



# PRODIVA WP 3

## Variety mixtures for weed suppression

### 2015

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***PRODIVA workshop - 18-19.02.2016, Rostock***

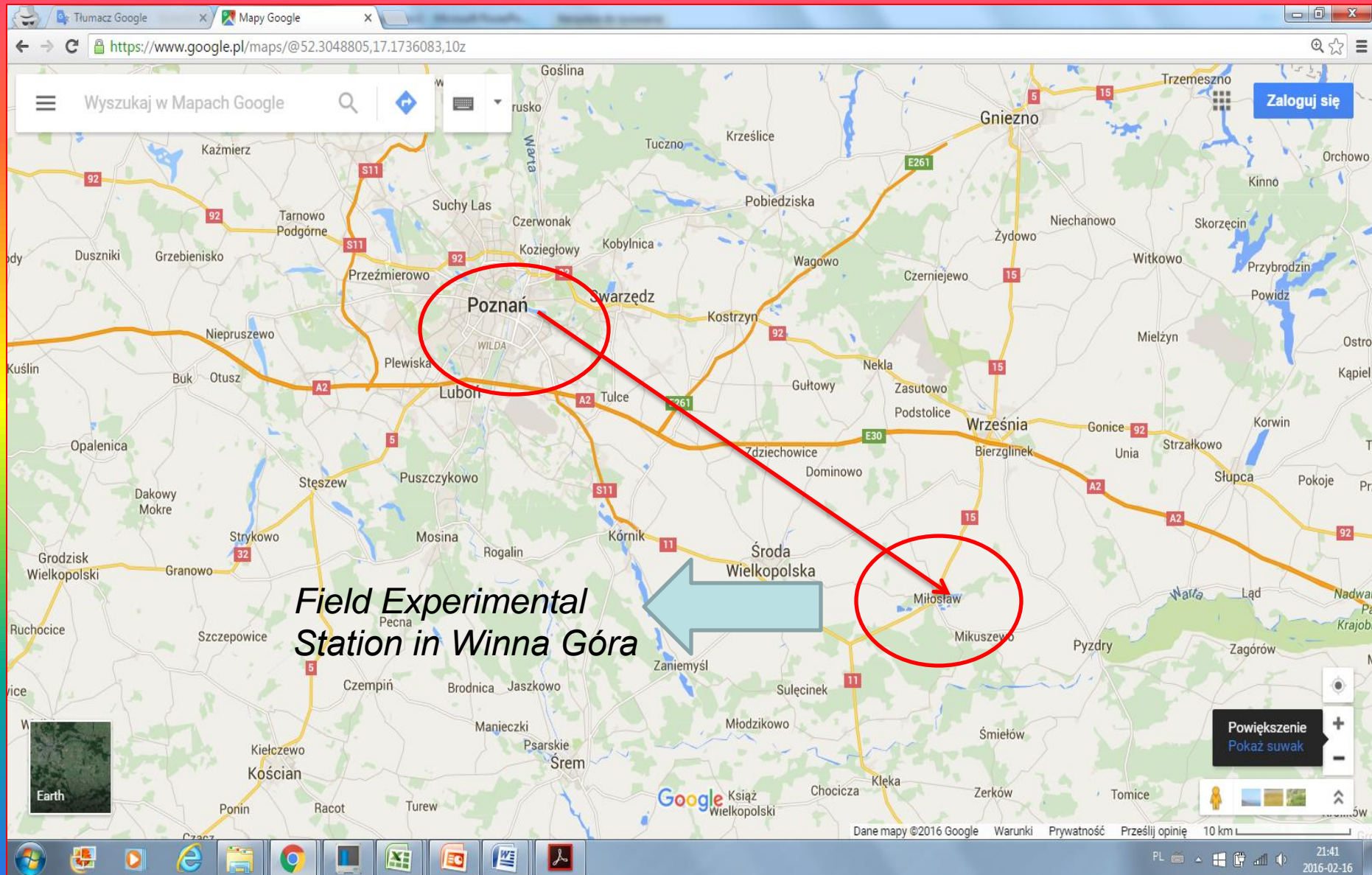
# ACTIONS MADE IN 2015

- The selection of varieties
- Field experiments (6 barley varieties, 3 oat varieties and mixtures)
- Promotional activities

# SELECTION OF VARIETIES

- According to the plant breeders and scientists knowledge
- Based mainly on the plant height, varieties popularity in the central region of Poland and on the registration year (quite new varieties)

# FIELD EXPERIMENTS



**PRODIVA workshop - 18-19.02.2016, Rostock**

# MAIN POINTS OF METHODS

- Strict field experiments
- Barley: 6 varieties, sole crops and mixtures = 21 objects (42 plots – natural infestation + model weed)
- Oat: 3 varieties, sole crops and mixtures = 6 objects (12)
- 4 replications
- Seeding rate: barley 300 no./m<sup>2</sup>, oat 400 no./m<sup>2</sup>, model weed – *Sinapis alba*- 60 no./ m<sup>2</sup> (according to the weight of 1000 grains/seeds and germination capacity)
- Plot size: 16,5 m<sup>2</sup> – each plot divide to 2 sub-plots:  
1. natural infestation, 2. model weed (*Sinapis alba* var. Maryna)



# Field experimets



## OBJECTS: Oat varieties

- Sławko (S)
- Nagus (N)
- Rajtar (R)

- S + N (50%+50%)
- S + R (50%+50%)
- N + R (50%+50%)

# Field experimets

- **OBJECTS: Spring barley varieties**

- → KWS Olof (Ol)
- → KWS Atrika (At)
- → KWS Orphelia (Or)
- → Kucyk (K)
- → Raskud (R)
- → Aegento (Ae)



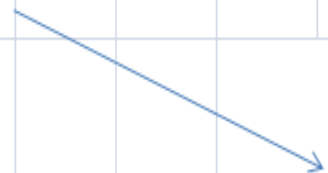
- → Ol + At (50%+50%)
- → Ol + Or (50%+50%)
- → Ol + K (50%+50%)
- → Ol + R (50%+50%)
- → Ol + Ae (50%+50%)
- → At + Or (50%+50%)
- → At + K (50%+50%)
- → At + R (50%+50%)
- → At + Ae (50%+50%)
- → Or + K (50%+50%)
- → Or + R (50%+50%)
- → Or + Ae (50%+50%)
- → K + R (50%+50%)
- → K + Ae (50%+50%)
- → R + Ae (50%+50%)



