

A simple decision support system for control of potato late blight

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Potato phenology in Estonia

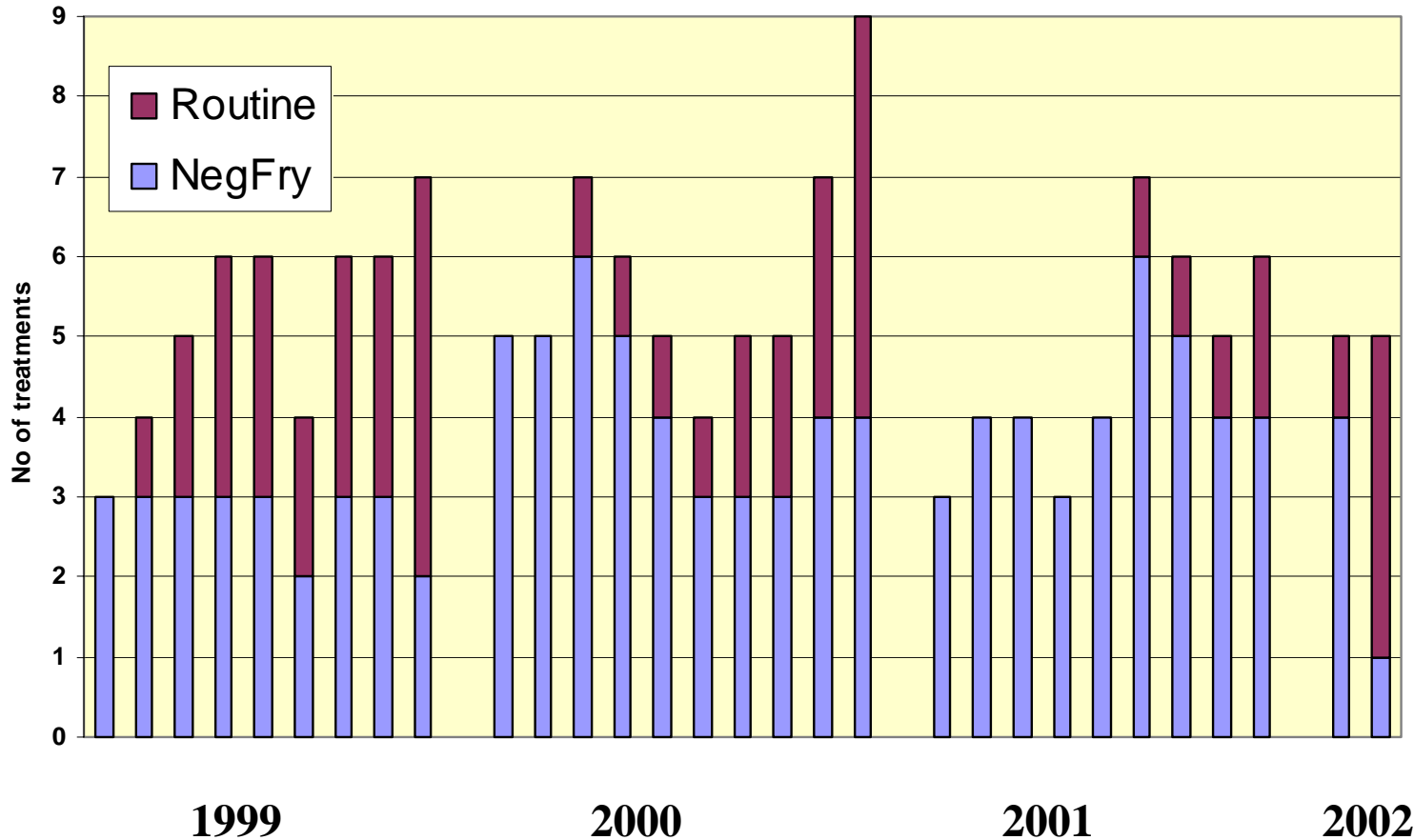
- Planting May, 1-20
- Emergence June, 5-20
- Late blight infection July, 10-25
- Harvest September, 1-20

