450-2012
Report

Insecticide seed treatments against pests in sugar beet 2012

Syngenta Seeds AB

Åsa Olsson

ao@nordicbeet research.nu
+46 709 53 72 62

NBR Nordic Beet Research Foundation (Fond)

Borgeby Slottsväg 11, SE-237 91 Bjärred
Højbygårdvej 14, DK-4960 Holeby
Tel: +45 56 69 14 40

www.nordicbeet.nu

Content

Insecticide seed treatments against pests in sugar beet 2012

Summary

The project included three field trials (Lindbyholm, Brönnestad and Fuglie) in the south of Sweden. Six insecticide seed treatments were evaluated concerning plant emergence, pest control and sugar yield.

Seed treatments tested in 2012 on three locations in the south of Sweden

	Product	**Active substance**	
			g a.i/unit
1	Untreated	-	0
2	Gaucho	Imidacloprid	60
3	Mundus Forte	Clothianidin + imidacloprid + betacyfluthrin	30 + 30 + 8
4	Cruiser Force	Thiamethoxam + tefluthrin	60 + 8
5	Force Magna	Thiamethoxam + tefluthrin	15 + 8
6	Cruiser	Thiamethoxam	45

The results from this investigation have shown that seed treatment is a very effective way to control pests in sugar beet. The seed treatments controlled the aphids for 14 weeks after drilling (late March to beginning of July) at both Lindbyholm and Fuglie. Gaucho (90 g a.i.) is reported to control aphids for about ten weeks after drilling. However, the weather conditions after drilling were cold and rainy which resulted in slow emergence in the trials. The time period from emergence to maximum infestation of aphids in this year trials were around ten weeks.

At an infestation level of around 200 aphids in untreated, seed treatments also had a positive effect on sugar yield. The cleanness of the beets was also increased significantly (mean three trials).

Early and maximum plant emergence: Plant emergence at 50% was significantly lower in Gaucho, Cruiser Force and Cruiser compared to untreated. Mundus Forte and Force Magna were not significantly different from untreated.

There was no significant difference in final emergence between the seed treatments.

Black bean aphids (*Aphis fabae*): The infestation of aphids on Lindbyholm was very high and all the seed treatments were effective in controlling the aphids. There were more than 200 aphids in untreated and with one exception, Force Magna, there were less than 50 aphids in the seed treatments.

Yield: There was a tendency for higher sugar yield in the seed treatments at Lindbyholm compared to untreated (prob. = 0.0577, tendency < 0.010). The sugar yield for Cruiser 45 was 14.6 ton/ha which is 9% higher than in untreated (13.4).

At Brönnestad, where there were almost no aphids, there were no significant differences in sugar yield between the seed treatments.

Betning med insecticider mot skadegörare i sockerbetor 2012

Sammanfattning

Målet med denna försöksserie var att prova några olika betningsmedel för deras effekt på skadegörare och skörd i sockerbetor. Försöken lades ut på tre platser; Lindbyholm, Brönnestad och Fuglie. Försöksplanen framgår nedan. Som kontroll användes standardbetningen 60 g a.i. Gaucho (imidakloprid).

Betningar som provats 2012 på tre platser i Skåne

	Produkt	**Aktiv substans**	g a.i/enhet
1	Obehandlat	-	0
2	Gaucho	Imidakloprid	60
3	Mundus Forte	Clotianidin + imidakloprid + betacyflutrin	30 + 30 + 8
4	Cruiser Force	Tiametoxam + teflutrin	60 + 8
5	Force Magna	Tiametoxam + teflutrin	15 + 8
6	Cruiser	Tiametoxam	45

Resultaten visar att betning av sockerbetsfröet är ett effektivt sätt att skydda plantan mot angrepp av olika skadegörare. De olika betningarna skyddade plantorna upp till 14 veckor efter sådd, dvs under perioden slutet av mars till början av juli. Gaucho i dosen 90 g a.i. skyddar plantorna i ca tio veckor. Att det blev 14 veckor i denna undersökning kan bero på att vädret efter sådd var mycket kallt och regnigt vilket gjorde att det tog lång tid för plantorna att gro.

Vid en angreppssnivå på ca 200 löss i obehandlat hade alla betningarna en positiv inverkan på skörden. Renheten påverkades också positivt jämfört med obehandlat.

