

## FOREST INSECT AND DISEASE SURVEY

## DATA RECORDING AND RETRIEVAL MANUAL

(1968 REVISION)

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FORESTRY BRANCH
DEPARTMENT OF FISHERIES AND FORESTRY
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FOREST INSECT AND DISEASE SURVEY DATA RECORDING AND RETRIEVAL MANUAL

## INTRODUCTION

The Forest Insect and Disease Survey Sampling Form is designed as a field record sheet and a source document for machine punching. Wherever possible we have developed or adopted standard codes and classifications compatible with other disciplines and data processing activities of the Department.

The front of the form (see sample next page) is designed so that all figures appearing in heavily outlined boxes or as circled bold numbers are punched, while figures in lighter font or in lightly outlined boxes are ignored by the punch operators. Most of the numbers to be punched on the front of the slip are entered or circled at the time the slip is filled in. Slips sent in by cooperators may require some coding by laboratory personnel.

In order to save space and to eliminate the need to use alphabetical characters we have excluded the "no information" or N.A. category from many fields. Where a collector has considered an item and has decided that none of the categories are applicable he should cross out the field title. This cannot be recorded in the tape system but may be useful to regional survey officers for management or reference purposes.

Entries on the back of the sampling form are made by laboratory personnel upon receipt, or following identification and processing of the collection. Figures pertaining to a species are entered, in the appropriate columns, along a single line. Figures entered on the back of the form for local recording purposes (notations about the collection such as "same as 66-3-0475-01", or photo 786) should be placed to the right of column 78 so they will not be punched. Where only a few species are present in a collection enter information on every second line.


Two sets of headings have been provided. Alignment one way places the headings for disease collections uppermost, while alignment the other way places the insect headings in position for entry of insect information. The definitions used in this manual have come from a variety of sources. Forestry terms are in the process of being revised and standardized, and their definitions may change. Wherever possible we have used the definitions contained in "Forestry Terminology", Society of American Foresters, 1964, or "British Commonwealth Forest Terminology", Empire Forestry Association, 1957. Where the definition of a term was not contained in published references it has been necessary to construct one.

## EDITING OF FORMS FOR CENTRALIZED DATA PROCESSING

A final scrutiny of sampling forms by a responsible and knowledgeable individual has always been necessary before the forms were sent to the punch operator. This scrutiny is particularly important when the punching is done outside the region, as it is very time-consuming if punch operators must stop punching to decipher figures or categories. Some of the items to be watched for are: right justification, legibility of numbers, wrong codes, omissions, and neatness. Zeros should be used to fill all unrecorded spaces except in columns $14,15,16,17,21,30,38$, and 40 (where zero has a definite meaning) or where the blank spaces are useful to indicate records which will be completed at a later date.

## CODING AND MACHINE RECOGNITION OF INSECT COLLECTIONS AND REPORTS

Six types of insect collections or reports are in use in the Forest Insect Survey. In order that these can be identified in an EDP system, coding must follow a prescribed pattern. Identification of each of these collections or reports is accomplished by a comparison of the information contained in columns 63-78 and any deviation from the patterns outlined below will result in rejection or misinterpretation of the record by the computer programme. A brief description and examples of the six kinds of records acceptable in our system are given below.

1．Species Collection：－This is the normal insect collection in which a number of insects are received at the laboratory，identified and pro－ cessed in the usual way．Identification of these records is accomplished by the recognition of at least one digit other than zero in columns 63－69， $70-73,74-76,77$ and 78．See examp1e＂A＂。

2．Negative Report：－A collection indicated as negative by a field technician who has applied a quantitative sampling technique and found no insects，or some one in the laboratory has examined a collection and been unable to find any insects．Identification is accomplished by the presence of zero in columns 63－69．Column 77 can contain＂ 2 ＂，＂ 3 ＂，or＂ 4 ＂but on1y a＂1＂is valid in column 78．See example＂B＂．

3．Negative Species Report：－A sampling form used to record a search （by some prescribed method）for a particular species of insect，the results of which were negative．Identification is accomplished by the presence of digits other than zero in columns 63－69，zeros in columns 70－76，a＂2＂in column 77，and＂ 1 ＂in 78．See examp1e＂C＂。

4．Species Damage Report：－This is a record of a sample containing damage which can be definitely attributed to a species of insect，although there were no live insects present at the time of examination．Identification is accomplished by the presence of digits other than zero in columns 63－69， zeros in 70－76，a＂ 3 ＂in column 77，and a＂ 2 ＂in column 78．No other digits in columns 77 or 78 are valid．See example＂D＂。

5．Species Report：－This report is used to record the occurrence of an insect in the field when no specimens accompany the sampling form．The coding is treated as though the field technician collects the insects， identifies them，and discards them．In practice he completes the front of the form and writes the identity of the insect under＂Remarks and Symptoms＂． Identification is accomplished by the presence of digits other than zero in columns 63－69，zeros in 70－76，a＂2＂in column 77，and a＂ 2 ＂or＂ 3 ＂in column 78．See example＂E＂。
NOTE：If the stage and number of insects are inserted the record will be identified as a＂Species Collection＂．This is perfectly acceptable in the system provided the Survey Head has delegated the authority to identify the insect to the field technician making the collection．

6. Substrate Collection: - This is the record of a collection of material containing insects e.g., a log containing borers, cones or seeds containing insects, etc., where it is impossible to determine the stage or number of insects present and when the identity of the insect may or may not be known. This type of collection is identified by the presence of at least one digit other than a zero in columns 63-69, zeros in $70-73$, and at least one digit other than zero in 74-76. The digit or digits in columns 74-76 indicate the number of pieces of substrate put in rearing, i.e., the number of logs, cones, etc. See example " $F$ ".
NOTE: Upon completion of rearing, the updating of this record would automatically convert it to a "Species Collection".

## CODING AND MACHINE RECOGNITION OF DISEASE COLLECTIONS AND REPORTS

Six types of disease collections or reports are in use in the Forest Disease Survey. In order that these can be identified in an EDP system, coding must follow a prescribed pattern. Identification of each of these collections or reports is accomplished by a comparison of the information contained in columns 63-78, and any deviation from the patterns outlined will result in rejection or misinterpretation of the records by the computer programme. A brief description and examples of the six kinds of records acceptable in our system are given below:

1. Species Collection: - This is the normal disease collection in which a specimen is received at the laboratory, identified and processed in the usual way. Identification of these records is accomplished by the recognition of characters other than zero (a blank is considered a character in this context) in columns 63-69, at least one character other than zero in $70-75$; a $2,3,4,5$, or 6 in column 76; a 1, 3, 4, 5, or 6 in column 77; and a 3, 4, 5, or 6 in column 78. See example "G"。
2. Negative Report: - A collection indicated as negative by a field technician who has applied a quantitative sampling technique and found no evidence of damage, or laboratory examination of a collection reveals no damage. Identification is accomplished by the presence of zeros in column 63-75; a zero or " 1 " in column 76; a 2, 3, 4, or 5 in column 77, and a " 1 " in column 78. See example "H"。

| G． | 53 |  | DISEASE |  |  |  |  | COLLECTIONS |  |  |  |  |  | （Office | use | only） |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | DISEASE | 3 Species coode |  |  |  | Stage |  |  | ${ }^{72}$ SYM | ${ }^{74}$ SYM | $\left.{ }^{\text {B1 }}\right]^{7810}$ |  |  | ． |  |  |
|  | 010 | ATEOER US |  |  | 11 |  |  |  |  | 1 | 1 |  |  |  |  |  | 1 |
| H |  | pONDPAPRA | 2 |  | 2,1510 | （0） 2 | 22 | 20 | （0） | 115 | 910 | $3)$ |  |  |  |  | 1 |
|  | 1 |  |  |  | $\begin{array}{r}1 \\ 1 \\ \hline\end{array}$ |  |  |  |  | $\square$ | 1 <br> 1 |  |  |  |  |  | 1 |
|  | 010 | WEGMTDME | （0） |  | 01010 | 010 | （0） | （0） | （0） | 010 | 010 |  | 88 |  |  |  | 1 |
|  | 1 |  |  |  | 1 |  |  |  |  | 1 | 1 |  |  |  |  |  | 1 |
| I． | 010 | ATPOPELGOS |  |  | 1 |  |  |  |  | 1 | 1 |  |  |  |  |  | 1 |
|  | 1 | SONDPADEG | 2 |  | 21510 | O 2 | 20 | （0） | （c） | 010 | （0） 0 | （0） 2 | 20 |  |  |  | 1 |
|  | 1 |  |  |  | 1 <br> 1 <br> 1 |  |  |  |  | T | 1 |  |  |  |  |  | 1 |
| J。 | 010 | ar2opededs |  |  | 11 11 1 |  |  |  |  |  | 1 |  |  |  |  |  | 1 |
|  | 1 | PANP PMOKA | $2$ | （0） | $5150$ | 02 | 20 | （0） 0 | O） | 015 | 010 | 43 | 32 |  |  |  | 1 |
|  |  |  |  |  | 11 |  |  |  |  | 1 |  |  |  |  |  |  | 1 |
| K。 | 0.10 | ATROPEAKIS |  |  | $\begin{array}{r}1 \\ 1 \\ +1 \\ \hline\end{array}$ |  |  |  |  |  |  |  |  |  |  |  | 1 |
|  | $\square$ | PONOPMOBG | 2 |  | $21510$ | (0) | $2$ | （0） 0 | O | 010 | （1）10 | 02 | 20 |  |  |  | 1 |
|  | 1 |  |  |  | 11 |  |  |  |  |  | 1 |  |  |  |  |  | 1 |
| L。 | 010 | （0）ESACK |  |  | $\begin{array}{r}11 \\ 1 \\ \hline\end{array}$ |  |  |  |  | （0） 5 | 013 |  | 55 |  |  |  | 1 |
|  |  |  | O |  |  | $\checkmark$ d | ${ }_{26}{ }^{1}{ }^{1}$ | $\bigcirc 3$ | ${ }_{3}^{3}$ | $3000 \mathrm{~s} 3123 \mathrm{ds} \mathrm{cos}$ |  |  |  | 1כ3SNI |  |  | OM， |
|  |  | （Kumo esn esnfo） | SNO153770 |  |  |  |  |  |  | 1O3SN1 |  |  |  | － | 4 | 95 | ${ }_{05}{ }^{5}$ |

3．Negative Species Report：－A sampling form used to record a search （by some prescribed method）for a specific disease or organism，the results of which were negative．Identification is accomplished by the presence of characters other than zero in columns 63－69．The presence of zero in columns $70-76$ ，a＂ 2 ＂in 77 and a＂ 1 ＂in 78．See example＂ 1 ＂。

4．Species Damage Report：－This is a record of a sample containing damage which can be definitely attributed to an organism or physical agent although no organism or agent is present at the time of examination．Iden－ tification is accomplished by the presence of digits other than zero in 63－69 and 70－75，and a 1 or 2 in 76 ，a $2,3,4$ ，or 5 in column 77 and a 2 in column 78．See example＂J＂．

5．Species Report：－This report is used to record the occurrence of a disease in the field when no specimens accompany the sampling form．The coding is treated as though the field technician makes the collection， identifies it，and discards it．In practice，he completes the front of the form and writes the identity of the organism under＂Remarks and Symptoms＂。 Identification is accomplished by the presence of characters other than zero in columns 63－69，zeros in 70－75，a＂1＂in column 76，a＂ 2 ＂in column 77，and a＂ 1 ＂in column 78．See example＂$K$＂。

6．Substrate Collection：－This is the record of a collection of material from a plant which is obviously unhealthy but the cause of the disorder cannot be determined without extensive culturing or other procedures．When the results of these cultures are known，it is possible that an updating will convert this record or records to a＂species collection＂．Identifica－ tion is accomplished by blanks in 63－69．Blanks in 70－71，digits other than zero in 72－75，a blank in 76，a 3，4，or 5 in 77 and $3,4,5$ ，or 6 in 78． See example＂L＂。

## INTERPRETATION OF SAMPLING FORM INFORMATION

Ideally each field of a document such as the Forest Insect and Disease Sampling Form should be totally independent of other fields in the record．This would prevent the possibility of misinterpretation on the
part of those extracting information from these records. We have attempted to make each field as independent as possible but total independence would so greatly increase the categories in each field that the form would be virtually useless as a field recording document. As a result, sections of the form are interdependent and information drawn from one section must be interpreted in the light of information contained in other sections. For example, the confidence which can be placed in information on the number of trees sampled is dependent upon the category checked in column 38.

If a quantitative category has been checked in column 38 we can be confident that the figures entered in columns 34 and 35 are accurate, but if a qualitative category has been checked in column 38 the figures entered in columns 34 and 35 are probably correct but data taken from such records should not be assumed to be absolutely accurate. Similarly the accuracy of a category checked in column 40 may depend upon the category checked in column 38. If it is a beating sample, either qualitative or quantitative, and "NA" has been checked in column 40 our knowledge of how beating samples are made is the only information we have on collection source. Outsiders using this data must either assume no information in this category or inquire from a subject matter specialist how beating is done. On the other hand, if "hand picked" has been checked in column 38 we should be able to place a great deal of confidence in the category checked in column 40 .

It cannot be too strongly emphasized that automatic data processing is a partnership between man and machine and man's part in this particular partnership is to apply subject matter knowledge and intuition to the results obtained from the machine.

## DESCRIPTION AND DEFINITIONS

USE OF FORM (Col. 1). (Circle appropriate category)

1. Insect
2. Disease

This field indicates the kind of collection for which a particular form has been used.

