

PHARMACOGNOSTIC STUDIES ON POWDERED FLOWERS OF *HIBISCUS ROSA-SINENSIS* L. AND ITS ADULTERANTS

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A B S T R A C T

The diagnostic characters of flower powders of *H. rosa-sinensis* and its adulterants have been worked out in the present study. The powder of the genuine drug can be identified on the basis of frequency of different types of trichomes, measurements of pollen grains and its spines, number of pores and fluorescence response under ultra-violet lamp.

INTRODUCTION

The flower of *Hibiscus rosa-sinensis* L. (Jabakusum) is reported to possess antifertility property and correct menstrual disorders (Kholkute and Udupa, 1974; Tiwari, 1974 and Kholkute *et al.*, 1976). Kholkute *et al.*, 1977 reported that when the flowers of *H. rosa-sinensis* L. are obtained from local suppliers, they are often adulterated with *H. schizopetalus* (Mast.) Hk. f., *H. mutabilis* L. etc. However, the benzene extract of these adulterant species failed to show any significant effect on pregnancy (Kholkute *et al.*, 1977). Therefore, the pharmacognostic characters of flower powders of *H. rosa-sinensis*, *H. schizopetalus*, *H. mutabilis* and *Malvaviscus mollis* DC. have been worked out in the present study to identify them when they are supplied in mixed condition.

MATERIAL AND METHODS

The flowers of *H. rosa-sinensis*, *H. schizopetalus*, *H. mutabilis* and *Malvaviscus mollis* were collected from Indian Botanic Garden, Howrah. They were dried and reduced to powders which were passed through 80 B. S. Sieve. The voucher specimens of these plants (Kayal 191, 192, 193 and 194) are deposited in herbarium (CAL). The powders were soaked in aqueous solution of

chloral hydrate and mounted in 50% glycerine for microscopical studies. The data of measurement of epidermis, crystals and pollen grains, number of spores, number of spines and frequency of different types of trichomes and glandular cells are the average of 10 samples in each case.

The fluorescence response of powdered flowers of all the four species exposed to ultraviolet radiation has been examined in the same manner as that of Kokoski *et al.* (1958). The source of ultraviolet light was Adair Dutta & Co., Calcutta Model Ultra-violet Lamp.

RESULTS

A significant difference has been observed in number of pores of pollen grains in *H. rosa-sinensis*, *H. schizopetalus* and *H. mutabilis*. This parameter shows no difference in *H. rosa-sinensis* and *M. mollis*. Number of spines of pollen grains are higher in *Malvaviscus mollis* than that of *H. rosa-sinensis*. The pollen grains of *Malvaviscus mollis* were observed to be little larger than other species. There was no significant difference in the average length and breadth of spines of pollen grains of all the four species (Table I and II, Fig. 1).

The stellate and covered trichomes of all the four species more or less resemble in their structure, Club-shaped biseriate or

multiseriate multicellular glandular trichomes were observed in all the four species. In *H. rosa-sinensis* globose-shaped glandular trichomes were also observed (Fig. 1, Table II).

The frequency of different types of trichomes in flower powders also differs remarkably and therefore can be utilized as a diagnostic parameter for identification of the genuine *H. rosa-sinensis* (Table III).

Ranunculaceous (anomocytic) type of stomata and Ca-oxalate crystals (Sphaera-

phides) were observed in flower powders of all the four species. No significant difference has been seen in the fibrous layers of anthers and the epidermal cells of bracts, calyx and corolla (Fig. 1, Table II and IV).

The fluorescence response of flower powders when treated with different chemicals under ultraviolet lamp are also different (Table V) and can be an important tool in the identification of *H. rosa-sinensis* and detection of the various adulterants.

