Syngenta - Nya betningsmedel mot jordburna svampsjukdomar i sockerbetor

New seed treatments against soil borne fungi in sugar beet

2003

SBU Projektkod 2003-1-2-487

SBU Sockernäringens BetodlingsUtveckling AB är ett kunskapsföretag som bedriver försöks- och odlings-utveckling i sockerbetor för svensk sockernäring.

SBU ägs till lika delar av Danisco Sugar och Betodlarna.

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Nya betningsmedel mot jordburna svampsjukdomar i sockerbetor

Sammanfattning

Syftet med denna försöksserie var att prova effekten av några nya betningsmedel (Celest med den verksamma substansen fludioxonil samt azoxystrobin i två doser, 4 och 8 gram) mot skadesvampar i sockerbetor.

- Samtliga provade betningsmedel mot jordburna svampar gav ett ökat plantantal jämfört med obehandlat led, 5 000 – 15 000 fler plantor/ha.

- Vid den andra fältbedömningen har de högre doserna av Celest resp. azoxystrobin resulterat i fler friska plantor jämfört med för den lägre dosen av respektive ämne. Även plantornas skador var mindre i leden med den högre dosen jämfört med för den lägre dosen.

- Försöksserien visade på en svag tendens till ökad skörd i led 8 (azoxystrobin 8 g).

Summary

The purpose of the present investigation was to test new seed treatments against root rot fungi in sugar beets.

- In comparison with treatment 1 (completely untreated), all fungicide treatments have increased the number of plants with between 5 000 – 15 000 pl/ha.

- In the second field evaluation the largest number of healthy plants was found in the treatments with the highest dose of Celest and azoxystrobin, in comparison with the lower dose of these substances. The damage score of the plants in the higher dose of Celest and azoxystrobin was also less than in the treatment with the lower dose.

- There was a weak tendency for increased yield in treatment 8 (azoxystrobin 8).

Introduction

A number of soil borne fungal diseases in sugar beet may cause substantial damage in sugar beet fields by reducing plant number and growth. One of the most important of these pests and diseases in Sweden is the water mold fungus *Aphanomyces cochlioides*. Under favourable conditions (warm and wet soil), *A. cochlioides* typically attack young seedlings 2 – 3 weeks after emergence. The roots become brown and in severe attacks, the entire hypocotyl (region between root and cotyledons) and cotyledons may rot and the seedling dies. Early seedling attacks of *A. cochlioides* may result in low plant numbers on the field. In addition, *A. cochlioides* may infect sugar beets throughout the growing season whenever conditions are favourable, thus reducing growth and storage capability.

Other fungi may also cause root rot e.g. *Pythium* spp. (preemergence damping-off) and *Rhizoctonia solani*. *Pythium* spp. attacks young seedlings within the first week after emergence. Recent inventories in Sweden have indicated that *Pythium* spp. and *Rhizoctonia solani* seem to be less common than *A. cochlioides* (L. Persson, SBU, pers. comm.)

This trial series included a total of eight different seed treatments: one untreated control, one treatment with insecticide (Cruiser 600 FS) but without fungicide and, six treatments with combinations of insecticides and fungicides (see field plan). The trials were laid out on three locations, with low, medium and high potential risk of damping-off, in the southern part of Sweden. The trials were sown 030414 (Ingelsträde and Skiberöd) and 030417 (Rycketofta).

The purpose of the present investigation was to test new seed treatments against root rot fungi in sugar beet and to compare their effect with the seed treatments that are used today.

