

Blight Management

**-a risk dependent dose model for
controlling potato late blight**



**Bent J. Nielsen & Jens Grønbech Hansen, Aarhus University
Lars Bødker, Danish Agricultural Advisory Service**

Euroblight Workshop, Arras 6th may 2010

Optimizing fungicide input in late blight control

Use of fungicides (dose x intervals) depend on risk situation (actual and coming days):

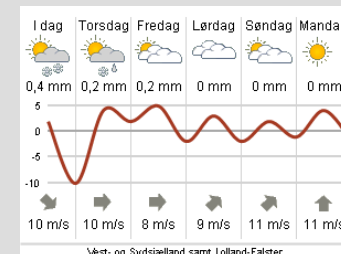
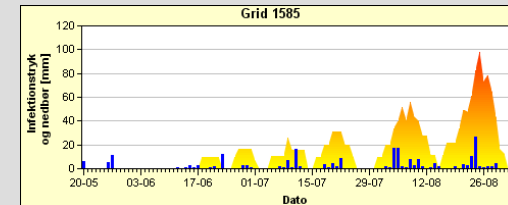
No or low risk of infection:	No spraying or low dose of effective fungicides
Increasing risk of infection:	Dose of effective fungicides depends on actual risk

BLIGHT MANAGEMENT recommends actual dose depend on infection pressure x initial inoculum x level of resistance



Basic elements in Blight Management (BM)

1. Occurrence of late blight
2. Infection pressure (HSPO)
3. Resistance in variety
4. Fungicides



Elements in Blight management



1. Occurrence of late blight

- No attack in country
- Attack in country
- Attack in region
- Attack in field



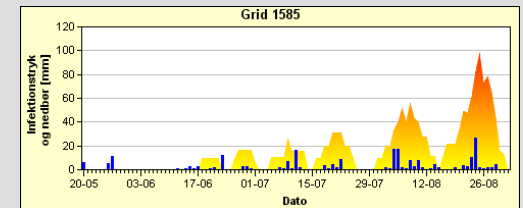
Monitoring network

www.planteinfo.dk

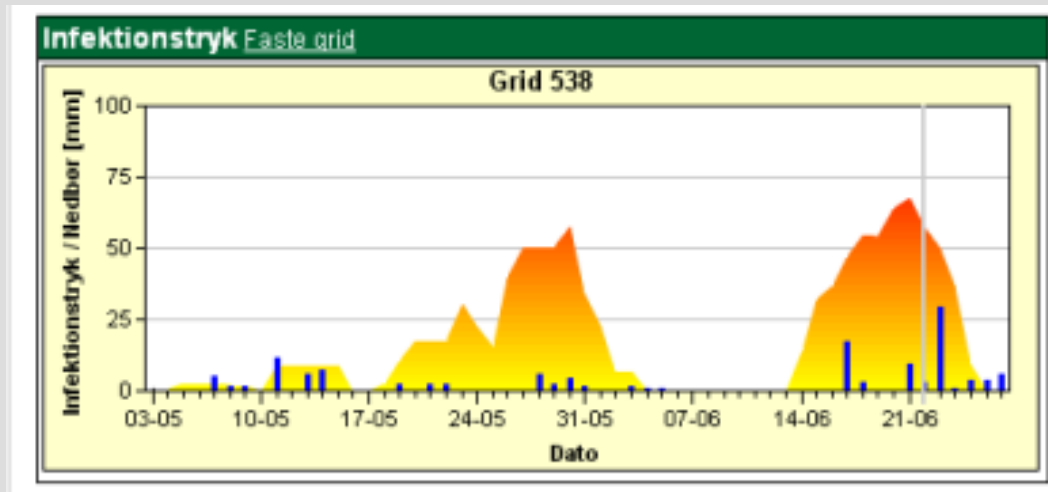
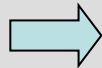
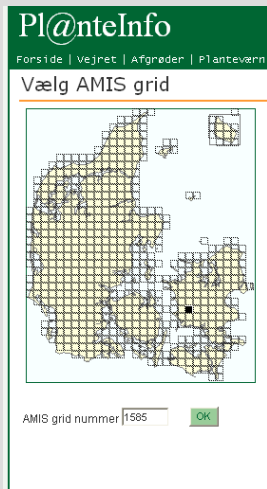


DET JORDBRUGSVIDENSKABELIGE FAKULTET
AARHUS UNIVERSITET

Elements in Blight Management



2. Infection pressure (HSPO)



Local weather

- Temperature
- Rh

Grid value 15x15 km

Calculated infection pressure (HSPO):

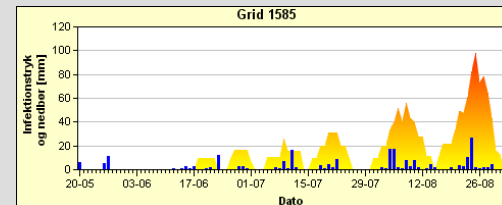
- Temperature > 10C
- RH > 88 %
- Periods with more than 10 hours

Sum HSPO:

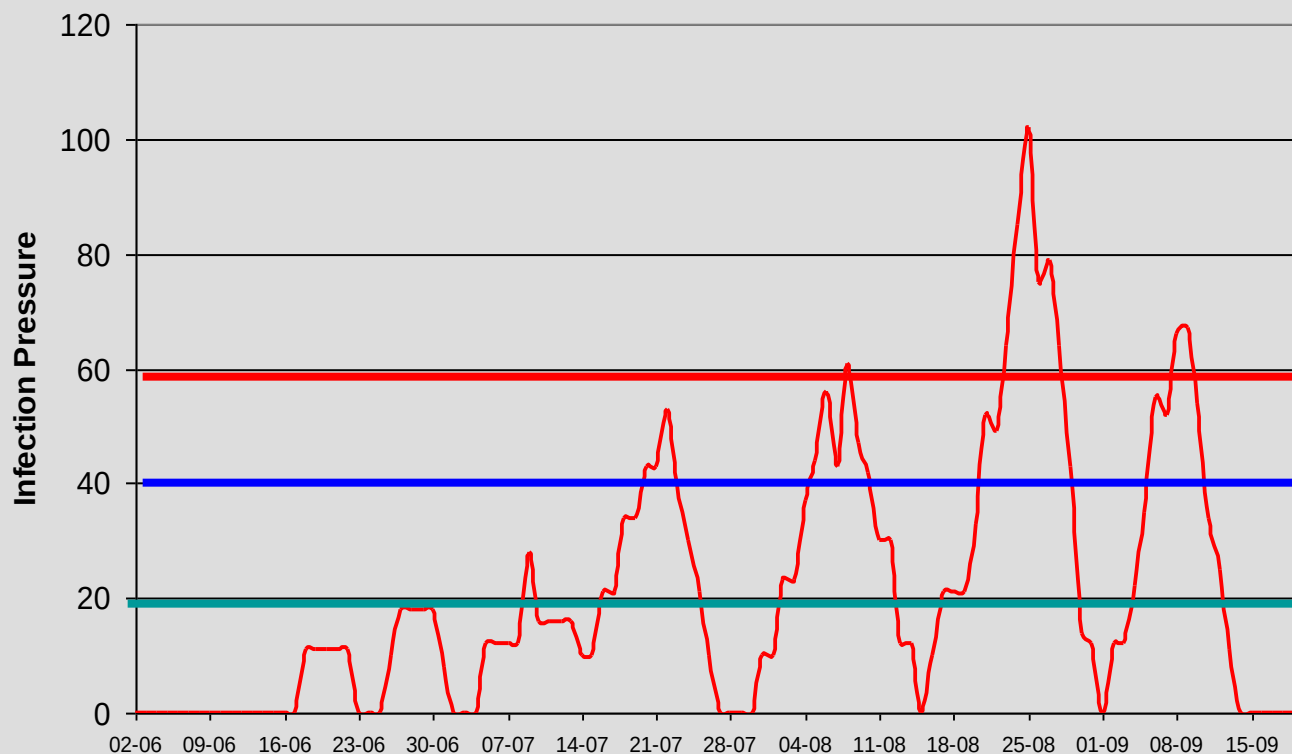
2 days before
Actual day
2 days forecast



Elements in Blight management



2. Infection pressure (HSPO)



>60: Very high risk

40-59: High risk

20-39: Moderate risk

0-19: Low risk

No risk

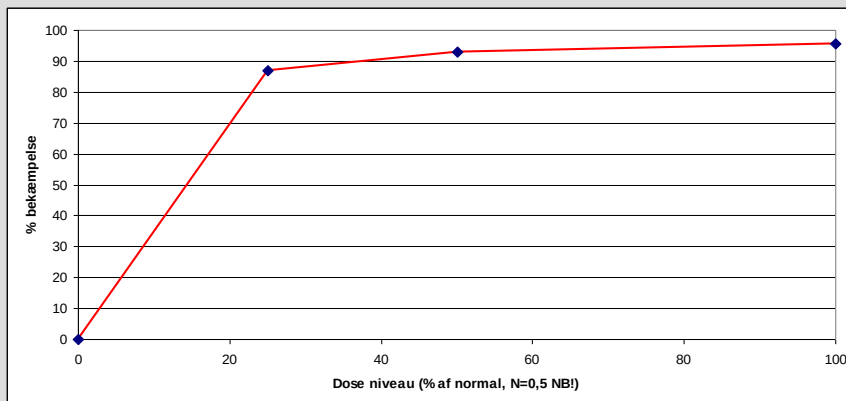


Elements in Blight management



4. Fungicides

- Previous field trials have shown that Ranman and Revus can give an effective control with low doses
 - Repeated sprayings at 7 days intervals
 - Preventive sprayings



Dose-response curve for Revus



Basic principle in Risk Dependent Dose Model

Fungicide dose in % of standard dose					
		LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
		No attack in country	Attack in country (first appearance)	Attack in area	Attack in field (experimental plot)
		Dose	Dose	Dose	Dose
DITTA (Susceptible ware potato)					
HSPO sum	Infection level				
> 60	VERY HIGH	75	100	100	100 (5 days interval)
40-60	HIGH	50	75	100	100 (5 days interval)
20-39	MODERATE	25	50	75	100
1-19	LOW	25	25	50	75
0	NO RISK	0	0	25	50
KURAS (Moderate resistant starch potato)					
HSPO sum	Infection level				
> 60	VERY HIGH	50	75	100	100 (5 days interval)
40-60	HIGH	25	50	100	100 (5 days interval)
20-39	MODERATE	25	25	75	100
1-19	LOW	0	0	50	75
0	NO RISK	0	0	25	50

