

## Introduction

The natural habitat of American ginseng, is in the floor of hardwood forests of eastern North America. This plant is very sensitive to conditions that vary from this, especially direct sunlight which means that we need to create field conditions that match the native habitat as much as possible.

Since direct sunlight will result in death of the plant, the North American industry has chosen either wooden lath coverings or the more modern woven synthetic fabrics to shade the gardens. These coverings that are used, filter out 78 – 82% of the sun and compares favourably with the natural tree canopy shading in midsummer. The shading materials must fit quite tightly, as any open spaces will allow sunscald if direct sunlight has appreciable contact with leaves.

The shading must be removed or winterized before any incidence of snow and not be spread out again in the spring until danger of snow is past, to prevent damage due to snowload. The shading materials and structures must be able, as much as possible, to withstand the worst storms that may occur in the area. These include unusually early or late snow, hail storms, and high winds.

The other major climate modification is mulching which is done to simulate leaves and leaf mold on the forest floor. In most situations, straw is used, applying a 5 to 7.5 cm (2 – 3 inch) layer evenly over the beds after seeding. The type of straw (wheat, oats, barley) doesn't seem to matter although the preference in the industry as a whole is barley straw. Care should be taken to purchase mulches that are as weed free as possible, since this crop is virtually all hand weeded.

The use of raised beds is also a soil climate modification and is covered later in this section. This gives better root zone drainage in times of heavy precipitation. Bed formers are available or can be custom made. The whole process of bed forming, seeding and mulch application can be custom done.

**Note:** *Growing ginseng without raised beds has been tried in various locations with virtually no success, so is not recommended. Round top beds as high as possible are recommended.*

Specialized Equipment either made for ginseng or modified for ginseng are as follows:

- **BED FORMER** – see the Planting Ginseng Garden section page 63.
- **BED PACKER** – see the Planting Ginseng Garden section page 63.
- **SEEDERS** – see the Planting Ginseng Garden section page 63.
- **MULCH SPREADERS** – see the Mulching Practises for Ginseng section page 67.
- **DIGGERS** – see the Post Harvest Handling section page 125.
- **WASHERS** – see the Post Harvest Handling section page 127.
- **COOLERS** – see the Post Harvest Handling section page 126.
- **DRYERS** – see the Post Harvest Handling section page 127.

## Wood Lath Gardens

Until the last 20 years, all gardens were covered with wood lath structures. They are still used and are preferred by some growers in Ontario and Wisconsin. They do allow more upward movement of air out of the garden for cooling but are not popular here for other reasons.

The wood shade panels are approximately 1.2 m x 4.3 m (4 ft x 14 ft) and are constructed from three 1" x 3" x 14' boards with 1 1/2" x 3/8" x 48" lath stapled on. Only 3.6 m (12 ft) of this length is covered with lath, placed at spacings dependent upon the shade percent desired. It takes approximately 900 of these panels per acre and building these is a good project for staff in the winter months. These panels sit on top of either 2" x 4", 2" x 6", or steel pipe attached to the top of the posts. Posts for this type of shade are put in at a 3.6 m x 3.6 m (12' x 12') spacing. This shading requires a different approach to procedures such as spraying, as the 12 ft post spacing requires more passes up and down the field per acre. These panels are tied down to stop wind from lifting them off. There are no gardens in British Columbia with this type of shade so they will not be discussed further in this guide.

