PRAKTIJKONDERZOEK
PLANT & OMGEVING

PROJECT

Field efficacy testing of the entomopathogenic nematode *Steinernema kraussei* against the vine weevil (*Otiorhynchus sulcatus*)

REPORT (PPO) - 1399

Boskoop, 7 June 2001

Author

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Applied Plant Research, Nursery Stock Research Unit, June 2001

SUMMARY

Report number: 1399

Title: Field efficacy testing of the entomopathogenic nematode *Steinernema kraussei* against the vine weevil (*Otiorhynchus sulcatus*)

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Purpose of this research is to show the efficacy of the nematode *Steinernema kraussei* strain N0093 at several application concentrations for control of larvae of the vine weevil in the field.
The results show that the winter application of *Steinernema kraussei*, strain N0093 is not effective for control of the vine weevil larvae. The autumn application, however, is giving good control of the larvae. The control for the higher application rate (0.5 million/m^2, 75% control) is significantly better than the lower rate (0.125 million/m^2, 66% control) (one-way analysis; $H_0 = P_B < P_A$). It is possible that a higher rate than 0.5 million/m^2 will give better control results but this has not been tested in this trial.

Application of Larvanem at the rate of 0.5 million/m^2 applied in autumn and winter is giving no control. The recommended application rate of 1.0 million/m^2 has not been tested in this trial.

In previous trials we have seen that application of *Heterorhabditis megidis* at lower rates than 1.0 million/m^2 is giving unpredictable control results and is therefore not advised for practice. Considering that Larvanem would have been effective at the practical rate of 1.0 million/m^2 the Steinernema strain N0093 is more effective at lower application rates than Larvanem. However, both strains should first be tested at 0.5 and 1.0 million/m^2 to proof that the Steinernema strain is more effective than Larvanem at the lower application rates.

Root-collar damage is low in all treatments but the differences in damage are in agreement with the control results of the larvae.

CONTENTS

1. SUBJECT

Purpose of this research is to show the efficacy of the nematode *Steinernema kraussei*, strain N0093 for control of larvae of the vine weevil in the field

2. MATERIALS AND METHODS

2.1 TRIAL SET UP

2.1.1 Trial schedule

Each treatment consists of 20 trial plants (4 blocks of 5 plants). The test treatments are coded with the capital letters A, B, C and D. The standard treatments are coded S1 and S2. The control (untreated) treatment is coded O.

2.1.2 Crops

The tested crop is *Thuja occidentalis* 'Smaragd'.

2.1.3 Treatments/ insecticides

Table 1. Treatments and applied amounts

code	product	active ingredient	application	dose x 10^6	eggs#
O	untreated	-	-	-	2x20
S1	Larvanem	*H. megidis*	3 October '00	0.5	2x20
S2	Larvanem	*H. megidis*	26 March '01	0.5	2x20
A	N0093	*S. kraussei*	3 October '00	0.125	2x20
B	N0093	*S. kraussei*	3 October '00	0.5	2x20
C	N0093	*S. kraussei*	26 March '01	0.125	2x20
D	N0093	*S. kraussei*	26 March '01	0.5	2x20

double inoculation (two times 20 eggs) with vine weevil eggs.

2.1.4 Sprayings and inoculations

The plants of all treatments were twice inoculated with 20 eggs of the vine weevil each time on respectively 26 July and 10 August 2000. Percentage living nematodes in the products were determined several hours before application. Concentration nematodes applied were based on the percentage living nematodes found. Nematodes were applied with a watering can. Three-liter water with nematodes was applied per m^2.