Material and methods

In early spring 2002, soil samples were taken from a number of different locations in the south of Sweden. The soil samples were analyzed for their potential to infect young sugar beet seedlings. The soil tests were carried out by Syngenta Crop Protection (Maria Nihlgård). Sugar beet seeds were sown in pots with test soil and then put in greenhouse under conditions favourable for infection. The seedlings were evaluated every week for symptoms of damping-off (dead seedlings were removed from the pots). A soil index was then calculated according to the method by Ewaldz (1993):

$$\text{Index} = (3 * as7 + 3 * (as14 - as7) + (as21 - as14) + 0{,}5 * (as28 - as21))/3$$

where as = number of attacked seedlings at 7, 14, 21 and 28 days.
This method focuses mainly on early and predominantly lethal attacks and the number of infected plants during the first two weeks is given higher weight in the calculation of soil index. Attacks that occur at a later stage in the seedlings development are regarded as less important since the plants often survive. The evaluation of the risk of damping-off (soil index 0 – 100) is shown in table 1. The soil test also indicates the most common fungi on each location. Three trial locations were chosen on the basis of the result from the soil tests; Skiberöd, Rycketofta and Ingelsträde. Skiberöd is situated in the central part of Skåne 25 km east of Lund. Rycketofta and Ingelsträde are situated in the northwestern part of Skåne. The result of the soil test from the three locations with the highest infection potential is shown in enclosure 3.

The results of the analyzes of soil type on each locality are shown in enclosure 2.

Plant number and vigour

The number of plants in each plot was counted three times during emergence and finally after inter-row cultivation. The results are shown in enclosure 4.

The general condition of the plants (vigour score) in each plot were evaluated twice using a scale from 0 – 100 where 0 was given to a plot with completely destroyed plants and 100 to plots with plants in very good condition and growth. The first evaluation of vigour took place when the plants had just developed cotyledons and the ordinary leaves were just visible. The second evaluation took place three to four weeks later. The results are shown in enclosure 5.

Damping-off

Evaluation of damping-off was performed twice in early spring. The first evaluation took place when the plants had just developed cotyledons and the second evaluation two weeks later. In the sample area 50 randomly chosen plants were dug up and each plant was evaluated for symptoms of damping-off and/or insect damage on a scale from 0 (healthy plant) to 5 (dead plant). The percentage of healthy plants and percentage of plants with damping-off were then calculated. The results are shown in enclosure 6.

Harvest

The trials at Skiberöd and Rycketofta were harvested. The trial at Ingelsträde suffered from severe attacks of damping-off and very few plants in several plots survived.

After harvest, the number of beets that showed symptoms of damping-off was counted in each plot (1. very weak, 2. weakly and 3. strongly infected beets, respectively). Beets classified as strongly infected are characterized by a severly deformed taproot whereas weakly infected beets show only moderate signs of deformation. A root rot index (0 – 3) was calculated:

$$\text{Index} = (1 * n_1 + 2 * n_2 + 3 * n_3)/\text{total no. plants in the plot}$$

where n = the number of plants in each category.
A root rot index below one indicates minor deformations on the beets whereas a root rot index close to three indicates severly deformed beets (enclosure 7).
The evaluation was carried out at the central tare house in Örtofta (Agri Provtvätt, Örtofta Sockerbruk, Danisco Sugar).

Statistical analyses

Each trial was laid out in a randomized complete block design with four replicates. To be able to remove plants for analyses, an extra sample area was sown adjacent to the original plot. All variables were analysed with one-way analysis of variance using Proc GLM in SAS, SAS Institute Inc.

Results and discussion

The results from the soil samples show that *A. cochlioides* was the most frequently occurring fungus on the three trial locations (enclosure 3). The highest soil index was found on Ingelsträde, followed by Skiberöd and Rycketofta. The most severe attacks of damping–off occurred at Ingelsträde.

Plant number

The emergence was rather slow in treatments 5 (Celest 3) and 8 (azoxystrobin 8) and the number of plants in the first counting was below 20 000 pl/ha in these two treatments. For treatment 5, the plant number is still rather low in the final counting and on the same level as in the treatment with only insecticide (76 000 pl/ha).

The highest number of plants was found in treatment 7 (azoxystrobin 4, 85 000 plants) which is around 15 000 more than in treatment 1 (untreated) and 9 000 more than in the treatment with only insecticide (treatment 2, Cruiser).

With the exception of treatment 4 and 5, all other fungicide treatments have increased the number of plants compared with treatment 2 (Cruiser) with as many as 3 500 in treatment 8 (azoxystrobin 4) to 9 000 in treatment 7 (azoxystrobin 8).

