Keying out *Ludwigia* and *Polygonum*

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Standards and Assessment Section

LVI/Plant ID Workshop
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Do it Yourself Plant Taxonomy

- **Focus on 2 Genera:**
  - ***Ludwigia*: ~ 30 spp. in FL, 22 have been recorded in LVI sampling, wide range of C of C scores, can be dominant or co-dom**
  - ***Polygonum*: ~ 20 spp. in FL, 10 have been recorded in LVI sampling, wide range of C of C scores , can be dominant or co-dom**

Thanks: Many *Ludwigia* slides from Dana Denson

Generic *Ludwigia* features

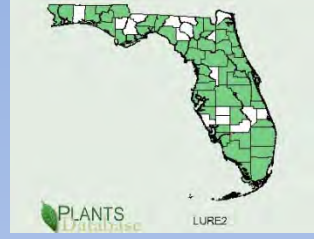
Box-like capsules – various shapes

Many species have reddish tendencies

Most *Ludwigia* species are readily key-able, even in the field!

- Leaves opposite or alternate
- # petals or sepals
- # stamens
- Capsule shape
- Flowers stalked/not

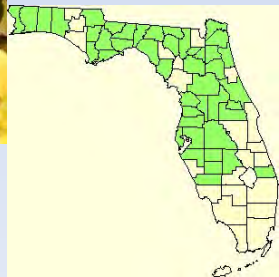
Ludwigia repens



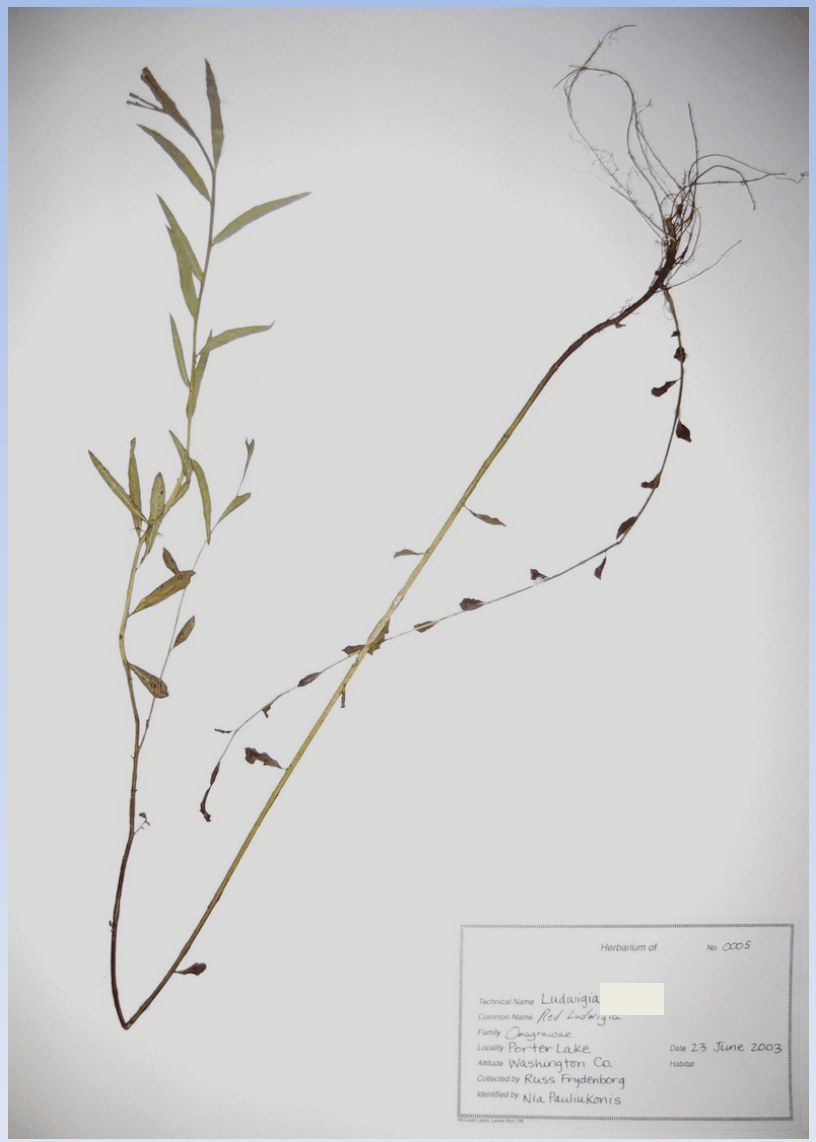
- **Submersed/ floating plant**
- **Roundish lvs, undersides often red/reddish**
- **Leaves opposite**
- **Fruits/flowers sessile (no peduncle)**
- **Almost identical to *L. palustris* – look for fruits!**

