

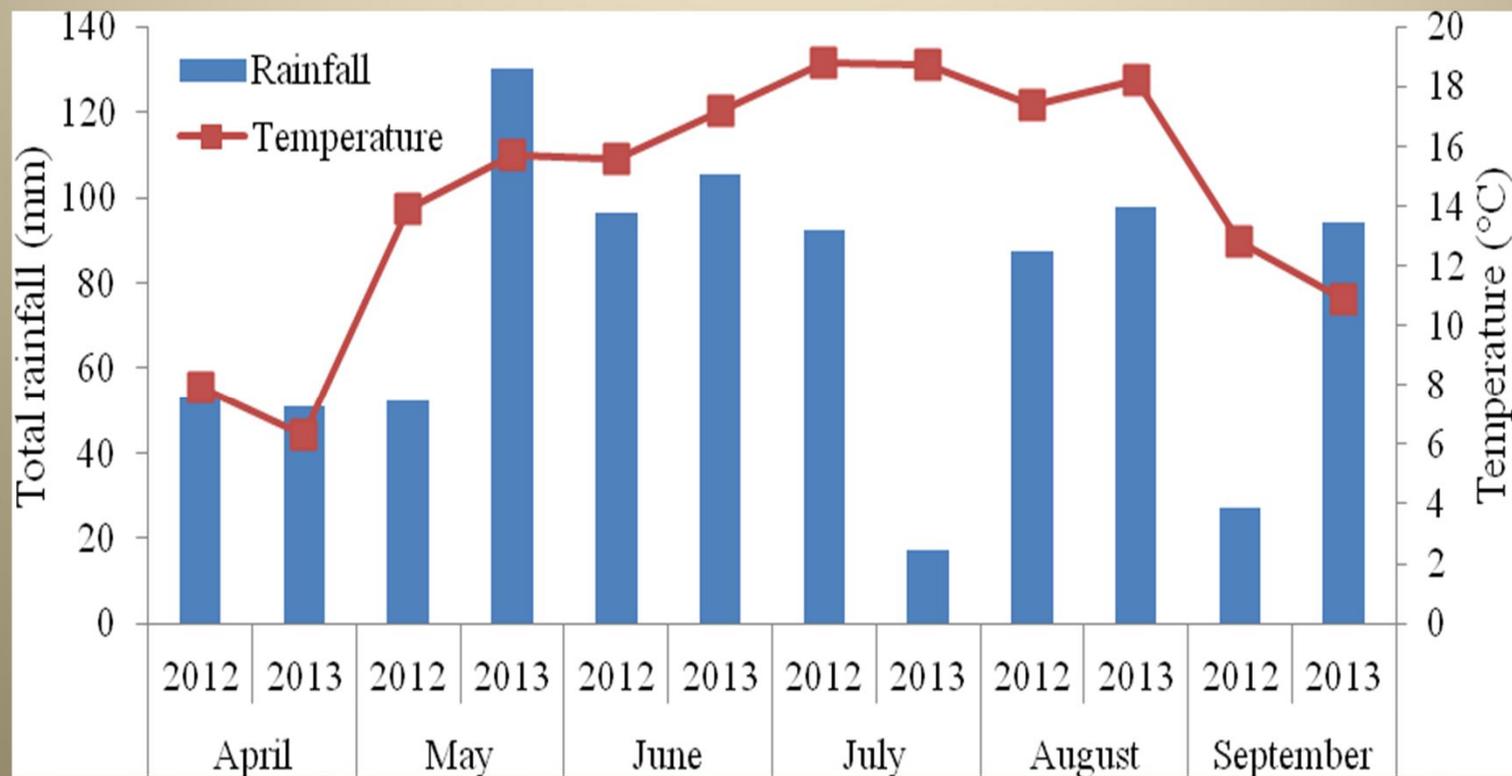
Predicting the yield of potato on
the basis of selected
morphological plant
development in organic

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A field study was conducted in 2012 and 2013, two seasons with very different temperature and rainfall patterns in Poland, with 2012 being a normal good year for potato production, and 2013 being poor. Four potato cultivars (Viviana, Gawin, Legenda, Gustaw) were grown under organic and conventional systems. Morphological and physiological characteristics of the plants were determined, as well as tuber yield and size distributions.

Total monthly rainfall (R) and mean monthly temperatures (T) during the vegetative growth period in the years 2012-2013 for Jadwisin.



