

User's Guide to ConeSys: A Cone Crop Monitoring and Insect Pest Management Decision Support System for Seed Orchards

Peter de Groot¹, Frank Schneckenger², Richard A. Fleming¹,
and Jean J. Turgeon¹

¹Natural Resources Canada, Canadian Forest Service,
Great Lakes Forestry Centre, P.O. Box 490,
Sault Ste. Marie, Ontario, Canada P6A 5M7

²Ontario Ministry of Natural Resources,
Ontario Forest Research Institute, P.O. Box 969,
Sault Ste. Marie, Ontario, Canada P6A 5N5

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ABSTRACT

A primary objective of seed orchards is to optimize the supply of high quality seeds. Meeting seed production targets often requires careful monitoring of the cone crop to predict the quantity and quality of cones and seeds and management of insect pests. Pest management decisions require accurate identification of the pest, knowledge of pest biology and damage, and methods to prevent or control damage.

ConeSys is a computer-based system to assist seed orchard managers in collecting data on the quality and quantity of cones and seeds from their orchard, and assist them in making informed decisions about insect pest management. This publication describes the general features and functions of ConeSys and provides step-by-step instructions on how to use it in the field and laboratory.

RÉSUMÉ

Les vergers à graines visent essentiellement à maximiser l'approvisionnement en semences de haute qualité. Or, la réalisation d'objectifs donnés de production de semences requiert souvent la surveillance étroite de la culture des cônes pour prévoir la quantité et la qualité des cônes et des graines, ainsi que la lutte contre les insectes nuisibles. D'ailleurs, pour prendre des décisions en cette matière, il faut clairement identifier les insectes ravageurs, connaître la biologie de ces insectes et les dommages qu'ils causent, de même que les méthodes de prévention ou de contrôle des dégâts.

ConeSys est un système informatique qui aide les gestionnaires de vergers à graines à faire la collecte de données sur la qualité et la quantité des cônes et des graines de leur verger. Ce système les aide aussi à prendre des décisions éclairées en matière de la lutte contre les insectes nuisibles. La présente publication décrit les caractéristiques et les fonctions générales de ConeSys et donne des instructions pas à pas sur la façon de l'utiliser sur le terrain et en laboratoire.

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HOW THIS MANUAL IS ORGANIZED

The manual has been organized into six sections.

Section One (What is ConeSys?) provides an introduction to the general features and functions of ConeSys and describes how to install ConeSys on your data logger and personal computer.

Section Two (Setting up Cone Crop Monitoring Studies in the Field) describes the field procedures for selecting and monitoring cone crop monitoring trees.

Section Three (Collecting CCMS Data: Using CCMSDAT) describes in detail how to use the data collection program CCMSDAT.

Section Four (Analyzing CCMS Data: Using CCMSPC) provides a detailed description of the computer program that summarizes and analyzes your data.

Section Five (Information on Cone and Seed Insects and Their Control: Using CCMSIMS) describes how to use the database, which contains a diagnostic key to identify insects, a description of the insects' life history and damage, and information on pest control products.

Section Six (Making Insect Pest Management Decisions: Using CCMSDSS) describes how to input information about pest management in order to determine if pest management will be cost effective.

WHAT IS CONESYS?

Background

In Canada, a large number of seed orchards have been established to supply genetically superior seed for reforestation. A primary objective of seed orchards is to optimize the supply of high quality seeds. Meeting seed production targets often requires careful monitoring of the cone crop to predict the quantity and quality of cones and seeds (Bramlett and Godbee 1982, Fleming et al. 1990, de Groot and Turgeon 1992, Fleming and de Groot 1992, Caron and Fleming 1995), and management of insect pests (Turgeon and de Groot 1992, 1994; de Groot and Fleming 1994; de Groot et al. 1994; Turgeon et al. 1994). Pest management decisions require accurate identification of the pest, knowledge of pest biology and damage, methods to prevent or control damage, and estimates of the size and value of the crop to be protected. Typically, pest management decisions are made under uncertain conditions by managers having varying degrees of experience, knowledge, and willingness to take risks; therefore, a system that assists appropriate decision making would be beneficial. Furthermore, automation of database files on insects and their control, of data collection and processing of cone crop yield estimates, and of decision-making procedures would help seed orchard managers.

ConeSys is a computer-based system to assist seed orchard managers in collecting and processing data on the quality and quantity of cones and seeds from their orchard, and assist in making informed decisions about insect pest management.

ConeSys consists of three core programs that function independently: The Cone Crop Monitoring System (CCMS), the Information Management System (IMS), and the Decision Support System (DSS). Both the CCMS and the IMS provide data and information for the DSS (Figure 1.1). The CCMS provides data on the size of the cone crop (item (1) in Figure 1.1) and expected damage. The IMS provides information on expected damage from

insect pests of pine, spruce and tamarack in eastern Canada, pest control products registered in Canada for use against these cone and seed insects, and estimates of the efficacy of the products. The DSS uses this data and asks the seed orchard manager for additional information about cost of treatment and the value of the crop to be protected to help calculate the consequences of various decisions.

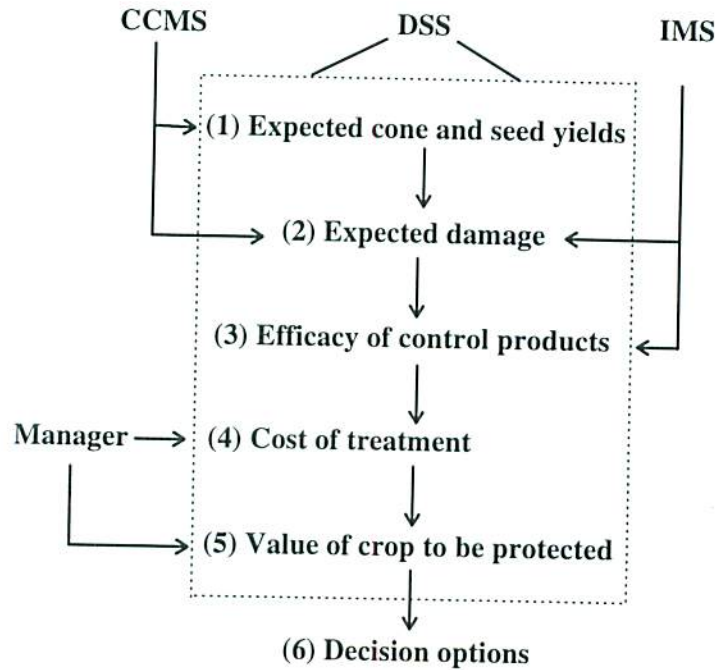


Figure 1.1. Flow of information and data from the Cone Crop Monitoring System (CCMS), Information Management System (IMS), and seed orchard manager into the Decision Support System (DSS).

Cone Crop Monitoring System

The Cone Crop Monitoring System (CCMS) enables seed orchard managers to estimate and predict cone and seed crop size at various times from pollination to cone maturity and harvest. It also provides estimates of the impact of insects, together with other cone- and seed-mortality factors, such as diseases, natural abortion, squirrels, and frost. CCMS data is collected on data loggers and then processed on an IBM compatible personal computer (PC).

Data collection for CCMS is comprised of periodic observations of seed cones on sample trees selected from an orchard. Figure 1.2 shows the flow of field procedures for use in setting up a CCMS study. These field procedures are described in detail in section 2 of this manual.

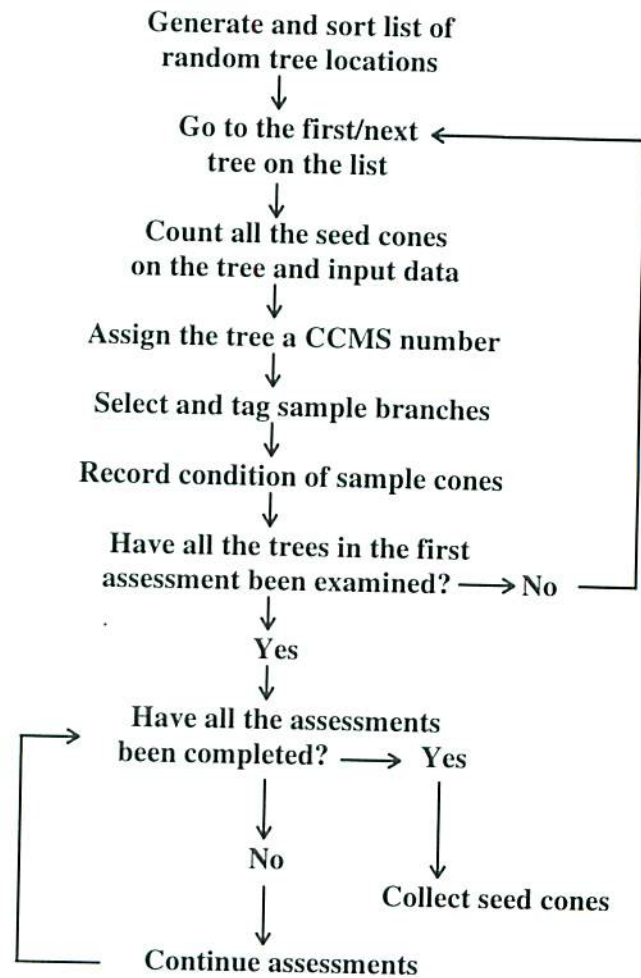


Figure 1.2. A flow chart outlining the field procedures for monitoring cone crops.

After the sample trees are chosen, all the seed cones on each tree are counted to provide estimates of the potential yield of cones and seeds from the orchard. Sample cones are permanently tagged and revisited periodically during their development period. On each visit, the cones are examined to determine the number of healthy, damaged, and dead cones, and the probable cause of death. The field data are collected on a data logger running the CCMSDAT program, which is described in detail in section 3 of this manual. The data is downloaded to a PC. The data is stored and managed in a program called CCMSPC, which is described in detail in section 4 of this manual. By using previous cone and seed loss data from the orchard (or some best guess), the user can then make predictions on the cone and seed yield expected at harvest (Figure 1.3). After each set of observations of the sample cones, the data is downloaded into CCMSPC to update the predictions of cone and seed yields. At harvest, sample cones are processed to determine seed potential, actual yield of filled seed, and seed losses.

04/01/1996		CONE CROP MONITORING SYSTEM										20:41:14	
Analysis Module													
OTIB Zone: 4		CCMS Study: 6		CCMS Year: 1994				Orchard: RAMORE					
		Assessments											
		1	2	3	4	5	6	7	8	9	10	Final	
Predicted CE		98	94	91	88	87	87	0	0	0	0	87	
Actual CE		98	96	96	94	93	93	0	0	0	0		
Revised CE		87	89	92	93	93	93	0	0	0	0	93	
Seed potential (#):						26	Revised final CE (%):						93%
Seed efficiency (%):						60%	Cone yield ('000):						344
Extraction efficiency (%):						85%	Cone yield (hl):						279
Germination efficiency (%):						98%	Orchard seed yield ('000):						5.368
Orchard cone inv. ('000):						370	Extracted seed yield ('000):						4.563
Number of cones/hl:						1,234	Seedling yield ('000):						4.472
<F1>		<F3>											
Help		Print											
		exit										<F10>	

Figure 1.3. Sample output from the Cone Crop Monitoring System for the Ramore seed orchard showing the predicted yields of cones, seeds, and seedlings.

Information Management System

The Information Management System (IMS) is a database that provides information on the insect pests of pine, spruce and tamarack in eastern Canada. There are three main modules in the IMS program. The Diagnosis module helps identify the pest or pests causing damage to the cone and seeds on the basis of damage characteristics. Next, the system identifies the pest and the user can view or print selected information about it. The Pest module provides information on the hosts, importance and distribution of the pests, a description of the damage and life stages of the pest, and the current control methods (Figure 1.4).

04/01/1996		INFORMATION MANAGEMENT SYSTEM		18:44:59	
Name: eastern pine seed moth (Cydia toreuta)					
Distribution					
15-80% of the cones can be attacked; up to 75% of the seeds per cone can be destroyed; one larva can destroy as many as 8 seeds; found throughout the range of pine					
				View Options	
				<PgUp> - Scroll up	
				<PgDn> - Scroll down	
				<Ctrl-PgUp> - Go to top	
				<Ctrl-PgDn> - Go to bottom	
				cone ridges cone resin midge eastern pine seed moth eastern spruce budworm fir cone worm jack pine budworm larch cone maggot larch seed chalcid	
<F1> Help		<F2> Diagnosis		<F3> Information	
		<F7> Print		<F4> Control	
				print Option	
				<F9> eXit	
				<F10>	

Figure 1.4. Sample of pest information from the Information Management System.

The Control module provides information on the pest control products registered by Agriculture Canada for use against cone and seed insects. This information includes the product name, registration number, registrant and Canadian agent, location of use, market type, formulation type, precautions, first aid, environmental hazards, spill cleanup, toxicology, storage and disposal instructions, directions for use, active ingredient, species of insects controlled, and estimates of the efficacy of the product. IMS is described in detail in section five of this manual.

Decision Support System

The Decision Support System (DSS) is designed to help seed orchard managers make economically and environmentally appropriate pest and crop management decisions. DSS requires seed orchard managers to input data on the current cone crop size, cost of pest management, and the expected gain in cone and seed yields from pest management, among other data. DSS processes these data (Figure 1.5) and provides a cost/benefit analysis of one or more pest management options.

DSS is described in detail in section six of this manual.

04/01/1996	DECISION SUPPORT SYSTEM	19:41:06
Edit Orchard Year Screen		
Orchard Name: ILI1A		
Year: 1996		
Description: BZ3 JACK PINE, FULL ORCHARD		
Initial Crop Size: 10,000		
<# of Cones>		
Current CE (%): 85		
Predicted cone loss - non-controllable (%): 10.0		
Predicted cone loss - controllable (%): 25.0		
Predicted potential seed loss - controllable (%): 6.0		
Predicted seed/cone #: 15		
Interest Rate (%): 4.0		
Cost adjustment date (mm/dd/yy): 04/01/1996		
Value of seed (\$/1000): 5.50		
Date value of seed realized (mm/dd/yy): 04/01/1997		
<F1> help		exit <F10>

Figure 1.5. Sample input data screen from the Decision Support System.

Installing CONESYS

System Requirements

To run ConeSys on a computer system you will require:

- an IBM-compatible 80386 PC or higher,
- DOS 3.1 or higher,
- a minimum 4 MB of RAM, and
- approximately 4 MB of available hard disk space.

The data collection program CCMSDAT is designed to run on a DAP Technologies PC1000 or PC 9000 with accompanying communications hardware and software. It will also run on most PCs.

Installing ConeSys

To install ConeSys onto your computer:

- 1) Get to a DOS prompt. If you are running Windows, either quit Windows or open a DOS window,
- 2) Insert the installation disk into your floppy drive,
- 3) At the DOS prompt, enter **a:\install**; if your floppy drive is b, enter **b:\install** instead, and
- 4) Follow the instructions on the screen.
- 5) Note that Installation Disk is also the ConeSys Boot Disk. If you run into memory problems while using ConeSys modules on your PC (particularly CCMSPC), you will need this disk to reboot your computer into a minimally configured mode. See "Starting CCMSPC" in Section Four for more details.

6) When the install is finished, print out a copy of the file 'README.TXT'. A copy of the README.TXT at the time of publication of the manual is shown here, but consult the disk copy as it will contain the most up-to-date information on the use of all ConeSys modules.

Current READ ME file for ConeSys

This file contains the latest information on the installation, setup and use of the CONESYS modules. IT IS ESSENTIAL THAT YOU CAREFULLY READ THIS FILE AND FOLLOW THE INSTRUCTIONS.

I. INITIAL SETUP

Before using the CONESYS modules for the first time, add the following line to your AUTOEXEC.BAT file:

```
SET CLIPPER=F075
```

Add the following lines to your CONFIG.SYS file:

```
BUFFERS = 40  
FILES = 40
```

If your CONFIG.SYS file already has a FILES or BUFFERS line, ensure that the numbers are at least as large as those given here. After the changes have been made and the files saved, reboot your computer so that these changes take effect.

If you are using a data logger, you must similarly make these changes to the AUTOEXEC.BAT and CONFIG.SYS files on the data logger, and then reboot it.

All CONESYS programs are DOS-based, and must be run from the DOS prompt.

II. CCMSDAT

To use CCMSDAT on your data logger, copy the files CCMSDAT.EXE and DICTON.DBF onto your data logger (these files may be found in your CCMSDAT subdirectory). To start CCMSDAT on the data logger, enter CCMSDAT at the DOS prompt.

You may also use CCMSDAT on your PC. Change directories to the CONESYS directory and enter CCMSDAT at the DOS prompt.

III. CCMSPC

CCMSPC typically does not run well in a DOS window open under Windows 3.1. It may also run into memory problems if several devices and programs (e.g. network software) are running on your PC in the background. To overcome these problems, place the CONESYS Boot Diskette (the Installation Diskette) in the floppy drive and reboot your computer. This will setup your computer in a minimally configured mode under which CCMSPC will work. To return your computer to its normal configuration when you are finished using CCMSPC, remove the diskette and reboot your computer.

IV. STARTING CONESYS MODULES

To start any of the CONESYS modules, change directories to the CONESYS directory. Enter the name of the module you wish to run at the DOS prompt (CCMSDAT, CCMSPC, CCMSIMS or CCMSDSS).

