SBU
Sockernäringens
BetodlingsUtveckling

Nya betningsmedel mot skadeinsekter 2001

New seed treatments against insects in sugar beet

2001-1-2-406

SBU Sockernäringens BetodlingsUtveckling AB bedriver försöks- och odlingsutveckling med sockerbetor inom områdena biologi, ekonomi och teknik.

SBU ägs till lika delar av Danisco Sugar och Betodlarna.

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Betning mot skadeinsekter - Syngenta

Summary

Insecticide treatment increased the number of plants/ha with 15 - 20 000 plants. The largest increase was found in the treatments with Montur and Gaucho, closely followed by Cruiser 30 g.

The largest amount of extractable sugar was found in the treatments with Gaucho, Montur and Cruiser 30 g.

The largest dose of Cruiser shows a somewhat better effect against aphids compared to the treatment with Cruiser 30 g.

Borgeby / 2002

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Åsa Olsson
Project Manager

Borgeby / 2002

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Robert Olsson
Managing Director SBU AB

Betning mot skadeinsekter - Syngenta

Introduction

The purpose of the trials was to evaluate the effect of new seed treatments on number of plants, plant condition, effect against insects and sugar yield.

Materials and methods

The trials were comprised of five treatments; an untreated control, Montur (15 + 4 g), Gaucho 90 g and two doses of Cruiser, 30 g and 60 g. The trials were layed out as randomized complete block designs at four locations in Skåne: Rutsbo, Ädelholm, Virestad and Minnesdal.

The number of plants in each treatment was counted three times during emergence and finally after inter-row cultivation. The countings were performed on all four trial sites.

The plant condition was evaluated at twice in each trial and included estimations of the number of healthy plants, damage score and number of plants affected by fungi. The first evaluation of plant condition took place when the cotyledones had developed and the ordinary leaves were just visible. The second evaluation of plant condition took place two weeks later, when the plants had 2 - 4 ordinary leaves. Damage score was measured on a scale from 0 - 5 where 0 denoted a healthy plant and 5 a dead plant.

The number of insects at each trial site was estimated in the untreated control.

The number of aphids and percentage of plants with aphids were evaluated at three times: in the beginning, middle and end of july). The evaluation of plant condition, number of insects and aphids were carried out by the Swedish University of Agricultural Sciences.

Results and discussion

Insects

The number of insects/10 plants at the different trial sites is shown in Table 1. For comparison, the table also show the corresponding values for year 2000. During 2001 there has been an exceptionally high frequency of various genera of insects compared to year 2000.

The insecticide pressure at the different trial sites was, with the exception of Minnesdal, fairly equal. At Ädelholm, Virestad and Rutsbo the most frequently occurring genera were *Onychiurus* spp. with on average between 22 – 40 insects/10 plants in the untreated control. In addition, a few Symphyla,*Collembola, Atomaria linearis* and *Diplura* were also found.

At Minnesdal, *Onychiurus* spp., *Atomaria linearis, Collembola* and millipedes (*Blaniulus guttulatus*) was equally common with on average 6 – 10 insects/10 plants.

Tusenfoting (Millipedes, *Blaniulus guttulatus*)
Betbagge (*Atomaria linearis*)
Fåfoting (Symphyla)
Klotcollembol (*Collembola*)
Larvborstsvans (*Diplura*)

Plant number

In the total analysis, the insecticide treatments with Montur and Gaucho had more than 80 000 plants/ha at harvest which is significantly more than in the control (60 000 plants/ha). The number of plants/ha in the treatments with Cruiser (77 000 and 75 000 in the 30 g and 60 g dose, respectively) were also significantly different from the control.

When the different insecticide treatments are compared there are significant differences ($p<0,0001$, LSD 5%=4 600) between, on the one hand Montur and Gaucho (80 000 plants/ha) and on the other hand Cruiser 60 g (75 000 plants/ha).

In conclusion, insecticide treatment (Montur and Gaucho) resulted in 20 000 more plants/ha compared to in the untreated control. Insecticide treatment with Cruiser 60 g and 30 g resulted in 15 - 17 000 more plants/ha, respectively, than in the control. The largest dose of Cruiser (60 g) has significantly fewer plants than the conventional seed treatments whereas the smaller dose (30 g) only shows a tendency to have fewer plants/ha than the conventional seed treatments.

