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PLANTING AND HARVESTING DATES IN ONTARIO

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INTRODUCTION

An important element of successful farm management is timeliness of field operations, including the planting and harvesting of annual crops as well as soil tillage. Timeliness refers to the completion of field work associated with planting or harvesting of annual field crops on schedule. To achieve timeliness, it must be realized that not every day in the spring and the fall during critical field work periods will always be available. When the work-time available at spring planting is insufficient, the result is delayed seeding. Late seeding leads to delayed crop emergence, shortening of the effective growing season and reduced crop yield. In addition, chronic delays in completion of seeding means that there are fewer choices of crop types because of the shortened growing season.

When the time available for field operations in the fall is limited, then crops which are ripe and no longer growing must remain in the field waiting to be harvested. Continued exposure to weather means rapid loss in quality. Ultimately, delayed harvesting can lead to harvest failure and total crop loss.

THE WORKDAY CONCEPT

A workday is any day where field work, involving heavy farm equipment, could have been done. Workdays define the potential for doing work regardless of whether any work was actually done on that day. Workdays are determined on the basis of soil conditions, primarily soil moisture. The soil must also reach a certain temperature in spring for proper seed germination, but the warming of soils is closely linked to soil drying.

It is important to understand that the stability of soil structure is also related to soil moisture. Above a certain level of moisture, soil structure is more likely to break down under mechanical pressure such as the crushing and grinding of turning tractor tires. The result is soil compaction and the loss of soil pore spaces. That includes those large enough to permit drainage of excess water and those of an appropriate size for longer term water storage for plant growth (field capacity). Other consequences of compaction by heavy farm equipment are that these soils become poorly aerated and roots have difficulty penetrating.

Because of these less favorable growing conditions, crop yields are reduced. Soil erosion is increased because more surface water is lost by runoff when infiltration is retarded. Tractor tire slippage is also much higher on a wet surface. It results in inefficient use of farm equipment, higher risk of getting stuck and an additional form of soil structure damage known as smearing. Research has shown that the damage to soil caused by heavy farm equipment decreases dramatically when soil moisture falls below a certain moisture content (i.e. the soil can quickly regain it's structural stability as it dries). Therefore, it is possible to designate a field as workable or not workable on any given day depending on whether the soil mositure content falls inside or outside a specific critical range. For a given field, any day is therefore either a workday or a non-workday depending on the soil moisture.

Farmers who experience this limitation in field work time during spring planting and fall harvesting have only two options: (1) proceed with field work as scheduled and accept the risk of severe damage to soil structure, or (2) delay their field work and accept the crop losses associated with untimely completion of field work. With advanced planning, however, they can cope with this time limitation. This coping means, for example, the selection of implements which are able to cover all fields in the work time available and the purchase of tractors powerful enough to pull the implements. The amount of time available depends on the number of good workdays which can be expected.

SOIL TYPE FACTORS

The relationship between soil moisture and the mechanical stability of soil required for field work changes with soil type. The most influential soil property is texture. For example, it takes longer for clay soils to reach a workable condition than sandy soils. This relationship is complex, involving the loss of water by drainage and by drying as well as the level of dryness that the soil must reach to be considered workable. The time and condition required are illustrated in Figure 1 for the three soil classes shown on the map in Figure 2.

Figure 1 shows that the soil moisture level required to permit field work is close to field capacity (the maximum soil water storage after drainage). The high clay content soils must dry to just below field capacity whereas the more sandy, low clay content soils become workable at just above their capacity levels. Although field capacity is generally much lower in sand than it is in clay, sandy soils can be drained to their field capacity levels much sooner after a saturating rain. The number of days required to drain to field capacity and the amount of drainage on the first day after saturation for each soil is shown in Figure 1. Clay soils must wait the longest after a heavy rain to be worked because they are slow to drain and require additional drying of the soil to remove the water. Sandy soils are the fastest drying since they can be drained to a workable level one day after a heavy rain. Loamy soils are between clays and sands. This Factsheet only considers well drained soils. When drainage is retarded by the presence of a high water table, workable field conditions can be delayed by weeks while the water table recedes.

Workday Expectations

There is a considerable variation in the amount of worktime farmers can expect. The occurrence of workdays varies from year to year. In an unusually wet spring or fall considerably fewer workdays can be expected than during an average year.

