

Environmental Stewardship in the Nursery®

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INTRODUCTION

In these “green” times, it seems as though the nursery sector is one of few industries that hasn’t been recognized for its contributions towards helping the environment. Nursery growers produce the plants that sequester carbon, provide oxygen, clean the air and water, restore habitats, and so on. But it doesn’t stop there. At many nurseries in Ontario, growers are working hard to implement more sustainable production practices. Many of these stewardship activities are targeted towards protecting surface and sub-surface water, reducing the use of fossil fuels, and recycling or reducing waste.

STEWARDSHIP ACTIVITIES IN ONTARIO NURSERIES

Water. The Great Lakes basin is one of the richest farming areas in Eastern Canada. Although the area boasts ~22% of the world’s fresh water resources, access for irrigation may be limited in order to conserve this precious resource for the future. Hot, dry growing seasons and low-flow surface water situations have stimulated water conservation strategies throughout the nursery sector. Several Ontario nurseries have expanded their water storage capacity in order to shift water taking to high-flow periods and away from low-flow periods. Sheridan Nurseries Ltd. has a large, multi-million-litre storage pond capable of supplying enough water to irrigate their entire operation for 10 days. Most container production operations have been constructed and retrofitted so they are sloped to capture runoff and direct it into their water storage areas. Irrigation runoff is diverted along the surface or into underground drains, through larger drains and ditches to ponds where it can be stored for re-use. Vegetated waterways, buffer zones, and bioswales are becoming a lot more common. The vegetation helps slow down water flow to prevent erosion and improve water quality by reducing sediment and also nutrients in the runoff.

To reduce the total water applied, some Ontario operations use cyclic or pulse irrigation to irrigate container crops. They irrigate for a short cycle and repeat 1–2 h later. Pieper Nurseries Inc. found that they can achieve a water savings of about 33% through this method of irrigation. In addition, cyclic irrigation results in a more thorough wetting of the root ball which stands up to wind and heat. To maximize efficiency in layout, container crops are grouped according to their water needs and irrigation cycles are customized according to plant needs. This helps reduce total water applied and root problems associated with overwatering. Manual watering (hoses and booms) is a very effective method of irrigation for small areas. J.C. Bakker & Sons Ltd. uses mobile water wagons for spot watering and estimates water savings to be 50%–80% compared to automated zone irrigation.

Low-volume irrigation systems such as spray stakes or drip stakes can be effective solutions for reducing water use. Unfortunately, significant material, installation, and maintenance costs restrict their use to larger, high-value crops.

Low-volume irrigation systems for container crops can achieve a water savings of 80%–85% compared to conventional, overhead sprinklers. Pot-in-pot systems support cooler root-zone temperatures and can also help reduce irrigation needs. Some Ontario growers have found that they can achieve high quality crops with minimum irrigation volumes when they use pot-in-pot systems with low-volume irrigation, especially under a cyclic or pulse watering regime. Drip irrigation is gaining in popularity as a means of irrigating harvested B&B stock and field-grown nursery crops. Somerville Nurseries Inc. has installed drip irrigation on over 120 ha of field-grown trees and have significantly reduced water use on their farms, especially in the transplant year. At J.C. Bakker & Sons Ltd, evapotranspiration models are being used to direct irrigation schedules on outdoor container crops, a first for the Ontario nursery industry. This Argus system collects environmental data (wind, temperature, relative humidity, etc.) from several points in the production area and the data is used by a computer software program to estimate water loss in the crop.

Fertilizer. Skyrocketing fossil fuel prices in 2008 had significant impacts on the cost of production for nursery operations. The cost of fertilizers has nearly doubled in the last few years. With input costs going up and commodity prices holding steady or decreasing, nursery growers have had to make some changes to reduce production costs and increase efficiency. By managing container crops more closely with the goal of shorter irrigation cycles, growers have found that container leachate volumes can be minimized and nutrients can be retained in the substrate. Even a 5–10 min reduction in the irrigation cycle can significantly reduce leachate losses, which means more nutrients will stay in the root zone. Many Ontario growers incorporate controlled-release fertilizers at potting to help regulate nutrient release compared to top-dressing. By dibbling controlled-release fertilizer at 2–3 places just under the substrate surface, fertilizer rates can be reduced and nutrient uptake can be maximized.

