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Present day high prices have created renewed interest in two native perennial, herbaceous forest plants, American ginseng *Panax quinquefolium* (Fig 1.) and goldenseal *Hydrastis Canadensis* (Fig. 2.). Kentucky is the leading exporter of wild ginseng (\$11-12 million dollars annually) and is a major harvester of wild goldenseal. Unfortunately very high prices the past four to five years have increased the harvest pressure on both crops and caused numerical declines in native plant populations. We receive numerous requests from individuals who are thinking about raising these

crops to supplement their incomes. We recommend to those who are able, to produce *woods grown* or *wild simulated* ginseng and to raise goldenseal as a companion crop and as an intensively grown rotational crop following ginseng. We stress the risks involved (crop failure, diseases, theft, drought, rodents, and price fluctuations) and urge people to start small and gain experience. After the first growing year, evaluate your chances and then decide whether to go forward.

**Ginseng (*Panax quinquefolium*) is an herb that has been used for centuries in Asia and in North America by Native Americans. In 1716 ginseng was found in Quebec province by a Catholic priest. A lucrative export industry was immediately undertaken. Indians were paid two francs / lb in Canada and a pound of ginseng sold for twenty-five francs in China . With intense digging ginseng soon became scarce in some parts of Canada . After the attempted sale of some poor quality ginseng the majority of the export business was taken over by American diggers. Daniel Boone was a major player in the harvest and shipment of ginseng from the American frontier ( Kentucky ). Ginseng is most commonly propagated by seed. The ginseng stalk dies down every year producing a bud scar on the underground neck that reveals the age of the**



**root (Fig 3.). Older roots are more highly valued in the markets and command a premium price.**



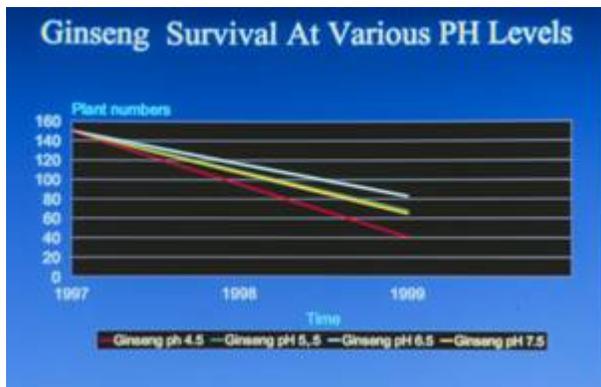
**Goldenseal (*Hydrastis canadensis* L.), a native perennial, is a highly valued medicinal herb which has been harvested for generations. Originally goldenseal was most plentiful in the states of Ohio , Indiana , Illinois , West**

Virginia and Kentucky . By the early 1900's it was reported to be scarce in other areas of its range. The U.S. Department of Agriculture began cultivation studies near Washington , D.C. in 1899. Lewis and Clark collected a goldenseal plant sample on their famous trip across the U.S. While used by American Indians and early European settlers, there was little commercial demand for goldenseal until the 1860's. Goldenseal has become difficult to find but this has not stopped people from collecting it, and wild populations continue to decrease. Fortunately, cultivation of this herb is easy and should be encouraged. The market makes no price distinction between wild and cultivated goldenseal. As early as 1914 goldenseal was described as an ideal succession crop for ginseng growers.



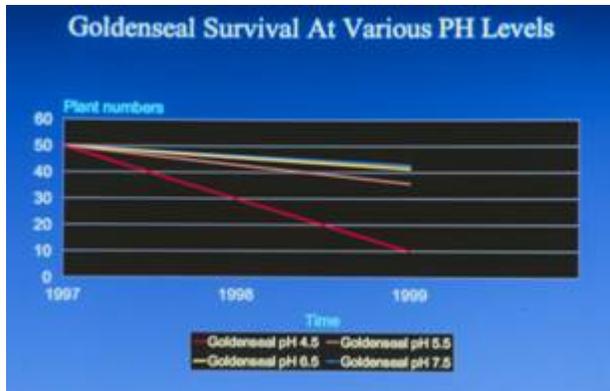
Goldenseal emerges in early spring from buds that over winter on a perennial rootstock. Mature plants (at least three years old) have two or more erect hairy stems, ten - fourteen inches tall, and usually two leaves, one of which is much larger than the other. The five-seven lobed, toothed leaves can be up to twelve inches wide and eight inches long. Small, rather inconspicuous flowers (Fig. 4.) occur on the stalk of the smaller leaf in late April to early May and last about a week. The single red

