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Early blight at potato crops and its control in Poland



Disease / Pathogen

Losses of the yield

Early blight

Genus: *Alternaria*

10-57% (Harrison, *et al.* 1965)

25%, locally **60%** (Bacanov 1970, Dorozkin 1972)

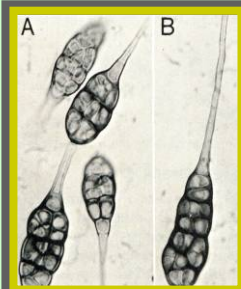
Average **20-30%** (Fry 1994),

Species:

Synonym

A.solani

Sorauer



***A.porri*, *Macrosporium solani*,
A.porri f.sp.*solani*, *A.dauci* f.sp.*solani***

A.alternata

(Fries.) Keissler



***A.tenuis*
*Torula alternata***

POTATO EARLY BLIGHT

– *Alternaria solani*
and *Alternaria alternata*



tenuazonic acid

„target” spots

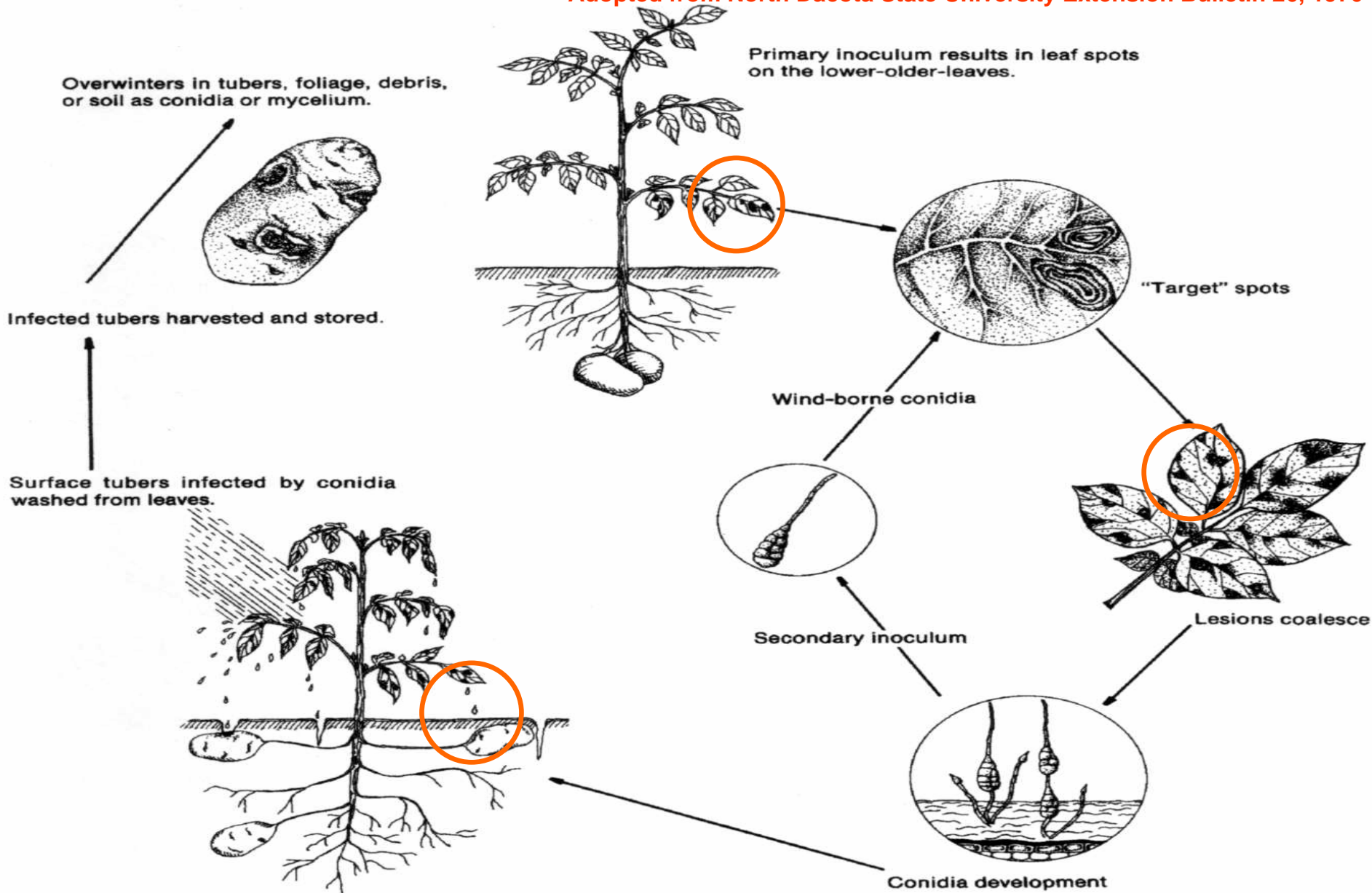


yellow zone –effect of
alternariol activity



Early blight disease cycle

Adopted from North Dakota State University Extension Bulletin 26, 1976



Dates of the first recorded outbreaks of early and late blight in potato fields in Poland (based on questionnaires)

Disease	Years of observations								
	1998	1999	2000	2001	2002	2003	2004	2005	2006
Late blight	23.06.	02.06.	07.06.	06.06.	21.05.	11.06.	17.06.	13.06.	05.06.
Early blight	20.05.	21.05.	31.05.	01.06.	20.05.	27.05.	04.06.	02.06.	04.06.



Incidence of early blight symptoms at potato fields in Poland

Year	Number of observed fields	Percentage of fields with early blight	Term of e.b. appearance (mean number DAP*)
1998	138	78,3	60
1999	93	88,0	65
2000	56	91,1	57
2001	50	96,0	61
2002	64	90,6	56
2003	34	85,0	63
2004	25	80,0	65
2005	21	86,0	54
2006	19	78,9	67
Σ / x	500	86,0	60,9

* DAP = number of days after planting

Comparative profile of early and late blight epidemics in experimental fields in the years 2004-2006