2.1.5 Statistics

Data were statistically analyzed with ANOVA after square root transformation of the original data. The data are shown in **appendix 1** and the statistic analysis is shown in **appendix 2.**

3. OBSERVATIONS

3.1 PEST INDEX

Plants were harvested on 7 to 10 May 2001. From each plant the number of larvae were counted as well as the developmental stages of the larvae. For the developmental stages we used an index based on the length of the larval body and the transparency of the larvae (between brackets).

larval development index:

stage 1: 0-1 mm (transparent)

stage 2: 2-3 mm (transparent)

stage 3: 4-6 mm (transparent)

stage 4: 7-10 mm (transparent)

stage 5: 7-10 mm (milky white)

For the pest index we also used the degree of damage to the root-collar (see index below).

root-collar damage index:

0 = no damage

1 = <25% girdling of the root collar

2 = 25 - 50% girdling of the root collar

3 = 50 - 75% girdling of the root collar

4 = 75 - 100% girdling of the root collar

5 = 100% girdling of the root collar

3.2 PHYTOTOXICITY

For phytotoxicity of the green plant parts we looked at the discoloration and/or necrosis of these parts (see index below). For phytotoxicity the control treatment O (no larvae, no chemical) is compared with the other treatments.

phytotox. index green plant parts:

0 = no necrosis/discoloration

1 = little necrosis (<10%)/discoloration

2 = moderate necrosis (10-25%)/discoloration

3 = large necrosis (>25%)/discoloration

4 = plant dead

3.3 CROP GROWTH AND DEVELOPMENT

Not performed

4. RESULTS AND DISCUSSION

4.1 PEST INDEX

Table 2. Mean number of larvae per plant (n) and percentage reduction compared to the control treatment O.

code	treatment	n	total%#	L1%#	L2%#	L3%#	L4%#	L5%#
O	untreated	3.8@	-	-	-	-	-	-
S1	Larvanem	3.6	6	-	40	12 *	-	0
S2	Larvanem	4.0	0	-	8	0	-	0
A	N0093	1.3	66 *	-	75 *	35	-	79 *
B	N0093	1.0	75 *	-	50 *	55 *	-	92 *
C	N0093	3.5	8	-	42	25 *	-	0
D	N0093	4.7	0	-	50	25	-	0

Percentage reduction based on number of larvae. L1 and L4 too low number of larvae (4%) for analysis
@ The population in the control (O) consisted for 4% of L1-larvae, 16% of L2-larvae, 26% of L3-larvae, 4% of L4-larvae and 50% of L5-larvae.
* Values followed by an asterisk are significantly different from the control treatment O

Table 3. Root-collar damage expressed as percentage damage compared to the control treatment O (n = mean number of larvae per plant).

code	treatment	n	%damage#
O	untreated	3.8	100
S1	Larvanem	3.6	46 *
S2	Larvanem	4.0	14 *
A	N0093	1.3	14 *
B	N0093	1.0	0 *
C	N0093	3.5	57 *
D	N0093	4.7	71

percentage root-collar damage based on index numbers (see Chapter 3.1)
* Values followed by an asterisk are significantly different from the control treatment O

The percentage mortality of the nematodes in the products prior to application revealed the following results:

<u>October 2000 application</u>

- Larvanem: 44% mortality
- N0093: 57% mortality

<u>March 2001 application</u>

- Larvanem: 9 % mortality
- N0093: 17% mortality

The results show that the winter application of *Steinernema kraussei*, strain N0093 is not effective for control of the vine weevil larvae. The autumn application, however, is giving good control of the larvae. The control for the higher application rate (0.5 million/m^2, 75% control) is significantly better than the lower rate (0.125 million/m^2, 66% control) (one-way analysis; $H_0 = P_B < P_A$).

Application of Larvanem at the rate of 0.5 million/m^2 applied in autumn and winter is giving no control.

4.2 PHYTOTOXICITY

There were no symptoms of phytotoxicity found on any of the green plant parts.

4.3 CROP GROWTH AND DEVELOPMENT

not performed.

5. CONCLUSIONS

The results show that the winter application of *Steinernema kraussei*, strain N0093 is not effective for control of the vine weevil larvae. The autumn application, however, is giving good control of the larvae. The control for the higher application rate (0.5 million/m^2, 75% control) is significantly better than the lower rate (0.125 million/m^2, 66% control) (one-way analysis; $H_0 = P_B < P_A$). It is possible that a higher rate than 0.5 million/m^2 will give better control results but this has not been tested in this trial.