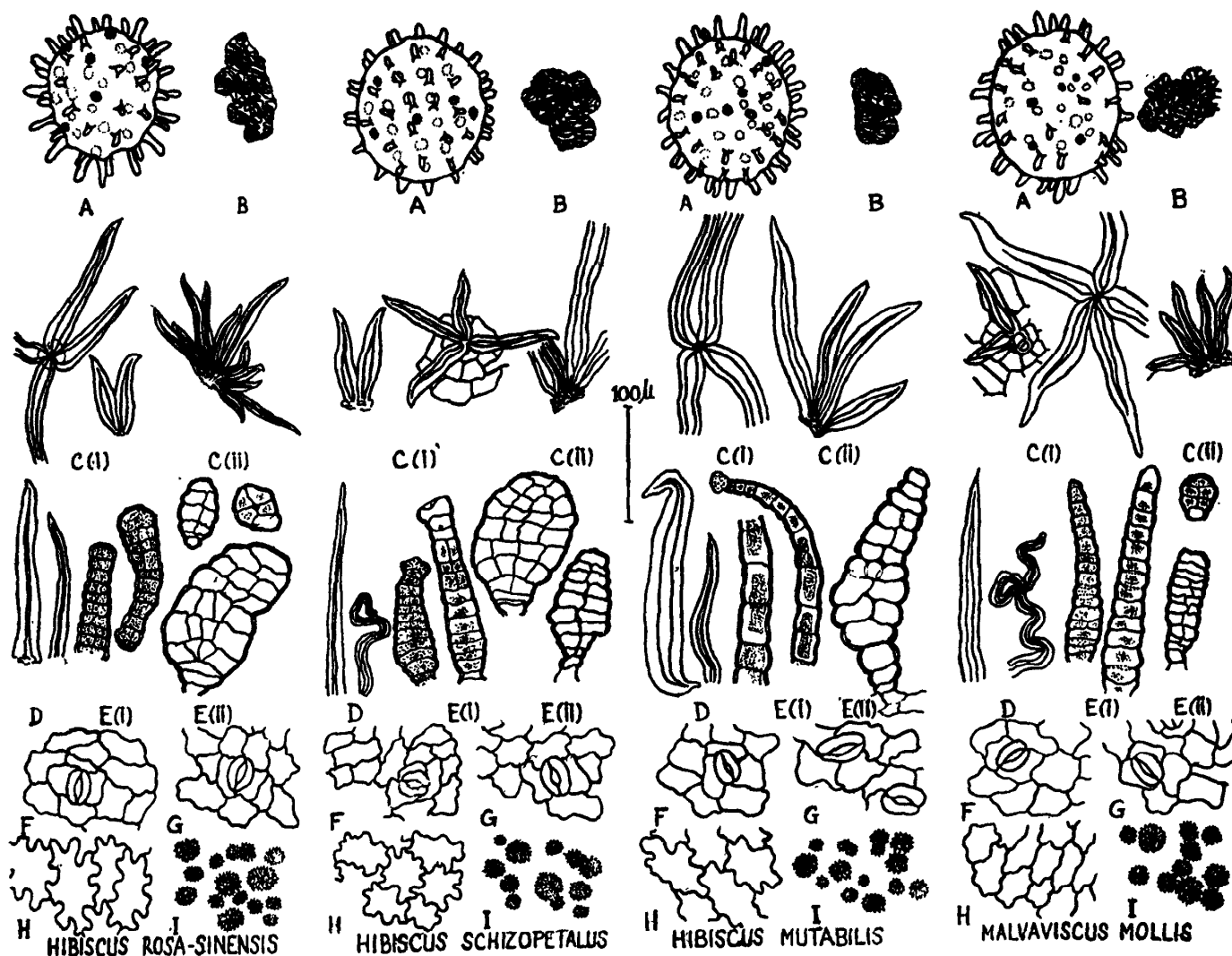


Fig. 1. Camera lucida drawings of microscopical structures of flower powders of *Hibiscus rosa-sinensis*, *H. schizopetalus*, *H. mutabilis* and *Malva viscosa mollis*.

A. Pollen grains. B. Fibrous layer of anther in surface view. C. Stellate trichomes : (i) Entire and radiating ; (ii) Tufted. D. Covering trichomes. E. Glandular trichomes : (i) Cylindrical ; (ii) Club or globose shaped. F. Epidermis of bract with stomata in surface view. G. Epidermis of calyx with stomata in surface view. H. Epidermis of corolla in surface view. I. Clusters of Ca-oxalate crystals.