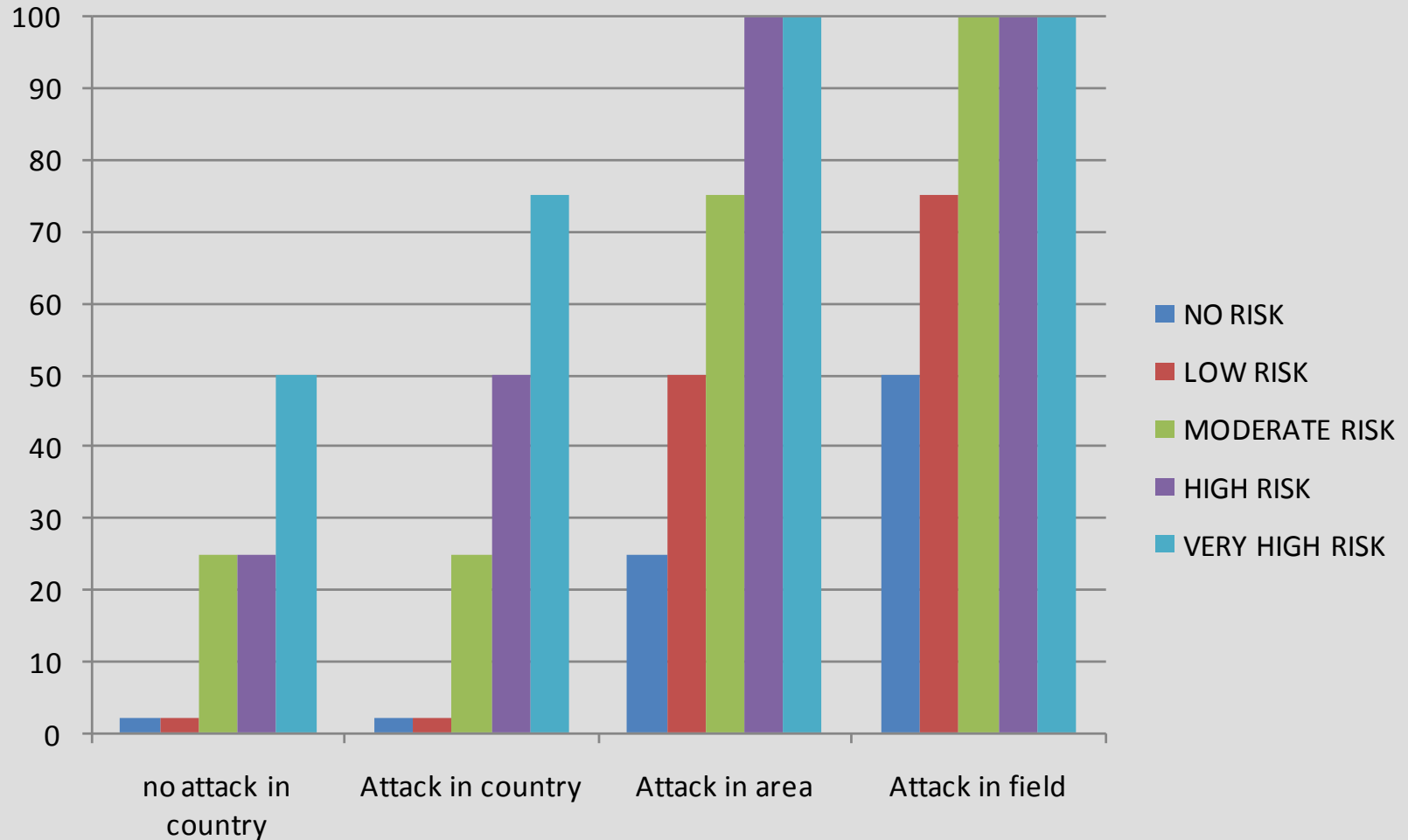
HSPO sum: Sum of sporulation hours (RH > 88% and temp. > 10C), two days back and two days prognose. [www. Planteinfo.dk](http://www.Planteinfo.dk)