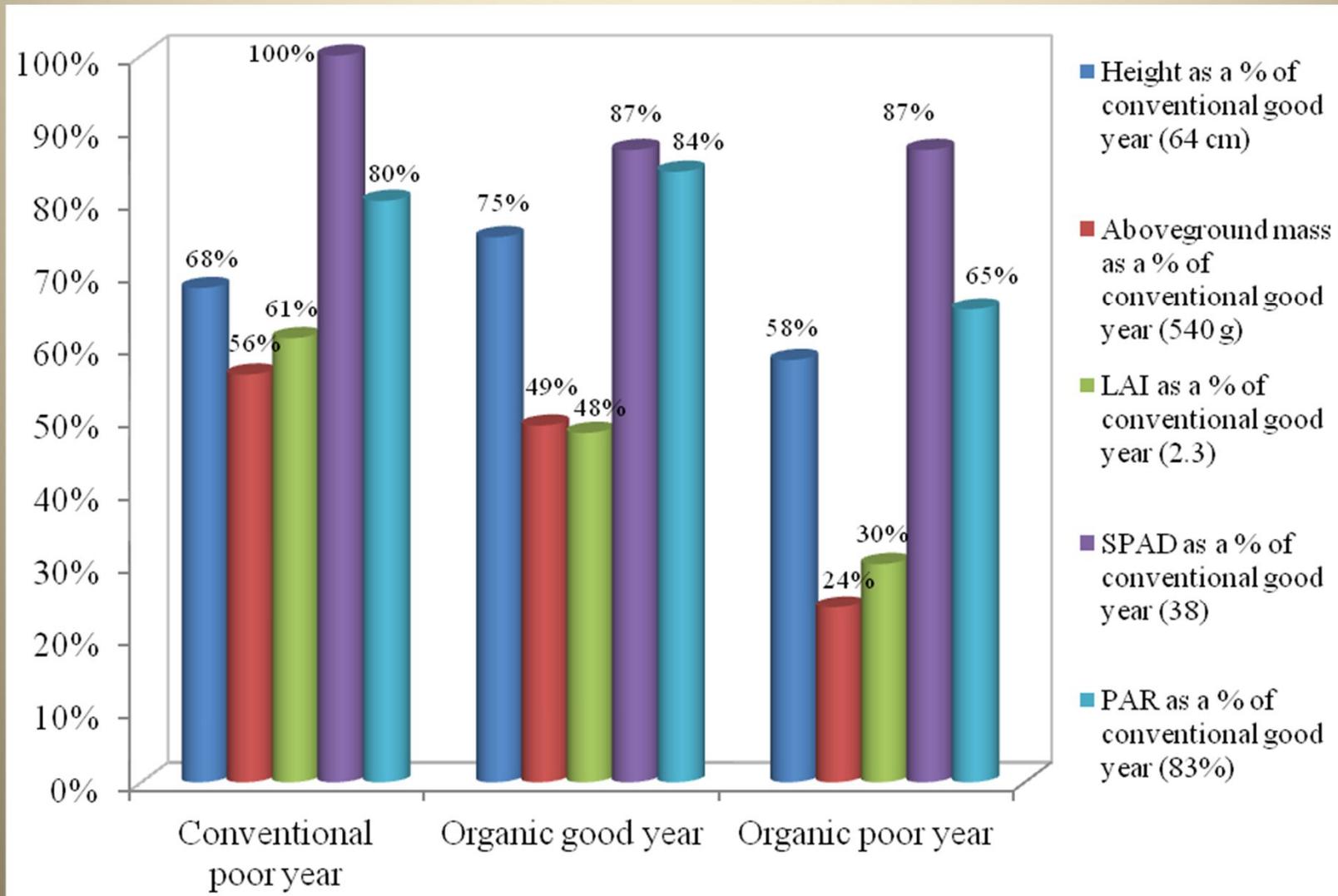
Characteristics of four potato cultivars evaluated in organic and conventional production systems during 2012- 2013

Cultivar	Maturity	Resistance to Phytophthora infestans
Viviana	very early	2
Gawin	mid early	3
Legenda	mid early	5
Gustaw	mid late	5