Application of Larvanem at the rate of 0.5 million/m^2 applied in autumn and winter is giving no control. The recommended application rate of 1.0 million/m^2 has not been tested in this trial.

In previous trials we have seen that application of *Heterorhabditis megidis* at lower rates than 1.0 million/m^2 is giving unpredictable control results and is therefore not advised for practice. Considering that Larvanem would have been effective at the practical rate of 1.0 million/m^2 the Steinernema strain N0093 is more effective at lower application rates than Larvanem. However, both strains should first be tested at 0.5 and 1.0 million/m^2 to proof that the Steinernema strain is more effective than Larvanem at the lower application rates.

There are no phytotoxic symptoms found on the test plants *Thuja occidentalis* 'Smaragd' at the tested application rates.

APPENDIX

Appendix 1. Data

1399 (2001): DATA FIELD TRIAL VINE WEEVIL LARVAE 2000/2001

Location: Boskoop, Rijneveld 153, The Netherlands
Harvest date: May 2001
Crop: *Thuja occidentalis* 'Smaragd'
O = untreated
S1 = *Heterorhabditis megidis* (Larvanem); $0.5x10^6/m^2$; 3 October 2000 applied
S2 = *Heterorhabditis megidis* (Larvanem); $0.5x10^6/m^2$; 26 March 2000 applied
A = *Steinernema kraussei* (N0093); $0.125x10^6/m^2$; 3 October 2000 applied
B = *Steinernema kraussei* (N0093); $0.5x10^6/m^2$; 3 October 2000 applied
C = *Steinernema kraussei* (N0093); $0.125x10^6/m^2$; 26 March 2001 applied
D = *Steinernema kraussei* (N0093); $0.5x10^6/m^2$; 26 March 2001 applied

block	treatm.	plant	larvae total	larvae stag.1	larvae stag.2	larvae stag.3	larvae stag.4	larvae stag.5	damage root-collar
1	O	1	4	1	1	1	0	1	0
1	O	2	2	0	1	0	0	1	0
1	O	3	8	0	6	1	1	0	0
1	O	4	2	0	0	2	0	0	0
1	O	5	6	0	1	3	0	2	0
1	S1	1	3	0	0	0	0	3	0
1	S1	2	2	0	0	0	0	2	0
1	S1	3	0	0	0	0	0	0	1
1	S1	4	2	0	0	0	0	2	0
1	S1	5	1	0	0	0	0	1	0
1	S2	1	7	0	1	1	0	5	1
1	S2	2	1	0	0	1	0	0	0
1	S2	3	2	0	0	2	0	0	0
1	S2	4	3	0	2	0	1	0	0
1	S2	5	10	0	3	7	0	0	0
1	A	1	2	0	0	2	0	0	0
1	A	2	1	0	0	0	0	1	0
1	A	3	0	0	0	0	0	0	0
1	A	4	1	0	0	0	0	1	0
1	A	5	0	0	0	0	0	0	0
1	B	1	1	0	0	1	0	0	0
1	B	2	1	0	0	0	1	0	0
1	B	3	0	0	0	0	0	0	0
1	B	4	0	0	0	0	0	0	0
1	B	5	0	0	0	0	0	0	0
1	C	1	5	0	2	0	0	3	0
1	C	2	13	0	0	6	0	7	1
1	C	3	1	0	0	0	0	1	0
1	C	4	5	0	0	5	0	0	0
1	C	5	7	0	2	1	0	4	0
1	D	1	9	0	0	2	0	7	0
1	D	2	3	0	0	0	1	2	0
1	D	3	2	0	0	0	0	2	0
1	D	4	2	0	0	0	0	2	0
1	D	5	9	0	2	2	0	5	0
2	O	1	3	0	0	2	0	1	1

