MORA seedling guide

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

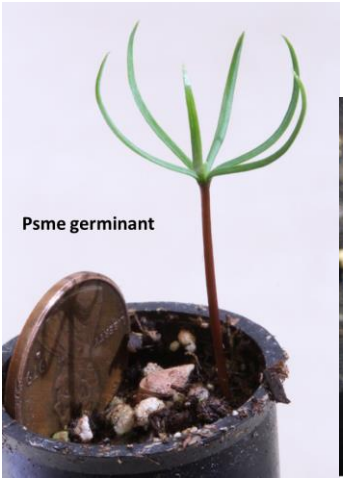
Distinguishing firs

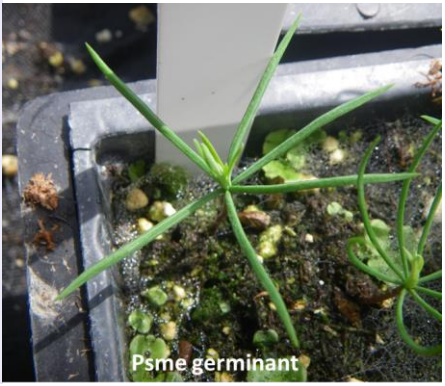
The true firs are extremely difficult if not impossible to tell apart at the germinant and seedling stage. To make things even more difficult, there are 4 species of firs at Mt. Rainier NP – the two more common species noted above (Silver fir, Subalpine fir; Abam and Abla) and two less common firs (Grand fir, Noble fir; Abgr and Abpr). Here are a couple of pieces of information to help:

- Elevational ranges are as follows: Abgr most common at the lowest elevations; Abam has the largest elevation range and occurs from low – high elevations; Abpr also occurs at mid elevations; Abla occurs at the highest elevations, and (together with mountain hemlock, Tsme) forms treeline at Mt. Rainier NP.
- Abam has the largest seeds, and thus the largest germinants
- Abpr tends to have pointier cotyledons
- Once seedlings are older and have true leaves, you may be able to rely on the needle shape and stomata to distinguish the firs (as you would with adult trees); as indicated here:
    - Abam has 2 rows of stomata below, needles are in a plane with a 'mohawk' (needles cover branchlet)
    - Abgr also has 2 rows of stomata below, but needles do not cover the twig (no mohawk)
    - Abla needles also have faint lines of stomata on the upper surface (as well as the lower surface). Needles curve upward (although this may be less prevalent on seedlings)
    - Abpr also has stomata on the upper surface of its leaves (like Abla), and the needles also curve upward. However, leaves are notably angled in cross section.

Psme (Douglas fir)

- Mid-sized germinant (10-25 mm cotyledon)
- 4-8 cotyeldons (rarely 9, 10)
- Pointed, thin cotyledons (compared to firs)
- May have double line of stomata on upper surface (can be faint with newly germinated seedlings), but not on lower surfaces.
- Cotyledons very symmetrically arranged (compared to drunken starfish Abam)





Tabr (Pacific yew)

- Mid-sized germinant (10-25 mm cotyledon)
- 2 cotyledons (much longer than cedars)
- Blunt tips, very long
- Stems very green (in once older)
- Rare seedling (observed at lower elevations)

Acci (vine maple)

- Mid-sized germinant (10-25 mm cotyledon)
- 2 strap like, clearly dicot cotyledons (not needles!)
- First true leaves toothed, long, before becoming more maple like as young seedlings
- Rare seedling (observed at lower elevations)

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)

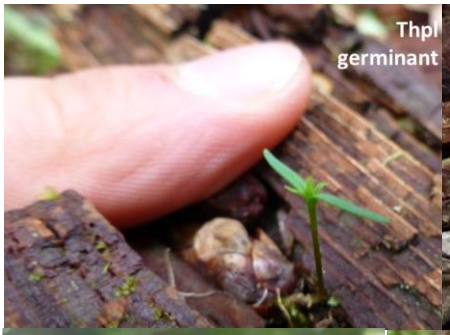
Distinguishing hemlocks

The two hemlock species at Mt. Rainier are particularly difficult to tell apart. Here are a couple of pieces of information to help:

- Western hemlock (Tshe) and Mountain hemlock (Tsme) do not overlap much in their range – Western hemlock is abundant at low elevations (up to 1000 masl) while Mountain hemlock is abundant at high elevations (1200 – 1700 masl)
- Mountain hemlock is a slightly larger germinant - it tends to have more cotyledons (4-5 rather than Tshe which has 3-4) and have longer cotyledons (8-12 mm; Tshe has 4-10 mm).

Thpl (Western red cedar)

- Small germinant (5-10 mm cotyledon)
- 2 cotyledons
- Blunt tips
- First true needles short spikes (young seedlings can be mistaken for moss)
- Seedlings eventually grow branches with scales (Frankenstein seedlings)



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

Distinguishing cedars

The two cedars, despite being in different families. Here are a couple of pieces of information to help:

- Western red cedar occurs at low elevations (<1000 masl); while Alaska cedar is dominant at higher elevations (1200 – 1600 masl).
- Cano germs are slightly larger than Thpl; Thpl's cotyledons 5-10 mm long; 1-2 mm wide; Cano's cotyledons 7-11 mm long; 1.5-2.2 mm wide
- Cones and seeds of Thpl and Cano are quite different. If you can find cones and seeds on the forest floor near the quadrats, this might help you determine their identity.
- You may be able to use the leaves of older seedling to tell them apart much like adult trees – Thpl has oval scales that lie flat against branchlets; Cano has sharp tipped scales that point away from branchlets.

Very rare tree sedlings

Other (coniferous) trees that occur at Mt. Rainier NP but are fairly rare (implying that their seedlings are rare). They include:

Pinus contorta (we have seen these, but rarely). 4-6 (generally 5) cotyledons – very long (30 mm) and thin (0.5 mm), with pointy tips.

Note; there are adult trees of Pinus monticola and Pinus ponderosa in the park which are very rare – but we have never seen seedlings (to our knowledge. PIPO germinants have 8-12 (generally 10) cotyledons that are very long (up to 60 mm), like a messy hairdo.

Picea engelmannii and sitchensis (PIEN and PISI) These are similar to Douglas fir in appearance, but smaller (<12 mm long), with thinner and pointier cotyledons. The two Picea species are probably impossible to tell apart.

PIEN germinant