



THE UNIVERSITY OF ARIZONA  
Cooperative Extension

# ARIZONA NATIVE PLANTS

## SEEDLING IDENTIFICATION POCKET GUIDE



*Asclepias speciosa*



*Lupinus arizonicus*

**AZ2190-2026**

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**PRODUCED BY**

**THE UNIVERSITY OF ARIZONA COOPERATIVE EXTENSION**

This guide is meant to assist in the identification of a few of Arizona's most common native grasses and forbs. Identifying plants can be hard, identifying seedlings can be outrageously difficult. Here, we attempt to provide general guidelines for seedling identification in the field, in the garden, or in the greenhouse.

The species in this guide are just a small fraction of all of the native plants in Arizona. They were chosen for inclusion due to their general common distribution across the state and their high frequency of use in ecological restoration projects. To confirm your identification, take a picture of your plant and ask a Master Gardener for assistance, or wait until the plant grows. Never pick a native (or unknown) plant from the ground.

Measurements for this guide were taken inside of a greenhouse and environmental conditions can modify aspects of growth, so all values are provided as a suggested guide. We thank Borderlands Restoration, Patricia "Patsy" Lynn Dennis and Payette Neess for assistance in the greenhouse and lab. Seed photos are associated with a ruler showing centimeters. All photos, unless noted, were taken by Albert Kline.



L to R *Disakisperma dubium*, *Bouteloua curtipendula*, *Schizachyrium scoparium*, *Digitaria californica*, *Bothriochloa barbinodis*

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**FORBS**

*Achillea millefolium*  
Common Yarrow, Western Yarrow

*Achillea millefolium* is a hardy, perennial herb native to much of North America, including the Southwest. It grows 1-3 feet tall with finely divided, feathery leaves and clusters of small white umbel-like flowers that provide nectar for bees, butterflies, and other pollinators which typically bloom from spring through fall. Adapted to a wide range of soils and having low water requirements, it is highly drought-tolerant and resilient in disturbed environments. Due to its fibrous root system and ability to spread by rhizomes, it's also useful for soil stabilization and erosion control.



**Seeds**

Tiny, narrow achenes, typically 1-2 mm in length, gray to brown, with a smooth surface and no pappus that they produce in large numbers.



## Cotyledon

Shape & Tips: Oval with round tips

Average tip to tip length: 5.73 mm

Average Height: 3.91 mm

Other distinguishing features: Bright green cotyledons with very short fine pubescence giving them almost a gritty look and a sometimes grayer stem, very symmetrical growth.



## Seedling

Shape & Tip: Pinnatisect lanceolate, oblong, or spatulate

Margins: Serrate

Average Leaf Sizes: 2.4 mm length and 1.15 mm width

Average Leaf tip to tip length: 4.4 mm Average Height: 7 mm

Other distinguishing features: Typically fully green or bright green, stems and petioles included. Cotyledons become larger but remain fairly in the same shape and continue to have short pubescence. However, the leaves are covered in longer hairs, more pilose than the cotyledons. Doesn't seem to have any noticeable midveins on either cotyledons or the first set of leaves.



## *Asclepias angustifolia* Arizona milkweed

Arizona Milkweed is a perennial native forb to southern Arizona, typically found in rocky canyons, riparian woodlands, and upland slopes. It features slender stems and narrow leaves, with delicate white to pink flowers that attract a variety of native pollinators. As a host plant for monarchs and other butterfly species, it plays a vital role in supporting their life cycles. In restoration, Arizona Milkweed enhances pollinator habitat, contributes to biodiversity, and helps stabilize soils in sensitive or degraded areas.



### Seeds

Typically flattened and oval to oblong in shape, with a slightly tapered tip. They measure approximately 4-6 mm in length and 2-3 mm in width, with a slightly textured seed surface, often with a brown coloration. When found in the wild note they might have their comas, silky white hairs that help with wind dispersal, still attached.



## Cotyledon

Shape & Tips: Elliptical to oblong with round to blunt tips

Average Sizes:

First Cotyledon: 8 mm length with a width of 3.75 mm;

Second Cotyledon: 7.75 mm length and 3.5 mm width

Average tip to tip length: 11.5 mm

Average Height: 11.5 mm

Other distinguishing features: Prominent lighter-colored and slightly raised midvein, slightly raised arcuate branching veins, and glabrous



## Seedling

Shape & Tip: Linear to lanceolate with rounded to blunted tips

Margins: Entire and wavy

Average Leaf Sizes:

First Leaf: 19.5 mm length and 2.25 mm width

Second Leaf : 19 mm length and 2.25 mm width

Average tip to tip length: 22.5 mm

Average Height: 49 mm

Other distinguishing features: Pubescent to wooly hairs on leaf surfaces, indented midrib with occasional lighter coloration near the base, cotyledons elongate and become less glabrous and more noticeably pubescent, with a generally darker colored stem (reddish brown).



## *Asclepias speciosa* Showy milkweed

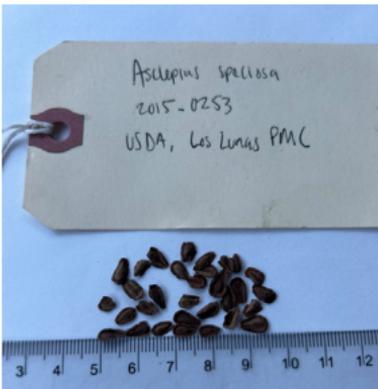
Showy Milkweed is a perennial herb native to the western United States, including parts of Southern Arizona. It prefers moist, well-drained soils, but tolerates dry conditions once established; thriving in open meadows, roadsides, and riparian areas. This species is a critical host plant for monarch butterflies and supports a wide range of pollinators. In restoration, it's valued for its ecological role in pollinator networks and its ability to establish in disturbed soils.



Max Licher

### Seeds

Typically, brown and ovate with a raised center and papery margins. Fairly large, roughly 50 mm in length. When found in the wild note they might have their pappuses, silky white hairs that help with wind dispersal, still attached.



## Cotyledon

Shape & Tips: Elliptic to ovate with rounded to blunted tips

Average Cotyledon Sizes:

First Cotyledon: 10 mm length with a width of 3.75 mm

Second Cotyledon: 9.5 mm length and 3.5 mm width

Average tip to tip length: 14 mm

Average Height: 8.75 mm

Other distinguishing features: Leaves with prominent lighter-colored midvein and branching secondary pinnate veins, glabrous to slightly pubescent cotyledons



## Seedling

Shape & Tip: Linear to lanceolate with blunt to acute tips

Margins: Entire

Average Leaf Sizes:

First Leaf: 9 mm length and 2.25 mm width;

Second Leaf : 8.75 mm length and 2.25 mm width

Average tip to tip length: 10 mm

Average Height: 15.5 mm

Other distinguishing features: Glabrous leaf surfaces, indented midrib with occasional lighter coloration , cotyledons elongate and can become slightly pubescent. The base of the stem is typically darker in color (brown) and becomes lighter (greener) past the cotyledons.