Vigour score

There were no significant differences in plant condition between the treatments.

Field evaluation of plant damage due to damping-off

In the first field evaluation all the treatments with fungicides had more than 63% healthy plants. The highest number of healthy plants was found in treatment 8 (70%, azoxystrobin 8). The average damage on the plants was also low in treatment 8 (damages score = 0,8), which is significantly different from the average damage in treatments 1 and 2 (without fungicides, damage score = 1,3 and 1,2 respectively).

The number of healthy plants was less than 60% in the treatments without fungicides.

In the second field evaluation the number of healthy plants had decreased in all treatments. The treatments with the highest number of healthy plants were treatment 6 (Celest 6), treatment 8 (azoxystrobin 8) and treatment 4 (Tachigaren). These treatments also had a low general plant damage (2,3, 2,4 and 2,4 respectively).

These results indicate that the two higher doses of Celest and azoxystrobin may have been more effective in reducing damping-off than the lower dose of each substance.

Investigation of beets after harvest

The investigation of beets with chronical symptoms of damping-off carried out at the central tare house showed that the beets from both localities (Skiberöd and Rycketofta) in general had very weak symptoms of root rot. There were no significant differences between the treatments (enclosure 7).

Yield

There were no significant differences in amount of sugar between the treatments at any of the localities. However, there was a small tendency for treatment 8 (azoxystrobin 8 g) to have the highest yield at both Skiberöd and Rycketofta (enclosure 8, 9).

Correlation between soil index and yield

The correlation between soil index before drilling and extractable amount of sugar has now been investigated in 12 fungicide trials 2000 – 2003 (figure 1). The result is shown in figure 1. The trend line shows that on average, for every increase by one unit of the soil index, 0,0534 ton extractable sugar is lost (calculated from the standard fungicide treatment used in Sweden (Euparen 10 g, Tachigaren 14 g, Montur/Cruiser).

The average amount of extractable sugar was different between Rycketofta and Skiberöd. On average (over all eight treatments), the amount of extractable sugar was 10,1 ton/ha at Rycketofta and 7,7 ton/ha at Skiberöd. A decrease in soil index by 16 units (Rycketofta soil index = 40 to Skiberöd soil index = 56) would thus according to above correlation correspond to a yield loss of around 0,870 ton extractable sugar/ha. This partly explains the difference in yield between Rycketofta and Skiberöd. Weather conditions have a strong impact on the occurrence of root rot and may have been particularly favourable at Skiberöd, thus resulting in the lower yield.

References

Ewaldz, T. 1993. Determining the risk of damping-off in sugar beets. Växtskyddsnotiser 169 – 171.

Table 1. The table shows the evaluation of risk of damping-off (Ewaldz 1993)

Index	Risk	Evaluation
0 – 20	No risk	-
20 – 40	Low	Normally no problems
40 – 70	Medium	Growing sugar beets could be hazardous
70 – 100	High	Under favourable conditions, damping-off is highly likely

