

Heartnut Farming for Profit

Planning Your Orchard

Regardless if you are looking for land to plant heartnut trees, *Juglans ailantifolia* var. *cordiformis* or you already own land, you need to be aware of the climate, soil and the conditions and where heartnut trees will flourish. You must focus on the hardiness and suitability requirements of your climatic region. Heartnut trees are originally from Japan, a humid, temperate maritime climate, so they will do best in a similar North American climatic region. That characteristic places them in a zone 6-7, near a large body of water, where moderated winter conditions and a degree of spring frost protection exist.

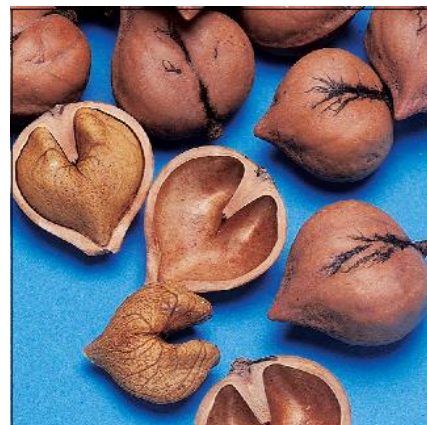
Over the millennia the heartnut's cousin, the native black walnut has adapted to the North American climate extremes. The heartnut in its gentler maritime climate has never needed to adapt with a thick outer bark to resist cold and south-west injury. All walnut species bear their female flowers in the terminal buds. The terminal buds leaf out first in the spring ahead of the lateral buds, exposing them to injury from late spring frosts. Black walnut has survived because it has evolved the practise of leafing out 2-3 weeks later than most other wild trees, including the Japanese heartnut, and so avoiding damage to flower buds.

We generally recommend planting seedling Chinese chestnut trees (grown from seed and not cloned). The heartnut is an exception. The more usual Japanese walnut *Juglans ailantifolia*, has a nut shaped more like a black walnut, round and poor cracking. Occasionally, this species has evolved off-spring that produces a more flattened nut that takes on the shape of a valentine heart and so the name, heartnut. Even rarer is the heartnut that cracks out releasing the kernel in one or two pieces, making them a potential commercial variety. The chance of getting an exceptional cracking, hardy, productive heartnut with a nut of reasonable size is about 5% or less. For this reason, we only recommend grafted heartnut trees for commercial orchards. Our grafted selections have stood the test of time. We have been propagating them for over 25 years and have not yet been disappointed by them.

In our continual search to find more selections that crack out and release the kernel whole, we have made hand crosses of our best heartnut trees. We have grown out over 100 of the crosses and we are now evaluating them. We found about a dozen that have good cracking qualities. We have narrowed the selections down to 4 that we are testing as grafted trees to determine if they are suitable performers. Time will tell.



12 year old heartnut orchard



Easy cracking heartnuts, whole

Your Bucket List

Choose land that is gently sloping without low spots where water can collect and pool. Heartnut trees grow best in well-drained, deep, fertile, moist loam to sandy loam soil with good aeration and a soil pH of 6 to 7. Do not plant in heavy clay soils and soils with a pH below 6. If the pH is too low, it should be raised with an application of agricultural lime. Soil test should be done annually to address the fertilizer and pH needs. The land should be

in an appropriate climatic zone, preferably where commercial tender fruit growing and some protection from late spring frost exist.

Wind machines for frost protection adopted by vinifera grape growers would benefit heartnut growers too. It would allow him to grow heartnuts in less than ideal climatic conditions and possibly use cheaper land to buy, offsetting the cost of the machines. One machine will protect up to 5 acres of trees.



Once the land selection is in place, the first things on your bucket list is to; install windbreaks, plan the row layout, consider the location of field tile lines, identify the water source for irrigation and learn about the soil by testing it to determine soil fertility and pH, so proper amendments are made before planting. Also determine what was planted on the land the previous year. What herbicides were used and do they persist in the soil? If so, they may affect newly planted orchard trees in negative ways. Atrazine, for example, can persist for more than one year.

Cover crops, planted a year in advance also called green manures, are a great way to add nitrogen and humus, improve soil aeration and texture, and encourage microorganisms as well as earthworms. Earthworm tunnels are nature's soil aerator allowing tree roots to obtain the water vapour and nutrients they need. The cover crop can be tilled under prior to planting to improve soil quality and health.

