Keying out *Ludwigia* and *Polygonum*

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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
- Showy yellow flower (usually)
- Persistent calyx
- Leaves with entire margins and lovely venation

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. uruguayayensis
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 sphaerocarpha

- 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 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 -elevate. Fruit a many-seeded capsule, or an indescendent 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 het by hooked bristles or hairs.
2. 1. Ludwigia
   - Calyx segments deciduous after anthesis; petals pinkish to rose, violet, purple, or white; seed bearing a terminal tuft of hairs.

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, debiscens longitudinally or terminally.

1. Leaves alternate.
   - Stems 8–10, in 2 series.
   - Calyx segments 4 (rarely 5 in L. peruviana), seeds in several series in each locule, free of endocarp.
   - Intermediate conspicuously winged on the angles.
   - L. decurrens
   - Calyx segments 3–4 mm long, petals 5–6 mm long; capsule 10–15 mm long. 2. L. ericoides
   - Calyx segments 10–15 mm long, petals 5–6 mm long; capsule 2–5 mm long. 3. L. sidewalk
   - Floral tube at anthesis markedly longer than the calyx segments; calyx segments at anthesis broadly ovate, 5–10 mm wide near the base; petals 2–3 mm long, cobwebby, oblong, corolla 4–5 mm long. 4. L. oncorhine
   - Floral tube at anthesis the same length as the calyx segments or little longer; calyx segments at anthesis broadly ovate, 10–15 mm wide near the base; petals very broadly ovate, 3–5 mm long and as broad as long, corolla 6–7 mm long. 5. L. bowianum
   - Calyx segments 5, rarely 6 or 7; seeds in 1 series in each locule, situated within endocarp tissue.
   - Stem erect, stalks of the flowers short, much shorter than the floral tube, seed embedded by a corky, hooklike segment of endocarp.
   - L. echinocarpa
   - Stems 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 tube of wood.
   - L. leptophylla
   - Bracteoles at the base of the floral tube or just below it on the flower; deliquescent; ovaries of the stem bearing flowers usually ovate; stem, petals, and leaf blades sparsely to densely pubescent with long, soft, shaggy hairs.
   - L. leucophaea
   - Stamens 4, in 1 series; calyx segments 4.
   - 10. Capsule little if any longer than broad.
   - 11. Flowers and capsules distinctly stalked.
   - 13. Calyx segments ovate, strongly reflexed at anthesis; sepals at anthesis relatively short and spreading or early flaccid.
   - 14. Calyx segments lanceolate or lance-ovate; spreading to erect after anthesis; sepals at anthesis of long, spreading hairs.
   - 15. Calyx segments 2–4-locular, or 2–4-lobed; fruit a many-seeded capsule, or an indescendent nutlike structure.
   - 16. Leaves of the flowering stems obtuse-acute, spathulate, or subcordate, strongly cuneate-tapered at base, subtended by bracteoles.
   - 17. Calyx segments ovate to obovate, about 1.5 mm long.
   - 18. Calyx segments triangular-acute, 2–2.5 mm long.
   - 19. Leaves of the flowering stems ovate to lanceolate, narrowly lanceolate, linear-oblong, or essentially linear; sessile and little if at all tapered basally.
   - 20. Calyx segments narrowly winged.
   - 21. Calyx segments obtuse, the angles rounded.
   - 22. Flowers in the axils of well separated leaves or bracteate leaves; leaves narrowly lanceolate, somewhat tapered basally.
   - 23. Flowers in the axils of well separated leaves or bracteate leaves; leaves narrowly lanceolate, somewhat tapered basally.
   - 24. Calyx segments triangular-acute, 2–3 mm long, very much shorter than the capsule, seed bullate.
   - 25. Calyx segments triangular-subulate, 5–6 mm long, as long as the capsule or a little more; seeds corky, brown.
   - 26. Calyx segments triangular-subulate, 5–6 mm long, as long as the capsule or a little more; seeds corky, brown.

1. Ludwigia decurrens Walp.

Annual herb, of variable stature from 2 to 25 dm tall and from simple to widely and diffusely branched. Stem glabrous, with narrow wings-angles on the internodes, 2 running down from the leaf base. Leaves alternate, sessile or subsessile, lanceolate, 5–18 cm long, bases cuneate to rounded, apices acuminate, surfaces glabrous or slightly pubescent, margins finely ciliate. Flowers solitary in the axils of reduced leaves or bracteate leaves of the stem, flexuous branches, sessile or on stalks 1–5 (10) cm long, 2–5 minute, scale-like bracts 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, subsessile to ochraceous, 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

Bristles on ocreae
(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 recurvously barbed.
2. Leaves petiolate.
3. Leaf blades sagittate, strongly recurvously barbed on the midvein below; achene 3-angled.
   1. P. sagittatum
   2. P. arifolium
   3. P. maquiniteram

2. Leaves sessile.
3. Stems not barbed.
5. Outer calyx lobes enlarging as the fruit matures and becoming strongly winged. 4. P. scandens
6. Outer calyx lobes essentially unchanged as the fruit matures, narrowly keeled on the back.
7. 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
7. 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. P. lemmonius
8. 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 striae nerves the membranous portions between the nerves may be fractured and shed leaving the striae nerves free and appearing like bristles).
8. P. jexonatum
9. Raceme 1 and terminal, or a terminal unequal pair.
10. Racemes usually several to numerous, both terminal and axillary.
11. Calyx with glandular dots; achene lenticular, both faces convex; plant perennial.
12. P. densiflorum
13. Calyx without glandular dots; achene lenticular, one or both faces flat or concave; plant annual.
14. Stalks of the raceme glabrous or (usually) with sessile or subsessile glands; racemes mostly nodding.
15. P. lapathifolium
16. Stalks of the racemes pubescent, sometimes stipitate-glandular, sometimes with stipitate glands intermixed with short, stiff pubescence, sometimes with only short, stiff pubescence.
17. P. pycnanthum
8. 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.
12. P. biflorum
13. Internodes and stipular leaf sheaths not both with spreading hairs.
14. Achenes black, its surface very finely granular and dull; racemes nodding; calyx usually 4-parted.
15. P. hydropiper
16. Achenes black, its surface smooth and lustrous; calyx 5-parted.
17. Plant perennial with horizontal rhizomes or stolons.
18. Fruiting calyx spherical or nearly so in outline, the lobes incurved toward the slightly exerted tip of the achene.
19. Fruiting calyx oval in outline and completely enclosing the achene.
20. Calyces with numerous glandular dots randomly spaced (drying yellowish to brownish and then more evident).
21. P. sativum
22. Calyces without glands, or with a few scattered, pale, scalelike structures.
23. Leaves 1.5 cm broad or more; hairs on the tube of the stipular sheath loose and spreading, not stiff.
24. P. setaceum
25. 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).
26. P. hydropiperoides

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 panicules. 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 capitulate. Achene lenticular or 3-angled.