



Mulgrave cane growers strategic grub management implementing BSES decision-making tools

by
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SD10001

**SRDC Grower Group Innovation Project
Milestone Report**

SRDC project number:	GGP029
Project title:	Mulgrave cane growers strategic grub management implementing BSES decision-making tools.
Group name:	Mulgrave Cane Grub Management Group
Contact person:	Jeffrey Day
Milestone number:	5
Due date for milestone:	01 May 2009
SRDC Funding:	\$15,000
Workplan criteria:	Assessment of 2009 grub status and prediction of next year's population trend.

Project objectives:

- Implementation of a regional grub monitoring system developed in Mulgrave during 2003-2006 by BSES, with improvements in the accuracy of predictions;
- Provision of advice on district-wide grub trends to group members to assist with grub management decisions;
- Testing of a farm-level monitoring and prediction service that could be used to make field-by-field decisions, by interested growers;
- Implementation of a regional approach to managing the grub problem by participating growers in addition to individual efforts;
- Increased adoption of grub IPM strategies in Mulgrave;
- Participating growers making well-informed decisions on when, where and what to treat, thus minimising pesticide use and crop losses.
- Increased revenue plus reduced input costs with environmental and social benefits (reduction of chemical use in a Wet Tropics Region).

Milestone Achievement

Achievement Criterion 1: Validating predictions made in 2008

Table 1 shows grub monitoring results for 2009. Five plots were discontinued due to either replanting or fallow planting in 2008, while four new plots were included in 2009 to keep the total number of monitoring plots more or less stable over the years. In total, 246 grubs were found by digging 20 holes in each of 41 plots across Mulgrave, giving an average of 6.0 grubs per plot (0.3 grubs/stool). This is almost double the regional average for 2008 (0.17 grubs/stool), indicating that the regional grub population is on the increase. However, the regional average is still relatively low, and in the presence of a good monitoring system, growers are advised to act quickly as soon as a rise in grub numbers or in damage levels is predicted.

Table 1. Grub monitoring results for 2009 in Mulgrave (DOA = Dead on arrival, DNC = Dead not collected, F = *Lepidiota frenchi*)

