

Fungicide dose rates & cultivar resistance

Results of 5 years of field experiments in the Netherlands

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Outline Presentation

- Back ground
- Experiments
 - Foliar (first half growing season)
 - Tuber (second half growing season)
- Conclusions



Background

- Umbrella plan Phytophthora
 - Integration all LB-research
 - Communication and implementation to practice
- Major objective
 - Reduce environmental burden by 50% in year 1-5
 - Reduce environmental burden by 25% in year 6-10 (2013)
- How to achieve?
 - Exploit cultivar resistance to reduce protectant dose rate
 - Improve timing of sprays
 - Development new chemicals



Source PRI

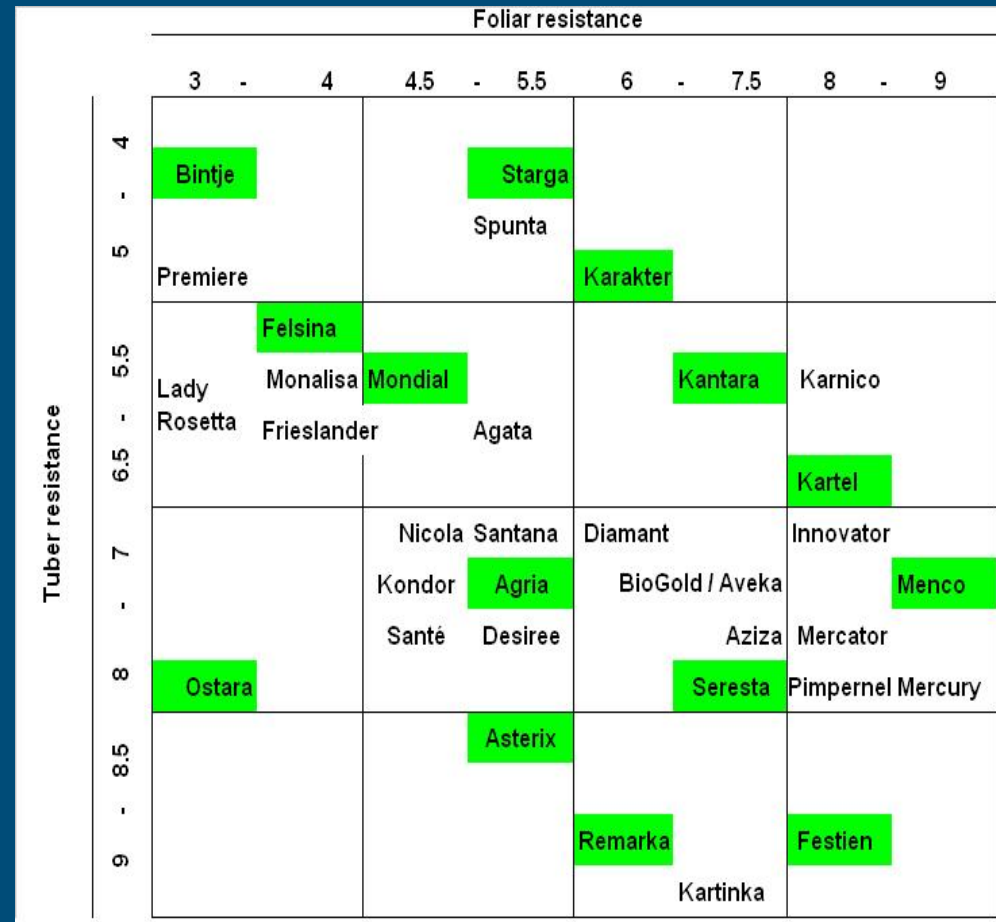
Experiments

- 5 years: 2002 – 2006
- Foliar: reduced dose rates Shirlan (2002-2004)
 - Polycyclic field experiments with spreader rows
- Tuber: reduced dose rates Shirlan (2005-2006)
 - Polycyclic field experiments with spreader rows



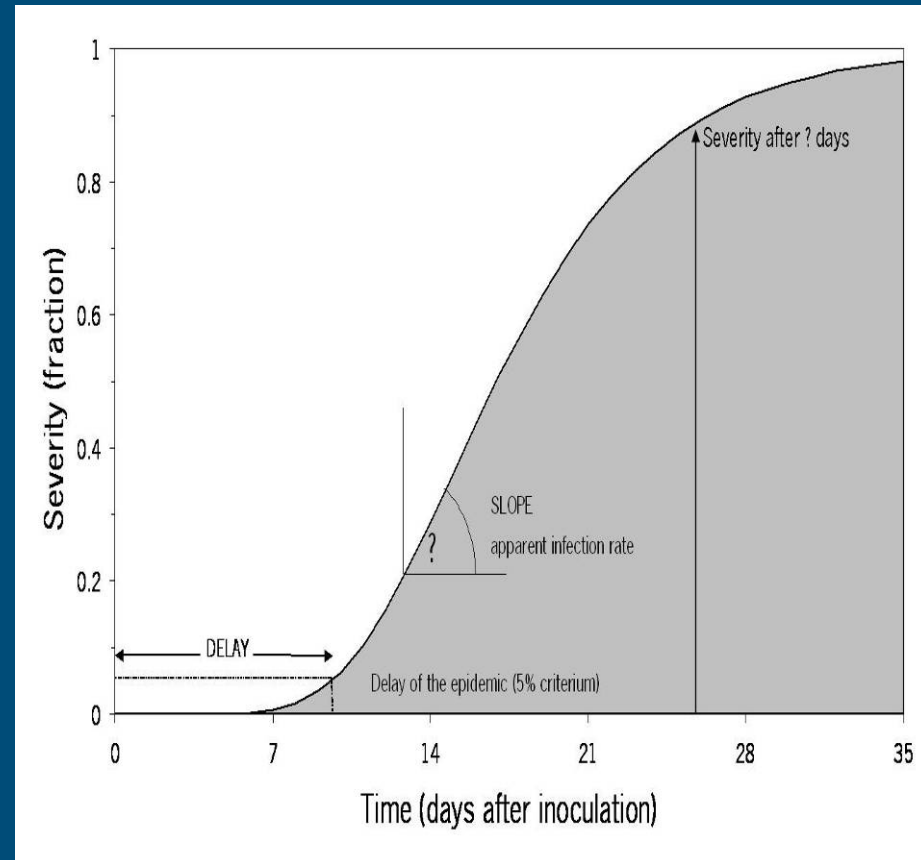
Foliar experiments

- 34 varieties
- 6 dose rates (0, 20, 40...100%) Fluazinam
- Split-plot design with inoculated spreaders (15 isolates)
- Sprays according to Plant Plus
- Assessments twice a week