# Field experimental design – example from oat

OAT EXPERIMENT						
	S + N	S	N + R	R	S + R	N
IV replication	401	402	403	404	405	406
	S + R	R	S + N	N	N + R	S
III replication	301	302	303	304	305	306
	N	S + R	S	N + R	R	S + N
II replication	201	202	203	204	205	206
	S	N	R	S + N	S + R	N + R
I replication	101	102	103	104	105	106

Example of plot (16,5 m<sup>2</sup>=1,5x11 m) for variety mixtures included two sub-plots



1/3 of plot size

Variety X + Variety Y  
Model weed, without  
natural weed flora

2/3 of plot

Variety X + Variety Y  
Natural weed flora



# Analysis and observations

- Barley and oat plant density (no./m<sup>2</sup>)
- Tillering: number of tillers with and without ears (69 BBCH)
- Weeds dry weight:  
weed species composition, weeds dry weight (0,25x0,5 m, two times on each plot)  
end of cereal flowering – 69 BBCH
- Dry weight of barley and oat plants  
(69 BBCH, 5 plants per each plot)

# Analysis and observations

- Barley and oat plant height (10 plants per plot)
- Leaf area index: using AccuPAR LP-80 9 (4 times during vegetation season)



PAR DATA to estimate biomass production without destroying the crop (see details at right). Measure photosynthetically active radiation (PAR) and get leaf area index (LAI) values simultaneously in real time.

# Analysis and observations

- Leaf area index for particular plant parts (leaves, stems, ears) using pictures and counting „dark points”



# Analysis and observations

- Grain yield
- Grain parameters

**Weight** of 1000 grains

**Grain quality:** protein, grain humidity, starch (Infratec grain analyser by Foss)



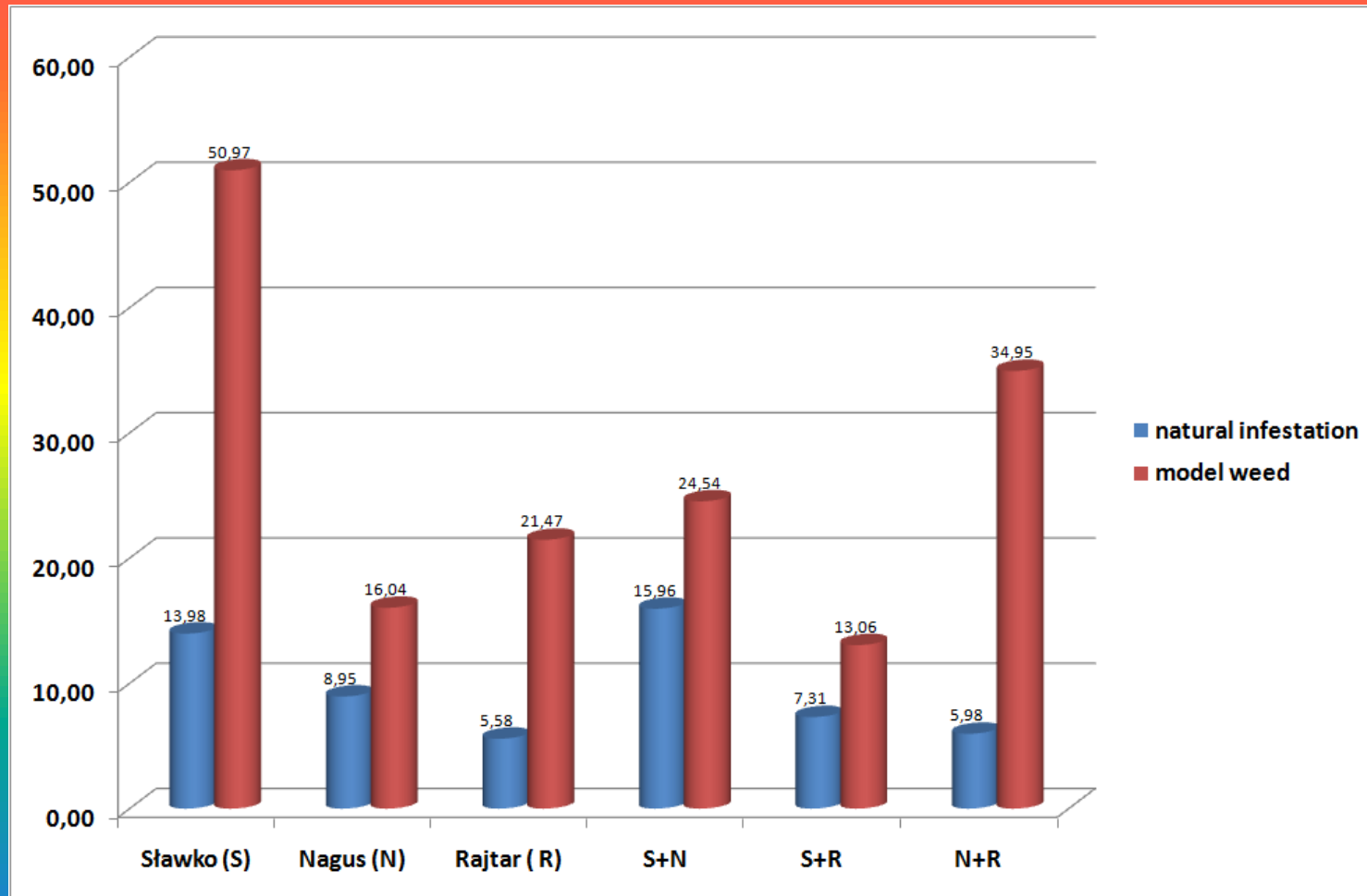
*The Infratec offers the ultimate solution for whole grain analysis. Rapid, reliable and dedicated analytical solutions for routine testing to allow for fast decisions on how to maximise value of production of agricultural food products*