REGIONAL SUB-DIVISION CODE (Co1. 2-4). (Enter the appropriate code number)
These are local codes, the details of which have been worked out by each region. They enable the quick selection of a particular ecological, or administrative unit.
U.T.M. GRID (Col. 5-11). (Enter the appropriate code number)

The Universal Transverse Mercator Grid System has been selected to designate locality (see example next page). The area defined by each set of grid figures is 10,000 meters or 6.2 miles square. The seven digits making up the code are used as follows: Col. 5 \& 6 - the zone, Col. 7 \& 8 the easting and Co1. 9, $10 \& 11$ - the northing. For details of the system see "An Explanation of the Universal Transverse Mercator Grid", published by the Surveys and Mapping Branch of the Department of Mines and Technical Surveys, copies of which have been distributed to each region.

PLOT OR SAMPLE AREA NUMBER (Co1. 12 \& 13). (Enter the plot number)
Only 99 plots can be recorded in any 6.2 mile square area, so that when sorting for plots the plot number will always consist of the U.T.M. Grid, plus two digits assigned in sequence as the plots are established, i.e., in grid 16-44-568 the first plot will be designated 16-44-568-01.

ELEVATION (Col. 14 \& 15). (Enter the appropriate digits)
Elevation is recorded to the nearest 100 feet, i.e. $00=$ an elevation closer to sea level than 100 feet, $01=$ an elevation closer to 100 than 200 feet, $02=$ an elevation closer to 200 than to 100 or 300 feet and 99 = an elevation closer to 9900 than to 9800 feet or any elevation greater than 9900 feet.

DESCRIPTION (Col. 16). (Circle appropriate category)

1. Nursery
2. Ornamental
3. Plantation (natural species)
4. Plantation (exotic species)
5. Shelterbelt


## 6. Hedgerow

7. Woodlot
8. Natural forest
9. Treed swamp
10. Scattered individuals

## DEFINITIONS

Nursery. An area of young trees in a seedbed or transplant plot. This category should not be used for other trees located on nursery grounds.

Ornamental. Single trees or groups of trees of planted or natural origin maintained for aesthetic purposes.

Plantation (natural species). An area artificially reforested with native tree species. It may have been established by planting or by direct seeding with no limitations in arrangement, size, shape, or habitat.

Plantation (exotic species). As above with the exception that it has been planted or seeded with exotic species.

Shelterbelt. A row or rows of planted trees whose primary purpose is the reduction of wind velocity or the protection of homesites. It may be composed of either native or exotic species.

Hedgerow. Narrow bands of naturally regenerated trees encouraged or allowed to grow to provide shelter or to occupy unusable land.

Woodlot. This is a relatively small, delimited stand, originally part of a forest, now surrounded by agricultural or urban areas.

Natural forest. An area in which reforestation has been accomplished by natural processes. A history of cultivation (old field), scarification or burning may be disregarded.

Treed swamp. A poorly drained area in which the water table is above ground or within a few inches of the surface for most of the year. Predominantly open and characteristically forested by scattered black spruce, tamarack or red maple.

Scattered individuals. Trees growing in predominantly open areas. May be used for savannah type natural areas or for urban or rural areas where most of the trees have been removed.

STAND HISTORY (Col. 17). (Circle appropriate category)

1. Undisturbed
2. Clear cut
3. Selective cut
4. Burned
5. Insect damaged
6. Disease damaged
7. Anima 1 damaged
8. Climate damaged
9. Wind damaged
10. Water damaged
-. Agriculture

DEFINITIONS
In most instances this will not include damage by the organism being sampled but some other factor likely to have influenced the stand in such a way that it was predisposed to the attack of the organism.

Undisturbed. A stand in which no apparent disturbance has occurred to the existing trees during recent (up to 15 or 20 ) years.

Clear cut. A stand in which virtually all trees have been removed by cutting.

Selective cut. A stand in which a portion of the trees has been systematically removed.

Burned. A stand in which a burn occurred in recent years and its effects are still obvious.

Insect damaged. A stand in which insect damage has occurred within recent years and the effects are still obvious.

Disease damaged. A stand in which damage from a disease has occurred within recent years and the effects are still obvious.

Animal damaged. A stand showing signs of decadence as the result of feeding, compaction of the soil, or other damage by animals.

Climate damaged. A stand in which sufficient trees have been damaged by a climatic factor other than wind force or flood waters to seriously alter conditions within the stand.

Wind damaged. A stand in which sufficient trees have been damaged by the force of the wind to seriously alter the conditions within the stand.

Water damaged. A stand in which flooding has occurred; this may be an abnormal condition caused by the damming of a stream, or a higher than usual water table produced by one of many causes. It may also be the normal condition found in a swamp or muskeg.

Agriculture. A stand located on an area which previously had been used for agricultural purposes.

ASPECT (Co1. 18). (Circle the appropriate category).

1. North
2. Northeast
3. East
4. Southeast
5. South
6. Southwest
7. West
8. Northwest
9. Flat

The aspect is the direction toward which a slope faces. Provision has been made for recording essentially flat terrain with no significant slope, or an appreciable slope in any direction as indicated by the cardinal points of the compass.

MATURITY (Col. 19). (Circle appropriate category)

1. Seedling (nursery)
2. Transplant (nursery)
3. Seedling (forest)
4. Sapling
5. Young growth
6. Semi-mature
7. Mature
8. Over-mature

DEFINITIONS *

Seeding (nursery). A stand of young trees that have not been removed from the seed bed.

Transplant (nursery). A stand of young trees that have been removed from the seed bed to the transplant plots.

Seedling (forest). A stand of young trees growing in the forest; generally used for young trees that have not reached the sapling stage; they may be planted or naturally regenerated.

Sapling (forest). A young tree greater than $4 \frac{1}{2}$ feet tall with a DBH of at least $\frac{1}{2}$ inch.

Young growth. Young vigorously growing trees below the minimum merchantable size for the species in the area in which they are growing.

Semi-mature. Trees which are at least minimum merchantable size for the species and area, and whose annual increment has not been slowed by maturity.

Mature. Stands which have reached or are approaching their maximum growth and development. They have a vigorous healthy appearance with no indications of decadence.

Over-mature. This refers to a stand which has passed maturity and is beginning to show signs of decadence in the form of dead limbs or tops, reduced shoot growth, foliage size or colour, etc.
*NOTE: Regions may set their own size limits for categories 4 to 8.

AGE STRUCTURE (Col. 20). (Circle the appropriate category)

1. Even-aged
2. Two-aged
3. Uneven-aged

## DEFINITIONS

Even. Applied to a stand in which relatively small age differences exist between individual trees. The maximum difference in age permitted in an even-aged stand is usually 10 to 20 years, although when the stand will not be harvested until it is 100 to 200 years old, larger differences of up to 25 per cent of the rotation age will be allowed.

Two. Applied to a stand in which two distinct age groups are present, each of which would be described as an even-aged stand if the other age group was not present.

Uneven. Applied to a stand in which there are considerable differences in the ages of the trees and in which three or more age classes are well represented. Stands sometimes classified as all-aged are included here.

BASAL AREA (Col. 21). (Circle appropriate category)
The species composition of a stand may be defined on the basis of total number of trees, dominant trees, basal area, volume or crown cover. Basal area which takes into consideration the size of the trees as well as their number, is the most suitable and has been chosen for use in these records. Basal area can be defined as "the area, usually expressed in square feet, of the cross section at breast height of a single tree or all the trees in a stand"。

A prism or relascope is a simple and satisfactory way of finding basal area. For general collecting purposes a single sweep is satisfactory.

FOREST SECTION (AND REGIONS) (Co1. 22). (Enter the appropriate code number)
The forest regions and sections are those first described by
Halliday and are based on the revision contained in the publication "Forest Regions of Canada" by J.S. Rowe, Forestry Branch, Department of Northern the prism method is included for the convenience of field personnel.

Affairs and National Resources, Bu11. 123, 1959. A three-digit code has been developed, the first digit representing forest regions, the second and third digits representing the forest sections. Because of the use of subletters (i.e. la, lb) for some forest sections, the numbers assigned in the code do not agree with the numbers used in Bulletin 123. The code numbers assigned to each section are as follows:

FOREST REGIONS OF CANADA

Code

100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124

Abbreviations in Bul1. 123

B
B. 1 a
B. 1b
B. 2
B. 3
B. 4
B. 5
B. 6
B. 7
B. 8
B. 9
B. 10
B. 11
B. 12
B. 13a
B. 13 b
B. 14
B. 15
B. 16
B. 17
B. 18 a
B. 18 b
B. 19a
B. 19b
B. 19c

Name
Boreal Forest Region
Laurentide-Onatchiway Section
Chibougamau-Natasquan Section
Gaspé Section
Gouin Section
Northern Clay Section
Hudson Bay Lowlands Section
East James Bay Section
Missinaibi-Cabonga Section
Central Plateau Section
Superior Section
Nipigon Section
Upper English River Section
Hamilton and Eagle Valleys Section
Northeastern Transition Section
Fort George Section
Lower English River Section
Manitoba Lowlands Section
Aspen-Oak Section
Aspen Grove Section
Mixedwood Section
Hay River Section
Lower Foothills Section
Northern Foothills Section
Upper Foothills Section

Code
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
200
201
202
203
300
301
302
303
304
305

## 400

401
B. 20
B. 21
B. 22a
B. 22b
B. 23a
B. 23 b
B. 24
B. 25
B. 26a
B. 26 b
B. 26 c
B. 26d
B. 27
B. 28 a
B. 28 b
B. 28 c
B. 29
B. 30
B. 31
B. 32
B. 33

SA
SA. 1
SA. 2
SA. 3
M
M. 1
M. 2
M. 3
M. 4
M. 5

C
C. 1

Upper Churchill Section
Nelson River Section
Northern Coniferous Section
Athabasca South Section
Upper Mackenzie Sections
Lower Mackenzie Section
Upper Liard Section
Stikine Plateau Section
Dawson Section
Central Yukon Section
Eastern Yukon Section
Kluane Section
Northwestern Transition Section
Grand Falls Section
Corner Brook Section
Anticosti Section
Northern Peninsula Section
Avalon Section
Newfoundland-Labrador Barrens Section
Forest-Tundra Section
Alpine Forest-Tundra Section
Subalpine Forest Region
East Slope Rockies Section
Interior Subalpine Section
Coastal Subalpine Section
Montane Forest Region
Ponderosa Pine \& Douglas Fir Section
Central Douglas Fir Section
Northern Aspen Section
Montane Transition Section
Douglas Fir \& Lodgepole Pine Section
Coast Forest Region
Strait of Georgia Section

Code

$$
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$$

403
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## 714

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## 801

802
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Abbreviations in Bu11. 123
C. 2
C. 3
C. 4

CL
CL. 1
CL. 2

D
D. 1

L
L. 1
L. 2
L. 3
L. 4 a
L.4b
L. 4 c
L.4d
L. 4e
L. 5
L. 6
L. 7
L. 8
L. 9
L. 10
L. 11
L. 12

A
A. 1
A. 2
A. 3
A. 4
A. 5 a
A. 5 b
A. 6

Name
Southern Pacific Coast Section
Northern Pacific Coast Section
Queen Charlotte Islands Section
Columbia Forest Region
Southern Columbia Section
Northern Columbia Section
Deciduous Forest Region
Niagara Section
Great Lakes-St. Lawrence Forest Region
Huron-Ontario Section
Upper St. Lawrence Section
Middle St. Lawrence Section
Laurentian Section
Algonquin-Pontiac Section
Midd1e Ottawa Section
Georgian Bay Section
Sudbury-North Bay Section
Eastern Townships Section
Temiscouata-Restigouche Section
Saguenay Section
Haileybury Clay Section
Timagami Section
A1goma Section
Quetico Section
Rainy River Section
Acadian Forest Region
New Brunswick Uplands Section
Upper Miramichi-Tobique Section
Eastern Lowlands Section
Carleton Section
South Atlantic Shore Section
East Atlantic Shore Section
Cape Breton Plateau Section
A. 7
A. 8
A. 9
A. 10
A. 11
A. 12
A. 13

G。

Cape Breton-Antigonish Section
Prince Edward Island Section
Fundy Coast Section
Southern Uplands Section
Atlantic Uplands Section
Central Lowlands Section
Cobequid Section
Grassland Region

COVER- OR SUB-TYPE (Co1. 25-28). (Enter the appropriate code number)
Either the sub-type or cover-type should be entered on the sampling form. Sub-type is preferred as it is much more descriptive of the stand than cover-type. Cover-types can be deduced with reasonable accuracy from sub-types but sub-types cannot be deduced from cover-types.

The codes for sub-types are listed below. Note that two numbers have been assigned to what appears to be the genus of many tree species: i.e., "01" is "pines genera1" and "09" is "miscellaneous pines". These are interpreted as follows "01" pine general to be used where the species of pine are not to be, or cannot be differentiated. "09" miscellaneous pines to be used when the species of pine involved has not been assigned a sub-type code number. Single species stands are coded by entering the appropriate digits in columns 25 and 26 and 00 in columns 27 and 28. Mixed stands are coded as follows:

1. If two species constitute $80 \%$ or more of a stand, enter the appropriate codes in columns 25-28. The species whose code appears in columns 25 and 26 will have the greater basal area and will be assumed to constitute at least $40 \%$ of the basal area of the stand, and that whose code appears in columns 27 and 28 at least $20 \%$ of the basal area of the stand.