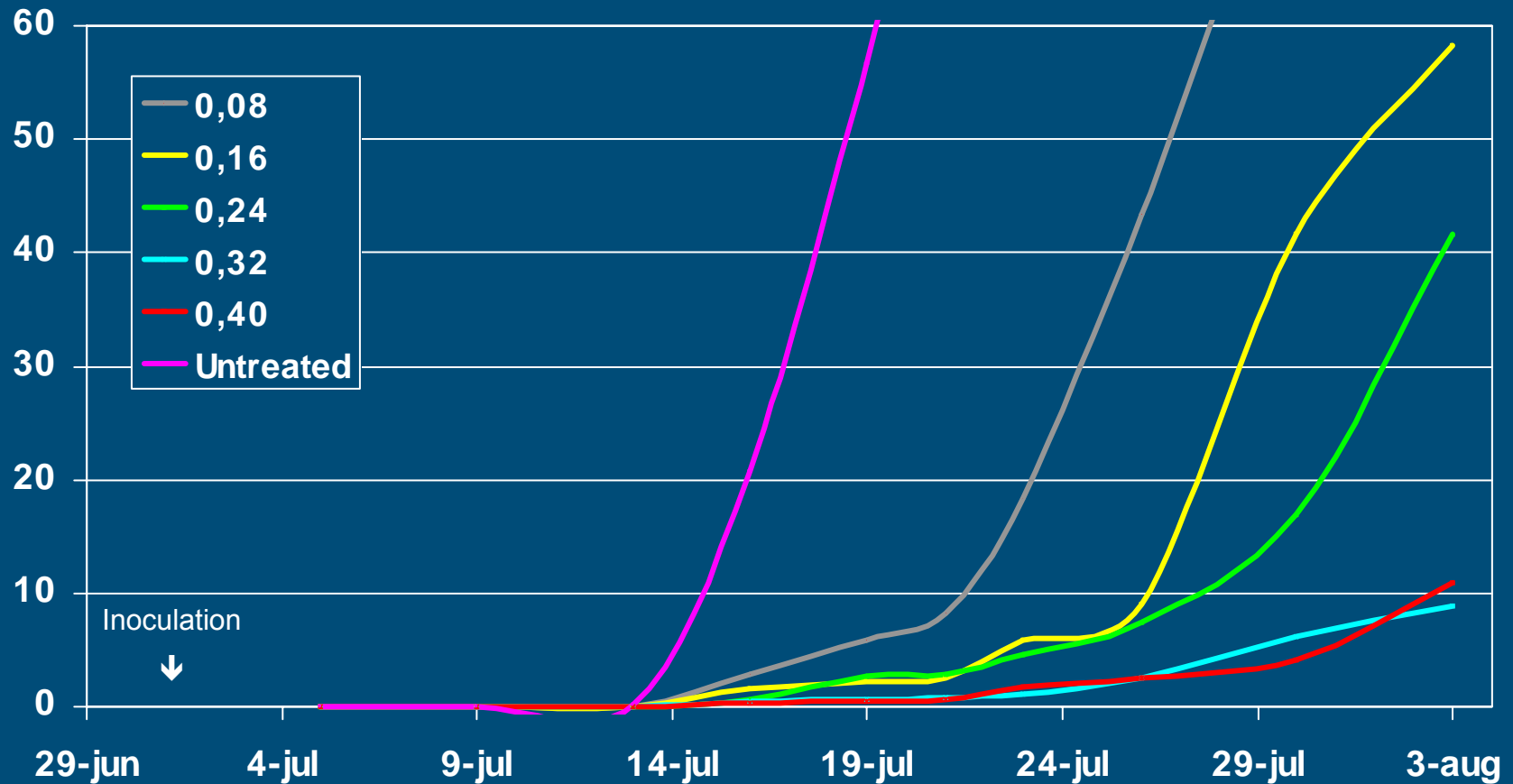


Results

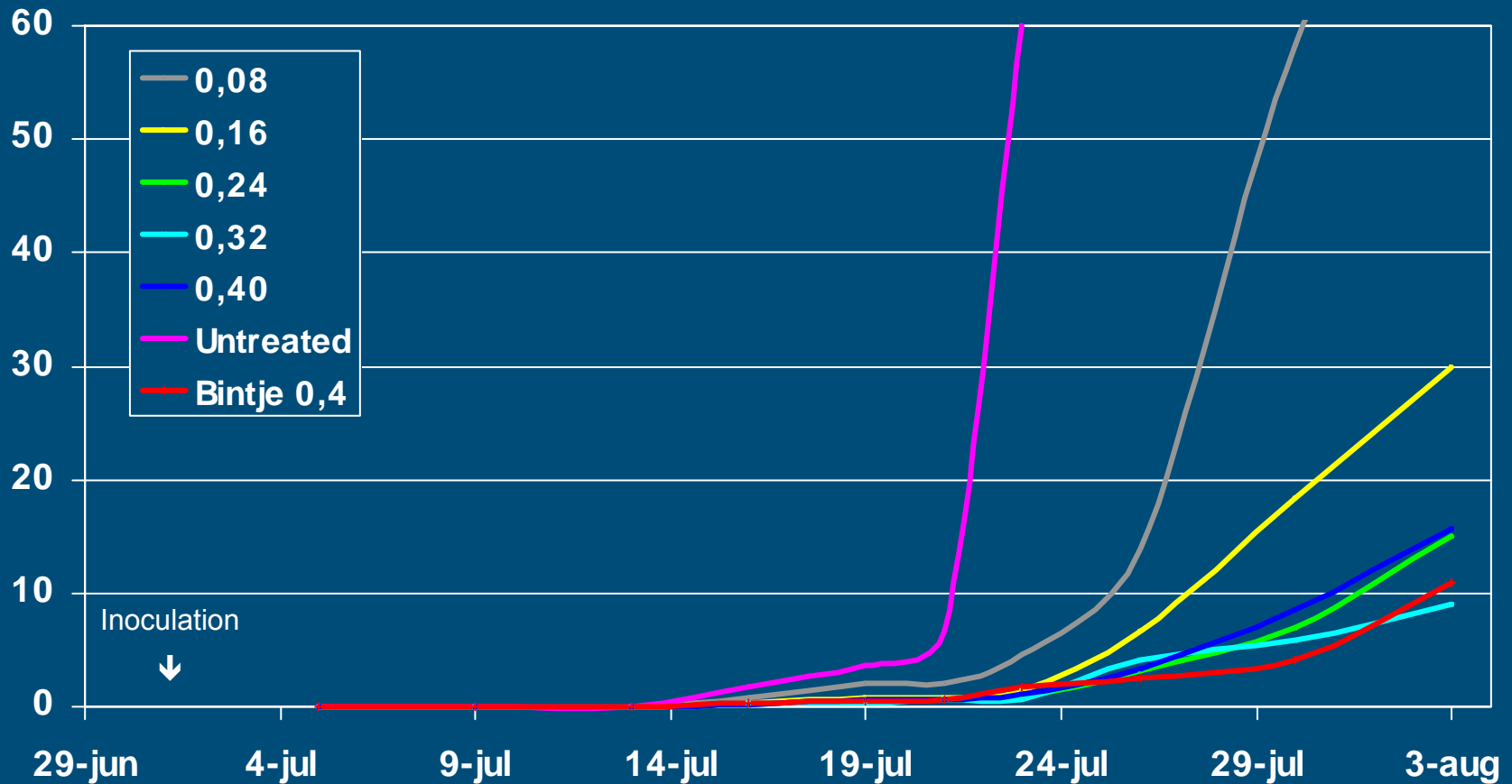
- Polycyclic data
- Parameters
 - Delay
 - stAUDPC
 - Severity 25 days
- Calculation dose rate per variety based on these parameters