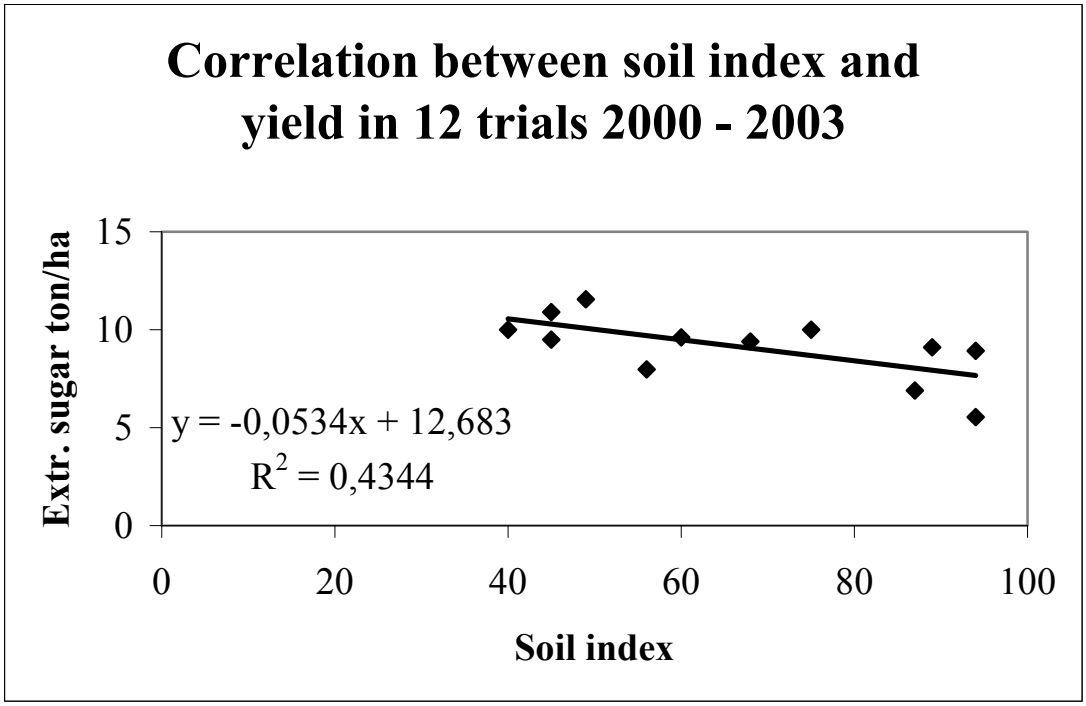

Figure 1. The figure shows the amount of extractable sugar (ton/ha) obtained with conventional seed treatment (Euparen, Tachigaren and Montur/Cruiser WS 70 2002, 600 FS 2003) plotted against soil index values for 12 different trial locations during 2000 – 2003.

GEP-information

Uppdragsgivare/Contractor:

Syngenta Crop Protection
Hans Rasmussen
Strandlodsvej 44, 1. sal, 2300 Köpenhamn S

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

Planansvarig/Project Manager:

Åsa Olsson, SBU AB

Försöksfrö/Trial seed

Försöksfrö har tillhandahållits av Syngenta Crop Protection. /Trial seed has been supplied by Syngenta Crop Protection
Betsort Envol/ Variety Envol.

Försöksmetodik/Methodology

RCB. Beskrivning av metoder och bedömningar: se fältkort för hänvisning till PM i SBUs kvalitetshandbok. /Description of methods and evaluations: see field plan for references to PM in SBU quality handbook.

Försöksplatser/Trial sites

Ingelsträde
Rycketofta
Skiberöd
För adressuppgifter till försöksvärdarna: se de enskilda försöksrapporterna.

Teknisk beskrivning/Technical details:

Produkt/Product	**Verksam substans/ Active ingredient**	**Dos/Dose**
1. Obehandlat/Untreated	-	
2. Obehandlat, Cruiser 600 FS	*thiametoxam*	30 g
3. Euparen, Tachigaren, Cruiser 600 FS	*tolylfluanid, thiametoxam, hymexazol*	4, 10, 14 , 30 g
4. Tach., Cruiser 600 FS	*hymexazol*, *thiametoxam*	14, 30 g
5. Celest + Tach. + Cruiser 600 FS	*fludioxonil, hymexazol*, *thiametoxam*	3, 14, 30 g
6. Celest + Tach. + Cruiser 600 FS	*fludioxonil, hymexazol*, *thiametoxam*	*6*, 14, 30 g
7. Azoxystrobin + Tach. + Cruiser 600 FS	*azoxystrobin, hymexazol, thiametoxam*	4, 14, 30 g
8. Azoxystrobin + Tach. + Cruiser 600 FS	*azoxystrobin, hymexazol*, *thiametoxam*	8, 14, 30 g

Avvikelser/Problems

Försöket på Ingelsträde var hårt drabbat av rotbrand. Uppkomsten var till en början god men plantorna led kraftigt av rotbrand och dog. I block I och II saknades i stort sett alla plantor. Försöket kunde inte skördas/The trial at Ingelsträde suffered from severe attacks of damping-off. The plant number in blocks I and II was extremely low and the trial could not be harvested.

