



Medicinal Herb Production Guide

Jackie Greenfield, M.S.
Jeanine M. Davis, Ph.D.

American ginseng (*Panax quinquefolius* L.)

Introduction

Botanical Information

American ginseng, *Panax quinquefolius*, is native to eastern North America and can be found in rich woodlands from Quebec to Alabama, west to Minnesota, Missouri, and Nebraska. A member of the Araliaceae family, it is an herbaceous perennial and grows as an understory plant in densely shaded deciduous hardwood forests. Ginseng emerges in late April from a dormant bud on the upper end of the root. The plant grows to a height of twelve to twenty-four inches and has three compound leaves, with five toothed leaflets, that are joined at the top of an erect stem. Greenish-white flowers bloom in late spring or early summer. Green berries follow and ripen to red by late summer. Each year, when the leaves die back in the fall, a scar is imprinted on the top of the root. The age of the plant can be determined if all of the scars from a root are counted. The root is harvested anywhere from four to ten years old, or older, depending upon cultivation methods. It is the root and seeds (rarely the leaf) that are sold commercially.

Ginseng is a valued plant to many people in the Southern Appalachian region and has earned the reputation as "green gold". Marj Boyer, North Carolina Department of Agriculture and Consumer Services, Plant Protection Section, estimates that it takes over three hundred dried roots to make a pound of wild harvested ginseng. In an effort to conserve and protect this native species, cultivation is to be encouraged.

Bioactive Components

The main bioactive components of ginseng are a diverse group of steroidal saponins called ginsenosides. As many as twenty-five different ginsenosides have been separated and cataloged as existing in the root of the ginseng plant. Ginsenosides demonstrate an ability to act on different tissues in the body in different ways. Research into the function and relevance of the various ginsenosides in medicine has been complicated by these sometimes contradictory and confusing reactions.

Uses and Treatments

In North America and Europe, ginseng is used to relieve stress, increase energy, and improve mental acuity. In China and other countries of Asia, it has achieved almost mythical status as a cure-all. Some of its uses according to Chinese medicine include curing sexual impotence, nervousness, vomiting, and dyspepsia. In Germany, *Commission E* approves ginseng for the treatment of fatigue. Some of the medicinal uses of ginseng are listed in Table 1.

Table 1. Modern and traditional uses of ginseng.

<u>Modern Uses</u>	<u>Traditional/Folk Uses</u>
<ul style="list-style-type: none">- <i>Reverses/prevents cognitive loss</i>- <i>Boosts the immune system</i>- <i>Improves physical performance</i>	<ul style="list-style-type: none">- <i>Gastric disturbances, vomiting</i>- <i>Impotence and sterility</i>- <i>Rheumatism and debility</i>

Cultivation Practices

Site Selection

Wild harvested material describes ginseng that was harvested from native and naturalized sites and has not been planted or cultivated by humans. It brings the highest prices of any ginseng on the market. There are three different methods of growing ginseng. *Wild simulated* describes ginseng grown in the forest with little or no maintenance, taking more years to harvest, but often bringing in a comparable price to wild harvested material. *Woods grown* ginseng describes the method of planting ginseng in the woods, in prepared beds, using the forest trees as a natural canopy. This type of ginseng sells for substantially less than wild harvested or wild simulated roots but produces a larger crop much faster. *Field grown* ginseng is cultivated in beds and grown under an artificial shade structure. This method produces the highest yields in the shortest period of time, but the market value is the lowest.

Wild simulated and woods grown are the methods recommended for the North Carolina mountain areas. Seed and root chilling requirements for ginseng can be satisfied with the temperatures that are typical of North Carolina mountain winters, and many of the forests are very suitable for growing ginseng. Choose an area with conditions that closely resembles where ginseng naturally grows. A north or east-facing slope with good surface drainage is ideal. The soil should be moist, but well drained throughout. Root diseases can cause many problems in wet soils. A 75% shade canopy is necessary, as excessive light can cause bronzing of the leaves and early death of the tops. The ideal soil is a loam with high organic matter and a pH of 5.5. Additional compost can be added, to improve soil tilth and fertility. Heavy clay or light sandy soils should be avoided.

Locate your planting site where woodland plants, like trillium, bloodroot, mayapple, and wild ginseng already grow. Tree species including walnut, oak, poplar, and basswood make an excellent canopy for ginseng. Avoid planting under conifers or other shallow-rooted trees as they compete with ginseng for soil moisture and nutrients. The cost of securing the ginseng crop must also be considered. Wild simulated and woods grown ginseng are especially vulnerable to poachers. As a result, planting should only take place in areas that can be closely monitored.