2	O	2	6	0	0	1	0	5	1
2	O	3	4	0	0	0	0	4	1
2	O	4	2	0	0	0	0	2	1
2	O	5	2	1	1	0	0	0	1
2	S1	1	5	0	0	3	0	2	0
2	S1	2	3	0	1	0	0	2	0
2	S1	3	3	0	0	3	0	0	0
2	S1	4	11	0	2	6	0	3	1
2	S1	5	4	0	2	0	0	2	0
2	S2	1	4	0	0	0	0	4	0
2	S2	2	2	0	0	0	0	2	0
2	S2	3	6	0	0	1	0	5	0
2	S2	4	3	0	0	0	0	3	0
2	S2	5	5	0	0	0	0	5	0
2	A	1	1	0	1	0	0	0	1
2	A	2	5	0	0	4	0	1	0
2	A	3	1	0	1	0	0	0	0
2	A	4	0	0	0	0	0	0	0
2	A	5	1	0	0	1	0	0	0
2	B	1	1	0	0	0	0	1	0
2	B	2	0	0	0	0	0	0	0
2	B	3	1	0	0	0	0	1	0
2	B	4	0	0	0	0	0	0	0
2	B	5	0	0	0	0	0	0	0
2	C	1	4	0	2	0	0	2	0
2	C	2	2	0	0	2	0	0	0
2	C	3	0	0	0	0	0	0	0
2	C	4	6	0	0	0	0	6	1
2	C	5	4	0	0	0	0	4	0
2	D	1	3	0	0	0	0	3	0
2	D	2	5	0	0	0	0	5	0
2	D	3	6	0	0	1	0	5	0
2	D	4	7	0	0	0	0	7	0
2	D	5	2	0	0	0	0	2	0
3	O	1	7	1	1	2	2	1	0
3	O	2	6	0	0	2	0	4	0
3	O	3	6	0	0	4	0	2	0
3	O	4	2	0	0	1	0	1	0
3	O	5	1	0	0	1	0	0	0
3	S1	1	2	1	0	0	0	1	0
3	S1	2	2	0	1	0	0	1	0
3	S1	3	4	0	0	0	0	4	0
3	S1	4	5	0	1	2	0	2	0
3	S1	5	1	0	0	0	0	1	0
3	S2	1	5	0	0	2	0	3	0
3	S2	2	5	0	2	0	0	3	0
3	S2	3	2	0	0	1	0	1	0
3	S2	4	0	0	0	0	0	0	0
3	S2	5	5	0	0	0	0	5	0
3	A	1	1	0	0	0	0	1	0
3	A	2	0	0	0	0	0	0	0
3	A	3	0	0	0	0	0	0	0
3	A	4	2	0	0	2	0	0	0
3	A	5	1	0	0	1	0	0	0
3	B	1	2	0	1	1	0	0	0
3	B	2	2	0	0	1	0	1	0
3	B	3	0	0	0	0	0	0	0
3	B	4	1	0	0	1	0	0	0
3	B	5	3	0	2	1	0	0	0
3	C	1	4	0	0	0	0	4	2
3	C	2	1	0	0	0	0	1	0

