

**PLANNING**  
**FOR**  
**TREE PLANTING**

**"LET'S DO IT RIGHT -  
THE FIRST TIME"**



## PLANNING FOR TREE PLANTING

In Southern Ontario we need more plantations. They protect soil, provide wildlife habitat, forest products and enhance the environment. Before trying to plant trees, however, one should give some thought to selection of the right species, the type of soil to be planted, and what you want from the trees. For instance, plantings for wildlife purposes may be quite different from those planted for timber production.

### THE SITE

#### SOIL

*"You've got your sand and your clay and silt is a figment of your imagination".*

To many, this adage may be true. However, there are many soil types between the extremes of clay and sand. To be "heavy clay" a soil, by definition, must have greater than 60% clay particles. Yet, a soil with 30% clay will have "clay-like" soil properties including stickiness and plasticity. On the other end of the scale, sandy soils with greater than 50% sand particles can have loam-like properties depending on the size of the sand grains and the presence and amount of silt or clay with the sand particles. Silt particles will impart moisture-holding properties to a sandy soil without the stickiness of clay. Loam is a "pot-pourri" of particle sizes from clay to sand. Also, don't be fooled by organic matter. Organic matter can make the soil behave as if it has more clay than is actually present. Go below the organic enriched layer to test the soil texture. A good test of soil texture can be made by forming moist soil into a ball or "cast". The more the ball resists crumbling, the more clay is present. If pressed between thumb and forefinger into a "ribbon", the longer and thinner the ribbon formed, the more clay that is present. The less cohesiveness to these two tests, the more sand and silt is in the soil.

#### A FEW SIMPLE SOIL TESTS

No Cast	No Ribbon	Sand
Weak or Very Weak Cast	No Ribbon, Barely Ribbons, * Soil "Flakes"	Loamy Sand, Silty Sand, Sandy Loam, * Silt, Silt Loam
Moderate Cast	Thick, Short Ribbon	Sandy Clay Loam, Loam
Strong Cast	Thin, Short Ribbon (2.5 - 5 cm.) * Thin, Long Ribbon (5 - 7.5 cm.)	Clay Loam, Silty Clay Loam * Sandy Clay
Very Strong Cast	Thin, Long Ribbon ( > 7.5 cm.)	Silty Clay, Clay

## SITE HISTORY (EROSION)

*"That soil on the hill is a heavy clay".*

Clay soils are normally found in depressions or low areas such as in the Chatham region where water at one time collected in a large lake, and stayed long enough for the clay to settle out. Clayey soils found on hill-tops can indicate past erosion that has removed lighter soil layers and exposed "clay enriched" soil layers such as clay loams, that are normally buried. Soil layers or "horizons" are formed in "unweathered parent materials", over long periods of time in which chemical and physical changes take place. In soils south of the Canadian Shield, one of these changes is the removal of calcium carbonate or "free lime" by organic acids and normal acidic rainfall. If there is "free lime" at, or near the soil surface, then this may indicate past erosion which has removed the "weathered" soil which was formed from, and which used to lie on top of, the "unweathered parent materials". If you have a bit of muriatic acid around, place a few drops on the soil surface. If it bubbles and fizzes, you are seeing evidence of the presence of calcium carbonate. (Try this on your gravel driveway and you will see a vigorous "fizzing"). If it doesn't fizz, but "crackles" when you listen to it, then this indicates magnesium carbonate. Both of these conditions indicate "parent materials" and a high pH (alkaline) soil which will be damaging to some tree species, particularly pines, and lack sufficient nutrients for some hardwoods.

## DRAINAGE (MOISTURE AND FROST)

*"It's too wet to work with a tractor so I want to plant trees".*

Certain tree species will withstand wet conditions or periodic flooding. Other species are more suited to drier conditions. However, extremes of both may be too severe to establish any tree species. Furthermore, although some trees are suited to growing on extreme sites, establishment, or getting the trees started, will be a difficult and frustrating experience. Wet sites typically have heavy grass and weed growth which can damage trees. Lowland sites can be frost pockets resulting in "frost heaving" of seedlings. Dry or "droughty" sites can be eroded or may not have enough moisture to support the seedlings long enough for the roots to establish so the tree can fend for itself. Sites with bedrock near the soil surface will usually act as a dry site.