# Weed composition

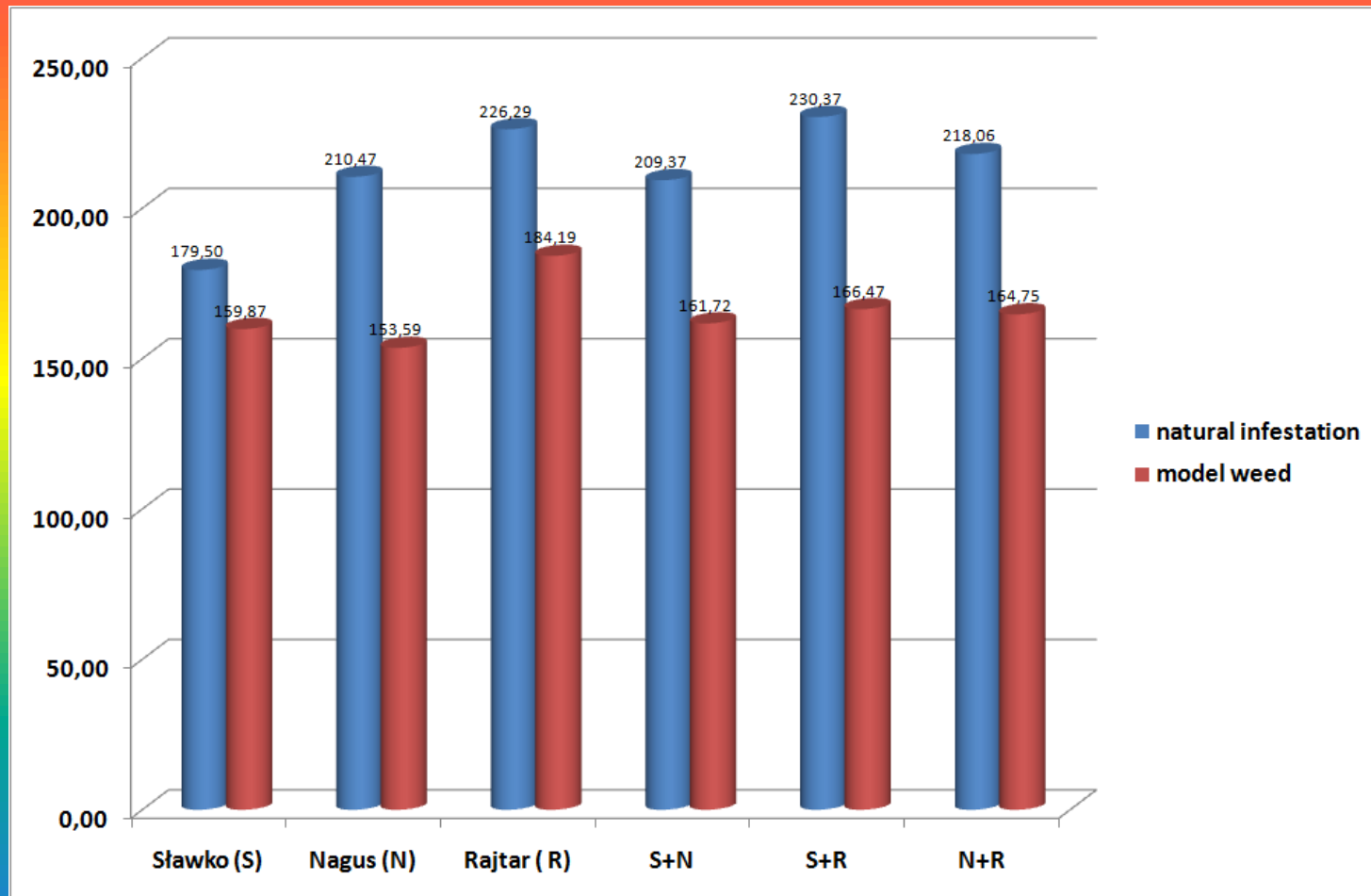
- *Polygonum spp*
- *Chenopodium album*
- *Cirsium arvense*
- *Viola arvensis*
- *Geranium pusillum*
- *Galium aparine*
- *Thlaspi arvense*
- *Matricaria inodora*



