PLANTATION ESTABLISHMENT

INSECT SURVEY

SUMMER 1990 - 1991

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rec'd 14.2.92

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SUMMMER 1990 - 91

Introduction

The survey was conducted in accord with directives in the CALM Insect Manual. Weekly monitoring of new plantings were performed by CALM staff primarily to assess the level of wingless grasshopper and budworm populations with the object of determining when appropriate measures of control were to be implemented. Data was collected from plantation managers by Simon Penfold then forwarded to Economic Entomology for collation and assesment.

There were a number of difficulties in assessing the data. These included:

1. Method for assessing populations of wingless grasshopper and budworm as described in the 1990 edition of the CALM manual was obviously not practical for plantation staff (see appendix I). Thus each manager adopted their own individual method; from recording populations as none (0), low (0 - 20), medium (20 - 50), high (>50), most common qualification in parentheses; to several other methods. Some rankings used a quadrat sampling method, some a plant row walking method, other methods were not clear. Thus population estimates of whatever nature were inconsistent and not comparible between observers.

   The data on wingless grasshopper and budworm therefore refer to the number of positive sightings not number of individuals.

2. The initial data gave no indication of any control measures implemented. This was because application to spray notices had not been included. This data implied that although insects were present in plantations their numbers were not high enough to justify control. However from a number of chemical control enquires directed to Economic Entomology (ex Nannup and Kirup) I knew this to be false. Also in the procedure for application to spray, the insect survey form for that week would accompany the application and thus be missing from the data. Only extensive enquiries enabled me to recover this information.

   Secondary to this problem was that applications to spray were often several for one site over a period of days. These sometimes listed different recommended insecticide treatments and sometimes not. It was difficult to determine whether such applications referred to one control treatment or several unsuccessful attempts. I assumed for the most part that they were singular treatments.

   I would therefore like to point out that the control data may be incomplete.

3. A few plantation forms included data for only 1 or 2 quadrats. Such data are unusable. Also very few forms had the reverse

pages on damage estimates completed (I. Abbott, personal communication).

4. Several forms referred to large numbers of spring beetles and weevils, but no specimens appear to have been collected. This means that these obsevations are useful only in a very general sense (I. Abbott, personal communication)

Results and Discussion

A total of 306 observations were taken from 36 plantations. Examining individual weekly records (table 1) wingless grasshopper was present in 57% of samples; budworm in 17%. Of the 13 eucalypt and mixed eucalypt plantations 62 observations were made in which 27% of records showed wingless grasshopper present; 19% of records showed spring beetle present; 6% of records had budworm present (only mixed pine and eucalypt).

Comparing plantations: 57% of all plantations were infested with budworm, 74% with wingless grasshopper (table 2). Despite the greater apparent infestation rate by wingless grasshopper most control measures were directed toward budworm (table 3). I suspect that the number of control operations for wingless grasshopper is an under-estimate since it was believed by plantation managers that the recommended control for this insect was not effective. Thus it is likely that in cases of high grasshopper numbers budworm was looked for to justify a more prefered spray regime. This problem has now been addressed with permission to use alphamethrin to control this insect (CALM insect manual, 1991, attachment 6A).

For control methods against other insects there is one record for locusts, two for garden weevil and one for spring beetle (table 3). However the control for spring beetle is an assumption as the target insect is not clear (see raw data summary p7, appendix III). It must be pointed out that for spring beetle, observation numbers and the number of control measures taken are not a reliable estimate of the incidence or impact of this insect on eucalypt plantations. The reason for this is the nature of the insect in relation to its episotic behaviour. This insect flies in swarms particularly during spring and early summer. Swarms of these insects will fly into a plantation on clear sunny days and can strip eucalypt seedlings of leaves within three to six hours (personal observation) then fly on. Thus even if a plantation manager is present during a feeding flight, by the time a control measure is organised the insects have left and the damage is done. Usually eucalypt plantations adjoining native forest are most affected. Comments from plantation managers indicate damage by spring beetles is substantial.

