

## Ginseng



*Panax ginseng* and *Panax quinquefolium*

Korean or Chinese ginseng, and American or Canadian ginseng.

Ginseng is an herbaceous perennial belonging to the Aralia family. Korean ginseng is a native of Eastern China, and American ginseng is a native of North America. The root of both species is highly prized for medicinal properties. Traditionally, the crop has been harvested from the wild. Its high value has led to excessive exploitation resulting in the virtual extinction of the plant in its native habitat both in Asia and North America. As a result, ginseng is being developed as a horticultural crop on both sides of the Pacific. Ginseng's high price on the world markets, despite increased production, has created worldwide interest in this crop.

### Uses

Medicinal use of ginseng in China can be traced back 4000 years. North American Indians were also using American ginseng for medicinal purposes well before it was commercially developed in the 18th century. Both species have distinct medicinal uses in Chinese medicine. The name *Panax* means cure all or all healing.

The active ingredients in ginseng that give the plant its medicinal properties are the saponins, commonly called ginsenosides or panaxosides. Many ginsenosides have been isolated and identified. Most are found in the root, however, quantities vary considerably from plant to plant.

The major use of ginseng is in Asia. While ginseng has not yet been recognised by Western pharmacology it is being used widely in herbal, health food and cosmetic applications.

### Growing environment

The native habitat of the two ginseng species is the open, broad-leaved woodlands in hilly areas between latitudes 36° and 48° N. Korean ginseng has a natural range from northern China to Siberia including the Korean Peninsula while American ginseng occurs in an area around the great lakes from Quebec and Manitoba south to northern Florida, Alabama, Louisiana and Arkansas.

Most commercial production occurs in areas that experience a continental-type climate with cold winters

and dry summers. This climate ensures that the plant experiences sufficient winter chilling to allow uniform emergence in the spring while the dry summers help prevent the spread of disease.

The preferred soil type is free draining with no hard pan. Sandy loams to clay loams are preferred. Organic matter and fertilisers are often added to the soil before planting at rates that vary considerably from grower to grower.

In its native environment ginseng grows under high levels of shade provided by the forest canopy and quickly loses vigour and dies if the shade is removed. Shade can be provided by wooden lath, shade cloth or by growing the crop commercially under a forest canopy. Most shading systems provide between 75 to 90% shade.

### Seed preparation

Ginseng is propagated by seed, which is harvested in late summer-early autumn. The seed is de-pulped then mixed with mortar sand before being placed in especially constructed subterranean seed boxes. This allows the seed to stratify and the immature seed embryo to develop over the following winter and summer. The seed is removed from the seed boxes and sown approximately 12 months later. Seed is sown in rows using a precision sower at a rate of about 110 kg/ha. After sowing, a mulch (usually weed-free straw) is applied. Seedlings emerge in the spring after sowing.

### Agronomy in North America

Commercial ginseng is mainly produced in intensive production systems. Intensive management results in a crop that can be harvested in three years. Some other systems which take much longer to mature include wild crafting, which involves harvesting wild ginseng from the woods, and wild-simulated production, where ginseng is cultivated in the woods using a low input system to produce roots resembling wild ginseng.

Before seed sowing, a cover crop, along with animal manure, may be incorporated into the soil to improve its structure and water-holding capacity. Often the soil is fumigated with vorlex, basamid or methyl bromide. Tile drainage is laid, and raised beds are formed to help improve the drainage. Support structures for shade are also usually put in place before sowing.

Little work has been carried out on optimum fertiliser applications and, as a result, fertiliser use varies considerably throughout the industry. Ginseng has been found growing in soils that have a pH range from 4.8 to 7.4, however, lime or gypsum is usually added to low pH soils to get a pH of between 5.5 and 6.0.

Crop management during the growing period includes the application of additional mulch and placement of shade in the spring. During the season, the crop is continually monitored for disease and is sprayed often.

Weeding is carried out by hand except during the dormant season when a clean up spray may be used. In late summer and early autumn, seed is collected from two- and three-year old plants and prepared for stratification. Stratified seed is prepared for sowing and new beds are prepared for planting. In early winter, shade is removed and if harvesting is to be carried out the mulch is removed. Harvesting is carried out using modified potato diggers after the tops have started to die but before the ground has frozen.

Because of the risk of disease, which is considered to be one of the main limiting factors to production, most growers in North America harvest their crop after three years. Soil fumigation, fungicides, good crop hygiene and good drainage are all considered essential in the control of disease. Although diseases can cause widespread destruction of the crop with the exception of root knot nematode there are few pest problems. Theft is a major problem in North American crops.

The cultural requirements of Korean ginseng are similar to American ginseng but are usually smaller in scale and more labour intensive.

### Processing and quality

After harvesting, the roots are tumble-washed in water. Roots are then either placed in a drier or cool stored for up to eight weeks prior to drying. In North America, drying is often carried out in modified tobacco kilns. All growers have their own drying recipes but, as a general rule, roots are dried at 38°C for 10-14 days. The root is considered dry when it can be cleanly broken, is no longer spongy and has a moisture content of 8-10%.

Once dried, growers usually sell their crop as a single grade to a buyer or broker. The price received depends on the world supply of ginseng, currency exchange rates, market manipulations by the major importers and exporters, market demand and product characteristics. The quality of the product, in turn is influenced by the presence of disease, root age, root size, shape, condition and method of cultivation. Although there are no formal grade standards, highly valued roots are disease-free, old, have a rough surface and are large and variously shaped. Wild ginseng commands the highest price in Asian markets.

### Yields

Production statistics for ginseng are difficult to find. The annual world trade is probably between 3500 and 4100 t. The main exporting countries, in decreasing order of production, are China, Korea, the US, Canada and Japan.

Intensive production of American ginseng using artificial shade results in average crop yields of approximately 2.5 t/ha after three to four years. Intensive

production using a forest canopy for shade results in an average yield of 1.1 t/ha after five to six years while wild simulated plantings result in average yields of 0.3 t/ha after six to 12 years.

### **Markets**

Hong Kong is currently the major world centre for ginseng trade. Between 1983 and 1987 more than 86% of the North American ginseng crop was marketed in Hong Kong with most of the crop then being exported to China. While American ginseng is always sold as white ginseng (raw, dried root) Korean ginseng can also be sold as red ginseng (boiled or steamed root then dried). Red ginseng is produced in Korea and production is closely regulated by that government.

### **Prospects for New Zealand**

Currently, production areas of ginseng are increasing rapidly both in North America and China. One of the main constraints to production in these traditional areas is disease, which has decreased the size of the root produced as growers harvest younger and younger roots. New Zealand growers could well command a market niche if they could grow larger, older roots. Ginseng roots grown in the forest also command high prices because they resemble wild ginseng. Another market niche exists if ginseng could be successfully grown in New Zealand plantation forests.

Ginseng has been successfully grown under small scale experimental conditions in New Zealand in the past but they have not produced reliable information on quality or likely yields. No commercial development has resulted from these initial plantings because of a lack of knowledge of the agronomic requirements of the crop. Crop & Food Research has a programme underway to establish the agronomic requirements and evaluate the commercial development of this crop in New Zealand.

### **Further reading**

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