3	C	3	1	0	0	0	0	1	0
3	C	4	1	0	0	0	0	1	0
3	C	5	1	0	0	1	0	0	0
3	D	1	2	1	1	0	0	0	0
3	D	2	6	0	1	4	0	1	0
3	D	3	7	2	1	0	3	1	0
3	D	4	5	0	1	4	0	0	0
3	D	5	1	0	0	1	0	0	0
4	O	1	3	0	1	0	0	2	0
4	O	2	2	0	0	0	0	2	0
4	O	3	5	0	0	0	0	5	2
4	O	4	1	0	0	0	0	1	0
4	O	5	4	0	0	0	0	4	0
4	S1	1	7	0	0	3	0	4	0
4	S1	2	2	0	0	0	0	2	1
4	S1	3	8	0	0	0	0	8	0
4	S1	4	3	0	0	0	0	3	0
4	S1	5	*	*	*	*	*	*	*
4	S2	1	2	0	0	0	0	2	0
4	S2	2	3	0	0	0	0	3	0
4	S2	3	4	0	0	2	0	2	0
4	S2	4	10	0	2	6	0	2	0
4	S2	5	1	0	1	0	0	0	0
4	A	1	2	0	0	1	0	1	0
4	A	2	1	0	0	0	0	1	0
4	A	3	0	0	0	0	0	0	0
4	A	4	6	2	1	1	0	2	0
4	A	5	1	0	0	1	0	0	0
4	B	1	1	0	0	1	0	0	0
4	B	2	0	0	0	0	0	0	0
4	B	3	0	0	0	0	0	0	0
4	B	4	0	0	0	0	0	0	0
4	B	5	6	0	3	3	0	0	0
4	C	1	5	0	0	0	0	5	0
4	C	2	2	0	0	0	0	2	0
4	C	3	1	0	0	0	0	1	0
4	C	4	5	0	1	0	0	4	0
4	C	5	2	0	0	0	0	2	0
4	D	1	3	0	0	0	0	3	0
4	D	2	5	0	0	1	0	4	3
4	D	3	2	0	0	0	0	2	1
4	D	4	7	0	0	0	0	7	1
4	D	5	8	0	0	0	0	8	0

Appendix 2. Statistic analysis

Values for larvae are analysed after square-root transformation of the original data, shown in appendix 1. The results shown in appendix 2 are therefore not presenting the average number of larvae found in the treatments.

```
Genstat 5  Release 4.1  (PC/Windows 98)              29 May 2001 16:18:59
Copyright 1998, Lawes Agricultural Trust (Rothamsted Experimental Station)

  3 OUTPUT[WIDTH=80] 1
  4 UNITS [NVALUES = 140]
  5 FACTOR [LABELS = !T(O, S1, S2, A, B, C, D)] beh
  6 FACTOR [LEVELS = !(1...4)] blok
  7 factor[lev=5]plant
  8 OPEN 'DATA1399.txt'; CHANNEL = 2; width=132
  9 "SKIP [CHANNEL = 2] 21"
 10 READ [CHANNEL = 2] blok, beh, plant, larv, sta1, sta2, sta3,\
 11                    sta4, sta5, schadewrt;\
 12                     FREP = levels, labels, levels, *, *, *, *, *, *, *

 Identifier  Minimum     Mean  Maximum  Values  Missing
       larv    0.000    3.115   13.000     140        1  Skew
       sta1  0.00000  0.06475  2.00000     140        1  Skew
       sta2   0.0000   0.3741   6.0000     140        1  Skew
       sta3   0.0000   0.8058   7.0000     140        1  Skew
       sta4  0.00000  0.06475  3.00000     140        1  Skew
       sta5    0.000    1.806    8.000     140        1  Skew
   schadewr   0.0000   0.1511   3.0000     140        1  Skew

 Identifier  Values  Missing  Levels
       blok     140        0       4
        beh     140        0       7
      plant     140        0       5

 13 close 2
 14 CALC Wlarv = SQRT(larv)
 15 CALC WL1 = SQRT (sta1)
 16 CALC WL2 = SQRT (sta2)
 17 CALC WL3 = SQRT (sta3)
 18 CALC WL4 = SQRT (sta4)
 19 CALC WL5 = SQRT (sta5)
 20
 21 BLOCKS blok
 22 TREATMENTS beh

 41 ANOVA [FPROB = yes] Wlarv
```

41.....