fruits that develop on each plant look like a large raspberry. The fruits mature in July or August with each fruit producing ten to twenty five small (1/8 in.), shiny black seeds. The plant dies after the fruits mature. During dry years the plant may even die down before the seed has matured. The goldenseal 'root' is actually a horizontal rhizome, one half to three quarters of an inch thick with many fibrous rootlets. The rhizome and rootlets are bright yellow.



Site selection: In southern growing areas like Kentucky , north or east facing slopes are preferred because they are cooler and have more moisture. As you go further north this requirement is not as important. The site selected should receive between 70-80% shade and be well drained. Standing water or heavy soils are not suitable. The selected area should have some slope so that water will drain away from the intended planting site. Plant species often associated

with good sites include the following: trees - walnut, hickory, tulip poplar, beech and sugar maple; herbaceous plants include; jack-in-the- pulpit, may apples, trillium, wild ginger, bloodroot and cohosh. Once a potential site is selected take a random soil sample and have it tested. Ginseng survives best at a soil pH between 5.5 and 6.5 (Fig. 5). The soil test should show plenty of available calcium (greater than 1500 lb) and have moderate to high phosphorus levels. Goldenseal is more sensitive to low pH levels regardless of calcium levels and should be grown at a pH between 6.0 and 7.0 (Fig. 6.).



For beginners about 1/10th acre for each crop is enough to learn on. This would require about three - four lb ginseng seed and/or thirteen lb of goldenseal root pieces.

Preparing Your Site for Planting - "*Wild simulated*" is probably the method of choice for ginseng but not every site is suitable. Goldenseal should be grown as woods cultivated on prepared beds to encourage rapid crop development. No premium is

received for slow growing goldenseal. 1. Clearing undergrowth improves air circulation and reduces disease problems. 2. Eliminate major weeds - using herbicides or mechanically 3. Plant directly on the forest floor. "*wild simulated*" or Prepare and plant beds in the forest? "*woods grown*". 4. If planting on beds run the beds up and down slope. Beds will act as dams and wash out if you plant across the slope. 5. Use trenches/alleys as drainage paths. Make them longer than the beds so water will not stand between the beds. 6. Put a slight crown on each bed, so water will not stand on the bed surface. 7. Mulch the beds after planting to retain soil moisture and provide winter protection. Cover seed beds with one to two inches of mulch (e.g., shredded hardwood bark, leaves, weathered bark-sawdust, and weed free straw) immediately after planting.

When to Plant - Ginseng is usually planted in the fall from October until freezing weather prevents further planting. Early spring (February/March) planting is also possible but must be done before the seed starts to germinate. In northern areas where the ground is frozen or cold and wet until April try to avoid spring planting. Handling seed that has already begun to sprout often damages the young plant. Holding ginseng seed in a refrigerator may delay germination for an entire year. I had some that never came up whereas seed planted immediately did? The reason for the delay is not understood. Goldenseal roots can be dug, divided and planted in the late summer or early fall when the tops begin to die down. If necessary root pieces may also be stored under cool humid conditions and planted in the spring.

