



Great Lakes Fruit, Vegetable & Farm Market EXPO

Michigan Greenhouse Growers EXPO

December 9 - 11, 2014

DeVos Place Convention Center, Grand Rapids, MI



Chestnuts

Tuesday afternoon 2:00 pm

Where: Grand Gallery (main level) Room C

MI Recertification credits: 2 (COMM CORE, PRIV CORE)

OH Recertification credits: 0.5 (presentations as marked)

CCA Credits: PM(0.5) CM(1.0)

Moderator: Pete Ivory, President, Midwest Nut Producers Council, Lapeer, MI

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| 2:00 pm | Chestnut Germplasm Update <ul style="list-style-type: none">• Dennis Fulbright, Plant, Soil and Microbial Sciences Dept., MSU |
| 2:45 pm | The ABCs of Cultivating Ginseng <ul style="list-style-type: none">• Mary Hausbeck, Plant, Soil and Microbial Sciences Dept., MSU• Blair Harlan, Plant, Soil and Microbial Sciences Dept., MSU |
| 3:30 pm | Pesticide Considerations for Chestnut Growers (OH: 2B, 0.5 hr) <ul style="list-style-type: none">• Erin Lizotte, Extension Educator, MSU Extension, Cadillac, MI |
| 4:00 pm | Session Ends |

The ABCs of Cultivating Ginseng

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American ginseng (*Panax quinquefolius* L.) is a perennial herb native to parts of the U.S. and Canada. “Panax” is a Greek word that means “panakeia” or all-healing, and refers to the reputed medicinal value of ginseng which has been used extensively in oriental countries as a traditional medicine. The root may be sold whole and intact, or as crystals, extract, or powder capsules. The majority of ginseng harvested in the U.S. and Canada is sold wholesale as dried whole root to buyers from Asia. Ginseng root is used in a variety of products including toothpaste, soft drinks, tea, candy, chewing gum, and cigarettes. In the U.S., ginseng and ginseng products may be found in Asian markets and health food stores. Wild, non-cultivated ginseng will not be discussed in this seminar/proceedings as it is illegal to harvest. Instead, we will focus on how and why to grow ginseng from seed as a lucrative crop. Woods-grown ginseng takes from 7 to 10+ years to mature, at which time the roots are harvested. The limited supply of this type of ginseng and increasing demand led to cultivation in shaded “gardens” which began in the 1800s. Currently, demand for ginseng far exceeds production. This lack of supply is partially due to the capital investment needed upfront and the multiple years needed before a return can be realized. However, based on the climate, soil, and topography, we feel that Michigan could become a major producer of woodland cultivated and field cultivated ginseng.

Field Cultivated Ginseng Production

The majority of ginseng harvested in the United States each year is field cultivated. Cultivated ginseng is grown in raised, straw mulched, beds under shaded conditions provided by black polypropylene (Fig. 1) or wood lath (Fig. 2). Site selection is the most important aspect of a successful ginseng garden. A garden should only be planted in well drained, sand or loam based soil. Any standing water in a ginseng garden will result in high losses from root rot pathogens. Fumigation prior to planting is recommended but not required. Cultivated ginseng is established in early fall with seed that is planted into 5' wide raised beds that are 9" to 12" high. After seeding, a thick, 2-4" straw mulch is applied over the beds. This mulch helps keep the seed moist, limits weed pressure, and provides some protection from pests. The following spring, woven panels or wooden lath, providing 80% shade, are suspended via 8-10' posts. Many ginseng gardens are small and typically less than one acre. Cultivated (artificial shade-grown) ginseng matures in 3 to 4 years with an average initial cost of \$30,000/acre and a yearly production cost of \$3,000 (chemicals, re-mulching, weed control, etc.).



Fig. 1. Field cultivated ginseng garden utilizing a polypropylene shade structure.