The number of workdays will vary from region to region due to both soil and climate conditions. Because of the variation in available worktime over both time and space, there will be a wide range in the completion dates for both spring planting and fall harvesting, even if no differences in farm management practices are considered. Therefore, in this Factsheet, workday information is presented in the form of planting dates and harvesting dates. Those being the dates when planting or harvesting field work should be completed. The criteria for theoretical planting and harvesting dates, used in a previous crop performance index listed in the source material, are based on the accululation of five workdays. In fall they must occur within a 10-day harvest period, delayed as late as possible to lengthen the growing season.

WORKTIME ESTIMATIONS

Because of the difficulty in observing potential field work conditions on a wide scale basis, workday estimates are made by theoretical procedures and analysis of weather records. Because data from many sites and years are required to accurately represent the province's climate, several computer models have been used (see information source material). These models calculate soil moisture estimates for various soil types which are then used to determine either workdays or nonworkdays. These simulated workdays are counted to determine planting and harvesting dates and the risk of these dates being delayed.

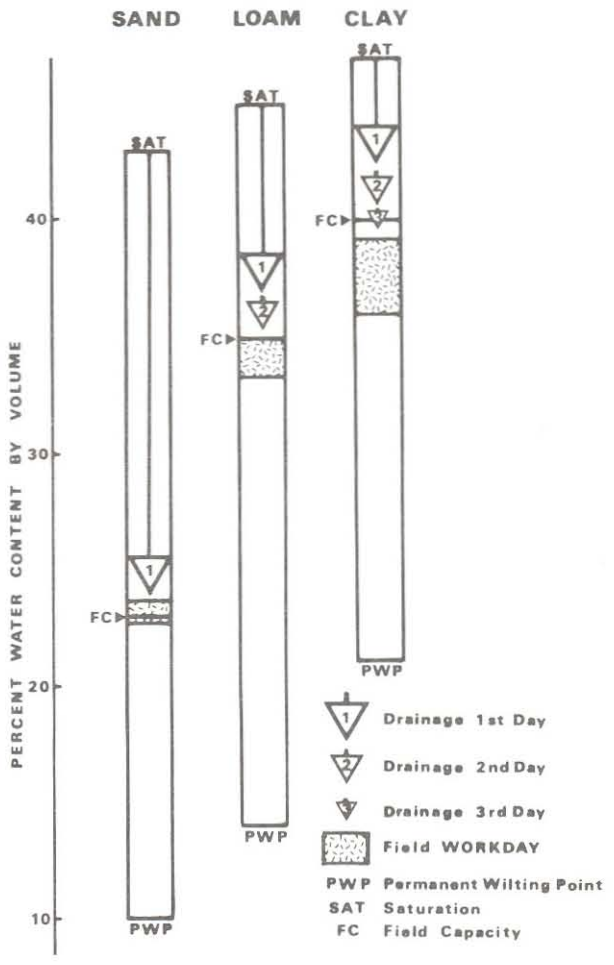

FIGURE 1

Figure 2 defines regions for which the reference climate stations are representative. These regions have been superimposed on a soil texture map. Soil textures have been grouped under three classes; sand, loam and clay. Dates by which planting and harvesting would be complete are presented in Tables 1 and 2 for the respective regions. The weather station locations used in estimating these dates are shown by dots on the map. Except for Barrie, the selection of stations was restricted to those where some workday analysis had been previously done (see source material). Workday estimates for Barrie were extrapolated from surrounding stations. One Quebec station (Ste. Anne de Bellevue) was used for Eastern Ontario.

Tables 1 and 2 show different levels of risk; 1 year out of 2 (50% chance) and 4 years out of 5 (80% chance), for the clay, loam, and sand, for each of the defined regions.

