PRODIVA WP 3
Variety mixtures for weed suppression 2016

Sylwia Kaczmarek

Weed Science and Plant Protection Techniques Department
Institute of Plant Protection-National Research Institute
Poznań, Poland

PRODIVA annual meeting – 23-24.01.2017, RIGA

ACTIVITIES 2016

Field experiments
(6 var. of barley, 3 var. of oat, mixtures)

Dissemination
(conferences, posters, oral presentations; Organic Eprints)

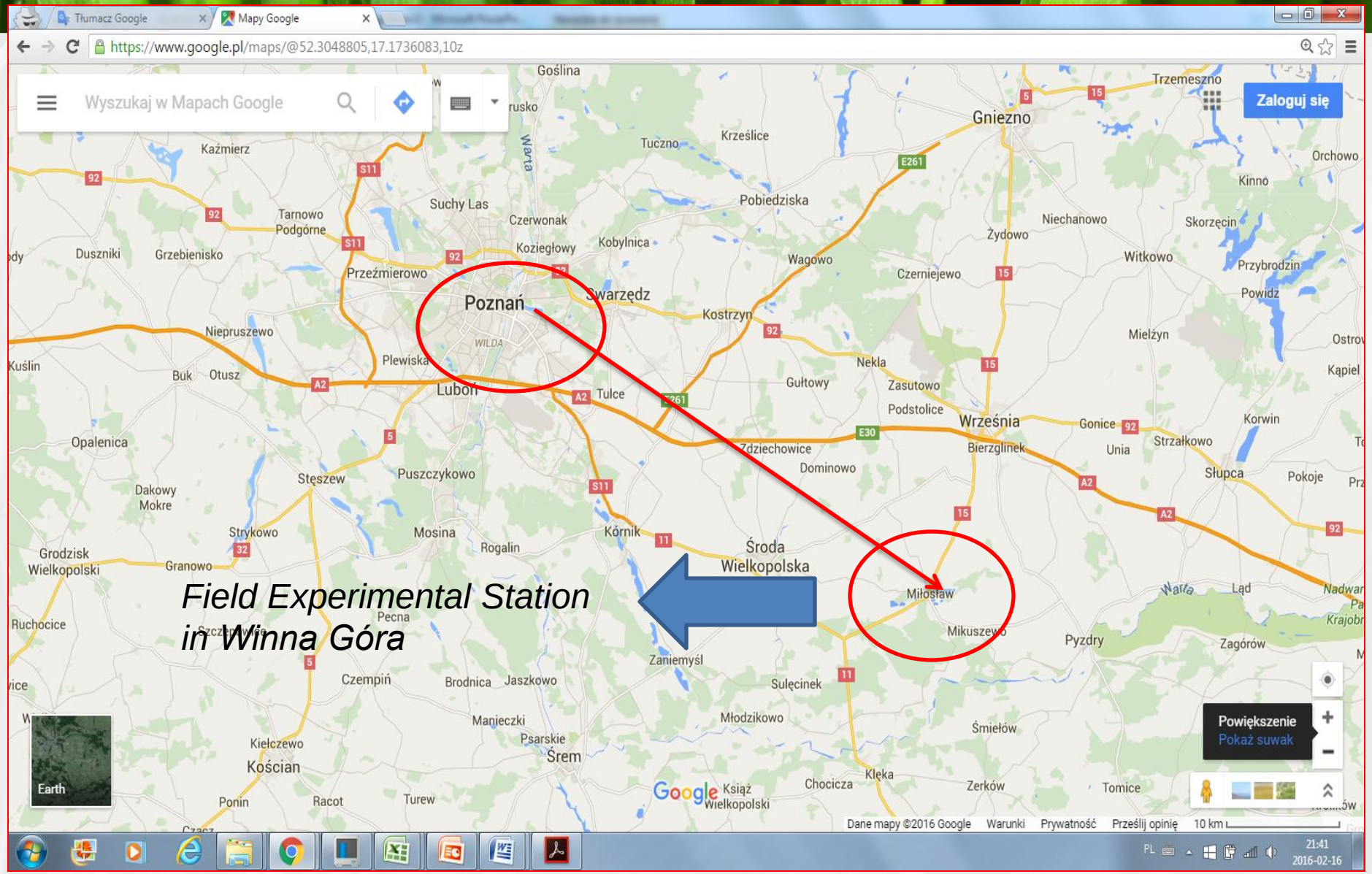
Field experiments 2016

Selection of varieties:

The same barley and oat varieties

Based mainly on the plant height, varieties popularity in the central region of Poland and based on the registration year (quite new varieties)

Field experiments 2016



Field experiments 2016

METHODS

Strict field experments

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^2, oat 400 no./m^2 ,

model weed – Sinapis alba- 60 no./ m^2

(according to the weight of 1000 grains/seeds and germination c apactity)

Plot size: 16,5 m^2 – each plot devided to 2 sub-plots:

1. natural infestation, 2. model weed (*Sinapis alba* var. Maryna)

Field experiments 2016

OBJECTS: Oat varieties

→ Sławko (S)
→ Nagus (N)
→ Rajtar (R)

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

Spring barley varieties

→ KWS Olof (Ol)
→ KWS Artika (At)
→ KWS Orphelia (Or)
→ Kucyk (K)
→ Raskud (R)
→ Argento (Ae)

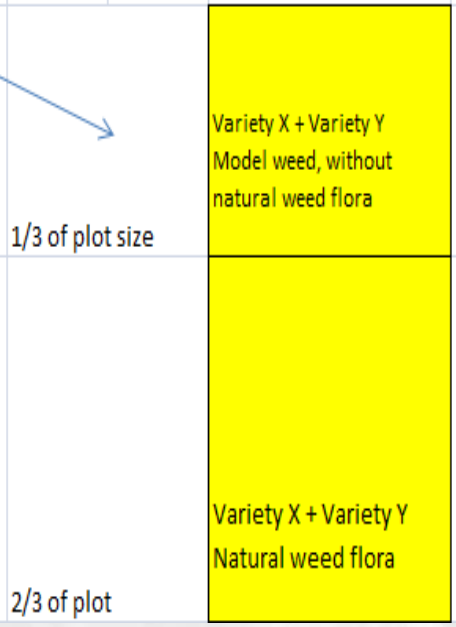
→ Ol + At (50%+50%)
→ Ol + Or (50%+50%)
→ Ol + K (50%+50%)
→ Ol + R (50%+50%)
→ Ol + Ae (50%+50%)
→ At + Or (50%+50%)
→ At + K (50%+50%)
→ At + R (50%+50%)
→ At + Ae (50%+50%)
→ Or + K (50%+50%)
→ Or + R (50%+50%)
→ Or + Ae (50%+50%)
→ K + R (50%+50%)
→ K + Ae (50%+50%)
→ R + Ae (50%+50%)

Field experiments 2016

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
IIIreplication	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 m2=1,5x11 m) for variety mixtures included two sub-plots



Field experiments 2016

Analysis and observations

Barley and oat plant density 2 x 0,5 m

Tillering: number of tillers with and without ears (69 BBCH), 5 plants per plot

Weeds weight:

weed species composition, weeds dry weight (0,25x0,5 m, two times on each plot) at the end of cereal flowering – 69 BBCH

Dry weight of barley and oat plants

(69 BBCH, 5 plants per each plot)

Barley and oat plant height (10 plants per plot)

Leaf area index – on the field: using AccuPAR LP-80 9 (4 times during vegetation season)

Leaf area index for leaves, stems, ears separately, 5 plants per plot

Parts of plant were scaned, green area was calculated by counting „green points" using computer programme

Grain yield

Grain parameters

Weight of 1000 grains

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

Field experiments 2016

Weed composition

OAT

Chenopodium album
Matricaria inodora
Centaurea cyanus
Polygonum aviculare
Lycopsis arvensis
Capsella bursa-pastoris

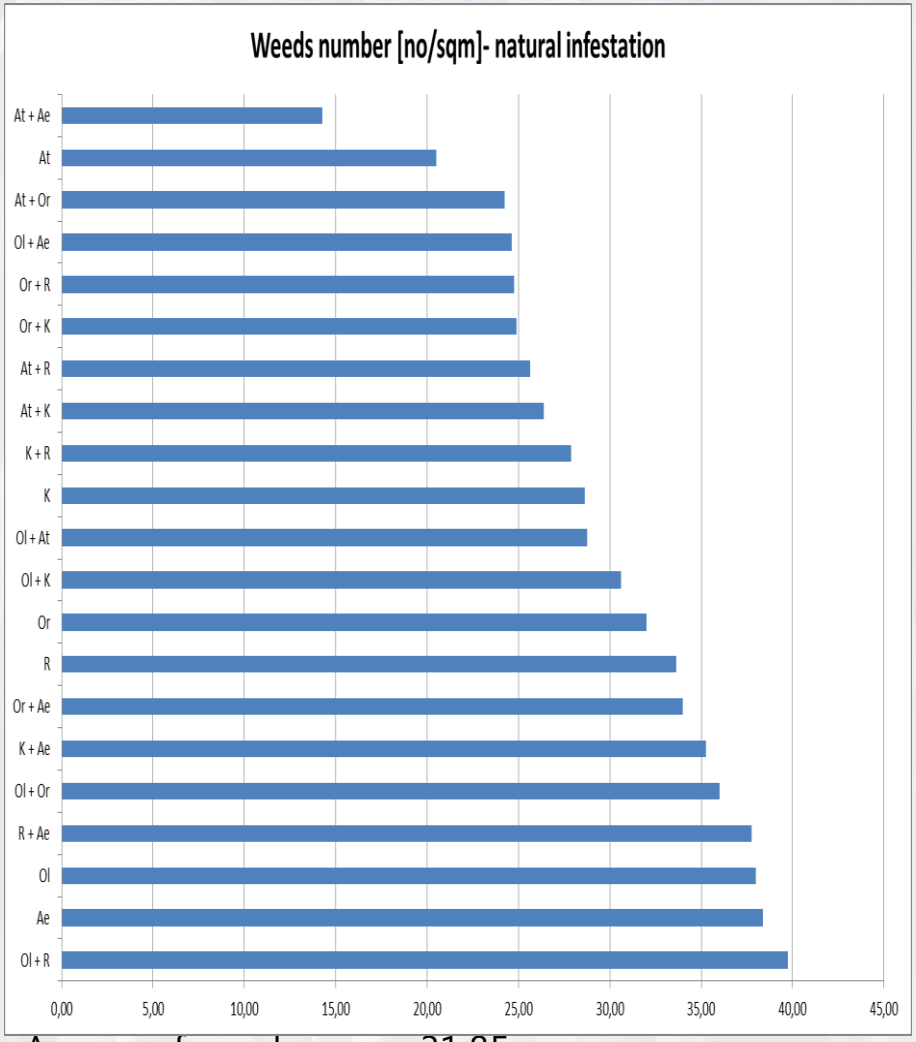
BARLEY

Chenopodium album
Matricaria inodora
Centaurea cyanus
Polygonum aviculare
Lycopsis arvensis
Polygonum convolvulus
Polygonum lapathifolium
Cirsium arvense
Viola arvensis
Geranium pusillum
Galium aparine
Thlaspi arvense
Erodium cicutarium

