

ASTERACEAE OF BHOPAL (MADHYA PRADESH)—A SYSTEMATIC STUDY*

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ABSTRACT

The present paper deals with the systematic study of 28 genera and 35 species of the family Asteraceae growing in Bhopal area. An artificial key to all the species based on achene characters, which are also illustrated by line drawings, has been given. A table showing distribution of the species in the area under study is added.

INTRODUCTION

The Botany of Madhya Pradesh has not been adequately studied and no detailed published flora is so far available, particularly, for the Central part of the State. Recently R. S. Rao and Narayana-swamy (1960), Maheshwari (1960; 1961; 1962; 1963), Joseph (1963), Rao and Sastry (1964), Panigrahi *et al* (1965; 1966; 1967), Balapure (1966), Subramanyam & Henry (1966) and a few others have contributed to the knowledge of the flora of some selected regions of the State. In this respect, Bhopal area is, however, very much neglected. Oommachan (1966) published some information on the rainy season plants of Bhopal and so this is now added the systematic data on the family Asteraceae. Good taxonomic treatments on the family were published in various provincial floras of India. Of late, Santapau (1946) and Venkatesh (1948) however, presented the family with artificial keys to the genera and species of Bombay and Bangalore respectively, giving importance to the colour of the florets and a few other characters. Such keys have been found to be useful as long as the area under study and the range of species are limited. Similarly the key based on Achene character as presented overleaf has been found to be workable for Bhopal area.

Bhopal city (23°16'N-72°25'E) covering an area of 20 sq. km at 503 m altitude, stands on the edge of two big lakes with an undulating plateau of partly black cotton soil and red gravel interspersed with low sand stone hills which forming an extension of the Vindhyan belt. The area is partly under cultivation and the hill slopes are covered to some extent with low deciduous forests, indicating heavy biotic interference.

The underlying Vindhyan rock system of Bhopal belongs mainly to the Bhandar series of the upper Vindhyan. The main types of soils are medium black cotton and lateritic with different grades and somewhat sandy at few places.

The average annual rainfall is about 1270 mm with most of it falling during July to September. Sometimes the rainfall is unusually low, 678.6 mm as during 1966. The temperature in summer varies from 23° to 41°C, with May being the hottest month, while in winter, it varies from 8° to 24°C with January being the coldest month.

METHOD OF STUDY

From August, 1965 to July, 1966, periodical collections of wild species (excluding cultivated and garden plants) were made from seven different localities, representing the different types of habitat. Standard methods necessary for a taxonomic work have been followed, after assessing the field data and the identification of various species. Necessary scrutiny of the material has been made at the herbaria of Botanical Survey of India, both Central and Western Circles.

The specimens are deposited in the herbarium of the Botany department of Motilal Vigyan Mahavidyalaya, Bhopal and a duplicate set, at Botanical Survey of India, Western Circle, Poona.

SYSTEMATIC TREATMENT

Based on such of the characters of fruit, as presence or absence of pappus, number of pappus hairs, shape and size of fruit and marking on fruit wall etc., an artificial key to the genera studied has been presented alongwith drawings of achenes. Again under each genus, wherever more than one species is recorded, key for the species based mostly

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AN ARTIFICIAL KEY PROPOSED—KEY TO THE GENERA

(The numbers given after the genus in bracket denote the corresponding number given for the drawings).