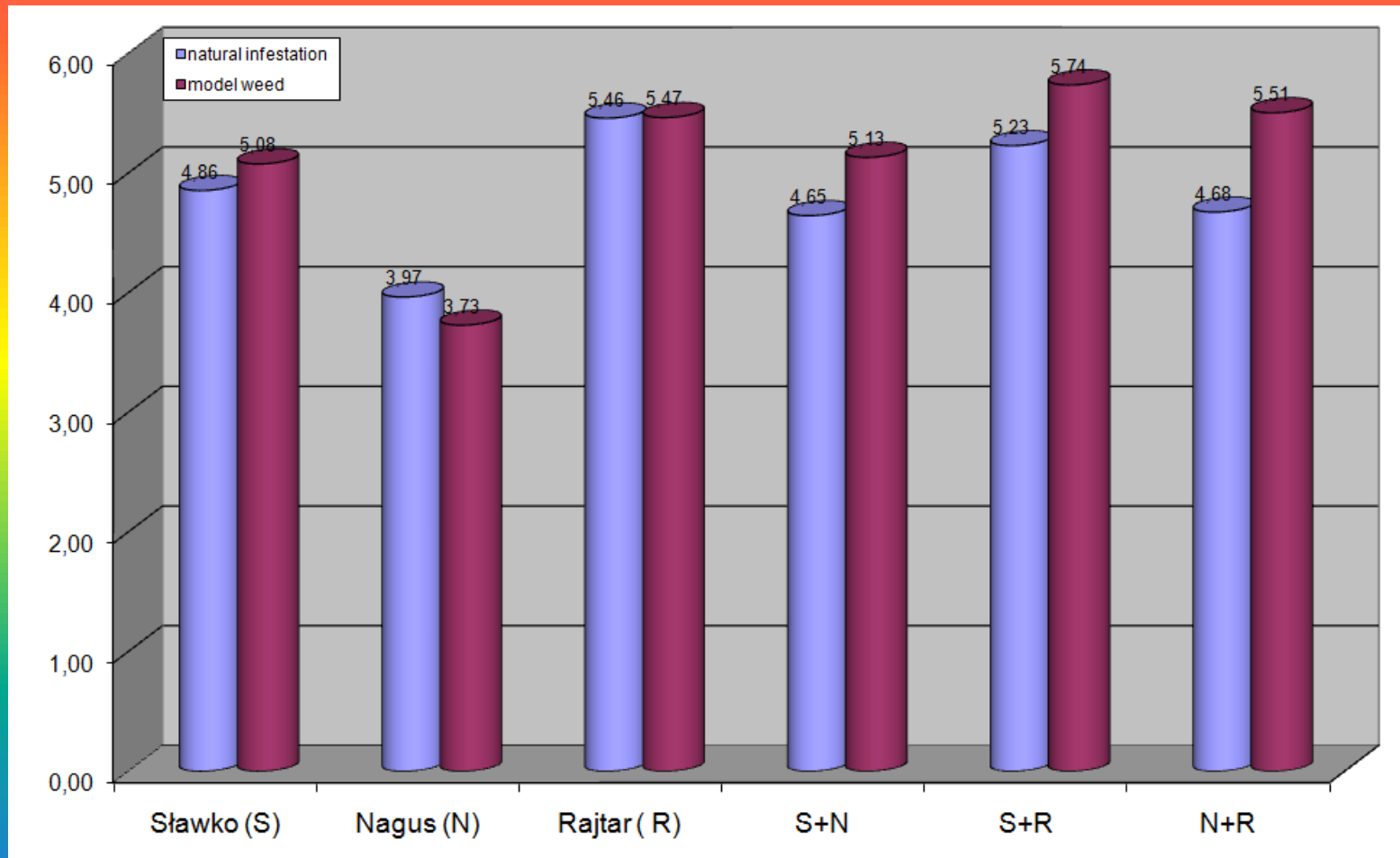
# Oat – Weeds dry weight



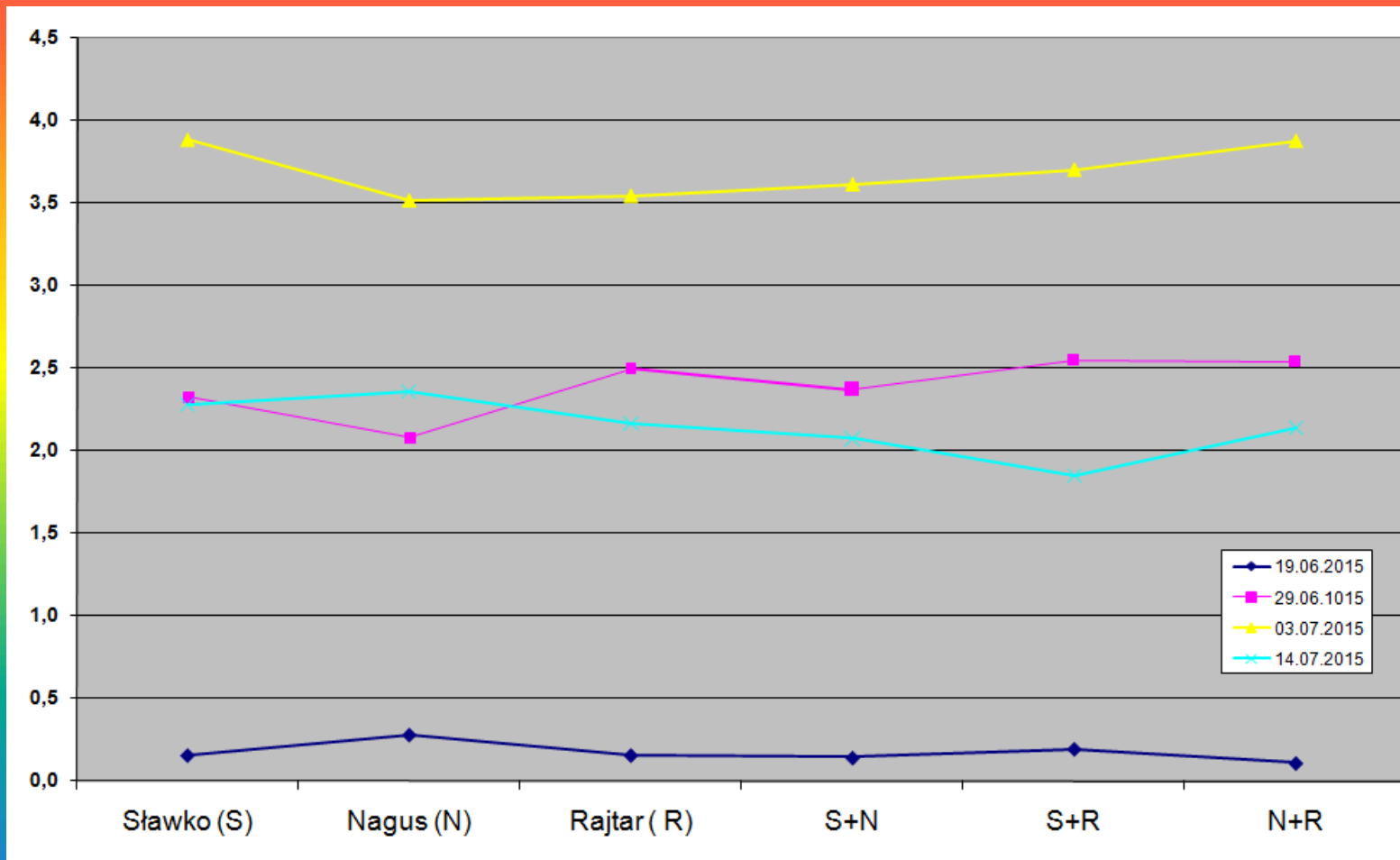
# Oat dry weight



