Hazelnut Farming for Profit

Grimo Nut Nursery - Hazelnut Trees for Sale **Advertisement**

Farmers who order from us will benefit from our more than 46 years of experience and our dedication to you as a grower. In appreciation of your order and the fact that you are an OFA member, we offer a 5% discount over the list price to farmers who order $1000 worth of hazelnut trees and a further discount of 5% for being a member of OHA. That is not all! 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 discount amounting to 20%! Not a member of OHA? Join now by going to: http://www.ontariohazelnuts.com/downloads/OHA%202016%20Membership%20Form.pdf

Our trees were grown from layers and/or cuttings. We grow them naturally in nursery rows where they have room to expand their root systems in natural soil, unrestricted. They are free from circling roots that develop in pot culture that can eventually strangle the tree. They have become adjusted to natural outdoor wind and rain conditions and when they are planted in bare root format, they quickly adapt in your field. It has been found that our bare root trees grow well and handle stress best.

Background


Ferrero Canada

The hazelnut is an important worldwide crop, and yet it is in short supply. Ferrero Roche is the world's largest user of hazelnuts. With factories all around the world, their products reach out to 130 countries on 5 continents. Nutella™ chocolate hazelnut spread produced by Ferrero uses 50% of world production alone and demand for this product is expanding.

Canada imported over 10,000 metric tons of shelled hazelnuts in 2013 and about 9,000 metric tons were used by Ferrero. To supply that amount to Ferrero, we would need at least 10,000 Ha (25,000 A), that is, if we only produce about 1 metric ton per hectare (1 T/A). Since the arrival of the Ferrero plant at Brantford, Ontario in 2006, the plant has been expanded several times to meet the demand for their products in North America. The United States is one of their expanding consumer markets. They are the leading supporter of the drive to plant hazelnuts in Ontario. Ferrero pledges to buy all of the product we can supply, provided it meets with their specific cultivar choices. So far we recommend only three, 'Yamhill', 'Gamma' and 'Jefferson'.

The Ontario Hazelnut Association was formed in 2012 to encourage the planting of hazelnuts in appropriate growing areas. The goal is to establish 5,000 acres of hazelnuts in the near future with a plan to double this as the demand arises. In 2016, Ferrero and the OHA supported six growers who planted 10 acres each in different regions and soil conditions across Southern Ontario as demonstration plantings. Our trees performed well under the adverse summer conditions as these growers will tell you. Let us know if you would like to visit one near you and we will provide you with information.


Eastern Filbert Blight

Two major factors limit the culture of hazelnuts in Ontario and Eastern Canada: susceptibility to Eastern filbert blight (Anisogramma anomala (Peck, E. Müll.) and a lack of cold hardiness. Growing hazelnuts successfully in Ontario requires varieties with blight resistance and winter hardiness. In particular, varieties with

hardy catkins that are not killed by frost during bloom and varieties with a range of pollen shedding, for consistent yields.

Experimental plantings have been established in 2011-2 at two climatic zones, the Simcoe Experiment Station and the Vineland Innovation Centre, to test the current cultivars for commercial production. Only preliminary data is available for now. The information gained offered few surprises. The gentler climate at Vineland was best suited for the European hazelnut cultivars, mainly those introduced by Oregon State University, while the Simcoe site needed hardier hybrid cultivars for success. The windbreak at both locations also provided protection against winter winds. We highly recommend windbreaks and they can't be planted too soon.

Cultivars That Can Cross Pollinize

Hazelnut trees are not self-fertile. They must be pollinized by a compatible partner. The reproductive gene in each cultivar is governed by alleles that come from each parent. The alleles have been identified as male or female or both. To simplify, if two cultivars share the same numbered alleles on opposite sides, they are not compatible. In the chart below, for example, 'Cheryl' will not pollinize 'Gamma'.

We have listed the cultivars with their alleles below, and beside them the cultivars that will pollinize them. We only list the cultivars that we consider worthy of propagation for Ontario as identified by the researchers at the Simcoe Experiment Station. New cultivars will be added as they are introduced to the marketplace.