## *Bahia absinthifolia* Hairyseed Bahia, Bahia

Bahia is a low-growing, herbaceous perennial native to the southwestern U.S., *Bahia absinthifolia* features finely divided gray-green leaves and bright yellow, daisy-like flowers that attract a variety of pollinators. It thrives in sandy or disturbed soils and is highly drought tolerant. This species plays a key role in restoration by stabilizing soil, supporting pollinators, and integrating well with other native desert plants. Its long blooming season and adaptability make it a valuable component in arid land revegetation efforts.



### Seeds

Small, 4-5 mm, and are typically enclosed in a single-seeded achene, characteristic of the Asteraceae family, at the base. They're typically slender and almost cone-like, with a rough, hairy surface that, along with the pappus of papery scales, aids in wind dispersal and soil anchoring. The hairs give the seeds a woolly appearance, which is reflected in the common name "Hairyseed Bahia" and these adaptations help to enhance germination success especially in sandy or disturbed soils.



## Cotyledon

Shape & Tips: Oblong with truncate tips

Average Sizes: First Cotyledon: 4.88 mm length and 1.39 mm width; Second Cotyledon: 4.88 mm length and 1.41 mm width

Average tip to tip length: 8.125

Average Height: 9.5 mm

Other distinguishing features: Typically, green cotyledons with faint pubescent hairs on the surface with a darker colored smooth stem. Cotyledons can be so oblong and truncated that they appear almost rectangular.



## *Carnegiea gigantea* Saguaro

*Carnegiea gigantea* is a long-lived cactus species native to the Sonoran Desert. This desert icon can reach heights of 40 feet and live for over 150 years. Saguaros have thick, ribbed stems that store water and produce large white flowers in the later parts of the cool season, followed by red, fleshy fruits in the summer. It's a keystone species in Sonoran Desert ecosystems, providing nesting sites for birds, while its flowers and fruits support pollinators and wildlife, and when mature can act as a nurse plant for other plant species to help with establishing.



### Seeds

Seeds are tiny, about 1 mm, black, round, and smooth. They're produced in large numbers within the fleshy fruit and require warm temperatures and consistent moisture for germination, often establishing under nurse plants that provide shade and protection..

## Cotyledon

Average Sizes:

First Cotyledon: 3.58 mm length and 2.85 mm width

Average tip to tip length: 7.13 mm

Average Height: 6.38 mm

Other distinguishing features: Bright green entirely, succulent with the first spines emerging from the top center of the cotyledons, roughly takes about 75 days from seed to cotyledons, glabrous but may appear to be lighter colored at the pores sometimes giving it the appearance of trichomes or "freckles", round black seeds may still be attached and visible near apex and cotyledon tips.



Pictured above is a saguaro about 1 year from seed. It's rounded out, and the spines are all over not only at the apex, but it remains smaller than a penny.

*Dalea candida*  
**White prairie clover, White dalea**

*Dalea candida* is a perennial legume native to prairies and open habitats across North America, including parts of the Southwest. It grows 1–3 feet tall with slender stems and pinnate leaves composed of narrow leaflets. The plant produces elongated spikes of small white flowers during the warm season, attracting bees and other pollinators. Its deep root system enhances soil stabilization and drought resilience while improving nitrogen fertility in degraded soils.



**Seeds**

Seeds are small, roughly 1-2 mm in length, round to oval, and light brown to greenish brown. Each seed is enclosed in a small pod that splits open when mature.



## Cotyledon

Shape & Tips: Oval to elliptic with round tips

Average Sizes:

First Cotyledon: 3.55 mm length and 2.0 mm width

Average tip to tip length: 7.13 mm

Average Height: 6.13 mm

Other distinguishing features: Roughly 10 days on average for cotyledons to form, entirely green to bright green including the stem, mostly glabrous but may have some faint trichomes on cotyledon surfaces, no distinguishing venation.



*Gaillardia pulchella*  
Firewheel, Indian blanket

*Gaillardia pulchella* is a colorful, warm-season annual native to the southwestern U.S. It grows 12–24 inches tall with branching stems and lance-shaped leaves. The plant produces striking red and yellow bicolored daisy-like flowers typically from spring through fall, attracting bees, butterflies, and other beneficial pollinators. Adapted to drought and poor soils, its ability to establish quickly and reseed easily in sandy or disturbed soils makes it useful for erosion control and ground cover.



**Seeds**

Seeds are small, wedge-shaped achenes, usually about 4-6 mm in length, with short bristles or remnants of a pappus that aid in limited wind dispersal and germinate readily without pretreatment.





### **Cotyledon**

Shape & Tips: Elliptic to ovate with blunt tips

First Cotyledon: 3.17 mm width

Average tip to tip length: 11.0 mm

Average Height: 3.67 mm

Other distinguishing features: Entirely green to bright green, low growing with little to no exposed stem, cotyledon surfaces are slightly pubescent, no prominent venation, very symmetrical growth as cotyledons but not with their first true leaves.



*Helianthus annuus*  
**Sunflower, Common sunflower, Wild sunflower**

*Helianthus annuus* is a tall, annual plant native to much of North America, including the Southwest providing shade and structure in restoration sites. It typically grows 3–8 feet tall with coarse, hairy stems, and large, rough leaves and substantial, bright yellow flower heads with a central disk that blooms in summer and early fall. Its flowers attract a wide range of pollinators, including bees, butterflies, and birds, while its seeds offer food for wildlife. Sunflowers are highly adaptable, drought tolerant, establish quickly, and thrive in poor and disturbed soils, providing rapid soil stabilization.



**Seeds**

Seeds are large, usually around 5 mm in length, flattened achenes, gray to black, often with striped patterns and are produced in abundance and disperse primarily by gravity and wildlife.



## Cotyledon

Shape & Tips: Circular to oval with round tips

Average Sizes:

First Cotyledon: 6 mm length and 4 mm width

Second Cotyledon: 6 mm length and 4 mm width

Average tip to tip length: 12 mm

Average Height: 19.33 mm

Other distinguishing features: Tall/long stem for cotyledon, green with darker colored stem sometimes darker colored margins, glabrous to slight glandular pubescence, roughly 15 days on average for cotyledons to emerge.



## Seedling

Shape & Tip: Linear ovate with round tips

Margins: Entire and typically ciliate

Average Leaf Sizes:

First Leaf: 4.67 mm length and 2.67 mm width

Average Leaf tip to tip length: 8 mm

Average cotyledon tip to tip: 22 mm

Average Height: 28.67 mm

Other distinguishing features: Symmetrical growth, tall/long stem, green to bright green leaves with darker colored stem, cotyledons from circular to spatulate with slight pubescence, hirsute to hispid hairs on leaf surfaces, lighter colored midvein with palmate venation, 5 days on average from cotyledons and first leaves developed, around 5 days for leaves to develop post-cotyledon.



