

INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

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„Facultative wheat cultivars – **the diagnosis of pest risk and chances for cropping in Poland**“

24. května 2013, od 9.00 hod, A34 MENDELU AF (budova A)

Akce je realizována v rámci klíčové aktivity 02 „Interdisciplinární vzdělávání pracovníků výzkumu a vývoje projektu

EXCELENCE DOKTORSKÉHO STUDIA NA AF MENDELU
PRO NAVAZUJÍCÍ EVROPSKOU VĚDECKO - VÝZKUMNOU KARIÉRU
CZ.1.07/2.3.00/20.0005

Tento projekt je spolufinancován z Evropského sociálního fondu a státního rozpočtu České republiky



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Dep. of Plant Growing Principles and

Experimental Methods

University of Technology and Life Sciences

in Bydgoszcz

Poland

Spotlight on Poland

In the World



In Europe



Area

•31 300 000 ha (31,3 mln)

Population

39 million

Capital

Warsaw - 2,219,000 people

Political Status

The Solidarity movement brought democracy in 1989.

2005 – part of European Union

Geography topography climate



91% of the territory is less than 300 m above sea level. The highest point is 2499 m, the lowest point is 1.8 m below sea level. Three main mountain ranges: the Carpathians, the Sudetes and the Holy Cross Mountains. The longest river is the Vistula (1047 km). Poland has some 9300 lakes with an area of over 1 ha; they make up 1% of the country's territory. Climate - moderate with both maritime and continental elements. Six seasons including early spring (March) and early winter (November). Last years very various .

Polish Agriculture



Number of farms – **1, 543, 000**

Total population of people actively farming – **4, 250, 000**

Average area of farm – **12 ha** (farms with over 300 ha make up **15 %** of farmlands)

Growing season in Poland lasts **205-220** days

total country area is covered by:

Farmlands – **57 %**

Field crops – **44 %**

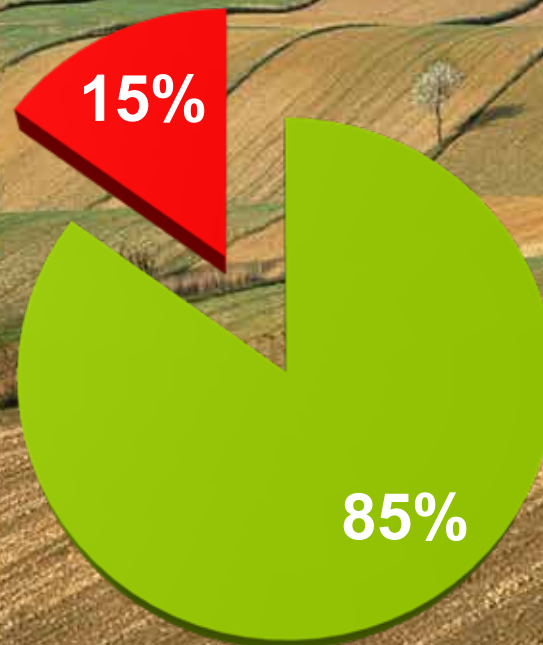
Orchards – **1 %**

Cereals crops – **73 %** of total fields

In Poland 17,2 mln ha are rural areas,
10,5 mln ha crop land, 1,8 mln ha - **WHEAT**

Wheat forms in Poland and % in cropping

■ winter wheat ■ spring wheat



The world grows about 220 million hectares of wheat, of which 75 million ha of winter wheat and facultative form (Braun and Saulescu 2002).

Facultative forms of wheat as compared to winter wheat are :

1. less resistant to frost and winter hardness ,
2. require a shorter period of vernalization ,
3. faster start vegetation in the spring
4. bloom and ripen faster

SPRING WHEAT CULTIVARS :

CAT.

- A. Qualitative
- B. Bread
- C. General utility



Definition of facultative wheat in Poland:

This is **spring cultivar** with attributes :

1. Improved resistance to frost in the early stages of development BBCH 07 -13
2. the cold hardiness greater than the other cultivars
3. useful for the late autumn sowing

**Yield and winter hardiness of the best varieties
in 2010-2012 – region of Kujavia and Pomerania**

Cultivar	Grain yield dt/ha	winter hardiness (%)
Bombona (PL)	75,4	63
Katoda (PL)	76,5	61
Monsoon (GE)	73,2	58
Ostka Smolicka (PL)	77,0	71
Tybalt (PL)	76,5	67
Parabola (PL)	65,0	61

1. The main reasons and interest of FACULTATIVE CROP

wheat producers

want to overcome the early
spring drought

Monzun – siew
jesienny

Monzun – siew
wiosenny

Autumn term

Spring term



2. The main reasons and interest of FACULTATIVE CROP



FOLLOWING
the
forecrops
late coming
down from
the field:

Corn for
grain



Sugar beet



3. The main reasons and interest of FACULTATIVE CROP

sandy soil for shallow cultivation

FAVORS

to enter with equipment in the autumn



4. The main reasons and interest of FACULTATIVE CROP



grain quality:

- * total protein content
- * gluten
- * falling number
- * sedimentation

are better in these varieties than in winter wheat varieties



CULTIVATION BEFORE SOWING

Forecrop

- Corn
- tillage is needed to cover a large amount of post-harvest residues and the Campbell's shaft

Forecrop

- Sugar beet
- Active tool unit for seedbed with Gruber's section

Forecrop

- Wheat
- plowing after harvesting wheat in mid-September, Roundup Energy, tillage with Campbell's shaft

SOWING DATES



**NOVEMBER-
DECEMBER**

OCTOBER

**LATE
EARLY
FECULTATIVE**



Threats ...

