



# SAVING GINSENG SEEDS



A practical guide to preserving American ginseng (*Panax quinquefolius*) seeds and strains.

Prepared by Sara Jackson (Bat Cave Botanicals) and Eric P. Burkhart  
(Penn State University) v.1 (2025)

# SAVING GINSENG SEEDS - PART 1

## WHY PRESERVE AMERICAN GINSENG STRAINS?



Page 3 Conservation of an Indigenous North American Plant

Page 4 Preservation of Remaining Genetic Lineage

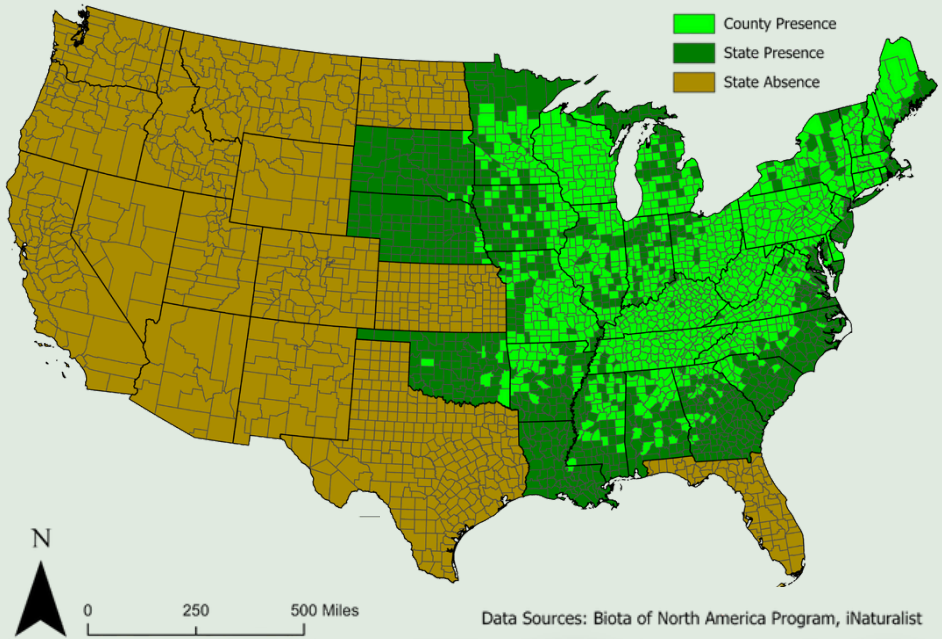
Page 5 Locally Adapted Genetics

Page 6 Regional Planting Stock

Page 7 Stock Development for Forest Farming



# PRESENCE OF AMERICAN GINSENG IN THE CONTINENTAL UNITED STATES



## CONSERVING AN INDIGENOUS NORTH AMERICAN PLANT

Planting of seed from wild plants is an essential part of stewardship. All U.S. states that have legal wild ginseng harvest and export programs require that seeds be planted near where wild plants that are harvested. The intent of this requirement is to encourage wild populations to persist in a local environment. If seeds are removed, then recovery from harvest will be greatly jeopardized. Just as important, the simple act of planting seeds from wild plants can dramatically increase the persistence, growth, and success of a population.

# PRESERVATION OF REMAINING GENETIC LINEAGES

North America, and specifically, the eastern deciduous forest biome, is the home of American ginseng. The species does not occur as a wild plant anywhere else in the world. Wild ginseng is therefore a cultivated species in North America with relatives that still grow wild in nature. These wild relatives may be needed in the future to contribute genetic material to forest farming and the development of crops, in order to improve disease resistance, root traits, yields, medicinal chemistry, or other desirable traits. These wild populations are regionally and locally adapted which improves survival and performance. Such locally adapted genetic variants are needed for restoration planting activities (e.g., "re-wilding"). It is in our collective best interest to retain and protect this wild genetic material for future generations.







## LOCALLY ADAPTED GENETICS

American ginseng has been commercially wild harvested in North America for more than 300 years, and cultivated for the past century. During the late 1800s, people began experimenting with planting and growing ginseng as a “crop” and there has been distribution and sharing of seed and planting stock from these efforts in North America ever since. Due to this long history of harvest and planting, it is difficult to know if the ginseng you encounter is “wild” (meaning, spontaneously occurring) or resulted from someone’s planting efforts in the past (i.e., “wild simulated”). Regardless of this uncertainty, any plants that you encounter that are established and reproducing are worth preserving as a seed source, given they are already occurring and reproducing in that location and therefore are adapted to the local forest conditions.