Ludwigia palustris

- **Green bands on capsule**
- **Leaves not as round**
- **Glands sometimes on leaf margins**



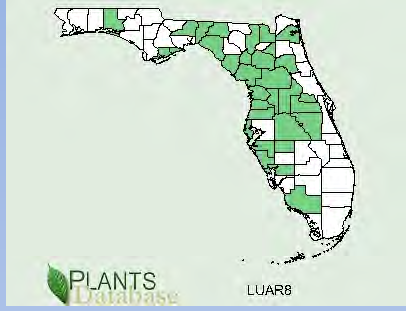
Dimorphism in *Ludwigia*



Several species can have underwater shoots. Look at leaf arrangement and connectivity.

JUST BECAUSE IT'S GROWING IN THE WATER DOESN'T MEAN IT'S *L. REPENS*!
(L. palustris, L. arcuata, L. sphaerocarpa, L. alata…)

Ludwigia arcuata



- **Narrow opposite leaves**
- **Flowers stalked and in four parts**
- **Grows like a ground cover in marshes and at lake margins**
- **Can grow submersed, looks very different!**

Submersed *L. arcuata*. Note reddish, opposite, linear leaves.

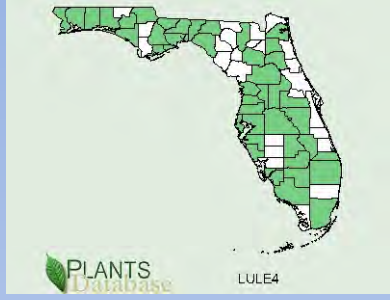
Ludwigia peruviana

- **Largest species, to 3 m tall**
- **FLEPPC Exotic**
- **Capsules pyramidal**
- **4-5 petals, sepals**
- **Stem pubescent**
- **May form large thickets on lake shores, along roadsides**

Ludwigia octovalvis

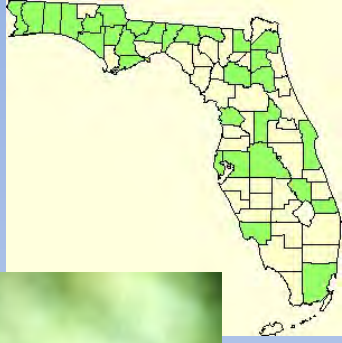
- **Capsule long, cylindrical**
- **4 petals, sepals**
- **Similar to *L. peruviana* but with cylindrical fruits and not usually in such large colonies**
- **Similar to *L. leptocarpa*, but flowers in 4 parts**

Ludwigia leptocarpa

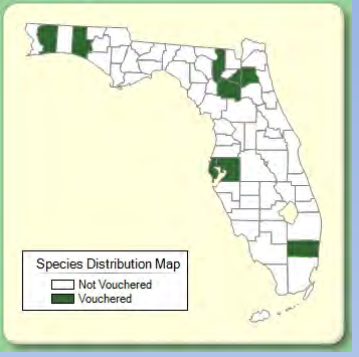


- **Capsule long and cylindrical**
- **5-6 petals, sepals**
- **Stem appears minorly angled, not winged**

Ludwigia decurrens



- **Winged capsules and stems**
- **Alternate leaves**
- **4 petals, sepals**

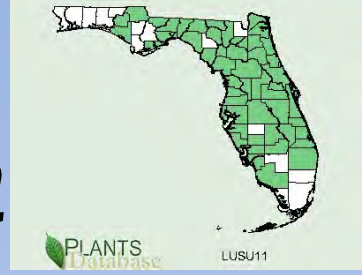


Ludwigia grandiflora

- **Calyx segments 5**
- **Petals 5, overlapping**
- **Stems, petioles, and blades pubescent with long, shaggy hair**
- **Syn:**