Tile Drainage & Irrigation

Most soils will benefit from the installation of a tile drainage system and it should be in place before planting. Aside from the benefits to the trees, tiling will make the soil conditions better for all orchard work by preventing tractor ruts or tracks, and wet spots. It is important to maintain relatively smooth, level ground for orchard work and harvesting. Tile drainage spaced between the rows, and not under where the trees will be planted, will drain excess water from the orchard. Tile contractors can be a year behind in getting to your job, so planning ahead is essential. It also helps to order trees a year or more in advance for large plantings.



The spring and summer of 2016 will long be remembered by some as the year to have irrigation in place at planting time. The 3 months of drought from May to mid-August left some newly planted orchards in distress or dead. Plans need to be made for providing water. If a good well or other water source is not available then a pond will need to be dug. This is best done when the tiling is installed. Place the pond at the low end of the slope and have the tiles feed into it, and then out again into the outlet for the tile system. An outlet is needed to prevent the water from backlogging the tiles or overflowing the land when the pond is full. Water that is used during the dry periods would be replaced by the tile drainage system above the pond the following winter.



If a pond is your only source of irrigation water, be sure to make it large enough. If land is at a premium, go deeper. To put one inch of water on one acre of land in one application will take 27,000 US gallons of water. In a dry year, you may need to apply water at crucial times, possibly 3-6 times or more. If only the tree row is watered with a drip system, about 10 times less water is needed to sustain the same acre.

Irrigation specialists should be consulted before pond construction begins to determine your pond requirements. Also consult a pond specialist for natural ways to control algae that will invariably form. Of course, fish can be added too. There is a grant for farmers to install ponds. Apply to: Ontario Soil and Crop Improvement Association Telephone: 1-800-265-9751 Fax: 519-826-4224 www.ontariosoilcrop.org.

Once the pond or water source is chosen, arrange with an irrigation contractor to install your system. It would best be done before or as soon as the trees are planted. We favour underground drip irrigation as a system that is most efficient for water use. Surface drip is also good. If there is no shortage of water then underground pop-up sprinkler systems are next best. A temporary system is one that uses overhead irrigation. Once the trees are too tall for an overhead system then it needs to be replaced.

Spacing Heartnut Trees

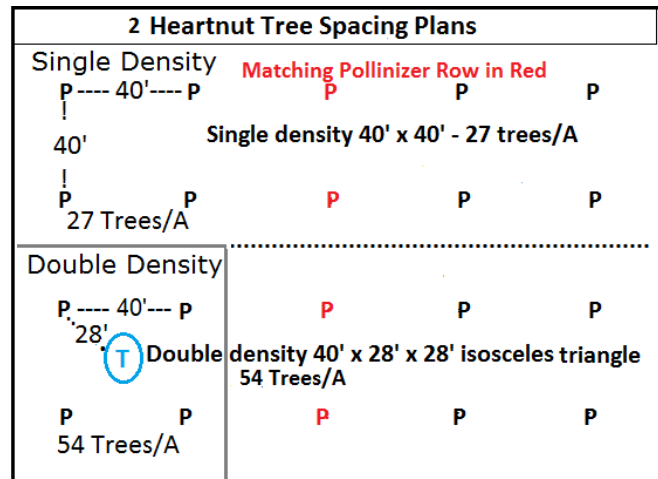
Heartnut trees are medium size trees. They reach a height of 11m-17 m (35'-55'). In Ontario we recommend a final planting space of 12 m x 12 m (40' x 40') or 27 trees per acre.

An option is "double-density". This means planting double the number of trees in each row. For double density, a tree is planted in the centre of the square (T) created by the 40' x 40' initial spacing requiring 54 trees per acre. As the trees begin to crowd in 10-15 years, intermediate trees can be removed. By

planting double density, the costs are higher upfront, but the return is also earlier since the trees should be starting to produce commercial crops in 6 years, and thinning crowding trees out could take up to 15 years.

Another option is to plant an intercrop while the trees are small. Suitable temporary crops could be strawberries and other berry crops or even soybeans and vegetables in the early years.

Heartnut trees are partially self-pollinating. For best pollinizing, we recommend 2 main crop cultivars and 2 matching pollinizer varieties. We suggest 2 rows of a main cultivar like 'Imshu' followed by a pollinizer partner like 'Campbell CW3'. We like this arrangement because they are a week apart in dropping ripe nuts allowing 'Imshu' to be harvested first, and later 'Campbell CW3'. 'Simcoe 8-2', 'Stealth' and 'Locket' are also late ripening, while 'Campbell CW1' is early with 'Imshu'. 'Campbell CW1' and 'Imshu' are our late pollinizers that pollinize all of the other cultivars.

