



**Nya betningsmedel mot
skadesvampar i sockerbetor 2001**
New seed treatments against fungi in sugar beets
2001-1-2-482

**SBU Sockernäringsens 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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Seed treatments against fungi/Betning mot skadesvampar

Summary

All fungicide treatments showed significantly more plants/ha (+ 9 - 15 000 plants/ha) than the control and the insecticide treatment (+ 5 - 10 000 plants/ha).

Although the results were not significant in the total analysis, the highest yield was found in the treatments with Montur + Tachigaren and the highest dose of Celeste.

The percentage of healthy and missing plants was fairly equal in the conventional treatments (TMTD + Tachigaren + Montur, Euparen + Tachigaren + Montur and Tachigaren + Montur) and in the treatments with Celeste (0,5 and 1,0 g).

Borgeby / 2002

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Seed treatments against fungi/Betning mot skadesvampar

Introduction

The purpose of the trial series was to evaluate the effect of new seed treatments on number of plants, plant condition, effect against fungi and yield.

Materials and methods

The series included an untreated control, seven treatments with different types of seed coating against fungi and one treatment with seed coating only against insects. The trials were laid out as randomized complete block designs at four locations in the south of Sweden; Svalöv and Västregård in the western part of Skåne and Köpingegården and Araslöv in the eastern part of Skåne.

Before the trial was sown we measured the infection pressure at each location. Soil samples were collected and sent for analysis to Maria Nihlgård, Syngenta Seeds (Table 1).

The number of plants in each treatment were counted three times during emergence and finally after inter-row cultivation.

The plant condition was evaluated twice in each trial and included estimations of the number of healthy plants, damage score and number of plants affected by fungi. Damage score was measured on a scale from 0 - 5 where 0 denotes a healthy plant and 5 a dead plant. The plant condition was evaluated by the Swedish University of Agricultural Sciences.

After harvest, we counted the number of beets, strongly and weakly infected by *Aphanomyces cochlioides* in each plot. Beets classified as strongly infected are characterized by a severely deformed taproot whereas weakly infected beets show only moderate signs of deformation (a tendency for so called "waist"). The evaluation was carried out in the tare house at the sugar factory in Örtofta. From the amount of plants drilled we could also estimate the number of healthy and missing plants.

Results and discussion

Countings during emergence

At the third counting, all the fungicide treatments had over 90 000 plants/ha, which is over 10 000 plants more compared to the untreated control and the insecticide treatment. There were no significant differences between the different fungicide treatments.

The result from the final counting (after inter-row cultivation) at each location is shown in table 2. The fungicide treatments have 5 - 10 000 more plants compared to the treatment with only insecticide (treatment 2).

Table 1. Evaluation of the risk of infection at each trial location and the most frequently occurring fungi on each location (mentioned in decreasing order).

Locality	Index	Risk of infection	Type of fungi
Svalöv	68	Large risk of infection, in particular under wet and warm conditions	<i>Aphanomyces</i> , <i>Pythium</i> , <i>Rhizoctonia</i>
Västregård	60	Medium	<i>Aphanomyces</i> , <i>Pythium</i> , <i>Rhizoctonia</i>
Araslöv	45	Low	<i>Pythium</i> , <i>Aphanomyces</i> , <i>Rhizoctonia</i>
Köpingegårder	38	Low	<i>Pythium</i> , <i>Aphanomyces</i> , <i>Rhizoctonia</i>

Table 2. The number of plants after inter-row cultivation (1000nds/ha) on the different trial locations.

Treatment	No. of plants (1000nds/ha)				Total
	Köpingegården	Araslöv	Svalöv	Västregård	
1	100,8	70,1	94,0	59,9	81,2
2	103,7	68,8	94,5	73,7	85,2
3	102,1	95,1	97,9	75,8	92,7
4	105,7	94,8	100,8	78,6	95,0
5	98,7	93,2	98,2	81,5	92,9
6	96,6	92,2	94,5	76,6	90,0
7	100,5	87,2	101,0	76,3	91,3
8	97,9	95,1	99,5	84,1	94,1
9	99,2	91,9	98,7	77,6	91,9

Plant condition

The plant condition in the fungicide treatments was generally higher than in the control and in the insecticide treatment. However, the differences were only significant for the damage score measure and evaluation of fungi.

Evaluation of Aphanomyces

The results from the evaluation of *Aphanomyces* are shown in tables 4, 5, and 6 and figure 1. The number of missing plants were higher in the control and in the treatment with Montur compared to in the fungicide treatments. The number of healthy plants was also low in the control and in the treatment with Montur.