abiotic stress

Soil

- Too heavy
- Too wet
- Too loose

Winter

- Without snow cover
- Temperature below -15°C

Spring

- Delate in growing season

wrong prepared soil for sowing
seeds too deep - the main limiting factor



The syndrome of **cold soil**
too dense and moist



TOO HEAVY SOIL
LOSSY EMERGENCY



limiting factor

The syndrome of compacted soil



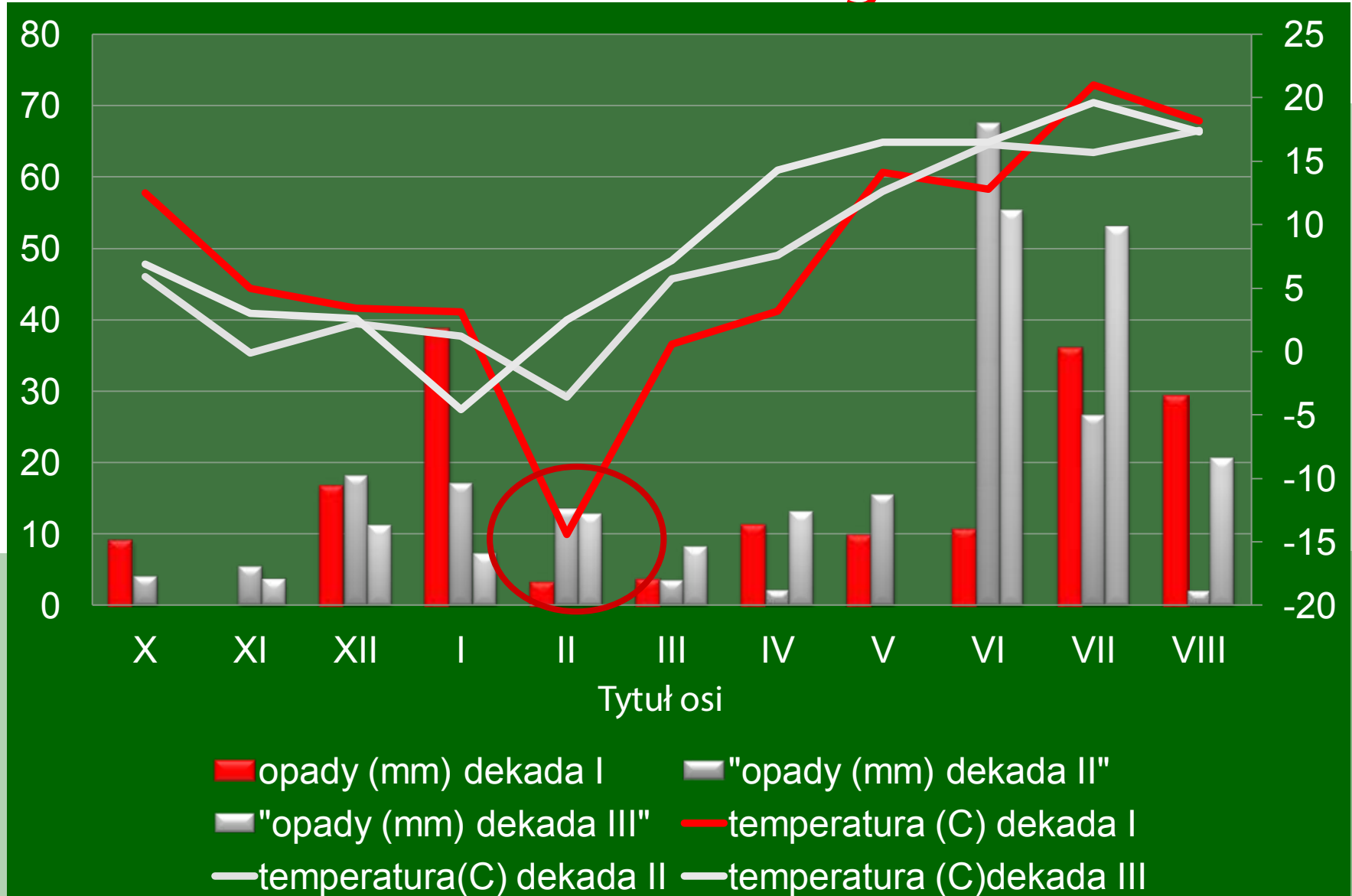
EXTRA
DROUGHT



LOSSY EMERGENCY

Harsh winter

2011 -2012 - **limiting**







YIELD: 30,8 dt/ha





favorable conditions



Seedlings are in soil ,
covered by the snow



A large field of green corn plants, likely a trial plot. In the foreground, a white sign with the number '26' is visible. The field is densely packed with young corn plants. In the background, there are more rows of corn and some white markers. The overall scene is a lush green agricultural field.

Good luck ...

Threats ...

biotic stress

Diseases

- Foot root rot complex
- Rusts
- Powdery mildew
- Septoria
- FHB (Scab)

Pests

- Cereal leaf beetle
- Cereal aphids

Weeds

- Monocots
- Dicotyledonous (winter and spring forms)

Project granted by Polish Ministry of Agriculture for 2010 -2014

DIAGNOSIS OF THE RISKS POSED BY DISEASES AND PESTS

FUNGAL DISEASES OF WHEAT



1st FACTOR - FORECROP

**a1 - monoculture of wheat forms,
a2 - seed corn crop,
a3 - sugar beet.**

2nd FACTOR - TERM OF SOWING

b1 - facultative

b2 - spring,

Seed dressing

Triadimenol+ imazalil+ fuberidazol

3rd FACTOR - INTENSITY AGAINST DISEASE CONTROL

c1 - control, without protection treatments

c2 - T2 (BBCH 32-65) with prothioconazole and fluoksastrobine,

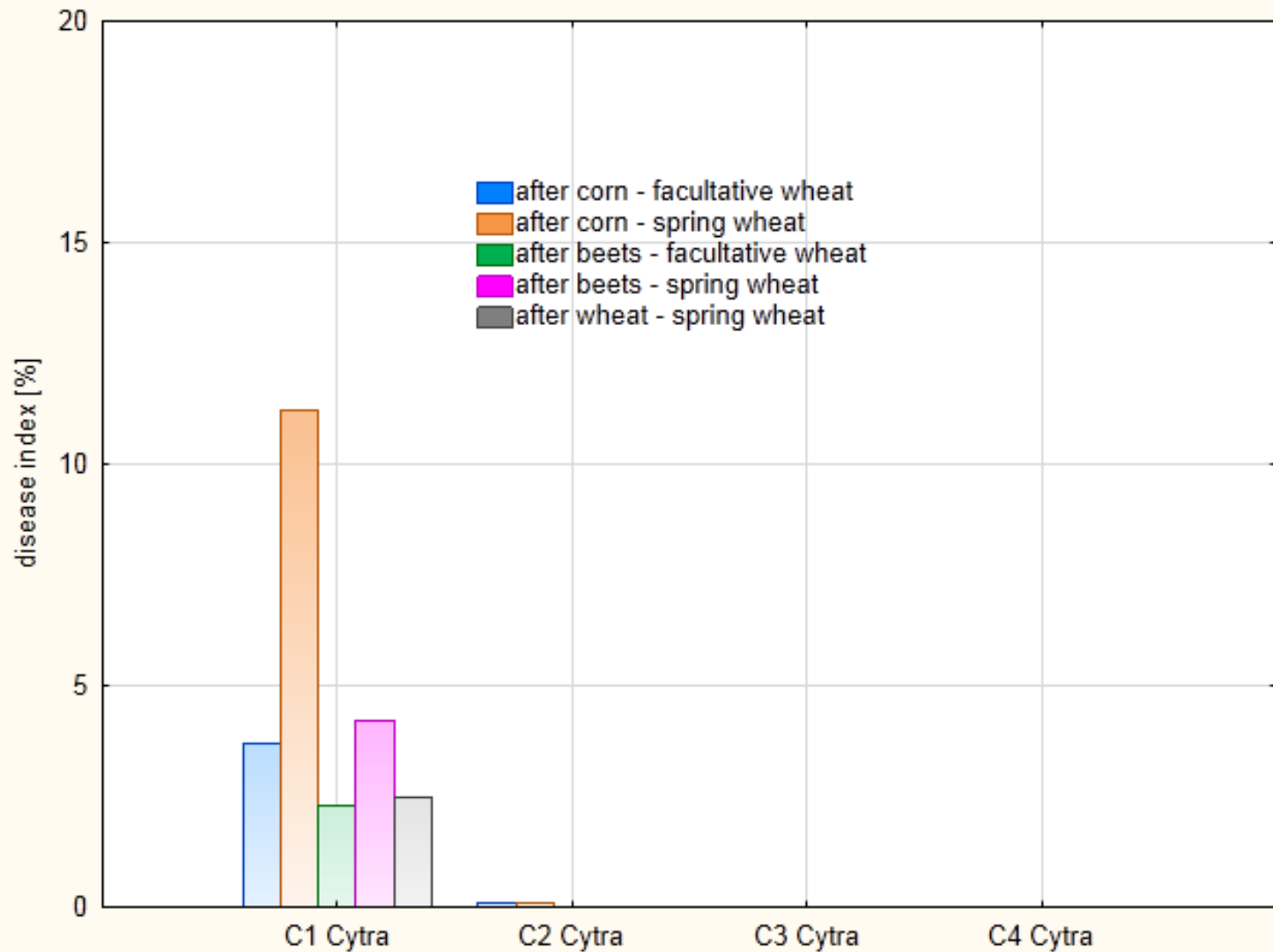
c3 - T1 (BBCH 30-32) + T2 (BBCH 41-65) with spiroxamine and prothioconazole, and mixture of fluoksastrobine and prothioconazole,