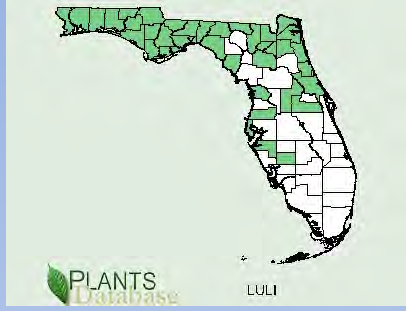
  L. uruguayensis

Ludwigia suffruticosa



- **Small squarish, sessile capsules**
- **Capsules in crowded terminal cluster**
- **Smaller plant (to 0.8 m), occurs along shores or in shallow water**
- **Sepals whitish with reddish centers**

Ludwigia linearis



- **4 petals, sepals**
- **Small in stature, only up to 0.7 m tall**
- **Leaves narrow, alternate**
- **Submersed portion of stem spongy**

Ludwigia peploides

- **Creeper, rooting at nodes, can form floating mats**
- **Flowering branches somewhat ascending**
- **Glabrous, shiny appearance**
- **Flwrs long stalked; floral tube/capsule narrow, only slightly wider than stalk**

Ludwigia pilosa

- **Bushy, branched habit, erect flowering stems, copiously pilose (furry) throughout**
- **Lvs. Alt, lance-elliptic**
- **Flwrs/frts sessile in leaf axils at tips of branchlets**
- **Petals none or minute**
- **Calyx w/4 segments**

Ludwigia sphaerocarpa

- **Slender, erect, branched, submersed portions, if present, very spongy.**
- **Lvs alt., sessile on flwring stem. Lance to linear, acute**
- **Flwrs solitary in leaf axils. No petals, calyx segments 4**

Onagraceae (EVENING-PRIMROSE FAMILY)

Herbs or shrubs of diverse size and habit. Leaves simple, alternate or opposite; stipules minute and more or less glandular, or lacking. Flowers bisexual, mostly radially symmetrical, ovary inferior, the floral tube in some extending beyond the ovary. Calyx segments and petals 2–7 each (petals none in some species), distinct, borne at the summit of the floral tube. Stamens as many as the sepals and opposite them, or twice as many. Ovary 2–4-locular, style 1, stigma capitate, 2–4-lobed or -cleft. Fruit a many-seeded capsule, or an indehiscent nutlike structure.

1. Calyx segments, and petals if present, 3 each, 4 each, rarely 5 or 6; fruit a capsule, glabrous or pubescent but not beset with hooked bristles or hairs.
  2. The calyx segments persistent on the fruit; petals, if present, yellow; seed glabrous. 1. *Ludwigia*
  2. The calyx segments deciduous after anthesis; petals pinkish to rose, violet, purple, or white; seed bearing a terminal tuft of hairs. 2. *Epilobium*
1. Calyx segments and petals 2 each; fruit indehiscent, nutlike, beset with hooked bristles or hairs. 3. *Circaea*

1. Ludwigia

Annual or perennial herbs or subshrubs. Leaves opposite or alternate, margins entire or minutely toothed, small stipules present. Floral tube not prolonged beyond the ovary. Calyx segments 4 or 5, rarely 6, persistent. Petals 4 or 5, rarely 6 (absent in some species), yellow, quickly deciduous and very easily detached. Fruit a many-seeded capsule, dehiscing longitudinally or terminally.