Goldenseal/Ginseng Seeds- Goldenseal may be propagated by seed (1,700/oz.), rhizome divisions or rootlets cuttings. Depulp goldenseal or ginseng (seed) berries in a sack. After depulping either stratify or plant immediately. When collected in small quantities break the goldenseal berries apart and plant immediately! Never plant whole berries. Fruits should be collected before they shatter, mashed lightly and fermented for 1-2 days in a bucket of water. There are some reports that goldenseal seed should be planted immediately after extraction because fermentation may reduce germination. Sometimes goldenseal seed rots or loses viability during stratification. If the seed bed is ready I feel it is best to plant it immediately. Regardless, the seeds should be separated from the pulp. For stratification the cleaned seeds should be placed in moist sand in a screen box or nylon stocking pouch and stored in the ground in a shaded, well drained area exposed to natural rainfall. The seeds should never be allowed to dry out. Goldenseal seed germinates the first spring after harvest and should be planted the fall after harvest or very early the

following spring. For seedling beds, plant one inch deep and one inch apart in rows about six inches apart. Transplant goldenseal rootstocks to permanent beds when the tops die down after the first or second growing season.

Ginseng seed has an 18-21 month dormancy. Serious loss of viability will occur if either ginseng or goldenseal seed is allowed to dry out or if they become too wet. Ginseng seed requires a cold/warm/cold cycle. There should be 45 days of cold below 36° F to meet the cold requirement for ginseng seed. The ginseng roots themselves will not sprout without 60 days below 49° F.

**Goldenseal Rhizomes-** To propagate vegetatively, goldenseal rhizomes may be divided into half inch or larger pieces, preferably with a bud on each piece. Plant 1 inch deep and eight-twelve inches or more apart. Also, rootlets with buds can be removed from the rhizomes and cut into 1 or 2 inch sections and planted close together under one inch of soil. Many of these will grow and can be replanted in a year or two into permanent beds.

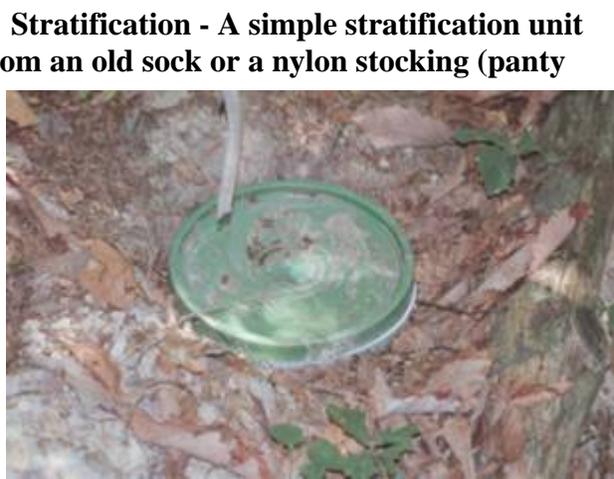
**Goldenseal Root layering-** Goldenseal spreads by means of root layering. Goldenseal should be harvested on a regular basis, at least once every five years, because the plants can become very dense and the central rhizome will eventually decay.

**Mulching -** Mulch as soon as you are through planting. Mulch retains moisture, reduces weeds, and prevents heaving and soil compaction. About 2" of leaf litter is ideal. Goldenseal seed beds should be covered with several inches of bark and leaf mulch for winter protection. Most of the mulch should be removed from new seedling beds by April 1 for good emergence. Keep beds well weeded. *Goldenseal seedlings do not look like the mature plant so make sure you know what you are weeding (Fig. 7).*



**Care and Protection -** Ginseng is subject to more disease problems than goldenseal and requires deeper shade (70 – 80% as compared to 60 – 75%) conditions to grow successfully. *Diseases of Cultivated Ginseng A3465* by J. L. Parke and K. M. Shotwell is a good reference on ginseng problems. The major disease problems with goldenseal are Botrytis Blight, Rhizoctonia, and Root Knot Nematodes.

for small quantities of seed is a pouch made from an old sock or a nylon stocking (panty hose). For large quantities of seed, construct an 8 to 12 inch deep wooden box with a screen top and bottom or a plastic bucket with small holes in the bottom. Regardless of the size or construction,



design the container to allow for good drainage and to keep out rodents. Fill the container with alternating layers of seed and clean, moist sand, using at least twice the volume of sand as seed. Bury the pouch or sock under 4 to 5 inches of loose soil in a shaded or north-facing area and cover with several inches of mulch. A hardware cloth cover can be used to protect the pouch or sock. Bury the box or bucket (Fig. 8) the same way, but have the top of the box only 1 to 2 inches below the soil surface. Mark the location well.