TABLE I

SHOWING QUANTITATIVE DIFFERENCES IN POLLEN GRAINS OF FLOWER POWDERS OF *HIBISCUS ROSA-SINENSIS* & ITS ADULTERANTS

	<i>Hibiscus rosa-sinensis</i>	<i>H. schizopetalus</i>	<i>H. mutabilis</i>	<i>Malvaviscus mollis</i>
Measurement of pollen grains (Range)	L48 μ -123 μ -189 μ × B42 μ -120 μ -162 μ	L111 μ -129 μ -142 μ × B105 μ -126 μ -144 μ	L129 μ -141 μ -150 μ × B123 μ -135 μ -144 μ	L150 μ -159 μ -168 μ × B126 μ -144 μ -162 μ
Average	L129.6 μ × B121.5 μ	L125.4 μ × B121.8 μ	L135.3 μ × B131.1 μ	L160.5 μ × B144.6 μ
Measurement of spines (Range)	L6 μ -15 μ -24 μ × B3 μ -9 μ -15 μ	L12 μ -16.5 μ -21 μ × B6 μ -7.5 μ -9 μ	L12 μ -15 μ -21 μ × B6 μ -7.5 μ -10.5 μ	L12 μ -16.5 μ -21 μ × B6 μ -9 μ -12 μ
Average	L14.52 μ × B9.45 μ	L15.4 μ × B8.5 μ	L15.93 μ × B8.55 μ	L17.04 μ × B9.18 μ
Number of spines (Range)	19-24-27	13-20-27	22-30-39	22-28-36
Average	24	22.5	29.2	29.1
Number of pores (Range)	18-23-27	10-13-18	13-20-27	15-21-27
Average	21.9	14.1	19.5	21.2
L = Length B = Breadth				

TABLE II

COMPARATIVE STATEMENT OF ANATOMICAL ELEMENTS IN THE FLOWER POWDERS OF *H. ROSA-SINENSIS* & ITS ADULTERANTS

	<i>Hibiscus rosa-sinensis</i>	<i>H. schizopetalus</i>	<i>H. mutabilis</i>	<i>Malvaviscus mollis</i>
1. Pollen grains	Spheroidal, pantoporate, pore-circular	Spheroidal, pantoporate, pore-circular	Spheroidal, pantoporate, pore-circular	Spheroidal, pantoporate, pore-circular
2. Stellate Trichome	(a) Entire and radiating ; sometimes detached. (b) Tufted	(a) Entire and radiating ; sometimes detached (b) Tufted	(a) Entire and radiating ; sometimes detached (b) Tufted	(a) Entire and radiating ; sometimes detached (b) Tufted
3. Covered Trichome	Single, elongated, conical or twisted and convoluted.	Single, elongated, conical or twisted and convoluted.	Single, elongated, conical or twisted and convoluted ; sometimes tapering at both ends.	Single, elongated, conical or twisted and convoluted.
4. Glandular Trichome	(a) Uni-, or bi-seriate, multicellular-cylindrical. (b) Bi-, or multi-seriate, multicellular-globose or club-shaped.	(a) Uni-, or bi-seriate, multicellular-cylindrical (b) Bi-, or multi-seriate, multicellular-club-shaped	(a) Uni-seriate, multicellular-cylindrical (b) Bi-, or multi-seriate, multicellular-club-shaped	(a) Uni-, or bi-seriate, multicellular-cylindrical (b) Bi-seriate, multicellular-club-shaped
5. Stomata	Ranunculaceous (Anomocytic)	Ranunculaceous (Anomocytic)	Ranunculaceous (Anomocytic)	Ranunculaceous (Anomocytic)
6. Crystals	Sphaeraphides	Sphaeraphides	Sphaeraphides	Sphaeraphides