Comments

This was the first plantation establishment insect survey conducted by CALM and many of the problems in sampling and observation technique have now been overcome. The original sampling technique was essentially designed for agricultural cropping systems and proved ineffective when applied to tree seedlings. New sampling techniques (see appendix II) for budworm, wingless grasshopper and weevils have

been devised so that the '91 - '92 survey should give a more comprehensive guide to insect populations and damage. Also control for wingless grasshopper has now been adjusted to a more acceptable insecticide so that the '91 - '92 survey should give a more reliable indication of the impact of this insect.

Comparing tree species, the data indicates that new plantations of pine had more insect problems than those of eucalypts. However only 36% of the plantations surveyed contained eucalypts in which the frequency of observations were far less than those for pines; an average of 4.8 observations per eucalypt plantation compared to 10.7 observations per pine plantation (see table 1). Whether this is a reflection of a later planting date for eucalypts is not known.

Spring beetles were recorded in 46% of eucalypt plantations. All of the spring beetle records are from Manjimup District. Whether the greater apparent incidence of this insect in Manjimup is a function of the greater number of observations made per plantation (mean 5.3, mode 6.0, table 1) or the location is uncertain. As mentioned previously spring beetle attack is episotic and thus more frequent observations are more likely to result in a greater apparent incidence. It may be useful in future to include a question on spring beetle presence within ecalypt plantations in the Plantation Insect Survey.

late ?

Table 1

Plantation Insect Survey
Summer 1990 -91, summary of individual sample observations.

District	Block	Tree sp	n	WGH	% WGH	BW	% BW	SB	Wv	Insecticide Control
Albany	Cappelli	P	26	16	61	11	42		1	B 15/12/90
	Skijoring	P	27	16	59	9	33			B 15/12/90
	Horne	P&E	13	10	77	3	23		1	B 22/12/90
	Treeby	P	22	14	63	3	13			
	Ball	P	17	11	65	1	6			B&W21/11/90
										B 30/11/90
	Odea	E	11	9	81					
	WAWA1	P	7	3	42	1	14			
	WAWA2	P	11	6	55	1	9			B 14/12/90
	UPC	P	19	10	53	3	16			GW 28/11/90
										GW 21/12/90
	Johnson	P	13	10	77	4	31			B 22/12/90
	McWilliam	P	16	10	62	4	25			
	Dennis	P	18	12	67	1	6			
	Thorpe	P	12	9	75	1	8			
	Belrose	P	19	13	68	2	11			
	Milgraum	P	5	3	60					
	Lockhart	P	1	50						
	Wise	P	13	9	69	2	15			B 23/12/90
	Cantwell	P	3	2	67					
Manjimup	Dinnis	E	6	1	17			2		
	East	E	6	1	17			2		
	Johnson	E	6	2	33			1		L 08/01/91
	Phillip	E&P	7	1	14	1	14	2		SB 19/12/90
	Price	E	6	1	17			2		
	Hanekamp	P	6	1	17					
	Long	E	1					1		

OVER /-

Table 1 Cont.

District	Block	Tree sp	n	WGH	% WGH	BW	% BW	SB	Wv	Insecticide Control
Dwellingup	ALCOA	E	2							
	Wandellup	E	2							
Kirup	Ayer	E	1	1	100					
	Widdup	E	1							
	Robert	P	2	2	100	2	100			
	Brown	P	1			1	100			
	Ferndale F	P	1			1	100			
	Ferndale G	P	1			1	100			
	Southhampton	P	1							
	Grimwade	E	1							
Nannup	Maidment	P	1			1	100			B 26/12/90
Total			**306**	**174**	**57**	**53**	**17**	**10**		
	Euc	13	62	17 8/13	27	4	6	12	6/13	
	Pine		246	168	68	52	21			

Note:
n = number of observations (generally weekly) taken at each block. **P** = pine; **E** = Eucalyptus.
WGH = number of observations of wingless grasshopper
BW = number of observations of bud worm
SB = Number of observations of spring beetle
Wv = " " observations of unamed weevil
% WGH and BW is calculated as % of n for each block
These values do not represent discrete insect population levels.

