Pakistan J. Sci. Ind. Res., Vol. 30, No. 10, October 1987

PHARMACOGNOSTICAL STUDY ON "CHANGERI"

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(Received July 22, 1985; revised July 23, 1987)

The Unani drug "Changeri" is confused with two botanical names, *Rumex dentatus* L. and *Oxalis corniculata* L. In order to determine the correct botanical name of the drug, pharmacognostic studies on "changeri" as well as on *Oxalis corniculata* L., and *Rumex dentatus* L. were taken up. These pharmacognostic studies show that the correct botanical name of "changeri" is *Oxalis corniculata* L.

Key words: Medicinal plants; Changeri; Unani drug.

INTRODUCTION

The vernacular names of botanical plants differ in the different areas of Indo-Pakistan subcontinent. For example, *Rumex dentatus* L. is "ambavati", "humaz" [1,2]; *Oxalis corniculata* L. is "amtika", "amrul", "ambuti", "palikiri," "puli-chinatu", "Polyarala," and "khatti-booti" [1,3]. But these two plants, *Rumex dentatus* L. and *Oxalis corniculata* L. are also referred to under one Sanskirat name "changeri" [4,5,6[. Similarly, *Hydrocotyle Javanica* Thunb., *Centella asiatica* L., *Herpestris monniera* HBK. and *Merramia emarginata* Hallier are known by the common unani name of "Brahmi" [7]. *Anthemis nobilis L.,* Corchorus despressue *L. and Matricaria chamomilla* L. are confounded with "Babuna", *Euphorbia hirta* L., and *E. hypercifolia* HK. F. are referred to in literature under one Unani name, "dudhi". The correct botanical names of the Unani drugs "babuna" and "dudhi" have been established as *Matricaria chamomilla* L., and *Euphorbia hirta* L. respectively [8,9]. The correct botanical name of "changeri" has, however, not yet been determined. Pharmacognostic studies on "changeri" *Oxalis corniculata* L., and *Rumex dentatus* L. were undertaken in order to establish the correct botanical origin of "changeri".

The drug "changeri" is considered to be cooling [10], refrigerant, antiscorbutic (it cures scurvy), astringent, appetising, useful in fever and bilousness [5] and dysentery [6].

MATERIALS AND METHODS

The drug "changeri" which is comprised of flowers, leaves and stems was procured from Akbarimandi, Lahore. *Oxalis corniculata* L., was collected from the botanical garden of the PCSIR Laboratories, Peshawar, while *Rumex dentatus* L., was collected from Drosh (Chitral). The authentication and identification of both species was done by Mr. Shahid Farooq, Taxonomist PCSIR Laboratories Peshawar. Pharmacognostic studies of fresh and dried material were conducted in order to determine the correct botanical name of "changeri". Maceration studies were carried out by Jaffary's method [11]. Small pieces of leaves and stems were fixed in formaline - acetic acid (F.A.A.) for microtome sectioning. After dehydration by n. butyl and ethyl alcohol, the paraffin embedding was done by Zirkle's method [11]. The sections were stained by double stains (safranin and fast green). The drawing of the cells were made by camera lucida and measurements of the cells were recorded [12] (Table 1).

The uniform powdered material of "changeri", *Oxalis corniculata* L. and *Rumex dentatus* L., was obtained by sifting through mesh No. 80. The starch grains appear black when the powdered materials was treated with 5% iodine solution [11,13,14]. Calcium oxalate crystals were identified by treating the powdered samples with cupric acetate and ferric sulphate. A yellow colour indicates the presence of calcium oxalate crystals [11].

RESULTS AND DISCUSSION

Taxonomic studies. Taxonomic characters of the drug "changeri", *Oxalis corniculata* L., and *Rumex dentatus* L. were examined in order to determine the correct botanical name of "changeri". Taxonomic characters of "changeri", *Oxalis corniculata* L., and *Rumex dentatus* L., are as follows:–

"Changeri" leaves. Acidic in taste. Leaves composed of three leaflets. Leaflet 1.2–1.4 cm broad, 1.5–1.8 cm long. Leaflets broad, obcordate, stipulate, pale greenish. Stem: hairy, brown in colour, wrinkled, slender, 0.5 cm in dia.

Flowers: subumbellate; bracts setaceous; petals obcordate. Capsule subcylinderic, 1.4 cm long, sepals 5, free; Petals 5, notched; stamens 10; style 5.