Uppkomst: Uppkomsten vid 50 % var signifikant lägre för Gaucho, Cruiser Force och Cruiser jämfört med obehandlat. Mundus Forte och Force Magna var inte signifikant skilda från obehandlat. Det fanns inga signifikanta skillnader i slutlig uppkomst.

Betbladlöss (*Aphis fabae*): Angreppsgraden på Lindbyholm var mycket hög med ca 200 löss i obehandlat. Med ett undantag, Force Magna, hade alla betningarna färre än 50 löss per planta.

Sockerskörd: Det fanns en tendens till högre sockerskörd mellan betningarna på Lindbyholm jämfört med obetat (prob. = 0.0577, tendens < 0.010). Sockerskörden för Cruiser 45 var 14,6 ton/ha vilket är 9 % högre än i obehandlat (13,4).

I Brönnestadförsöket fanns det nästan inga löss och det blev inga signifikanta skillnader mellan betningarna i sockerskörd.

Introduction

The project included three field trials (Lindbyholm, Brönnestad and Fuglie) in the south of Sweden. Six insecticide seed treatments (table 1) were evaluated concerning plant emergence, pest control and sugar yield.

Table 1. Seed treatments tested in 2012 on three locations in the south of Sweden

	Product	**Active substance**	
			g a.i/unit
1	Untreated	-	0
2	Gaucho	Imidacloprid	60
3	Mundus Forte	Clothianidin + imidacloprid + betacyfluthrin	30 + 30 + 8
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Picture 1. Black bean aphids on sugar beet plant 13 June 2012, Lindbyholm. Untreated.

The damage threshold for black bean aphids in Sweden is 50 aphids per plant (Larsson, 1989). It is very important that spraying to control the aphids is avoided, to protect the environment and beneficial insects like bees.

The tested seed treatments all belong to the neonicotinoid group (Elbert et al., 2008; Maienfisch et al., 2001).

Neonicotionids are almost exclusively transported in the xylem, from the roots to the leaves (Sur and Stork, 2003). As the plant grows, the concentration of imidacloprid has been shown to differ between the youngest and oldest leaves. In the 8-leaf stage, the concentration of imidacloprid has been shown to be six times higher in the oldest leaves compared to the youngest (Westwood et al., 1998). In the 16-leaf stage, the concentration of imidacloprid was low in the whole plant.

Differences in concentration of imidacloprid between leaves of different age has also been shown for potatoes (Olsen et al., 2004), sunroses (Laurent and Rathahao, 2003) and maize (Bonmatin et al., 2005).

Materials and methods

Trial design

Randomized complete block design with four replications per treatment (table 2).

Gross plot size at Lindbyholm and Brönnestad was 27.0 m^2 (6 rows, row spacing 50 cm and length 9 m); net plot size was 9.0 m^2 (2 rows for harvest). Seed spacing was 5.3 cm.

Gross plot size at Fuglie was 25.92 m^2 (6 rows, row spacing 48 cm and length 9 m); net plot size was 9.0 m^2 (2 rows for harvest). Seed spacing was 5.4 cm.

Assessments

The plant numbers are counted at approximately 50% and maximum plant emergence.

Plant vigour is evaluated at maximum plant emergence on scale 0–100 where 100 = 100% healthy plants.

The trials are inspected regularly for attacks of various pests.

In the early spring, attacks of infesting pests were evaluated. For the evaluation of thrips (*Thrips angusticeps)*, 25 plants per plot are evaluated and numbers of plants with typical symptoms on the cotyledons are counted.

The trials were inspected regularly for presence of *Myzus persicae* (peach-potato aphid). Inspection for *Aphis fabae* (black bean aphids) was performed 3–5 times with one week interval from beginning of attack or at least in late June, beginning of July and mid-July. Aphids are evaluated according EPPO PP 1/228(1). The number of plants with aphids and number of aphids per plant is counted.

Selected treatments have been harvested and standard yield parameters have been measured.

Statistical analyses

Variables were analyzed using Proc GLM in SAS v 9.2 SAS institute Inc. Pair wise comparisons were calculated with Fisher's protected LSD.

For evaluation of pests, interpretation of the significant levels resulting from the analysis should be done with caution. This is caused by the fact that, random deviations in the statistical model are assumed to follow a normal distribution, which, however, often is not the case for such data.