The conventional insecticide and fungicide treatments (treatments 3, 4 and 5) have few missing plants and also a high percentage of healthy plants. Only the two highest doses of Celeste show a similar result.

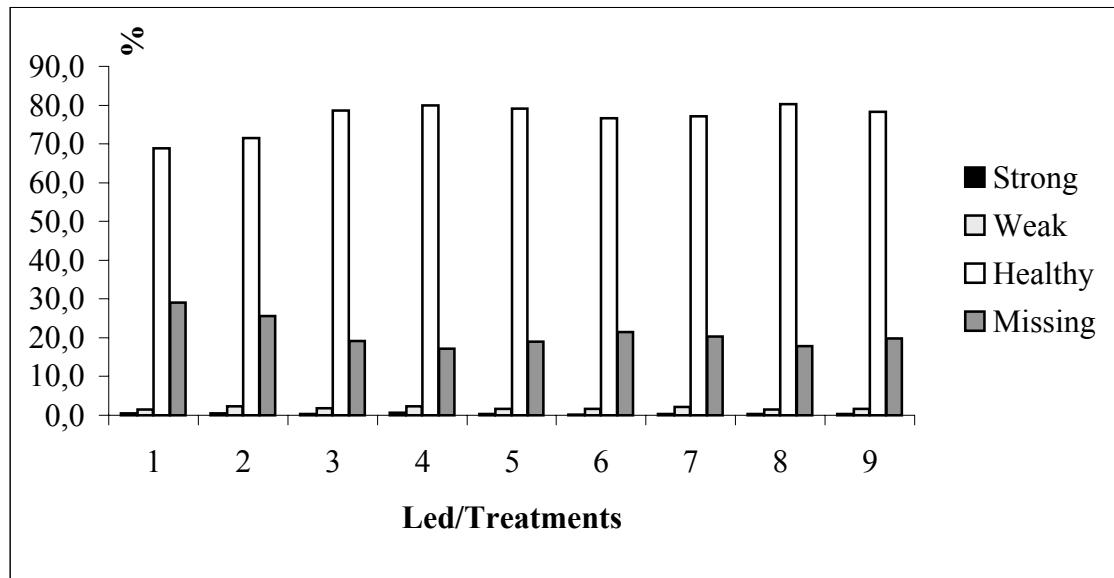


Figure 1. The figure shows the number of plants in each of the four groups (strong, weak, healthy and missing plants) in the total analysis (four trials).

Variation in yield between trial locations

At Araslöv, where the infection pressure of fungi was low, the yield of extractable sugar was over ten tons/ha in all treatments (except treatment 2 with Montur).

Although the infection pressure of fungi was low also at Köpingegården, the level of extractable sugar is not over nine tons/ha. The difference in yield between Araslöv and Köpingegården may be caused by infection of the beet cyst nematode *Heterodera schachtii* Schmidt at Köpingegården. At harvest, beets with symptoms were found in the field.

The largest risk of infection was found at Svalöv. Despite this, the yield is still around ten tons/ha in several treatments (treatments 2, 5, 8 and 9). At Västregård the yield was just under ten tons/ha.

Yield (four trials)

Except for the measure of K + Na there were no significant differences between the treatments for any of the variables measured at harvest in the total analysis. In contrast, there were significant differences between the treatments in the amount of extractable sugar (tons/ha) on three of the trial locations (Table 3).

Although the results were not significant in the total analysis, the highest yield was found in the treatments with Montur + Tachigaren and the highest dose of Celeste.

Yield (three trials)

There is a risk that the results from Köpingegården may be affected by other factors than the different seed treatments e. g. nematodes. During August, Köpingegården also suffered from severe drought. A second statistical analysis was therefore performed without Köpingegården. The results are shown in table 3. The second analysis show more or less the same differences between treatments as the total analysis including all four trials.

Table 3. The table shows the amount of extractable sugar (tons/ha) in each treatment at the different trial sites. There were no significant differences between the treatments in the total analysis including all four trials.