Oxalis corniculata L. Family: Oxalidacea. Weed, found through out Pakistan. Small, annual/perennial herb. Leaves: Acidic in taste. Leaves composed of three leaflets. Leaflets 1.2–1.4 cm broad, 1.5–1.8 cm long, stipulate, pale greenish broad obcordate. Flowers: subumbellate, bracts setaceous; calyx persistant; petals obcordate. Capsule subcylindric, 1.4 cm long. Sepals 5, free; petals 5, notched; stamens 10; style 5. Stem: hairy, brown in colour, wrinkled, slender, 0.5 cm in dia.

Rumex dentatus L. Family: Polygonaceae. Annual, erect herb. Leaves: tasteless, 3–3.5 cm broad, 16–17 cm long, dark green in colour, glabrous, radical, alternate. Flowers: Arranged in close or distant whorls on simple or panicled racemes, pedical about .51 cm long with articulation near the base. Perienths 6, oblong-ovate, obtuse, with an oblong, smooth tubercle on the back and broad, densly reticulate and irregularly toothed wings, teeth many, short, straight. Stamens 6, in 3 pairs; stigma fringed. Stem: shiny, greenish brown, ridged, slender, 1.2 cm in dia. The above taxonomic studies show that the drug "changeri" and *Oxalis corniculata* L., resemble each another, while *Rumex dentatus* L. belongs to a different family i.e. Polygonaceae and its taxonomic features are totally different from those of drug "changeri."

Microscopic studies.

(a) *Maceration studies.* Changeri (Fig. 1) Leaf: Epidermal cells with unicellular hairs; stomata rubiaceous, sunken; cortical cells with calcium oxalate crystals; collenchyma; fibres with one end pointed and the other rounded; vessels with scalariform and reticulate thickening. Stem: (Fig. 2) Parenchyma, epidermal cells with unicellular hairs; xylem parenchyma; fibres with both ends pointed; spiral and reticulate vessels are examined.

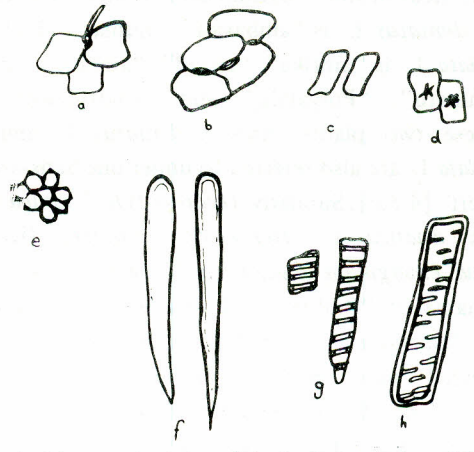
Oxalis corniculata L. Leaf: (Fig. 3) Epidermal cells with unicellular hairs; stomata rubiaceous; cortical cells with calcium oxalate crystals; collenchyma; fibres with one end pointed and the other rounded; scalariform Parenchyma and reticulate vessels are investigated. Stem: (Fig. 4) epidermal cells with unicellular hairs; xylem parenchyma; fibres with both ends pointed; spiral and reticulate vessels are examined.

Rumex dentatus L. Leaf: (Fig. 5) parenchyma; cortical cells with starch grains; calcium oxalate crystals; collenchyma, fibres with one end pointed and the other rounded, spiral vessels (single helicle and double helicle), druse crystals and ranunculaceous type of stomata are examined. Stem: Fig. 6) Cortical parenchyma, xylem parenchyma, two types of fibres (a) rectangular (b) one end pointed; spiral, reticulate and pitted vessels are recorded.

The above macerated studies and other details as given in Table 2 show that "changeri" and *Oxalis corniculata* L. are identical while *Rumex dentatus* L. does not resemble the unani drug "changeri".

(b) Transverse sections of the leaves and stems of "changeri", *Oxalis corniculata* L. and *Rumex dentatus* L.

Changeri leaf: (Fig. 7) Leaf consists of three leaflets. Each leaflet is bifacial. Unicellular, non glandular hairs on both sides of the leaflet are observed. Epidermis: One - two layered parenchyma constitute the epidermis cortex: Cortex is composed of (i) palisade parenchyma (ii) spongy parenchyma (i) Palisade parenchyma: A few layered palisade parenchyma is examined. Some of the cells contain calcium oxalate crystals. (ii) Spongy parenchyma: Intercellular spaces among the spongy parenchyma are observed. Cal-



Fiq. 1. Macerated tissue of leaf of unani drug "Changeri" x100. (a) epidermal cells with unicellular hair; (b) epidermal cells with stomata; (c) cortical parenchyma; (d) cortical parenchyma with calcium oxalate crystals; (e) collencyma; (f) fibres; (g) scleriform vessels; (h) reticulate vessel.