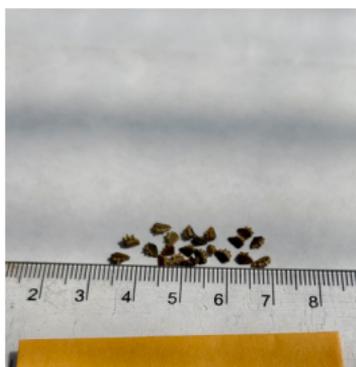
*Kallstroemia grandiflora*  
**Arizona poppy, Orange Caltrop, Summer poppy**

*Kallstroemia grandiflora* is a warm-season, drought tolerant, annual, native to the deserts of the southwestern U.S. and northern Mexico. It's adapted to sandy and rocky soils and forms low, spreading mats, reducing erosion and dust. With pinnate leaves and vibrant orange to reddish-orange flowers that resemble poppies (but with an extra petal), its bright flowers attract bees and other pollinators.



**Seeds**

Seeds are small, hard, and angular, typically 2 to 5 mm in length, and are enclosed in spiny capsules that break apart when mature. Each capsule contains multiple seeds that disperse through gravity and surface runoff and germinate readily following summer rains.



## Cotyledon

Shape & Tips: oval to elliptic with round or slightly blunt tips

Average tip to tip length: 13.25 mm

Average Height: 12.5 mm

Other distinguishing features: Green cotyledons, usually with a lighter colored slightly indented midvein, with a typically darker green-brown stem. Cotyledon surface hairs are pubescent to tomentose and have ciliate margins and the stems have strigose to hirsute hairs too.



## Seedling

Shape & Tip: Oval to ovate with round or blunt tips

Margins: Entire and ciliate to fimbriate

Average Leaf Sizes:

First Leaf: 23.33 mm length and 13.33 mm width

Average Height: 44.67 mm

Other distinguishing features: Leaves are even pinnate, ciliate to fimbriate on leaf margins and petiole, slight midvein/indentation, stems strigose to hirsute, pubescent leaf surface, first set of leaves grow and mature before second set fully emerges/ non-symmetrical growth.



*Machaeranthera tanacetifolia*  
Tanseyleaf tansyaster, Takhoka daisy

Tanseyleaf tansyaster is a hardy annual or short-lived perennial/biannual native to the southwestern U.S. It grows 1–3 feet tall with deeply lobed, gray-green leaves and produces purple to violet daisy-like flowers with yellow centers during summer and fall that help support pollinators. This species is drought tolerant and grows in sandy, rocky, and even establishes well in disturbed soils helping with soil stabilization in arid land restoration sites.



**Seeds**

Seeds are small, narrow achenes with a smooth surface and a short pappus of bristles that help with wind dispersal. They germinate readily in well-drained soils and require minimal pretreatment.



## Cotyledon

Shape & Tips: Spatulate and round tips

Average Sizes:

First Cotyledon: 2.29 mm width

Second Cotyledon: 2.14 mm width

Average tip to tip length: 9.71 mm

Average Height: 3.71 mm

Other distinguishing features: Green to bright green, very low growing, with pubescent surface hairs on the cotyledon surfaces. 17 days on average from seed to cotyledon emergence.



## Seedling

Shape & Tips: Pinnatisect lanceolate to linear

Margins: Deeply lobed and ciliate

Average Leaf Sizes:

First Leaf: 10 mm length and 3 mm width

Second Leaf: mm 9.29 length 2.86 and mm width

Average tip to tip length: 16.57 mm

Average cotyledon tip to tip: 16.14 mm

Average Height: 7.14 mm

Other distinguishing features: Ciliate hairs on margins, leaf surface hairs glandular/sticky, slight citrusy aromatic scent from glands on leaves, low growing/short stem with first leaves grows taller later, midvein/deep fold, 7-8 days on average from cotyledon to first leaves, all parts green/bright green.



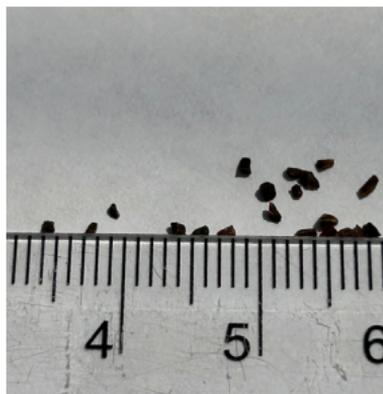
*Oenothera elata*  
Hooker's evening primrose, Western evening primrose

*Oenothera elata* is a tall, biennial or short-lived perennial native to the southwestern U.S. It typically grows 3–6 feet tall with lance-shaped leaves. Adaptable to a range of soils, its deep root systems help stabilize soils in riparian zones and disturbed sites. They have large, bright yellow flowers that open in the evening and close by midday, attracting moths, bees, and other insects with their night-blooming flowers. Blooming occurs from late spring through summer.



**Seeds**

Seeds are small, oval, and brown, usually about 1 mm in length. They're produced in elongated capsules that split open when mature. Each capsule contains numerous seeds that are dispersed by gravity and water flow.



## Cotyledon

Shape & Tips: oval to elliptic with round or slightly blunt tips

Cotyledon width: 2.44mm

Average tip to tip length: 7.44 mm

Average Height: 4 mm

Other distinguishing features: Short stem (especially with how tall it grows when mature) and typically green/ bright green entirely. Cotyledons are usually slightly pubescent to glabrous. No noticeable midvein or venation.



## Seedling

Shape & Tip: Triangular ovate with round tips

Other distinguishing features: Cotyledons enlarge, and petioles elongate into a more triangular ovate shape with slightly lightened partial midvein that goes about a quarter of the way up. They continue to have slight pubescence on surfaces but ciliate hairs can start to develop along the margins. Leaves typically have slight midvein indentation and have pubescent hairs on surface and can have ciliate hairs along the margins as well.



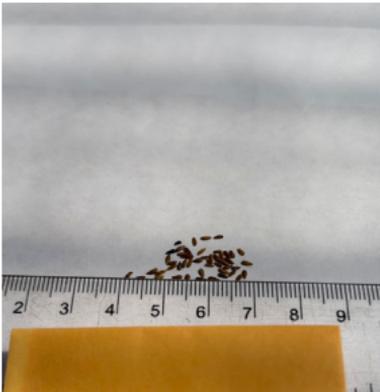
## *Oenothera pallida* Pale evening primrose

*Oenothera pallida* is a perennial forb native to arid and semi-arid regions of the southwestern U.S. It grows 1–2 feet tall with slender stems and lance-shaped leaves. Adapted to drought and poor soils, its deep root systems help to stabilize sandy soils. The plant produces large, delicate white to pale pink flowers that open in the evening and fade by morning, providing nectar for nocturnal pollinators such as moths. Blooming occurs in spring and summer, often following seasonal rains.



### Seeds

Seeds are small, around 2 mm in length, angular, and brown. They're contained within elongated capsules, that hold multiple seeds and split open when mature. Seeds are dispersed through gravity and wildlife and germinate best under warm conditions and may benefit from light exposure during germination.



