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Growing American Ginseng (*Panax quinquefolius* L.) in Your Backyard Woods

Huseyin B Tecimen, Ph.D., Extension Assistant Professor

Contact: 615-963-5547, htecimen@tnstate.edu

Background

American ginseng (*Panax quinquefolius* L. [Araliaceae]) is native to the eastern half of North America, extending from Georgia to Quebec in the north and to the Mississippi River on the west. Due to its ingredients such as ginsenosides, polysaccharides, peptides, and polyacetylenic alcohols, it has been used to treat a number of maladies including nervousness, vomiting, dyspepsia, and sexual impotency (Liang et al 2019).

The plant, a member of the Ginseng Family (Araliaceae), is an aromatic perennial herb easily recognized by its single group of leaves, which measure 2.4-6 inches and feature conspicuously serrated edges (Fig. 1). It grows a solitary stem, reaching 8 inches to 2 ft in height, which is topped by one set of flowers. The flowers within this cluster are greenish-white and characterized by five stamens and two styles. Finally, the plant produces bright red, berry-like fruit that are about 0.4 inch in diameter. American ginseng is collected wild in northern U.S. States under a federally approved export program (Case et al. 2007). Due to extensive wild harvesting, the distribution of American ginseng has decreased in some northern states such as Minnesota, Wisconsin or Vermont largely because it is collected for use as a medicinal plant. In general, the wild population of ginseng has been depleted by

over-harvesting for commercial purposes. To combat this, states, such as Maryland, introduced a permit process for wild harvesters. Certain U.S. ports have been designated by the USDA APHIS as ports through which ginseng can be exported with markings such as “controlled collected” or “exported plant product”.

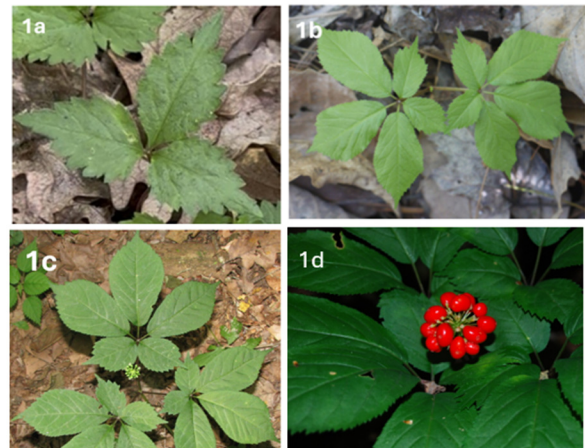


Figure (1a) Year 1 with 3-leaflets, (1b) Year 2-3 with 3 prongs, (1c) Year 3-4 with 3 prongs or leaves, (1d) Berries on 4+ year old ginseng plants..

Use of ginseng

Ginseng has been used for 5000 years, and the Asian and American varieties serve as an adaptogen that protects the body against stress and restores balance. While the observed benefits are promising, they are typically limited to a mild or moderate range

across various conditions, such as dementia, infections, cancer, diabetes, cardiovascular disorders, cognition, mood, the common cold/flu, cancer fatigue, and quality of life. With a good safety record in humans, ginseng is considered a valuable add-on therapy to standard medical treatments and an important dietary supplement for maintaining overall health (Zhou et al. 2023).

The most common way of consuming ginseng is as ginseng tea. Though all parts of the plant have medicinal value, the roots are used most extensively in traditional medicine, especially for its curative and restorative properties. Extracts of both the root and berry of American ginseng show antioxidant properties, as does ginseng leaf extract. Ginseng roots have been utilized for many purposes since its introduction including benefiting psychiatric and neurological conditions and enhancing vitality, especially by the people of China, Japan, and Korea.

Ecological properties

Ginseng is an obligate shade plant, meaning that it requires low light, and inhabits the understory of hardwood forests with well-drained, porous, and humus-rich soils. Ginseng is commonly found on upland north- and east-facing slopes. It is also found in coniferous forests and/or on south-facing slopes in soils composed mostly of sand and clay. Shade and loamy soils are requirements for thriving wild populations.