If goldenseal seed was stored after harvest it should be planted during the first fall after harvest (within 2-3 months). For ginseng early the next spring following harvest open the container and check the seeds for decay, removing any that are soft. (If stratified seed



was stored for the winter, plant them at this time). Some ginseng seeds, particularly those that were harvested first, may germinate the first spring following harvest. Remove these seeds and plant them immediately. Some growers store the first harvested ginseng seed separate from that harvested latter. Stir the remaining seeds carefully to aerate them, make certain the sand is still moist and rebury the container. If soil conditions are extremely wet or dry,

check the stratification unit periodically. Many ginseng seeds will enlarge and begin to open after a year in storage (Fig. 9), this is a good indication that the seed is viable. In the fall, plant the ginseng seed as stratified seed.

### Sowing Seeds

Plant ginseng seed 1/2 to 3/4 inch deep. There are approximately 5000-8000 ginseng seeds per pound. The seeds require special handling because, to germinate, they must first be subjected to a long period of storage in a moist medium with a warm/cold treatment, a process known as stratification. Because of this requirement, ginseng seed normally does not germinate until the second spring following berry harvest in late summer. Fall planted, stratified ginseng seed will usually emerge the following April-June. Fresh, non-stratified (green) ginseng seed may be planted immediately after harvest of the berries. It will stratify naturally in the seed bed over the next year and a half, although loss to rodents and disease may be quite high (seventy percent or more may be lost). Plant stands will be better, if fresh seed is stored and stratified in a secure container and planted in a protected site a year later. Whether the seed is “green or stratified”, it should be carefully inspected when obtained. If the seeds are soft, moldy or discolored, return them to the supplier for replacement.

**Planting Roots** - Small ginseng roots can be easily transplanted and used as planting stock. Transplanting ensures a more uniform stand than seeding and reduces the time from planting to harvest. Plant ginseng roots at an angle (30 to 45 degrees from the vertical) in well prepared soil with the bud one inch below the soil surface. Plant 3-12 inches apart in rows 6-12 inches apart. Mulch the same as seeded beds. The price of roots, however, is considerably higher than that of seed. Carefully dig roots for transplanting after the tops of the plants have begun to die in late summer or early fall. Plant the roots as soon as possible. For temporary storage, cover the roots with four to six inches of damp peat or soil in a container and store in a cool place.

Have the seed/root beds ready to plant before seeds or roots arrive. If planting must be delayed, never allow the seeds or plants to dry out. Seeds/roots can be stored temporarily in a plastic bucket in a cool basement. Place a damp cloth on top and cover the bucket with a lid. Each day stir the seeds/roots well or pour back and forth into a second container to aerate them and re-wet the cloth. If fall planting cannot be completed before the ground freezes, store the seeds/roots in a protected stratification box until spring.

**Digging and Drying The Crop.** Fall harvest is best for both crops. The roots or rhizomes will weigh the heaviest and will dry down better. Wash the roots immediately after digging to remove dirt and debris (Fig. 10). While both ginseng and goldenseal should be washed clean of dirt and debris they should not be scrubbed. Scrubbing lowers root value and can cause the root hairs to fall off. After washing allow the roots to drain on a screen for an hour or two then begin the drying process.



Dry in a warm area where temperatures of 80°F to 90°F can be maintained. Mature ginseng has 80 to 350 dry roots/pound. Goldenseal root size is highly variable with reports of as few as 16-25 large roots to as many as several hundred dried rhizomes/pound. Try to preserve as many of the fibrous roots as possible. Roots will lose approximately 70% of their weight in drying. Goldenseal leaves and stems have commercial value also and can be harvested while still green in July/August and dried.

