

The background of the slide is a close-up photograph of green leaves. Several leaves show signs of late blight, with brown, necrotic lesions of varying sizes and shapes. The lesions are most prominent on the lower and middle leaves, while the upper leaves appear healthier. The lighting is bright, highlighting the texture of the leaves and the contrast between the green and brown areas.

Late blight control in Denmark in the light of EU43

Lars Bødker

EuroBlight 13.-16. May 2024

Treatments against late blight in Denmark

1944

1-2 treatments



Bordeaux mixture
Non-specific

1962

2 treatments



Dithane (mancozeb)
Non-specific

2023

12-14 treatments
(two MoA, double dosage)

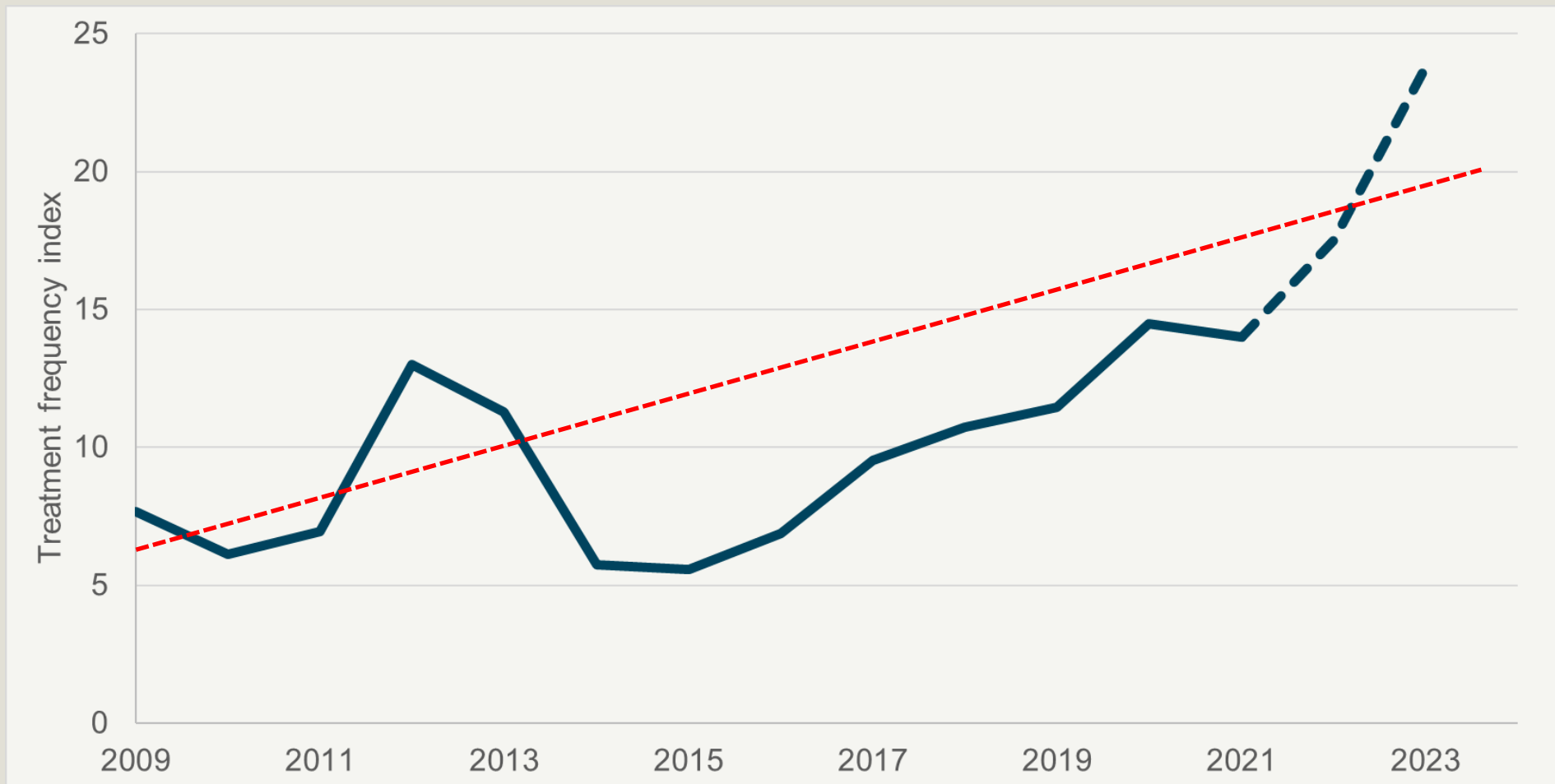


Mandipropamid
Fluazinam
Oxathiapiprolin