Site	District	Name	Farm No	Blk	08-09	Var	1st ins.	2nd ins.	3rd ins.	Total collected	DOA	(Total - DOA)	DNC	Total found	F
1	Sandy Ck	Amadio, Steve	106	7-1	3R	Q200	0	1	7	8	0	8	0	8	3
2	Sandy Ck	Amadio, Steve	106	8-1	RP	Q186	0	0	0	0	0	0	0	0	0
3	Sandy Ck	Arcidiacono, John	856	5-1	2R	Q220	0	0	2	2	0	2	0	2	1
4	Meringa	Bacalakis, Theo	231	3-1	2R	Q166	0	2	0	2	0	0	0	2	0
5	Meringa	Bacalakis, Theo	231	1-1	2R	Q186	0	1	0	1	0	0	0	1	0
6	Mulgrave	Castini, John	73	17-2	2R	Q200	1	1	6	8	2	6	1	9	1
7	Sawmill Pkt	CEC- Formside	33	4-1	3R	Q200	0	1	11	12	2	10	0	12	0
8	Green Hill	Day, Jeff	78	8-1a	3R	MXD	0	1	0	1	0	1	1	2	1
9	Pine Ck	Day, Jeff	78	17-1	RP	Q200	0	0	5	5	1	4	1	6	0
10	Pine Ck	Day, Jeff	78	17-2	3R	Q167	0	1	0	1	0	1	0	1	0
11	Pine Ck	Dillon, Jim	82	1-2	3R	Q186	0	0	0	0	0	0	0	0	0
12	Green Hill	Downing, Ron	67	4-3	2R	MXD	1	1	0	2	0	2	0	2	0
13	Sawmill Pkt	Ferrando, John	270	5-5	3R	Q200	0	0	1	1	0	1	0	1	0
14	Behana G	Giacomi, Michael	313	19-5	3R	Q200	0	0	0	0	0	0	0	0	0
15	Behana G	Giacomi, Michael	313	10-1	2R	Q218	0	0	2	2	0	2	0	2	0
16	Green Hill	Greenwood, Andrew	58	3-2	SPAYOUT										
17	Sawmill Pkt	Hussey, Don	17	12-2	FALLOW										
18	Sawmill Pkt	Hussey, Don	17	14-5	3R	MXD	0	0	0	0	0	0	0	0	0
19	Sandy Ck	Johnson, H	434	22-1	2R	Q229	0	2	8	10	4	6	0	10	0
20	Simmonds Ck	Morellini, David	64	6-1	2R	Q200	0	1	1	2	0	2	0	2	0
21	Aloomba	Rossi Mark	413	8-1A	3R	Q200	2	1	2	5	2	3	0	5	0
22	Aloomba	Rossi Mark	413	8-1B	3R	Q300	0	3	2	5	1	4	0	5	1
23	Aloomba	Rossi Mark	413	8-2	3R	Q186	0	2	2	4	0	4	0	4	0
24	Sandy Ck	Thomason, Ross	779	19-1	2R	Q186	0	1	1	2	0	2	0	2	1
25	Aloomba	Volpi, Vince	220	6-1	2R	Q200	0	0	3	3	1	2	0	3	0
26	Sawmill Pkt	Veronese, John	18	1-1	2R	Q200	0	5	29	34	10	24	0	34	2
27	Sawmill Pkt	Veronese, John	18	2-1	2R	Q200	0	6	24	30	7	23	1	31	0
28	Pine Ck	Wah Day, David	827	8-3	2R	Q200	0	0	0	0	0	0	0	0	0
29	Pine Ck	Wah Day, David	827	5-1	2R	Q127	0	4	2	6	1	5	0	6	0
30	Barbagello	Wienert, Viv	853	22-2	2R	Q200	0	2	19	21	4	17	0	21	0
31	Pine Ck	Day, Jeff	78	6-1	4R	Q200	0	16	19	35	3	32	2	37	0
32	Pine Ck	Day, Jeff	78	11-1	4R	Q200	0	0	0	0	0	0	0	0	0
33	Pine Ck	Day, Jeff	78	13-7	2R	Q200	0	0	0	0	0	0	0	0	0
34	Pine Ck	Dillon, Jim	82	1-3	REPLANT										
35	Pine Ck	Dillon, Jim	82	8-5	3R	MXD	0	1	16	17	5	12	0	17	3
36	Pine Ck	Dillon, Jim	82	8-6	3R	Q186	0	0	4	4	1	3	0	4	1
37	Green Hill	Downing, Ron	67	8-1	REPLANT										
38	Green Hill	Downing, Ron	67	8-2b	FALLOW										
39	Green Hill	Downing, Ron	67	4-1	3R	MXD	0	1	1	2	0	2	0	2	5
40	Sawmill Pkt	Ferrando, John	270	4-4	2R	Q186	0	0	0	0	0	0	0	0	1
41	Sawmill Pkt	Ferrando, John	270	4-5	4R	MXD	0	0	0	0	0	0	0	0	2
42	Sawmill Pkt	Ferrando, John	270	4-7	5R	Q138	0	1	1	2	1	1	0	2	4
43	Green Hill	Greenwood, Andrew	58	1-3	2R	Q166	0	0	0	0	0	0	0	0	0
44	Meringa	Bacalakis, Theo	66	4-3	2R	Q166	0	0	0	0	0	0	0	0	0
45	Sawmill Pkt	Hussey, Don	17	7-2	2R	Q220	0	1	5	6	2	4	0	6	0
46	Pine Ck	Day, Jeff	78	8-1b	3R	MXD	0	1	6	7	2	5	0	7	1
Total							4	57	179	240	49	188	6	246	27

Figure 1 compares grub numbers in 2008 and in 2009 in plots that received chemical treatment in 2008, while Figure 2 compares 2009 results only in plots that have not been treated in 2008. Where fields have been treated, a general decline in grub numbers is obvious, while the opposite is true in most cases for fields that have not been treated. It needs to be indicated here that “not treating” can still be the correct decision - that is when the prediction indicates low grub numbers in the following year that do not necessitate treatment, provided that a monitoring program is in place and that the grower will promptly treat if the prediction is for a significant rise in grub numbers or damage.