c4 - T1 (BBCH 29-31), T2 (BBCH 37-51) and T3 (BBCH 65-69) for the full protection of stem base and roots, leaves and heads

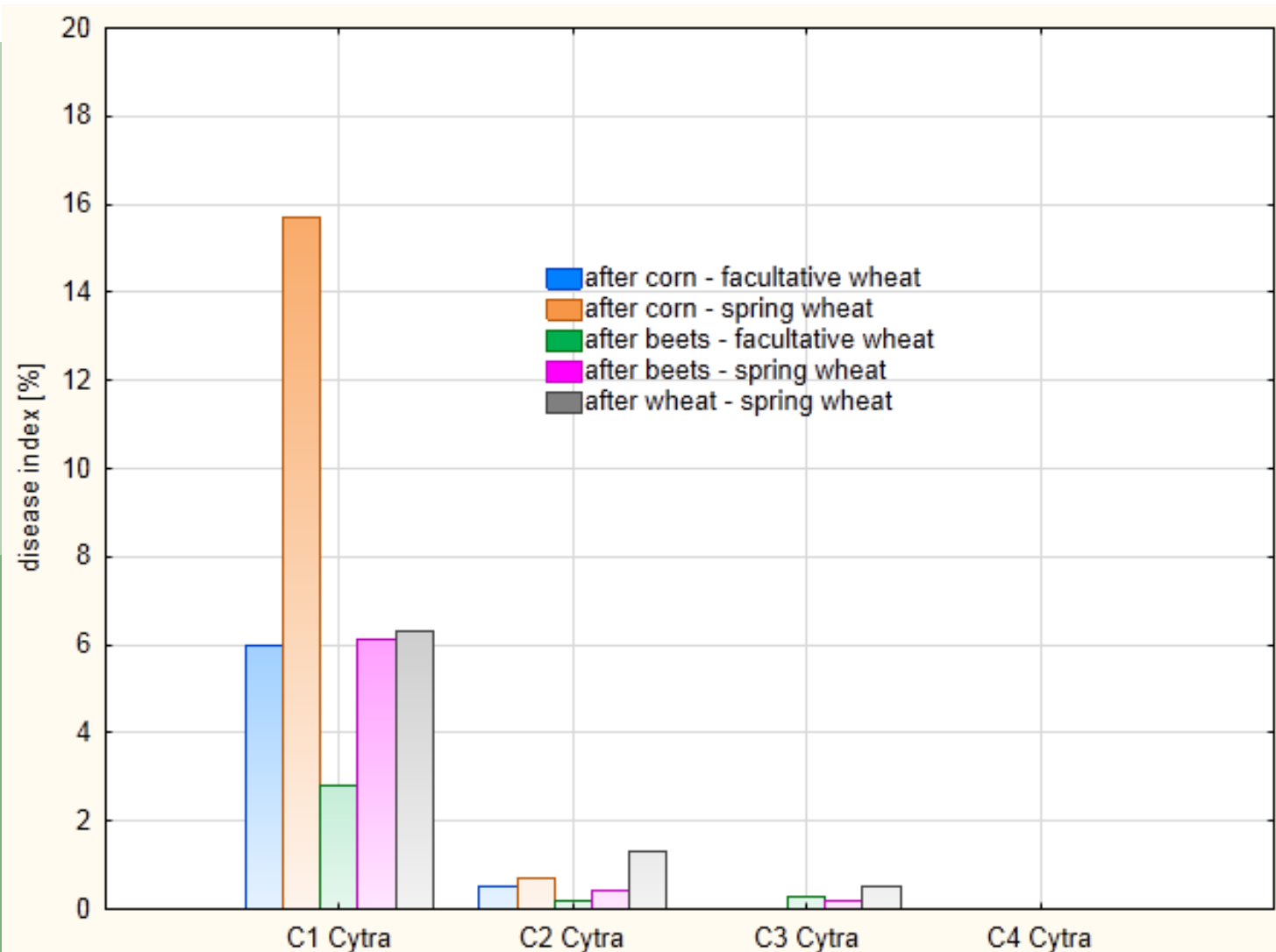
(+ tebukonazole)

4th - TWO CULTIVARS : Monsun and Cytra (Ostka Smolicka)

treatments against rusts in wheat sown after various forecrops



fungicidal treatments against *Setporia nodorum* in wheat sown after various forecrops



Micotoxins profile

Treatment			Metabolites (ppb)									
Fore-crop	Fungicide	Cultivar	DON		NIW		ADON		HT-2		ZEA	
			S ¹	F ²	S	F	S	F	S	F	S	F
Wheat	Control	Monsun	49,75	nw	<3,00	nw	10,80	nw	<2,00	nw	1,76	nw
		Cytra	300,00	nw	6,05	nw	42,40	nw	7,40	nw	7,89	nw
	T1 + T2	Monsun	116,50	nw	3,86	nw	7,27	nw	<2,00	nw	5,67	nw
		Cytra	261,75	nw	12,60	nw	22,46	nw	8,06	nw	3,26	nw
Corn	Control	Monsun	79,30	29,60	3,29	nd	11,60	nd	<2,00	nd	1,07	1,61
		Cytra	707,00	360,00	7,78	nd	103,00	6,53	1,43	<2,00	17,46	24,20
	T1 + T2	Monsun	108,00	11,00	<3,00	nd	21,10	nd	nd	<2,00	0,53	<0,20
		Cytra	702,40	71,60	13,80	3,81	85,50	nd	0,65	nd	5,66	6,22
Sugar beet	Control	Monsun	66,65	169,10	5,58	4,90	14,70	17,30	3,13	4,26	0,71	0,52
		Cytra	260,50	333,00	7,58	12,70	20,63	29,78	13,50	2,9	3,73	3,44
	T1 + T2	Monsun	39,70	71,55	4,66	4,14	6,08	15,30	<2,00	2,51	0,76	1,53
		Cytra	360,50	120,00	7,02	nw	43,80	5,30	11,50	nw	3,01	3,58