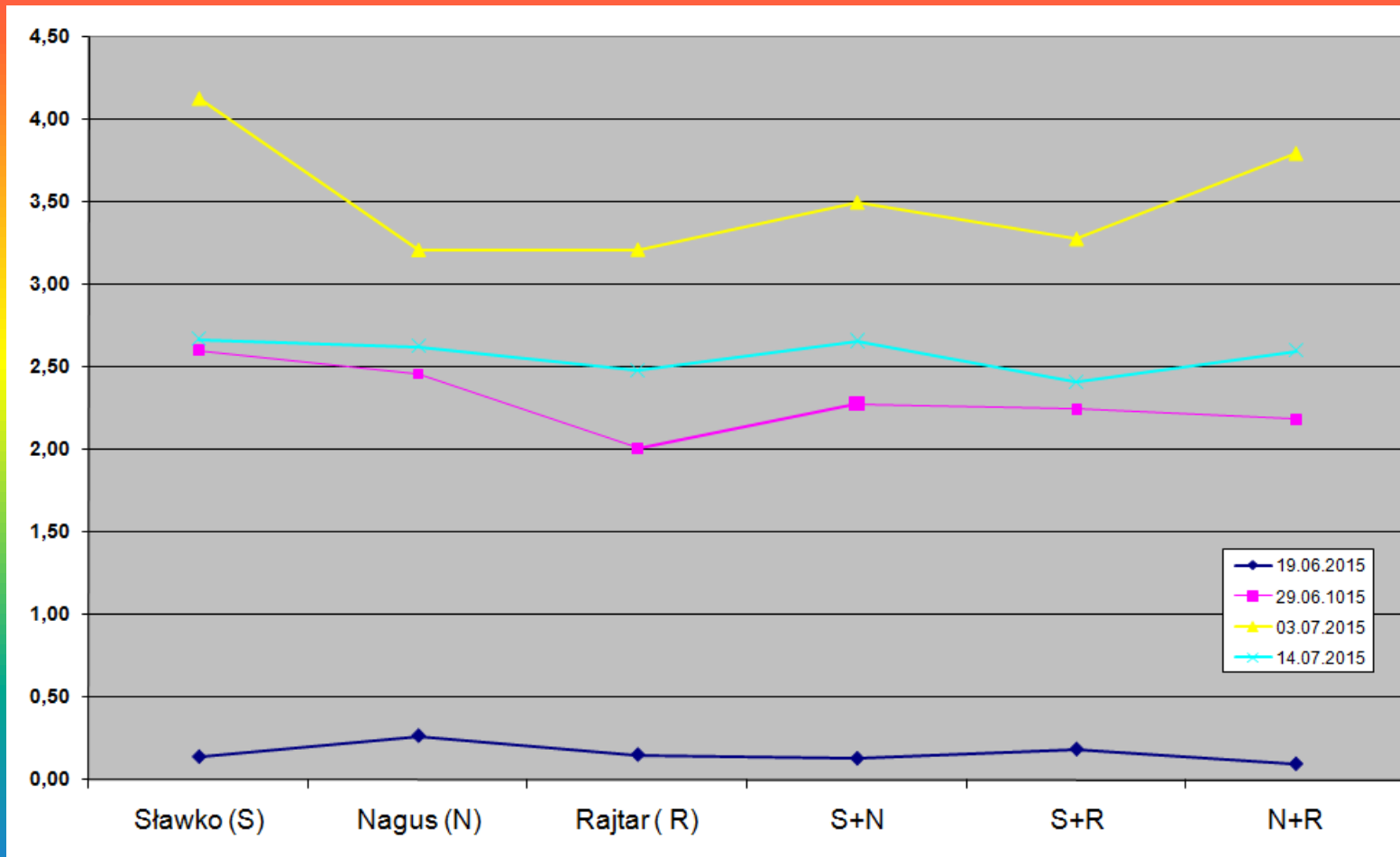
# Oat – grain yield



# Oat – LAI (natural infestation)

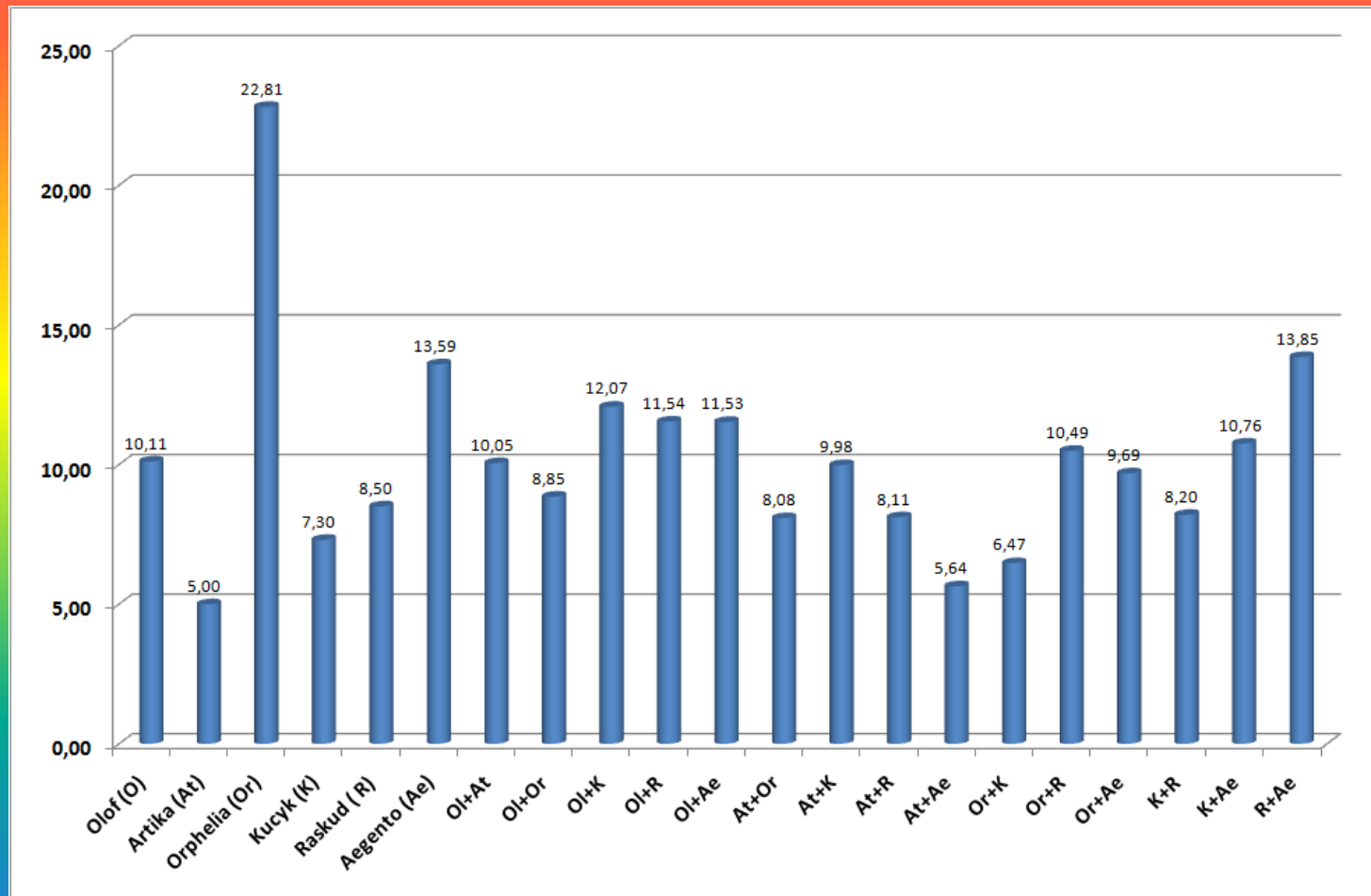