## COMPETITION (VEGETATION)

*"I could never get a good crop off that field".*

What the field is growing before the trees are planted may give an indication of how well the trees may do. Sites with heavy grass may be rich sites and may support trees, but establishing trees will be difficult. On the other hand, sites with sparse ground cover may be extremely dry or infertile. Somewhere in the middle will be the ideal condition. If a field is variable, it may

not be reasonable to expect a fully stocked plantation. Be prepared to accept areas that "don't catch". These areas can be managed as wildlife openings to provide edge and increase plant diversity.

Watch for grass species such as Reed Canary Grass. Heavy grasses such as this are strong competitors and will smother trees. Grasses such as twitch or couch grass and sedges (sedges have a triangular stem whereas grasses are round) may compete chemically with trees and have the same effect as walnut has on tomatoes. The technical name is "allelopathy" or chemical competition.

## SITE PREPARATION

*"I'm going to work that field up and plant trees".*

Working up a field completely, with or without herbicides, is one way to prepare a site. This is the best bet for valuable species such as walnut or oak providing the herbicides used are recommended for tree establishment. However pine or spruce, which have greater tolerance to competition from grasses and weeds, may not require this amount of work. In addition, erosion may occur, or if cultivation is not continued after the trees are planted, weeds may invade the bare ground. For these reasons, it may be only necessary to control vegetation in the tree rows, or in the immediate area around the tree. This can be done before the trees are planted by killing the grass and weeds in strips where the tree rows are to go. In wet areas, single furrow ploughs can be used to "mound" the site to plant the tree on a raised area out of the saturated ground. Often, mulches or herbicides are used at the time of planting, or immediately after planting in a strip or spot to reduce competition near the tree. While a 3 foot (1 metre) patch or strip is adequate for conifer species, a 6 foot (2 metre patch) or strip is required for hardwoods.

If a field has been cropped with the addition of chemicals such as atrazine, it is advisable to allow two years from the time of the last application before trees are planted. The rule of thumb is that if you can plant oats without damage, then you can plant trees. In order to prevent weed growth and erosion, it may be desirable to plant a ground cover. A grass cover is recommended, in order of suitability: Tall Fescue, Creeping Red Fescue, Timothy, Bromegrass. Deep-rooted plants such as alfalfa are not suitable as they are not as easily controlled by herbicides which are commonly used in tree establishment.

## SPECIES

*"I need a tree tough enough to grow on a sidewalk".*

The general rule is that the more average the site, the easier will be tree establishment. Extremely dry, shallow, or wet sites will be difficult. On dry sites, the hardiest trees are those which may be recommended for gravel pit restoration such as black locust or larch. If locust dies back in a drought, it will often sucker again and the entire tree will not be lost. On wet

sites, the last resort is willow or poplar "cuttings" shoved into the wet ground to root naturally.

A further consideration is that hardwoods are subject to more mouse (or meadow vole) damage than conifers. These rodents have a four year cycle. You may think your plantation is well established until the "high" of the cycle occurs and most of your trees are girdled. Rabbits will nip off the tops of the trees at a sharp 45° angle. If the tops of the trees are torn off with a ragged cut, then this is likely browsing by deer. They prefer oak and silver or red maple.

**A GUIDE TO SPECIES SELECTION**

	Well Drained Soil (Not "droughty" or shallow to bedrock)	Moderately-Well Drained to Moist Soil	Poorly Drained+ (Wet) Soil + Frost Heaving
Sands including Coarse Medium and Fine Sands, Loamy Coarse, Medium and Fine Sands	(1)Norway Spruce European Larch White Pine Red Oak Black Locust	(5)White Pine White Spruce European Larch Norway Spruce Red Oak White Ash	(1)Tamarack White Cedar
Loams including all Very Fine Sands, Silts, Sandy Loams, Silt Loams, Silty Clay Loams, Clay Loams	(5)Norway Spruce European Larch White Cedar Red Oak White Ash Black Walnut	*(Score 10) All Species	(5)Tamarack White Cedar Silver Maple
Clays or "Clayey Soils" including Clays, Silty Clay Heavy Clay	(1)Norway Spruce White Spruce White Cedar White Pine European Larch	(5)Norway Spruce White Spruce White Pine White Cedar Green Ash	(1)Tamarack White Pine Norway Spruce White Cedar Silver Maple

**NOTE:**      **WHITE PINE** - do not plant on sites with "free lime"  
                  **BLACK WALNUT** - do not plant north of Highway #7  
                  **NORWAY SPRUCE** - subject to frost damage in low areas.