Infection pressure x initial inoculum x level of resistance

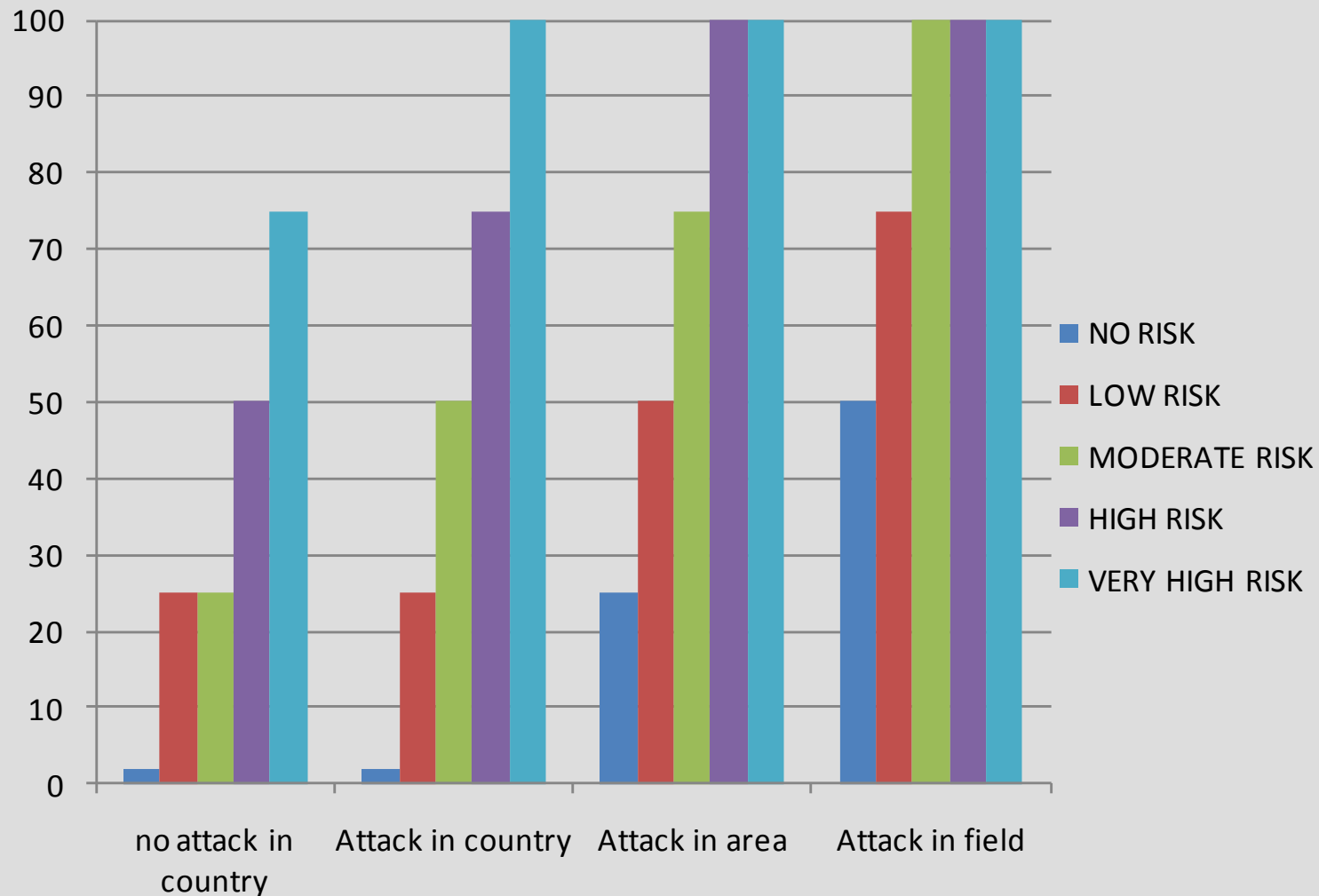


DET JORDBRUGSVIDENSKABELIGE FAKULTET
AARHUS UNIVERSITET

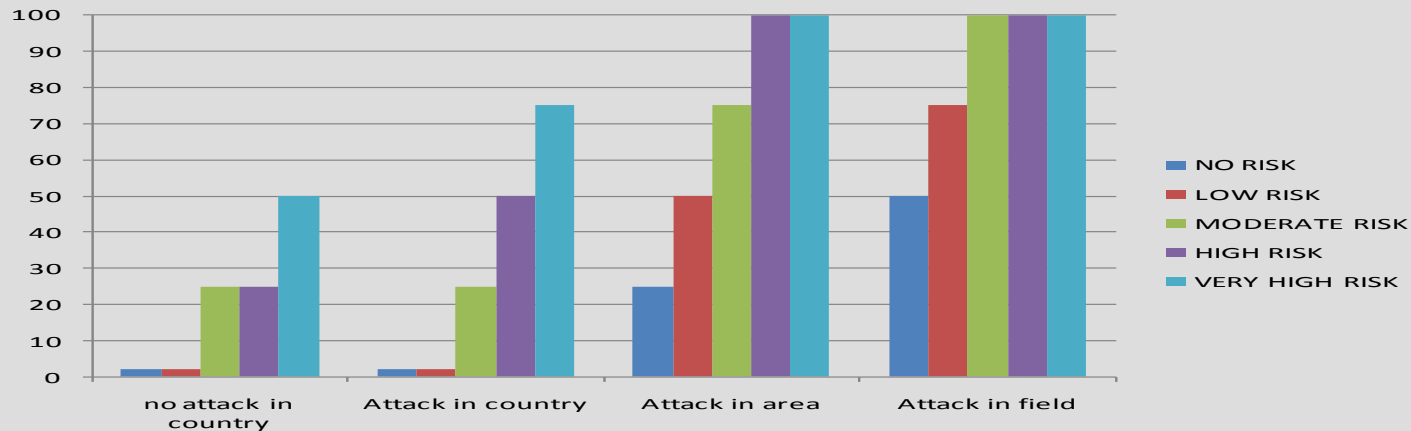
Example of calculated dose (% of standard) in moderate resistant variety Kuras



Example of calculated dose (% of standard) in susceptible ware potato



Fungicide used in BM models 2009



BM ST. Dithane (Full dose) Ranman Ranman Revus Revus Tyfon Ranman (tuber)

BM R/R Revus-Revus-Ranman-Ranman-Revus-Revus.... Alternating whole season
actual dose depends on infection level

Tyfon: propamocarb + fenamidone



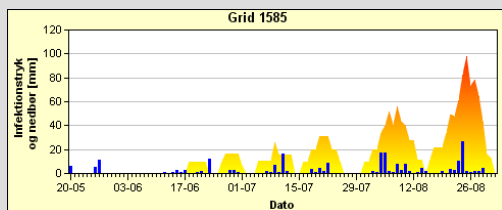
Validation of BM R/R in field trials 2009

