

## CARAWAY / CONTROL OF CARAWAY MOTH (*DEPRESSARIA DAUCELLA*)

**Study directors:** Erja Huusela-Veistola and Jarmo Ketola

Trial ID	Variety	Location	Experimental starting and completion
I-12-091-06	Sylvia	Jokioinen	May 24 <sup>th</sup> and December 15 <sup>th</sup> 2012

**Purpose of trial:** To test efficacy of chemical control of Karate 2.5 WG (*lambda-cyhalothrin 25 g/kg a.i.*) against caraway moth applied at different growth stages on caraway.

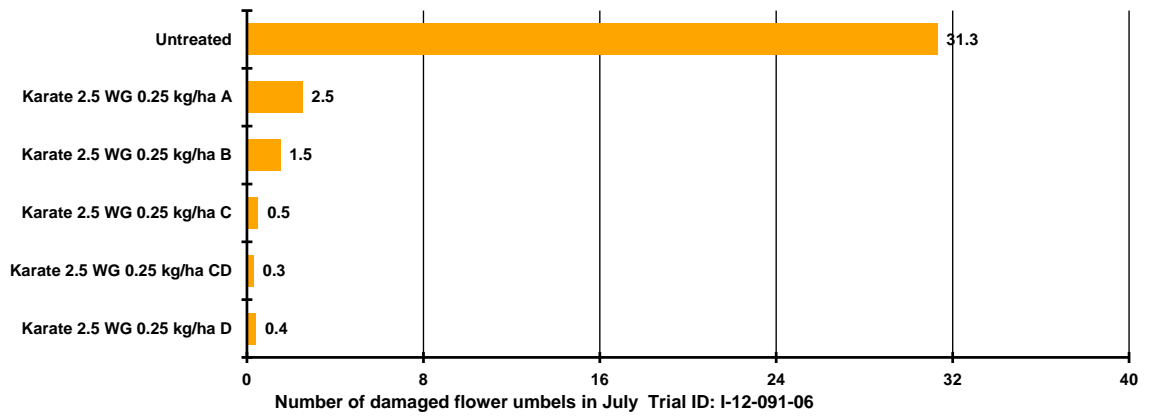
### SUMMARY

Insecticide Karate 2.5WG (*lambda-cyhalothrin 25 g/kg*) at 0.25 kg/ha was tested in the efficacy trial in 2012. The product was tested as a foliar spraying with the volume rate 300 l/ha. The trial was a continuation of an insecticide trials with Decis EW 50 Mega at 0.15 l/ha (*deltamethrin 50 g/l*) against caraway moth in 2010 and Karate 2.5 WG at 0.25 kg/ha in 2011. In the trial the sprayings were made once to twice per treatment with five different timings. The timings of the sprayings in both trials were the followings:

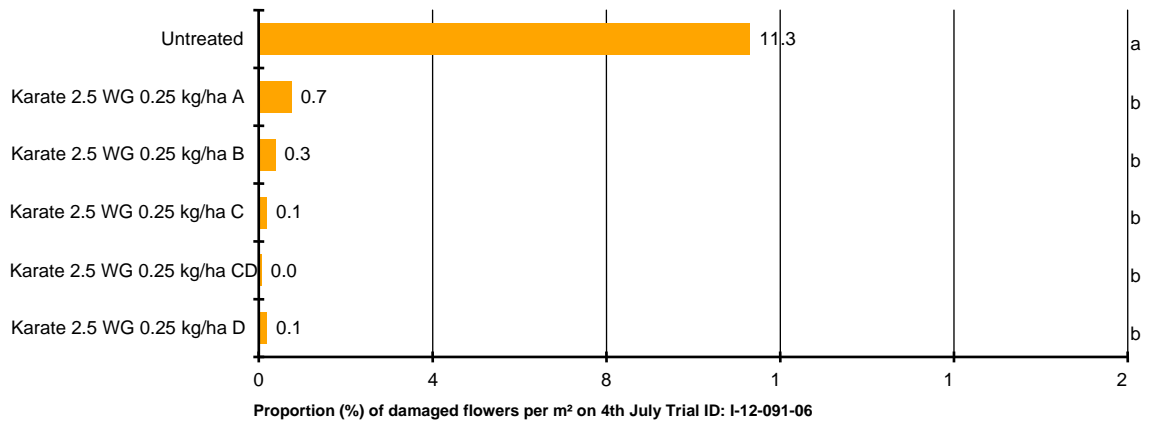
Year 2012: Application code and date	Descriptive growth stage at application	Effective Temperature Sum at application	Crop height cm
A: 23.5.2012	Flower buds < 10% visible	138.6°C	8-10
B: 25.5.2012	Flower buds visible 30 %	158.6°C	10-16
C: 29.5.2012	Flower buds visible 70 %	191.4°C	25
D: 31.5.2012	Flower buds visible 95 %	199.2°C	35