ca 50 days from late blight infection to harvest
4-7 fungicide treatments



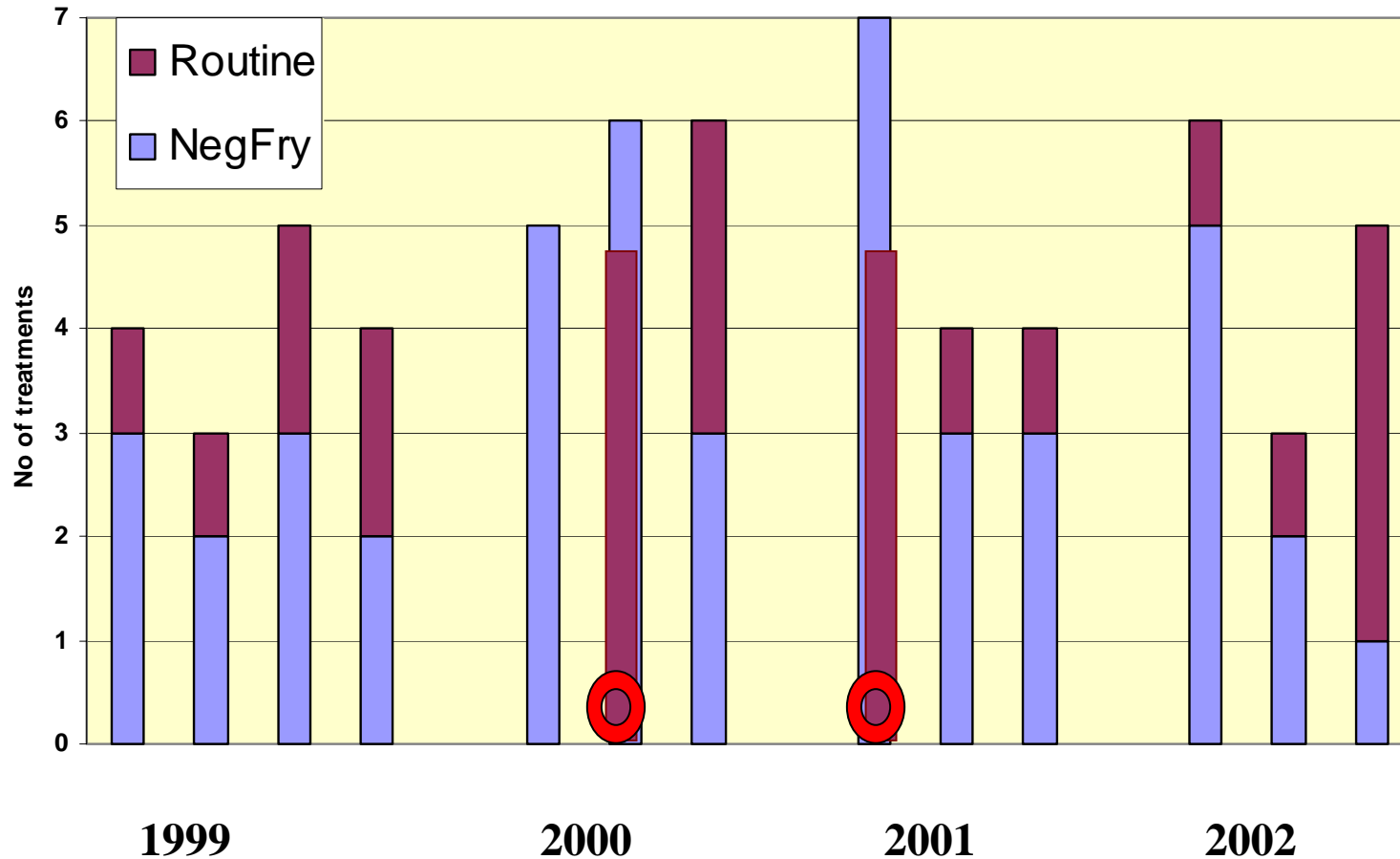
Reduction of applications

Number of treatments in B3 varieties



Reduction of applications

Number of treatments in B1 varieties



Use of NegFry in reduction of fungicide applications

Resistance class	No of treatments		Reduction %
	NegFry	Routine	
B1	3,5	4,6	24,7
B2	3,2	5,0	36,3
B3	3,6	5,2	30,5
Year			
1999	2,8	4,8	38,0
2000	4,3	5,8	22,3
2001	4,1	4,6	10,3
2002	2,7	4,6	40,1
Total	3,5	5,0	28,0

Later start of treatments

Longer treatment intervals

Principles

- Simple message to the farmer - when to treat, not why to treat (farmers are getting bigger)
- Area based advice, not a single field based advice (easier to understand to the farmers)
- Optimization of the late blight control - better control with optimal use of fungicides (efficacy and economy), not reduction of fungicide use (environment and economy).
- Use of wide range of fungicides