Specific

← 1882 - 2020 →

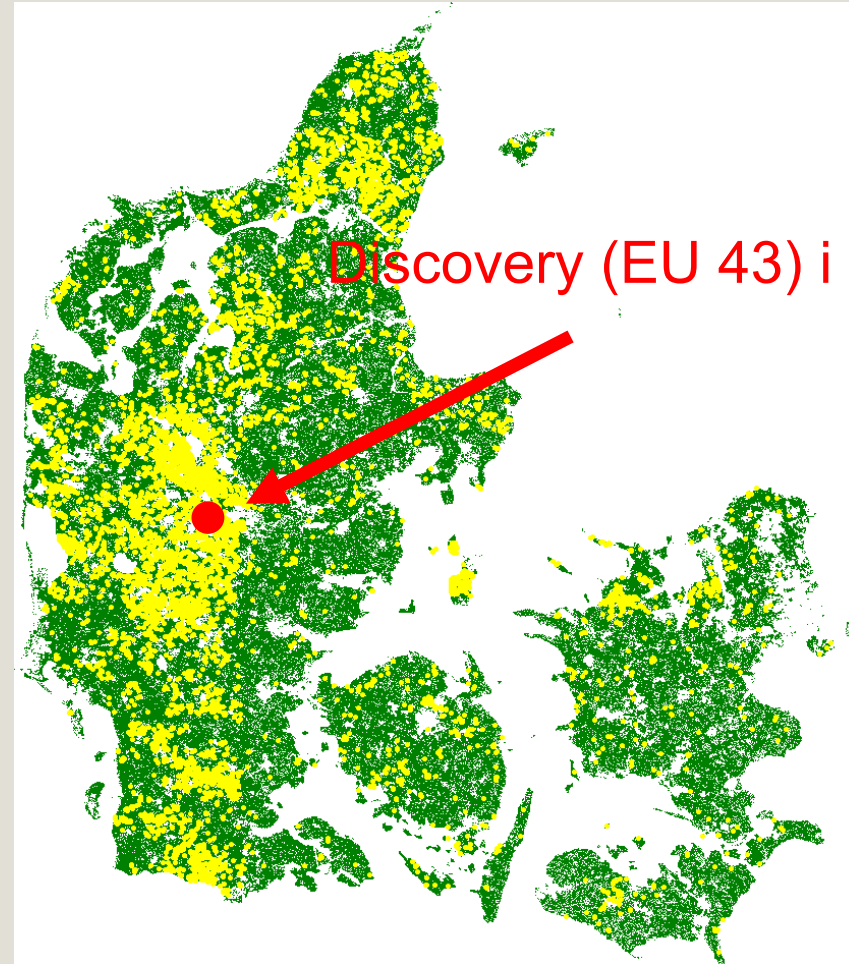
← 2020 - ? →

Treatment frequency Index



(Source: Bekæmpelsesmiddelstatistikken 2009-2021)

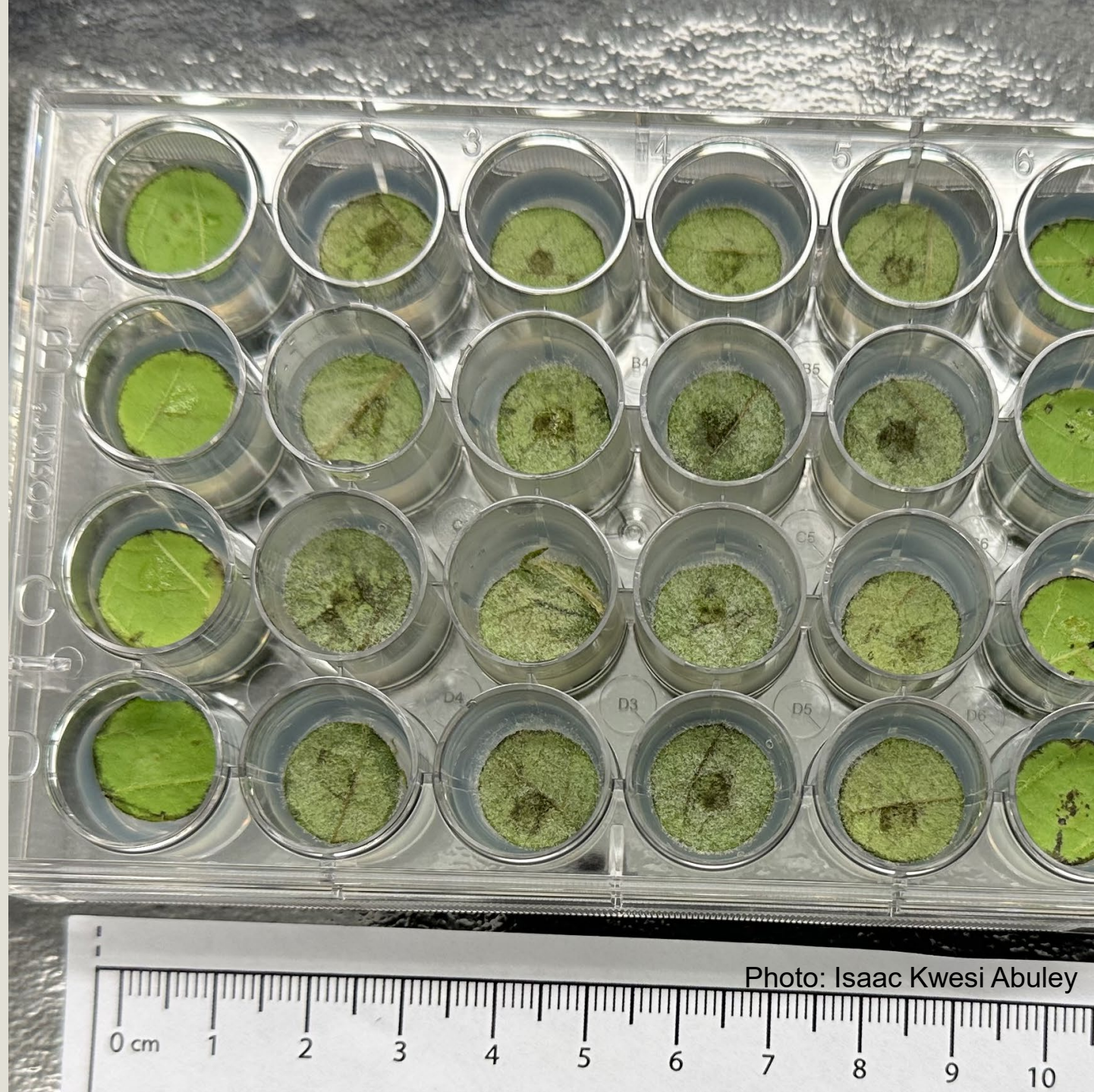
8.500 potato fields in Danmark (60.000 ha)



Discovery (EU 43) i august 2022

Fungicide resistance

- Metalaxyl 2004
- Fluazinam 2006, 2011, 2017
- Mandipropamid 2022
- Oxathiapiprolin 2023



Development of control strategy for 2023

- Danish Potato Workshop december 2022
 - 75 participants; researchers, advisers, farm supply companies, agro chemical companies (Syngenta) - Status on situation – what did we know?
- On-line workshop spring 2023 – Control Strategy 2023
 - 55 participants
- Monday morning online-meeting
 - 10-12 participants; responsible for newsletters