The timings in 2012 were fixed as beforehand to presume the most potential stage of caraway moth for the application by *lambda-cyhalothrin 6.25 g/ha (a.i.)*. An untreated control was included in the trial. The trial was located in the field in Somero. The number of flowers damaged by caraway moth larvae was counted per net plot area (4x0.5 m<sup>2</sup>) in July (Figure 1 & 2). The damaged plant stems (%) of caraway moth were assessed after harvest in August (Figure 3). The yield was harvested on the 27<sup>th</sup> of July (Figure 4). The thousand seed weight (Figure 6) and hectolitre weight (Figure 7) were assessed from the sorted yield (Figure 5). Percentage and number of damaged flower umbels were log transformed prior to analysis as necessary to satisfy conditions of normality and homogeneity of variance. Log-transformed values are used in tables, but original means are presented in the figures.

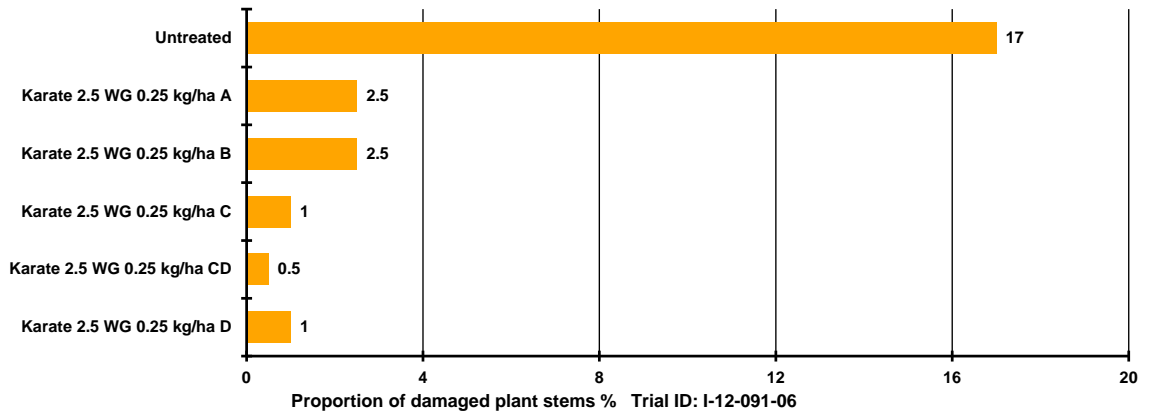
The number of adults of caraway moth was low in the trial field. First small larvae of caraway moth were detected 23<sup>rd</sup> May in Jokioinen, and all applications were done after that. The efficacy of insecticide treatments in damage level compared to control was clear. The proportion of damaged plant stems was statistically significantly higher in the untreated (17 %) compared with all other treatments (0.5-2.5 %). There were also statistically significantly higher numbers of damaged flower umbels in the untreated (31.3/m<sup>2</sup>) than in all other treatments (0.3-2.5/m<sup>2</sup>). Nevertheless, no statistically significant differences in any yield components were detected between the untreated and treated plots. The yield level was quite low, between 618 and 664 kg/ha. The hectolitre weight varied from 46.8 kg to 7.4 kg and the thousand seed weight was between 4.330 and 4.442 g. All insecticide applications were done during quite short period (approx. one week) before flowering of caraway, and no differences were gained compared with the timings. By delaying insecticide treatment just before the flowering is possible to have only one application time, at least in a situation when the pressure of caraway moth is low.