Ginseng production is highly labor intensive. For weed and insect control, fields must be prepped the year prior to planting. Although not impossible, it is risky to plant into fallow ground or after a grain

crop due to weed, slug, and ground insect pests. After emergence, ginseng growers apply fungicides every 5 to 10 days until the middle of September. Since sprays (insect, disease, and foliar fertilizers) may be applied separately, growers typically make more than one pass through a garden each week to apply the needed products. At a minimum, a granular fertilizer should be applied every spring prior to emergence. Each fall, the shade structure must be ‘opened’ to allow the snowfall to cover the beds. The snow cover is needed to help insulate the roots from extreme cold temperatures. In the spring, the gardens must be recovered with the shade material prior to emergence of the plants but after the last snowfall. For polypropylene shade gardens, if snowfall occurs while ‘closed,’ the structure will be destroyed. After 3 to 4 years of growth, the garden is ready for harvest. For harvesting, the shade structure is completely removed from the field and the straw mulch is scraped from the beds. The most commonly used harvesters are modified, PTO-driven, potato diggers that cut into the beds, subsoil the roots and toss them onto a conveyor. Yields from a field cultivated garden can vary greatly based on the age of the roots, the initial stand, pest pressure, soil type, and the fertilization program. An ‘average’ yield for commercial growers is approximately 1,500 lb of dried ginseng root from a 3-year-old garden. With the current price of ginseng at ~\$85/lb, an ‘average’ garden could yield ~\$128,000 per acre.



Fig. 2. Field cultivated ginseng garden utilizing a wood lath shade structure.

New grower estimated production costs for a one acre field cultivated garden planting:

Equipment/supplies	Estimated cost
Bed forming plow	\$200 (used)
Seed	\$8,500
Gandy seeder	\$1,000 (used)
Straw	\$2,000
Straw mulcher	\$3,000 (used)
Shade structure	\$23,000
Post pounder	\$3,000 (used)
Sprayer	\$2,000 (used)
Total	\$42,700

Woodland Ginseng (Cultivated and Wild)

Woods-grown ginseng is a relatively new crop for Michigan, with the first seedlings (Wisconsin transplants) being planted in 1995. Most of the ginseng production is located in Michigan’s Upper Peninsula (Houghton County). Michigan has approximately 135 acres of woods-grown ginseng at various stages of maturity and an unknown number of acres of cultivated ginseng. Woods-grown ginseng has a higher market value (up to 10 times) than that of cultivated ginseng. Based on current prices, this represents a Michigan inventory of over \$50 million.

Unlike field cultivated ginseng, the shade structure is provided by the trees of the forest (Fig. 3). Site selection should be based on the soil type, drainage, and the density and type of trees. Site selection should be done in the spring prior to planting and if any standing water is observed that area should be avoided. The main soil type of the site should be loam or sand. Sandy-loam soils are considered the best

for ginseng production. The trees at the site should be mature hardwoods; maples are considered the most desirable, but other hardwoods species are acceptable as well. After site selection, the underbrush should be removed, including all tree saplings. I have observed woodland ginseng grown in raised beds made between the trees and also on flat ground that had been cleared. The biggest advantage to using raised beds is during harvest when fewer tree roots make subsoiling easier. For planting, leaves should be raked from the beds/area, seeds planted, after which the leaves and decomposing organic material are placed back over the beds as mulch. Woodland gardens are usually planted with seed; however, it is not uncommon to start plantings from rootlets (1- or 2-year-old roots) that are transplanted into the raised beds. This will cut production time while still garnishing top dollar for the product as ‘woodland’ ginseng.



Fig. 3. Woodland cultivated ginseng planted on raised beds.

The major disadvantage for woodland grown ginseng is the extended growing time needed to produce a harvestable crop. Woodland ginseng takes a minimum of seven years of growth until harvest, but it is not uncommon to have plantings well over 10 years old. Older roots are more valuable to buyers as they are able to determine the age of the roots by counting the ‘crown scars’ left from each year of growth. It is hard to estimate what is the average yield per acre of woodland grown ginseng; however, 500 lb/acre of dried root would be considered a success. Current prices for woods-grown ginseng are \$200 per green pound and \$650 per dry pound. A grower with one, healthy acre of woodland ginseng could net \$325,000 after approximately 10 years of growth.