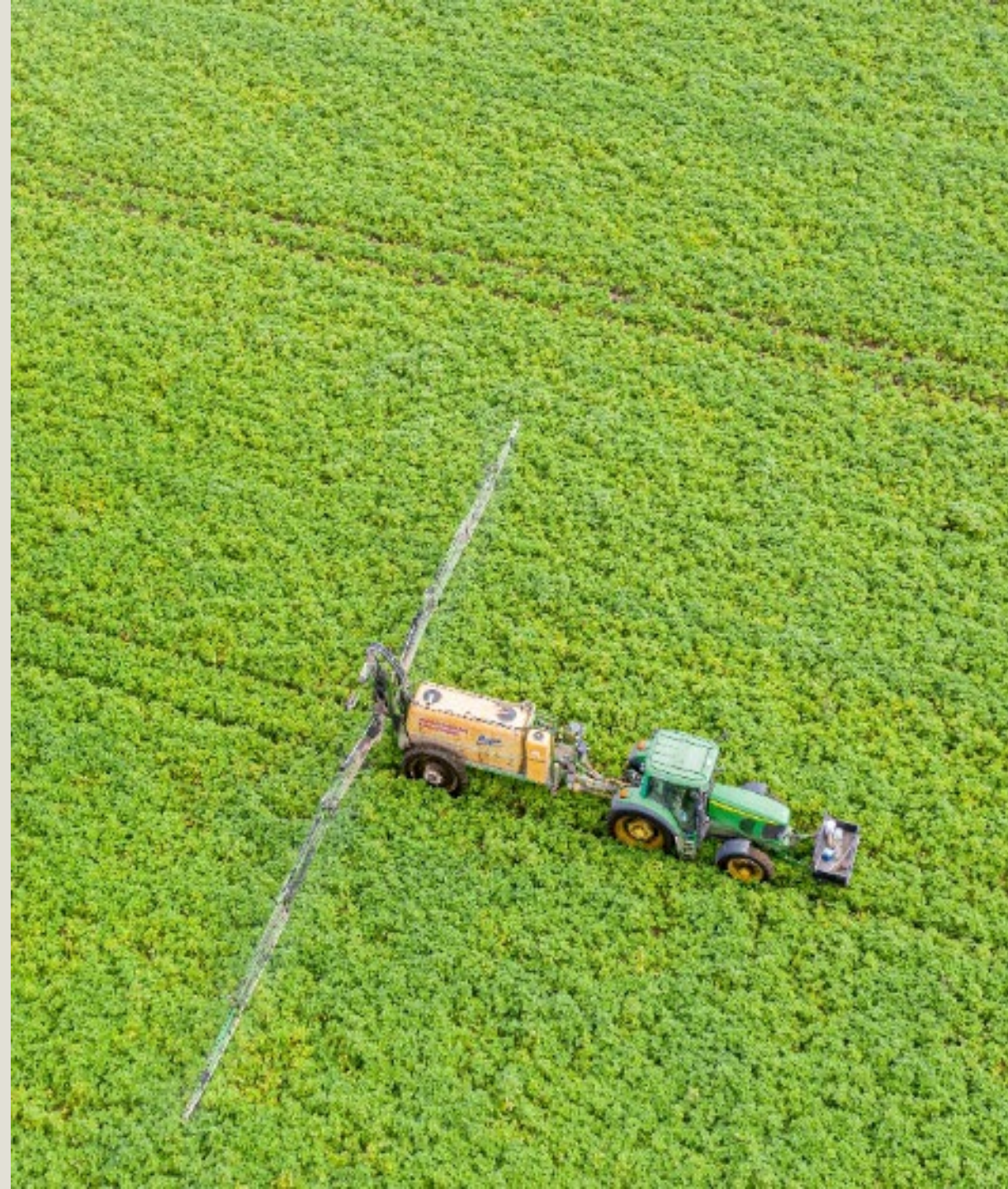
In spring 2023, we did not know about the phenotypic traits (EU43)

- Sporulation capacity
- Latency periode
- Virulence
- Lesion growth rate
- Infection of tubers
- Overwintering - survival in tubers during storage (bottle neck)
- Ability as primary infection source
- Fungicide resistance against fluazinam and oxathiapiprolin
- **And the weather**



Available fungicides i 2023

- Fluazinam
- Oxathiapiprolin
- Propamocarb/cymoxanil
- Cymoxanil
- (Mandipropamid)
- (Azoxystrobin)



Control strategy for 2023

”the back against the wall”

No	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	No.
Date	05-jun	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	11-sep	treatm.
Mandipropamid								0,6			0,6					2
Fluazinam		0,4	0,4	0,4	0,4	0,4			0,4	0,4		0,4	0,4	0,4		10
Oxathiapiprolin					0,15	0,15										2
Propamocarb + cymoxanil			2					2			2					3
Cymoxanil		0,25		0,25					0,25	0,25		0,25	0,25	0,25		7
Azoxystrobin								0,5								1
		Start block			Zorvec block			Middle block				Final blok				25

Control strategy for 2023 "the back against the wall"

- Only two times Zorvec
- After BBCH 59
- Not on late blight in the field

No	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	No.
Date	05-jun	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	11-sep	treatm.
Mandipropamid								0,6			0,6					2
Fluazinam		0,4	0,4	0,4	0,4	0,4			0,4	0,4		0,4	0,4	0,4		10
Oxathiapiprolin					0,15	0,15										2
Propamocarb + cymoxanil			2					2			2					3
Cymoxanil		0,25		0,25					0,25	0,25		0,25	0,25	0,25		7
Azoxystrobin								0,5								1
		Start block			Zorvec block			Middle block				Final blok				25

Control strategy for 2023 "the back against the wall"

- Propamocarb/cymoxanil at high risk
- Cymoxanil at low risk

No	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	No.
Date	05-jun	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	11-sep	treatm.
Mandipropamid								0,6			0,6					2
Fluazinam		0,4	0,4	0,4	0,4	0,4			0,4	0,4		0,4	0,4	0,4		10
Oxathiapiprolin					0,15	0,15										2
Propamocarb + cymoxanil			2					2			2					3
Cymoxanil		0,25		0,25					0,25	0,25		0,25	0,25	0,25		7
Azoxystrobin								0,5								1
		Start block			Zorvec block			Middle block			Final blok				25	

Control strategy for 2023

”the back against the wall”

- Mandipropamid after results of genotype test
- Mandipropamid after Zorvec block – residual effect
- Only 2 times mandipropamid

No	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	No.
Date	05-jun	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	11-sep	treatm.
Mandipropamid								0,6			0,6					2
Fluazinam		0,4	0,4	0,4	0,4	0,4			0,4	0,4		0,4	0,4	0,4		10
Oxathiapiprolin					0,15	0,15										2
Propamocarb + cymoxanil			2					2			2					3
Cymoxanil		0,25		0,25					0,25	0,25		0,25	0,25	0,25		7
Azoxystrobin								0,5								1
		Start block			Zorvec block			Middle block				Final blok				25

