

# FURTHER CONTRIBUTION TO BIOSYSTEMATICS OF *CHENOPODIUM*, REPORTING THREE NEW SPECIES FROM NORTH INDIAN PLAINS<sup>1</sup>

(With three text-figures)

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**Key words:** *Chenopodium adpressifolium* sp. nov., *C. sagittatum* sp. nov.,  
*C. hastatifolium* sp. nov., photonastic movements

Three new species of *Chenopodium* aggregate occurring in the north Indian plains have been distinguished and described as *Chenopodium adpressifolium* sp. nov., *C. sagittatum* sp. nov. and *C. hastatifolium* sp. nov.

## INTRODUCTION

Three new species of *Chenopodium* aggregate occurring in the north Indian plains have been distinguished and described as *Chenopodium adpressifolium* sp. nov., *C. sagittatum* sp. nov. and *C. hastatifolium* sp. nov. Earlier Pandeya *et al.* (1998) have communicated two new species of the genus from the north Indian plains.

Further, in both extensive and intensive surveys over the last several years, three new species of the genus *Chenopodium* have been distinguished from the north Indian Plains (alt. 100-250 m). All the three species are edible and occur naturally as weed in winter crop fields, in gardens and other moist places. They start growing in November and flower from January to April. Ecoclimate of the region is Tropical semi-arid and soils are Pleistocene with fresh alluvium of great depths. The specimens are deposited in Raja Balwant Singh College, Agra, India.

The three suspected species were put through a Provenance Trial (neutral garden experiment) at Agra for three consecutive years

for observing any plasticity therein. In neutral garden experiments, the plants collected from various habitats are grown together side by side under similar soil and climatic conditions in order to eliminate features developed due to differences of habitat. The quantified description of the three new species pertains to the neutral garden experiments.

### *Chenopodium adpressifolium* Pandeya & Pandeya sp. nov.

Affinis *C. album* Linn. Sp. Pl. 219, 1753.

Differt a *C. album* Linn. f. habitus, positus foliis, folia crasso, marginemque laminae, folia photonasticus, nervo rosea.

Herbae annuae, erectae. Herba 1 m alta. Caule fibro, erecto, angusto costato, ramoso. Ramosae longior ad 10-25 cm, longis basales rosetus. Folia ovatus, dentatus, marginemque, laminae 3-5 cm to 1.5-3.0 cm, pubescentia in primordiis, nervo rosea. Petiola 2.5-3.5 cm, rosea. Inflorescentia spikus, pedunculata 18 cm longum, brevis spikus 1-2 m ad folia axillaris. Flores perianthus 5, rosea. Stamina 5, longior quam perianth. Stigma pilosum, bifidis, brevis-brunnea. Semina brunnea 1.26-1.30 x 0.61-0.67 mm.

Holotypus 910 et positus Raja Balwant Singh College Agra, India. lectus Agra ad February 26, 1999. Isotypus *Ibid.* S.C. Pandeya & A. Pandeya. Fig. 1.