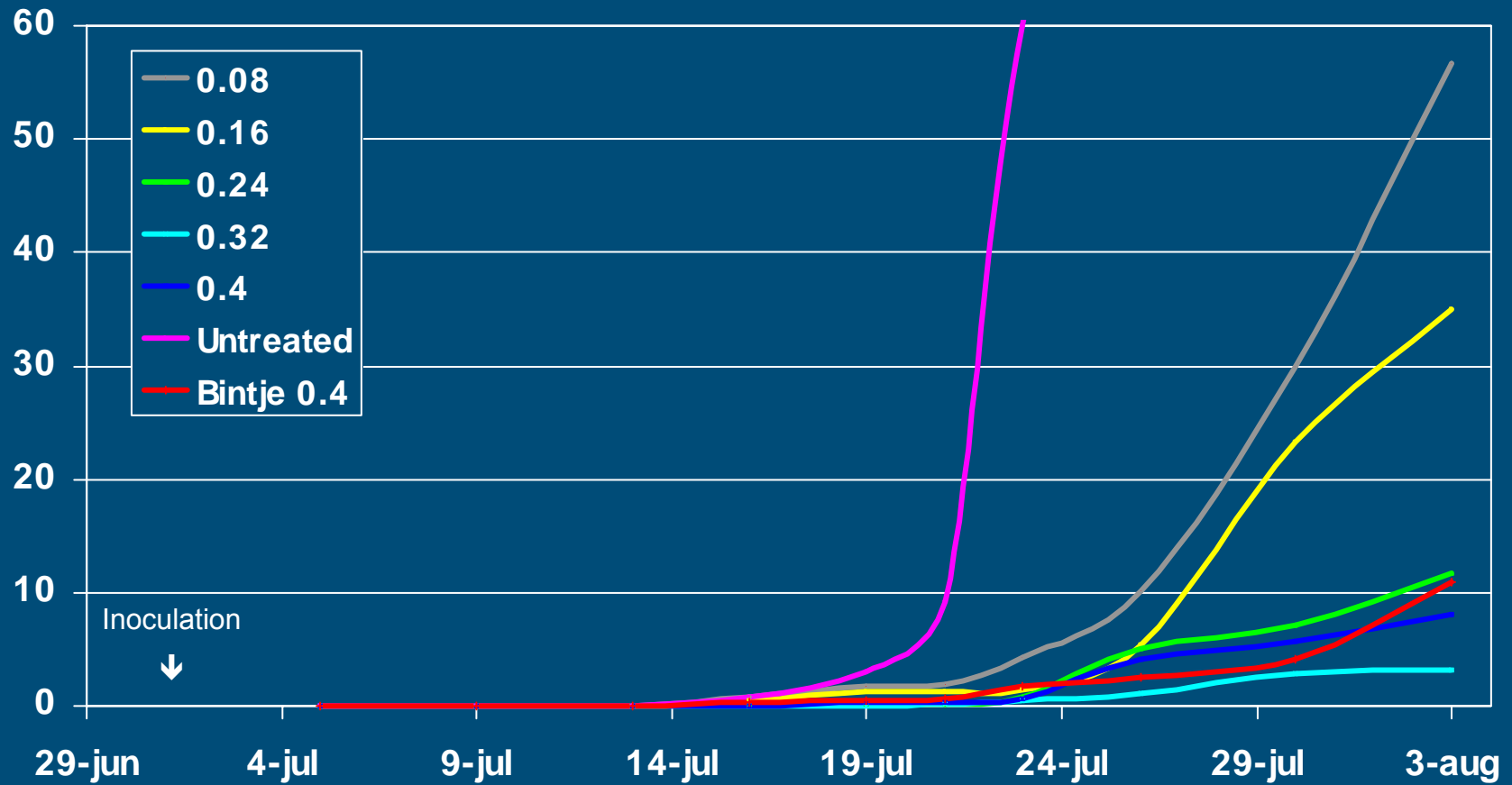
Foliage (Bintje, 3)