Acknowledgments

Many people have contributed to the development of ConeSys. In particular we would like to thank the many seed orchard managers and tree improvement specialists of the Ontario Ministry of Natural Resources (OMNR) and their industrial partners who helped us design ConeSys to their needs and who worked with us in "getting the bugs out": their dedication, patience, and enthusiasm is much appreciated. We appreciate the support of Dr. Denis Joyce, Ontario Forest Research Institute (OMNR) for his initial and continual support throughout the program, and Randy Barbarie and Darryl Buck of RBB Innovations, Sault Ste. Marie, Ontario, for programming design and assistance. A special thanks to Beverly Aelick for putting much of the IMS database together and to Bert Zylstra and Tim Burns for their assistance in assessing the user-friendliness of the program and for reviewing the manuscript. We greatly appreciated the superb technical editing by Duncan McKenzie.

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SETTING UP CONE CROP MONITORING STUDIES IN THE FIELD

Overview

Cone crop monitoring is based on periodic observations of seed cones on sample trees selected from an orchard (see Figures 1.2 and 2.1). After the sample trees are selected, all seed cones are counted on each tree to provide estimates of the orchard's potential yield of cones and seeds. Sample cones are permanently tagged and are revisited periodically during the seed cone development period. On each visit, the cones are examined to determine the number of healthy, damaged (attacked live), and dead cones, along with the probable cause of death or damage. When the seed cones have reached maturity, a sample is processed to determine seed potential, the number of filled and empty seeds, and seed losses.

Step-by-Step Procedure

1. Select trees.

Trees should be selected randomly from your orchard to avoid biasing the estimates of cone and seed values. You may wish to choose trees from the entire orchard or restrict your selection to a particular portion of the orchard. However, by restricting your selection to only a part of the orchard, you can draw inferences only about the selected part and not the whole orchard. We recommend that you select trees from the whole orchard, unless there are good reasons for selecting only a portion.

The random tree locator of CCMSPC is designed to let you randomly select trees, by location, from your orchard. Select 50 tree locations at random and sort them. After the tree locations have been sorted, make a sketch map of a sampling path through the orchard that will allow you to visit each tree efficiently.

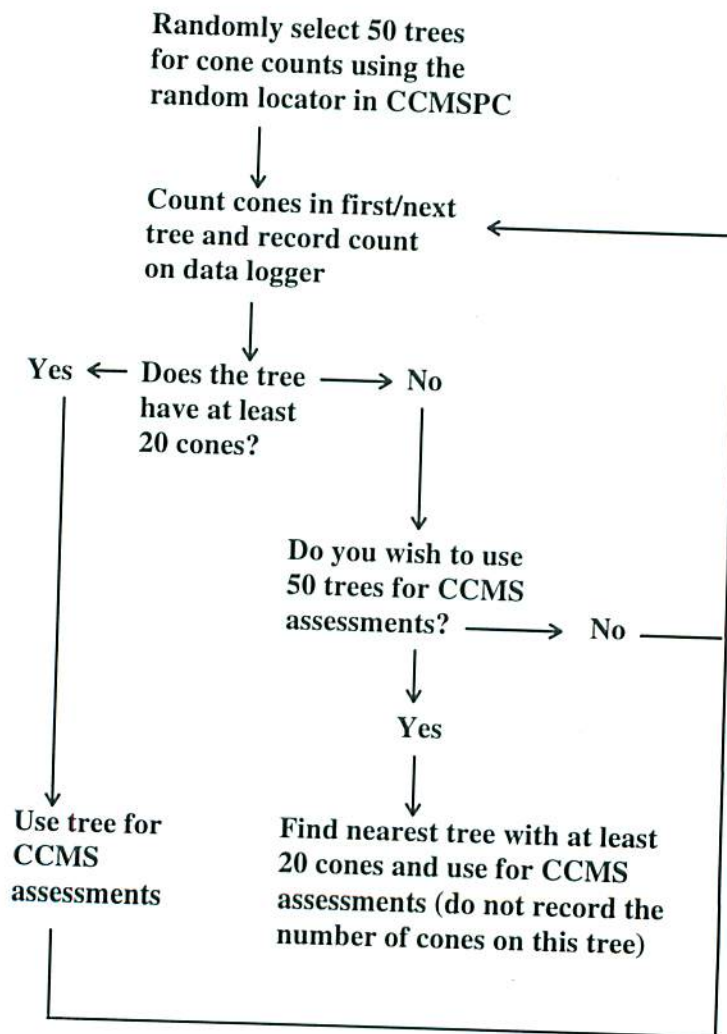


Figure 2.1 A flow chart outlining the field procedures for selecting cone crop monitoring trees.

2. Go to the first (next) tree on the list.

Within one to two days after pollen release, go to the first tree on the list. At this time most or all of the seed cones should be visible and receptive to pollen.

If the tree is missing (because it was rogued, for example), or is dead, then use the nearest living tree. Note that you must have an accurate record of the number of trees in the orchard in order to make estimates of the cone and seed yields. Record location information for the tree.

3. Count all the seed cones on the whole tree.

Divide the tree crown into two sectors, north and south. The north sector is the area from 270 degrees to 90 degrees, and south is the other half. Now divide the cone-producing region (the area between the highest and lowest cones) into two levels of equal width (Upper and Lower). Dividing the tree into two sectors and two crown levels produces four "cells" in a tree. Count all the seed cones (living and dead) and record the count.

4. Select and tag sample branches and record first assessment.

Randomly select a cell from the four cells, i.e., North Upper, North Lower, South Upper, and South Lower. To make a random selection, number each cell, e.g., North Upper = 1, North Lower = 2, South Upper = 3, and South Lower = 4, then randomly pick a number from one to four using a table of random numbers (or using a hand-held calculator which has this feature).

After selecting a cell, randomly select a cone bearing branch. To do so, we recommend that you count the number of cone-bearing branches within the cell by beginning at the top of the cell, and then randomly select a number within the range of branch counts. For example, say you count five cone-bearing branches within the cell. Select a number from one to five, say branch two; then, counting from the top of the cell (as before), locate this branch.

Place a metal tag (or a tag made of some other durable and corrosion resistant material) on the cone-bearing branch just below the seed cones closest to the tree trunk (so as not to interfere with their development), and inscribe the tag with the branch number shown on the data logger. Enter the cone count, cone condition and mortality factor. You do not have to record the mortality factor for each cone; however, by failing to do so you will be unable to determine the cause for the loss of cones, particularly by cone and seed insects. Mortality factor information is essential to implement a pest management program. Be sure to record the number of living AND dead seed cones.

If there are less than 20 cones on the branch you selected, randomly select another cone bearing branch (using the same procedure as before) and record the condition of the cones on the second branch, either until 20 cones have been tallied or until all the cones have been tallied. You may need to move to another cell (selected at random) to complete this tally. You can either stop recording after 20 cones have been found, or if you wish to complete the branch, record the condition of the remaining cones on the branch. For example, if the first branch has been tallied with 14 cones, and the second branch has an additional 10 cones, you can either record the condition of the first six cones on the second branch, bringing the tree total to an even 20, or complete the entire second branch, bringing the tree total to 24 cones. The latter option is preferable, because, if you record the condition of only a portion of the cones on a branch, you will be faced, on subsequent tallies, with the problem of distinguishing the cones being monitored from the remaining cones.

5. Repeat steps 2 to 4 until all 50 CCMS trees have been assessed.

6. Monitor cones periodically until cone maturity.

For the second and all other assessments, return to the CCMS trees and tagged branches and record the condition and mortality factors of the cones. The number and timing of the assessments varies with the tree species.

Pine (*Pinus* spp.): For pine there are five more assessment periods after the first assessment, which are done over two years.

Assessment 1: one or two days after pollen release;

Assessment 2: about one month after the first assessment, usually late June or early July;

Assessment 3: mid to late September;

Assessment 4: late May the following year, the same time that the next years' cones are receptive to pollen;

Assessment 5: about one month after the fourth assessment, usually late June or early July; and

Assessment 6: when seeds are mature, late August to mid September.

Spruce (*Picea* spp.) and Tamarack [*Larix laricina* (Du Roi) K. Koch.]: Because spruce and tamarack cones mature within one year, there are three more assessment periods after the first assessment:

Assessment 1: one or two days after pollen release;

Assessment 2: when cones are pendant, about one to two weeks after pollen release;

Assessment 3: end of June or the first week of July; and

Assessment 4: when seeds are mature, late August to mid September.

Consult the Information Management System (see section six of the manual) for information on the damage, biology and management of the cone insects.

7. Collect mature cones for cone analysis.

Randomly select two cones from each CCMS tree. Each cone should be placed in a separate paper bag on which the following information is labeled: (1) Seed zone, (2) CCMS study number, (3) CCMS year, (4) orchard name, (5) species, (6) tree location, e.g., rep, block, set, quad, row, column, position, (7) family or clone number, (8) CCMS tree number, and (9) the sector and level from which the cone was collected.

Cone analysis determines, among other things, the seed potential (two times the number of fertile scales) and the number of filled seeds per cone. This information is necessary to make predictions (done in CCMSPC) on seed yield from the cone crop data. Cone analysis should be arranged with a seed processing laboratory.

What is CCMSDAT?

CCMSDAT is designed to collect and store the number and the condition of seed cones in your orchard on a data logger. A number of trees and branches are selected at random, and the seed cones on these branches are assessed several times over the following year or two. Each assessment will record the number of cones, the cone condition and the cause of mortality (mortality factor). As an option, you may want to record only the number of living and dead cones without determining the cause of mortality.

Creating a study is the first step. After a study has been created, you can edit it or start a new assessment. If this is the first time using CCMSDAT, familiarise yourself with its general features and functions before you begin.

Starting CCMSDAT

To start CCMSDAT on your DAP Technologies PC100 or PC9000:

1. Make sure the data logger has the CCMSDAT program installed. Check that the CCMSDAT.EXE is present.
2. Make sure the data logger has the dictionary database file. Check that the DICTON.DBF is present.
3. Set the data logger screen size to 16 columns by 21 rows. Press <CTR> 1 to toggle between the two sizes.
4. Type CCMSDAT, and press <Enter>. The logo screen will appear. Press any key to continue.
5. General features and functions of CCMSDAT are described in the next section. After you are familiar with these, you are ready to create a study.

You may also run CCMSDAT on your PC. To do so, change directories to the CONESYS directory and enter CCMSDAT at the DOS prompt.

Using CCMSDAT

General Features and Functions

Using function keys. Several options in CCMSDAT are accessed by using the function keys, <F1> to <F10>. On the DAP™ (DAP Technology, Montreal, Quebec) data logger units, function keys work by pressing the red <FCT> key, releasing it, and then pressing the corresponding number (e.g., 5 for <F5>). A function key name will sometimes be displayed on screen, in angle brackets, preceding the option it activates. For example, <F3> New Study means press <F3> to create a study. In the manual, function keys are displayed in angle brackets, for example, <F9>. Note that on the DAP units, the <F10> key is accessed by pressing the <FCT> key, followed by the 0 digit.

Using the escape key. The Escape key (Esc) is also used to exit various points of CCMSDAT. It is sometimes displayed on screen as an option, as <Esc>. On the DAP unit, the Escape key is accessed by pressing the <FCT> key, followed by the <Esc> key (the Esc key is the one with the decimal point).

Using control keys. Some functions and features of CCMSDAT are accessed using Control keys. To use control keys on the DAP units, press the blue <CTL> key, release it, and then press the required number or letter (e.g., 3, for <CTL> 3). In this manual, control keys will be displayed in angle brackets, for example – <CTL>3.

On the data logger, some of the control keys represent keystrokes on a full, standard keyboard. For example, <CTL>3 on the data logger is equivalent to <PgDn> on a full keyboard. Where this is the case, both keystrokes will be displayed in headings in the manual (e.g., <CTL>3/<PgDn>). Use the second of the two keystrokes (e.g., <PgDn> in this case) when working with CCMSDAT on a PC.

Yes/No prompt. At many points in CCMSDAT, a dialog box will be displayed allowing you to respond "Yes" or "No" to a question from CCMSDAT. There are two ways to respond to this prompt: (1) press the Y key to select Yes, or the N key to select No; or (2) use the left or right arrow keys to highlight "Yes" or "No" in the dialog box, and then press <Enter>.

Navigating lists. Some of the input screens of CCMSDAT display input items in a list. Typically, you can move the cursor up and down the list of items using the <Up Arrow> and <Down Arrow> keys. In some lists, the <PgUp> and <PgDn> keys may also be used to move the cursor. Some lists display items from which you must make a selection. In this case, use the <Up Arrow> and <Down Arrow> keys, moving the cursor to highlight your selection, and then press <Enter>. Some lists, specifically lists of tree and branch numbers, allow you to enter the number required and automatically highlight that number in the list, at which point you can press <Enter> to make your selection.

Entering text. Where text or numbers must be keyed into a field, simply enter the required text or number at the cursor and press <Enter>. In most cases, CCMSDAT will automatically move the cursor to the next required field. Sometimes, CCMSDAT will provide a default value for an item. To accept the default, just press <Enter>. To overwrite the default, key in the desired text and press <Enter>.

Creating a Study

1. To create a study, press <F3>: this will display the following identifiers screen.

Enter New
Study Identifiers:

OTIB Zone : 4

CCMS Study: 2

CCMS Year : 1996

2. Enter the Ontario Tree Improvement Board (OTIB) Zone (1-6), the CCMS study number (1-99) and the CCMS year (automatically defaulted to current year). The program will display the information entered and ask you to verify that it is correct. If it is, select **Yes**.

Note:

The data collection program is designed for use by Ontario Ministry of Natural Resources (OMNR) and OTIB members; however, other than the orchard identifiers, this program is generic and can be used in many other jurisdictions. The zone number and other specific OMNR/OTIB identifiers can be left blank, or you can use these spaces with your own numbering system.

3. The following study date screen will appear. Enter the study date.

Starting
Assessment Date

Enter today's
date :

04/03/96

If the current date is the study date, then press <Enter>. Otherwise type in the correct date and press <Enter>.

4. The next screen is the orchard identifiers screen.

Assessment: 1

Seed Source #:

Breeding Zone:
bz 3

District:
Chapleau

Orchard Name:
ILTIA

Species:
01

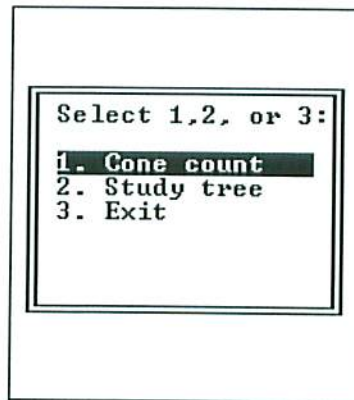
Enter the seed source number, OTIB breeding zone, district, orchard name and tree species. The orchard name is mandatory.

5. The next screen allows you to select the parameters you use to specify tree location and identification.

Assessment: 1		
Field Selection:		
Rep	:	Y
Block	:	N
Set	:	Y
Quad	:	Y
Row	:	Y
Column	:	Y
Position	:	N
Bearing	:	N
Family	:	Y
Clone	:	N
Factor	:	Y

The options include Rep, Block, Set (A-D), Quad (1-4), Row (1-99), Column (1-99), Position (1-99), Bearing (N, NE, E, SE, S, SW, W, NW), Family, Clone and Factor. These options should be selected according to the specific needs of your orchard. To use a parameter press **Y** or **<Enter>** on the defaulted Y. If the parameter is not to be used, press **N** to change it to No.

6. The next screen prompts you with a menu with three available options:



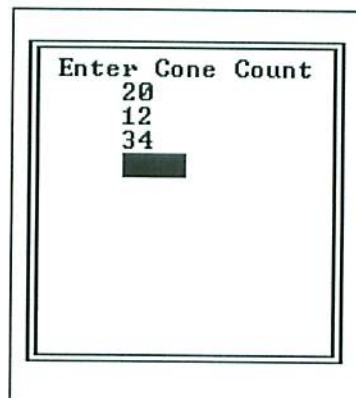
```

Select 1,2, or 3:
1. Cone count
2. Study tree
3. Exit

```

Select **Cone count** from the menu screen and press **<Enter>** to add a cone count to the file.

7. The cone count screen appears, as shown below.



```

Enter Cone Count
20
12
34

```

After entering the cone count for the tree, press **<Enter>**. To delete a cone count, highlight it, and press **<F0>** (or **<F10>** on a conventional PC). Press **<Esc>** or **<Enter>** on a blank field to return to the menu options.

8. Select **Study Tree** from the menu screen to add a tree to the CCMS study. The system prompts you for the next tree number, defaulting to the next available sequential number as shown here.

Next Tree
Number:
1

Press <Enter> for the default number, or type in another number.

9. The tree location screen requires you to input information for the selected fields: Rep, Block, Set, Quad, Row, Column, Position, Bearing, Family, Cone and Factor. The fields that appear here will be those you selected in step 5.

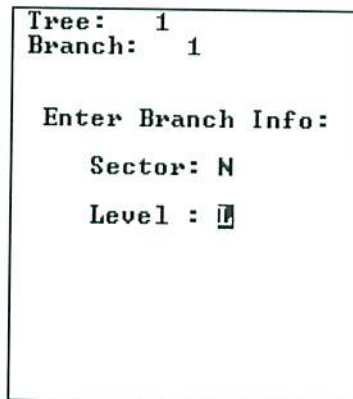
Tree: 1
Enter Tree Info:
Rep : 12
Set : C
Quad : 2
Row : 10
Column : 6
Family : **343123**

10. After entering the tree information, you are prompted to enter the branch number. CCMSDAT defaults to the next available sequential number.



A screenshot of a terminal window showing a prompt for the next branch number. The text 'Next Branch Number:' is displayed, followed by a small box containing the number '1'.