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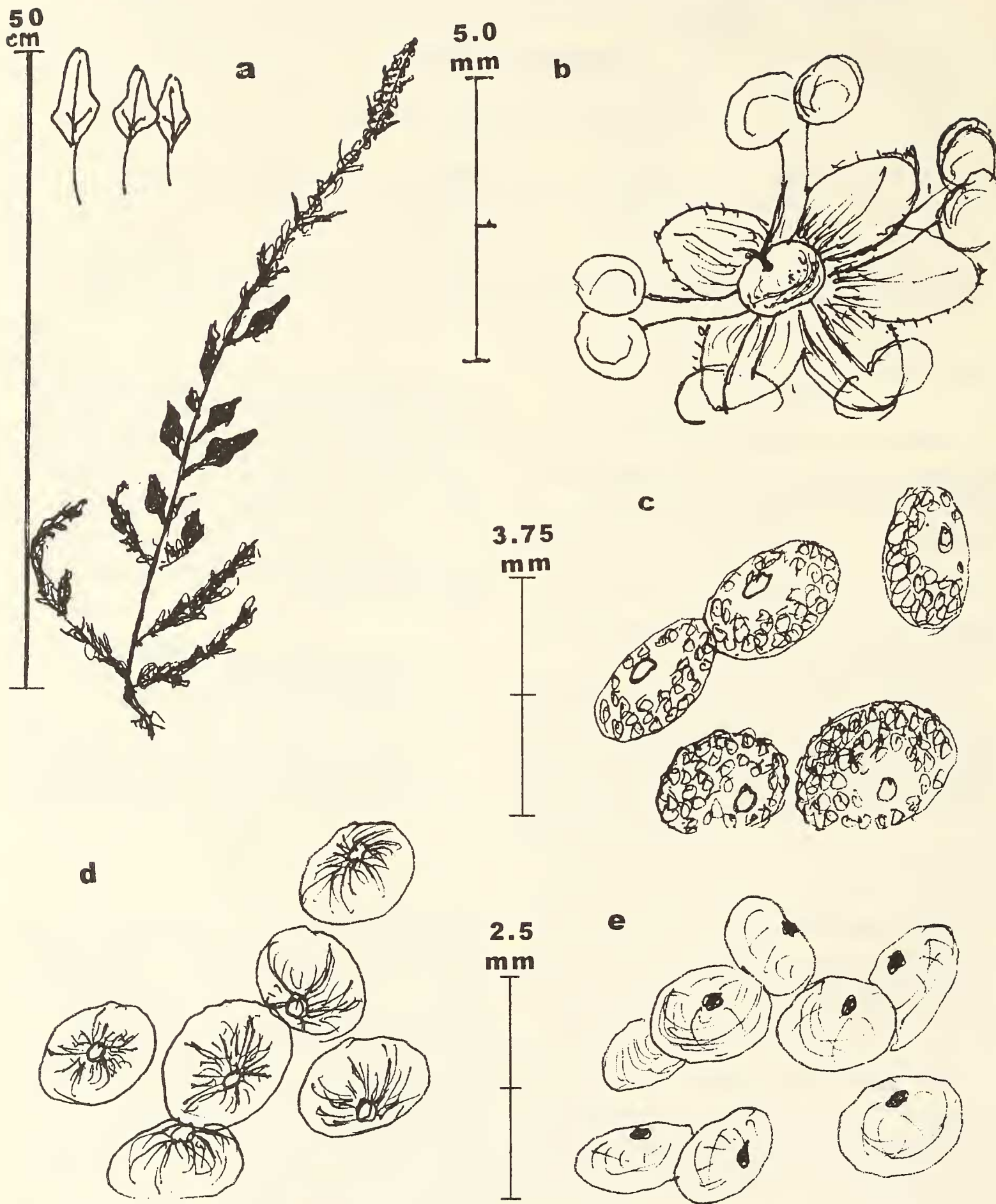


Fig. 1: *Chenopodium adpressifolium*, a. Habit and maximum size of leaves, leaves turn crimson during senescence, b. Filaments longer than perianth, c. Purple perianth upon maturity, d. seeds with pericarp, e. seeds without pericarp