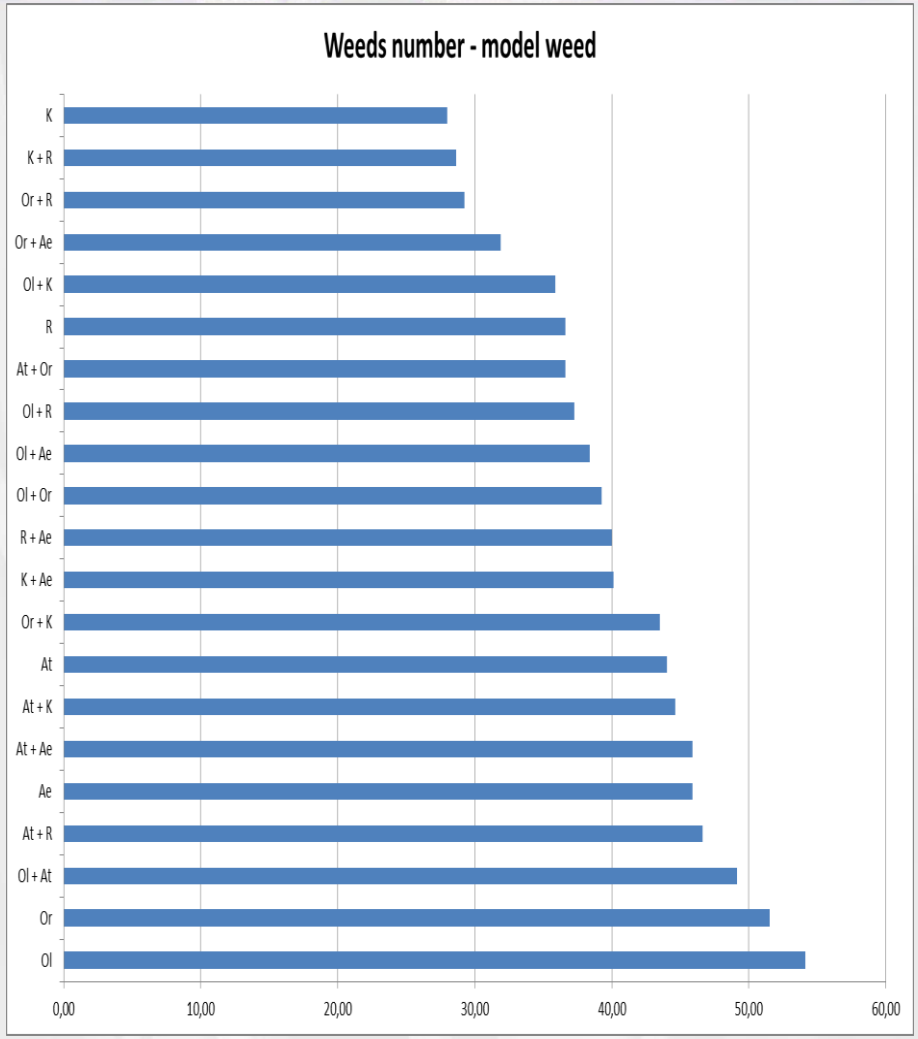
Field experiments

RESULTS - BARLEY

Field experiments 2016

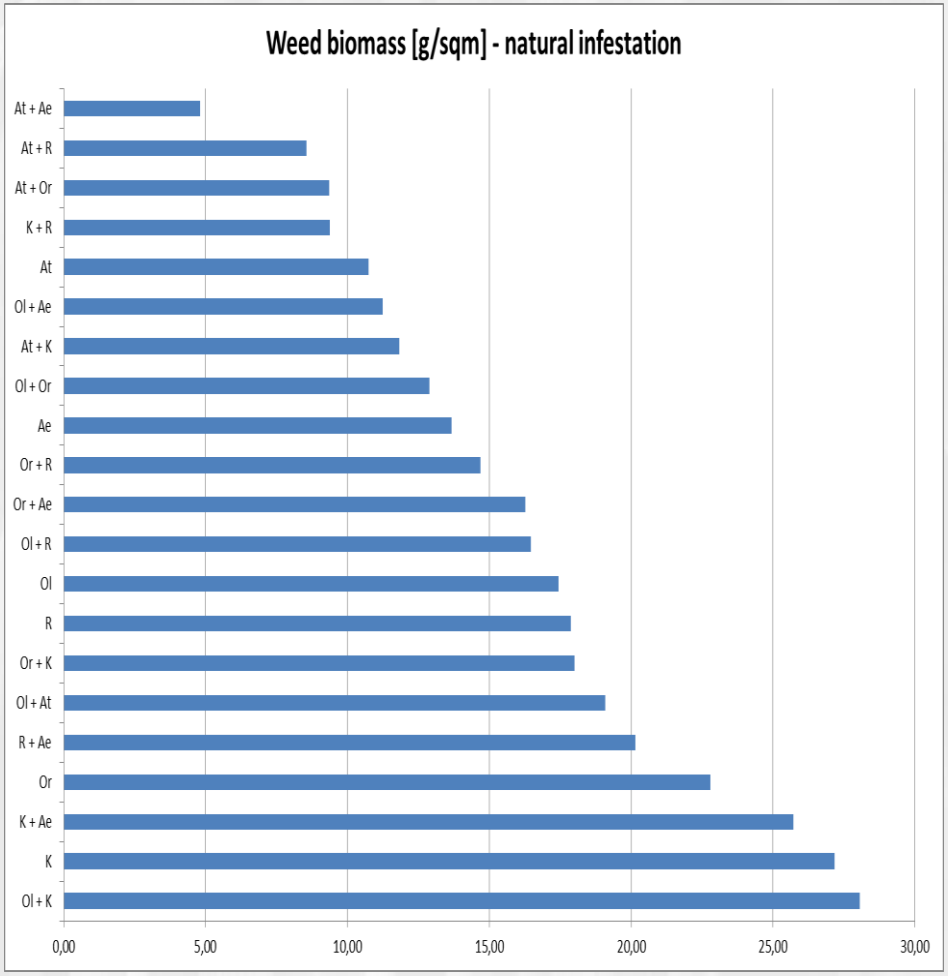


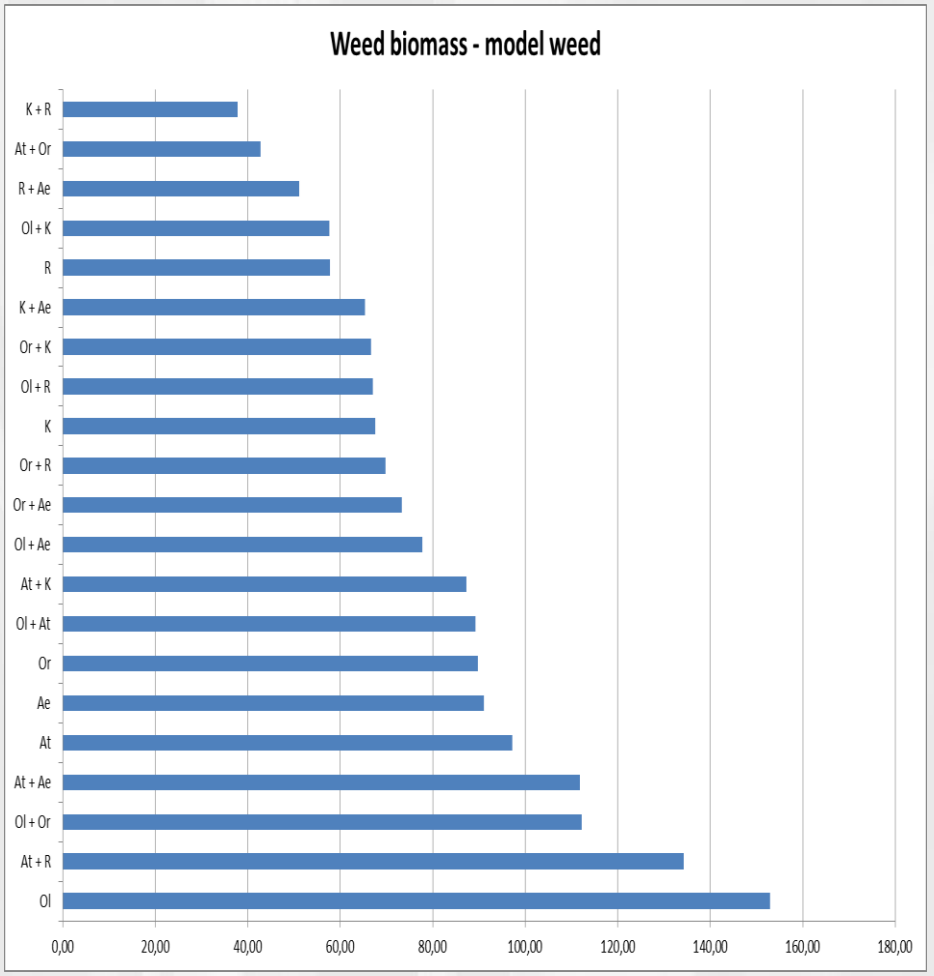
Average for sole crops 31,85
Average for mixtures 28,98



