

Methods of Breaking Seed Dormancy

Plastic Covers

Most seeds will germinate well without a plastic cover. Others, especially those that require light to germinate, often do better with the additional humidity from a plastic cover.



A sandwich bag fits perfectly over a 3" pot.

Avoid direct sun shining on plastic.



Monitor for excess moisture which can cause diseases, algae and mold.

After seedlings have germinated, gradually remove plastic by lifting cover more each day over a period of a few days.

Scarification



Use a file or nail clipper to remove a small amount of the seed coat so that water can penetrate more easily.

Avoid damaging the embryo by clipping or filing on the side of the seed coat instead of the rounded end.



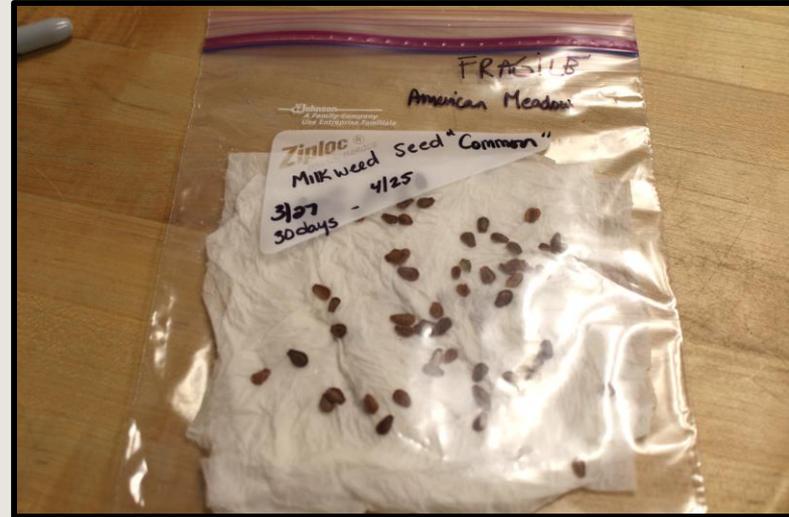
Mistletoe seeds spread by birds

Stratification

Refrigerated seeds are exposed to moisture, oxygen and cool temperatures for 30 days or more.

Methods:

- Place seeds in a moist medium of peat and vermiculite or course sand.
- Place seeds on a wet paper towel or coffee filter. Enclose in a plastic bag.
- Plant seeds in a container, cover w/vermiculite.



Stratification

The Result:

Physiological changes occur within the seed. These changes increase the growth-promoting hormones and decrease the growth-inhibiting hormones permitting germination.

Starting seeds under alternating temperatures (55°/night and 75°/day will often produce the same results.



Winter Seed Sowing

For More Information:

<https://extension.illinois.edu/news-releases/winter-seed-sowing>

nflower2@illinois.edu



<https://www.agardenforthehouse.com/2012/11/winter-sowing-101-6/>

- Use a clean, opaque milk jug. Drill holes in top and bottom of jug for drainage and air circulation.
- Cut the jug just below the handle, leaving 2" section connected for a hinge.
- Fill bottom portion with moist seedling medium, and water well.

Winter Seed Sowing

- **Plant seeds, and cover w/vermiculite. Lightly water the seeds, making sure they have good contact with the soil.**
- **Tape the milk jugs closed with duck tape.**
- **Protect containers from wind and animals, but allow snow and rain to fall on them.**
- **Check periodically for sprouted seeds.**

For More Information:

<https://extension.illinois.edu/news-releases/winter-seed-sowing>

nflower2@illinois.edu



<https://www.agardenforthehouse.com/2012/11/winter-sowing-101-6/>

Winter Seed Sowing

- **When seeds sprout, open containers during the day as the weather warms. Close at night.**
- **Gradually increase the amount of sun available to the seedlings to prevent burning.**
- **Bring indoors if there is a huge temperature drop.**
- **After hardening off, plants can be moved into the garden.**

<https://extension.illinois.edu/news-releases/winter-seed-sowing>

nflower2@illinois.edu



<https://www.agardenforthehouse.com/2017/02/winter-sowing-how-many-seeds-per-container/>