Spray schedule for field trials 2009

	A	B	C	D	E	F	G	H	I	J	K	L	
1	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	
2	Dithane	Dithane	Dithane	Dithane	Dithane	Dithane	Dithane	Dithane	Dithane	Dithane	Dithane	Dithane	
3	0,2 RE	0,2 RE	0,07 Ra	0,07 Ra	0,2 RE	0,2 RE	0,07 Ra	0,07 Ra	0,2 RE	0,2 RE	0,07 Ra	0,07 Ra	30%
4	0,3 RE	0,3 RE	0,1 Ra	0,1 Ra	0,3 RE	0,3 RE	0,1 Ra	0,1 Ra	0,3 RE	0,3 RE	0,1 Ra	0,1 Ra	50%
5	0,6 RE	0,6 RE	0,2 Ra	0,2 Ra	0,6 RE	0,6 RE	0,2 Ra	0,2 Ra	0,6 RE	0,6 RE	0,2 Ra	0,2 Ra	100%
6	?RE	?RE	?Ra	?Ra	?RE	?RE	?Ra	?Ra	?RE	?RE	?Ra	?Ra	varies



Dose depends on calculated risk of infection



2 varieties:

- Moderate resistant starch variety Kuras
- Susceptible ware potato Ditta

7 days intervals, 3 localities



Validation of BM R/R in field trials 2009

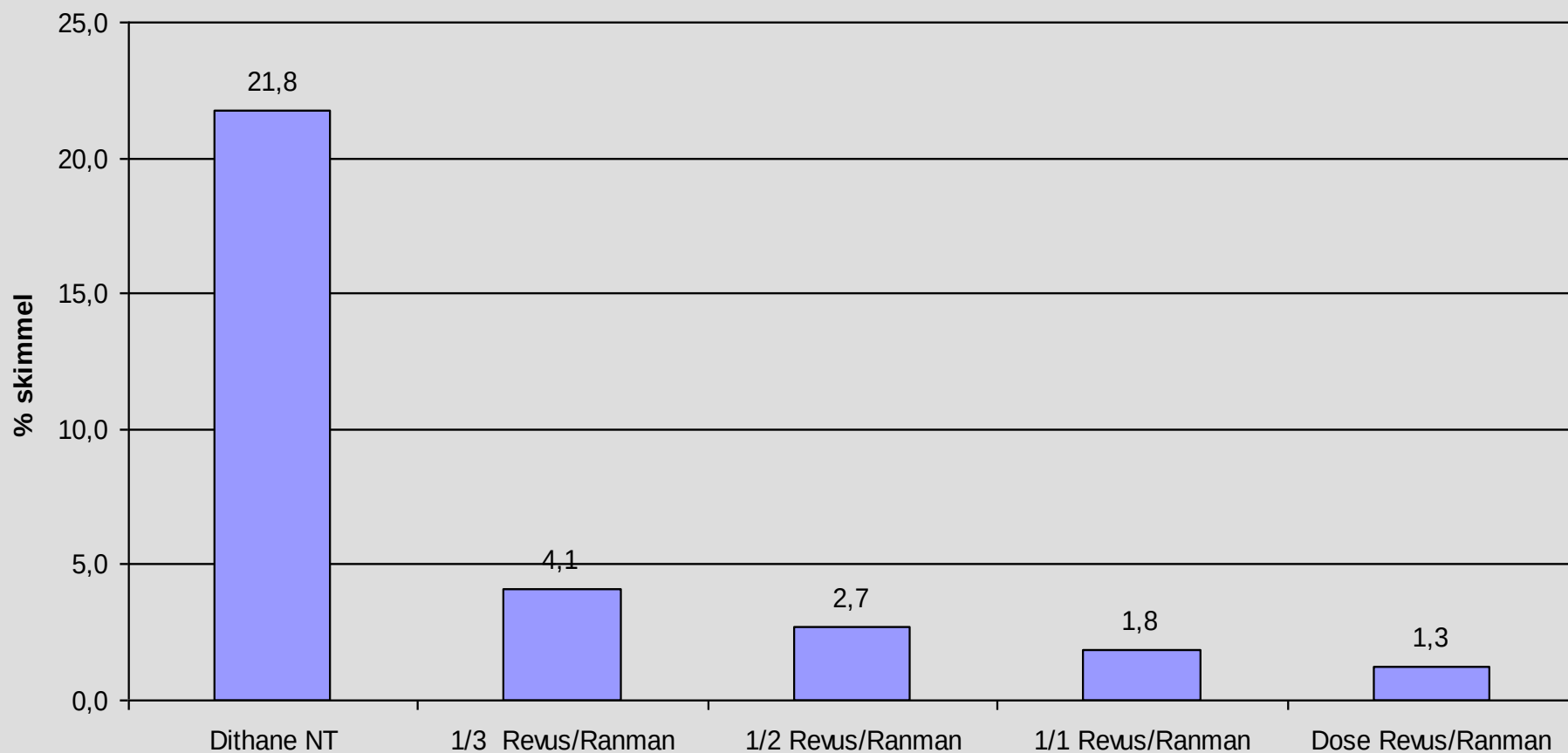
BM adjusted to spray at low risk in field trials 2009

		Status 1	Status 2	Status 3	Status 4
		No attack of LB in DK	Attack of LB in Denmark (first occurrence)	Attack of LB in the region	Attack of LB in the field (experimental plots)
		Dose	Dose	Dose	Dose
DITTA (Susceptible ware potato)					
HSPO sum	Infektion levels				
> 60	VERY HIGH	75	100	100	100 (5 days interval)
40-60	HIGH	50	75	100	100 (5 days interval)
20-39	MEDIUM	25	50	75	100
1-19	LOW	25	25	50	75
0	NO RISK	25	25	25	50
KURAS (Moderate resistant starch potato)					
HSPO sum	Infektion levels				
> 60	VERY HIGH	50	75	100	100 (5 days interval)
40-60	HIGH	25	50	100	100 (5 days interval)
20-39	MEDIUM	25	25	75	100
1-19	LOW	25	25	50	75
0	NO RISK	25	25	25	50