Average for sole crops 43,35
Average for mixtures 39,13

Field experiments 2016

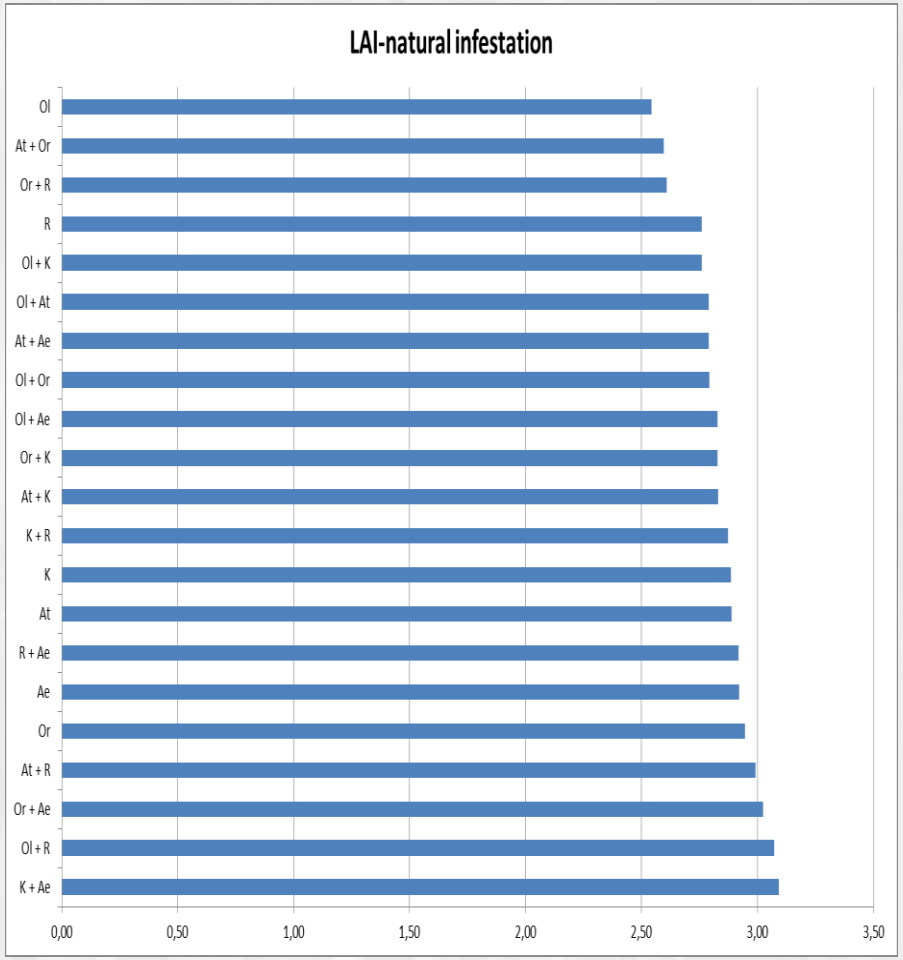


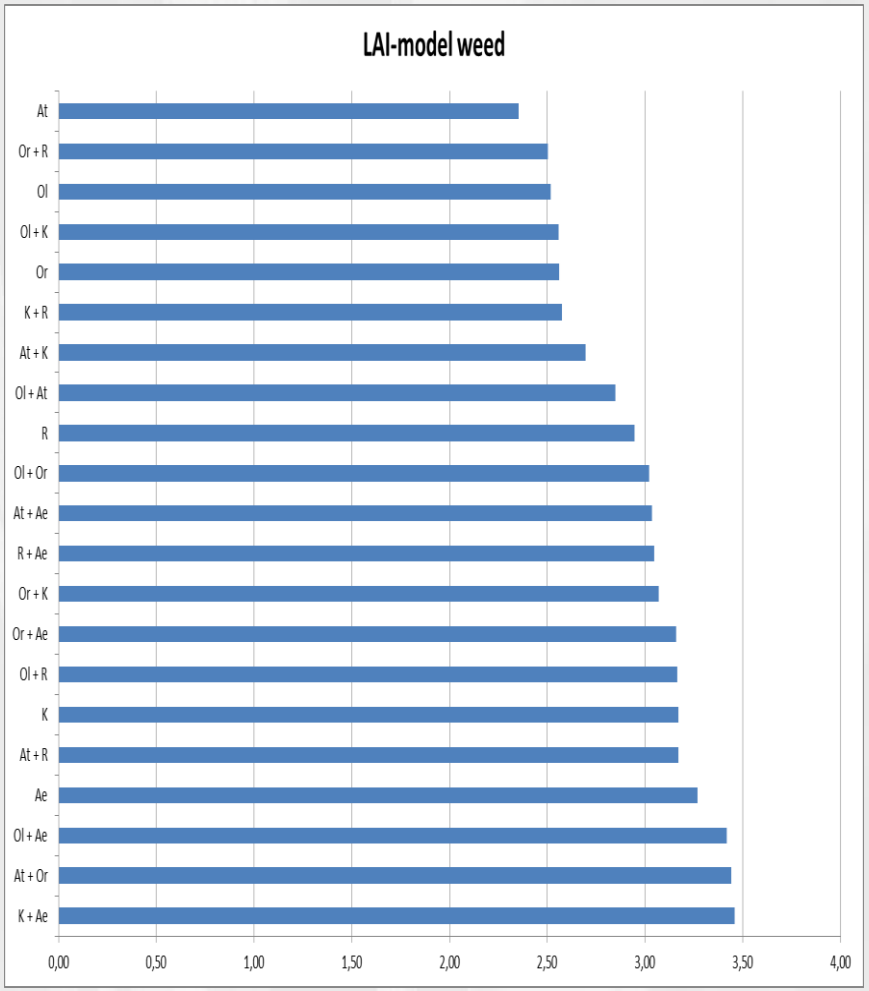


Average for sole crops 18,28
Average for mixtures 15,10

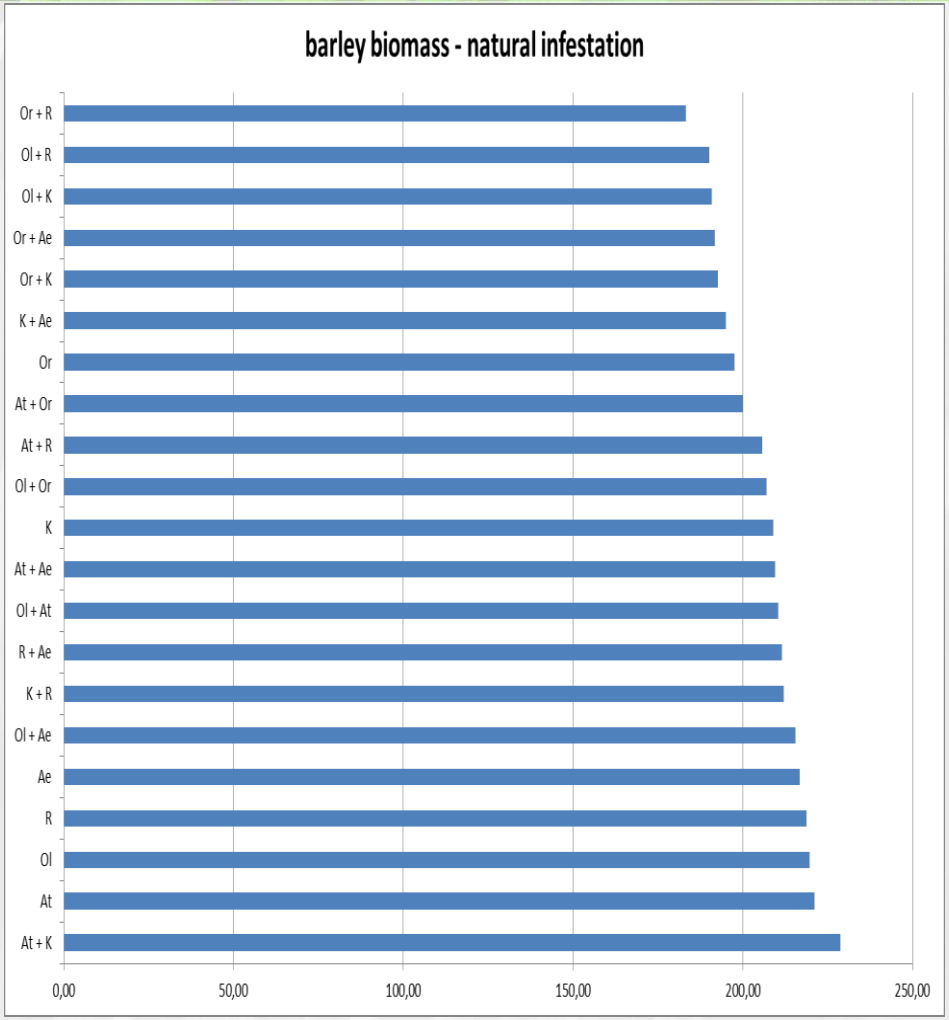
Average for sole crops 92,74
Average for mixtures 76,27