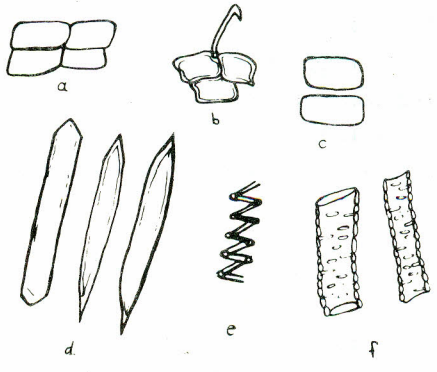


Fig. 2. Macerated tissues of stem of unani drug "Changeri" x100. (a) parenchyma; (b) epidermal cells with hair; (c) xylem parenchyma; (d) fibres; (e) spiral vessel; (f) reticulate vessels.

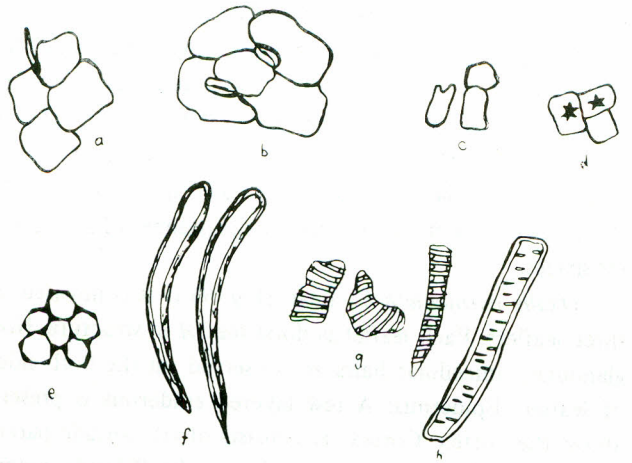


Fig. 3 Macerated tissues of leaf of *Oxalis corniculata* L x 100. (a) epidermal cells with unicellular hiar; (b) epidermal cells with stomata; (c) cortical parenchyma; (d) cortical parenchyma with calcium oxalate crystals; (e) collenchyma; (f) fibres; (g) scleriform vessels; (h) reticulate vessel.

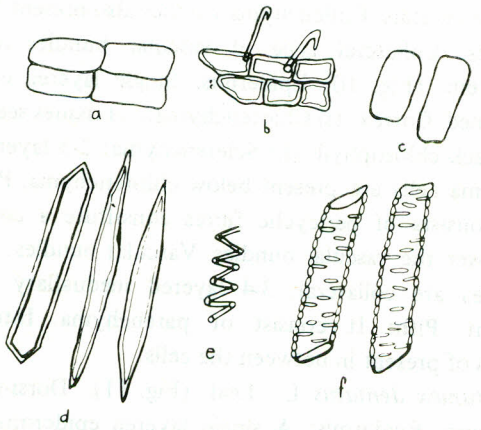


Fig. 4. Macerated tissues of stem of *Oxalis corniculata* L. x 100. (a) parenchyma; (b) epidermal cells with hairs; (c) xylem parenchyma; (d) fibres; (e) spiral vessel; (f) reticulate vessels.

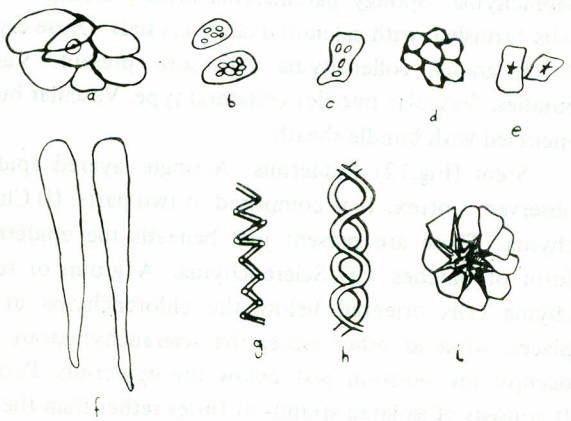


Fig. 5. Macerated tissues of leaf of *Rumex dentatus* L. x 100. (a) epidermal cells with stomata; (b,c) cortical cells with starch grains; (d) collenchyma; (e) cortical parenchyma with calcium oxalate crystals; (f) fibres; (g) spiral vessels (singel helicle); (h) spiral vessels (double helicle); (i) druse crystals.