Individual species comprising $40 \%$ or more of the stand must be named and those comprising less than $20 \%$ must not be named.
2. If a mixed stand cannot be described by two species codes a standard species group code may be substituted for one or both species codes.
3. If sub-type codes cannot be used cover-type codes determined from cover-type maps or the following rules should be used. The softwood cover-type consists of stands whose composition is at least 81 per cent softwood by basal area or volume and the hardwood cover-type includes stands which are at least 81 per cent hardwood. Mixedwood stands are all others. The composition of a softwood-hardwood stand is $51-80$ per cent softwood and that of a hardwood-softwood stand $51-80$ per cent hardwood. The codes for cover-type consist of $a+i n$ each of the first three boxes and the appropriate digit in the fourth box.

```
+ + + 1. Softwood
+ + + 3. Softwood - hardwood
+ + + 7. Hardwood - softwood
+ + + 9. Hardwood
```

Rules for designating sub-types appear on page 26. For more complete information refer to "Standard Codes" by A. Bickerstaff and T.G. Honer, Department of Forestry and Rural Development.

SUB-TYPES
Individual Species

| Code | Abbreviation | Common Name |
| :--- | :---: | :--- |
| 00 | - | Non-forest type |
| 01 | P | Pine - general |
| 02 | wP | Eastern white pine |
| 03 | rP | Red pine |
| 04 | jP | Jack pine |
| 05 | $1 P$ | Lodgepole pine |
| 06 | sP | Shore pine |
| 07 | pP | Ponderosa pine |
| 08 | wwP | Western white pine |
| 09 | -P | Misce11aneous pines |
| 10 | S | Spruce - general |
| 11 | bS | Black spruce |
| 12 | rS | Red spruce |
| 13 | wS | White spruce |


| Code | Abbreviation | Common Name |
| :---: | :---: | :---: |
| 14 | eS | Engelmann spruce |
| 15 | sS | Sitka spruce |
| - |  |  |
| 19 | -S | Misce11aneous spruce |
| 20 | F | Fir - general |
| 21 | bF | Balsam fir |
| 22 | a1F | Alpine fir |
| 23 | gF | Grand fir |
| 24 | aF | Amabilis fir |
| 25 | D | Douglas-fir |
| - |  |  |
| 30 | L | Larch - general |
| 31 | tL | Tamarack |
| 32 | aL | Alpine larch |
| 33 | wL | Western larch |
| - |  |  |
| 39 | -L | Miscellaneous larch |
| 40 | C | Cedar - general |
| 41 | eC | Eastern white cedar |
| 42 | wC | Western red cedar |
| 43 | yC | Yellow cedar |
| 44 | rJ | Red juniper |
| 45 | roJ | Rocky Mt. juniper |
| 50 | H | Hemlock - general |
| 51 | eH | Eastern hemlock |
| 52 | wH | Western hemlock |
| 53 | mH | Mountain hemlock |
| 60 | A or Po | Aspen or Poplar - general |
| 61 | tA | Trembling aspen |
| 62 | 1A | Largetooth aspen |
| 63 | bPo | Balsam poplar |
| 64 | eCo | Eastern cottonwood |
| 65 | pCo | Plains cottonwood |


| Code | Abbreviation | Common Name |
| :---: | :---: | :---: |
| 66 | 1Co | Lanceleaf cottonwood |
| 67 | nCo | Narrowleaf cottonwood |
| 68 | bCo | Black cottonwood |
| 69 | -Po | Miscellaneous poplars |
| 70 | B | Birch - general |
| 71 | wB | White birch |
| 72 | $y B$ | Yellow birch |
| 73 | wiB | Wire birch |
| - |  |  |
| 79 | -B | Miscellaneous birches |
| 80 | M | Maple - general |
| 81 | sM | Sugar maple |
| 82 | rM | Red maple |
| 83 | bM | Black maple |
| 84 | siM | Silver maple |
| 85 | mM | Manitoba maple |
| 86 | bM | Broadleaf maple |
| - |  |  |
| 89 | -M | Miscellaneous maple |
| 90 | A1 | Alder |
| 91 | As | Ash |
| 92 | Ba | Basswood |
| 93 | Be | Beech |
| 94 | Ch | Cherry |
| 95 | E | E1m |
| 96 | Hi | Hickory |
| 97 | I | Ironwood |
| 98 | 0 | Oak |
| 99 | W | Willow |
| Standard Coniferous Species Groups - Eastern |  |  |
| Code | Abbreviation | Species Group |
| 16 | PS | Pine-spruce mixture |


| Code | Abbreviation | Species Group |
| :---: | :---: | :--- |
| 17 | PF | Pine-fir (Abies) mixture |
| 18 | SF | Spruce-fir (Abies) mixture |
| 26 | SFP | Spruce-fix-pine mixture |
| 27 | SL | Spruce (and/or fir) - larch |
| 28 | CL | Cedar-larch |
| 29 | SCL | Spruce (and/or fir) - cedar - larch |
| 34 | SHP | Hemlock-pine (white and/or red) <br> 35 |
| 36 | Z | Spruce (and/or fir) - hemlock-pine |

## Standard Coniferous Species Groups - Western

| 37 | FS | Fir* - spruce (and/or balsam**) |
| :--- | :--- | :--- |
| 38 | FH | Fir - hemlock |
| 46 | FC | Fir - cedar |
| 47 | HB | Hemlock - balsam (and/or spruce) |
| 48 | HC | Hemlock - cedar |
| 49 | BS | Balsam - spruce |
| 54 | FCH | Fir - cedar - hemlock |
| 55 | FHB | Fir - hemlock - balsam |
| 56 |  | Cedar - hemlock - balsam |
| 58 |  | These codes have been left open |
| 59 |  | for temporary or local use, to <br> cover special situations where <br> the standard coniferous groups |
|  |  | are not applicable |

Standard Deciduous Species Groups - Eastern and Western

| 74 | BA | White birch (and/or wire birch) - <br> aspen (and/or poplar) |
| :--- | :--- | :--- |
| 75 | BR | White birch (and/or wire birch) - <br> red maple |

[^0]| Code | Abbreviation | Species Group |
| :---: | :---: | :---: |
| 76 | BM | Yellow birch - sugar maple (and/or maple) |
| 77 | K | Beech - basswood - ash - oak elm complex |
| 78 | BMK | (Combination of BM and K ) |
| 87 | X | Mixed or pure hardwoods (not otherwise classifiable) |
| 88 |  | This code is left open for temporary or local use to cover special situations where the standard deciduous groups are not applicable. |

## Rules for the Designation of Sub-types:

1. Individual species comprising $40 \%$ or more of the basal area of the stand must be named.
2. Individual species comprising less than $20 \%$ of the basal area must not be named.
3. Individual species comprising between $20 \%$ and $40 \%$ of the stand may be named, provided that no more than two species are used in the subtype name.
4. If two species occur in a sub-type name, the most abundant species will be written first, and will be assumed to constitute $40 \%$ or more of the total.
5. A standard species group may be substituted for species in the subtype name where single species individually
(a) do not make up the percentage indicated above, or
(b) would, if named, describe less than $80 \%$ of the stand.

In applying these rules the function of the standard species groups must be clearly understood. Species groups will be used only if the stand cannot be described according to the above rules in terms of one or two individual species. Each of the standard species groups shown is a group of either commonly associated conifers or commonly associated hardwood species. Hardwoods and softwoods do not appear in the same group. The order in which the species (genera) symbols appear in the specific group designation is fixed and does not reflect the relative importance of the species in the group.

DOMINANT SPECIES (Co1. 29). (Enter appropriate code number)
Coding of the dominant species is dependent upon the presence of a sub-type code in field 13 of the sampling form. It has been assumed that the dominants will always be mentioned as part of the sub-type and the code simply indicates the position in which the dominant name occurs in the subtype code, e.g., if the code appearing in field 13 is 0507 and ponderosa pine trees are dominant; the code entered in field 14 is 2. If lodgepole pine were dominant it would be 1 . Where standard groups are used - i.e., if 4954 were entered in field 13 and hemlock are the dominant trees the code for dominant species is "5". If spruce were dominant it would be 2. As the order in which species appear in a standard group is fixed, the computer can be programmed to identify the dominant species.

HEIGHT OF DOMINANT TREES (FEET) (Col. 30). (Circle the appropriate category)

1. 0.5 feet
2. 45 feet
3. 1.5 "
4. 70 "
5. 3 "
6. 7 "
7. 15 "
8. 30 '
"

TREE SPECIES (Col. 31-33). (Enter appropriate code number)
For details of this code see appendix.

NUMBER OF TREES SAMPLED (Cols. 34 \& 35). (Enter number sampled)
The number of trees sampled is entered directly up to 99. The
figure 99 should be interpreted as 99 or more.

STATUS (Co1. 36). (Circle appropriate category)

1. Living
2. Ingrowth (not used on this form)
3. Damage suspect (not used on this form)
4. Recently dead standing
5. Recently dead cut
6. Recently dead fallen
7. 01d dead standing
8. O1d dead fallen
9. Manufactured

This had been developed as one of the Department's standard codes hence the inclusion of 2 and 3 which are not used in most insect and disease survey sampling.

DEFINITIONS
Living. An uncut tree in which living tissue occurs.
Recently dead. A tree that has been cut, or if standing contains no living tissue (brown cambium completely encircles lower stem) and has been dead less than 2 years.

01d dead. A tree which has been dead more than 2 years.
Manufactured. Any timber or wood product. For purposes of this code trees which have been sawn or chipped, or processed as poles or plywood, will be considered to have reached the manufactured status.

TREE CLASS (Co1. 37). (Circle appropriate category)

1. Dominant
2. Codominant
3. Intermediate
4. Suppressed
5. Undergrown regeneration
6. Understory tree
7. Fringe
8. Open
9. Old veteran

DEFINITIONS
Dominant. Trees with crowns extending above the general level of the crown and receiving full light from above and partly from the side; larger than the average trees in the stand, and with crowns well developed but possibly somewhat crowded on the sides.

Codominant. Trees with crowns forming the general level of the crown cover and receiving full light from above, but comparatively little from the sides; usually with medium-sized crowns more or less crowded on the sides.

Intermediate. Trees shorter than those in the two preceding classes, but with cover formed by codominant and dominant trees, receiving little direct light from above, but none from the sides; usually with small crowns considerably crowded on the sides.

Suppressed. Trees with crowns entirely below the general level of the crown cover receiving no direct light either from above or from the sides. Syn. overtopped.

Undergrown regeneration. Natural seedlings coming up under a canopy of trees. Usually restricted to trees less than 10 feet in height and $1 \frac{1}{2}$ inch DBH.

Understory tree. Vigorous young trees growing under the canopy of a stand; larger than undergrown regeneration trees but not large enough to be considered intermediates.

Fringe. Trees with one or more sides exposed to the light the remaining sides shaded by trees of the stand.

Open. Trees which are exposed to the light on all sides.
Old veteran. A tree in a stand surviving from a previous generation which is larger than its neighbours and occupies more space than its silvicultural value warrants. May be used for old open-grown trees.

SAMPLING TECHNIQUE (Col. 38). (Circle appropriate category)

Qualitative
1.
3.
5.
7.
9.
-。

Quantitative
2. Beating
4. Hand picked
6. Traps
8. Ground observation
0. Aerial observation
+. Photography

Quantitative. Where measuring equipment or techniques are used to give quantitative significance to the results obtained.

Qualitative. Where no measuring equipment or techniques are used.
Beating. Organisms dislodged from a tree by jarring it with a pole, axe or hand.

Hand picked. Removal of a specimen from a part of a tree by hand or hand tools.

Traps. The capture of an organism in an artificial enclosure (include sweep nets).

Ground observation. Areas examined from the ground or a ground vehicle. Aerial observation. Areas examined from an aircraft.

Photography. Where the evidence of the existence of an organism at the sample location is contained in a photograph and no sample was collected.

POPULATION LEVEL OR INCIDENCE (Co1. 39). (Circle appropriate category)

1. Negative
2. Trace
3. Low
4. Moderate
5. High
6. N.A.

NOTE: Incidence is used here in the dictionary sense to mean "extent of damage". Editing will automatically eliminate information in this category on all specimen numbers larger than 01 . The collector must indicate, in the remarks section, the organism to be coded 01.

DEFINITIONS

Negative. This category is used to indicate that a search was made for a particular organism but none was found or where a quantitative procedure was followed and no insect or disease organisms found.

The remaining categories in this section cannot be defined as they are directly related to the organism sampled. For some insects and diseases these terms have been defined in numbers or intensity per unit area, but for others, their definition must be developed. For those organisms that do not have an established quantitative definition, regions may tentatively define them for their own use. For some organisms broad categories loosely defined are meaningful to forest managers and Departmental personnel and should be used, e.g., the light, medium and high population categories used on many of the maps appearing in the Annual Report have no numerical value but serve a useful purpose.

COLLECTION SOURCE (Col. 40). (Circle appropriate category)

1. Flower
2. Fruit
3. Buds
4. Old foliage
5. New foliage
6. New shoot
7. Branch
8. Stem
9. Butt

0 . Root
-. Duff or soil

+ N.A.

DEFINITIONS
Flower. As in any botany text.
Fruit. As in any botany text.
Bud. As in any botany text.
Where organisms are taken from flower buds it would be better to indicate the source as "flower" rather than "bud" if the organism appears to differentiate between flower and foliage buds.

Old foliage. Foliage produced prior to the current year.
New foliage. Foliage produced during the current year. Foliage refers only to leaves and petioles not to twigs or shoots.
NOTE: A number of organisms feed on both old and new growth. These must be coded on one or the other but when data is extracted from a series of collections both will be represented.

New shoot. Distal growth 1 year or less in age, issuing from a twig, branch, or stem.

Branch. An appendage growing out of a stem, exclusive of the new shoot.
Stem. The trunk of a tree, it may extend to the top (conifers) or be lost in the ramifications of the crown (hardwoods). All logs are classified as stem.

Butt. The base of a stem, usually the thickest part just above the ground. In a cut tree that portion left attached to the root.

Root. That part of a tree which is normally below the earth's surface. Duff or soil. All dead vegetative matter on the mineral soil including litter and incorporated humus and the mineral soil itself.