New grower estimated production costs for a one acre woodland cultivated planting:

Equipment	Estimated cost
Bed forming plow	\$200 (used)
Seed	\$6,800
Gandy seeder	\$1,000 (used)
Sprayer	\$2,000 (used)
Total	\$10,000

Ginseng Seed

Unlike most crops, you cannot go to your local seed dealer and purchase ginseng seed to start your garden. Unfortunately, seed availability or the lack thereof, is often the limiting factor in expanding or starting ginseng production. Seed is only available for purchase from other ginseng growers. Often these growers are not willing to part with seed as they need it for their own plantings or do not want more competition with increased production. There are two types of seed that can be purchased from a grower: ‘green seed’ is seed that needs a year of development prior to planting, while ‘stratified seed’ can be planted immediately. Ginseng seed is harvested from the berries that are collected from the stalks of mature, minimum 3-year-old, plants (Fig. 4, left). Once the berries are collected they must be depulped and washed. For stratification, growers try to mimic the natural process by which ginseng grows in the wild. After depulping, the seed is either buried in the ground in seed boxes containing sand, or placed in totes in a temperature controlled cooler. The seed will remain in the sand until planting the following fall and it is important that the sand is not overly moist as bacterial rot can be a problem. Just prior to

planting, the seed is removed from the sand, washed and treated (Fig. 4, right). It is recommended that before deciding to grow ginseng, you have some leads on where to purchase seed. Although not always possible, visit the grower you are purchasing seed from to determine the health of the gardens from where it was picked. Seed from gardens with disease issues can carry those pathogens to your planting! The good news in all of this is that when your oldest garden is in its third year of growth, you will likely be able to use your own seed for future plantings and also possibly sell any extra seed as added income.



Fig 4. Berry cluster on mature ginseng (left) and stratified seed (right).

Diseases of Ginseng

Keeping a ginseng garden healthy from establishment until harvest can be a daunting task. Even the most experienced ginseng growers can lose entire sections of their plantings to various pathogens. The diseases of ginseng can be broken down into two categories: foliar blights and root rots.

Alternaria panax is the most common pathogen of ginseng throughout the world. It can attack shoots, leaves, and stems on plants of all ages. This leaf blight includes lesions with yellow-green halos, dark brown margins and pale brown centers. Stems can become blighted and collapse. When weather is favorable (humid and wet), blight symptoms and reproduction of the fungus can occur in 5 to 7 days. Outbreaks of *A. panax* in one season greatly increase the potential for epidemics in subsequent seasons, since the fungus overwinters in the infested plant debris. In the spring, conidia that overwintered can spread to the newly emerging healthy plants via rain or splashing water and begin the disease cycle for the new growing season. Conidia can travel via air currents, resulting in spread of *A. panax* from a diseased garden to nearby healthy gardens. In recent years, newly registered fungicides have been used successfully by growers to control foliar blights of ginseng.

Root rots are a primary concern of ginseng growers and are caused by *Rhizoctonia solani*, *Fusarium* spp., *Pythium* spp., *Phytophthora cactorum* and *Cylindrocarpon destructans*. Preemergence damping-off and postemergence seedling root rot, especially of 1- and 2-year-old ginseng plants, are caused by soilborne fungi, *Fusarium* spp. and *R. solani*, and soilborne fungal-like oomycete pathogens, *Pythium* spp. and *P. cactorum*. The fungus, *C. destructans*, causes disappearing root rot, a disease that affects plants of all ages. The disease can infect all underground plant parts, causing near total destruction. Initial infections appear as small, gold to brown areas on the root surface which enlarge rapidly and deepen into a reddish-brown, spongy rot. The root exterior becomes dark brown at infection sites. *Phytophthora cactorum* is a serious threat to growing ginseng in Michigan and Wisconsin. This pathogen is favored during wet weather and can destroy entire ginseng plantings within a few weeks. Initial symptoms include a bronzing and wilting of the foliage with infected roots becoming discolored and spongy and eventually disintegrating. Controlling root rot pathogens in a ginseng garden can be extremely difficult even when the most effective fungicides are used. The best way to 'battle' these pathogens is to exclude them from the garden by purchasing disease-free seed and maintaining a sanitary operation.

Post Harvest

Only a very small portion of ginseng sold is fresh (not dried) root. The majority of ginseng sold in the U.S. is dried down by 80 to 90% of their original moisture content. Prior to drying and washing, roots should be kept at ~40°F for about two weeks. This cooling step insures proper texture of the roots

Acknowledgements

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