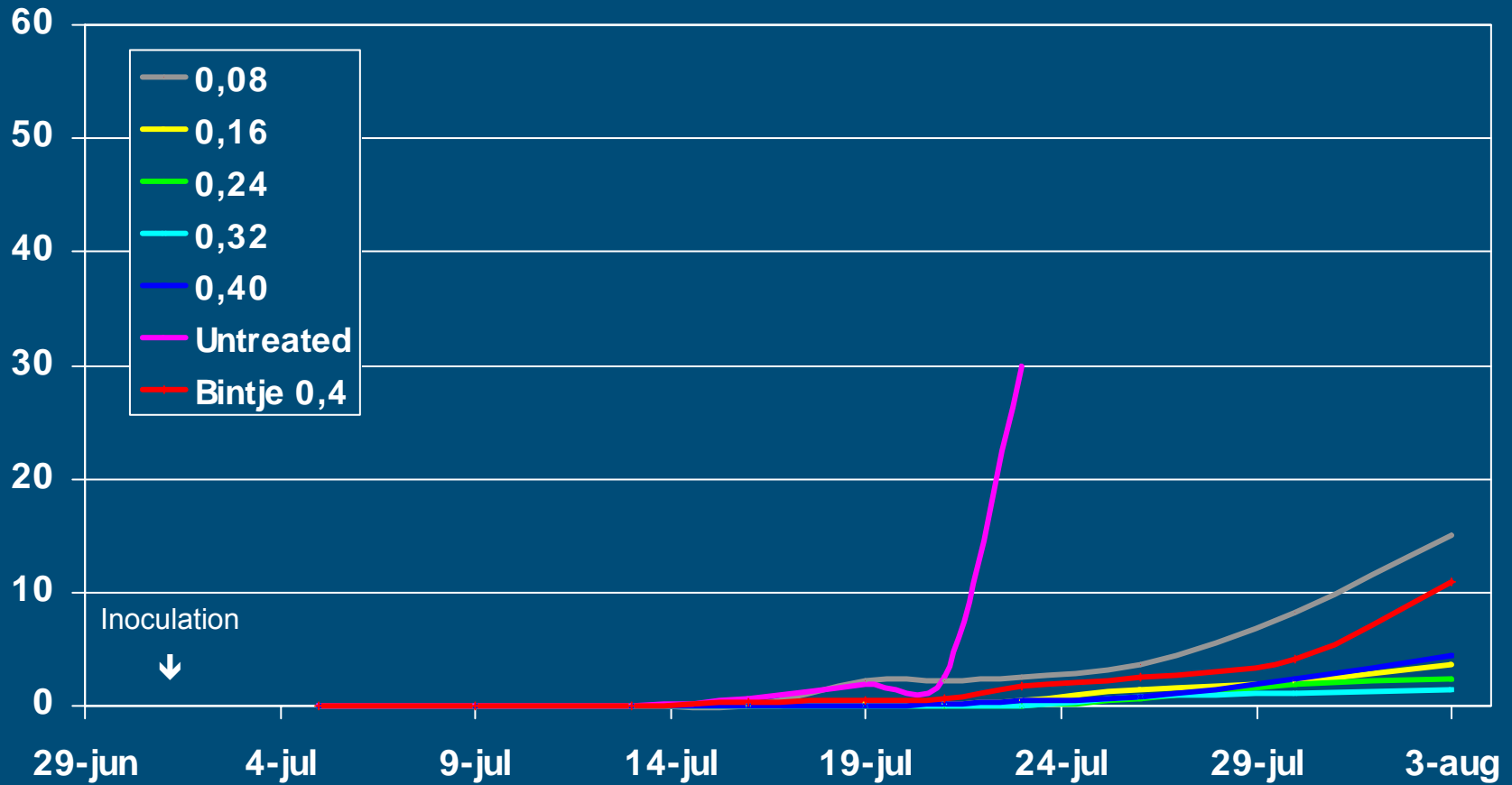
Foliage (Santé, 4.5)



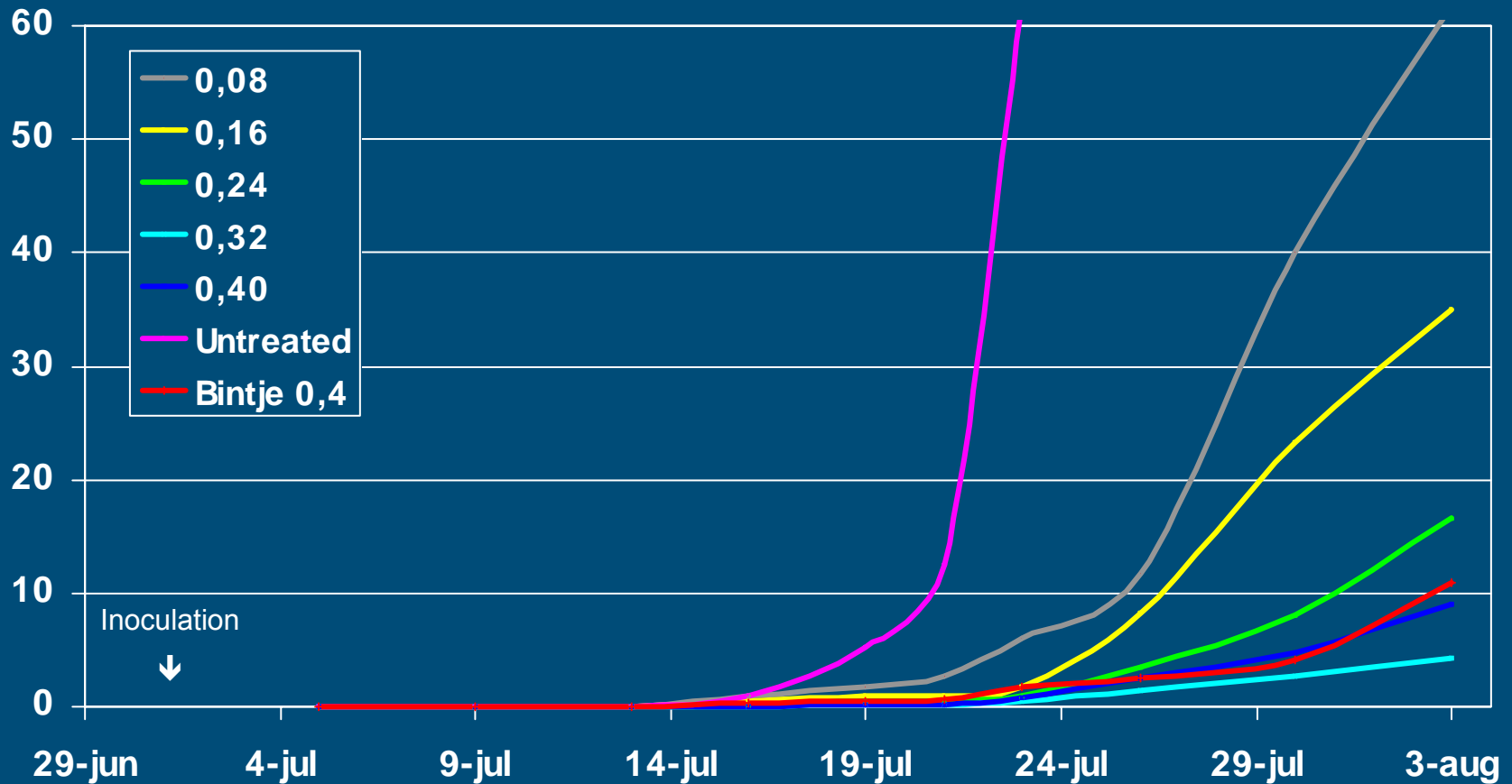
Foliage (Agria, 5.5)