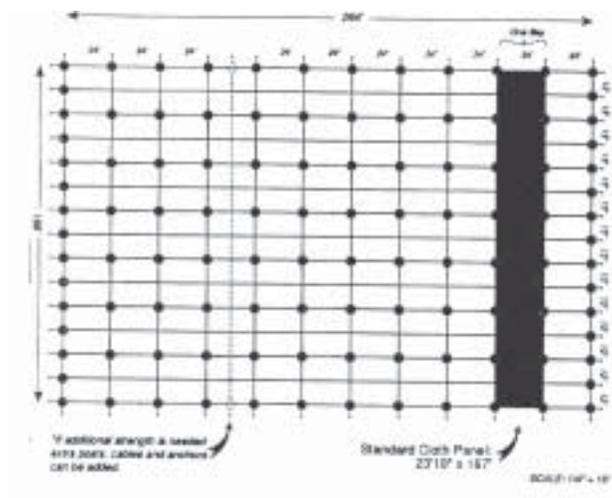
# Garden Design and Choices

## SHADE CLOTH

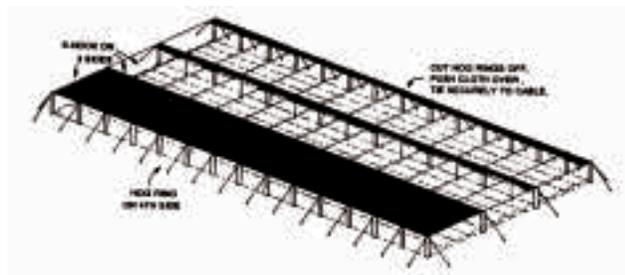
The more recent shift for ginseng shading has been from wood to a woven polypropylene cloth. There are many companies now selling shade cloth and it is not the intention of this publication to distinguish differences in individual companies but to make general observations.

The following diagrams are of a typical general layout of a ginseng garden. There are very specific requirements for post placement so the cloth will fit properly. These can be obtained from the shade dealer as individual companies differ somewhat in layout requirements. See figures 19 and 20.

**FIGURE 19. Requirements for post placement**



**FIGURE 20. General layout of a ginseng garden**



The above figures were made available courtesy of Kamloops Ginseng Company.

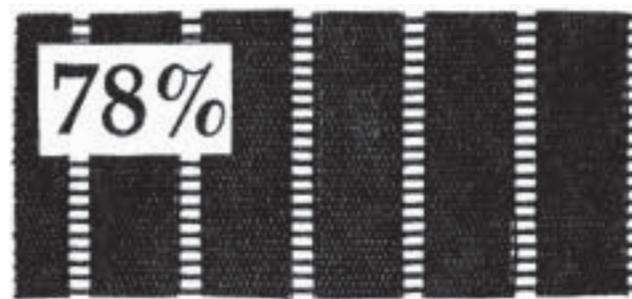
## SHADE CLOTH TYPES

### Woven

Shade can be purchased in various styles of weaves in widths up to 36 feet in 6 foot intervals. The typical weave is called a lath configuration which has heavy and light strips as you would find in the wooden lath type. This comes in a wide lath and a narrow lath pattern with the wide pattern being less popular as the light weave strips let considerably more light through than the heavy parts. There are also solid weave cloths available in many light transmission percentages.

See figure 21, which shows the typical 78% lath weave construction used in this industry.

**FIGURE 21. Lath weave construction shade cloth**



### Side Shade

The cloth weave and percentage shade are typically different for the side shade than the top shade. It is generally 60% shade in widths of 5 to 10 feet and any length desired. There is some consideration given lately to not having a side shade at all but build the main garden a bit larger and not plant the outside bed to ginseng. This would have the advantage of allowing better air circulation in and through the garden for disease prevention. Many things will be tried and accepted or found wanting as this industry proceeds. Figure 22 shows a typical weave pattern for side panels.

**FIGURE 22. Typical weave pattern for side panels**



## IMPORTING SHADE CLOTH

When you are importing shade cloth materials into Canada, Customs Canada require an import number, supplied by the Privy Council of Canada. This number is O.I.C., PC, 1993 - 1811, December 31, 1997. Since this material is not manufactured in Canada, it can be imported duty free as an agricultural product.

*Note: After December 31, 1997 this will no longer be necessary as the Free Trade Agreement will cover this.*

## QUALITY OF SHADE CLOTH

Most companies sell a standard cloth and a special cloth to give price choices and be competitive. What it comes to in the decision making process is what is right for you at the time. In most situations the standard cloth seems to be the best bargain as it will last longer and have more value if it had to be sold. On the other hand your start up costs could be reduced, by using the special cloth. Discuss these with a shade cloth dealer to be sure you get what is best for your situation.