***** Analysis of variance *****

Variate: Wlarv

Source of variation	d.f.(m.v.)	s.s.	m.s.	v.r.	F pr.
blok stratum	3	0.5469	0.1823	0.36	
blok.*Units* stratum					
beh	6	35.6528	5.9421	11.58	<.001
Residual	129(1)	66.1718	0.5130		
Total	138(1)	102.2908			

* MESSAGE: the following units have large residuals.

blok 1.00 *units* 27 1.932 s.e. 0.687

***** Tables of means *****

Variate: Wlarv

Grand mean 1.545

beh	O	S1	S2	A	B	C	D
	1.873	1.754	1.861	0.896	0.650	1.694	2.082

*** Standard errors of differences of means ***

Table	beh
rep.	20
d.f.	129
s.e.d.	0.2265

(Not adjusted for missing values)

***** Missing values *****

Variate: Wlarv

Unit	estimate
115	1.827

Max. no. iterations 2

42 ANOVA [FPROB = yes] WL1

42.....

***** Analysis of variance *****

Variate: WL1

Source of variation	d.f.(m.v.)	s.s.	m.s.	v.r.	F pr.
blok stratum	3	0.23214	0.07738	1.27	
blok.*Units* stratum					
beh	6	0.45330	0.07555	1.24	0.291
Residual	129(1)	7.87403	0.06104		
Total	138(1)	8.55911			

* MESSAGE: the following units have large residuals.

blok 1.00	*units* 1	0.878	s.e. 0.237
blok 2.00	*units* 5	0.878	s.e. 0.237
blok 3.00	*units* 1	0.780	s.e. 0.237
blok 3.00	*units* 6	0.878	s.e. 0.237
blok 3.00	*units* 31	0.809	s.e. 0.237
blok 3.00	*units* 33	1.224	s.e. 0.237
blok 4.00	*units* 19	1.358	s.e. 0.237

***** Tables of means *****

Variate: WL1

Grand mean 0.056

beh	O	S1	S2	A	B	C	D
	0.150	0.052	0.000	0.071	0.000	0.000	0.121

*** Standard errors of differences of means ***

Table	beh
rep.	20
d.f.	129
s.e.d.	0.0781

(Not adjusted for missing values)

***** Missing values *****

Variate: WL1

Unit	estimate
115	0.037

Max. no. iterations 2

43 ANOVA [FPROB = yes] WL2

43.....

***** Analysis of variance *****

Variate: WL2

Source of variation	d.f.(m.v.)	s.s.	m.s.	v.r.	F pr.
blok stratum	3	0.7256	0.2419	0.81	
blok.*Units* stratum					
beh	6	1.1417	0.1903	0.64	0.701
Residual	129(1)	38.5938	0.2992		
Total	138(1)	40.4571			

* MESSAGE: the following units have large residuals.

blok 1.00 *units* 3 1.919 s.e. 0.525
blok 4.00 *units* 25 1.602 s.e. 0.525

***** Tables of means *****

Variate: WL2

Grand mean 0.288

beh	O	S1	S2	A	B	C	D
	0.422	0.303	0.399	0.150	0.207	0.262	0.271

*** Standard errors of differences of means ***

Table	beh
rep.	20
d.f.	129
s.e.d.	0.1730

(Not adjusted for missing values)

***** Missing values *****

Variate: WL2

Unit	estimate
115	0.226

Max. no. iterations 2

44 ANOVA [FPROB = yes] WL3

44.....

***** Analysis of variance *****

Variate: WL3

Source of variation	d.f.(m.v.)	s.s.	m.s.	v.r.	F pr.
blok stratum	3	2.3451	0.7817	1.44	
blok.*Units* stratum					
beh	6	1.9329	0.3221	0.59	0.736
Residual	129(1)	70.1846	0.5441		
Total	138(1)	74.4193			

* MESSAGE: the following units have large residuals.

blok 1.00 *units* 27 1.931 s.e. 0.708
blok 2.00 *units* 9 2.078 s.e. 0.708
blok 4.00 *units* 14 1.940 s.e. 0.708

***** Tables of means *****

Variate: WL3

Grand mean 0.518

beh	O	S1	S2	A	B	C	D
	0.719	0.469	0.667	0.491	0.387	0.405	0.491

*** Standard errors of differences of means ***

Table	beh
rep.	20
d.f.	129
s.e.d.	0.2333

(Not adjusted for missing values)

***** Missing values *****

Variate: WL3

Unit	estimate
115	0.311

Max. no. iterations 2

45 ANOVA [FPROB = yes] WL4

45.....