American ginseng is reported to improve heart and blood circulatory functions, reduce cholesterol and have insulin like properties. The active ingredients are various ginsenosides. The concentration of these ginsenosides increases with plant age and varies with growing conditions. American ginseng has approximately 4% total ginsenosides on a dry weight basis.

The odor of the fresh and dried goldenseal roots is disagreeable and the taste is bitter. The biologically active compounds in goldenseal are the alkaloids hydrastine and berberine. Berberine imparts the bright yellow color and the bitter taste to the root. Goldenseal is used for many medicinal purposes, including its use for eye, skin and

digestive disorders. Goldenseal/Ginseng are commonly available at health food stores as tea, tinctures, and powders or as capsules.

**Economics**

Although ginseng root has a high price per pound, wild ginseng in a forested environment is not a “get rich quick” scheme for the reasons previously mentioned. Risk of theft, the length of time needed to harvest a mature crop; 8-12 years make this a risky production system.

A projected budget and expected returns for a one half-acre plot of “wild simulated” ginseng and expected returns for a 1000 sq ft. plot are included below.

| <b>Projected 9-year Budget for One-half Acre of Wild-simulated Ginseng</b>         |  |                 |
|--|--|-----------------|
| Seed   | 10 pounds @ \$75/lb  | \$750           |
| Labor  | Site preparation and planting (125 hrs @ \$10/hr.)               | \$1,250         |
|  | Bi-Weekly inspections (500 hrs x \$10/hr.)                       | \$5,000         |
| Materials and Equipment  | Rakes and shovels  | \$50            |
|  | Backpack sprayer (\$125), fungicide, and rodenticides            | \$200           |
| Drying   | Addition of insulation and drying racks to existing room or shed | \$400           |
|  | Energy cost to heat (50/lb. Of dried root)                       | \$40            |
| Total Cost   |  | \$7,690         |
| Expected Yeild   | 80 lbs X \$410/lb <sup>2</sup>                                   | \$32,800        |
| Net Revenue in 9 years   |  | \$25,110        |
| <b>Net revenue in 200 dollars for 0.5-acre plot, assuming 4% rate of inflation</b> |  | <b>\$17,641</b> |

<sup>1</sup>Modified from USDA National Agro forestry Center : Agro forestry Notes: AF Note-5. Lincoln , Nebraska . July, 1999.

<sup>2</sup>Note price can change drastically. Last year's price was around \$185/lb, cutting net revenues by a third (\$7,110).

| <b>Forest Grown Medicinal Herbs</b> |                               |                 |                         |
|-------------------------------------|-------------------------------|-----------------|-------------------------|
| <b>Crop</b>                         | <b>Yield lbs./1000 sq. ft</b> | <b>Price/lb</b> | <b>Expected Return*</b> |
| Wild Simulated Ginseng              | 5 to 8                        | \$185.00        | \$925 to \$1480         |
| Godlenseal                          | 35 to 45                      | \$40.00         | \$1360 to \$1800        |

**\* Wild simulated ginseng returns based on a 7-year production cycle.  
Goldenseal returns based on a 5-year production cycle.**

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**web sites:**

a. <http://.attra.org/attra-pub/ginsgold.html>

Goldenseal, and Other Native  
Roots

b. <http://www.ces.ncsu.edu/hil/spcrop-index.html>

Fact sheets on ginseng and  
goldenseal

**Discussion groups:**

To subscribe to an interactive ginseng discussion group, send an e-mail to:

[mailserv@cariboo.bc.ca](mailto:mailserv@cariboo.bc.ca) Type “subscribe Panax [Your Name]” in the message body.

To subscribe to an interactive medicinal/aromatic plants discussion group, send an e-mail

to: [listserv@vm.egu.tr](mailto:listserv@vm.egu.tr) Type “subscribe Herb [Your Name]”