Styrelsen för ackreditering och teknisk kontroll (SWEDAC)

Försöksstationer ackrediteras av Styrelsen för ackreditering och teknisk kontroll (SWEDAC) enligt svensk lag. Den ackrediterade verksamheten vid försöksstationerna uppfyller för GEP-ackreditering relevanta delar av kraven i SS-EN ISO/IEC 17025 (2000).
Test facilities are accredited by the Swedish Board for Accreditation and conformity Assessment (SWEDAC) under the terms of Swedish legislation. The accredited test facilities meet the relevant requirements for GEP accreditation in SS-EN ISO/IEC 17 025 (2000).

Borgeby / 2003

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Åsa Olsson
Project Manager
SBU AB

Borgeby / 2003

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Robert Olsson
Managing Director
SBU AB

Nya betningsmedel mot jordburna svampsjukdomar

SBU projektkod 2003-1-2-487

Syngenta

Antal försök 3

Fältkort

Försöksvärd

Skiberöd
Rycketofta
Ingelsträde

Syfte: Att prova nya betningsmedel mot jordburna svampsjukdomar i sockerbetor.

Uppdragsgivare: Syngenta, SBU, DuPont

Försöksled		Dos fung. g a. i./unit	Dos ins. g a. i./unit
1	Obehandlat	-	-
2	Obehandlat/Cruiser 600 FS	-	30 g
3	Euparen/Tachigaren/Cruiser 600FS	10 + 14	30 g
4	Tachigaren/Cruiser 600FS	14	30 g
5	Celest/Tachigaren/Cruiser 600 FS	3 + 14	30 g
6	Celest/Tachigaren/Cruiser 600 FS	6 + 14	30 g
7	A /Tachigaren/Cruiser 600FS	4 + 14	30 g
8	B /Tachigaren/Cruiser 600FS	8 + 14	30 g

Handelsnamn	**Verksam beståndsdel**
Euparen	*tolylfluanid*
Tachigaren	*hymexazol*
Cruiser 600FS	*thiametoxam*
Celest	*fludioxonil*
A och B	kodat

Bricknr i försöket:	1801 - 1896	**Försökets totala yta, m²:**	1 567
Skördeyta/parcell, m²:	2 r x 10 m	**Bruttoyta/parcell, m²:**	6 r x 17 m

Kontaktperson + telefonnr:

Åsa Olsson 0709-53 72 62

För försökets utförande ansvarig person + telefonnr:

Krav på försöksplats: Högt svampinfektionstryck.

Provtagningsytor till alla parceller. Yta om 10 m läggs mellan block I och II samt block III och IV.

Utsädesmängd: 5 frö/m.

Försöksuppgifter:		**Försöksåtg.:**	**PM**		Datum/Sign.
Såmaskin, märke		Generalprov 6	2.6.1	HS	
Sådd, datum		Utstakning i fält	2.4.1	HS	
Radavstånd, cm		Parcellvis sådd	2.4.2	HS	
Antal frö per m		Svampprov	2.6.1	HS	
Sort	Envol	Planträkning 20	2.5.4	HS	
Betning, produkt	Enligt plan ovan	Planträkning 50	2.5.4	HS	
Uppkomst, datum		Planträkning max	2.5.4	HS	
Förfrukt 2002		Planträkning slutl	2.5.4	HS	
År med betor 1992-02:		Rotbrand 2 ggr	2.5.8	HS	
		Sundhet 1, 2	2.5.20	SBU	
Gödsling	Se "Behandlingsdata"				
Ogräsbekämpning	Se "Behandlingsdata"	Skörd	2.4.7	HS	
Svampbekämpningar	Se "Behandlingsdata"	Lev. provtvätt	2.4.7	HS	
Insektsbekämpningar	Se "Behandlingsdata"	Analys	-	DS	

20030401/ÅO

Försöksdata kontrollerat (datum+sign.):