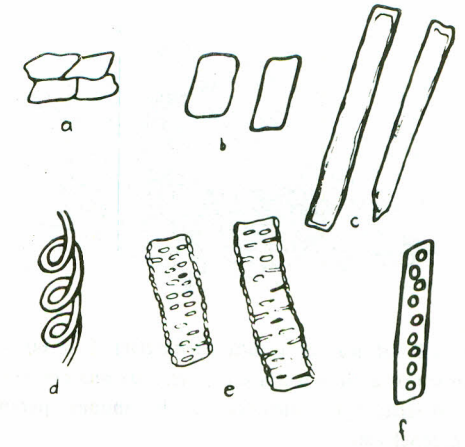


Fig. 6. Macerated tissues of stem of *Rumex dentatus* L. x 100. (a) cortical parenchyma (b) Xylem parenchyma (c) fibres; (d) spiral vessel; (e) reticulate vessel; (f) pitted vessel.

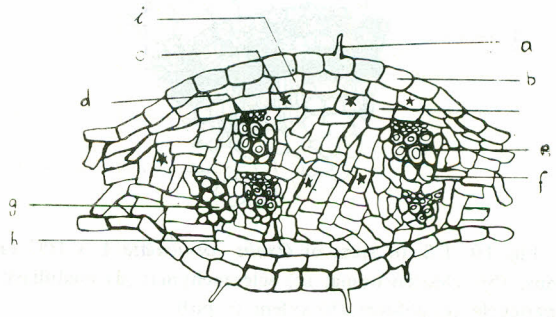


Fig. 7. T.S. of leaf of "Changeri' x 60. (a) unicellular hair; (b) epidermis; (c) calcium oxalate crystal; (d) phleom; (e) xylem; (f) bundle sheath; (g) collenchyma; (h) spongy parenchyma; (i) palisade parenchyma.

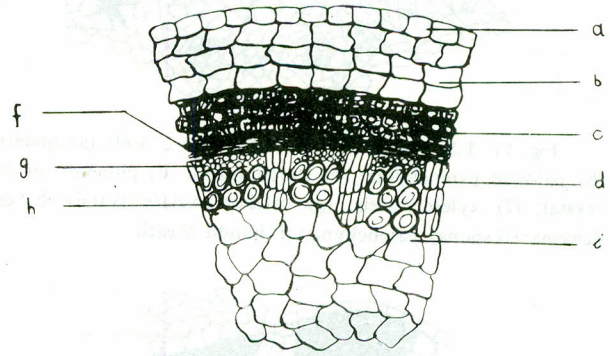


Fig. 8. T.S. of stem of Changeri" x 60 (a) epidermis; (b) chloenchyma; (c) sclerenchuma; (d) medullary rays; (f). pericycle; (g) phleom; (h) xylem; (i) pith.

cium oxalate crystals and collenchyma patches are present.

Vascular bundles. Collateral type of vascular bundles are present. Stem: (Fig. 8) Epidermis: Single layered epidermis is present. Cortex: Cortex consists of (i) chlorenchyma (ii) Sclerenchyma tissues. (i) Chlorenchyma: Chlorophyll is present in chlorenchymatous tissues, but a few cells

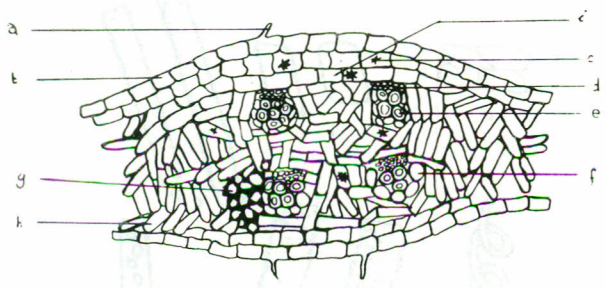


Fig. 9. T.S. of leaf of *Oxalis corniculate* L x 60. (a) hair; (b) epidermis; (c) calcium oxalate crystals; (d) phloem; (e) xylem; (f) bundle sheath; (g) collenchyma; (h) spongy parenchyma; (i) palisade parenchyma.