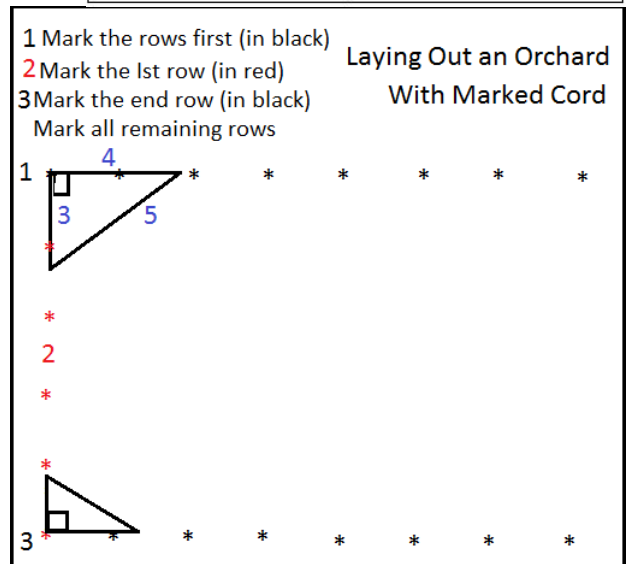
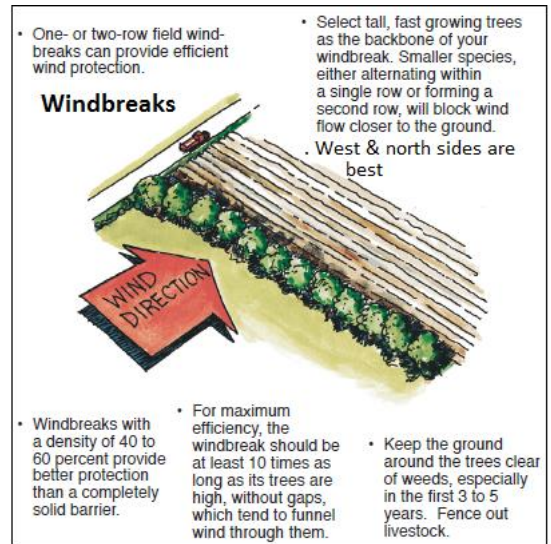


Plan Your Field Layout

If you are planning a large orchard, we need to know at least a year in advance, possibly 2, so we can have enough trees for your planting. We can then offer you grafted trees in the numbers and cultivars needed. You should also plant your windbreaks on the north and west sides if they are not already there. More information is available about windbreaks by Googling ‘windbreaks Ontario’.

After cultivating the field and preparing the soil for planting you will need to mark the tree spaces in advance. This is an important step in establishing the orchard. Establish how far in from the edge of the field the tree rows will be first, and then mark the four outside corners of the planting, allowing for tractor turning and other management activities.

The most accurate way to lay out an orchard is with a surveyor’s transit and compass or laser guidance system. For do-it-your-selves, the next best way is to prepare a cord or rope with markers (e.g. colored tape) each distance the rows will be apart. Mark a second rope with the tree spacing distance marked on to be used at right angles to the line of rows. For 40’ x 40’ spacing, a second marked rope is not necessary. DO NOT USE NYLON CORD - it has too much “give.” Binoculars would be useful to ensure straight lines.



- 1 Lay out the base line first, marking where each row will go with flags or stakes.
- 2 Then lay out the first tree row at right angles to the base line ensuring that it is straight and true. The “3,4,5” triangle or multiples of this form can be used to create a 90 degree angle for your tree row.
- 3 Go to the end of the field or your rope length and repeat the row spacing with markers, completing a square. Use the 3,4,5 triangle as needed.
- 4 Move row by row across the field marking all of the tree locations with coloured flags or stakes. Place a different second stake or use an up-side-down paint mark near the planting site. Once the hole is augured, the stake may be lost, so the necessity of second marker. The colour coded paint mark near the stake will ensure that mix-ups can’t occur. Be sure that the planters are all familiar with this.
- 5 Repeat the 1-4 routine as needed to complete the whole field.