Rutfördelning

Rycketofta

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

Skiberöd

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

Ingelsträde

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

Analyzes of soil type **Enclosure 2**

	pH	P-AL	P-klass	K-AL	K-klass	Mg-AL	K/Mg kvot	Ca-AL	K-HCL	K-HCL klass	Cu-HCL	P-HCL (klass)	Bor
Rycketofta	6,7	13	IV	12	III	5,2	2,3	120	54	2	13	76 (4)	0,56
Skiberöd	7,0	21	V	15	III	8,1	1,9	210	120	3	10	91 (5)	0,99
Ingelsträde	6,8	20	V	7,1	II	6,3	1,1	120	53	2	8,8	51 (3)	0,61

	Mullhalt %	Lerhalt %	Finler %	Sand Grovmo	Jordart	Basm. grad	S-värde	T-värde
Rycketofta	2,5	8	8	61	nmh lMo	70	6,7	9,6
Skiberöd	2,9	12	12	52	nmh lMo	>80	11,5	13
Ingelsträde	2,2	6	6	82	nmh lSa	73,9	6,7	9,1

Enclosure 3

Tests for damping-off in soil before drilling

Behandling/Treatment	**Rycketofta**	**Skiberöd**	**Ingelsträde**
Svampindex/soil index:	40	56	73
Risk of infection:	Låg/Low	Medium	Hög/High
Most frequently occuring fungi:	***Aphanomyces*** *Pythium* *Rhizoctonia*	***Aphanomyces*** *Pythium*	***Aphanomyces*** *Pythium* *Rhizoctonia* *Fusarium*

The most frequently occurring fungi on all localities was*Aphanomyces.* The highest soil index was found on Ingelsträde, followed by Skiberöd and Rycketofta.

Nya betningsmedel mot jordburna svampsjukdomar

Enclosure 4

Planträkningar/Plant number

Behandling/Treatment		Antal plantor / Number of plant 1000-tal/ha / 1000nds/ha			
		1	2	3	Plh slutlig after inter-row cult.
		3 försök	3 försök	3 försök	3 försök
1	Obehandlat/Untreated	23,7	58,4	73,6	71,2
2	Obehandlat/Cruiser 600 FS	21,9	57,5	79,6	76,5
3	Euparen/Tachigaren/Cruiser 600FS	24,9	57,3	88,4	83,7
4	Tachigaren/Cruiser 600FS	23,7	58,2	82,3	76,7
5	Celest/Tachigaren/Cruiser 600 FS	15,7	52,3	81,7	76,2
6	Celest/Tachigaren/Cruiser 600 FS	22,2	57,4	85,2	81,9
7	A. /Tachigaren/Cruiser 600FS	21,0	57,9	88,6	85,3
8	B. /Tachigaren/Cruiser 600FS	19,0	55,5	83,9	80,1
CV		10,2	3,9	3,9	5,8
LSD 5%		3,8	3,8	5,7	8
RSQ %		90,9	99,2	87,2	91,9
Prob.		0,0033	0,0603 ns	0,0011	0,0331
Prob., parvis/pairwise		0,0001	-	<0,0001	0,0020

The emergence was rather slow in treatments 5 and 8 and the number of plants in the first counting was below 20 000 pl/ha. After inter-row-cultivation these treatments had 5 000 and 9 000 more plants, respectively, than in treatment 1.
The highest number of plants was found in treatment 7 (85 000 plants) which is around 15 000 more than in the untreated entry and 9 000 more than in the treatment with only insecticide (treatment 2).

Sundhet/Vigour score

Behandling/Treatment		Sundhet / Vigour score 0 - 100	
		1 2 försök/2 trials	2 2 försök/2 trials
1	Obehandlat/Untreated	54	65
2	Obehandlat/Cruiser 600 FS	60	73
3	Euparen/Tachigaren/Cruiser 600FS	62	73
4	Tachigaren/Cruiser 600FS	53	61
5	Celest/Tachigaren/Cruiser 600 FS	61	66
6	Celest/Tachigaren/Cruiser 600 FS	60	70
7	A. /Tachigaren/Cruiser 600FS	66	75
8	B. /Tachigaren/Cruiser 600FS	58	64
CV		7	11
LSD 5%		10	17
RSQ %		95,7	92,6
Prob.		0,2263 ns	0,5195 ns
Prob., parvis/pairwise		-	-

There were no significant differences in plant condition between the treatments.