11. The next screen requires you to input branch information.



A screenshot of a terminal window showing the 'Enter Branch Info' screen. It displays the following information: 'Tree: 1', 'Branch: 1', 'Enter Branch Info:', 'Sector: N', and 'Level : U'.

CCMSDAT allows you to change the branch number. Press **<Enter>** to accept the number, or enter a new number. The sector (N = North, E = East, S = South, W = West) and level (U = Upper, M = Middle, L = Lower) must be entered next on the branch information screen. Press either the N, E, S, or W

key for the sector and then either the **U**, **M** or **L**, key for the level. These fields may be left blank.

Note:

In section 2.3, which provides instruction on setting up CCMS trees in the field, instructions were given to divide the tree into north and south sectors and upper and lower levels. CCMSDAT is set up to let you divide the tree into four sectors and three crown levels. This flexibility is in place for those who wish to divide the tree further, either to facilitate easier location of sample branches, or to obtain more data. If you choose to use only the north and south sectors and the upper and lower levels, you may simply ignore the E, W, and M options.

12. After you have entered in the tree and branch information, you are ready to enter information on the condition of the cones and their mortality factors.

Tree:	1		
Branch:	1		
Tallied:	0		
		1	

		# CC MF	
1		<input checked="" type="checkbox"/> 0 0	
2			
3			
4			
5			
6			
7			
8			
9			

The screen should have the tree and branch numbers at the top of the screen and one or two assessment numbers heading one or two assessment columns, respectively.

If you are on the first assessment, there will only be one column in the right half of the screen and "Tallied:" appears under "Branch:". This number indicates the total number of cones assessed on this tree. Between the two assessment columns, there is a column of numbers from one to nine that designate the row numbers for entering tally information.

Each assessment column consists of three sub-columns with the headings #, CC, and MF. These are used to enter the cone count (#), cone condition (CC) and mortality factor (MF).

As an example, if a branch has 15 cones which have been damaged, but not killed, by jack pine budworm, enter 15 under cone count. For cone condition, put 4, the code for attacked and alive. For mortality factor, put 16, the code for jack pine budworm. After entering the mortality factor, the program will automatically scroll to the next line.

You may enter the codes either by typing in a number or by pressing <F3> and selecting the factor from the list.

The codes for the possible cone conditions are:

- 1 - healthy
- 2 - missing
- 3 - aborted
- 4 - attacked and alive
- 5 - attacked and dead

The possible mortality factors are:

- 1 - healthy
- 2 - missing
- 3 - aborted
- 4 - unknown
- 5 - mechanical damage
- 6 - frost
- 7 - pw (white pine) cone beetle
- 8 - pr (red pine) cone beetle/co (cone)
- 9 - pr (red pine) cone beetle/sh (shoot)
- 10 - cone resin midge
- 11 - fir coneworm
- 12 - webbing coneworm
- 13 - pw (white pine) cone borer
- 14 - pr (red pine) cone borer
- 15 - cone midges
- 16 - pj (jack pine) budworm
- 17 - spr (spruce) cone loopers
- 18 - spr (spruce) micro moth
- 19 - spr (spruce) cone maggot
- 20 - east spr (spruce) budworm
- 21 - spr (spruce) coneworm
- 22 - unknown insect/c (cone)
- 23 - pw (white pine) weevil
- 24 - east pw (white pine) shoot bo (borer)
- 25 - eur (european) pine moth sh (shoot)
- 26 - unknown insect/s (shoot)
- 27 - squirrel cone
- 28 - squirrel shoot
- 29 - inland spr c (spruce cone) /rust
- 30 - am spr (american spruce) /rasp rust

If a cone condition of healthy (1), missing (2) or aborted (3) is entered, the matching number is automatically entered under mortality factor. Use the <Up Arrow> or <Down Arrow> to move up and down on the tally screen. To move to the right, use the <Enter> key. To move to the left, when on CC or MF, use the <Esc> key.

If you have decided not to record the mortality factors along with the condition codes, then use missing or aborted to record dead cones. As noted above, the data logger will automatically record the matching mortality factor for these cone conditions.

When the branch tallies are completed, go to a blank line and press <Enter> on a zero in the cone count (#) column. If the number of cones in this assessment does not match the number in the previous assessment, the data logger will note this and ask if you wish to change the data.

Tree: 1

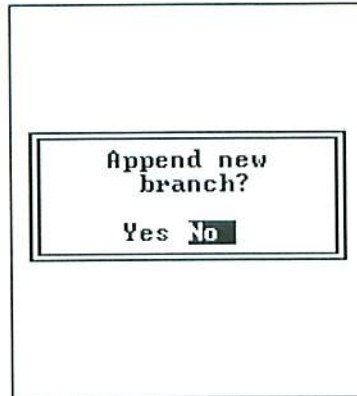
Current tally
count (5)
does not match
previous tally
count (9).

Continue anyway?

Yes **No**

If **Yes** is selected, you are returned to the tally screen. If **No** is selected, or the number of cones matches the previous assessment, the data logger will ask if this branch is OK. If **No** is selected, you are returned to the tally screen of the

same branch. If **Yes** is selected, and if this is the first assessment, you are then asked if another branch is to be appended. (If this is not the first assessment, the data logger will go to the next branch of the tree, ready for input).



Append new
branch?

Yes No

13. On the first assessment, if **Yes** is selected for "Append new branch?", you are asked for the next branch number and branch information as previously described.

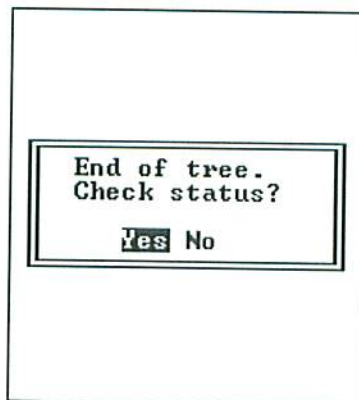
If you do not wish to append another branch, or if this is not the first assessment and you have completed the last branch of the tree, the data logger will state that this is the last branch and ask if you wish to leave the tree.



A screenshot of a data logger screen. It features a rectangular border. Inside, there is a smaller rectangular box with a double-line border. The text inside this box reads: "Last branch." followed by "Leave tree?" on the next line. Below this, there are two options: "Yes" and "No", with "No" being highlighted by a solid black background.

Last branch.
Leave tree?
Yes No

If **Yes** is selected, the data logger will ask whether the status of the tree should be checked.

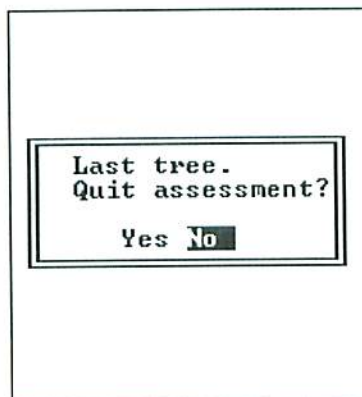


A screenshot of a data logger screen. It features a rectangular border. Inside, there is a smaller rectangular box with a double-line border. The text inside this box reads: "End of tree." followed by "Check status?" on the next line. Below this, there are two options: "Yes" and "No", with "Yes" being highlighted by a solid black background.

End of tree.
Check status?
Yes No

14. A tree status check must be performed in order to pass the orchard status check. If you select **Yes**, the data logger checks to ensure that all branches have been tallied. If you have missed a branch, the data logger will note that the tree is incomplete and ask if you wish to return to the missed branch. If you do, you will be sent to the tally screen for the missing branch and the tally may be entered then. If the tree is complete, or if you do not wish to find the incomplete branch, the data logger will go to the first branch on the next tree. When you are on the first assessment, the data logger returns to the submenu with the three options: 1. *Cone Count*, 2. *Study Tree* and 3. *Exit*. The first assessment is the only assessment where this submenu will appear and is the only assessment where a new tree can be added.

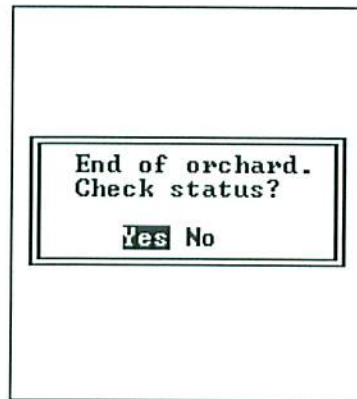
If another tree is not needed on the first assessment, or the last branch of the last tree has just been completed, the data logger states that the last tree was just completed and asks if you wish to quit the assessment.



The image shows a screenshot of a data logger screen. It features a rectangular border containing a smaller rectangular box. Inside this box, the text "Last tree." is displayed on the first line, and "Quit assessment?" is on the second line. Below these lines, the word "Yes" is followed by a solid black square, and the word "No" is followed by an open square.

```
Last tree.  
Quit assessment?  
Yes ☒ No ☐
```

If you select **Yes**, the data logger states that the end of the orchard has been reached and asks if the status of the orchard should be checked.



The <Esc> key can also be used to exit the tally screen and quit an assessment. If you choose not to check the orchard, the data logger prompts the select study screen. If you choose to check the orchard, the data logger determines if all of the trees have been checked. If a tree has been missed, the data logger informs you that the assessment is incomplete and asks if it should find the missed tree. If you say **Yes**, the data logger returns you to the incomplete tree and branch.

If the orchard status check is passed, the data logger asks if the assessment has been completed. If you select **Yes**, the data logger asks for the completion date, with the current date as the default. If you select **No** or if the completion date has been entered, you are returned to the select study screen where you can begin a new study or continue an existing one.

Editing an Existing Study

After a study has been created, you may edit the assessments within it or add new ones. When one or more studies exist on the data logger, CCMSDAT will display a list of the studies at startup.

Select Study:

10194	May 24/94
10294	Jun 20/94
40396	Mar 31/96
10196	Mar 31/96

↑
↓

<F3> New Study
<esc> Exit

Select the study you wish to work with. You are then given the choice of either editing an existing assessment or starting a new one.

To edit an assessment of the study, enter the assessment number.

If assessment 1 is entered, CCMSDAT prompts "Next Tree?". Answer **No** to select an existing tree or **Yes** to append new trees or enter tree cone counts. If you append new trees, CCMSDAT prompts you with a submenu with three options.

Once you have selected an assessment or created a new one, CCMSDAT prompts you to select a tree number.

```
Select tree:
  1
  2
  3
  4
  5
  6
  7
  8
  ↑
  ↓

Search:
```

A list of available tree numbers is displayed. Select the desired tree number or use the search option by entering the actual number required. Press **<Enter>** when the correct tree number is highlighted. After you select the tree, you must select the branch number for that tree. This is done in the same way that the tree number was selected.

```
Tree: 1

Select branch:
  1
  2
  3
  4
  ↑
  ↓

Search:
```

Adding a New Assessment to an Existing Study

To add a new assessment to the study press <F3>. If the completion date for the previous assessment was not entered, the data logger asks if the previous assessment was completed. Select **Yes** or **No**. The **No** option will return you to the previous screen, because a new assessment cannot be started until the previous assessment has been completed. If **Yes** is selected, the date field beside "End:" is highlighted and defaults to the current date. Enter the correct date. CCMSDAT then prompts you for the start date of the new assessment. The current date is highlighted in the field next to "Start:" Enter the correct date.

Editing Features and Functions

The following features and functions can be accessed at any time by pressing the specified function key while in the tally screen. Editing functions work only within the tally screen.

Help <F1>

The help menu can be called up at any time by pressing <F1>. It will provide you with a list of functions that can be used in the current section of the data logger. Hit any key to leave the list.

F1	- Help
F2	- Edit Session
F3	- Code Lists
F4	- Prev Branch
F5	- Next Branch
F6	- Selct Branch
F7	- Selct Tree
F8	- Dup Assesmnt
F9	- Sel Assesmnt
F0	- Delete Line
C2	- Omit Branch
C3	- Omit Tree
C4	- Show Tree
<esc> to Quit CCMS	
Press any key...	

Edit Session <F2>

This option allows you to change the orchard, tree and branch information and the field selection parameters for the current study. Use <CTL>3 (or <PgDn> on a PC) to skip pages.

Code Lists <F3>

This function is used to view or select codes from a list. While entering Cone Condition or Mortality Factor fields press <F3>. Selecting an option from the menu and then pressing <Enter> will automatically insert the code for that option into the appropriate field.

Select Condition:

- 1 Healthy
- 2 Missing
- 3 Aborted
- 4 Attacked/alive
- 5 Attacked/dead

<esc> to cancel

Select Mortality:

- 1 Healthy
- 2 Missing
- 3 Aborted
- 4 Unknown
- 5 Mechanical damage
- 6 Frost
- 7 Pw cone beetle
- 8 Pr cone beetle/co
- 9 Pr cone beetle/sh

<esc> to cancel

Previous Branch <F4>

You can move to the previous branch on the current tree by pressing <F4>. If you are already on the first branch of the tree, a highlighted bar appears containing the words "First Branch".

Next Branch <F5>

Selecting this function will display the tallies for the next branch on the current tree. If you are already on the last branch of the tree, a highlighted bar appears containing the words "Last Branch".

Select Branch <F6>

This option will list all the available branches for the current tree. You can select a branch from the list or enter the required number. Doing so will automatically return you to the tally screen for the branch number selected.

Select Tree <F7>

If you wish to work on a tree other than the one shown, another tree can be selected by pressing <F7>. Before doing this, however, you must first finish the branch and tree you were on. After pressing <F7>, you will be presented with a list showing all of the available trees. You can select a tree from the list or enter the required number. After selecting the tree, select the appropriate branch for the tree. This will automatically return to the tally screen for the corresponding tree number and branch number selected.

Duplicate Assessment <F8>

To enter the same tallies as the previous assessment for a branch press <F8>. (This function is not available on the first assessment.) CCMSDAT prompts "Use Previous Assessment?". Select **Yes** or **No**; Yes will copy the previous assessment tallies to the current assessment.

Select Assessment <F9>

To select a different assessment, press <F9>, then enter the assessment number. The assessment number will always default to the first selected assessment. After selecting the assessment, the screen will display the tallies for the tree and branch number. These tallies can be viewed or edited, or another assessment can be selected.

Delete Line <F0>

To delete a tally line from a branch, move the cursor to that line and press <F0> (<F10> on a PC).

Append Tree <PgDn>

This function allows you to add a new tree to the study on the first assessment only. Press <PgDn> and answer **Yes** to append a tree. After confirming the Append Tree prompt, enter the tree number to append, then enter the tree information. The branch number and the branch information are entered next.

Omit Tree <PgDn>

On second and subsequent assessments, this function allows you to omit a tree from the study. Press <PgDn> and answer **Yes** to omit a tree. Type the omit code number next. The omit reason will appear in the omit reason field. (To access the omit code enter <F3> to see the codes and press <PgDn> until you see the screen entitled "Omission Codes"). The reason may be edited or you can press <Enter> to accept it. Doing so will flag the omitted tree. The tallies for the tree are not lost and can still be viewed and edited.

**Append Branch **

This function allows you to add a new branch to the existing tree on the first assessment only. Press and select **Yes** to append a new branch. When you are on the first assessment, after entering the tallies for a branch, the data logger will ask whether you want to append a new branch. After saying yes to the Append Branch prompt, type the branch number to be appended and press <Enter>. The branch information screen will be displayed where you may enter the sector and level fields.

**Omit Branch **

On second and subsequent assessments, this function allows you to omit a branch from the current tree. To do so, go to the tally screen for the branch to be deleted, then press . Respond **Y** at the prompt to omit this branch. Type the omit code number next. The omit reason will appear in the omit reason field. The reason may be edited or you can press <Enter> to accept it. Doing so will flag the omitted branch. The tallies are not lost and can still be viewed and edited. This function is available only after the first assessment is completed.

Show Tree and Branch Status <Tab>

This function can be used to show the current tree and branch number together with all the information corresponding to the tree and branch. It is used by pressing <Tab>. Press any key to continue.

Leaving the Current Assessment

To leave an assessment at any time press <Esc> and answer **Yes** to the prompt. The data logger will prompt for the tree status check and the orchard status check next. You should use this option when an assessment has been completed. If an assessment is not complete and there are additional tallies to be entered, answer **No** to skip the check. This will display the select study screen.

Quitting CCMSDAT

To leave CCMSDAT and return to the DOS prompt, press <Esc>. Answer **Yes** to quit. This can only be done at the Select study screen.

ANALYZING CCMS DATA: USING CCMSPC

What is CCMSPC?

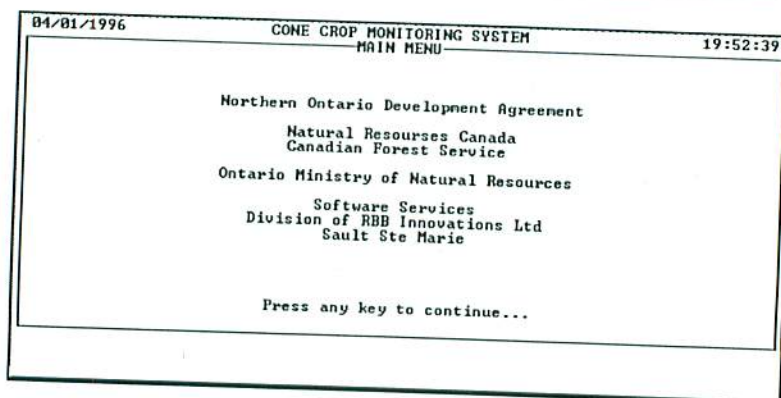
CCMSPC is designed to provide tabular and graphical summaries and analyses of CCMS data. In addition to its analysis and summary functions, the program can also be used for

- editing CCMS data;
- transferring data to an Ascii text file (useful if you want to analyze the data with another data management program);
- transferring data to and from a data logger (allowing you to edit the data on the PC and then return it to the data logger for the next assessment);
- generating random numbers, which may be used to select CCMS trees.

