

# Ginseng Production

## A Brief Grower Guide

In the fall of 1982 the first commercial planting of American ginseng *Panax quinquefolius* L. was seeded in B.C. It has become a major 'special crop' for the interior agricultural community today ('03) and appears here to stay.

There are many other species of ginseng, but only three are of any commercial importance. These are the Asian ginseng, *Panax ginseng*, C.A. Meyer, native to North-eastern China and Korea, Notoginseng, *Panax pseudoginseng* var. *notoginseng*, from South-western China and Vietnam and the species we grow in B.C., American ginseng, *Panax quinquefolius* L., native to parts of eastern Canada and the eastern United States.

Ginseng is used mainly by people of the South East Asian Pacific Rim countries, although it is gaining popularity in other cultures. The use of ginseng dates back 3000 years or more in China where it is considered the most important herb in traditional medicine. It is called the "elixir of life" and some people believe that, if taken regularly, ginseng can reduce stress, increase physical stamina, quiet the nerves, enhance blood flow, help in blood sugar and cholesterol levels, help regulate blood pressure, strengthen the metabolism, vitalize glandular functions, slow the degeneration of cells and increase longevity.



Ginseng is used in many forms. It is purchased as a whole root, root pieces, powdered root or extracts, to name a few, and is ingested in tea, soups, as pills or capsules, or may be chewed in small pieces. It is also becoming popular in various cosmetic products as shampoo, skin creams etc. The active ingredients are a group of closely related chemicals called ginsenosides which are produced by and stored in the plant. Ginseng is the most widely used medicinal herb in the Asian Pacific Rim countries. The three commercial varieties of ginseng have many similar quantities but are considered to have different effects – the American ginseng giving a cooling or depressant effect and the Asian species a warming or stimulating effect as examples.

### Plant Characteristics

The American ginseng *Panax quinquefolius* is a fleshy rooted, herbaceous perennial, with whorled leaves. Each leaf of a mature American ginseng plant has five leaflets giving it the latin species name, quinque (five) folius (leaved). Ginseng grows naturally under the canopy of hardwood forests as it is a shade-loving herb, growing only where there is at least 70 percent shade.

Commercially, ginseng is grown from seed and it takes three or four years for the root to attain a harvestable size. This long-lived perennial plant gains in value with size, age, quality and shape of the root. Seed is generally harvested in the third and fourth years.

Ginseng

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Revised October 2003

## **Typical Growth Pattern: Years One to Four**

### **Year One**

- Seed produces an aerial stem with a single three leaflet leaf
- 5 to 10 centimetres (2 to 4 inches) high

### **Year Two**

- one aerial stem with two leaves of three or five leaflets each
- 15 to 20 centimetres (6 to 8 inches) high
- may be minimal seed production

### **Year Three**

- may have two aerial stems (usually one) with three leaves on each stem, each with five leaflets
- 25 to 35 centimetres (10 to 14 inches) high
- will generally produce enough seed to return to the grower what was planted

### **Year Four**

- a mature plant
- one or more aerial stems, each generally having a whorl of four, five-leaflet leaves
- 40 to 60 centimetres (16 to 24 inches) high
- should produce three to five times the amount of seed used to plant the garden

## **Site Selection**

When you come to select a site for a ginseng garden, many factors come into play. The slope, soil depth, soil type and soil chemistry are the most important ones. You need a slight slope to drain off any excess water and at least 30 centimetres (12 inches) of top soil as you have to dig at least that deep when harvesting. Soil types (sand, silt, or clay) affect the quality of roots harvested as well as the ease of digging. A silt to a sandy loam soil seems to produce the best quality roots and is the easiest to harvest from. Clay soils hold too much water, promoting disease, and are very hard to extract roots from. Clay or soil with rocks, especially shale type rock, causes roots to be more branched, reducing the quality. Large rock, bedrock, or rocky-subsoil makes harvesting difficult and should be avoided. Soil chemistry also important and can only be determined by having a complete soil analysis done. Ginseng prefers slightly acidic soil, but is tolerant of a range of pH levels, and is a low nutrient requirement plant. Some other factors to consider when selecting a site are: elevation, exposure to the sun, subsoil characteristics, water availability and quality, frost pocket areas and soil organisms such as wireworms, cutworms or nematodes. The availability of labour, previous crops grown (chemicals used) and severe climate should also be considered. Ginseng is officially a Zone 3 plant (Agriculture Canada rating), but we think is more like a 4, so would be considered marginal or not hardy in zones 0 to 3b. Zone maps are available on the internet at [http://sis.agr.gc.ca/cansis/nsdb/climate/hardiness/intr\\_o.html](http://sis.agr.gc.ca/cansis/nsdb/climate/hardiness/intr_o.html) ,

in garden center publications or at your local library.

The ideal location does exist, but often you have to learn to work with what you have available. Ginseng is a fairly tolerant plant and with good management can be grown in a relatively wide range of locations.