Trial conditions and climate

The field trials are placed in the main area of sugar beet growing in SE and cultural conditions have been uniform for all plots and have conformed to local agricultural practice.

Daily weather parameters, see appendix A.

Results and discussion

Plant number

Plant emergence at 50% was significantly lower in Gaucho, Cruiser Force and Cruiser compared to untreated. Mundus Forte and Force Magna were not significantly different from untreated (figure 1). There was no significant difference in final emergence.

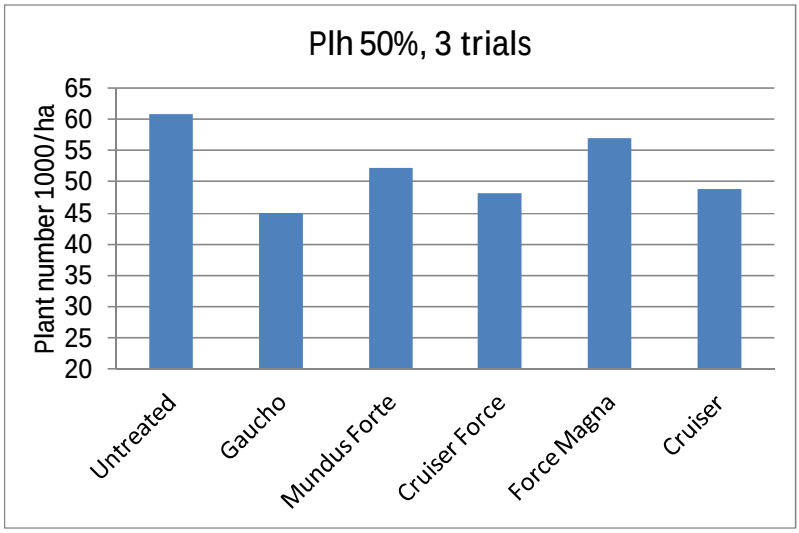

Figure 1. Plant number at 50% emergence, 3 trials 2012. Prob. = 0.0144, LSD 5% = 9.4.

Vigour

There were no significant differences in plant vigour in mid June.

Pests

Black bean aphids were the dominating pest in the trials 2012.

Thrips (*Thrips* spp.)

There were low infestation levels of thrips in the trials and no significant differences between the treatments.

Black bean aphids (*Aphis fabae*)

In the middle of June, infestations of black bean aphids were observed in the trials.

The trial at Lindbyholm was drilled in late March. The number of aphids per plant in untreated developed from 90 per plant 11 June to over 200 in July (figure 2). At Lindbyholm, the number of aphids per plant was below the damage threshold on 50 aphids per plant in June. In the last counting, 5 July, the number of aphids per plant was higher than 50 for Force Magna (figure 2).

The aphid colonies developed very slowly at Brönnestad and they never started to colonize.

At Fuglie, there were no significant differences between the seed treatments in June (figure 3). On 5 July, there was a tendency that Gaucho, Cruiser Force and Cruiser had fewer aphids per plant than untreated, Mundus Forte and Force Magna. The number of aphids never reached over the damage threshold on 50 aphids per plant in any of the seed treatments or untreated. The trial at Fuglie was also drilled in late March and in the beginning of July, 14 weeks later, there was still an effect of the seed treatments on the aphids.