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Planting

Fall planting is recommended for both seeds and roots. Before ginseng seeds will germinate, a long period of stratification is needed. The seed must be exposed to warm moist temperatures, then cold temperatures. Typically, the seeds will germinate the second spring following a fall harvest of the berries. In, *Care and planting of ginseng seed and roots*, Jeanine Davis, North Carolina State University, writes, "Commercial seed suppliers store seed for a year and then market it in the fall as stratified seed. Fall planted, stratified ginseng seed will usually emerge the following April to June. Fresh, non-stratified (green) ginseng seed may be planted immediately after harvesting the berries. Seeds will stratify naturally in the seedbed over the next year and a half, although loss to rodents and disease may be quite high. The seeds must never be allowed to dry out." To learn more about stratification methods for ginseng seed, go to the website, <http://www.ces.ncsu.edu/fletcher/staff/jmdavis/bot.html>.

Once the planting site has been chosen, decide what method of planting suits your needs. For *wild simulated*, clear out the brush and rake the leaf mulch aside in the areas you will be planting. If direct seeding, work the soil surface into a fine seedbed; if setting roots, work the ground deeper. To prepare the soil for *woods grown* ginseng, much of the underbrush will need to be cleared out. Raised beds are the recommended planting method for woods grown. The beds should be tilled several times, with generous amounts of organic matter worked in. If lime is needed, add it at this time.

Davis recommends the following planting methods for seeds and roots. "To plant seeds, place seeds one-fourth to one-half inch deep, spacing seeds one to six inches apart in rows six to nine inches apart. There are approximately eight thousand ginseng seeds per pound. To retain soil moisture and winter protection, mulch seedbeds with one to two inches of shredded hardwood bark, aged leaves, or composted sawdust, immediately after planting. To plant roots, place the ginseng root in the soil, at a slight angle, 30-45^o, with the bud one inch below the soil surface. Space plants three to twelve inches apart in rows six to twelve inches apart. Mulch recommendations are the same as for planting seeds."

If transplants are used, they can be started from seed using deep flats or in a shaded planting bed. Plant seeds two to three inches apart in a prepared soil mix or in a prepared bed with adequate organic matter. Richo Cech, author of *Growing at Risk Medicinal Herbs*, recommends waiting until seedlings are two to three years old before transplanting out into permanent beds. Fertilize with generous amounts of finished compost. Transplant into permanent beds using the spacing recommended above for planting roots. Keeping weeds under control is very critical the first few years.

One of the biggest challenges to growing ginseng is the attraction other animals have for the plant and seeds. Ginseng is defenseless against rodents, turkey, and deer, for example. The plants need to be monitored and protected against these animals, and are especially vulnerable when newly seeded. Fencing in beds may be necessary. If slugs are a problem, rake some of the mulch away from the plants, and either hand pick the slugs at dusk or apply an organic control. Human poachers, by far, have had the greatest impact on private ginseng patches, as they often dig up whole populations of ginseng, leaving nothing behind.

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Insects and Diseases

There are many diseases that can affect ginseng, especially in field cultivated, mono-crop systems. The book, *Index of Plant Diseases in the United States*, lists the following diseases for *Panax quinquefolius*: *Alternaria panax*, alternaria blight, root rot; *Armillaria mellea*, root rot; *Botrytis cinerea*, gray-mold blight, stem rot, seed rot; *Colletotrichum dematium*, secondary leaf spot; *Fusarium scirpi*, root rot, wilt; *Meloidogyne* sp., root knot nematodes; *Phytophthora cactorum*, root and stem rot, downy mildew; *Puccinia araliae*, rust; *Pythium debaryanum*, damping-off; *Ramularia* spp., root rot; *Rhizoctonia solani*, damping-off, root rot; *Sclerotinia sclerotiorum*, white rots of rhizomes; *S. smilacina*, black rot of rhizomes; *Septoria* sp., leaf spot; *Thielaviopsis basicola*, black root; and *Verticillium albo-atrum*, wilt.

Harvesting, Cleaning, and Drying

Ginseng plants are harvested, in the fall, usually after three to ten growing seasons, depending upon cultivation method. Harvesting begins after the berries have ripened on the plants. The following harvesting and drying techniques have been taken from Davis' publication, *Ginseng: a production guide for North Carolina*. "Before harvest, remove the mulch and the tops of the plants from the beds. In artificially shaded plantings, take down the shade structure. Removing the shade and mulch helps to dry the soil and to make digging easier. Minimize root injury by exercising care when harvesting. Spades or forks can be used for harvesting most plantings; large-scale growers can use mechanical diggers, similar to potato harvesters. Digging is easiest when the ginseng is grown in raised beds. Gather whole roots and promptly put into baskets or boxes. Carefully wash all soil from the roots with clean running water and take care not to damage or destroy feeder roots or the neck of the root. Do not scrub or skin the roots, and do not attempt to remove natural soil stains in the skin of the roots."