HSPO sum: Sum of sporulation hours (RH > 80% and temp. > 10C), two days back and two days prognose. [www. Planteinfo.dk](http://www.Planteinfo.dk)



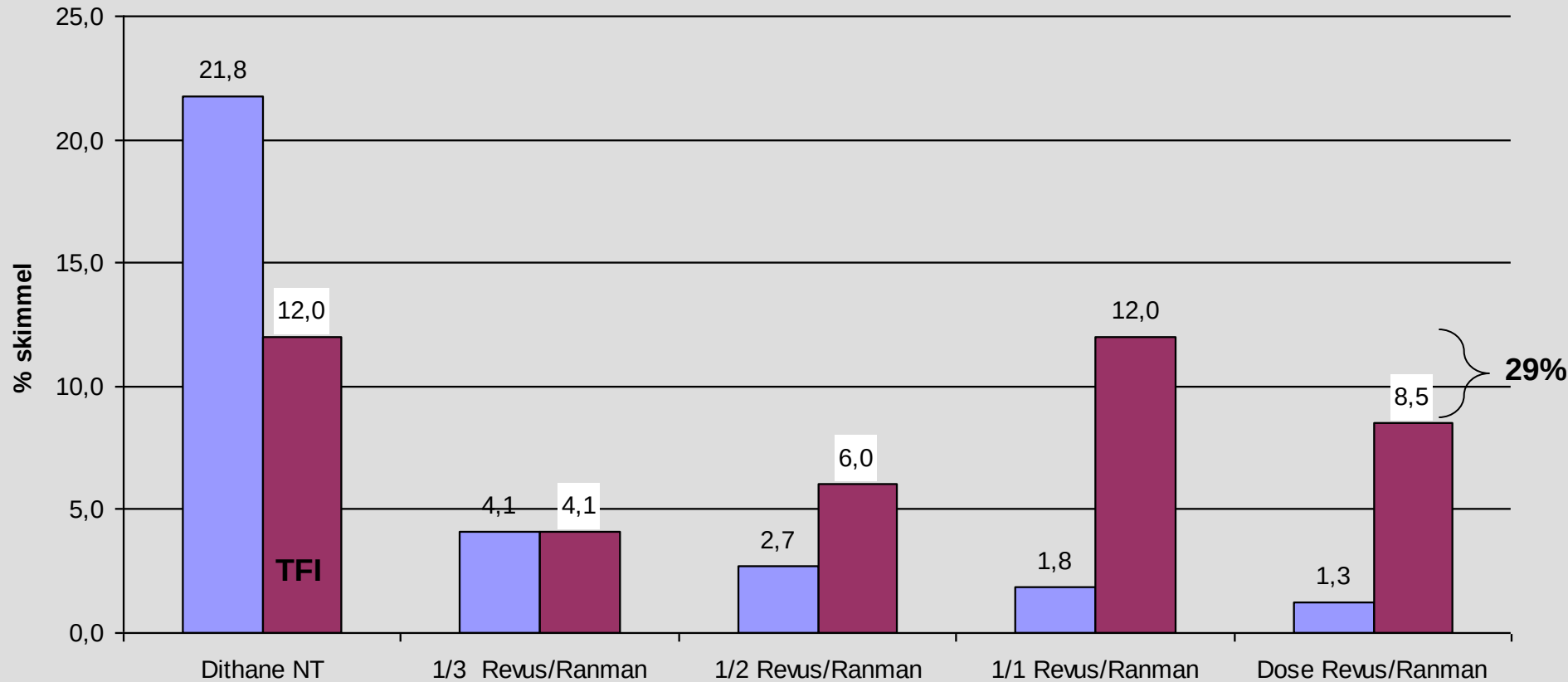
% late blight 3 trials ware potato 2009



12 treatments, cv. Ditta, assessments 18/8-2/9



% late blight and treatment frequency index (TFI)