# SUPPORT FOR AVAILABILITY OF REGIONAL PLANTING STOCK

Cultivated seed and root stock is often available from artificial shade ginseng farms located in Wisconsin and Canada. While these are important sources of planting material, there is a need, and opportunity, to expand and diversify this stock supply both genetically and geographically. This is desirable to maintain a diverse genetic resource that is not just limited to cultivated lineages in two North American regions. This effort further supports regional ginseng growers located throughout the North American range to make sure that a steady, affordable supply of stock is available to those seeking planting materials.







## STOCK DEVELOPMENT FOR FOREST FARMING

Forest farming is a type of agroforestry practice in which plants and/or fungi are intentionally stewarded or cultivated within an existing forest. American ginseng is one of the most sought after and profitable native forest farming crops, and interest in forest farming continues among forest landowners. As forest farming continues to expand and be recognized as an agricultural land use, ginseng crop traits such as disease resistance and medicinal properties could be useful in breeding and production efforts. In the immediate future, more ginseng planting materials are needed for those interested in growing ginseng as a forest crop.

# SAVING GINSENG SEEDS - PART 2

## HOW TO SAVE GINSENG SEEDS



Page 9	<u>American Ginseng Lifecycle</u>
Page 10	<u>Flowering and Pollination</u>
Page 11	<u>Berry Ripening</u>
Page 12	<u>Berry and Seed Development</u>
Page 13	<u>Protecting Plants and Sites</u>
Page 16	<u>Human Theft</u>
Page 17	<u>Handling Seeds: Extraction</u>
Page 19	<u>Handling Seeds: Treatments and Diseases</u>
Page 20	<u>Handling Seeds: Stratification</u>
Page 21	<u>Handling Seeds: Temperature</u>
Page 22	<u>Handling Seeds: Storage</u>
Page 23	<u>Handling Seeds: Seed Packets and Boxes</u>
Page 26	<u>Planting Ginseng Seeds</u>
Page 27	<u>Identifying Seedlings</u>
Page 28	<u>Ginseng Lookalikes</u>
Page 28	<u>Credits and References</u>



# AMERICAN GINSENG LIFE CYCLE

American ginseng is a perennial herbaceous plant, meaning that it grows for many years, but any above ground portions (stems, leaves, etc.) do not persist over the winter months. As a plant ages, it progresses through a series of distinct stages (see below). Since ginseng produces palmately compound leaves in which each leaf consists of one to seven smaller leaflets arranged around a central axis, each of its stages are identified by the total number of leaves (rather than leaflets) on a plant. In ginseng trade, a palmately compound leaf is commonly referred to as a "prong." Through the course of development, the number of compound leaves increases. Thus, the stages in ginseng development are called one-prong, two-prong, three-prong, and so on, depending on leaf number. Generally, the progression of vegetative growth is from seedling to one prong (with five leaflets); from one prong to two prongs (with ten leaflets); from two prongs to three prongs (with fifteen leaflets); and from three prongs to four prongs (with twenty leaflets). This progression may occur on an annual basis, or the plant may take many years to evolve from one stage to the next.



## FLOWERS

Ginseng flowers are small and inconspicuous.

Up close, you will notice five greenish-yellow petals with five alternating stamens.



## POLLINATORS

Although ginseng is self-compatible, small insects such as native bees visit ginseng flowers, and help facilitate pollen transfer and thus genetic crossing between plants and populations.



## FLOWERING AND POLLINATION

American ginseng is slow growing and requires years before flowering begins. The flowers are small, greenish-white, and arranged in a cluster that is botanically referred to as an umbel. This flower cluster sits at the top of the stalk where the leaves diverge. The flowering period begins in early to mid-June and continues through late-July. Ginseng is self-compatible, which means that plants do not need to be cross-pollinated for fruits and seeds to develop, although the process is beneficial for adaptation to changing conditions over time.

# BERRY RIPENING TIMELINE

American ginseng fruit is often referred to as a berry (though botanically considered a 'drupe') and ripens to a bright red color. These berries mature during August and September through most of its range and typically do not ripen all at the same time but instead over days to weeks. Ginseng berries should be allowed to mature to bright red color for best viability. Research has determined that while green berries sometimes germinate successfully, red berries are much more likely to germinate. This means that you may need to return to a plant or population multiple times to gather red berries as they mature and become ready for harvest.

## SPRING TO EARLY SUMMER

Successfully pollinated flowers begin to develop into green berries, starting with the outermost part of the cluster.