***** Analysis of variance *****

Variate: WL4

Source of variation	d.f.(m.v.)	s.s.	m.s.	v.r.	F pr.
blok stratum	3	0.38087	0.12696	2.08	
blok.*Units* stratum					
beh	6	0.40559	0.06760	1.11	0.360
Residual	129(1)	7.85738	0.06091		
Total	138(1)	8.63260			

* MESSAGE: the following units have large residuals.

blok 1.00	*units* 3	0.816	s.e. 0.237
blok 1.00	*units* 14	0.886	s.e. 0.237
blok 1.00	*units* 22	0.886	s.e. 0.237
blok 1.00	*units* 32	0.800	s.e. 0.237
blok 3.00	*units* 1	1.254	s.e. 0.237
blok 3.00	*units* 33	1.556	s.e. 0.237

***** Tables of means *****

Variate: WL4

Grand mean 0.051

beh	O	S1	S2	A	B	C	D
	0.121	-0.003	0.050	0.000	0.050	0.000	0.137

*** Standard errors of differences of means ***

Table	beh
rep.	20
d.f.	129
s.e.d.	0.0780

(Not adjusted for missing values)

***** Missing values *****

Variate: WL4

Unit	estimate
115	-0.055

Max. no. iterations 2

46 ANOVA [FPROB = yes] WL5

46.....

***** Analysis of variance *****

Variate: WL5

Source of variation	d.f.(m.v.)	s.s.	m.s.	v.r.	F pr.
blok stratum	3	6.7293	2.2431	4.66	
blok.*Units* stratum					
beh	6	35.9580	5.9930	12.44	<.001
Residual	129(1)	62.1533	0.4818		
Total	138(1)	104.4484			

***** Tables of means *****

Variate: WL5

Grand mean 1.031

beh	O	S1	S2	A	B	C	D
	1.177	1.379	1.226	0.371	0.150	1.315	1.600

*** Standard errors of differences of means ***

Table	beh
rep.	20
d.f.	129
s.e.d.	0.2195

(Not adjusted for missing values)

***** Missing values *****

Variate: WL5

Unit	estimate
115	1.655

Max. no. iterations 2

47 ANOVA [FPROB = yes] schadewrt

47.....

***** Analysis of variance *****

Variate: damage root-collar

Source of variation	d.f.(m.v.)	s.s.	m.s.	v.r.	F pr.
blok stratum	3	0.9186	0.3062	1.58	
blok.*Units* stratum					
beh	6	1.9026	0.3171	1.64	0.142
Residual	129(1)	25.0152	0.1939		
Total	138(1)	27.8273			

* MESSAGE: the following units have large residuals.

blok 3.00 *units* 26 1.895 s.e. 0.423
blok 4.00 *units* 3 1.566 s.e. 0.423
blok 4.00 *units* 32 2.666 s.e. 0.423

***** Tables of means *****

Variate: schadewr

Grand mean 0.152

beh	O	S1	S2	A	B	C	D
	0.350	0.162	0.050	0.050	0.000	0.200	0.250

*** Standard errors of differences of means ***

Table	beh
rep.	20
d.f.	129
s.e.d.	0.1393

(Not adjusted for missing values)

***** Missing values *****

Variate: schadewr

Unit	estimate
115	0.246

Max. no. iterations 2

48 STOP

******** End of 1399-01; bestrijding keverlarven in de vollegrond 2001.
Maximum of 7364 data units used at line 48 (81654 left)

Genstat 5 Release 4.1 (PC/Windows 98) 29 May 2001 16:19:00

Genstat 5 Fourth Edition - (for Windows)
Genstat 5 Procedure Library Release PL11