To grow American ginseng in Tennessee woodlands, there is no need to remove the canopy for light penetration. A soil with high organic matter (>10%), loamy texture (<20% clay), pH between 5-7, good water penetration, low slope (or raised beds for plantation), high P and Ca, and deep and high moisture soils are most suitable. To ensure adequate drainage, ginseng is usually planted on slight to moderate slopes. If terrain is flat, be sure to avoid areas with poorly drained soils. Some indicators of a good ginseng site include the presence of sugar maple (*Acer saccharum* Marsh.) and

tulip-poplar (*Liriodendron tulipifera* L.) trees with spicebush (*Lindera benzoin* L.), ferns (Polypodiophyta), goldenseal (*Hydrastis canadensis* L.), jack-in-the-pulpit (*Arisaema triphyllum* L.), and blue cohosh (*Caulophyllum thalictroides* (L.) Michx.) as understory vegetation.

Life cycle of ginseng

The growth and development cycle of wild-grown *Panax ginseng* is characterized by a significantly protracted timeline (Table 1 and Fig. 1a, b, and c).

Table 1: Growth stages of ginseng

Stage	Description	Key Characteristic
Year 1 Seedling	A ginseng seedling has three leaflets in the first year of growth.	3 leaflets on a single stem.
Year 2-3 Immature Plant	An immature plant with one leaf or prong with five leaflets.	1 prong (5 leaflets).
Year 3-4 Immature Plant	An immature plant with two leaves or prongs with each having five leaflets.	2 prongs (10 leaflets).
Year 5+ Mature Plant	A mature plant with three leaves or prongs . The plant is in flower and with immature, green berries.	3 prongs (15 leaflets) & fruiting.
Year 7+ Mature Plant	A mature plant with four leaves (prongs) . The plant is in flower and with immature, green berries.	4 prongs (20 leaflets) & fruiting.

The process required for a seed to develop into a mature, berry-producing plant spans 7-10 years, making ginseng a resource that requires long-term ecological management.

Status in Tennessee

Ginseng is listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in Appendix II for the Federal and international status and in the state of Tennessee it is marked as- S-CE (Special Concern - Commercially Exploited) which means any species or subspecies of plant which is uncommon in Tennessee, or has unique or highly specific requirements or scientific value and therefore requires careful monitoring of its status. According to its current market volume in Tennessee, it is classified as Commercially

Exploited, due to large numbers being taken from the wild and propagation or cultivation insufficient to meet market demand. American ginseng is of long-term conservation concern.

Site preparation for growing wild simulated American Ginseng

The goal in growing wild-simulated ginseng is to produce a root which resembles the appearance of a wild plant (Fig. 2). This allows the grower to receive higher prices. Growing in this method is almost always done exclusively from seed.

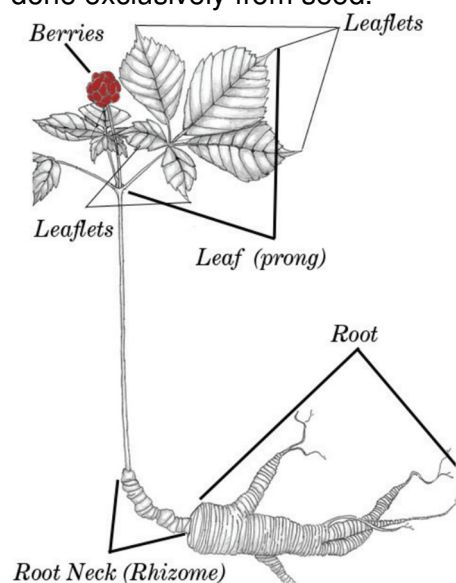


Figure 2- American ginseng plant diagram (US Fish and Wildlife Services)

It is crucial to recognize that ginseng, especially cultivated varieties, are susceptible to various diseases. A significant factor contributing to these ailments is excessive moisture combined with inadequate air circulation. Stagnant air in a humid environment can lead to severe disease pressure that is challenging to manage. Overcrowded plantings typically experience more disease problems compared to those that are well-spaced. Therefore, the initial step in preparing a wild-simulated ginseng production area involves removing certain understory trees and shrubs to foster an environment that

promotes better air flow around the ginseng plants.

