

Grounds Maintenance

Conventional ground maintenance is very energy dependent and expensive. It uses large inputs of chemical fertilizers, herbicides, and pesticides. Conversely, ecological ground maintenance is much less energy dependent and avoids chemical additives, except in extreme cases. The goal of ecological maintenance should be to “*achieve the maximum vegetation mass with minimum maintenance requirements.*”

Developments are not enclosed environments. They have greatly influenced, in some cases eliminated, the migration and perpetuation of wild life and plant forms in cities.

Initially, the switch from a chemical dependent maintenance program to an ecological maintenance program may cause shock, resulting in poor showing of lawns and planted areas. This is due to the probability that the soil is very poor due to the chemical applications. Some patience is required and possible applications of herbicides and pesticides in extreme situations, until a full change can be made.

Factors to consider in moving towards an environmentally friendly maintenance program are:

1. Energy efficiency
2. Water conservation
3. Use of machinery

A healthy, chemical free soil, rich with microorganisms is essential for plant life.

Problems with Convention

- The soil often starts in poor condition as the subsoil is compacted during the construction phase and the topsoil often becomes compacted from being run over by machinery
- Shrubs are often planted close together for instant effect and in a few years, they become top-heavy, leaving the ground exposed
- Most pesticides are toxic, necessitating a special license to apply them and the wearing of gloves, goggles, face shields, and other forms of protective clothing
- Weight of machinery contributes to soil compaction, increasing runoff, resulting in

erosion. This also means that more water is required for irrigation since less water is able to soak into the ground.

- Machinery can contribute to hearing loss for operators, as well as general noise pollution
- Faulty spray equipment exposes operators and others to poisonous solutions
- The chemical components of herbicides, pesticides, and even fertilizers can kill soil life and ruin its structure
- Pesticides that kill worm populations can result in increased thatch accumulation since worms tend to feed on organic residue on the soil surface
- Problems associated with de-icing salts include:
 1. They readily absorb water that would otherwise be available to roots,
 2. Chloride ions are absorbed by vegetation and accumulate at levels that are toxic to vegetation, and
 3. Sodium can cause soil to lose its capacity to clump, facilitating compaction
- Chemicals tend to damage the soil microorganisms
- Chemical fertilizers tend to be water soluble, resulting in leaching of NO_3

Benefits of Ecological Maintenance

- Considerable financial savings can be realized due to decreased waste disposal fees, fewer chemical applications and lower labour requirements
- Best weed control is a healthy lawn
- Fewer potential liability issues due to the elimination of applying chemical sprays
- Soil that is full of microorganisms:
 1. Can retain moisture without becoming oversaturated,
 2. Is loose and soft due to air entrapment,
 3. Is capable of supporting healthy growth,
 4. Allows grass roots to penetrate deep into the topsoil, and
 5. Develops rhizomes
- Loose subsoil will allow tree and shrub roots to grow deeper to absorb the necessary moisture and nutrients
- Compost, sewage sludge, processed manure, and food processing waste can be used as organic fertilizer, turning a waste product into a useful product

- The Ontario Ministry of Environment estimates that 16% of the landfill waste stream is yard waste – a material which may be composted [1]
- All plants can be grown with sufficient nutrient supplies (hydroponics), but higher yields are possible in soils that have a high humus content
- Humus helps to decrease erosion due to high absorptive qualities and stimulates soil bacteria – high bacteria activity increases the nutrients available to plants

General Ecological Alternatives

- Select plants that are resistant to salt injury when exposure is unavoidable
- Avoid frequent watering, in favour of occasional soaking to 150 mm
- Avoid over watering as this leads to acidification of the soil
- Replace synthetic fertilizers with organic or combined fertilizers
- Reduce the frequency of fertilizer application to one application of organic fertilizer which will provide plant food for 4-6 months
- Grass clippings, provided that they are short and fine, will provide additional plant food
- Use compost, where applicable, as top dressing and nutrient supplement
- Do not use herbicides and apply non-chemical weed killers only to areas heavily infested
- Convert slopes, rarely used lawn areas, or lawns in the shade, into meadows or wildflower areas
- Use ground cover planting as an alternative to conventional lawns
- Most common and practical way to improve soil conditions is to aerate
- Humus (organic matter) is the catalyst for healthy plants. It comes in many forms: compost, manure, peat moss, etc. Humus can absorb 3-5 times its weight in water, allowing for the water to be used by plants later during drought conditions.
- Traffic patterns should be examined to prevent compaction due to high foot traffic – new walkways and paths should be constructed if needed. The need for repeated laying of sod is a sure sign of poor design for foot traffic. Traffic may be

diverted to existing pathways by low fencing, plantings, etc.