Starting CCMSPC

To start CCMSPC follow these steps:

- 1) Start up your computer to get to the DOS prompt. If you are in Windows, exit Windows to get to the DOS prompt.
- 2) Change directories so that you are in the directory containing the CCMSPC.EXE program (e.g. C:\CONESYS).
- 3) Type **CCMSPC** and press **<Enter>**. The following logo screen will appear; press any key to continue.



4) The functions and features of CCMSPC are described in the following section.

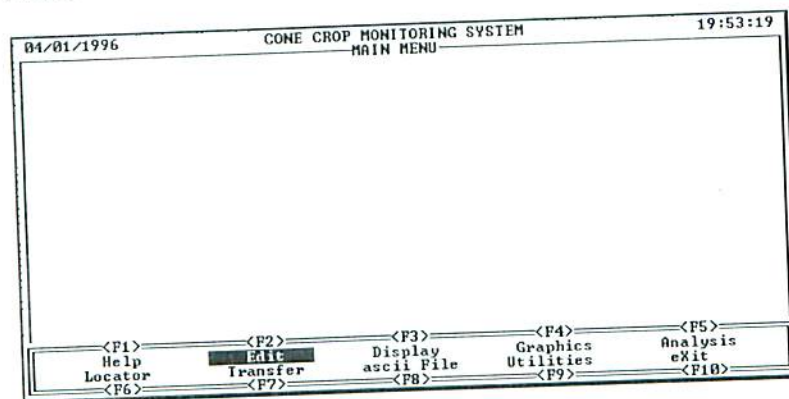
Note: If you run into memory problems while using CCMSPC, exit the program. Insert the ConeSys Boot Disk (Installation Disk 1) into your floppy drive (A: or B:) and restart your computer. This will boot your computer into a minimally configured mode. Rerun CCMSPC. When you are finished using CCMSPC, remove the boot disk and restart your computer.

General Features and Functions

Yes/No prompt. At many points in CCMSPC, a dialog box will be displayed allowing you to respond "Yes" or "No" to a question from CCMSPC. There are two ways to respond to this prompt. You may press the letter **Y** to select Yes, or **N** to select No; alternatively, you may use the left or right arrow keys to highlight "Yes" or "No" in the dialog box and press <Enter>.

Entering text. Where text or numbers must be keyed into a field, simply enter the required text or number at the cursor and press <Enter>. In most cases, CCMSPC will automatically move the cursor to the next required field. Sometimes, CCMSPC will provide a default value for an item. To accept the default, just press <Enter>. To overwrite the default, key in the desired text and press <Enter>.

Navigating Menus. CCMSPC is a menu-driven system. All modules display a menu at the bottom of the screen; the menu items will change to reflect the options available in a particular module and its sub-modules. The following figure shows the main menu.

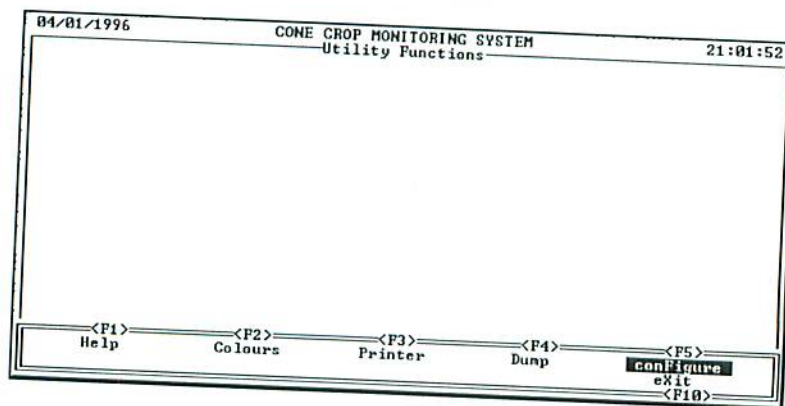


To select a menu item you may either, (1) use the arrow keys to move the cursor onto the desired item and press <Enter>, (2) press the function key associated with the item; or (3) press the key

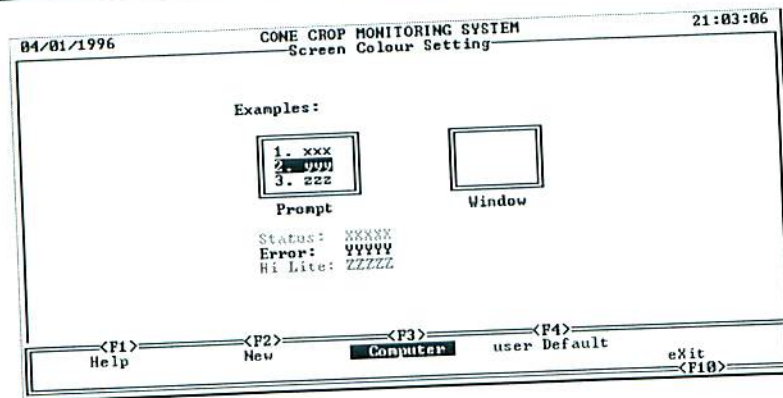
corresponding to the capitalized letter in the item name. The first of these three options will not always be available, depending on where you are in CCMSPC; in that case, use options two or three.

Navigating Lists. Some of the input screens of CCMSPC display input items in a list. Typically, you can move the cursor up and down the list of items using the <Up Arrow> and <Down Arrow> keys. In some lists, the <PgUp> and <PgDn> keys may also be used to move the cursor. Some lists display items from which you must make a selection. In this case, use the <Up Arrow> and <Down Arrow> keys, moving the cursor to highlight your selection, and then press <Enter>. Some lists, specifically lists of tree and branch numbers, allow you to enter the number required and automatically highlight that number in the list, at which point you can press <Enter> to make your selection.

Utilities. The Utilities function (<F9> or U in the main menu) allows you to modify system information.



To change the colour combinations for the screen layouts select <F2> Colours, which will bring up the following menu.



To enter a new colour combination select **<F2> New**. Next, select **<F2> Status line**, **<F3> Border/Text**, **<F4> Menu Items** or **<F5> Warning Prompt** and enter the new colour to be used. To set the colour to the built in colour scheme select **<F3> Computer**. To set the colour to your defined colour select **<F4> User Default**.

The remaining Utilities functions work as follows.

Printer <F3> allows you to select the printer and fonts to be used. To enter a new printer select **<F3> Select** and select the name of the printer. To change the fonts, select **<F5> Fonts** and select the font from the given list. To see a sample of the font select **Yes** when the computer asks "Print sample?". To return the selections to the preset defaults select **<F2> Defaults**.

Dump <F4> will send CCMSPC control information to the printer.

Configure <F5> allows you to edit CCMSPC control information from the following screen.

04/01/1996

CONE CROP MONITORING SYSTEM
Configuration Functions

Allow automatic Enter when field is full: ☒ Y
Default mortality factor threshold percent: 5.0
Default display layout number: 1
Display defaults to actual counts?: ☒ Y
Directory where system control information
will be stored:
E:\CCMSPC\
(This consists of the following databases: PRINTERS.DBF,
DICTION.DBF, CEHIST.DBF and CEPRED.DBF. However, CONFIG.DBF,
PRX_TBL.BIN, TTL8_48.e, SS2_22.e and SSD1_20.e must be in
E:\CCMSPC\.)

CCMSPC control information which can be changed includes automatic enter on field input, mortality factor threshold percentage, the display layout number, defaults to actual counts, and the default directory used to store CCMSPC control information (PRINTERS.DBF, DICTION.DBF, CEHIST.DBF and CEPRED.DBF).

Help. The Help function (<F1> or H in the main menu) will display more information on the menu selections available. This menu option is the same throughout CCMSPC and can be used at any time. Press any key to return to the previous menu.

Exit. The Exit function (<F10> in the main menu) will return you to the previous screen. This menu option is included throughout CCMSPC and can be used at any time. If used at the Main Menu, it will quit CCMSPC and exit to DOS.

Summarizing CCMS Data

The Display function <F3> or **D** in the main menu allows you to examine the study data for an orchard, a tree, a family, a clone or a factor. The information provided includes the total cones in each of the five conditions plus the total number of cones for each assessment. Other information includes actual cone efficiency, interval mortality and cumulative mortality.

When you select the Display function from the main menu, CCMSPC displays the following Select Study screen.

04/01/1996 CONE CROP MONITORING SYSTEM 20:07:27
Display Module

Highlight the study
you want using ↑,
↓, Page Up and
Page Down.
Then press Enter.

40694 Jul 28/1994

Looking in E:\CCMS\DATA\1995\CHRIS\ for studies.

<F1> Help <F4> New path eXit <F10>

In this screen you are given a list of existing studies and a new set of menu options. (To change the default directory press <F4> **New Path** from the menu at the bottom of the screen. Enter the new path name when it is requested.)

Select the study to be displayed. You are then presented with a screen with the study information at the top and new menu options.

04/01/1996 CONE CROP MONITORING SYSTEM 20:08:21
 Display Module
 OTIB Zone: 4 CCMS Study: 6 CCMS Year: 1994 Orchard: RAMORE

<F1> Help <F2> Orchard <F3> Tree <F4> Family
 eXit
 <F10>

The menu choices for the display function include <F2> Orchard, <F3> Tree. Depending on the fields originally selected during data collection, you may also see <F4> Family, <F5> Clone and <F6> Factor. Selecting <F2> Orchard will include all the trees, while the other choices display only the indicated subset of trees. Selecting <F3> Tree, <F4> Family, <F5> Clone or <F6> Factor will prompt you to select corresponding items from a list.

After you have selected the subset you wish to work with, CCMSPC will display the following screen.

04/01/1996 CONE CROP MONITORING SYSTEM 20:10:38
 Display Module
 OTIB Zone: 4 CCMS Study: 6 CCMS Year: 1994 Orchard: RAMORE

Condition/Mortality	1	2	3	4	5	6
Healthy	1,050	980	922	935	894	873
Missing	0	12	15	19	20	20
Aborted	22	22	22	22	22	22
Attacked/alive	8	65	117	85	119	136
Attacked/dead	3	4	7	22	30	34
TOTALS	1,083	1,083	1,083	1,083	1,085	1,085
Cone Efficiency	98%	96%	96%	94%	93%	93%
Interval mortality	0%	2%	0%	2%	1%	0%
Cumulative mortality	2%	4%	4%	6%	7%	7%

<F1> Help <F2> Orchard <F3> Tree <F4> Family
 eXit
 <F10>

The screen shows the number of cones in each condition category. You can also see the same information as a percentage (shown below).

04/01/1996		CONE CROP MONITORING SYSTEM				20:11:36
		Display Module				
OTIB Zone: 4		CCMS Study: 6		CCMS Year: 1994		Orchard: RAMORE
Condition/Mortality	Assessments					
	1	2	3	4	5	6
	97%	90%	85%	86%	82%	80%
	0%	1%	1%	2%	2%	2%
	2%	2%	2%	2%	2%	2%
	1%	6%	11%	8%	11%	13%
	0%	0%	1%	2%	3%	3%
	100%	100%	100%	100%	100%	100%
	98%	96%	96%	94%	93%	93%
	0%	2%	0%	2%	1%	0%
Cumulative mortality	2%	4%	4%	6%	7%	7%
<F1>		<F2>				
Help		Counts		Report		eXit
Layout				<F9>		<F10>
<F6>						

Press <F2> to toggle between the two views.

To display the data for the previous item (tree, family, clone or factor), press <F4> Previous. To display the data for the next item, press <F5> Next.

The <F6> Layout option will change the layout of the data. There are three different layouts available and each layout groups the data in a different way. Layout 1 displays the cone counts for each of the five condition codes, as well as cone efficiency, interval mortality and cumulative mortality. Layout 2 groups the attacked/alive counts and the attacked/dead counts by mortality factor. Layout 3 combines the attacked/alive and attacked/dead under one heading called "attacked", which is then grouped by mortality factor. CCMSPC always defaults to the most recent layout you have used.

Note on the calculations:

The actual cone efficiency is calculated by dividing the number of living cones (healthy and attacked/alive) by the total number of cones and multiplying it by 100. The mortality interval is calculated by subtracting the actual cone efficiency for the current assessment from the actual cone efficiency for the previous assessment. The cumulative mortality is calculated by subtracting the actual cone efficiency from 100%.

The <F7> Select option allows you to display the data for a selected item under the current scope: tree, family, clone or factor, as shown below for family 323565.

04/01/1996						
CONE CROP MONITORING SYSTEM						
OTIB Zone: 4 CCMS Study: 6 Display Module 20:18:24						
Family: 323565 CCMS Year: 1994 Orchard: RAMORE						
Condition/Mortality	1	2	3	Assessments	4	5
Healthy	21	19	19	17	17	15
Missing	0	0	0	2	2	2
Aborted	0	0	0	0	0	0
Attacked/alive	0	2	2	2	2	4
Attacked/dead	0	0	0	0	0	0
TOTALS	21	21	21	21	21	21
Cone Efficiency	100%	100%	100%	90%	90%	90%
Interval mortality	0%	0%	0%	10%	0%	0%
Cumulative mortality	0%	0%	0%	10%	10%	10%
<div> <div><F1></div> <div>Help</div> <div><F6></div> </div> <div> <div><F2></div> <div>perCent</div> <div><F7></div> </div> <div> <div><F4></div> <div>Prev family</div> <div><F9></div> </div> <div> <div><F5></div> <div>Next family</div> <div><F10></div> </div>						

Selecting <F8> Threshold allows you to change the threshold percentage. For cone conditions indicating an attack, any mortality factor for which the percentage of affected cones is less than the threshold will be classified under "Other". Mortality factors for which the percentage of affected cones exceeds the threshold will be classified under the name of the factor. To change the threshold percentage press <F8> or T and enter the new percentage. CCMSPC will default to the last threshold you entered.

04/01/1996		CONE CROP MONITORING SYSTEM						20:07:27
OTIB Zone: 4		CCMS Study: 6		Display Module		CCMS Year: 1994		Orchard: RAMORE
Condition/Mortality	1	2	3	4	5	6		
Healthy	1,050	980	922	935	894	873		
Missing	0	12	15	19	20	20		
Aborted	22	22	22	22	22	42		
Subtotal								
Attacked/alive						85		
Unknown						1		
Mechanical dama						1		
Pr cone beetle						3		
Cone resin midg						2		
Fir cone worm						1		
Pw cone borer								
<F1> Help						<F4> New path	eXit <F10>	

For cone conditions indicating an attack, any mortality factor counts that are less than the threshold percent will be classified as 'Other'. Enter a new threshold percent.

5.0

Selecting <F9> **Report** prints the report using the same layout format as displayed on the screen.

Analyzing CCMS Data

The Analysis function <F5> or A in the main menu allows you to calculate the predicted, actual and revised cone efficiencies for a study. Other information calculated by this function includes predicted cone yield, total number of hectolitres, predicted orchard seed yield, predicted extracted seed yield, and predicted seedling yield.

To make predictions, you will first require information from CCMS studies and other data, including the seed potential, seed efficiency, extraction efficiency, germination efficiency, and cones/hectolitre. These later data are obtained from dissecting cones in your orchard or from data obtained from the literature or seed processing facilities in your area. After you have input the data, you can generate tables (reports) or graphs.

To start, select **Analysis** from the main menu.

The system displays the Select Study screen with a list of the existing studies in the default directory and a new set of menu options, as shown below.

84/01/1996 CONE CROP MONITORING SYSTEM 20:19:07
Analysis Module

Highlight the study
you want using ↑,
↓, Page Up and
Page Down.

Then press Enter.

The cone efficiency
analysis for the
study will be
displayed.

40694 Jul 28/1994

Looking in E:\CCMS\DATA\1995\CHRIS\ for studies.

<F1> Help <F2> Predicted <F3> historical <F4> New path
eXit
<F10>

The default directory is displayed under the study list. To change the directory, select <F4> **New Path**.

Highlight a study for analysis from those listed on the screen.

Before you can analyze the data, you must enter the predicted cone and seed yield statistics; these data can be based on historical data (see the explanation of the <F3> **h**istorical option below) or some best guess.

To enter or examine predicted cone efficiency data for an orchard press <F2> **Predicted** from the Select Study screen. The Select Orchard screen displays a list of orchards with data already entered. Press <F3> **Add** to add new data for a new orchard. Enter in the orchard name where it is indicated, or, if historical cone efficiency data for this orchard has already been entered, press <F2> **sel Orchard** and select the orchard from the list presented. To delete predicted cone efficiency data for an orchard select <F9> **Delete** when the orchard name is highlighted.

The predicted cone efficiencies are displayed in a row under the numbers one to ten for up to ten assessments.

04/01/1996		CONE CROP MONITORING SYSTEM		20:39:10						
		Analysis Module								
Orchard name: RAMORE										
Predicted cone efficiencies for assessments										
	1	2	3	4	5	6	7	8	9	10
	98	94	91	88	87	87	0	0	0	0
Seed potential (#):	26									
Seed efficiency (%):	60									
Extraction efficiency (%):	85									
Germination efficiency (%):	98									
Number of Orchard Trees:	10,000									
Mean # of Cones/Sample Tree:	37.00									
Orchard cone inventory ('000):	370									
Number of cones per hectolitre:	1.234									
<F1> Help						<F5> Cones/tree exit <F10>				

The numbers shown are percentages. Under the predicted cone efficiencies are: the Seed Potential (0-999), Seed Efficiency (0-100%), Extraction Efficiency (0-100%), Germination Efficiency (0-100%), Number of Orchard Trees (0-99,999), Mean Number of Cones/Sample Tree (0-9,999), Orchard Cone Inventory (0-999,999: this field is calculated as the number of orchard trees

times the mean number of cones/sample tree) and Number of Cones per Hectolitre (0-99,999). To make a change move the cursor to the field to be edited, type in the new number and enter the new number.