## Cotyledon

Shape & Tips: lanceolate to hastate with round tips

Average tip to tip length: 12.13 mm

Cotyledon width: 2.5 mm

Average Height: 6.25 mm

Other distinguishing features: Short stemmed, gray green with purplish undertones, lighter midvein going about halfway up the cotyledons. Woolly to velvety pubescence covering cotyledon surfaces.



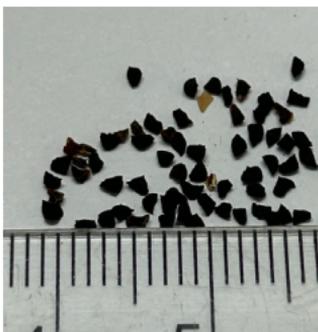
*Penstemon pseudospectabilis*  
**Desert penstemon, Rosy Desert Beardtongue,  
Canyon Penstemon**

Desert penstemon is a striking, drought-tolerant perennial native subshrub in the deserts and uplands of the southwestern United States. It typically grows 2–4 feet tall, with upright stems and opposite, lance-shaped almost triangular, clasping leaves that often have prominent serrated margins. Its vivid pink tubular flowers bloom in spring and early summer and are arranged in showy spikes that attract hummingbirds, native bees, and other pollinators. Its deep root system helps stabilize slopes and disturbed soils, especially in upland and desert wash environments. It's well-adapted to arid, gravelly, and rocky soils and requires minimal irrigation once established, making it ideal for low-water restoration and xeriscaping.



### Seeds

Seeds are produced in capsule-like fruiting bodies that contain multiple seeds and split open at maturity. The seeds are small, angular, and dark brown to black, typically about 1 mm in length and have a rough surface texture that aids in soil contact. Natural dispersal occurs through gravity and water flow.



## Cotyledon

Shape & Tips: Ovate in shape with tips that tend to have a slight notch, retuse, or are rounded.

Average Sizes: First Cotyledon: 2.33 mm length and 1.75 mm width; Second Cotyledon: 2.33 mm length and 1.75 mm width

Average tip to tip length: 4.67 mm

Average Height: 4 mm

Other distinguishing features: No noticeable midvein but may indent slightly near the base of the cotyledon and have velvety to pubescent leaf surfaces.



## Seedling

Shape & Tips: Triangular ovate with obtuse tips

Margins: Serrate

Average Leaf Sizes: First Leaf: 6.71 mm length and 3.45 mm width; Second Leaf: 6.71 mm length and 3.55 mm width

Average tip to tip length: 13.43 mm

First Cotyledon: 5.86 mm length with a width of 3.12 mm

Second Cotyledon: 5.86 mm length and 3.06 mm width

Average cotyledon tip to tip: 18.8 mm

Average Height: 9.3 mm

Other distinguishing features: Typically symmetrical in growth, first leaves and cotyledons covered in pubescent to tomentose hairs on the upward facing surface. Cotyledons elongate and become almost triangular. Tends to have a purplish-brown stem, and on the leaves have a slight indented midvein that fades about halfway with no noticeable secondary venation.



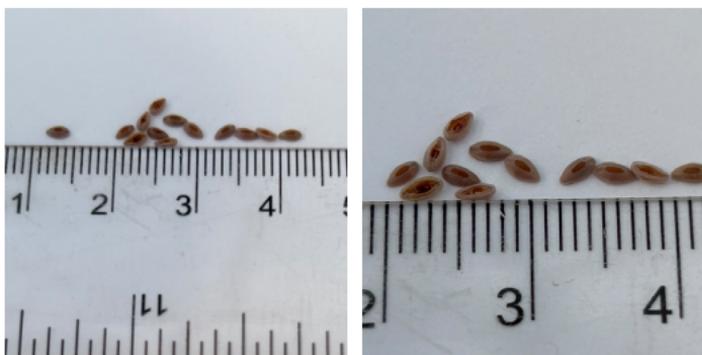
*Plantago ovata*  
**Indian wheat, Woolly plantain, Blond plantain**

*Plantago ovata* is a short-lived, fast-growing, annual native to arid regions of the southwestern U.S. and northern Mexico. It typically grows 4–12 inches tall with fuzzy, narrow, leaves and produces small, white, inconspicuous flowers arranged in dense spikes. With its fibrous root systems, quick growth and establishment, this species is well adapted to disturbed and sandy soils and thrives during cool seasons, often following winter rains.



**Seeds**

Seeds are small, oval, and light brown, usually about 2 to 3 mm in length, and are enclosed in tiny capsules that split open when mature. Seeds are smooth with a mucilaginous coating that swells when wet, aiding soil contact, and germinate readily after winter precipitation.



## Cotyledon

Shape & Tips: Linear with pointed tips; almost acicular

Average Sizes:

First Cotyledon: 15.06 mm length and 0.68 mm width

Second Cotyledon: 15.06 mm length and 0.6 mm width

Average tip to tip length: 11.93 mm

Average Height: 14.22 mm

Other distinguishing features: 5.5 days after planting, Aries/bunny ear esq to almost "V" shaped, entirely green to bright green, no super noticeable/central stem, mostly entirely glabrous with occasional slight trichome cover on lower halves.



## Seedling

Shape & Tip: Linear with blunt to pointed tips

Margins: Entire

Average Leaf Sizes:

First Leaf: 15.5 mm length and 0.75 mm width

Average Height: 22 mm

Other distinguishing features: Leaves form roughly 6.5 days after cotyledons emerge, green to bright green entirely, tomentose to villous hairs covering entire leaf surface, parallel venation, cotyledons elongate but mostly stay the same and a small stem starts to form at the base.



Important Note: *P. ovata* can be easily mistaken for a similar species; *P. patagonica*. However, there are differences. As seedlings, *P. ovata* tends to be brighter in color, have longer and more hairs on their entire leaf surfaces while *P. patagonica* can appear more ciliate, with more pointed leaf tips, and *P. ovata* typically tends to have more a stem at the base.



Left: *Plantago patagonica* Right: *Plantago ovata*

## *Sphaeralcea hastulata* Spear globemallow, Spreading globemallow

*Sphaeralcea hastulata* is a fast-growing, drought-tolerant perennial subshrub native to the southwestern U.S. It features gray-green, spear-shaped leaves and produces clusters of orange to apricot-colored flowers from spring through fall. This species is well-adapted to dry and disturbed environments, making it a valuable component in arid land restoration. It establishes quickly, stabilizes soil, and provides nectar for native pollinators. Its resilience and ability to thrive in poor soils make it ideal for revegetation and erosion control efforts.



### Cotyledon

Shape & Tips: Ovate to cordate with blunt tips

Average Sizes: First Cotyledon: 5.5 mm length with a width of 3.78 mm; Second Cotyledon: 5 mm length and 3.51 mm width

Average tip to tip length: 10.5 mm

Average Height: 7.5 mm

Other distinguishing features: Green leaves and stems with the stems sometimes having some reddish-brown mixed in. Cotyledons can sometimes have a slight indentation midway at the base. Cotyledon surfaces are covered in short dense hairs almost appearing velvety or felted with the stems being hirsute.



