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| **Supplementary** **Table 1: A list of the** qualitative vegetative and reproductive traits of the two outgroup species (1&2) and 23 species of the subtribe (Plucheinae).   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **No.** | **Species** | **Habit** | **Life cycle** | **Stem surface** | **Stem wings** | **Growth form** | **Stem sulcation** | **Leaves arrangement** | **Leaves petiolate** | | **1** | ***Dittrichia viscosa*** | shrub | perennial | densely glandular and hairy | not winged | erect | not sulcate | alternate | sessile | | **2** | ***Pulicaria dysenterica*** | herb | perennial | Lanate tomentose and sparsely glandular | not winged | erect | not sulcate | alternate | sessile | | **3** | ***Cylindrocline commersonii*** | shrub | perennial | densely white to light brown tomentose | not winged | erect | not sulcate | spiralled | sessile | | **4** | ***Pterocaulon pycnostachyum*** | herb | perennial | lanate-tomentose and/or glandular | winged | erect | not sulcate | alternate | sessile | | **5** | ***Pseudoconyza viscosa Eg*** | herb | perennial | villous and glandular | not winged | erect | not sulcate | alternate | sessile | | **6** | ***Laggera alata*** | herb | annual | glandular pubescent. | winged | erect | not sulcate | alternate | sessile | | **7** | ***Blumea bovei  (Doellia bovei)*** | herb | perennial | glabrous or sparsely pubescent | not winged | suffrutescent | not sulcate | alternate | sessile | | **8** | ***Sphaeranthus indicus*** | herb | annual | minutely stipitate glandular | winged | ascending | not sulcate | alternate | sessile | | **9** | ***Sphaeranthus suaveolens Eg*** | herb | perennial | densely pubescent to puberulous but glabrescent, glandular | winged | ascending | not sulcate | alternate | sessile | | **10** | ***Geigeria alata*** | herb | annual | minutely scabridulous | winged | erect | not sulcate | subopposite | sessile | | **11** | ***Pegolettia senegalensis*** | herb | annual | glandular and scabridulous-hairy. | not winged | erect | not sulcate | alternate | sessile | | **12** | ***Tessaria integrifolia*** | shrub | perennial | puberulent, soon glabrescent | not winged | erect | not sulcate | alternate | petiolate | | **13** | ***Pluchea dioscoridis Eg*** | shrub | perennial | pilose and glandular | not winged | erect | not sulcate | alternate | sessile | | **14** | ***Pluchea baccharis*** | shrub | perennial | puberulent to sparsely villous and stipitate- to sessile-glandular (sometimes viscid) | not winged | erect | not sulcate | alternate | sessile | | **15** | ***Pluchea camphorata*** | herb | perennial | stems usually closely arachose (hairs appressed) | not winged | erect | not sulcate | alternate | etiolate | | **16** | ***Pluchea carolinensis*** | shrub | perennial | densely tomentose | not winged | erect | not sulcate | alternate | petiolate | | **17** | ***Pluchea foetida*** | shrub | perennial | arachnose, glandular. | not winged | erect | not sulcate | alternate | sessile | | **18** | ***Pluchea indica*** | shrub | perennial | finely shortly crisp hairy, later glabrate | not winged | erect | sulcate | alternate | subsessile | | **19** | ***Pluchea lanceolata*** | shrub | perennial | covered with soft short whitish close appressed pubescence | not winged | erect | not sulcate | alternate | sessile | | **20** | ***Pluchea longifolia*** | shrub | perennial | sparsely arachnose | not winged | erect | not sulcate | alternate | sessile | | **21** | ***Pluchea odorata*** | herb | annual | tomentellous | not winged | erect | not sulcate | alternate | petiolate | | **22** | ***Pluchea ovalis*** | shrub | perennial | pilose, tomentose or woolly, and densely glandular. | not winged | erect | not sulcate | alternate | sessile | | **23** | ***Pluchea pteropoda cga*** | herb | perennial | glabrous, rarely sparingly puberulent. | not winged | ascending | sulcate | alternate | sessile | | **24** | ***Pluchea sagittalis*** | herb | perennial | densely tomentose. | winged | erect | not sulcate | alternate | sessile | | **25** | ***Pluchea sericea*** | shrub | perennial | densely leafy, sericeous, not glandular. | not winged | erect | not sulcate | alternate | sessile |   **Continued**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **No.