An erect annual herbaceous plant. Starts growing in January, flowers in February/March and senesces by April/May; Height up to 1 m; Stem fibrous and hard, somewhat ridged, greenish-red to purple striped, turning homogeneously crimson upon maturity; Branches limited up to 10 cm from the base, decumbent, longest branch 20-25 cm; giving mature plant a rosette at the base with internodes 2-3 cm; Leaves ovate, petiole and lamina in one line, erect, attached to the node at an angle of 70-75° during day and completely adpressed at night (photonastic movement), petiole 2.5-3.5 cm, reddish-green; lamina olive green, veins reddish-green, dentate margin purple in mature leaves, dentations sharp and pointing upwards, lamina 3.0-5.0 x 1.5-3.0 cm, 0.56-0.8 mm thick and brittle, heavy mealiness on primordia, young stem leaves and perianth, lamina and petiole turn crimson upon maturity, terminal spike up to 18 cm long, few small spikes (1-2 cm) in axil of upper leaves; Flowers- perianth 5, central vein prominent; Stamens 5, longer than perianth, anthers coming out of flowers, feathery stigma bifid, small, purple, seeds covered with pericarp with a circular opening on the top, biconvex, disc-shaped, dark brown, 1.26-1.3 x 0.61-0.67 mm. Holotype deposited at Raja Balwant Singh College, Agra, India. No. 910. Fig. 1.

**Etymology:** The species has been named so as its leaves get completely adpressed to the stem during night owing to photonastic movement.

The specimen was sent to Prof. Pertti Uotila of Finland. He (1997, pers. comm.) opined that *C. adpressifolium* belongs to the group of *C. album* resembling in seed shape, size, and surface structure, as well as in the general shape of the leaves. The two species under discussion differ largely in their habit, position of the leaves, leaf size, leaf thickness and photonastic movement of leaves in the former species. He was of the view that the taxonomy of *C. album* in India needs revision.

***Chenopodium sagittatum*  
Pandeya & Pandeya sp. nov.**

Affinis *C. moquianum* Aellen.

*C. moquianum* Aellen affinis, ab ea differt: habitus, ramosa longior, folia gigantea, supra, lobi, lamina sagittus.

Herbae, annuae, erectae, 3.65 m alta. Caule erecto, roseo, basales circumference *c.* 12 cm. Ramosa longior ad 65 cm. Folia petiolata *c.* 10-12.5 cm longa, diam 21.5 cm, lamina sagittus 17-20 cm x 10-12 cm, lobus 2-2.5 cm. Inflorescentia terminalis, spikus, bracts lanceolatus, rosea, pubescentibus. Stamina 5, equilongus perianthus. Stigma bifidus, longa *c.* 0.64 mm, erectae, ovary diam 0.32 mm. Semina nigra brunnea, diam 0.91- 0.96 mm.

Holotypus 911 et positus Raja Balwant Singh College, Agra, India. lectus Agra ad March 12, 1999. Isotypus *Ibid.* S.C. Pandeya & Amita Pandeya. Fig. 2.

An erect annual herbaceous plant growing to 3.65 m height, starts growing in January-February, flowers from mid-April and spikes fully mature by May end; Stem ridged, red-striped, turning completely red up to apex upon maturity, circumference at the base up to 12 cm branching throughout, branches straight, stiff and at an angle of 30-40° from the node, branches parallel to each other in acropetal order, number of branches on mature plants 40-50. Several branchlets on each branch, longest branch up to 65 cm, when young red blotch on nodes; Leaves-petiole at an angle of 35-40° to stem and lamina 30° to petiole, at night both petiole and lamina become straight adpressed to the stem at an angle of 80-85°, lamina boat-shaped at night clasping the stem, exhibiting the photonastic movement. Petiole and lamina venation light purple, petiole 10-12.5 cm long, diameter 2.15 cm lamina arrow shaped (sagitate) with small side lobes pointing upwards, lamina 17-20 cm long and 10-12 cm at the broadest part, side lobes 2-2.5 cm, sometimes bifid, young lamina greyish-green,

