

Forebyggelse af kartoffelskimmel

Lars Bødker

Kartoffelworkshop 7. december 2023

STØTTET AF
Kartoffelafgiftsfonden

SEGES
INNOVATION

Hvad skal vi tale om?

- Annus horribilis 2022
- Kartoffelskimlens historie
- Bekæmpelsesstrategi 2023
- Resultater af markforsøg 2023
- Principper for bekæmpelsesstrategi 2024

Annus horribilis 2022



August 2022

SEGES INNOVATION LANDBRUGSINFO

[< Tilbage](#)
Planter

Virkningen af Revus over for kartoffelskimmel varierer

I forsøgsmarken i Arnborg er der i flere forsøg set vigende effekt, hvor der forsøgs-mæssigt er behandlet ugentlig med Revus (mandipropamid) igennem hele vækstsæsonen.



Januar 2023



Kartoffelskimlens historie - paradigmeskift

- Kartoffler kommer til Europe i 1537
- Kartoffelskimmel til Europe in 1840'erne (A1) – 300 år uden skimmel
 - Hurtig spredning i 1845-1847 (super spredet)
- Bordeaux mixture (kobbersulfat + læsket kalk) – slutningen af 1800'tallet
- Kartoffelskimmel til Europe i 1979 (A2) – 140 år efter A1
 - Seksuel krydsning A1 + A2 = oosporer i jorden (1990'erne)
- Ikke-specifikke svampemidler – start 1950'erne (manep) and 1960'erne (mancozeb)
 - Dithane (mancozeb) indtil 2013-2015 in Danmark (pesticidafgift)
 - Dithane (mancozeb) indtil 2020 in EU (forbud)
- Alene specifikke svampemidler fremadrettet

Svampemidler – stigning i behandlingshyppighed

1944 1-2 behandlinger



Bordeaux mixture - blåsten
Ikke-specifikt svampemiddel

1962 2 behandlinger



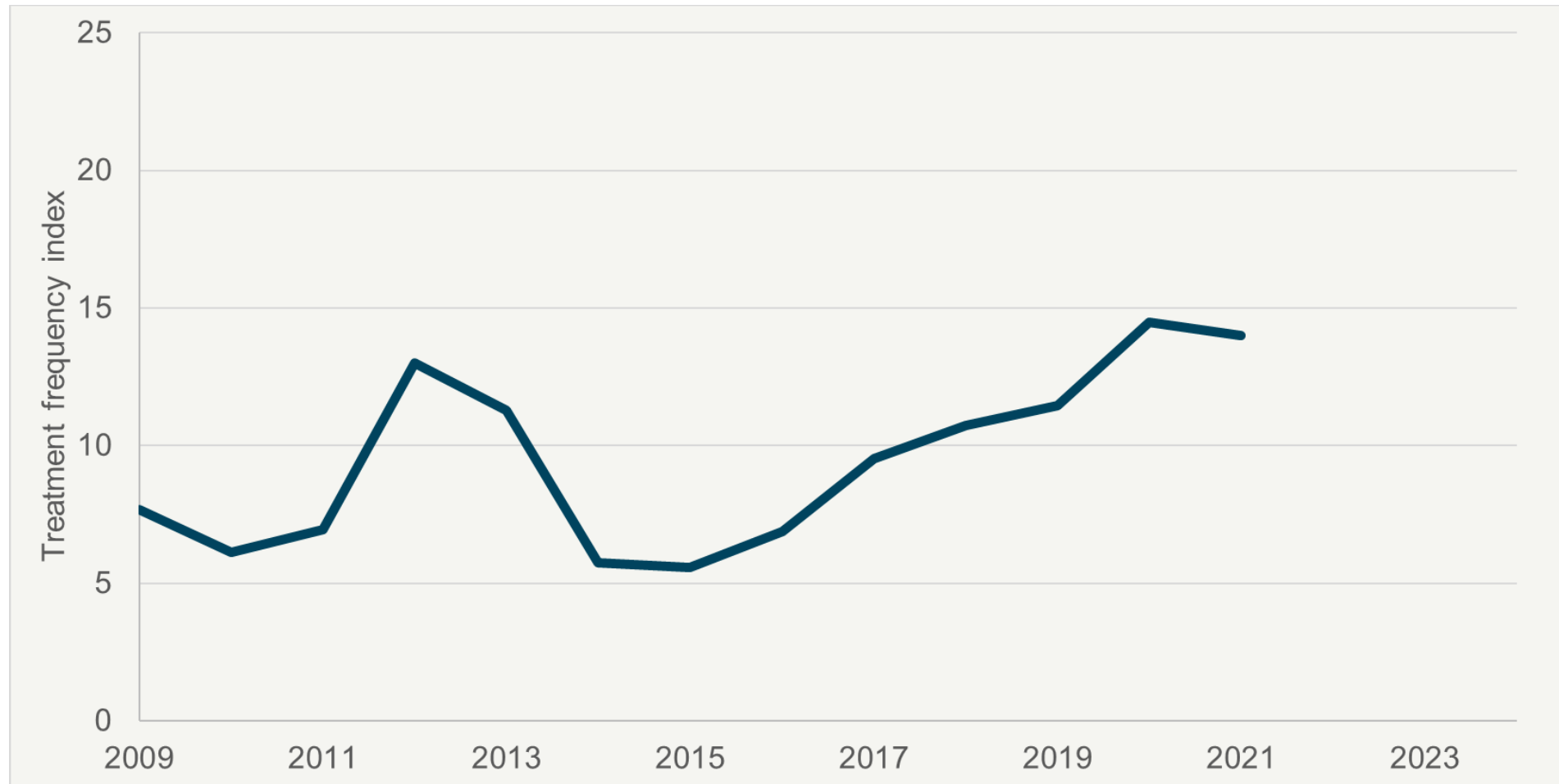
Dithane (mancozeb)
Ikke-specifikt svampemiddel

2023 12-14 behandlinger – dobbelt dosis



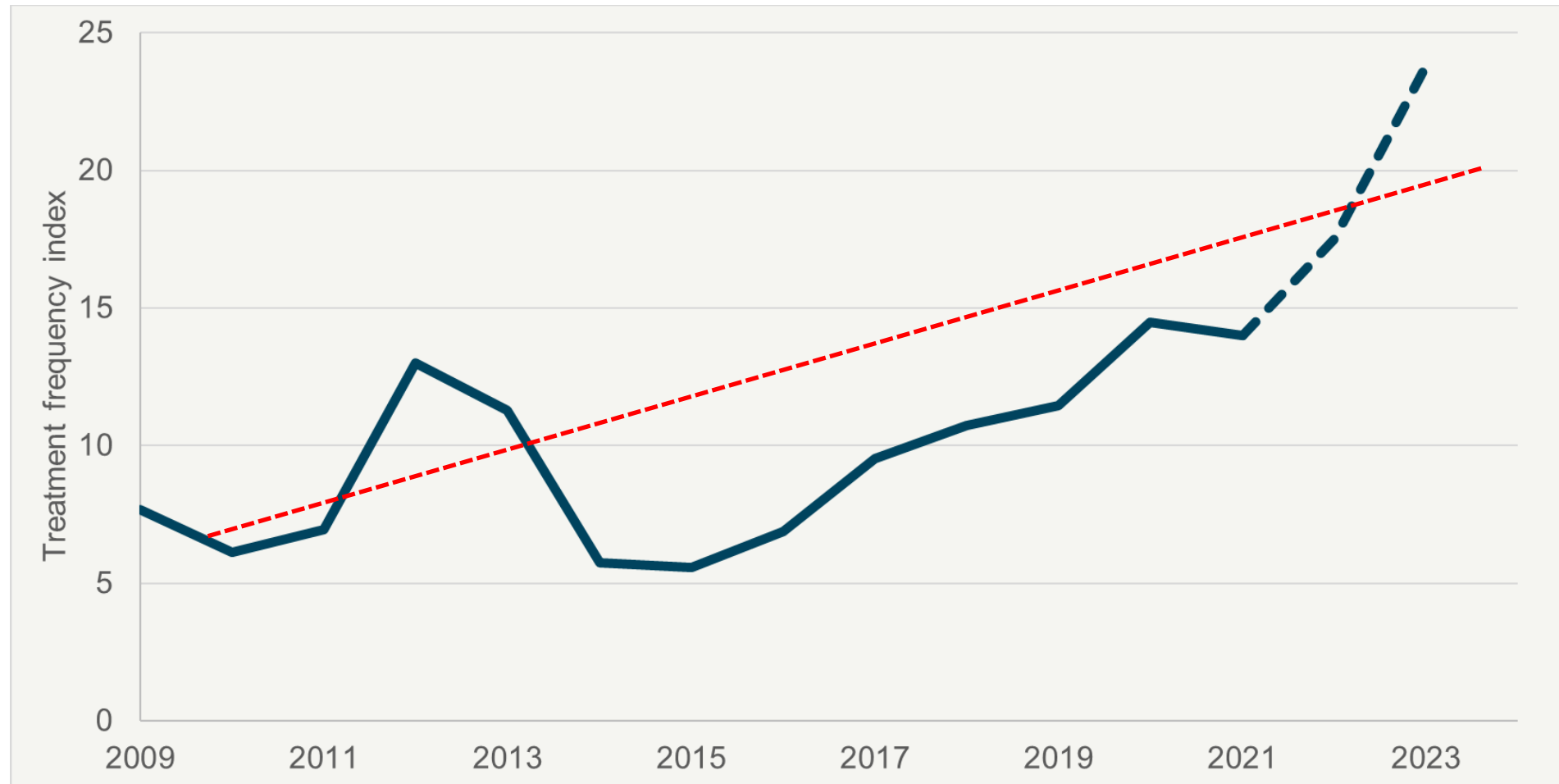
Revus
Shirlan
Ranman Top
Zorvec
Flere...
Specifikke svampemidler

Behandlingshyppighed - svampemidler



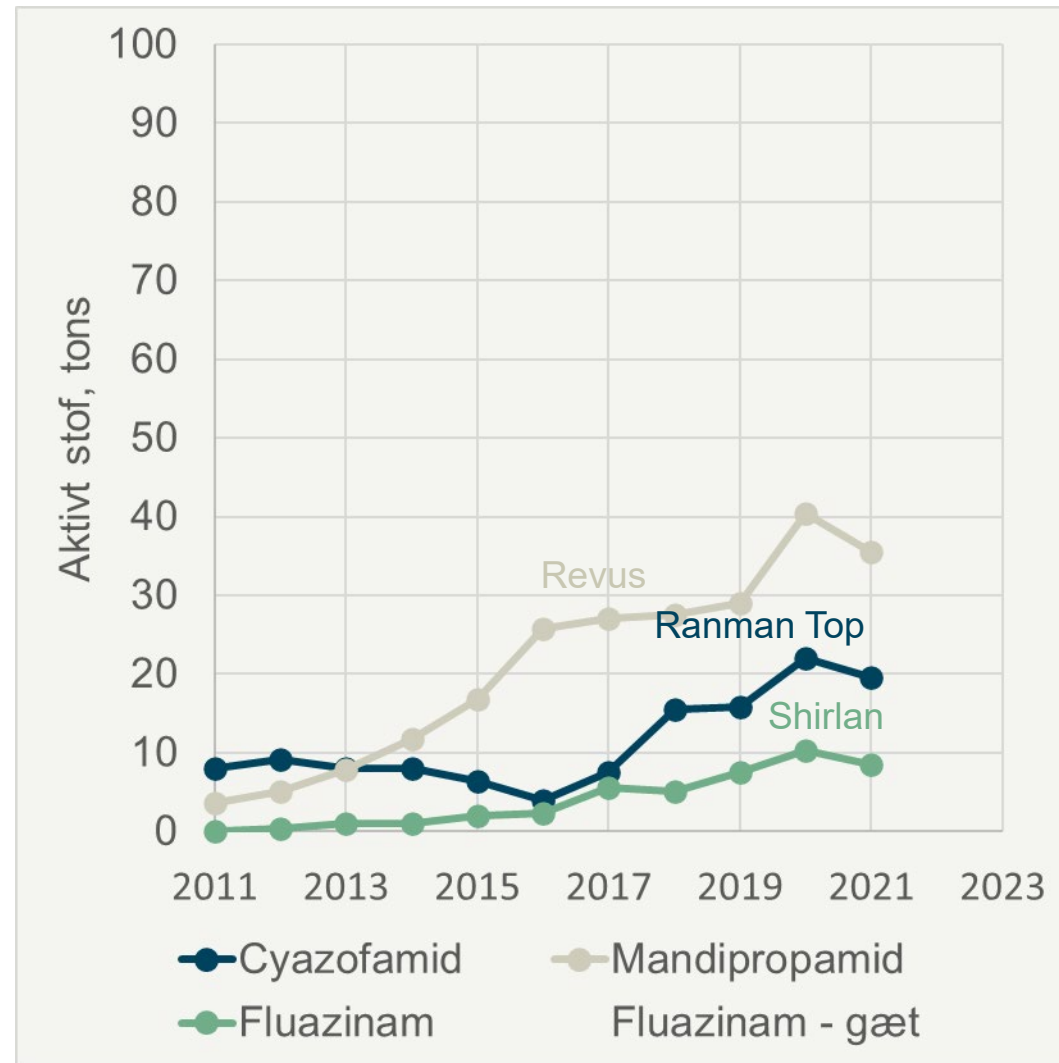
(Kilde: Bekæmpelsesmiddelstatistikken 2009-2021)

Behandlingshyppighed - svampemidler



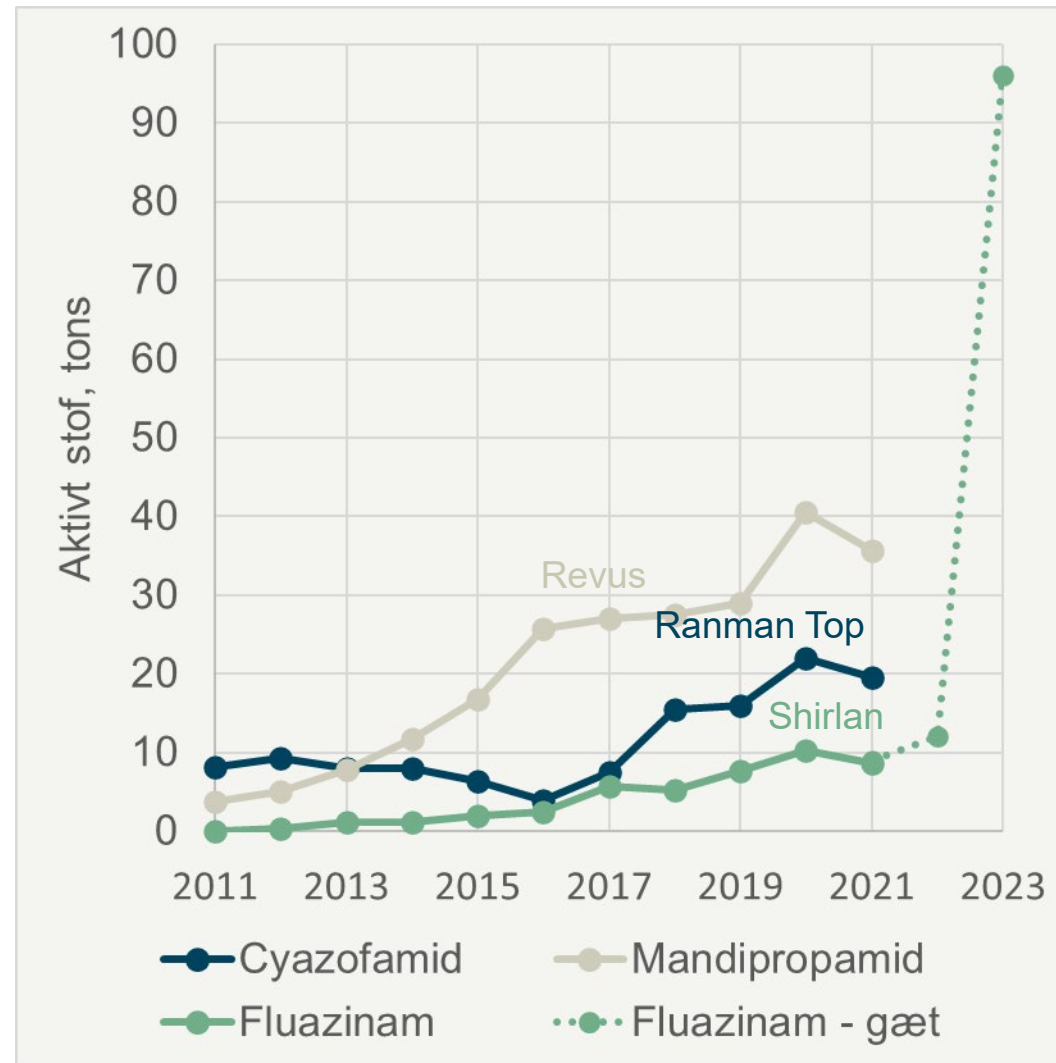
(Kilde: Bekæmpelsesmiddelstatistikken 2009-2021)
Bladskimmel, pct.