NUMBER OF UNITS (Col. 41 \& 42). (Enter number of units)

A maximum of 99 units can be recorded. The size of the unit will depend upon the design of the sampling system and it will be the responsibility of the region to maintain a permanent record of the sampling system, size of units, etc., for each of the organisms for which this section of the sampling form has been used.

AVERAGE COUNT (Co1. 43 \& 45). (Enter appropriate digits)

These columns may be used for recording average count or total count at the discretion of the survey head but a record must be kept of the system used and the position of the decimal point. The information in these columns will be removed (by computer) from all but the 00 or 01 records. Hence the organism to which this information applies must always be assigned one of these specimen numbers.

DAMAGE AND HAZARD INDEX (Col. 46).

In developmental stages - ignore for present.

COLLECTOR (Col. 47 \& 48). (Enter appropriate code number)
This field is used to identify the collector responsible for the collection or report. Field technicians of the Department are assigned
specific identification numbers which are entered in columns 47 and 48. Personnel of other agencies making collections are identified by major groups only. They are as follows:
94. Provincial Forest Service personnel.
95. Other Provincial employees.
96. Forest Industry employees.
97. Department of Fisheries and Forestry personnel exclusive of those who, as indicated above, have been assigned a number.
98. Other Federal Government employees.
99. Private persons not affiliated with any of the above.

Ninety-three numbers have been reserved for assignment to field technicians. When these 93 numbers have been used it will be necessary to reassign numbers but confusion will be minimized by the time lapse between original use and reuse.

LAND OWNERSHIP (Co1. 49). (Enter appropriate code number)
Items 1-6 refer to land used for some forestry purpose such as lumber, pulp, recreation, watershed, etc. The codes are:

1. Federal crown land
2. Provincial crown land
3. Municipal crown land
4. Land owned by a forest industry
5. Land leased to a forest industry
6. Private
7. Land not used for a forestry purpose
8. Ownership unknown.

DAY (Col. 50 \& 51). (Enter appropriate digits)
Entered directly as a figure, i.e., 01, 21 , or 31.

MONTH (Co1. 52 \& 53). (Enter appropriate digits)
Entered directly as a figure, i.e., January $=01$, July=07, December=12.

YEAR (Col. 54 \& 55). (Enter appropriate digits)
The last two digits of the year are entered directly.

1. Newfoundland
2. Maritimes
3. Quebec
4. Ontario
5. Manitoba-Saskatchewan
6. Alberta-NWT-Yukon
7. British Columbia (Victoria)
8. British Columbia (Vernon)

Because collections of insects are located at both Vernon and Victoria and the disposition of specimens will be recorded on cards, separate numbers have been retained.

REGISTRATION NUMBER (Col. 57-60). (Enter appropriate digits)

The number assigned to a collector and/or a report at the time of registry is entered directly. The numbers are assigned in sequence and should never be duplicated.

SPECIMEN NUMBER (Col. 61 \& 62). (Enter appropriate digits)
These columns are used to record the number assigned to individual entries on the back of the sampling form. Negative records are numbered 00 and 90-99 and positive records from 01 to 89 . It is permissible to enter positive and negative records on the same sampling form but the positive records must begin at 01 and the negative records at 90. Where a single negative record is recorded on a form it is recorded as 00 , where two negatives are recorded on a form they are recorded as 00 and 90 . Where one negative and one or more positives are recorded on a sampling form the positives begin at 01 and the negatives at 90. 01 AND 00 MUST NEVER APPEAR ON THE SAME SAMPLING FORM as they are used as keys to many of the data extraction procedures and their use on the same form would invalidate many of the results.

SPECIES CODE - DISEASE CAUSE CODE (Co1. 63-69). (Enter appropriate code number)

These columns are used to enter the above-named codes produced as separate volumes. Details of the construction of these codes is included in the introduction to each.

Columns are provided for the entry of the number of individuals in each stage. Since only one column is provided for each stage, their numbers are coded as follows:

Code No. Number of Insects Decode
1 1 1
2 2-5
6-10 8
11-20 15
21-40 30
41-60 50
61-100 80
$100-200 \quad 150$
$200+200$

NUMBER OF INSECTS (Col. 74-76). (Enter appropriate digits)
Three columns are provided for the number of individuals of each species and the actual number up to a maximum of 999 can be entered directly. This provides an accurate number of insects per collection and an approximate number in each stage.

STAGE OF DEVELOPMENT OF ORGANISM (Col. 70-71). (Enter appropriate code number)

Since several developmental stages of a pathogen are frequently present on a specimen, a double code has been developed for this section. This allows the two most important stages to be recorded; those most likely to occur together have been placed in different codes. They are as follows:

Code A. (Col. 70)

1. Vegetative state.
2. Mature perfect state (including telia of rusts).
3. Immature perfect state.
4. Overmature perfect state.
5. Mature aecia.
6. Immature aecia.
7. Overmature aecia.
8. Mature pycnia or spermagonia.
9. Immature pycnia or spermagonia.

- Overmature pycnia or spermagonia.

0 . None of the above present or recorded.
Code B. (Col. 71)

1. Mature imperfect state (including uredia of rusts).
2. Immature imperfect state.
3. Overmature imperfect state.
4. Mature pycnia or spermagonia.
5. Immature pycnia or spermagonia.
6. Overmature pycnia or spermagonia.
7. Sclerotia.
8. Rhizomorphs.
9. Mycelial fans.

0 . None of above present or recorded.

DISEASE SYMPTOMS (Co1. 72-73 and 74-75). (Enter appropriate code number)
Provision has been made for field recording of symptoms as an aid to identification. This section allows either these symptoms or a refinement of them (made by laboratory personnel) to be recorded. They will allow the cataloging of diseases of unknown origin and may make subsequent identification possible. They will also identify the type of disease associated with an organism. For the purposes of this code a symptom is defined "as evidence of a diseased condition" and may include items usually called signs. A double set of columns has been provided to allow recording of the two most important symptoms:

Necrotic (death or break-down of tissue)
01 Current necrosis
02 Non-current necrosis
03 Wilt
04 Blight
05 Dieback

```
0 6 ~ S p o t
0 7 \text { Discoloured areas}
0 8 ~ P e r s i s t e n t ~ d e a d ~ l e a v e s
0 9 ~ D e f o l i a t i o n ~
10 Damping-off
11 Rot - unspecified
12 Rot - sap
13 Rot - heart
14 Stain
15 Canker
16 Canker - target
17 Injuries (physical)
Hypertrophic (overdevelopment)
6 0 ~ H y p e r t r o p h y ~ - ~ u n s p e c i f i e d ~
61 Hypertrophy - fusiform galls
6 2 ~ H y p e r t r o p h y ~ - ~ g l o b o s e ~ g a l l s ~
6 3 ~ F a s c i a t i o n ~
6 4 ~ F a s c i c u l a t i o n ~
Atrophy (underdevelopment)
80 Dwarfing
81 Chlorosis
Other Symptoms and Signs
90 Exudate - Resinosis
91 Exudate - Gummosis
92 Exudate - Bleeding
93 Malformation
```

DEFINITIONS

Premature abcission. Unseasonal falling of leaves, flowers, fruits, or twigs.

Blight. Sudden drying and browning involving whole organs such as: fruits, blossoms, leaves, twigs, shoots; also the last stage of wilting.

Canker. Localized lesions on woody or more rarely herbaceous stems which generally result in the corrosion and sloughing away of tissue with the final production of an open wound exposing or penetrating the wood. Canker-target. A perennial canker characterized by prominent, concentrical1y arranged zones, which mark successive outgrowth and death of tissue surrounding wound.

Chlorosis. Diffused or patterned subnormal chlorophy11 development producing a yellow discoloration.

Damping-off. The killing of young seedlings by fungi that cause decay of the stem or roots.

Dieback. Dying back of twigs or branches from the tips inward toward the trunk.

Discoloured areas. The presence of discoloured areas on fruit, green stems, or leaves. This category is used where "spot" does not seem appropriate because of the large size, the irregularity, or the location of the damage.

Dwarfing. Subnormal size of plant or some of its organs.
Exudate - Bleeding. (Slime-flux) - Chronic sap-flow from wounds or other lesions.

Exudate - Gummosis. Formation of gums by diseased cells and tissues, and extrusion of gum from wounds and other lesions.

Exudate - Resinosis. Flow of resin or pitch from wounds or other lesions in conifers.

Fasciation. Flattening or cohering of organs such as stems, flowers, and roots.

Fasciculation. (Hairy root, witches' brooms). Clustering of organs such as roots, twigs, fruits, about a common point, arising from adventitious development caused by pathogen irritation.

Hypertrophy. Abnormal growth of cells or abnormal production of cells causing enlargement of some part of a plant.

Hypertrophy - fusiform ga11s. As above causing fusiform galls.

Hypertrophy - globose galls. As above causing globose galls.
Injuries (physical). Damage caused by physical factors such as hail, lightning, logging and equipment, etc. (The cause of injury is specified under the disease cause code).

Leaves persistent. Dead leaves persist for an abnormally long time.
Malformation. Abnormal configurations that cannot be considered to be either hypertrophy or atrophy.

Current necrosis. Not ascribable to any of the following; death occurred in the current growing season.

Non-current necrosis. Not ascribable to any of the following; death occurred prior to the current growing season.

Rot. Discolouration and decay of woody tissue.
Rot - Heart. As above in heartwood.
Rot - sap. As above in sapwood.
Spot. Localized circular, areolate, or irregular discoloured or killed areas on leaves, fruits, or green stems.

Stain. Discolouration without obvious deterioration of woody tissue, may be either in streaks or bands.

Wilt. A drooping appearance of leaves and shoots resulting from temporary or permanent lowering of turgor due to excess of transpiration over water supply to the leaves and shoots.

BASIS OF IDENTIFICATION (Co1. 76). (Enter appropriate code number)
This section is included to establish the degree of confidence which can be placed in an identification. When extending information it should be used in conjunction with field 38. The codes are:

1. Field observations unsupported by a description of symptoms or a collection.
2. Symptoms of a specimen in a collection or a description of symptoms if no specimen was submitted.
3. Examination of the organism in collection.
4. Examination of the cultural characteristics of the organism.
5. Inoculation with the organism.
6. Chemical analysis.

IDENTIFIER (Co1. 77). (Enter appropriate code number)

1. Probable Identification (poor specimen or incomplete report, there is no possibility of ever making a positive identification).
2. Field Technician.
3. Laboratory Technician.
4. Forest Insect and Disease Survey Taxonomist or other regional authority (the regional authority may be equivalent to a taxonomic specialist and if so code 5 should be assigned).
5. Taxonomic Specialist (Research Institute or equivalent).
6. Identifications by 2,3 or 4 confirmed by a specialist.

DISPOSAL (Co1. 78). (Enter appropriate code number)
The disposal of the specimen is recorded using the following code:
0. Holding, disposition undecided.

1. No specimen or damage.
2. Sample contained damage definitely attributable to the organism entered in field 34 (columns 63-69). (Sample may be discarded or retained for display purposes).
3. Specimen discarded.
4. Specimen retained.
5. Reared or cultured.
6. Look for additional information (use on1y when 4 and 5 do
not apply).
NOTE: Code numbers 4, 5, and 6 will usually indicate that additional information is available about this specimen which may be added to the record at a later date.

## CHANGING, ADDING OR DELETING RECORDS

Records that have been entered into the FIDS Records System may be changed by the use of optical scanning forms (see following pages) or by deletion and the resubmission of sampling forms. Records that are entirely new must be added by the submission of a sampling form but records which are already partially entered (e.g. columns 1-60 exist in the system) should be added by optical scanning forms. Records must be deleted by optical scanning forms. The details of these procedures appear in the section on the use of optical scanning forms.

A11 of the forest insect and disease records have been or will be converted to the format and the codes of the sampling form in current use prior to any updating. This means that any information you wish to change is now located in the column indicated for that category on the Forest Insect Disease and Survey Sampling Form FE 10, i.e., the aspect code under the old 90 column (Remington Rand System) was located in column 76. It has now been transferred to column 18 and any change of aspect must stipulate that the change be made in column 18. If aspect was flat the code would have been "1" but it has been transformed to a "9". There are now no records in the old format or codes.

Editing checks have been built into the system which will prevent a record from entering the permanent file if it contains illogical information, i.e., a region number for Ontario accompanied by a grid number which is in Manitoba or Quebec, or a district number which does not occur in Ontario. Some of these checks can be precisely defined but others must be defined fairly broadly. For instance it is difficult to define the QuebecOntario border with precision and the computer may sometimes indicate that a Quebec location close to the border is in error when actually it is correct (see item 8). It is for situations like these that the error acceptance signal is needed. We have defined a number of areas where we feel the computer can be instructed to indicate errors and we hope to define others as time permits. Print outs indicating the area in which the errors occur will be supplied as the errors become apparent to us.

Optical scanning forms have been developed for recording the changes to be made in Forest Insect and Disease Survey data stored in magnetic tape files. Pencil marks placed in the response boxes of these forms are sensed by an optical scanning machine and translated into magnetic tape impulses.

The example on the right shows how the year 67 is indicated. This method of indicating the number to be read by the scanning machine applies throughout the form.

## YEAR

$$
04=4
$$

$$
5 \quad 5
$$

$$
\theta
$$

$$
\Rightarrow \quad=7
$$

Forms printed in green (FE 131 and 132) are for correcting insect files; those printed in red (FA 157 and 156) for correcting disease files. It is imperative that the correct form be used as the small black rectangles preprinted in the upper left-hand corner of the red form occurs in a different location than that on the green form. These rectangles determine the file to be up-dated and misuse will introduce incorrect data into another file.