Its shortcomings as a crop are not with hardiness or soil types – although these factors are important – but rather with its susceptibility to fungal diseases, especially in higher rainfall periods or areas.

## **Soil Preparation/Bed Formation**

The first and most important thing to do is to ensure that the field is free of all perennial weeds such as field bindweed, couchgrass, Canada thistle, etc., before seeding begins. This can be done with a long-term cultivation program, but it is more common to use a herbicidal spray such as glyphosate.

The next step is to work up the soil to a good loose condition, to an even depth of about 20 centimetres (8 inches). Mix in soil amendments and fertilizers as determined by soil lab tests, and form the beds in late summer to match the dimensions required for the shade structure (see Shade Structure below). The edges of the beds should be as vertical as the soil will allow, with a slightly rounded centre for drainage. Specialised equipments called a bed plow and packer is used to attain this shape. Usually 12 to 16 rows of ginseng are seeded on each bed.

The beds need to be as wide as possible, within the space allowed. Leave room for vehicle wheels to travel through the beds, especially through the central bed between the posts, which is almost always the one used for mechanical equipment. Generally the beds are 1.5 metres (5 feet) wide with a 30 centimetre (12 inch) spacing between each bed. This means that the vehicle and equipment tires need to have a 1.8 metre (6 foot) wheelbase with narrow tires. Wheel guards are added later, to reduce the risk of plant damage for older crops. Some modification of standard equipment may be necessary to increase wheelbase and clearance.

## **Seed**

Ginseng plants may produce seed as early as the second year, but generally only harvestable amounts are found on three-year and older plants. Seed is harvested by hand between mid-August to mid-September, depending on location. It is picked when the berries are crimson red. The berries do not ripen all at the same time, but can be left and harvested at one time. Some growers prefer to pick two times to reduce seed losses due to wind shattering the ripe berries. The ratio of ripe berries to clean seed is about 4.5:1, thus 20 kilograms (45 pounds) of red berries yield 4.4 kilograms (10 pounds) of seed.

After seed is harvested, it cannot be used right away, but must undergo a process called stratification, which takes 18 to 22 months. Generally when seed is purchased it is previously "stratified", ready to sow. If you purchase, or use your own "green" (current year's production) seed with the pulp removed, you will have to follow detailed procedures to stratify the seed prior to planting the following year. This technical process is not covered in this document but is available in the commercial production guide at:

<http://www.agf.gov.bc.ca/speccrop/ginseng/prodguide.htm>

Ginseng seed must not be allowed to dry out at any time or it may be permanently damaged.

### Seeding Depth and Spacing

Once everything is prepared for seeding there are various ways to seed, depending on the size of the field. Methods range from seeding by hand to single row mechanical seeders to equipment that can seed up to 20 rows at a time. Generally seeding is done in rows 10 – 12 centimetres (4 to 5 inches) apart with seeds spaced 5 centimetres (2 inches) apart within each row. The planting depth is about 1.2 to 2.5 centimetres (0.5 to 1 inch). The industry generally seeds anywhere from 40 to 45 kilograms (90 to 100 pounds) per acre,

### Mulch

Mulching is done to simulate leaf litter on the forest floor where ginseng is found naturally. In most situations, a 5.0 to 7.5 centimetre (2 to 3 inch) layer of straw is applied evenly over the beds after seeding. Of the three types of straw that are used (barley, oat and wheat), barley is preferred. Care should be taken to purchase mulches (straws) that are as weed-free as possible to eliminate weed seeds since this crop is hand weeded. Do not purchase fall rye or winter wheat as this straw's grain will germinate and survive overwinter, possibly becoming a future weed problem.

Mulch can be applied by hand on plantings up to one acre in size but on a large scale, a power driven, mechanical chopper/spreader is a must.

### Shade Structure

The natural habitat of American ginseng is the

hardwood forests of eastern North America. This plant is sensitive to conditions in other environments, especially direct sunlight which will result in death of the plants. Therefore, the field conditions need to be altered to match the native habitat as much as possible.

The B.C. industry has chosen woven synthetic fabrics to produce shade to protect the plants. The fabric that is generally used filters out 78 percent of the sunlight. This compares favourably with a natural tree canopy in mid-summer.