## Seedling

Shape & Tip: Ovate to cordate with round or pointed tips

Margins: Serrate to wavy

Average Leaf Sizes: First Leaf: 14.5 mm length and 7.34 mm width; Second Leaf: 7.11 mm length and 4.3 mm width

Average Leaf tip to tip length: 16.13 mm

First Cotyledon: 11.33 mm length with a width of 5.07 mm

Second Cotyledon: 10.89 mm length and 4.72 mm width

Average cotyledon tip to tip: 20.56 mm

Average Height: 12.56 mm

Other distinguishing features: Leaves are green to gray-green but petioles and stems can have a reddish-brown tint to them. Venation appears slightly indented into leaf surface in a palmate formation starting from petiole usually up to the tip. Stems and petioles continue to be hirsute but the trichomes on the leaves appear stiffer and whiter and compound into a stellate formation as the plant matures. The trichomes can be so dense that new emerging leaves can often appear almost hoary before growing into them and can then give a gray or frosted appearance to the leaves.



## *Verbesina encelioides* Golden Crownbeard

*Verbesina encelioides* is an annual or short-lived perennial native to the southwestern U.S. and northern Mexico. It grows 1–3 feet tall with coarse, green leaves and produces bright yellow, sunflower-like flowers throughout the warm season. This species is highly adaptable, thriving in sandy, disturbed soils and along roadsides making it valuable for rapid ground cover and erosion control due to its fast growth and prolific seed production which helps contribute to a persistent seed bank. Its flowers attract bees, butterflies, and other pollinators, enhancing biodiversity and are highly drought-tolerant and resilient to poor soils.



### Seeds

Small, flattened, gray to dark brown, sunflower-seed like with lighter colored and papery margins, roughly around 5 mm in length, and often with short bristles or remnants of a pappus. They disperse primarily by gravity and wind and germinate readily in disturbed soils without special pretreatment.



## Cotyledon

Shape & Tips: Oval with round tips

Average Sizes: First Cotyledon: 5.55 mm length with a width of 2.4 mm; Second Cotyledon: 5.55 mm length and 2.4 mm width

Average tip to tip length: 11.1 mm

Average Height: 7.8 mm

Other distinguishing features: Fast growing annual, typically cotyledons occur 10 to 14 days after planting and about 5 days after that for the first set of leaves to form. Bright green stems and cotyledons with no apparent midvein and tips that can sometimes curl or cup. Cotyledons are also covered in short dense hairs appearing velvety, felted, or woolly.



## Seedling

Shape & Tip: Ovate with pointed tips

Margins: Serrated

Average Leaf Sizes: First Leaf: 5.83 mm length and 3 mm width; Second Leaf : 5.5 mm length and 2.67 mm width

Average Leaf tip to tip length: 11.33 mm

First Cotyledon: 11.33 mm length with a width of 5.07 mm

Second Cotyledon: 10.89 mm length and 4.72 mm width

Average cotyledon tip to tip: 31.67 mm

Average Height: 11.33 mm

Other distinguishing features: Green leaves, cotyledons, and stems with symmetrical growth. Almost silky or woolly hairs that become more pubescent as the leaves grow. Sometimes partial midvein-indentation near the base of the leaf. Cotyledons elongate and become more spatulate in shape.



# GRASSES

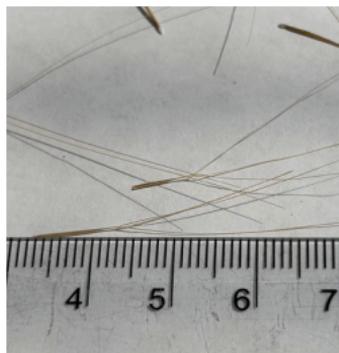
## *Aristida purpurea* Golden Crownbeard

*Aristida purpurea* is a warm-season perennial bunchgrass native to North America, including the southwestern U.S. It typically grows 1-2 feet tall and forms loose clumps of fine, wiry leaves. The plant is easily recognized by its distinctive inflorescence that takes on a purplish to reddish hue and bears seeds with three long, slender awns, which give rise to its common name. Its drought tolerance and deep fibrous root systems give it the ability to establish in poor soils and allows it to thrive in dry, sandy, or gravelly soils, increasing soil stabilization which helps with erosion control. While its forage value for livestock can be limited because of the awns, it does provide forage and cover for other wildlife.



### Seeds

Seeds are small, elongated grains, usually roughly 4 to 8 mm in length, attached to three long awns that can be up to more than a few centimeters long. These long awns aid in wind and animal dispersal and the seeds germinate best under warm conditions.



## Cotyledon

Average Sizes:

First Cotyledon:

Average Length: 38.58 mm

Average Height: 33.75 mm

Average Width: 0.88

Other distinguishing features: Typically, green with a brighter green lower half, thin, upright, and rolled until near the top of the cotyledon's blade where it tends to unfurl, widening the tip and causing it to droop over slightly, parallel venation can usually be seen on the blade where it unfurls, look for long awns from the seed that're commonly partially exposed out of the nearby ground.



*Bothriochloa barbinodis*  
Cane beard grass, Cane bluestem

Cane beard grass is a common, widely distributed perennial bunchgrass often found along graded roadsides, open range, drainages and dry, rocky or sandy slopes. This species is commonly used in dryland restoration because it responds well to fire and is a prolific seed producer. This species is also a valuable forage species, especially palatable and nutritious for livestock in spring and early summer. As an adult, cane beard grass is easy to identify due to the unique smell of blueberries created by the crushed seeds.



**Seeds**

Seeds are small grains, typically 1 to 3 mm long, and are surrounded by silky hairs that aid in wind dispersal that're enclosed in fluffy spikelets. Seeds germinate best under warm conditions and can give off a blueberry-like smell when crushed.



## Cotyledon

Average Sizes:

First Cotyledon:

Average Length: 9.14 mm

Average Height: 8.64 mm

Average Width: 1.52

Other distinguishing features: Typically, green to bright green, very straight and upright growth, usually furling inward sometimes so much it may look rolled giving it a fountain pen nib look to it, when unrolled the blade is quite wide and there's usually very faint to no parallel venation visible, usually about 26 days between seed and cotyledon emergence.



## Seedling

Average Leaf Sizes:

First Leaf: 12.5 mm length and 1.83 mm width

Second Leaf: 15.5 mm length and 1.375 mm width

Average Height: 14.5 mm

Other distinguishing features: Typically, green to bright green blades, stem, and sheath that can have a reddish-brown tint at the very bottom of the base, rolled blades when emerging but are quite wide for grass blades when unfurled, parallel venation to no distinct venation on leaf blades however venation on leaf sheaths on the stem become more noticeable as the plant becomes more mature, usually entirely glabrous when young, membranous ligule.