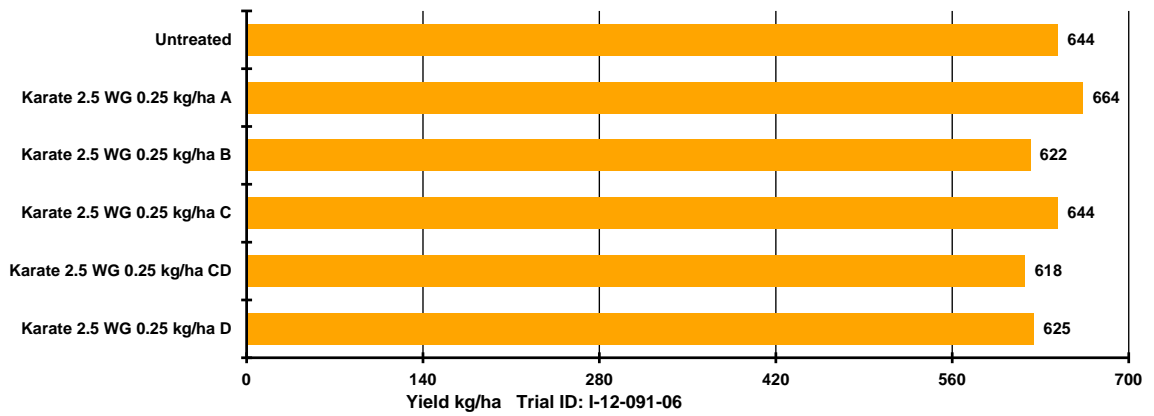
**Figure 2.** Number of damaged flower umbels per square meter in July 2012.



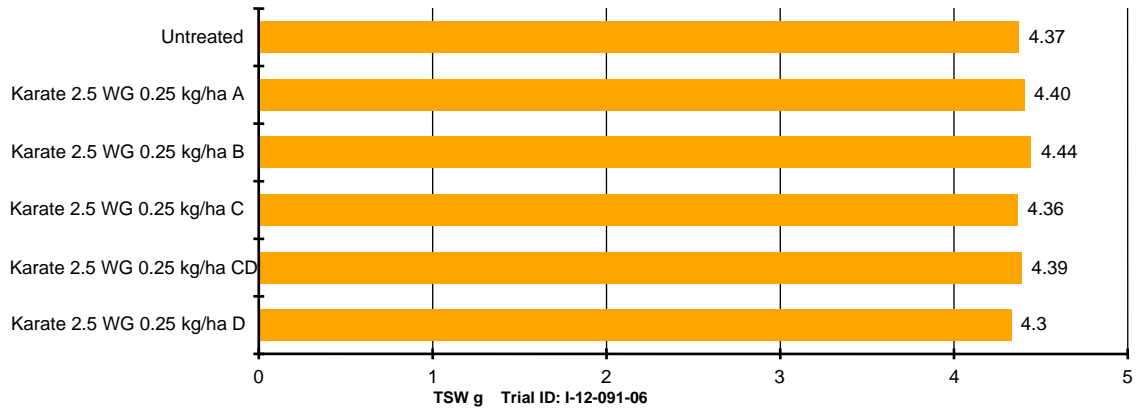
**Figure 3.** Proportion of damaged flowers per square meter in June 2012.



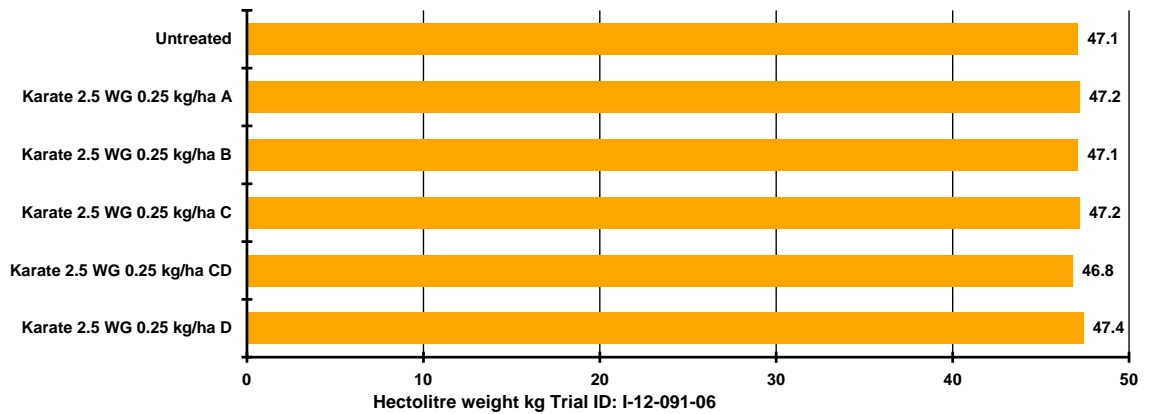
**Figure 4.** Proportion of damaged plant stems by the larvae of *D. daucella* after harvest.



