

# Cold Stratification: The Key to Unlocking Seed Germination

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## Why do some seeds need cold stratification?

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Seed dormancy is a state in which the seed is unable to germinate to prevent it from breaking dormancy during the harsh winter season. This is a survival tactic that increases its chances of survival by preventing the seed from germinating until conditions are right.

During cold stratification, seeds undergo a series of physiological changes that lead to the breaking of seed dormancy. These changes include a decrease in abscisic acid levels, a hormone that inhibits seed germination, and an increase in gibberellin levels, a hormone that promotes seed germination. This shift in hormone balance signals to the seed that conditions are now favourable for germination, allowing enzymes to be activated that break down stored nutrients and initiate the process of growth and development.

In addition, seeds requiring cold stratification often possess a hard, impermeable outer shell that prevents water and gases from passing through, making it difficult for the seed to absorb the necessary nutrients for germination. When these seeds are exposed to cold, moist conditions, water is able to penetrate the seed coat, causing it to imbibe and initiate physiological changes that lead to germination. This process is known as imbibition and plays a crucial role in the activation of enzymes that break down stored nutrients, to provide energy to the embryo.

Exposure to the cold, moist winter environment helps to break down the seed coat, allowing the seed to absorb water and other necessary nutrients that activate enzymes and trigger germination.

## **When is the best time to stratify seeds?**

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Wintertime is the ideal time to begin stratification, and then the seeds will be ready to plant when spring arrives.

- Northern hemisphere: January – February
- Southern hemisphere: June – July

Obviously, seeds could be sowed directly into the ground or pots during winter, but weather conditions can be unpredictable. Also, some climates may not have a cold or wet enough winter to trigger germination, in other cases, the winter may be so wet that the seeds rot.

## **Do all seeds need cold stratification?**

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No, seeds from warm climates don't need stratification, however, some seeds require scarification, which is a process in which the seeds are buffed to weaken the outer shell, allowing water in to trigger the natural sprouting process.

## **Do you put cold stratification seeds in the fridge or freezer?**

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Cold stratification seeds are typically placed in a refrigerator. Seeds should not be placed in a freezer for cold stratification, as freezing temperatures can damage or kill the seeds. Instead, the ideal temperature range for cold stratification is typically between 0 and 10°C (32 to 50°F), which can be achieved in a refrigerator or other cool, but not freezing, environment. It's important to research the specific requirements of the plant species you are working with to determine the optimal temperature and duration of cold stratification.

## **Seed stratification process**

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There are several to cold stratify seeds, we will cover the most simple stratification method, known as '*moist seed stratification*'.

**What you will need:**

- Seeds
- Paper towel
- Sandwich bag
- Marker pen
- Spray bottle
- Water
- Refrigerator (set to 1 – 4°C)

**Method:**

1. Mark the sandwich bag with the name of the seeds and the date.
2. Carefully moisten the paper towel with a spray bottle, the paper should be damp but not saturated.
3. Lay the seeds in a thin layer on the paper towel, and fold the paper towel over the seeds to help keep the seeds moist
4. Put in the refrigerator for 30 – 90 days (until outside temperatures warm up)

Monitor the seeds daily to make sure the medium remains moist. If any seeds sprout during stratification, pot them up and keep them in a warm location inside if it is cold outside. Remove seeds that have developed mould.

Note: Some seeds may require a warmer temperature (up to 10°C) than the temperature of a refrigerator. In this case, they can be stored in a basement.

## Which seeds need stratification?

Anemone	<i>Anemone spp.</i>
Anise hyssop	<i>Agastache foeniculum</i>
Angelica	<i>Angelica archangelica</i>
Arnica	<i>Arnica montana</i>
Artichoke	<i>Cynara cardunculus</i>
Asparagus	<i>Asparagus officinalis</i>
Balloon flower	<i>Platycodon grandiflorus</i>
Barrenwort	<i>Epimedium spp.</i>
Bellflower	<i>Campanula spp.</i>
Black cohosh	<i>Actaea racemosa</i>
Black-eyed Susan	<i>Rudbeckia hirta</i>
Blanket flower	<i>Gaillardia aristata</i>
Bloodroot	<i>Sanguinaria spp.</i>
Blue star	<i>Amsonia spp.</i>
Borage	<i>Borago officinalis</i>
Brussels sprouts	<i>Brassica oleracea var. gemmifera</i>
Butterfly bush	<i>Buddleja spp.</i>
Butterfly weed	<i>Asclepias tuberosa</i>
Catchfly	<i>Silene spp.</i>
Catnip	<i>Nepeta spp.</i>
Chamomile	<i>Matricaria chamomilla</i>
Chinese lantern	<i>Physalis alkekengi</i>
Clematis	<i>Clematis spp.</i>
Common boneset	<i>Eupatorium perfoliatum</i>
Common mallow	<i>Malva sylvestris</i>