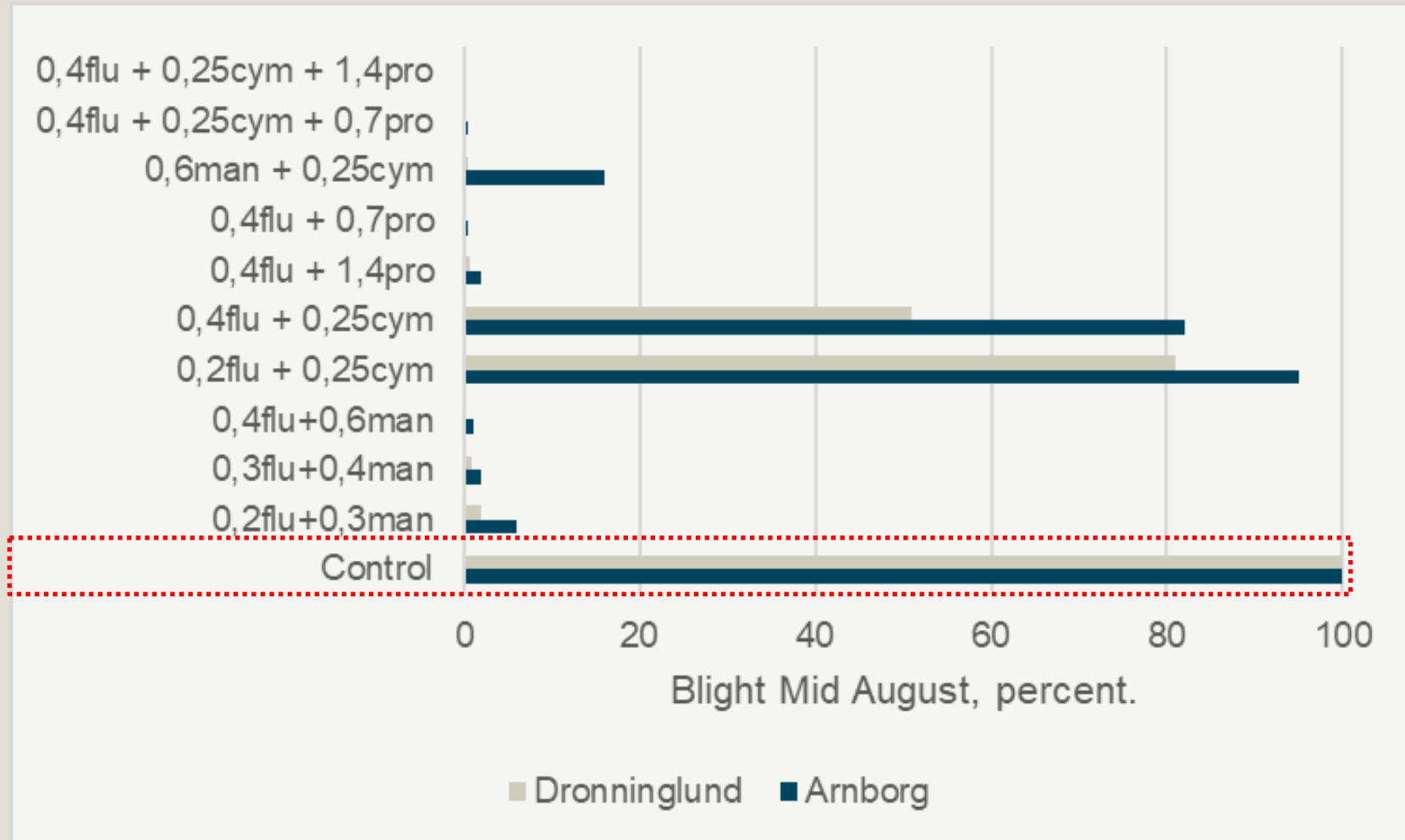
Control strategy for 2023

”the back against the wall”