PESTS OF WHEAT

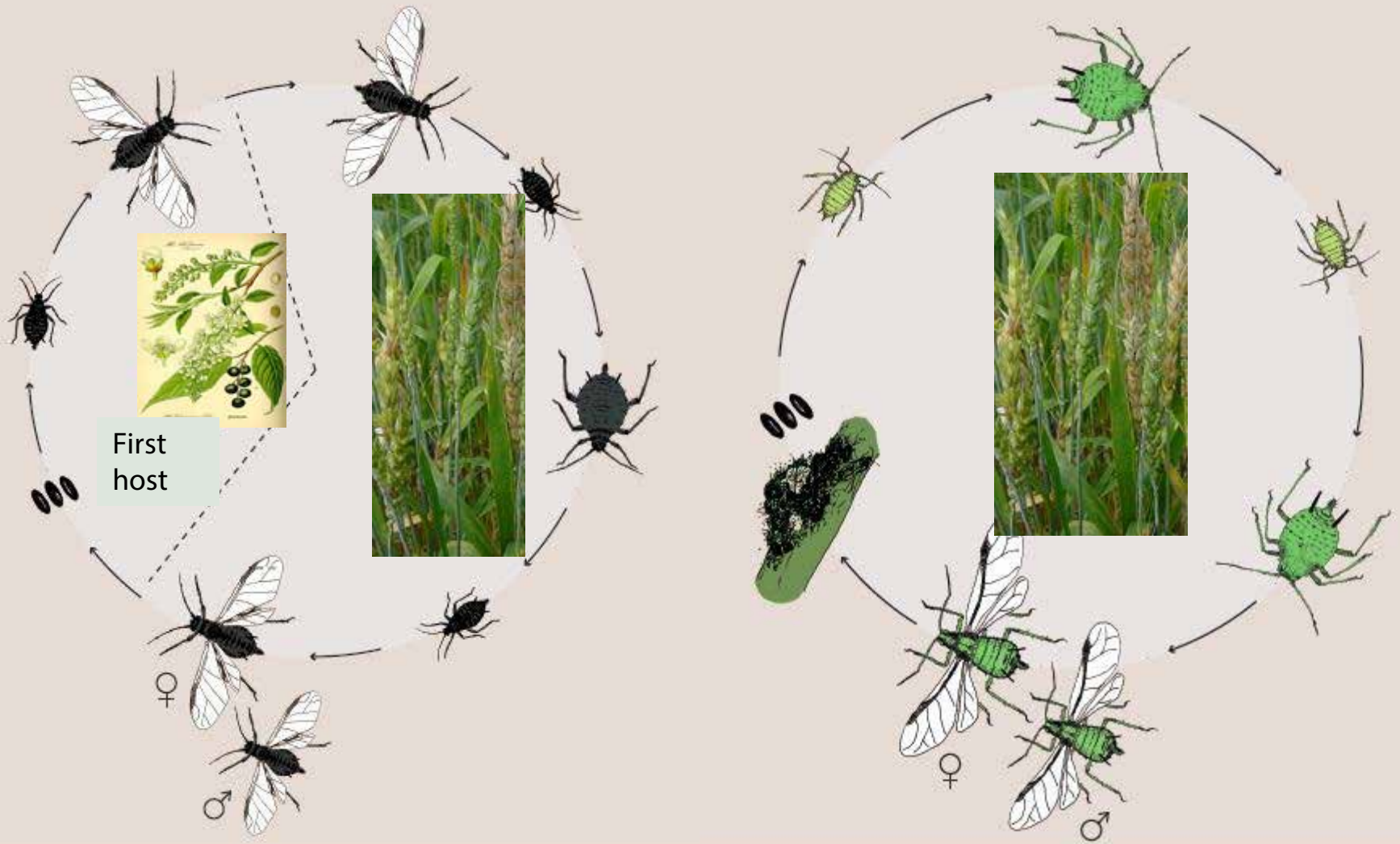
Aphids
RHOPPA
MACSAV



Oulema sp.

ALERT!

Bird cherry grain aphid anholocyclic forms in the autumn sowings of spring wheat, which can cause infection with the BYDV.



holocyclic

anholocyclic

FIELD EXPERIMENT-pest control program

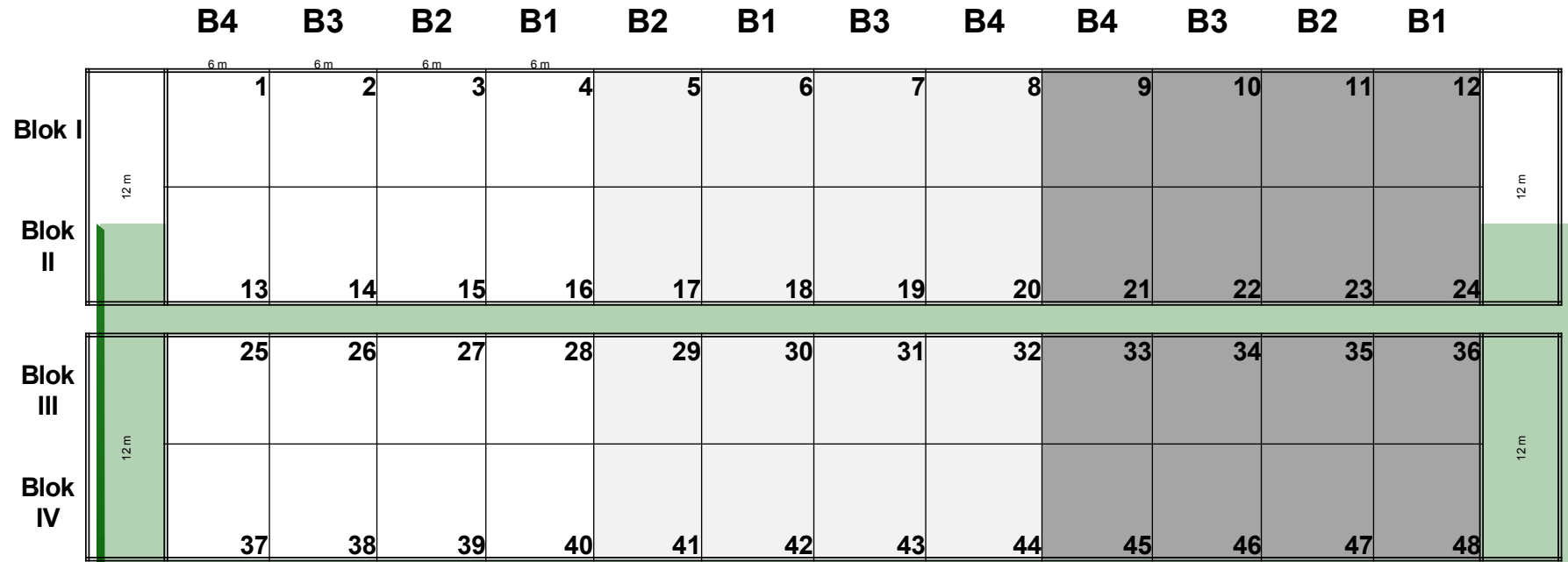
1st - term seeding of spring wheat cv. Monsun:

- a1 – early facultative (October 2nd decade),
- a2 – late facultative (after November 3rd decade),
- a3 - spring (March 25 - April 5),

2nd – treatments against pests:

- b1- control, lack of insecticidal seed treatment + no interventional insecticides,
- b2 – lack of insecticidal seed treatment + interventional mixtures of insecticides,
- b3 – insecticidal seed dressing + no interventional insecticides,
- b4 – insecticidal seed dressing + interventional mixtures of insecticides.