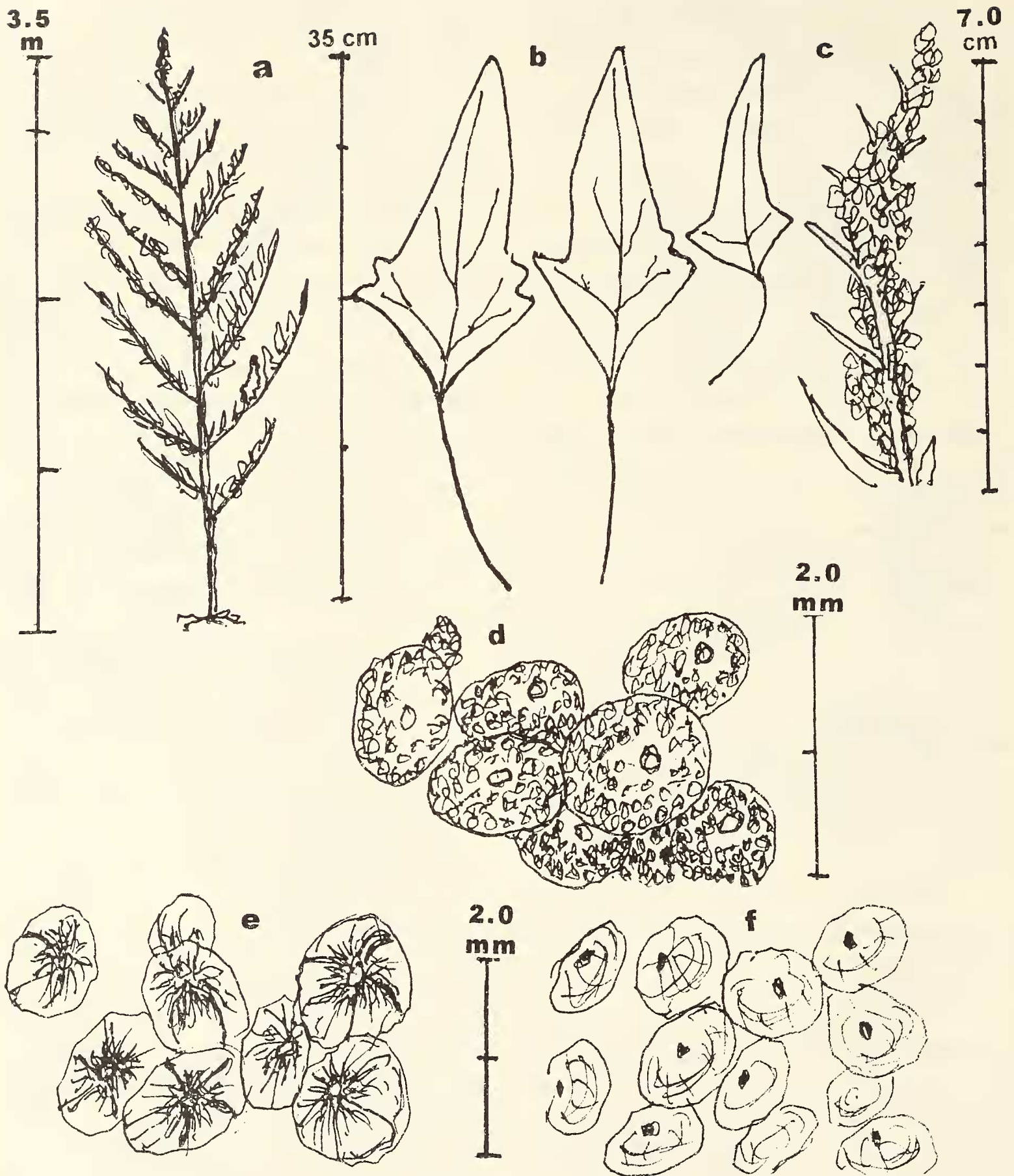


Fig. 2: *Chenopodium sagittatum*, a. Habit with acropetal branching, b. Maximum size of leaves, old leaves turn crimson, c. Flowering branch, anthers coming out of the flowers, d. Crimson perianth upon maturity, e. Seeds with pericarp, f. Seeds without pericarp