Svampemidler i Danmark



(Source: Bekæmpelsesmiddelstatistikken 2011-2021)

Svampemidler i Danmark



(Source: Bekæmpelsesmiddelstatistikken 2011-2021)

Strategi 2023 – Principper

No	1	2	3	4	5	6	7	8	9	10	11	12	13	No. treatm.	Volume, l/ha	Price, kr./kg-l	Costs, kr.-€/ha	
Week	25	26	27	28	29	30	31	32	33	34	35	36	37					
Date	12-jun	19-jun	26-jun	03-jul	10-jul	17-jul	24-jul	31-jul	07-aug	14-aug	21-aug	28-aug	04-sep					
Cyazofamid																		
Mandipropamid							0,6			0,6				2	1,2	325	390	
Fluazinam	0,4	0,4	0,4	0,4	0,4			0,4	0,4		0,4	0,4	0,4	10	4	528	2.112	
Oxathiapiprolin				0,15	0,15									2	0,3	1.457	437	
Propamocarb + cymoxanil		2					2			2				3	6	239	1.434	
Cymoxanil	0,25		0,25					0,25	0,25		0,25	0,25	0,25	7	1,75	280	490	
Azoxystrobin							0,5							1	0,5	235	118	
														25			kr. 4.981	€ 664
	Start block			Zorvec block			Middle block				Final blok							

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Strategi 2023 – Principper

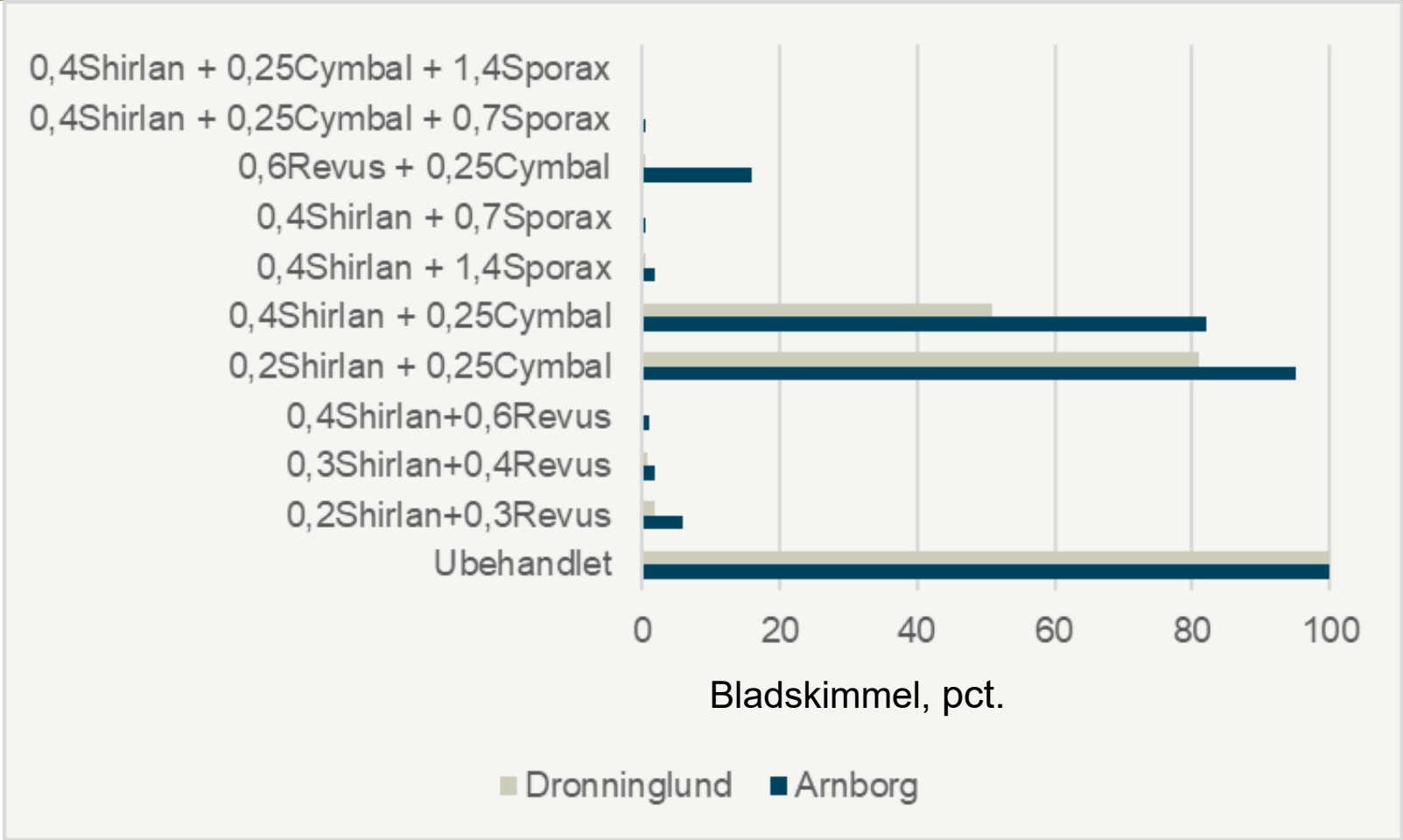
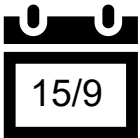
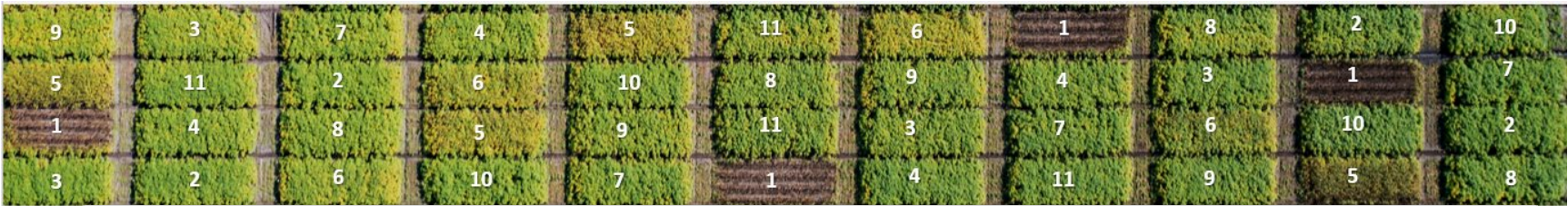
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Forsøg 2023

- Kombinationseffekt mellem svampemidler
- Effekten af svampemidler i mellemblok

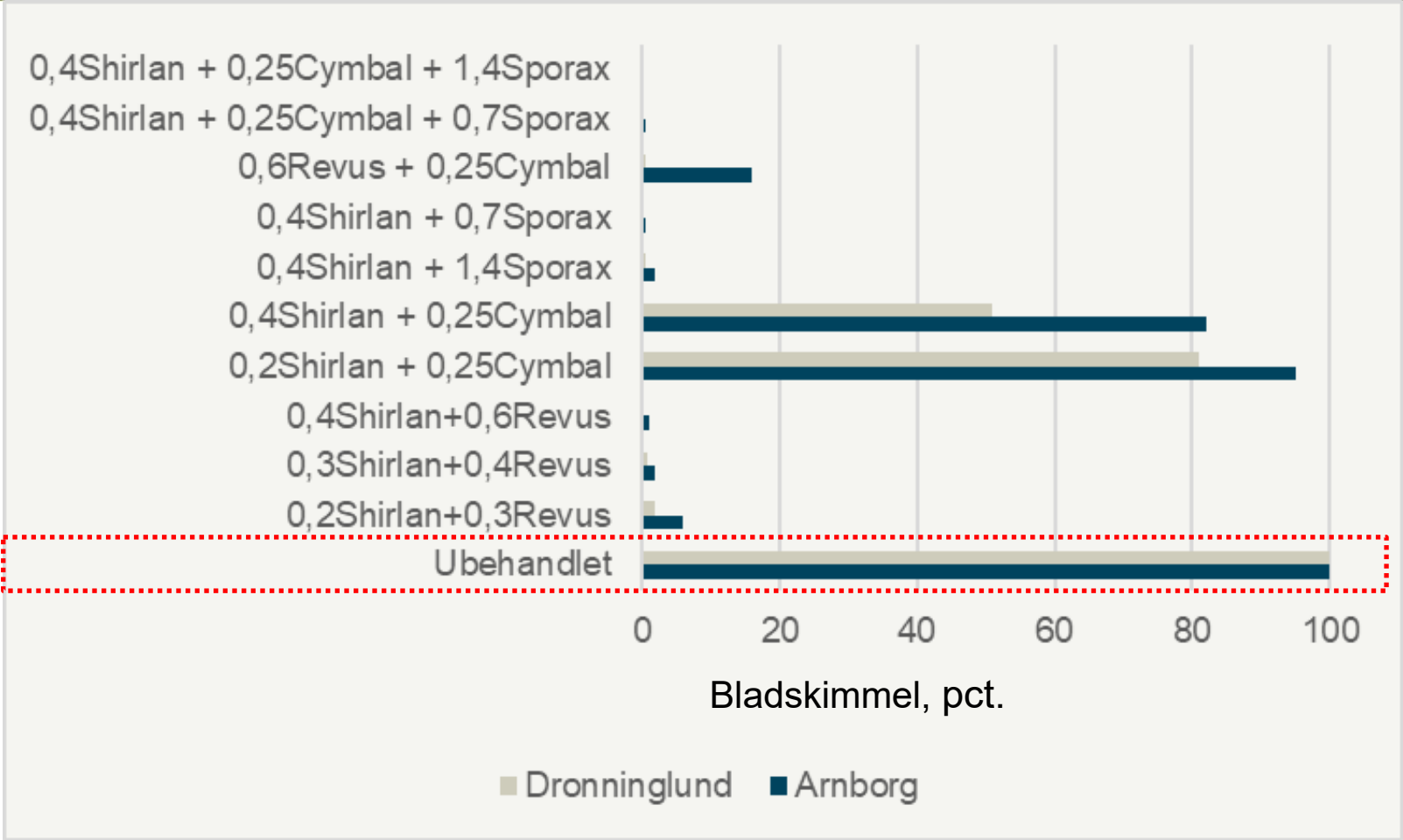
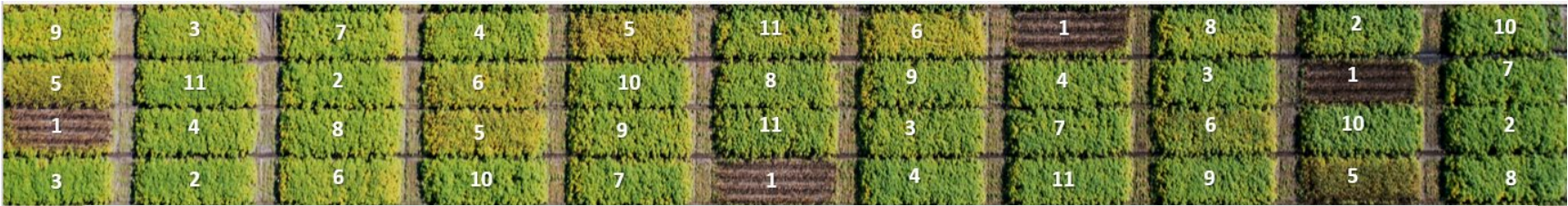
Kombinationseffekt mellem svampemidler

(Bo Nyegaard, NA)