**Figure 5.** Yield of caraway in 2012.



**Figure 6.** Thousand seed weight (g) 2012.



**Figure 7.** Hectolitre weight (kg) 2012.

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Trial ID: I-12-091-06      Protocol ID: I-12-091-06  
 Location: Somero      Study Director: Erja Huusela-Veistola, Jarmo Ketola  
 Project ID:      Investigator: Jarmo Ketola  
 Sponsor Contact:

Trt No.	Treatment Name	Form Conc	Form Type	Lot Code	Rate	Rate Unit	Appl Code
1	Untreated						
2	Karate 2.5 WG -lambda-cyhalothrin	25 25	WG	L109129	0.25 6.25	kg/ha g AI	A
3	Karate 2.5 WG -lambda-cyhalothrin	25 25	WG	L109129	0.25 6.25	kg/ha g AI	B
4	Karate 2.5 WG -lambda-cyhalothrin	25 25	WG	L109129	0.25 6.25	kg/ha g AI	C
5	Karate 2.5 WG -lambda-cyhalothrin	25 25	WG	L109129	0.25 6.25	kg/ha g AI	CD
6	Karate 2.5 WG -lambda-cyhalothrin	25 25	WG	L109129	0.25 6.25	kg/ha g AI	D

Replications: 4, Untreated treatments: 1, Conduct under GLP/GEP: Yes (GEP with no protection), Design: Randomized Complete Block (RCB), Treatment units: Treated 'Plot' experimental unit size, Dry Form. Unit: g/kg, Treated 'Plot' experimental unit size Width: 2.5 meters, Treated 'Plot' experimental unit size Length: 8 meters, Application volume: 300 L/ha, Mix size: 3 liters, Format definitions: G-AII7.def, G-AII7.frm

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 Sponsor Contact:

### General Trial Information

**Study Director:** Erja Huusela-Veistola & Jarmo Ketola  
**Investigator:** Jarmo Ketola      **Title:** Research Scientist

**Discipline:** I insecticide  
**Initiation Date:** 8/5/12    **Planned Completion Date:** 15/12/12

### Trial Location

**City:** Jokioinen    **Latitude of LL Corner °:** 60.74214 N  
**Longitude of LL Corner °:** 23.43291 E  
**Postal Code:** 31600  
**Country:** FIN Finland  
**Map Reference:** WGS84

**Conducted Under GEP:** Yes

No.	Guideline	Description
1.	PP 1/152(3)	Design and analysis of efficacy evaluation trials
2.	PP 1/181(3)	Conduct and reporting of efficacy evaluation trials including GEP

### Objectives:

To test efficacy of Karate 2.5 WG (lambda-cyhalothrin 25 g/kg) against caraway moth (*Depressaria daucella*) on caraway.

### Personnel

**Study Director:** Erja Huusela-Veistola & Jarmo Ketola  
**Affiliation:** MTT Agrifood Research Finland  
**Address:** Plant Production Research  
**Location:** Jokioinen, Finland  
**Postal Code:** FI-31600  
**Investigator:** Jarmo Ketola      **Title:** Research Scientist  
**Affiliation:** MTT Agrifood Research Finland  
**Address:** Laboratorium, Uutetie 1  
**Location:** Jokioinen, Finland  
**Postal Code:** FI-31600      **E-mail:** jarmo.ketola@mtt.fi  
**Phone No.:** +358 29 531 7343

### Crop Description

**Crop 1:** CRYCA Carum carvi      **Caraway, common**  
**Variety:** Niederdeuzer  
**BBCH Scale:** BDIC  
**Planting Method:** DRILLE drilled      **Planting Date:** 28/5/10  
**Depth, Unit:** 1 cm      **Rate, Unit:** 25 kg/ha  
**Row Spacing, Unit:** 12.5 cm  
**Seed Bed:** FINE fine  
**Soil Moisture:** SLIWET slightly wet, moist  
**Harvest Date:** 7/8/12      **Harvest Equipment:** Sampo  
**Harvested Width, Unit:** 2 m      **Harvested Length, Unit:** 7.5 m

### Pest Description

**Pest 1 Type:** I    **Code:** DEPRSP *Depressaria* sp.  
**Common Name:** *Depressaria* sp.  
**Description:** Kuminakoi

### Site and Design

**Plot Width, Unit:** 2.5 m      **Site Type:** FIELD field  
**Plot Length, Unit:** 8 m  
**Plot Area, Unit:** 20 m<sup>2</sup>      **Tillage Type:** CONTIL conventional-till  
**Replications:** 4      **Study Design:** RACOB� Randomized Complete Block (RCB)