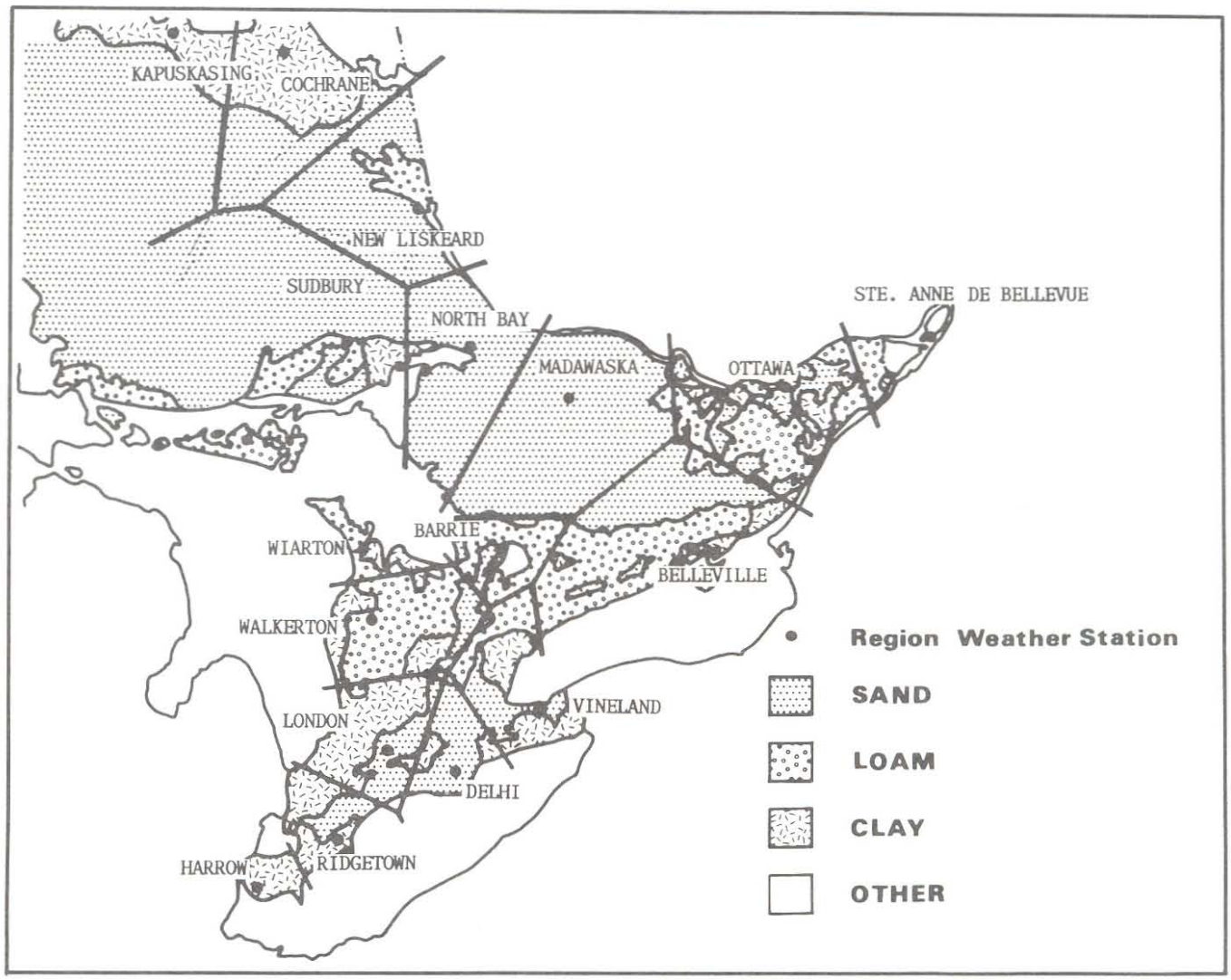

FIGURE 2

Table 1. SPRING PLANTING DATE* for 50% and 80% probability for three major soil types