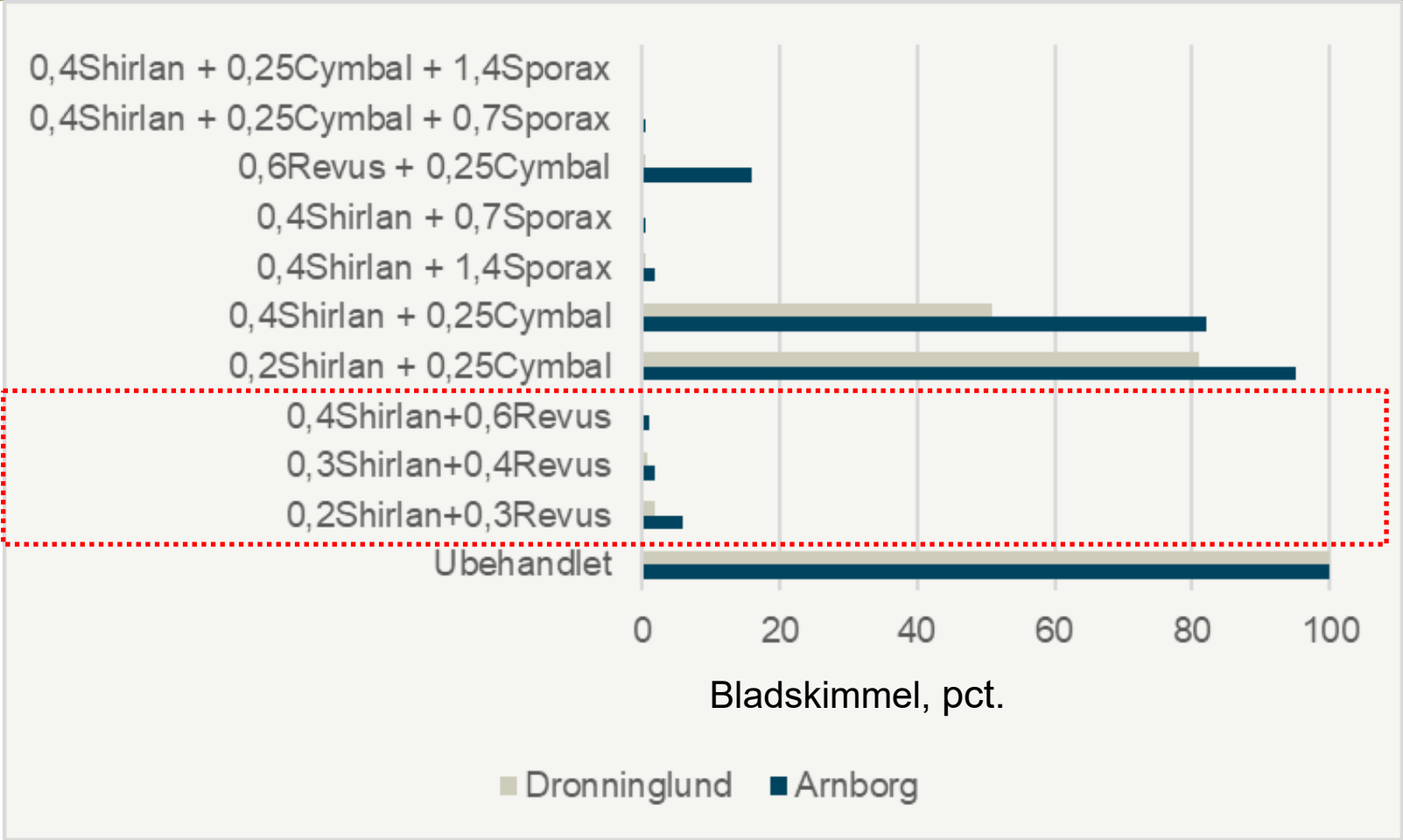
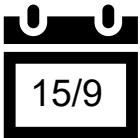
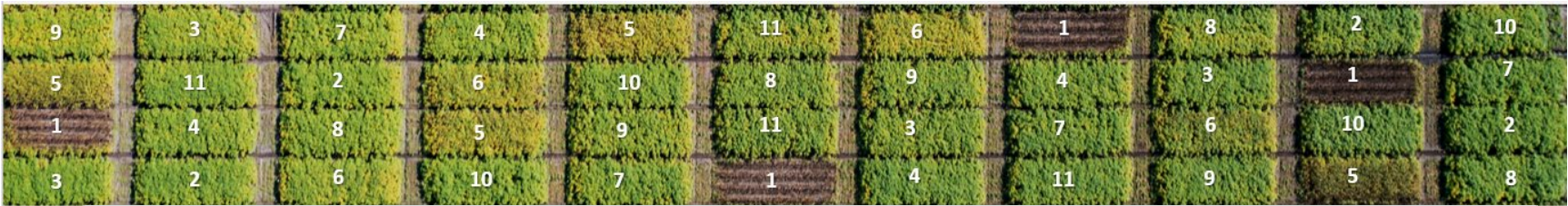
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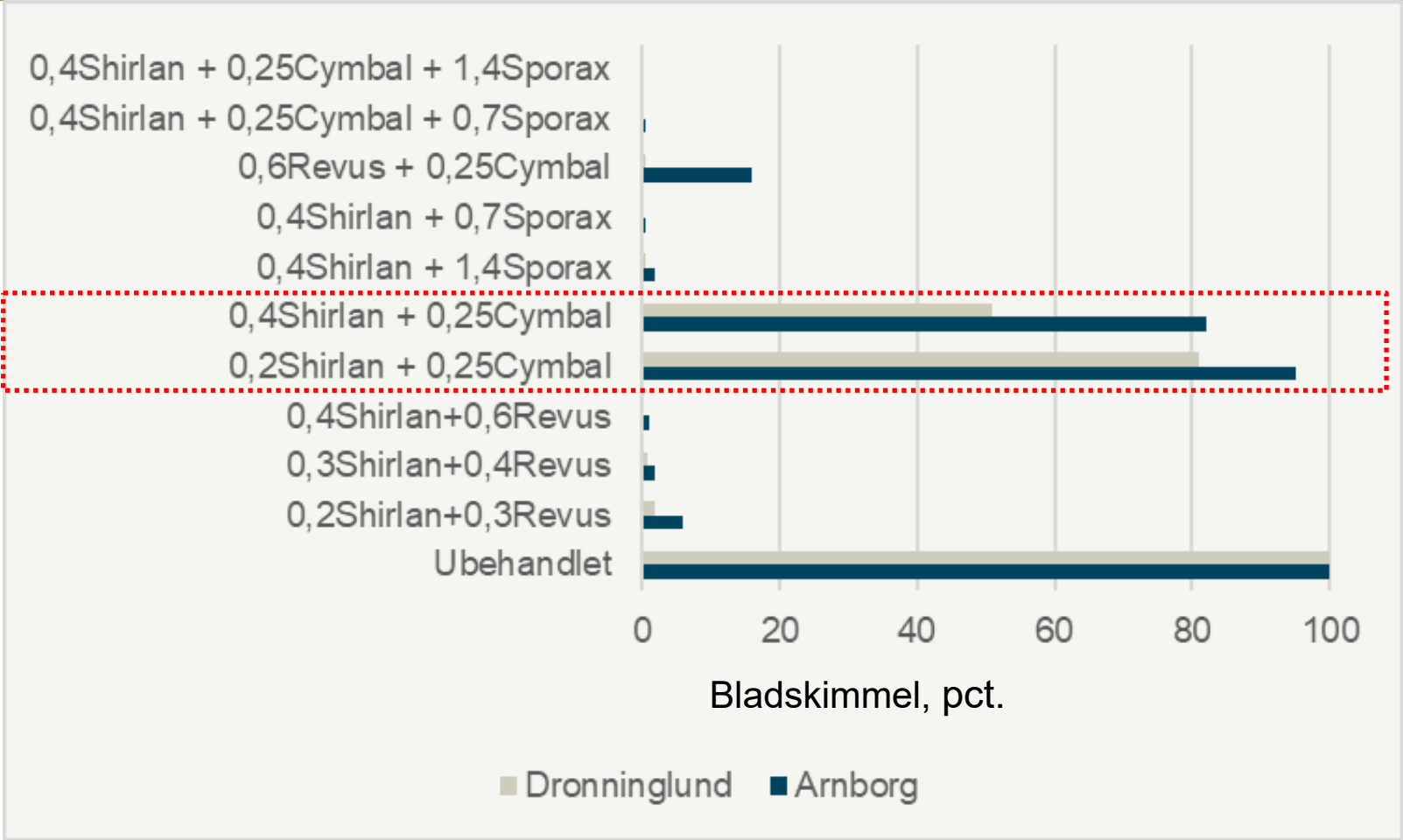
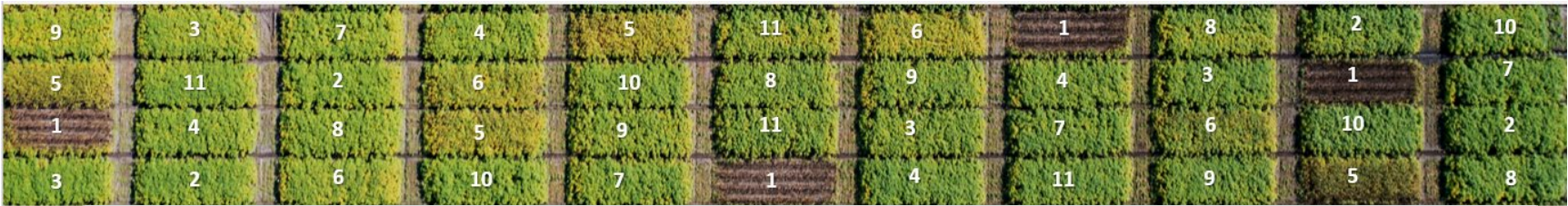
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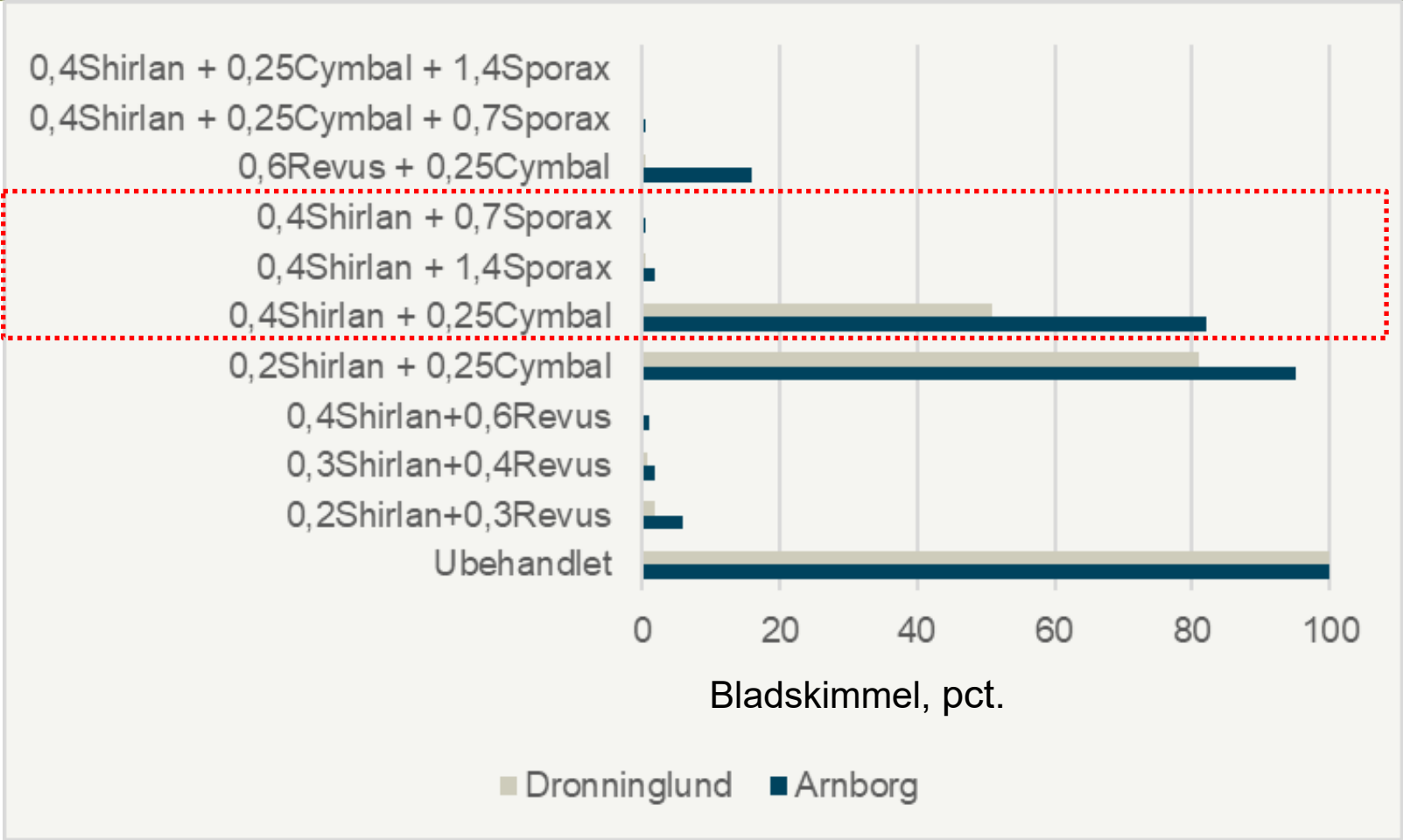
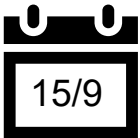
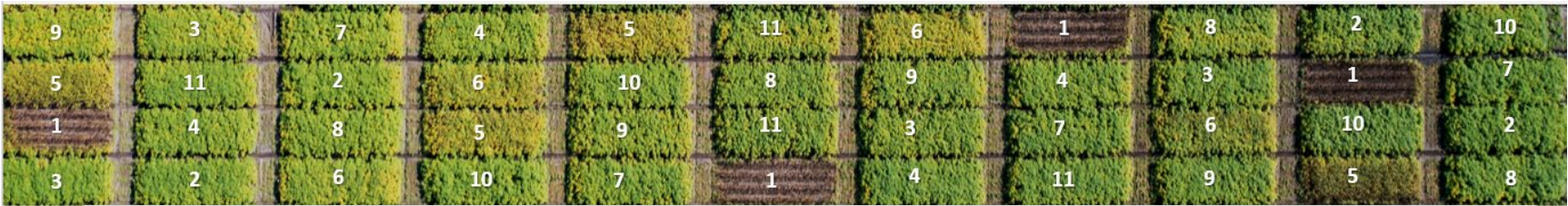
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(Bo Nyegaard, NA)



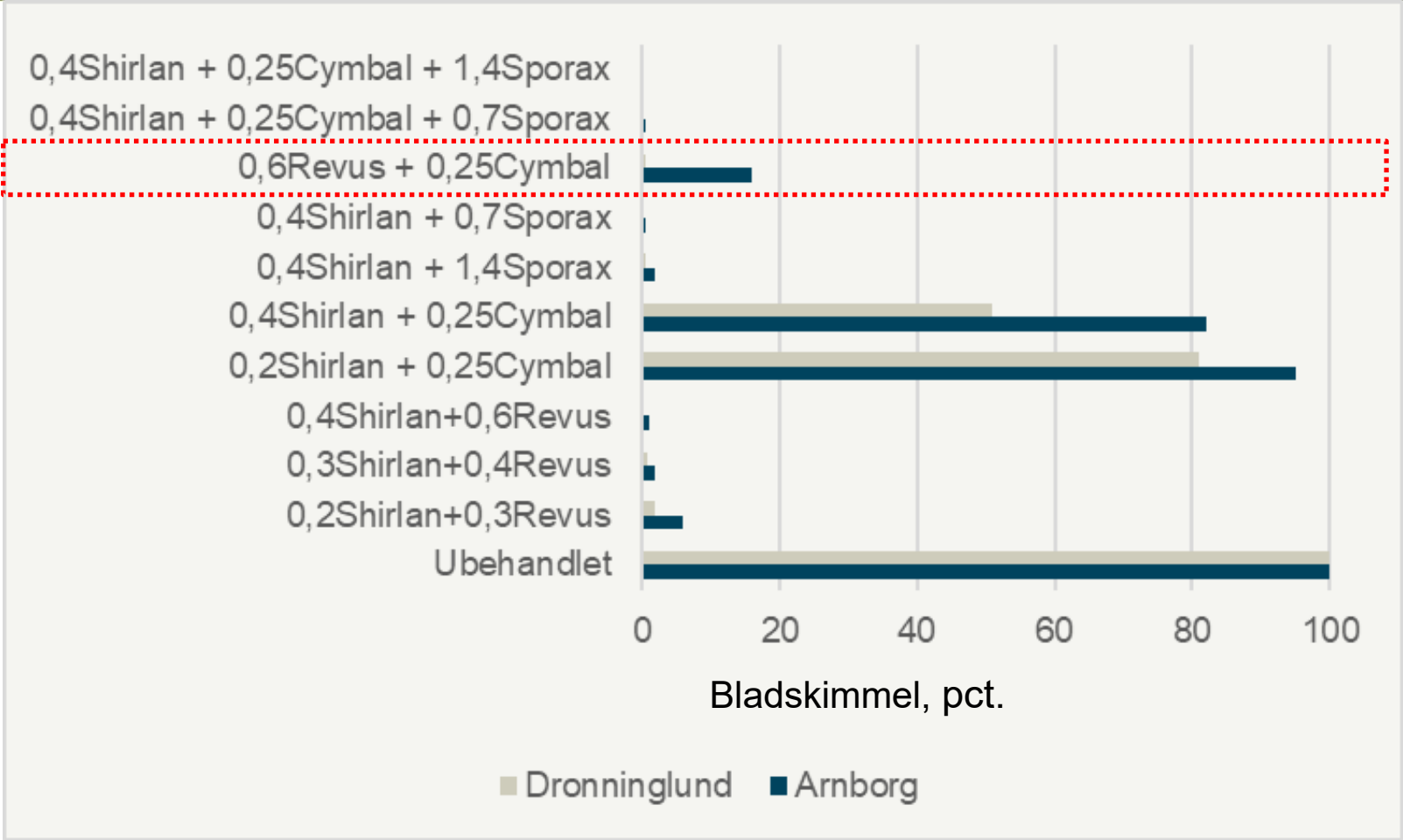
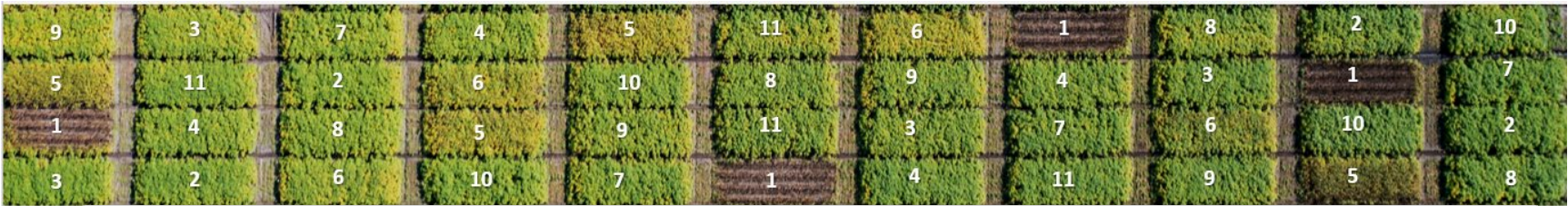
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(Bo Nyegaard, NA)



