

SEED SELECTION, PRE-PLANT HANDLING AND SEEDING PROCEDURES

This process is one of the most important aspects of ginseng culture but is also one of the least understood and least controllable, factors that make the faint of heart take notice. One of the major difficulties with seed is that you can purchase the best seed available, seed it in the site you have selected and prepared then get poor germination. Because there are so many factors surrounding this process it is very difficult sometimes to tell what went wrong.

Seed Viability/Quality

It is difficult to look at a seed lot and say it is good or bad seed. There are some fundamental things to look for when purchasing stratified 'ready to plant' seed. There are laboratories that can test seeds to see if they are viable or not, at the time they are tested.

- **ODOUR** there should be no foul odour coming from the seed mass. Some seed treatment chemicals have an odour, so don't confuse this with bad seed.
- **SPLITTERS** a good proportion of the seed should be split. This is where the embryo inside has developed and pushed the two halves of the seed coat slightly apart. This is a general guideline only as non-split seed has given good results.
- **COLOUR** this is not a determining factor as it is a function of how the seed was depulped and the material they were mixed with during the stratification period.
- **SIZE** this is not a major factor but you would not want all small seeds. Large seed has proven to produce larger, healthier first year plants but not necessarily greater germination percentage or survivability.
- **PAPERWORK** the seed should come to you with some basic information, so if there is a problem, some knowledge of how it was handled is available.
 - growers name and dealers name (if applicable)
 - what depulping process was used
 - what year of plants the seeds are from
 - what seed fungicidal treatment was done prior to stratification, if any
 - what seed fungicidal treatment was used following stratification, if any
 - if a seed treatment product was used, what was the percentage dilution or amount of product used/kg seed.

Seed Purchasing — Types

Seed can be purchased 'green' or 'stratified.' Only stratified seed can be used for seeding in the fall for a crop next spring. Stratification is a process of burying seed in a box with sand for a year. See the seed harvesting and handling section for more information.

Green seed is from current years plants, with the pulp removed by a machine or by fermentation. If you seed green seed the same fall as it is harvested, it will not germinate for 18 months and would have to be protected, watered, weeded etc. during that time. You would generally purchase this 'green' seed to stratify yourself thereby saving a few dollars. You can also in some cases purchase whole berries and do the whole process yourself. The berry to seed ratio is approximately 4.5:1 so if you want 10 pounds of seed you need to harvest 45 pounds of berries. Arrangements have even been made where you actually pick the berries yourself, saving even more on the price of seed. See the Harvesting Seed section (page 121) of this guide for details on this aspect.

Sources of Seed

There are many sources of seed as most ginseng growers with four year old plants have some seed to sell. They may though, only sell to a seed dealer so they don't have to deal with lots of people, which can be time consuming. There are seed dealers who have established themselves and do all the leg work for you. They will purchase green seed and stratify it and have it ready for you on a certain date or they can buy stratified seed for you from somewhere and have it delivered when you wish, all this for a fee, but you don't have the hassles involved.

Multiple Seed Sources

Assuming you are planting ginseng and you purchase seed from four (4) sources, what procedures do you use? Because you don't know what these seed lots will do in the spring (eight months later) you need to take some precautions. Assuming that one of these sources will do very poorly, it is hard to pick weeds out a garden with 5-10% germination. It is also inefficient as far as your beds not all producing product. It is suggested that the following be done:

- Plant one bed or a portion of a bed with each seed lot.
- Keep good records of which lot is where. If you know the history of each lot, it makes more sense to do this.

- Then mix the balance of all four lots together and seed the rest of the garden. This will give an average germination and make better use of light distribution as well as root spacing, fertilizer efficiencies and other things as well.

Importing Regulations for Seed

The importation of ginseng seed has become much easier since February 1, 1995 as a permit is no longer required. This is controlled by Agriculture and Agri-food Canada.

Note: For a legal and expanded version of this summary, please contact Al Oliver at:
British Columbia Ministry of Agriculture, Food and Fisheries
 162 Oriole Road
 Kamloops, British Columbia V2C 4N7
 Tel: 250 371-6050 or Fax: 250 828-4631

or Contact: Agriculture and Agri-Food Canada
 1921 Kent Road
 Kelowna, British Columbia V1X 7S6
 Tel: 250 470-4884 or Fax: 250 470-4899

or Agriculture and Agri-Food Canada
 Box 2527 103-620 Royal Avenue
 New Westminster, British Columbia V3L 5A8
 Tel: 604 666-2891 or Fax: 604 666-8577

Storing Seed After Purchasing

There have been and will be occasions where your seed arrives at the same time as inclement weather. To store seed after it arrived you need to attend to a few things:

- Keep the seed cool but not allowed to freeze. Warmer seed will encourage fungal organisms to start growing.
- The seed needs to be moist but not wet. No water should be in the bottom of the container. A moist cloth laid over the top will help the surface seeds to stay moist.
- Seed should be rotated from one container to another each day. The bottom seed would end up on top and new air would be mixed in. Proper oxygen and carbon dioxide percentages are important even for short term storage.