Nya betningsmedel mot jordburna svampsjukdomar

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Enclosure 6

Fältbedömning/Field evaluation **Sammanslagning 3 försök/3 trials**

Behandling/Treatment	Fältbedömning 1 / Plant condition 1			Fältbedömning 2 / Plant condition 2		
	Friska pl Healthy pl % 3 försök	Damage score 0-5 3 försök	Svamp Fungi % 3 försök	Friska pl Healthy pl % 3 försök	Damage score 0-5 3 försök	Svamp Fungi % 3 försök
1 Obehandlat/Untreated	54,8	1,3	38,7	31,7	2,6	68,3
2 Obehandlat/Cruiser 600 FS	57,5	1,2	33,3	40,3	2,4	59,7
3 Euparen/Tachigaren/Cruiser 600FS	66,5	1,0	29,4	34,4	2,7	65,6
4 Tachigaren/Cruiser 600FS	66,0	0,9	24,6	43,3	2,4	56,7
5 Celest/Tachigaren/Cruiser 600 FS	69,4	0,8	23,6	37,9	2,7	62,1
6 Celest/Tachigaren/Cruiser 600 FS	63,4	1,1	31,7	46,0	2,3	54,2
7 A. /Tachigaren/Cruiser 600FS	65,1	0,9	26,5	38,5	2,7	61,5
8 B. /Tachigaren/Cruiser 600FS	70,2	0,8	25,4	43,0	2,4	56,6
CV	29,0	16,0	62,5	33,1	3,9	21,41
LSD 5%	15,1	0,3	14,8	10,6	0,2	10,53
RSQ %	36	95	58	79,2	97,7	79,4
Prob.	0,4260 ns	0,0130	0,4541 ns	0,1416 ns	0,0335	0,1357 ns
Prob., parvis/pairwise	-	0,0013	-	-	0,0098	-

In the first field evaluation all the treatments with fungicides had more than 63% healthy plants and the number of healthy plants was particularly high in treatment 8. The number of healthy plants was less than 60% in the treatments without fungicides. The average damage on the plants was also low in treatment 8 (damage score 0,8) which is significantly different from the average damage in treatments 1 and 2 (without fungicides).

In the second field evaluation the number of healthy plants had decreased in all treatments. The treatments with the highest number of healthy plants was treatment 6 (Celest), treatment 8 (azoxystrobin) and treatment 4 (Tachigaren). These treatments also had the lowest general plant damage.

Enclosure 7

Root rot index evaluated at the central tare house

Behandling/Treatment		Root rot index 0 - 3		
		Rycketofta	Skiberöd	2 försök 2 trials
1	Obehandlat/Untreated	0,22	0,12	0,17
2	Obehandlat/Cruiser 600 FS	0,20	0,09	0,14
3	Euparen/Tachigaren/Cruiser 600FS	0,21	0,12	0,16
4	Tachigaren/Cruiser 600FS	0,15	0,10	0,13
5	Celest/Tachigaren/Cruiser 600 FS	0,20	0,13	0,16
6	Celest/Tachigaren/Cruiser 600 FS	0,20	0,10	0,15
7	A. /Tachigaren/Cruiser 600FS	0,16	0,06	0,11
8	B. /Tachigaren/Cruiser 600FS	0,20	0,17	0,19
CV		46,25	44,49	12,90
LSD 5%		0,13	0,07	0,05
RSQ %		18,8	42,1	93,00
Prob.		0,9518 ns	0,1436 ns	0,0686 ns
Prob., parvis/pairwise		-	-	-

The root rot index is measured on a scale from 0 - 3 where 0 is given to completely healthy plants, 1 to plants with very weak symptoms, 2 is given to plants with weak symptoms and 3 is given to heavily infected plants. The beets from both localities showed in general very weak symptoms of root rot. There were no significant differences between the treatments.