Planting

Once the trees arrive, be sure to keep the tree roots wet at all times. Cover the roots with wet blankets and store in a cool dark but above freezing place until planted. If necessary, they can be “heeled in” on the north side of a building or in a shady location. Dig a shallow trench, lay the tree bundles in and cover all exposed roots with soil. Roots need protection from freezing conditions, so be aware for storage situations.

When everything is marked it is time to plant. Bare root trees are labelled and bundled and ready in April to be planted. All grafted trees will have an identification tag.

Our growers have implemented various planting methods. You can use a 20 inch auger, but be sure to weld a piece of metal or something similar that will scratch the side of the hole to avoid leaving a glazed edge that prevents water and roots from penetrating. Auger the hole only as deep as the tree needs. Going too deep will cause the tree to sink as the ground settles, leaving it in a “sink hole”. Hand digging is a good option but this requires lots of shovels and hand labour. The fastest way is with a tractor mounted tree planter equipped with a planting distance marker. Planting contractors can be hired to perform this task.



A tractor mounted auger with teeth to prevent glazing

When planting, you can add ½ cup bone meal or superphosphate to the soil that is backfilled into the hole. This helps to stimulate root growth. Once the hole is backfilled the roots should be well covered and you can gently tamp the ground around it, but do not stomp or you can damage the roots. Do not plant the tree deeper than the root collar. Top side roots should be about 5 cm (2”) below ground.

It is important that the bare root trees are not left in the sun or wind. Both elements can dry out the roots and begin to kill the trees before you have even planted them. Wet the roots of the trees before taking them to the planting area and only take as many trees as can be planted within a half hour. When planting, keep the trees covered in a wheelbarrow or enclosed trailer or a trailer covered with a large wet blanket. Only pull the trees out from this protection when ready to place in the hole.

We have seen a planting method such as this that worked well:

- Person 1: augers the holes.
- Person 2: Plants the trees. Several planters will be necessary.
- Person 3: waters the tree.
- Person 4: puts on a layer of mulch about 2” thick and 2- 3 feet in diameter. Two or more workers will be needed.
- Person 5: puts on a tree shelter or stakes the tree if necessary.

There are companies that offer a fertilizer to help reduce tree shock. You can add this to your first watering if you would like. Check with your local farmer’s co-op for what is available.

Mulches can vary but are essential to keep weed and grass competition away from the roots. Mulch also keeps the water from evaporating so the roots can absorb more from rain or irrigation. It will also help reduce or eliminate hand weeding during the summer months, a normal necessity. A wood chip covering of 8 cm (3") works well. Biodegradable plastic squares designed for this purpose anchored with 6 inch steel staples can be used to prevent any emerging weeds for season long control. Earthworm activity is greater under a mulch too.

Tree shelters are optional, but many growers find they help keep rodents away in the winter and keep herbicides off the tree when spraying. Heartnut grafted trees tend to grow sideways, rather than upwards. A tree shelter that is one foot or so over the height of the tree promotes upright growth and suppresses side branches that may occur low on the graft. It is important in the first and second year to check for sprouts that may come up from the rootstock early in the season. These need to be removed if they occur, to prevent the rootstock from overtaking the graft. Growers also report that the trees have a better start each spring compared to those without tree shelters. We use tree shelters routinely on heartnut grafts in the nursery.

Irrigation

It is important to ensure the trees are properly irrigated in the first summer. The trees are not established and will quickly die or be stunted in a drought. Hand watering is labour-intensive and sometimes ineffective. It is a wise choice to install drip lines as soon as the trees are in the ground. An emergency temporary surface system using thin walled 3/4 inch black poly pipe can be laid out along the rows near the trees. A special punch can be used to insert several emitters at each tree location. A simple garden hose at 40-50 pounds pressure can be connected to water a whole row at a time. Be sure to have a filter in the water line. This system is relatively inexpensive and parts are available at *Zwart Systems in Beamsville, Ontario also at *Vandenbussche Irrigation in Delhi, Ontario. Either can assist you in setting up a complete system. Watering two times a week should be enough but this can be modified if there is a rain of 10 cm or more. Be sure that enough water is reaching the roots by digging down near a tree and observing if the water is wetting the earth in the root zone. This can help you decide how long to water each time. A fertilizer injector can be used to fertilize while watering.



Follow Up

Once the trees are planted and all of the tree needs are established, the orchard floor needs your attention. Plant material is needed. We prefer a grass that can stand some traffic along with clover or other nitrogen fixer. We also like a grass that is not deep rooted so it doesn't compete with the tree roots. Dwarf perennial rye grass has been suggested as a suitable ground cover. A grass surface is ideal for a harvester that sweeps the nuts from the ground. We use a modified Savage pecan harvester for our harvesting.