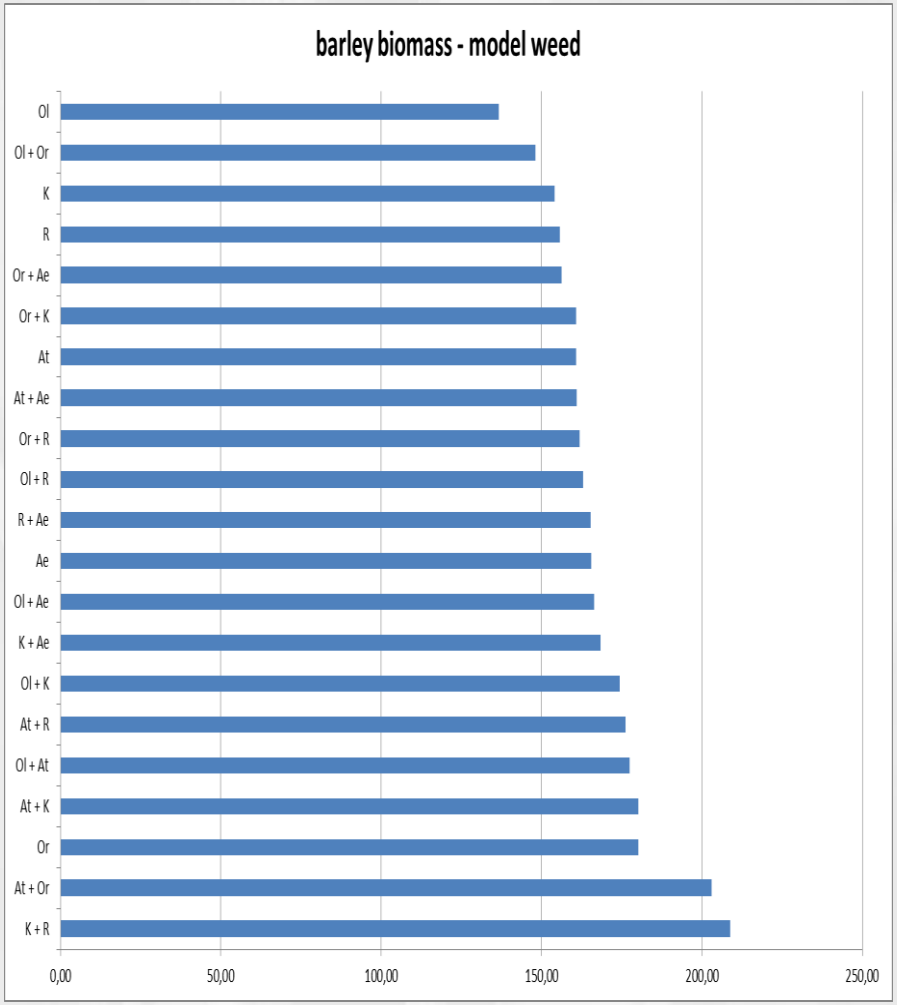
Field experiments 2016



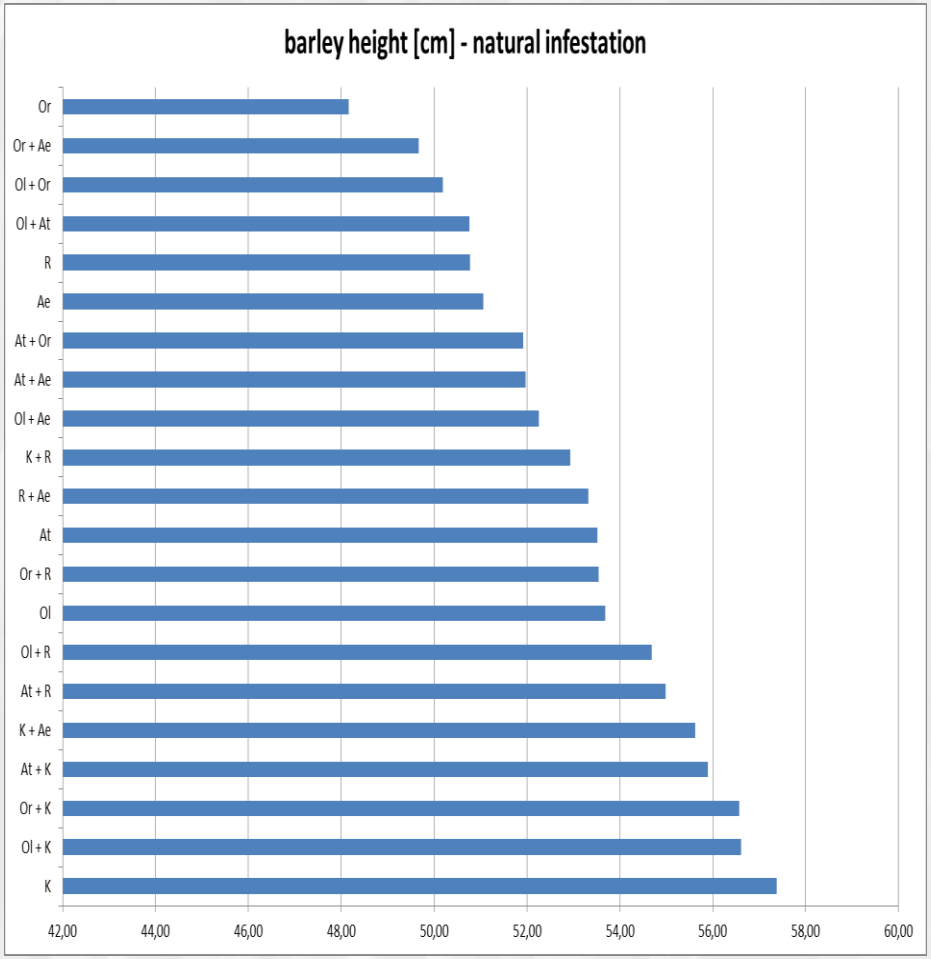


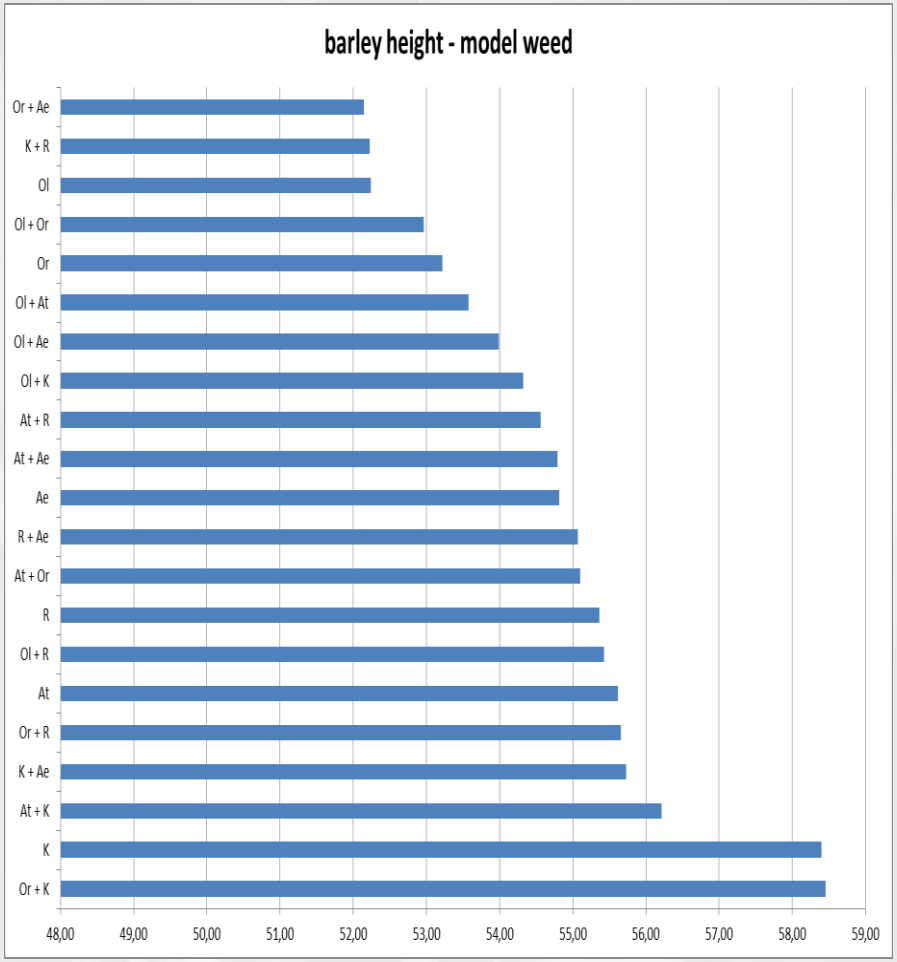
Field experiments 2016



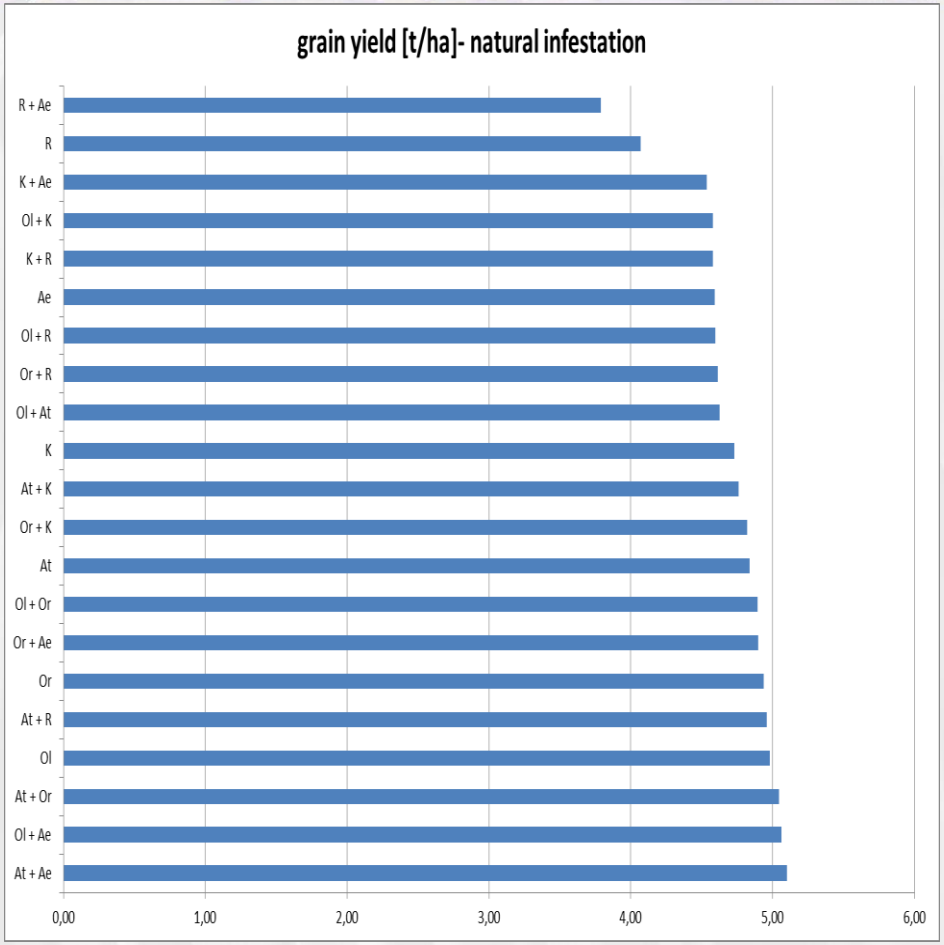


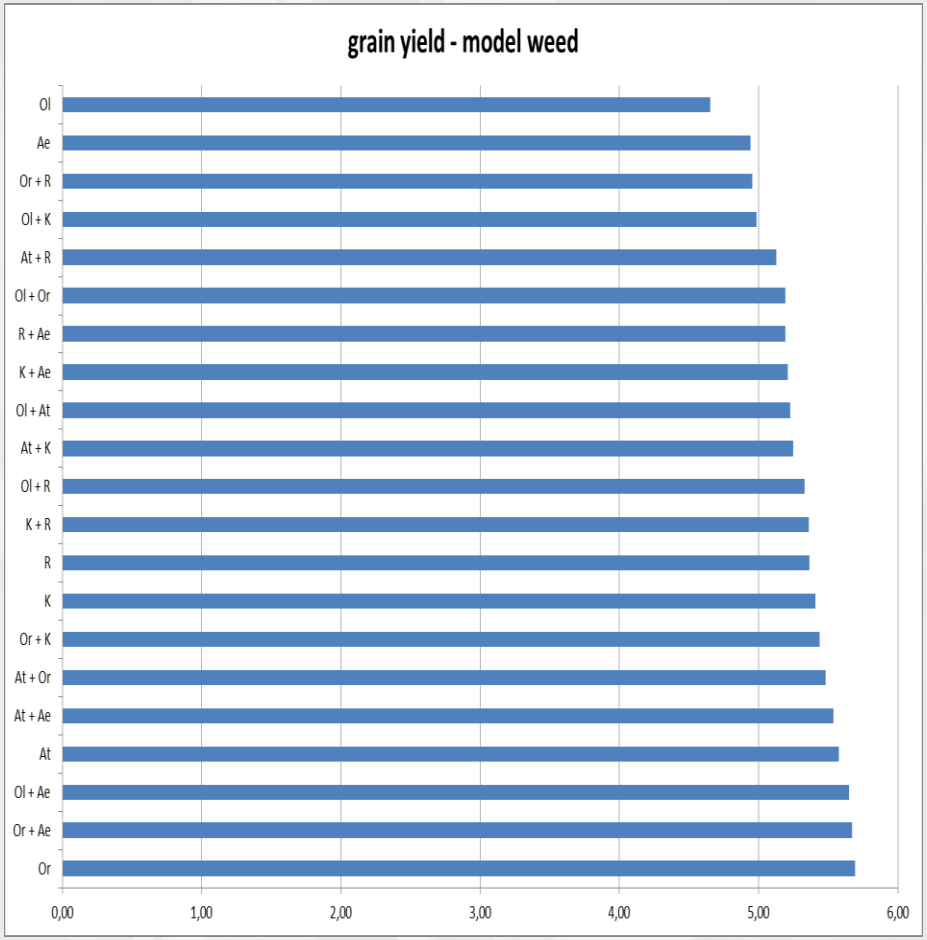
Field experiments 2016





Field experiments 2016





Field experiments 2016

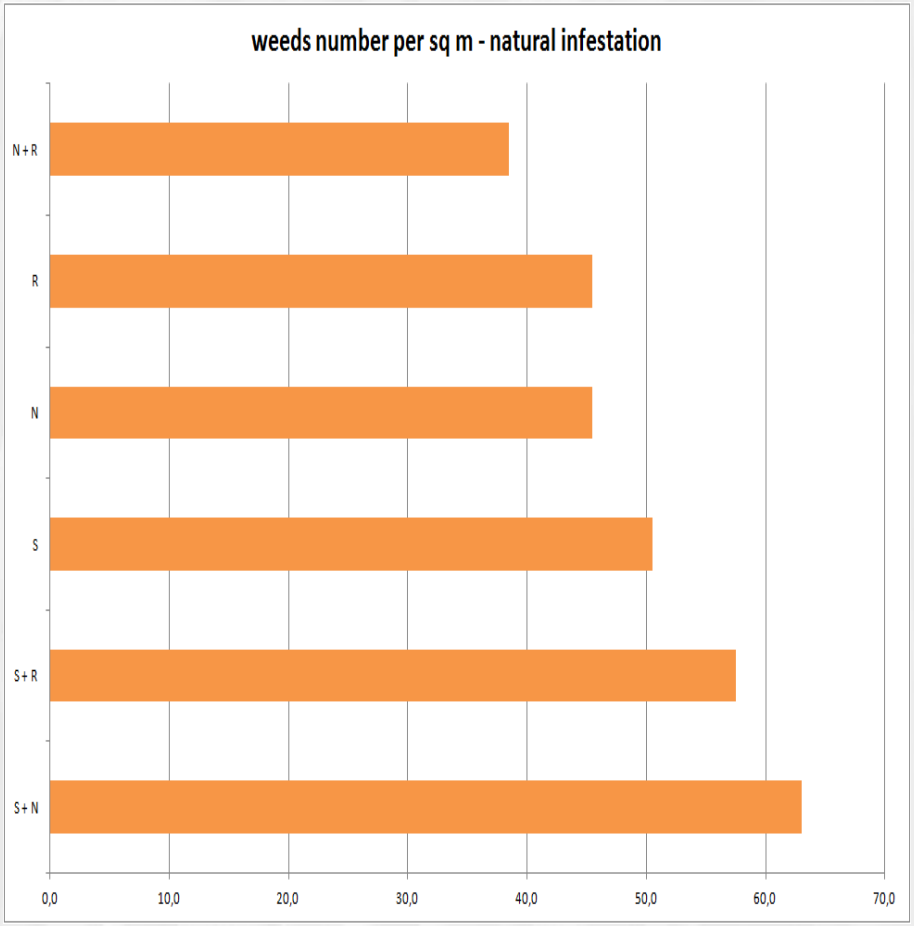
TOP 3 FOR BARLEY!!!

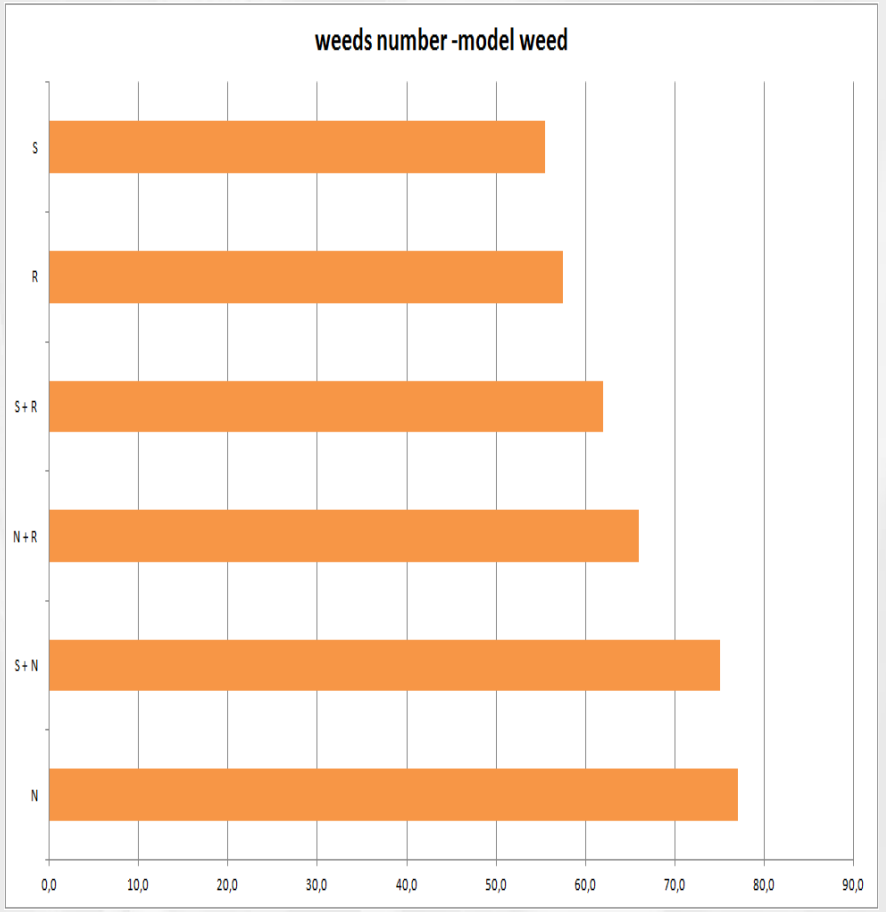
VAR.	Weeds no		W.biomass		LAI		Oat bmass		Oat height		Grain yield		Sum
	NI	MW	NI	MW	NI	MW	NI	MW	NI	MW	NI	MW	
Ae													
At	x						x						2
K		x							x	x			3
Ol							x						1
Or								x				x	2
R													
K + Ae					x	x							2
K + R		x		x				x					3
R + Ae				x									1
Ol + Ae						x					x	x	3
Ol + At													
Ol + K									x				1
Ol + Or													
Ol + R					x								1
Or + Ae					x							x	2
Or + K		x							x	x			3
Or + R													
At + Ae	x		x								x		3
At + K							x			x			2
At + Or	x		x			x		x			x		5
At + R			x	x									2