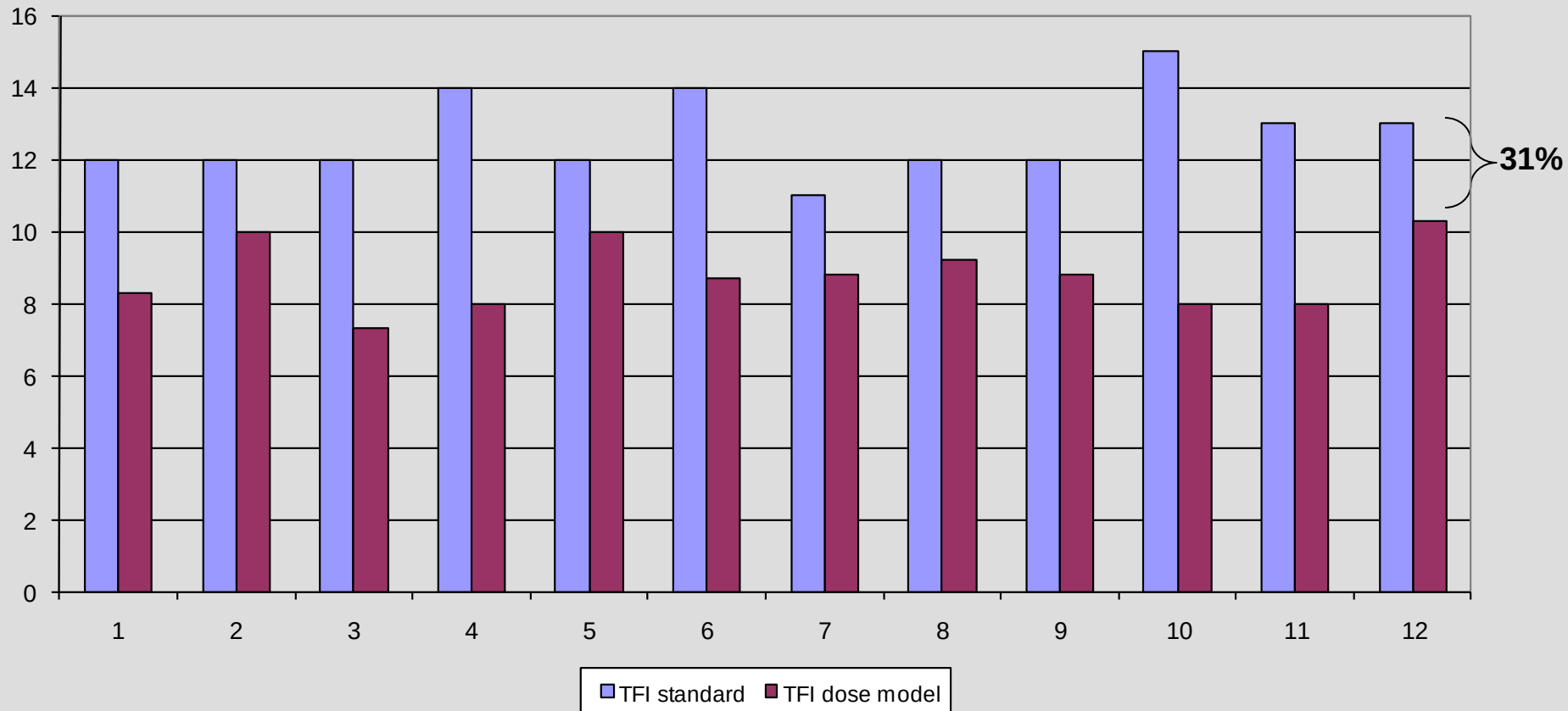
12 treatments, cv. Ditta, 3 trials, assessments 18/8-2/9