We also plan to have our northern hazel cultivars assessed for their alleles, so we can recommend them as pollinizers and production cultivars too. Ferrero likes the idea of these northern hazel cultivars since they are harvested weeks ahead of their chosen varieties and so won't mix with them in harvesting. Ferrero has so far not tested the northern cultivars so until they are, they need to be kept separate from those going to Ferrero. The alleles have not been tested either. This will be done in the spring of 2017. Sale of these nuts will not be a problem for other buyers who will find these selections quite acceptable. Until we have alleles tested, we will not be able to provide suitable pollinizer partners for our northern cultivars. We suggest that a variety of them be planted. Since the nuts of all of them are similar, no separation of the crop is necessary.

The suitable cultivars for zones 6b-8 are at right.

For zones 5b-6a, we suggest a mix of these cultivars excluding 'Yamhill' and 'Jefferson'. We suggest also including 'Norfolk','Chelsea' 'Aldara', 'Northern Blais', 'Andrew' and our other northern cultivars as pollinizers.

Cultivar	Alleles	Pollinizers in order of hardiest to least suitable for zones 6b-7
Yamhill	8, 26	Gene, Gamma, Linda, Cheryl, Jefferson, Slate
Jefferson	1, 3	Gene, Gamma, Linda, Cheryl, Yamhill, Slate
Gene	15, 23	Gamma, Linda, Cheryl, Jefferson, Yamhill, Slate
Linda	14, 23	Gene, Gamma, Cheryl, Jefferson, Yamhill, Slate
Cheryl	10, 12	Gene, Linda, Jefferson, Yamhill, Slate
Slate	1, 23	Gene, Gamma, Linda, Cheryl, Jefferson, Yamhill
Gamma	2, 10	Gene, Linda, Jefferson, Yamhill, Slate

For zones 4-5a, we only recommend our northern cultivars. A rigid planting arrangement is recommended but not essential, as long as enough cultivars are in the planting for good pollination.

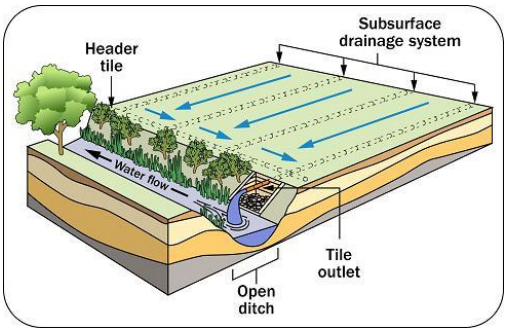
Prepare your field

Regardless if you are looking for land to plant nut trees, or you already own land, you need to be aware of the climate, soil and the conditions and where the nut trees you wish to plant will flourish. You must focus on the trees that meet the hardiness and suitability requirements of your climatic region. Walnut trees that are hardy enough for California will linger and die in the mildest Ontario climates. Hazelnuts too have degrees of hardiness to consider. Oregon (European) hazelnut trees are suited for zone 7 while northern hybrids can perform in climate zones 4-5.

Choose land that is gently sloping without low spots where water can collect and pool. Most nut 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. Avoid soils with a pH below 5.8 for hazelnuts. The first things you need to do is plan the row layout and to consider the location of field tile lines, water source for irrigation and soil fertility. A few months before planting a soil test is recommended to determine soil fertility and pH, so proper amendments are made before planting.

Cover crops, planted a year in advance also called green manures, are a great way to add nitrogen, improve soil aeration and texture, and support and encourage microorganisms and 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. Tiling will make the soil conditions better for all orchard work by preventing tractor ruts or tracks. 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 August left many newly planted trees in distress. 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. This will prevent the overflow of pond water from backing up into the upper tiles or flooding downstream land. 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. 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.

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. Once the pond or water source is chosen, arrange with an irrigation specialist to determine your pond or water source requirements. It would best done before or as soon as the trees are planted.

Irrigation specialists include *Vandenbussche Irrigation in Delhi, Ontario,*Heartnut Grove Inc. in Mount Brydges, Ontario, and *Zwart Systems in Beamsville, Ontario. They can assist you in setting up a complete system.

