Studies on the Microscopical Characters of Roots and Rhizomes, and Acute Toxicity Test of *Canna indica* L.

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Abstract

The plant *Canna indica* L. locally known as (Budatharana), belonging to the family Cannaceae, which is growing wild in Yangon vicinity were collected, identified and classified. The morphology and taxonomy of this plant has been studied by using the standard methods used in Botany Department of Yangon University. In this paper, the microscopical characters of roots and rhizomes were investigated. In addition, the acute toxicity test of watery and 95% ethanol (alcohol) extracts from rhizomes of *Cannaindica* L. were conducted by using animal model.
Keywords: *Canna indica* L., acute toxicity

Introduction

The *Canna indica* L. are found throughout the world, but most of the varieties are grown as the native of Central America and South Indies. In Myanmar, it is called Budatharana. In previous presentation, the morphology and phytochmical investigation, physicochemical characters, elemental analysis of mineral contents and antimicrobial activity of this plant have been presented. Budatharana contains proanthocyanidin (cyanidin), flavonols (kaempferol and quercetin) (http:// delta-intkey/com: and Watson, L., and Dallwitz, M.J. 1992). The rhizomes of Budatharana is used as emollient poultices for abscesses and tumors, sudorifics and diuretics (Kirtikar and Busu, 1935; Dr. A.M. Michael, 1998 and Priti Shukla and Shital P. Misra, 1979). The microscopical characters and acute toxicity test have not been undertaken in Myanmar. As such this research has been conducted. The objectives are to study the microscopical characters of roots and rhizomes and to evaluate the acute toxicity of aqueous and 95% ethanol extracts of rhizomes.

Materials and Methods

The rhizomes of *Canna indica* L. were obtained from N/Okkalar park, Insein park and Hlaing Township. The rhizomes were cleaned cut and air - dried for several days. The dried rhizomes were crushed and powdered with a grinding mill. The powders were stored in airtight containers for further studies.

Preparation of powdered samples

The fresh rhizomes were first removed of grit and washed with water. And then, they were cut into small pieces and then reduced to powder in the electric grinder.

Chemical reagents

The following reagents were used to examine the sections and the powdered samples: chloral – hydrate as clearing agents; Iodine water B.P.C for testing starch; acetic acid B.P for testing calcium oxalate crystals; solution of phloroglucinol B.P., followed by concentrated hydrochloric acid for testing lignin, cutin and suberin.

The microscopical characters were carried out according to the literature of Tomlinson, 1969; Katherine Esau, 1953 and S.N Pandey, 1998. For acute toxicity test, aqueous and 95% ethanol extracts from the rhizomes were carried out by the methods of Litchfield and Wilcoxon, 1949.

The acute toxicity of ethanolic and aqueous extracts of *Canna indica* L. on albino mice.

The acute toxicity is to detect the lethal activity along with the determination of LD_{50} of the aqueous and 95%ethanolic extracts of *Canna indica* L. were done

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according to the method of Litchfield and Wilcoxon (1949). Usually, the acute lethality of a compound is determined on a basis of death occurring in 24 hours but the survivors should be observed for at least 2 weeks in order to detect delayed effects.

Materials

Animals used	− seventy adult mice
	− 1both sexes weighing from 15-35gm
Requirements	− different doses of ethanolic and aqueous extracts of *Canna indica* Linn.
	− Mouse cages
	− '18' gauge intragastric needle
	− Animal balance
Dose schedule up to	− 6 g/ kg in mice (on body weight basic)
	− 12g/ kg in mice (on body weightbasic)
	− 24g/ kg in mice (on body weightbasic)
Period of observation	− two weeks.

Method

The lethal activity and the determination of LD_{50} of the extracts (watery and 95% ethanol) of *Canna indica* L. (Budatharana) were carried out according to the method of Litchfield and Wilcoxon (1949). The route of administration selected should be intended for administration of the tested drug given to the human during therapy. The oral route was chosen for this test.

Both the sexes of seventy albino mice, weighing 15-35 grams were used in this study. Food was withheld for a period of 12 hours. Mice were separated into seven groups with 10 mice in each cage.Group I served as control group and was administered 0.2ml/10g distilled water.