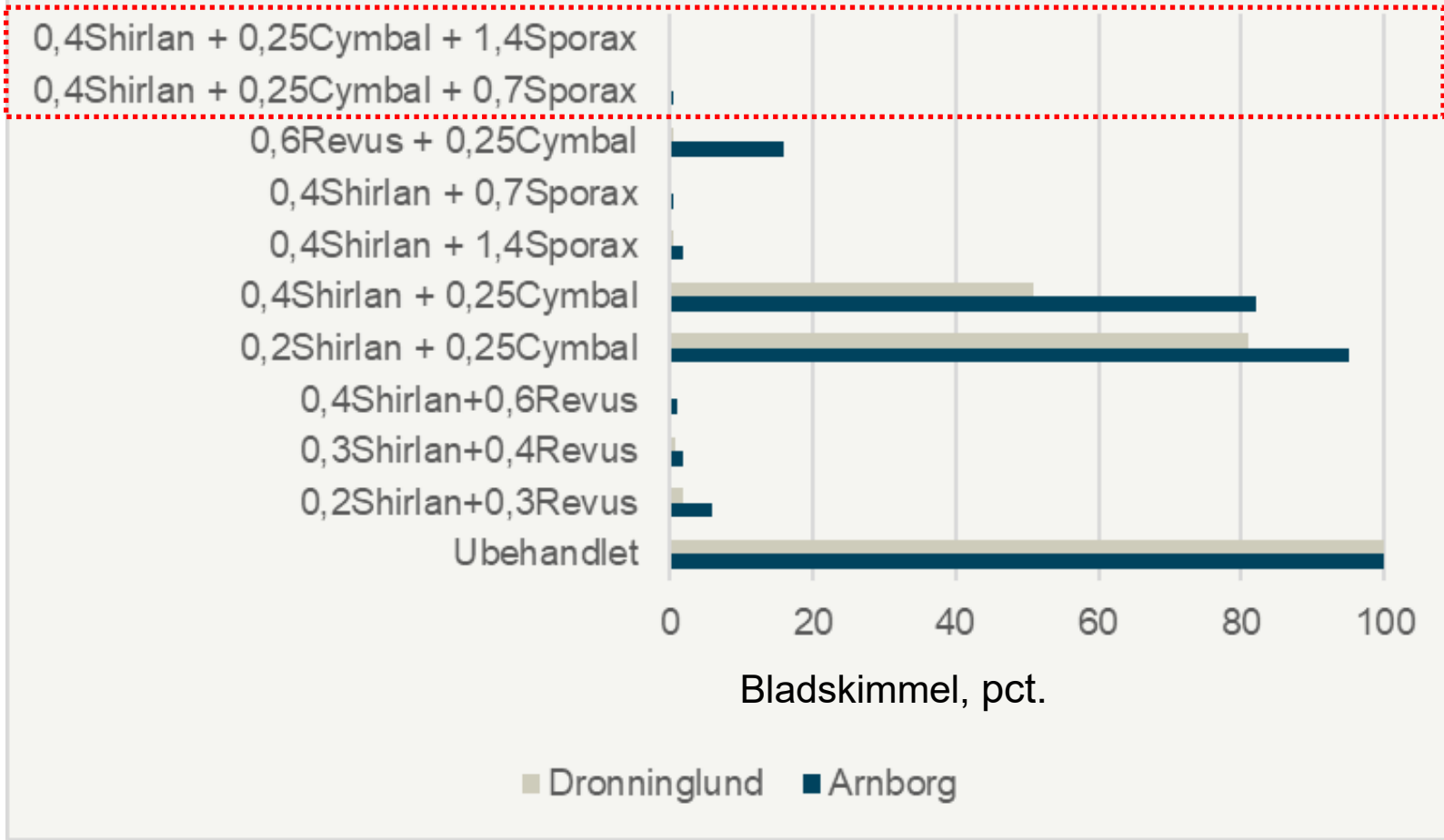
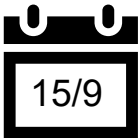
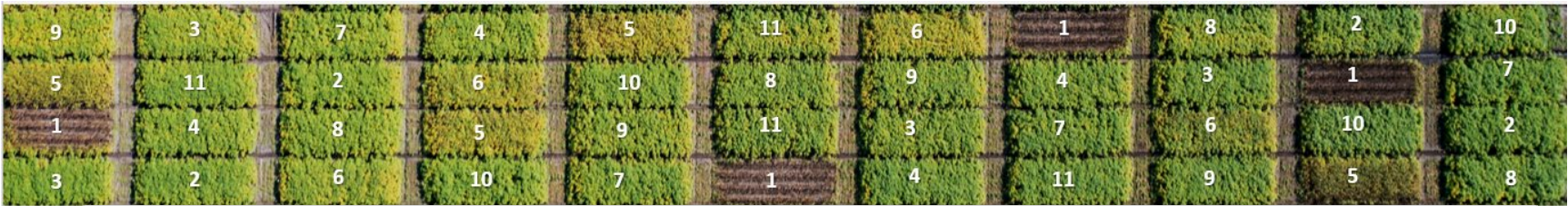
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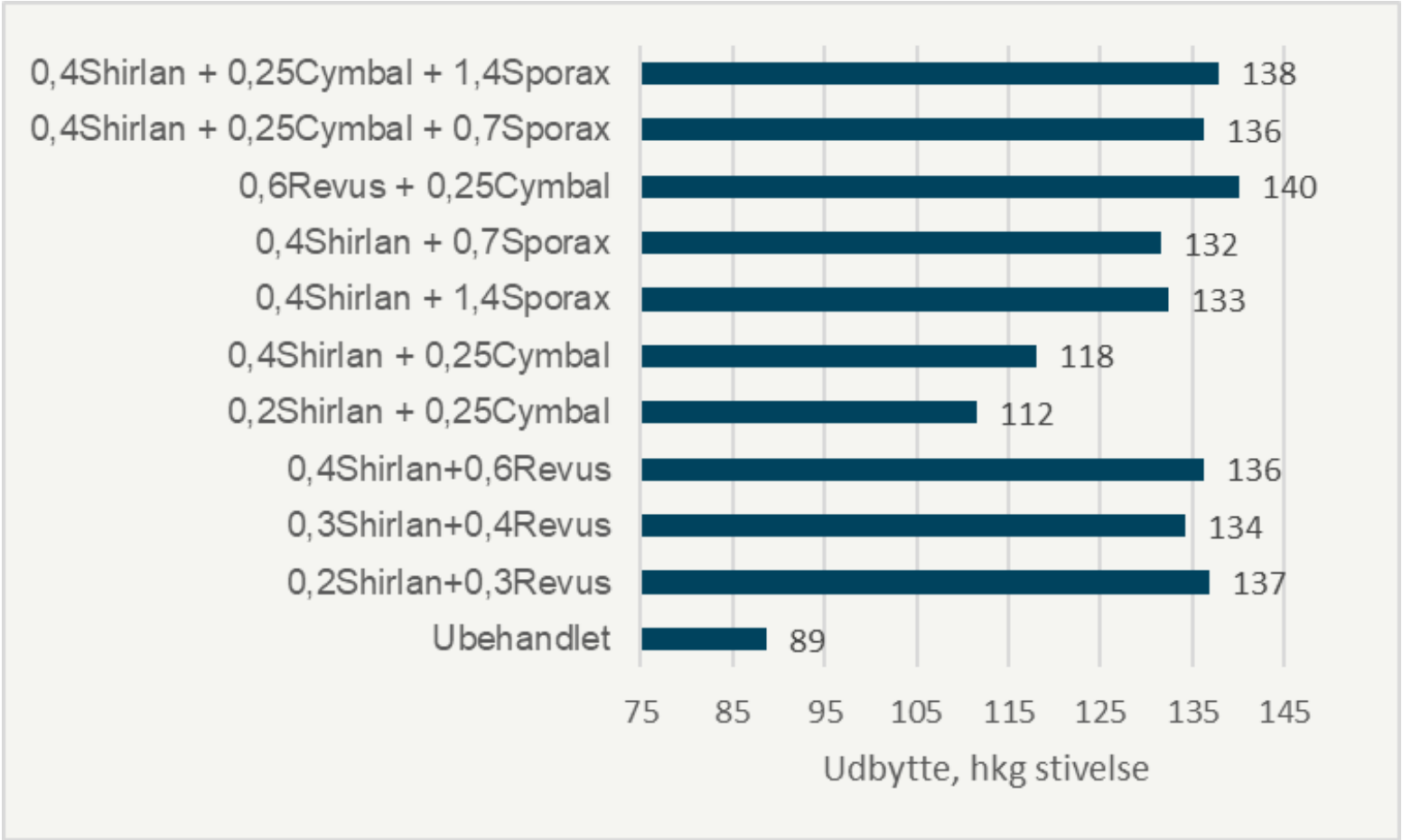
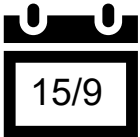
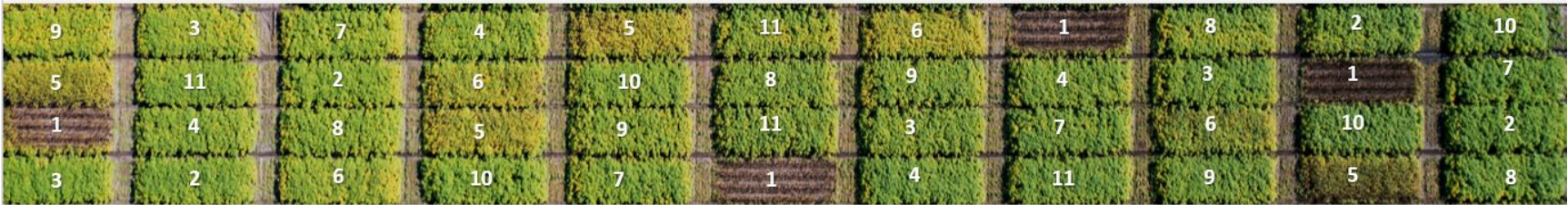
Kombinationseffekt mellem svampemidler

(Bo Nyegaard, NA)



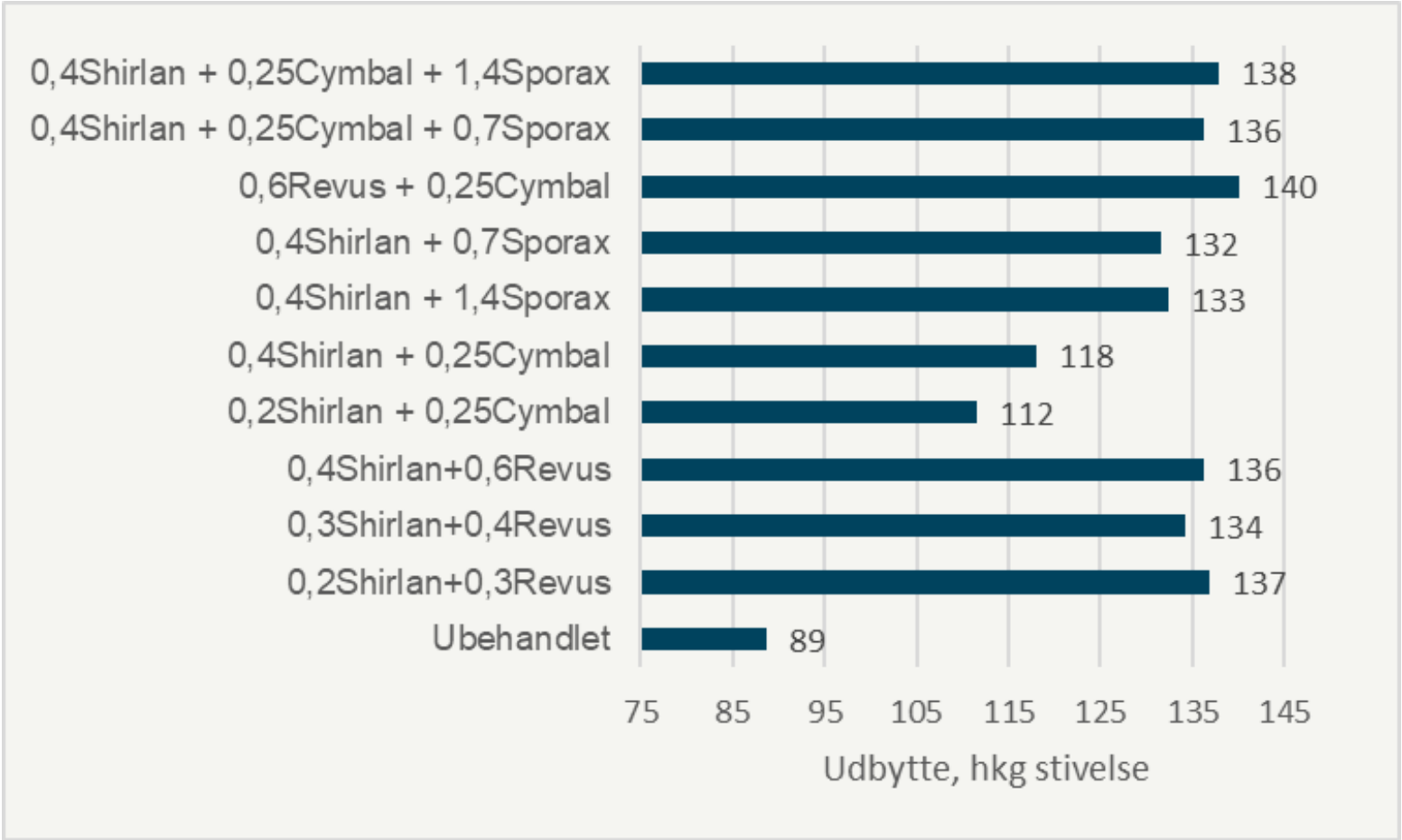
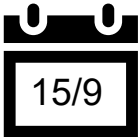
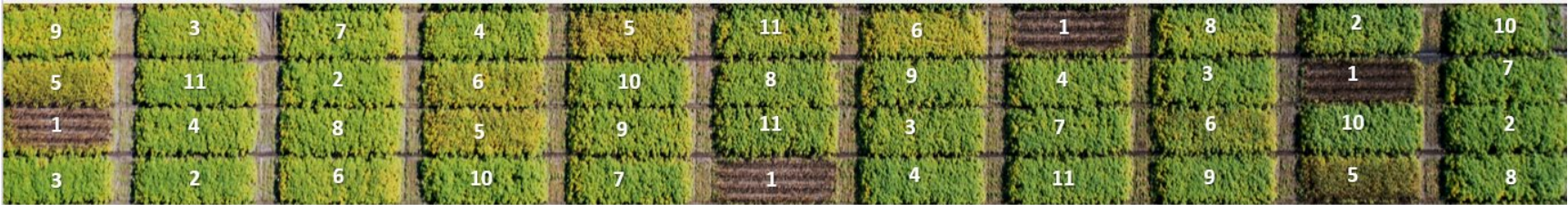
Kombinationseffekt mellem svampemidler - Arnborg