Planting Beds

- Eliminate regular digging and cultivating
- Leaves should be left where they fall. They provide natural mulch, resulting in better soil conditions, retention of soil moisture and important microorganisms
- Eliminate edging of planting beds
- Provide a natural transition between lawns and planting beds
- Eliminate all trimming of branches
- Prune shrubs only to rejuvenate and to remove dead growth
- Do not apply herbicides (in a healthy, vigorously growing shrub bed with natural mulch, weeds do not get a chance to establish themselves)
- In the initial stages of converting to an ecological program, and before a natural mulch has established itself, use fatty acid type weed killers (Spectrum) where needed
- Restrict the use of chemical fertilizers (fertilization can be provided through the natural cycle of decomposing leaves)

Trees

- Reduce pruning to cutting of dead branches or branches that interfere with other plants, structures, or traffic
- Do not maintain open saucers around trees located in lawn areas – grass at the base of trees protect the soil from drying out and eliminates certain maintenance procedures necessary to maintain a saucer
- Do not fertilize - trees in nature can develop well without them!
- Feed cut branches and twigs through a wood chipper and use the chips as mulch on site
- Cut larger branches into log size for firewood

Paved Areas

- German cities have shown that winter salting is not necessary. In many cases, sand, light gravel, or cinder may be applied to roads and sidewalks and produce sufficient traction

- Hand pull or use localized application of infrared equipment or flame throwers to eliminate weed problems
- The application of infrared rays causes the penetration of the natural protective shield of the foliage and, at a temperature of 65°C, blocks the plant's protein cells resulting in a cessation of the photosynthesis process
- Avoid the use of calcium chloride and sodium chloride for ice and snow melting. Use sand mixed with either or apply urea.
- Eliminate grass in mass plantings of trees and replace with mulch or ground cover planting
- Turn rarely used lawn areas into meadows (mowed once or twice per year)
- Bluegrasses and perennial ryegrasses should be kept at a height of 40-60 mm [3]
- The application of 30 mm of water per week to turf grasses will encourage deep root growth. Frequent light sprinklings do more harm than good!
- Grass clippings, left on the lawn, can provide 5-8 g/m² of nitrogen per year – mown lawns require 10-15 g/m² of nitrogen per year [4]
- Grass clippings are a good source of plant nutrients – fertilizer ratio of 4-1-3
- Seed a mixture of grass varieties for lawn areas rather than one single variety

Compost

- An inexpensive source of high quality bulk organic matter
- The organic matter, pH, nutrient content, etc. will remain extremely consistent from load to load, unlike many other sources of topsoil
- Usually contains 1-2% nitrogen, which is the most commonly applied nutrient. Much of the nitrogen is in an organic form, meaning it will stay in the soil for a long time.
- Organic content is between 50 and 70% [2]
- The organic matter within the compost has many benefits:
 1. It will lower the bulk density of heavy soils,
 2. It will increase the water holding capacity of lighter soils,
 3. It will make the soil more friable (workable),
 4. It will increase the cation exchange capacity, and
 5. It is rich in Humic acid (Humic acid converts nutrients in the soil into plant available forms of food)

Lawn Areas

- Choose turf grass species that require less maintenance, are drought resistant, develop strong root systems, and have a limited height
- Mowing is necessary to stimulate new growth and to keep the grass at a length that will not retain excessive moisture
- Reduce the frequency of cuttings

Natural Weed, Pest and Disease Prevention

- Disease and pest attacks are often associated with plant stress
- Use disease resistant plants and grasses
- Do not over water – diseases are not a problem in arid regions
- Water sufficiently – stressed plants are more susceptible to diseases
- Make sure there is a free flow of air
- Remove thatch where evident
- Apply soap solutions occasionally to break up thatch and for control of sod webworms and chinch bugs
- Relationships naturally exist between plants and insects, which can be taken advantage of
- Plant several different plants together so that insects are confused by the multitude of “smells” and have more difficulty finding the plant they prefer to eat and lay their eggs on
- Certain plants, such as marigolds, mints and garlic, are offensive to some insects and will deter them from attacking other nearby plants
- Combining plant species will result in better and healthier vegetation and crops
- Lure plants are placed near plants you want protected. Insects are attracted to the lure and can be handpicked and destroyed
- Physically remove insect infested, diseased, dying and dead plants
- Introduce bird feeders and protect bird nests, as birds feed on many harmful insects