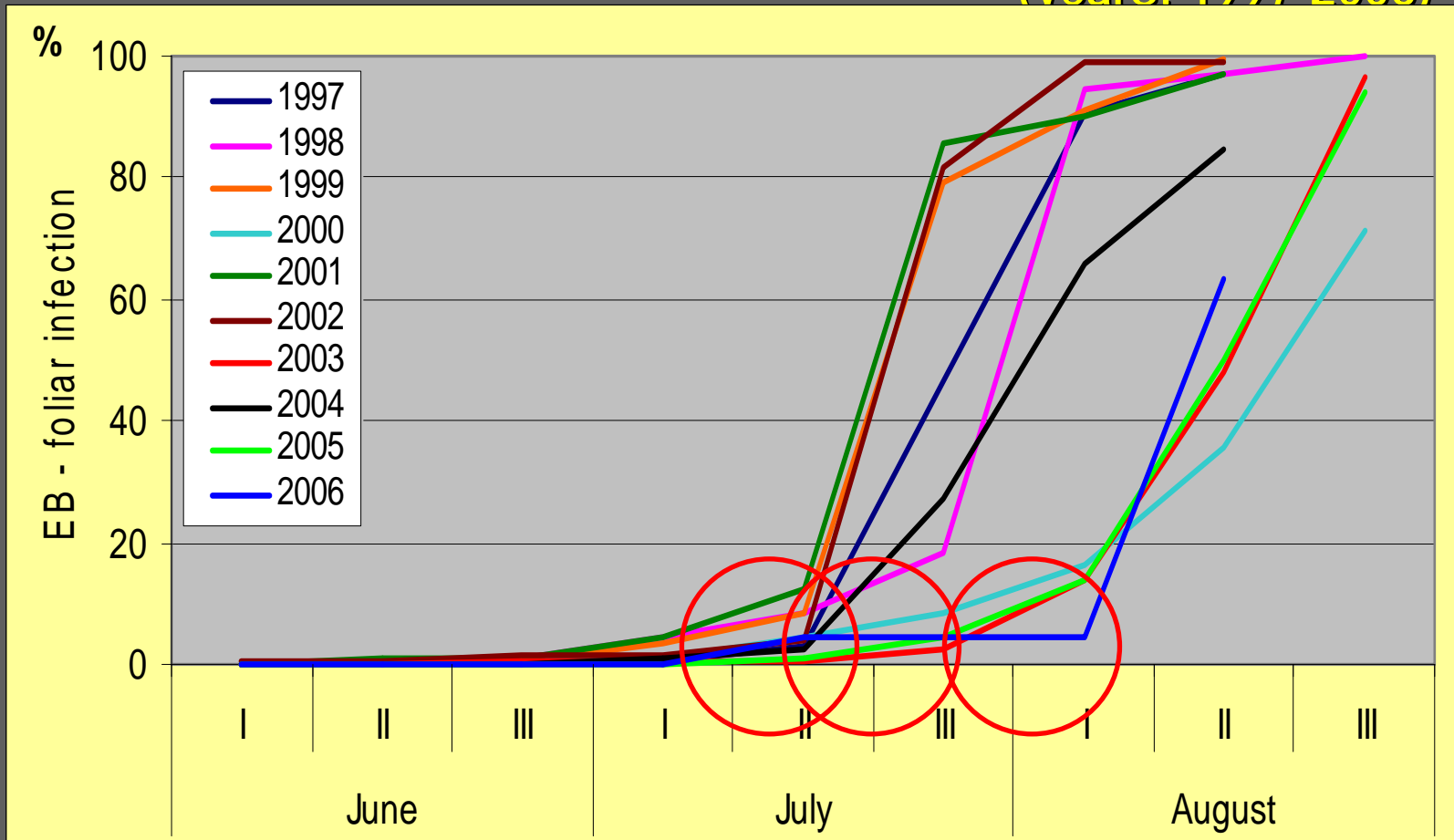
Year	Field location	The earliest infections of		Foliage infected (%) *		Rate of the disease development	
		early blight	late blight	early blight	late blight	early blight	late blight
2004	Bonin	22.06.	27.06.	84,6	99,6	0.151	0.400
	St.Olesno	17.06.	18.07.	65,9	77,0	0.237	0.192
2005	Bonin	27.06.	25.07.	94,1	99,1	0.124	0.359
	Mierzym	29.06.	29.07.	78,3	98,9	0.138	0.428
	Silnowo	05.07.	28.07.	59,0	98,4	0.114	0.281
	St.Olesno	24.06.	10.08.	99,6	91,9	0.131	0.215
2006	Bonin	27.06.	27.06.	63,4	95,3	0.139	0.571
	Mierzym	26.06.	18.08.	85,1	98,9	0.160	0.574
	Silnowo	13.07.	21.08.	-	50,0	-	0.365
	St.Olesno	01.07.	01.09.	94,1	-	0.181	-

* final assessment before haulm destruction



Early blight progress in unsprayed potato field in the North of Poland (at Bonin)