1. Pappus present :
 2. Pappus more than 5 :
 3. Pappus feathery *Tridax* (4)
 3. Pappus not feathery :
 4. Pappus 1 or 2 seriate :
 5. Pappus uniseriate :
 6. Achene hairy :
 7. Pappus forming a cup *Echinops* (7)
 7. Pappus not forming a cup :
 8. Pappus forming a parachute :
 9. Achene slender, pappus silky and soft : *Emilia* (3)
 9. Achene roughly quadrangular and pappus of silvery brown hairs and relatively more rigid *Amberboa* (26)
 8. Pappus not forming a parachute :
 10. Achene ribbed :
 11. Achene black, ob-conical 3 mm *Hymenatherum* (33)
 11. Achene not black, oval, less than 3 mm *Blumea* (22-24)
 10. Achene not ribbed :
 12. Achene compressed and marginate *Conyza* (25)
 12. Achene not compressed, sub-terete *Vicoa* (15)
 6. Achene not hairy :
 13. Achene compressed :
 14. Achene glandular *Grangea* (31)
 14. Achene not glandular :
 15. Achene narrowly obovoid and transversely muricate *Sonchus* (1)
 15. Achene sub-terete and thickly ribbed *Launaea* (2)
 13. Achene not compressed *Gnaphalium* (28-29)
 5. Pappus biseriate :
 16. Outer pappus a laciniate-cup *Pulicaria* (20, 27)
 16. Outer row of pappus very short, not forming a laciniate cup *Vernonia* (13)
 4. Pappus multiseriate *Goniocaulon* (32)
 2. Pappus 5 or less than 5 :
 17. Achene hairy :
 18. Pappus 4 *Lagascea* (9)
 18. Pappus 2 *Glossocardia* (14)
 17. Achene not hairy :
 19. Pappus more than 2 :
 20. Achene less than 5 mm. Achene triquetrous, pappus of minute scaly bristles, 2-4, (of ray floret) *Blainvillea* (6)
 20. Achene more than 5 mm :
 21. Achene 5-angular, pappus scaly, five and as long as the achene *Ageratum* (19)
 21. Achene 4 angular, pappus of bristles, rigid and much shorter than the achene *Bidens* (8,10)
 19. Pappus 2. Achene flattened, pappus scaly *Caesulia* (17)
 1. Pappus absent :
 22. Fruit spiny :
 23. Spines distinctly hooked, fruit 1.5 to 2 cm, oval *Xanthium* (5)
 23. Spines slightly curved, fruit less than 1.5 cm, triangular *Acanthospermum* (12)
 22. Fruit not spiny :
 24. Achene distinctly hairy and minutely stalked *Sphaeranthus* (18)
 24. Achene not hairy :
 25. Achene distinctly ribbed :
 26. Achene black and compressed *Flaveria* (30)
 26. Achene brownish and ob-conic (of ray floret), or flattened and winged (of disc floret) *Chrysanthellum* (21)
 25. Achene not ribbed :
 27. Achene tri-quetrous (of ray floret) or sub-compressed (of disc floret) with protuberances *Eclipta* (16)
 27. Achene cuneate, laterally compressed, obovate *Sclerocarpus* (11)

on achene characters is also added. A table showing distribution and relative abundance of various species collected from seven different localities of Bhopal area (indicated as I-VII) is given at page 39. Under the enumeration of species only distinct characters for each species followed by the locality number and the field number are given. The collector for most of the species enumerated below being K. V. Billore, the Junior author, the name is omitted while giving the field numbers.

ENUMERATION

Vernonia cinerea (Linn.) Less.

Erect herb, variable in height from 5 cm to 1 m. Leaves variable in shape and size, 1-5.5 cm long, 0.5-2.5 cm broad. Head pink to purple-violet. Achene slightly obovate, flattened, base conical. II, 2.

Ageratum conyzoides Linn.

Erect, pubescent herb. Head white or purple : peduncle 0.5-3 cm. Achene black. I, 13.

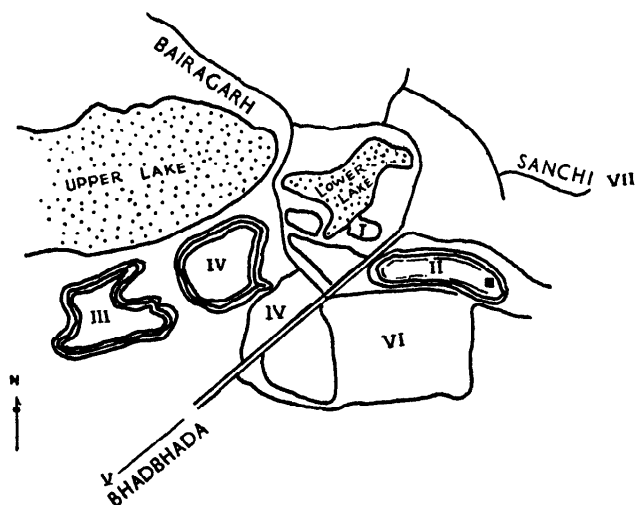


DIAGRAM showing localities of collection (I-VII) : I. M. V. Mahavidyalaya campus. II. Arera hill. III. Shamla hill. IV. North T. T. Nagar. V. Bhadbhada. VI. South T. T. Nagar. VII. Sanchi.

