

MASE

Microbial Antagonists for a Sound Environment

Tillväxtfrämjande bakterier som betningsmedel i sockerbetor

Field trial, Sweden 2005

SBU Projektkod 2005-1-4-908

**SBU Sockernäringsens 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.

Kontaktperson:

Åsa Olsson

tel 0709-53 72 62

asa.olsson@danisco.com

Borgeby Slottsväg 11, 237 91 Bjärred

Tillväxtfrämjande bakterier som betningsmedel i sockerbeter - 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 2004 from several locations in the south of Sweden and were analysed 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 11 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 24 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 2005 was cold with very little rain. This resulted in overall mild attacks of *Aphanomyces* damping-off.

Plant number and plant condition

In the first counting at 40% emergence, two treatments (tr. 4 and 5, bacteria, carrier with and without hymexazol) showed slightly delayed emergence. The plant number in these treatments was less than 23,000 compared to over 27,000 in the other treatments. There were no significant differences between the treatments in final plant number.

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

Evaluation of root rot

There were only minor symptoms of chronic root rot on the sugar beets after harvest.

Yield

There were no significant differences in yield parameters between the treatments.

Summary

None of the treatments have shown any significant yield increase or growth promoting effect during emergence.

References

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

General information

Uppdragsgivare/Contractor:

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 Danisco Seed, Holeby, Danmark.

Försöksmetodik/Methodology

RCB. Beskrivning av metoder och bedömningar: se appendix 1 (fältkort) för hänvisning till PM i SBUs 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/None confirmables

None registered.

Borgeby / 2005

Borgeby / 2005

.....
Åsa Olsson
Project Manager
SBU AB

.....
Robert Olsson
Managing Director
SBU

MASE

SBU projektkod

2005-1-4-908

Antal försök

1

Fältkort

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

Syfte: Tillväxtfrämjande mikroorganismer som betningsmedel till sockerbetor**Uppdragsgivare:** MASE**Försöksled**

	Fungicid	Applicering	Bakterie	Fermentering
1 No fungicide	-	-	-	-
2 Fungicide	hymexazole 14 a.i./unit	-	-	-
3 No fungicide	-	-	F30A	Fermentation 1
4 No fungicide	-	Carrier	F30A	Fermentation 1
5 Fungicide	hymexazole 14 a.i./unit	Carrier	F30A	Fermentation 1
6 No fungicide	-	Steeping	-	-
7 No fungicide	-	Steeping	F30A	Fermentation 1
8 Fungicide	hymexazole 14 a.i./unit	In furrow	F30A	Fermentation 1

Försöksdesign: RCB (4 block).

Bricknr i försöket:	Från 2801	Till 2832	Försökets totala yta, m²:	1106
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 enh finns tillgängliga. Led 8: Bakteriekultur sprutas i såfåran.
 Skörd meddelas senare.

Försöksuppgifter:

Såmaskin, märke
Sådd, datum
Radavstånd, cm
Antal frö per m
Sort
Betning, produkt
Uppkomst, datum
Förfrukt 2004
År med betor 1993-03:
Gödsling
Ogräsbekämpning
Svampbekämpningar
Insektsbekämpningar

Monozentra SP 6 r
11/4
48
5,1
Enl. plan
Enl. plan
25-apr
korn
1997, 2001
Se "Behandlingsdata"
Se "Behandlingsdata"
Se "Behandlingsdata"
Se "Behandlingsdata"

Försöksåtg.:

Generalprov 6
Utstakning i fält
Parcellvis sådd
Svampprov
Planträkning 40%
Planträkn. max
Planträkning slutlig 4 - 6 veckor
efter max
Sundhet
Skörd
Svampangr. e skörd
Lev. provtvätt
Analys
Besiktning inför skörd

PM

2.6.1 HS
2.4.1 HS
2.4.2 HS
2.6.1 HS
2.5.4 HS
2.5.4 HS
2.5.4 HS
2.5.4 HS
2.5.20 SBU
2.4.7 HS
2.5.10 SBU
2.4.7 HS
- DS
SBU

Datum/Sign.

1/12-04 LJ
6/4 LJ
11/4 LJ, TB, AE
1/12-04 LJ
25/4 AE, RHF
20/5 AE, TB
22/6 TB
2/6 ÅO
24/10 LJ, TB
27/10 ÅO
25/10 TB
27/10
22/9 ÅO

20050314/ÅO

Försöksdata kontrollerat (datum+sign.): 20051128 LJ

MASE

SBU projektkod 2005-1-4-908

Fältplan**Skiberöd**

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

Jordanalys / Soil analyses 2004

For definition of soil fractions and soil type see below.