Harvest

Only three of the trials were harvested (Minnesdal, Ädelholm and Rutsbo). The trial site at Virestad suffered from heavy rain soon after drilling which had a negative affect on the plant number (less than 60 000 plants/ha in several treatments). Consequently, the trial at Virestad was not harvested.

The trial sites show somewhat contrasting results in amount of extractable sugar. At Minnesdal, the largest yield was found in the treatment with Cruiser 30 g (10 tons/ha) whereas Cruiser 60 g were more comparable to the control (8,5 and 8,6 ton/ha, respectively). At Ädelholm the largest yield was found in the treatment with Gaucho (10 tons/ha) closely followed by Cruiser 60 g (9,8 ton/ha). The yield at Rutsbo was high (over 12 tons/ha in the insecticide treatments) with no significant differences between any of the treatments.

In the total analysis including all three trials, there were no significant differences between the treatments for any of the variables measured at harvest. However, there is a tendency for the insecticide treatments to have a higher sugar content, percentage and amount of extractable sugar than the control.

Aphids

In comparison with the untreated control, all insecticide treatments show a good effect against aphids. This result is consistent across all trial sites. In the total analysis (four trials), there are significant differences between the control and insecticide treatments for both the number of aphids/plant and percentage of plants affected by aphids in the first two evaluations.

When the two doses of Cruiser are compared, the larger dose shows a somewhat better effect than the lower dose at the two first evaluations (in the beginning and middle of July). By the end of July the number of aphids decreased substantially and there were no significant differences between the treatments.

Table 2. The number of plants after inter-row cultivation at each trial site and in the total analysis including all four trials.

	No. of plants/ha (1000nds/ha)				
Treatment	Minnesdal	Rutsbo	Virestad	Ädelholm	Total
1. Untreated	70,1	62,2	37,5	71,4	60,3
2. Montur 15 + 4 g	92,5	83,3	62,5	83,9	80,5
3. Gaucho 90 g	94,3	85,9	56,8	84,4	80,3
4. Cruiser 30 g	92,2	81,3	55,7	80,2	77,3
5. Cruiser 60 g	86,2	81,5	56,0	77,3	75,3
P-value	0,0002	0,0013	0,0117	<0,0001	<0,0001
P-value - pairwise	<0,0001	0,0002	0,0011	0,0005	<0,0001
LSD 5%	8,3	9,7	12,8	6	4,6

Table 3. The amount of extractable sugar on each trial site and in the total analysis including all four trials.

Treatment	Extractable sugar (tons/ha) Minnesdal	Rutsbo	Virestad	Ädelholm	Total
1. Obetat	8,6	11,4	-	9,5	9,9
2. Montur 15 + 4 g	9,9	12,3	-	9,6	10,6
3. Gaucho 90 g	9,6	12,3	-	10,1	10,7
4. Cruiser 30 g	10,0	12,3	-	9,5	10,6
5. Cruiser 60 g	8,5	12,1	-	9,8	10,1
P-value	ns	ns	-	ns	ns
P-value - pairwise	-	-	-	-	-
LSD 5%	-	-	-	-	-

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Table 1. The number of insects/10 plants in the untreated control at the different trial sites. The number of insects was counted two or three times at each site. The values for 2000 are also shown.

Insect	Antal insekter/10 plantor 2001 / No. of insects/10 plants 2001										Medelvärde Mean	
	Rutsbo			Minnesdal		Virestad			Ädelholm			
Evaluation	1	2	3	1	2	1	2	3	1	2	2001	2000
Onychiurus	30,8	15,8	66,3	4,0	10,0	36,2	30,0	121	42,8	22,8	**42**	**11**
Tusenfoting (Millipedes, *Blaniulus guttulatus*)	0,5	-	0,3	9,5	26,3	2,8	0,8	7,25	1,5	-	**7**	**0**
Övr hoppstjärtar *(Onychiurus* spp.)	4,8	3,8	12,0	1,0	1,8	4,8	0,8	1,25	18,5	3,5	**5**	**0**
Betbagge *(Atomaria linearis)*	0,5	5,5	5,8	6,3	6,3	0,3	6,8	0,5	-	1,8	**4**	**2**
Fåfoting (Symphyla)	1,8	0,5	6,8	0,5	3,0	1,0	-	1,25	4,5	1,0	**3**	**1**
Klotcollembol *(Collembola)*	-	9,0	0,3	7,0	1,5	-	0,8	-	-	1,0	**2**	**0**
Larvborstsvans (*Diplura*)	0,5	0,3	-	-	-	1,0	0,5	0,75	1,5	-	**1**	**-**
Mygglarv	-	0,3	-	-	-	-	-	-	-	-	-	-
Knäpparelarv	-	0,3	-	-	-	-	-	-	-	-	-	-
Jordlöpare	-	-	-	-	-	0,3	-	-	-	-	-	-
Skalbaggelarv (Grub)	-	-	-	-	-	-	-	-	0,3	-	-	-