Input

- Weather data
- Variety resistance
- Fungicide information



Bases

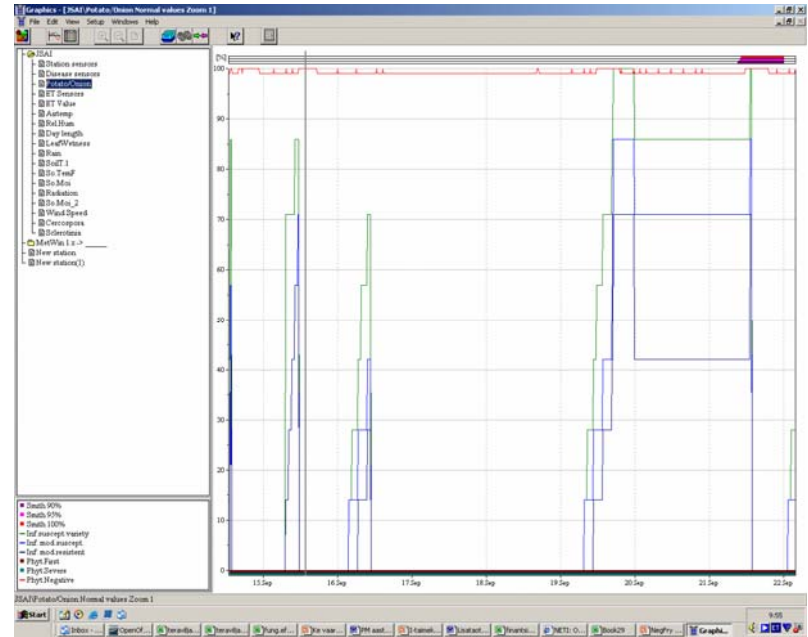
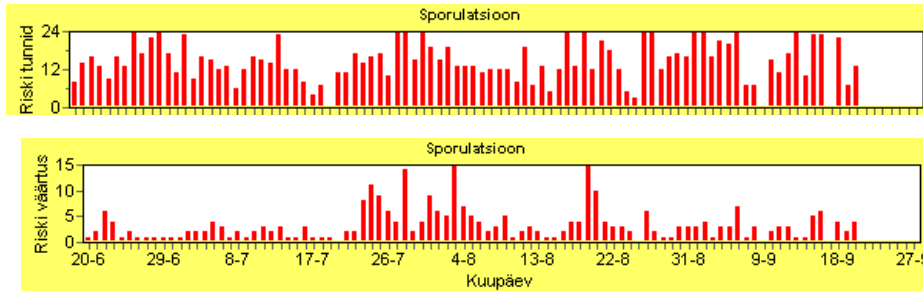
- Timing of first treatment Negative prognosis
- Intervals between following treatments
 - Based on weather conditions NegFry
 - Based on variety resistance EUCABLIGHT
- Proper choice of the fungicide Bologna, 2007