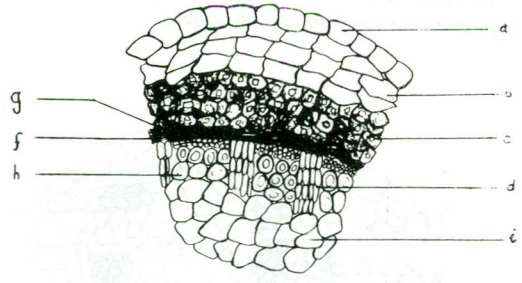


Fig. 10. T.S. of stem of *Oxalis corniculata* L x 100. (a) epidermis; (b) chlorenchyma; (c) sclerenchyma; (d) medullary rays; (e) pericycle; (g) phloem; (h) xylem; (i) pith.

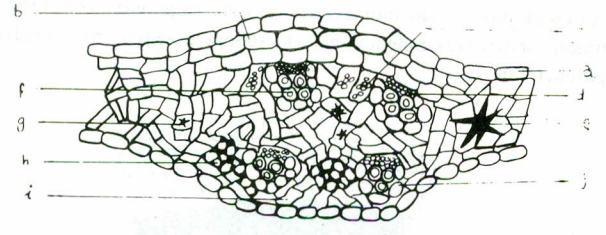


Fig. 11. T.S. of leaf of *Rumex dentatus* L. x 60. (a) epidermis; (b) palisade parenchyma; (c) starch grains; (d) phloem; (e) druse crystal; (f) xylem vessels; (g) calcium oxalate crystals; (h) collenchyma; (i) spongy parenchyma; (j) bundle sheath.

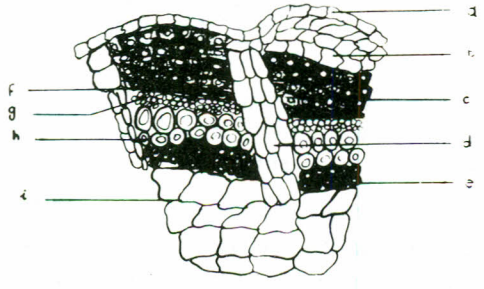


Fig. 12. T.S. of stem of *Rumex dentatus* L. x 60. (a) epidermis; (b) chlorenchyma; (c) sclerenchyma; (d) medullary rays; (e) sclerenchyma; (f) pericycle; (g) phloem; (h) xylem; (i) pith.

are devoid of chlorophyll (ii) Sclerenchyma: 2-3 layered sclerenchymatous cells are oriented over the pericycle. Pericycle: It is comprised of a continuous layer of pericyclic fibres which are present above the vascular bundles. Vascular bundles: collateral type of vascular bundles are examined. 3-4 layered medullary rays are present. Pith: It consists of parenchyma with a large number of intercellular spaces.

Oxalis corniculata L. Leaf. (Fig. 9) It is comprised of three leaflets. Each leaflet is dorsi-ventral in structure. Non glandular, unicellular hairs are observed on the both sides of leaflet. Epidermis: A few layered epidermis is present above the cortex. Cortex: It consists of (i) palisade parenchyma and (ii) Spongy parenchyma. (i) Palisade parenchyma: 2-4 layered Palisade: parenchyma constitutes the palisade. Some cells are furnished with calcium oxalate crystals. (ii) Spongy parenchyma: Spongy parenchyma with intercellular spaces present. Few cells packed with calcium oxalate crystals. Collenchyma patches also present Vascular bundles: Collateral type of vascular bundles observed.

Stem: (Fig. 10) Epidermis: Single layered epidermis examined. Cortex: (i) Chlorenchymatous tissues seen. Some cells lack chlorophyll. (ii) Sclerenchyma: 2-3 layered sclerenchyma cells are present below chlorenchyma. Pericycle: It consists of pericyclic fibres constitute a continuous ring over the vascular bundles. Vascular bundles: Vascular bundles are collateral. 3-4 layered meduallary rays are present. Pith: It consist of parenchyma. Intercellular spaces of present in between the cells.

Rumex dentatus L. Leaf: (Fig. 11). Dorsi-ventral in structure. Epidermis: A single layered epidermis present. Cortex: Comprised two parts: (i) Palisade parenchyma: A few layered palisade parenchyma observed. (ii) Spongy parenchyma: Spongy parenchyma loosely arranged. Some cells furnished with calcium oxalate crystals. Druse crystals, starch grains; collenchyma cells also present. Vascular bundles: Vascular bundles collateral type. Vascular bundles encircled with bundle sheath.