heavy mealiness. Both petiole and lamina turn crimson during senescence. Lamina 0.34 mm thick in vertical section, stele with both upper and lower epidermis red in colour. Inflorescence terminal along with branchlets up to 15 cm long, branches and branchlets bear up to 12 cm long spikes, spikes and lanceolate bracts all turn crimson upon maturity of seeds. Flowers 1.1 mm across, perianth 5, connate at base, greyish-green when young, crimson upon maturity, heavy mealiness. Stamens 5, anthers dehisce soon after opening of flowers, filaments equal to perianth. Stigma bifid, purple and erect, 0.64 mm long above ovary, diameter 0.32 mm. Seeds disc-shaped, notched, blackish-brown, diameter 0.91-0.96 mm, width 0.6-0.61 mm. Holotype deposited at Raja Balwant Singh College, Agra, India. No. 911. Fig. 2.

**Etymology:** The species has been named so as it has a characteristic sagittate lamina margin.

For this species Uotila (1997, pers. comm.) opined that it might be close to a taxon called *C. moquianum* Allen. *C. sagittatum* can easily be distinguished from the said group on account of its very large leaves. The leaves in *C. moquianum* are small and resemble Chenopod.

***Chenopodium hastatifolium***

**Pandeya & Pandeya sp. nov.**

Affinis *C. ficifolium* Sm. Fl. Brit. 1: 276 (1800).

*C. ficifolium* Sm. Affinis ab ea differt folia tribus lobis obscuris, oblongo; foliis minuta, inferio.

Herbae annuae, erectae c. 1 m alta, ramosae 20-25, longior ramosae 60-70 cm. Caulis rosea green, stripus basales circumference c. 2.7 cm, folia 3-lobus, lobus oblongo, dentibus - 2, lamina pubescens, petiolata 3-4.5 cm longa. Inflorescentia terminalis, spikes 5-10 cm longis, Folia basales spikes parvi. Flores parvi, perianthus 5 basales connatis. Stamina 5 acquilongis perianthus, purplish. Carpella-

stigma longo, bifidus. Semina biconvex, diameter 0.96-1.02 x 0.56-0.61 mm, brunnei.

Holotypus 912 et positus Raja Balwant Singh College, Agra, India. lectus Agra ad March 15, 1999. Isotypus *Ibid.* S.C. Pandeya & Amita Pandeya. Fig. 3.

An annual erect herb, up to 1 m, profusely branched (20-25 main branches), longest middle branches 60-70 cm, starts growing in November-December, flowers from February-March, fruits in March and senescens by April end. Stem greenish-red striped, ridged, circumference at base up to 2.7 cm. Leaves green, completely crimson upon senescence, 3-lobed, middle lobe oblong 3.5 x 0.6-1.2 cm, with two dentations, basal two lobes pointing upwards, 0.6-1.8 cm long, sometimes with 1-2 dentations, lamina 0.2-0.26 mm thick with heavy mealiness when young. Petiole 3-4.5 cm long. Inflorescence greyish-green, turning crimson upon maturity of seeds due to perianth changing to crimson, terminal spike 5-10 cm, several small spikes in axil of leaves; Flowers-perianth 5, connate at base, central vein prominent. Stamens 5, equal to perianth. Stigma purple bifid, long and moustache-like, each arm 0.3-0.4 mm long. Seeds biconvex covered with pericarp with a circular opening on the top. Seeds without pericarp 0.96-1.02 x 0.56-0.61 mm, dark brown with a small notch. Holotype deposited at Raja Balwant Singh College, Agra, India. No. 912. Fig. 3.

**Etymology:** The species has been named on the basis of its hastate leaf margin.

For this specimen Uotila (1997, pers. comm.) is of the view that it is close to *C. ficifolium* although the leaf shape is not very typical of that taxon. However, the interspecific taxonomy of the species is not completely known.