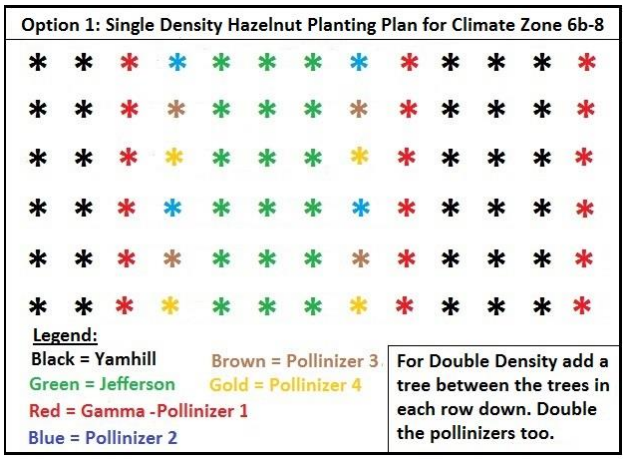
Spacing Hazelnut Trees

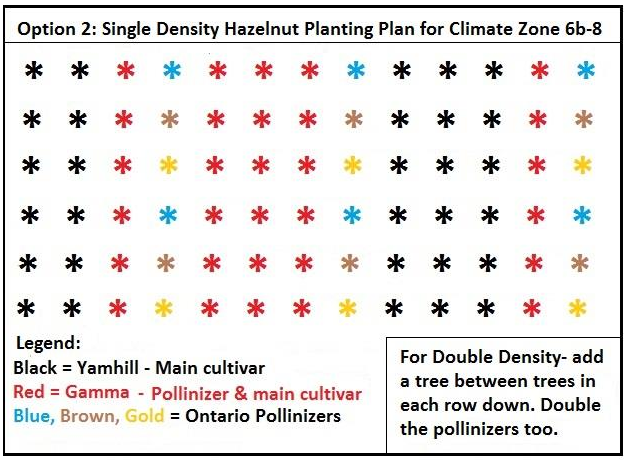
Hazelnut trees are the smallest growing of all of the temperate growing region nut trees. They reach a height of 3 m-5 m (11'-16'). In Ontario we recommend a final planting space of 5.5 m x 5.5 m (18' x 18') resulting in 134 trees per A. Many people are also choosing to plant in what is being termed "double density" by planting double the number of trees in each row. These are planted 5.5m x 2.75 m (18' x 9') or 268 trees/A. Once the trees are mature and crowding, the intermediate trees can be removed or moved to expand the orchard. While the costs are higher upfront, the return is also earlier. Clay soil will slow the growth of trees and therefore it might be beneficial to select double density. Another spacing alternative for the grower who wants early production, but does not want to double space and have the double density trees removed at a later date, is to plant trees closer in the row e.g. 5.5m x 4.5m (18' x 15'). This requires 162 trees/A.

Our 'northern' hazel hybrids are somewhat smaller trees and can be planted at closer spacing. We suggest planting them at 4 x4 m (16' x 16') or 170 trees/A. Of course, double density planting is optional at (340/A).

Plan Your Field Layout

A planting plan is important to consider before ordering trees. Hazelnut trees are not self-pollinizing, so





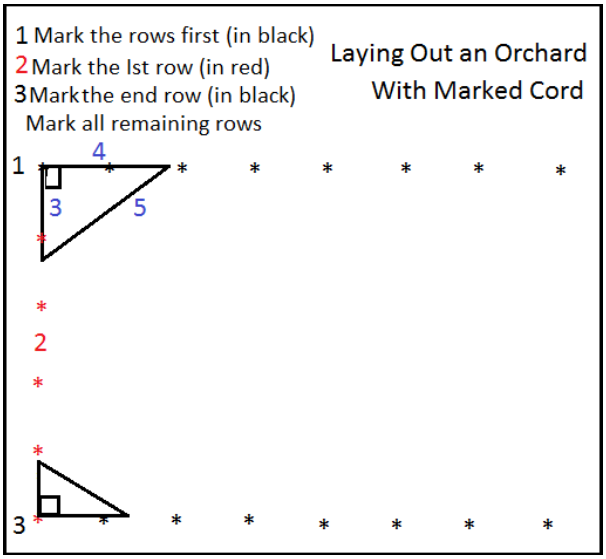
compatible pollinizers need to be planted in the orchard. This cannot be a random arrangement since each main cultivar ('Yamhill', and 'Jefferson') should be harvested separately to satisfy Ferrero and other processors. We suggest that pollinizer rows should be placed as shown to minimize mixing nuts at harvest. Since 'Yamhill' and 'Gamma' have similar shape and size of nuts that drop at the same time and both are acceptable to Ferrero, they can be harvested mixed together. At least 3-4 pollinizer cultivars should be planted. If one pollinizer cultivar fails to produce pollen or the catkins are damaged by frost, others can help to fill the void and produce the crop.