- **STANDARD** – longer lasting and stronger
- **SPECIAL** – cheaper but not as strong and long lasting

*Note: Ginseng shade cloth is very strong and can be walked on when in place. This is not recommended unless necessary. Cloth is generally hung looser today to reduce pressure on grommets and to get longer life from the cloth.*

## NUMBER OF GROMMETS

Shade cloth can be made to a growers specification. There are a number of choices, some mentioned above, but there are others. Grommet spacing is one of them and the more you have the more expensive the cloth. Be careful not to get to scrumpy on this as extra ones are handy in certain situations. If one is pulled out for some reason it is handy to have another nearby to use. If a cloth is very tight, more grommets holding will mean less strain on individual ones. Grommets are placed at one or two foot intervals and the closer spacing is particularly necessary at the corners.

## CLOTH COLOUR

Shade cloth comes in different colours and the jury is out as to the advantages of any particular one. The traditional black is being challenged by blue, green, white and beige to name a few and it will be a few years before any decisions are made. There is some concern that the coloured cloth will not have as good ultra violet light (UV) protection built into it and will not last as long. The makers of coloured cloth say there is no problem any more with the coloured materials.

There is also the question of the advantage of a colour, especially green, as that more closely mimics the forest colour. The coloured cloth does create a different light spectrum in the garden and only some very close observation will give the answer to that question. Tests are being done to determine the light quality differences under the various shade colours and construction types. An interesting item with the coloured cloth is that you have to go to a slightly higher shade % as the materials used to make the cloth are translucent, allowing some light to pass through the material and this has to be compensated for.

## PROBLEMS AND CONSIDERATIONS WITH SHADE MATERIALS

Some problems that the industry has encountered with shade cloth over the last few years are as follows and is not a condemnation of the industry, but things to watch for:

- poor sewing of edges
- poor instalment of grommets
- improper thread used in sewing (no UV protection)
- general early deterioration of cloth (poor quality)

The following are some important considerations to keep in mind when working around shade cloth, some that can be very costly if not heeded:

- Shade cloth will melt with engine exhausts so exhaust configurations of tractors have to be modified.
- Shade must be rolled up or removed in fall to prevent 'gravity' problems with snow load. Wet snow can be very heavy and will collapse a garden quite quickly.
- Don't spread cloth out too early in spring as it cannot handle too much wet snow. As long as cloth is out when plants start to come through the straw is soon enough.
- Water will 'run' on cloth, especially on slopes. Lath weave should go across the slope not with it, if at all possible. Water running and dripping at cables or ends will cause wet spots that encourage diseases to start.
- Stretching too tight will pull out grommets or tear stitching.
- Kids will get up and bounce on top of the fabric which can cause considerable damage — they call it 'ginseng bounce.'
- You can walk on fabric but should only be done when necessary.
- Length of fabric sections should not be too long for handling ease.

## POST PLACEMENT FOR VARIOUS WIDTHS OF SHADE CLOTH

This may seem like a simple decision to make and that all you have to do is have the posts the right distance apart. While that is true there are other considerations to ponder. It will affect the size of the sprayer boom you use, the length of the posts you need, the number of S-hooks you need, the amount of cable you use and probably other things as well.

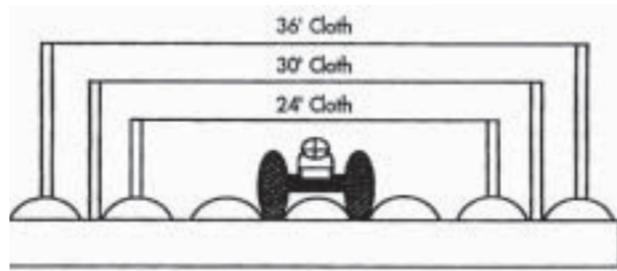
In gardens using 24 and 36 foot wide shade cloth:

- the posts have to go down centre of beds because if you don't the equipment will not be centred between the posts.
- the irrigation line have to lay on the bed or must be suspended. (If it lays on the bed, the problem of pipe 'snaking' in heat/cold cycles due to expansion/contraction of the plastic need to be addressed.
- spraying will be most efficient in the 36 foot garden as less passes will have to be made to spray the whole garden. See figure 23 following.

