NURSERY CROPS

Some Green Manure Crops for Increasing Soil Organic Matter

Annual Ryegrass
Alfalfa
Field Corn
Sorghum-Sudan Grass

Some Cover Crops for Erosion Protection

Winter Rye
Winter Wheat
Spring Barley
Spring Oats
***Buckwheat**
Corn
Red Clover
Alfalfa
Hairy Vetch
Austrian Winter Peas
***Winter Canola**
***Tame Mustard**
***Oil Seed Radish**

*** Species may become a weed problem if allowed to go to seed.**

The nursery industry is facing a number of challenges in an effort to produce high-quality nursery stock while using economical and environmentally-sound systems. Best management practices for nursery production address concerns about soil conservation, pesticide use and water conservation and protection.

SOIL MANAGEMENT

Soil and soil quality, the basic ingredients of traditional field nursery stock production, can be removed and damaged by water and wind erosion. The following cultural practices improve soil structure:

- Crop rotation with sod crops or green manure crops improves soil structure, adds organic matter and can reduce soil erosion by 90%.

  Grasses combined with legumes grown for two years for maximum benefit. The dense root system produces a large amount of organic matter. Tap-rooted legumes (e.g. alfalfa) improve soil drainage by loosening soil.

- Green manure crops grown for less than one season then plowed down, in late summer or fall, before setting seed. These crops are useful when a more effective two year crop rotation is not feasible.

Cover crops are planted in August or early September between nursery rows or on fallow fields to protect soil for the winter. Know the crop cycle of cover, green manure and rotation crops to avoid future weed problems.

Excessive tillage reduces the size of soil clods. This can contribute to compaction, crusting and increased erosion. Soil structure can be heavily damaged by the use of machinery on wet soils. To minimize this damage:

- Tile drain wet fields.
- Delay working on these fields until dry.
- Reduce the number of trips over the field when tilling.

Such practices as contour planting nursery rows on sloping land, strip cropping and planting a cover between rows of trees have many benefits:

- Reduced wind erosion and soil movement (avoids sandblasting crops).
- Reduced soil loss from water erosion.
- Reduced soil structure damage as traffic and cultivation decrease.
- Reduced compaction from heavy machinery loads.

A sod crop growing between nursery rows with a narrow band of clean cultivation directly underneath trees.

A nursery pest, Japanese beetle, prefers sod or weedy areas for egg-laying using white, red, or alsike clover, buckwheat or alfalfa as alternate strip crops may discourage larval populations.

Wind erosion can be controlled with the maintenance of good soil structure and cover crops. Orienting the planting rows at right angles to the prevailing winds provides some protection. Windbreaks planted along the north and west boundaries or all around fields reduce wind erosion and protect sensitive nursery stock from wind burning and sand blasting. They also help to reduce crooked growth. See the booklet on Farm Forestry and Habitat Management for further information.

Surface run-off from nursery fields must be controlled to reduce pollution of watercourses and collection ponds. A grassed waterway can direct water movement through the field; it must be smoothly contoured with a constant grade and an easily-maintained, hard-wearing sod cover.

Buffer strips around irrigation ponds should be at least five metres wide, measured from the top of the bank back to the field. This allows for adequate maintenance and access. A wider buffer strip may be necessary depending on soil erodiblity, average slope and current vegetation. See section on Non-Tillage Options in the booklet on Field Crop Production for more information.

Drip irrigation of shade trees in the nursery.

WATER MANAGEMENT

Water is an important resource not only to growers but to off-farm neighbours. By reducing water use, the possibility of leaching and loss of nutrients through surface run-off decreases.

Drip irrigation is a very efficient system of watering larger field stock. It applies small amounts of water to the root zone area only. It also promotes compact root development which is important for subsequent tree survival in the landscape. In container production, drip irrigation is often not used because of difficulties of working around and moving containers when drip lines are present.