Perennials That Should Be Stratified

Scientific Name	Common Name	Scientific Name	Common Name
Agastache foeniculum	Hyssop	Lupinus	Lupine
Asclepias	Milkweed	Nepeta	Catmint
Baptisia	False Indigo	Oenothera	Evening Primrose
Echinacea	Coneflower	Penstemon	Beardtongue
Geranium species	Geranium	Phlox	All Types
Helianthemum	Rock Rose	Platycodon	Balloon Flower
Helianthus	Perennial Sunflower	Ratibida	Prairie coneflower
Helopsis	False Sunflower	Rudbeckia	Black Eyed Susan
Heuchera hybrids	Coral Bells	Saponaria ocymoides	Soapwort
Hypericum perforatum	St. John's Wort	Scabiosa	Pincushion Flower
Iberis	Perennial Candytuft	Sedum	Stonecrop
Knautia macedonica	Crimson Scabiosa	Sidalcea	Prairie Mallow
Lathyrus	Perennial Sweet Pea	Veronica	Speedwell
Lavendula	Lavender	Viola	Prairie Violet

Soaking Seeds

Soaking seeds in warm water for up to 24 hours is one way to break dormancy and get seeds to germinate faster. Seeds with thinner seed coats should be soaked for 12 hours or less.

Vegetables & Herbs:

Basil
Beets
Beans
Chile
Cilantro
Corn
Cucumber
Dill
Melons
Parsley
Peas
Peppers
Squash
Swiss Chard

Flowers:

Butterfly Weed
Canna
Echinacea
Lupine
Morning Glory
Nasturtium
Sunflower
Sweet Pea



Soil should be completely warm and not soggy before planting or seeds may rot.

Planting the Seeds

Get Started

Gather Your Materials



Mother Earth News



**Place medium
in a container,
and thoroughly
moisten.**

The Process

Fill a container to the top with **moist** soil.



Water thoroughly to settle and level the soil.



Using smaller containers to start seed conserves medium if seeds don't sprout and takes less valuable space under lights.

Another Alternative is to Soak Containers in Water

Watch for the buildup of salts (dissolved minerals) which can accumulate on the surface of the soil.

Be aware that the lower half of soil in the container may remain wetter than the top – OK when seedlings are older, but not helpful for sprouting.



Planting Seeds

Spread seeds evenly on top of the medium.

Try to space seeds so that they are not touching.

Seeds that are planted too closely together can be leggy and stunted without proper room to grow.

Bamboo skewers are helpful for spacing seeds.



Hans Braxmeier -
<https://pixabay.com/photo-60457/>



Cover Seeds with Horticultural Grade Vermiculite



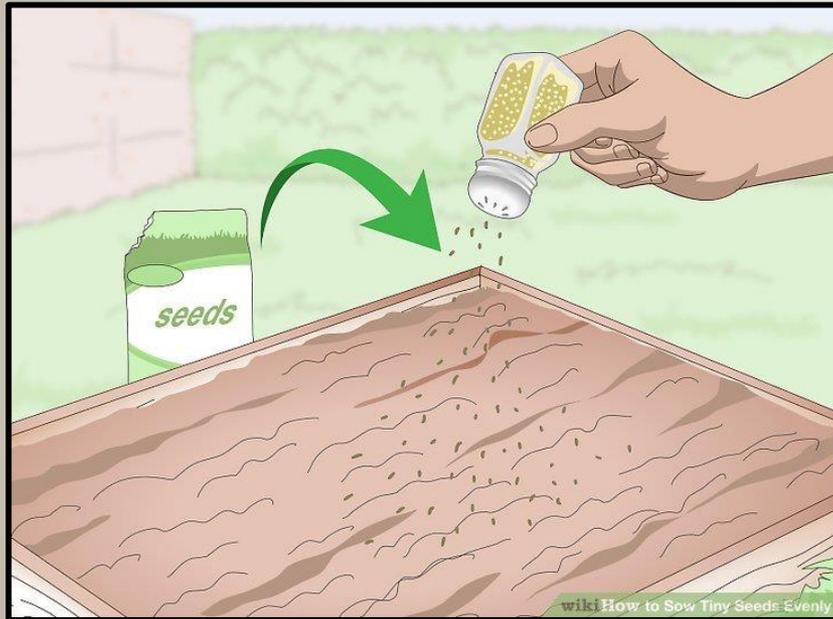
Cover seeds completely if they need darkness to germinate. Cover small seed with cardboard.