1. Leaves alternate.
  2. Stamens 8–10, in 2 series.
    3. Calyx segments 4 (rarely 5 in *L. peruviana*); seeds in several series in each locule, free of endocarp.
      4. Internodes conspicuously winged on the angles. 1. *L. decurrens*
      4. Internodes not at all or very faintly winged on the angles.
        5. Capsule broadly obconic or obpyramidal. 5. *L. peruviana*
        5. Capsule narrowly obconic or linear-oblong to long-clavate.
          6. Calyx segments 3–4 mm long; petals 4–5 mm long; capsule 10–16 mm long. 2. *L. erecta*
          6. Calyx segments 10–15 mm long; petals 15–30 mm long; capsule 2–5 cm long.
            7. Floral tube at anthesis markedly longer than the calyx segments; calyx segments at anthesis narrowly ovate, 3–5 mm wide near the base; petals 1–2 cm long, cuneate-obovate, corolla 2–4 cm across. 3. *L. octovalvis*
            7. Floral tube at anthesis the same length as the calyx segments or little longer; calyx segments at anthesis broadly ovate, 10 mm wide near the base; petals very broadly obovate, 3–5 cm long and as broad distally, corolla 6–7 cm across. 4. *L. bonariensis*
    3. Calyx segments 5, rarely 6 or 7; seeds in 1 series in each locule, seated within endocarp tissue.
      8. Stem erect; stalks of the flowers short, much shorter than the floral tube; seed embraced by a corky, horseshoelike segment of endocarp. 6. *L. leptocarpa*
      8. Stem's lower portions decumbent or creeping and rooting at the nodes; stalks of the flowers slender, much longer than the floral tube; seed embedded in a cube of woody endocarp.
        9. Bractlets at the base of the floral tube lanceolate; portions of the stem bearing flowers usually erect; stem and leaf surfaces glabrous or nearly so. 7. *L. peploides*
        9. Bractlets at the base of the floral tube or just below it on the flower stalk, deltoid or ovate; portions of the stem bearing flowers usually floating or creeping; stem, petioles, and leaf blades sparsely to densely pubescent with long, soft, shaggy hairs. 8. *L. uruguayensis*
  2. Stamens 4, in 1 series; calyx segments 4.
    10. Capsule little if any longer than broad.
      11. Flowers and capsules distinctly stalked.
        12. Bases of leaves cuneate-attenuate. 9. *L. alternifolia*
        12. Bases of leaves rounded or blunt.

        13. Style 7–10 mm long; plant glabrous throughout, or, if pubescent, then the hairs very short. 10. *L. virgata*
        13. Style not exceeding 3 mm long; plant pubescent throughout with curly-shaggy or long-spreading hairs.
          14. Calyx segments ovate; strongly reflexed after anthesis; pubescence of relatively short and spreading or curly-shaggy hairs. 11. *L. maritima*
          14. Calyx segments lanceolate to lance-ovate, spreading to erect after anthesis; pubescence of long, spreading hairs. 12. *L. hirtella*
      11. Flowers and capsules sessile or subsessile.
        15. Plant glabrous throughout.
          16. Leaves of the flowering stems oblanceolate, spatulate, or suborbicular, strongly cuneate tapered to subpetiolate bases.
            17. Calyx segments broadly ovate, about 1.5 mm long. 13. *L. microcarpa*
            17. Calyx segments triangular-acute, 2–2.5 mm long. 14. *L. curtissii*
          16. Leaves of the flowering stems lanceolate, oblanceolate, narrowly lanceolate, linear-oblong, or essentially linear, sessile and little if at all tapered basally.
            18. Capsule narrowly wing-angled. 15. *L. alata*
            18. Capsule obscurely quadrangular, the angles rounded.
              19. Flowers in globose headlike or oblong, bracteate spikes; leaves linear to linear-oblong, rounded basally. 16. *L. suffruticosa*
              19. Flowers in the axils of well separated leaves or bracteal leaves; leaves narrowly lanceolate, somewhat tapered basally. 17. *L. polycarpa*
        15. Plant pubescent throughout, or at least the calyx segments and floral tube pubescent.
          20. Plant copiously pilose throughout. 18. *L. pilosa*
          20. Plant with glabrous or sparsely short-pubescent stem and leaves; outer surfaces of calyx segments and capsule finely short-pubescent. 19. *L. sphaerocarpa*
    10. Capsule definitely longer than broad.
      21. Capsule shallowly grooved longitudinally below each calyx segment; petals none. 20. *L. glandulosa*
      21. Capsule not longitudinally grooved; petals present.
        22. Calyx segments triangular-acute, 2–3 mm long, very much shorter than the capsule; seed buff. 21. *L. linearis*
        22. Calyx segments triangular-subulate, 5–6 mm long, ½ as long as the capsule or a little more; seed reddish brown. 22. *L. linifolia*
1. Leaves opposite.
  23. Flowers or capsules distinctly stalked, stalks 5 mm long or much more.
    24. Stalks of flowers or capsules markedly longer than the subtending leaves; petals somewhat longer than the calyx segments. 23. *L. arcuata*
    24. Stalks of the flowers or capsules shorter than the subtending leaves; petals equaling the calyx segments. 24. *L. brevipes*
  23. Flowers or capsules sessile, or (in ours) rarely with stalks 1–3 mm long.
    25. Plant with stem and both leaf surfaces, floral tube or capsule, and outer surfaces of calyx segments markedly hirsute. 25. *L. spathulata*
    25. Plant glabrous, or some parts very sparsely and minutely pubescent.
      26. Floral tube or capsule with a pair of bractlets borne somewhat above the base; floral tube or capsule without longitudinal bands of darker green. 26. *L. repens*
      26. Floral tube or capsule usually without bractlets, or, if a minute pair of bractlets present, then these borne below the base of the floral tube or capsule; floral tube with 4 longitudinal bands of a more definitely green color than that of the tissue between them. 27. *L. palustris*

