

Vascular Plants of Williamson County
Pinus echinata – SHORTLEAF PINE [Pinaceae]

Pinus echinata Miller (possible selection, mixed-sized plants in woodland of escaped plants originating from cultivated specimens), SHORTLEAF PINE. Tree, evergreen, with 1 trunk to 30 cm diameter (non-cultivated), in range 4–10 m tall (reproductive); monoecious; shoots with long shoot-short shoot organization, long shoot growth beginning in late March, with closely spaced, nonphotosynthetic scale leaves along new axis (new spring growth after pollination begins), springtime long shoot initially to 200 × 8 mm before foliage leaf elongating, at each node having a scalelike primary leaf but immediately producing a short shoot in the axil of scale leaf (syllaptic development) = a “fascicle” of 2–3 photosynthetic leaves (needles) held together by several tightly wrapped papery (scarios) leaves at the base, glabrous, having resin ducts within plant, aromatic, especially when crushed or damaged. **Stems:** internodes relatively short hidden by persistent bases of scale leaves; young twigs flexible, lacking leaves when > 4 mm diameter, with helically arranged remnants of scale leaves; older stems with woody seed cones mostly 7–8 mm diameter shedding tannish gray leaf bases and forming light brown periderm; bark large-scaly, not peeling and tightly attached, gray, not obviously resinous. **Leaves:** of 3 types (scale, foliage, wrapper); scale leaves on new long shoots helically alternate, simple, sessile with decurrent bases; foliage leaves (needles) terminal and mostly in 3s (“whorled”) less so 2s (opposite) on short shoot, photosynthetic, simple, sessile; wrapper leaves initially membranous after full elongation aging scarios, fully sheathing and mostly cylindrical around bases of foliage leaves subtended by prophyll; blade of scale leaves acute-triangular with firm point at tip and firmly attached to a raised green base, 2–2.5 × 1.2–1.4 mm + widely spreading and coarsely fringed (frayed) ⊥ to margin, reddish but darker at tip, fringe 0.5–1 mm long, tip straight; part of blade eventually abscising leaving a reduced and obtuse-rounded projecting rim subtending fascicle; prophyll closed to midpoint, crownlike somewhat compressed front-to-back, ca. 2 × 2 mm, 2-keeled on lateral sides alternating with V-shaped sinus on other faces, the keels thickened and light green and other tissue membranous aging scarios; wrapper leaves sheathing, < 10, initially membranous later forming a scarios cylinder around the set of 2–3 growing, foliage leaf blades, forming cells by meristem at base of leaf (intercalary meristem), fully enlarged 9–15 mm long, venation obscure, upper portion becoming tattered and partial shed and constricting downward with ringlike ridges, weathering gray and cylinder reduced to 5–10 mm long; foliage leaves persistent 3–5 years, ± hemi-cylindric slightly concave (2-needled) and 3-sided (3-needled), long-linear, 70–170 × 0.8–1.2 mm, equal to subequal in fascicle (2) or third leaf 1–2 mm shorter, flexible and when elongated slightly twisted, green (not glaucous or glossy), 2-veined, margins minutely toothed, acute at tip, lower (outer) surface rounded with 9–11 lines of minute white dots (stomates) and similar lines on the upper (inward-facing) surface, on 3-sided blade becoming hemi-cylindric approaching hardened and yellowish tip. **Reproductive structures:** Pollen cones emerging from helically arranged axillary buds at the base of new growth to form short-lived (determinate) short-shoots, forming in a cluster of several cones to shed pollen in early spring, with several or more scalelike “bracts” (cataphylls, bud scales) subtending the pollen cone on each short-shoot, the cataphylls ± cupped-ovate and tough (chartaceous), 3–4.5 × 2–2.5 mm, pale

reddish brown with membranous margins. Seed cones emerging on spring growth several weeks after pollen cones begin to shed pollen, on short stalks with several primary leaves, stalks fully elongated < 10 mm long and woody. **Pollen cone** (male strobilus or androstrobilus): \pm cylindric, spikelike, and flexible (nonwoody), $15\text{--}20 \times 4\text{--}4.5$ mm, of closely arranged, helically alternate, pollen-bearing structures radiating \perp the axis (microsporophylls), microsporophylls evenly spaced, at anthesis $\pm 130/10$ mm in a 5/13 phyllotaxy, each microsporophyll sessile to subsessile, ca. 1.5 mm long including stalk to 0.3 mm long, at the top having a cupped, scalelike cover (apophysis) forming the broken surface in bud, beneath the apophysis having 2 plump, pollen-producing pollen sacs (microsporangia) attached to the axis; cone at pollen release straight to gently curved, before shedding pollen the overlapping apophysis scales of the surface narrowly spreading apart to form spaces for pollen dispersal from the concealed pollen sacs, the apophysis roughly semicircular to weakly 3-lobed in outline (half-umbrellalike), ca. $0.6\text{--}0.8 \times 1\text{--}1.2$ mm, length < width, truncate to shallowly subcordate at base, the lobes broadly rounded with wavy margins partially rolled downward, the apophysis margins initially narrowly colorless and short-fringed surrounded a colored center appearing purplish rose-pink but fading as scales dry to reveal a light green base; **microsporangia** broadly ellipsoid, 1–1.2 mm long, pale yellow, longitudinally dehiscent; central cone axis ca. 1 mm diameter, rose-red drying brown, with irregular surface having longitudinal wrinkles and fine streaks; pollen cone emerging in late winter initially ellipsoid-ovoid and angular; **pollen** copious, dry and wind-dispersed, pale yellow, each pollen grain having a pair of semicircular “wings” on 1 side. **Seed cone** (female strobilus, megastrobilus): solitary on short shoot (determinate) having at most 3 determinate shoots close on branch (“cluster”), in range not observed on lower branches during principal period of pollination, with a central axis and 50–60 helically alternate “bracts” each = unit of a wide bract subtending a pair of scales each ovule-bearing (bract-ovuliferous scale); at pollination ovoid, 12–15 mm long, reddish, having bracts slightly spread to permit pollen grains to fall into crevices to be delivered to exposed, inward-facing ovule at base of each bract-scale; mature unopened seed cone ovoid, in range $50\text{--}70 \times$ ca. 30 mm long, only slightly prickly (not injurious when handled), opened seed cone (potentially shedding seeds, if present) maturing and releasing seeds in about 20 months, spreading, sessile to short-stalked < 6 mm long (axis of determinate shoot), symmetric ovoid to ovoid-conic with widely spreading, stiff, wooden cone scales, in range $50\text{--}70 \times 32\text{--}50$ mm, each cone scale with 2 winged seeds on upper surface (seeds fertile or sterile and aborted), scales below midcone the widest 10–13 mm across (per cone), scale upper surface red-brown and having outline of seed wings, outfacing surface aging gray having a central sharp projection (umbo), the umbo positioned backward, in range straight, < 1–2 mm long, having broad base, scales lacking an obvious contrasting dark border on upper surface. **Seed:** winged, wing = modified tissue of cone scale surface, scarious, asymmetrically lanceolate, $12\text{--}16 \times 3.8\text{--}4.6$ mm and the narrowest at seed, whitish with streaks (lines of pigmented cells) and patches red-purple especially at base and tip, with 1 margin straight (adjacent to other side on cone scale), rounded at tip; seed ellipsoid, $5 \times 3 \times 2$ mm long, initially brown aging gray to nearly black; wings formed even when seed aborted, of aborted seed notched at narrow base.

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