For control data
"B" indicates control for budworm
"W" indicates control for wingless grasshoppper
"L" " " " locusts
"GW" " " " garden weevil

Table 2

Plantation Details
(number of plantations)

Pltn Type	# Pltn	BW	WG	% BW	% WG	*No B&W	** Cntrl
Euc	11	0	6		55	5	1
Pine	23	18	18	78	78	1	8
E&P	2	2	2	100	100	0	2
Total	**36**	**20**	**26**	**57**	**74**	**6**	**11**

* Plantations where budworm and wingless grasshopper were absent.
** Number of plantations where chemical controls were implemented.

Table 3

Control Records
(*number of controls implemeted)

Budwm	Wingl.GH	Gd.Wv	Spr.B	Locust	Total
9	1	2	1	1	13

* note comment 2 in introduction.

Appendix I

PLANTATION INSECT SURVEY

1. SITE INFORMATION

Location .....

Tree Species .....

Tree Age .....

Date .....

Name of Insect .....

Identified by .....

2. INSECT SURVEY

2.1 Wingless grasshopper and budworm

For **wingless grasshopper** and **budworm**, throw out at random 10 x 1m^2 quadrants and count the number of individuals of each species. A rapid and easy method to estimate the numbers of budworm is to carefully cut the plants from a 100cm x 100cm square and place in a large plastic bag. Shake the plants in the bag to dislodge the caterpillars and count those one to two centimetres long. This should be repeated ten times in different parts of the paddock until an estimate can be made.

Record of Survey (no. of individuals)

Sample No.	1	2	3	4	5	6	7	8	9	10
Wingless grasshopper										
Budworm										

2.2 Other injurious insect species

DAMAGE (circle whichever applicable)

Leaf	Shoot	Branch/Stem	Root
skeletonised	snipped off	broken	chewed
chewed	wilted	gnawed/girdled	dry
blisters	dead	holes	lesions
blotchy	deformed	galls	deformed
galls	other	scales	other
scales		other	
other (specify below)			

If leaf then: are the leaves affected

mature:	old	new
juvenile:	old	new

Damage Description: _____

_____

_____

_____

From CALM Insect Manual 1990

Appendix II

PLANTATION INSECT SURVEY

1. BUDWORM *(Helicoverpa punctigera)*

WEEVILS *(Phlyctinus callosus) (Listroderes difficilis)*

1.1. Site Information

Location .....

Tree Species .....

Tree Age .....

Insect Name .....

1.2. Survey Technique

Commencing the second week in October, randomly select lines of 20 trees (one line for every 20 hectares of plantation) and mark with pegs. This is necessary only for 1 year old plantations; although 2 year old plantations can be damaged.

Starting at weekly intervals, inspect the lines for the presence of budworms. When caterpillars are discovered on trees commence recording their numbers for each location on the form overleaf. Once budworms are recorded it is necessary to inspect plantations every 3 days.

When an average of 5 caterpillars are recorded in each row of 20 trees commence spraying.

Appendix II Cont.

PLANTATION INSECT SURVEY

2. WINGLESS GRASSHOPPER

2.1. Site Information

Location .....

Tree Species .....

Tree Age .....

2.2. Survey Technique

Begin inspecting plantations in September. At random intervals estimate the number of nymphs to every square metre. Record your estimate on the form overleaf. Also record if damage to trees is occurring.

Eucalypt plantations are more susceptible to damage by wingless grasshopper than pine plantations.

2.3. Method of Recording

Estimate of numbers: Few (F) 0 - 30m^2 Moderate (M) 30 - 100m^2 Dense (D) >100m^2

Level of damage: Nil (0); Light (1); Moderate (2); Severe (3)

No damage (0) is when insects may or may not be present but no damage to trees is evident.

Light damage (1) is where obvious damage to foliage is apparent; however, <10% of the foliage is affected.

Moderate damage (2) is when 10% - 50% of the foliage is affected. Some shoots may have been removed.

Severe damage (3) is when >50% of the foliage is affected, shoots have been removed and some damage to the stems is occurring.

Example:

Location No.	1		2		3		4		5		6		7		8	
	i	ii	i	ii	i	ii	i	ii	i	ii	i	ii	i	ii	i	ii
DATE: 22.3.91	F	O	M	O	D	1	D	2	M	1	M	O	F	O	M	1

from CALM insect Manual 1991

APPENDIX III

Raw Data
Report Summary

Appendix III
Raw Data Summary Report.