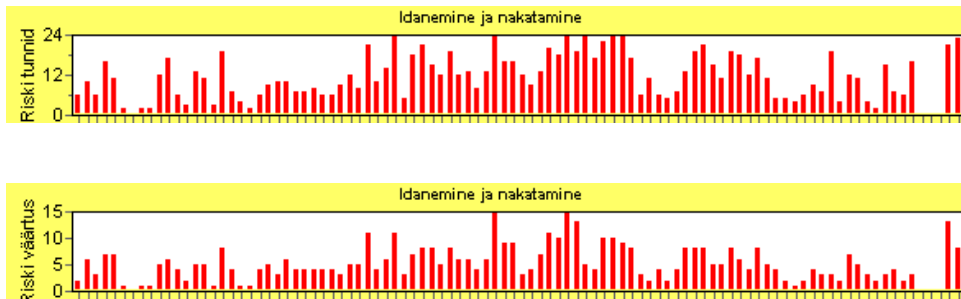
Sporulation 2004

NEGFY

METOS

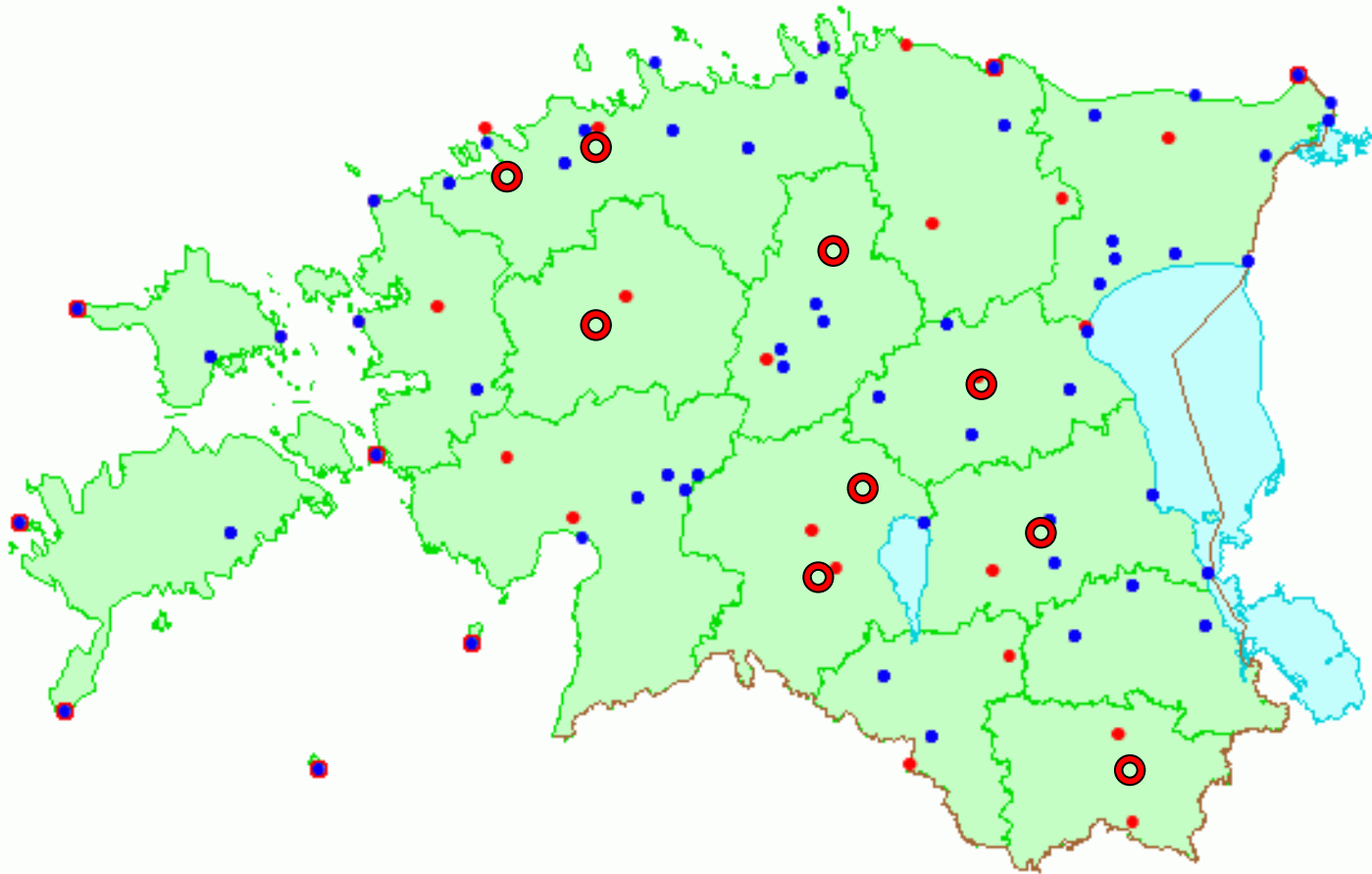


Germination and infection 2004



Jõgeva Plant Breeding Institute

Data from meteorological stations