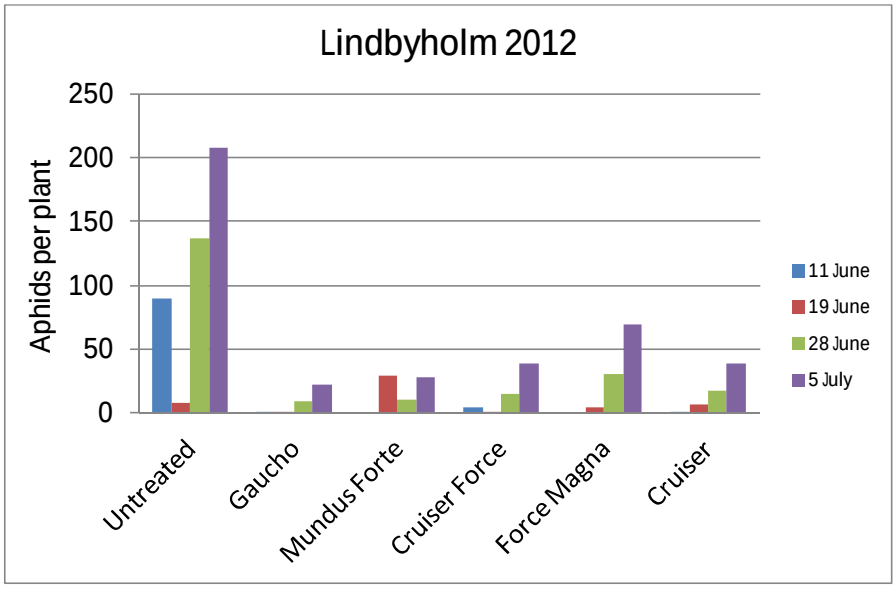

Figure 2. Number of aphids per plant in the trial at Lindbyholm 2012. Prob. (11/6) = 0.0091, prob. (20/6;28/6) = ns. Prob (5/7) = 0.0020.

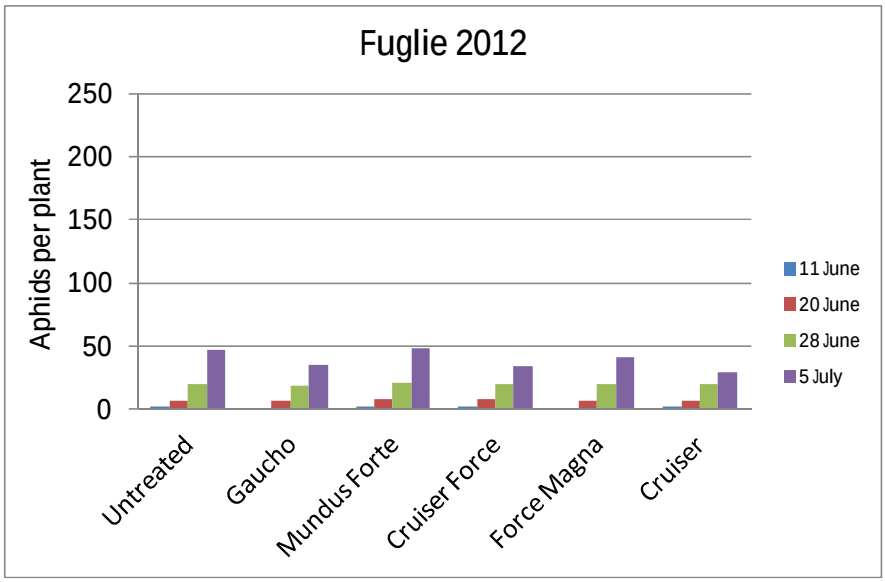

Figure 3. Number of aphids per plant in the trial at Fuglie 2012. Prob. (11/6; 20/6;28/6) = ns. Prob (5/7) = 0.0530.

Yield

All three trials were harvested.

At Brönnestad, where there were almost no aphids, there were no significant differences in sugar yield. The average sugar yield in three trials showed no significant differences between the seed treatments (figure 4).

When the yield in the two trials which were attacked by aphids was calculated (figure 5) there were no significant differences between the treatments.

The cleanness was significantly higher for Gaucho (90.7), Mundus Forte (90.7), Cruiser Force (90.7) and Cruiser (90.4) than in untreated (89.8) and Force Magna (89.8).