		Skiberöd	
		2005	Klass
pH-värde	pH	6,7	
P-AL (mg/100 g jord)		14	IV
K-AL (mg/100 g jord)		6,5	II
Mg-AL (mg/10 g jord)		8,9	
K/Mg-kvot		0,7	
Ca-AL (mg/kg jord)		230	
K-HCl (mg/100 g jord)		110	3
Cu-HCl (mg/kg jord)		5,5	
P-HCL mg/100 g		76	4
Bor (mg/kg jord)	Boron	0,83	
Mullhalt (%)	Organic matter	3,3	
Lerhalt (%)	Clay content	12	
Finler (%)	Fine Clay	9	
Sand + grovmo (%)	Sand + fine sand	59	
Jordart	Soil type	mmhlMo	
Basmättnadsgrad		>80	
S-värde (mekv/100g jord)		12,4	
T-värde (mekv/100g jord)		12,2	

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

mmhlMo = humus rich fine sand soil

Analys av marksmitta och vanligaste förekommande svampar på försöksplatserna 2004-2005

Risk of infection and most frequently occurring fungi on the trial locations 2004-2005

Plats Location	Sjukdomsindex Disease index	Infektionsrisk Risk of infection	Förekommande svampar (vanligaste först) Fungi (most frequently occurring first)	Isolerade svampar från plantor i fält Fungi isolated from plants collected in the field
Skiberöd 2005	97	High	<i>Pythium, Aphanomyces, Fusarium</i>	

MASE

SBU projektkod

2005-1-4-908

Skiberöd 2005**Ogräsbekämpning / Weed control**

Datum	Produkt och dos
08-maj	1,75 G + 1,5 B + 0,1 T + 1 superolja
26-maj	1,5 G + 1,5 B + 0,5 P + 0,2 T + 0,5 superolja

Gödsling / fertilization

Datum	Produkt och giva	N	P	K
09-apr	NPK 650 kg/ha	97	24	44
15-jun	Mangan 235 2 l/ha			

MASE

SBU projektkod

2005-1-4-908

Planträkningar / Plant number, Sundhet / plant condition

Skiberöd 2005

Behandling/Treatments				Planträkning 1000-tal/ha Plant number 1000nds/ha			Sundhet Plant condition	Kronisk rottröta Root rot
Sådd/drilling:	050411			Plh40	Plh100	Plhslut	0 - 100	0 - 3
Skörd/harvest:	051024			050425	050520	050622	050602	051027
1	No fungicide	-	-	30,7	81,8	86,2	7	0,03
2	Fungicide	hymexazole 14	-	28,1	89,8	92,7	8	0,11
3	No fungicide	-	F30A	27,9	84,9	88,3	7	0,04
4	No fungicide	-	Carrier	21,6	78,4	81,0	6	0,03
5	Fungicide	hymexazole 14	Carrier	22,9	81,5	88,0	7	0,05
6	No fungicide	-	Steeping	28,6	82,3	84,6	6	0,04
7	No fungicide	-	Steeping	32,3	84,4	86,7	7	0,08
8	Fungicide	hymexazole 14	In furrow	27,1	86,7	89,8	7	0,03
RSQ %				15,2	23,6	23,9	35,5	35,0
CV				41,3	11,1	8,9	13,9	104,8
LSD 5%				16,6	13,7	11,4	1,4	0,1
Prob.				0,8876	0,7652	0,5810	0,3996	0,4199
				ns	ns	ns	ns	ns

Skörd / Harvest

Skiberöd 2005

Behandling/Treatments		No. plants Ant. plantor	Clean weight Renvikt	Sugar content Sockershalt	Sugar Sockers	Amino-N Blåtal	K + Na	Extr. sugar Utv. socker	Cleanness Renhet						
Sådd/drilling:	11/4	1000-nds/ha	ton/ha	%	ton/ha	mg/100g beta	mM/ 100 g beta	%	ton/ha	rel 1	%				
Skörd/harvest:	24/10	1000-tal/ha	ton/ha	%	ton/ha	rel 1	beta	100 g beta	%	ton/ha	rel 1	%			
1	No fungicide	-	-	-	81,8	55,4	19,05	10,54	100	8	3,58	91,78	9,67	100	86,34
2	Fungicide	hymexazole 14 a.i./unit	-	-	89,8	53,1	19,07	10,14	96	10	3,81	91,33	9,26	96	87,29
3	No fungicide	-	-	F30A	84,9	56,4	18,57	10,47	99	8	3,51	91,89	9,62	99	86,56
4	No fungicide	-	Carrier	F30A	78,4	55,0	18,97	10,43	99	9	3,68	91,55	9,55	99	87,41
5	Fungicide	hymexazole 14 a.i./unit	Carrier	F30A	81,5	56,3	19,15	10,77	102	9	3,74	91,43	9,84	102	90,39
6	No fungicide	-	Steeping	-	82,3	53,9	18,34	9,89	94	9	3,72	91,41	9,04	94	87,08
7	No fungicide	-	Steeping	F30A	84,4	56,5	18,78	10,62	101	9	3,74	91,60	9,73	101	86,86
8	Fungicide	hymexazole 14 a.i./unit	In furrow	F30A	86,7	55,0	18,46	10,15	96	8	3,52	91,84	9,32	96	85,14
RSQ %					23,6	21,5	44,66	28,78	-	42,4	42,75	39,90	28,22	-	36,95
LSD 5%					11,1	7,4	2,24	7,55	-	12,1	5,90	0,37	7,72	-	4,01
CV					13,7	6,0	0,62	1,15	-	1,5	0,32	0,50	1,08	-	5,14
Prob.					0,7652	0,9205	0,0841	0,7857	-	0,2630	0,4242	0,1913	0,7904	-	0,6449
					ns	ns	ns	ns	-	ns	ns	ns	ns	-	ns