In preparation for planting a grass cover, the orchard needs to be disked and harrowed to get it smooth and free of pot holes and tractor tracks. Rocks that would damage a mower should be removed. The cover crop of grass seed is then ready to be spread. Once the grass is growing well, the surface where the driplines are placed need

to be to be kept weed free. A non-selective weed killer and a longer term weed control product can be used to control the growth in the tree rows. Avoid spraying close to the trees the first year, presuming no mulch or tree shelter was added.

The rest of the first year requires scouting for problems, irrigating, mowing, and row weed spraying. Look for insect and animal damage, poor tree colour and any other unforeseen problem. Tree spraying may be necessary to control aphids, leafhoppers, caterpillars and invasive species like the Japanese beetle that has become a serious pest in Ontario. Orchard grass should be kept short to remove foliage cover allowing predators like hawks and owls to reduce populations of moles and mice and rabbits that can be tree pests. Put up raptors nesting sites to encourage them to nest and raise young.

Future Follow Up

In the fall each year after the tree shelters were removed, we recommend coating the trunk with white high gloss latex paint. This will prevent bark splitting that is caused by “south-west injury”. You can put it on with a brush but the fastest way is to use a car wash mitt and put it on with a rubber glove under the mitt to keep your hand clean.



White Paint Protection

In March on a sunny day, when there is still snow on the ground and the temperature goes above freezing, conditions are set up for south-west injury. The warming southern side of the trunk is stimulated by the sun’s rays reflecting from the snow. Sap begins to rise up the tree. As the day progresses and the sun sets, the air temperature drops below freezing again. The sap has not had enough time to return to the roots and freezes in the trunk, splitting it. The white paint reflects the sun’s heat from the tree so it doesn’t heat up and the sap remains in the roots.

It is advisable to get a farmer’s spray license if you don’t have one now. Go to <https://www.oep.ca/> and find all of the information you need to know. The spray materials that you can use on heartnut trees are listed in *Publication 360-Chapter7, Tree Nuts Walnut Calendar*.

<http://www.omafra.gov.on.ca/english/crops/pub360/p360toc.htm>

Scouting for butternut curculio and oblique banded leafroller should be conducted from the time new growth appears until September. Both will lay eggs on new growth in the spring. The eggs hatch and feed as they tunnel into pith of the new growth. The support for the new branch fails and the limp new growth dies. Sprays should be applied if the problem becomes serious. Other pests are mentioned in the spray calendar as well as their controls. If problems arise, consult the Ontario fruit spray calendar.



Oblique banded leafroller

Spraying will be necessary for weed control in the tree rows. Do not spray close to the trees. Weed mats, mulches and tree shelters will lessen the need to spray close to the trees. Herbicides for walnut are listed in *Publication 75 – Weed Control*: www.omafra.gov.on.ca/english/crops/.../pub75toc.htm .



Butternut curculio

Some effort will be needed especially in the winter and spring to reduce deer damage if the population is high. Encourage hunting in deer season and get a gun acquisition licence and a license to hunt too. Put out the human scent in the form of strong deodorant s or perfumes on small sponges or

tie small bars of aromatic soaps like the ones used in motels and station them around and within the orchard tied to branches. Renew them as needed. Deer equate these aromas with the human scent. A dog trained in a dog fence perimeter can also be a deterrent.

Rabbits and mice can be a problem in winter when food is scarce. They will chew on branches, buds and bark. A tree shelter will help to keep them off. Mowed grass will expose them to predators. Put up raptors nests for hawks and owls to nest and raise their young. These will help to reduce the population of squirrels, rabbits and mice as well as other pests.

It is always good to scout your orchard from time to time for any problem that may exist. Set out a trap line in the orchard for squirrels. Trapping and shooting are some means of control. A 20 gauge shotgun is much safer than a rifle. Trap squirrels in the off-season when they are scrounging for food. View this video for trap placement and suggestions: <http://www.youtube.com/watch?v=58jg5YwHSEk>



Harvesting Heartnuts

Heartnuts are an easy crop to grow and harvest. The nuts drop to the ground when they are ripe. However, hand harvesting is tedious and not profitable. Hand harvesting is only for pick your own and harvesting in awkward places where machines don't work, like close to the trunk. This kind of hand harvesting can be done with a Wizard tool that is truly remarkable for avoiding stoop work.