Seeding Ginseng Gardens

The timing of the actual seeding process can be quite variable and depends on the type of system used, the soil type, the irrigation water availability and to some extent the climate expectations of the area. What is critical is that the seed not be allowed to dry out internally as this will either cause the seed to die or will delay germination. Ginseng seed is not alone in this requirement but is rare for seeds in general.

As long as the seed is kept moist, it can be sown on the surface or up to 2.5 cm (1") deep. It is a fairly large seed and does not need light to germinate so covering it is okay. If it is surface seeded the surface of the bed should be scarified (raked) and the seed packed well into the soil to get good contact with moisture. Surface seeding also leaves it more vulnerable to mice so these need to be controlled.

Seeder Types

There are many types of seeders and all have their positive and negative features. There are also options for small growers to have seeding (as well as other related operations) custom done so the cost of owning a seeder is not necessary.

- **DISC SEEDERS** where seeds are picked up by notches in a disc and dropped into a slot.
- **BELT SEEDERS** where seed drops into holes in a belt and then dropped into a slot.
- **VACUUM/AIR** where seed is picked up by a vacuum against a plate. This is probably the most accurate type.

Since germination of seed is variable and the maximum percentage is probably in the 60-70% range, very precise seeding is not necessarily a large advantage. Although plants in rows look neat compared to scatter planting, there probably is no advantage there either. Care should be taken to get as even seed distribution as possible over the whole bed whatever the system used, to give each root its maximum space.

Seeding Rate/Density

Seed is generally sown from 101 -112 Kg/ha (90-100 lbs/ac), although lower and higher rates have been used. If you have a marginal location such as very sandy, a high clay content soil or an area of high moisture, the higher rate should be used. At a seeding rate of 100 lbs/ac and 70% germination you should have approximately 150 plants/m² (120 plants/yd²).

Germination Percentage

As mentioned earlier, germination expectations are from 60-70% on average. You can also expect about 5% more seeds to germinate the second spring after seeding and occasionally if seed hasn't been stratified properly, this can be as high as 40% but this is rare. Stratification procedures are the critical element here as improperly stratified seed will have poor germination rates. Check the seed harvesting and seed selection sections for determination of handling procedures. It is very difficult to look at seed and say whether it is good or bad, then also remember that it sits overwinter in the garden bed and is vulnerable there for up to another eight months after seeding.

Seeding — Timing

Ginseng is sown anywhere from mid August to the end of September and is dependent on a number of factors:

- CUSTOM OPERATOR Availability of custom operator
- WATER Availability of irrigation water to keep seed damp after seeding — if limited water is available in the early fall, later seeding might be in order.
- SOIL TYPE Very light soil will be harder to keep moist in a warm dry fall.
- CLIMATE/RAINFALL Some areas are hot and dry, others more humid and cool which may influence the time of seeding.
- WORK SCHEDULING If you are harvesting in mid September you don't want to be seeding at the same time.
- LABOUR Available labour and other manpower commitments.

Seeding Pattern

The surface of the bed whether rounded or more flattened has approximately five feet of width to plant on. If seed is sown close to the edge, some will slide into the wheel gutters, so not seeding too close to the edges will help. However crowding all rows towards the centre will increase plant density and be less efficient. There are also many configurations of seeders, some doing all rows in one pass, others requiring two passes to achieve the required distribution. Some seeders like the stanhay, sow two rows per unit, others only one row. This all determines how many seeders are required or how many passes are made.

The typical garden has 10-16 rows down the bed giving the required distribution and seeding rates. It is hard to get the rows properly separated if the seeder has to make two passes, as this process generally gives some overlap of rows and high density in these rows. The more rows/bed gives better plant spacing within the row, to plant the required number of seeds/acre.

Seed Treatments for Seeding Ease

Most seeders if not all, will not work properly if seed is too moist or wet. Bridging or sticking in the seeder is the most common problem. Just prior to seeding the seed should be surface dried* so it will flow. Graphite or talc can be used to add flowability, but the seed must be dry for these materials to work properly.

***Note:** *This is not the same 'dry' as mentioned in seed handling where seed must not be allowed to dry, as this refers to internal drying.*

Once seed is in the soil and mulch placed over the beds, the mulch and seed should be watered immediately to settle the straw and to help seed make contact with soil particles. Make sure you apply enough water to get through the straw and to the desired depth in the bed itself.

Seed Stratification Procedures

See page 121 – 123 in the Harvesting Seed section of this guide.



A typical bed former used to make raised beds necessary to ensure drainage and adequate oxygen to the root zone.



Seeding and straw spreading operations in a ginseng garden near Kamloops, British Columbia. The straw serves multiple purposes of moisture retention, winter protection and weed control.