Experimental layout



2012 date of sowing

13.10

29.11

23.04

- B1 BAYTAN,**
- B2 BAYTAN+insecticides**
- B3 ASTEP 225FS,**
- B4 ASTEP 225FS+insecticides**

THIS PROGRAM IS BASED ON:

The insecticidal seed treatment

Astep FS 225 for wheat having a double track: against diseases (prothioconazole) and against pests containing imidac hloprid .

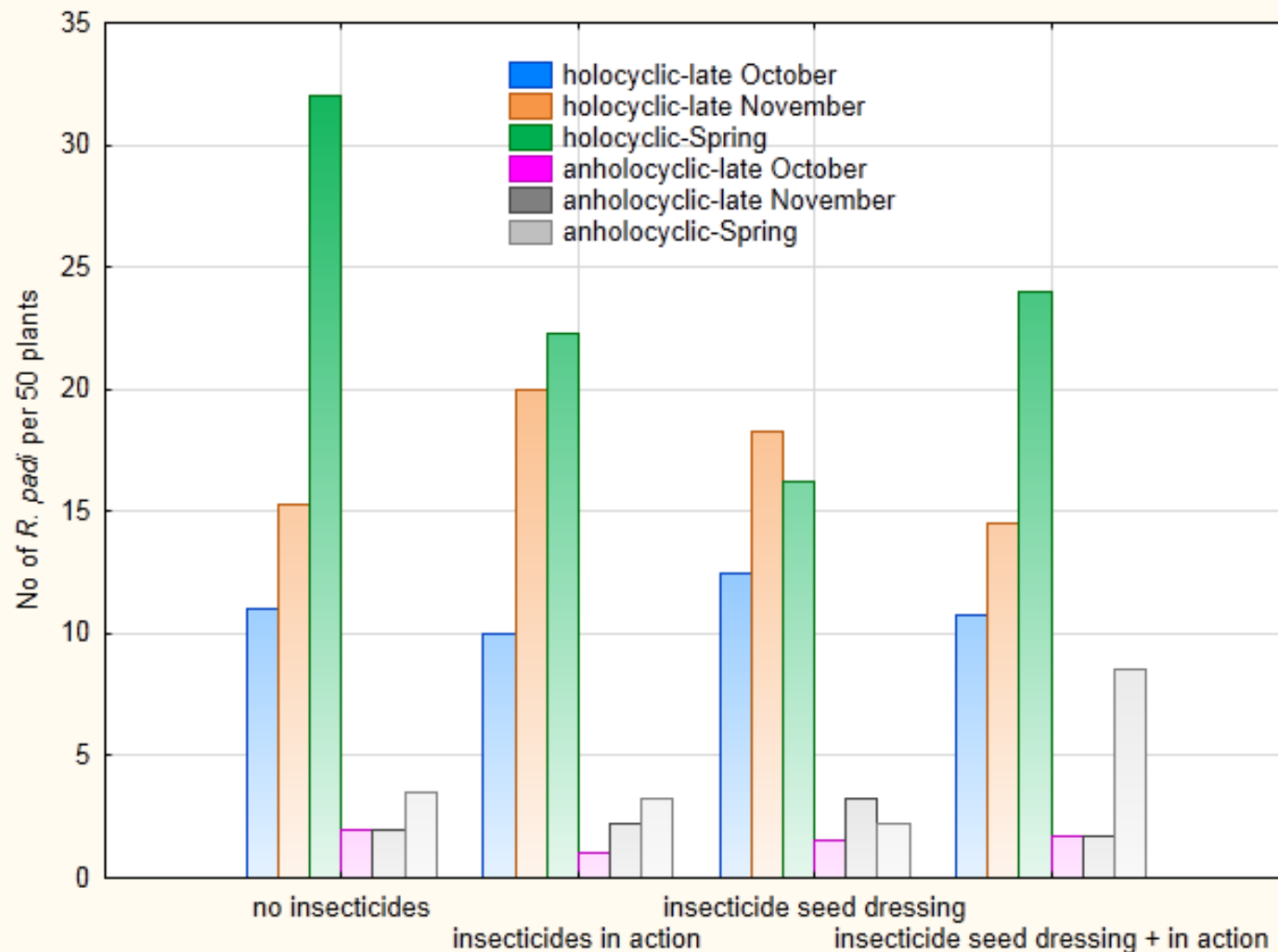


The use of interventional treatment in the form of active substances mixture applied at BBCH 31

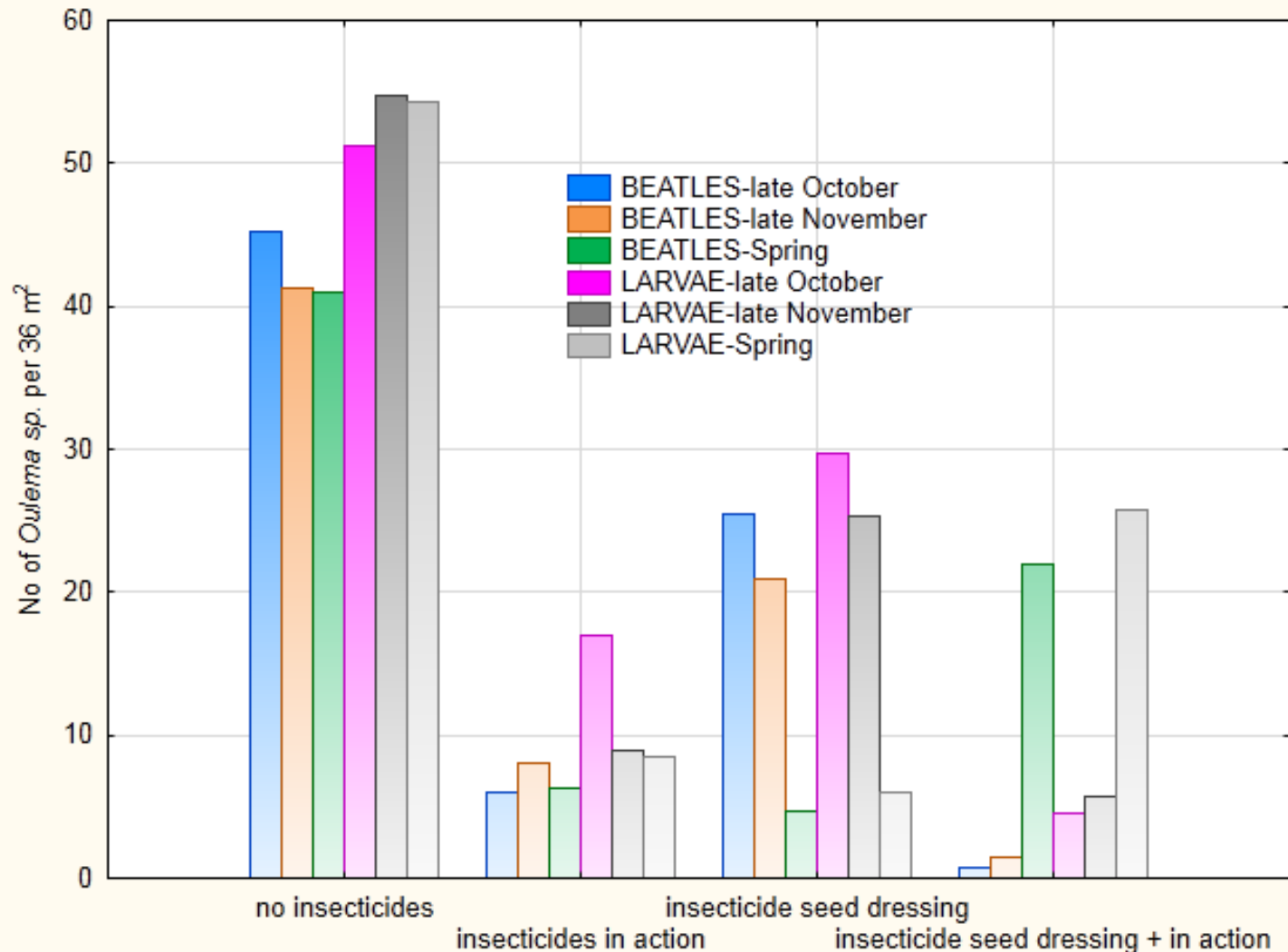
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Deltametryne (AGRIA) + dimethoate (BI58) + pirimicarb (PIRIMOR) against cereal leaf beetles and aphids.

