

MASE

Microbial Antagonists for a Sound Environment

Biologisk betning mot jordburna svampsjukdomar

Field trial, Sweden 2004

SBU Projektkod 2004-1-1-908

**SBU Sockernäringsens BetodlingsUtveckling AB är ett
kunskapsföretag som bedriver försöks- och odlings-
utveckling i sockerbeter för svensk sockernäring.**

SBU ägs till lika delar av Danisco Sugar och Betodlarna.

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Biologisk betning mot jordburna svampsjukdomar - MASE

Introduction

This trial is a part of the MASE project (Microbial Antagonists for a Sound Environment). The aim of the trial was to test the growth promoting effect on sugar beets of bacterial strains, alone and in combination with hymexazol.

Material and methods

Soil samples were collected in December 2003 from several locations in the south of Sweden and were analyzed for their potential to infect young sugar beet seedlings. The soil tests were carried out by Syngenta Seeds (Maria Nihlgård). Sugar beet seeds were sown in pots with test soil and then put in green house 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):

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

where as = number of attacked seedlings at 7, 14, 21 and 28 days.

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

DSI soil	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

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 soil test also indicates the most common fungi on each location. On the basis of these results and previous experience of heavy infections of damping-off, the trial location Skiberöd, southeast of Lund was chosen. The field trial was a randomised complete block design with four replications. The trial was sown on the 13th of April. Each plot consisted of 6 rows with length ten meters. Rows three and four were harvested.

The number of plants in each plot was counted three times (at 40%, max and final emergence). Plant condition was assessed once. The trial was harvested on the 7th of October.

Statistical analyses

All variables measured in the field trial at Sandby gård were analyzed using analysis of variance (Proc GLM, SAS) and pairwise differences were analyzed with Fischer's LSD test.

Results and discussion

The weather during spring 2004 was rather cold with very little rain. This resulted in overall mild attacks of *Aphanomyces* damping-off.

Plant number

The final number of plants in the control treatments with and without hymexazol was 91 300 and 78 300 respectively. In the treatments where bacteria was used without hymexazol the final plant number was slightly less than 80 000 plants/ha. In the treatments where bacteria and hymexazol was combined, the final plant numbers varied from 83 000 (DS 2) to 90 000 (DS 2) plants/ha. The two bacteria isolates BA/KWS 1 and 2 had 88 300 and 89 800 plants/ha, respectively in combination with hymexazol. The trial shows that neither of the bacteria isolates, alone or in combination with hymexazol give any increase in plant number compared to the control treatment with hymexazol.

Yield

The white sugar yield in the control treatment with hymexazol was 9,8 ton/ha. The white sugar yield in the treatments with bacteria and hymexazol was 9,6 ton/ha for BA/KWS 1 and 2, and 9,1 and 9,4 ton/ha for DS 1 and DS 2 respectively. The trial shows that neither of the bacteria isolates, alone or in combination with hymexazol give any increase in white sugar yield compared to the control treatment with hymexazol.

Summary

In this trial neither of the bacteria isolates, alone or in combination with hymexazol, give any growth promoting effect (fast emergence or increase in white sugar yield) compared to the control treatment with hymexazol.

References

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

General information

Uppdragsgivare/Contractor:

Christian Thanning
MASE Laboratorierna AB
Box 148
751 04 Uppsala

Planansvarig/Project Manager:

Åsa Olsson, SBU AB

Försöksfrö/Trial seed

Trial seed was delivered to SBU AB from Syngenta Seeds AB.

Försöksmetodik/Methodology

RCB. Beskrivning av metoder och bedömningar: se appendix 1 (fältkort) för hänvisning till PM i SBU:s kvalitetshandbok. / Description of methods and evaluations: see appendix 1 (field plan) for references to PM in SBU quality handbook.

Försöksplatser/Trial sites

Skiberöd S. Olsson, Skiberöds gård, 240 33 Löberöd

Teknisk beskrivning/Technical details:

Produkt / Product	Verksam substans/ Active ingredient	Dos / dose
Tachigaren	<i>hymexazol</i>	14 g

Avvikelser/Problems

None registered.

Borgeby / 2005

Borgeby / 2005

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Åsa Olsson
Project Manager
SBU AB

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Robert Olsson
Managing Director
SBU

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Antal försök 1

Fältkort

Försöksvärd		Odlarnummer
Sten Olsson	9081/04	52 279
Gård	Adress	Telefon
Skiberöd	Skiberöds gård, 240 33 Löberöd	0709-367698

Syfte: Mikroorganismer som betningsmedel mot skadegörare i sockerbetor

Uppdragsgivare: MASE

Försöksled	Bakterie	Dos fungicid g a. i./unit	Dos insekticid g a. i./unit
1 Kontroll	-	-	imidacloprid 90 g
2 Kontroll	-	hymexazol 14,7	imidacloprid 90 g
3 DS 1 (<i>B. pumilis</i>)	96.734	-	imidacloprid 90 g
4 DS 2 (DR54)	DR54	-	imidacloprid 90 g
5 BA/KWS 2	F30A	-	imidacloprid 90 g
6 BA/KWS 1	F9B	-	imidacloprid 90 g
7 DS 1	96.734	hymexazol 14,7	imidacloprid 90 g
8 DS 2	DR54	hymexazol 14,7	imidacloprid 90 g
9 BA/KWS 2	F30A	hymexazol 14,7	imidacloprid 90 g
10 BA/KWS 1	F9B	hymexazol 14,7	imidacloprid 90 g

Försöksdesign: RCB (4 block).