The optical scanning form cannot be used to:
a. Insert the special characters " + " and " " " . This means that if a special character is already in a certain column you can change it to a number but you cannot change from one special character to another or from a number to a special character. To change a special character you must delete the record and reinsert it.
b. Change the year (columns 54-55), region (column 56), collection number (column 57-60), or specimen number (column 61-62). To change any of these you must delete and reinsert.
c. Change or insert information into columns 39 and 43-46 if the specimen is greater than 01.

$$
\begin{aligned}
& \text { - } 0 \\
& 1 \\
& 2 \\
& 5
\end{aligned}
$$

General Rules for Completing Optical Scanning Forms

1. Use only an HB lead pencil; DO NOT use a ball point or other type of pen. The response area does not have to be neat but must be fully filled, it is better to have too large an area covered than too small an area provided it does not extend into the next response box.
2. Accuracy is essential as evidence of errors will only be apparent after updating is complete. In order to ensure accuracy a printout showing the record before and after correcting will be sent to originator. Spaces to write numbers have been provided at the top of each column, these are of no use to the scanner but may increase the accuracy of the user.
3. An erasure may be made on these forms provided another box of the same column is being marked. The machine is programmed to select the darkest response position and will reject the erasure if there is a darker position in the same column.
4. Unused portions of a sheet should not be ruled or crossed out.
5. Do not staple anything to the sheets or staple them together, as the staples may go unnoticed and cause a machine jam.
6. Separate each sheet from the pad so they can be fed directly into the machine.
7. The two types of form should not be intermingled in shipment as they must be separated before being fed to the machine. A record of the number of each type should accompany every shipment to Biometrics Research Services.

## Rules for Completing Standard Change Forms

The Standard Change Form allows you to add or correct information in columns 63-69 and 77. Each sheet can be used to change up to six records if the year and region is common to all. A new sheet must be used if either the region number or the year changes. No gaps in information are allowed. Each column of a section must be completely filled out but it is not necessary that all six sections be used.

NOTE: As six changes can be made on this form it is sometimes more economical to repeat the recorded portion of the species code than to use the non-standard change form for adding or changing species or genera codes.

## FOREST INSECT AND DISEASE SURVEY

STANDARD CHANGE FORM-



FE-132

|  | 0 | A A A A A A A A－ | \＃\＃\＃\＃AABAA | A A A \＃A B A A |
| :---: | :---: | :---: | :---: | :---: |
|  |  | ¢ \＃\＃\＃B A A | \＆A A A A A A |  |
|  |  | \＆\＆\＆\＃\＆\＆\＃ | A A A A B B B | \＃\＃\＃\＃B B A |
|  | $\stackrel{8}{8}$ | \＃\＃\＃\＃\＆B \＃ | \＃\＃\＃\＃\＃BBABA |  |
|  | － | \＃\＃\＃\＃\＃\＃\＃， | B\＃ABABBABA | \＃A A ABABA |
|  | － | A \＃\＃\＃\＃\＃\＃\＃\＃\＃ | B \＃A A B B A | \＃\＃\＃\＃\＃\＃B\＃B |
| $z$ |  | \＃\＃为日\＆日甘\＆ | 8\＃\＃\＃\＃\＃BABA | A A A \＃B B A |
| $\bar{\Sigma}$ |  | \＃\＃A A \＃\＃A | A A A A ABABA | \＃\＃A A \＃B A |
| $0$ | ${ }^{2}$ | A \＃\＃\＃\＃BABA |  | \％ |
|  | － |  | A ABA日BAA | \＃\＃\＆\＆\＃\＆B |
|  | 0 | \＃\＃\＃\＃\＃\＃\＃\＃At | A A A A B A A－ |  |
| $\begin{array}{ll} 0 & \sum \\ 1 & 0 \end{array}$ | $\left\|\begin{array}{l} 0 \\ 2 \\ z_{0} \\ 0 \end{array}\right\|$ | \＃\＃\＃\＃\＃\＃BAAA | \＃\＃\＃\＃\＃B ABA | \＃\＃\＃\＃\＃\＃B日甘为 |
|  | 景 | \＃\＃\＃\＃\＃\＃BABA | A A A \＃B B A | \＃A A A B A |
| $\begin{array}{ll\|l} \underset{\sim}{x} & \underset{\sim}{w} & \underset{0}{w} \\ \hline \end{array}$ | U | A\＃\＃\＃\＃\＃\＃\＃\＃\＃） | \＃A\＆ABABABA | \＃\＃\＃ABABABA |
| $$ | 0 | \＃\＃AtABBABA |  | BAABA日BAA |
| $\mathbb{Z} \quad \therefore \quad \frac{1}{\square}$ |  | \＃\＃\＃\＃\＃\＃B\＃\＆ | \＃\＃fitabyag | A A A A B B A |
| $\begin{array}{lll} \gtrless & \gtrless & 0 \\ \mathbb{\alpha} & \& & 0 \end{array}$ |  | \＃\＃\＃\＃\＆B B |  | $\triangle$ \＆\＃\＃B B A |
| $\begin{array}{lll} F & 5 \\ 0 & 0 \\ 4 \end{array}$ | \％ | \＃\＃\＃\＃\＃\＃B\＃B\＃ | \＃\＃\＃\＃\＃\＃BABA | A A A A B A B |
|  | 0 | \＃\＃\＃\＃\＃\＃BABA |  | \＃\＃\＃\＃\＃\＃\＃\＃\＃ |
| $u \leq 5$ | \％ | BA\＆ABABABA | A \＃ABABABA | \＃\＃A B \＃B \＃A |
| $\begin{array}{lll} 1 & 5 & \text { in } \\ 0 & 0 & \end{array}$ |  | \＃\＃\＆\＃B A A | \＃\＃\＃\＃\＃\＃B\＃\＃\＃ | \＃\＃\＃\＃\＃B B |
|  |  |  |  | BAdABABAB |
|  | 2 | A \＃fitarant ${ }^{\text {¢ }}$ |  | \＃\＃d\＃\＃B日为 |
| $\underset{\sim}{k}$ | \％ | \＃A A \＃BABA |  |  |
| $\stackrel{\leftrightarrow}{\alpha}$ |  |  | \＃\＃\＃\＃\＃\＃BABA |  |
| $\stackrel{\frac{1}{\mathbf{u}}}{\square}$ | 2 | \＃\＃\＃\＃\＃BBABA |  | \＃\＃－\＃\＃B A B |
|  | ¢ | B\＃\＃\＃\＃BBA\＆ |  | A A A A B A A |
|  |  | \＃\＃\＃\＃\＃\＃BA\＆ | $\# \# \# \# 甘 甘 B A B A$ | \＃\＃\＃\＃\＃B \＃B |




1．The Non－Standard Change and Deletion Form is used for records involving changes other than the above．Two changes or two deletions may be made on each sheet if the year and region number are common to both．

2．The＂Digits to be Inserted＂section need not be completely used，but marking must start at the left－hand side．The spaces following the last digit must be left blank．Each column of the sections＂Year， Region，Record No．，Spec．No．（except as noted in item 4），and first Col． Chgd．＂（except as noted in item 5）must contain a mark．Each sheet of this form allows two records to be changed or deleted and cannot be used for a mixture of changes and deletions as only one category in the＂Deletion， Change＂section can be marked in each form．This section is used to in－ dicate to the computer the appropriate program to be used in updating the record and simultaneous selection of two programs would cause the computer to halt．

3．To add a new record i．e．，where an＂ 02 ＂or an＂ 03 ＂is added to an existing sampling form，the＂Change＂box is marked as are appropriate boxes for year，region and registration number．The new＂Spec．No．＂is inserted in the appropriate columns；the first column to be changed is always column 63．The first column under＂Digits to be Inserted＂will con－ tain the first digit of the insect or disease cause code．See example below．

| Record No． |  |  |  | Spec．No． 1 st Col．Chgd． |  |  |  |  |  |  |  |  |  | Digits to be |  |  |  | inserced |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 3 | 2 | \＄ | $\theta$ | 2 | 3 | E | 3 | 5 | ， | 0 | 3 | 3 | 0 | $\cdots$ | at | 3 | 5 | 23 |
| 0 | 0 | 0 | 0 | $\square$ | 0 | 0 | 0 | 0 | 0 | 0 | $\square$ | $0{ }^{-3}$ | 0 | 0 | 0 | 0 O | 0 | 0 | CO |
| T | 1 | 519 | C1 | 13 | $\pm$ | 1 | $\square$ | 1 | $1 \%$ | ct | 15 | 57 | 1. | $\square$ | Cl | C1\％ | ci－ | 1 | $\pm$ |
| 2－1 | －2 | $\square$ | 2 | \％ | $\square$ | c2 | c2． | 2 | 2 | ¢3 | 5－9 | 2 | 2. | 2 | 2 | 2 | ， 3 | $\square$ | $\square$ |
| 5 | $\square$ | 5 | $\square$ | C3 | －3 | 4 | $\square$ | 3 | 5 | 3 | 3 | $\square$ | $\square$ | 3 | －3， | 3 | $\square$ | 5 | cs |
| 4 | 54 | 4 | 50 | 43 | 4） | 4 | 4. | 4 | 4. | $\square$ | ［3： | 40 | 4 | 4 | 4. | $\square$ | 4 | 14 | 08 |
| 5 | 5 | －5 | 55 | T5 | 5 | \％ | 5 | 5 | $\square$ | cs | 5 | ga | 5 | 3 | 5 | 5 | cys | －2 | c5 |
| $\square$ | 6 | － 6 | $\square$ | 6 | $\bigcirc$ | $\square$ | 6 | $\square$ | 3 | \％ | to | ごって | －\％ | － | $\square$ | 4 | \％ | 0 | － |
| 7 | 5 | $\square$ | 5 | 7 | 7 | 7 | $\square$ | ＝ 7 | $z$ | 7 | 7 | 07 | 43 | 73 | ：7 | 17 | tz | ． 7 | c\％ |
| 80 | 58 | －8 | 8 | $=9$ | －8：3 | \％ | E） | 8\％ | 5s | 5 | 8． | 08 | 78： | \％ | \％ | ¢8＂ | 0 | 8 | 88 |
| 9 | 0 | 0 | 0 | 0 | 4 | 0 | ：9 | －9 | － | 09 | 0 | Q | $\square$ | 0 | c全 | － | 0 | 2． 0 | 00 |

4. When the change being made occurs in columns 1-60 and hence refers to all the records generated from a sampling form, the "Spec. No." columns are left blank. Blanks in this area will always signify to the computer that the change is to be made to all the records generated from the sampling form whose "Record No." is shown on the optical scanning form.
5. It is necessary to leave some columns blank on many of our records as we have no other way of indicating "no information". Because of this it may also be necessary to create or insert a blank in some columns. The procedure for this is as follows: If the blank occurs in the middle of a correction, the correction is made in the usual way and the appropriate column is left blank. However, if the blank occurs at the


end of the correction, a digit must be inserted in the next column. If the insertion of a blank is the only correction to be made the form is filled out in the usual way, i.e., year, region, record number, etc. The number of the column to be left blank is inserted in the "1st Col. Chgd.", the first column of the "Digits to be Inserted" area is left blank and the digit which follows the blank column is inserted in the next column of this area. This means that you are changing one extra column but since the last column already contained the digit entered from the optical scanning form it has not been changed. A digit must always follow a blank to be inserted as scanning of the records is done in reverse and a digit is needed to indicate the length of the correction. If the column following the one in which you wish to insert a blank contains a special character the optical scanning form cannot be used.
6. To delete a record, mark the deletion box, the appropriate year and region boxes and insert the proper registration and specimen numbers. If only the registration number is inserted and the specimen number left blank all records pertaining to that sampling form will be deleted. If both registration number and specimen number are inserted only the record with the indicated specimen number will be deleted.

|  | DELETE |  | RECORD |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 00 | 0 | -0 | 0 | $\square$ | $\square$ |
| 12 | $\square$ | $1 \pm$ | 1 | 5 | 0 |
| 2\% | 138 | 2 | 23 | 2 | 2 |
| $\square$ | 08 | $\square$ | 3 | 3 | $\square$ |
| 4 | $\square$ | 4 | (4.) | $4 \pm$ | 4 |
| cg | ¢5 | 9 | -5. | 5 | -5 |
| 5 | 5 | 0 | 63 | 0 | $\bigcirc$ |
| 7 | 9 | 7 | $\square$ | 2. | 12 |
| c\% | c\% | 8 | -8: | 8. | -8. |
| 0 | 00 | 0 | 0 | 0 | 0 |

deletes only 3437-03 3437-01 and 02 wil1 remain in the file as will 04 and 05 if such existed

## DELETE RECORD

| $\infty$ | - | $\infty$ | $\square$ | 0 | $\oplus$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\square$ | ¢ | $\Leftrightarrow$ | $\Leftrightarrow$ | $\square$ | क |
| 8 | -8 | $\square$ | 20 | \% | $\square$ |
| $\square$ | ¢ | $\square$ | $\square$ | $\rightarrow$ | $\square$ |
| ¢ 0 | 4 | $\square$ | coun | - | $\square$ |
| -5 | $\square$ | c | $\square$ | -9 | $\square$ |
| $\square$ | $\cdots$ | $\square$ | $\infty$ | $\square$ | $\infty$ |
| 7 | $\%$ | $\square$ | 7 | $\infty$ | $\square$ |
| 5 | 0 | 80 | $\square 5$ | -80 | 0 |
| 0 | $\Leftrightarrow$ | $\Leftrightarrow$ | $\theta$ | 吅 | ¢ |

will delete all
records with 3534
in columns 57-60

7．Insertion－If a registration number（columns 57－60）is not present in the file，either by omission or deletion，it must be reinserted by submission of the sampling form（or a photocopy）．If a record has been deleted and there is an existing registration number and specimen number which is smaller than the specimen number of the record to be inserted，an optical scanning form can be used，i．e．，if a 01 is in existence you can use the optical scanning form to insert a 02 or higher．