Roots must be dried for storage and marketing. Drying can best be accomplished by exposing the roots to warm, dry, moving air. A simple method is to create a drying room. Spread the roots evenly in a single layer on a screen-bottom tray to allow maximum ventilation. A fan and small heater can be used to circulate and warm the air in the drying room. In general, the temperature should not exceed 95⁰ to 100⁰ F. If humidity is very high, it might be necessary to raise the temperature to dry the roots thoroughly. If the roots dry too quickly, the exterior will darken, reducing their value. Use a dehumidifier or ventilation fan to remove moisture from the drying room. Tobacco barns, kilns, and dehydrators of various kinds can also be used. Just remember to keep temperatures low and air flow high.

"Once the roots are dry, place them in clean cardboard barrels or boxes. Do not place them in plastic or other airtight containers because mold and mildew could develop on the roots. Store the roots in a cool, dry, atmosphere and free from rodents and insects."

Ginseng Regulations

Ginseng trade is monitored by state agencies in cooperation with the U.S. Fish and Wildlife Service, to watch that wild American ginseng does not go extinct through over collection. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was formed to provide a mechanism to regulate and monitor international trade in wild plants and animals, and their parts and products. Wild ginseng is currently listed by CITES in Appendix II as a species that may be traded internationally through the use of export permits, thus, a permit must be obtained before exporting ginseng roots. For permit applications and more information, contact the Office of Management Authority, 4401 N. Fairfax Drive, Room 700, Arlington, VA 22203. Telephone number is 1-800-358-2104, and website address is: <http://international.fws.gov>.

In North Carolina, the North Carolina Department of Agriculture and Consumer Services (NCDA&CS), Plant Industry Division, oversees the ginseng trade through its Plant Conservation Program. Ginseng is a legally protected plant in North Carolina, ranked as Special Concern, and is subject to certain regulations. Following are a few excerpts from NCDA&CS, *Ginseng in North Carolina: what you need to know*, <http://www.agr.state.nc.us/plantind/plant/conserv/sangno.htm>:

"A ginseng grower or digger needs a North Carolina ginseng dealer's permit if the grower/digger intends to sell roots directly to an out-of-state buyer rather than to a North Carolina-registered dealer. The permit is needed only when the ginseng is to be sold."

"No permit is needed to grow ginseng to be harvested only for the roots. If intending to sell live plants, the grower needs a nursery certificate, issued by the local NCDA&CS plant protection specialist. Growers should keep records to show that their ginseng is not wild, since there is always the possibility that future regulations may restrict the sale of wild ginseng."

"Anyone collecting or dealing in live ginseng plants intended for replanting must obtain a Collected Plant Certificate and/or Nursery Dealer Certificate from NCDA&CS. Live ginseng plants are subject to plant pest regulations."

Additional information on North Carolina ginseng regulations can also be found at: <http://www.ncagr.com/plantind/plant/conserv/48f03c.htm#.0305>. A North Carolina ginseng dealers list is available from NCDA&CS. For questions or additional information, contact Marjorie Boyer at Marj.Boyer@ncmail.net.

Marketing and Economics

Annual Consumption and Dollar Value

Wild simulated: Approximately 30,000 pounds of wild harvested and 16,000 pounds of wild simulated material made its way to market in 2001. Harvested pounds of "true" wild ginseng continue to drop. The combined consumption of wild-harvested and wild-simulated material represented about 1.2% of the total ginseng harvest for 2001.

Wild simulated ginseng carries the highest price per pound for dried root of ginseng. The dollar value of the 2001 consumption for wild-harvest and wild-simulated material was about \$12.1 million. Of that amount, wild-simulated material accounted for \$4.5 million in sales. A large "black market" in the trade of wild ginseng exists in North America. The numbers reported here for wild harvest material are based on official harvest estimates gathered from licensed ginseng sellers. They do not include any estimate of the black market trade in dried root.

Woods cultivated: Consumption of woods cultivated ginseng is small to moderate in terms of harvested pounds per year. The market for this material is still relatively undeveloped. In 2001, approximately 80,000 pounds of this material was sold on world markets, representing 2.5% of the ginseng used in 2001. The dollar value for this material in 2001 was approximately \$10 million or 14.5% of the total ginseng market.

Field cultivated: Use of field grown ginseng is large in terms of harvested pounds. In 2001, approximately 3.9 million pounds was harvested in North America and sold on world markets. Canada produced 60% of the harvest in 2001 with the United States contributing the remaining 40%. This represented 96.2% of the total consumption of ginseng in 2001. In dollars, consumption of this material was approximately \$47 million, representing 68.1% of the ginseng market in 2001.

