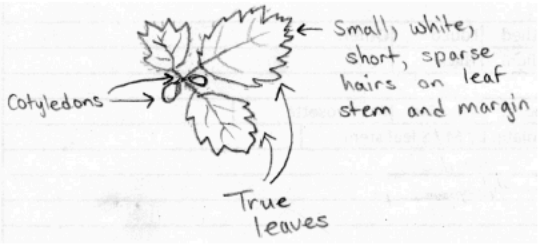
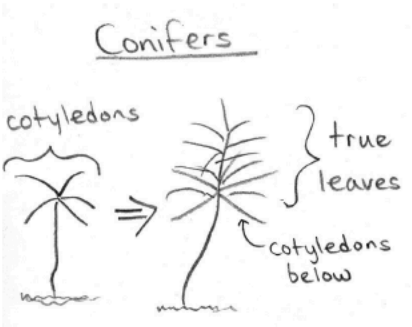
Helpful Hints for Seedling Identification

Basic Terminology[2]

Cotyledons are the first leaves of a seedling. Unlike true leaves, cotyledons emerge from the seed. Most flowers have one or two cotyledons, while conifers usually have multiple cotyledons.

True leaves are leaves that emerge after the cotyledons. True leaves often look very different than cotyledons.



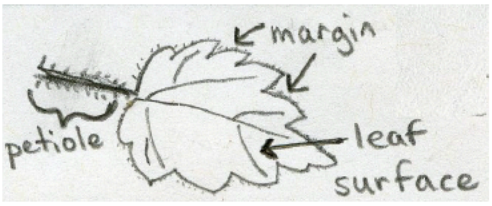


Stomata are pores that allow plants to breathe in carbon dioxide for photosynthesis and breathe out oxygen and water vapor. Most stomata are found on leaves. Conifer stomata are typically white and arranged on the needle in stripes. Different conifers have different numbers of stomatal stripes, which is useful for identification.

The *petiole* is the stem of a leaf, which attaches the leaf blade to the main stem. The petioles of cotyledons often lengthen as the cotyledons age, and may not be visible when the cotyledons first emerge. The petioles of true leaves are usually longer than the petioles of cotyledons. Some plants do not have petioles.

The *margin* of a leaf is the edge of the leaf, and may be smooth, spiny, jagged, etc.

The *surface* of a leaf is the area or blade of the leaf. The upper surface of the leaf faces the sky, and the lower surface faces the soil. Color and texture may differ between the upper and lower leaf surface.



Helpful Hints for Seedling Identification

Tools

Use a magnifying glass! It will help you identify details such as plant hairs and stomatal stripes that may be hard to see without magnification.

If you want to photograph seedlings, use a camera with a macro lens and tripod. A macro lens captures minute details that a regular lens will not. A tripod provides stability and minimizes image blur. If your seedlings are growing in a greenhouse, you may need to move your plants to better lighting to avoid yellow-tinted photographs.

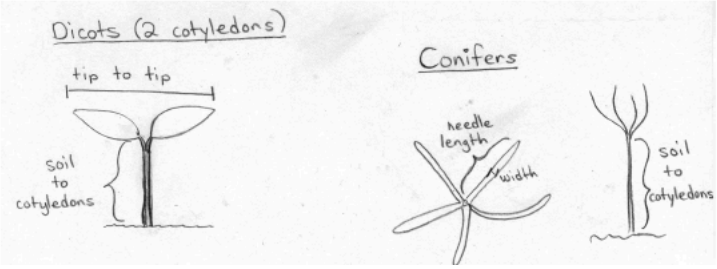
The penny in each photograph provides a visual size reference. Compare seedling dimensions to the diameter of the penny, 0.75 inches (19.05 mm).

Tips

When identifying seedlings, first examine leaf shape and cotyledon number, and look for the presence of hairs. Other traits such as color can be informative but often vary between seedlings of the same species, especially when seedlings receive different amounts of light and water due to their location. Seed shells stuck to cotyledons may be useful if the seed can be identified.