Grangea maderaspatana (Linn.) Poir.

Erect or prostrate herb. Head yellow. Pappus tubular with a fimbriate mouth. *Oommachan* 30.

Conyza bonariensis (Linn.) Cronquist.

Erect, villous herb. Head yellow. Achene oblong; pappus creamy. I, 32; *Oommachan* 167.

BLUMEA DC

- | | | | |
|--|-----|-----|-----------------------|
| A. Achene distinctly 8-10 ribbed, elliptic and oblong | ... | ... | <i>B. membranacea</i> |
| A. Achene not distinctly ribbed: | | | |
| B. Receptacle glabrous : | | | |
| C. Achene narrowly oblong, truncate about 0.1 cm | ... | ... | <i>B. oxydonta</i> |
| D. Achene flattened, dark brown | ... | ... | <i>B. obliqua</i> |
| B. Receptacle minutely pilose, achene flattened, brown | | | |
| ... | ... | ... | <i>B. laciniata</i> |

Blumea laciniata (Roxb.) DC.

Erect, glandular, hairy herb reaching about 2 m. Leaves variable in size and shape, 20-50 cm long and 2.5-5 cm broad. Head yellow. Achene oblong, minutely ribbed, brownish, pappus white. VI, 35.

B. membranacea DC.

Erect, pubescent herb, variable in length 6 cm to 1 m. Head yellow. Achene brown. VI, 24.

B. obliqua (Linn.) Druce.

Erect, villous herb. Head pink to purple. Pappus sparsely hairy, creamy. I, 29.

B. oxydonta DC.

Prostrate, spreading, pubescent herb. Head orange to yellow. Pappus yellow. A number of characteristic woolly knob-like vegetative buds are usually developed on the brownish stem that is partly covered by the soil and such buds develop into prostrate shoots which emerge from the soil after proper growth. Sometimes these shoots produce roots and become stoloniferous. I, 26.

Sphaeranthus indicus Linn.

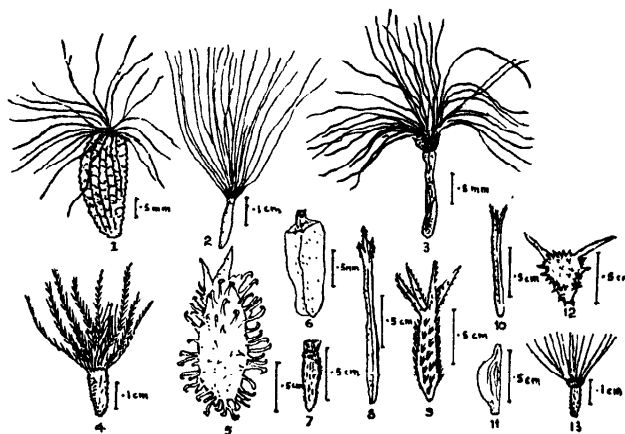
Prostrate, glandular, herb. Head globose, pink to purple. Achene oblong, obovate. VI, 25.

GNAPHALIUM LINN.

- | | | | |
|---|-----|-----|---------------------|
| A. Achene oblong, fruit wall with irregular ridges, pappus forming a crown of caducous ring | ... | ... | <i>G. purpureum</i> |
| A. Achene obovoid, fruit wall blistered, pappus not forming a crown of caducous ring | ... | ... | <i>G. indicum</i> |

Gnaphalium indicum Linn.

Small, erect, woolly, herb. Head pale brown to yellow. Achene minute, obovoid; pappus hairy, caducous not cohering to the achene. VI, 27.



Figs. 1-13: 1. *Sonchus oleraceus* Linn. 2. *Launaea fallax* (Jaub. & Spach.) Kuntze. 3. *Emilia sonchifolia* DC. 4. *Tridax procumbens* Linn. 5. *Xanthium strumarium* Linn. 6. *Blainvillea acmella* (Linn. f.) Phil. 7. *Echinops echinatus* Roxb. 8. *Bidens biternata* (Lour.) Merr.-Sherff. 9. *Lagascea mollis* Cav. 10. *Bidens pilosa* Linn. 11. *Sclerocarpus africanus* Jacq. 12. *Acanthospermum hispidum* Linn. 13. *Vernonia cinerea* (Linn.) Less.