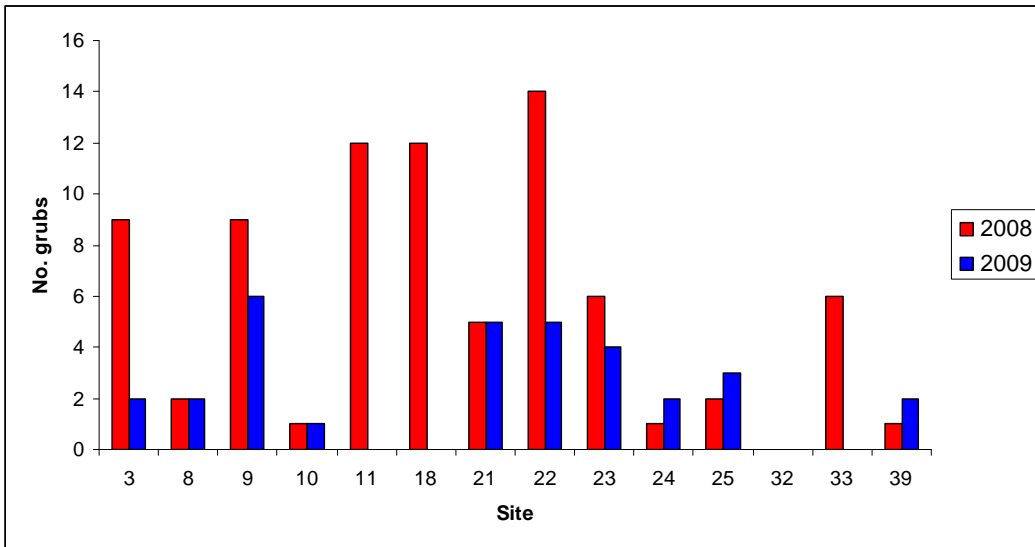


Figure 1 Comparison of grub numbers in 2008 and 2009 in monitoring plots that received chemical treatment in 2008.

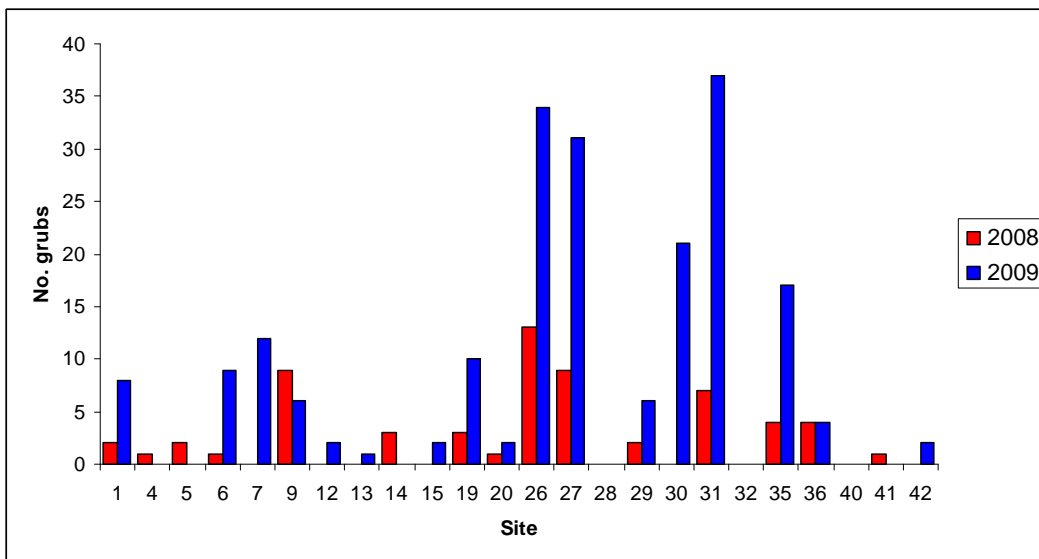


Figure 2 Comparison of grub numbers in 2008 and 2009 in monitoring plots that did not receive chemical treatment in 2008.

Table 2 compares predicted grub numbers (based on the prediction model) to the observed grub numbers based on actual field monitoring. Only fields that received no chemical treatment in 2008 were used to validate the model. Figure 3 shows the correlation between predicted and observed grub numbers. There was a moderate correlation between the two sets of values ($R^2=0.42$), indicating a degree of “soundness” to the model, but more work is still needed to improve the model’s accuracy.

Table 2 Comparison of 2008-predicted versus 2009-observed grub numbers in untreated fields in Mulgrave.