Figure 1

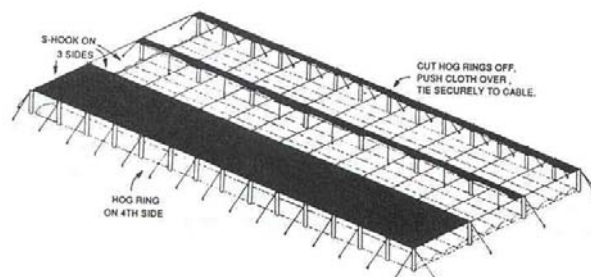


Diagram courtesy of Kamloops Ginseng Co., Kamloops, BC

Shade cloth must be rolled up (see Fig. 1 above) as winter approaches because the weight of the snow on the cloth will cause serious, costly damage. Support posts for the shade cloth run down the center of every fourth bed on a standard 24-foot garden. The posts are approximately 7.4 metres (24 feet 4 inches x 7.3 metres (24 feet) apart (see supplier instructions for details). The standard shade cloth is 7.3 x 51.2 metres (24 x 168 feet) (see Figure 2 on next page). This woven synthetic shading material is available in other widths, as long as it is in multiples of 1.8 metres (6 feet). It can also be as long as needed but longer lengths are hard to handle. Garden structures of 30 and 36 foot spacings are also being used. The field perimeter posts can be placed any time, but the interior posts should not be put in place until the seeding and mulching is done. If wooden posts are used, we recommend that you use 2.6 metre (9 foot) posts as a minimum. Giving adequate clearance for working underneath. These posts are pounded about 0.75 metres (2.5 feet) into the soil. Posts should be treated to prevent rot, allowing them to be used in successive gardens. Metal posts can also be used. They are mounted on special screw-in anchors, which are also used to anchor the whole structure.

Figure 2

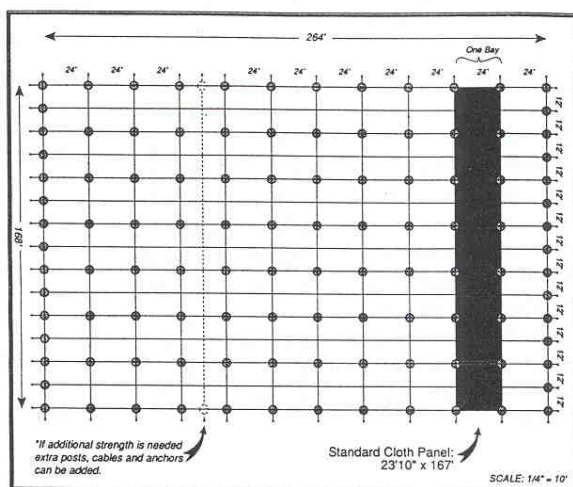


Diagram courtesy of Kamloops Ginseng Co., Kamloops, BC

### Water Requirements

Ginseng is an interesting crop in that it is a low user of water. This is partly due to the plant itself and partly to the modified environment (shade cloth and mulch maintaining soil moisture). Some irrigation may be necessary though, so access to a reliable water supply is essential.

### Weeds

There are chemicals registered for grassy weeds and for pre-emergence weed control but not broad leaf weeds during the growing season. Weeds must be removed by hand when they are small so ginseng roots are not disturbed. Weeds that have gone to seed should be removed from the garden after being pulled.

Good site preparation prior to seeding will eliminate many weed problems (see Soil Preparation section above).

### Insect/Molluscs/Nematodes

Pests that have been the major problem to date are wireworm, cutworm and slugs. Wireworm has to be controlled before the seed is planted; other pests may be controlled during the growth of the crop.

Nematodes are a potential problem. Test for nematodes before seeding.

### Animal Damage

If you are in an area inhabited by pocket gophers it is important to eliminate them before planting, and keep control of them around the garden. Mice have also been a problem after seed is planted so observations are essential and the mice must be controlled if they are present. Deer have been a problem in some gardens in the Okanagan-

Boundary area of BC and fencing has had to be used to keep them out.

### Diseases

The four diseases of primary concern for ginseng in B.C. are: *Phytophthora* root rot, *Alternaria* leaf and stem blight, damping-off, and rusty root.

These diseases can be either soil, water or airborne and are all fungal in nature. Damp conditions favour the growth and spread of fungi. Diseases can be easily spread throughout the garden if care is not taken when you are working in the garden, as fungal spores are easily transported on clothing, footwear and equipment.

### Harvesting/Washing/Drying

At the end of the four-year growing cycle, the roots are typically harvested with a machine much like a potato harvester. They are dug up, allowed to fall back on the ground and collected by hand. A small garden may be dug by hand, but a garden 0.5 acre or larger requires mechanized digging.

Immediately following harvest, the roots need to be washed, unless they are placed in cold storage for curing before drying. For small amounts, washing can be done with a garden hose. For larger amounts there are commercial washers available. Care should be taken not to bruise the outside root tissues with the machinery or over wash the roots. This is one of the more critical processes in post-harvest handling of ginseng. Fresh ginseng root can be kept in cold storage for up to six weeks at temperatures of 5 to 8° C, then washed and dried as above.

Ginseng is typically dried with warm air forced up through vertical stacks of trays with screen bottoms. The standard temperature for drying is 38° C (100° F), from start to finish

### Summary

Ginseng is a crop that demands 100 percent effort. It is a high input, long-term, labour intensive crop and unlike most other crops in Canada, needs shade for ensured survival. It is not a crop that you can easily get in or out of as there are many expenses to start-up and then four years to first harvest. It also has a sensitive supply/demand element and competition from China is increasing. Since ginseng has had no breeding and little selection work to date, to improve its disease resistance, it requires close attention to pest control issues. It also has a unique marketing method, where buyers come to the farms and inspect the product before buying.