We also suggest 3-4 rows of the main cultivars like 'Yamhill' and 'Jefferson' for separation at harvest. We like 'Yamhill' best for its greater blight resistance. Start the field with 2 outside rows of 'Yamhill' so pollen will reach them easily followed by one or two rows of 'Gamma' or Ontario pollinizers that are known for hardy catkins.

Option 2: is suggested as an alternative that leaves out 'Jefferson' in the planting. This will reduce the need for as many sprays for filbert blight, possibly eliminate them. 'Gamma' then becomes the second main crop cultivar as well as one of the pollinizers.

We are able to help you with the proper number of cultivars if we know well in advance; your objectives, who you wish to sell to, and the plan of your orchard. Instead of telling us that you would like 5 acres of hazelnuts, we need to know precisely how many trees of each cultivar you actually need. For example when you tell us that you have 28 rows with 50 trees in each row we can reserve the proper number of cultivars for your planting.

We suggest that you do this as soon as possible up to a year in advance, or we may not be able to reserve the right number of trees or cultivars to fill each row. You should plan an estimate when placing your advance order, even though you may not mark the actual tree placement until the following year.

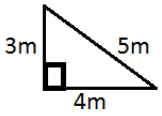


Laying Out the Field

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. Planting helpers need to know your orchard plan in advance so they don't plant the wrong cultivar or mix up the cultivars in the rows.

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/harvester turning and other management activities, especially at the row ends.

The most accurate way to lay out an orchard is with a surveyor's transit and compass or gps. For do-it-your-selfers, 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. 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 to identify the cultivar to be planted there. 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 code on the stakes or different coloured flags for each cultivar will ensure that mix-ups can’t occur. Be sure that the planters are all familiar with this.

5 Repeat this 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 in a cool dark but above freezing place until planted. If necessary, they can be “heeled in” the ground 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.


A tractor mounted auger with teeth to prevent glazing

Once everything is marked it is time to plant. Bare root trees are labelled and bundled by cultivar and ready in April to be planted. It may also be possible for some cultivars to be ready for fall planting in early November.

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 on the hole that prevents water from penetrating. Why such a large auger? Augering a hole can sometimes be a bit off. The planter can adjust for inaccuracies. Working the ground outside of the actual planting site loosens it for better root penetration. 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.

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 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, 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.

Our trees have already been pruned to a single stem to allow the energy to be used for new top growth. There will not be any pruning necessary on our trees in the first year unless you wish to top cut the trees as they do in Oregon. They prune the trees back to approximately 75 cm (30”) to compensate for the root loss in digging and transplanting.

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 the competition of weeds 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 which will be necessary. A woodchip covering of 8 cm (3”) works well. Biodegradable plastic squares or sheets of newspaper can be used under the mulch to prevent any emerging weeds for season long prevention. Earthworm activity is enhanced under mulch too.

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.

Other Considerations

Tree shelters are optional, but many growers find they help keep rodents away in the winter and keep herbicides off the tree when spraying. They report that the trees have a better start each spring compared to those without tree shelters.

It is advisable to get a farmer’s spray license if you don’t have one now. Go to https://www.opep.ca/ and find all of the information you need to know. The spray materials that you can use on hazelnut trees are listed in *Publication 360-Chapter7, Tree Nuts* http://www.omafra.gov.on.ca/english/crops/pub360/pub360ch7.pdf .

Sprays for filbert blight will be needed, especially for Jefferson that is only moderately blight resistant. Scouting in the fall and winter is a good time to find blight cankers and cut them out. Remove infected wood from the orchard and burn it. Blight can still sporulate at the normal time in spring from dead wood.

Scouting for big bud mite, so named for causing big swollen buds even though the mite can only be seen with a 20x magnifier, is also important. This mite infects flower buds that produce the nuts, but it does not kill the branches. When swollen buds are greater than 5-10% of buds, one or more spring spray will be needed to control this pest. This scouting can all be done during the normal late winter pruning period when you would remove low branches and any branches that lean the wrong way. For the first winter we only recommend sucker removal by pruning.

