



***Produced by the Special Forest Products Program at Virginia Tech in collaboration with:
USDA Forest Service, Southern Research Station, SRS-4702, Blacksburg, Virginia;
Top of the Ozarks Resource Conservation & Development, Inc., Houston, Missouri; &
Missouri Department of Conservation, Jefferson City, Missouri.***

Ginseng



American ginseng (*Panax quinquefolium*) grows wild in the eastern half of North America.

This perennial herb inhabits hardwood forests on well-drained, north-and east-facing slopes in predominantly porous, humus-rich soils. Ginseng also grows on southwest-facing slopes, in soil where sand or clay is characteristic, and in forests with conifers and softwoods.

Wild and cultivated ginseng produce an annual crop in the United States and Canada valued in excess of \$25 million. The price of wild root is about three times that of cultivated root. Because ginseng root is valuable, many overzealous collectors dig all plants from wild populations. They often fail to reseed, and as a consequence, there is serious concern about the survival of American ginseng in the forest ecosystem. Some diggers consider wild ginseng free to exploit, but such collecting is a criminal act in many states unless one owns the land or has permission to dig.

Woods-grown ginseng is an alternative to wild exploitation. It is an intensive culture of field-cultivated ginseng. Wild-grown ginseng is an expensive venture, requiring valuable land, high-cost artificial shade and costly maintenance for four or five years before a harvest. Is there an alternative to commercial collection of wild ginseng that will help conserve the species in its natural habitat while providing an income for the ginseng grower with a modest investment?

Woods-grown refers to the use of natural forest canopy for shade. Cultural techniques vary from simulating forest conditions (wild-simulated ginseng) to approximating the practices used in culturing ginseng under artificial shade (cultivated). A grower should adopt those procedures compatible with the local conditions. The ginseng grower would find wild-simulated ginseng more feasible the more limited the yearly investment.

Greatest demand, largely from the Orient, is for root that is old, variously shaped and forked, moderate in size, stubby but

tapering, off-white, firm when dry, and with many closely formed rings. Aged and slowly grown roots are preferred and bring the highest prices. Field-grown, sometimes heavily fertilized, cultivated roots often are harvested when relatively young. These generally lack many of the characteristics typical of wild roots, are less in demand and lower in value.

In addition, selling seeds to other growers may provide a small income several years after planting, and 1 or 2 year old seedlings may also be sold. The seed crop may also be of value in expanding one's own plantings.



Natural habitat

The Ozark Plateau, Appalachian-Allegheny Mountains, and river bluffs and hilly outcrops elsewhere in eastern North America abound in habitats suitable for growing ginseng. Often these areas are only marginal for growing most crops, but even small wooded ravines and hollows may be desirable areas for long-range ginseng culture. While ginseng collection has historically centered in mountain regions, producers are beginning to focus more attention on the piedmont region for production. Piedmont environments offer many of the same characteristics needed for production with the benefit of decreased incidence of theft.

Choose a well-drained upland area a few square yards to an acre or more that is shady

and slopes toward the north or east. For adequate drainage, soil should be light and loose with rocky or porous subsoil such as that in limestone or sandstone areas. Avoid hardpan and sites lacking good soil moisture. Sites that won't support other herbaceous growth are generally unsuitable for ginseng.



As a guide to appropriate sites, look for indicator plants, i.e., those that often grow among naturally occurring ginseng populations. Besides the usual deciduous trees (ash, basswood, elm, hickory, sugar maple, red oak and white oak), herbaceous perennials that include the rattlesnake fern (*Botrychium*), spleenworts (*Asplenium*), jack-in-the-pulpits (*Arisaema*), May apple (*Podophyllum*) and wild gingers (*Asarum*) indicate suitable habitats.

Ginseng requires at least 70 percent shade to develop successfully during the season. The site must have a tree canopy. However, to maximize aeration and minimize competition, the shrubby and herbaceous understory may be trimmed or removed provided the disturbance is minimal.

Little is known of the soil requirements for wild American ginseng. It grows best in well-drained, porous soils with topsoil rich in humus formed from hardwood and other leaf litter. Natural populations tolerate a wide range of pH, and grow in soils that vary greatly in level of other soil nutrients. Indications are that the species prefers a pH range of 5-6. The addition of lime to raise soil pH to this range may be desirable. Avoid very sandy or clayey soils. Many veteran growers have observed that adequate calcium is equally as critical a soil factor as pH for successful ginseng production.