# Oat – LAI (model weed)

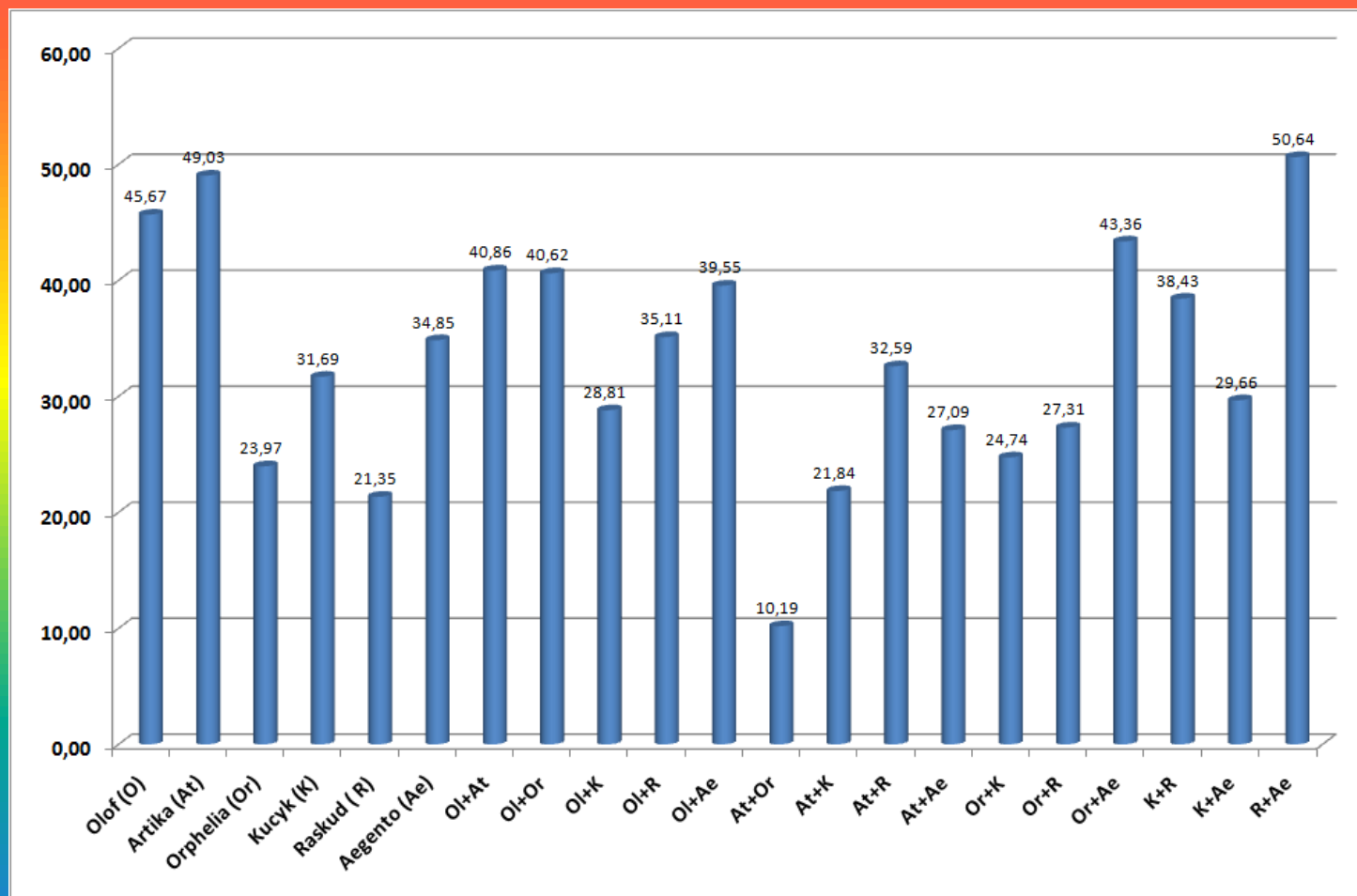




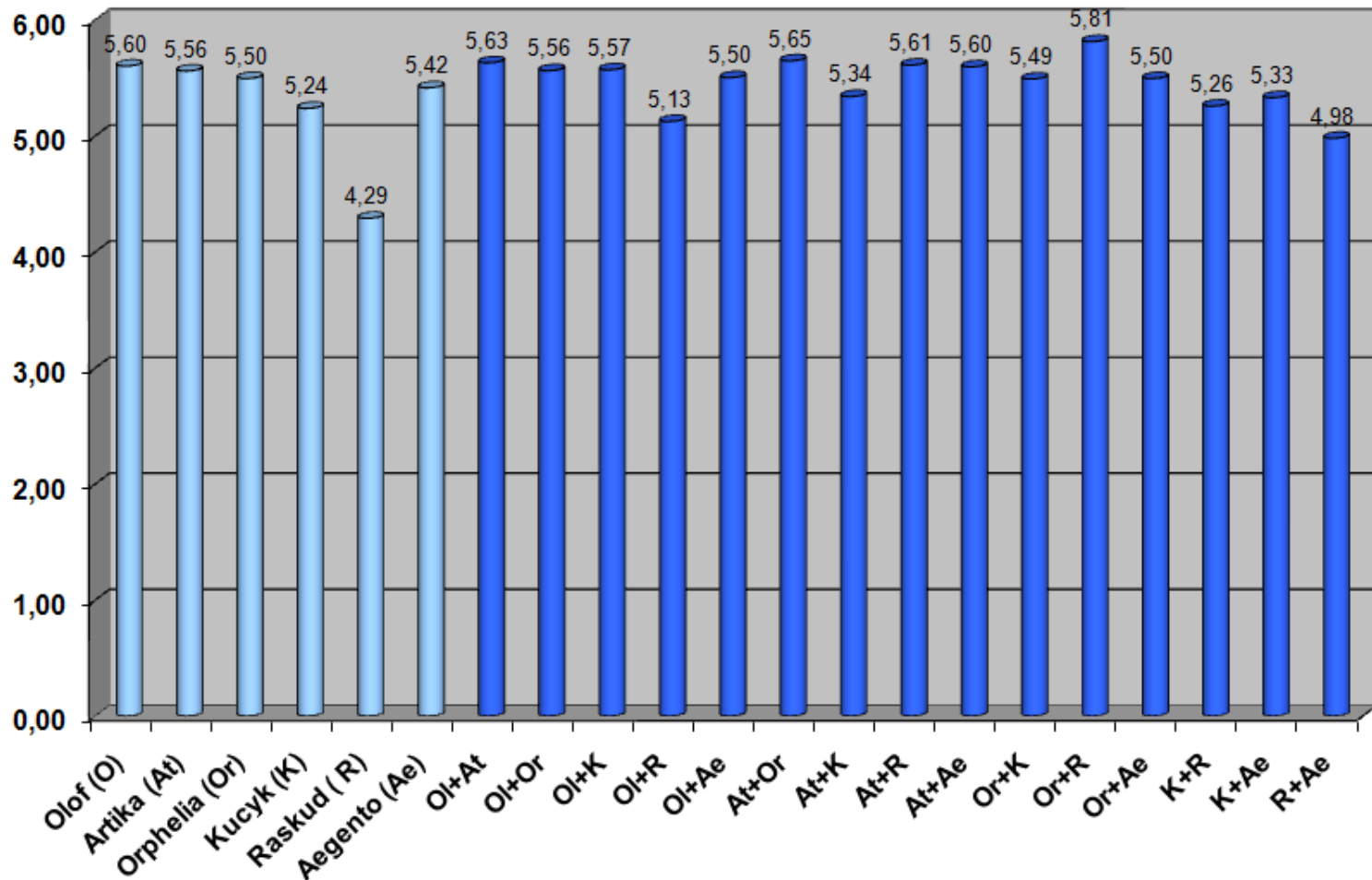
# Barley – weeds dry weight (natural infestation)