Field experiments

RESULTS - OAT

Field experiments 2016

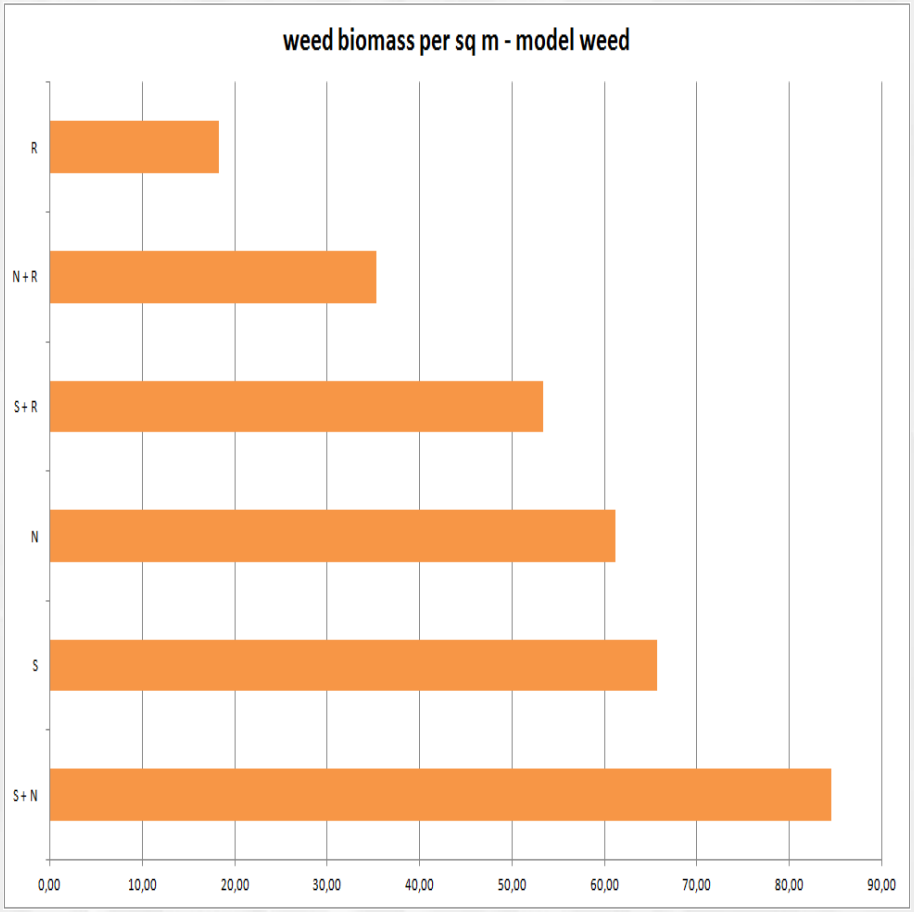




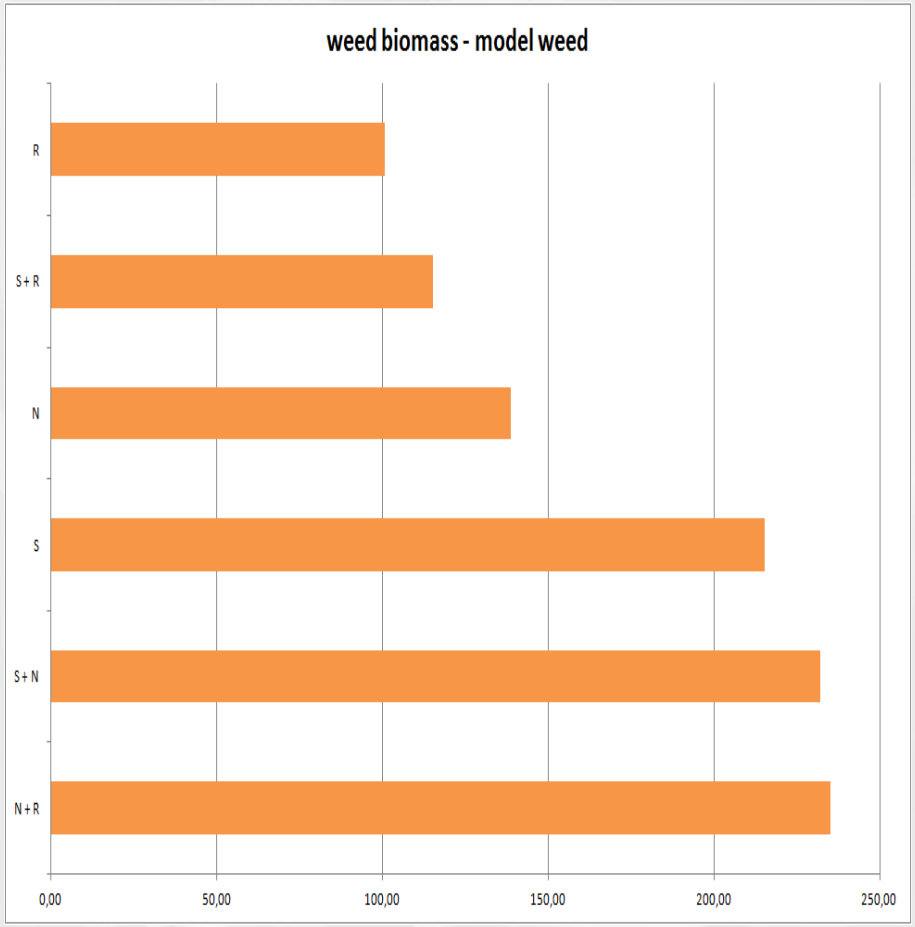
Average for sole crops 47,2
Average for mixtures 53,0