## MID TO LATE SUMMER

Green berries continue to develop before ripening to red, while some are still in early fertilization stages.



## LATE SUMMER TO FALL

Fully ripe ginseng berries are bright to dark red. If left on the plant the berries will eventually fall off naturally.



## FALL TO LATE FALL



## BERRY SHAPE & SEED DEVELOPMENT

At maturity, ginseng berries are covered with a bright red fleshy pulp that functions to attract dispersal partners. Each berry contains 1-3 seeds and the shape of the berry varies by the number of seeds.

Many forest animals eat ginseng berries but not all are dispersal partners. While animals such as deer, chipmunks, and turkeys will consume the berry, they mostly destroy the seed in the process. The seed must be passed intact to germinate and is quite large. To date, the only documented ginseng dispersal partner is the wood thrush (*Hylocichla mustelina*), a forest dwelling songbird that consumes the berry and then afterwards regurgitates the seed. It's possible that other thrush species contribute to dispersal, but this hasn't been studied due to their rarity.



# PROTECTING GINSENG PLANTS

Ginseng plants or berries can be browsed by a variety of wildlife during the summer months. Plant and seed predators include deer (which browse leaves and berries), turkey (which can scratch up large areas), chipmunks and jumping woodland mice (which eat and cache seeds), and voles (which eat ginseng roots, and sometimes seeds). Protection may be necessary to prevent your seed crop from disappearing and/or plants from being destroyed. The following strategies are most useful and practical when trying to protect individual plant tops from deer or turkeys. The strategies below can be used to protect populations or larger plantings are included in the following pages.



## SEED BAGS

After flowering is complete and green berries begin to develop, seed heads may be bagged using commercially available bags or custom crafted from lightweight netting materials.

## PLANT CAGES

Cages can be custom made around "seed plants" from materials such as fencing or hardware cloth.



# PROPAGATION BEDS

Planting stock propagation beds can offer above and below ground protection for seedlings and potentially adapted with above ground caging to protect seed producing plants as they grow. Shown below is a woodland bed that is 4' W x 8' L x 12" H, courtesy of Mountain Cove Forest Farm, Asheville, NC.

Material considerations include quality and durability, so that the beds will last many years and not degrade and harm the area. Native or amended woodland soil should be used, and leaf litter used as a top dressing.

## PROPAGATION BED MATERIALS

- Non pressure treated lumber like:
  - rot resistant wood or Japanese *Sho Sugi Bon* method for long term ground contact
- ½" hardware cloth, stainless steel to **cover the bottom** (in ground) and the top cover.
- ½" ReBar supports, more for above ground frame and further fencing.





## BRUSH WALLS

Branches and brush may be used to loosely cover or deter larger wildlife like deer. Another advantage is that it is an easy way to make plants less noticeable.



## FENCING

Protective fencing around larger areas is costly but sometimes worth it in high producing areas, and protecting well established populations.

## PROTECTING GINSENG SITES

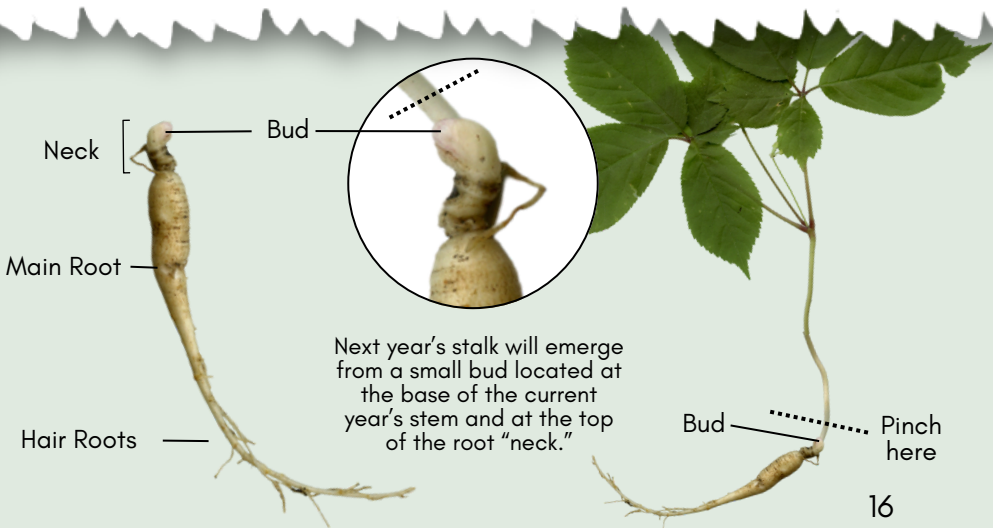
Other methods and strategies for protecting ginseng populations, groups of plants, or ginseng sites include carefully stacking up sticks and branches around plants ("brush walls") or fencing areas.