PLANTATION SURVEY-INSECTS
SUMMER 1990 - 1991

PLOT	DATE	*BDWORM	**WL GH	CTRL	OTHER	COMMENTS
** DISTRICT ALBANY						
BALL	03/10/90	0.0	0	N		
BALL	10/10/90	0.0	L	N		
BALL	22/10/90	0.0	0	N		
BALL	31/10/90	0.0	0	N		
BALL	13/11/90	0.0	0	N		
BALL	13/11/90	0.0	L	N		
BALL	19/11/90	0.0	0	N		
BALL	28/11/90	1.2	L	Y	CATPL ?	CATERPILLAR UNIDENTIFIED
BALL	05/12/90	0.0	L	N		
BALL	12/12/90	0.0	L	N		
BALL	18/12/90	0.0	L	N		
BALL	20/12/90	0.0		Y		APPL TO SPRAY NOT SURVY REC
BALL	31/12/90	0.0	M	N		
BALL	16/01/91	0.0	M	N		
BALL	16/01/91	0.0	M	N		
BALL	22/01/91	0.0	L	N		
BALL	29/01/91	0.0	L	N		
BALL	11/02/91	0.0	L	N		
BELROSE	05/10/90	0.0	0	N		
BELROSE	18/10/90	0.0	0	N		
BELROSE	24/10/90	0.0	0	N		
BELROSE	14/11/90	0.0	0	N		
BELROSE	20/11/90	0.0	0	N		
BELROSE	27/11/90	0.0	L	N		
BELROSE	04/12/90	0.0	0	N		
BELROSE	12/12/90	0.0	L	N		DATE_GUESSED
BELROSE	17/12/90	0.0	L	N		
BELROSE	20/12/90	0.0	L	N		
BELROSE	26/12/90	1.6	L	N		
BELROSE	02/01/91	0.2	L	N		
BELROSE	08/01/91	0.0	M	N		
BELROSE	14/01/91	0.0	L	N		
BELROSE	17/01/91	0.0	L	N		
BELROSE	17/01/91	0.0	L	N		
BELROSE	30/01/91	0.0	L	N		
BELROSE	05/02/91	0.0	L	N		
BELROSE	12/02/91	0.0	L	N		
CANTWELL	10/10/90	0.0	0	N		
CANTWELL	19/12/90	0.0	L	N		
CANTWELL	03/01/91	0.0	L	N		
CAPELLI	04/10/90	0.0	0	N		
CAPELLI	10/10/90	0.0	0	N		
CAPELLI	15/10/90	0.0	0	N		
CAPELLI	22/10/90	0.0	0	N		
CAPELLI	31/10/90	0.0	0	N		
CAPELLI	03/11/90	0.6	M	N		
CAPELLI	14/11/90	0.0	0	N		BD MOTH SEEN