8．Acceptance of errors－to indicate that a record which has been rejected during editing can be accepted，an optical scanning form should be prepared as follows：mark the change box，fill in the year， region and record number in the usual way and insert＂ 00 ＂in the＂Col． Chgd．＂area．Leave the＂Digits to be Inserted＂area blank．Only one op－ tical scanning form is needed per record regardless of the numbers of errors in it．

9．When the＂delete and reinsert＂procedure is necessary to cor－ rect a record，it is imperative that the deletion take place prior to reinsertion（or other change）．To insure that deletion instructions do not cause the loss of records that should be retained，send the deletion instructions then wait for confirmation of the deletion（report S132BG） before resubmitting the sampling form．

| Record No． |  |  |  | Spec．No．1st Col．Chgd． |  |  |  |  |  |  |  |  |  | Digits |  | to | be | insertec |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2 | 5 | 7 | 1 | 0 |  |  | 0 |  |  |  |  |  |  |  |  |  |  |  |  |
| $\cdots$ | 0 | $\Rightarrow$ | $\square$ | － | 0 |  | － | 0 | 0 | $\cdots$ | 0 | 0 | 0 | $\square$ | 0 | $\infty$ | $\infty$ | $\infty$ | $\infty$ |
| ¢ | ¢ | क | $\square$ | ¢ | － | 由 | $\pm$ | 由 | ¢ | $\pm$ | $\pm$ | $\pm$ | $\ddagger$ | क | क | ゅ | $\rightarrow$ | $\pm$ | क |
| － | 83 | －2 | \％ | － | 2 | $\square$ | 8 | 2 | 2 | － | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | 8 |
| － | $\cdots$ | $\rightarrow$ | $\square$ | 3 | $\square$ | 5 | क | $\square$ | $c$ | 3 | क | C－3 | $\cdots$ | cs | 3 | $\infty$ | cs | $\Rightarrow$ | क |
| $\square$ | $\square$ | $\square$ | 4 | － | $\square$ | $\pm$ | － | 4 | － | 4 | （4） | 4 | 4 | 4 | 4 | 4 | $\square$ | $\square$ | － |
| － | $\rightarrow$ | $\square$ | $\square$ | $c$ | c | c） | － | $\pm$ | $\square$ | 5 | $\square$ | \％ | 2 | 2 | $\cdots$ | 9 | $\sigma$ | 5 | $\square$ |
| $\square$ | $\infty$ | $\square$ | \％－ | $\cdots$ | $\infty$ | $\infty$ | $\square$ | $\infty$ | $\infty$ | ¢ | क | $=$ | क | $\cdots$ | $\infty$ | $\infty$ | $\square$ | $\infty$ | $\square$ |
| 7 | $\infty$ | － | $\infty$ | $\infty$ | cz | $\cdots$ | $\cdots$ | $\square$ | 7 | $\ldots$ | \％ | $\infty$ | 7 | $\infty$ | $\cdots$ | \％ | \％ | $\cdots$ | $\cdots$ |
| $\infty$ | $\square$ | $\infty$ | $\square$ | $\infty$ | $\square$ | $\infty$ | $\square$ | $\square$ | 0 | $\square$ | $\square$ | 8 | 8 | $\cdots$ | $\square$ | $\infty$ | $\infty$ | $\infty$ | $\infty$ |
|  | $\square$ | $\square$ | $\infty$ | $\square$ | $\square$ |  | $\infty$ | \％ | \％ | $\infty$ | $\cdots$ | $\cdots$ | ¢ | $\infty$ | $\square$ | $\infty$ | $\infty$ | $\infty$ | $\infty$ |

HOST TREE CODE

# A - Arranged by Code Number and Natural Groups <br> Scientific Name <br> Common Name 

Code Number

MISCELLANEOUS

No host
Miscellaneous trees, shrubs, herbs, etc.

CONIFEROUS SPECIES

001
002
003
004
005
006
007
010
011
012
013
014
018
019
020
021

Abies spp.
Fir
amabilis (Doug1.) Forb.
Fir, amabilis
balsamea (L.) Mill.
balsamea (L.) Mill. var. phanerolepis Fern.
concolor (Gord. \& Glend.) Lind1.
grandis (Doug1.) Lind1.
tasiocarpa (Hook.) Nutt.
Auracaria spp.
Cedrus spp.
libani Loud.
Chamaecyparis spp.
nootkatensis (D. Don) Spach
Cupressus spp.
macrocarpa Gord.
Juniperus spp.
communis L.
communis L. var. depressa Pursh
comminis L.
var. hibernica Gord.
horizontalis Moench
scopulorum Sarg.
virginiana L.
virginiana L.
var. crebra Fern. and Grisc.
Larix spp.
decidua Mill.
Zaricina (Du Roi) K. Koch

Fir, balsam
Fir, bracted balsam
Fir, silver
Fir, grand
Fir, alpine
Monkey tree
Cedar
Cedar, Lebanon
Cedar
Cedar, yellow
Cypress
Cypress, Monterey
Juniper
Juniper, common
Juniper, ground
Juniper, Irish
Savin, creeping
Juniper, Rocky Mountain
Juniper, red
Cedar, northern red
Larch
Larch, European
Tamarack

Code Number

Larix contd.
leptolepis (Sieb. and Zucc.) Rehd.
Zyallii Parl.
occidentalis Nutt.
siberica Ledeb.
Picea spp.
abies (L.) Karst.
enge Imannii Parry
glauca (Moench) Voss
glauca (Moench) Voss
var. albertiana (S. Brown) Sarg.
mariana (Mill.) BSP.
pungens Engelm.
mubens Sarg.
sitchensis (Bong.) Carr.
Pinus spp.
albicaulis Engelm.
banksiana Lamb.
contorta Doug1.
contorta Doug1. var. Zatifolia Engelm.
flexilis James
monticola Doug1.
mugo Turra
nigra Arn.
ponderosa Laws.
resinosa Ait.
rigida Mill.
strobus L.
syluestris L.
thunbergii Par1.
peuce Griseb.
pinaster Ait.
Pseudotsuga spp.
menziesii (Mirb.) Franco
menziesii (Mirb.) Franco var. glauca (Beissn.) Franco

Sequoia spp.
Taxus spp.
brevifolia Nutt.
canadensis Marsh.
Thuja spp.
occidentalis L. plicata Donn

Larch, Japanese
Larch, alpine
Larch, western
Larch, Siberian
Spruce
Spruce, Norway
Spruce, Engelmann
Spruce, white
Spruce, western white
Spruce, black
Spruce, Colorado
Spruce, red
Spruce, Sitka
Pine
Pine, whitebark
Pine, jack
Pine, shore
Pine, lodgepole
Pine, limber
Pine, western white
Pine, mugho
Pine, Austrian
Pine, ponderosa
Pine, red
Pine, pitch
Pine, eastern white
Pine, Scots
Pine, Japanese black
Pine, Balkan
Pine, cluster
Douglas-fir
Douglas-fir
Douglas-fir, blue
Sequoia
Yew
Yew, western
Hemlock, ground
Cedar
Cedar, eastern white Cedar, western red

090
091
092
Tsuga spp. canadensis (L.) Carr. heterophylza (Raf.) Sarg。 mertensiana (Bong.) Carr.

NON-CONIFEROUS SPECIES

100
101

Acer spp.
circinatum Pursh glabrum Torr. var. douglasii (Hook.) Dipp. macrophy Zlum Pursh
negundo L.
negundo L.
var. interius (Britt.) Sarg.
nigmum Michx. f .
pensylvanicum L.
platanoides L.
pseudoplantanus L.
rubrum L.
saccharinum L.
saccharum Marsh.
spicatum Lam.
ginnala Maxim.
Aesculus spp. carnea Hayne hippocastanum L.

Ailanthus spp. altissima (Mil1.) Swingle

Alnus spp. crispa (Ait.) Pursh glutinosa (L.) Gaertn. incana (L.) Moench rhombifolia Nutt.
rubra Bong.
mugosa (Du Roi) Spreng. var. americana (Rege1) Fern. serrulata (Ait.) Willd. sinuata (Rege1) Rydb。 tenuifolia Nutt.

Arbutus spp.
menziesii Pursh
Asimina spp.
triloba (L.) Dunal

Hemlock
Hemlock, eastern
Hemlock, western
Hemlock, mountain

Maple
Maple, vine
Maple, Douglas
Maple, broadleaf
Maple, Manitoba
Maple, inland Manitoba
Maple, black
Maple, striped
Maple, Norway
Maple, sycamore
Maple, red
Maple, silver
Map1e, sugar
Maple, mountain
Maple, ginnala
Buckeye
Horse-chestnut, red
Horse-chestnut
Tree-of-heaven
Sumac, Chinese
Alder
Alder, green
Alder, black
Alder, gray
Alder, white
Alder, red
Alder, speckled
Alder, common
Alder, Sitka
Alder, mountain
Madrone
Arbutus
Pawpaw
Pawpaw
Code NumberScientific Name

Betula spp. borealis Spach caerulea-grandis Blanch. eastwoodae Sarg. gladulosa Michx.
Zenta L.
alleghaniensis Britt.
occidentalis Hook.
papyrifera Marsh. papyrifera Marsh. var. commutata (Rege1) Fern. papyrifera Marsh. var. cordifolia (Regel) Fern. papyrifera Marsh. var. elobata (Fern.) Sarg. papyrifera Marsh.
var. humilis (Rege1) Fern. \& Raup papyrifera Marsh.
var. macrostachya Fern.
papyrifera Marsh.
var. pensilis Fern.
papyrifera Marsh.
var. subcordata (Rydb.) Sarg.
pendula Roth
populifolia Marsh.
pumila L.
Caragana spp.
arborescens Lam.
frutex K. Koch
pygmaea DC.
spinosa (L.) DC.
Carpinus spp.
caroliniana Walt.
var. virginiana (Marsh.) Fern.
Carya spp.
cordiformis (Wang.) K. Koch
glabra (Mill.) Sweet
Zaciniosa (Michx. f.) Loud.
ovalis (Wang。) Sarg。
var. borealis (Ashe) Sarg.
ovalis (Wang.) Sarg.
var. odorata (Marsh.) Sarg.
ovata (Mil1.) K. Koch
ovata (Mi11.) K. Koch
var. fraxinifolia Sarg.
tomentos $\alpha$ Nutt.
Common Name

Birch
Birch, northern
Birch, blueleaf
Birch, Yukon
Birch, dwarf
Birch, sweet
Birch, yellow
Birch, water
Birch, white
Birch, western white
Birch, mountain white
Birch, Gaspé white
Birch, Alaska white
Birch, large-fruited white
Birch, weeping white
Birch, northwestern white
Birch, European
Birch, wire
Birch, swamp
Caragana
Caragana, Siberian
Caragana, Russian
Caragana, pygmy
Caragana, spiny
Blue-beech
Blue-beech
Hickory
Hickory, bitternut
Hickory, pignut
Hickory, shellbark
Hickory, Michigan red
Hickory, roundnut red
Hickory, shagbark
Hickory, ashleaf shagbark
Hickory, mockernut

Castanea spp. dentata (Marsh.) Borkh.

CataZpa spp.
hybrida Spaeth ovata G. Don speciosa Warder

Celtis spp. occidentalis L.

## Cercis spp.

 canadensis L.Cornus spp. acadiensis Fern. altemifolia L. f. drummondii C.A. Meyer florida L. nuttalZii Audubon mugosa Lam. stolonifera Michx.

Corylus spp. americana Walt. californica K. Koch cornuta Marsh. ave Z Zana L.

Crataegus spp. chrysocarpa Ashe columbiana Howell douglasii Lind1.

Fagus spp. grandifolia Ehrh. sylvatica L.

Fraxinus spp. americana L. excelsior L. nigra Marsh. pennsylvanica Marsh. pennsylvanica Marsh. var. austinii Fern. pennsylvanica Marsh. var. subintegerrima (Vah1) Fern. quadranguZata Michx.

Chestnut
Chestnut, sweet
Catalpa
Catalpa, hybrid
Catalpa, Chinese
Catalpa, western
Hackberry
Hackberry
Redbud
Redbud
Dogwood
Dogwood, hybrid
Dogwood, alternate-1eaf
Dogwood, rough leaf
Dogwood, eastern flowering
Dogwood, western flowering
Dogwood, round-leaved
Dogwood, red osier
Hazelnut
Hazelnut, American
Hazelnut, California
Hazelnut, beaked
Filbert, European
Hawthorn
Hawthorn, roundleaf
Hawthorn, Columbia
Hawthorn, black
Beech
Beech, American
Beech, European
Ash
Ash, white
Ash, European
Ash, black
Ash, red
Ash, northern red
Ash, green
Ash, blue

Ginkgo biloba L.

Gleditsia spp. triacanthos L .

Gymnocladus spp. dioica (L.) K. Koch

Hamame ${ }^{2}$ is spp. virginiana L.

Ilex spp. aquifolium L. glabra (L.) Gray verticillata (L.) Gray

Juglans spp. cinerea L . nigra L .

Liquidambar spp. styraciflua L .

Liriodendron spp. tulipifera L .

Maclura pomifera (Raf.) Schneid.

Magnolia spp. acuminata L.

Morus spp. $a Z b a$ L. rubra L.

## Nemopanthus spp.

 mucronata (L.) Tre1.Nyssa spp. sylvatica Marsh.

Ostrya spp. virginiana (Mil1.) K. Koch

Platanus spp. acerifolia (Ait.) Willd. occidentalis L.