Within these larger protected areas, individual plant protections strategies still may be necessary to ensure the safety and uninterrupted production of seeds. The use of one or more methods of protection depends on the size of the the population(s) and the type of pest.

## HUMAN THEFT

In addition to the various pests and protection strategies outlined in the previous pages, a major threat to American ginseng is theft. While the topic of theft is a complex one, in this publication we bring it up because many ginseng stewards are discouraged from preserving and saving local genetic stock since they fear the plants will eventually be found and stolen. This is true especially late in the season when brightly colored red berries and yellow leaves are present, making plants easily spotted, even at a distance.

One strategy for protecting your local ginseng population from thieves is to “pinch the tops” or “top the plants.” This refers to the practice of removing the tops of plants after berries ripen so that the plants are no longer visible to diggers, especially during the fall ginseng harvest season. This practice is very simple: just wait for berries to ripen, gather the berries, and then pinch, cut, or trim the stalk above the bud. If you are concerned that this might somehow “hurt” the plant, keep in mind that once the bud for next year’s growth is formed at the top of the root “neck”, the plant is preparing to die-back (senesce) for the year and won’t be harmed by topping. This typically occurs around the same time that berries ripen in late summer and bud presence can be confirmed by using your finger to gently probe the base of the current year’s stem to look for the bud as it enlarges.







## SQUEEZING

Simply squeezing the seeds out of the berries and planting them in place (*in situ*) or seeding new nearby patches works well.

## SOAKING

For larger amounts of seeds, soaking in a bucket overnight is recommended to make it quicker and easier to remove berry pulp.



## HANDLING GINSENG SEEDS: EXTRACTION

Ginseng seeds can be planted with the berry pulp remaining on the seeds, or the seed can be removed from the berry prior to planting. Some people prefer to remove the pulp since it could contain germination inhibitors and/or harbor bacterial or fungal pathogens that can remain on the seed surface. Some also enjoy sucking the juicy pulp (which is rich in ginsenosides) and don't want it to go to waste, or prepare a juice from the berry for consumption or sale.

If you do choose to remove the pulp, you can simply squeeze the seed out of the pulp at the time of planting. However, if you have a large amount of seeds, you may want to soak the fruit overnight in a bucket to loosen the pulp for easier removal. Don't soak seeds for more than 24 hours because the lack of oxygen could injure the embryo or the seed coat may simply begin to rot. After soaking, the berry pulp is then rubbed off by hand and/or washed off using a garden hose.

# HANDLING GINSENG SEEDS: SEED TREATMENTS

Disease related pathogens can be transferred on the surface of ginseng seeds and can reduce germination and/or negatively impact the health of germinated seedlings. In wild populations, diseases are often present but are at low levels and treatment of seeds for pathogens is typically not necessary. However, disease presence typically is greater as plant density and numbers increase and high density gardens or farms are nearly always associated with very high disease levels. When moving seed around, especially when seed originates from known sources that have high disease pressure, it is a good idea to proactively treat seed in order to prevent accidental introduction of diseases into your ginseng growing areas.

The following organic methods are effective against many seed-borne pathogens:

## HYDROGEN PEROXIDE METHOD

1. Soak seeds in 3% hydrogen peroxide for 10–15 minutes.
2. Rinse seeds thoroughly with clean water afterward to prevent potential damage to the seed coat.
3. Store seeds (according to outlined methods) or plant immediately depending on your handling process.

## HOT WATER METHOD

1. Soak seeds in hot water (~120°F/49°C) for 10–15 minutes.
2. Store seeds (according to outlined methods) or plant immediately depending on your handling process.



ALTERNARIA ON MATURE GINSENG

## HANDLING GINSENG SEEDS: COMMON SEED-BORNE DISEASES

The following are some of the more common seed-borne diseases in ginseng and their impact.

### Damping-Off

(also affects seedlings)

**Pathogens:** Pythium,  
Rhizoctonia, Fusarium

**Symptoms:** Seed rot before germination, seedling collapse after sprouting, water-soaked lesion on stems.

### Alternaria Blight

(also affects seedlings)

**Pathogen:** Alternaria

**Symptoms:** Brown spots on emerging cotyledons; can carry over to young seedlings from infected seeds or stratification media.