* 99.9 in Budworm refers to no record of population numbers

** Wingless Grasshopper recorded as Low, Medium, High

PLANTATION SURVEY-INSECTS
SUMMER 1990 - 1991

PLOT	DATE	BDWORM	WL	GH	CTRL	OTHER	COMMENTS
CAPELLI	19/11/90	0.8		0	N		
CAPELLI	22/11/90	0.6		0	N		
CAPELLI	26/11/90	0.0		0	N		
CAPELLI	28/11/90	0.0		L	N		
CAPELLI	30/11/90	0.2		L	N		
CAPELLI	05/12/90	0.8		L	N	WEVL	50%TREE INF WEVL n10
CAPELLI	07/12/90	0.4		L	N		
CAPELLI	10/12/90	1.3		LM	N		
CAPELLI	12/12/90	1.1		L	N		
CAPELLI	14/12/90	34.5		L	Y		SMPL_N=8,
CAPELLI	21/12/90	0.0		0	N		
CAPELLI	31/12/90	0.0		0	N		
CAPELLI	03/01/91	0.0		L	N		
CAPELLI	09/01/91	0.0		L	N		
CAPELLI	15/01/91	0.0		L	N		
CAPELLI	15/01/91	0.0		L	N		
CAPELLI	18/01/91	0.0		L	N		
CAPELLI	24/01/91	0.0		L	N		
CAPELLI	29/01/91	0.0		L	N		
CAPELLI	11/02/91	0.0		L	N		
DENNIS	05/10/90	0.0		0	N		
DENNIS	09/10/90	0.0		0	N		
DENNIS	15/10/90	0.0		0	N		
DENNIS	24/10/90	0.0		0	N		
DENNIS	29/10/90	0.0		0	N		
DENNIS	14/11/90	0.0		M	N		WGH MEAN-37
DENNIS	20/11/90	0.0		0	N		
DENNIS	27/11/90	0.2		L	N		
DENNIS	04/12/90	0.0		L	N		
DENNIS	17/12/90	0.0		M	N		WG_SMPL_N=5
DENNIS	26/12/90	0.0		M	N		
DENNIS	02/01/91	0.0		M	N		
DENNIS	08/01/91	0.0		H	N		
DENNIS	14/01/91	0.0		L	N		
DENNIS	17/01/91	0.0		M	0	BLK.H.CAT	WGH_DAM_PL_EDGE
DENNIS	30/01/91	0.0		M	N		
DENNIS	05/02/91	0.0		M	N		
DENNIS	12/02/91	0.0		M	N		POORREC
HORNE	10/10/90	0.0		0	N		
HORNE	19/10/90	0.0		0	N		
HORNE	22/10/90	0.0		0	N		
HORNE	31/10/90	0.0		L	N		
HORNE	13/11/90	0.0		0	N		
HORNE	05/12/90	0.5		LM	N	EVL&BLCAT	
HORNE	10/12/90	0.3		L	N		
HORNE	18/12/90	0.1		L	N		
HORNE	20/12/90	0.0			Y		APPL TO SPRAY NOT SURVY
HORNE	31/12/90	0.0		L	N		
HORNE	16/01/91	0.0		M	N		

PLANTATION SURVEY-INSECTS
SUMMER 1990 - 1991

PLOT	DATE	BDWORM	WL	GH	CTRL	OTHER	COMMENTS
HORNE	16/01/91	0.0	M		N		
HORNE	22/01/91	0.0	L		N		
HORNE	29/01/91	0.0	L		N		
HORNE	11/02/91	0.0	L		N		
JOHNSON	03/10/90	0.0	0		N		
JOHNSON	30/10/90	0.0	0		N		
JOHNSON	19/11/90	0.0	0		N		
JOHNSON	28/11/90	0.4	L		N		
JOHNSON	10/12/90	0.6	M		N		
JOHNSON	19/12/90	2.5	LM		Y		BUDWORM, SPRAY
JOHNSON	31/12/90	0.0	M		N		
JOHNSON	16/01/91	0.0	M		N		
JOHNSON	16/01/91	0.0	M		N		
JOHNSON	22/01/91	0.0	L		N		
JOHNSON	29/01/91	0.0	L		N		
JOHNSON	11/02/91	0.0	M		N		
JOHNSON	03/11/91	1.2	M		N		
LOCKHART	15/10/90	0.0	0		N		
LOCKHART	03/01/91	0.0	L		N		
MCWILLIAM	05/10/90	0.0	0		N		
MCWILLIAM	18/10/90	0.0	0		N		
MCWILLIAM	24/10/90	0.0	0		N		
MCWILLIAM	29/10/90	0.0	0		N		
MCWILLIAM	14/11/90	0.0	0		N		
MCWILLIAM	20/11/90	0.0	0		N		
MCWILLIAM	27/11/90	0.0	L		N		
MCWILLIAM	05/12/90	0.8	L		N		DATE GUESSED
MCWILLIAM	11/12/90	0.1	L		N		
MCWILLIAM	17/12/90	0.0	M		N		
MCWILLIAM	20/12/90	0.9	LM		N		
MCWILLIAM	08/01/91	0.0	L		N		
MCWILLIAM	14/01/91	0.0	L		N		
MCWILLIAM	30/01/91	0.0	M		N		
MCWILLIAM	05/02/91	0.0	M		N		
MCWILLIAM	12/02/91	0.0	M		N		poor_record
MILGRAUM	16/10/90	0.0	0		N		
MILGRAUM	22/11/90	0.0	0		N		
MILGRAUM	03/01/91	0.0	L		N		
MILGRAUM	19/01/91	0.0	L		N		
MILGRAUM	24/01/91	0.0	L		N		
ODEA	03/10/90	0.0	0		N		
ODEA	10/10/90	0.0	0		N		
ODEA	22/10/90	0.0	0		N		
ODEA	28/11/90	0.0	L		N		
ODEA	05/12/90	0.0	L		N		
ODEA	18/12/90	0.0	LM		N		
ODEA	16/01/91	0.0	M		N		
ODEA	16/01/91	0.0	M		N		
ODEA	22/01/91	0.0	L		N		
ODEA	29/01/91	0.0	L		N		