Treatment	Extractable sugar (tons/ha)					Total 4 trials	Total 3 trials *
	Köpingegården	Araslöv	Svalöv	Västregård			
1	8,8	10,2	9,4	8,2	9,2	9,3	
2	8,6	9,8	10,2	9,0	9,4	9,7	
3	8,7	11,3	9,1	9,4	9,6	9,9	
4	8,8	10,9	9,4	9,6	9,7	10,0	
5	8,4	11,4	10,1	9,4	9,8	10,3	
6	8,4	10,4	9,1	9,3	9,3	9,6	
7	8,1	10,5	9,3	9,5	9,3	9,8	
8	8,0	11,0	9,8	9,7	9,6	10,2	
9	8,4	10,8	10,4	9,7	9,8	10,3	
P - value total	ns	0,0047	0,0012	<0,0003	ns	ns	
P - value pairwise	-	0,0003	0,0007	<0,0001	-	-	
LSD 5%	-	0,79	0,72	0,58	-	-	

* Köpingegården not included

Seed treatments against fungi/Betning mot skadesvampar

GEP-information

Uppdragsgivare/Contractors:

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Bengt Liljedahl
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261 23 Landskrona

DuPont Sverige AB
Jan-Åke Svensson
Box 839
201 80 Malmö

Teknisk beskrivning/Technical details: The active ingredient in Celest 025 FS is fludioxonil 25g/l. Celest has been approved by the National Chemicals Inspectorate for use in field tests in Sweden 2001.

Försöksplatser/Trial locations: Svalöv, Västregård, Köpingegården and Araslöv

Försöksmetodik/Methodology: Randomized complete block design

Avvikelser/Problems: -

Rapporten omfattar 14 sidor.

The report is comprised of 14 pages.

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Seed treatments against fungi/Betning mot skadesvampar - Syngenta, DuPont

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

	<u>Betning (g v.s./enhet)</u>
1 Obehandlat	Nej
2 Montur	Montur (15 + 4)
3 TMTD + Tachigaren + Montur	TMTD (4,8) + Tachigaren (14) + Montur (15+4)
4 Euparen + Tachigaren + Montur	Euparen (10) + Tachigaren (14) + Montur (15+4)
5 Tachigaren + Montur	Tachigaren (14) + Montur (15+4)
6 Celeste 025 FS + Tachigaren + Montur	Celeste (0,075) + Tachigaren (14) + Montur (15+4)
7 Celeste 025 FS + Tachigaren + Montur	Celeste (0,2) + Tachigaren (14) + Montur (15+4)
8 Celeste 025 FS + Tachigaren + Montur	Celeste (0,5) + Tachigaren (14) + Montur (15+4)
9 Celeste 025 FS + Tachigaren + Montur	Celeste (1,0) + Tachigaren (14) + Montur (15+4)

Fältplan

IV	7	6	9	5	1	2	4	3	8	Köpingegården
III	1	9	3	8	4	5	7	6	2	
II	6	5	8	4	9	1	3	2	7	
I	8	7	1	6	2	3	5	4	9	

IV	2	5	1	9	7	3	8	4	6	Araslöv
III	5	8	4	3	1	2	6	7	9	
II	1	4	9	8	6	7	2	3	5	
I	3	6	2	1	8	9	4	5	7	

IV	6	2	5	3	8	9	7	4	1	Västregård
III	9	5	8	6	2	3	1	7	4	
II	5	1	4	2	7	8	6	3	9	
I	7	3	6	4	9	1	8	5	2	

IV	2	6	3	7	5	9	1	8	4	Svalöv
III	5	9	6	1	8	3	4	2	7	
II	1	5	2	6	4	8	9	7	3	
I	3	7	4	8	6	1	2	9	5	

Parcellbredd: 6 rader

Försöksbredd: 20,16 m

Försökslängd: 68 m

Parcelllängd, brutto: 12 m

Parcelllängd, netto: 10 m

Försöksyta: 1 371 m²

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

Krav på försöksplats: Så högt tryck av skadesvampar som möjligt.

Försöksåtgärder:

- | | |
|-------------------------------------|---|
| 1 Jordprov för svampinfektionstryck | 5 Skadebedömning i fält, % friska plantor, damage score vid 2 tidpkt, alla led (SLU/Alnarp) |
| 2 Generalprov 6 | |
| 3 Parcellvis sådd | |
| 4 Planträkning 3 ggr under uppkomst | 6 Skörd |
| 5 Planträkning efter radrensning | |