(Bo Nyegaard, NA)



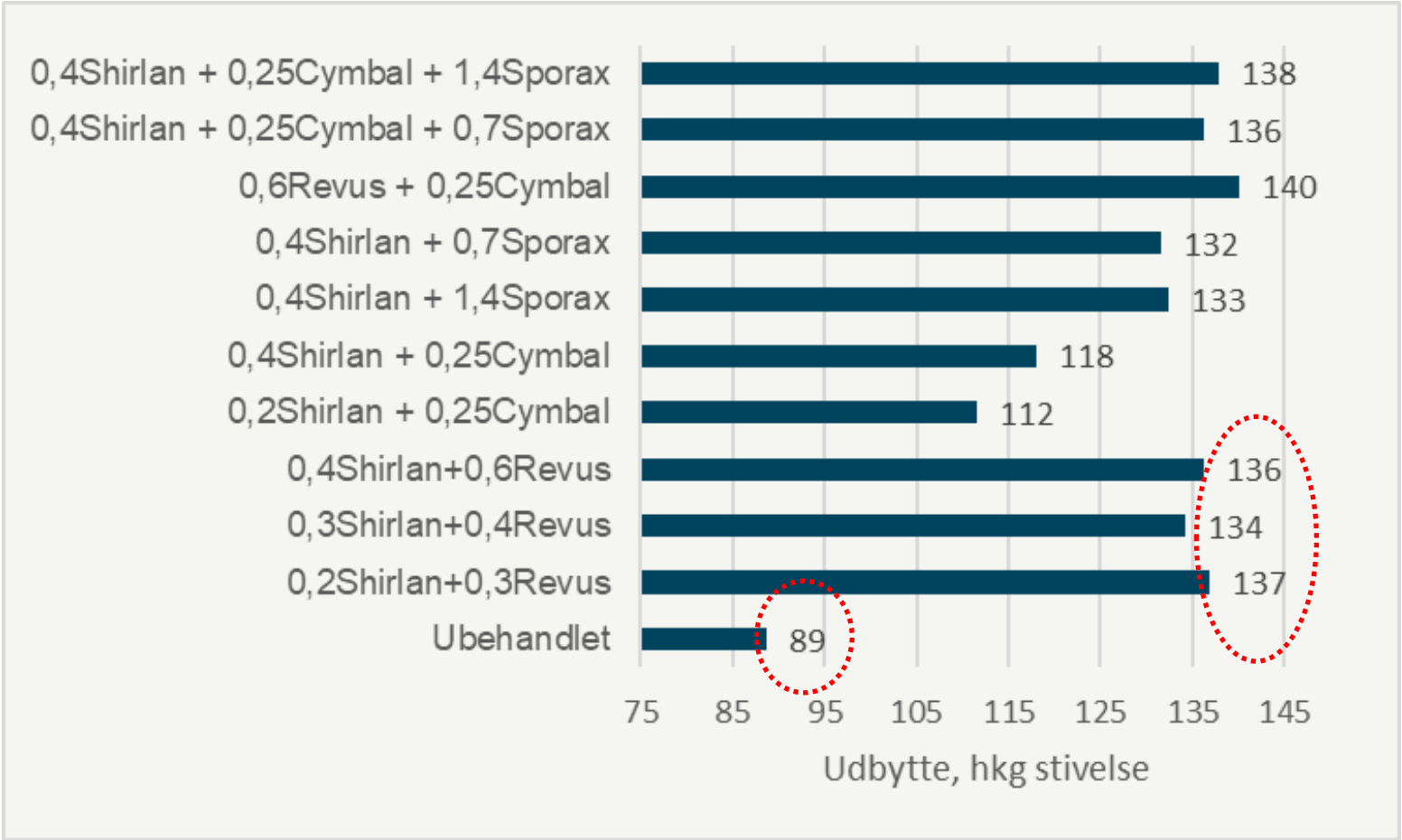
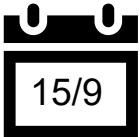
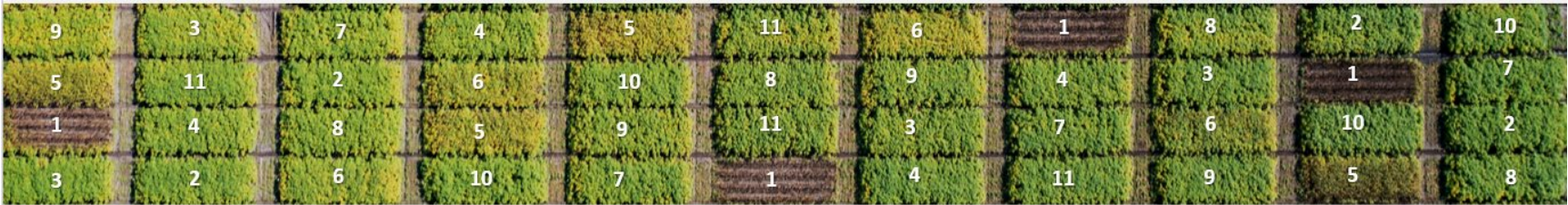
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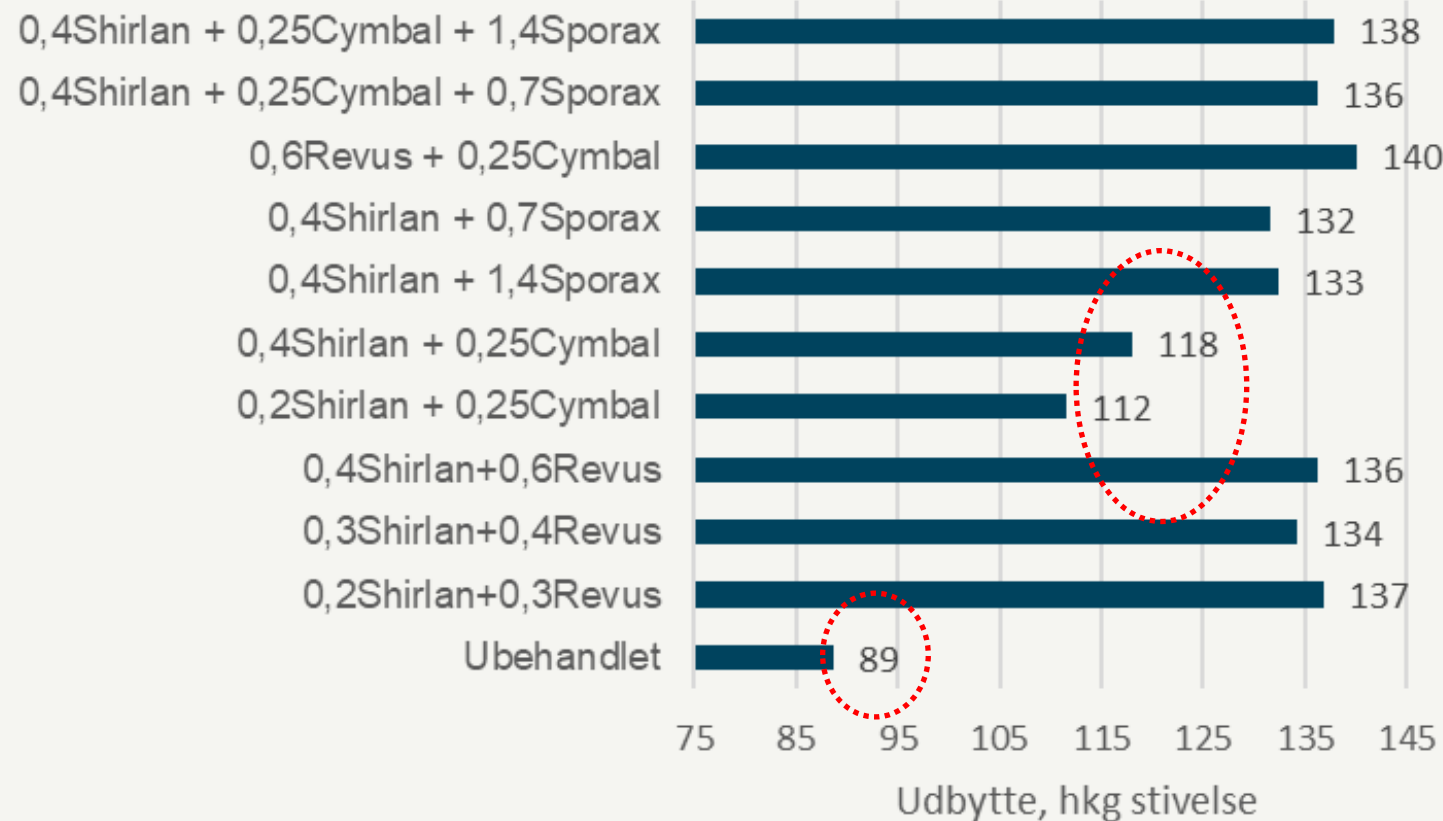
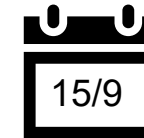
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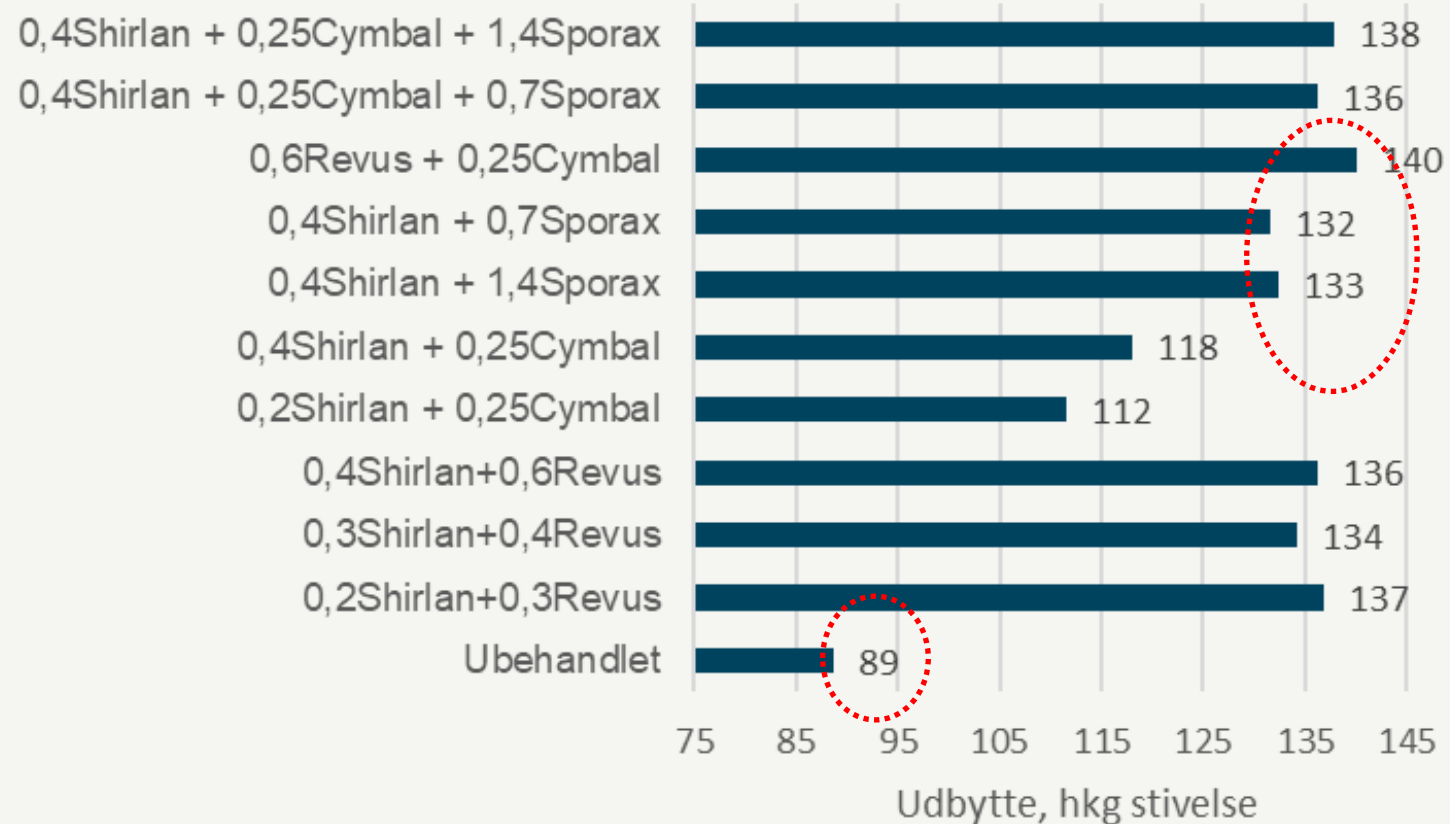
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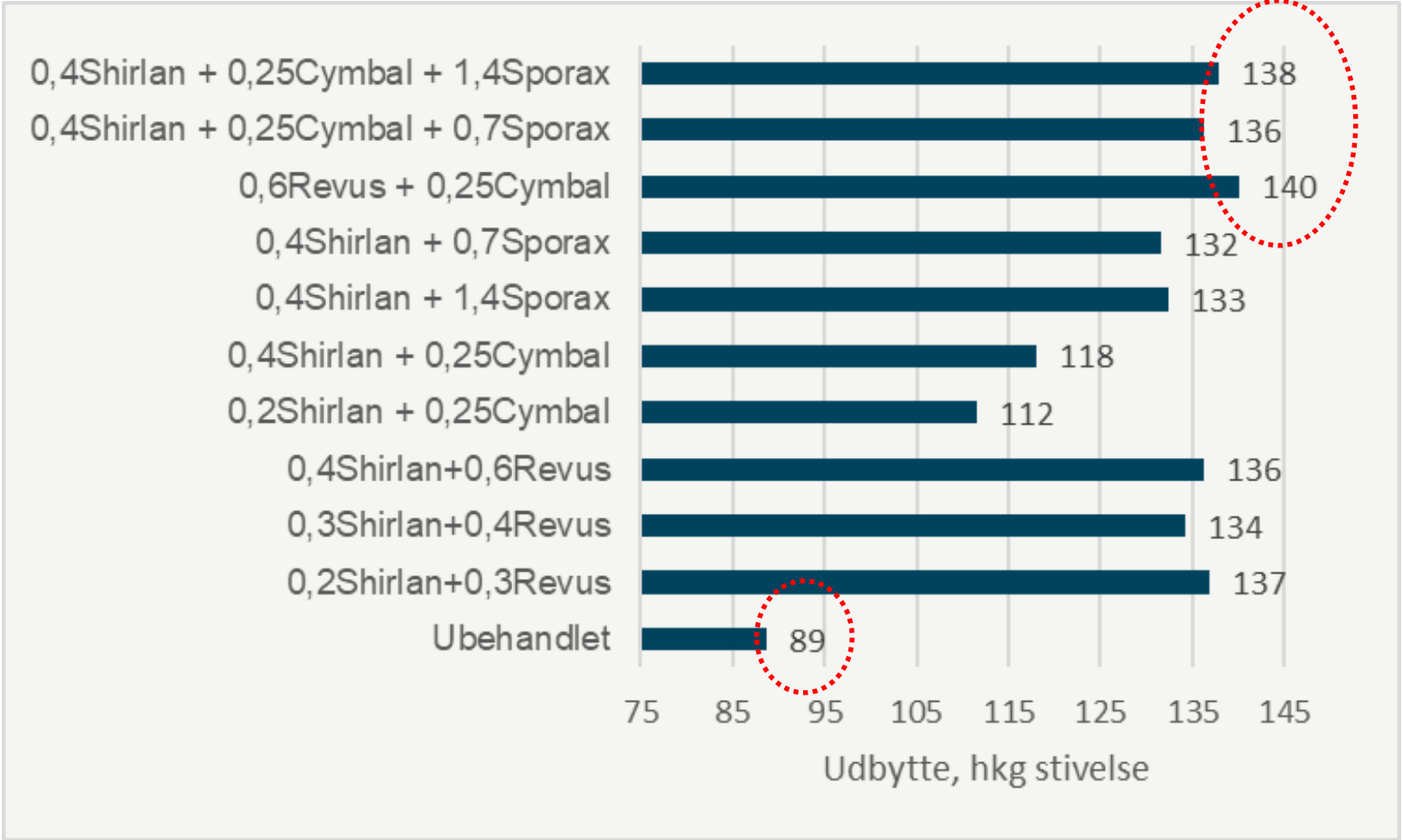
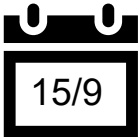
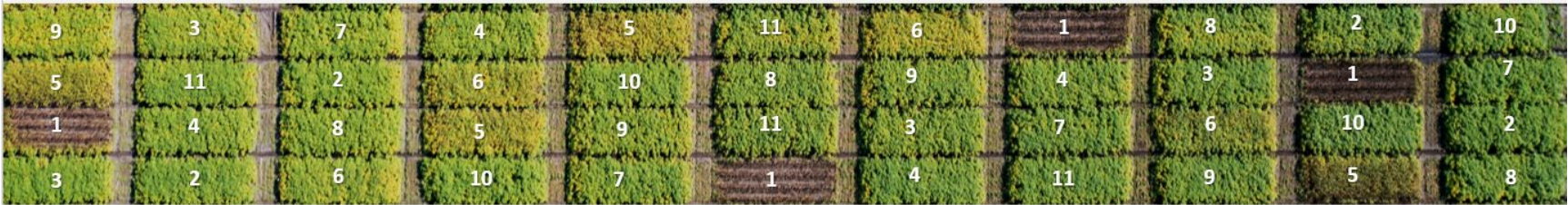
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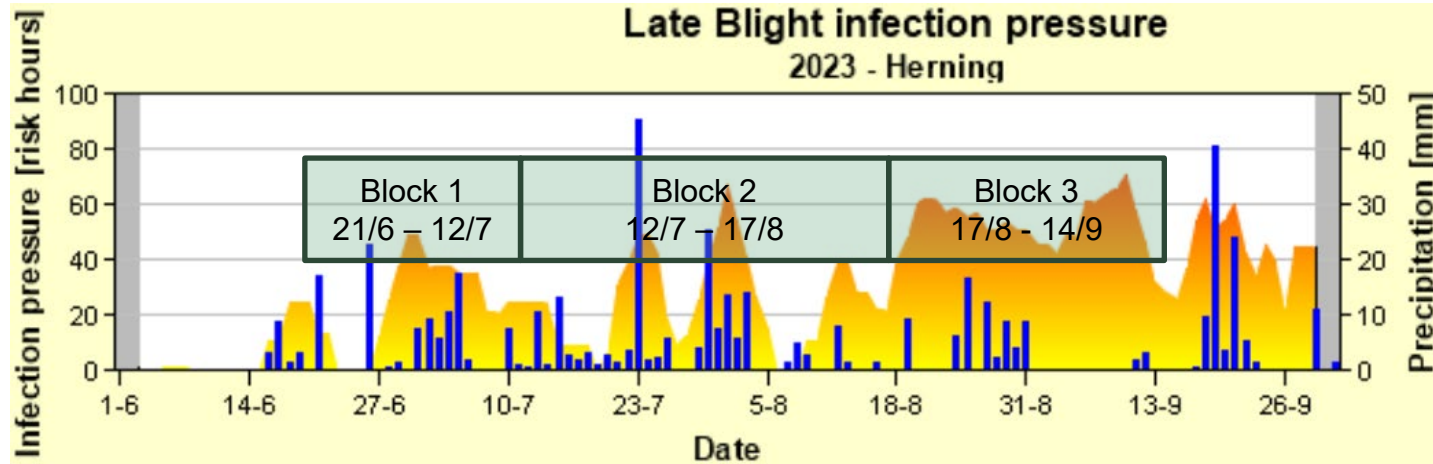