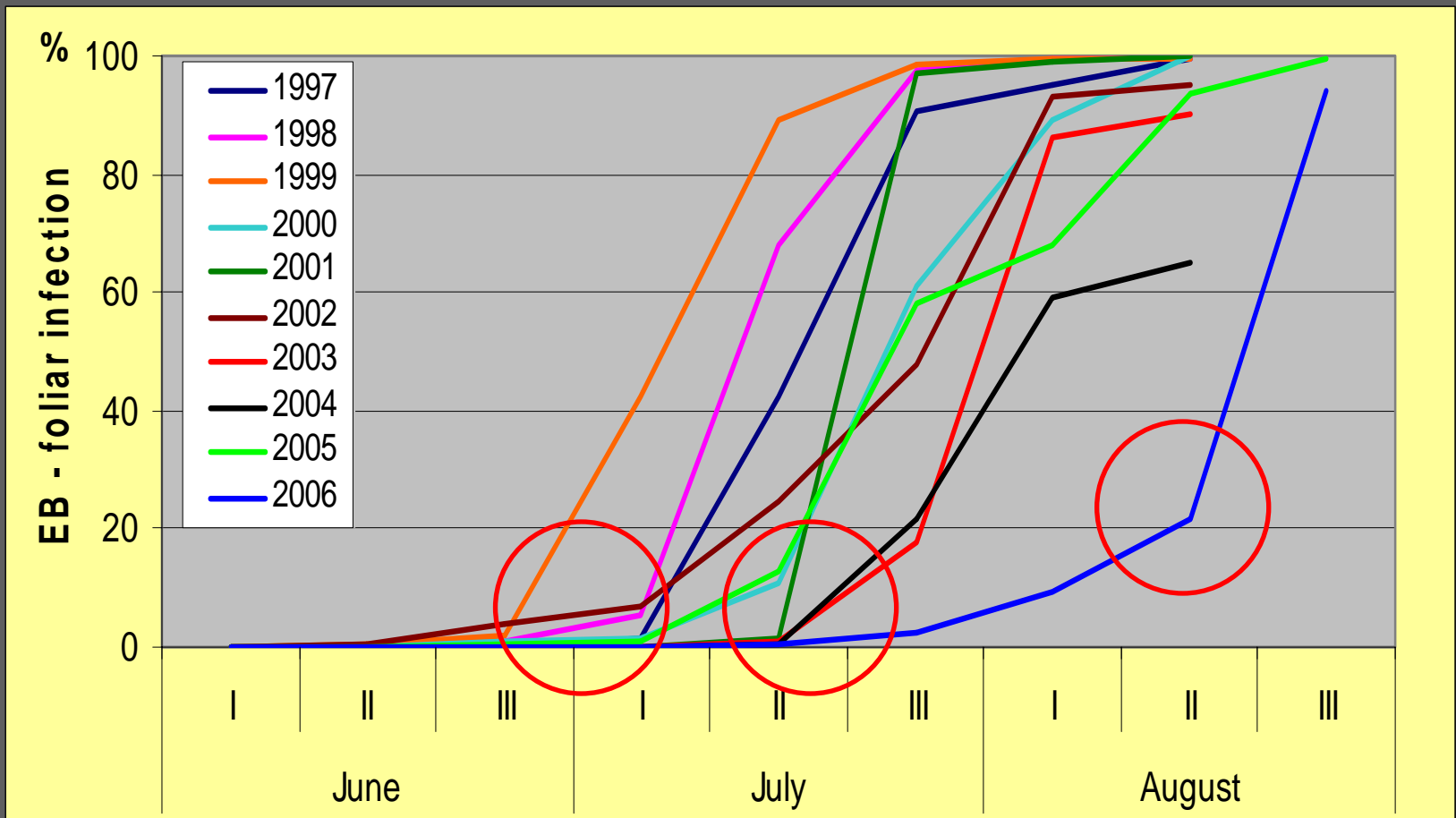
(years: 1997-2006)