Cover seeds lightly if they need light to germinate. Check top of medium often or cover with plastic.

Vermiculite absorbs excess moisture around seedling stems, which helps to discourage mold and damp off.

Disbursement Methods for Seed

Mix seeds with a little sand in a salt shaker.



**Use a salt shaker to spread seeds evenly.
(CC BY-NC-SA 3.0)**

Good for very small seed.



**Pick up the seeds using tweezers for
precise placement.
(CC BY-NC-SA 3.0)**

**Good for seeds that need to
be pressed into the soil, but
need light to germinate.**

Water Seedlings Lightly After Planting



Use a spray bottle for very small seed.



Use a watering can with a fine spout for larger seeds.

Direct Seed in Containers

Direct seeding into a larger container is a good choice for large plants with a tap root, such as artichokes and tomatoes.



<https://thecapecoop.com/starting-seeds-indoors/>

Cut extra seedlings with scissors, leaving the healthiest seedling to continue growing. Cutting, rather than pulling extra seedlings, leaves the roots undisturbed.

Label Containers



Use office labels instead of standing labels to keep the labels from interfering with the lights.



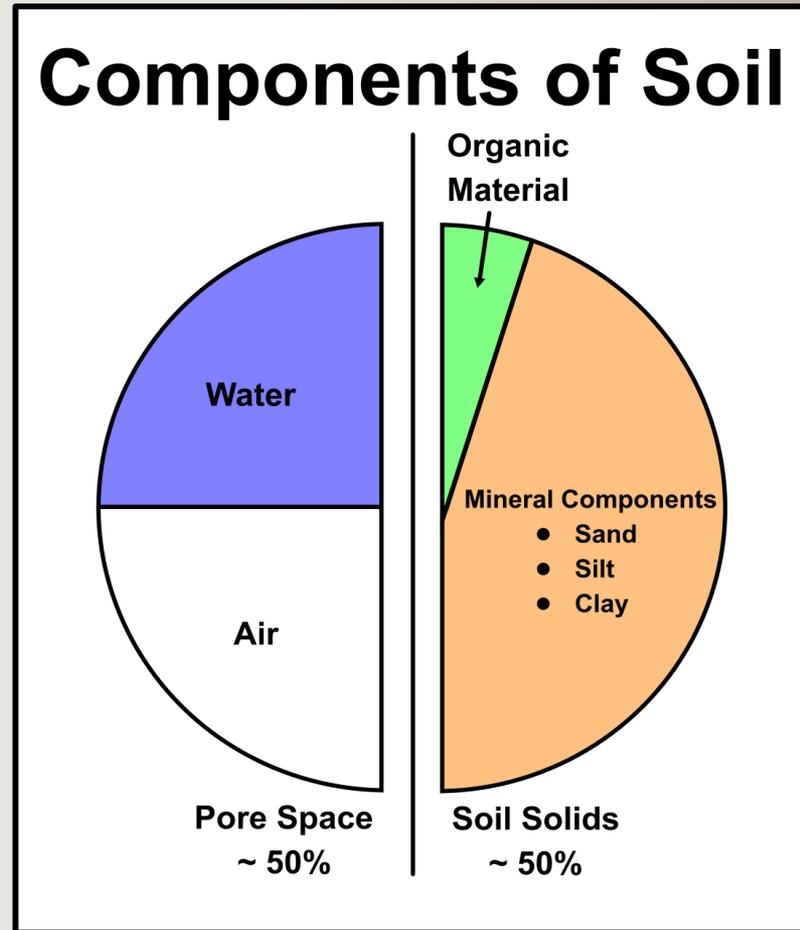
Watering Seedlings

Keep in mind that containers need air as well as water in the medium.

Keep young seedlings evenly moist. As they grow, let the containers dry a bit before watering again.

One easy way to determine dryness is to pick up the container. Dry containers weigh much less than wet containers.

Containers that are covered in plastic usually remain moist until seeds sprout.