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Uppdragsgivare/Contractor:

Syngenta Seeds AB
Bengt Liljedahl
Box 302
261 23 Landskrona

Teknisk beskrivning/Technical details: -

Försöksplatser/Trial locations: Minnesdal, Virestad, Rutsbo and Ädelholm

Försöksmetodik/Methodology: Randmized complete block design

Avvikelser/Problems: Only three trials were harvested.

Rapporten omfattar 12 sidor.

The report is comprised of 12 pages.

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Syfte *Att undersöka olika betningsmedels inverkan på plantantal, betkondition och skörd, samt effekt mot skadeinsekter.*

Försöksplan

		gram v.s/enhet
1	Obetat	-
2	Montur 15 + 4 g	imidakloprid 15 g + tefluthrine 4 g
3	Gaucho 90 g	imidakloprid 90 g
4	Cruiser 30 g	thiametoxam 30 g
5	Cruiser 60 g	thiametoxam 60 g

Fältplan

Ädelholm

IV	4	1	5	3	2
III	1	3	2	5	4
II	3	5	4	2	1
I	1	2	3	4	5

Virestad

IV	2	1	4	5	3
III	5	4	2	3	1
II	1	5	3	4	2
I	3	2	5	1	4

Rutsbo

IV	1	2	4	3	5
III	4	5	2	1	3
II	3	4	1	5	2
I	5	1	3	2	4

Minnesdal

IV	5	1	2	4	3
III	3	4	5	2	1
II	4	5	1	3	2
I	1	2	3	5	4

Parcellbredd: 6 rader | Försöksbredd: 14,4 m | Försökslängd: 68 m

Parcellängd, brutto: 12 m | Parcellängd, netto: 10 m | Försöksyta: 979 m^2

Försöksplatsinformation: Provtagningsyta 10 m mellan block I-II och mellan block III-IV.

Krav på försöksplats: Ädelholm + ytterligare 3 platser med förmodat högt insektstryck.

Försöksåtgärder:

1 Generalprov 6
2 Parcellvis sådd
3 Planträkning 3 ggr under uppkomst
4 Planträkning efter radrensning
5 Flotation (SLU/Alnarp)
6 Skadebedömning i fält, % friska plantor, damage score vid 2 tidpkt, alla led (SLU/Alnarp)
7 Bladlusräkning (SLU/Alnarp)
8 Skörd

2001-03-09 ÅO

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Slutskörd/Harvest **3 försök/3 trials**

Behandling	No. plants Ant. plantor 1000-nds/ha 1000-tal/ha	Clean weight Renvikt ton/ha	Sugar content Sockerhalt %	Amino-N Blåtal mg/100g beta	K + Na mM/ 100 g beta	Extr. sugar Utv. socker %	Extr. sugar Utv. socker ton/ha	Extr. sugar Utv. socker rel a	Cleanness Renhet %
1 Untreated	67,9	65,4	17,08	20	4,9	88,52	9,85	100	83,5
2 Montur 15 + 4 g	86,5	69,6	17,17	20	4,8	88,75	10,59	108	82,6
3 Gaucho 90 g	88,2	70,2	17,17	20	4,8	88,77	10,67	108	83,3
4 Cruiser 30 g	84,5	69,6	17,16	19	4,7	88,84	10,59	107	82,8
5 Cruiser 60 g	81,7	65,9	17,32	19	4,7	89,01	10,14	103	82,8
CV	3,8	3,6	0,7	6	2,78	0,34	4,05	-	1,3
LSD 5%	5,8	4,7	0,22	2	0,25	0,56	0,79	-	2,0
P-value	0,0003	ns	ns	ns	ns	ns	ns	-	ns
P-value - pairwise	<0,0001	-	-	-	-	-	-	-	-

Only three of the trials were harvested and all the results in the table, including the counting of plants, are calculated on the basis of three trials (Minnesdal, Ädelholm and Rutsbo).