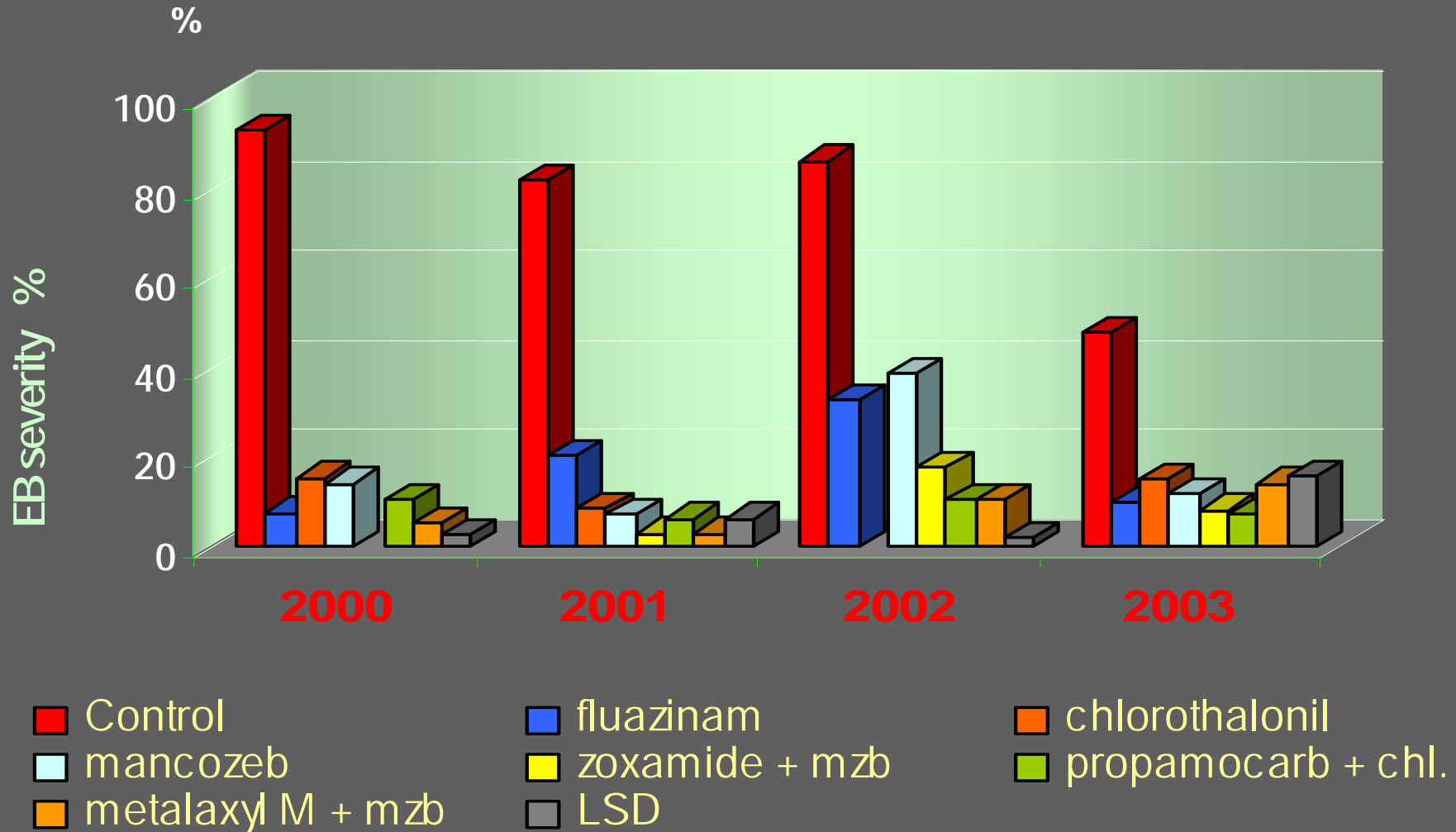
Early blight progress in unsprayed potato field in the South of Poland (at St. Olesno)

(years: 1997-2006)