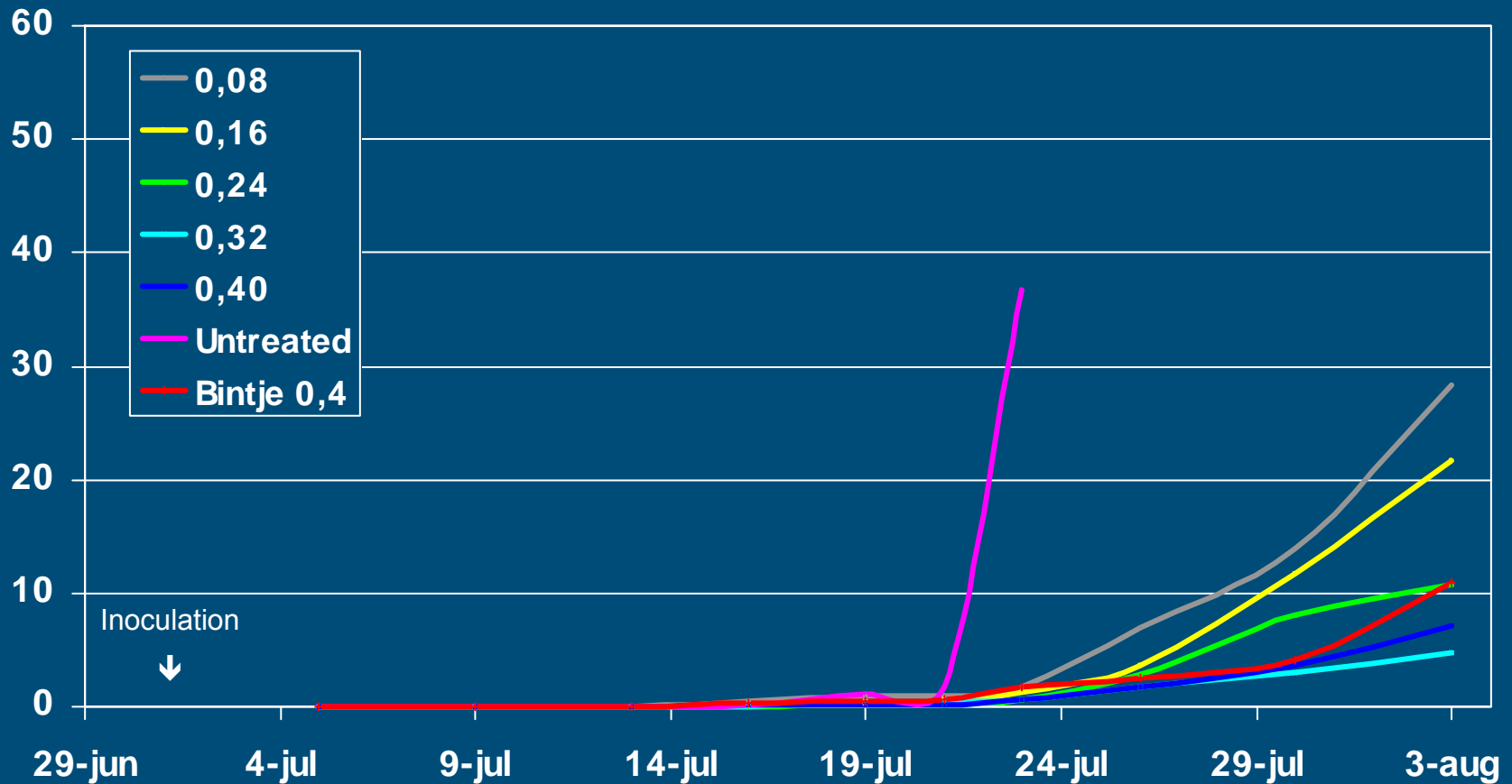
Foliage (Aziza, 7.5)



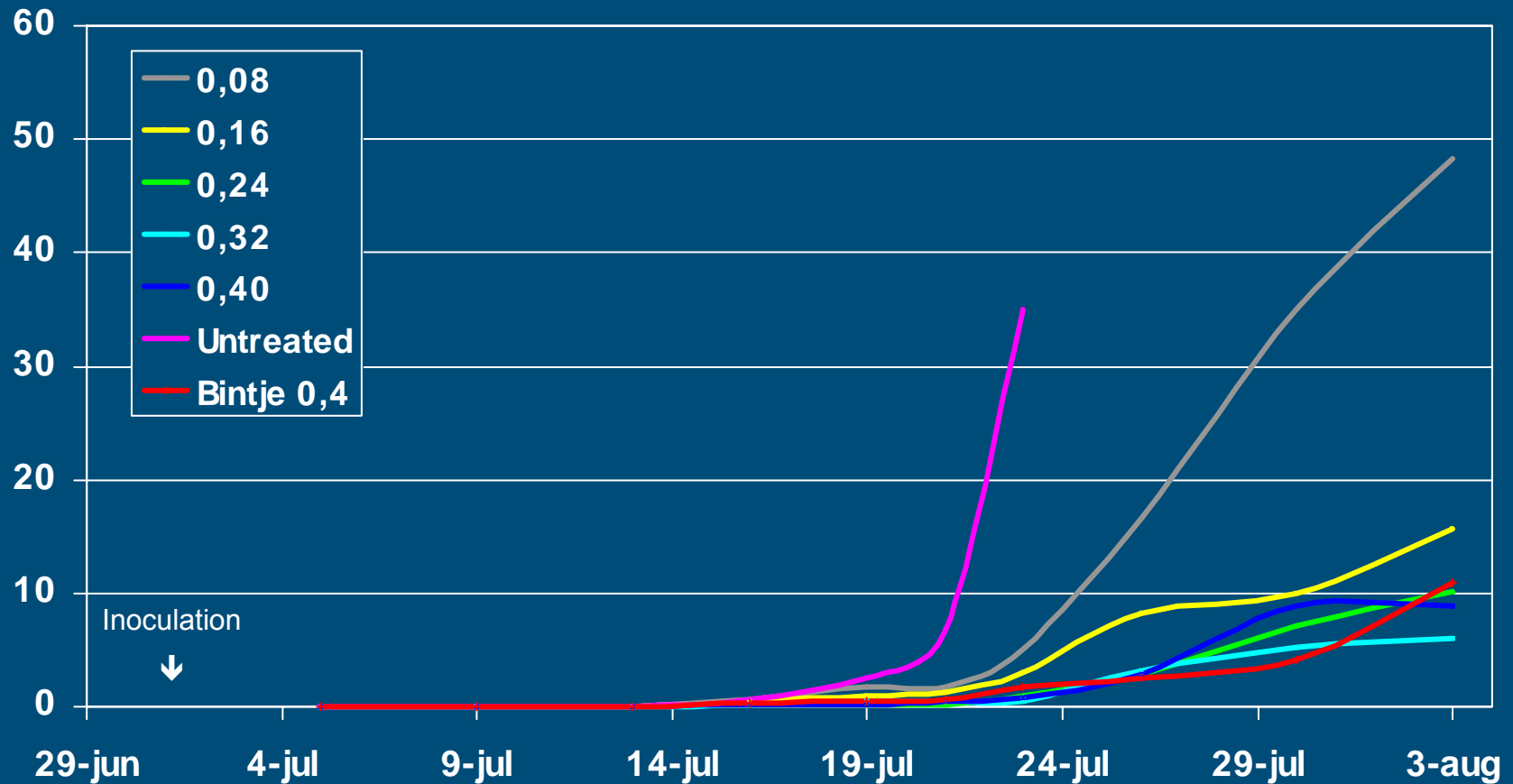
Foliage (Starga, 5.5)



Foliage (Seresta, 7.5)



Foliage (Karnico, 8??)