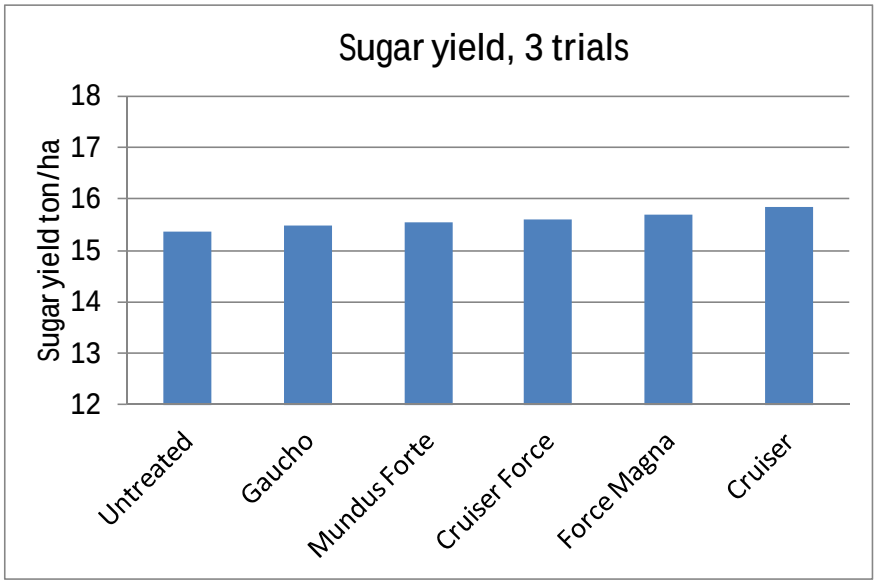

Figure 4. Sugar yield, all 3 trials 2012. Prob. = ns.

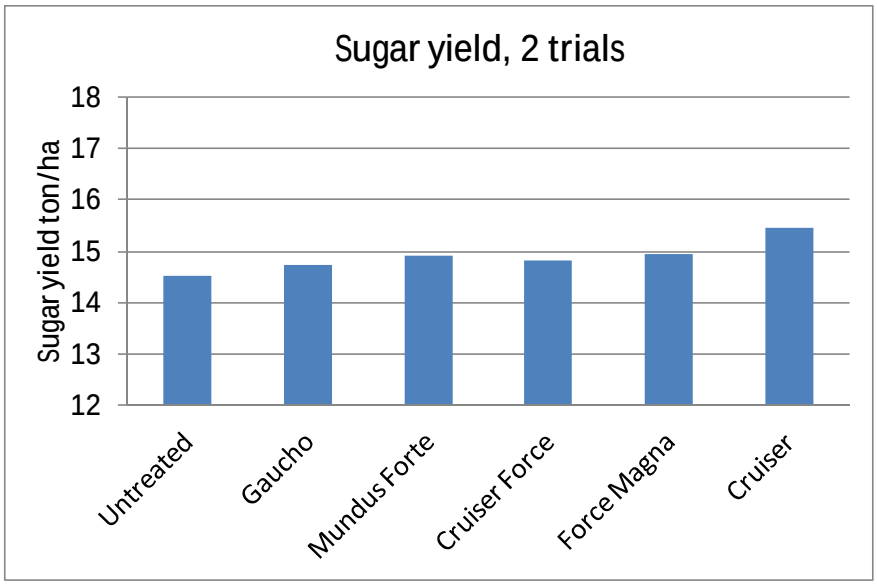

Figure 5. Sugar yield, 2 trials 2012, Fuglie and Lindbyholm. Prob. = ns.

Conclusions

The results from this investigation have shown that seed treatment is a very effective way to control pests in sugar beet. The seed treatments controlled the aphids for 14 weeks after drilling (late March to beginning of July) at both Lindbyholm and Fuglie. Gaucho (90 g a.i.) is reported to control aphids for about ten weeks after drilling. However, the weather conditions after drilling were cold and rainy which resulted in slow emergence in the trials. The time period from emergence to maximum infestation of aphids in this year's trials was around ten weeks.

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References

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Trial information

No of series and title		450-2012 Insecticide seed treatments against pests in sugar beet.
Objective		To evaluate the effect of new seed treatments on pests and yield in sugar beet.
Claimant		Syngenta Seeds AB Ingvar Christensson Box 302, 261 23 Landskrona
Testing unit		Nordic Beet Research Foundation Højbygaardvej 14, DK-4960 Holeby Phone: +45 54 69 14 40, Fax: +45 54 69 14 58 www.nordicbeet.nu
Trial manager	SE	Åsa Olsson, NBR
Technical manager/organisation		Jörgen Mårtensson, Hushållningssällskapet Malmöhus
Trial seed		Trial seed was provided by Syngenta Seeds AB
Methodology		Methods are described in the NBR quality handbook. SE: See PM on field plan

Trial locations / starting and finishing dates

Trial no	Location	Start (drilling)	Finish (harvest)
59	Lindbyholm	2012-03-28	2012-11-01
60	Brönnestad	2012-03-29	2012-10-31
61	Fuglie	2012-03-30	2012-10-19

Tested materials	All seed treated with Thiram 6 g a.i/unit and Tachigaren 14 g a.i./unit.
Identification of reference	Entry 1 is untreated control.
Non conformances	Plot number 6423 Lindbyholm (repl 4, treatment 4): drilling error resulted in few plants. Omitted from all calculations.