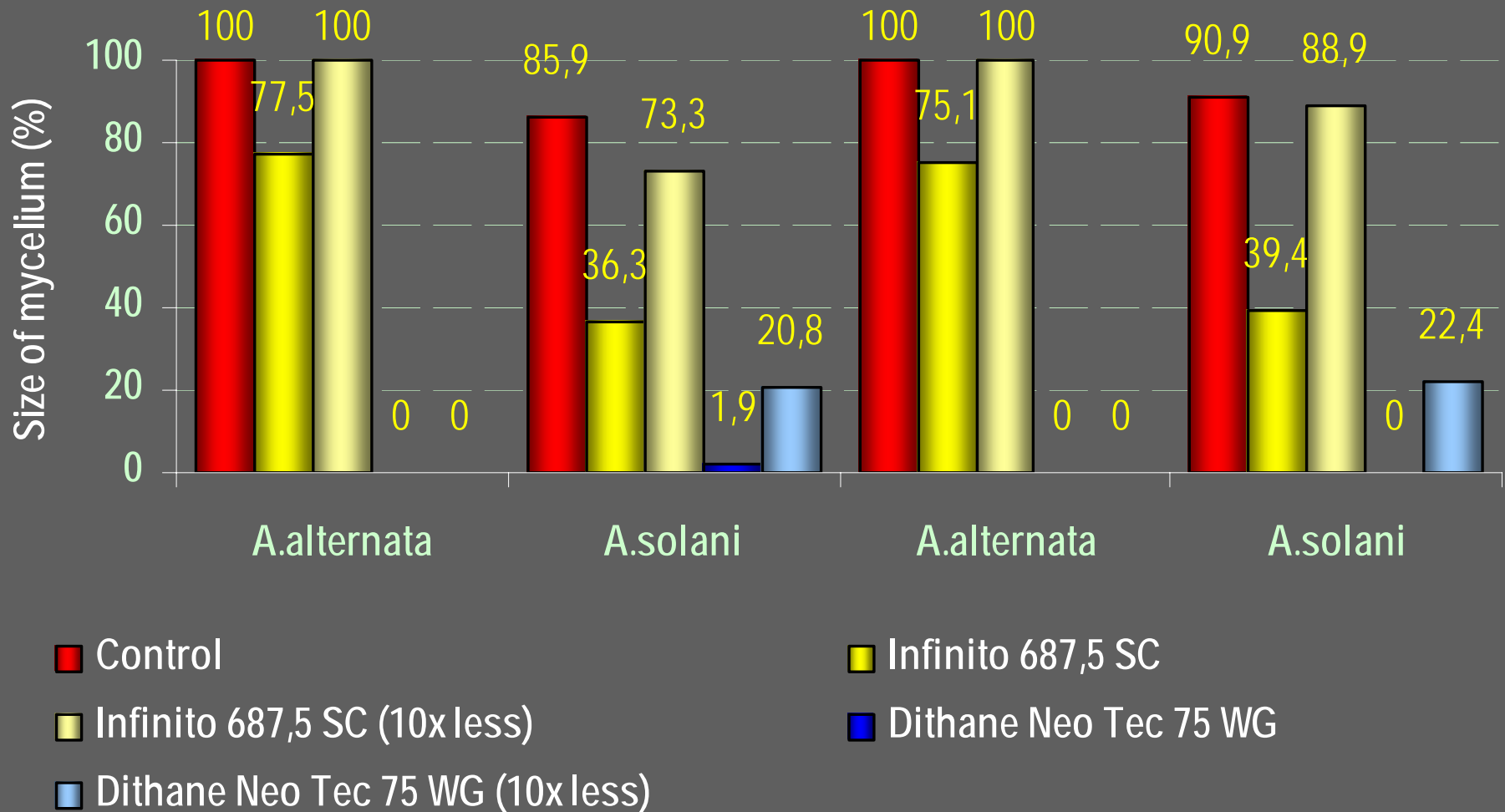


Effectiveness of some fungicides in early blight control

(years: 2000-2003, Bonin, 3 weeks after last application)



Reduce of *Alternaria* mycelium growth 12 days after inoculation



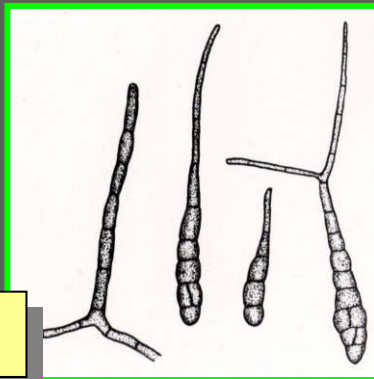
Results of field trials on evaluation of fungicide effectiveness in control of early blight in potato from different countries or regions show sometimes striking discrepancy. Maybe it is connected with composition of *Alternaria* genus in different regions.



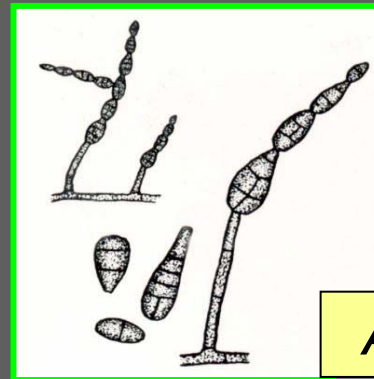
Is it possible to use Burkard spore trap for determine *Alternaria* species in potato fields?



Volumetric spore samplers trap spores of various fungal species as well as various pollens. Spores of *A.alternata* and *A.solani* have a specific shape and definite size, thus they are easily recognizable among other spores.



A.solani



A.alternata

System for Forecasting Disease Epidemics (SPEC)

- SPEC has been operating since 1st September 2004 as a joint initiative of [Institute of Plant Genetics PAS](#) and [DuPont Poland](#) and in cooperation with research organisation such as COBORU, IOR as well as University of Rzeszow.
- It is the first system in Poland that aims to forecast the risk of stem canker of oilseed rape - one of most dangerous diseases of rapeseed in Poland and worldwide. The system is based on estimation of pathogenic fungi ascospores (*Leptosphaeria maculans* & *L.biglobosa*) concentration in the air.
- . In 2004 monitoring took place in 5 locations in central and western Poland. Five new Burkard spore trapes were added in 2005 and monitoring of ascospore concentration in the air also covered the eastern regions of Poland.
- At present SPEC is the biggest system aimed at monitoring stem canker in the world.