- Birds of the Fringillidae family (includes cardinals, finches, buntings, and sparrows) feed mainly on weeds and insects
- Utilize compost topdressings on lawns to biologically suppress turf grass diseases
- Use organic fertilizers to build up a vigorous soil environment
- Some insects (such as ladybugs) prey on harmful insects
- Diseased branches or plants must be removed but cannot be composted due to potential for fungi to survive and reinfect
- Reduce weed growth by mulching or introducing ground cover planting
- Permit a certain controlled amount of weeds in grass or planting beds

Comparative Labour Costs of Various Plantings
[5]

Type of Open Space	Number of hours per 100 m ²
Woodland	1.7
Shrubs	1.8
Groundcovers	8.0
Roses	15.2
Rose Gardens	18.8
Annuals	61.9
Perennial	29.9
Hedges	22.0
Lawns	3.3

Organic Insecticides and Fungicides

The following information on organic herbicides is taken from Organic and Ecological Grounds Maintenance for Multiple Housing. Pg. 40-41.

Insecticidal Soap (liquid)

- Controls aphids, earwigs, mealy bugs, mites, sawfly larvae, white flies and others
- Harmless to beneficial insects
- Manufactured by Green Cross, Safer and Wilson
- **Do not use household detergent!**

Organic Insect Killer (liquid)

- Controls most species of caterpillars
- Harmless to beneficial insects
- Contains Thuringicides derived from bacillus thuringiensis (B. T.)
- Manufactured by CIL

Pyrethrins Plus Piperonyl Butoxide (Liquid)

- Controls flea beetles, leafhoppers, Colorado potato beetles, rose chafers and tarnished plant bugs
- Harmful to beneficial insects
- Breaks down rapidly after application
- Manufactured by Green Cross, Safer and Wilson

Rotenone (spray or dust)

- Controls Colorado potato beetles, corn borers, cucumber beetles, currant and raspberry sawfly, raspberry fruit worm, flea beetles and leafhoppers
- Harmful to beneficial insects and fish
- Breaks down rapidly after application
- Spray and dust manufactured by Green Cross and Wilson, dust also manufactured by CIL, Co-op and Safer

DIO Slug Killer (dust)

- Attracts and kills slugs and earwigs
- Harmless to beneficial insects and dogs – contains diatomaceous earth (silicon dioxide)
- Manufactured by Wilson

Dormant Oil (spray)

- Kills overwhelming mites and scale insects on trees and shrubs when applied in spring before leaf buds open – do not apply when frost is expected
- Harmless to beneficial insects
- Manufactured by CIL, Green Cross and Wilson
- **Do not use motor oil!**

Lime Sulphur (fungicide/insecticide)

- Controls overwintering spores of peach leaf curl and plum black knot diseases, also black spot on roses, anthracnose, cane and spur blight on raspberries, mildew and rust on currants and gooseberries
- Kills overwintering mites, aphids and scale insects

- Harmless to beneficial insects when applied properly. Apply before leaf buds break in spring and only on plants listed on the label. Can also be used against certain diseases in the summer if the label directions are carefully followed.
- Manufactured by Green Cross and Wilson

Sulphur Fungicide (spray or dust)

- Controls black spot on roses, apple scab, brown rot and black of fruit stone, rust and powdery mildew
- Harmless to beneficial insects, except predacious mites. Injury to plants may occur if applied at temperatures above 24°C
- Manufactured by Safer and Wilson

References

1. Canada Mortgage and Housing Corporation. Organic and Ecological Grounds Maintenance for Multiple Housing. 1995. Pg. 44.
2. Canada Mortgage and Housing Corporation. Organic and Ecological Grounds Maintenance for Multiple Housing. 1995. Pg. 22.
3. Canada Mortgage and Housing Corporation. Organic and Ecological Grounds Maintenance for Multiple Housing. 1995. Pg. 43.
4. Canada Mortgage and Housing Corporation. Organic and Ecological Grounds Maintenance for Multiple Housing. 1995. Pg. 46.
5. Canada Mortgage and Housing Corporation. Organic and Ecological Grounds Maintenance for Multiple Housing. 1995. Pg. 61.