Group II to VII were administered orally with various concentration of the test drug. The dosages employed were 6g/ Kg, 12 g/kg, 24 g/kg respectively. After given the extracts orally, each group of mice was kept in 7 cages with free access to food and water.

Then, the observation of the above treated mice was carried out.

Results

Morphological characters of *Canna indica* L.

Habit: Perennial herbs, creeping rhizomes, aerial stems herbaceous, erect, 0.5 − 2.5m high. **Leaves:** alternate and distichous, simple, sheathing petiole, the lamina elliptic lanceolate, unicostate, parallel venation, the bases obtuse, the margin entire and brownish purple coloured. **Inflorescence:**terminal on leafy stem, two cincinnus raceme. **Flower**:bright orangish red, the floral bracts ovate-oblong, brownish purple, glabrous, the bracteoles ovate oblong, tricarpellary, syncarpous zygomorphic, epigynous.**Fruit:** loculicidal capsule, ovoid, purple, dehiscing by callapse of the warty pericarp. **Seed:**numerous, subglobose, seed black, with very hard endosperm, the embryo straight.

Fig. (1) Habit of *Canna indica* L.

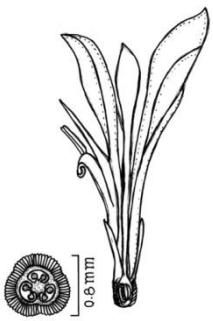
Various sizes of leaves (lower surface)

Various sizes of leaves (upper surface)

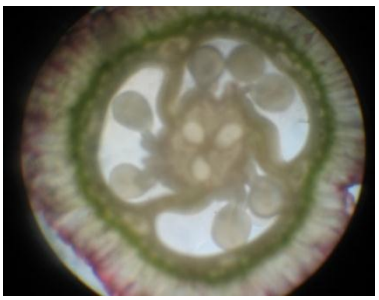
Fig. (2) Leaves of *Canna indica* L.

Fig. (3) Inflorescence

Flower of *Canna indica* L.



L.S of flower



T.S of ovary

Fig. (4) Flower

Fig. (5) Fruit of *Canna indica* L.

Fig. (6) Seed of *Canna indica* L.

Fig. (7)T.S of root low power (× 100)

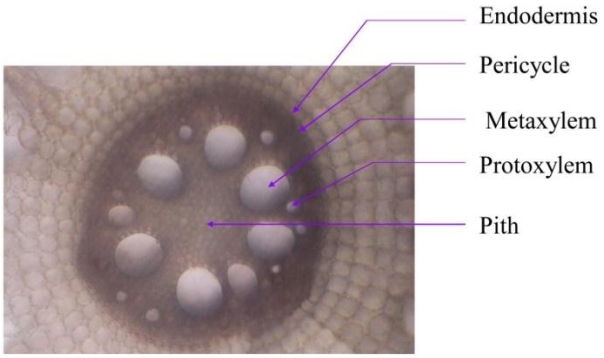


Fig. (8) T.S of root, showing polyarch vascular bundles (× 400)

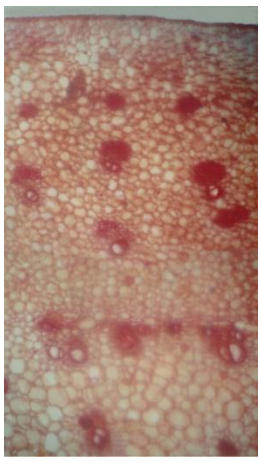


Fig. (9) T.S of rhizome with scattered vascular bundles(× 100)

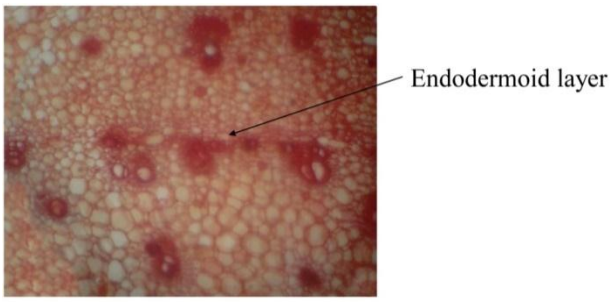


Fig. (10) T.S of rhizome showing endodermoid layer (× 400)