PLANTATION SURVEY-INSECTS
SUMMER 1990 - 1991

PLOT	DATE	BDWORM	WL	GH	CTRL	OTHER	COMMENTS
ODEA	11/02/91	0.0	L		N		
SKIJORING	04/10/90	0.0	0		N		
SKIJORING	10/10/90	0.0	0		N		
SKIJORING	16/10/90	0.0	0		N		
SKIJORING	24/10/90	0.0	0		N		
SKIJORING	31/10/90	0.0	0		N		
SKIJORING	03/11/90	4.1	M		N		BD METH STRANGE
SKIJORING	05/11/90	3.0	M		N		BD METH STRANGE
SKIJORING	14/11/90	0.0	0		N		BD MOTH SEEN
SKIJORING	22/11/90	0.0	0		N		MOTHS PRESENT
SKIJORING	26/11/90	0.0	0		N		
SKIJORING	28/11/90	0.2	L		N		
SKIJORING	30/11/90	0.1	L		N		BD 2/60 TREES
SKIJORING	07/12/90	3.5	0		N		
SKIJORING	10/12/90	5.6	L		N		BD_METH_STRANGE
SKIJORING	12/12/90	3.2	L		N		
SKIJORING	14/12/90	31.0	L		Y		SMPL_N=7, SPRAYED
SKIJORING	21/12/90	0.0	L		N		
SKIJORING	31/12/90	0.0	0		N		
SKIJORING	04/01/91	0.0	L		N		
SKIJORING	09/01/91	0.0	L		N		
SKIJORING	15/01/91	0.0	L		N		
SKIJORING	15/01/91	0.0	L		N		
SKIJORING	18/01/91	0.0	L		N		
SKIJORING	24/01/91	0.0	L		N		
SKIJORING	29/01/91	0.0	L		N		
SKIJORING	11/02/91	0.0	M		N		
THORPE	03/10/90	0.0	0		N		
THORPE	30/10/90	0.0	0		N		
THORPE	22/11/90	0.0	M		N		
THORPE	26/11/90	0.0	0		N		
THORPE	04/01/91	0.0	L		N		
THORPE	15/01/91	0.0	L		N		
THORPE	15/01/91	0.0	L		N		
THORPE	18/01/91	0.0	L		N		
THORPE	24/01/91	0.0	L		N		
THORPE	30/01/91	0.0	L		N		
THORPE	11/02/91	0.0	L		N		
THORPE	18/12/91	0.1	L		N		
TREEBY	04/10/90	0.0	0		N		
TREEBY	10/10/90	0.0	0		N		
TREEBY	16/10/90	0.0	0		N		
TREEBY	24/10/90	0.0	0		N		
TREEBY	31/10/90	0.0	0		N		
TREEBY	03/11/90	0.0	L		N		
TREEBY	16/11/90	0.0	0		N		
TREEBY	20/11/90	0.0	0		N		
TREEBY	22/11/90	0.0	0		N		
TREEBY	26/11/90	0.0	L		N		
TREEBY	10/12/90	0.1	M		N		