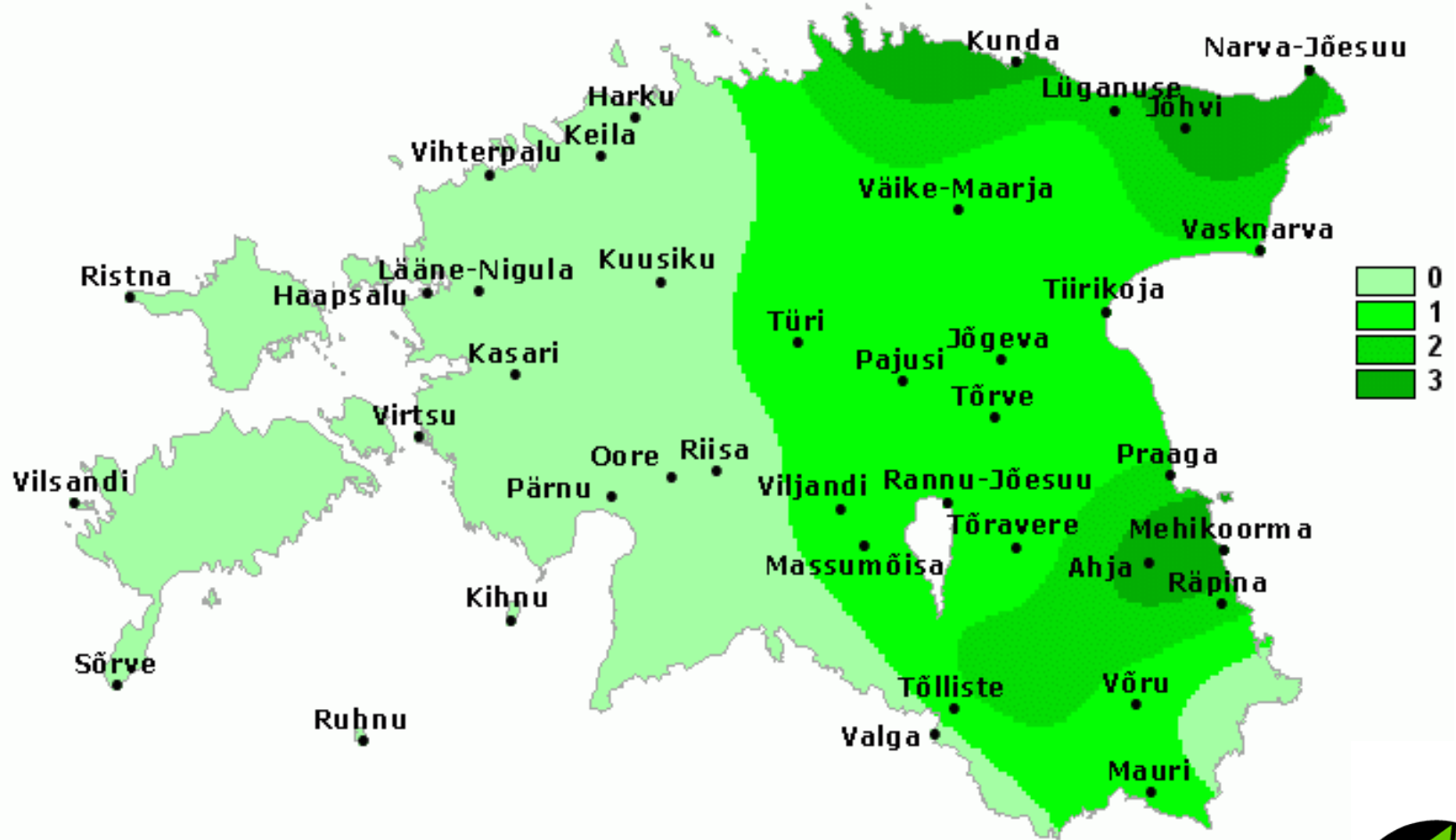


Use NegFry programme



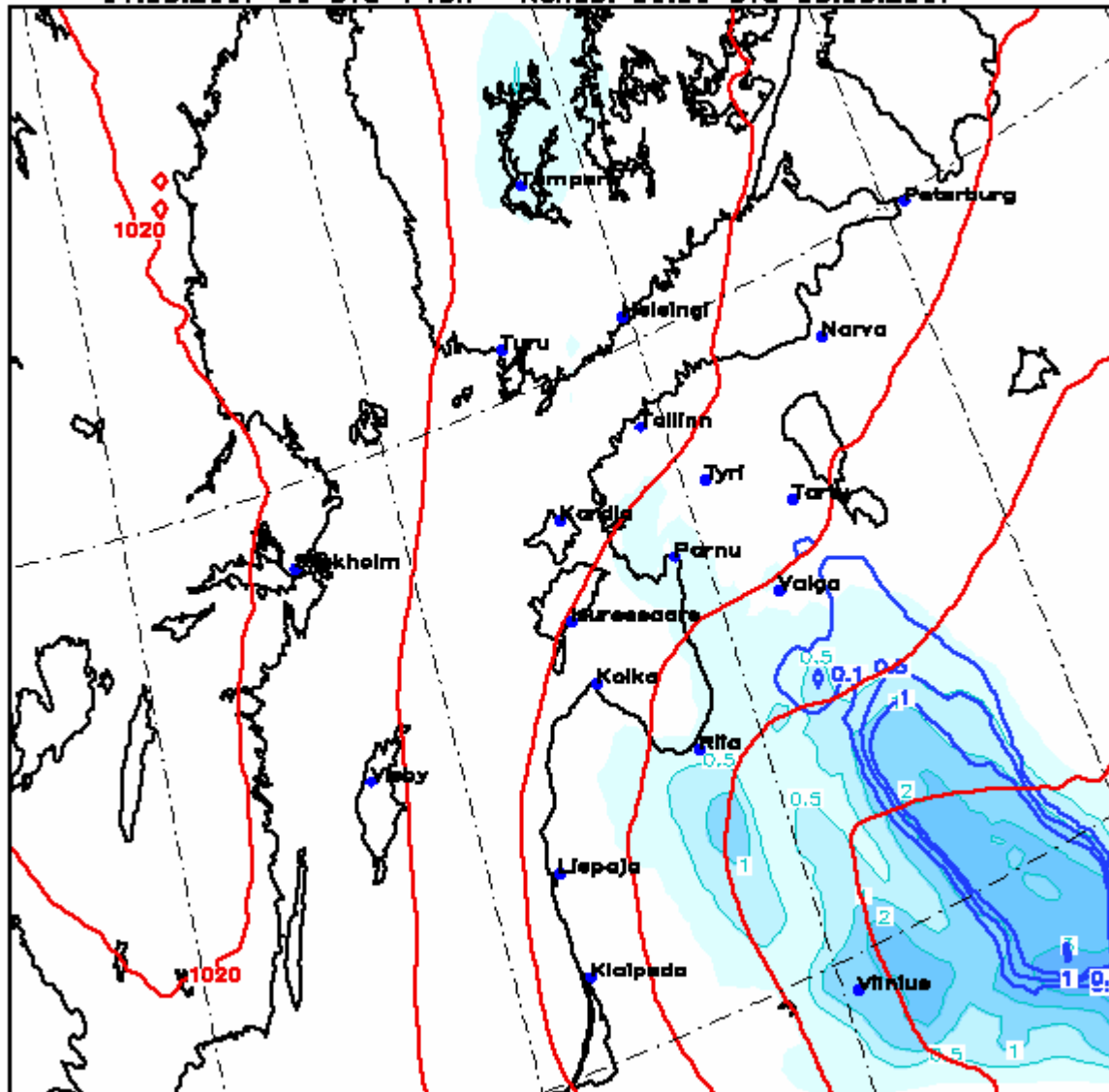
Precipitation map, mm

29.04 kell 06:00 - 30.04 kell 06:00 GMT



HIRLAM model for next 48 hours

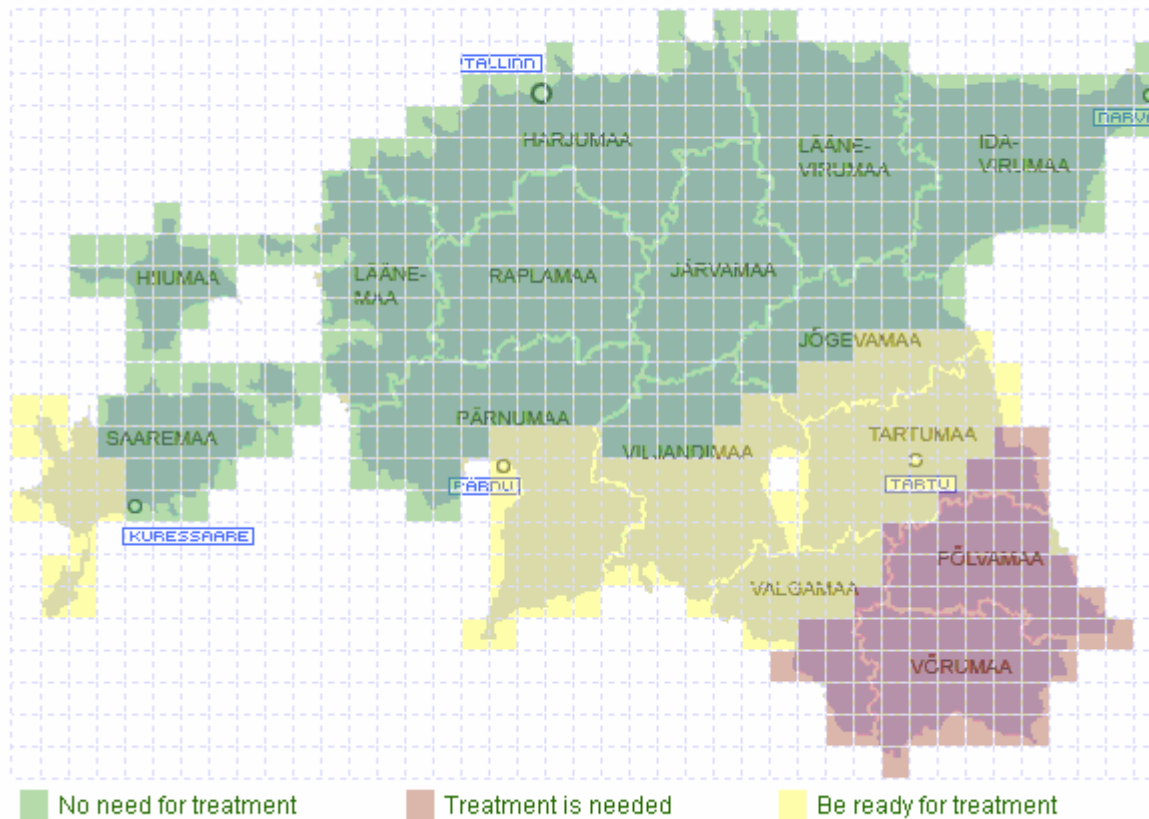