The <F5> **Cones/tree** option is used to calculate the mean number of cones/sample tree. Press <F5> and CCMSPC will display a list of studies that contain a total cone count file. Select the study from those listed. The mean number of cones/sample tree will be calculated and entered into the field.

To enter or examine historical cone efficiency data for an orchard, select <F3> **hIstorical** from Select Study screen. The Select Orchard screen appears. It contains a list of orchards for which data has been previously entered and a new set of menu options: <F3> Add, <F4> Calc ce, <F9> Delete, and <F10> Exit. Select an orchard from those listed and press <F3> to add a new orchard. At the top of the screen is the study information and the orchard name. Cone and seed statistics are entered in the same manner as they are in the predicted statistics screen (see above).

You can display all historical cone efficiencies, and their mean, for an orchard. At the Select Orchard screen, highlight the orchard and press <F4> **Calc ce**. This will group all the actual cone efficiencies for the selected orchard and calculate a mean cone efficiency like the following.

04/01/1996

CONE CROP MONITORING SYSTEM

20:28:22

Analysis Module

Orchard name: RAMORE

Study	Year	Actual cone efficiencies for assessments									
		1	2	3	4	5	6	7	8	9	10
4 195	1995	86	82	78	73	68	68	0	0	0	0
4 296	1996	85	82	75	75	75	75	0	0	0	0
Mean		86	82	77	74	72	72	0	0	0	0

<F1>

Help

<F2>

Sel orchard

<F3>

Print

exit

<F10>

The mean cone efficiency is calculated for each of up to ten assessments and you can use these cone efficiencies as a guideline when you enter the predicted cone efficiency data for that orchard.

Select <F3> **Print** to print the data. Select <F2> **Sel orchard** to choose a different orchard from the list presented.

To delete historical cone efficiency data for an orchard, highlight that orchard and assessment from the Select Orchard screen and press <F9> **Delete**.

After you have entered the data, CCMSPC will analyze it and make predictions. From the Select Orchard screen, highlight the orchard and press <Enter>. The analysis screen displays the study information at the top, the Predicted CE, Actual CE and Revised CE in the centre and some calculated amounts for analysis at the bottom as shown here.

CONE CROP MONITORING SYSTEM												20:41:14
Analysis Module												
CCMS Year: 1994												Orchard: RAMORE
OTIB Zone: 4 CCMS Study: 6												
	Assessments											
	1	2	3	4	5	6	7	8	9	10	Final	
Predicted CE	98	94	91	88	87	87	0	0	0	0	87	
Actual CE	98	96	96	94	93	93	0	0	0	0		
Revised CE	87	89	92	93	93	93	0	0	0	0	93	
Seed potential (#):	26 Revised final CE (%):										93%	
Seed efficiency (%):	60% Cone yield ('000):										344	
Extraction efficiency (%):	85% Cone yield (hl):										279	
Germination efficiency (%):	98% Orchard seed yield ('000):										5,368	
Orchard cone inv. ('000):	370 Extracted seed yield ('000):										4,563	
Number of cones/hl:	1,234 Seedling yield ('000):										4,472	
<div><F1></div> <div>Print</div>												<div>eXit</div> <div><F10></div>
<div>Help</div>												

The assessments are displayed in columns from one to ten with a "final" column on the end. The rows beneath the assessment numbers are the predicted cone efficiencies (taken from the predicted cone efficiency file for the selected orchard), the actual cone efficiency data (taken from the tally file for the selected study), and the revised cone efficiencies (calculated using the predicted and actual cone efficiencies). The revised cone

efficiency is calculated by adding the actual cone efficiency to the final predicted cone efficiency and subtracting the predicted cone efficiency for the assessment. To print a copy of the analysis in table form, press <F3> **Print**.

Note on the calculations:

The predicted cone yield is calculated by multiplying the final revised cone efficiency by the number of seed cones in the orchard at the start of the season, based on orchard inventory and dividing by 100. The total number of hectolitres is calculated by dividing the predicted cone yield by the cones/hectolitre. The predicted orchard seed yield is calculated by multiplying the predicted cone yield by the seed potential and then the seed efficiency and dividing by 100. The predicted extracted seed yield is calculated by multiplying the predicted orchard seed yield by the extraction efficiency and dividing by 100. The predicted seedling yield is calculated by multiplying the predicted extracted seed yield by the germination efficiency and dividing by 100.

Graphing CCMS Data

The Graphics function (<F4> or **G** in the main menu) allows you to examine the study data for an orchard, a tree, a family, a clone or a factor in a graphic presentation. The graphs can be displayed in two-dimensional line format or three-dimensional chart format.

To start, select **Graphics** from the main menu.

The system displays the Select Study screen first, presenting a list of existing studies and a new set of menu options at the bottom of the screen. The default directory is displayed under the study list. To change the default directory select <F4> **New Path**.

Select a study for analysis by highlighting one of those listed on the screen and pressing <Enter>. You should see the following screen. (The menu choices for the graphics functions may include <F2> Orchard, <F3> Tree, <F4> Family, <F5> Clone and/or <F6> Factor, depending on which were selected for the study.)

CONE CROP MONITORING SYSTEM				20:31:58
04/01/1996	Graphic Module			
OTIB Zone: 4	CCMS Study: 6	CCMS Year: 1994	Orchard: RAMORE	
<F1> Help	<F2> Orchard	<F3> Tree 3D Graph <F8>	<F4> Family	eXit <F10>

Selecting <F2> **Orchard** will include all of the trees while the other choices graph only the indicated subsets of trees. If you select <F2> **Orchard**, CCMSPC will prompt you to tag the historical studies to be included in the graph.

04/01/1996 CONE CROP MONITORING SYSTEM 20:32:34
 OTIB Zone: 4 CCMS Study: 6 Graphic Module
 CCMS Year: 1994 Orchard: RAMORE

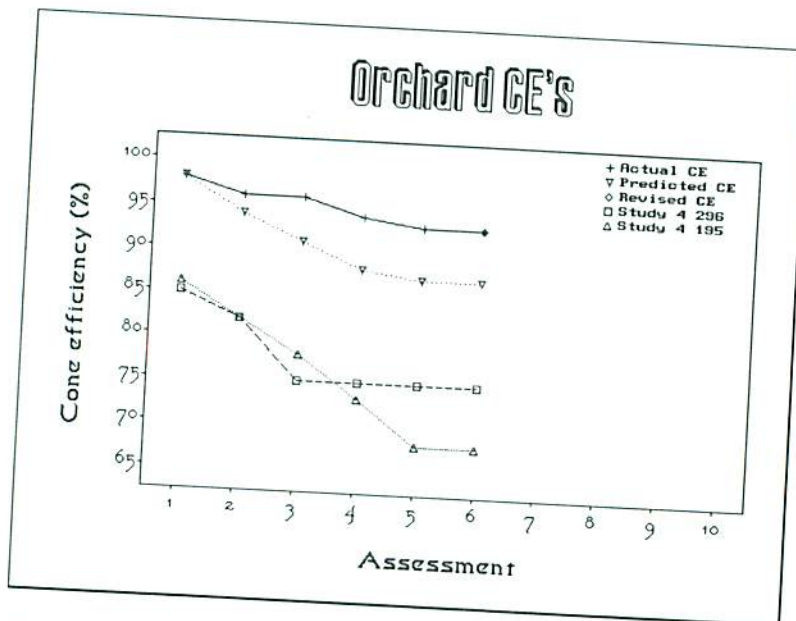
Tag a maximum of seven historical CE's to be included.
 Then press ENTER to accept.

* Study 4 296
 > Study 4 195

<Space Bar> to tag/untag.
 "T" to tag all.
 "U" to untag all.
 <ESC> to cancel.

1 historical CE's have been tagged

The orchard data can be viewed only as a line graph (shown below).



If you select <F3> Tree, <F4> Family, <F5> Clone or <F6> Factor, CCMSPC will prompt you to tag the items from a list of available subset of items to be graphed. Highlight the desired option and press the spacebar to tag or untag an item. A star will appear beside the tagged items. Press <Enter> when you have

finished making your selections. You can tag a maximum of ten items for the graphic display. If there are ten items on the list, you can press **T** to tag all the items or press the letter **U** to untag all the items. After some processing time, CCMSPC prompts you with "Output: Screen Printer Quit". Select **Screen** to display the graph on the screen or select **Printer** to output the graph to the printer. If this is the first time you are outputting the graph to a printer, CCMSPC will prompt you to select the printer driver to be used.

The <F8> menu option is used to select the type of graphical output. Press <F8> to toggle between **3D Graph** and **Line Graph**.

Select <F10> **Exit** to return to the Select Study screen.

Editing CCMS Data

The Edit function (<F2> or E in the main menu) allows you to change the data in existing studies or add a new study. You will recall that CCMSDAT also has an edit function; however, the editing function on CCMSPC is considerably faster and is the preferred choice if you have numerous changes to make.

To start, select **Edit** from the main menu.

The system displays the Select Study screen first, presenting a list of existing studies as shown.

04/01/1996

CONE CROP MONITORING SYSTEM
Edit Module

19:54:10

Highlight the study
you want using ↑,
↓, Page Up and
Page Down.
Then press Enter.

40694 Jul 28/1994

Looking in E:\CCMS\DATA\1995\CHRIS\ for studies.

<F1> Help <F3> Add <F4> New path exit <F10>

The default directory is displayed under the study list. To change to another directory select <F4> **New Path** from the menu at the bottom of the screen. Enter the new path name. The Select Study screen will display all the available studies that are contained in the path directory.

Editing An Existing Study

To select an existing study, highlight it with the <Up Arrow> or <Down Arrow> keys and press <Enter>. You will see the following Enter Assessment screen.

04/01/1996		CONE CROP MONITORING SYSTEM		19:54:56	
OTIB Zone: 4		CCMS Study: 6		Edit Module	
Tree: 1		Branch: 0		CCMS Year: 1994 Orchard: RAMORE	
		Family: 380587			
Enter assessment: 6					
<F1> Help		<F3> New		exit <F10>	

CCMSPC displays the highest assessment number available. To edit an existing assessment, enter the assessment number. See the section "Editing Features and Functions" in the CCMSDAT section of the manual for more information.

Adding a New Assessment to an Existing Study

To start a new assessment, select <F3> New from the Enter Assessment Screen. If the completion date for the previous assessment was not entered, the computer asks if the assessment was completed. Select **Yes** or **No**. If you select **No**, you will be returned to the previous screen because a new assessment can not be started until the previous assessment has been completed. If you select **Yes**, enter the date that the last assessment was completed, then enter the start date for the new assessment. Next, you must select the tree number required from the list of available tree numbers as shown here.

```

04/01/1996          CONE CROP MONITORING SYSTEM          19:55:34
Edit Module
OTIB Zone: 4  CCMS Study: 6  CCMS Year: 1994  Orchard: RAMORE
Tree: 1      Branch: 0  Family: 380507

Select tree:

1  ↑
2
3
4
5
6
7
8  ↓

Search:

<F1>
Help

exit
<F10>

```

After a tree has been selected you must select the branch number for the tree from the following screen.

```

04/01/1996          CONE CROP MONITORING SYSTEM          19:56:04
Edit Module
OTIB Zone: 4  CCMS Study: 6  CCMS Year: 1994  Orchard: RAMORE
Tree: 1      Branch: 0  Family: 380507

Select branch:

1  ↑
2
3
4
5

Search:

<F1>
Help

exit
<F10>

```

Now, proceed to the section "Entering Cone Tallies" for instructions on how to enter tallies, append trees and append branches.

Creating a New Study

To create a new study select <F3> Add at the Select Study screen. You will need to enter the OTIB Zone (1-6), the CCMS study number (1-99) and the CCMS year (automatically defaulted to current year). CCMSPC will then ask you to verify that the information is correct. You cannot create a study with the same OTIB Zone, CCMS study number and CCMS year as one that

already exists. If you do, the program will display a warning message.

On the next screen, enter the seed source number, breeding zone, district, orchard name and the tree species.

Next, select the parameters you will use to identify tree location and identification. The options include rep, block, set (A-D), quad (1-4), row (1-99), column (1-99), position (1-99), bearing (N, NE, E, SE, S, SW, W, NW), family, clone and factor. To use a parameter press **Y** or **<Enter>** on the defaulted **Y**. If the factor is not to be used, press **N** and **<Enter>**.

On the next screen enter the tree number. The field default is 1. Enter the location information for the selected tree using the parameters selected on the previous screen.

The following screen requires you to input the next branch number. The field default is 1. The sector (N=North, E=East, S=South, W=West) and level (U=Upper, M=Middle, L=Lower) must be entered next on the branch information screen. Press the **N**, **E**, **S** or **W** key for the sector and then the **U**, **M** or **L** key for the level. This information is used to locate the branch on the tree.

The system then prompts "Date assessment 1 started" with the default current date displayed below it. Type in the correct date or press **<Enter>** to accept the default.

Now, proceed to the section "Entering Cone Tallies" to enter tallies, append trees and append branches.

Entering Cone Tallies

The tally screen is where the cone count (#), cone condition (CC) and the mortality factor (MF) are entered and edited.

The screen should have the tree and branch numbers at the top of the screen along with the study information. The assessments in the study are broken up into columns, with the earliest assessment at the leftmost column and later assessments to the right. To the left of the column currently selected is a column of numbers from one to nine which designate the row numbers for entering tally information.

Each assessment column contains three smaller columns. The first column is the Cone Count (#), the second column is the Cone Condition (CC) and the third column is the Mortality Factor (MF). See CCMSDAT for a list of the codes for cone conditions and mortality factors. Enter the cone count number first, then the cone condition and the mortality factor. Repeat until all cone condition and mortality factor combinations have been entered for the branch. If a cone condition of healthy (1), missing (2) or aborted (3) is entered, the matching number is automatically entered under mortality factor. Use the **<Up Arrow>** and **<Down Arrow>** keys to move the cursor up and down through the tally rows. To move to the right use **<Enter>** and to move to the left when on CC or MF press **<Esc>**.

When the branch tallies are completed, move to a blank line and press **<Enter>**. If the number of cones in this assessment does not match the number in the previous assessment the computer will note this and ask whether you wish to continue or change the data.

Select **No** to return to the tally screen. If you select **Yes** or if the number of cones matches the previous assessment, the computer will take you to the next branch on the tree and prompt for tally input. If you are on the last branch number of the tree CCMSPC will prompt "Last branch. Leave tree?" select **No** to return to the last branch on the tree or **Yes** to leave the tree. CCMSPC will take you to the first branch on the next tree. If you are on the last branch of the last tree CCMSPC will then prompt "Last tree. Quit assessment?" select **No** to return to the last branch on the last tree. If you select **Yes**, CCMSPC will prompt "Assessment # complete?" If the assessment is complete select **Yes** and CCMSPC will prompt you to enter the completion date.

If this is the first assessment, CCMSPC will indicate that this is the last branch and will ask if you wish to leave the tree. Select **No** to return to the tally screen for the last branch and make any necessary changes. Select **Yes** to go to the next tree.

Enter the tree number and the required tree information. CCMSPC then prompts you to enter the first branch number to be used. Then enter the branch sector and level on the screen that appears next.

If you attempt to leave a tree and an assessment contains a tally cone count of zero in an assessment, CCMSPC will warn you and prompt you to go to that branch. Select **Yes** to return to the branch or **No** to leave the tree. All the tree checks must be passed before an assessment can be completed.

If you attempt to quit an assessment when some trees have failed the tree check, CCMSPC will warn you that the orchard is incomplete and asks if it should find the tree that has failed the tree check. Select **Yes** to go to the first incomplete tree or **No** to leave the assessment.

Editing Features and Functions.

<F2> Edit/Show. This option allows you to change orchard information, tree information, branch information, and total cone counts. CCMSPC prompts you with the following pop-up screen.

04/01/1996 CONE CROP MONITORING SYSTEM 19:57:58

OTIB Zone: 4 CCMS Study: 6 Edit Module Orchard: RAMORE
Tree: 1 Branch: 4 Family: 380507

1	2	3	4	5	6
# CC MP	# CC MP	# CC MP	# CC MP	# CC MP	# CC MP
5 1 1	5 1 1	5 1 1	5 1 1	3 1 1	3 1 1
				14	2 5 14

Select 1 or 2:

1. Edit Orchard Info

2. Edit Cone Count

<CTRL>+ = Prev Ass't <CTRL>+ = Next Ass't

If you select **Edit Orchard Info**, CCMSPC brings up the orchard, tree and branch information. The screen is divided into three sections, Orchard Information, Tree Information, and Branch Information.

04/01/1996 CONE CROP MONITORING SYSTEM 19:57:58

OTIB Zone: 4 CCMS Study: 6 Edit Module Orchard: RAMORE
Tree: 1 Branch: 4 Family: 380507

ORCHARD INFORMATION		TREE INFO:		BRANCH INFO:	
Seed Source #:	Field Selection:	Tree :	1	Branch:	4
Breeding Zone:	Rep :	Block :	8	Sector:	N
District:	Block :	Set :	1	Level :	U
Orchard Name:	Set :	Row :	4		
Species:	Quad :	Column :	4		
	Row :	Position :	4		
	Column :	Family :	380507		
	Position :				
	Bearing :				
	Family :				
	Clone :				
	Factor :				

Assessment dates for : 4
Starting: 06/14/1995
Ending : 06/21/1995

Use the <Up Arrow> and <Down Arrow> keys to move to the field to be edited. Once the proper field to be changed has been reached, type the correct information into the field and press <Enter>. Use the <Up Arrow> and <Down Arrow> and

<Enter> keys to navigate the fields. Press <Esc> to leave this function. Do not press <Esc> on an edited field without pressing <Enter> or the field will be returned to its original state.