Stem (Fig.12) Epidermis: A single layered epidermis observed. Cortex: It is comprised of two parts: (i) Chlorenchyma: These are present just beneath the epidermis in form of patches. (ii) Sclerenchyma: A group of sclerenchyma cells oriented below the chlorenchyma at some places, while at other places the sclerenchymatous tissues occupy the position just below the epidermis. Pericycle: It consists of isolated strands of fibres rather than the continuous ring. These pericyclic fibres are located above the vascular bundles.. Vascular bundles: Vascular bundles collateral. 2-4 layered medullary rays observed. 2-3 layered sclerenchyma present in form of groups beneath vascular

Table 1. Measurements of the cells comprising the various structural parts of the leaves and stems of unani drug 'Changeri', *Oxalis corniculata* L. and *Rumex dentatus* L.

Type of cells	Changeri*		*Oxalis corniculata* L*		*Rumex dentatus* L. *	
	Breadth	Length	Breadth	Length	Breadth	Length
Leaf						
Parenchyma	6- 8-10μ	30- 35- 40μ	6- 8-10μ	30- 35- 40μ	15-20-25μ	40- 50- 60μ
Palisade parenchyma	10-15-18μ	20- 23- 28μ	10-15-18μ	20- 23- 28μ	20-22-25μ	30- 36- 40μ
Spongy parenchyma	12-15-20μ	22- 28- 33μ	12-15-20μ	22- 28- 33μ	22-25-30μ	35- 40- 45μ
Collenchyma	8-10-12μ	14- 16- 18μ	8-10-12μ	14- 16- 18μ	13-16-18μ	19- 21- 23μ
Fibres	14-16-18μ	500-660-720μ	14-16-18μ	500-660-720μ	12-24-30μ	220-300-500μ
Stem						
Epidermal parenchyma	18-25-30μ	100-160-200μ	18-25-30μ	100-160-200μ	10-12-14 μ	30-35-40μ
Hairs	6- 8-10μ	140-160-210μ	6- 8-80μ	140-160-210μ		
Xylem parenchyma	40-50-80μ	100-150-190μ	40-50-80μ	100-150-190μ	50-66-70μ	90-140-170μ
Fibres	12-16-20μ	300-400-600μ	12-16-20μ	300-400-600μ	20-24-28μ	320-800-950μ

* Ten replica of each were examined.

Table 2. The comparative macerated studies of the tissues of 'Changeri', *Oxalis corniculata* L. and *Rumex dnetatus* L.

Name of tissues	Changeri*	*Oxalis corniculata* L.*	*Rumex dentatus* L.*
Leaves			
Hair.	Present	Present	Absent
Stomata	Rubiaceous	Rubiaceous	Renunculaceous
Scalariform vessels	Present	Present	Absent
Reticulate vessels	Present	Present	Absent
Spiral vessels	Absent	Absent	Present
Starch grains	Absent	Absent	Present
Druse crystals	Absent	Absent	Present
Stem			
Hairs	Present	Present	Absent
Pitted vessles	Absent	Absent	Present

* Ten replica of each were examined.

bundles. Pith: Intercellular spaces in the Central portion of pith are present.

Different dimensions of the cells are recorded in the Table 2.

The transverse sections of the leaves, stems and data collected in Table 2 show that "changeri" and *Oxalis corniculata* L. resemble each other.

Microchemical tests. Microchemical tests show the presence of calcium oxalate crystals in the powdered drugs, *Oxalis corniculata* L. and *Rumex dentatus* L. Tests also reveal the presence of druse crystals in the powdered drug of *Rumex dentatus* L. while such type of crystals are absent in "changeri", and *Oxalis corniculata* L. Starch grains are found in the powdered drug of *Rumex dentatus* L. while these are absent in "Changeri" and *Oxalis corniculata* L.

The above micro chemical tests show that "changeri" and *Oxalis corniculata* L. are similar when subjected to different micro-chemical tests.

CONCLUSION

Taxonomic studies, microscopy and microchemical tests reveal that the unani drug "changeri" and *Oxalis corniculata* L. are identical to *Rumex dentatus* L., though

referred to in the literature under unani name "Changeri" is totally different when compared with "changeri". According to these pharmacognostic studies, "changeri" originates from *Oxalis corniculata* L.

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