Site	District	Name	Farm No	Blk	Predicted grub no.	Observed grub no.
1	Sandy Ck	Amadio, Steve	106	7-1	0.13	0.4
4	Meringa	Bacalakis, Theo	231	3-1	0.11	0.1
5	Meringa	Bacalakis, Theo	231	1-1	0.14	0.05
6	Mulgrave	Castini, John	73	17-2	0.11	0.45
7	Sawmill Pkt	CEC- Formside	33	4-1	0.04	0.6
9	Pine Ck	Day, Jeff	78	17-1	0.37	0.3
12	Green Hill	Downing, Ron	67	4-3	0.07	0.1
13	Sawmill Pkt	Ferrando, John	270	5-5	0.07	0.05
14	Behana G	Giacomi, Michael	313	19-5	0.1	0
15	Behana G	Giacomi, Michael	313	10-1	0.04	0.1
19	Sandy Ck	Johnson, H	434	22-1	0.1	0.5
20	Simmonds Ck	Morellini, David	64	6-1	0.06	0.1
26	Sawmill Pkt	Veronese, John	18	1-1	0.29	1.7
27	Sawmill Pkt	Veronese, John	18	2-1	0.25	1.55
28	Pine Ck	Wah Day, David	827	8-3	-0.02	0
29	Pine Ck	Wah Day, David	827	5-1	0.14	0.3
30	Barbagello	Wienert, Viv	853	22-2	0.07	1.05
31	Pine Ck	Day, Jeff	78	6-1	0.33	1.85
32	Pine Ck	Day, Jeff	78	11-1	0.07	0
35	Pine Ck	Dillon, Jim	82	8-5	0.2	0.85
36	Pine Ck	Dillon, Jim	82	8-6	0.2	0.2
40	Sawmill Pkt	Ferrando, John	270	4-4	0.07	0
41	Sawmill Pkt	Ferrando, John	270	4-5	0.06	0
42	Sawmill Pkt	Ferrando, John	270	4-7	0.03	0.1

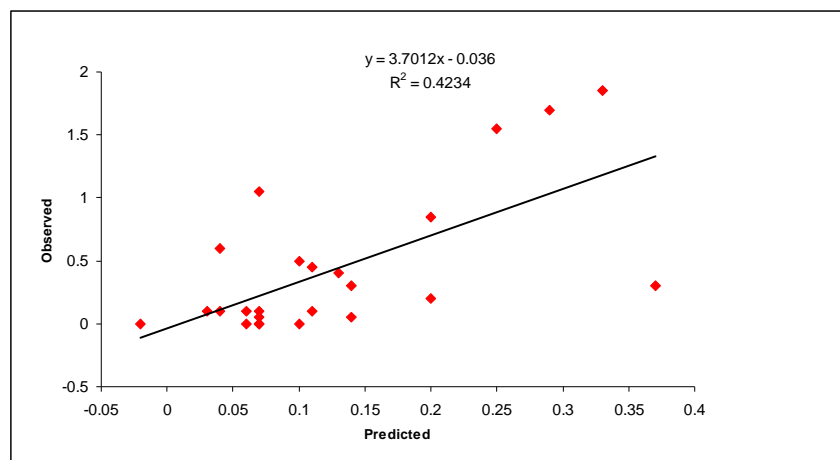


Figure 3 2008-predicted versus 2009-observed grub numbers in untreated monitoring fields in Mulgrave.

It is hoped that Dr. Frank Drummond from the University of Maine who assisted in the development of the prediction models will be able to visit Australia in November 2009, and an application for a TLOP to be conducted by Dr. Drummond has been submitted to SRDC. One of his main activities would be to use these recent results in further improvement of the model. However, a number of models were used in 2008 before advising growers whether to treat or not to treat for 2009. The main focus was on models that relied on damage prediction rather than prediction of grub numbers, and it does appear that those models gave better indications. Validation of those models in 2009 will not be feasible until all signs of damage appear in monitoring fields (which is usually in June-July), and when all collected grubs have been examined for pathogen levels, mainly the *Adelina* pathogen. Currently, collected grubs are being bred in the laboratory to examine levels of *Adelina*, *Metarhizium* and Milky disease as well as unknown mortality factors. Again, these data will be used to further improve the model.

Achievement Criterion 2: Beetle activity in 2008/09 across Mulgrave mill area

On 12 March 2009, damage on alexandria and coconut palm fronds due to feeding by greyback adult beetles was recorded for selected palms or palm groups in Mulgrave. Damage ratings from 0 – 3 were used and average damage calculated for each region. Although these results are not required by any of the prediction models, they are presented here in case they become useful in future versions of the models (Table 3).