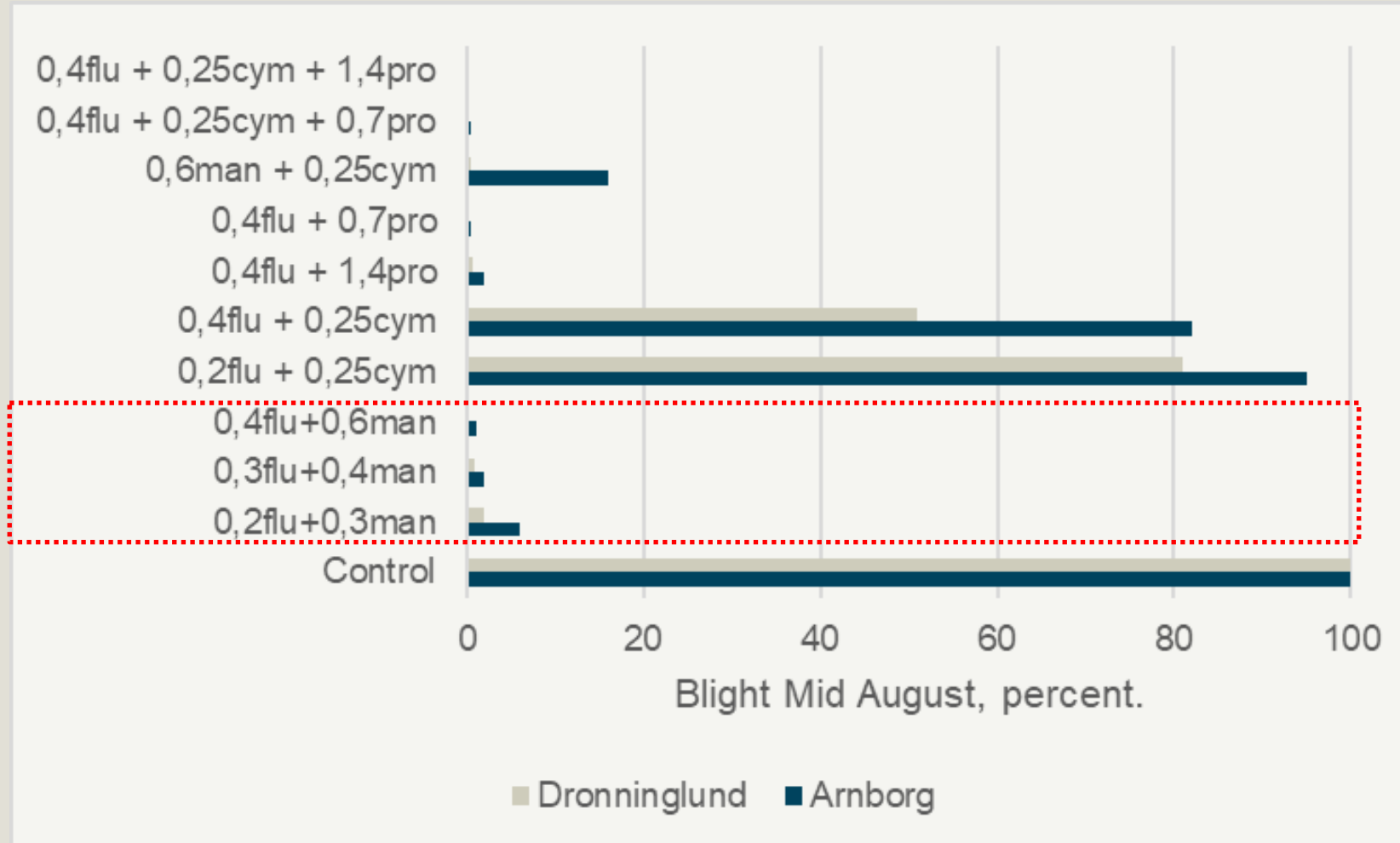
- Fluazinam for control of tuber blight

No	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	No.
Date	05-jun	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	11-sep	treatm.
Mandipropamid								0,6			0,6					2
Fluazinam		0,4	0,4	0,4	0,4	0,4			0,4	0,4		0,4	0,4	0,4		10
Oxathiapiprolin					0,15	0,15										2
Propamocarb + cymoxanil			2					2			2					3
Cymoxanil		0,25		0,25					0,25	0,25		0,25	0,25	0,25		7
Azoxystrobin								0,5								1
		Start block			Zorvec block			Middle block				Final blok				25