### Seed Rot

**Pathogens:** Phytophthora,  
Alternaria, Fusarium

**Symptoms:** Soft, mushy, or brown to black discolored seeds that fail to germinate.

### Gray Mold

**Pathogen:** Botrytis

**Symptoms:** Moldy coating on seeds, fuzzy gray fungal growth, particularly in poorly ventilated stratification setups.

# HANDLING GINSENG SEEDS: SEED STRATIFICATION

Newly harvested and de-pulped ginseng seed is often called “green seed” and requires special treatment (stratification) to maintain viability and to facilitate germination. In particular, seeds exhibit a delayed germination period of at least 8 to 22 months after harvest. During this time seeds must be kept moist (around 10% moisture) and exposed to alternating cycles of chilling and warming (cool-warm-cool).

To accomplish this, you can simply plant ripened berries or seeds around where the wild plants are located (or a nearby suitable forest location) and wait at least two years while these conditions are (hopefully) naturally provided.

Alternatively, you can remove the berries/seeds and carefully stratify the seeds using a more controlled process involving above-ground or below-ground storage containers and a few supplies. A primary advantage of removing the berries/seeds and stratifying under controlled conditions is that you can reduce seed loss due to turkey and rodent predation because the seeds won’t remain exposed in forest soil for as long. A second advantage is that you can better control the process to achieve optimum planting density and germination results. However, a lot can go wrong during controlled handling and so make sure you are committed to the process. Keep in mind that most U.S. states have regulations governing removal of seeds from a wild population that must be followed.

## STRATIFICATION TIMELINE

**GATHER BERRIES**



**Summer  
Year 1**

**SOW SEEDS**



**Autumn  
Year 2**

**GERMINATION**



**Spring  
Year 3**



## TEMPERATURE CYCLE



**COOL**  
40°F/3°C



**WARM**  
70°F/20°C



**COOL**  
40°F/3°C

**9 months**  
first cool period,  
Sep-May

**3 months**  
warm period,  
Jun-Aug

**9 months**  
second cool period,  
Sep-May

## HANDLING GINSENG SEEDS: TEMPERATURE

Controlled stratification can be done by putting freshly de-pulped seeds in the refrigerator at 40°F/3°C for 9 months (first cool period, Sep-May) and then exposing to warmer temperatures (70°F/20°C) for 3 months (warm period, Jun-Aug) and then back in the fridge (second cool period, Sep-May). Or, more commonly, seeds are planted during the fall months after the first cool-warm period is provided and winter temperatures then provide the second required cool period. Research has also found that this stratification period can be reduced to less than a year by holding seed (non-refrigerated) at 60-70°F/15-20°C) for 4 months (Sep-Dec) and then storing in colder temperatures (refrigerated at 37-40°F/3-4°C) for 4 months (Jan-Apr). The seeds are then spring planted and will germinate as outside temperatures begin to warm up. This practice is sometimes done in large commercial ginseng farms and results in seed that can germinate in less than a year. However, seed germination can be lower (20-80%) using this method.

# HANDLING GINSENG SEEDS

## STORAGE

When not immediately planted, ginseng seed can be stored for months to years if proper conditions are provided. In general, seed should be stored between 45-50F/8-10C and 10-20% moisture to maintain viability. Keep in mind that seed should not be kept indefinitely but should be planted as soon as possible. Once the seed coat begins to "crack" or split open, what some refer to as "smile," it should be planted since root emergence will soon follow. If the root does emerge (see picture below), it is susceptible to damage or disease and becomes much more difficult to care for and plant. It is recommended that seed be "floated" before planting to help ensure seed is viable. This is done by placing seed in a bucket of water and disposing of the "floaters," which have been found in research to lack a viable embryo (often due to bacterial or fungal infection of the seed).