TABLE III

SHOWING FREQUENCY (COUNTS/mm) OF DIFFERENT TYPES OF TRICHOMES IN FLOWER POWDERS OF *H. ROSA-SINENSIS* & ITS ADULTERANTS

	Frequency of different stellate trichomes	Frequency of covered trichomes	Frequency of Glandular trichomes	
			Uni- or bi-seriate, multicellular (cylindrical)	Bi- or multi-seriate, multicellular (globose or club-shaped)
<i>H. rosa-sinensis</i>	1.6	1.6	1.4	0.8
<i>H. schizopetalus</i>	1.2	0.8	1.0	0.4
<i>H. mutabilis</i>	2.0	3.7	1.0	0.6
<i>Malvaviscus mollis</i>	1.2	1.9	1.2	0.3

TABLE IV

SHOWING QUANTITATIVE DIFFERENCES IN EPIDERMAL CELLS AND CRYSTALS OF FLOWER POWDERS OF *HIBISCUS ROSA-SINENSIS* AND ITS ADULTERANTS

	<i>Hibiscus rosa-sinensis</i>	<i>H. schizopetalus</i>	<i>H. mutabilis</i>	<i>Malvaviscus mollis</i>
Measurement of epidermis of bract (Range)	L30 μ -60 μ -90 μ ×	L24 μ -36 μ -48 μ ×	L15 μ -39 μ -63 μ ×	L27 μ -66 μ -105 μ ×
	B21 μ -33 μ -45 μ	B15 μ -21 μ -30 μ	B15 μ -30 μ -39 μ	B18 μ -30 μ -39 μ
Average	L50.4 μ × B30.6 μ	L33.3 μ × B21.9 μ	L36.6 μ × B27.3 μ	L50.4 μ × B27.6 μ
Measurement of epidermis of calyx (Range)	L21 μ -48 μ -69 μ ×	L21 μ -45 μ -66 μ ×	L27 μ -45 μ -63 μ ×	L21 μ -48 μ -60 μ ×
	B18 μ -30 μ -42 μ	B15 μ -30 μ -45 μ	B18 μ -30 μ -36 μ	B18 μ -24 μ -33 μ
Average	L41.7 μ × B27 μ	L42.6 μ × B27.9 μ	L41.4 μ × B27.6 μ	L41.1 μ × B25.8 μ
Measurement of epidermis of corolla (Range)	L60 μ -126 μ -186 μ ×	L18 μ -45 μ -69 μ ×	L30 μ -54 μ -90 μ ×	L33 μ -60 μ -81 μ ×
	B27 μ -42 μ -54 μ	B18 μ -24 μ -30 μ	B18 μ -33 μ -45 μ	B27 μ -39 μ -51 μ
Average	L106.2 μ × B42 μ	L44.1 μ × B24.9 μ	L55.2 μ × B31.8 μ	L57.9 μ × B33.9 μ
Measurement of crystals (Range)	L12 μ -30 μ -36 μ ×	L9 μ -24 μ -36 μ ×	L9 μ -18 μ -24 μ ×	L9 μ -21 μ -30 μ ×
	B12 μ -24 μ -36 μ	B6 μ -18 μ -30 μ	B6 μ -12 μ -18 μ	B9 μ -18 μ -27 μ
Average	L24.6 μ × B21.6 μ	L23.1 μ × B18.9 μ	L16.2 μ × B12.9 μ	L20.4 μ × B18 μ

L = Length

B = Breadth

TABLE V

SHOWING RESULTS OF FLUORESCENCE TEST UNDER U. V. OF FLOWER POWDERS OF
HIBISCUS ROSA-SINENSIS AND ITS ADULTERANTS

Treatments	<i>Hibiscus rosa-sinensis</i>	<i>H. schizopetalus</i>	<i>H. mutabilis</i>	<i>Malvaviscus mollis</i>
Drug Powder	Red (Indian)	Red	Buff	Tan
Drug+ 1N NaOH in methanol	Blackish brown	Bright light green	Pinkish red	Yellowish red
Drug+ 1N HCl	Pink red	Pink red	Yellowish	Pink red
Drug+ 1N NaOH in water	Brown (Bright)	Dark reddish brown	Blackish yellow	Light reddish brown
Drug+ HNO ₃ diluted in equal volume in water	Red	Red	Yellow	Red
Drug+ H ₂ SO ₄ diluted in equal volume in water	Red	Bright red	Green	Light red
Drug+ I & KI solution	Dark green	Dark green	Yellowish violet	Dark green

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