Leaf litter is important as an organic fertilizer and for mulching. Light mulching in addition to natural leaf fall helps retain moisture, prevent leaching, maintain humus levels, and minimize frost heaving and damage. Otherwise, habitat preparation should be restricted to removing troublesome weeds and branches.



Wild-simulated woods-grown ginseng

If fresh seeds are not available from wild populations or local growers, purchase seeds

that have been properly stored since harvest (August through October) during the current or previous year. Proper storage (or stratification) consists of holding seeds under conditions that approximate the natural environment of the forest soil—a protected site that is never permitted to dry completely. Freshly extracted seeds may be mixed with equal parts of clean, damp sand and placed in a screened box (to exclude rodents), partly buried in well-drained soil, and covered with mulch to prevent drying and admit rainfall. Plant fresh or stratified seeds in the fall; spring planting is less desirable.

Fall planting as early as September is recommended. If seeds are fresh, and within the moist pulp of the red fruit, squeeze them out (usually two per fruit). Plant the seeds immediately so they do not dry; planted this way, many seeds (at least in the South) will germinate the following spring. They also should be disease free. Some seeds require another year before germinating. If you are cleaning many seeds, rub them on a wire screen and wash them with water to get rid of the pulp.

Seeds should be planted about 1/2-inch deep and six inches or more apart. Alternately, seeds may be scattered on the soil, after raking to remove litter and loosen the soil surface. Then recover with the litter. One or 2-year old seedlings can be planted, too. The hole or spade cut should be sufficiently deep to accommodate the taproot without cramping and to cover the terminal bud with one inch of soil. Roots need not be exactly

vertical since wild roots frequently grow at an angle, even horizontally, in the soil.

Wild-simulated woods-grown ginseng requires little maintenance. Adding light mulch to the natural leaf litter is appropriate. Minimal use of pesticides may be necessary if pests threaten a planting, and some use of fertilizers may prove valuable (see discussions below). Weeding out major intruders is also appropriate. Keep plants well separated for maximum aeration. As already noted, plant different stock at distinct sites and disinfect seeds purchased commercially. Footpaths for access should be included at the site.



Harvest

During the first year of growth under natural conditions, the above-ground portion of ginseng has three leaflets (like a strawberry). The second year it usually has five leaflets, and in subsequent years two, three, or four prongs with three to five leaflets in each prong. This progressive development of prongs is not necessarily annual; rather, the plant often remains in the two-prong stage for several years and even longer in the three-prong and four-prong stages. Harvesting may occur before plants reach the four-prong stage. Flowers usually develop during the two-pronged stage and a limited number of fruit may mature. By the time the three-prong plants form, you can expect a full complement of 20-40 fruit.

The majority of plants grown to simulate the wild condition will not reach a desired root size and maturity until 9-10 years after planting. However, you can remove flowers annually from two- and three-prong plants in increase root size and decrease harvest time by a year or so. If flowers are not removed, annual seed crops are possible after four or five years. Seedlings can also be sold should thinning prove necessary during the first few years.



Ginseng

Dig roots in the fall as the above-ground parts die back. Carefully expose the underground stem (rhizome) at the base of the above-ground portion, and follow its often horizontal length until it joins the top of the true root. Remember that the taproot may be forked and that it has many diffusely branches rootlets. Expose the whole root and

rhizome intact, remove loose soil, and as soon as possible wash, but do not scrub, the remaining soil from the root (a little soil left around the root rings may enhance its value).



Processing

Forked root of old ginseng plant are of higher commercial value. Spread cleaned roots on screen racks for drying. Turn them frequently and provide adequate aeration. Drying time varies with root size and drying techniques: large roots require three or more weeks to dry at room temperature or outdoors, but small roots dry in a few days. More rapid drying is possible, with artificial heat at about 90F, using exhaust fans to expel moisture. Do not oven dry; such drying is too rapid and roots may discolor. Store dried roots in a dry, airy, rodent-proof place until ready for sale.

Usually the price for roots is best between November and April, but since price often fluctuates sharply, a grower should sell cautiously even during this period.



Cultivated woods-grown ginseng

Except for the choice of habitat, growing cultivated ginseng in the woods differs markedly from growing wild-simulated ginseng. Even site details vary. A larger continuous area for intensive cultivation may be desirable, and a radical removal of

all understory (small trees) and even some larger trees may be necessary. A canopy shade of more than 70 percent must be maintained.

The more intensively cultured plantings of ginseng seek to maximize yield in minimum time. They minimize competition by bedding and by growing dense plant populations. Some growers also add complete fertilizers and/or organic fertilizers.