Dose rate

- AUDPC values were calculated
 - Dose rate & variety
- Reference was Bintje sprayed at 0.4 L / ha
- Regression analysis was conducted
 - AUDPC, dose rate, variety
 - Predicted adequate dose rate per variety was established

Calculated doses rates

Class 1: 0.1	Class 2: 0.2 (a)	Class 3: 0.3 (a)	Class 4: 0.4 (a)
Aziza (7.5) (b)	Diamant (6)	Felsina (3.5)	Agata (4)
Biogold (7)	Kondor (4.5)	Agria (5.5)	Asterix (5)
Festien (8)	Karnico (8)	Karakter (6)	Bintje (3)
Innovator (8)	Katinka (6.5)	Santé (4.5)	Frieslander (3.5)
Kantara (7)	Seresta (7)	Premiere (2.5)	Monalisa (4)
Kartel (8)	Aveka (7)	Santana (5)	Mondial (4.5)
Menco (9)	Pimpernel (8)	Starga (5.5)	Nicola (4.5)
Mercator (8)		Ostara (3.5)	Spunta (5)
Mercury (9)		Remarka (6.5)	Lady Rosetta (3)
			Derisee (5)

(a) At low disease pressure dose rate can decreased with maximum of 0.1L

(b) Between brackets resistance

Calculated dose rate

namenras	Adv 02c04 d=0.4	Adv 02c04 d=0.3	namenras	Adv 02c04 d=0.4	Adv 02c04 d=0.3
Agata	0.36	0.29	Kondor	0.15	0.10
Agria	0.21	0.15	LadyRosetti	0.33	0.25
Asterix	0.39	0.26	Menco	0.05	0.03
Aveka	0.13	0.08	Mercator	0.10	0.05
Aziza	0.05	0.03	Mercury	0.03	0.01
Bintje	0.40	0.30	Monalisa	0.40	0.24
Biogold	0.01	0.00	Mondial	0.40	0.28
Derisee	0.33	0.19	Nicola	0.43	0.30
Diamant	0.15	0.09	Ostara	0.24	0.18
Felsina	0.25	0.18	Pimpernel	0.15	0.10
Festien	0.07	0.04	Premiere	0.25	0.20
Frieslander	0.38	0.32	Remarka	0.25	0.14
Innovator	0.10	0.07	Santana	0.29	0.20
Kantara	0.05	0.03	Sante	0.21	0.14
Karakter	0.27	0.19	Seresta	0.16	0.10
Karnico	0.18	0.12	Spunta	0.36	0.25
Kartel	0.06	0.03	Starga	0.27	0.19
Katinka	0.20	0.14			



Lowering the dose rate in the second half of the season

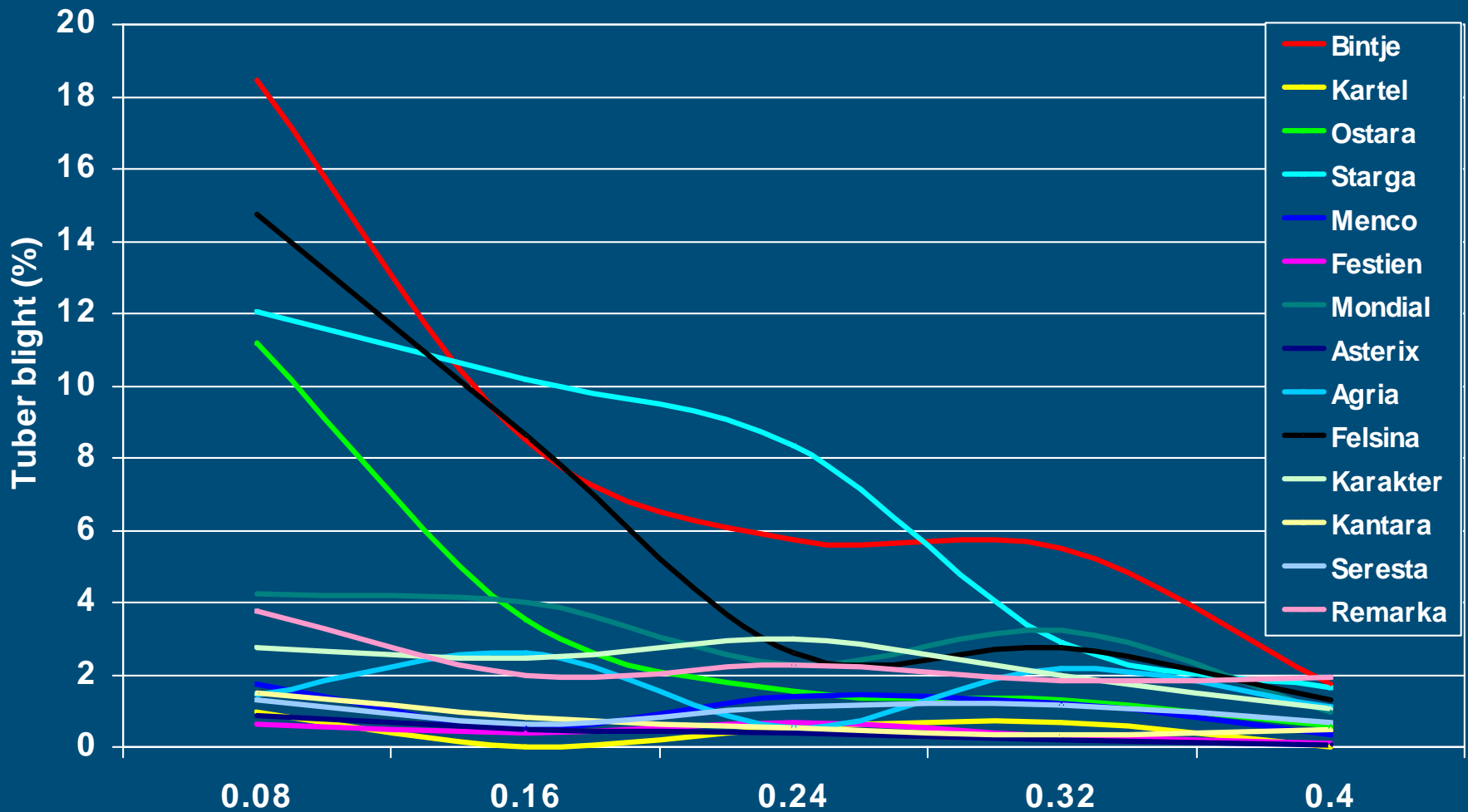
- Foliage and tuber resistance does not match
- If the canopy is not infested, no tuber infection is expected
- If a slight infection of the canopy is present tubers are at risk
- What is the acceptable dose rate in the second half of the season considering tuber blight?