If you select "Edit Cone Count", CCMSPC brings up the list of cone counts.

CROP MONITORING SYSTEM 28:08:48

Edit Module
CCMS Year: 1994 Orchard: RAMORE
anily: 388507

Select Condition:

- 1 Healthy
- 2 Missing
- 3 Aborted
- 4 Attacked/alive
- 5 Attacked/dead

<esc> cancel

		4		5		6	
MP	#	CC	MP	#	CC	MP	#
1	3	1	3	1	3	1	1
2	4	14	2	4	14	2	5
3	8						
4							
5							
6							
7							
8							
9							

<CTRL>+ = Prev Ass't <CTRL>+L = delete Line <CTRL>+ = Next Ass't

You can edit or add numbers to the list. Press <Esc> to return to the tally screen.

<F3> Code Lists. This function is used to view or select cone conditions or mortality factors or to omit codes from a list. While entering cone conditions or mortality factors, press <F3> or L to select from the available options for the field. Use the <Up Arrow> or <Down Arrow> keys to highlight the correct selection and press <Enter>. If you are not in the CC or MF fields, selecting this function simply displays the cone conditions, mortality factors and omission codes for viewing only; press <Esc> to return to the Tally Screen.

<F4> Previous Branch. You can move to the previous branch on the current tree by pressing <F4> or P. Tally checks are also performed and you may see a prompt warning you of a tally count disagreement.

<F5> Next Branch. You can move to the next branch in the current key by pressing **<F5>** or **N**. Tally checks are also performed and you may see a prompt warning you of a tally count disagreement.

<F6> Omit/Delete. To omit a tree or branch from the study, you press **<F6>** or **O**, then press the **<F2>** or **T** key to omit a tree, or **<F3>** or **B** to omit a branch.

04/01/1996		CONE CROP MONITORING SYSTEM		20:03:07	
OTIB Zone: 4		CCMS Study: 6		Edit Module	
Tree: 1		Branch: 4		CCMS Year: 1994 Orchard: RAHORE	
		Family: 380507			
<p>Use function keys to omit the tree <F2> or the branch <F3> or to delete the tree <F4> or the branch <F5>.</p>					
<F1>	<F2>	<F3>	<F4>	<F5>	
Help	Omit Tree	omit Branch	Delete tree	delete branch	
				exit	
				<F10>	

CCMSPC will then prompt for the omit code number. Enter the omit code and press **<Enter>**. The omit reason will appear in the omit reason field and CCMSPC will prompt "This code okay?" Select **Yes** to accept or **No** to correct the code. The code will be used to flag the omitted tree or branch. The tallies are not lost and can still be viewed and edited. This function is available only after the first assessment is completed. After omitting a branch or tree the menu option changes from "Omit/Delete" to "Un-omit" and displays the tree or branch omitted at the top left corner of the screen. To un-omit a tree or branch select it and press the **<F6>** key. To delete a tree or branch from the study, press the **<F6>** key, then press **<F4>** or **D** to delete a tree or **<F5>** or **E** to delete a branch. CCMSPC will confirm that you want to delete this branch or tree. Select **Yes** to confirm or **No** to cancel the delete function. After deleting the tree or branch, CCMSPC will prompt you for the next tree or branch.

<F7> Select Tree. To go to another tree within the study, select a new tree number by pressing **<F7>** or **S**. This will list all of the available tree numbers. After selecting the tree, select the appropriate branch for that tree. This will automatically take you to the tally screen for the branch.

<F8> Copy Assessment. To copy the tally of the previous assessment into the current assessment, press **<F8>**. CCMSPC prompts "Use previous assessment?" Select **Yes** to copy or **No** to cancel the copy. This function is not available on the first assessment.

<F9> Append. This function allows you to append a new tree, branch or assessment. To add a new tree or branch to the study press **<F9>** or **A**, then press **<F2>** or **T** to append a tree or **<F3>** or **B** to append a branch.

04/01/1996		CONE CROP MONITORING SYSTEM		20:04:16	
		Edit Module			
OTIB Zone: 4	CCMS Study: 6	CCMS Year: 1994	Orchard: RAMORE		
Tree: 1	Branch: 4	Family: 380507			
Use function keys to add a tree (F2) or a branch (F3) or an assessment (F4).					
<F1>	<F2>	<F3>	<F4>		
Help	add Tree	add Branch	add Assessment	exit	
				<F10>	

Enter the tree and/or branch information as prompted. To add an assessment to the study press **<F9>** or **A** and then **<F3>**. If the previous assessment has no ending date, CCMSPC prompts you to confirm that the previous assessment is complete. Select **No** to return to the tally screen; an assessment cannot be added until the previous assessment has been completed. If **Yes** is selected, CCMSPC will request that the completion date be entered for the previous assessment, then CCMSPC will prompt you for the starting date of the new assessment.

<F10> Exit. You may leave an assessment at any time by pressing **<F10>** or **X** and selecting **Yes** to confirm the prompt. CCMSPC will automatically do the tree status check and the orchard status check. These checks are required for an assessment to be complete. The check validates that all the trees have been completed. If an assessment is not complete and CCMSPC fails on the checks, select **N** to skip the check. CCMSPC will return to the select study screen.

<Ctrl>L Delete Line. This function is used to delete a tally line from a branch. Move the cursor to the tally line to be deleted and press **<Ctrl>** and **L** simultaneously.

<Ctrl><Left Arrow> Previous Assessment. This function is used to scan through previous assessments. Press **<Ctrl>** and **<Left Arrow>** simultaneously to move to the previous assessment column. The previous assessment tallies will then become current.

<Ctrl><Right Arrow> Next Assessment. This function is used to scan through assessments. Press **<Ctrl>** and **<Right Arrow>** simultaneously to move to the next assessment column. The next assessment tallies will then become current.

Transferring Data to an ASCII Text File

The Ascii File function <F8> or **F** in the main menu allows you to create an Ascii text file with tally information for an orchard, tree, family, clone or factor. This file can be used to import CCMS data into other software packages.

To start, select **ASCII File** from the main menu. CCMSPC displays the Select Study screen first, presenting a list of existing studies and a new set of menu options at the bottom of the screen. The default directory is displayed under the study list. To change the default directory select <F4> **New Path**.

Select a study from those listed. The next screen shows the study information. Before you can create an Ascii file, you must provide a name for it. Select <F7> **File Name**, then enter the file name at the prompt. Do not include spaces, ?, or * in the name. Include an extension if you want one. Press <Enter> after entering the name. If the filename already exists, CCMSPC will ask if you want to use it anyway. If you select **Yes**, CCMSPC asks if you want to append data to it? **No** will erase all the data in the file; **Yes** will add the new data to the end of the file. This is useful if you are using data from several studies and appending them to the same file.

After entering a filename, CCMSPC will prompt "Filename OK?" If you select **No**, CCMSPC will prompt you for a new filename; if you reply **Yes**, the filename will be inserted and you will return to the Ascii File screen.

Select <F8> **Options** to change the data to be included with the tally information in the Ascii file. CCMSPC displays the output options: Study, Family, Clone and Factor. Only the fields selected in the orchard information will be available. Highlight the desired option and press the spacebar to tag or untag an item.

04/01/1996 CONE CROP MONITORING SYSTEM 20:56:37
 OTIB Zone: 4 CCMS Study: 6 ASCII File Module CCMS Year: 1994 Orchard: RAMORE

Tag the family/familys to be included.
 Then press ENTER to create ASCII file.

* 323532
 * 323541
 * 323549
 * 323554
 * 323561
 * 323565
 > 323566
 323567
 336004
 336005

<Space Bar> to tag/untag.
 'T' to tag all.
 'U' to untag all.
 <ESC> to cancel.

<PgDn> - more

Press <Enter> when all the selections have been made. The output options box with Study, Family, Clone and Factor show the items available to be included in the Ascii File. The "*" indicates which of those options will actually be included.

04/01/1996 CONE CROP MONITORING SYSTEM 20:57:22
 OTIB Zone: 4 CCMS Study: 6 ASCII File Module CCMS Year: 1994 Orchard: RAMORE

ASCII file name: OUTPUT.TXT

Output Options:

* Study
 * Family

<F1> Help
<F2> Orchard
<F3> Tree
<F4> Family

<F6> Factor
<F7> Options
eXit <F10>

Other menu options include <F2> Orchard, <F3> Tree and if the orchard field selections were used, <F4> Family, <F5> Clone and <F6> Factor. Selecting <F2> Orchard will include all of the trees, while the other choices include only the indicated subset of items. Selecting <F3> Tree, <F4> Family, <F5> Clone or <F6> Factor will allow you to tag the items from a list of available items to be added to the Ascii file. Highlight the desired item and press the spacebar to tag or untag an item. Press <Enter> when all the selections have been made. You can press T to tag all the

items or press **U** to untag all the items. Once the selections have been made, press **<Enter>**; CCMSPC will copy the data to the Ascii file.

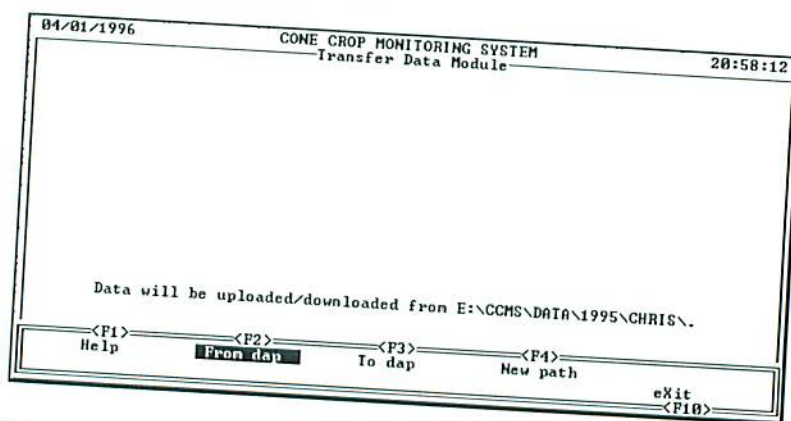
Select **<F10> Exit** to return to the Select Study screen.

Transferring Data to and from a Data Logger

The Transfer function <F7> or T is used for transferring data to or from a data logger. It is required only if the assessment of a study is too large to fit onto a datalogger. Generally, this shouldn't be the case, and you will be able to use the DAP COM program to transfer complete studies to and from a DAP.

COM.COM or COM.EXE must be used to transfer the data. COM.EXE will work on both the DAP 1000 and the DAP 9000 but COM.COM will work only on the DAP 1000.

To start, select **Transfer function** from the main menu. The following screen is displayed.



The default working directory is displayed above the menu options. To change to another directory select <F4> **New Path** from the menu and enter the new path name for the locator files.

To transfer files from a DAP select <F2> **From DAP**. This function is used to copy the orchard (.ORC), tree (.TRE), branch (.BRA), tally (.TAL), assessment (.ASS), omit (.OMT), and total cone count (.TOT) files for a study from the data logger into a directory named C:\TEMP. Tally records will then be merged with

the CCMSPC tally file, if it exists. All other files will be updated from the new files. Any files in the C:\TEMP directory will be erased before the new files are copied there. To proceed select **Yes**.

The program will now go to the COM.COM or COM.EXE menu screen. Enter **COM** at the A:\> prompt on the DAP to run the COM.COM or COM.EXE program and the COM.COM or COM.EXE menu screen will be displayed on the DAP.

On the PC select **2. Master** and the DAP screen will display "Slave On Line". The PC screen should now display a new menu with eight choices. On the PC select **2. Receive** and when CCMSPC prompts you for the disk and file, enter **A:=C:filename** where filename is the name of the file to be transferred. For example, to transfer the ORC40295.DBF file, enter **A:=C:ORC40295.DBF**. This process must be repeated for each file to be copied from the DAP. After all the files have been copied select **7. End** and the PC will return to the Select Study screen. If no files were copied CCMSPC will give you a warning message.

To transfer files to a DAP select <F3> **To DAP**. This function is used to copy the orchard (.ORC), tree (.TRE), branch (.BRA), tally (.TAL), assessment (.ASS) and omit (.OMT) files for one study to the data logger. CCMSPC will display the Select Study screen and you can select the study to be transferred.

04/01/1996 CONE CROP MONITORING SYSTEM 20:58:59
Transfer Data Module

40694 Jul 28/1994

Highlight the study
you want using ↑,
↓, Page Up and
Page Down.

Then press Enter.

Information from this
study will be copied
to the data logger.
Existing files will
be replaced.

Data will be uploaded/downloaded from E:\CCMS\DATA\1995\CHRIS\.

<F1> Help <F4> New path eXit <F10>

You are then able to select the range of assessments to be transferred to the DAP. The highest numbered assessment in the study is displayed on the screen.

04/01/1996 CONE CROP MONITORING SYSTEM 20:58:59
Transfer Data Module

40694 Jul 28/1994

Highlight the study
you want using ↑,
↓, Page Up and
Page Down.

Then press Enter.

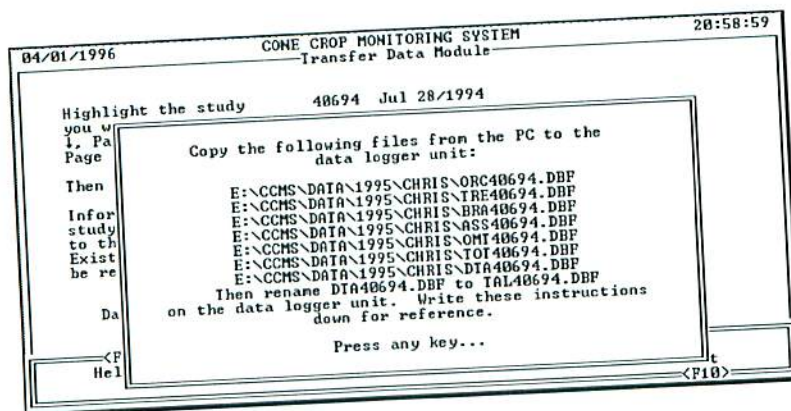
Information from this
study will be copied
to the data logger.
Existing files will
be replaced.

Select the range of assessments
to transfer to the data
logger.
Highest assessment is 6.

1 ..to.. 6

<F1> Help <F4> New path eXit <F10>

If there is more than one assessment in the study but only the latest assessment is needed on the DAP, the transfer time and file size will be reduced if the range is limited to only the necessary assessment. For example if five assessments have been done and you are going out to do assessment six, you need only the last two assessments, therefore only assessments four and five need be transferred to the DAP. CCMSPC will now display six files which must be copied from the PC to the DAP and advise you to rename one of these files after it is on the DAP. It is recommended that the instructions on the screen be written down for reference.



You are then taken into the COM.COM or COM.EXE program to complete the transfer.

At the A:\> prompt on the DAP type **COM** and press <Enter>. The menu displayed on the PC and the DAP should now be the same. On the PC, select **2. Master**; and the DAP screen should display "Slave On Line" if it is working correctly. The PC should now have a new menu with eight choices.

On the PC select **1. Send** and when CCMSPC prompts for the disk and file, type **A:=C:filename**. This process must be repeated for each file to be sent to the DAP. After the files from your written list have been copied, select **7. End** and the PC will return to the Select Study screen.

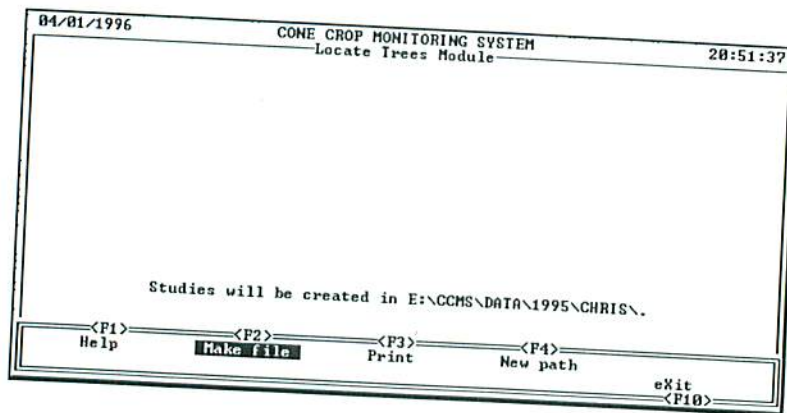
Next, go to the A:\> prompt on the DAP and use the **RENAME** command to rename files from your written list. For example, to rename DTA404694.DBF to TAL40694.DBF you would type **Rename DTA404694.DBF TAL40694.DBF**. When all renaming is complete, the DAP is ready for data collection.

Select <F10> to return to main menu.

Generating Random Numbers for CCMS

The random number generator (<F6> **Locator** in the main menu) allows you to print a random list of tree locations to be used when setting up a CCMS study.

To start, select **Locator** from the main menu. CCMSPC displays the following screen.



The default directory is displayed under the study list. To change the default directory select <F4> **New Path**.

To create a file with a list of random tree locations for an orchard, select <F2> **Make file**. Enter the new file name (up to eight characters long) when it is requested. Do not include an extension; CCMSPC will automatically add a .LOC extension to the file name. Select the tree location parameters used in the orchard, with a **Y** if it is to be used and an **N** if it is not to be used.