Pulse irrigation saves water in container production. Traditional irrigation comes from a long, single application of water from an overhead sprinkler. In pulse irrigation:

- ►Water is applied for about 15 minutes, four or more times.
- ►A pause of 30-60 minutes occurs between applications.
- ►During the pause, water fills the pores and wets hard-to-wet components of the medium.
- ►The medium is saturated before excess water drains from the pot. Water use is reduced by about 30%.
- ►Run-off from the container is minimized.

The nursery industry in Ontario is valued at $150 million per year according to a Stats Canada survey completed in 1990.

NUTRIENT MANAGEMENT

Nursery growers should test soils each year (midsummer to fall) to determine fertilizer needs for fields the following year (refer to OMAF Publication 383). Using slow release fertilizers on container stock is efficient and reduces nutrient run-off. Various periods of release are available, from several months to two growing seasons.

Timing of fertilization should be based on growth habit. Plants that have a single flush of growth should be fertilized in the fall and early spring before growth begins. For plants that have multiple flushes, split recommended applications among fall, spring and a third application as the first flush begins to slow down. Fall fertilization is effective because roots continue to absorb nutrients until soil temperatures reach 5°C. Do not fertilize field stock in late fall or early winter; fertilizer is not absorbed by roots and can easily run off frozen ground.

PEST MANAGEMENT

Weed Control

Weed control should be integrated, combining the use of mechanical, cultural and as necessary, chemical controls. The following methods control weeds in either a nursery field or container crop:

►Plant new crops in a weed-free field or media.

►Control weeds in perimeter areas (i.e. fence rows and windbreaks).

►To reduce weed seeds, properly store and compost manure before applying to the soil.

►Mow buffer strips to reduce seeds blown into irrigation ponds.

►Minimize run-off from weedy fields to ponds.

►Pump irrigation water from deep in the pond to avoid seeds on the water surface.

►Ensure weed-free material is planted.

►Do not move weeds between fields on equipment.

►Cultivate fields when seedlings are small.

►Use shallow tillage (2.5-5.0 cm) if herbicide has been applied.

A mowed grass strip between nursery rows with a weed-free strip at the base of the plants 0.5 to 1.0 metre wide can be maintained by: hand hoeing, mechanical cultivation, mulching with various organic materials, or herbicide application. For more information, refer to OMAF Publication No.75. Rodents often overwinter in mulch so, remove it from the base of plants in the fall and consider appropriate traps.

Weed control with container stock is more difficult than in the field because there are few effective registered herbicides. In container stock, the following measures will help:

- ▸Weed by hand.
- ▸Install a weed barrier of old polyethelene or geotextile fabric under pots. This prevents weed germination under the pots. Water ponding may occur if polyethelene is used.
- ▸Keep media components weed-free. Components stored outdoors should be covered.
- ▸If planning to use field soil, ensure that it comes from a source known to have few weeds and no herbicide residues.
- ▸Use weed discs in pots; these reusable barriers are made of materials that allow water and air movement while reducing seed germination.

Geotextile weed disc in container stock.

Insect and Disease Management

Because of the variety of plants in the nursery, insect and disease control poses many challenges. Integrated pest management (IPM) combines chemical, cultural and biological control techniques to address pest problems. Good sanitation and plant health reduce pest and disease problems.

The following procedures make up an effective IPM program:

- ▸Mapping the nursery. Identify plants which are most susceptible to insects and disease problems. Note which species and cultivars are affected first.
- ▸Monitoring the nursery at least once a week. Pay particular attention to sensitive species.
- ▸Identifying pests and beneficial insects, noting life cycle stages and population levels.
- ▸Making a decision on appropriate control from collected information.

Some selective insect traps are available but yellow sticky traps can be used to identify pests. Control insects at vulnerable stages of their life cycle. When a control is necessary, refer to OMAF Publication 383 and spray only those plants or species infested.

Few biological controls are available for use in the nursery but *Bacillus thuringiensis* var. *kurstaki* has been effective against gypsy moth.

Summary

Best management practices such as soil conservation, efficient water use, water source protection, and reduced chemical use through cultural and biological pest management methods benefit both the grower and the environment.