**\* CONSIDER THIS CHART A "BULLS-EYE": THE CLOSER TO THE CENTRE, (10) THE BETTER YOUR CHANCES OF SUCCESS.**

**NOTE:** Soils with higher clay content, clay loams, silty clay, clay, heavy clay, may crack when dry exposing the tree roots to drying. Mounding or cultivation may help solve this problem.

## PLANTATION SET-UP

### ARRANGEMENT

*"Monocultures are bad".*

Although single species plantations may appear as "biological deserts", plantations of mixed species may be difficult to manage or thin later on. Usually, first thinnings are "row" thinnings where a complete row, usually every third or fourth row, is removed to provide access into the plantation. After the initial "row" thinning, "selection" thinnings remove individual trees from the remaining rows. When planting a mixture of species, it is wise to think ahead to which rows and which species will be removed in a thinning. If the plantation is to thin itself, species which grow at different rates can be mixed so that one species crowds out the other. For instance, white pine usually will "overtop" white spruce. Norway spruce will compete better with white pine and will also outperform white spruce. Hardwoods will not perform as well as conifers if grass and weed competition is present in the plantation, but if this vegetation is controlled, hardwoods can out compete conifers.

When it comes to wildlife, neatness does not count. Utilize natural wildlife food or cover tree species and shrubs such as dogwood, nannyberry, elderberry, hawthorne, high-bush cranberry, wild grape etc., particularly along fence-rows, to enhance the wildlife value of your planting. Consider leaving openings or access trails in the plantation and planting these to wildlife shrubs

### SPACING

*"I want to mow between the trees".*

Trees were traditionally planted at a six feet by six feet spacing. This allows the trees to rapidly dominate the site and shade out other vegetation. Close spacing is also advantageous for white pine as some early crowding discourages white pine weevil. Sometimes spacing is widened to seven feet by six feet so that after a row thinning, fourteen feet is the resultant width instead of only twelve feet. Wider initial spacings can be adopted, even up to fourteen feet by fourteen feet for some hardwoods where cultivation must take place between the rows. Similarly, in windbreaks where a farmer wants to mow weeds, spacing can be as wide as necessary to allow equipment movement. However, in wider spacings, trees will not naturally shade off their lower branches and pruning may be necessary. In addition, wider spacings will prolong weed and grass growth in the plantation as "crown closure" is delayed. The widest spacing is for intercropping where agricultural crops are to be grown between the tree rows. This spacing is usually 40 to 50 feet and will allow the production of row crops for 10 years, and a further 5 years of forage crops, before the trees dominate the site. This system is usually reserved for valuable species such as walnut and red oak.

Results of research in plantation growth found that in terms of beneficial effects to tree growth, herbicide control of weeds and grass showed the most benefit with cultivation second. Mowing was of marginal benefit to growth, but did prevent tall weeds and grasses from laying down in the winter and smothering the trees.

## ACREAGE

An acre is approximately 210 feet by 207 feet (or more exactly 43,560 square feet). A simple way to calculate acreage is to measure or pace two sides of the planting area, if the area is a rectangle or square, and multiply the length of the two sides in feet and divide the total by 43,560. One complete pace, left foot to left foot is often about six feet for a person of average height. Odd shapes are more difficult but actual tree numbers can be counted by pacing out the rows. For a spacing of six feet, each time the left foot comes down, count one tree.

A hectare is 1000 square metres or approximately 2.5 acres.

### TREES PER ACRE (numbers actually needed in an operational setting)

6 ft. x 6 ft.	1000 (actually works out to 1200, but operationally, 1000 is realistic)
6 ft. x 7 ft.	900
8 ft x 8 ft.	600
10 ft. x 10 ft.	400
12 ft. x 12 ft.	275
14 ft. x 14 ft.	200

**MORE READING:** For tips on how to handle and plant seedlings, see the leaflet: 8 Ways to Improve the Survival of Your Planted Trees.

J. R. Irwin  
Forester

October 12, 1993