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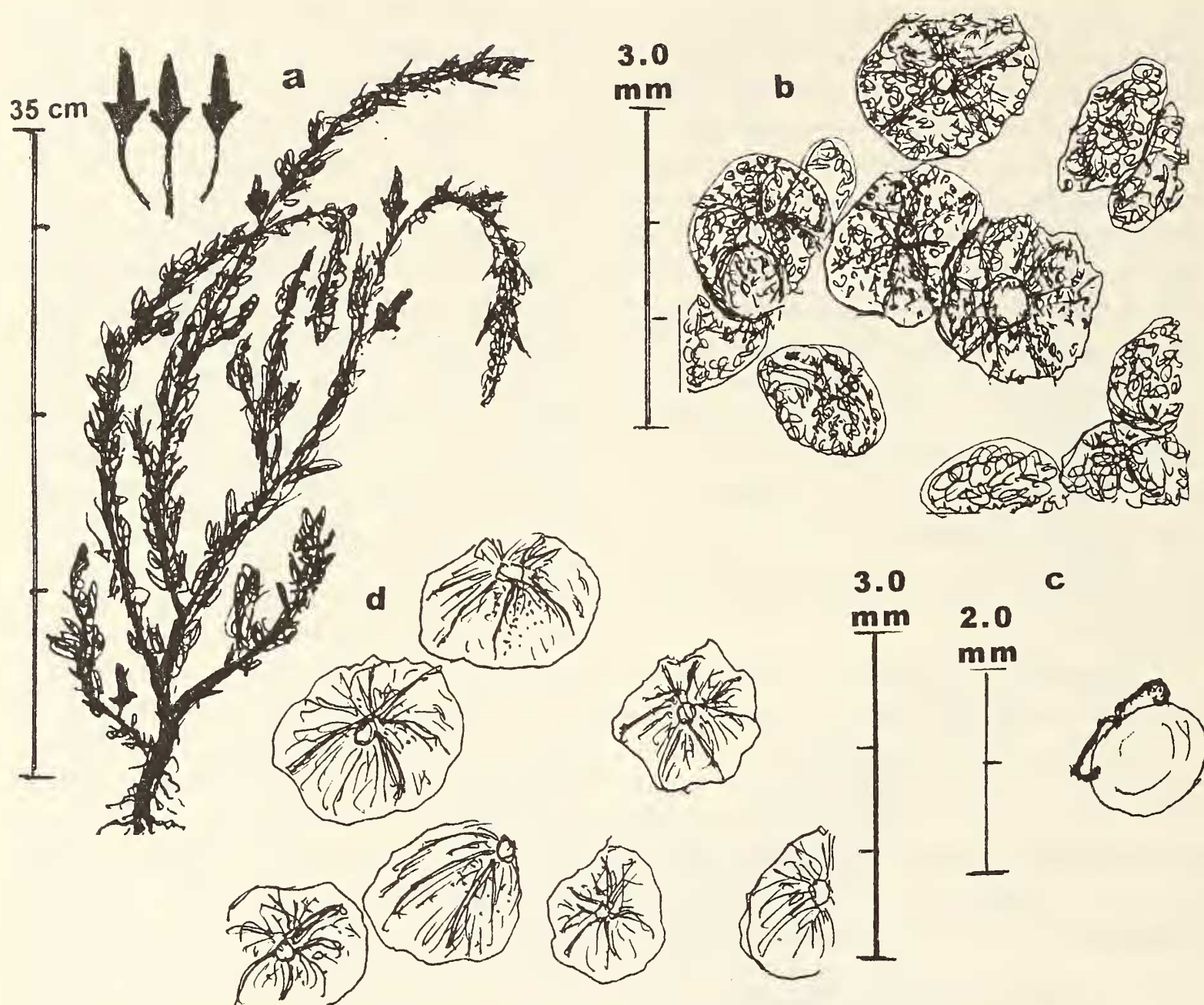


Fig. 3: *Chenopodium hastatifolium*, a. Habit with maximum size of leaves, crimson old leaves, b. Heavy mealiness on flowers, c. Bifid stigma with long arms, d. Perianth turns reddish upon maturity

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#### REFERENCE

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