Common milkweed	<i>Asclepias syriaca</i>
Coral bells	<i>Heuchera spp.</i>
Creeping thyme	<i>Thymus serpyllum</i>
Delphinium	<i>Delphinium spp.</i>
Echinacea (coneflower)	<i>Echinacea spp.</i>
False indigo	<i>Baptisia spp.</i>
False sunflower	<i>Heliopsis helianthoides</i>
Foxglove	<i>Digitalis spp.</i>
Fuchsia	<i>Fuchsia spp.</i>
Geum	<i>Geum spp.</i>
Globe flower	<i>Trollius spp.</i>
Globe thistle	<i>Echinops spp.</i>
Goldenrod	<i>Solidago spp.</i>
Great burnet	<i>Sanguisorba officinalis</i>
Hardy plumbago	<i>Ceratostigma spp.</i>
Helen's flower	<i>Helenium spp.</i>
Hellebore	<i>Helleborus spp.</i>
Hibiscus	<i>Hibiscus spp.</i>
Hollyhock	<i>Alcea spp.</i>
Hyssop	<i>Agastache spp.</i>
Indian pink	<i>Spigelia spp.</i>
Joe-Pye weed	<i>Eupatorium maculatum</i>
Lady's mantle	<i>Alchemilla spp.</i>
Lavender	<i>Lavandula spp.</i>
Lemon balm	<i>Melissa officinalis)</i>
Licorice	<i>Glycyrrhiza glabra</i>
Lilac	<i>Syringa spp.</i>
Lobelia (cardinal flower)	<i>Lobelia spp.</i>

Loosestrife	<i>Lysimachia spp.</i>
Lupine	<i>Lupinus spp.</i>
Marshmallow	<i>Althaea officinalis</i>
Masterwort	<i>Astrantia spp.</i>
Meadowsweet	<i>Filipendula ulmaria</i>
Milkweed	<i>Asclepias spp.</i>
Monkshood	<i>Aconitum spp.</i>
Oxeye sunflower	<i>Heliopsis helianthoides</i>
Pansy	<i>Viola tricolor var. hortensis</i>
Pasque flower	<i>Plusatilla vulgaris</i>
Peony	<i>Paeonia spp.</i>
Perennial flax	<i>Linum perenne</i>
Peruvian lily	<i>Alstroemeria spp.</i>
Phlox	<i>Phlox spp.</i>
Plantain lily	<i>Hosta spp.</i>
Poppy	<i>Papaver spp.</i>
Primrose	<i>Primula vulgaris</i>
Red hot poker	<i>Kniphofia spp.</i>
Rosemary	<i>Rosmarinus officinalis</i>
Sage	<i>Salvia officinalis</i>
Sea holly	<i>Eryngium spp.</i>
Skullcap	<i>Scutellaria spp.</i>
Speedwell (Veronica)	<i>Veronica spp.</i>
Spiderwort	<i>Tradescantia spp.</i>
Spring adonis	<i>Adonis vernalis</i>
Spring corydalis	<i>Corydalis solida</i>
St. John's Wort	<i>Hypericum perforatum</i>
Sweet cicely	<i>Myrrhis odorata</i>

Swiss chard	<i>Beta vulgaris subsp. cicla)</i>
Sweet woodruff	<i>Galium odoratum</i>
Tansy	<i>Tanacetum spp.</i>
Thyme	<i>Thymus vulgaris</i>
Tickseed	<i>Coreopsis spp.</i>
Toad lily	<i>Tricyrtis spp.</i>
Valarium	<i>Valeriana officinalis</i>
Viburnum	<i>Viburnum spp.</i>
Violet	<i>Viola spp.</i>
Whirling butterflies	<i>Gaura lindheimeri</i>
Wild garlic	<i>Allium ursinum</i>
Wild indigo	<i>Baptisia tinctoria</i>
Winter aconite	<i>Eranthis hyemalis</i>
Wintergreen	<i>Gaultheria procumbens</i>
Yarrow	<i>Achillea millefolium</i>

## Is cold stratification really necessary?

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Some seeds will germinate even without stratification, but stratification can increase the germination rate. I have sown a number of cottage plant seeds without stratification. My foxgloves from last year self-sowed and I have a large collection of baby foxgloves in the garden. However, if you have purchased cold climate seeds that should be stratified, it is recommended.

Some plant species, particularly those native to colder climates, have evolved to require the moist, cool conditions of winter to break their dormancy and initiate germination in spring. By exposing the seeds to a period of cold stratification, which mimics these natural conditions, the germination process can be jump-started for these species.

Therefore, if you have purchased seeds of plants that require cold stratification, it is always advisable to follow the recommended stratification period and conditions for optimal germination.

## Conclusion

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- Cold stratification is a simple process of exposing seeds to a period of moist, cool conditions in order to break their dormancy and promote germination.

- The process of cold stratification mimics the natural conditions that many plant seeds would experience in the wild during winter when cold temperatures and moisture help to prepare the seeds for spring germination.
- By properly cold-stratifying seeds, gardeners can increase the germination rate of seeds.
- Cold stratification can be achieved by placing seeds in a moist medium, such as sand or vermiculite, or a damp paper towel and placing them into a refrigerator or other cool location for a period of time ranging from several weeks to months.