Soil is tilled to a depth of six to eight inches. Lime may be added to adjust pH to 5.5 or higher. Some growers add a balanced fertilizer, such as 14-14-14, before planting; organic fertilizers may also be added. Four- to six-foot wide beds are elevated six to eight inches with a low walkway between them for maximum water runoff. In addition, beds should slope gently downhill so that the roots never stand in water. Beds should not be elevated on steeper slopes where serious erosion could occur.

Seeds (or seedlings) are usually planted closer than six inches (only two to three inches apart when simulating field-grown conditions) in rows 6-12 inches apart at a depth of 1/2 inch. Beds are then covered with one to two inches of leaf mulch or clean straw. Fresh or stratified seeds and seedlings preferably should be planted in the fall after disinfecting all stock purchased from large commercial sources.

Organic and chemical fertilizers enhance plant growth, but the more they are used, the

more the roots will resemble the lower valued field-grown ginseng. A top dressing of balanced or complete chemical fertilizers is desirable. Also, organic fertilizers such as bone meal or blood meal (repellant to deer and rabbits) can be added periodically during the growing season. Cover beds annually in the fall with leaf mulch or clean straw.

Growers recommend weeding beds routinely, removing flowers as desired and applying pesticides. Application of fungicides, particularly for stem and leaf blight (*Alternaria*), may be necessary weekly when rain or dew is heavy. Some growers suggest maneb (e.g., dithane M-22). Plants heavily infected with *Alternaria* may be removed, soaked in maneb solution and planted away from the main site. Additionally, insecticides may be needed to control lygus bug, white fly, aphid, leaf beetle and other insects. Growers variously recommend the organophosphate malathion or the plant-derived biodegradable pyrethrum or rotenone. Since pesticides don't affect some diseases of ginseng, diseased-appearing plants should be removed and destroyed as soon as they are observed. Use of pesticides should be minimal during the final year of growth before harvesting.

Larger animals also may be serious pests. Moles, mice and slugs can be destroyed with poison baits placed in appropriate holes or on paths and beds. It may be necessary to surround each site with a vertical metal shield buried one foot in the ground and

exposed about two feet above ground to keep out the majority of these pests.

You can harvest roots using a potato digger or by hand with an appropriate tool. Drying procedures parallel those described above.

For reasons not understood, it is not always possible to culture a second crop of cultivated, densely grown ginseng at the same site as the original crop. This is a concern in the northern United States, Ontario and parts of Asia. Apparently, it is less important in the southern United States where growers report three successive crops of ginseng before a major reduction in production occurs, and others produce good crops after fallow periods of two years.

Debate still continues on the range of allowable conditions for successful ginseng production. For example, many collectors and growers believe that ginseng may only be grown under hardwood shade and soils. However, preliminary research from West Virginia suggests that as long as favorable soil and environmental conditions are met, ginseng can grow quite successfully under white pine shade.

Other risk factors are biological in nature and include the non-sustainable management of native American ginseng populations and the control and management of ginseng pests and pathogens. High prices paid for American ginseng and ease of theft have created non-sustainable harvesting conditions throughout ginseng's natural range. Because of its scarcity, when found in

the wild ginseng is often harvested before it reaches seed bearing maturity. Consequently, ginseng is now listed as a threatened or endangered plant in many states. Similar conditions caused the extermination of wild ginseng populations in China.



Marketing

A natural outgrowth of collective protection against poaching, neighborhood or area growers can realize economic benefits by forming grower cooperatives. By collectively pooling their resources, cooperatives allow individual growers greater control over ginseng marketing, including building long-term relationships with overseas buyers, access to education programs, and information transfer.

As much of the U.S. ginseng crop is exported to the Orient, long-term relationships with these markets are crucial. However, because foreign markets are not generally not interested in small producers marketing directly, individual growers must sell their ginseng to a domestic buyer, who then gathers adequate quantities for shipment to the orient. Obviously, small growers stand to realize greater gain from their efforts by eliminating the middleman and marketing directly, via a growers' cooperative, to overseas buyers. To aid in the development of cooperatives, experienced growers are collaborating with state, federal, and private natural resource agencies to implement education programs

on ginseng production and marketing to landowners. Additionally, tools such as ginseng value grading systems have been developed to effectively transfer the marketing knowledge of seasoned growers to novices. For the veteran grower, new growers entering the market are generally welcomed for multiple reasons: new growers must purchase seed until their own plants produce seed; they lend strength to existing cooperatives, or help to form new marketing alliances; and they help to police other growers' crops from theft.