Average for sole crops 63,3
Average for mixtures 67,7

Field experiments 2016

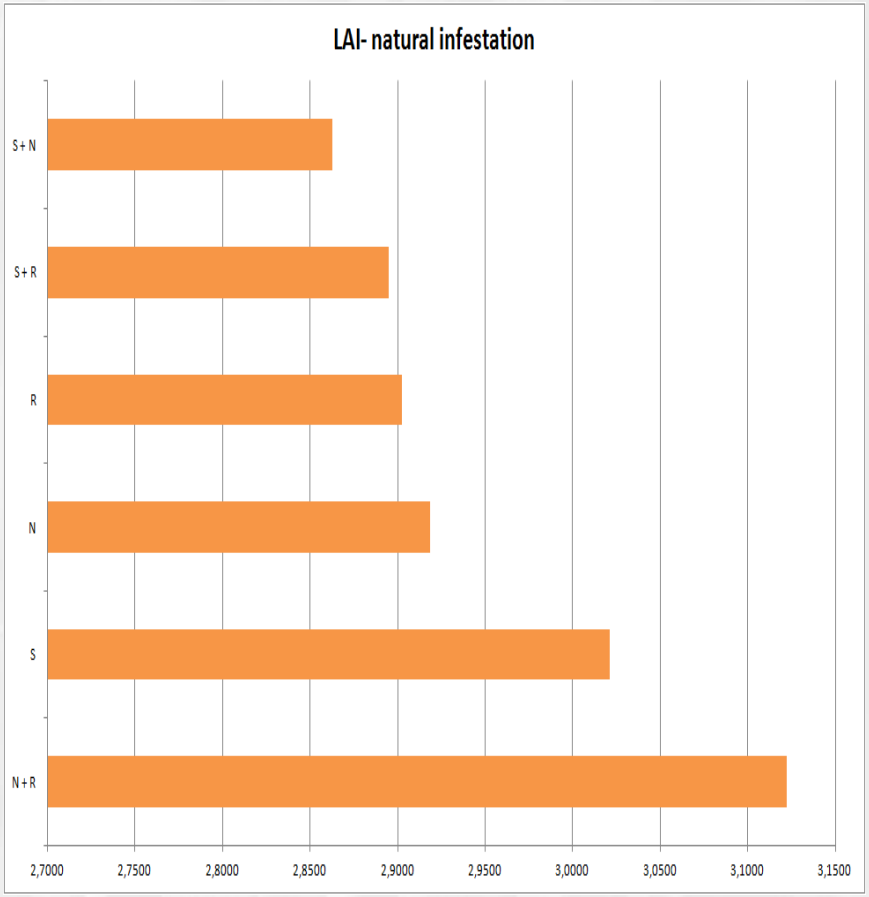


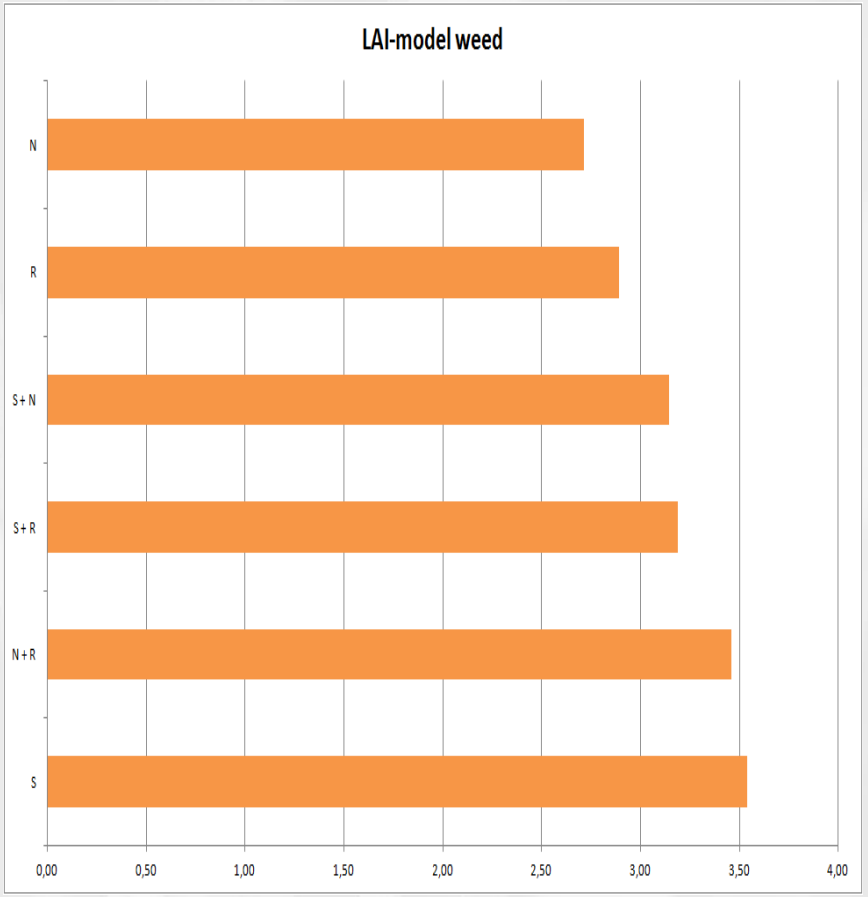
Average for sole crops 48,41
Average for mixtures 57,74



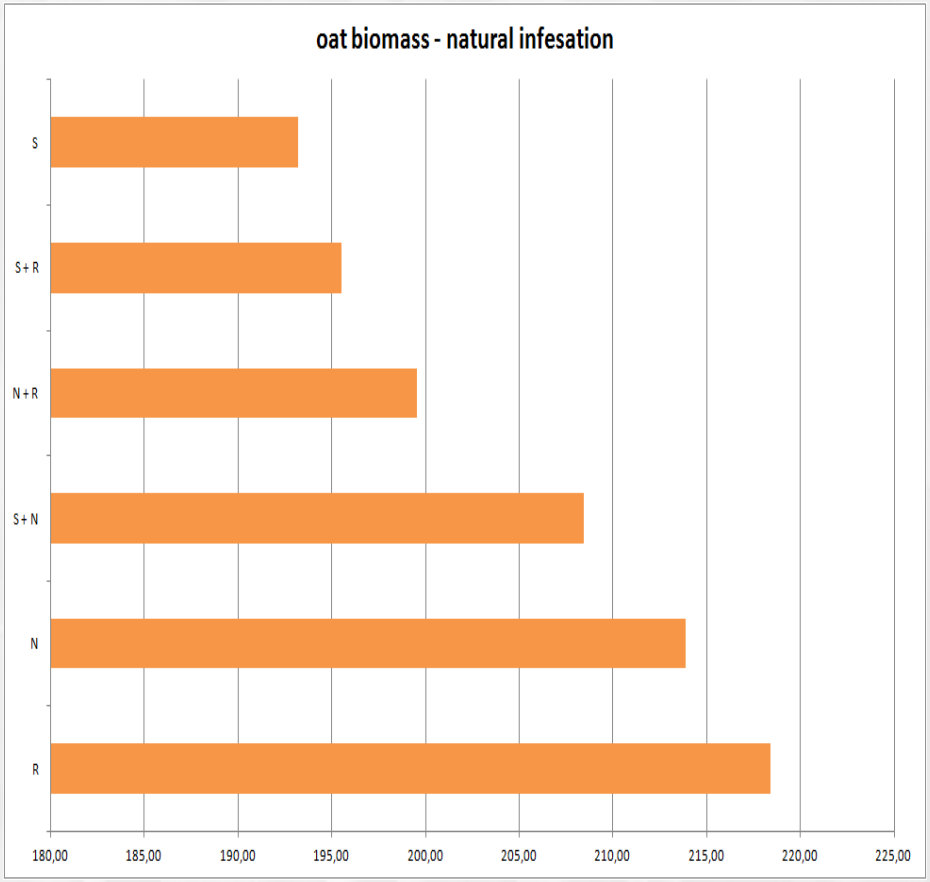
Average for sole crops 151,66
Average for mixtures 194,23