** | **Species** | **Leaves Shape** | **Leaves surface** | **Leaves base** | **Leaves margin** | **Leaves apex** | | **1** | ***Dittrichia viscosa*** | lance-shaped (i.e., lanceolate) to oval in shape (i.e., elliptic) | glandular | Semiamplexicaul | serrated | obtuse rarely subacute | | **2** | ***Pulicaria dysenterica*** | lanceolate | thinly gray tomentose or sublanate | auriculate profoundly cordate and | entire or | apex acute | | **3** | ***Cylindrocline commersonii*** | spathulate to oblanceolate or elliptic or obovate | with dense white woolly hairs | cuniform | dentate | apex obtuse to acute. | | **4** | ***Pterocaulon pycnostachyum*** | Leaf blades lanceolate to obovate-lanceolate, oblong, or elliptic | abaxial faces densely whitish-tomentose [puberulent or glabrescent], adaxial (green) glabrous or glabrescent, both faces usually stipitate- or sessile-glandular. | decurrent leaf bases | dentate or denticulate | apex acute | | **5** | ***Pseudoconyza viscosa Eg*** | oblanceolate-ovate to obovate | villous | cuneate to attenuate | margin serrate to doubly serrate | apex rounded to acute. | | **6** | ***Laggera alata*** | oblong | m, densely covered with long multiseptate hairs | decurrent | margin denticulate | apex acute to subobtuse | | **7** | ***Blumea bovei (Doellia bovei)*** | linear oblong//linear or narrowly lanceolate | glabrous or sparsely pubescent | auriculate | remotely denticulate | obtuse or apiculate | | **8** | ***Sphaeranthus indicus*** | Leaves oblanceolate or spatulate | minutely stipitate glandular and white lanate | semiamplexicaul and strongly decurrent, | margin rather irregularly biserrate-dentate | apex obtuse or | | **9** | ***Sphaeranthus suaveolens Eg*** | elliptic or (ob-)lanceolate | pubescent or sparsely puberulous but glabrescent, glandular-punctate | simple, decurrent | margins serrulate or serrate | apex acute or obtuse and mucronate | | **10** | ***Geigeria alata*** | lanceolate | scabridulous and glandular on both surfaces. | cuneate and decurrent | obscurely denticulate | acute with a spiny point | | **11** | ***Pegolettia senegalensis*** | linear or oblanceolate | glandular and scabridulous on both surfaces | cuneate or attenuate | margin entire or with few teeth | apex obtuse and mucronate | | **12** | ***Tessaria integrifolia*** | oblanceolate or elliptical | glandular when young, glabrescent in age and then with a waxy | mucronulate | entire or denticulate | mucronulate | | **13** | ***Pluchea dioscoridis Eg*** | lanceolate or narrowly obovate | pilose and glandular, (pubescent, puberulous or subglabrous and glandular on both surfaces). | attenuate and auriculate at the base | dentate with callose teeth or subentire (dentate or entire) | apex acute | | **14** | ***Pluchea baccharis*** | ovate to ovate-oblong or elliptic-oblong, | faces puberulent to sparsely villous and stipitate | bases cuneate to truncate or subcordate, clasping to subclasping | margins shallowly apiculate-toothed | leaves/apex/apiculate to obtuse | | **15** | ***Pluchea camphorata*** | lanceolate to ovate or elliptic | faces glandular-puberulent or puberulent and sessile-glandular | decurrent | dentate-serrate or entire | acuminate | | **16** | ***Pluchea carolinensis*** | oblong-ovate to elliptic | thinly tomentose and glandular on both surfaces | attenuate | margins entire or denticulate | apex mucronulate-obtuse | | **17** | ***Pluchea foetida*** | oblong, elliptic, lanceolate, oblanceolate, ovate | sessile-glandular | bases clasping | margins denticulate | rounded to acute | | **18** | ***Pluchea indica*** | obovate | abaxially loosely puberulent to subglabrous | attenuate | dentate | apex acute to mucronate | | **19** | ***Pluchea lanceolata*** | oval-oblong, | glandular | attenuate | entire or (in Indian specimens) acutely serrulate | mucronate | | **20** | ***Pluchea longifolia*** | blong to