1. Ludwigia decurrens Walt. Fig. 179

Annual herb, of variable stature from 2 to 25 dm tall and from simple to widely and diffusely branched. Stem glabrous, with narrow wing-angles on the internodes, 2 running down from each leaf base. Leaves alternate, sessile or subsessile, lanceolate, 5–18 cm long, bases cuneate to rounded, apices acuminate, surfaces glabrous or sparsely short-pubescent, margins very finely scabrid. Flowers solitary in the axils of reduced leaves or bracteal leaves of the slender, flexuous branchlets, sessile or on stalks 1–5 (–10) mm long, 2 minute, scalelike bractlets at the base of the floral tube or on the flower stalks. Calyx segments 4, mostly triangular-subulate, 7–10 mm long. Petals 4, yellow, suborbicular to obovate, broadly rounded

Polygonum spp. - Smartweeds

- Fairly easy to key out
  - Ocreae with or without bristles
  - Stems with hairs, barbs, or neither
  - Sepals and petals with or without glands

(*P. densiflorum*)

Various sizes, thin ones or large ones many look alike in field. Bring back to key out.

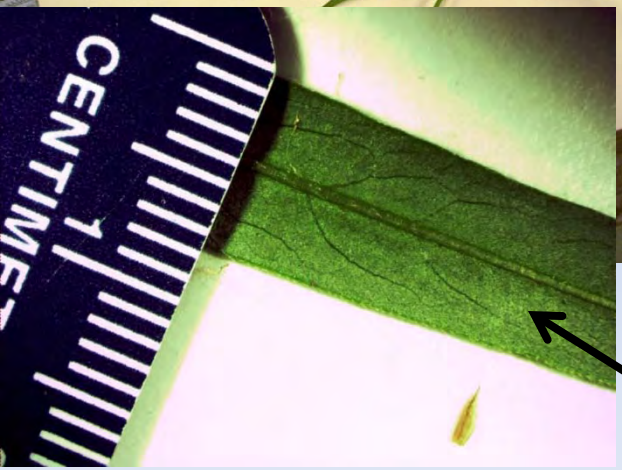
Punctate Glands - *Polygonum* spp.

Glands visible with 10x hand lens. Can appear yellowish on older plants.