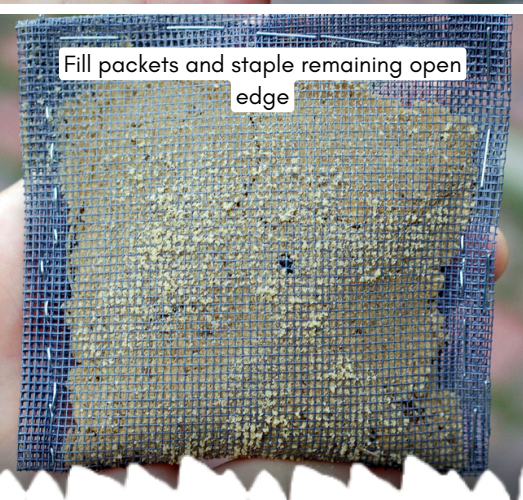
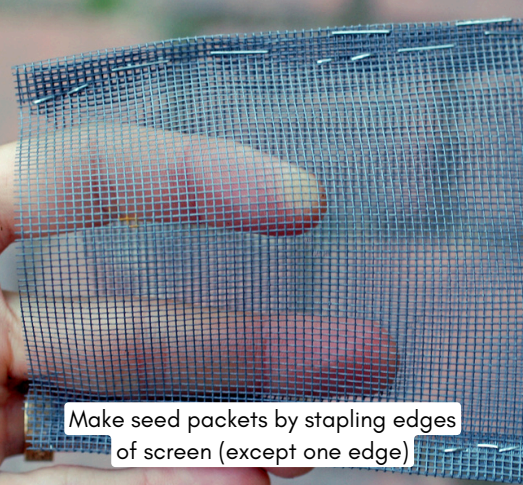


Healthy and well stored and slightly moist seeds, some are beginning to 'smile', meaning to begin to crack open to allow the radicle to grow.



Noticeable desiccation (drying out), radicles (first roots) growing and exposed. Any damage to the radicle can reduce success.



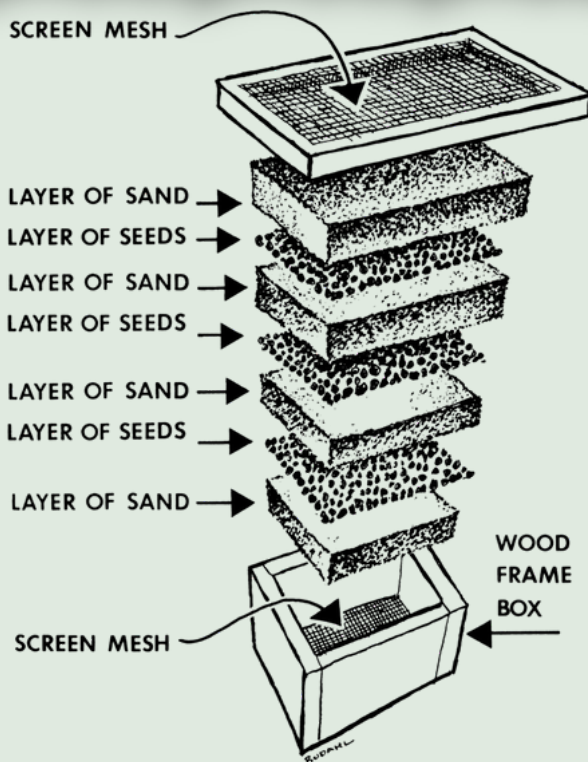


## HANDLING GINSENG SEEDS: STRATIFICATION "PACKETS"

When stratifying seeds under natural conditions, there are several options available depending on the amount of seed handled. For small amounts of seed, you can harvest berries/seed as they ripen and make "ravioli" packets. Mix de-pulped seed with clean masonry sand (1 part seed to 2-3 parts sand) and place inside of small custom made stapled screen packets and bury these just below the surface of the soil, and below leaf litter, within your ginseng patch. Be sure to mark where you bury them!

# HANDLING GINSENG SEEDS: BELOW-GROUND STRATIFICATION BOXES

Below-ground boxes are typically made using plastic or wood with screen on both top and bottom (or drilled holes) to allow for good moisture infiltration and drainage. As with the packets described on page 22, the seed is mixed with the sand (1 part seed to 2-3 parts sand), usually layered or mixed, and buried in the soil with the top of the box near soil level and just below the leaf layer. The box is typically buried in the forest where ginseng grows and the soil is workable to create a hole for the box to sit in during the winter months. It is essential that moisture drains readily through the box or seeds may rot.