Components of Soil - Minerals, Organic Material, Water, Air

Fertilizer

Seeds contain all of the nutrients that emerging seedlings need to grow for several weeks.

After sprouting, leaves will produce food from light, water and carbon dioxide (photosynthesis).

After six weeks, a weak solution (1/4 strength) of fertilizer may be necessary.



**Flexible intermediate bulk containers-
Fertilizer**

[Cjp24](#) [GNU Free Documentation License](#)

**Too much fertilizer
will burn foliage
and roots.**



Fertilizer-Burn

[Fenrisulfir](#) (CC BY-SA 3.0)

Synthetic Fertilizer

**Algae growth from excess nitrogen
and phosphorus from fertilizer**



Algae bloom in a small farm pond

[Soil Science](#) (CC BY 2.0)

Organic Fertilizers

Contain important secondary and trace nutrients.

Improve soil texture, aeration, and drainage.

Provide slow-release nutrition.



Organic fertilizer in bags

[International Institute of Tropical Agriculture](#)

(CC BY-NC 2.0)

Potting Up Seedlings

Seedlings are Ready to Pot Up When the First True Leaves Appear

The first leaves are cotyledons which provide nutrients for the seedling until roots have developed.

Seedlings should be potted up when 2 sets of new leaves appear when roots are developed enough to support the seedling.



Eryngium maritimum seedling - first leaf
[Konrad Wolinski](#) (CC BY-SA 4.0)

Reasons to Pot Up

Stimulates feeder roots

Permits selection of the best and healthiest seedlings

Seedlings and roots continue to grow and expand with more room and a richer medium.

The medium for potting up can be coarser, but should still be sterile.



**GREEN SEEDLING WITH ROOTS
IN HAND**

[Merry Steward](#)

Removing Seedlings



Renee's Garden

Seedlings are easier to remove and separate if the medium is allowed to dry out a bit before potting up.

Carefully prick out seedlings from a small section of the container, or turn over a smaller container while protecting the seedlings between your fingers.

Separating Seedlings

Carefully tease roots apart.

Keep extra seedlings covered with moist soil.

Choose seedlings with the best roots system and healthiest growth.



Potting Up Methods

There are two methods of potting up seedlings depending on the size of the root system.

1. Lower seedling into container and pour soil around it filling each cell with soil.
2. Hold the seedling by a leaf and lower the seedling into a open space in the container.



Place Seedlings in Containers



Make sure the seedlings are placed at the same level as they were in the previous container. Do not cover cotyledons.

Fill containers to the top with medium. Do not tamp. Allow water to settle the medium.

Seedlings After Potting Up



Give seedlings a day to recuperate in low light, and then place them back under lights.

Troubleshooting Seed Starting Problems

Cultural Issues

Causes:

- Too much water**
- Over fertilization**
- Poor air circulation**
- Insufficient drainage**

Algae



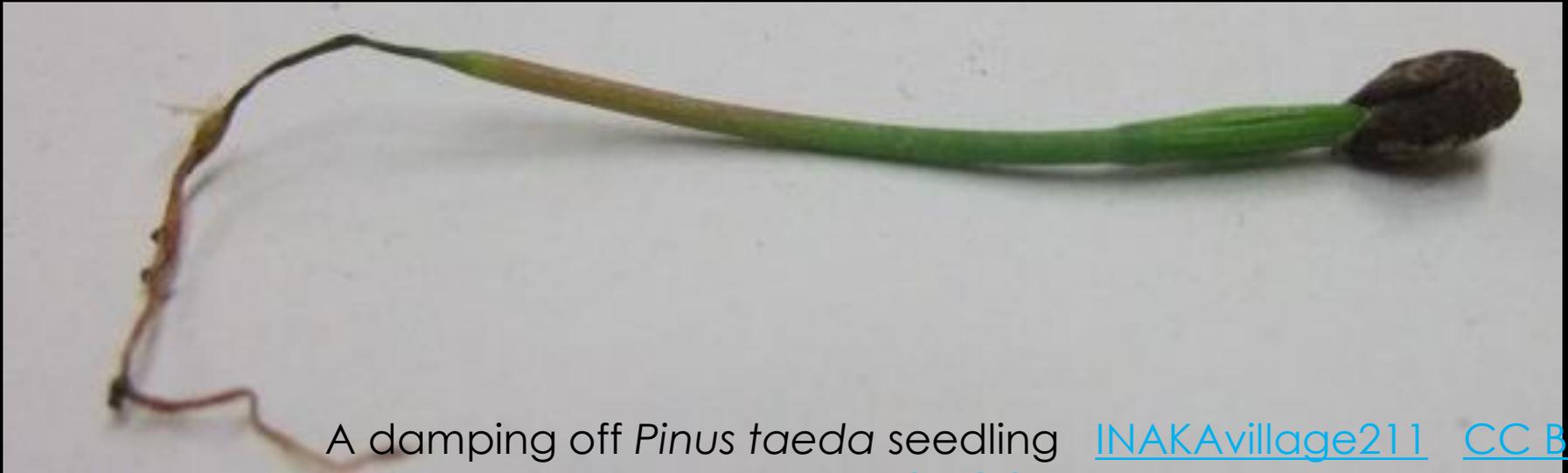
Algae growing on a growing medium's surface. Source: Premier Tech Horticulture