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PLOT	DATE	BDWORM	WL	GH	CTRL	OTHER	COMMENTS
TREEBY	19/12/90	2.2	M		N		
TREEBY	21/12/90	0.2	L		N		
TREEBY	04/01/91	0.0	L		N		
TREEBY	09/01/91	0.0	L		N		
TREEBY	15/01/91	0.0	L		N		
TREEBY	15/01/91	0.0	L		N		
TREEBY	18/01/91	0.0	L		N		
TREEBY	24/01/91	0.0	L		N		
TREEBY	30/01/91	0.0	L		N		
TREEBY	11/02/91	0.0	M		N		
U.P.C.	05/10/90	0.0	0		N		
U.P.C.	15/10/90	0.0	0		N		
U.P.C.	24/10/90	0.0	0		N		
U.P.C.	29/10/90	0.0	0		N		
U.P.C.	10/11/90	0.0	0		N	WEVL	WEVL 50/2YR,20/1YR
U.P.C.	14/11/90	0.0	0		N		BD MOTH SEEN
U.P.C.	22/11/90	0.0			Y	WEVL	APPL TO SPRAY NOT SURVY REC
U.P.C.	27/11/90	1.3	L		Y	WEVL	GARDEN WEVL, SPRAY
U.P.C.	04/12/90	0.0	0			WEVL	GDN WEVL/TR 12 n=10
U.P.C.	06/12/90	0.0	L		N		
U.P.C.	13/12/90	0.0	0		N		
U.P.C.	17/12/90	0.0	L		N		
U.P.C.	20/12/90	3.2	L		N		BD_SMPL_N=14
U.P.C.	21/12/90	0.0			Y	WEVL	APPL TO SPRAY NOT SURVY REC
U.P.C.	02/01/91	0.0	0		N		
U.P.C.	08/01/91	0.0	L		N		
U.P.C.	14/01/91	0.0	L		N		
U.P.C.	17/01/91	0.0	L		N		
U.P.C.	30/01/91	0.0	L		N		
U.P.C.	05/02/91	0.0	M		N		
U.P.C.	12/02/91	0.0	L		N		POORREC
WAWA1	18/10/90	0.0	0		N		
WAWA1	01/11/90	0.0	0		N		
WAWA1	20/11/90	0.0	0		N		
WAWA1	02/01/91	0.0	0		N		WGH_DAM_E.G
WAWA1	14/01/91	0.0	L		N		
WAWA1	17/01/91	0.0	L		N		
WAWA2	05/10/90	0.0	0		N		
WAWA2	18/10/90	0.0	0		N		
WAWA2	25/10/90	0.0	0		N		
WAWA2	01/11/90	0.0	0		N		
WAWA2	13/11/90	0.0	0		N		
WAWA2	13/11/90	0.0	0		N		
WAWA2	20/11/90	0.0	L		N		
WAWA2	06/12/90	1.3	LM		N		WGH EATING TREES
WAWA2	13/12/90	12.9	L		Y		DOMINEX 14/12
WAWA2	02/01/91	0.0	L		N		E.G_DAM_WGH
WAWA2	08/01/91	0.0	M		N		