Domestic growers also have two more factors working in their favor: lack of adequate oriental environments for ginseng production and very high demand. Years of poor forest management practices have stripped oriental forests of needed hardwood cover and fertile soils for ginseng production. Lack of suitable growing environments combined with a huge demand (approximately 1/3 of the world's population) creates what may be viewed as a "bottomless market" for domestic growers. Consequently, savvy growers will realize that there is much to be gained by encouraging new growers to enter the market.

There is yet one more way to increase income from ginseng production. Rather than selling raw or green ginseng to overseas markets, some enterprising growers are processing and marketing ginseng into value added products. For example, a grower in Kentucky currently processes part of his ginseng harvest into a berry/ginseng

conserve. While only a small percentage of the total product volume is ginseng, the value added price per pound is about 1.5 times that of raw product marketed overseas. Greater numbers of value added products and domestic demand for ginseng should act to increase the price overseas buyers are willing to pay for U.S. grown ginseng.



References and information resources

(There are several publications available on ginseng and its production. We have listed just a few here. You may be able to find some of these or other publications in your local library. Another valuable resource is your local cooperative extension office.)

Beyfuss, Robert L. 1998. American Ginseng Production in New York State. Cornell Cooperative Extension of Greene County. Cairo, NY.

Beyfuss, Robert L. 1999. Economics and Marketing of Ginseng. Agroforestry Notes, Forest Farming # 4 (July) USDA Forest Service, USAD NRCS, National Agroforestry Center, Lincoln, Nebraska.

Hankins, Andy. 1999. Producing and Marketing Wild Simulated Ginseng in Forest and Agroforestry Systems. In: Proceedings of the North American Conference on Enterprise Development Through Agroforestry: Farming the Agroforest for Specialty Products. Ed: Scott J. Josiah. Pg. 85-91. October 4-8, 1998.

Center for Integrated Natural Resources and Agricultural Management, St. Paul, MN.

Hankins, Andy. 2000. Producing and Marketing Wild Simulated Ginseng in Forest and Agroforestry Systems. Alternative Agriculture Publication 354-312. Virginia Cooperative Extension.

Hutchens, Alma R. 1991. Indian Herbage of North America. Shambhala Publications, Inc., Boston. 382 p.

Miller, Richard Alan. 1998. The Potential of Herbs as a Cash Crop. Metairie, Louisiana. Acres USA, Inc. 230 p.

Miller, Richard Alan. 1988. Native Plants of Commercial Importance. Grants Pass, Oregon. Oak, Inc. 343 p.

Persons, Scott W. 1994. American Ginseng: Green Gold. Bright Mountain Books, Inc. Asheville, North Carolina. 203 p.

Persons, Scott W. 1999. Growing American Ginseng in its Native Woodland Habitat. In: Proceedings of the North American Conference on Enterprise Development Through Agroforestry: Farming the Agroforest for Specialty Products. Ed: Scott J. Josiah. Pg. 74-84. October 4-8, 1998. Center for Integrated Natural Resources and Agricultural Management, St. Paul, MN.



Electronic resources

(Several web sites now carry information on the cultivation and resources needed for ginseng cultivation. Several published references reflect the work being done with ginseng by researchers and extension experts.)

Medicinal Plants Society

<http://agebb.missouri.edu/mac/links/index.htm>

National Agroforestry Center, Missouri

<http://www.unl.edu/nac/>

Missouri Department of Conservation

http://www.conservation.state.mo.us/nathis/f_lora/ginseng/ginseng.html

Virginia Cooperative Extension

<http://www.ext.vt.edu/pubs/forestry/354-312/354-312.pdf>

<http://www.ext.vt.edu/pubs/forestry/354-312/354-312.html>



This fact sheet was written and prepared by Soumitri Das, Laura Shillington, and Tom Hammett at the College of Natural Resources, Virginia Tech, Blacksburg, Virginia.



This is part of a series of fact sheets on special forest products. The full set of fact sheets is available at the Special Forest Products website: <http://www.sfp.forprod.vt.edu/>

Please give us your comments on this fact sheet and suggestions for future fact sheets. Direct your comments to Tom Hammett, Department of Wood Science and Forest Products, 210 Cheatham Hall, Virginia Tech, Blacksburg VA 24061-0323. Phone: (540)-231-2716. E-mail: himal@vt.edu.

© January 2001

The United States Department of Agriculture (USDA) prohibits discrimination in its programs on the basis of race, color, national origin, religion, age, disability, political beliefs, and marital or familial status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).