Mold



Image by Gardening Know How, via Nikki Tilley

Damp Off



A damping off *Pinus taeda* seedling [INAKAvillage211](#) [CC BY-SA 3.0](#)

Most commonly caused by the fungi, *Fusarium* spp. or *Rhizoctonia* spp., or the water mold, *Pythium* spp.

Symptoms:

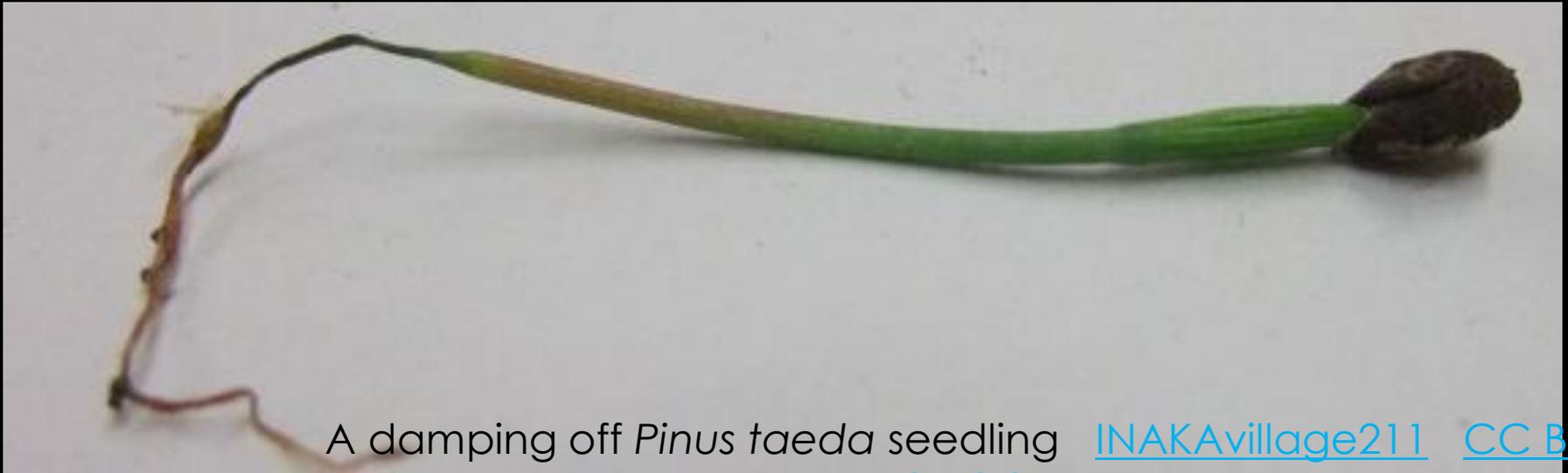
Seedlings fail to emerge from the soil.

Cotyledons and stems may be soft, mushy and discolored.

Stems are thread like where infected.

Roots are stunted and/or discolored.