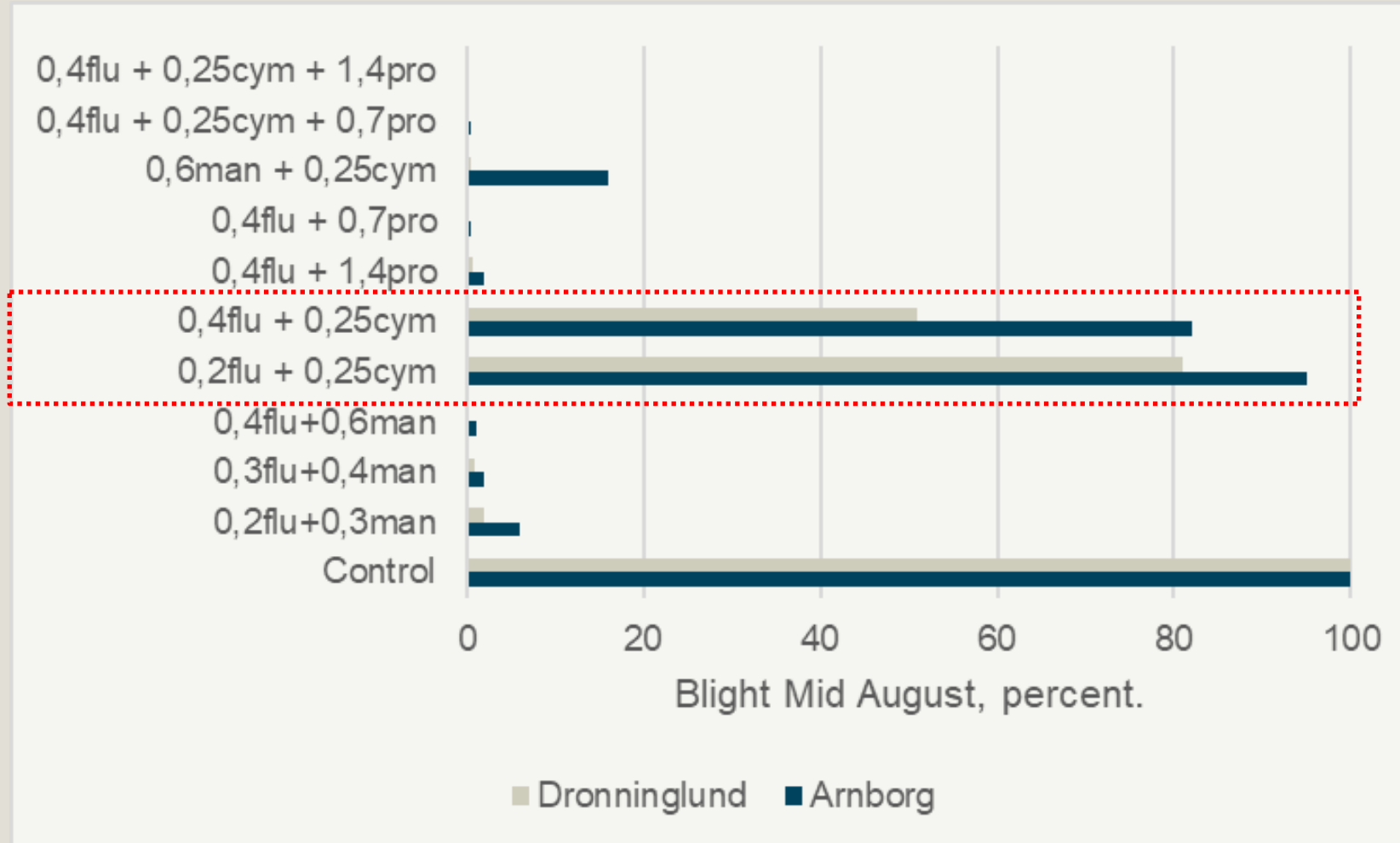
Adjustment of strategy middle of season



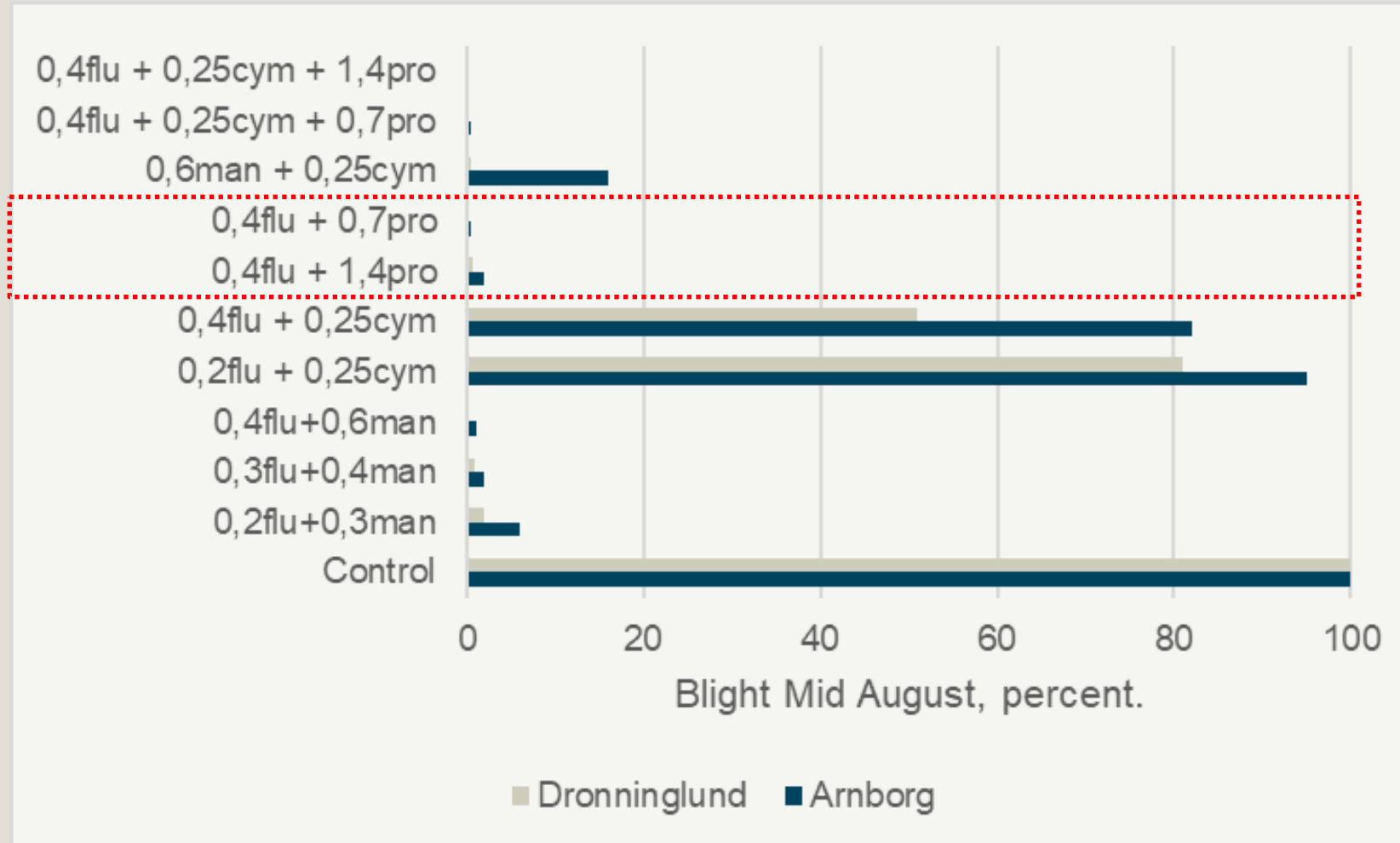
Adjustment of strategy middle of season



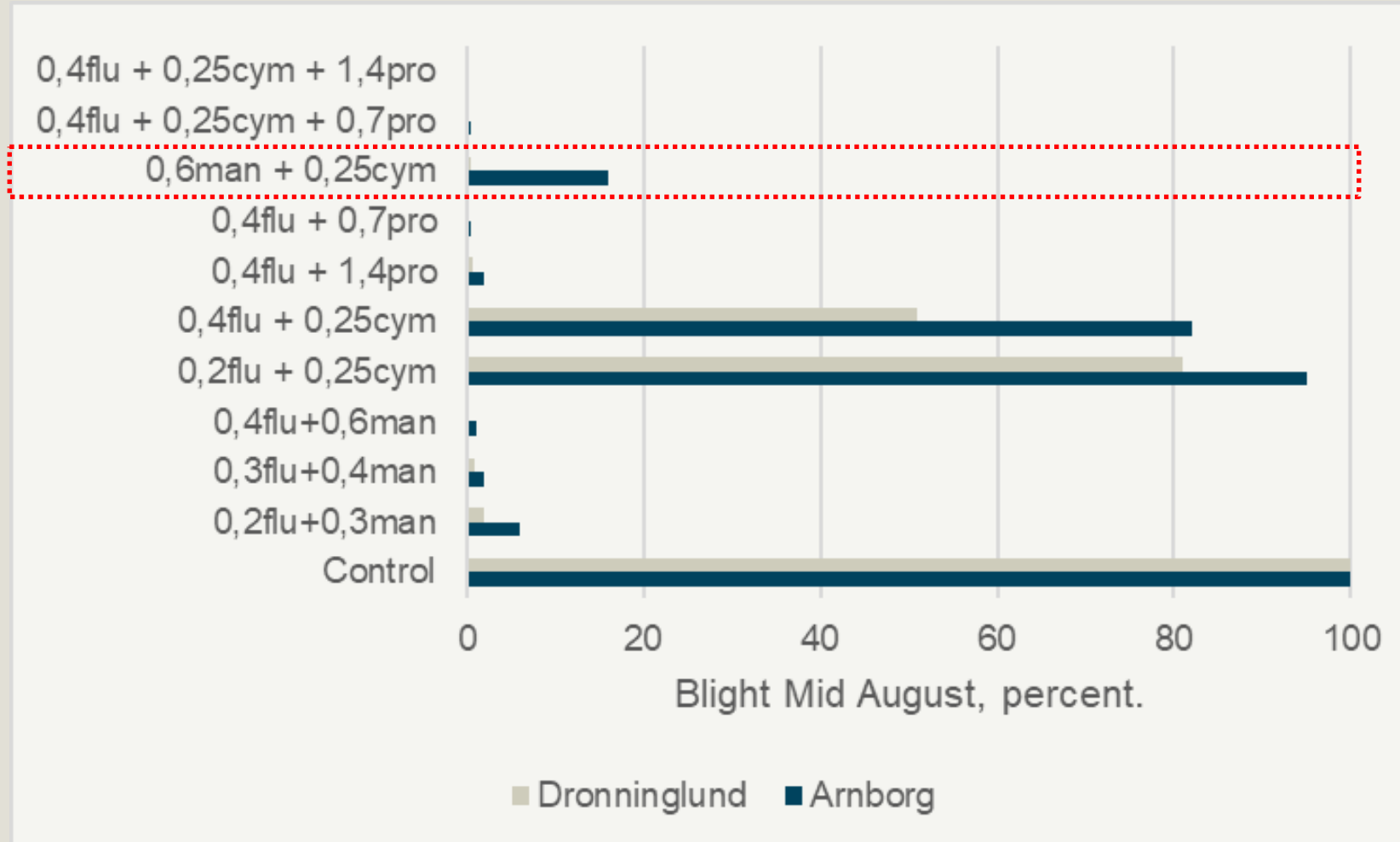
Adjustment of strategy middle of season



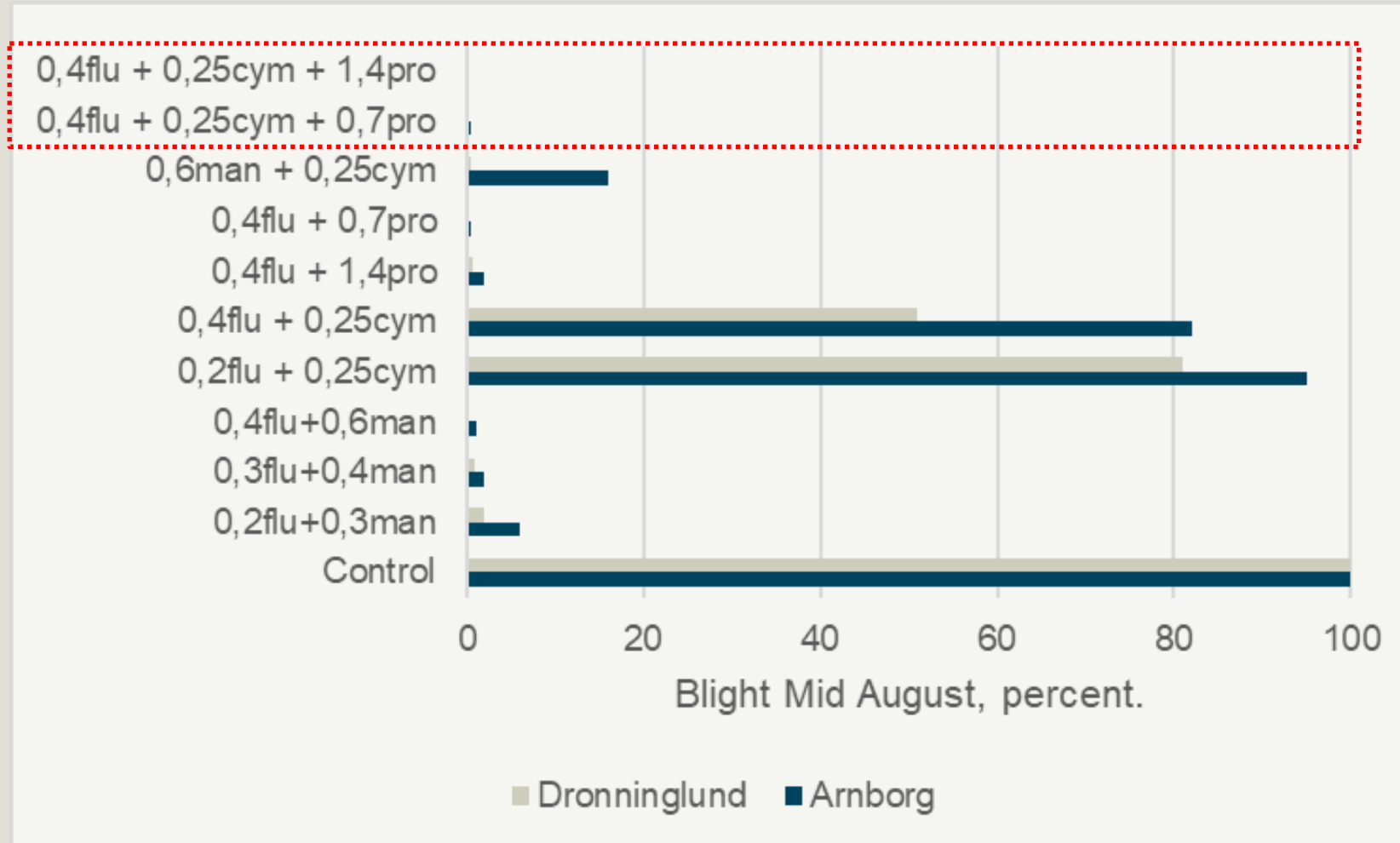
Adjustment of strategy middle of season



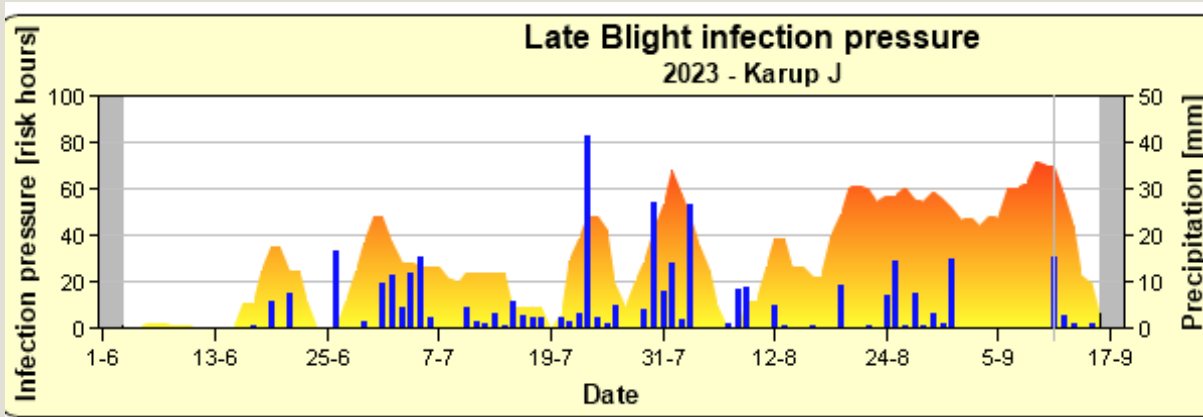
Adjustment of strategy middle of season



Adjustment of strategy middle of season

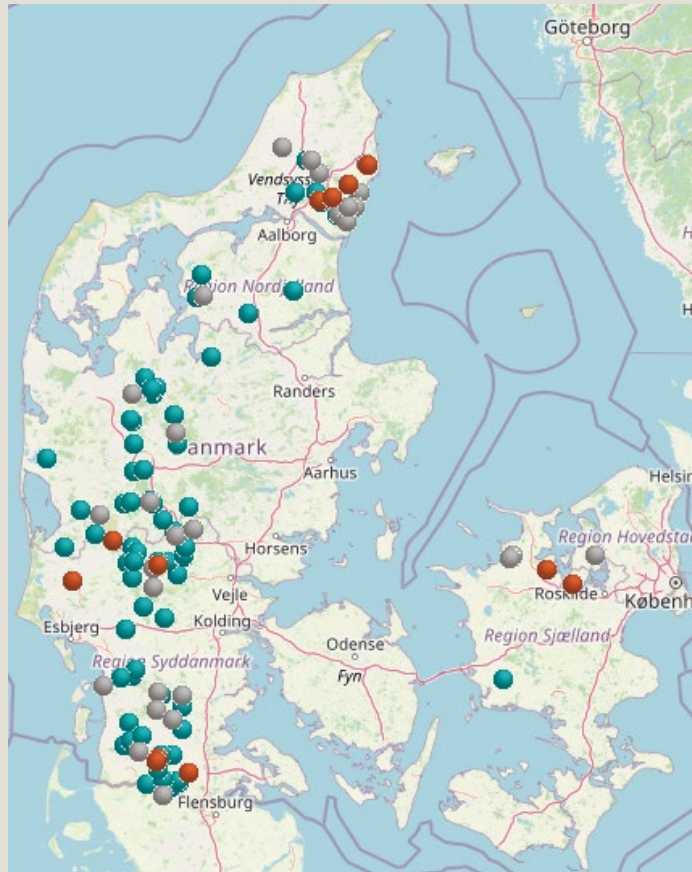


Extremely blight favorable weather conditions