All insecticide treatments had more than 80 000 plants/ha which is significantly more than in the control (<70 000 plants/ha). The number of plants/ha in treatment 3 were significantly different from treatment 5 (Cruiser). There were no significant differences between the treatments for any of the variables measured at harvest.

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Planträkningar/Plant number **4 försök/4 trials**

Behandling/Treatment	Plant number 1000nds/ha Planträkning 1000-tal/ha 1	2	3	Plant number after inter-row cult. Planträkning efter radrensn.
1 Untreated	18,5	44,1	58,9	60,3
2 Montur 15 + 4 g	26,3	62,7	78,6	80,5
3 Gaucho 90 g	22,1	55,9	77,8	80,3
4 Cruiser 30 g	24,8	59,7	74,3	77,3
5 Cruiser 60 g	22,3	55,1	70,6	75,3
CV	20,5	7,7	4,6	4
LSD 5%	7,2	6,6	5,1	4,6
P-value	ns	0,0006	<0,0001	<0,0001
P-value - pairwise	-	<0,0001	<0,0001	<0,0001

The calculations were performed on all four trials.

There were no significant differences between the conventional seed treatments (treatments 2 and 3) and treatment 4 (Cruiser 30 g). The highest dose of Cruiser had significantly fewer plants than treatments 2 and 3.

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4 försök/4 trials

Behandling/Treatment	Aphids/Bladlöss					
	no./plant antal/pl	% plants aff. % angr. pl	no./plant antal/pl	% plants aff. % angr. pl	no./plant antal/pl	% plants aff. % angr. pl
	1-3 jul	1-3 jul	9-10 jul	9-10 jul	16-18jul	16-18jul
1 Untreated	19,7	17,8	18,5	57,8	19,8	16,3
2 Montur 15 + 4 g	3,5	6,3	3,9	32,0	1,6	13,5
3 Gaucho 90 g	0,1	1,5	1,2	17,3	0,5	9,8
4 Cruiser 30 g	1,7	6,3	3,9	36,3	1,2	13,8
5 Cruiser 60 g	1,1	3,0	2,3	25,5	1,9	17,0
Signifikansnivå (Sign. level)	99,3	97,5	99,7	100	46,0	42,9
Medelfel %	63,7	45,4	44,1	12,3	169	23,2
LSD 5 %	10,3	9,7	8,1	12,8	26,0	10,1
SNK-test	1#övr	1#övr	1#övr	1#övr 4#3	ns	ns

In comparison with the untreated control, all insecticide treatments showed a good effect against aphids. In the first two evaluations there were significant differences for both the number of aphids/plant and percentage of plants affected by aphids.

When the two doses of Cruiser are compared, the larger dose showed a somewhat better effect than the smaller dose at the two first evaluations (in the beginning and middle of July).

There were no significant differences between the treatments in the last evaluation.

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SBU Projektkod 2001-1-2-406

Insekter/Insects **4 försök/4 trials**

Behandling/ Treatments	Flotation 1			Flotation 2			Plant condition 1 Fältbedömning 1			Plant condition 2 Fältbedömning 2		
	Healthy pl Friska pl %	Ds 0-5	Fungi Svamp %	Healthy pl Friska pl %	Ds 0-5	Fungi Svamp %	Healthy pl Friska pl %	Ds 0-5	Fungi Svamp %	Healthy pl Friska pl %	Ds 0-5	Fungi Svamp %
1 Obetat	3,6	2,5	0	0	2,5	2,5	17,1	1,5	0	0	2,0	0
2 Montur 15 + 4 g	-	-	-	-	-	-	21,9	1,2	0	1,9	1,6	2,5
3 Gaucho 90 g	-	-	-	-	-	-	33,8	1,0	0	0,6	2,1	0,6
4 Cruiser 30 g	-	-	-	-	-	-	26,9	1,0	0,6	0,6	1,6	0,6
5 Cruiser 60 g	-	-	-	-	-	-	28,1	1,0	0	1,3	1,6	1,3
CV	-	-	-	-	-	-	56,6	30,3	894,4	322,3	56,0	352,1
LSD 5%	-	-	-	-	-	-	10,2	0,3	0,8	2,0	0,7	2,5
P-value	-	-	-	-	-	-	0,0212	0,0007	ns	ns	ns	ns
P-value - pairwise	-	-	-	-	-	-	0,0017	0,0004	-	-	-	-

All insecticide treatments have significantly more healthy plants than in the control. There are no significant differences between the insecticide treatments.

The damage score (Ds) was significantly higher in the control than in any of the insecticide treatments.