Insulated aboveground stratification box



Mix seeds and sand (at 3:1 ratio)



Refrigerated above-ground stratification bin



Mix seeds and sand (at 3:1 ratio)

## HANDLING GINSENG SEEDS: ABOVE-GROUND STRATIFICATION BOXES

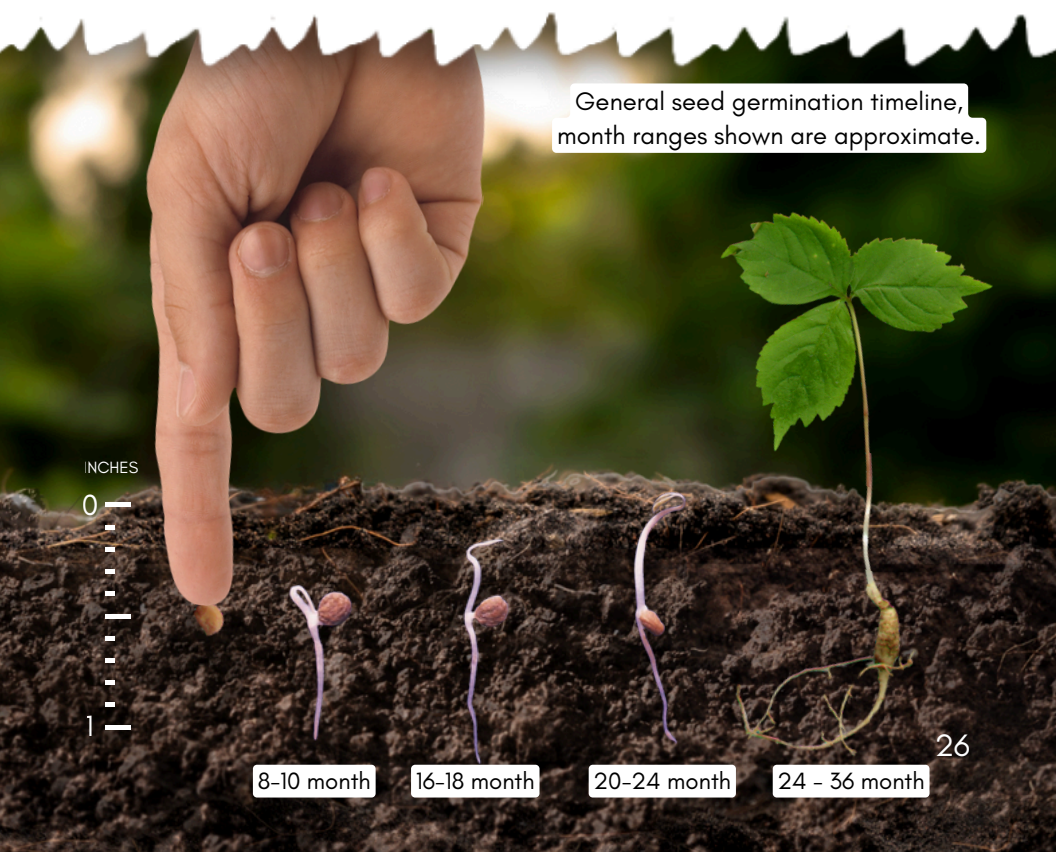
Above-ground stratification boxes make it easier to manage the stratification process, especially if you want to carefully control, or speed up, stratification using the methods described on page 20.

Above-ground boxes are typically made using plastic or wooden boxes with drilled holes to allow for good drainage. As with the packets described on page 23, the seed is mixed with the sand (1 part seed to 2-3 parts sand), usually layered or mixed, and left in a shady protected location where it can be exposed to ambient outdoor temperatures (cool-warm-cool) or in a cooler where temperatures can be manipulated.

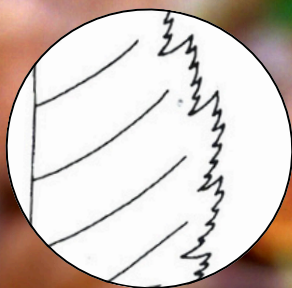
# PLANTING GINSENG SEEDS

There are many different ways to plant ginseng seeds depending on the scale of planting efforts. For forest farming efforts where hundreds or thousands of seeds are being sown each season, planting each seed by hand is typically avoided by using rakes, broadcasting, seed-jabbers, and even leaf blowers. All of these methods are outlined elsewhere in books, on the internet, and in social media videos.

No matter how seed is planted, **the most important guideline is that each seed should be sown in the mineral soil layer between ½ and 1 inch deep.** This means that the leaf litter needs to be pulled aside to expose the mineral soil and then the seed is planted. Additionally, planting should be timed so that the soil is not dry and therefore the seed will not dry out before it is able to germinate.







Doubly serrated  
leaf margin

Asymmetrical  
bases

Seedlings are trifoliate

## IDENTIFYING GINSENG SEEDLINGS

Ginseng seedlings can easily be mistaken for other plants that can be found in the forest understory. It is essential to know what to look for in the years following seed planting so that you can evaluate success and keep track of plants. Ginseng seedlings look very different from the mature plants. The seedling appearance persists the entire first growing season, and plants can continue to be “stuck” in this stage for many years under some growing conditions.