Ginkgo
Ginkgo
Honey-locust
Honey-locust
Coffee-tree
Coffee-tree, Kentucky
Witch-haze1
Witch-haze1
Holly
Holly, English
Inkberry
Holly, Canada
Walnut
Butternut
Walnut, black
Gum, sweet
Gum, sweet
Tulip-tree
Tulip-tree
Osage-orange
Osage-orange
Magnolia
Cucumber-tree
Mulberry
Mulberry, white
Mulberry, red
Mountain-holly
Mountain-holly, false
Tupe11o
Gum, black
Ironwood
Ironwood, rough-barked
Cycamore
Plane, London
Sycamore

300

Populus spp. acuminata Rydb. $a l b a$ L. angustifolia James balsamifera L . eugenei Simon-Louis candicans Ait. deltoides Marsh. grandidentata Michx. nigra L . var. italica Muenchh. deltoides Marsh. var. occidentalis Rydb. tremuloides Michx. trichocarpa Torr. \& Gray

Prunus spp. (see also 520 \& 521) americana Marsh.
cerasifera Ehrh.
emarginata Doug1.
nigra Ait.
pennsylvanica L. f.
serotina Ehrh.
virginiana L.
virginiana L. var. demissa (Nutt.) Torr.
virginiana L. var. melanocarpa (A. Nels.) Sarg.

Ptelea spp. trifoliata L.

Malus spp.
Aronia arbutifolia (L.) E11.
Malus coronaria (L.) Mill. fusca (Raf.) Schneid. glaucescens Rehd.

## Sorbus

americana Marsh.
aucuparia L .
decora (Sarg.) Schneid. occidentalis (Wats.) Greene sitchensis Roem.

Quercus spp. a $\quad$ ba L .

Poplar
Cottonwood, lanceleaf
Poplar, silver
Cottonwood, narrowleaf
Poplar, balsam
Poplar, Carolina
Balm of Gilead
Cottonwood, eastern
Aspen, largetooth
Poplar, Lombardy
Cottonwood, plain
Aspen, trembling
Cottonwood, black
Cherries and plums
Plum, wild
Plum, cherry
Cherry, bitter
Plum, Canada
Cherry, pin
Cherry, black
Cherry, eastern choke
Cherry, western choke
Cherry, black choke
Hop-tree
Hop-tree
App1e
Chokeberry, red
Crab-apple, sweet wild
Crab-apple, Pacific
Crab-apple, wild

Mountain-ash, American Mountain-ash, European Mountain-ash, showy Mountain-ash, western Mountain-ash, Sitka

Oak
Oak, white

| Code Number | Scientific Name | Common Name |
| :---: | :---: | :---: |
|  | Quercus contd． |  |
| 352 | bicolor Willd． | Oak，swamp white |
| 353 | mubra L． | Oak，red |
| 354 | coccinea Muenchh． | Oak，scarlet |
| 355 | ellipsoidalis E．J．Hill | Oak，northern pin |
| 356 | garryana Doug1． | Oak，Garry |
| 357 | macrocarpa Michx． | Oak，bur |
| 358 | montana Willd． | Oak，chestnut |
| 359 | muehlenbergii Engelm． | Oak，chinquapin |
| 360 | palustris Muenchh． | Oak，pin |
| 361 | velutina Lam． | Oak，black |
| 370 | Rhamnus spp． | Buckthorn |
| 371 | alnifolia L＇Her． | Buckthorn，alderleaf |
| 372 | cathartica L． | Buckthorn，common |
| 373 | purshiana DC． | Cascara |
| 374 | frangula L． | Buckthorn，alder |
| 376 | Rhododendron spp． | Rhododendron |
| 377 | maximum L． | Laure1，great |
| 380 | Rhus spp． | Sumac |
| 381 | glabra L． | Sumac，smooth |
| 382 | typhina L． | Sumac，staghorn |
| 383 | vermix L． | Sumac，poison |
| 390 | Robinia spp． | Locust |
| 391 | pseudo－acacia L． | Locust，black |
| 392 | viscosa Vent． | Locust，clammy |
| 400 | Salix spp。 | Willow |
| 401 | alaxensis（Anderss．）Cov． | Willow，feltleaf |
| 402 | $a l b a \mathrm{~L}$ 。 | Willow，white |
| 403 | $a て b a \mathrm{~L}$ ． <br> var．vitellina（L．）Stokes | Willow，golden |
| 404 | amygdaloides Anderss． | Willow，peachleaf |
| 405 | babylonica L． | Willow，weeping |
| 406 | bebbiana Sarg． | Willow，Bebb |
| 407 | candida Flugge | Willow，hoary |
| 408 | caudata（Nutt．）Heller | Willow，whiplash |
| 409 | cordata Michx． | Willow，heart－leaved |
| 410 | coulteri Anderss． | Willow，Coulter |
| 411 | discolor Muh1． | Willow，pussy |
| 412 | exigua Nutt． | Willow，coyote |
| 413 | fragilis L． | Willow，crack |
| 414 | hookeriana Barratt | Willow，Hooker |
| 415 | interior Rowlee | Willow，sandbar |
| 416 | Zasiandra Benth． | Willow，Pacific |
| 417 | lucida Muh1． | Willow，shining |

Salix contd.
Iutea Nutt.
mackenzieana (Hook.) Barratt
melanopsis Nutt.
nigra Marsh.
pentandra L.
pseudomonticola Bal1
purpurea L.
pyrifolia Anderss.
scouleriana Barratt
sericea Marsh.
sessilifolia Nutt.
sitchensis Sanson
vestita Pursh
Sambucus spp.
canadensis L.
glauca Nutt.
pubens Michx.
Sassafras spp.
albidum (Nutt.) Nees
albidum (Nutt.) Nees var. molle (Raf.) Fern.

Tilia spp.
americana L.
cordata Mill.
platyphyZZos Scop.
Ulmus spp.
americana L.
glabra Huds.
montana Stokes
procera Salisb.
pumila L.
rubra Muh1.
thomasii Sarg.
parvifolia Jacq.
Lonicera spp.
canadensis Bertr.
Diervilla Zonicera Mill.
Viburnum spp.
lentago L.
cassinoides L. trilobum Marsh.

Willow, yellow
Willow, Mackenzie
Willow, dusky
Willow, black
Willow, bayleaf
Willow, serviceberry
Willow, basket
Willow, balsam
Willow, Scouler
Willow, silky
Willow, northwest
Willow, Sitka
Willow, hairy
Elder
Elder, common
Elder, blueberry
Elder, red-berried
Sassafras
Sassafras, white
Sassafras, red
Basswood
Basswood, American Linden, small-leaved
Linden, large-leaved
E1m
E1m, white
Elm, Wych
Elm, Scotch
Elm, English
Elm, Siberian
Elm, slippery
E1m, rock
E1m, Chinese
Honeysuckle
Honeysuckle, American fly
Honeysuckle, bush
Viburnum
Nannyberry
Wild-raisin
Cranberry, highbush
Code NumberScientific Name
Common Name
490491

Berberis spp. vulgaris L.

Shepherdia spp.

Spiraea spp.
Amelanchier spp. padus L.

Syringa spp. vulgaris L .

Rosa spp.
Ledum spp.
Elaeagnus spp.

Cotoneaster spp.
thunbergii DC. argentea Nutt. canadensis (L.) Nutt.

Chamaedaphne Moench calyculata (L.) Moench alnifotia (Nutt.) Nutt. canadensis (L.) Medic.

Prunus amygdalus Batsch var. commutata Dipp.

Arctostaphylos spp. uva-ursi (L.) Spreng. angustifolia L .

Barberry
Barberry, Japanese
Barberry, common
Shepherdia
Buffalo-berry
Soapberry
Leatherleaf
Spiraea
Serviceberry
Saskatoon
Serviceberry
Almond
May-day tree
Lilac
Lilac
Bearberry
Bearberry, common
Currants and gooseberries

Rose
Labrador-tea
Russian-olive
Russian-olive
Cotoneaster

## B - Arranged Alphabetica1ly by Common Name

Common Name
gray green

Alder Alrus spp. 130
black glutinosa (L.) Gaertn.
132
common sermulata (Ait.) Willd. 137
Scientific Name
Code Name
incana (L.) Moench
133
crispa (Ait.) Pursh 131Common Name Scientific Name
Alder contd.
mountain
red
Sitka
speckled
whiteAlmondAppleArbutus
Ashblackblue
European
green
northern red
red
white
Aspen
largetooth
trembling
Balm of Gilead
Barberry
common
Japanese
Basswood
American
Beech
American
European
Bearberrycommon
Blue-beech
tenuifolia Nutt. ..... 13.9
mubra Bong. ..... 135
sinuata (Rege1) Rydb. ..... 138
rugosa (Du Roi) Spreng. var. americana (Rege1) Fern. ..... 136
rhombifolia Nutt. ..... 134
Prunus amygdalis Batsch ..... 520
Malus ..... 340
Arbutus
menziesii Pursh ..... 151
Fraxinus spp. ..... 250
nigra Marsh. ..... 253
quadrangulata Michx. ..... 257
excelsior L. ..... 252
pennsylvanica Marsh. var. subintegerrima (Vah1) Fern. ..... 256
pennsylvanica Marsh.
var. austini Fern. ..... 255
pennsylvanica Marsh. ..... 254
americana L. ..... 251
Populus
grandidentata Michx. ..... 308
tremuloides Michx. ..... 311
candicans Ait. ..... 306
Berberis spp. ..... 490
vulgaris L. ..... 492
thunbergii DC. ..... 491
Tilia spp. ..... 450
americana L. ..... 451
Fagus spp. ..... 240
grandifolia Ehrh. ..... 241
sylvatica L. ..... 242
ArctostaphyZos spp. ..... 535
uva-ursi (L.) Spreng. ..... 536
Carpinus spp. ..... 187caroliniana Walt.var. virginiana (Marsh.) Fern.188
Common NameScientific Name
Birch
Alaska whiteblueleafdwarf
European
Gaspé white
large-fruited white
mountain white
northern
northwestern white
swamp
sweet
water
weeping white
western white
white
wire
yellow
YukonBuckeyeBuckthorn
alderleafcommonalder
Buffalo-berry
ButternutCaraganapygmyRussianSiberianspiny
Betula spp. ..... 160 papyrifera Marsh.
var. humilis (Rege1) Fern. \& Raup. ..... 172
caerulea-grandis Blanch. ..... 162
glandulosa Michx. ..... 164
pendula Roth ..... 176
papyrifera Marsh. var. elobata (Fern.) Sarg. ..... 171
papyrifera Marsh. var. macrostachya Fern. ..... 173
papyrifera Marsh.
var. cordifolia (Regel) Fern. ..... 170
borealis Spach ..... 161
papyrifera Marsh.
var. subcordata (Rydb.) Sarg. ..... 175
pumila L. ..... 178
lenta L. ..... 165
occidentalis Hook. ..... 167
papyrifera Marsh. var. pensilis Fern. ..... 174
papyrifera Marsh. var. commutata (Rege1) Fern. ..... 169
papyrifera Marsh. ..... 168
populifolia Marsh. ..... 177
alleghaniensis Britt. ..... 166
eastwoodae Sarg. ..... 163
Aesculus spp. ..... 120
Rhamnus spp. ..... 370
alnifolia L'Her. ..... 371
cathartica L . ..... 372
frangula L. ..... 374
Shepherdia argentea Nutt. ..... 496
Juglans
cinerea L. ..... 276
Caragana spp. ..... 180
pygmaea DC. ..... 183
frutex K. Koch ..... 182
arborescens Lam. ..... 181
spinosa (L.) DC. ..... 184
Catalpa Catalpa spp. ..... 202Chinesehybrid
western
ovata G. Don ..... 204
hybrida Spaeth ..... 203
speciosa Warder ..... 205
Cascara
Cedar
eastern white
Lebanonnorthern red
western red
yellow
Cherry
bitterblack
black choke
eastern choke
pin
plum
western choke
ChestnutsweetChokeberryred
Coffee-tree
Kentucky
Cotoneaster
Cottonwoodblack
eastern
lanceleaf
narrowleaf
plains
Crab-apple
Pacificsweet wildwild
Cranberry, highbush Viburnum trilobum Marsh. ..... 484
312
Populus
trichocarpa Torr. \& Gray
307
deItoides Marsh.
301
acuminata Rydb.
303
angustifolia James
deltoides Marsh.
var. occidentalis Rydb. ..... 310
Malus
fusca (Raf.) Schneid. ..... 343
coronaria (L.) Mill. ..... 342
glaucescens Rehd. ..... 344
Rhamnuspurshiana DC.373
Cedrus, Chamaecyparis, Thuja spp. ..... 011, 013, 085
Thuja occidentalis L. ..... 086
Cedrus libani Loud. ..... 012
Juniperus virginiana L. var. crebra Fern. \& Grisc. ..... 027
Thuja plicata Donn ..... 087
Chamaecyparis nootkatensis (D. Don) Spach ..... 014
Prunus spp. ..... 320
emarginata (Doug1.) D. Dietr. ..... 323
serotina Ehrh. ..... 326
virginiana L .
var. melanocarpa (A. Ne1s.) Sarg. ..... 329
virginiana L . ..... 327
pennsylvanica L. f. ..... 325
cerasifera Ehrh. ..... 322
virginiana L. var. demissa (Nutt.) Torr. ..... 328
Castanea spp. ..... 200
dentata (Marsh.) Borkh. ..... 201
Aronia
arbutifolia (L.) E11. ..... 341
Gymnocladus spp. ..... 264
dioica (L.) K. Koch ..... 265
Cotoneaster spp. ..... 580

| Common Name | Scientific Name | Code Num |
| :---: | :---: | :---: |
| Cucumber-tree | Magnolia acuminata L . | 285 |
| Currant | Ribes spp. | 540 |
| Cypress | Cupressus spp. | 018 |
| Monterey | macrocarpa Gord. | 019 |
| Dogwood | Cornus spp. | 210 |
| alternate-1eaf | altermifolia L. f. | 212 |
| eastern flowering | florida L. | 214 |
| hybrid | acadiensis Fern. | 211 |
| red osier | stolonifera Michx. | 217 |
| roughleaf | drummondi C.A. Meyer | 213 |
| round-leaved | mugosa Lam. | 216 |
| western flowering | nuttallii Audubon | 215 |
| Douglas-fir | Pseudotsuga spp. | 070 |
| blue | menziesii (Mirb。) Franco |  |
|  | var. glauca (Beissn.) Franco | 072 |
| Douglas-fir | menziesii (Mirb.) Franco | 071 |
| E1der | Sambucus spp. | 440 |
| blueberry | glauca Nutt. | 442 |
| common | canadensis L. | 441 |
| red-berried | pubens Michx. | 443 |
| Elm | UZmus spp. | 460 |
| Siberian | pumila L. | 465 |
| English | procera Salisb. | 464 |
| rock | thomasii Sarg. | 467 |
| Scotch | montana Stokes | 463 |
| slippery | rubra Muh1. | 466 |
| white | americana L. | 461 |
| Wych | glabra Huds. | 462 |
| Chinese | parvifolia.Jacq. | 468 |
| Filbert, European | Corylus avellana L. | 224 |
| Fir | Abies (See also Douglas-fir) |  |
| alpine | Zasiocarpa (Hook.) Nutt. | 007 |
| amabilis | amabilis (Doug1.) Forb. | 002 |
| balsam | balsamea (L.) Mill. | 003 |
| bracted balsam | balsamea (L.) Mill. var. phanerolepis Fern. | 004 |
| grand | grandis (Doug1.) Lindl. | 006 |
| silver | concolor (Gord. \& Glend.) Lindi. | 005 |
| Ginkgo | Ginkgo |  |
|  | biZoba L. | 260 |