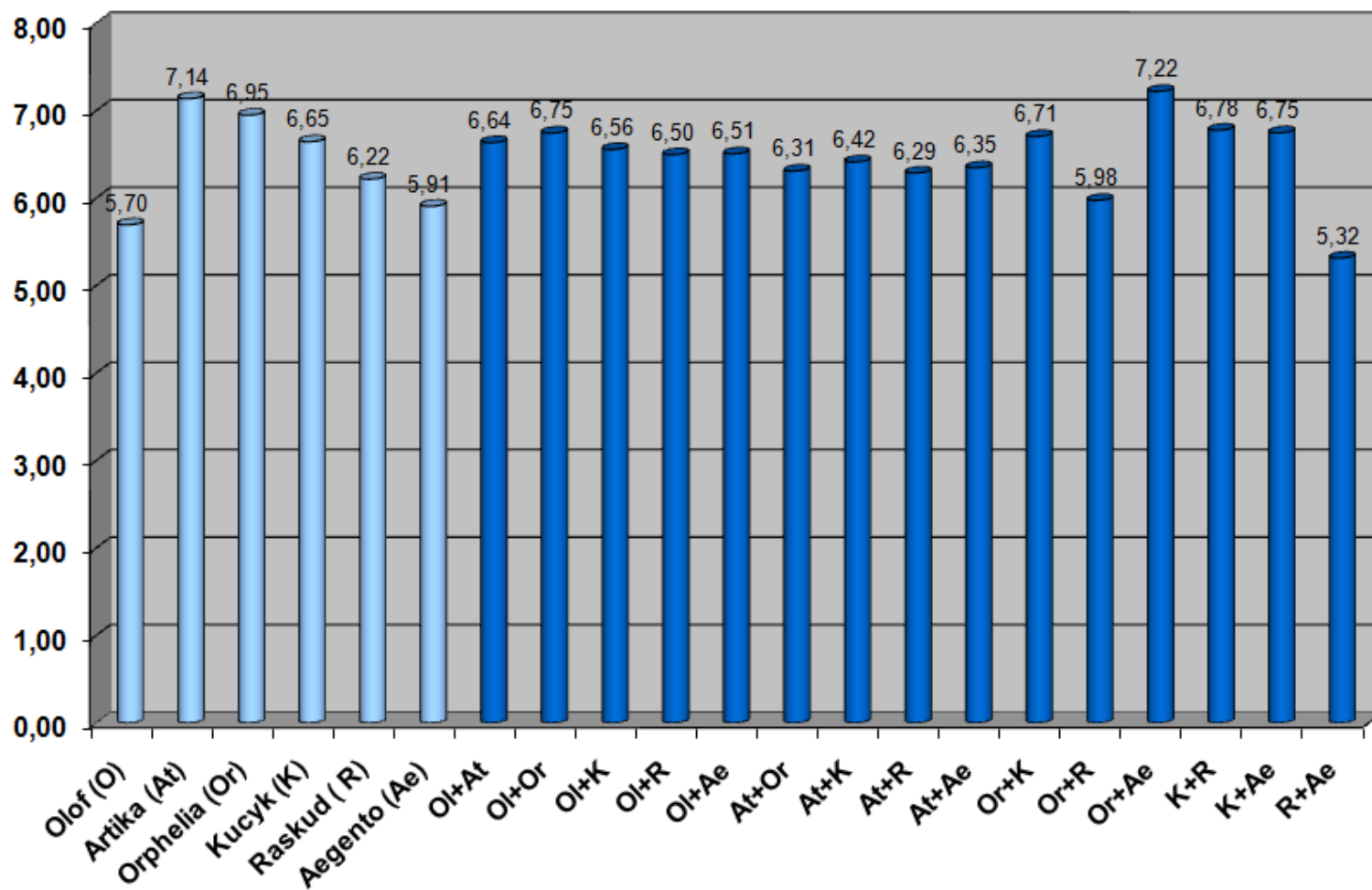
# Barley – weeds dry weight (model weed)