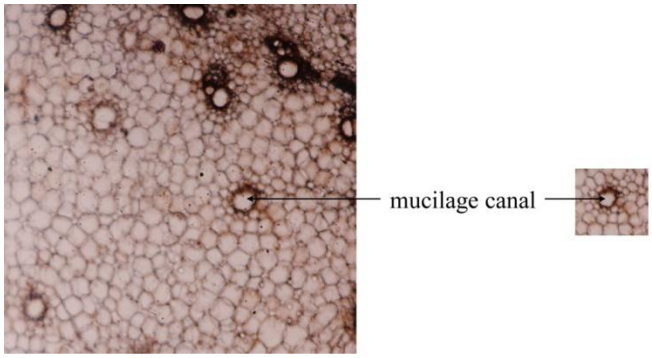


Fig. (11) T.S of rhizome showing mucilage canal with epithelial cells (× 100)

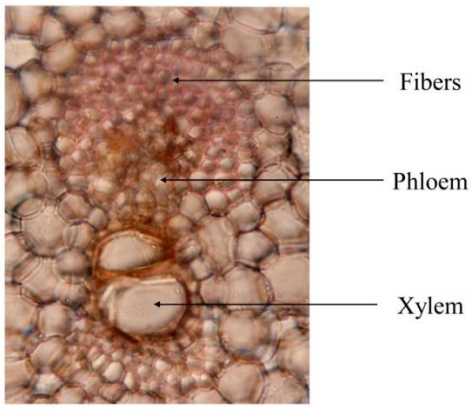


Fig. (12) T.S of rhizome showing vascular bundle in detail (× 400)

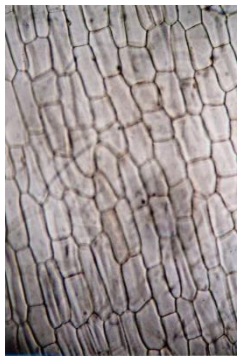


Fig. (13) Surface view of rhizome epidermis (×400)

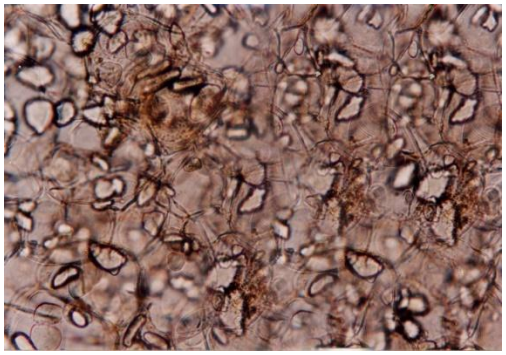


Fig. (14)T.L.S of rhizome showing parenchymatous cells with numerous starch grains (×400)

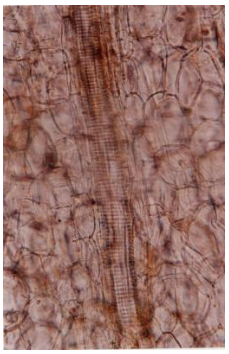


Fig. (15)T.L.S of rhizome showing parenchyma cells and vessel elements (× 400)

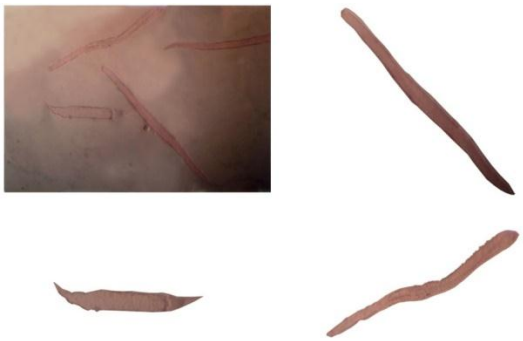


Fig. (16)Tracheary elements and xylem fibres (×100)

Fig. (17) Vessel elements showing annular and spiral thickenings(× 100)