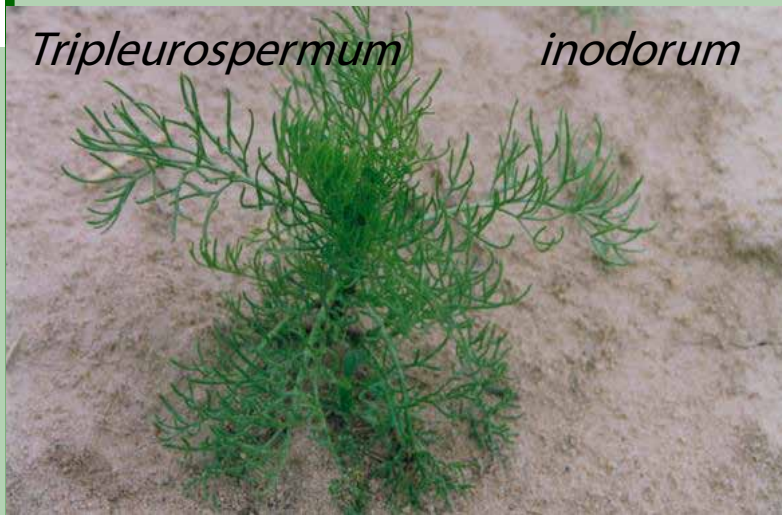
insecticidal treatments against *aphids* in wheat sown at various terms



insecticidal treatments against *Oulema sp.* in wheat sown at various terms



WEEDS OF FACULTATIVE WHEAT

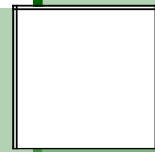
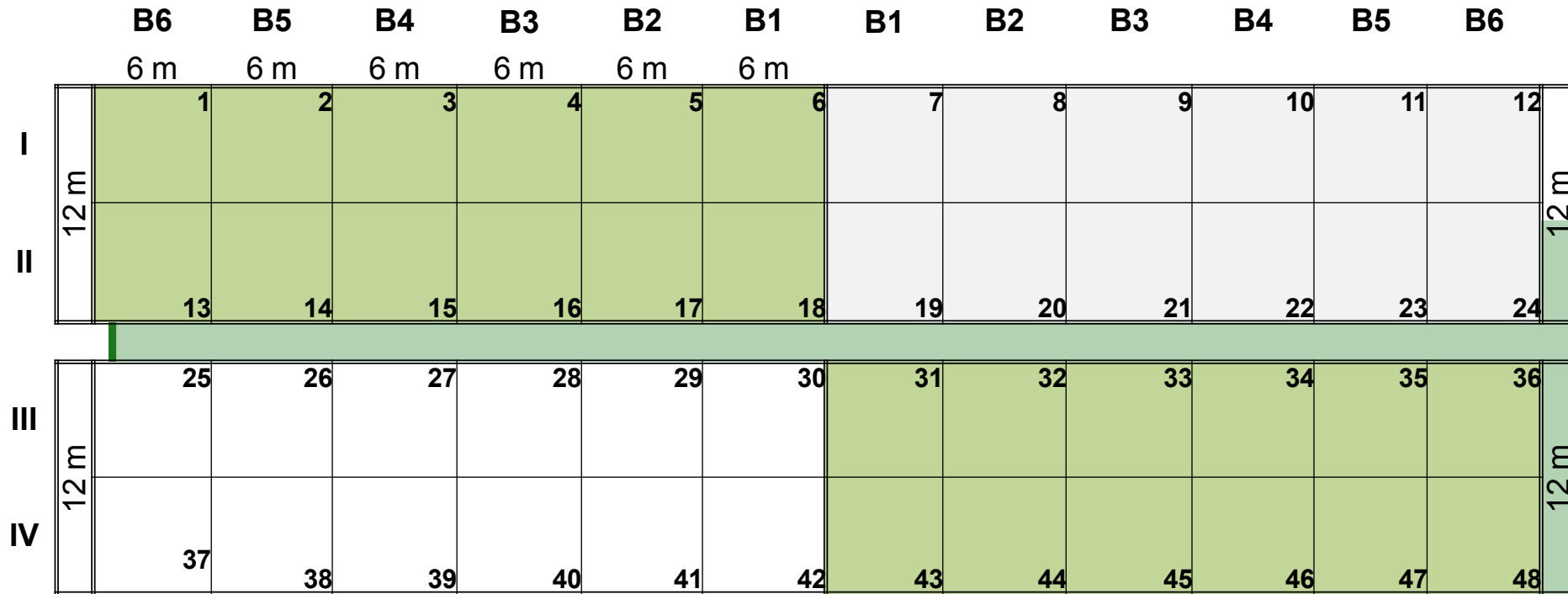


