

## About Austrian Pines

The Austrian Pine is a fast growing, pyramidal tree when young, becoming a flat topped large tree when it matures. It is also commonly called a Black Pine. Austrian Pines are prized for their long, stiff needles and dark green color, their fast growth rate, and their resistance to road salt damage. The Austrian Pine is the most urban tolerant pine tree for the Midwestern United States. They can be transplanted outside in most climates in the biodegradable coconut coir pot supplied. These pines are often used as Christmas trees.

## Germination Experiments - Pine

Use 8-12 pots for this and one pack of seeds for every 4 pots. Consider planting the Siberian Elm at the same time for more ideal comparisons of the 2 types of trees, but they can still be compared if planted at different times.

1. Divide the seeds to be planted into four groups. You should have enough for 3 seeds per pot. Prepare the seeds by scarifying lightly with sandpaper or soaking in water.
  - a. sandpapered
  - b. sandpapered and soaked (1 to 4 hours)
  - c. soaked (1 to 4 hours)
  - d. untreated
2. Place disk in bowl and pour 1 cup of water over it.
3. Wait at least 5 minutes and watch the soil absorb the water. Then mix it up.
4. Put pot in provided bag and pour mixture into pot. Add another  $\frac{1}{4}$  cup water.
5. Place about 3 seeds on top  $\frac{1}{4}$  inch apart and press in about  $\frac{1}{4}$  of an inch.
 

Each student can pick 3 different seeds and then mark the pot and draw a diagram of which seed was placed where in the pot for future reference.
6. Close bag with a twister and put pot in bright light or in the dark until they sprout.
7. Wait 1-2 weeks.
8. After they have sprouted, open the bag and place all pots in a sunny spot.

## About Siberian Elms

Siberian Elms grow quickly and display shrubby or treelike shape, interesting bark and foliage including dark green, oval, toothed leaves. You can rest under the shade of the tree in summer and gaze at the magnificent colors they provide in the fall. The Siberian Elm was introduced to the U.S. in the 1860's for its hardiness and fast growth in a variety of moisture regimes and habitats, including droughts

and cold winters. Many Siberian Elms were able to survive the Dutch Elm Disease.

## Germination Experiments - Elm

Use 4-12 pots and one bag of seeds for every 4 pots.

1. Place disk in bowl and pour 1 cup of water over it.
2. Wait at least 5 minutes and watch the soil absorb the water. Then mix it up.
3. Put pot in provided bag and pour mixture into pot. Add another  $\frac{1}{4}$  cup water.
4. Place about 6 seeds on top of soil at least  $\frac{1}{3}$  of an inch apart. Make sure each pot gets some big and some smaller seeds, because the smallest seeds may not sprout.
5. Press a few of the seeds just under the soil, but leave some on top of the soil.
6. Close germination bag with a twisty tie or leave it open.
7. Put pot in bright light (windowsill) or a dark spot (closet).

You should end up with 4 different types of pots: (1) closed bag/sun, (2) open bag/sun, (3) closed bag/dark, and (4) open bag/dark. Wait a few days. If the soil becomes dry, add more water to keep it moist.

**Experiment #1:** Do the seeds on top of the soil or underneath the soil grow better?

**Experiment #2:** Do the open-bag and closed-bag pots behave the same?

**Experiment #3:** Do the pots in the sun or in the dark sprout first? Do they look different?

Within two days of sprouting, open the bags and move all of the pots to a sunny location.

## Heliotropism and Geotropism

A few days after the trees have sprouted, are they pointed upright or are they leaning in one direction? If they are leaning, turn the pots around 180 degrees, so they face the opposite direction. Wait one day. Now which direction are they leaning?

## Circadian Movements

Choose 3 Austrian Pines with similar size sprouts/trees and 3 Siberian Elms likewise. Place one of each in a closet or somewhere completely dark and without windows. Place one of each under a light that can be left on all day and night. Place one of each (ideally) under another light on a timer that is only on during daylight hours; alternatively, they can be left on a sunny windowsill. Make sure the plant on daylight only cannot detect the nighttime lamplight. Leave the plants in these areas for a few days; do not open the

closet, because even a short exposure to light could affect the experiment. Compare the plants and move the ones from the dark back to the windowsill. Watch the trees in 24-hour light for another week. How do plants react to being in darkness versus light? What are circadian movements?

## Fertilizer (Fertilizer is not included)

Pick 2 pots with similar size trees. Add a small amount of fertilizer to one, but not the other. Water both and set together on a sunny windowsill. Observe the plants' growth over a week's time. Which one grows faster, the one with fertilizer or the one without? What is the purpose of fertilizer?

## Roots and Erosion

Carefully dig up one Austrian Pine and one Siberian Elm tree after they are a few months old. Try to get the entire root system and all of the dirt within it. Hold it in your hand with slightly spread fingers. Now pour one tablespoon of water over the roots. Make sure you have a bowl underneath to catch the water and dirt. Try the same thing with a similar size ball of dirt (no tree or roots). How much dirt ends up in the bowl? How much is left in your hand? Compare the roots of the two trees.

## Long-term Care

### Austrian Pines

- Keep seedlings moist during early growing stage, but do not over water young trees.
- Trees may be transplanted after the first or second season to a larger container.
- Plant outside after plants reach four to eight inches tall.
- Austrian Pines like to be planted in full sun to part shade in moist, well-drained soils. If they are given very good weed-excluding mulch they establish very well.
- Stake the trees to help maintain upright habit.
- Provide some protection from the cold in winter months for the first 2 years outside.
- Plants have very sparse root system, so the sooner they are in their permanent location the better they will grow.
- Transplanting larger trees (up to 35 inches) will slow their growth for several years. This also badly affects root development and wind resistance.
- The greatest bloom is usually observed in the Late Spring, with fruit and seed production starting in the Summer and continuing until Fall.

### Siberian Elms

It is best to plant your trees outside in their biodegradable coconut coir pot after they are six to eight inches tall in late spring or early summer. This will provide them enough time to establish themselves in permanent positions. Siberian Elms prefer full sun and well-drained soil. They can be grown on slopes, in drought conditions and in regions with cold winters. When planted in rows along side of homes, they can lessen the impact of adverse weather conditions, lowering home heating and cooling costs. Siberian Elms are also a favorite choice in soil erosion control projects. They can spread up to 50 feet in their natural environment. Fertilize during the spring and summer.

## Discussion Questions

1. What are Austrian Pines used for - while alive and when chopped down?
2. Dutch Elm Disease is caused by a fungus that is often spread by beetles. The fungus is native to Asia. Why do you think many Siberian and other Asian Elm trees are resistant to Dutch Elm Disease?
3. When the Siberian Elm and the Austrian Pine were grown in the dark, how were they similar? How were they different? Did they look the same as when they were grown in the light? Why?

## Notes

©DuneCraft, Inc. 2008  
Chagrin Falls, Ohio 44022  
All Rights Reserved

Made in the USA  
Visit [www.dunecraft.com](http://www.dunecraft.com) for more information.

# DuneCraft, Inc.