Enclosure 8

Skörd/harvest

Behandling/Treatment		**Polsocker, ton/ha / Sugar, ton/ha**				
		Skiberöd		**Rycketofta**		**Totalt**
Root rot soil index before drilling:		56		40		
			Mean		**Mean**	
1	Obehandlat/Untreated	8,30		11,39		9,8
2	Obehandlat/Cruiser 600 FS	9,05		11,21		10,1
3	Euparen/Tachigaren/Cruiser 600FS	8,98		10,97		10,0
4	Tachigaren/Cruiser 600FS	8,43		10,99		9,7
5	Celest/Tachigaren/Cruiser 600 FS	8,31		11,02		9,7
6	Celest/Tachigaren/Cruiser 600 FS	8,13		10,75		9,4
7	A. /Tachigaren/Cruiser 600FS	8,69		10,50		9,6
8	B. /Tachigaren/Cruiser 600FS	9,24	8,64	11,60	11,05	10,4
CV		7,84		8,40		3,0
LSD 5%		1,00		1,37		0,7
RSQ %		33,60		21,1		97,6
Prob.		0,2312 ns		0,7788 ns		0,1471 ns
Prob., parvis/pairwise		-		-		-

There were no significant differences in amount of sugar between the treatments at any of the localities. There was a small tendency for treatment 8 to have the highest yield at both Skiberöd and Rycketofta.

The average yield at Skiberöd was below 9 ton sugar/ha. The average yield at Rycketofta was 11,05 ton/ha.

Nya betningsmedel mot jordburna svampsjukdomar

SBU projektkod 2003-1-2-487

Enclosure 9

Skörd/Harvest **2 försök/2 trials**

Behandling/Treatments	Ant. plantor No. plants 1000-tal/ha 1000-nds/ha	Renvikt Clean weight ton/ha	Sockerhalt Sugar content %	Polsocker Sugar ton/ha	Polsocker Sugar rel 1	Blåtal Amino-N mg/100g beta	K + Na mM/ 100 g beta	Utvinnbart socker Extractable sugar %	Utvinnbart socker Extractable sugar ton/ha	Utvinnbart socker Extractable sugar rel 1	Renhet Cleanness %
1 Obehandlat/Untreated	79,0	53,5	18,53	9,8	100	10,9	4,6	90,1	8,9	100	91,8
2 Obehandlat/Cruiser 600 FS	81,5	54,5	18,71	10,1	103	10,4	4,7	90,0	9,1	103	92,8
3 Euparen/Tachigaren/Cruiser 600FS	91,5	53,3	18,81	10,0	101	10,3	4,6	90,2	9,0	101	90,7
4 Tachigaren/Cruiser 600FS	88,5	51,8	18,85	9,7	99	10,3	4,6	90,1	8,8	99	90,7
5 Celest/Tachigaren/Cruiser 600 FS	84,2	52,2	18,62	9,7	98	10,9	4,8	89,9	8,7	98	91,6
6 Celest/Tachigaren/Cruiser 600 FS	90,5	50,8	18,68	9,4	96	10,5	4,7	90,0	8,5	96	92,2
7 A. /Tachigaren/Cruiser 600FS	90,1	51,3	18,77	9,6	97	9,8	4,6	90,1	8,7	97	92,5
8 B. /Tachigaren/Cruiser 600FS	87,2	55,9	18,73	10,4	106	10,8	4,6	90,0	9,4	106	89,8
CV	4,1	3,2	0,34	3,0	-	6,1	2,1	0,1	3,0	-	0,9
LSD 5%	8,5	3,9	0,15	0,7	-	1,5	0,2	0,2	0,6	-	2,0
RSQ %	79,4	98,3	99,6	97,6	-	76,4	99,5	99,8	98,0	-	90,8
Prob.	0,0735 ns	0,1748 ns	0,0216	0,1471 ns	-	0,6641 ns	0,5368 ns	0,1656 ns	0,1525 ns	-	0,1014 ns
Prob., parvis/pairwise	-	-	0,0016	-	-	-	-	-	-	-	-

There were significant differences in sugar content between the treatments. The largest sugar content was found in treatment 4 (Tachigaren) and treatment 3 (Euparen, Tachigaren).