## *Bouteloua curtipendula* Sideoats grama

*Bouteloua curtipendula* is a warm-season perennial bunchgrass native to North America, including the southwestern U.S. It typically grows 1–3 feet tall with narrow leaves and distinctive seed spikes that hang off the side of the stem, giving rise to its common name. This drought tolerant species is highly adapted to dry, rocky, sandy, and disturbed soils and is a key component of native grasslands. Its fibrous root system helps with erosion control, and it provides forage for wildlife and livestock.



### Seeds

Seeds are small, elongated grains, approximately 5 mm long and about 1 mm wide, enclosed in spikelets that hang along the side of the rachis. Each spikelet typically contains one fertile floret, and seeds germinate best under warm conditions.



## Cotyledon

Average Sizes:

First Cotyledon:

Average Length: 20.56 mm

Average Height: 18.56 mm

Average Width: 0.86

Other distinguishing features: Typically, green to bright green with an occasional brown-green tint on the base of the sheathed stem, roughly 16.5 days from seed to cotyledon, a thinner flat blade that becomes slightly rolled and narrower closer to the base, long parallel venation from edge to edge of the cotyledon's surface but usually most noticeable in the center of the blade.



## Seedling

Average Leaf Sizes:

First Leaf: 44.33 mm length and 0.86 mm width

Second Leaf: 24.8 mm length and 0.55 mm width

Average Height: 36.11 mm

Other distinguishing features: Typically, on average about 9.5 days for the next leaf to develop, long and thin blades that tend to be slightly (droopy? Slumped? Floppy?) green to bright green blades (the first cotyledon blade typically doubles in length but stays about the same width), round thin stem all the way down sometimes getting a brown-green tint near the base, very short and thin membranous ligule, venation is mostly only seen on the leaf blades but become more noticeable on the sheath as it matures too, also while young the ligule and collar region can appear bare and glabrous but will usually have pilose to villous like hairs there as it matures, as seen in the photos.



## *Digitaria californica* Arizona cottontop

*Digitaria californica* is a warm-season perennial bunchgrass native to the southwestern U.S. and northern Mexico. It typically grows 1–3 feet tall with slender stems and narrow leaves and produces distinctive fluffy, white seed heads that resemble cotton. It is highly drought tolerant and adapted to sandy, rocky, and disturbed soils and thrives in arid environments. Its fibrous root system helps with erosion control, improving soil structure and water infiltration while its above ground biomass provides forage for wildlife and livestock, and its seed heads provide food for birds.



### Seeds

Seeds are small, roughly 2-4 mm in length, ovate grains enclosed in a husk of fine, white, hairs that aid in dispersal and soil surface contact. They're produced in fluffy clusters that break apart when mature and germinate best in warm conditions.



## Cotyledon

Average Sizes:

First Cotyledon:

Average Length: 9.17 mm

Average Height: 6.83 mm

Average Width: 1.29

Other distinguishing features: Typically, about 28 days from seed to emergence, entirely green to bright green, usually cupped/rolled giving it a sort of fountain pen nib look to it, faint ciliate-like hairs along the margins and stem.



## Seedling

Average Leaf Sizes:

First Leaf: 17.5 mm length and 2.42 mm width

Second Leaf: 11.5 mm length and 1.0 mm width

Average Height: 12.17 mm

Other distinguishing features: Typically, about 7 days on average for the next leaf to develop, rolled or flat blades, ciliate-like hairs become more prominent and tomentose to villous hairs can start to form on the leaf surfaces and stems becoming more dense closer to the base, venation becomes more visible in the leaf blade's center, membranous ligule.



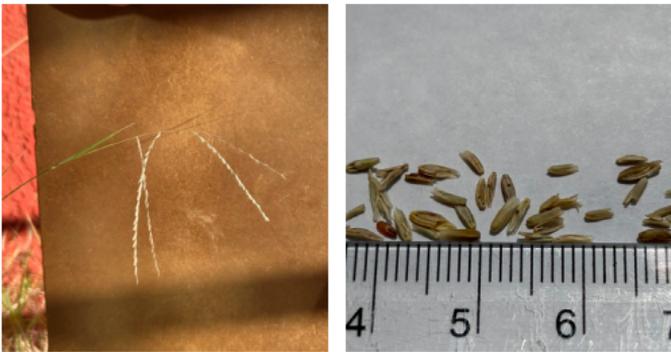
## *Disakisperma dubium* Green sprangletop

*Disakisperma dubium* is a warm-season perennial bunchgrass native to the southwestern U.S. and northern Mexico. It typically grows 1–3 feet tall with narrow, bright green leaves and produces open, airy panicles with fine branches and small spikelets. This drought tolerant species provides forage for wildlife and livestock and has a fibrous root system that helps with erosion control. It's highly adapted and establishes readily to sandy, rocky, and disturbed soils and thrives in arid and semi-arid environments.



### Seeds

Seeds are small, elongated grains, roughly 2-4 mm in length and 1 mm wide, enclosed in narrow spikelets, that break apart when mature. They disperse through wind and surface movement and germinate best under warm conditions.



## Cotyledon

Average Sizes:

Average Length: 11.0

Average Height: 10.05 mm

Average Width: 1.03 mm

Other distinguishing features: Typically green to bright green, roughly about 9.25 days between planting seed to cotyledon emergence, generally very flat and broad blade that grows mostly upright or with a slight curve, glabrous, deep noticeable venation edge to edge of the blade's surface.



## Seedling

Average Leaf Sizes:

First Leaf: 25.29 mm length and 1.21 mm width

Second Leaf :30.94 mm length and 1.97 mm width

Average Height: 24.19 mm

Other distinguishing features: Typically, about 8 days on average for next leaf blade to develop, green to bright green but closer to the base it tends to become darker with a purplish to reddish-brown tint to it, stems tend to be broader and thinner at the base giving it a flattened appearance and feel, usually very upright growth, noticeable parallel venation throughout on leaf blades, sheaths, and stems, mostly glabrous especially when young but can have villous hairs along the sheath and stems, membranous ligules.



## *Hesperostipa comata* Needle and thread

*Hesperostipa comata* is a cool-season perennial bunchgrass native to North America, including parts of the southwestern U.S. It typically grows 1–3 feet tall with narrow, rolled leaves and distinctive seed heads bearing long, twisted awns that resemble needles and threads, giving the species its common name. This drought tolerant grass provides moderate forage and cover for wildlife and is highly valued for soil stabilization and erosion control due to its deep, fibrous root adapted to dry, sandy, and gravelly soils.



### Seeds

Seeds are elongated grains, usually about 9 to 12 mm long and about 1 mm wide. The seeds are attached to very long, twisted, awns that aid in wind dispersal and self-burial into the soil while the other end can have short, dense, light colored, pubescence. This unique self-burial adaptation helps the species increase soil contact and improves establishment of the seeds which germinate best under cool conditions.