G. purpureum Linn.

Erect, less woolly herb. Head brownish. Achene oblong, minutely papillose; pappus hairy-caducous. I, 28.

Caesulia axillaris Roxb.

Semi-aquatic, erect to decumbent herb. Head whitish-purple. Achene obovate, winged; pappus of 2-ovate scales, *Oommachan*, 16.

Vicoa indica (Willd.) DC.

Erect, variable herb, 5 cm-1 m. Head bright yellow. Ligule narrow, with a small conspicuous scaly appendage on the ligule. Pappus sparsely hairy. II, 15.

PULICARIA GAERTN.

- A. Achene elliptic-oblong upto 1 mm ... *P. foliosa*
A. Achene truncate-oblong upto 2 mm ... *P. angustifolia*

Pulicaria angustifolia DC.

Decumbent herb. Head yellow. II, 9.

P. foliosa DC.

Small, erect, hairy herb. Head yellow, with only tubular flowers. Achene small. I, 34. *Oommachan* 240.

Lagascea mollis Cav.

A well branched, erect herb. Head white. Achene cuncate, compressed, 3-4 angled; pappus stiff scaly forming a cup. I, *Oommachan* 12.

Xanthium strumarium Linn.

Scabrous, rigid herb. Head monoecious, greenish. Achenes 2 to each head, enclosed in a 2-beaked cell of hardened involucre, obovoid, thick. I, *Oommachan* 14.

Acanthospermum hispidum DC.

Erect herb. Head yellow. I, 13.

Eclipta prostrata (Linn.) Linn.

Much variable herb, 8 cm-1 m. Head white. Common in moist places. I, *Oommachan* 8.

Sclerocarpus africanus Jacq.

Erect, scabrous herb. Head yellow, ligulate flowers sterile. Achene fleshy black, smooth and ribbed. Fleshy part of the fruit is eaten by lizards and birds. II, 10.

Blainvillea acmella (Linn. f.) Phil.

Erect, scabrous herb. Small white head. Achene of disc-floret dorsally compressed; pappus of minute bristles. II, 1.

Glossocardia bosvallea (Linn. f.) DC.

Very variable, prostrate to erect, aromatic herb, 2-25 cm long. Head yellow. Achene compressed, oblong, densely-beared. II, 4.

Hymenatherum tenuifolium Cass.

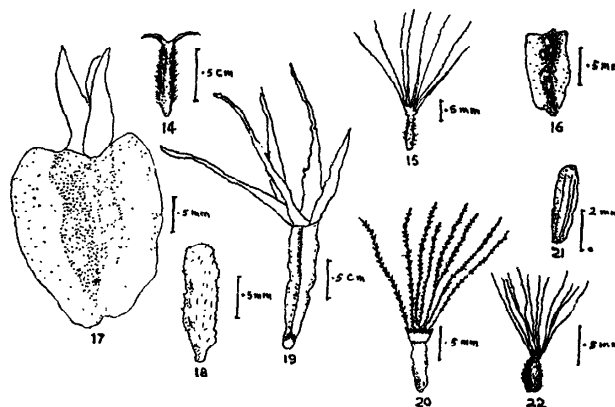
Erect or prostrate, strongly aromatic herb. Head bright yellow. Achene obconical, angled; pappus of membranous scales. A native of Central America growing as weed in gardens and also wild on red gravelly soil. VI, 31.

BIDENS LINN.

- A. Achene 0.5-1 cm, pappus of 2-3-barbed bristles ... *B. pilosa*
A. Achene 1-2 cm, pappus of 4-barbed bristles ... *B. biternata*

Bidens biternata (Lour.) Merr. & Scherff.

Erect, variable herb 5 cm-1 m, young leaves pinnately partite, hairy. Head yellow, ray-florets 2-3. Achene linear, dorsally compressed. Flowers and fruits during August-October. I, *Oommachan* 6.



Figs. 14-22: 14. *Glossocardia bosvallea* (Linn. f.) DC. 15. *Vicoa indica* (Willd.) DC. 16. *Eclipta prostrata* (Linn.) Linn. 17. *Caesulia axillaris* Roxb. 18. *Sphaeranthus indicus* Linn. 19. *Ageratum conyzoides* Linn. 20. *Pulicaria angustifolia* DC. 21. *Chrysanthellum indicum* DC. 22. *Blumea membranacea* DC.