Tuber experiments

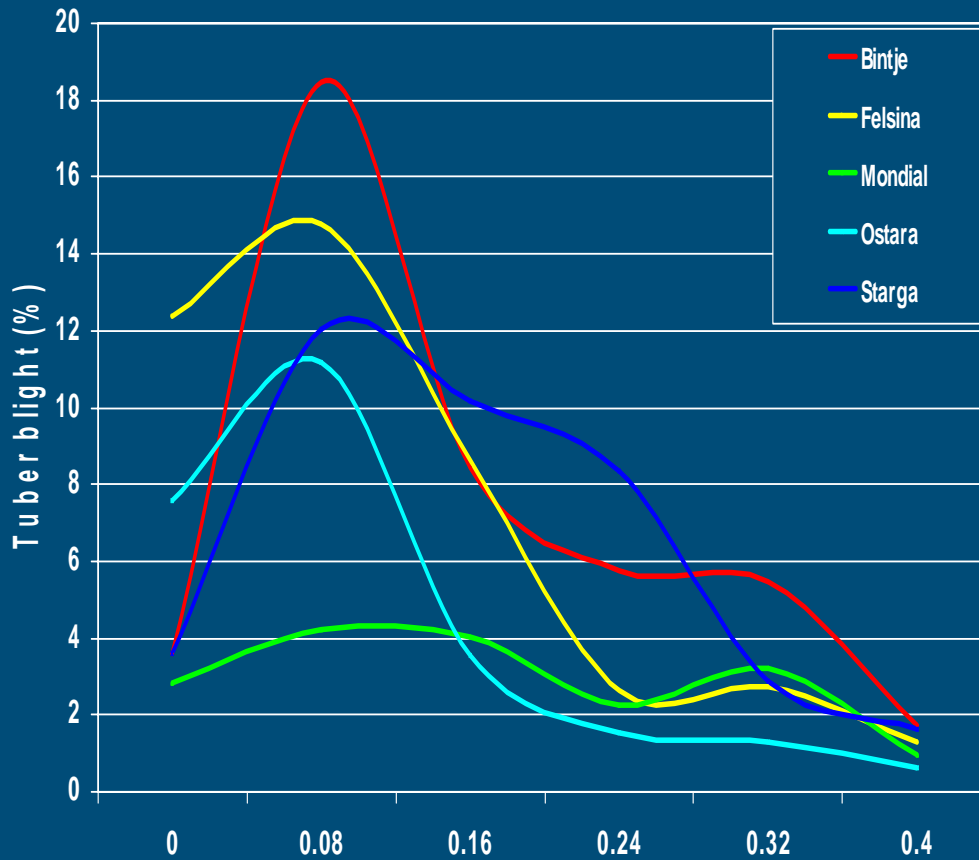
- 14 varieties
- 6 dose rates (0, 20, 40...100%)
Fluazinam
- Split-plot design with inoculated
spreaders (15 isolates)
- Spray interval 5-8 days
- Assessments foliage
- Artificially raining (10 mm)
- Harvest/storage tubers
- Assessments tubers (twice)

		Foliar resistance			
		3 - 4	4.5 - 5.5	6 - 7.5	8 - 9
Tuber resistance	4	Bintje	Starga		
	5			Karakter	
	5.5	Felsina	Mondial	Kantara	
	6.5				Kartel
	7		Agria		Menco
8	Ostara		Seresta		
8.5		Asterix			
9			Remarka	Festien	

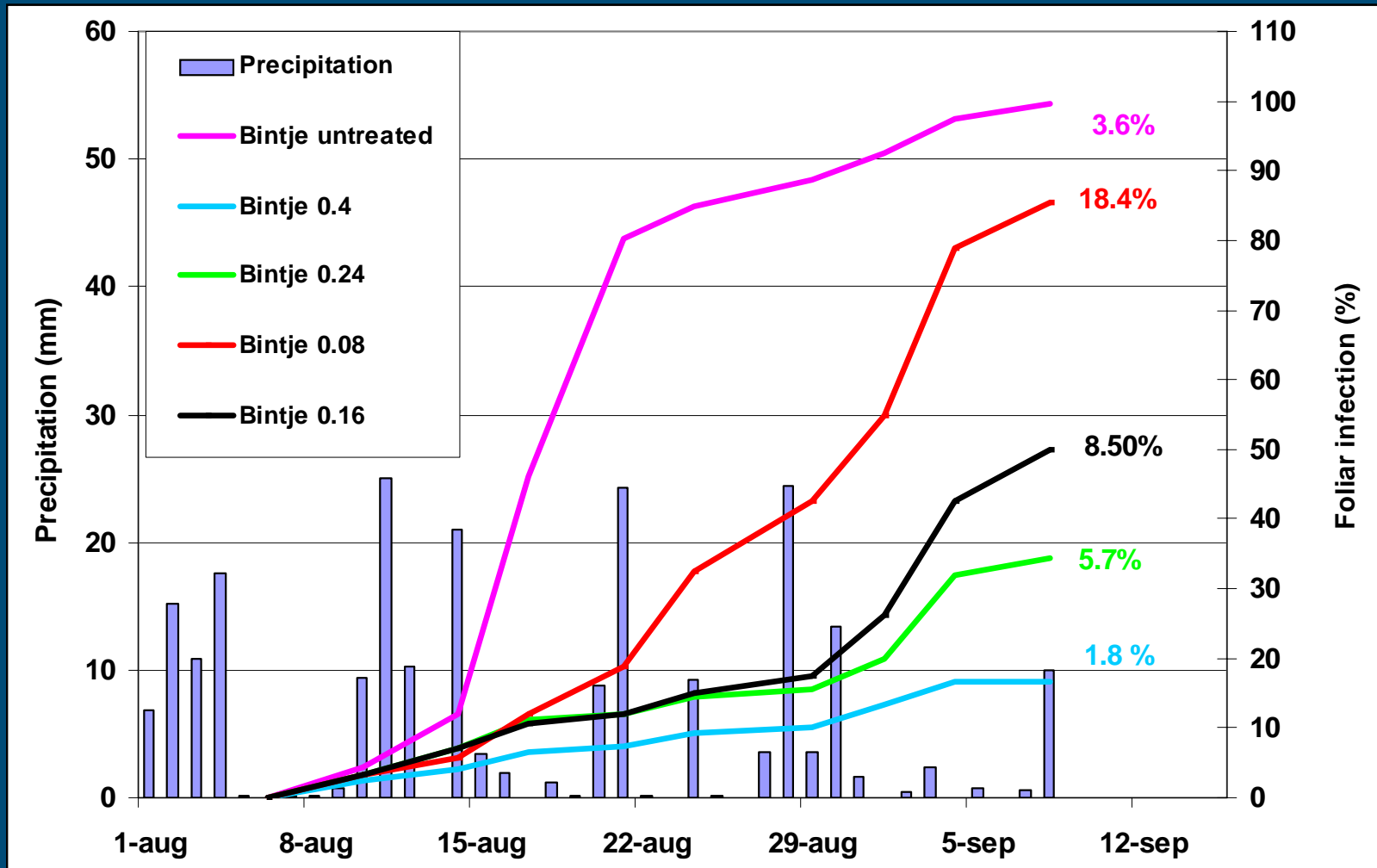
Results tuberblight (%)