Bricknr i försöket:

2801-2840

Försökets totala yta, m²:

346

Skördeyta/parcell, m²:

2 r x 10 m

Bruttoyta/parcell, m²:

6 r x 10 m

Kontaktperson + telefonnr:

Åsa Olsson 0709-53 72 62

För försökets utförande ansvarig person + telefonnr:

Leif Jönsson 0708-161051

Krav på försöksplats: Högt svampinfektionstryck. Inga provtagningsytor mellan parcellerna.

Utsädesmängd: 5 frö/m. OBS! endast 0,3 enheter finns tillgängliga.

Skörd meddelas senare.

Försöksuppgifter:

		Försöksåtg.: PM	Datum/Sign.
Såmaskin, märke	Monozentra SP	Generalprov 6 2.6.1 HS	1/12-03 LJ
Sådd, datum	13/4	Utstakning i fält 2.4.1 HS	7/4 LJ
Radavstånd, cm	48	Parcellvis sådd 2.4.2 HS	13/4 TB, AH
Antal frö per m	5,1	Svampprov 2.6.1 HS	1/12-03 LJ
Sort	Philippa	Planträkning 40% 2.5.4 HS	29/4 AE,HH
Betning, produkt	Enligt plan ovan	Planträkn. max 2.5.4 HS	19/5 HH,TB
Uppkomst, datum	28-apr	Planträkning slutlig 4 - 6 veckor	
Förfrukt 2003	Höstvete	efter max 2.5.4 HS	28/6 TB
År med betor 1992-02:	1993,1997,2000	Sundhet 2.5.20 SBU	19/5 ÅO
Gödning	Se "Behandlingsdata"	Skörd 2.4.7 HS	7/10 LJ,TB
Ogräsbekämpning	Se "Behandlingsdata"	Lev. provtvätt 2.4.7 HS	8/10 TB
Svampbekämpningar	Se "Behandlingsdata"	Analys - DS	20/10
Insektsbekämpningar	Se "Behandlingsdata"		

20040315/ÅO

Försöksdata kontrollerat (datum+sign.): 20041124 LJ

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Fältplan / Field plan**Skiberöd**

IV	10	1	3	7	4	9	2	5	6	8
III	9	8	5	2	6	1	3	7	4	10
II	2	6	3	7	5	10	9	8	1	4
I	2	5	10	9	7	4	8	3	1	6

Jordanalys/Soil analyses 2004

For definition of soil fractions and soil type see below.

		Skiberöd	
			Klass
pH-värde	pH	6,6	
P-AL (mg/100 g jord)		9,6	IV
K-AL (mg/100 g jord)		5,6	III
Mg-AL (mg/10 g jord)		3,9	
K/Mg-kvot		1,4	
Ca-AL (mg/kg jord)		130	
K-HCl (mg/100 g jord)		57	2
Cu-HCl (mg/kg jord)		9,2	
P-HCL mg/100 g		78	5
Bor (mg/kg jord)	Boron	0,55	
Mullhalt (%)	Organic matter	3,2	
Lerhalt (%)	Clay content	6	
Finler (%)	Fine Clay	6	
Sand + grovmo (%)	Sand + fine sand	62	
Jordart	Soil type	mmh1Sa	
Basmättnadsgrad		70	
S-värde (mekv/100g jord)		7	
T-värde (mekv/100g jord)		10	

Particle size

Sand	Sand = 2-0,2 mm
Grovmo	Fine sand = 0,02-0,06 mm
Finmo	Coarse silt = 0,06-0,02 mm
Mjäla	Silt = 0,02-0,002
Lera	Clay = <0,002 mm
Finler	Fine clay = <0,0006

Soil type

mmh1Sa = humus rich light sand

Analys av marksmitta och vanligaste förekommande svampar på försöksplatserna 2004

Risk of infection and most frequently occurring fungi on the trial locations 2004

Jordprov tagna december 2003. Analys av svampinfektionstryck är utförd av Maria Nihlgård, Syngenta enligt Ewaldz metod (1993).

Samples were collected during December 2003. Analysis of infestation risk was performed by Maria Nihlgård according to the method by Ewaldz (1993).