In a garden with 30 foot wide shade cloth:

- Posts can go down the gutters and have the tractor centred in between the posts.
- Need to use slightly higher posts to compensate, as the same size post needs to be driven in further for stability, losing clearance.
- Irrigation can also go down the gutter and the 'snaking' problem is eliminated. See figure 23 below.

**FIGURE 23. Post placement requirements for various widths of shade cloth**



**Note:** *the tractor must be in the centre of the span whether it is 24, 30 or 36 ft. for equalization of the sprayer booms.*

## POST TYPES FOR GARDEN CONSTRUCTION

### Wooden

There are various options available when deciding what style of garden to build as far as posts are concerned. If you are using wooden posts the first major decision is whether to buy treated or non-treated. Non-treated posts will only last one cycle (four years) and then need to be replaced as the butts will have rotted in that time. They are though, considerably cheaper to purchase initially. Treated post will last longer but will become quite brittle for pounding, for second and third use in gardens. If your soil type is quite hard in the sub soil layer, considerable breakage might occur. Discussions with other growers in your area with same soil types will help in making this decision.

The length of the post will determine the clearance inside the garden. Most posts are pounded in to approximately 0.6 m (2 ft), so a 2.0 m (7 ft) clearance would require a 2.7 m (9 ft) post. The higher the garden is the cooler it will be at the plant level and better air circulation you will have in the garden. Disadvantages to this are extra cost, special pounders for very high gardens and special techniques for working at heights beyond reach from the ground. Some garden today have a 3.0 m (10 ft) clearance.

### Steel

Another option is to use steel posts for garden construction. This will eliminate the use of post pounders but will add the need for some mechanism to screw in the anchors needed for mounting the posts. Each post is bolted to an anchor which is screwed into the ground approximately 0.6 m (2 ft) and has an eye on the top to receive the bolt. This anchor has some limitations in some soil types where the anchor will not screw in all the way or not hold properly. Contact your supplier for the limitations of the this type before committing yourself.

Steel posts come with various hardware such as pole tops, rain caps, bolts etc. so more parts are involved. You do not have to drill the steel posts to receive cables as the post tops are already fitted with holes and cable guides. As in wood post you can purchase various lengths to create various clearances in the garden.

Which ever type of construction you use, you need to be very precise in laying out your garden from building beds to pounding posts. Shade cloth does not go around corners or even slight curves well, so straight lines are important. Proper bed construction according to shade cloth requirements will allow the posts to go where they should. If you are out only a few centimetres, after 30 beds or so it will be noticeable. When building beds it would be wise to do the post rows first and fit the other beds in between.

## ANCHORS

There are three types of anchors that could be used in this industry:

- **DEAD HEAD** Dig a hole and bury a short piece of post with cable around it
- **SCREW IN TYPE** Various lengths and sizes, cable attaches to an eye
- **DRIVEN OR DUCKFOOT TYPE** Cable attaches to an eye

All these anchors types can be used for perimeter ground anchors around the garden. The screw in anchor is also used extensively inside a wood post garden as tie downs. These are not necessary in a steel post garden.

## ASSORTED HARDWARE FOR BUILDING GINSENG GARDENS

- **CLAMPS** Must fit cable size — 3 or 4 types
- **S HOOKS** Attaching devices — different sizes and strengths for various uses
- **RAT TAILS** Used to wrap around and hold some types of cables instead of clamps
- **GUY ATTACHMENTS** For bolting to posts for attaching anchor cables, in some designs
- **EYE BOLTS** For going through posts and attaching cables
- **POST BRACKETS** For holding cables in place
- **CABLE GRIPPERS AND WINCHES**
- **STAPLES, WASHERS ETC.**

## CABLE FOR GARDEN CONSTRUCTION

There is basically two types of cable used in the ginseng industry, aircraft and guy strand. These come in various sizes or diameters as well as materials. The type of cable you use will determine what hardware you need to purchase. The rat tail ties will only work with the guy strand type as an example. The industry also has access to used oilfield cable from time to time and it seems to work fine. One problem with this is that it is not galvanized so is prone to rusting and may not last as long.