04/01/1996

CONE CROP MONITORING SYSTEM
Locate Trees Module

Field Selection:

Rep	:	1
Block	:	1
Set	:	1
Quad	:	1
Row	:	1
Column	:	1
Position	:	1

Next enter the valid ranges for each selected parameter.

04/01/1996

CONE CROP MONITORING SYSTEM
Locate Trees Module

Supply the valid ranges for tree location information.

	From	To	
Rep	1	999	1-20,30-50
Block			
Set			
Quad	1	4	1-4
Row	1	99	1-10
Col	1	99	1-10
Pos			

How many trees would you like to assess? 50

(To a maximum of 999.)

Enter comma's to separate numbers and - for range

An example input = 3,5-10,14,17,20-25,44-47,77,89

Use commas to separate numbers and use a dash to specify a range. For example, 3, 5-10, 14, 17 specifies 3, 5, 6, 7, 8, 9, 10, 14, and 17. After entering all the ranges for the selected fields, press **<Enter>** and you will be prompted as to the number of tree locations to be generated. The maximum number of locations is listed under the prompt "How many trees would you like to access?"

To print or display the list of tree locations on screen, select **<F3>** **Print**. CCMSPC displays a list of filenames with the extension .LOC. Highlight the filename to be printed or viewed and press **<Enter>**. CCMSPC prompts you with "Output: Screen Printer

LIST OF TREES AND ADDRESSES

DATE: 04/01/1996

```

Tree: 28 Rep: 1 Quad: 1 Row: 2 Col: 8
Tree: 38 Rep: 1 Quad: 2 Row: 4 Col: 1
Tree: 45 Rep: 1 Quad: 4 Row: 5 Col: 2
Tree: 34 Rep: 2 Quad: 2 Row: 2 Col: 6
Tree: 31 Rep: 2 Quad: 4 Row: 10 Col: 7
Tree: 49 Rep: 3 Quad: 3 Row: 10 Col: 8
Tree: 27 Rep: 3 Quad: 4 Row: 3 Col: 6
Tree: 12 Rep: 7 Quad: 1 Row: 9 Col: 2
Tree: 25 Rep: 7 Quad: 1 Row: 10 Col: 5

```

Press any key for more or <esc> key to quit...

INFORMATION ON CONE AND SEED INSECTS AND THEIR CONTROL: USING CCMSIMS

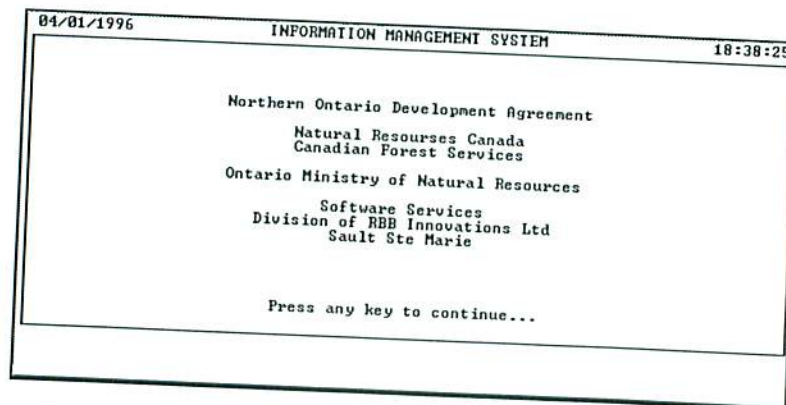
What is CCMSIMS?

The Information Management System is a database containing information on biology, damage and management of insects of pine, spruce and tamarack found in eastern Canada. There are three modules in the CCMSIMS program. The Diagnosis module helps you identify the pest damage to the cone and seeds. The Pest module provides information on the hosts, importance and distribution of the pests, a description of the damage and all the life stages of the pest, and the current control methods. The Control module provides information on the pest control products registered by Agriculture Canada for use against these cone and seed insects. This information includes the product name, registration number, registrant and Canadian agent, location of use, market type, formulation type, precautions, first aid, environmental hazards, spill cleanup, toxicology, storage and disposal instructions, directions for use, active ingredient, insects controlled, and estimates of the efficacy of the product.

Starting CCMSIMS

To start CCMSIMS follow these steps:

- 1) Start up your computer to get to the DOS prompt. If you are in Windows, exit Windows to get to the DOS prompt.
- 2) Change directories so that you are in the directory containing the CCMSIMS.EXE program (e.g. C:\CONESYS\).
- 3) Type **CCMSIMS** and press <Enter>. The following logo screen will appear; press any key to continue.



- 4) The functions and features of CCMSIMS are described in the following section.

Key Features

To display more information on the available menu selections, select <F1> **Help** on any screen and then press any key to return to the previous screen. This menu option can be used at any time.

The <F9> **Utilities** function allows you to change the screen colours and the printer.

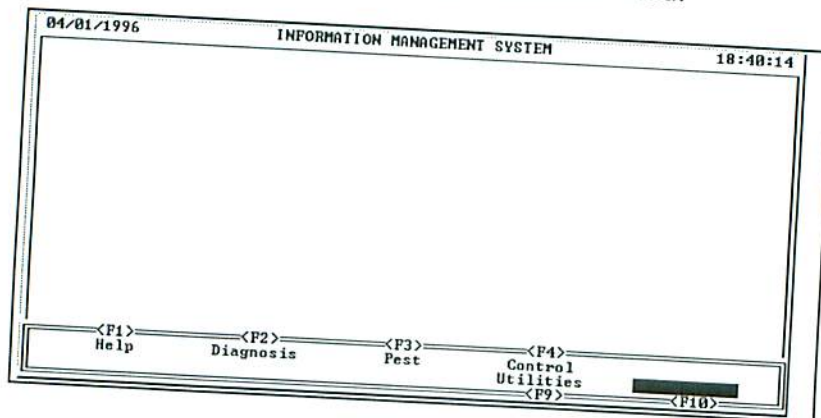
To change the colour combinations for the screen layouts, select **<F2> Colours**. You can either enter a new colour combination or restore the default colour settings. To enter a new colour, select **<F2> New**. Next, select which part of the screen you wish to change, that is, **<F2> Status line**, **<F3> Window box**, **<F4> Prompt/menu** or **<F5> Highlight** and enter the new colour. To return to the original colours, select **<F3> Default**.

To select a new printer, press **<F3> Select**, highlight the name of the printer and press **<Enter>**. To change the font for the selected printer, select **<F5> Fonts** and highlight the font and press **<Enter>**. To see a sample of the font, select **<Yes>** when the system asks "Print sample?" To return to the original settings, select **<F2> Defaults**.

To quit CCMSIMS select **<F10> Exit**.

Using CCMSIMS

After the startup screen, you will go to the main menu.



If you know the insect species, start with **<F3> Pest**. If you want information about a specific insect control product, start with **<F4> Control**. If you are uncertain about the insect identification, start with **<F2> Diagnosis**.

Diagnosis

To identify an insect pest by its damage to cones and seeds, select **<F2> Diagnosis** from the main menu and then follow these steps.

At the prompt "Select a Host", select the tree genus on which the damage is found – pine, spruce or tamarack. Use the **<Up Arrow>** or **<Down Arrow>** keys to highlight the host and press **<Enter>**.

At the prompt "Select the damage location", highlight either **External** or **Internal** to select whether the damage to the cone is visible externally or internally. Press **<Enter>** to continue.

04/01/1996

INFORMATION MANAGEMENT SYSTEM

Select a Host

Pine
Spruce
Lamarack

Select damage location

External
Internal

You should now see the following Select Damage screen.

04/01/1996

INFORMATION MANAGEMENT SYSTEM

SELECT DAMAGE DESCRIPTION TO CONE

tunnelling in cone axis; seed coat partially destroyed;
remainder of seed coat glued to the scale, and filled with a
mixture of frass and resin.

<PGDN>-Next <PGUP>-Prev <ENTER>-Accept <ESC>-Cancel <F10>-MENU

Use **<PgUp>** or **<PgDn>** to find the damage description that best matches the damage to your cone, then press **<Enter>**. The next screen, "Pest Information Screen", displays information about the insect that causes the damage.

Information on Cone and Seed Insects and their Control

5 - 6

04/01/1996 INFORMATION MANAGEMENT SYSTEM 18:43:15

Name: eastern pine seed moth (Cydia toreuta)
Distribution
15-88% of the cones can be attacked; up to 75%
of the seeds per cone can be destroyed; one
larva can destroy as many as 8 seeds; found
throughout the range of pine

View Options
<PgUp> - Scroll up
<PgDn> - Scroll down
<Cntl-PgUp> - Go to top
<Cntl-PgDn> - Go to bottom

eastern pine seed moth

<F1> Help <F2> Diagnosis <F3> Information <F4> Control
<F7> Print <F9> print Option eXit <F10>

Use <Esc> to return to the previous menu. Use <F10> to return to the main menu.

Pest

To access information about specific cone and seed pests, select **<F3> Pest** from the main menu to bring up the following screen.

The screenshot shows a terminal window titled "INFORMATION MANAGEMENT SYSTEM" with a date of "04/01/1996" and a time of "18:44:59". The main text area displays information for the "eastern pine seed moth (Cydia toreuta)", including its distribution: "15-80% of the cones can be attacked; up to 75% of the seeds per cone can be destroyed; one larva can destroy as many as 8 seeds; found throughout the range of pine". To the right, under "View Options", are controls for scrolling and navigating: "<PgUp> - Scroll up", "<PgDn> - Scroll down", "<Ctrl-PgUp> - Go to top", and "<Ctrl-PgDn> - Go to bottom". Below this is a scrollable list of other pests: "cone ridges", "cone resin nidge", "eastern pine seed moth" (highlighted with a cursor), "eastern spruce budworm", "fir cone worm", "jack pine budworm", "larch cone naggot", and "larch seed chalcid". At the bottom, a menu bar contains five options: "<F1> Help", "<F2> Diagnosis Print <F7>", "<F3> Information", "<F4> Control print Option <F9>", and "eXit <F10>".

The screen shows the name of the pest in the database, the distribution information for the pest, and, in the bottom right corner, a list of other insect pests.

You can scroll up and down the list of pests using **<PgUp>** and **<PgDn>** or the **<Up Arrow>** and **<Down Arrow>** keys. Pressing **<Ctrl><PgUp>** will take you to the top of the list and pressing **<Ctrl><PgDn>** will take you to the bottom.

For each pest, there are a set of menu options on the bottom of the screen. These work as follows.

<F2> Diagnosis. This option will take you directly to the Diagnosis menu without having to exit to the main menu.

<F3> Information. The information option is used to view the available information on the highlighted pest. It will bring up a list like the following.

04/01/1996 INFORMATION MANAGEMENT SYSTEM 18:45:45

Name: eastern spruce budworm (Choristoneura funiferana)

Display Information Options:

- Distribution
- Hosts
- Egg
- Larva
- Pupa
- Adult
- Damage
- Detection
- Monitoring
- Control

Use the <Up Arrow> and <Down Arrow> keys to select the desired information option. The system returns to the Pest Information screen with the selected information displayed under the pest name.

<F4> **Control.** This option will take you directly to the Control module without having to exit to the main menu.

<F7> **Print.** The Print function allows you to print out information on the selected pest.

<F9> **Print Option.** The Print Option function allows you to select from a list the specific pest information you want to print. Use the spacebar to tag or untag an item to be printed and press <Enter> when finished. To print the list select <F7>.

<F10> **Exit.** Select <F10> Exit to return to the main menu.

Control

To access information about specific pest control products registered by Agriculture Canada, select <F4> **Control** from the main menu. You should see a screen like the following.

04/01/1996 INFORMATION MANAGEMENT SYSTEM

SELECT ACTIVE INGREDIENT IN CONTROL

Azinphos-methyl (GOO)

PRODUCTS CONTAINING ACTIVE INGREDIENT

3 4 5 6 22 23 24

<PGDN>-Next <PGUP>-Prev <ENTER>-Accept <ESC>-Cancel <F10>-MENU

The screen shows the active ingredient and the products that contain the active ingredient. You can view other active ingredients by pressing <PgDn> or <PgUp>. When the correct active ingredient is displayed, make note of the products that contain the ingredient and press <Enter>.

You should now see a screen like the following.

04/01/1996 INFORMATION MANAGEMENT SYSTEM 18:49:18

Name: CLEAN CROP AZINPHOS-M 50W INSECTICIDE

Disclaimer

There is no guarantee, warranty, assurance, undertaking or anything similar, that the information provided is correct, accurate or current. The Canadian Forest Service or the Ontario Ministry of Natural Resources shall not be liable for any loss resulting from or in connection with the use of or reliance upon the information. The User assumes all risks and responsibility and shall be liable for use of and any reliance upon information provided and the results thereof and in connection therewith.

View Options

<PgUp> - Scroll up

<PgDn> - Scroll down

<Ctrl-PgUp> - Go to top

<Ctrl-PgDn> - Go to bottom

01

02

03

04

05

06

07

08

↓ more ↓

<F1>-Help <F2>-Diagnosis <F3>-pEst <F4>-Information

<F5>-print Option <F6>-eXit <F7>-Print <F8>-MENU

The control products are listed in the box in the bottom right corner of the screen. You can select other control products by using <PgUp> or <Up Arrow> to scroll up the list or <PgDn> or <Down Arrow> to scroll down the list. Pressing <Ctrl><PgUp> will take you to the top of the list and <Ctrl><PgDn> will take you to the bottom.

For each pest control product, there are a set of menu options at the bottom of the screen. These work as follows.

<F2> **Diagnosis.** This option will take you directly to the Diagnosis menu without having to exit to the main menu.

<F3> **Pest.** This option will take you directly to the Pest menu without having to exit to the main menu.

<F4> **Information.** The Information option is used to view the available information on the highlighted control product. It will bring up a list like the following.

04/01/1996	INFORMATION MANAGEMENT SYSTEM	18:50:06
Name: CLEAN CROP AZINPHOS-M 50W INSECTICIDE		
<div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: 80%;"> <p>Display Information Options:</p> <ul style="list-style-type: none"> Disclaimer Product Name Registration Number Registrant and Canadian Agent Location of use Market Type Formulation Type Precautions First Aid Environmental Hazards Spill Cleanup <p style="text-align: center;">↑ more items ↓</p> </div>		

The list includes Disclaimer, Product Name, Registration Number, Registrant and Canadian Agent, Location of Use, Market Type, Formulation Type, Precautions, First Aid, Environmental Hazards, Spill Cleanup, Toxicology, Notice to User, Storage, Disposal, Limitation of Warranty, Direction of Use, Active Ingredient,

Insect Controlled, Efficacy and Tips. Use the **<Up Arrow>** and **<Down Arrow>** keys to select the desired option. Press **<Enter>** and the system returns to the Control Product information screen with the selected information displayed under the control number.

<F7> Print. The Print function allows you to print out information on a control product.

<F9> Print Option. The Print Option function allows you to select from a list the specific pest control product information on the Control product you want to print. Use the spacebar to tag or untag an item to be printed. Press **<Enter>** when finished tagging the required items, then select **<F7> Print** to print the list.

<F10> Exit. Select **<F10> Exit** to return to the main menu.

MAKING INSECT PEST MANAGEMENT DECISIONS: USING CCMSDSS

What is CCMSDSS?

The Decision Support System is a program that provides analyses of possible pest management options and their costs, and helps you deal with uncertainty in product values, pest damage, control product effectiveness and interest rates.

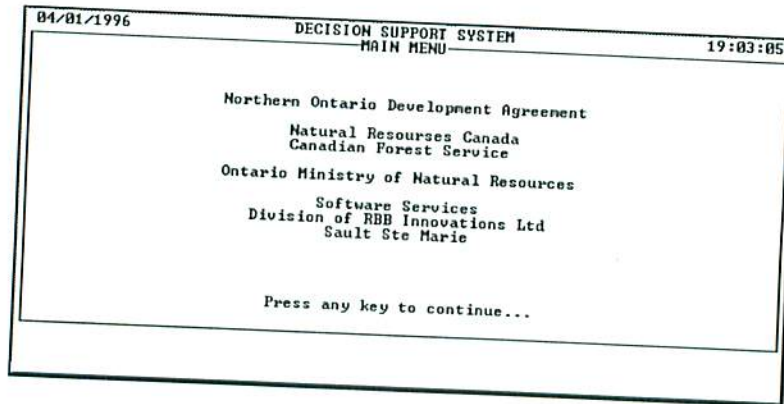
Among other variables, the DSS program requires you to input interest rate, current cone crop size, cost of pest management, and the expected gain in cone and seed yields from pest management. You can run as many scenarios as you wish and when finished you can print a copy.

Starting CCMSDSS

To start CCMSDSS follow these steps:

- 1) Start up your computer to get to the DOS prompt. If you are in Windows, exit Windows to get to the DOS prompt.
- 2) Change directories so that you are in the directory containing the CCMSDSS.EXE program (e.g. C:\CONESYS\).

3) Type CCMSDSS and press <Enter>. The following logo screen will appear; press any key to continue.



4) The functions and features of CCMSDSS are described in the following section.

Using CCMSDSS

To use CCMSDSS, you must input data into three files (screens), Select Orchard, Select Year, and Select Scenario. Each screen is described below.

Select Orchard

The Select Orchard screen is the first screen to appear after the logo screen. It allows you to organize information about each individual orchard. At the bottom of the screen are the functions that may be performed. To select the function press the function key or letter associated with it.