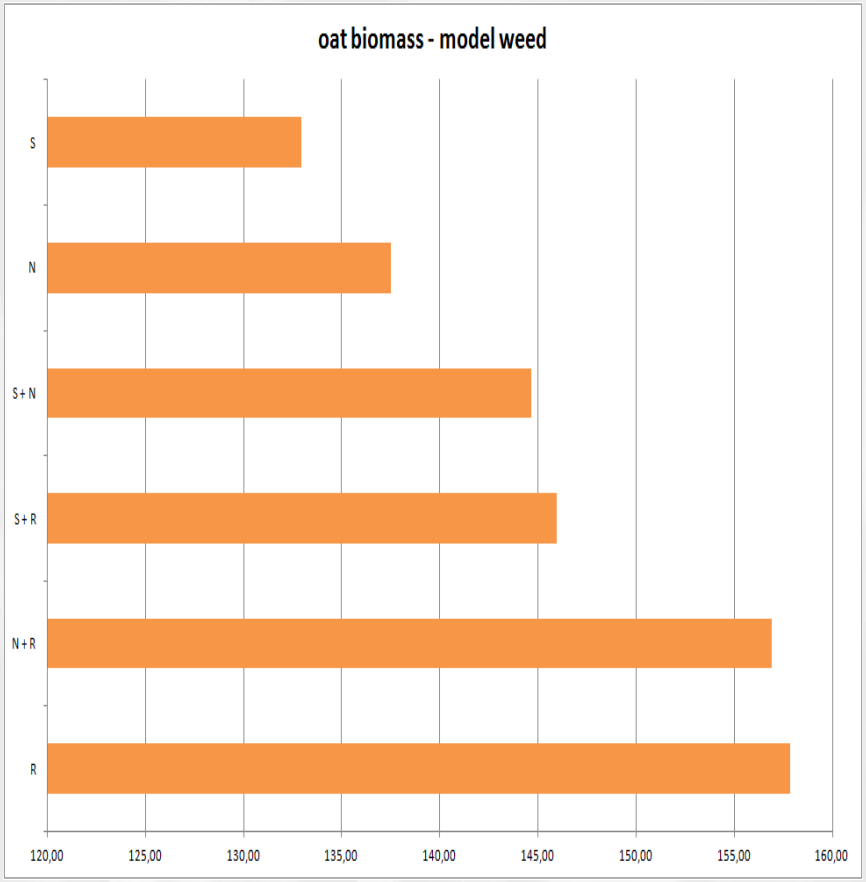
Field experiments 2016



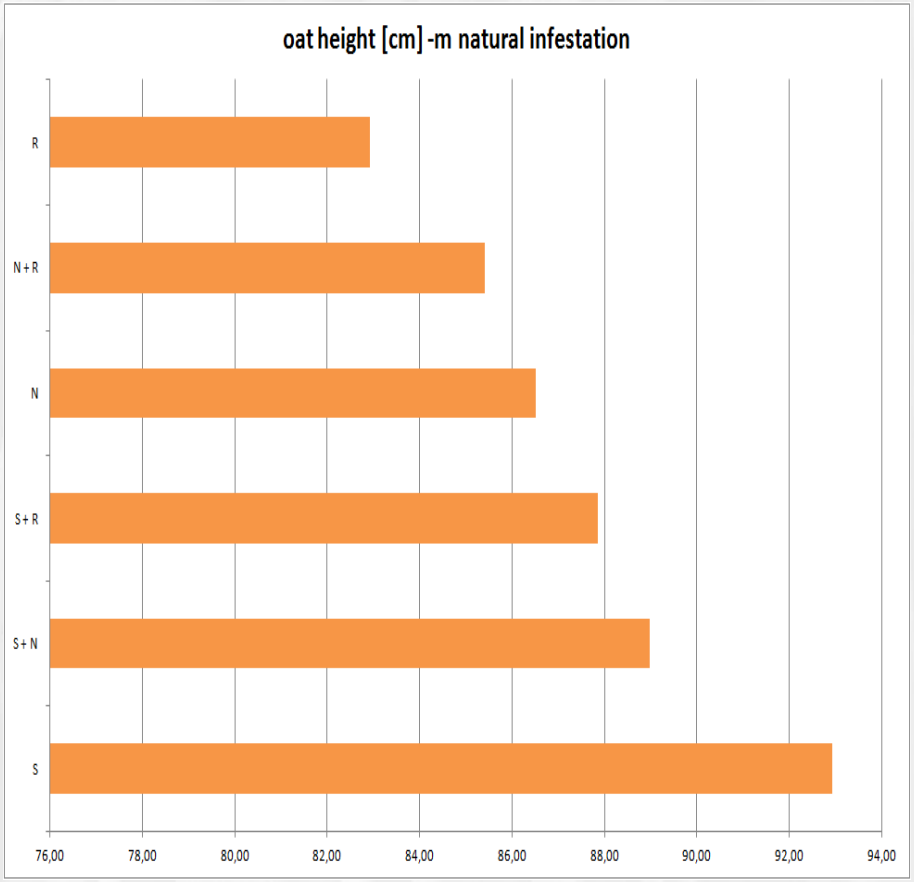


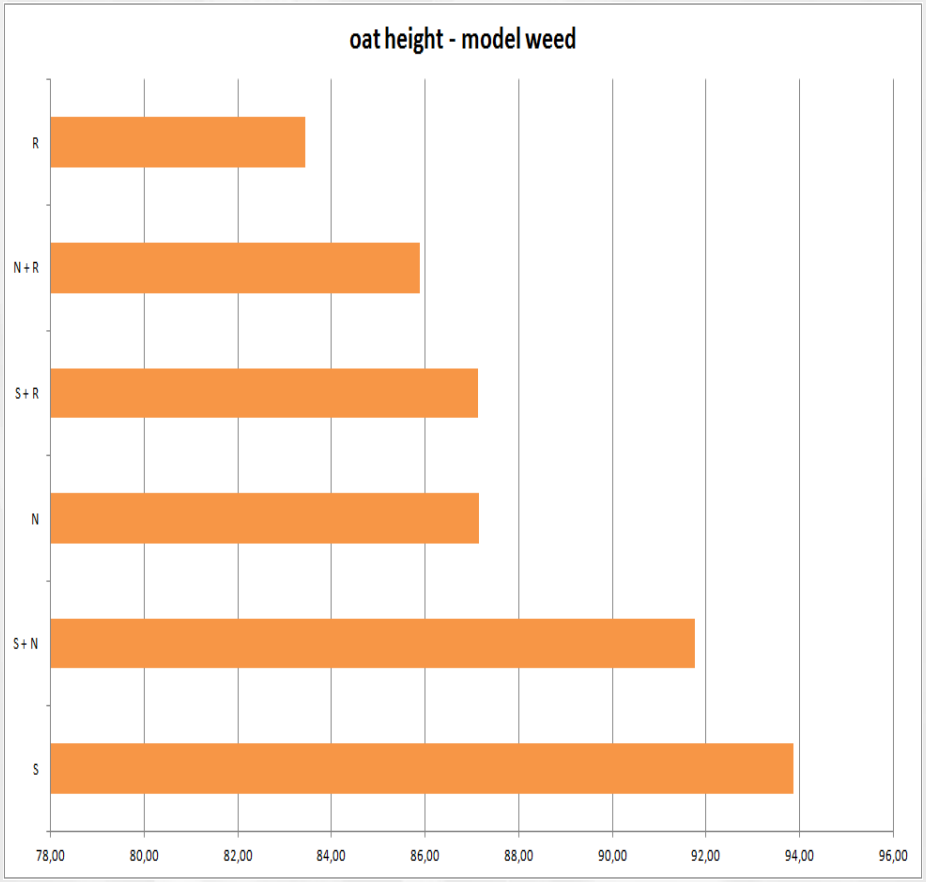
Field experiments 2016



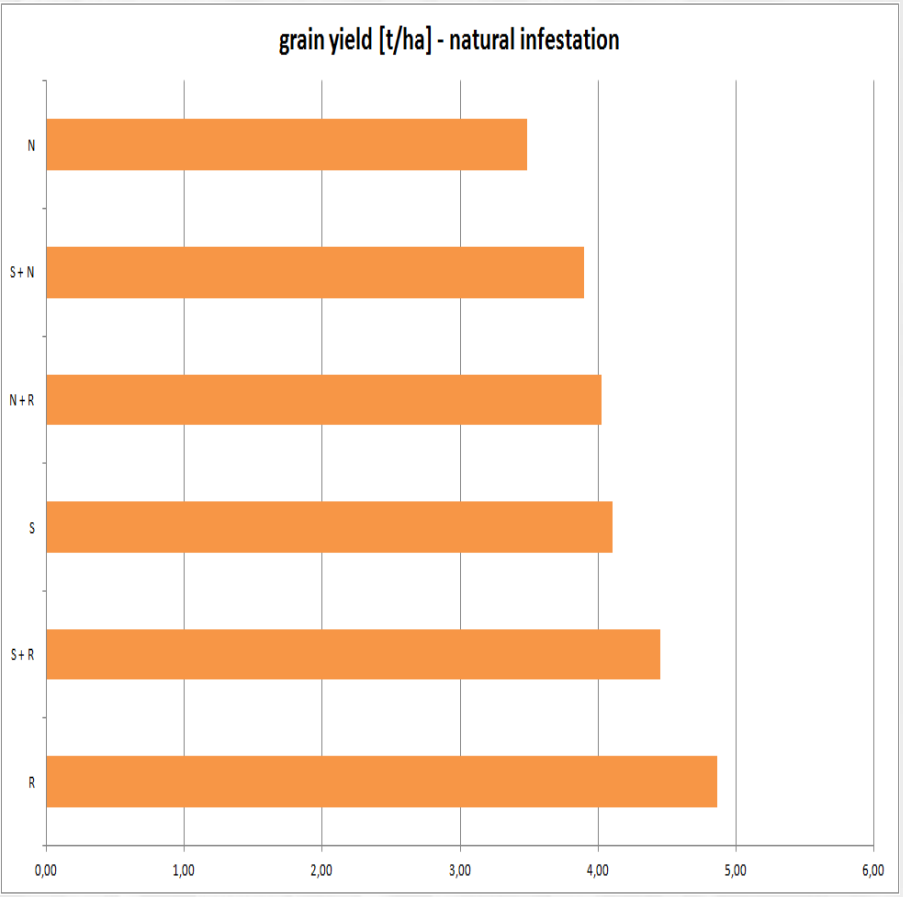


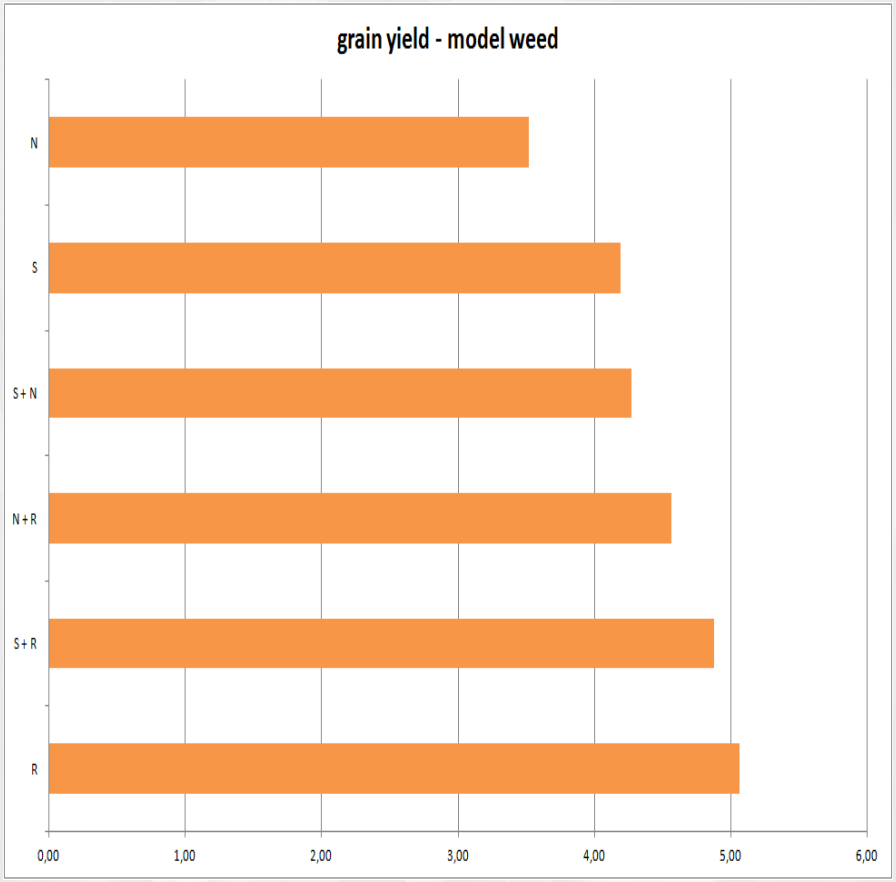
Field experiments 2016





Field experiments 2016





Field experiments 2016

TOP 3 FOR OAT!!!

Var	Weeds no		W.biomass		LAI		Oat bmass		Oat height		Grain yield	
	NI	MW	NI	MW	NI	MW	NI	MW	NI	MW	NI	MW
S		X			x	x			x	x	x	
N	x			x	x		x			x		
R	x	X	x	x			x	x			x	x
SN							x		x	x		
SR		x	x	x		x		x	x		x	x
NR	x		x		x	x		x				x

Dissemination 2017

Conferences

5-7. 10.2016, Puszczykowo, Konferencja naukowa: **„Rolnictwo ekologiczne – stan obecny i perspektywy rozwoju”**

11-13.05.2016, Dymaczewo Nowe, Konferencja naukowa: **„Rola odmiany i ochrony roślin w intensyfikacji produkcji roślinnej„**

19-25.06.2016, Praga **International Weed Science Congress**

9-10. 02.2017, Poznań, 11-12 luty 2016, **National Symposium of Institute of Plant Protection**

Dissemination 2017

Conference presentations

Kaczmarek S**.,** Zarina L., Melander B., Krawczyk R. 2016. **Wykorzystanie potencjału mieszanin odmian owsa jarego i jęczmienia jarego w redukcji zachwaszczenia.** „Rola odmiany i ochrony roślin w intensyfikacji produkcji roślinnej", 11-13 May 2016, Dymaczewo Nowe.

Zarina L., Kaczmarek S. Melander B. 2016. **Mixtures of varieties of spring cereals for weed suppression in organic crop production**., Proceedings, 7 th International Weed Science Congress "Weed Science and Management to Feed the Planet", Prague, June 19-25, 2016.

Krawczyk R., Kaczmarek S., Melander B., Gerowit B., Salonen J., Verwijst T., Zarina L., Hofmeijer M., Lundkvist A. Sonderskov M. 2017 **Rożnorodność upraw i chwastów – projekt „PRODIVA".** Sesja Naukowa Instytutu Ochro ny Roślin – PIB, Poznań February 9-10, 2017.

Plans for 2017

Field experiments :

Barley (6 varieties) and oat (3 varieties) and variety mixtures

– natural infestation and model weed

List of observations and Methods the same as in 2015 and 2016

Collecting and analyzing data

Comparing results from three vegetation seasons

Conclusions

Publication ☺

THANK YOU!!!

☺