Visually, the seedling stage is represented by a small plant (<3 inches tall) that has three leaflets (trifoliate). Importantly, there are sharp teeth present along nearly the entire edge of the leaflet margin. These teeth arc towards the leaflet tip (serrate) and both large and small teeth are intermixed (doubly serrate). Further, the base of the two lateral leaflets each have an unequal (asymmetrical) shape when compared to the terminal leaflet base.

# GINSENG SEEDLING LOOKALIKES

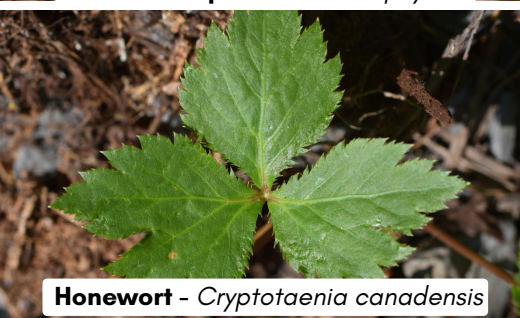
The plants below are a few of the easily confused ginseng seedling lookalikes, and are often associated with the habitat types where wild ginseng populations occur or can be forest farmed. If you have mature seed-bearing plants of any of the plants below in the area(s) where you are planting ginseng seeds, you will want to learn to carefully distinguish lookalikes. You should make an effort to observe seedling development over time to build recognition skills and experience: pay attention to subtle differences in leaf margins (smooth versus toothed, tooth pattern), leaf shape, form (herb, tree seedling, vine), and woody versus herbaceous stems.



**Indian turnip** - *Arisaema triphyllum*



**Wild strawberry** - *Fragaria virginiana*



**Honewort** - *Crytotaenia canadensis*



**Sanicle** - *Sanicula* spp.



**Virginia creeper** - *Parthenocissus quinquefolius*



**Hickory** - *Carya glabra*



# CREDITS & REFERENCES

## Image Credits

- Pages 1, 6, 7, 10, 12, 13, 15, 16, Fig. 2 on 17, 19, 20, 22, 23, 25, 26, 27, 28, 29, 30: Cover Photo & Images, Eric Burkhart (Penn State University)
- Pages 2, 4, 5, 11, 12, 16, 20, 21, 22, 26, 27: Images & Diagrams, Sara Jackson (Bat Cave Botanicals)
- Page 3: American Ginseng Range Map, Ezra Houston, 2024
- Page 9 & 24: Ginseng Lifecycle Illustration, Below Ground Stratification Box Illustration, *Growing and Marketing Ginseng, Goldenseal and other Woodland Medicinal: 2nd Edition by W. Scott Persons & Jeanine Davis, 2014*
- Page 12: Woodland Propagation Bed, David Brown (Mountain Cove Forest Farm, Asheville, NC), 2025

---

## Resources

Wild American Ginseng Conservation Collaborative  
[WildAmericanGinseng.org](https://WildAmericanGinseng.org)

NC State New Crops & Organics  
<https://newcropsorganics.ces.ncsu.edu/>

Appalachian Forest Farming Coalition  
[Appalachianforestfarmers.org](https://Appalachianforestfarmers.org)

United Plant Savers  
<https://unitedplantsavers.org/>

---

## **Penn State Botany, Ethnobotany and Agroforestry**

<https://linktr.ee/forestfarmingwebinars>  
Instagram: @psu\_botany\_and\_ethnobotany

## **MTSU International Ginseng Institute**

<https://ginseng.mtsu.edu/>

## **Bat Cave Botanicals**

<https://linktr.ee/batcavebotanicals>  
Instagram: @batcavebotanicals



“Take care of your ginseng patch  
and your ginseng patch will take  
care of you.”

Appalachian Proverb

## Funding and Production Partners

This publication is a collaboration between the following partners.



United States Department of Agriculture  
National Institute of Food and Agriculture

MTSU Pub # 0525-1641

MTSU prohibits discrimination based on sex, race, color, national origin, or other protected categories. Report concerns to the Title VI/IX Coordinator. See the full policy at [mtsu.edu/iec](https://mtsu.edu/iec).

This work is supported by the USDA National Institute of Food and Agriculture. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and should not be construed to represent any official USDA or U.S. Government determination or policy.