Spraying will be necessary for weed control in the tree rows. Do not spray close to the trees. The mulch will control weeds there. For the first 2 years suckers can be removed by pruning in the winter. After the second year, suckers can be controlled by spraying them during the growing season. Herbicides are listed in *Publication 75 – Weed Control:* www.omafra.gov.on.ca/english/crops/.../pub75toc.htm .

It is natural for hazelnut trees to form bushes. We recommend maintaining a single trunk on the trees but some growers prefer to have up to 3 stems for earlier nut production. If you do this be sure to allow only added stems that face in the row and not into the aisles. Added stems tend to lean away from each other and can be a barrier for movement in the aisles. In pruning we need to be mindful that the nuts are produced on new wood. When we remove branches we are reducing the crop. This is not all bad since pruning tends to invigorate new growth and that will increase production the next year. Each year after the first or second year, some winter pruning is necessary to remove crowding or broken branches and those that are too close to the ground. Some branches only need to be headed back on awkward growing trees. Staking may correct some badly shaped or leaning trees.

In the following years, predation by chipmunks, mice, squirrels, blue jays and crows needs to be addressed. *C. Frensch Ltd in Beamsville, Ontario sells a voice synthesized noise maker that produces the distress cry of several birds including the blue jay as well as the attack cry of a hawk. One unit can cover up to 4 acres; a larger model covers 25 acres.

The bold blue jay may also need human presence and the noise of a shotgun or pistol launched bird bangers to dispel them. These pest controls are suitable for blue jays and crows.

By keeping the orchard grass cut during the growing season, the cover needed by small critters is removed making them targets for predator hawks, owls and coyotes. Placing raptor nesting boxes in the orchard is good too.

Other traps like the *Conibear 110 can be used in the offseason when squirrels are searching for territory and food. It can be baited with a marshmallow with a dab of peanut butter and fastened to a low horizontal branch near the trunk or simply hung on the side of a tree with screw hooks. This will prevent other non-target animals from getting trapped. An internet video is informative in the set up and use of this product. See: http://www.youtube.com/watch?v=58jg5YwHSEk . A larger Conibear trap will be needed for racoons. During the ripening season squirrels are more attracted to the nuts in the trees and your bait may be ignored.

Harvesting Hazelnuts

For a small planting of 1-10 acres or so, the Savage 8042 harvester will do the job. There is some hand work involved because there is no storage of the harvested nuts and the bags or containers of harvested nuts need to be removed from the machine. The larger growers should


Orchard sweeper & blower


Savage 8548 Row Harvester

Savage Harvesters

A perforated mat under 3" of mulch, none near trunk

consider the Flory 480 Row Harvester or the Savage 8548 Row Harvester. A sweeper/ blower combination is used to move the nuts out from under the trees and into a windrow where the harvester can pick them up. Since they are fairly tall machines, some pruning of the branching that extends in the aisles may be necessary to get the machine down the rows.


Savage Nut Cleaner

Once the nuts are harvested, they need to be cleaned, washed, sanitized and dried. Not all of the debris is removed in harvesting. The nuts need to go through a cleaner that first scrubs the nuts and then blows off any twigs, hulls, blank nuts and stones. The nuts fall onto the conveyer where other foreign material is removed visually.

The nuts then need to be washed and sanitized. For a small operation of 10-20 acres, a batch washer will work. The nuts can be dipped in a small stock tank filled with a 5% water and bleach solution (about a cup of bleach in 20 gallons of water) for one minute to sanitize them. Once drained, the nuts can be placed in a dryer. Heat is not necessary as long as there is moving air through the nuts. A homemade dryer like the one pictured here will handle 1000 pounds of nuts or more with screen bottom bins stacked over each other.


Modified to wash nuts


Hazelnut dryer

A larger operation would use a continuous flow system where the nuts would travel from a cleaner to a washer to a sanitizing bath and on to a dryer.

*Please note, we do not endorse any supplier, product, contractor or video that were mentioned in this information. It is simply a way of supplying contacts to growers who need assistance.

Not a member of OHA? Don't wait! Join now by going to the order form at: www.ontariohazelnuts.com