01.05.2007 00 UTC +48h Kehtib: 00:00 UTC 03.05.2007



Timing of first treatment **Biggest factor**

Need for chemical control

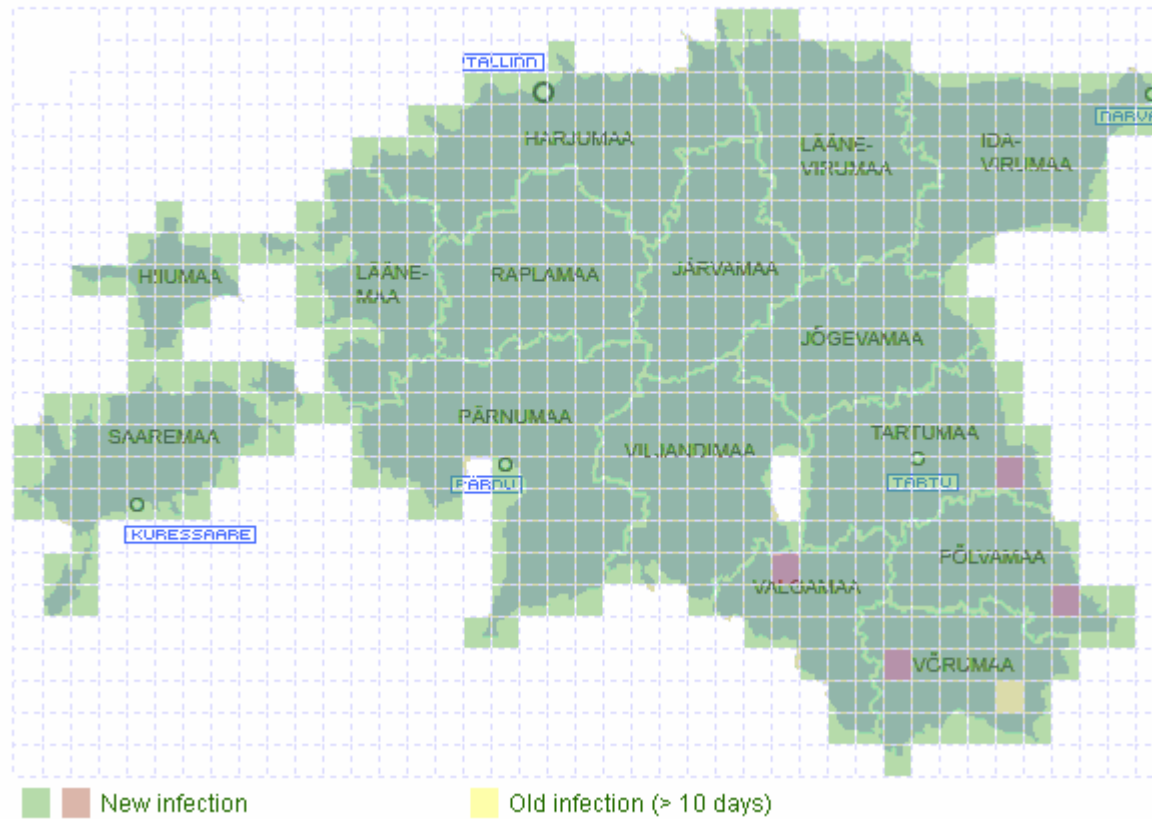
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Beginning of infection