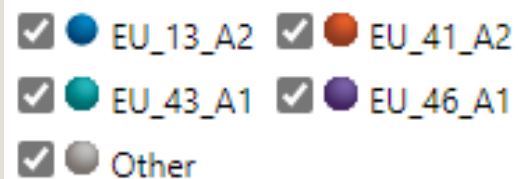
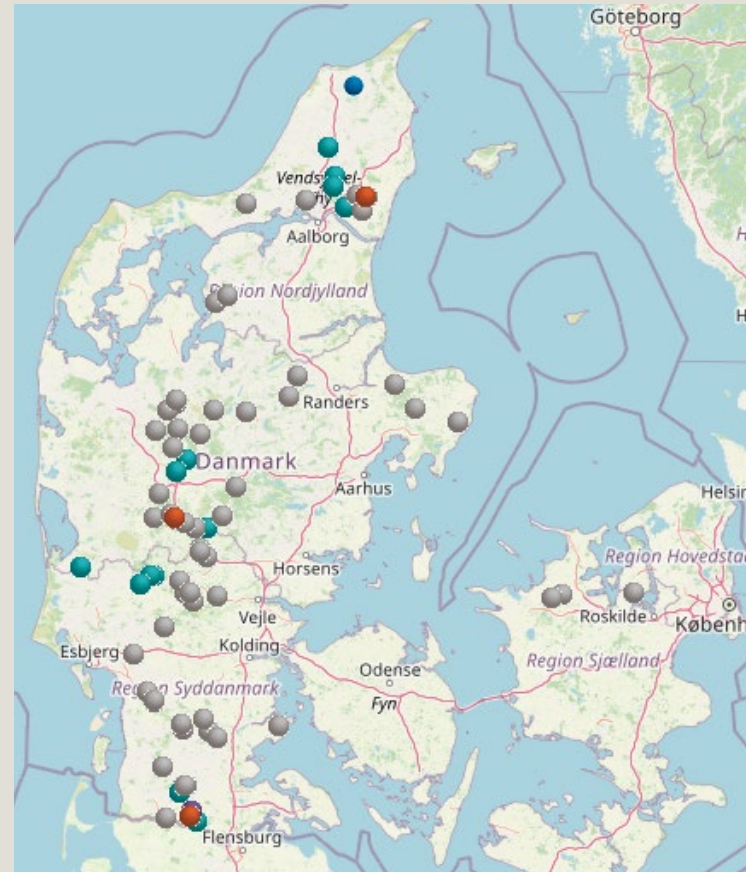


Frequency of EU 43 in Denmark

2022 (64 pct.)



2023 (20 pct.)



Control strategy for 2024

No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	No. treat.
Date	05-jun	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	11-sep	
Mandipropamid		0,45						0,45		0,45		0,6		0,6		5
Fluazinam		0,4	0,4		0,4		0,4		0,4		0,4		0,4	0,4	0,4	9
Oxathiapiprolin				0,15		0,15										2
Propamocarb			1,0	1,4		1,4		1,0		1,0						5
Cymoxanil					0,25				0,25		0,25	0,25	0,25		0,25	6
Azoxystrobin							0,5					0,5				2
		Start block		Zorvec block				Middle block				Final block				29

The 10 principles – for discussion

1. Reduce inoculum pressure; volunteer potatoes, waste piles, crop rotation..
2. Mix at least two MoAs
3. Two consecutive treatments contain at least three MoAs
4. Alternate of MoAs much as possible
5. Never mix mandipropamid and OXTP
6. OXTP after BBCH 59 but before blight
7. Apply good spraying techniques
8. Use DSS (BlightManager)
9. *Mix resistance genes and MoAs*
10. *Reduce dosage of mandipropamid and propamocarb in mixtures only at low risk*