Results tuber blight (%)



Results Tuber

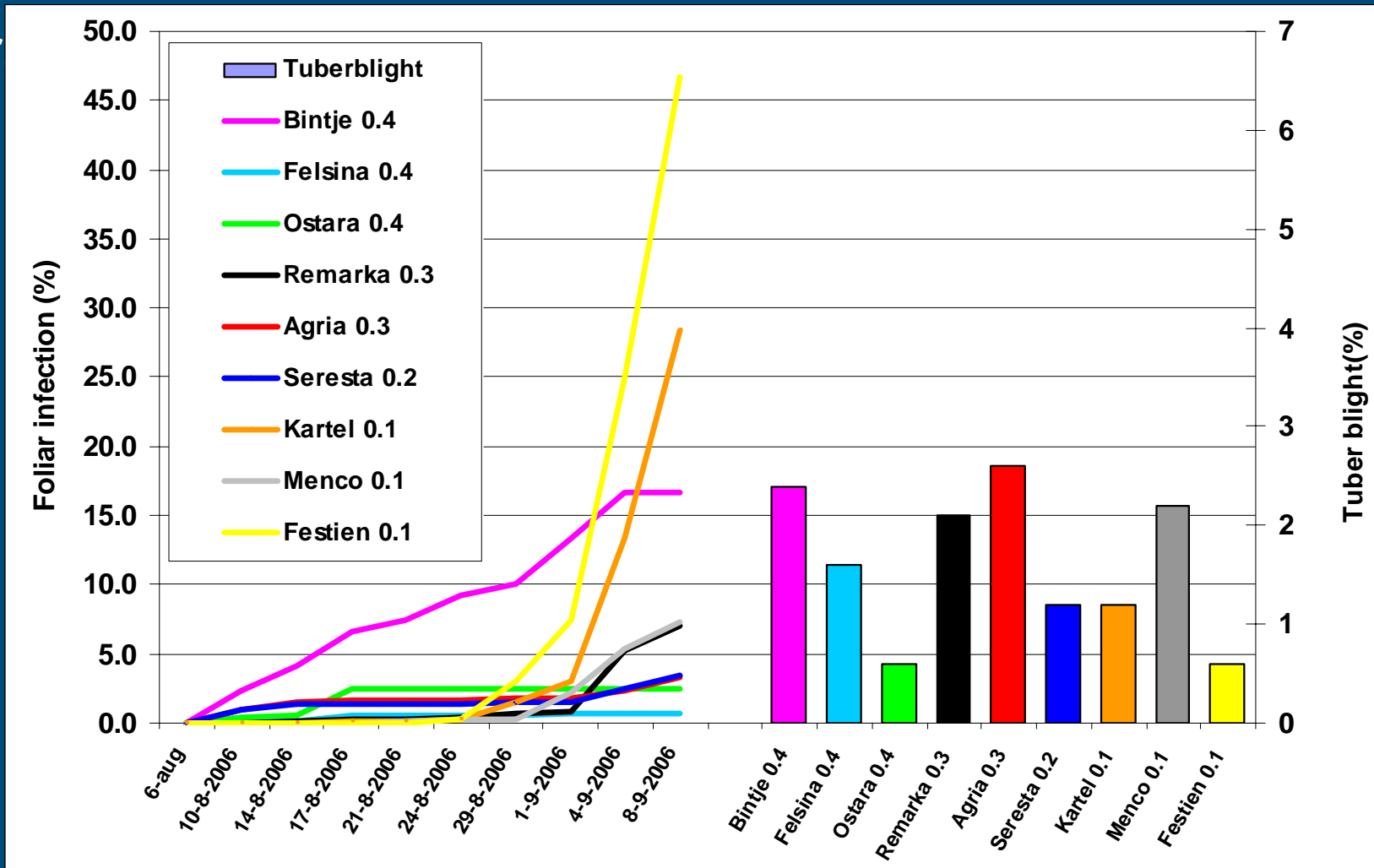


Calculated doses rates.

Class 1: 0.1	Class 2: 0.2 (a)	Class 3: 0.3 (a)	Class 4: 0.4 (a)
Festien (8 / 9)	Seresta (7 / 8)	Agria (5.5 / 7.5)	Asterix (5 / 8.5)
Kartel (8 / 6.5)		Remarka (6.5 / 9)	Bintje (3 / 4.5)
Menco (9 / 7.5)			Mondial (4.5 / 6)
			Felsina (3.5 / 5.5)
			Kantara (7 / 6)
			Karakter (7 / 5)
			Ostara (3.5 / 8)
			Starga (5.5 / 4.5)

(a) At a low disease pressure dose rate can be decreased with maximum 25%
(Resistance Foliage / tuber)

Infection of foliage and tubers at calculated dose



Conclusions

- Reduced protectant dose rates are feasible on more resistant cultivars
- Possibilities to reduce dose rates are more feasible in the first half of season
- Reliable resistance ratings are crucial!
- Resistance ratings ≥ 7 suitable for reduced dose rates
- In the second half of the season tuber blight must be taken into consideration, which limits possibilities to reduce the dose rate



Thank you for your attention

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