Beginning of infection

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Use of fungicides in following treatments

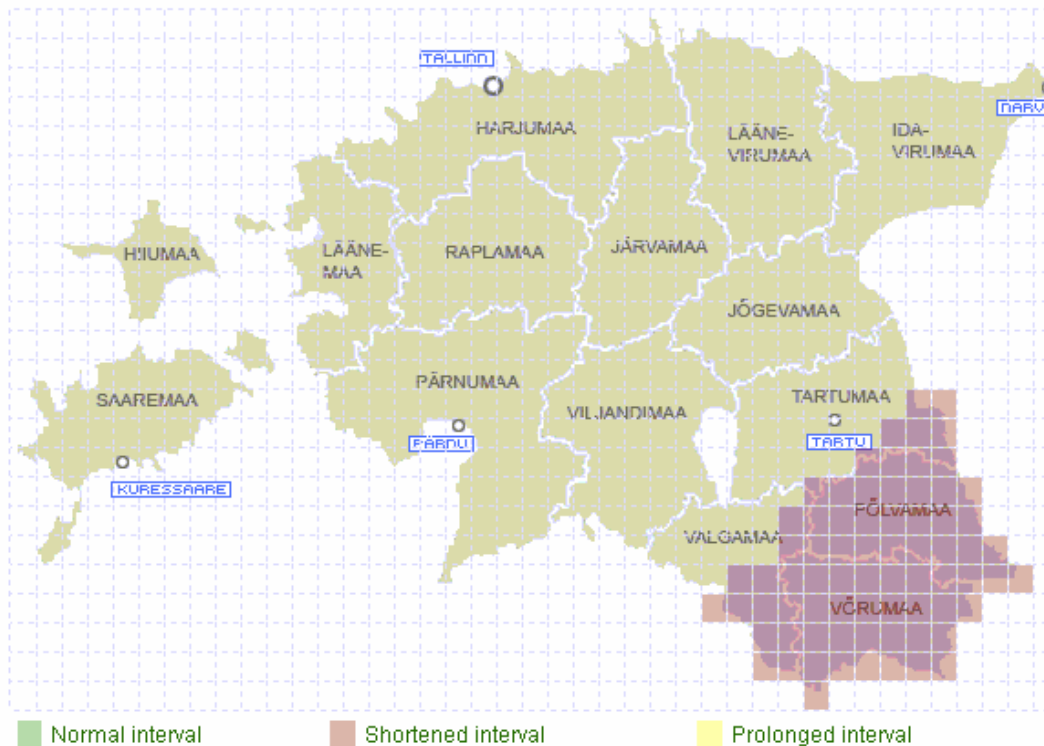
- Use of recommended doses
- Adjustment of treatment interval according to weather conditions and variety resistance



Treatment interval

Treatment intervals

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NegFry B2

Normal interval - Use treatment interval according to fungicide label recommendation

Shortened interval - Treatment interval has to shorten for one-two days

Prolonged interval - Treatment interval can be prolonged for additional one-two days



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Information from EUCABLIGHT observation trials



7

Tri
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Year

Documentation

Pages: 3 Responsibility: Mati Koppel

<input type="checkbox"/>										
<input type="checkbox"/>	Sarme	463,4	0,12	0,17	0,07	10,2	20,0	-0,61	4,2	7,6
<input type="checkbox"/>	Kuras	493,5	0,13	0,20	0,08	12,5	21,1	-0,58	6,4	7,5
<input type="checkbox"/>	Anti	716,5	0,19	0,15	0,07	0,9	13,1	-0,63	-5,2	6,8
<input type="checkbox"/>	R 1076-97	789,7	0,21	0,37	0,25	17,0	21,5	-0,40	11,0	6,6
<input type="checkbox"/>	R 1559-98	895,3	0,24	0,30	0,20	13,1	18,5	-0,47	7,0	6,4
<input type="checkbox"/>	Robijn	966,2	0,25	0,18	0,08	4,3	13,7	-0,60	-1,8	6,2
<input type="checkbox"/>	R 1079-99	999,6	0,26	0,33	0,23	13,4	18,5	-0,45	7,4	6,1
<input type="checkbox"/>	649-94	1.070,3	0,28	0,32	0,20	12,9	18,1	-0,46	6,8	5,9
<input type="checkbox"/>	R 872-00	1.110,9	0,29	0,26	0,16	7,9	14,6	-0,52	1,9	5,8
<input type="checkbox"/>	1431-99	1.126,7	0,30	0,31	0,22	11,5	16,9	-0,47	5,4	
<input type="checkbox"/>	R 360-98	1.178,2	0,31	0,32	0,22	12,0	17,1	-0,45	5,9	
<input type="checkbox"/>	R 5	1.210,8	0,32	0,44	0,28	15,3	19,1	-0,34	9,2	