B. pilosa Linn.

Erect, glabrous herb. Young leaves usually simple, glabrous. Head with 4-8 white ray-florets and yellow disc-florets. Achene 4-5 angled. Flowers and fruits during December-May. I, 20.

Chrysanthellum indicum DC.

Small, glabrous herb. Head yellow. VII, 19.

Tridax procumbens Linn.

Prostrate, hispid herb. Head pale-yellow. Achene oblong, terete and hairy. IV, *Oommachan* 5.

Flaveria repanda La Gasca

Erect, glabrous herb. Head yellowish. Achene obovate, shining. A native of Peru. VI, 18.

Emilia sonchifolia DC.

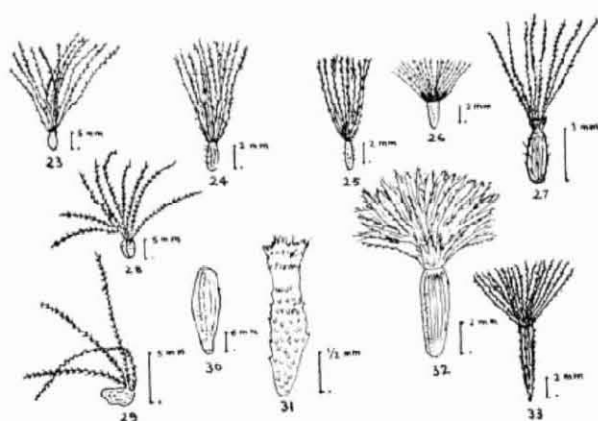
Glabrous, glaucous herb. Head pinkish to dark red. Achene slender. I, 11.

Echinops echinatus Roxb.

Rigid, pickly herb. Head globose, white. Achene slender, obconical. VI, 21.

Goniocaulon glabrum Cass.

Erect, glabrous herb. Head pink to purplish. Achene glabrous, ob-cylindric, grooved, pappus scaly. VII, 33. *Oommachan* 197.



Figs. 23-33: 23. *Blumea oxyodonta* DC. 24. *B. obliqua* (Linn.) Druce. 25. *Conyza bonariensis* (Linn.) Cronquist. 26. *Amberboa ramosa* (Roxb.) Jafri. 27. *Pulicaria foliosa* DC. 28. *Gnaphalium purpureum* Linn. 29. *G. indicum* Linn. 30. *Flaveria repanda* La Gasca. 31. *Grangea maderaspatana* (Linn.) Poir. 32. *Goniocaulon glabrum* Cass. 33. *Hymenatherum tenuifolium* Cass.

Amberboa ramosa (Roxb.) Jafri.

Straggling, smooth, annual. Head purplish. VI, Oommachan 241.

SONCHUS LINN.

A. Leaves with acute spreading auricles. Achene obovoid, ribbed, transversely muricate ...

S. oleraceus

A. Leaves with obtuse appressed auricles. Achene oblong, narrow, ribbed and transversely rugose ...

S. arvensis

Sonchus oleraceus Linn.

Erect, herb. Leaves very variable in shape. Head yellow. A common weed in cultivated fields and vegetable beds. I, 17.

S. arvensis Linn.

Erect, variable glaucous herb. Head yellow, umbellately corymbose. I, Oommachan 238.