Wizard Nut Picker

An investment in a harvester and hulling machine are necessary. These two items are needed to gather and remove the trash and hulls from the nuts. The huller illustrated here is set to turn at 400 rpm. Any faster and some nuts will break in two. The hulls fall out through the open bars underneath and three nuts travel to the outlet at the end.



Savage 8042 Nut Harvester

After hulling the nuts are washed, sanitized and dried. Dipping the nuts including the perforated bin in bleach at 200 ppm for one minute would make a suitable sanitizing solution.

There are several options for drying the nuts. They can vary from small dryers run with furnace fans to large corn and tobacco dryers. Heat is not necessary since the nuts are slow to mould, so all that is needed is moving air to remove moisture.



Heartnut huller

The Savage 8042 harvester has been our machine of choice and is suitable for plantings of 1-10 acres or more. The drawback with this machine is the limited nut storage and the need for hand labour to handling the bins, bushels or sacks. For larger plantings, where hand labour is much reduced, we recommend the Savage 8261 harvester or the Flory 8548 harvester. A sweeper/blower may be needed to move the nuts to the centre of the aisles for these taller harvesters to maneuver in the orchard to avoid hitting low limbs.



De-husking heartnuts with a rubber paddle huller is ideal for the small and medium size planting

Marketing Heartnuts

Customers need to see how heartnuts are cracked in order to enjoy them. The ordinary nutcrackers that are used for soft shelled walnuts, pecans and hazelnuts won't work. The shell is too hard or too thick. One of our breeding objectives is to find a heartnut that has a thin enough shell that it could crack it with a hand cracker.

At our farm display, we demonstrate cracking the heartnut with a hammer and the nut held on its edge on a brick. No special cracking tool is needed, though our heavy duty nut crackers will do it easily too. Since the nut must be struck on end or the side to side edges in order to crack successfully, existing commercial nut crackers will not orient the nut properly. This means that for now all sales of heartnuts would need to be in-shell, limiting the potential sales. Hand cracking and sorting nut meats out is labour-intensive and not practical. We hope to soon have a commercial machine cracker that will orient the nuts and crack them for us at a price that growers can afford, enlarging our potential sales and making the heartnut a viable crop for Ontario and all other areas with suitable climate and soil.

The heartnut has a delectable mild walnut flavour that draws attention when customers sample it. It has uses comparable to those of the walnut from California. Our cookbook, *Nuts about Heartnut Cooking, A Heartnut Lovers Delight* was designed to encourage customers to use heartnuts in their cooking.

For the farmer it is a win win situation. A well maintained orchard can produce 1 tonnes per Ha (1 tons /A) at 10-15 years of age. At \$4 per pound, the return can be over \$4,000 per acre. Once a commercial cracker is available, there will be a much bigger clientele.

Value Added Products & Farm Entrepreneurship

If we take a lesson from the "Big Apple" on highway 401 near Colborne, Ontario, "Kernel Peanut" south of Simcoe, Ontario or "Picard's" in a number of locations in Ontario, a great deal can be done to draw customers to you and to make your store attractive and alluring.

Grimo Nut Nursery - Heartnut Trees for Sale

Advertisement

Farmers who order from Grimo Nut Nursery will benefit from our more than 46 years of experience and our dedication to you as a grower. We are proud of our reputation that is based on honest information to growers from our own experiences. At Grimo Nut Nursery we offer our customers sound advice and stock that is guaranteed true to name. Our bare root stock is exceptional bar none.

Our heartnut trees are grafted (cloned cultivars). For commercial plantings we do not recommend seedling trees (grown from seed). Seedlings are much too variable and do not share the characteristics of the improved selections.

We grow them naturally in nursery rows where they have room to expand their root systems in natural soil, unrestricted. They have become adjusted to natural outdoor wind and rain conditions and when they are freshly dug and planted in bare root format, they quickly adapt in your field. It has been found that our bare root trees grow well, handle stress best and bear early.

In appreciation of your order we offer a 5% discount over the list price to farmers who order \$1000 worth of trees. Additionally, trees to be shipped have a 5% reduced shipping cost from 15% to 10% as the order value goes over \$1000. Orders over \$2000 receive an additional 5%. Then for each \$1000 amount added beyond \$2000, there is an additional 1% discount until another 5% is reached. Farmers can achieve a savings value from 15% to 20%.