Common NameScientific Name
Gooseberry
Ribes spp. ..... 540
Liquidambar, Nyssa spp. ..... 278, 292
Nyssa sylvatica Marsh. ..... 293
Liquidambar styraciflua L. ..... 279
Celtis spp. ..... 206
occidentalis L. ..... 207
Crataegus spp. ..... 230
douglasii Lind1. ..... 233
columbiana Howel1 ..... 232
chrysocarpa Ashe ..... 231
Corytus spp. ..... 220
americana Walt. ..... 221
cornuta Marsh. ..... 223
californica K. Koch ..... 222
Hemlock
eastern
ground
mountain
western
Hickory
ashleaf shagbark
bitternut
Michigan red
mockernut
pignutroundnut red
shagbark
she11bark
Ho11y
CanadaEnglish
Honey-locust
Honeysuckle
American flybush
Tsuga, Taxus spp. ..... 090, 082
Tsuga canadensis (L.) Carr. ..... 091
Taxus canadensis Marsh. ..... 084
Tsuga martensiana (Bong。) Carr. ..... 093
Tsuga heterophylla (Raf.) Sarg. ..... 092
Carya spp. ..... 190
ovata (Mi11.) K. Koch
var. fraxinifolia Sarg. ..... 197
cordiformis (Wang.) K. Koch ..... 191
ovalis (Wang.) Sarg. var. borealis (Ashe) Sarg. ..... 194
tomentosa Nutt. ..... 198
glabra (Mi11.) Sweet ..... 192
ovalis (Wang.) Sarg. var. odorata (Marsh.) Sarg. ..... 195
ovata (Mi11.) K. Koch ..... 196
Zaciniosa (Michx. f.) Loud. ..... 193
Ilex spp. ..... 270
verticizlata (L.) Gray ..... 273
aquifolium L . ..... 271
Gleditsia spp. ..... 262
triacanthos L. ..... 263
Lonicera spp. ..... 475
canadensis Bertr. ..... 476
Diervilla Zonicera Mill. ..... 480

## Hop-tree

Horse-chestnut Aesculus
carnea Hayne121
Inkberry ILex
Ironwoodrough-barkedJuniper
common
creepingground
Irish
red
Rocky Mountain
Labrador-tea
Larch
alpine
European
JapaneseSibetianwestern
Laure1
great
Leatherleaf
Lilac
Linden
1arge-1eavedsma11-1eaved
Locust
black
clammy
Madrone
Ptelea spp. ..... 330
trifoliata L. ..... 331

hippocastanum L. 122
hippocastanum L.
glabra (L.) Gray ..... 272
Ostrya spp. ..... 294
virginiana (Mill.) K. Koch ..... 295
Juniperus spp. ..... 020
communis L. ..... 021
horizontalis Moench ..... 024
communis L. var. depressa Pursh ..... 022
commuis L. var. hibernica Gord. ..... 023
virginiana L. ..... 026
scopuZomm Sarg。 ..... 025
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Larix spp. ..... 030
Zyallii Parl. ..... 034
decidua Mill. ..... 031
leptolepis (Sieb. \& Zucc。) Rehd. ..... 033
siberica Ledeb. ..... 036
occidentalis Nutt. ..... 035Rhododendronmaximum L.377
Chamaedaphne calyculata (L.) Moench ..... 499
Syringa spp. ..... 530
vulgaris L. ..... 531
Tilia
platyphyZZos Scop. ..... 453
cordata Mil1. ..... 452
Robinia spp. ..... 390
pseudo-acacia L. ..... 391
viscosa Vent. ..... 392
Arbutus spp. ..... 150

| Common Name | Scientific Name | Code Numb |
| :---: | :---: | :---: |
| Magnolia | Magnolia spp. | 284 |
| Maple | Acer spp. | 100 |
| black | nigrum Michx. f. | 106 |
| broadleaf | macronhyllum Pursh | 103 |
| Douglas | glabrum Torr. <br> var. douglasii (Hook.) Dipp. | 102 |
| ginnala | ginnala Maxim. | 114 |
| inland Manitoba | ```negundo L. var. interius (Britt.) Sarg.``` | 105 |
| Manitoba | negundo L. | 104 |
| mountain | spicatum Lam. | 113 |
| Norway | platanoides L. | 108 |
| red | rubrum L. | 110 |
| silver | saccharinum L. | 111 |
| striped | pensylvanicum L. | 107 |
| sugar | sacchamum Marsh. | 112 |
| sycamore | pseudoplantanus L. | 109 |
| $v$ ine | circinatum Pursh | 101 |
| May-day tree | Prunus padus var. commututa Dipp. | 521 |
| Monkey tree | Auracaria spp. | 010 |
| Mountain-ash | Sorbus |  |
| American | americana Marsh. | 345 |
| European | aucuparia L. | 346 |
| showy | decora (Sarg.) Schneid. | 347 |
| Sitka | sitchensis Roem. | 349 |
| western | occidentalis (Wats.) Greene | 348 |
| Mountain-holly | Nemopanthus spp. | 290 |
| false | micronata (L.) Trel. | 291 |
| Mulberry | Morus spp. | 287 |
| red | mibra L. | 289 |
| white | $a l b a \mathrm{~L}$ 。 | 288 |
| Nanny berry | Viburnum lentago L. | 482 |
| Oak | Quercus spp. | 350 |
| black | velutina Lam. | 361 |
| bur | macrocarpa Michx. | 357 |
| chestnut | montana Willd. | 358 |
| chinquapin | muehZenbergii Enge1m. | 359 |
| Garry | garryana Doug1. | 356 |
| northern pin | ellipsoidalis E.J. Hill | 355 |
| pin | palustris Muenchh. | 360 |
| red | rubra L. | 353 |


| Common Name | Scientific Name | Code Numb |
| :---: | :---: | :---: |
| Oak contd. |  |  |
| scarlet | coccinea Muenchh. | 354 |
| swamp white | bicolor Willd. | 352 |
| white | alba L. | 351 |
| Osage-orange | Maclura |  |
|  | pomifera (Raf.) Schneid. | 283 |
| Pawpaw | Asimina spp. | 155 |
|  | triloba (L.) Dunal | 156 |
| Pine | Pinus spp. | 050 |
| Austrian | nigra Arn. | 058 |
| Balkan | peuce Griseb | 065 |
| cluster | pinaster Ait. | 066 |
| eastern white | strobus L. | 062 |
| jack | banksiana Lamb. | 052 |
| Japanese black | thunbergii Par1. | 064 |
| 1imber | flexilis James | 055 |
| lodgepole | contorta Doug1. |  |
|  | var. Zatifolia Engelm. | 054 |
| mugho | mugo Turra | 057 |
| pitch | rigida Mill. | 061 |
| ponderosa | ponderosa Laws. | 059 |
| red | resinosa Ait. | 060 |
| Scots | sylvestris L. | 063 |
| shore | contorta Doug1. | 053 |
| western white | monticola Doug1. | 056 |
| whitebark | albicaulis Engelm。 | 051 |
| Poplar balsam | Populus spp. | 300 |
| balsam | balsamifera L. | 304 |
| Carolina | eugenei Simon-Louis | 305 |
| Lombardy | nigra L. <br> var. italica Muenchh. | 309 |
| silver | $a l b a$ L. | 302 |
| Plane | Platanus |  |
| Lond on | acerifolia (Ait.) Milld. | 297 |
| Plum | Prunus |  |
| Canada | nigra Ait. | 324 |
| wild | americana Marsh. | 321 |
| Redbud | Cercis spp. | 208 |
|  | canadensis L. | 209 |
| Rhododendron | Rhododendron spp. | 376 |
| Rose | Rosa spp. | 560 |


| Common Name | Scientific Name | Code Number |
| :---: | :---: | :---: |
| Russian-olive | Elaeagnus spp. angustifolia L. | $\begin{aligned} & 575 \\ & 576 \end{aligned}$ |
| Savin creeping | Juniperus horizontalis Moench | 024 |
| Saskatoon | Amelanchier alnifolia (Nutt.) Nutt. | 511 |
| Sassafras red white | ```Sassafras spp. albidum (Nutt.) Nees var. molle (Raf.) Fern. albidum (Nutt.) Nees``` | 446 448 447 |
| Sequoia | Sequoia spp. | 080 |
| Serviceberry | Ame Zanchier spp. canadensis (L.) Medic. | $\begin{aligned} & 510 \\ & 512 \end{aligned}$ |
| Shepherdia | Shepherdia spp. | 495 |
| Soapberry | Shepherdia canadensis (L.) Nutt. | 497 |
| Spiraea | Spiraea spp. | 500 |
| Spruce | Picea spp. | 040 |
| black | mariana (Mill.) BSP. | 045 |
| Colorado | pugens Engelm. | 046 |
| Engelmann | enge Imannii Parry | 042 |
| Norway | abies (L.) Karst. | 041 |
| red | rubens Sarg. | 047 |
| Sitka western white | sitchensis (Bong.) Carr. <br> glauca (Moench) Voss <br> var. albertiana (S. Brown) Sarg. | 048 044 |
| white | glauca (Moench) Voss | 043 |
| Sumac | Ailanthus, Rhus, spp. | 126, 380 |
| Chinese | Ailanthus altissima (Mill.) Swingle | 127 |
| poison | Rhus vernix L. | 383 |
| smooth | Rhus glabra L. | 381 |
| staghorn | Rhus typhina L. | 382 |
| Sycamore | Platanus spp. occidentalis L . | $\begin{array}{r} 296 \\ .298 \end{array}$ |
| Tamarack | Larix laricina (Du Roi) K. Koch | 032 |
| Tree-of-heaven | Ailanthus spp. | 126 |
| Tulip-tree | Liriodendron spp. tulipifera L. | $\begin{aligned} & 280 \\ & 281 \end{aligned}$ |

Common NameScientific Name
Code Number
Tupello Nyssa spp. ..... 292
Viburnum Viburnum spp. ..... 481
Walnut Juglans spp. ..... 275
blackWild-rais inViburnum cassinoides L.483
Willowbalsambasketbay leafBebb
black
Coulter
coyote
crack
dusky
feltleaf
golden
hairy
heart-1eaved
hoary
Hooker
Mackenzie
northwest
Pacific
peachleaf
pussy
sandbar
scouler
serviceberry
shining
silky
Sitka
weeping
whiplash
white
yellow
Witch-haze1
Yew
western
SaZix spp。 ..... 400
pyrifolia Anderss. ..... 425
purpurea L. ..... 424
pentandra L. ..... 422
bebbiana Sarg. ..... 406
nigra Marsh. ..... 421
coulteri Anderss. ..... 410
exigua Nutt. ..... 412
fragilis L. ..... 413
melanopsis Nutt. ..... 420
alaxensis (Anderss.) Cov. ..... 401
$a l b a \mathrm{~L}$.
var. vitellina (L.) Stokes ..... 403
vestita Pursh ..... 430
cordata Michx. ..... 409
candida Flugge ..... 407
hookeriana Barratt ..... 414
mackenzieana (Hook.) Barratt ..... 419
sessilifolia Nutt. ..... 428
Zasiandra Benth. ..... 416
amygdaloides Anderss. ..... 404
discolor Muh1. ..... 411
interior Rowlee ..... 415
scouleriana Barratt ..... 426
pseudomonticola Ball ..... 423
lucida Muh1. ..... 417
sericea Marsh. ..... 427
sitchensis Sanson ..... 429
babylonica L. ..... 405
caudata (Nutt.) Heller ..... 408
alba L. ..... 402
lutea Nutt. ..... 418
Hamame ins spp. $^{\text {s }}$ ..... 266
virginiana L. ..... 267
Taxus spp. ..... 082
brevifolia Nutt. ..... 083


[^0]:    *Douglas-fir
    **Abies (spp.)