Achievement Criterion 3: Records of grub damage and pesticide use across Mulgrave in 2008

Detailed data on 2008 grub damage in Mulgrave were included in the previous milestone report which contained a map of Mulgrave showing all damaged plots. In this report, Table 4 shows an estimation of the total area treated by either suSCon Blue, suSCon Maxi or Confidor Guard as well as grub damage in 2008 in Mulgrave as assessed by the Mulgrave Cane Productivity Service. According to these data, 1112.35 ha of plant cane have received Confidor Guard treatment. This indicates that a large proportion of growers prefer to apply Confidor Guard, being an easier chemical to use and also cheaper than suSCon Maxi. It needs to be noted here that growers tend to believe that Confidor Guard will result in 2-year protection, which is a risky assumption. Growers are consistently advised that Confidor Guard is likely to only result in 1-year protection, but it might appear that the chemical gives longer term protection if all growers in a region have been treating regularly causing the grub population to decline significantly. This in turn may lead growers to assume that the chemical is still active in the ground. Such issues are always discussed at GrubPlan workshops where advice is given to growers on a case-by-case basis.

Achievement Criterion 4: Further advice on grub status in 2009 on 2-3 blocks on 20 farms

Advice on grub status in all farms was completed in Milestone 4 report which included detailed grub damage maps. In the current milestone, all monitoring sites are combined in one table including individual extra blocks that were used to advise growers on a block-by-block basis (Table 1).

Achievement Criterion 5: Predictions for 2010

Based on the available data on grub numbers in 2009, the population trend compared with 2008 results in each monitoring block is indicated in Table 5. However, accurate prediction of grub status in 2010 will not be feasible until August - September 2009 when the full extent of grub damage is obvious in the field and when all collected grubs have been examined for pathogens. Meetings with individual growers are an integral part of this project and advice on grub status and prediction is conveyed through either face to face meetings or GrubPlan workshops, which will take place as soon as prediction results are available.

Environmental Impact:

The use of alternative management options and strategic application of insecticides is likely to have a positive impact on the environment.

Communication and Adoption of Outputs:

GrubPlan workshops are scheduled to start as soon as prediction results are available in August – September 2009. Growers will be advised on the regional grub population and damage trend as well as on a block by block basis for selected growers.

Proposed changes:

Nil

Confidentiality:

Growers need to agree to provide BSES with their farm maps. The distribution of farm maps is restricted.

Other Matters:

Nil

Table 3

Rating of regional tree damage by adult greyback beetles in 2009

Area	Road number	Coordinates		Trees	Damage rating in individual trees										Total	Av.	Regional average	
		South	East		1	2	3	4	5	6	7	8	9	10				
Aloomba	49 Hesp Rd.	17.07.033	145.49.827	2C, 1A	1	2	1									4	1.333	
Aloomba	89 Hesp Rd.	17.07.149	145.49.514	8A	1	1	0	0	0	0	0	1				3	0.375	
Aloomba	Cnr Moller / Vohland Rd.	17.07.853	145.50.414	2C	2	1										3	1.5	
Aloomba	226 Moller Rd.	17.07.772	145.50.088	1C	1											1	1	
Aloomba	232 Moller Rd.	17.07725	145.50.379	1C	1											1	1	
Aloomba	334 Moller Rd.	17.07.217	145.50.187	1C	1											1	1	
Aloomba	350 Moller Rd.	17.07.118	145.50.157	1C, 2A	1	0	0									1	0.333	
Aloomba	96 Bennett Rd.	17.06.891	145.50.659	6A	1	1	0	1	0	1						4	0.667	
Aloomba	133 Bennett Rd.	17.06.857	145.50.876	1A	1											1	1	
Aloomba	177 Bennett Rd.	17.06.728	145.57.072	2C	1	1										2	1	
Aloomba	Fixter Rd.	17.06.690	145.50.051	4C	1	1	1	1								4	1	
Aloomba	90 Kenny Rd.	17.06.408	145.50.400	7C	1	1	1	1	0	0	1					5	0.714	
Aloomba	99 Kenny Rd.	17.06.404	145.50.441	2C	1	1										2	1	
Aloomba	122 Kenny Rd.	17.06.316	145.50.534	4C	1	1	1	1								4	1	
Aloomba	156 Kenny Rd.	17.06.175	145.50.645	4C	1	1	1	1								4	1	
Aloomba	35 Banna Rd.	17.06.191	145.48.890	2C, 3A	1	0	0	0	0							1	0.2	
Aloomba	23 Banna Rd.	17.06.200	145.48.886	1C	2											2	2	0.95
Behana Gorge	24 Behana Gorge Rd.	17.07.793	145.49.333	10C	2	2	2	2	2	1	1	1	1	1		15	1.5	
Behana Gorge	204 J. Rossi Dr.	17.08.716	145.49.398	1A, 3C	0	0	0	0								0	0	
Behana George	372 Behana Gorge Rd.	17.09.490	145.49.670	2C	0	0										0	0	0.50
Highleigh	360 Highleigh Rd.	17.04.955	145.48.755	2A	1	1										2	1	
Highleigh	4 Richardson Rd.	17.05.385	145.49.493	7A	1	0	0	0	0	1	1					3	0.429	
Highleigh	56-58 Richardson Rd.	17.05.074	145.49.560	3C, 4A	0	0	0	0	1	1	0					2	0.286	
Highleigh	53 Nucifora Acc.	17.04.508	145.50.094	3A	1	0	0									1	0.333	
Highleigh	102 Nucifora Acc.	17.04.193	145.50.173	1C, 2A	2	1	1									4	1.333	
Highleigh	100 Nucifora Acc.	17.04.263	145.50.164	3C	1											1	1	0.73
Green Hill	13 Green Hill Rd.	17.02.667	145.48.885	2A	1	1										2	1	
Green Hill	220 Green Hill Rd.	17.02.691	145.49.323	1A	2											2	2	
Green Hill	243 Green Hill Rd.	17.02.665	145.49.439	2C	2	2										4	2	
Green Hill	244 Green Hill Rd.	17.02.660	145.49.466	3A	2	0	1									3	1	
Green Hill	407 Green Hill Rd.	17.02.550	145.50.163	1C	1											1	1	
Green Hill	Brown Rd - Dillon	17.01.137	145.49.349	4A	0	0	1	1								2	0.5	
Green Hill	Brown Rd - Brown's	17.02.022	145.49.777	5A	0	1	0	0	0							1	0.2	
Green Hill	197 Gray Rd	17.02.059	145.49.192	2A	2	2										4	2	
Green Hill	Day's pump shed	17.02.043	145.48.840	2A	2	2										4	2	
Green Hill	Day's house	17.02.109	145.48.632	1C	2											2	2	1.37
Pine Ck	40 Nebbia Rd.	17.01.108	145.49.230	4A	0	0	0	1								1	0.25	
Pine Ck	63 Nebbia Rd.	17.01.239	145.49.322	6C	2	1	1	1	1	0						6	1	
Pine Ck	Pine Ck. Bridge	16.59.741	145.49.186	2C	0	0										0	0	

Pine Ck	Wah Day Ck.	16.58.188	145.48.813	1C, 1A	2	1									3	1.5	
Pine Ck	Falls Ck.	16.58.862	145.48.787	1C	1										1	1	
Pine Ck	1288 Yarrabah Rd.	16.58.468	145.48.633	3C	0	0									0	0	
Pine Ck	1462 Yarrabah Rd.	16.57.570	145.49.558	2C	0	1									1	0.5	
Pine Ck	1673 Yarrabah Rd.	16.56.550	145.48.975	2C	2	1									3	1.5	0.72
Meringa	97 Castlereagh	17.04.575	145.45.965	1C	1										1	1	
Meringa	Bacalakis shed	17.04.500	145.45.910	1C	0										0	0	0.50
Sawmill Pocket	34 Mt. Peter Rd.	17.02.728	145.44.546	3A	1	0	0								1	0.333	
Sawmill Pocket	412 Mt. Peter Rd.	17.03.136	145.44.421	2A	0	0									0	0	
Sawmill Pocket	428 Mt. Peter Rd.	17.03.277	145.44.406	2A	0	0									0	0	
Sawmill Pocket	Mohammed Access Rd.	17.03.495	145.44.880	1C	1										1	1	
Sawmill Pocket	Harold Rd.	17.03.582	145.44.355	2C, 6A	1	1	1	0	0	0	0	0			3	0.375	
Sawmill Pocket	72 Hussey Rd.	17.03.930	145.44.032	5A	1	1	0	0	0						2	0.4	
Sawmill Pocket	209-211 Maitland Rd.	17.04.070	145.45.100	4C	1	0	0	0							1	0.25	
Sawmill Pocket	105 Maitland Rd.	17.03.887	145.45.234	2A	1	0									1	0.5	
Sawmill Pocket	137 Maitland Rd.	17.03.988	145.45.461	3C	2	1	1								4	1.333	
Sawmill Pocket	90 Maitland Rd.	17.03.706	145.45.706	3C	1	0	1								2	0.667	0.49