TFI: Number of sprayings with standard dose



DET JORDBRUGSVIDENSKABELIGE FAKULTET
AARHUS UNIVERSITET

Comparison of TFI using Dithane NT 2 kg/ha or BM models 2009

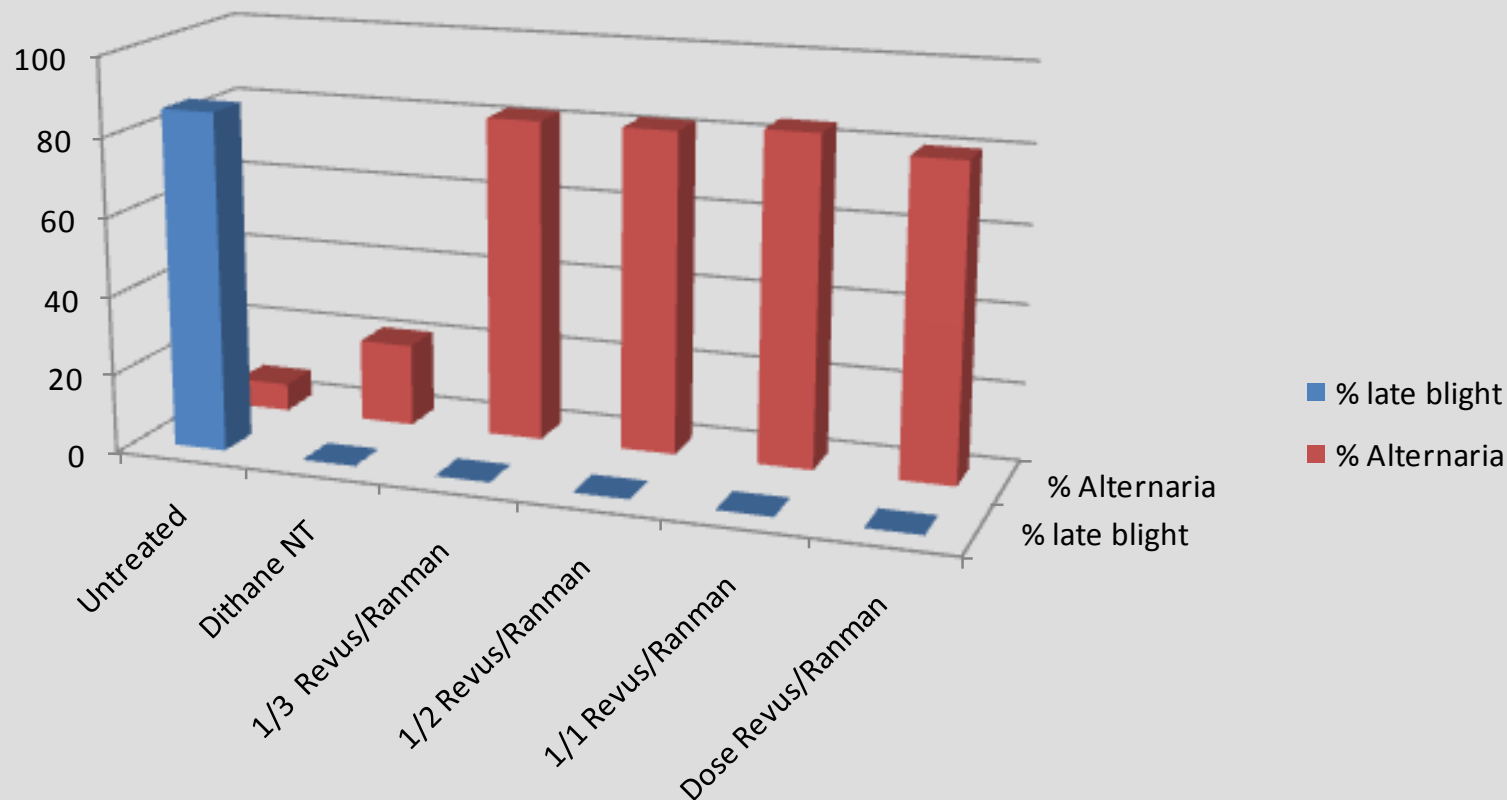


BM ST: 3 locations x 2 varieties; BM R/R 3 locations x 2 varieties, 2009



DET JORDBRUGSVIDENSKABELIGE FAKULTET
AARHUS UNIVERSITET

Strategy for *Alternaria* control needed

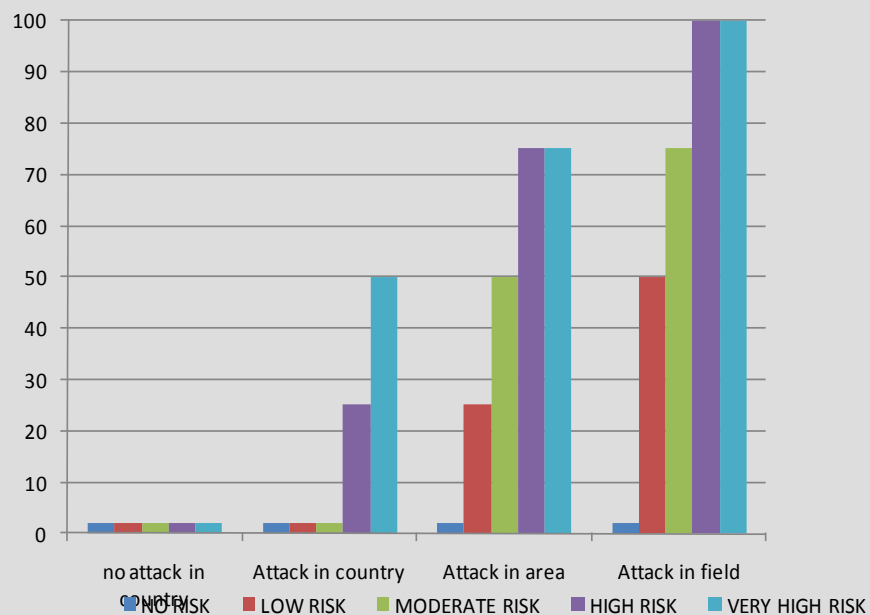


% Attack of Late Blight and Alternaria. Sunds 16-09 2009

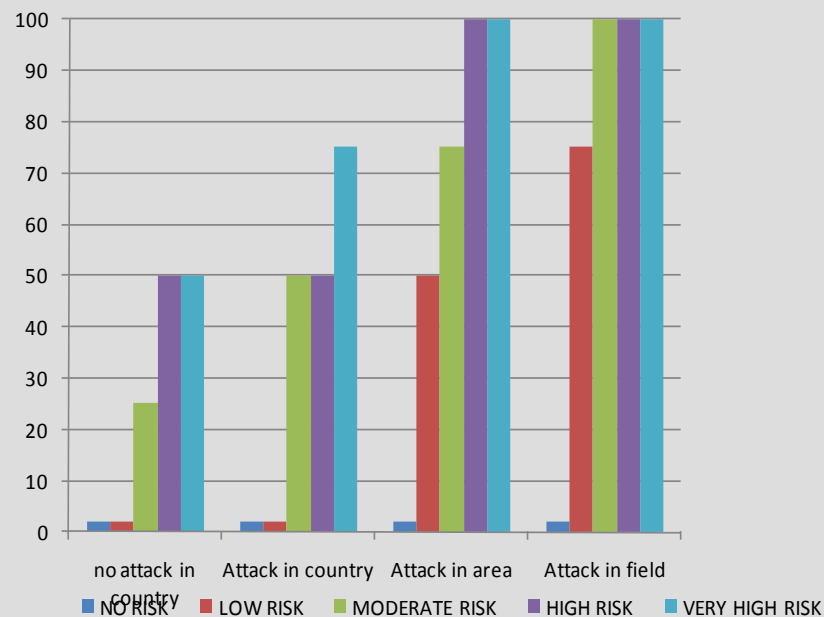


2010 ?

- No spraying – low dose at low infection level
- Alternaria control included



Dose level in resistant variety 2010



Dose level in susceptible variety 2010



Conclusion

- Relative late attack of LB (end July) and EB (September) 2009
- BM gave a good control of LB in all trials
- Using effective LB fungicide it is possible to reduce TFI 30% by adjusting dose to local infection pressure
- The fungicide used in the models was too weak against EB
- Same results were obtained by Plant Plus (using same fungicides) with full dose and longer intervals





DET JORDBRUGSVIDENSKABELIGE FAKULTET
AARHUS UNIVERSITET