Damp Off



A damping off *Pinus taeda* seedling [INAKAvillage211](#) [CC BY-SA 3.0](#)

Prevention and Management:

Sterilize all **used** equipment in a w/10% bleach solution for ½ hour.

Use new, sterile potting medium – not garden soil or compost.

Provide good drainage. Use warm water and avoid overwatering.

Use a heat mat for seedlings that prefer 70F+ germination temps.

Do not fertilize until several true leaves have formed.

Control fungus gnats, which can spread the infection.

Hardening Off and Transplanting Seedlings

Hardening Off

Hardening off gradually exposes seedlings to sun, heat and wind.

Allow more time when the sun is higher and hotter. Plants have a harder time moving from indoors to out.

This technique should be used with any plants moving from a covered area to full sun.



[Marie Richie](#) trial-by-ice (CC BY-NC-SA 2.0)

Plants that will be injured by frost must be moved back inside during cold weather.

Hardening Off

Locate microclimates around your house that will protect seedlings and provide the **gradual** increase in sun and wind necessary to acclimate seedlings.

One to two weeks before transplanting, move plants outside, beginning with shade, for increasingly longer periods of time - Up to 4 hours of morning sun.



Remember that shade moves and the wind can be variable.

Cold Frames



Large Cold Frame With Props
[Ofer El-Hashahar](#) (CC BY-SA 2.0)

Must be opened soon after the sun rises and closed at night if temperatures drop.

Automatic Opener



<https://www.groworganic.com/products/automatic-vent-opener>

Row Cover



Seed2Need Cold Frame

Wilting from Excessive Transpiration

Mild wilting for a short period of time is relatively harmless.

With prolonged or severe wilting, plants may:

- **Die.**
- **Lose lower leaves after turning yellow.**
- **Shed flowers or immature fruit.**
- **Be permanently stunted.**

(CC BY-N



my boss's wilting poinsettia on Monday's morning [pengrin™](#) (CC BY-NC 2.0)

First Aid for Wilted Plants

- **Move plants into the shade.**
- **Mist the leaves.**
- **Soak container in water if it is dry.**
- **Do not add more water to a container if the soil is already wet.**



<http://www.wikiHow.com/>

Prepare Area for Transplanting

Install irrigation and test to make sure everything is working properly.

Amend soil, if necessary, and water planting area well before transplanting.

Choose a cloudy, rainy day or plant in the evening to allow seedlings to recover before the following morning sun.



Raised Bed

[Sarah and Jason](#) (CC BY-SA 2.0)

Transplanting

Dig a hole as deep as the root ball. Tomatoes should be deeper.

Loosen soil 2 to 3 times as wide as the root ball.

Form a small cone in the center of the hole to avoid air pockets.

Place the seedling so that it is at the same level (soil line) as it was growing in the pot.

Replace soil, and water well.

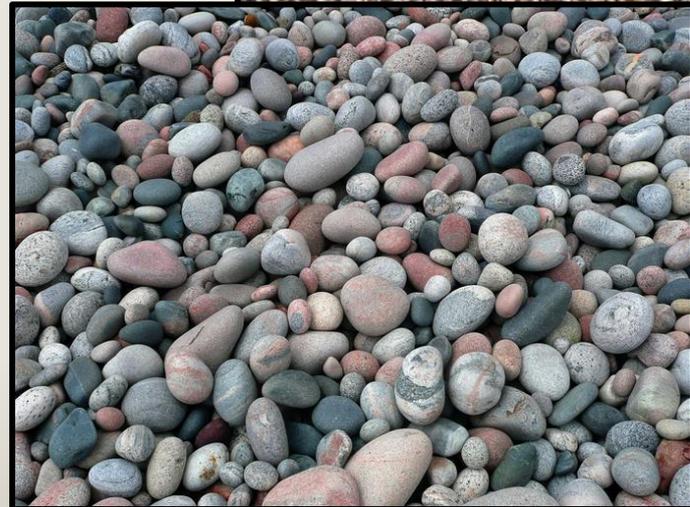


Mulching Plants

Mulch plants to retain moisture in the ground and moderate soil temperature.



Rock or gravel mulch can be used on native plants or plants that will tolerate reflected heat.



Shade Plants During the Hottest Part of the Day Until They Become Acclimated



Thank You!