Microscopical characters of powdered sample

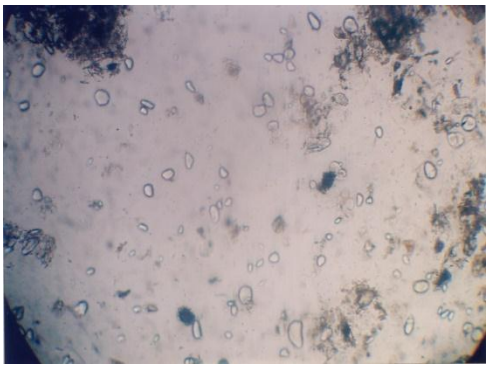


Fig. (18)Powdered sample as seen (× 100)

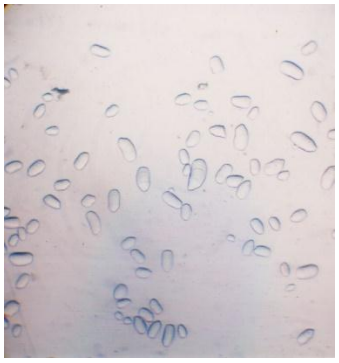


Fig. (19) Powdered sample with single starch grains (×100)

Acute toxicity test of *Canna indica* L.

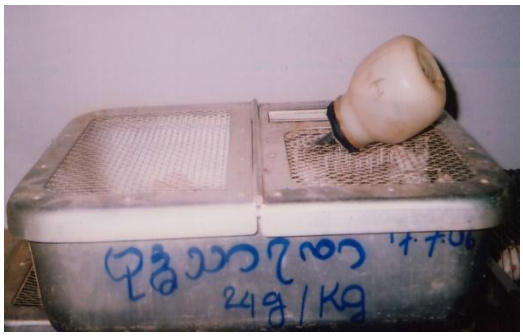


Fig. (20) Mouse cage (10 mice)

Fig. (21) Acute toxicity done

Table (1) Results of acute toxicity tests of both aqueous and 95% ethanolic extracts of *Canna India* L. on albino mice

G.N	Type of drugs	Does g/kg	No.of animal test	% of lethality
1.	Control	D/W(0.ml/g)	10	0 %
2.	EtOH	24	10	0 %
3.	EtOH	12	10	0 %
4.	EtOH	6	10	0 %
5.	Aqueous	24	10	0 %
6.	Aqueous	12	10	0 %
7.	Aqueous	6	10	0 %

Discussion and Conclusion

Both the fresh and preserved specimens of *Canna indica* L. have been studied in this research. In this work, the T.S of rhizomes show the scattered cortical bundles, mucilage canals, indistinct endodermoid layer between the cortex and the central cylinder. In the transverse section, the root is more or less circular in outline. Epiblema is single-layered and it produces a number of unicellular root hairs. Both the endodermis and pericycle are single-layered. The number of vascular bundles ranges from 8 – 10 or more and radially arranged. The most common thickening of vessel elements is annular, spiral and reticulate. In transverse section of rhizome, epidermis is not cutinized, the epidermal cells compact, thin-walled. The cortex is delimited from the central cylinder by and indistinct endodermoid layer surrounding a narrow zone of small cells with girdling and anastomosing vascular strands embedded in it. Starch is abundant in ground parenchyma of rhizome; grains are flattened, ellipsoidal, single and eccentric. Mucilage canals are abundant near the periphery of central cylinder.These characters are inagreement with those described by Tomlinson,1969.

The acute toxicity of the extract has been studied using the simplified method of Litchfield and Wilcoxon (1949). It was observed that, even with the maximum permissible dose of the extract (24g/kg), mice were found to be alive and healthy during the observation period of 7 days.There was no acute toxic effect on lethality.

Oral route was used in this study because it is the route which is intended to be used in human subjects. Thus, it was hoped that this plant may be used as an edible starch in future. The acute toxicity of the extract had been studied using the simplified method of *Canna indica* L. on albino mice was observed that, even with the maximum permissible dose of the extract (24g/ kg), mice were found to be alive and healthy during the observation period of 7 days.

There was no acute toxic effects and lethality up to the maximum giving dose of 24g/ kg of these extracts. Oral route was used in this study because it is the route which is intended to be used in human subjects.

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