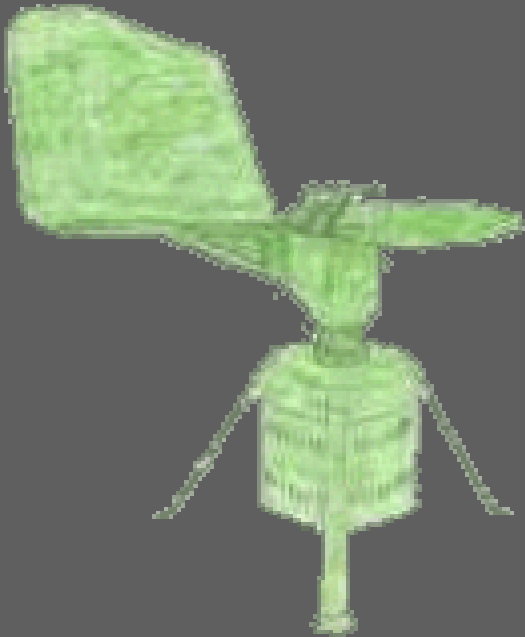
Location of traps in Poland:

10 traps are placed in regions of intensive oilseed rape breeding across the country:



1. Pomerania region (Experimental Station for Variety Testing in Rarwino near Kamień Pomorski);
2. Pomerania Lakeland (Experimental Station for Variety Testing in Radostowo near Tczew);
3. Mazuria and east Varmia (Agro Fundusz Mazury in Drogosze);
4. Great Poland (Institute of Plant Genetics PAS in Poznań);
5. Mazovia (Experimental Station for Variety Testing in Glebokie near Kruszwica);
6. Sudethian Foothills – Lower Silesia (Experimental Station for Variety Testing in Tarnów near Zabkowice Śląskie);
7. South part of the Opole region (commercial enterprise “Arenda” in Charbielin);
8. Lubuskie – Lower Silesia region (Institute of Plant Protection, Department in Sosnowice near Gliwice);
9. Carpathian Foothills and Cracow region (Krasne near Rzeszów and Department of Agrobiological and Environmental Protection at University of Rzeszów);
10. Lublin region (Institute of Soil Science and Plant Cultivation in Pulawy).

BURKARD SPORE TRAP: seven days volumetric spore trap (Burkard Manufacturing Inc., UK and Lanzoni, Italy)



The traps suck in air actively ($10 \text{ m}^3/\text{h}$) together with hovering spores and pollen which are deposited inside the trap on a tape covered with vaseline. The tape is fixed to a clockwork drum that rotates at 2 mm/h .

BURKARD SPORE TRAP: seven days volumetric spore trap (Burkard Manufacturing Inc., UK and Lanzoni, Italy)