FIELD EXPERIMENT

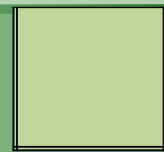
Weed control program



Experimental layout



no glifosate

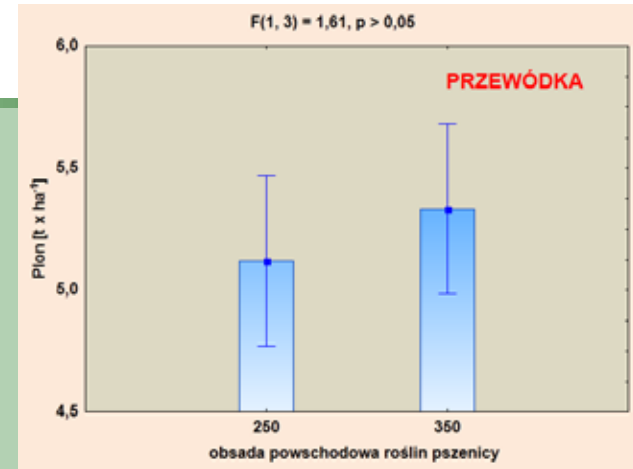
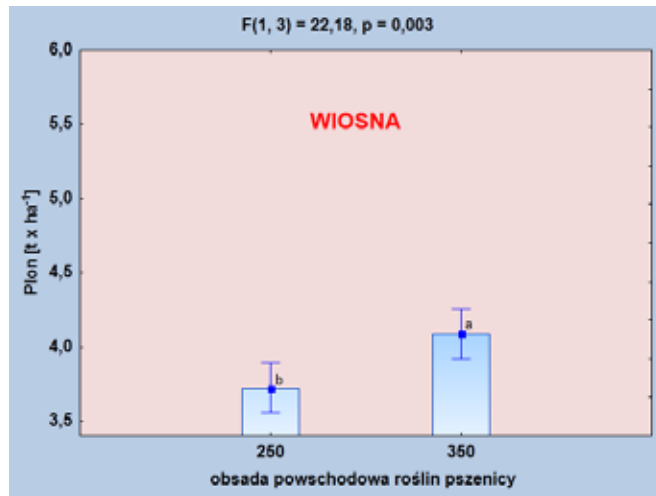


glifosate

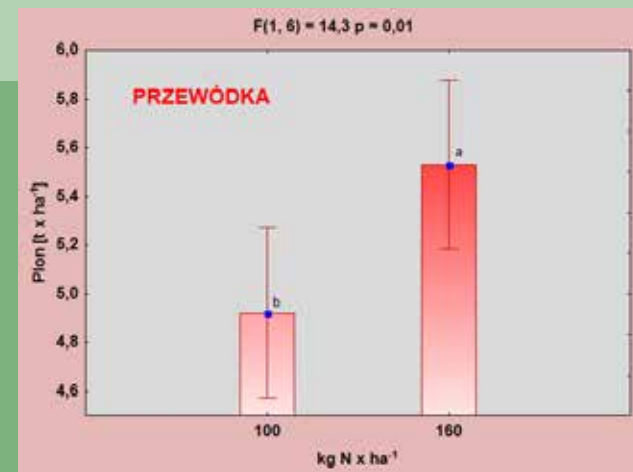
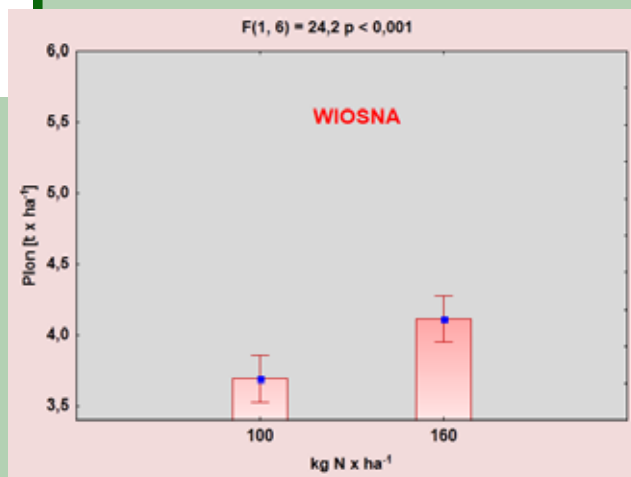
- B1 CONTROL
- B2 MCPA+sulfosulfuron
- B3 Florasulam+2,4D+sulfosulfuron
- B4 Tibenuron methyl+sulfosufuron
- B5 Tifensulfuron+chlorosulfuron
- B6 Fluoksypr+Florasulam

Results of yielding

Data from 2009/2010



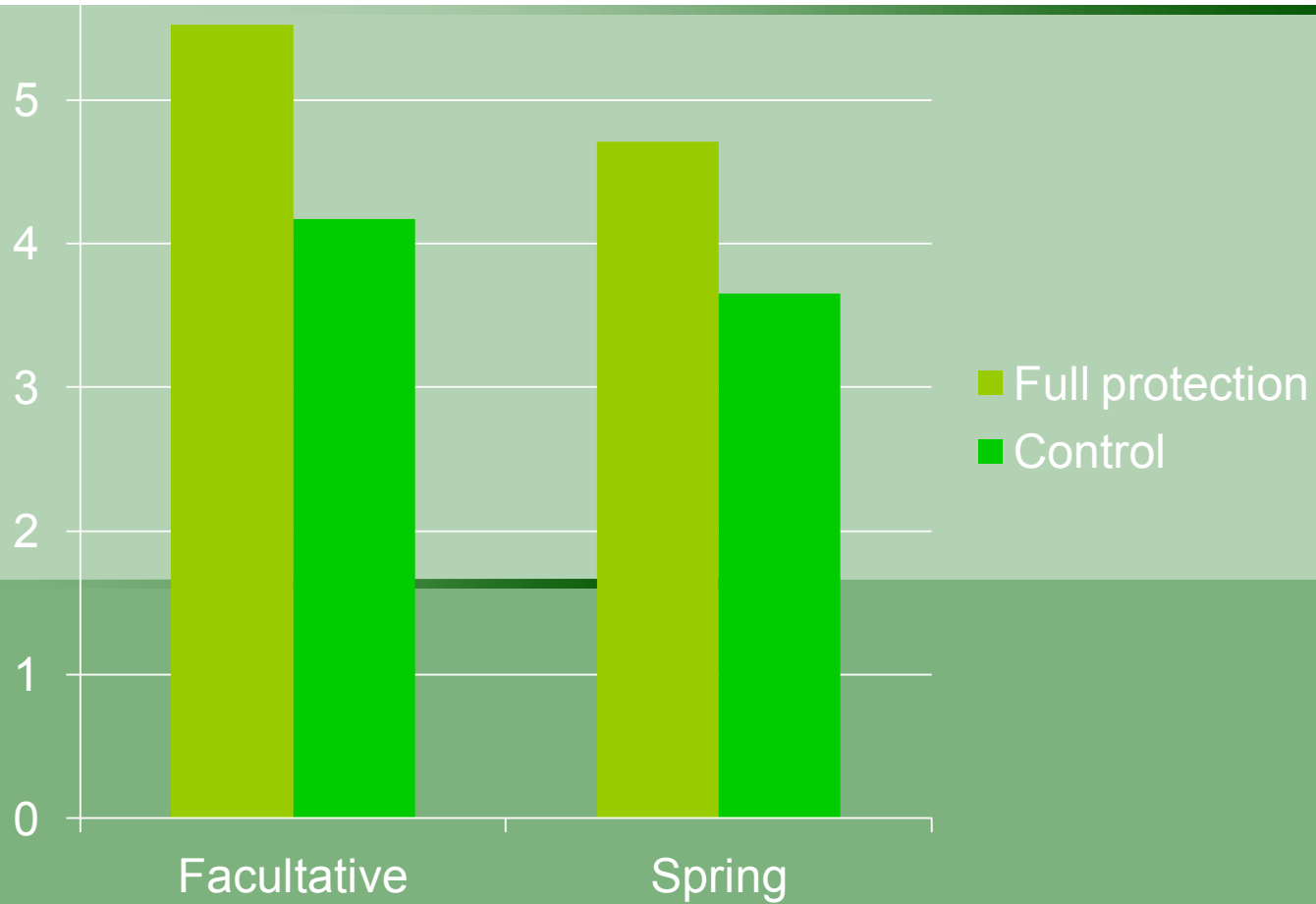
Response of wheat to the density at emergency