## Cotyledon

Average Sizes:

First Cotyledon:

Average Length: 25.38 mm

Average Height: 26.38 mm

Average Width: 0.875 mm

Other distinguishing features: Typically, light green to olive green, very upright growth and usually rolled inward, parallel midveins are usually hidden by the folding of the blade, blade margins can feel slightly scabrous but usually glabrous, sheath near the base is almost always glabrous and is typically a more muted green than the rest.



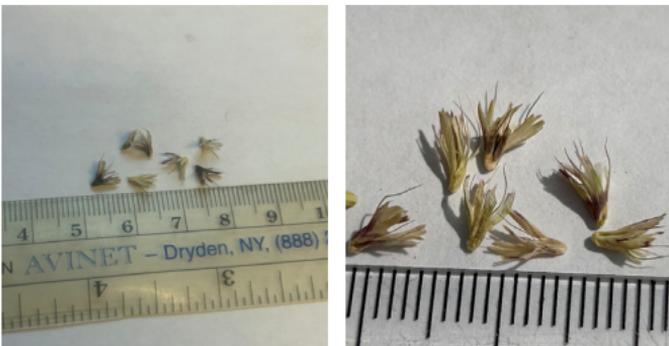
## *Hilaria belangeri* Curly mesquite grass

*Hilaria belangeri* is a warm-season perennial grass native to the southwestern United States and northern Mexico. It typically grows 6 to 12 inches tall and spreads by stolons, forming dense mats that greatly increase soil stabilization, helping with erosion control, while providing ground cover and moderate forage for wildlife. The leaves are narrow and often curled or twisted, giving rise to its common name. This species is highly drought-tolerant and can persist in poor, sandy soils in arid environments and is commonly found in desert grasslands.



### Seeds

Seeds are small and enclosed in spikelets, typically around 6 mm long, that form short, compact clusters along the stem with each spikelet typically containing one fertile floret. Seeds germinate under warm conditions but establishment from seed can be slow so vegetative spread through stolons can be easier than growing from seed.



## Cotyledon

Average Sizes:

First Cotyledon:

Average Length: 17.67 mm

Average Height: 16.56 mm

Average Width: 0.72 mm

Other distinguishing features: Typically, green with a sometimes brown-green glabrous sheath along the base of the stem, usually rolled or folded at least halfway up the cotyledon, parallel venation can be seen on the unfurled blade but aren't super prominent as seedlings, may have vaguely denticulated margins that can give a slightly scabrous feel, large membranous ligules at the collar region when more mature.



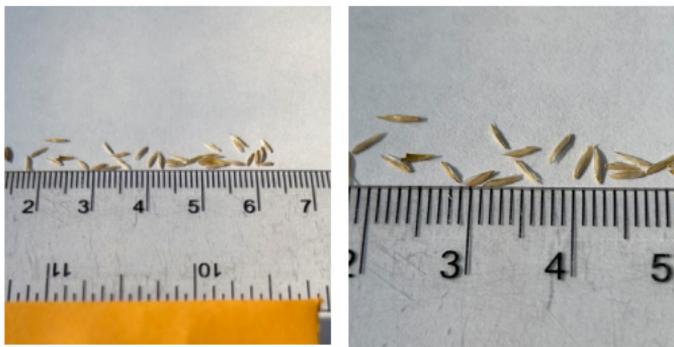
*Koeleria macrantha*  
**Prairie Junegrass, Prairie Koeler's grass**

*Koeleria macrantha* is a cool-season perennial bunchgrass native to North America, including the southwestern U.S. It typically grows 1-2 feet tall with fine, narrow leaves and dense, cylindrical seed heads that appear early in the growing season. This species is drought tolerant, helps with erosion control, provides forage for livestock and wildlife, as well as provides habitat and food for other wildlife species as well. It's well adapted to dry, sandy, clay, and rocky soils and is commonly found in prairies, open woodlands, and desert grasslands.



**Seeds**

Seeds are small, narrow grains, roughly 3 mm long and less than a mm wide, enclosed in compact spikelets within the erect seed heads. Seed heads are spikes, that narrow on both ends, and seeds germinate best under cool conditions.



## Cotyledon

Average Sizes:

First Cotyledon:

Average Length: 13.88 mm

Average Height: 12.78 mm

Average Width: 0.47 mm

Other distinguishing features: Typically, bright green to green, upright straight growth, very narrow (almost needle-like) and usually rolled inward, no distinct venation, glabrous, small membranous ligule with slight notch in the middle once mature.



## *Schizachyrium scoparium* Little bluestem

*Schizachyrium scoparium* is a warm-season perennial bunchgrass native to North America, including the southwestern U.S. It typically grows 2–3 feet tall with narrow, bluish-green leaves that turn reddish-bronze in the fall and produces slender seed heads with small, hairy, spikelets along the stem. Little Bluestem is highly drought-tolerant and can thrive in nutrient-poor, disturbed soils as well as dry, rocky, and sandy soils and is a dominant species in many native prairies and desert grasslands. The plant provides cover and nesting habitat for wildlife, moderate forage, and soil stabilizing fibrous root systems that aid in erosion control.



### Seeds

Seeds are small, narrow grains, typically 5 to 8 mm long, enclosed in spikelets with short, silky hairs that aid in wind dispersal. Short awns, typically under a centimeter in length, are sometimes present as well, and seeds germinate best under warm conditions.



## Cotyledon

Average Sizes:

First Cotyledon:

Average Length: 9.14 mm

Average Height: 9.32 mm

Average Width: 1.09

Other distinguishing features: Typically, green to blue green, bottom can appear rolled or folded, very upright and straight growth, fairly wide cotyledon blade width, faint parallel venation, glabrous, about 24.5 days from seed to cotyledon emergence.



## Seedling

Average Leaf Sizes:

First Leaf: 25.29 mm length and 1.21 mm width

Second Leaf :30.94 mm length and 1.97 mm width

Average Height: 24.19 mm

Other distinguishing features: Typically, about 8 days on average for next leaf blade to develop, green to bright green but closer to the base it tends to become darker with a purplish to reddish-brown tint to it, stems tend to be broader and thinner at the base giving it a flattened appearance and feel, usually very upright growth, noticeable parallel venation throughout on leaf blades, sheaths, and stems, mostly glabrous especially when young but can have villous hairs along the sheath and stems, membranous ligules.



*Sporobolus airoides*  
Alkali sacaton, Nuttall's alkali grass

*Sporobolus airoides* is a warm-season perennial bunchgrass native to North America, commonly found in the southwestern U.S. It typically grows 2-4 feet tall and forms large, dense clumps with narrow leaves and open, airy seed heads. This species is highly adapted to saline or alkaline soils where few other grasses can thrive and is often found in valley bottoms, floodplains, and other areas with poor drainage. Its tolerance to harsh soil conditions as well as extensive root system helps to improve degraded soil structure and prevent erosion while its above ground mass provides cover for wildlife.