Declaration

Series 450-2012 Insecticide seed treatments against pests in sugar beet, three field trials are made according to NBR-standards.

Borgeby, 21 December 2012

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Åsa Olsson
Project Manager
NBR Nordic Beet Research Foundation

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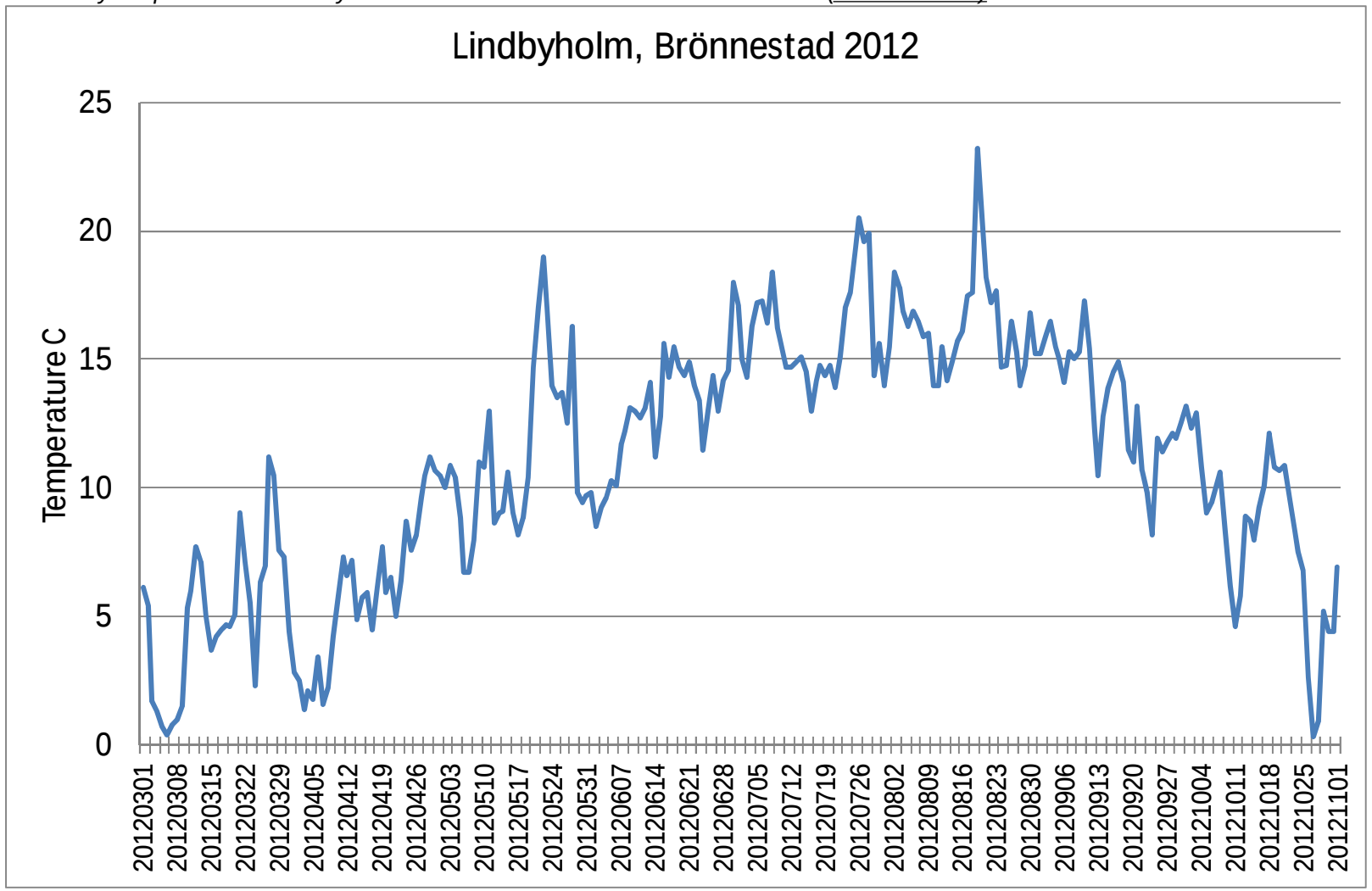
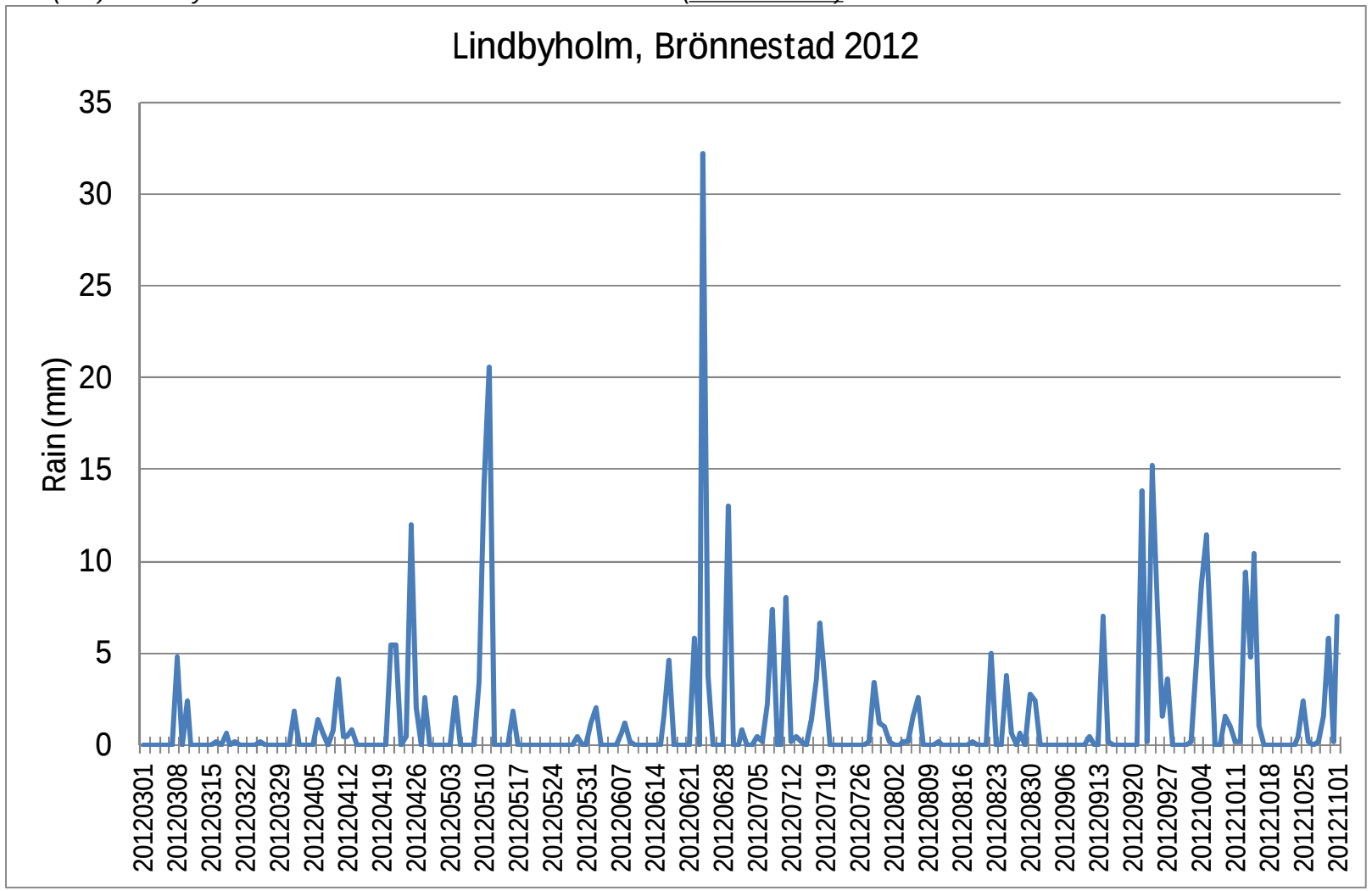
Robert Olsson
Technical Director
NBR Nordic Beet Research Foundation

Appendix A.