04/01/1996	DECISION SUPPORT SYSTEM Select Orchard Screen	19:05:00
Highlight the orchard you want using ↑, ↓, Page Up and Page Down.	Orchard Name SKURBAN ILTIA	
<F1> Help	<F2> Add	<F3> Edit
	<F4> Delete	eXit <F10>

Selecting Orchards

This feature is used if orchards have already been entered into the system. Use the <Up Arrow> and <Down Arrow> to highlight an orchard. Once an orchard is highlighted it can be modified or deleted. If there are no changes to be made, press <Enter> on the highlighted orchard to bring you to the Select Year screen.

<F1> Help

Selecting **<F1> Help** on any screen will display more information on the menu selections available. Press any key to return to the previous screen. This menu option can be used at any point in the program.

<F2> Add

This option will display the Add Orchard screen. In this screen, the orchard fields (name, species, etc.) will be blank and the field beside the orchard name will be highlighted. To add a new orchard, begin by typing in the orchard name. Once the orchard name has been added press **<Enter>**. The next field (species) will be highlighted. Type in the tree species name. Repeat the process for each of the remaining fields (see note below for an explanation of the fields). When all of the fields have been filled in press **<F10>** to exit. The system will prompt you if the values are correct. Press **Y** to continue or **N** to go back and make changes to the data.

Note on fields for the Add Orchard Screen

The OTIB (Ontario Tree Improvement Board) Zone, Breeding Zone and Seed Source Number are identifiers used in Ontario. If you are in another province, the program requires that you enter a number from 1-6 for the OTIB Zone (which number doesn't matter), but the other two fields can be left blank, or you can put in your own code (up to 14 characters) if you wish. The Area field is the area in hectares of the orchard or the part of the orchard for which you wish to make predictions, and Number of Trees is the total number in that area.

<F3> Edit

Selecting **<F3> Edit** after highlighting the orchard name will display the Edit Orchard Screen.

```
04/01/1996      DECISION SUPPORT SYSTEM      19:32:03
                  Edit Orchard Screen
Enter new orchard identifiers.

Orchard Name: ILI1A
Species: pj
OTIB Zone: 4
Breeding Zone: bz3
Seed Source #:
Area (ha): 8.0
# of Trees: 10,000

<F1>
help                                exit
                                     <F10>
```

When the system displays this screen, the orchard fields (name, species, etc.) with the current orchard data and the field beside the orchard name will be highlighted. To edit the orchard data, use **<Up Arrow>** and **<Down Arrow>** to move the cursor to the field to be modified. Make the appropriate changes and press **<Enter>**. Repeat the process for each of the remaining fields that require changes. When all of the changes have been made press **<F10>** to exit. The system will prompt you if the values are correct. Press **Y** to continue or **N** to go back and make further changes to the data.

<F4> Delete

Selecting **<F4> Delete** from the Select Orchard screen will remove the currently highlighted orchard from the database. To delete an orchard use the arrow keys to highlight the orchard then press **<F4>**. A box will appear prompting you whether or not to delete the currently selected orchard. Selecting **Yes** will remove the orchard and selecting **No** will cancel the deletion.

<F10> Exit

Selecting <F10> Exit from the Select Orchard screen will exit the CCMSDSS system. A box will appear asking you if you wish to exit the system.

04/01/1996

DECISION SUPPORT SYSTEM
Select Orchard Screen

19:51:23

Highlight the orchard
you want using ↑,
↓, Page Up and
Page Down.

Orchard Name
SKURBAN
ILTIA
MORSON

QUIT and
Exit to DOS?
Yes No

<F1>
Help

<F2>
Add

<F3>
Edit

<F4>
Delete

eXit
<F10>

Select **Yes** to return to the DOS prompt, or select **No** to cancel the exit.

Select Year

The Select Year screen allows you to organize information about each orchard year. It appears after selection of the orchard is made.

DECISION SUPPORT SYSTEM					
Select Year Screen					
04/01/1996	19:40:26				
Highlight the year you want using ↑, ↓, Page Up and Page Down.	<table border="1"> <thead> <tr> <th>Year</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1996</td> <td>BZ3 JACK PINE, FULL ORCHARD</td> </tr> </tbody> </table>	Year	Description	1996	BZ3 JACK PINE, FULL ORCHARD
Year	Description				
1996	BZ3 JACK PINE, FULL ORCHARD				
<div> <div><F1> Help</div> <div><F2> Add</div> <div><F3> Edit</div> <div><F4> Delete</div> <div>eXit <F10></div> </div>					

At the bottom of the screen are the functions that may be performed. To select the function press the function key or letter associated with it.

Selecting Orchard Years

Use the <Up Arrow> and <Down Arrow> keys to highlight an orchard year. Once an orchard year is highlighted, it can be modified or deleted. Pressing the <Enter> key on a highlighted orchard year will bring you to the Select Scenario screen.

<F1> Help

Selecting <F1> Help on any screen will display more information on the menu selections available. Press any key to return to the previous screen. This menu option can be used at any point in the program.

<F2> Add

This option will bring up the Add Orchard Year screen. When the system displays this screen, the orchard name, year, description, etc. will be blank and the field beside the orchard year will be highlighted. To create a new orchard, begin by typing in the orchard year. Once the orchard year has been entered, press **<Enter>**. Repeat the process for each of the remaining fields (see note below for an explanation of the fields). When all of the fields have been filled in, press **<F10>** to exit. The system will ask you if the values are correct. Press **Y** to continue or **N** to go back and make further changes to the data.

Note on fields for the Add Orchard Year Screen

The Description field is 40 characters long and allows you to provide some descriptive information about the orchard. It cannot be left blank. The Initial Crop Size is the size of the cone crop when you started CCMS: this information can be obtained from CCMSPC, or you can put in your own figure. Current CE (%) is the cone efficiency (proportion of the cone crop that has survived to present), and this information can be obtained from CCMSPC, or you can put in your own figure. Predicted cone loss - non controllable (%) is the predicted percentage of cones that will be lost to factors that you cannot (or decide not to) control from the present until the time you harvest the cones. Examples include, weather or natural cone abortion. Predicted cone loss - controllable (%) is the predicted percentage of cones that you can control from losses from the present until the time you harvest the cones. Examples include insects and squirrels. Similarly, Predicted seed loss - controllable (%) is the predicted percentage of seeds that you can control from losses from the present until the time you harvest the cones. The Predicted seed/cone is an estimate of the number of viable seeds per cone at the time of cone harvest. To determine the benefits of controlling certain factors in the seed orchard against using the money and investing it elsewhere, the program needs financial information. Interest Rate is the rate per annum if you were to invest your money elsewhere and Cost Adjustment Date is the date you collect the proceeds of your investment. Value of Seed (\$/1000) is the value of your seed

(however determined) per thousand. Finally, Date value of seed realized, is the date you sell the seeds. It is usually the same as the Cost Adjustment Date.

<F3> Edit

Selecting <F3> **Edit** after highlighting the orchard name from the Select Year screen will display the Edit Orchard Year screen.

04/01/1996	DECISION SUPPORT SYSTEM		19:41:06
	Edit Orchard Year Screen		
Orchard Name:	1LT1A		
Year:	1996		
Description:	BZ3 JACK PINE, FULL ORCHARD		
Initial Crop Size:	10,000		
(# of Cones)			
Current CE (%):	85		
Predicted cone loss - non-controllable (%):	10.0		
Predicted cone loss - controllable (%):	25.0		
Predicted potential seed loss - controllable (%):	6.0		
Predicted seed/cone #:	15		
Interest Rate (%):	4.0		
Cost adjustment date (mm/dd/yy):	04/01/1996		
Value of seed (\$/1000):	5.50		
Date value of seed realized (mm/dd/yy):	04/01/1997		
<F1>	exit		<F10>
help			

When the system displays this screen, the orchard year fields (year, description, etc.) will be displayed with the current orchard data, and the field beside the orchard year will be highlighted. To edit the data, use <Up Arrow> and <Down Arrow> to move the cursor to the field to be modified. Make the appropriate changes and press <Enter>. Repeat the process for each of the remaining fields that require changes. When all of the changes have been made, press <F10> to exit. The system will ask you if the values are correct. Press Y to continue or N to go back and make further changes to the data.

<F4> Delete

Selecting **<F4> Delete** from the "Select Year Screen" will remove the currently highlighted orchard year from the database. To delete an orchard year, use the arrow keys to highlight the year to be removed. Press **<F4>** to delete the highlighted orchard. A box will appear asking you whether or not to delete the currently selected year. Selecting **Yes** will remove the year and selecting **No** will cancel the deletion.

<F10> Exit

Pressing **<F10> Exit** will exit the Select Year screen and return you to the Select Orchard screen.

Select Scenario

The Select Scenario screen allows you to organize information about each individual orchard year scenario. A scenario is one way of managing your orchard. If you have flexibility to choose different control products, different application methods, etc., the Select Scenario screen allows you to input the various combinations and compare them. The Select Scenario screen will appear after you have selected an orchard year.

04/01/1996	DECISION SUPPORT SYSTEM Select Scenario Screen	19:48:30
Highlight the scenario you want using ↑, ↓, Page Up and Page Down.		
Scenario Description 1 - Pest maintenance 2 - Standard maintenance		
<F1> Help	<F2> Add	<F3> Edit
<F4> Delete	<F5> aNalysis eXit <F10>	

At the bottom of the screen are the functions that may be performed. To select the function press the function key associated with it.

Selecting Scenarios

Use the <Up Arrow> and <Down Arrow> keys to highlight scenarios. Once a scenario is highlighted it can be modified or deleted.

<F1> Help

Selecting <F1> Help on any screen will display more information on the menu selections available. Press any key to return to the previous screen. This menu option can be used at any point in the program.

<F2> Add

Selecting **<F2> Add** from the Select Scenario screen will display the following Add Scenario screen.

04/01/1996		DECISION SUPPORT SYSTEM		19:45:35	
Add Scenario Screen					
Orchard Name: ILTIA					
Year: 1996 1					
Scenario: 1 of 1					
Description: Pest maintenance					
Gain in cone yield due to pest management (%):				5	
Gain in seed yield due to pest management (%):				4	
Activity	Component	Date	Cost(\$)		
Treatment	labour	06/01/1996	1,000.00		
	supplies	06/01/1996	250.00		
<div style="display: flex; justify-content: space-between; align-items: center;"> <F1> Help <F2> Add line <F4> Delete Line </div> <div style="display: flex; justify-content: space-between; align-items: center;"> <F7> Copy scenes exit </div>					

When the system displays this screen, the scenario fields (orchard name, year, scenario description, etc.) will be blank and the field beside the scenario description will be highlighted. To enter a new scenario, begin by typing in the scenario description. Once the scenario description has been entered press **<Enter>**. Repeat the process for each of the remaining fields (see note below for an explanation of the fields).

Next the activities and components must be entered. After pressing **<Enter>** on the Gain in Seed Yield, the cursor will automatically move to the first Activity field. The function keys at the bottom of the screen will be updated with **<F3>Add Line**, **<F4>Delete Line** and **<F7> Copy scenes** (see below for a description of each function.) The row will be blank except for the date, which will display the current date, and the cost field which will display "0.00" Begin entering data with the first activity. After the activity field has been filled in press **<Enter>** or **<Tab>**. The cursor will move to the component field. Enter the value for the component and press **<Enter>** or **<Tab>**. Repeat this for the date and cost fields. After pressing **<Enter>** or **<Tab>** on the cost field, a new activity row is automatically displayed at the bottom of the list. Enter in as many activities as you need; the screen will

scroll through the list if there is not enough room to view all of them at once. You can also move through the list using the <Up Arrow> and <Down Arrow> keys.

Note on fields for the Add Scenario Screen

The Description field is 40 characters long and allows you to provide some descriptive information about the scenario. Gain in cone yield due to pest management is the effectiveness of the product. For example, if Product A typically protects about 80% of the cones from insect attack (very few products provide 100% protection), your gain is 80% if you use this product. The information about gain can be obtained for each product listed in CCMSIMS under "Efficacy", or it can be obtained from your own experience and data. The Gain in seed yield due to pest management is obtained in the same way. The Activity and Component fields identify the pest management activity and what they are comprised of. For example, an activity would be spraying an insecticide, and the components of the activity could include the costs of insecticide, application equipment, and labour. You can have as many components as you wish for each activity. The Date is the date on which the activities/components are started and the Cost is the cost of the activities and components.

Scenario Activity Functions

<F2> **Add Line:** This function will insert a blank row at the current cursor position. The rest of the activities will be moved down by one in the list.

<F4> **Delete Line:** This function will remove the current row from the activity list. The system will prompt for conformation of the delete. Select **Yes** to remove the activity from the list, or select **No** to cancel the delete.

<F7> **Copy scenes:** Use copy scenes to copy an activity row from another scenario. To begin a copy, press <F7>. The system will display a list of the available orchards. Using the <Up Arrow> and <Down Arrow> keys, highlight the orchard in which the

scenario activities to be copied are located and press **<Enter>**. Next a list of orchard years is displayed by the system. Again use **<Up Arrow>** and **<Down Arrow>** keys to highlight the orchard year in which the scenario activities to be copied is located, and press **<Enter>**. The system displays a list of available scenarios; highlight the desired scenario and press **<Enter>**. The system will now display the scenario activities. Use the arrow keys to highlight the activity that is to be copied and press the spacebar to tag it. The activity or activities selected will be displayed in red and will have an asterisk beside them. Press **<F10>** to copy the highlighted activities and return to the scenario to which you are copying the activities. The new activities are added to the bottom of the list.

When all of the activities have been filled in press **<F10>** to exit. The system will ask you if the values are correct. Press **Yes** to continue or **No** to go back and make changes to the data. After selecting **Yes** the cursor will be positioned on the top scenario screen. Press **<F10>** a second time to exit the top portion of the screen. Again you will be asked if the values are correct. Select **Yes** to exit the Add Scenario screen or **No** to go back.

<F3> Edit

Selecting **<F3> Edit** after highlighting the scenario function from the Select Scenario screen will display the Edit Scenario screen. When the system displays this screen the current scenario fields (orchard year, description, etc.) will be displayed, along with the current data. The description field will be highlighted. Additionally, the function keys will be updated with the following functions **<F2> Add Line**, **<F4>Delete Line** and **<F7> Copy Scenes** (for a description of these functions see Scenario Functions above). Use the arrow keys to move the cursor to the field to be modified. Make the appropriate changes and press **<Enter>**. Repeat the process for each of the remaining fields that require changes. When all of the fields have been filled in press **<F10>** to exit the edit function. The system will ask you if the values are correct. Press **Yes** to continue or **No** to go back and

make changes to the data. After selecting **Yes**, the cursor will be positioned on the top portion of the screen. Press **<F10>** a second time to exit the scenario screen. Again you will be asked if the values are correct. Select **Yes** to exit the Edit Scenario screen.

<F4> Delete

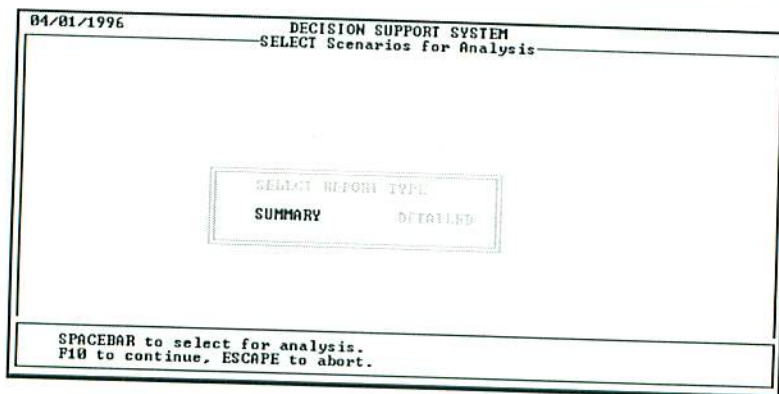
This option will remove the currently highlighted scenario from the database. A box will appear asking you whether or not to delete the currently selected scenario. Selecting **Yes** will remove the scenario and selecting **No** will cancel the deletion.

<F5> Analysis

To perform an analysis press **<F5> Analysis**. The system will display the following list of available scenarios.

The screenshot shows a terminal window titled "DECISION SUPPORT SYSTEM" with the subtitle "SELECT Scenarios for Analysis". The date "04/01/1996" is in the top left corner. A central box contains a list of scenarios, each preceded by an asterisk: "* Pest maintenance" and "* Standard maintenance". At the bottom of the window, a status bar contains the text: "SPACEBAR to select for analysis. F10 to continue, ESCAPE to abort."

Use the arrow keys to highlight the scenario to be included in the analysis. Press the spacebar to select the scenario. The scenarios which are to be included in the analysis are marked with an asterisk. Press the spacebar a second time to deselect a scenario. Once the scenarios have been selected press **<F10>** to continue. The system will then prompt for the destination of the report. Select **SCREEN** to view the report on the screen or **PRINTER** to send the report to the printer. Next the system will prompt for a Detailed or Summary report, as shown.



04/01/1996

DECISION SUPPORT SYSTEM
SELECT Scenarios for Analysis

SELECT REPORT TYPE

SUMMARY DETAILED

SPACEBAR to select for analysis.
F10 to continue, ESCAPE to abort.

Select the desired report type. The system will then produce the report on the selected device. If you are viewing the report on the screen use the arrow keys to scroll through the report and press <Esc> to continue.

Printing the Current Scenario - <F9> Print

Press <F9> Print to print out the current scenario.

<F10> Exit

Pressing <F10> Exit will exit the Select Scenario screen and return to the Select Year screen.