**Seeds**

Seeds are very small, roughly 1 mm, dark, round to oval grains enclosed in tiny spikelets within the open panicle. The plants produce a large amount of these tiny seeds which are then dropped readily when mature and germinate in warm conditions.



## Cotyledon

Average Sizes:

First Cotyledon:

Average Length: 8.14 mm

Average Height: 7.14 mm

Average Width: 0.67 mm

Other distinguishing features: Typically, bright green, very short, narrow, and upright cotyledon, usually flat and open but can be slightly curled, roughly 15.5 days between seed and cotyledon emergence, parallel venation usually most noticeable in the center of the blade.



# Morphological terms

## Hairs and trichomes definitions

**Ciliate:** Fine, eyelash-like hairs on the leaf margins

**Felted:** Covered with very dense, interlocked or matted, hairs that have the appearance and texture of felt cloth

**Fimbriate:** Long, course, hairs on the leaf margins

**Glabrous:** Without trichomes or hair

**Hirsute:** Course, long, hairs

**Hispid:** Long, erect, rigid hairs or bristles that are harsh to the touch, similar to strigose

**Hoary:** Short, dense cover of white or grey trichomes so dense that it makes the surface of the plant appear white or grey

**Pubescent/pubescence:** Somewhat dense cover of short, weak, soft, hairs

**Silky:** Densely covered with fine, soft, straight, hairs that have a glossy sheen and satin-like feel

**Stellate:** A branched trichome with six or more branches radiating from a single point

**Strigose:** Covered with appressed, rigid, bristle-like, straight hairs

**Tomentose:** Densely covered with matted, short, trichomes similar to villous, felty, or woolly

**Trichome:** Hair, bristle, scale, prickle, or any other hair-like outgrowth on the plants epidermis that doesn't have any vascular tissue

**Velvety:** Very densely covered with fine short, soft, erect hairs

**Villous:** Somewhat densely covered with long, soft, weak hairs that don't interlock or mat, similar to hirsute

**Wooly:** Very densely covered with long, soft, matted or interlocked hairs that have the appearance and texture of sheep wool

## Leaf venation: The arrangement of veins in a leaf



Arcuate



Palmate



Parallel

**Arcuate:** Secondary veins bending towards the leaf apex

**Midvein:** The main central vein that runs through the middle of the leaf, also known as the midrib or primary vein

**Palmate:** Several primary veins diverging from a single point

**Parallel:** Veins arranged along the long axis of the leaf and don't intersect

## Leaf tips



Acute



Blunt



Obtuse



Pointed



Retuse



Round



Truncate

**Acute:** Acute angle but not a prolonged point

**Blunt:** Lacking a sharp point

**Obtuse:** Blunt or rounded

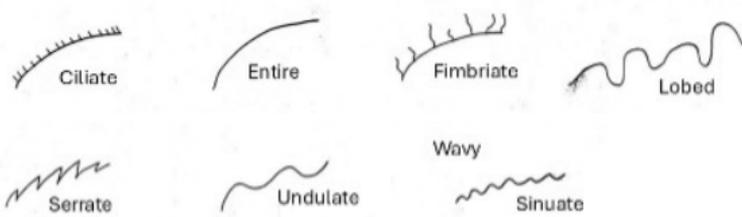
**Pointed:** A sharp point, less than a 90 degree angle

**Retuse:** A shallow notch

**Round:** Full arc, more than a 90 degree angle

**Truncate:** Squared off

## Leaf margins



**Ciliate:** Fine hairs along the leaf margin

**Entire:** Even and smooth leaf margin

**Fimbriate:** Long coarse hairs along the leaf margin

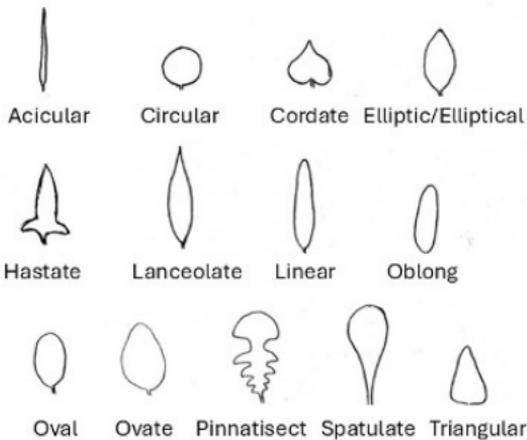
**Lobed:** Indented lobes that are not entirely separate from each other

**Serrate:** Forward pointing teeth-like indentations

**Wavy (Sinuate):** Wave-like indentations

**Wavy (Undulate):** Wide wave-like indentations

## Leaf shapes



**Acicular:** Needle-like

**Circular:** Round like a circle

**Cordate:** Heart shaped

**Elliptic/Elliptical:** Oval-like with little or no point

**Hastate:** Triangular with lobes at base

**Lanceolate:** Pointed at both ends

**Linear:** Very long and narrow, typically four or more times longer than wide

**Oblong:** Shorter or almost rectangular, two to four times longer than wide

**Oval:** Oval-like

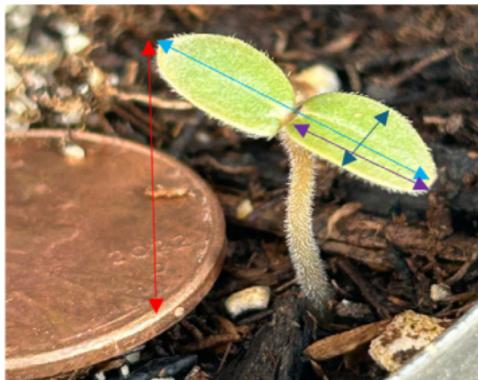
**Ovate:** Egg-like

**Pinnatisect:** Deep opposite lobes

**Spatulate:** Spoon-like

**Triangular:** Triangle-like

## Measurements

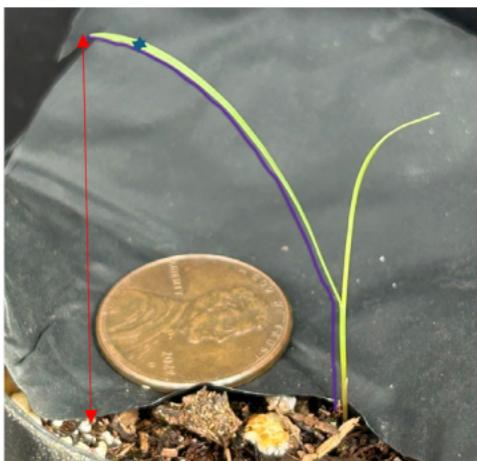


**Height:** Overall height of the seedling

**Tip to tip:** Distance between cotyledon tips, the seedling "arm span"

**Length:** Individual length of cotyledon or leaf

**Width:** Individual width of cotyledon or leaf, measured at the widest part



**Height:** Overall height of the seedling

**Length:** Individual length of cotyledon or leaf

**Width:** Individual width of cotyledon or leaf, measured at the widest part



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