2001-02-16 ÅO

Seed treatments against fungi/Betning mot skadesvampar

Slutskörd/harvest

Sammanslagning av 4 försök/Results from 4 trials

Behandling/Treatments	No. plants Ant. plantor 1000-nds/ha 1000-tal/ha	Clean weight Renvikt ton/ha	Sugar content Sockershalt %	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	81,2	59,2	17,26	14	4,44	89,45	9,15	100	86,1
2 Montur	85,2	60,3	17,41	14	4,29	89,83	9,41	103	84,1
3 TMTD + Tachigaren + Montur	92,7	61,1	17,49	13	4,21	90,04	9,63	105	84,5
4 Euparen + Tachigaren + Montur	95,0	61,6	17,45	13	4,17	90,07	9,67	106	83,8
5 Tachigaren + Montur	92,9	62,4	17,51	13	4,15	90,14	9,83	107	85,8
6 Celeste 025 FS + Tachigaren + Montur	90,0	59,4	17,38	13	4,19	89,98	9,27	101	87,2
7 Celeste 025 FS + Tachigaren + Montur	91,3	59,8	17,40	13	4,19	89,98	9,34	102	86,0
8 Celeste 025 FS + Tachigaren + Montur	94,1	61,3	17,47	13	4,16	90,10	9,63	105	84,4
9 Celeste 025 FS + Tachigaren + Montur	91,9	62,5	17,46	13	4,18	90,04	9,80	107	84,8
CV	6,2	4,2	0,9	4	2,71	0,32	4,65	-	2,9
LSD 5%	8,1	3,7	0,23	1	0,17	0,42	0,65	-	3,6
P-value (total analysis)	0,0329	ns	ns	ns	0,0380	ns	ns	-	ns
P-value (pairwise)	0,0018	-	-	-	0,0017	-	-	-	-

There were no significant differences between the treatments in clean weight, sugar content, Amino - N, K + Na, extractable sugar or tare. The number of plants after inter-row cultivation was high (and significantly different from the control) in all the fungicide treatments and highest in treatment four (Euparen + Tachigaren + Montur). The K + Na value was highest in the control and significantly different from all the fungicide treatments.

Seed treatments against fungi/Betning mot skadesvampar

Planträkningar under uppkomst/Plant number

Sammanslagning av 4 försök/Results from 4 trials

Behandling/Treatments	Plant number (1000nds7ha) Planträkning 1000-tal/ha			
	1	2	3	after inter-row cult. 4
1 Obetat	24,5	61,1	76,3	81,2
2 Montur	26,9	64,4	79,4	85,2
3 TMTD + Tachigaren + Montur	28,6	73,2	90,0	92,7
4 Euparen + Tachigaren + Montur	27,5	74,0	92,9	95,0
5 Tachigaren + Montur	29,5	74,0	91,9	92,9
6 Celeste 025 FS + Tachigaren + Montur	27,3	70,7	90,2	90,0
7 Celeste 025 FS + Tachigaren + Montur	30,7	72,9	91,1	91,3
8 Celeste 025 FS + Tachigaren + Montur	31,4	75,7	92,8	94,1
9 Celeste 025 FS + Tachigaren + Montur	29,6	73,6	90,8	91,9
CV	16,1	8,3	6,7	6,2
LSD 5%	6,7	8,6	8,6	8,1
P-value (total analysis)	ns	0,0236	0,0027	0,0329
P-value (pairwise)	-	0,0019	0,0006	0,0018

There were no significant differences between the treatments in the first plant counting. In contrast, the fungicide treatments had significantly more plants than the control in the following countings.

Seed treatments against fungi/Betning mot skadesvampar

4 försök/4 trials

Behandling/Treatments	Plant condition 1 Fältbedömning 1			Plant condition 2 Fältbedömning 2		
	Healthy pl	Ds	Fungi	Healthy pl	Ds	Fungi
	Friska pl %	0-5	Svamp %	Friska pl %	0-5	Svamp %
1 Obehandlat	28,8	1,1	0,0	0,0	1,7	6,9
2 Montur (15 + 4)	28,8	1,2	6,3	0,0	1,5	3,1
3 TMTD (4,8) + Tachigaren (14) + Montur (15+4)	36,3	0,9	0,0	0,0	1,4	0,0
4 Euparen (10) + Tachigaren (14) + Montur (15+4)	33,8	0,8	0,6	0,6	1,4	0,6
5 Tachigaren (14) + Montur (15+4)	35,6	0,9	0,0	1,3	1,4	0,0
6 Celeste (0,075) + Tachigaren (14)+ Montur (15+4)	38,8	0,9	1,9	0,6	1,3	0,0
7 Celeste (0,2) + Tachigaren (14)+ Montur (15+4)	35,0	0,9	1,9	1,3	1,2	0,0
8 Celeste (0,5) + Tachigaren (14)+ Montur (15+4)	37,5	0,8	0,6	1,9	1,3	0,6
9 Celeste (1,0) + Tachigaren (14)+ Montur (15+4)	30,0	1,0	1,3	0,6	1,3	0,6
CV	39,8	29,3	287,0	397,4	20,0	398,2
LSD 5%	9,4	0,2	2,8	1,9	0,2	3,7
P-value	ns	0,0010	0,0004	ns	<0,0001	0,0032
P-value - pairwise	-	0,0002	<0,0001	-	<0,0001	0,0003

There were no significant differences in the percentage of healthy plants between the treatments. The damage score (Ds) and percentage of plants infected by fungi were significantly lower in the fungicide treatments than in the control and insecticide treatment.