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(Bo Nyegaard, NA)

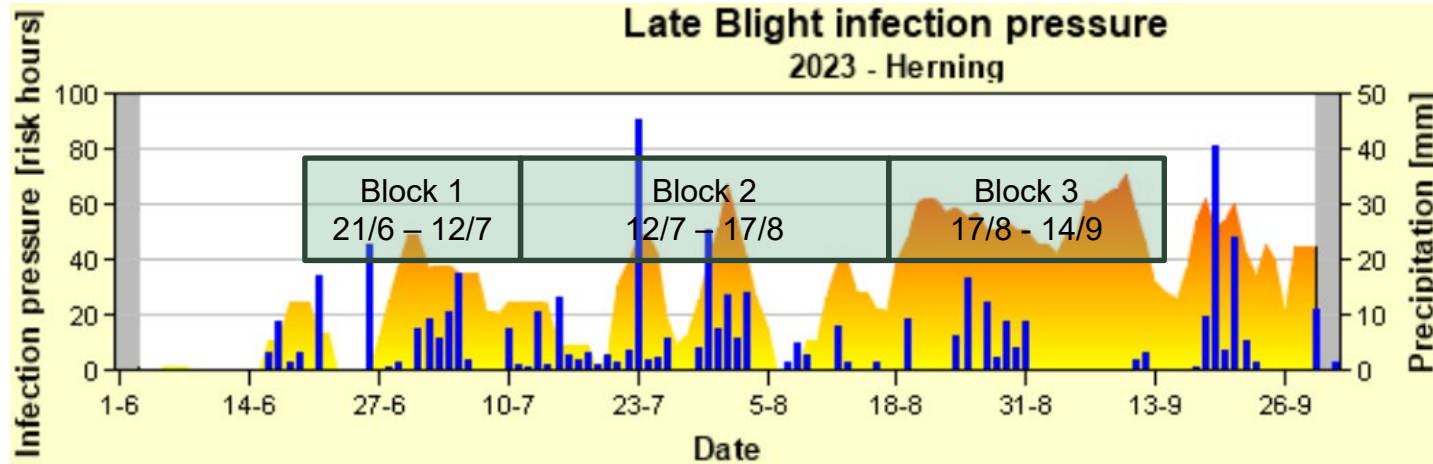


Kombiantion af svampemidler i mellemblok



Trial design			
No.	Block 1	Block 2	Block 3
1	Non- treated		
2	3 x 0,4 Shirlan	5 x 0,4 Shirlan + 0,25 Cymbal	5 x 0,3 Shirlan
3	3 x 0,4 Shirlan	5 x 0,4 Shirlan + 0,6 Revus	5 x 0,3 Shirlan
4	3 x 0,4 Shirlan	5 x 0,4 Shirlan + 0,5 Amistar	5 x 0,3 Shirlan
5	3 x 0,4 Shirlan	5 x 0,4 Shirlan + 1,4 Sporax	5 x 0,3 Shirlan
6	3 x 0,4 Shirlan	5 x 0,4 Shirlan + 2,0 Proxanil	5 x 0,3 Shirlan
7	3 x 0,4 Shirlan	5 x 0,6 Evagio Plus	5 x 0,3 Shirlan
8	3 x 0,4 Shirlan	5 x 0,5 Vendetta	5 x 0,3 Shirlan
9	3 x 0,4 Shirlan	5 x 0,4 Shirlan 2 x 0,15 Zorvec	5 x 0,3 Shirlan
10	3 x 0,4 Shirlan	5 x 0,4 Shirlan 2 x 0,15 Zorvec	5 x 0,3 Shirlan

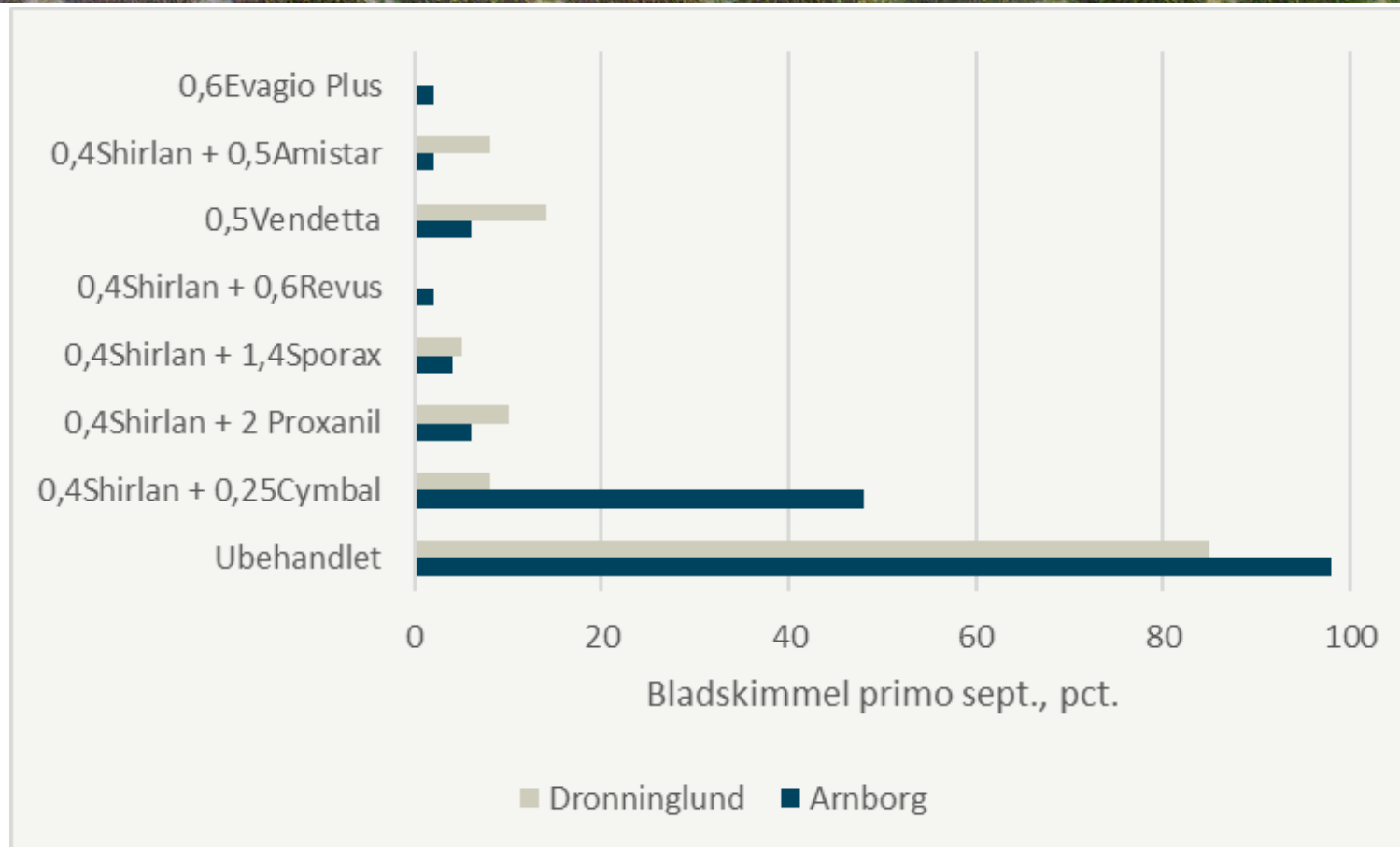
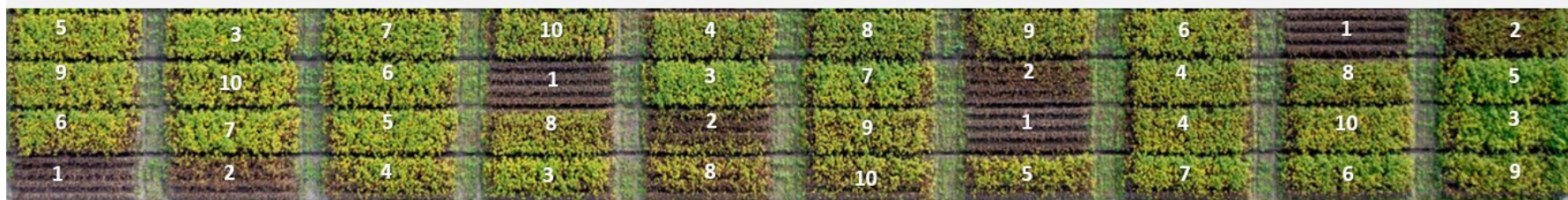
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5	3 x 0,4 Shirlan	5 x 0,4 Shirlan + 1,4 Sporax	5 x 0,3 Shirlan
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10	3 x 0,4 Shirlan	5 x 0,4 Shirlan 2 x 0,15 Zorvec	5 x 0,3 Shirlan

