish and piled up at the work-place in the enclosure of the thatcher. The tied thatch- spindles from each bundle are loosen and its fasten again near at the middle and the bundle hangs at the branch of the tree. Then, the bundle is shaken off by using the rake to separate the mixing of the thatch- spindles and the rubbish. The cleaned thatch- spindles are hung-off from the branch of the tree and are tied again to from the bundle or " Taball ". These " Taball " are made a pile in the sun at the enclosure of the thatch-maker and these are sprayed with water before thatch-making. Then, the bundle is shaken off by using the rake to separate the mixing of the thatch-spindles and the rubbish. Cleaned thatch-spindle bundles are sprayed with water before thatch- making.

While, the wa-bo (***Dendrocalamus giganteus*** Muntro) are also used and these are split into 2.25 m long bamboo sticks. The sticks are soaked in water over night to protect destructive thing and dried in the sun for 5 days.

In thatch-making, the prepared leaves are lengthwise attached to the bamboo stick at about the proportion of two third by using the outer part of Thin-pin or Thinbyu (***Clinogyne dichotoma*** Saliab.). The thatch-maker or thatchers operates about 30 finished goods called the thatch-panels for each day, and the 9-10 thatch-panels are obtained from the cleaned each bundle or "Taball". These procedures are described in photo plates (Figure 1-3).

Marketing

The thatch-making is mostly practiced from January to April. Generally, there is operated the thatching- roof once in a year in this area and onset of the rainy season seem to be the best selling time for the marketing of thatch – panels. The selling price is about 200 Kyats for each thatch-panel. The thatch-panels have been selling out at local and other areas of Hinthada Township.

(A) Leaves after harvesting

(B) Taballs lay in piles on the field

(C) Transportation with cart

(D) Taballs placed on bamboo poles

(E) Before cleaning Taball

(F) Thin pin parts dry in open area

Figure 1 Procedures of Thatch-making

(A) Rubbish removals by using rake

(B) Selected Taballs after cleaning

(C) Operating on Thatch-making

(D) Thekke leaves tied on bamboo stick

(E) Ending point of Thatch-panel making

(F) Thatch-panels dried in open area

Figure 2 Continuous procedures of Thatch-making

(A) Piles of Thatch-panels side view

(B) Barn roof coverings by Thatch-panels

(C) Partition and roofing by Thatch-panels

D. Use for roofing materials

(E) Arbors for betel plants

(F) Waste product materials covered for young seedling plants

Figure 3 Traditionally use in many ways

It is one of the cheapest form of roofing materials to many people because it is widespread, a fact which reflects its ability to grow quickly in the most marginal areas even with the poorest soils.

Medicinal and other uses

Preliminary phytochemical tests of the rhizomes of *Imperata cylindrica* (L.) P. Beauv

Dried powder of *Imperata cylindrica* (L.) P. Beauv were collected from Hinthada Township. Dried materials were grinded to get powder and stored in air tight containers. Preliminary phytocheimcal examination from the rhizomes was carried out (Trease & Evens, 1978).

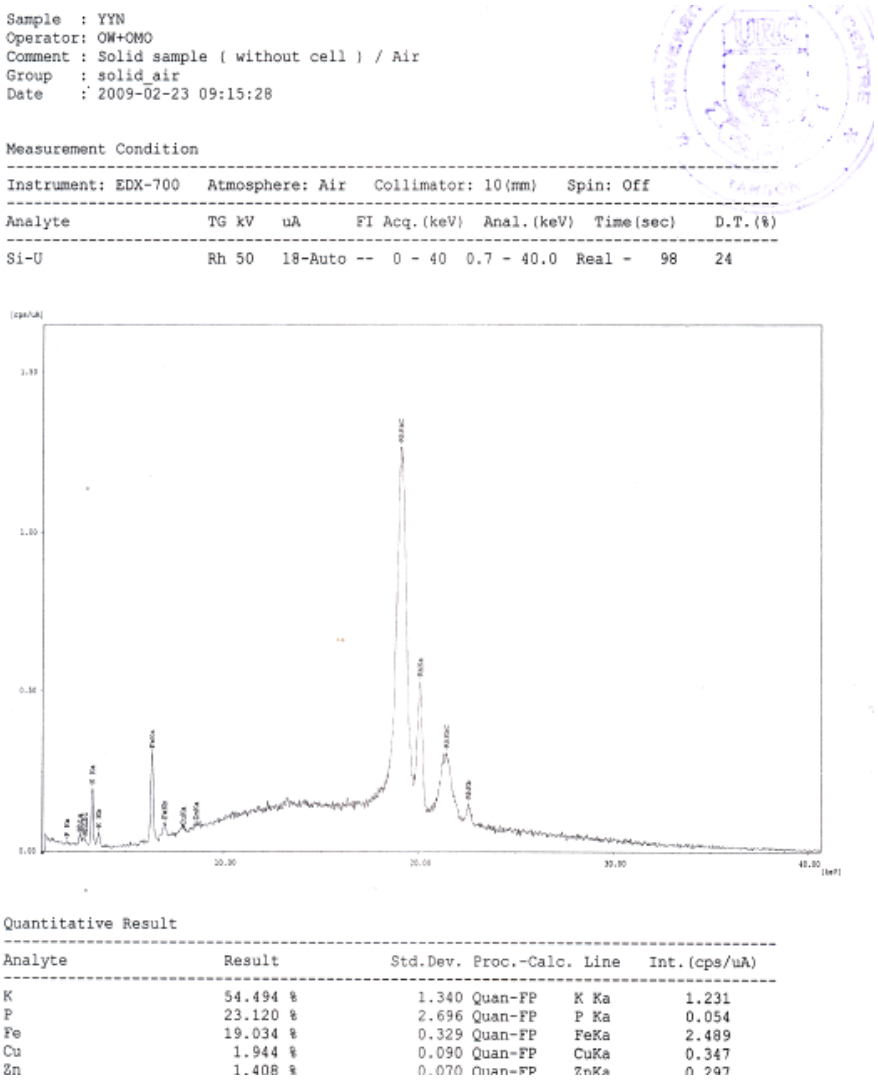
Table 1 Preliminary phytochemical tests on the powder of *Imperata cylindrica* (L.) P. Beauv