REGION	50% Probability			80% Probability		
	CLAY	LOAM	SAND	CLAY	LOAM	SAND
Harrow	May 3	Apr 21	Apr 13	May 11	May 1	Apr 21
Ridgetown	May 9	Apr 28	Apr 20	May 17	May 1	Apr 21
London	May 15	May 4	Apr 26	May 23	May 13	May 4
Delhi	May 17	May 6	Apr 28	May 26	May 16	May 6
Vineland	May 1	Apr 20	Apr 13	May 17	May 3	Apr 21
Belleville	May 3	Apr 22	Apr 14	May 11	May 3	Apr 22
Wiarton	May 15	May 5	Apr 28	May 23	May 13	May 6
Walkerton	May 22	May 12	May 3	May 28	May 21	May 10
Barrie	May 4	Apr 25	Apr 17	May 10	May 2	Apr 25
Ste.Anne D'B.	May 6	Apr 26	Apr 18	May 12	May 4	Apr 26
Ottawa	May 5	Apr 25	Apr 17	May 13	May 4	Apr 25
Madawaska	Jun 10	Jun 2	May 25	Jun 16	Jun 9	Jun 2
North Bay	May 14	May 4	Apr 28	May 21	May 12	May 6
Sudbury	May 18	May 9	May 2	May 30	May 19	May 10
New Liskeard	Jun 1	May 21	May 13	Jun 8	May 30	May 21
Cochrane	Jun 11	Jun 3	May 26	Jun 16	Jun 10	Jun 3
Kapuskasing	Jun 11	Jun 1	May 24	Jun 16	Jun 8	Jun 1

**Earliest date in Spring by which 5 workdays will have occurred*

Table 2. **FALL HARVEST DATE* for 50% and 80% probability for the major soil types**

REGION	50% Probability CLAY	LOAM	SAND	80% Probability CLAY	LOAM	SAND
Harrow	Oct 29	Nov 8	Dec 8	Oct 4	Oct 27	Nov 13
Ridgetown	Oct 26	Nov 8	Dec 8	Sept 29	Oct 23	Nov 8
London	Oct 24	Nov 8	Dec 7	Sept 25	Oct 18	Nov 4
Delhi	Oct 23	Nov 8	Dec 7	Sept 24	Oct 19	Nov 3
Vineland	Oct 23	Nov 6	Dec 5	Sept 23	Oct 19	Nov 9
Belleville	Oct 14	Oct 31	Nov 22	Sept 21	Oct 15	Nov 3
Wiarton	Sept 30	Oct 20	Nov 30	Sept 12	Sept 26	Oct 26
Walkerton	Oct 8	Oct 26	Dec 1	Sept 19	Oct 3	Oct 27
Barrie	Oct 11	Oct 29	Dec 6	Sept 20	Oct 9	Oct 30
St.Anne D'B.	Oct 12	Oct 25	Nov 20	Sept 16	Sept 29	Oct 25
Ottawa	Oct 15	Oct 29	Nov 18	Sept 14	Oct 22	Nov 3
Madawaska	Oct 4	Oct 21	Nov 23	Sept 9	Oct 3	Oct 27
North Bay	Sept 23	Oct 14	Nov 28	Sept 4	Sept 19	Oct 21
Sudbury	Sept 23	Oct 14	Nov 27	Sept 4	Sept 19	Oct 19
New Liskeard	Sept 26	Oct 11	Nov 25	Sept 4	Sept 18	Oct 9
Cochrane	Sept 24	Oct 9	Nov 11	Aug 28	Sept 16	Sept 2é
Kapuskasing	Sept 24	Oct 9	Nov 10	Aug 27	Sept 16	Sept 29

**Last date in Fall by which 5 workdays will have occurred within the previous 10 day sequence*

SUMMARY

If readers have a good understanding of the soil on their respective farms, then they need only consult Tables 1 and 2 for decision-making. An understanding of the soils in the surrounding areas, as well as climate differences throughout the province can help in relating one's own operation to practices on surrounding farms, or in other counties. A wide variation in planting and harvesting dates throughout the province is apparent, due to both soil and climate. When soil texture is considered, significant differences can be seen over short distances. Other factors not considered here, such as topography and drainage would add considerable variation. Readers should also consider closely the differences associated with the two risk levels, as an indication of the variation from year to year.

For more detailed information on workday occurrences and probabilities, as well as the use of workday information in farm planning, readers should consult the list of information source material.

INFORMATION SOURCE MATERIAL

Spring Field Workdays in Ontario, 1974. Brown, D.M. and Die, P. Van, Tech. Memo. 74-1, University of Guelph

Fall Field Workday in Ontario, 1974. Die P. Van, Brown, D.M. Tech. Memo. 74-2, University of Guelph

Spring Field Workday Probabilities For Selected Sites Across Canada, 1978. Dyer, J.A., Baier, W. Hayhoe, H.N. and Fisher, G., Tech. Bull. 86, Res. Br., Agriculture Canada.

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