TABLE SHOWING DISTRIBUTION OF SPECIES IN VARIOUS LOCALITIES OF BHOPAL AND ITS NEIGHBOURHOOD

Species	Field No.	I	II	III	IV	V	VI	VII	% of presence	Nature of distribution
<i>Vernonia cinerea</i> (Linn.) Less.	2	*	*	+	*	+	+	+	100	C.P.
<i>Ageratum conyzoides</i> Linn.	13	*	+	+	—	+	+	—	71.4	M.P.
<i>Grangea maderaspatana</i> (Linn.) Poir.	30	—	—	—	—	*	—	—	14.2	R.
<i>Conyza bonariensis</i> (Linn.) Cronquist.	167	+	—	—	—	—	—	—	14.2	R.
<i>Blumea membranacea</i> DC.	24	*	+	—	—	—	+	—	42.8	O.P.
<i>B. obliqua</i> (Linn.) Druce.	29	+	—	—	—	—	—	—	14.2	R.
<i>B. laciniata</i> (Roxb.) DC.	35	—	—	—	—	—	+	—	14.2	R.
<i>B. oxyodonta</i> DC.	26	*	—	+	—	+	*	—	58.2	O.P.
<i>Sphaeranthus indicus</i> Linn.	25	+	+	+	+	—	*	—	71.4	M.P.
<i>Gnaphalium indicum</i> Linn.	27	—	—	—	—	*	*	—	28.5	S.P.
<i>G. purpureum</i> Linn.	28	+	—	—	—	—	—	—	14.2	R.
<i>Caesulia axillaris</i> Roxb.	16	—	—	—	—	*	+	—	28.5	S.P.
<i>Vicoa indica</i> (Willd.) DC.	15	+	*	+	—	+	+	—	71.4	M.P.
<i>Pulicaria angustifolia</i> DC.	9	—	*	—	—	—	*	*	42.8	O.P.
<i>P. foliosa</i> DC.	240	+	—	—	—	—	—	—	14.2	R.
<i>Lagasea mollis</i> Cav.	12	+	—	+	—	—	—	—	28.5	S.P.
<i>Xanthium strumarium</i> Linn.	14	+	+	—	+	+	*	—	71.5	M.P.
<i>Acanthospermum hispidum</i> DC.	3	*	+	+	+	*	+	+	100	C.P.
<i>Eclipta prostrata</i> (Linn.) Linn.	8	*	—	+	*	*	*	+	71.5	M.P.
<i>Sclerocarpus africanus</i> Jacq.	10	—	*	+	—	—	—	—	28.5	S.P.
<i>Blainvillea acmella</i> (Linn. f.) Phil.	1	—	*	+	—	—	—	+	42.8	O.P.
<i>Glossocardia bosvallea</i> (Linn. f.) DC.	4	*	*	+	+	+	*	*	100	C.P.
<i>Hymenatherum tenuifolium</i> Cass.	31	+	+	—	—	—	—	—	28.5	S.P.
<i>Bidens biternata</i> (Lour.) Merr. & Scherff.	6	*	*	+	—	+	+	+	85.7	C.P.
<i>B. pilosa</i> Linn.	20	*	—	+	—	—	+	—	42.8	O.P.
<i>Chrysanthellum indicum</i> DC.	19	—	—	—	—	+	—	*	28.5	S.P.
<i>Tridax procumbens</i> Linn.	5	*	+	+	+	+	*	+	100	C.P.
<i>Flaveria repanda</i> La Gasca	18	—	—	—	—	—	+	—	14.2	R.
<i>Emilia sonchifolia</i> DC.	11	+	+	—	+	+	+	+	85.7	C.P.
<i>Echinops echinatus</i> Roxb.	21	+	—	+	—	+	*	—	58.2	O.P.
<i>Goniocaulon glabrum</i> Cass.	197	—	—	—	—	—	—	+	14.2	R.
<i>Amberboa ramosa</i> (Roxb.) Jafri.	241	—	—	—	—	—	+	—	14.2	R.
<i>Sonchus arvensis</i> Linn.	238	+	—	—	—	+	—	+	42.8	O.P.
<i>S. oleraceus</i> Linn.	17	*	—	+	—	+	+	*	71.5	M.P.
<i>Launaea fallax</i> (Jaub. & Spach.) Kuntze	7	*	—	—	—	—	*	+	42.8	O.P.

Symbols used: I = M. V. Mahavidyalaya campus; II = Arera hill; III = Shamla hill; IV = North T. T. Nagar; V = Bhadbhada; VI = South T. T. Nagar; VII = Sanchi.
 * = Abundant; + = Present; — = Absent.
 R = Rare (present in 1 to 20% of the localities); S. P. = Seldom present (21 to 40%);
 O.P. = Often present (41 to 60%); M. P. = Mostly present (61 to 80%) and
 C.P. = Constantly present (81 to 100%).

The genus *Sonchus* Linn. though represented by three species in India, is very variable in its leaf, shape and size with good range of intergrades. The correct identity of these taxa, purely by Herbarium method of taxonomy without a biosystematic approach is rather difficult.

***Laumaea fallax* (Jaub. & Spach.) Kuntze**

Glabrous, variable herb 5-55 cm. Head yellowish. Achene columnar; pappus of white copious hairs. I, 7.

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