Växthustest (Maria Nihlgård)

Plats Location	Sjukdomsindex Disease index	Infektionsrisk Risk of infection	Förekommande svampar (vanligaste först) Fungi (most frequently occurring first)
Skiberöd	36	Low	<i>Aphanomyces, Pythium, Fusarium</i>

Fält (Lars Persson)

Plats Location	Isolerade svampar från plantor i fält Fungi isolated from plants collected in the field
Skiberöd	<i>Pythium</i> spp.

Ogräsbekämpning / Weed control

Datum	Produkt och dos
12/5	2 G + 2 B + 1,5 superolja
25/5	1 G + 0,5 P + 1,5 B + 0,2 T + 1 superolja

Gödsling / Fertilization

Datum	Produkt och giva	N	P	K
11/4	Probeta NPK 620 kg/ha	93	24	43

Planträkningar och sundhet / Plant number and plant condition

Skiberöd

Behandling/Treatment:		Planträkning 1000-tal/h: Plant number 1000nds/ha			Sundhet Plant condition
Sådd/drilling:	13/4				
Skörd/harvest:	7/10	Plh40	Plhmax	Plhslut	0 - 100
		040429	040519	040628	040519
1	Kontroll -	41,2	80,0	78,3	73
2	Kontroll <i>hymexazol</i> 14,7	48,7	95,6	91,3	81
3	DS 1 (<i>B. pumilis</i>) -	45,1	83,9	80,8	76
4	DS 2 (DR54) -	39,3	81,0	79,0	74
5	BA/KWS 2 -	43,2	79,2	75,8	73
6	BA/KWS 1 -	34,9	80,7	76,5	74
7	DS 1 <i>hymexazol</i> 14,7	41,9	94,8	90,3	76
8	DS 2 <i>hymexazol</i> 14,7	36,2	87,8	83,8	75
9	BA/KWS 2 <i>hymexazol</i> 14,7	43,8	95,3	89,8	79
10	BA/KWS 1 <i>hymexazol</i> 14,7	40,4	92,7	88,3	77
CV		24,30	6,17	6,12	4,5
LSD 5%		14,62	7,8	7,40	5
RSQ %		33,6	73,9	69,6	57,2
Prob.		0,7376	<0,0001	0,0002	0,0229
		ns			

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Skörd/Harvest

1 försök

Behandling/Treatments		Ant. plantor No. plants	Renvikt Clean weight	Sockethalt Sugar content	Polsocker Sugar		Blåtal Amino-N	K + Na	Utvinnbart socker Extractable sugar			Renhet Cleanness	
Sådd/drilling:	13/4	1000-nds/ha	ton/ha	%	ton/ha	rel 1	mg/100g beta	mM/ 100 g beta	%	ton/ha	rel 1	%	
Skörd/harvest:	7/10	1000-tal/ha	ton/ha	%	ton/ha	rel 1	mg/100g beta	mM/ 100 g beta	%	ton/ha	rel 1	%	
1	Kontroll	-	81,5	50,0	17,52	8,8	100	9,3	3,5	91,2	8,0	100	90,0
2	Kontroll	<i>hymexazol</i> 14,7	95,1	55,3	17,74	9,8	112	9,5	3,5	91,3	9,0	112	89,7
3	DS 1 (<i>B. pumilis</i>)	-	84,1	51,2	17,27	8,8	101	9,3	3,6	90,9	8,0	100	88,8
4	DS 2 (DR54)	-	82,3	50,6	17,61	8,9	102	9,3	3,4	91,5	8,1	102	90,0
5	BA/KWS 2	-	78,9	48,6	17,38	8,4	96	10,5	3,4	91,2	7,7	96	89,5
6	BA/KWS 1	-	79,7	50,5	17,46	8,8	100	9,8	3,5	91,2	8,0	100	91,0
7	DS 1	<i>hymexazol</i> 14,7	94,0	52,4	17,42	9,1	104	9,3	3,4	91,3	8,3	104	89,4
8	DS 2	<i>hymexazol</i> 14,7	87,2	53,3	17,55	9,4	107	9,3	3,4	91,4	8,5	107	90,6
9	BA/KWS 2	<i>hymexazol</i> 14,7	93,5	54,9	17,54	9,6	110	9,5	3,5	91,2	8,8	110	89,5
10	BA/KWS 1	<i>hymexazol</i> 14,7	91,9	55,3	17,29	9,6	109	9,5	3,5	91,1	8,7	109	91,3
RSQ %			69,60	74,89	41,22	67,54	-	30,23	58,13	63,33	65,54	-	10,22
LSD 5%			6,12	5,10	1,86	5,59	-	11,22	3,02	0,28	5,70	-	3,05
CV			7,71	3,86	0,47	0,74	-	1,55	0,15	0,38	0,69	-	3,98
Prob.			0,0002	0,0078	0,6127	0,0120	-	0,8342	0,1122	0,2325	0,0139	-	0,9645
					ns			ns	ns	ns			ns