Polygonum hydropiperoides

Bristles on ochrea

No punctate glands



Lvs typically < 1 cm wide

Photos from Frank Butera, Bear Lake, Santa Rosa County

1. Stems of mature flowering specimens retrorsely barbed.
2. Leaves petiolate.
3. Leaf blades sagittate, strongly retrorsely barbed on the midvein below; achene 3-angled. 1. *P. sagittatum*
3. Leaf blades hastate, not barbed on the midvein below but pubescent; achene lenticular. 2. *P. arifolium*
2. Leaves sessile. 3. *P. meisnerianum*
1. Stems not barbed.
4. Stems twining (viny).
5. Outer calyx lobes enlarging as the fruit matures and becoming strongly winged. 4. *P. scandens*
5. Outer calyx lobes essentially unchanged as the fruit matures, narrowly keeled on the back. 5. *P. convolvulus*
4. Stems not twining or viny.
6. Flowers in elongate spikelike racemes mostly 15–30 cm long or more, mostly widely separated from each other; styles 2, becoming hard and persistent on the fruit, hooked terminally. 6. *P. virginianum*
6. Flowers in relatively short, spikelike racemes 6 cm long or less, commonly crowded at least toward the summit of the raceme, if remote then the racemes not nearly 15 cm long; styles not becoming hard, usually withering as the fruit matures, eventually deciduous.
7. Stipular sheaths of the leaves (ocreae) entire at the summit (note, however, that the ocreae often fracture and tear and that in those whose ocreae have striate nerves the membranous portions between the nerves may be fractured and shed leaving the striate nerves free and appearing like bristles).
8. Raceme 1 and terminal, or a terminal unequal pair. 7. *P. amphibium*
8. Racemes usually several to numerous, both terminal and axillary.
9. Calyx glandular-dotted; achene lenticular, both faces convex; plant perennial. 8. *P. densiflorum*
9. Calyx without glandular dots; achene lenticular, one or both faces flat or concave; plant annual.
10. Stalks of the raceme glabrous or (usually) with sessile or subsessile glands; racemes mostly nodding. 9. *P. lapathifolium*
10. Stalks of the racemes pubescent, sometimes stipitate-glandular, sometimes with stipitate glands intermixed with short, stiff pubescence, sometimes with only short, stiff pubescence. 10. *P. pensylvanicum*
7. Stipular sheaths of the leaves (ocreae) with bristles fringing their summits.
11. Internodes and stipular leaf sheaths both copiously and conspicuously pubescent with laterally spreading hairs. 11. *P. hirsutum*
11. Internodes and stipular leaf sheaths not both with spreading hairs.
12. Achene black, its surface very finely granular and dull; racemes nodding; calyx usually 4-parted. 12. *P. hydropiper*
12. Achene black, its surface smooth and lustrous; calyx 5-parted.
13. Plant perennial with horizontal rhizomes or stolons.
14. Fruiting calyx spherical or nearly so in outline, the lobes incurved toward the slightly exserted tip of the achene. 16. *P. opelousanum*
14. Fruiting calyx oval in outline and completely enclosing the achene.
15. Calyces with numerous glandular dots randomly spaced (drying yellowish to brownish and then more evident). 13. *P. punctatum*
15. Calyces without glands, or with a few scattered, pale, scalelike structures.
16. Leaves 1.5 cm broad or more; hairs on the tube of the stipular sheath loose and spreading, not stiff. 14. *P. setaceum*
16. Leaves mostly 1 cm wide or less; hairs on the tube of the stipular sheath strongly ascending-appressed, stiff, their bases attached to the tube (adnate). 15. *P. hydropiperoides*

13. Plant annual with a taproot.
17. Bristles fringing the summit of the sheath around the fascicles of flowers ⅔ as long as to somewhat longer than the tube bearing them. 18. *P. caespitosum*
17. Bristles fringing the summit of the sheath around the fascicles of flowers less than half as long as the tube bearing them, or absent. 17. *P. persicaria*

3. Polygonum (SMARTWEEDS AND KNOTWEEDS)

(Ours) annual or perennial herbs, some viny. Leaves simple, alternate, with tubelike, sheathing stipules (ocreae). Stems with swollen nodes. Flowers with jointed stalks, arranged in axillary clusters or in axillary or terminal spikelike racemes, the latter sometimes in panicles. Calyx united below, 4–6-lobed above, pink, green, or white, the lobes spreading at anthesis and then petallike in some, usually with glandular disks lining the lower parts, after anthesis closely embracing the fruit as it matures. Petals none. Stamens 3–9, often unequally inserted, sometimes some in the sinuses of the lobes, others below on the tube, occasionally some on the margins of the glands. Styles 2 or 3 and 2- or 3-divided above, stigmas capitate. Achene lenticular or 3-angled.