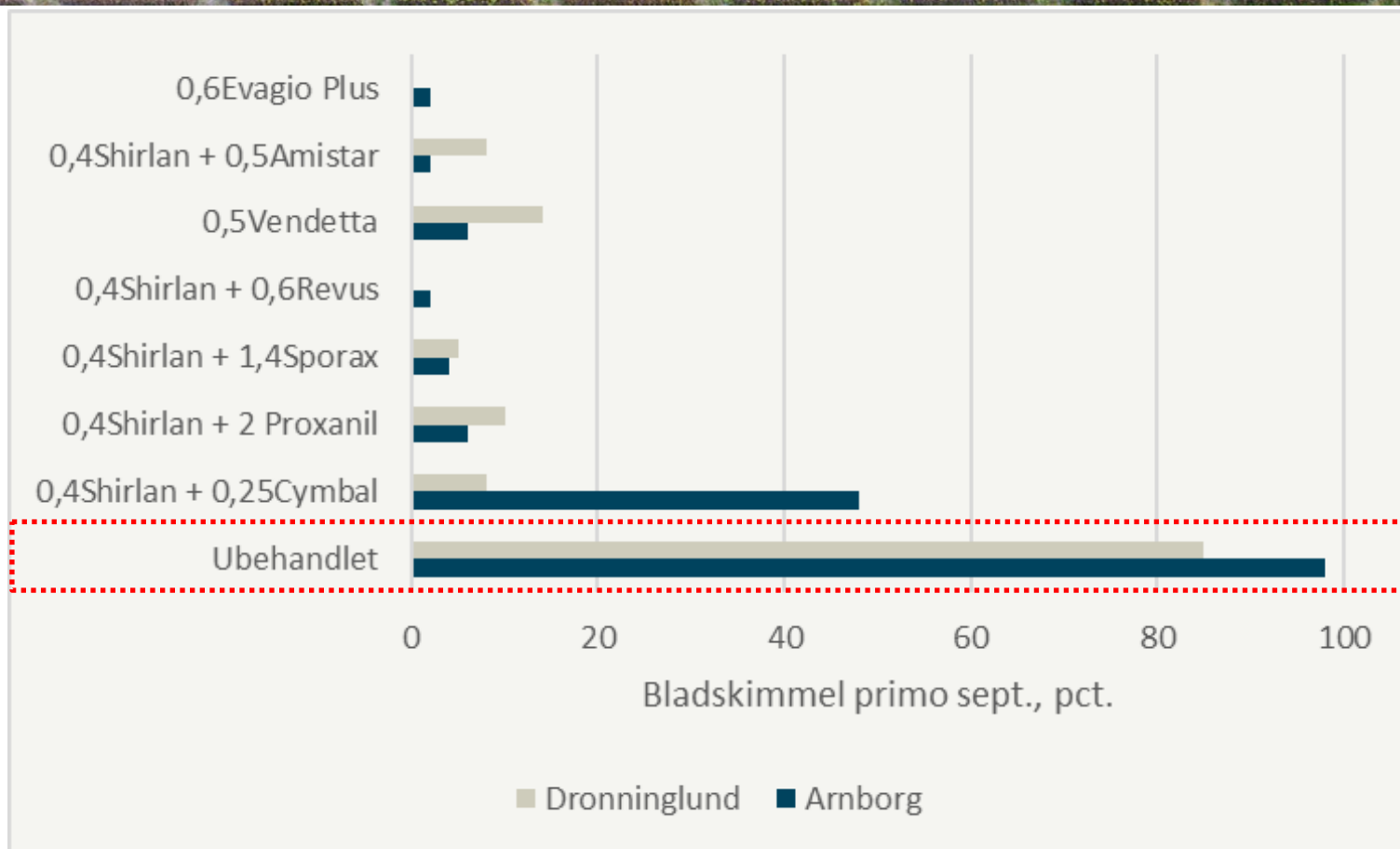
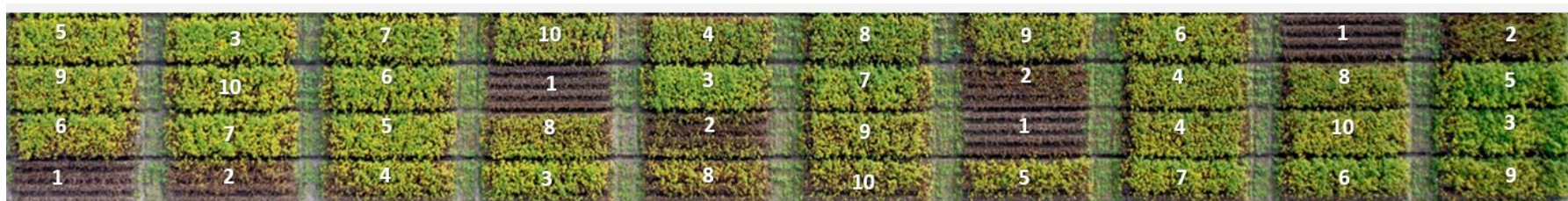
Kombination af svampemidler i mellemblok

0 0
6-7/9



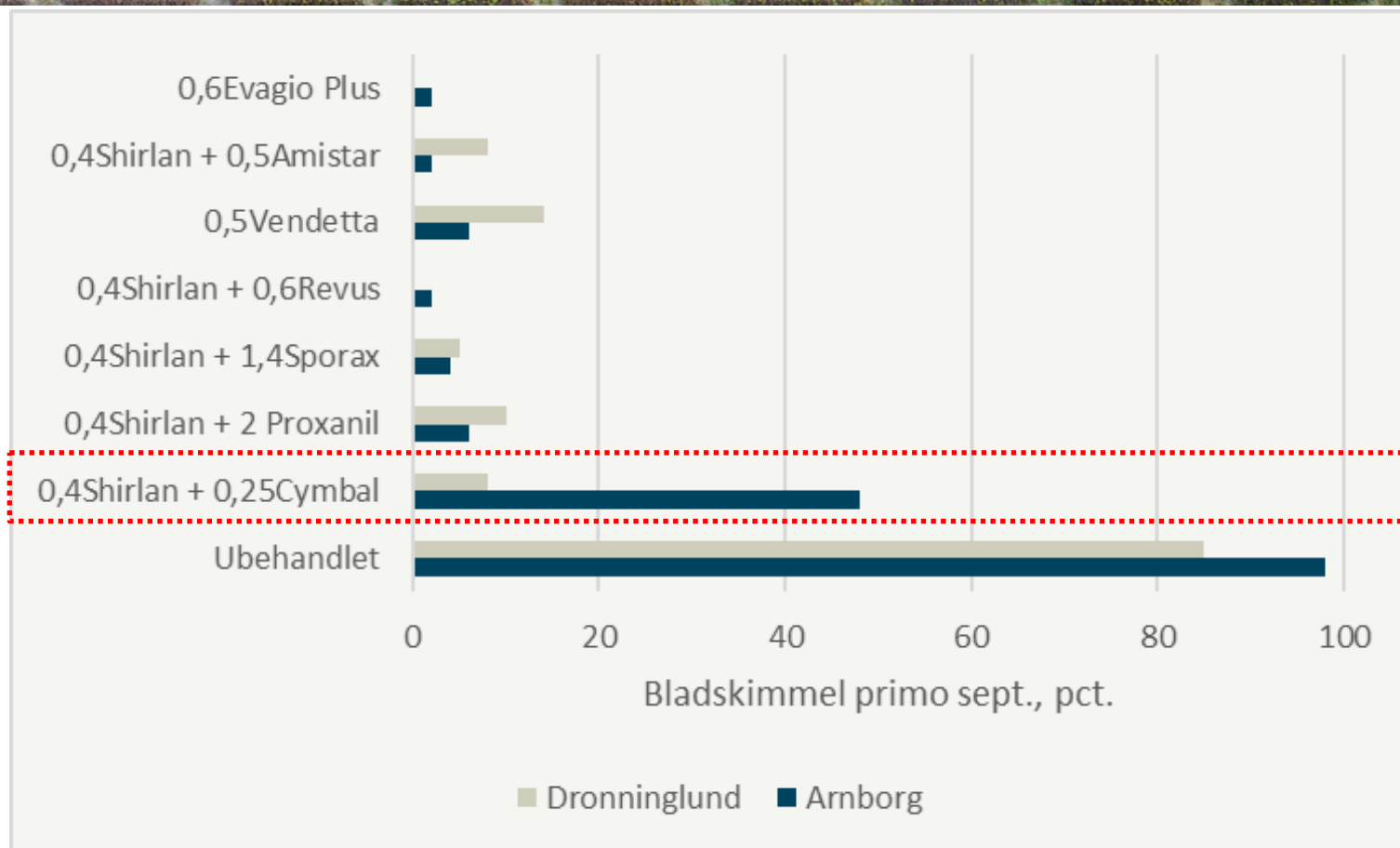
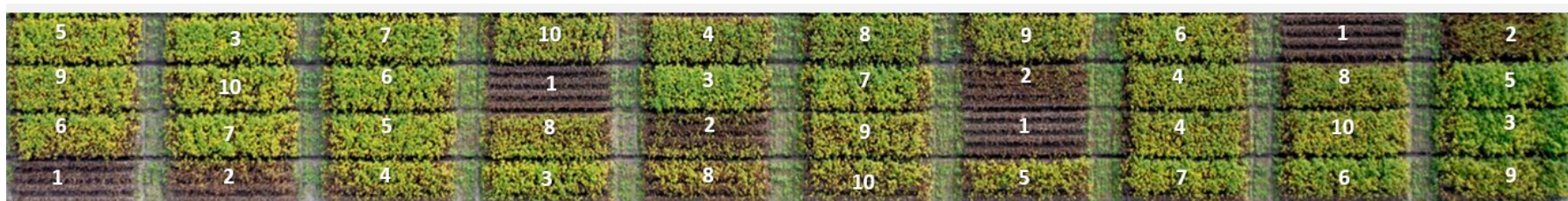
Kombination af svampemidler i mellemblok

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6-7/9

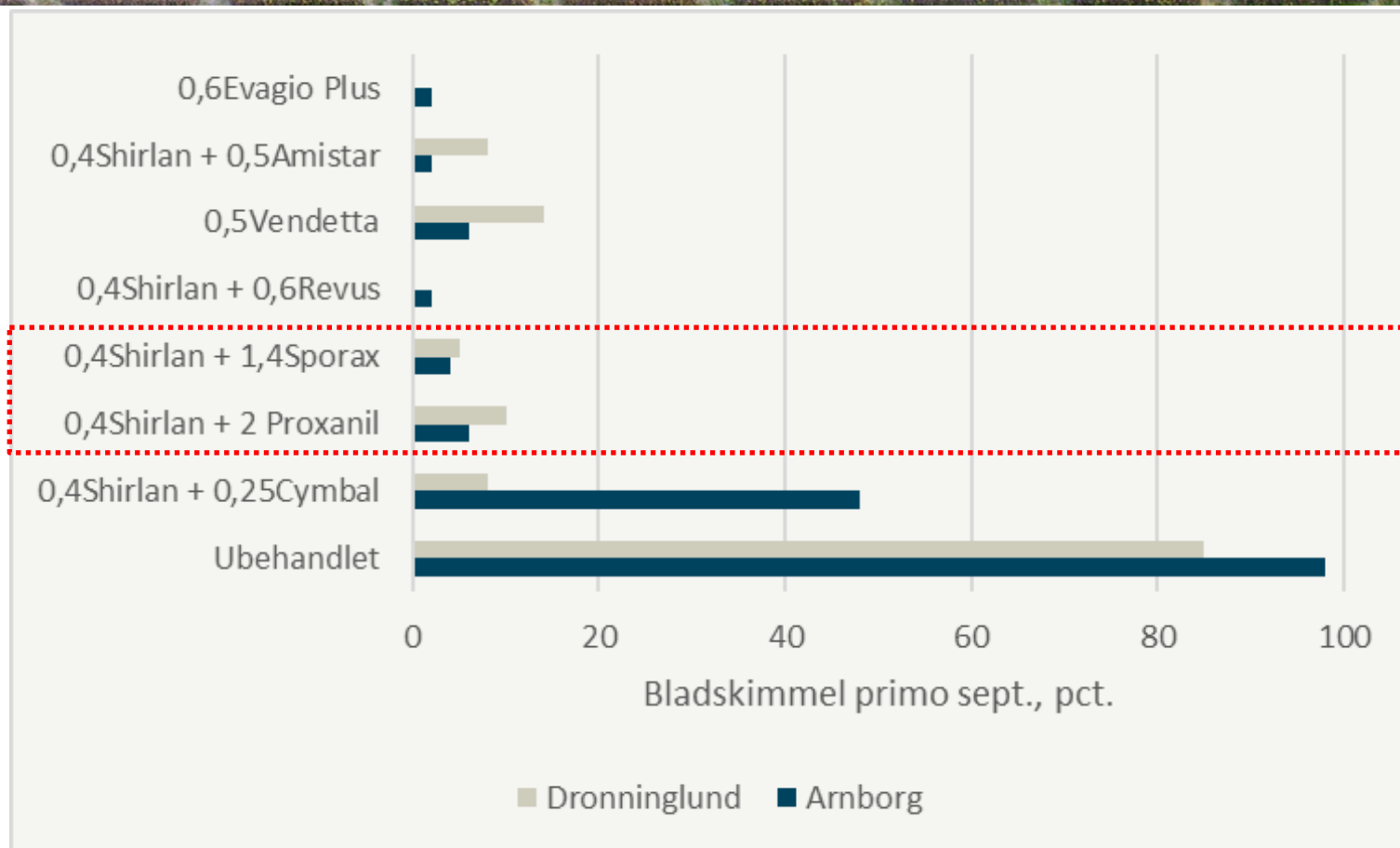
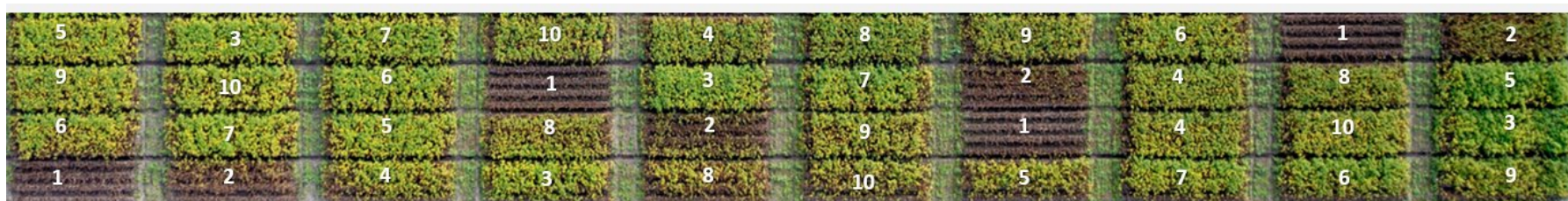