If you have dense understory plants, it may be useful to prune the lower branches that have leaves to allow air circulation. The pruning can be conducted through the main wind direction.

Planting

In the fall, during leaf fall, stratified ginseng seeds can be sown at $\frac{3}{4}$ inch depth in the soil with 4-5 seeds planted in a square foot to yield at least one, but no more than three, ginseng plants per square foot (Fig. 3a and b).

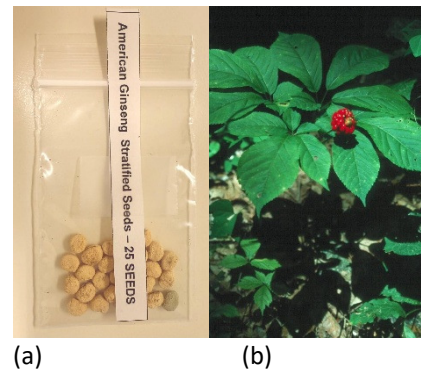


Figure 3 (a) Stratified seeds of American ginseng, (b) American ginseng flowers.

Covering the top of the seeds with one inch fall leaves will serve as a mulch. To monitor your plants, flagging can be used to mark your plantation area.

Seed selection

Seeds exhibit deep simple morphophysiological dormancy and take up to 2 y to germinate. Mature, stratified ginseng seeds exhibit an opening along one edge of the seed to initiate the germination process (Fig. 4). Both high summer temperatures and low winter temperatures are required to break dormancy.

Morphological dormancy cannot be broken until high temperatures overcome the first physiological dormancy and seeds are subjected to autumn temperatures.



Figure 4. Healthy, ready to grow ginseng seed (Lee et al. 2018).

Embryo growth occurs during winter. During stratification, seeds are subjected to warm temperatures during late summer and autumn. Remaining dormancy is broken by cold stratification during winter. Seed sources from the southern populations may germinate the first spring (Hsu 2002).

Harvesting and market for American Ginseng

The significantly higher market valuation of wild American ginseng and its depleted status due to over-harvesting, compounded by the regulatory framework of the Tennessee Department of Agriculture Ginseng Program, identifies wild-simulated cultivation as a viable and sustainable strategy for income generation. Matured ginseng can be harvested after 5 years but is more valuable if harvested after 8 years (Fig. 5). Wild ginseng can also be collected from the forest while paying attention to sustainability of the wild ginseng population. To ensure sustainability, leave a portion of mature plants as a seed reserve and sow seeds from wild berries immediately after harvesting. Additionally, always adhere to the established collection season calendar.

Ginseng roots can be collected and sold wet or dry. When they are dehydrated, ginseng can lose two-thirds of its weight due to moisture loss. Since the dry ginseng is more valuable, it yields greater financial returns. Market values for dry American ginseng vary drastically depending on its origin, with wild

American ginseng historically commanding a substantial premium at \$8,090 per pound, compared to cultivated American ginseng, which typically yields an expected retail value of around \$254 per pound (Arik et al. 2020).

Legislation / permission

Tennessee Department of Agriculture has regulations that need to be followed for ginseng harvesting, growing, selling, buying or being a dealer <https://www.tn.gov/environment/natural-areas/what-we-do/permits-licenses.html>.



Figure 5. Counting the age of the ginseng root. Each scar represents one year of the plant's above-ground growth.

The collection of wild ginseng for sale or personal use in Tennessee is permitted on private lands with permission from the landowner from September 1st through December 31st each year. Plants must have three or more prongs and mature red berries and the berries must be replanted after harvest. Tennessee does not issue permits to dig/collect ginseng for personal use or sale in Tennessee State or Federal forests, however, any ginseng dealer who purchases ginseng collected in Tennessee for resale or export out of state is required to obtain a ginseng dealer permit. The legal "buying season" for ginseng in Tennessee from wild harvesters is from September 1st for green roots and September 15th for dry roots through March 31st.

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