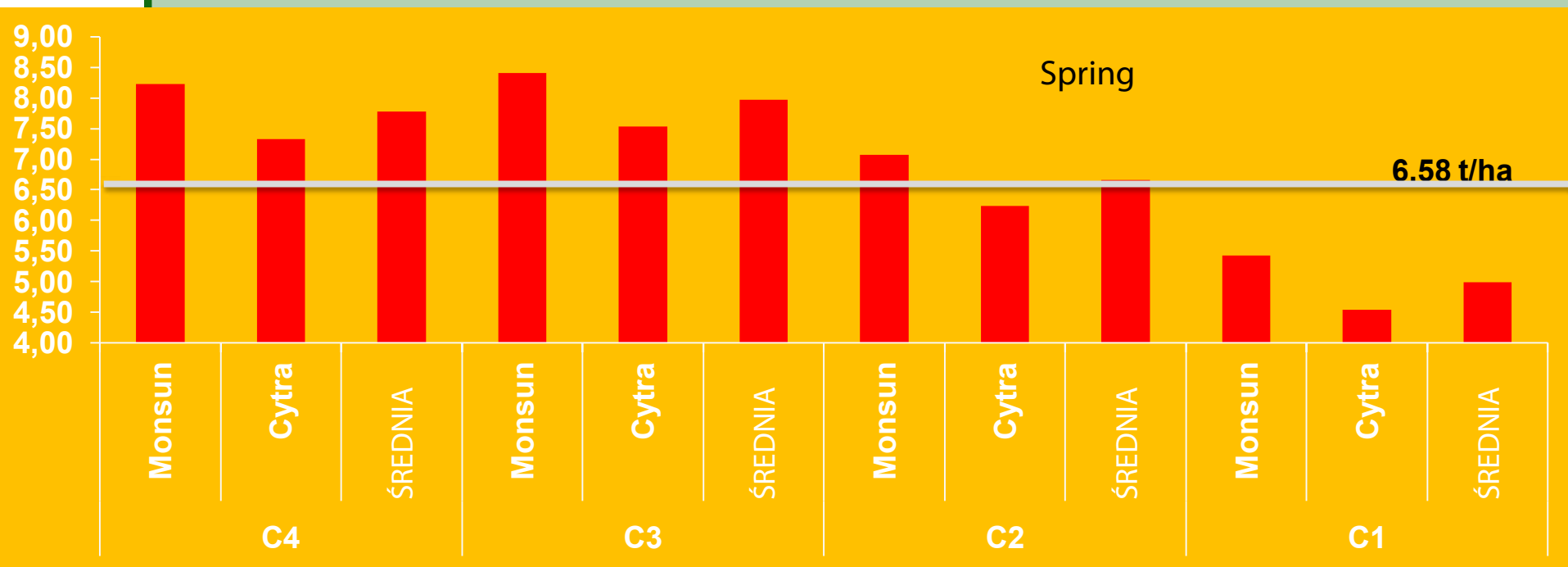
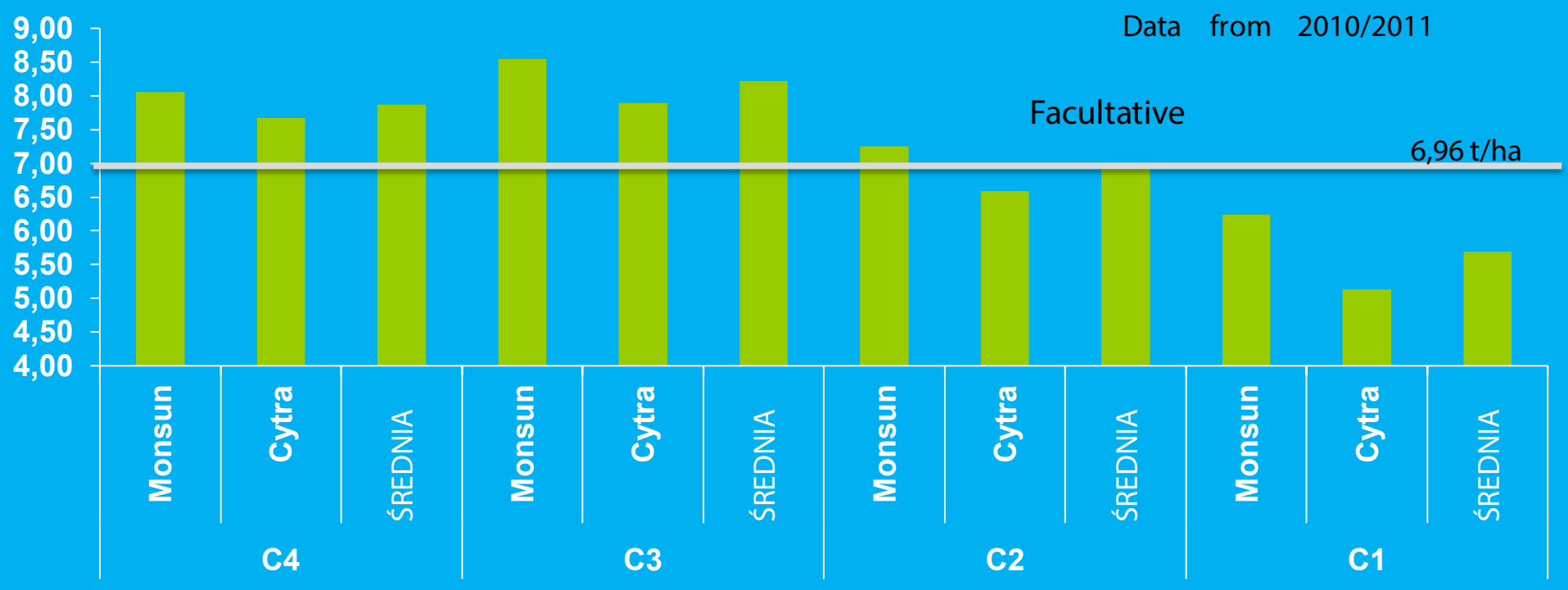
Response of wheat to the N dosage

Data from 2009/2010

Response of wheat to the control against agrophages



Data from 2010/2011



Conclusions

At the current stage of research, more risks for these crops is on the side of abiotic factors (especially winter weather).

It is justified to search for varieties with higher frost resistance.

Upon completion of these studies will be elaborated protection against pest.

The intention is to continue research into the testing of new varieties.



Thanks for your
attention