Supply and Demand

Wild simulated: Large quantities of wild simulated ginseng began entering the market in fall of 2000. Since then, it has exhibited strong demand from Asian customers who had exclusively purchased wild harvested ginseng in the past. Over 90% of the wild simulated harvest is destined for the Asian markets. Much of this material moves through the demand chain in its whole-root form, all the way to the consumer. Favorable comparisons to "true" wild harvest ginseng are essential to growth prospects. Most buyers of this product are brokers representing many distributors throughout Asia. The material is collected, stored, and shipped to ports in Asia for final dissemination. Most ginseng trade to and from North America still takes place through the port of Hong Kong.

Woods cultivated: Supply and demand are currently very stable for woods cultivated ginseng. Buyers and sellers in this market tend to be well integrated with one another. Customers of this material tend to be small-to-medium size extract producers who serve the needs of a slowly growing intermediate and retail market. Consistent demand enables suppliers to anticipate the needs of the market very efficiently. Like wild simulated

material, significant quantities of this material started coming to the market in fall of 2000. With the growing popularity of organic growing methods and organic certification, demand will increase for organic woods cultivated ginseng.

Field cultivated: Most of this ginseng is processed into extract or is powdered by large-scale operators. Supplies of field cultivated ginseng currently exceed demand. Strong imbalances over the past nine years drove prices down. Supply has begun to drop as many growers are forced to exit the market. Other segments of the nutraceuticals market will fuel added demand for field grown ginseng by incorporating it into functional foods, health beverages, and animal products. Buyers may have minimum bioactive constituent requirements for field grown ginseng. Demand should keep this material in a gently upward sloping trend for the next three-to-five years. Favorable clinical results are also very important to the growth potential of this material.

Pricing

Wild simulated: As harvest volumes continue to decrease for wild harvested ginseng, volumes of wild simulated harvest continue to increase. In 2001, prices ranged from \$190-\$250 per pound for dried root. The price of wild simulated material will probably increase over the next two-to-four years as harvests of "true" wild material continue to decrease. Growers of this material will increase harvest cycles in the hope of achieving more favorable comparisons to "true" wild material. As this material approaches the physical characteristics of "true" wild material, its price pattern will become more erratic.

Woods cultivated: Although this market is relatively immature, price patterns have remained very stable in a moderate price band. These patterns are the result of the high degree of integration among growers and buyers. In 2001, prices for this material ranged from \$60-\$110 per pound of dried root.

Field cultivated: Field cultivated ginseng was in a declining price pattern from the mid-1990's to the middle of 2000. Although demand continued to increase at a modest rate throughout this period, too much supply flooded the market putting downward price pressure on this commodity. Only recently has enough supply dropped out of the market to stabilize prices in a low-to-moderate price band. Prices in 2001 for this material ranged from \$10-\$14 per pound of dried root.

Distribution Channels

Distribution channels are very specialized for wild simulated ginseng. Growers deal with established "wild" ginseng brokers who work for clients in Asia. Demand in this market is fueled by qualitative rather than quantitative measures. Growers must be able to meet the requirements of the broker to gain a price relative to wild harvested material. For woods cultivated ginseng, a small number of well-established growers deal mainly with ginseng brokers representing Asian interests. Some growers sell directly to small-to-medium size extract producers and export companies. Field cultivated ginseng distribution channels are highly structured and vertically integrated. Many large growers deal directly with large extract producers on a contractual basis or as a fully integrated supplier. Many smaller growers have formed cooperatives through which they negotiate with buyers.

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Commercial Visibility

The ginseng market is highly visible throughout the world. Of the leading nutraceutical/botanical companies in North America and Europe, 43% offer ginseng as a stand-alone product, and 62% offer ginseng as either a stand-alone product or as part of a multi-constituent supplement.

Conclusion

In essence, the entire world supply of wild simulated ginseng comes from growers in North America. These growers are small-scale operators that produce ginseng in remote locations for fear of poachers. A typical area for wild simulated ginseng rarely exceeds one-half acre. On the other hand, growers of woods cultivated ginseng may have two or more acres under cultivation.

Although field cultivation of American ginseng is occurring in Europe and Asia, these endeavors are small in scale and have not made any significant impact on the supply structure of this material. North America is still the dominant supplier of this product. Large-scale pockets of cultivation are located in Marathon County, Wisconsin, large portions of Canada, and the northwestern United States.

The physical resemblance to aged, wild harvested ginseng is vital to the market value for wild simulated ginseng. Generally, this material must be at least ten years old from direct seeding to command prices close to "true" wild harvested ginseng. Buyers for woods grown dried root material require a threshold level of 5% ginsenosides, an absence of chemical residuals, and for some buyers, a certified organic product. Customer requirements for field grown material are similar to woods grown, except the prices paid are much less.

With ginseng's protective status under CITES and NCDA&CS Plant Protection Division, cultivation is to be encouraged. Native populations would then be allowed to regenerate and multiply.

This Medicinal Herb Production Guide includes excerpts from, Analysis of the economic viability of cultivating selected botanicals in North Carolina. Strategic Reports. 2002.

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