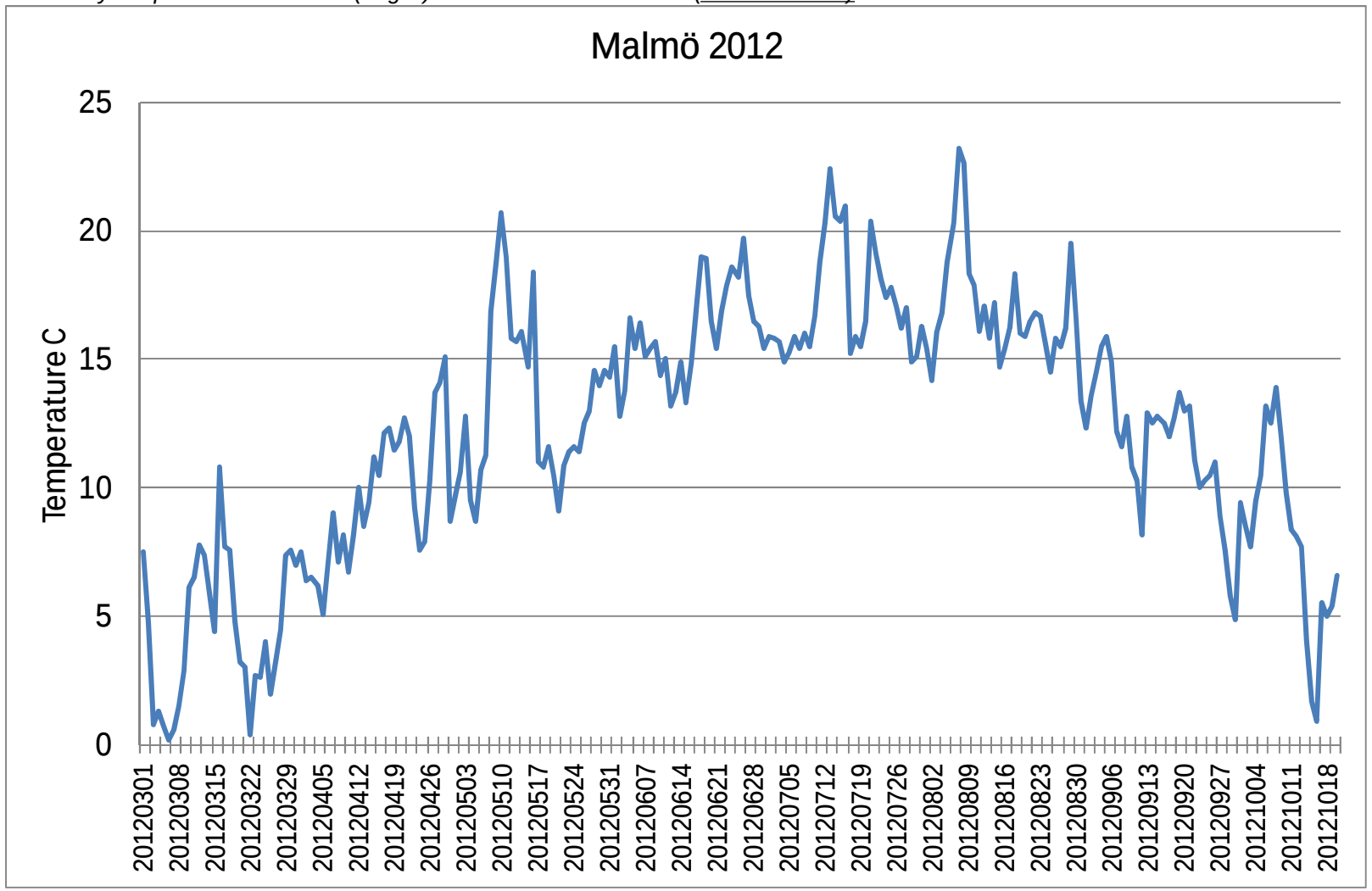
Mean daily temperatures at Lindbyholm and Brönnestad 2012. Data from Lantmet (www.ffe.slu.se).



Rain (mm) at Lindbyholm and Brönnestad 2012. Data from Lantmet (www.ffe.slu.se).



Mean daily temperatures in Malmö (Fuglie) 2012. Data from Lantmet (www.ffe.slu.se).



Rain (mm) in Malmö (Fuglie) 2012. Data from Lantmet (www.ffe.slu.se).