No.	Previous Crop	Year
1.	Spring wheat	2009
2.	Barley	2008

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### Maintenance

No.	Date	Maintenance Treatment Name
1.	15/6/10	Afalon + Boxer
2.	31/5/11	Fenix
3.	15/8/11	Matrigon
4.	31/5/12	Matrigon
5.	31/5/11	Karate 2.5 WG
6.	5/6/11	Karate 2.5 WG

### Soil Description

**Texture:** SC sandy clay  
**pH:** 6.2  
**Fert. Level:** G good  
**Soil Drainage:** G good

### Moisture and Weather Conditions

**Overall Moisture Conditions:** VERWET very wet  
**Closest Weather Station:** Jokioinen      **Distance, Unit:** 7.2 km

### Application Description

	A	B	C	D
<b>Application Date:</b>	23/5/12	25/5/12	29/5/12	31/5/12
<b>Time of Day:</b>	13:50	9:30	11:00	13:00
<b>Application Method:</b>	spray	spray	spray	spray
<b>Application Placement:</b>	foliar	foliar	foliar	foliar
<b>Applied By:</b>	JK ER JKo	JK ER JKo	JK ER JKo	JK ER JKo
<b>Air Temperature, Unit:</b>	22.4 C	19 C	14.3 C	12.8 C
<b>% Relative Humidity:</b>	24	33	34	34
<b>Wind Velocity, Unit:</b>	0.1 M/S	0 M/S	0 M/S	1.8 M/S
<b>Dew Presence (Y/N):</b>	N no	N no	N no	N no
<b>Soil Temperature, Unit:</b>	20.1 C	11.5 C	14.3 C	12.8 C
<b>Soil Moisture:</b>	dry	dry	dry	dry
<b>% Cloud Cover:</b>	0	0	0	0

### Crop Stage At Each Application

	A	B	C	D
<b>Crop 1 Code, BBCH Scale:</b>	CRYCA BDIC	CRYCA BDIC	CRYCA BDIC	CRYCA BDIC
<b>Stage Scale Used:</b>	DESC	DESC	DESC	
<b>Height, Unit:</b>	9 cm	13 cm	25 cm	35 cm
<b>Height Minimum, Maximum:</b>	8 10	10 16	20 30	30 40

### Pest Stage At Each Application

	A	B	C	D
<b>Pest 1 Code, Type, Scale:</b>	DEPRSP I	DEPRSP I	DEPRSP I	DEPRSP I
<b>Coverage, Unit:</b>	4 trp	8 trp	10 trp	10 trp

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                          Sponsor Contact:

#### Application Equipment

	A	B	C	D
<b>Appl. Equipment:</b>	Plot sprayer	Plot sprayer	Plot sprayer	Plot sprayer
<b>Equipment Type:</b>	SPRAYE	SPRAYE	SPRAYE	SPRAYE
<b>Operation Pressure, Unit:</b>	2.4 bar	2.4 bar	2.4 bar	2.4 bar
<b>Nozzle Type:</b>	Hardi4110	Hardi4110	Hardi4110	Hardi4110
<b>Nozzle Size:</b>	16	16	16	16
<b>Nozzle Spacing, Unit:</b>	50 cm	50 cm	50 cm	50 cm
<b>Nozzles/Row:</b>	5	5	5	5
<b>Boom ID:</b>	KSU1	KSU1	KSU1	KSU1
<b>Boom Length, Unit:</b>	2,5 m	2,5 m	2,5 m	2,5 m
<b>Boom Height, Unit:</b>	50 cm	50 cm	50 cm	50 cm
<b>Ground Speed, Unit:</b>	1 MPS	1 MPS	1 MPS	1 MPS
<b>Carrier:</b>	WATER	WATER	WATER	WATER
<b>Spray Volume, Unit:</b>	300 l/ha	300 l/ha	300 l/ha	300 l/ha
<b>Propellant:</b>	Air	Air	Air	Air