elliptic, lance-ovate, or ovate | abaxial faces villous and sessile-glandular, adaxial hirtellous and sessile-glandular. | decurrent | coarsely and irregularly toothed, | apex acute | | **21** | ***Pluchea odorata*** | ovate, elliptic or lanceolate, | evenly pubescent above and beneath with short, erect, weak hairs and glandular punctae | mucronulate | serrate to subentire | mucronulate | | **22** | ***Pluchea ovalis*** | elliptic, ovate or obovate | puberulous to scabridulous but often with remnants of arachnoid pubescence along the midrib, glandular. | base auriculate and with decurrent wings, | margins irregularly dentate with callose teeth | apex rounded or acute | | **23** | ***Pluchea pteropoda cga*** | obovate to oblanceolate | glabrous on both surfaces | base gradually narrowed | irregularly and sparsely dentate | apex obtuse to rounded | | **24** | ***Pluchea sagittalis*** | lanceolate to broadly lanceolate, | thinly tomentose with viscid glands on surfaces, | attenuate | serrate | acuminate | | **25** | ***Pluchea sericea*** | blades lanceolate to narrowly lanceolate or narrowly oblanceolate | sparsely to densely silvery sericeous, not glandular (minutely punctate) | attenuate | margins entire | obtuse and mucronate |   **Continued**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **No.** | **Species** | **Inflorescences type** | **Inflorescences base** | **Inflorescences number** | **Phyllaries rows** | **Shape of outer phyllaries** | **Shape of inner phyllaries** | | 1 | ***Dittrichia viscosa*** | radiate head | pedunculate | numerous (30-40) narrow | uniserite with connate phyllaries | linear-triangular | linear-lanceolate | | 2 | ***Pulicaria dysenterica*** | Capitula heterogamous radiate, in loose, corymbiform, or racemose synflorescences, | pedunculate | numerous (15-20) narrow | numerous, in 5 or 6 series | linear, | linear-lanceolate | | 3 | ***Cylindrocline commersonii*** | disciform - dense terminal corymbs | pedunculate | numerous | multiseriate | Linear-lanceolate or lanceolate | linear-lanceolate | | 4 | ***Pterocaulon pycnostachyum*** | disciform (Flower heads are crowded into a densely packed spike at the tips of the branches.) | sessile | solitary | multiseriate | narrowly lanceolate, unequal (subindurate to scarious) | linear-lanceolate | | 5 | ***Pseudoconyza viscosa Eg*** | Capitula terminal and axillary, in lax corymbs or cymose panicles, Capitula disciform in small, loose corymbs on leafy branches | pedunculate | numerous | multiseriate | lanceolate | linear | | 6 | ***Laggera alata*** | disciform terminal in large open leafy panicles, arranged in leafy racemes, on short axillary winged branches | sessile | numerous | multiseriate | Lanceolate | Linear-lanceolate | | 7 | ***Blumea bovei (Doellia bovei )*** | disciform corymbose | pedunculate | solitary | multiseriate | linear-subulate | linear-lanceolate | | 8 | ***Sphaeranthus indicus*** | Capitula disciform (ovoid-globose) | subsessile with several bracts below. | solitary | multiseriate | linear-oblong to linear-spatulate | linear-lanceolate, | | 9 | ***Sphaeranthus suaveolens Eg*** | Capitula disciform (globose or broadly ovoid) | subsessile with several bracts below. | solitary | multiseriate | lanceolate or elliptic | linear-lanceolate, | | 10 | ***Geigeria alata*** | radiate (Heads many-fl., radiate; ray-fl. uniseriate, female, ligulate; disc-fl. tubular,) | sessile | solitary | 2-3 rows | linear-lanceolate or lanceolate | ovate | | 11 | ***Pegolettia senegalensis*** | solitary on small branches but these forming small to large, lax, leafy corymbs | pedunculate | solitary | 2-3 rows | lanceolate | absent or not found | | 12 | ***Tessaria integrifolia*** | cymose panicle Heads d- | pedunculate | numerous | multiseriate | ovate-acuminate to ovate-lanceolate, | innermost lanceolate | | 13 | ***Pluchea dioscoridis Eg*** | Heads disciform- dense paniculate corymbs | sessile or pedunculate | numerous | multiseriate | outer ovate | the inner linear, | | 14 | ***Pluchea baccharis*** | Heads in corymbiform arrays | pedunculate | numerous | 2-3 rows | ovate-acuminate to ovate-lanceolate | absent or not found | | 15 | ***Pluchea camphorata*** | (Discoid) paniculiform arrays  corymbiform clusters t | pedunculate | numerous | 2-3 rows | triangular-ovate | ovate-acuminate to ovate-lanceolate, | | 16 | ***Pluchea carolinensis*** | dense terminal and axillary corymbs; | pedunculate | numerous | multiseriate | elliptic to very widely obovate | lanceolate to linear-lanceolate | | 17 | ***Pluchea foetida*** | Heads in loose to dense, corymbiform arrays. | sessile | numerous | 2-3 rows | outer ovate to ovate-lanceolate | absent or not found | | 18 | ***Pluchea indica*** | dense terminal and axillary corymbs; | pedunculate | numerous | multiseriate | ovate | inner lanceolate to linear | | 19 | ***Pluchea lanceolata*** | Tomentose or pubescent corymbs | pedunculate | numerous | 2-3 rows | broadly ovate | innermost linear | | 20 | ***Pluchea longifolia*** | corymbiform arrays. | pedunculate | numerous | 2-3 rows | elliptic to obovate | absent or not found | | 21 | ***Pluchea odorata*** | disciform- several-headed paniculate clusters, | pedunculate | numerous | multiseriate | linear | lanceolate | | 22 | ***Pluchea ovalis*** | many in terminal leafy corymbs | pedunculate | numerous | multiseriate | ovate | linear | | 23 | ***Pluchea pteropoda cga*** | densely congested in terminal corymbs. | pedunculate | numerous | multiseriate | broadly ovate | inner linear to lanceolate | | 24 | ***Pluchea sagittalis*** | terminal and axillary corymbs | pedunculate | numerous | multiseriate | widely elliptic to widely obovate | inner lanceolate to linear-lanceolate | | 25 | ***Pluchea sericea*** | cymiform clusters | sessile | numerous | 2-3 rows | oval-oblong to linear | absent or not found |   **Continued**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | No | **Species** | **Phyllaries surface** | **Marginal florets shape** | **Marginal florets color** | **Disc florets shape** | **Disc florets surface** | **Disc florets color** | | 1 | ***Dittrichia viscosa*** | densely hairy glandular hairy | ligulate with tube | yellow | 5-lobed | densely hairy glandular hairy | yellow | | 2 | ***Pulicaria dysenterica*** | tomentose-pilose and | ligulate with tube | yellow | 5-lobed | tomentose-pilose and | yellow | | 3 | ***Cylindrocline commersonii*** | , inner series glabrous or sparsely pubescent o | filiform | purplish | 5-lobed | , inner series glabrous or sparsely pubescent o | purplish | | 4 | ***Pterocaulon pycnostachyum*** |  | filiform | yellow | 5-lobed |  | yellow | | 5 | ***Pseudoconyza viscosa Eg*** | central part glabrous to sparsely villous, | filiform | white to pinkish, | 5-lobed | central part glabrous to sparsely villous, | pinkish | | 6 | ***Laggera alata*** | glandular pubescent on outer side | filiform | dark pink | 5-lobed | glandular pubescent on outer side | pinkish | | 7 | ***Blumea bovei (Doellia bovei)*** | pubescent | filiform | yellow | 5-lobed | pubescent | purplish | | 8 | ***Sphaeranthus indicus*** | ciliate, hispid and stipitate glandular | filiform | purplish | 5-lobed | ciliate, hispid and stipitate glandular | purplish | | 9 | ***Sphaeranthus suaveolens Eg*** | puberulous to almost glabrou | tubular | purplish | 5-lobed | puberulous to almost glabrou | purplish | | 10 | ***Geigeria alata*** | glandular | tubular | yellow | 5-lobed | glandular | yellow | | 11 | ***Pegolettia senegalensis*** | sparsely glandular, | tubular | yellow | 5-lobed | sparsely glandular, | yellow | | 12 | ***Tessaria integrifolia*** | glabrous, | ligules | white to pinkish, | 3-lobed | glabrous, | pinkish | | 13 | ***Pluchea dioscoridis Eg*** | pilose, glandular | filiform | white to pinkish, | 5-lobed | pilose, glandular | pinkish | | 14 | ***Pluchea baccharis*** | moderately appressed-villous to puberulous or arachnose, usually viscid-hairy as well | filiform | /rose-pink to purplish | 5-lobed | moderately appressed-villous to puberulous or arachnose, usually viscid-hairy as well | pinkish | | 15 | ***Pluchea camphorata*** | minutely sessile-glandular, | filiform | white to pinkish, | 5-lobed | minutely sessile-glandular, | pinkish | | 16 | ***Pluchea carolinensis*** | tomentose abaxially | filiform | white to pinkish, | 5-lobed | tomentose abaxially | pinkish | | 17 | ***Pluchea foetida*** | arachnoid-pubescent and sessile-glandular | filiform | white to pinkish, | 5-lobed | arachnoid-pubescent and sessile-glandular | pinkish | | 18 | ***Pluchea indica*** |  | filiform | white to pinkish, | 5-lobed |  | pinkish | | 19 | ***Pluchea lanceolata*** | pubescent | filiform | white to pinkish, | 5-lobed | pubescent | pinkish | | 20 | ***Pluchea longifolia*** | powdery puberulent, sometimes sparsely glandular | filiform | white to pinkish, | 5-lobed | powdery puberulent, sometimes sparsely glandular ( | purplish | | 21 | ***Pluchea odorata*** | pubescent | filiform | purplish | 5-lobed | pubescent | purplish | | 22 | ***Pluchea ovalis*** | puberulous | filiform | purplish | 5-lobed | puberulous | purplish | | 23 | ***Pluchea pteropoda cga*** | glandular | filiform | white to pinkish, | 5-lobed | glandular | pinkish | | 24 | ***Pluchea sagittalis*** | grading to glabrous. | tubular | white to pinkish, | 5-lobed | grading to glabrous. | pinkish | | 25 | ***Pluchea sericea*** | glabrate (inner). | ligules | white to pinkish, | 5-lobed | glabrate (inner). | pinkish |   **Continued**   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | No. | **Species** | **Achenes surface** | **Achenes shape** | **Pappus presence/absence** | **Pappus color** | **Pappus row** | | 1 | ***Dittrichia viscosa*** | hairy with gland | subcylindrical | present | whitish | biseriate | | 2 | ***Pulicaria dysenterica*** | short bristly hairs | oblong, | present | whitish | biseriate | | 3 | ***Cylindrocline commersonii*** | body sparsely setuliferous | terete to k triquetrous, | persistent | scale like | biseriate | | 4 | ***Pterocaulon pycnostachyum*** | faces usually sparsely strigose to hispidulous, minutely sessile-glandular between ribs | cylindric to fusiform | persistent | white | biseriate | | 5 | ***Pseudoconyza viscosa Eg*** | sparsely pilose | cylindric | persistent | white | uniseriate | | 6 | ***Laggera alata*** | appressedly pilose | oblong-ellipsoid | persistent | white | uniseriate | | 7 | ***Blumea bovei (Doellia bovei)*** | pubescent | oblong | persistent | white | uniseriate | | 8 | ***Sphaeranthus indicus*** | puberulent. | oblong, | absent | absent | absent | | 9 | ***Sphaeranthus suaveolens Eg*** | puberulous | cylindric | absent | absent | absent | | 10 | ***Geigeria alata*** | densely hairy | ellipsoid | persistent | scale like | biseriate | | 11 | ***Pegolettia senegalensis*** | pilose and sparsely glandular | cylindric | persistent | white | biseriate | | 12 | ***Tessaria integrifolia*** | straight hairs | irregular rounded angles; | persistent | white | uniseriate | | 13 | ***Pluchea dioscoridis Eg*** | sparsely hairy | cylindrical | persistent | brownish | uniseriate | | 14 | ***Pluchea baccharis*** | sparsely hairy | n indistinct or vestigial | persistent | white | uniseriate | | 15 | ***Pluchea camphorata*** | sessile-glandular | cylindric | persistent | white | uniseriate | | 16 | ***Pluchea carolinensis*** | absent | vestigial | persistent | white | uniseriate | | 17 | ***Pluchea foetida*** | absent | vestigial | persistent | white | uniseriate | | 18 | ***Pluchea indica*** | subglabrous | cylindric | persistent | white | uniseriate | | 19 | ***Pluchea lanceolata*** | glabrous | cylindric | persistent | white | uniseriate | | 20 | ***Pluchea longifolia*** | absent | vestigial | persistent | white | uniseriate | | 21 | ***Pluchea odorata*** | glandular | Achenes small, | persistent | white | uniseriate | | 22 | ***Pluchea ovalis*** | glabrous or sparsely hairy; | narrowly obovoid | persistent | brownish | uniseriate | | 23 | ***Pluchea pteropoda cga*** | appressed strigillose and glandular | cylindric | persistent | white | uniseriate | | 24 | ***Pluchea sagittalis*** | h viscid glands | vestigial | persistent | white | uniseriate | | 25 | ***Pluchea sericea*** | glabrous | vestigial | persistent | white | uniseriate | |