All fertilizer applications to field soils are based on soil tests. To reduce nutrient losses, Ontario nursery growers commonly split annual fertilizer amounts into two or three applications during periods of major root growth. Instead of broadcasting, most field fertilizers are applied in discrete bands along the row. Banding can reduce fertilizer application rates by 33% to 66%. Some nursery operations employ Global Position Systems to map out their soil nutrient analysis and in some cases, their fertilizer spreaders. Detailed maps indicate where specific nutrients or amendments are needed, and where they are not. Cannon Nurseries NVK Holdings Inc. is experimenting with band-applied, custom blends of controlled-release fertilizers in high-value field production blocks. They found that the plants were able to utilize more of the supplied nutrients, meaning less nutrient losses to runoff. With this technique, the nursery crops grew more uniformly with superior colour and vigour.

Ontario nursery operations routinely use organic waste to amend production soils. Cover crops are seeded after each crop and the residues (green manure) are worked into the soil at the end of the season. Composted agricultural, food processing and city wastes are very popular soil amendments in Ontario nurseries. The composts help to build organic matter and provide some long-term nutrients for future crops. Ontario nurseries use several hundred yards of excess municipal waste each year. Nurseries will also compost their own plant, media, and soil wastes. The

materials are aged properly to allow complete breakdown. Ground Covers Unlimited uses sawdust underneath their container production beds to trap nutrients and water from the leachate. After 2–3 growing seasons, the sawdust rots down and is an excellent amendment for building organic matter in their field production soils.

Pesticides. Ontario nursery growers use Integrated Pest Management to make informed decisions about pest problems. Many nurseries employ crop scouts to monitor crops for plant health issues. Results are reported back to crop protection managers. Monitoring is used to direct pesticide applications, with emphasis on spot-applications at the beginning of a pest infestation. Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA) specialists and University of Guelph researchers work closely with the Ontario nursery industry to provide timely extension services. Through IPM and selective spraying, Sheridan Nurseries Ltd. has cut their use of insecticides and fungicides by 50% since 2005.

Ontario nursery growers have been experimenting with several types of weed barriers as an alternative to herbicides in container production. Coco discs (made of compressed coconut coir or fibres) are used quite extensively and effectively in Ontario container nursery production. Verbinnen's Nursery Ltd. uses plastic mulch weed barrier in their field production blocks in lieu of herbicides.

Several nursery growers use biocontrol organisms to effectively manage pests in greenhouses, coldframes, and outdoor container production. This technology has been well documented and proven in greenhouse production for floriculture and edible crops. In container nursery production, beneficial nematodes for black vine weevil (*Otiorhynchus sulcatus*) have completely eliminated the need for insecticidal pesticide drenches for the larval stage.

Plastics. Because of rising fossil fuel prices, waste plastics from items such as containers, trays, tags, and greenhouse films that used to be destined for the landfill are now being used as manufacturing ingredients for several industries. Ontario nursery growers will re-use plastic pots and trays until they are too damaged. At that point, plastics are sorted and stored until they can be transported to recycling depots. Because of improvements in washing and shredding technology, plastic recycling companies in Ontario have become more flexible about the condition and type of plastics they can accept. In 2008, Pan American Nursery Products diverted nearly 15 tonnes of waste plastic away from the landfill by sending it to the Canadian Polysterene Recycling Alliance. During the same year, Sheridan Nurseries Ltd. sent 11 tractor trailer loads of waste plastic to Dekka Recycling and Re-Source Ontario. Many recycling companies will pay for shipping costs and, in times of high oil prices, they may even offer an additional monetary incentive. To encourage industry-wide recycling, most Ontario nurseries will accept used pots from their customers and some will even offer credits; especially for large, reusable containers used for tree production.

Several tonnes of poly film are now diverted from landfill and sent to various recycling plants for processing. Cannon Nurseries NVK Holdings Inc. sends their opaque poly film to Think Plastics, manufacturers of plastic composite lumber. Cannon NVK will then purchase the plastic composite lumber and use it in the construction of their new coldframe structures. Made of waste plastic with a wood fibre component, the plastic composite lumber is a sustainable alternative to traditional wood lumber.

Some nurseries are experimenting with coir pots, containers made of coconut fibre, instead of plastic. The coir pots are biodegradable but are strong enough to last 2–3 years in production. So far, the coir pots are producing plants with fibrous root systems superior to those grown in smooth-walled plastic pots.

Energy. Oil, natural gas, and propane costs have all risen considerably and continuously over the last decade. Several Ontario nurseries have invested in newer equipment in order to take advantage of fuel consumption savings and reduced emissions. By converting to newer diesel tractors, growers have reported at 50%–65% reduction in fuel costs. All-terrain vehicles are used more and more to transport employees and small plant orders around the nursery and can result in huge savings on fuel. More consideration is put into the placement and construction of greenhouses and cold storage facilities in order to facilitate more energy efficient temperature regulation and recuperation of waste heat. Biomass combustion units and alternative fuels such as wood waste and crop residues are being seriously considered as an alternative source of heat for controlled environment systems in the nursery.