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Pest Type	I Insect	I Insect	I Insect	I Insect	I Insect	I Insect	I Insect
Pest Code	DEPRSP	DEPRSP	DEPRSP	DEPRSP	DEPRSP	DEPRSP	DEPRSP
Crop Code	CRYCA	CRYCA	CRYCA	CRYCA	CRYCA	CRYCA	CRYCA
Part Rated	STEM C	STEM C	SEED -	SEED -	STEM C	STEM C	STEM C
Rating Date	14/8/12	14/8/12					4/7/12
Rating Type	DAMPES	DAMPES	YIELD	1000WEIG	PESSEV	PESSEV	PESSEV
Rating Unit	%	%	kg/ha	g	NUMBER	NUMBER	%
Sample Size, Unit	50 STEM	50 STEM	1 HA	- G	1 M2	1 M2	1 M2
Crop Stage Majority	99	99	99	99	65	65	65
Crop Stage Scale	BBCH	BBCH	BBCH	BBCH	BBCH	BBCH	BBCH
Assessed By	TV AS NP ER	TV AS NP ER	ME HH	ER	EH-V NP	EH-V NP	EH-V NP
ARM Action Codes		TS[5]		T3		TL[12]	
Trt Treatment	Rate	Rate	Rate	Rate	Rate	Rate	Rate
No. Name	Rate Unit Code						
1 Untreated	17.0 a	3.9 a	644 a	4.372 a	31.3 a	1.5 a	11.31 a
2 Karate 2.5 WG 0.25 kg/ha A	2.5 b	1.5 b	664 a	4.408 a	2.5 b	0.4 b	0.75 b
3 Karate 2.5 WG 0.25 kg/ha B	2.5 b	1.5 b	622 a	4.442 a	1.5 b	0.3 b	0.38 b
4 Karate 2.5 WG 0.25 kg/ha C	1.0 b	1.1 b	644 a	4.366 a	0.5 b	0.1 b	0.19 b
5 Karate 2.5 WG 0.25 kg/ha CD	0.5 b	0.9 b	618 a	4.393 a	0.3 b	0.1 b	0.06 b
6 Karate 2.5 WG 0.25 kg/ha D	1.0 b	1.1 b	625 a	4.330 a	0.4 b	0.1 b	0.19 b
LSD (P=.05)	7.32	1.39	79.7	0.2888	8.86	0.34	3.336
Standard Deviation	4.86	0.92	52.9	0.1916	5.88	0.22	2.214
CV	118.94	54.83	8.31	4.37	96.99	52.91	103.18
Bartlett's X2	22.152	6.341	5.674	2.579	47.541	6.851	51.534
P(Bartlett's X2)	0.001*	0.274	0.339	0.765	0.001*	0.232	0.001*
Replicate F	1.062	1.399	6.482	20.067	1.201	2.476	1.018
Replicate Prob(F)	0.3945	0.2819	0.0050	0.0001	0.3434	0.1012	0.4124
Treatment F	6.909	5.977	0.449	0.162	17.699	22.514	16.503
Treatment Prob(F)	0.0016	0.0031	0.8072	0.9727	0.0001	0.0001	0.0001

Means followed by same letter do not significantly differ (P=.05, Student-Newman-Keuls)

Column 2: TS[5] = SQR([5] + .5)  
 Column 4: T3 = ((100-[C11])\*[C9])/88  
 Column 6: TL[12] = LOG([12]+ 1)  
 Column 8: TL[14] = LOG([14]+ 1)  
 Column 9: T5 = ((100-[C11])\*[C16])/88

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Pest Type	I Insect	I Insect
Pest Code	DEPRSP	DEPRSP
Crop Code	CRYCA	CRYCA
Part Rated	STEM C	SEED -
Rating Date	4/7/12	27/11/12
Rating Type	PESSEV	HLW
Rating Unit	%	kg
Sample Size, Unit	1 M2	- G
Crop Stage Majority	65	
Crop Stage Scale	BBCH	
Assessed By	EH-V NP	LR
ARM Action Codes	TL[14]	T5
Trt Treatment	Rate Appl	
No. Name	Rate Unit Code	
1 Untreated	1.06 a	17
2 Karate 2.5 WG 0.25 kg/ha A	0.21 b	47.1 a
3 Karate 2.5 WG 0.25 kg/ha B	0.11 b	47.2 a
4 Karate 2.5 WG 0.25 kg/ha C	0.07 b	47.1 a
5 Karate 2.5 WG 0.25 kg/ha CD	0.02 b	47.2 a
6 Karate 2.5 WG 0.25 kg/ha D	0.02 b	46.8 a
LSD (P=.05)	0.202	0.56
Standard Deviation	0.134	0.37
CV	52.0	0.79
Bartlett's X2	9.566	1.765
P(Bartlett's X2)	0.089	0.881
Replicate F	1.585	1.767
Replicate Prob(F)	0.2345	0.1965
Treatment F	35.043	1.140
Treatment Prob(F)	0.0001	0.3820