Sizing of cable is also important and in areas where high winds are common the heavier cable should be used. Cable can be purchased from  $\frac{3}{16}$ " and up. Smaller than this would not be recommended. A small amount of heavy gauge wire has also been used with success but the availability of this is questionable.

## SIDE SHADE AND END SHADE

There has been considerable discussion regarding the use and type of side and end shade panels. A part of this discussion is the generally poor plant quality in the outside row in any garden, to the point where it produces very little ginseng. Part of this is a side shade problem but irrigation design and chemical spray patterns also play a part.

Typically the side panels are made of a solid weave material, with 60% shading capacity. Very quickly one realizes that at 60% shade, plants will suffer stress from the amount and intensity of light. Over time some plants will gradually succumb to this condition. Using a heavier shade material, at 80% shade would give the plants much better protection and more yield as an end product. It does not take too many roots at \$40.00/lb to pay for the extra cost of a higher percentage of shade.

When spraying a crop, the very outside edge gets only sprayed from one direction and good coverage is not achieved. This means less protectant materials and thus more disease pressure. To rectify this a spray, with a gun or backpack from the outside would be helpful.

The third factor is in irrigation design where typically the lines were placed in the second post row of the garden. This meant the outside edge of the garden had no overlap of water from the sprinklers so was generally water stressed. Now many growers place the sprinklers down the outside edge of the garden to overcome this problem.

End shade, where equipments have to go in and out are generally not used. The plants at the ends will burn up in the direct light but this is considered the cost of doing business. Many growers are not even planting in the first few feet of a row, especially on a southern type exposure. The higher the garden the farther in the light will penetrate in the high intensity parts of the day.

Occasionally a grower will use a side shade and lift it up whenever the need to enter a garden arises. Some also have hung a cloth on the ends and let them blow freely in the wind.

## BED FORMATION

These beds need to be formed so that they match the dimensions required for the shade cloth. The beds also need to be as wide as possible yet allow room for vehicle wheels to travel, especially the centre bed between the posts which is the one almost always used for equipment. Generally the beds would be 1.5 metres (5 feet) wide with a 30 cm (12 inch) spacing between each bed. This means that the vehicle and equipment tires need to be quite narrow to reduce the space required between the beds. On the other hand if the space between the beds is too narrow plants will be very close together causing excessive damage to them in spraying operations, etc.

The edges of the beds should be as vertical as the soil will allow, with a slightly rounded centre for drainage. Some growers now are basically using a flat bed and because it is raised feel they are getting enough drainage for the plants. Usually 10 to 16 rows are seeded on each bed and if the edges are not formed well, the outside rows will be seeded on the sloped edge.

## EROSION CONTROL

Where water or wind erosion is a problem, erosion control practices should be used to reduce soil loss. Water erosion damage is most severe on long or steep slopes where crop rows run up and down the slope or where cropping practices leave the soil surface exposed to rainfall impact. Wherever practical, planting should be done across the slope. Wind erosion can occur when light sandy soils are left bare of cover or residue over the winter.

In the preparation year, winter cover crops will help to minimize soil loss. **The use of fall seeded cover crops can provide good water and wind erosion control.** Cover crops, depending on the species, will serve as green manure or early spring forage for livestock. Winter cereals such as winter wheat or fall rye should be seeded at 100 to 170 kg/ha (40 to 70 kg/acre) before September 30. These crops will overwinter and should be plowed down or killed with herbicides early in the spring. Annual ryegrass, such as Westerwold's, can be seeded up until September 15 at a rate of 35 kg/ha (14 kg/acre) to provide erosion control and an excellent spring plowdown crop.