Seed treatments against fungi/Betning mot skadesvampar

Table 4. The number and percentage of beets infected by *Aphanomyces* (strong and weak, respectively)

Led/Treatment	No. of strongly infected beets Antal starkt angripna betor	%	No. of weakly infected beets Antal svagt angripna betor	%	Total no. of infected beets Totalt ant. infekterade betor
1	9	25,7	26	74,3	35
2	10	19,6	41	80,4	51
3	7	17,5	33	82,5	40
4	12	22,6	41	77,4	53
5	6	16,7	30	83,3	36
6	4	12,1	29	87,9	33
7	6	13,6	38	86,4	44
8	6	18,8	26	81,3	32
9	5	14,7	29	85,3	34

Table 5. The table shows the number of infected plants/ha as well as the number of healthy plants. The results from the four plant countings are also shown.

Tabellen visar antalet angripna plantor/ha samt resultat från planräkningar.

Led	Plants/treatment Plantor/led		Plants/ha (1000nds/ha) Plantor/ha (1000tal/ha)		Counting Planräkning			Diff. in no. of plants between: Skillnad i ant. plantor mellan: Counting/planräkning			No. of plants Ant. plantor At harvest Healthy	
	Strong Starkt	Weak Svagt	Strong Starkt	Weak Svagt	1	2	3	1 - 2	2 - 3	1 - 3	Skörd	Friska
1	9	26	0,6	1,7	24,5	61,1	76,3	36,6	15,2	51,8	81,2	78,9
2	10	41	0,7	2,7	26,9	64,4	79,4	37,5	15,0	52,5	85,2	81,9
3	7	33	0,5	2,1	28,6	73,2	90,0	44,6	16,8	61,4	92,7	90,1
4	12	41	0,8	2,7	27,5	74,0	92,9	46,5	18,9	65,4	95,0	91,5
5	6	30	0,4	2,0	29,5	74,0	91,9	44,5	17,9	62,4	92,9	90,6
6	4	29	0,3	1,9	27,3	70,7	90,2	43,4	19,5	62,9	90,0	87,9
7	6	38	0,4	2,5	30,7	72,9	91,1	42,2	18,2	60,4	91,3	88,4
8	6	26	0,4	1,7	31,4	75,7	92,8	44,3	17,1	61,4	94,1	92,0
9	5	29	0,3	1,9	29,6	73,6	90,8	44,0	17,2	61,2	91,9	89,7

Table 6. Tabellen visar antal plantor som var starkt resp. svagt angripna av *Aphanomyces*, antal plantor som var friska samt saknades. The table shows the number of plants affected by *Aphanomyces* as well as the number of healthy and missing plants.

Treatment	Drilled Led	Number of plants (1000nds/ha) Antal pl/ha (1000-tal/ha)					Percentage of plants within each group (%) Andel plantor i resp. grupp (%)			
		At harvest vid skörd	Strong Starkt	Weak Svagt	Healthy Friska pl	Missing Saknas	Strong Starkt	Weak Svagt	Healthy Friska pl	Missing Saknas
1	114,6	81,2	0,6	1,7	78,9	33,4	0,5	1,5	68,9	29,1
2	114,6	85,2	0,7	2,7	81,9	29,4	0,6	2,3	71,4	25,7
3	114,6	92,7	0,5	2,1	90,1	21,9	0,4	1,9	78,6	19,1
4	114,6	95,0	0,8	2,7	91,5	19,6	0,7	2,3	79,9	17,1
5	114,6	92,9	0,4	2,0	90,6	21,7	0,3	1,7	79,0	18,9
6	114,6	90,0	0,3	1,9	87,9	24,6	0,2	1,6	76,7	21,5
7	114,6	91,3	0,4	2,5	88,4	23,3	0,3	2,2	77,2	20,3
8	114,6	94,1	0,4	1,7	92,0	20,5	0,3	1,5	80,3	17,9
9	114,6	91,9	0,3	1,9	89,7	22,7	0,3	1,6	78,3	19,8