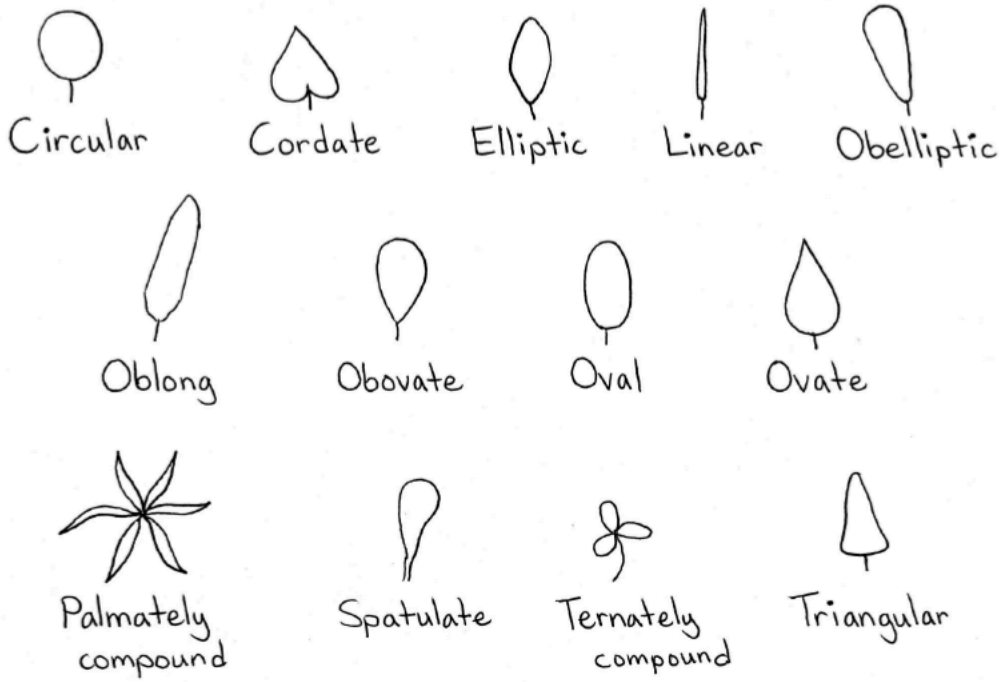
If you are struggling to identify a seedling, try identifying the adult plants in the area. The seedling could have emerged from a seed produced by a nearby plant.

Measurements in this guide serve as a rough size guideline for new seedlings. For plants with two cotyledons, the cotyledon measurement from "tip to tip" is the distance between the cotyledon tips. This leaf span is analogous to the human arm span. For conifers, the length and width of an individual needle is included instead of a "tip to tip" measurement. Secondly, the stem measurement from "soil to cotyledons" describes the distance from soil level to the bottom of the cotyledon leaf blades (not the bottom of the cotyledon petioles). Note that these numbers will increase as the seedling grows.

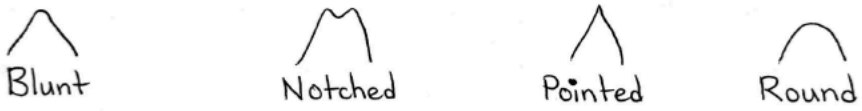


Leaf Shape Terminology[2]

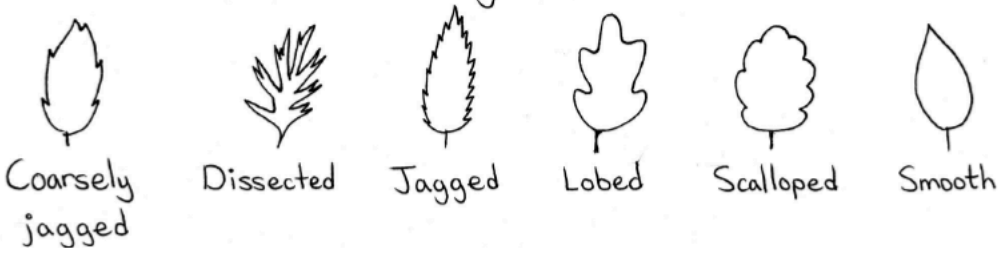
Leaf Shapes



Leaf Tips



Leaf Margins



Lodgepole pine (*Pinus contorta*)

Cotyledons

Number: 4-6 (most commonly 5)

Color: Medium green

Upper needle surface: Plain green

Lower needle surface: Plain green

Shape: Pointed tip, flat needle that becomes triangular with age

Length: 16-30 mm long, 0.4-0.5 mm wide[1]

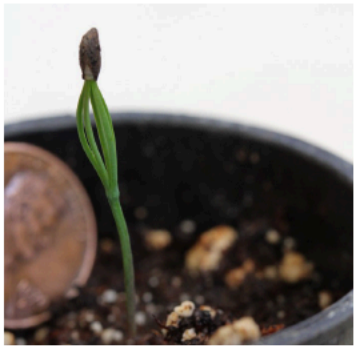
Angle: Needles strongly pointed or cupped up, forming a V or U when viewed from the side

Young stem

Color: Green, reddish green, or reddish purple

Texture: Waxy, no hairs

Length: 10-25 mm from soil to cotyledons[1]



Left: Seedling with seed shell attached to cotyledon tips. **Middle and right**: Seedlings with cotyledons only. Note thinner and longer needles than *Abies*.



Left: Seedling with cotyledons surrounding central emerging true needles. **Middle and right**: Seedlings with cotyledons and true needles. Needles shorter than *Pinus ponderosa*, shown in reference to penny and edge of cone-tainer.