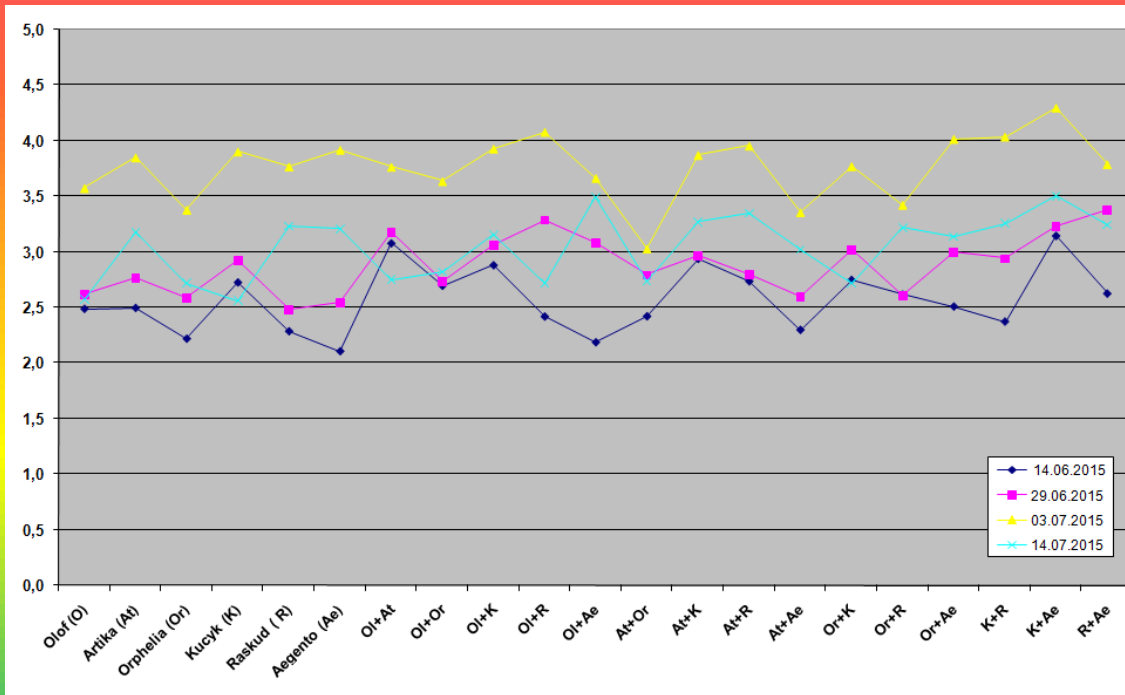
# Barley – grain yield (natural infestation)



# Barley – grain yield (model wed)



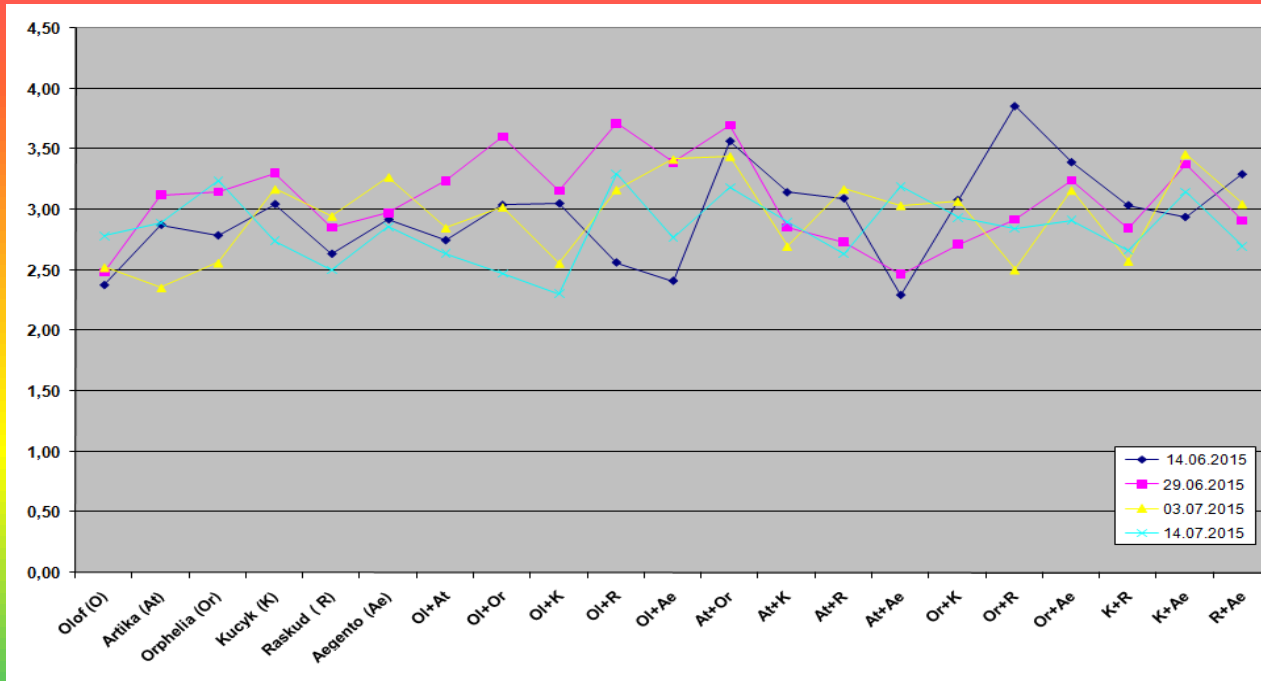
# Barley – LAI (natural infestation)



	average
Orphelia (Or)	2,7
At+Or	2,7
Olof (O)	2,8
At+Ae	2,8
Raskud ( R)	2,9
Aegento (Ae)	2,9
Or+R	3,0
Ol+Or	3,0
Kucyk (K)	3,0
Or+K	3,1
Artika (At)	3,1
Ol+Ae	3,1
Ol+R	3,1
K+R	3,2
Or+Ae	3,2
Ol+At	3,2
At+R	3,2
Ol+K	3,3
R+Ae	3,3
At+K	3,3
K+Ae	3,5



# Barley – LAI (model weed)



	average
Olof (O)	2,5
Raskud ( R)	2,7
At+Ae	2,7
OI+K	2,8
K+R	2,8
Artika (At)	2,8
OI+At	2,9
At+K	2,9
At+R	2,9
Orphelia (Or)	2,9
Or+K	2,9
R+Ae	3,0
OI+Ae	3,0
Aegento (Ae)	3,0
Or+R	3,0
OI+Or	3,0
Kucyk (K)	3,1
Or+Ae	3,2
OI+R	3,2
K+Ae	3,2
At+Or	3,5

# Weed competition

- The best variety mixtures:  
OAT: Sławko + Rajtar and Nagus + Rajtar  
BARLEY: Artica + Orphelia, Artica + Aegento, Orphelia + Kucyk

# Future plans

- Field experiments with oat and barley
- Natural infestation/model weed
- Number of objects???
- Number of observations???

*THANK YOU*