Variety resistance

Variety resistance

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Shorten interval 1 day	Shorten interval 1 day	Normal interval	Normal interval	Extend interval 2 days	Extend interval 2 days
2	3	4	5	6	7
Aminca	Berber	Asterix	Agria	Escort	Ando
Arielle	Bintje	Ditta	Ants	Graniola	Anti
Princess	Carlita	Fontane	Evita	Juku	Kuras
Sinora	Courage	Milva	Fresco	Oleva	Robijn
Velox	Eersteling	Santé	Maret	Piret	Sarme
	Folva	Satina	Picasso	Raja	
	Impala	Sava	Remarka		
	Latona	Van Gogh	Vigri		
	Platina	Varane kollane			
	Red Scarlet	Victoria			
	Secura				



Weather conditions

NegFry risk calculation

	Blight-favourable High risk	Normal	Unfavourable Low risk
	-1 day	0	+1 day



Weather

		Blight-favourable	Normal	Unfavourable
		-1	0	+1
Susceptible	-1	-2	-1	0
Moderately susceptible	0	-1	0	+1
Moderately resistant	+1	0	+1	+2

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Late blight fungicides

Fungitsiidid

Triiki leht 

	Dose, kg/l, ha	Movement	Active ingredient	Treatment interval	Cost, EEK/day
Dithane NT	2,5	Contact	mancozeb	7	57
Bravo 500 SC	1,3	Contact	chlorothalonil	7	87
Sereno WG 60	1,25	Translaminar	fenamidon, mancozeb	7	86
Tanos 50 WG	0,6	Translaminar	cymoxanil; famoxadon	7	73
Shirlan	0,3	Contact	fluazinam	7	84
Shirlan	0,4	Contact	fluazinam	10	73
Ranman	0,2	Contact	cyasofamid	10	73
Electis 75 DG	1,25	Contact	soxamid; mancozeb	10	61
Acrobat Plus	2,0	Translaminar	dimetomorph, mancozeb	12	64
Glory	2,0	Systemic	propamocarb, fenamidon	12	66
Ridomil Gold MZ 68 WG	2,5	Systemic	metalaxyl-M; mancozeb	12	84
Tattoo	4,0	Systemic	propamocarb; mancozeb	12	63



Fungicides of 7 day treatment interval

Weather

		Blight-favourable	Normal	Unfavourable
		-1	0	+1
Susceptible	-1	5	6	7
Moderately susceptible	0	6	7	8
Moderately resistant	+1	7	9	9

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Fungicides of 10-14 (12) day treatment interval

Ridomil Gold, Tattoo

Weather

		Blight-favourable	Normal	Unfavourable
		-2	0	+2
Susceptible	-1	9	11	13
Moderately susceptible	0	10	12	14
Moderately resistant	+1	11	13	15

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Selection of fungicides

Fungitsiidide mõju

	Late blight	New growth	Stem blight	Tuber blight	Early blight
Dithane NT	2	?	1	1	2
Shirlan	3	?	1	1	0,5
Ranman	3	?	1	1	?
Bravo 500 SC	2	?	0,5	0,5	1,5
Ridomil Gold MZ 68 WG	3	2	2	2	2
Tattoo	2,5	1,5	2	2	?
Glory	2,5	1,5	2	2	2
Acrobat Plus	2,5	2	1,5	1,5	2
Sereno WG 60	2,5	2	1,5	1,5	2
Tanos 50 WG	2,5	2	1,5	1,5	2
Electis 75 DG	2,5	2	1,5	1,5	2

Fungitsiidide toimemehhanism ja vihmakindlus

	Kaitsev toime	Raviv toime	Sporulatsiooni vastane	Vihmakindlus
Dithane NT	2	0	0	1,5
Shirlan	3	0	0	2,5
Ranman	3	0	0	3
Bravo 500 SC	2	0	0	2,5
Ridomil Gold MZ 68 WG	2,5	2,5	2,5	3
Tattoo	2,5	2	2	3
Glory	2,5	2	2	3
Acrobat Plus	2,5	1	2	2,5
Sereno WG 60	2,5	0	1,5	2
Tanos 50 WG	2	2	1	2,5
Electis 75 DG	3	0	0	2,5



Selection of fungicides

First treatments, normal or unfavourable conditions for late blight	Dithane, Shirlan, Electis, Acrobat Plus
First treatments, favourable conditions for late blight, possibility of being late with the first treatment	Ridomil Gold, Tattoo, Glory
Active growth of potato plants before the flowering	Ridomil Gold, Tattoo, Glory
Period of intensive infection and spread of late blight	Shirlan, Ridomil Gold, Electis
Rainy period	Ranman, Ridomil Gold, Shirlan
Prolonged dry period suppressing late blight, but being favourable for early blight	Electis, Dithane, Glory, Sereno, Tanos
Last treatments to avoid tuber blight	Ranman, Shirlan

Weather
circumstances

Growing stage