Abam (Pacific silver fir)

- Largest germinant (20-30 mm cotyledons)
- Generally 4-6 cotyledons (rarely 3, 7)
- Characteristic 'drunken starfish' shape
- Cotyledons blunt / notched
- Needles also blunt / notched
- True needles have 2 lines of stomata below
- Difficult to distinguish from other firs

Abla (Subalpine fir)

- Larger germinant (10-25 mm length cotyledon)
- Generally 5 or 6 cotyledons (rarely 4, 7)
- Similar look to Abam (and other firs)
- True needles have one line of stomata above, 2 below

Tshe (Western hemlock)

- Small germinant (4-10 mm cotyledon)
- 3-4 cotyeldons (rarely 9, 10)
- Rounded tips
- Older seedlings 'messy' (Check Tshe branches); no clear 'top' to the seedling, needles growing in all directions

*We do not have any great pictures of TSME germinants and seedlings; they will look very similar to Tshe (see also below)

Engelmann spruce (*Picea engelmanni*)

Cotyledons

Number: 4-8 (most commonly 5-7)

Color: Medium to dark green

Upper needle surface: Two white stomatal stripes, sometimes difficult to see

Lower needle surface: Plain green, no stomatal stripes

Shape: Pointed tip, flat needle that increases in thickness with age

Length: 6-13 mm long, 0.3-0.6 mm wide[1]

Angle: Needles usually cupped upward, but may point in multiple directions

Young stem

Color: Greenish white, green, greenish red, or red

Texture: Waxy, no hairs

Length: 8-18 mm from soil to cotyledons[1]

Left: Seedling with seed shell attached to cotyledon tips. **Middle and right**: Seedlings with cotyledons only. Note *Picea* needles are much shorter than *Abies* and *Pinus* needles in this guide.

Left: Seedling with cotyledons only. Note pointed *Picea* needle tips, as opposed to rounded *Abies* needle tips.
Middle and right: Seedlings with cotyledons and true needles.

White Spruce (*Picea glauca*)

Cotyledons narrow, less than 0.7 mm wide. Seedlings generally shorter than *Pseudotsuga menziesii*. Less than 20 mm tall soon after emergence. Cotyledon length usually shorter than *Pseudotsuga menziesii*. Less than 13 mm long.

Hardy, symmetrical and naturally dense evergreen. Needles 1/2" to 1", blue-green, angled and sharp tipped usually sharper than Englemann spruce and if you remove a cotyledon and crush it you get a pungent smell similar to cat urine.]

Trembling Aspen (*Populus tremuloides*)

Cotyledons are cordate shaped and have jagged shaping and pointed tips usually a green colour but have been known to be slightly yellow at times as well. The only deciduous tree in most of our Smithers sites.

FROM: DeByle, Norbert V., and Robert P. Winokur, editors. 1985.
Aspen: Ecology and management in the western United States.
USDA Forest Service General Technical Report RM-119, 283 p.
Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

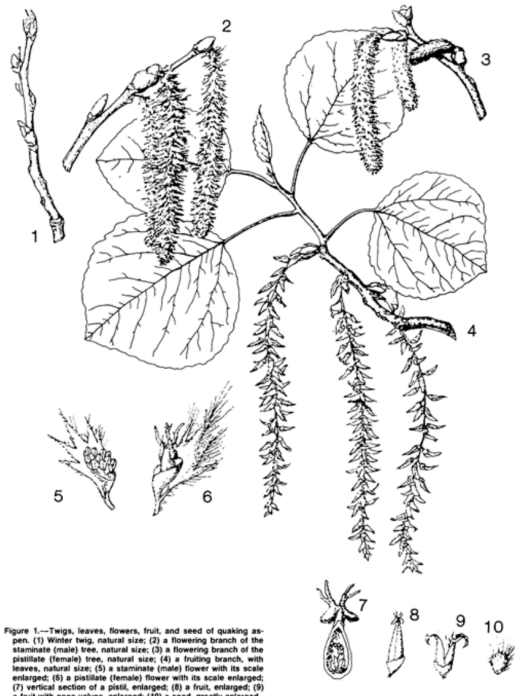


Figure 1.—Twigs, leaves, flowers, fruit, and seed of quaking aspen. (1) Winter twig, natural size; (2) a flowering branch of the staminate (male) tree, natural size; (3) a flowering branch of the pistillate (female) tree, natural size; (4) a fruiting branch, with leaves, natural size; (5) a staminate (male) flower with its scale enlarged; (6) a pistillate (female) flower with its scale enlarged; (7) vertical section of a pistil, enlarged; (8) a fruit, enlarged; (9) a fruit with open valves, enlarged; (10) a seed, greatly enlarged.