	Type of product	Test reagent	Observation	Result
1	Alkaloids	Mayer's reagent	no ppt	-
		Dragendorff's reagent	no ppt	-
		Sodium picrate solution	no ppt	-
		Wagner's reagent	no ppt	-
2	Glycosides	10% lead acetate	White ppt	+
3	Reducing sugars	Benedict's solution	Red ppt	+
		Fehling solution	Red ppt	+
4	Saponin	Distilled water	no frothing	-
5	Steroid	Acetic anhydride and conc: Sulphuric Acid	Pale-green colour	+
6	Carbohydrate	10%&Naphthol, conc: Sulphuric Acid	pink ring	+
7	Cyanogenic glycoside	Sodium picrate paper conc: Sulphuric Acid	No colour change	-
8	Phenolic	3%Ferric choride		-
9	Amino acid	Ninhydrin reagent	Pink-purple	+
10	Acid/Base neutral	Bromocresol green	Green colour	+
11	Tannins	5% Lead acetate solution	Deep brown ppt	+
12	Flavonoid	conc : hydrochloric acid Magnesium turning	Pink colour	+
13	Terpenoid	Acetic anhydride conc : Sulphuric Acid	Deep pink colour	+

\+ = present
\- = absent
N = neutral

The elemental analysis (ED-XRF)

Mineral and trace element were found in these rhizomes from the elemental analysis such as potassium, iron, zinc, phosphorous and copper. The result was shown in Figure 4.



Sample : YYN
Operator: OW+OMO
Comment : Solid sample (without cell) / Air
Group : solid_air
Date : 2009-02-23 09:15:28

Measurement Condition

Instrument: EDX-700	Atmosphere: Air	Collimator: 10(mm)	Spin: Off

Analyte	TG kV	uA	FI Acq.(keV)	Anal.(keV)	Time(sec)	D.T.(%)
Si-U	Rh 50	18-Auto	0 - 40	0.7 - 40.0	Real - 98	24

Quantitative Result

Analyte	Result	Std.Dev.	Proc.-Calc.	Line	Int.(cps/uA)
K	54.494 %	1.340	Quan-FP	K Ka	1.231
P	23.120 %	2.696	Quan-FP	P Ka	0.054
Fe	19.034 %	0.329	Quan-FP	FeKa	2.489
Cu	1.944 %	0.090	Quan-FP	CuKa	0.347
Zn	1.408 %	0.070	Quan-FP	ZnKa	0.297

Figure 4 The elemental analysis of ED-XRF spectrum

Discussion and Conclusion

The thatching has been widely practiced in household articles about 20 centuries in the Hinthada Township. After harvesting, the field is burned for manuring and weeding for the next. The local growers do not use both fertilizer and insecticide for this crop plantation. The thekke plantation and thatching are their family business and can be used by posterity. Its income is supported to the livelihood of the local people in Hinthada Township.

Imperata cylindrica **(L.)P. Beauv** contains glucose, cane sugar, fructose, fatty acid and starch. The rhizomes of this plant were used for diarrhoea, dysentery, kidney, stomach troubles, genital stimulant and depressants, diurectics, veneral diseases and vermifuges. Stem with leaf portions used for tumour and cancers. A decoction of the dried plant is taken as a gargle for sore throat. Aqueous extracts of the leaves and stems have shown in laboratory experiments some action on tumours. The foliage has been tried for paper. The flossy flowers are collected for stuffing cushions and pillows. Philippine

Islands, it is similarly used as a vulnerary to arrest bleeding and take internally is sedative. (http://www. aluka. Org).

The elemental analysis (ED-XRF) of powdered sample showed it contains potassium, phosphorus, iron, copper and zinc. This mineral and trace elements are needed for diet. Wilbert (1961) also found that most of the minerals and trace elements needed in our average diet are metal ions, but some anions are also required

Thekke plants have familiar features of the Hinthada Township environment. Although it cannot compare in commercial value to the woody plants, it has proven suitable for a wide variety of uses as we have seen. While some uses have disappeared, many traditional uses continue, and there will no doubt, always be new uses discovered for these remarkably versatile plants. It is naturally, plentiful, cheap, durable and easy to work. In fact, compared to its celebrated status in Myanmar, the *Imperata* plants could well be considered an under utilized resource in Hinthada Township, its full potential yet to be realized.

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