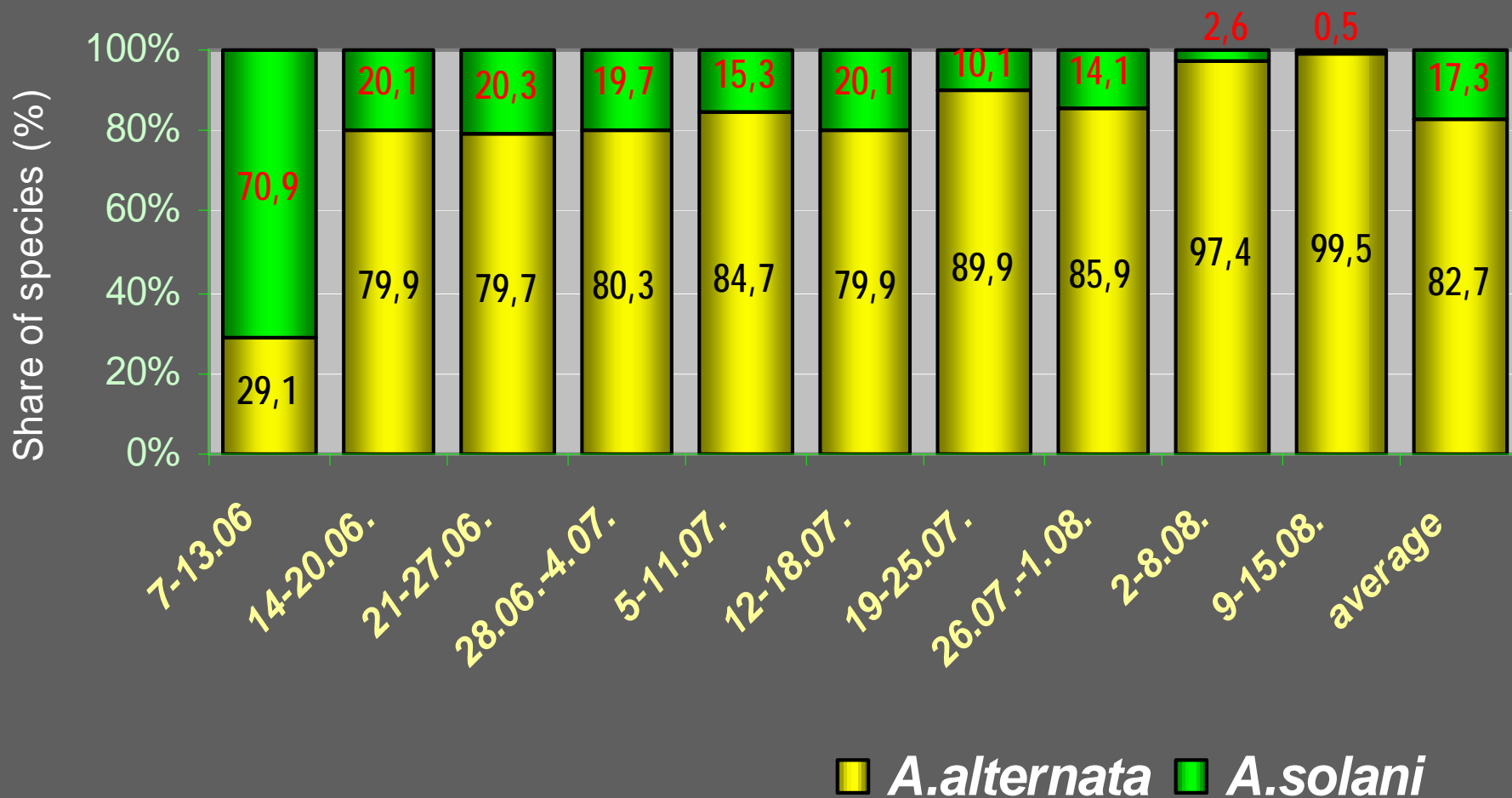
After one week the tape is removed from the drum and cut into 48 mm pieces, each representing 24 hours of trap operation.

Observation of the tape slides under the microscope can determine when exactly (day and hour) spores were present in the air. As the speed of air flow is known and constant, it is feasible to estimate precisely the concentration of spores in 1 m³ of air.

Number of *Alternaria* spores from Burkard spore trap in 2006 season

Time of observation	Number of genus <i>Alternaria</i> spores		
	Totality	<i>A.alternata</i>	<i>A.solani</i>
07.06.-13.06.	127	37	90
14.06.-20.06.	154	123	31
21.06.-27.06.	128	102	26
28.06.-04.07.	71	57	14
05.07.-11.07.	509	431	78
12.07.-18.07.	164	131	33
19.07.-25.07.	109	98	11
26.07.-01.08.	149	128	21
02.08.-08.08.	157	153	4
09.08.-15.08.	214	213	1
Σ	1782	1473	309

Share of different species within genus *Alternaria* at potato field - y.2006



An aerial photograph of a vast agricultural field, likely a tobacco plantation, showing neat rows of vibrant green plants stretching across the landscape. The perspective is from a high angle, looking down on the rows. The plants are densely packed, and the soil between the rows is visible as a lighter brown color. The overall scene is one of a well-maintained and productive farm.

**Thank you
for your attention**

Control of early blight- The percentage of haulm destruction caused by early blight (Poland, PBAI Bonin, 2001-2003)