Kombination af svampemidler i mellemblok

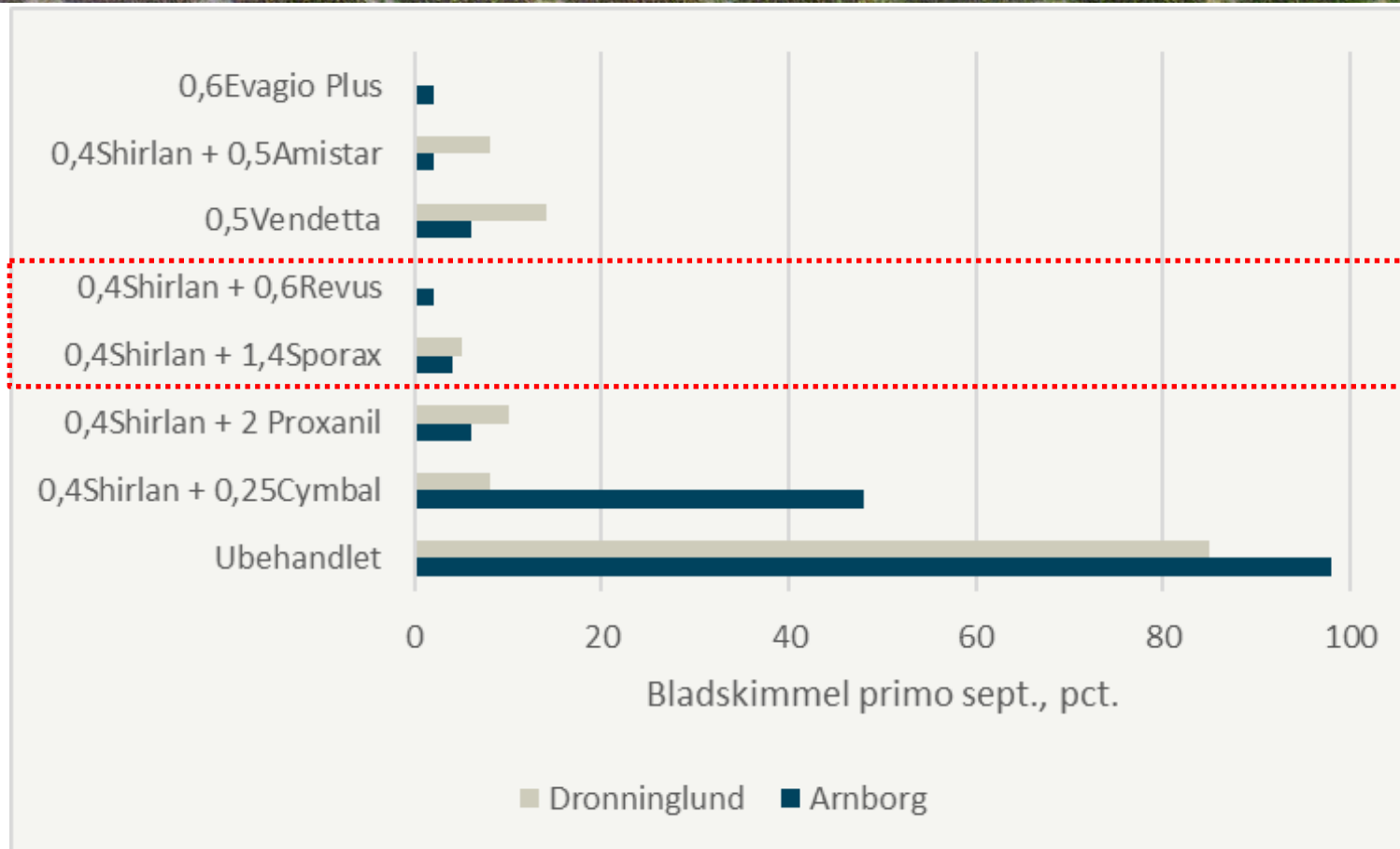
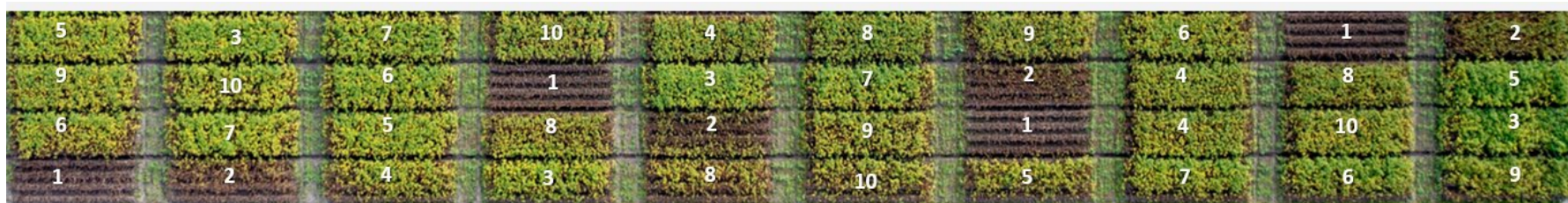
0 0
6-7/9



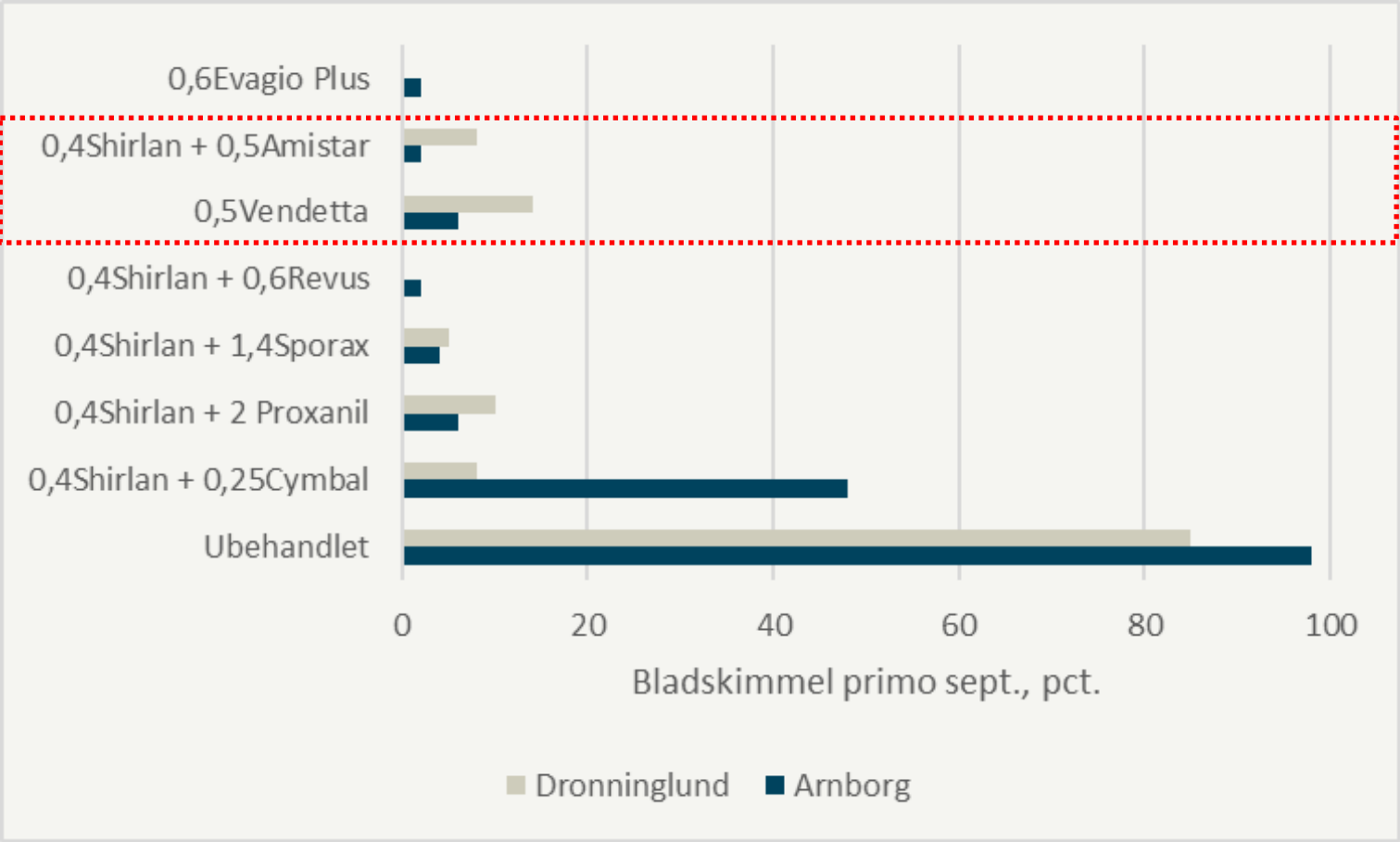
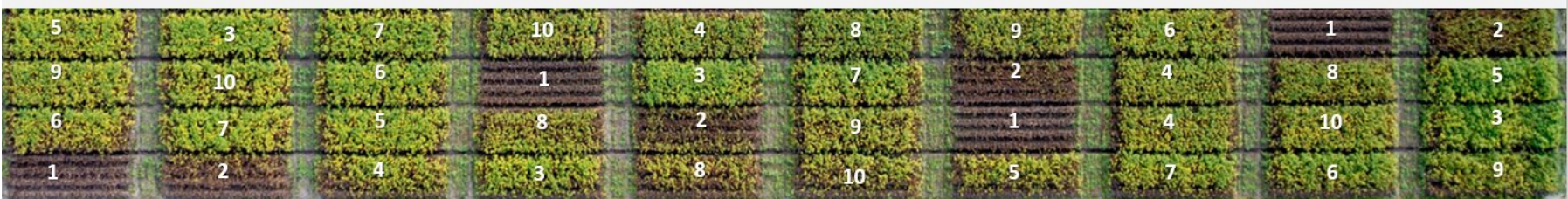
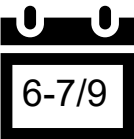
Kombination af svampemidler i mellemblok



Kombination af svampemidler i mellemblok

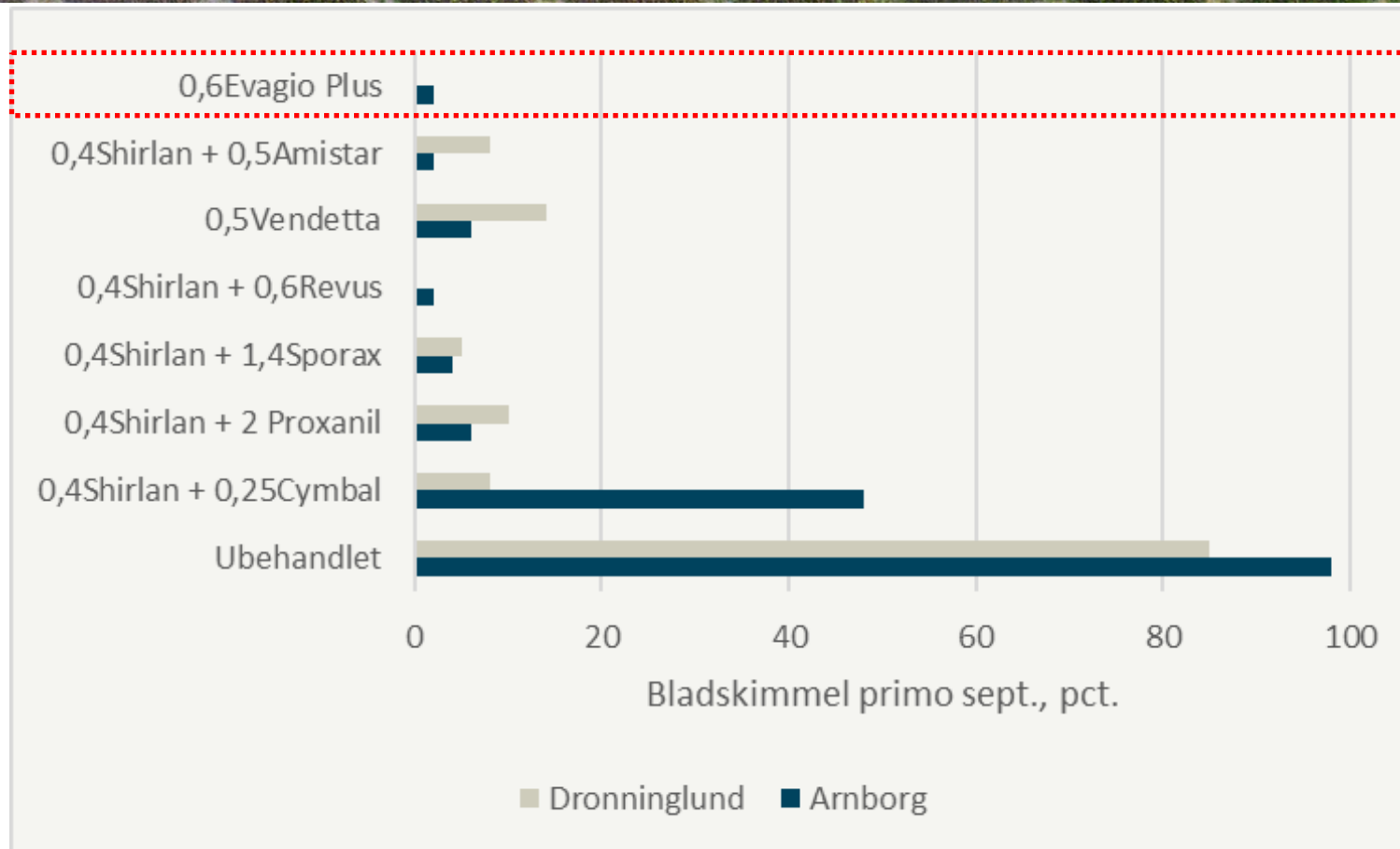
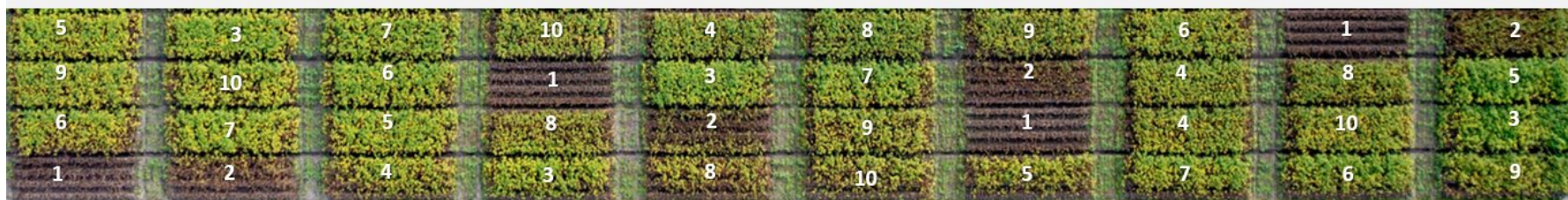


Kombination af svampemidler i mellemblok



Kombination af svampemidler i mellemblok

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6-7/9



Principper for bekæmpelse i stivelseskartofler

- Høj risiko – resistens mod fluazinam (Shirlan/Banjo/Signal)
- Høj risiko – resistens mod Zorvec Enicade
- Høj risiko – nedbrud af R-gener
- Kombination af virkemekanismer (dosering?), R-gener og beslutningsstøtte
- Altid blandinger af svampemidler
- Mest mulig alternering mellem forskellige virkemekanismer
- 2 behandlinger med Zorvec før skimmel i marken, 7(-10) dage blandingspartnere fluazinam og Sporax
- 1 behandling med andre midler mellem to Zorvec behandlinger
- 3-4 behandlinger med Revus
- Vent med Revus til efter sidste Zorvec behandling
- Aldrig Revus i blok

Konklusion

Bekæmpelse af skimmel lykkedes i 2022 ved fælles hjælp