Table 4 Pesticide usage and area damaged by greyback cane grubs (ha) in Mulgrave in 2008

suSCon Blue	suSCon Maxi	Confidor Guard		Grub Damage (Light)	Grub Damage (Heavy)
		On ratoons	On plant cane		
43.15	277.05	104.41*	1112.35	49.64	16.73

* This figure maybe an underestimation of treatment. Not all growers provided data on ratoon treatment in 2008.

Table 5 Greyback canegrub population trend in 2009

Site	District	Name	Total 2008	Total 2009	Treated in 2008?	Trend
1	Sandy Ck	Amadio, Steve	2	8	N	Increasing
2	Sandy Ck	Amadio, Steve	0	-	-	-
3	Sandy Ck	Arcidiacono, John	9	2	Y	Decreasing
4	Meringa	Bacalakis, Theo	1	2	N	Slightly increasing
5	Meringa	Bacalakis, Theo	2	1	N	Slightly decreasing
6	Mulgrave	Castini, John	1	9	N	Increasing
7	Sawmill Pkt	CEC-Formsisde	0	12	N	Increasing
8	Green Hill	Day, Jeff	2	2	Y	Static
9	Pine Ck	Day, Jeff	9	6	N	Decreasing
10	Pine Ck	Day, Jeff	1	1	Y	Static
11	Pine Ck	Dillon, Jim	12	0	Y	Decreasing
12	Green Hill	Downing, Ron	0	2	N	Increasing
13	Sawmill Pkt	Ferrando, John	0	1	N	Increasing
14	Behana G	Giacomi, Michael	3	0	N	Decreasing
15	Behana G	Giacomi, Michael	0	2	N	Increasing
16	Green Hill	Greenwood, Andrew	2	-	-	-
17	Sawmill Pkt	Hussey, Don	2	-	-	-
18	Sawmill Pkt	Hussey, Don	12	0	Y	Decreasing
19	Sandy Ck	Johnson, H	3	10	N	Increasing
20	Simmonds Ck	Morellini, David	1	2	N	Slightly increasing
21	Aloomba	Rossi Mark	5	5	Y	Static
22	Aloomba	Rossi Mark	14	5	Y	Decreasing
23	Aloomba	Rossi Mark	6	4	Y	Decreasing
24	Sandy Ck	Thomason, Ross	1	2	Y	Slightly increasing
25	Aloomba	Volpi, Vince	2	3	Y	Slightly increasing
26	Sawmill Pkt	Veronese, John	13	34	N	Increasing
27	Sawmill Pkt	Veronese, John	9	31	N	Increasing
28	Pine Ck	Wah Day, David	0	0	N	Static
29	Pine Ck	Wah Day, David	2	6	N	Increasing
30	Barbagello	Wienert, Viv	0	21	N	Increasing
31	Pine Ck	Day, Jeff	7	37	N	Increasing
32	Pine Ck	Day, Jeff	0	0	Y	Static
33	Pine Ck	Day, Jeff	6	0	Y	Decreasing
34	Pine Ck	Dillon, Jim	4	-	Y	-
35	Pine Ck	Dillon, Jim	4	17	N	Increasing
36	Pine Ck	Dillon, Jim	4	4	N	Static
37	Green Hill	Downing, Ron	0	-	-	-
38	Green Hill	Downing, Ron	2	-	-	-
39	Green Hill	Downing, Ron	1	2	Y	Slightly increasing
40	Sawmill Pkt	Ferrando, John	0	0	N	Static

41	Sawmill Pkt	Ferrando, John	1	0	N	Decreasing
42	Sawmill Pkt	Ferrando, John	0	2	N	Increasing
43	Green Hill	Greenwood, Andrew	-	0	Y	-
44	Meringa	Bacalakis, Theo	-	0	Y	-
45	Sawmill Pkt	Hussey, Don	-	6	N	-
46	Pine Ck	Day, Jeff	0	7	N	Increasing
Total			143	246		