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PLOT	DATE	BDWORM	WL	GH	CTRL	OTHER	COMMENTS
WAWA2	14/01/91	0.0	L		N		
WAWA2	17/01/91	0.0	L		N		
WISE	10/10/90	0.0	0		N		
WISE	30/10/90	0.0	0		N		
WISE	26/11/90	0.0	0		N		
WISE	07/12/90	1.0	L		N		
WISE	20/12/90	0.0			Y		APPL TO SPRAY NOT SURV REC
WISE	21/12/90	5.8	M		N		WG&B_SMPL_n=5
WISE	04/01/91	0.0	L		N		
WISE	15/01/91	0.0	L		N		
WISE	15/01/91	0.0	L		N		
WISE	18/01/91	0.0	L		N		
WISE	24/01/91	0.0	L		N		
WISE	29/01/91	0.0	L		N		
WISE	11/02/91	0.0	L		N		
** Subtotal **		129.7					
** DISTRICT DWELLINGUP							
ALCOA	15/11/90	0.0	0		N		
ALCOA	13/12/90	0.0	0		N		TRAGE < 12
WANDALUP	15/11/90	0.0	0		N		
WANDALUP	13/12/90	0.0	0		N		TRAGE <12
** Subtotal **		0.0					
** DISTRICT KIRUP							
AYERS	12/12/90	0.0	L		N		TRAGE <12
BROWN	11/12/90	4.0	0		N		SMPL N=1,TRAGE<12
FERNDALE F	11/12/90	6.0	0		N		SMPL N=2,TRAGE<12
FERNDALE G	11/12/90	6.0	0		N		SMPL N=2,TRAGE<12
GRIMWADE	12/12/90	0.0	0		N		TRAGE <12
ROBERT	11/12/90	4.0	5		N		SMPL N=2
ROBERT	10/01/91	1.0	L		S		WG&B_TICK_IN_BOX
SOUTHAMPTN	11/12/90	0.0	0		N		TRAGE<12
WIDDUP	12/12/90	0.0	0		N		TRAGE<12
** Subtotal **		21.0					
** DISTRICT MANJIMUP							
DINIS	31/10/90	0.0	0		N		
DINIS	08/11/90	0.0	0		N		
DINIS	14/11/90	0.0	0		N		
DINIS	20/11/90	0.0	0		N	SPR BTL	
DINIS	28/11/90	0.0	0		N	SPR BTL	
DINIS	05/12/90	0.0	L		N		
EAST	08/11/90	0.0	0		N		
EAST	14/11/90	0.0	0		N		
EAST	20/11/90	0.0	0		N	SPR BTL	

PLANTATION SURVEY-INSECTS
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PLOT	DATE	BDWORM	WL	GH	CTRL	OTHER	COMMENTS
EAST	28/11/90	0.0	0		N	SPR BTL	
EAST	28/11/90	0.0	0		N	SPR BTL	
EAST	05/12/90	0.0	L		N		
HANEKAMP	31/10/90	0.0	0		N		
HANEKAMP	08/11/90	0.0	0		N		
HANEKAMP	14/11/90	0.0	0		N		
HANEKAMP	22/11/90	0.0	0		N		BD MOTHS PRESENT
HANEKAMP	28/11/90	0.0	0		N	SPR BTL	
HANEKAMP	05/12/90	0.0	L		N		
HANEKAMP	18/12/90	0.9	0		N		
JOHNSONS	31/10/90	0.0	0		N		
JOHNSONS	08/11/90	0.0	0		N		
JOHNSONS	14/11/90	0.0	0		N	SPR BTL	DAM IN TR=50,PL<10
JOHNSONS	22/11/90	0.0	0		N		
JOHNSONS	28/11/90	0.0	H		N		WG 100-200/mm
JOHNSONS	05/12/90	0.0	L		N		
JOHNSONS	08/01/91	0.0	H		Y	PL LOCUST	CTRL DOMINEX
LONG	04/10/90	0.0			N	SB,WE,SC,P	SPRING BEETLE 75% DAM,WEVL,
PHILLIPN	28/09/90	0.0	0		N	SPR BTL	100 BTL PER TREE
PHILLIPN	18/12/90	2.7	0		Y		CTRL DOMINEX,19/12
PHILLIPM	31/10/90	0.0	0		N		
PHILLIPM	08/11/90	0.0	0		N		
PHILLIPM	14/11/90	0.0	0		N		
PHILLIPM	22/11/90	0.0	0		N		BD MOTHS PRESENT
PHILLIPM	28/11/90	0.0	0		N	SPR BTL	DAMAGE MINOR
PHILLIPM	05/12/90	0.0	L		N		
PRICE	31/10/90	0.0	0		N		
PRICE	08/11/90	0.0	0		N		
PRICE	14/11/90	0.0	0		N		
PRICE	20/11/90	0.0	0		N	SPR BTL	
PRICE	28/11/90	0.0	0		N	SPR BTL	
** Subtotal **		3.6					
** DISTRICT NANNUP							
MAIDMENTS1	26/12/90	99.9	0		Y		DAM 100%,SPRAYED DOMINEX
MAIDMENT4	18/12/90	99.9			Y		SPRY DOMINEX
MAIDMENT3	18/12/90	99.9			Y		SPRY DOMINEX
MAIDMENT2	18/12/90	99.9			Y		DOMINEX
** Subtotal **		399.6					
*** Total ***		553.9					