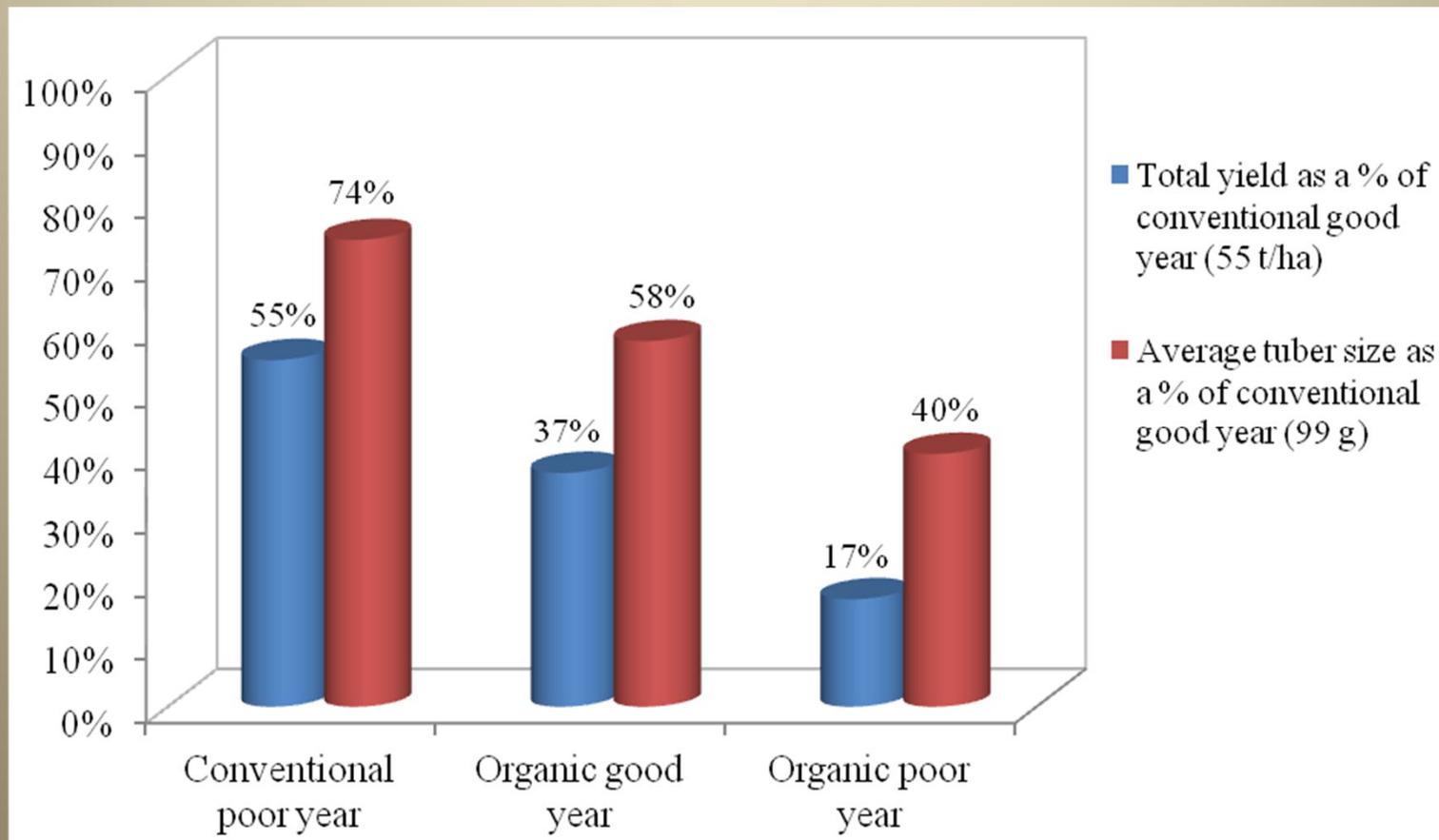
Significance of tested parameters.

Tested parameter	Crop production system	Year	Cultivar
Plant height (cm)	++	++	+
Aboveground biomass (g)	++	++	+
LAI	++	++	+
SPAD	++	-	+
PAR	++	++	+
Total yield (t·ha ⁻¹)	++	++	+
Share of small tubers (<35mm)	++	++	+
Share of medium tubers (35-60 mm)	-	-	-
Share of big tubers (>60 mm)	++	++	+
Mass of 1 tuber (g)	++	++	+

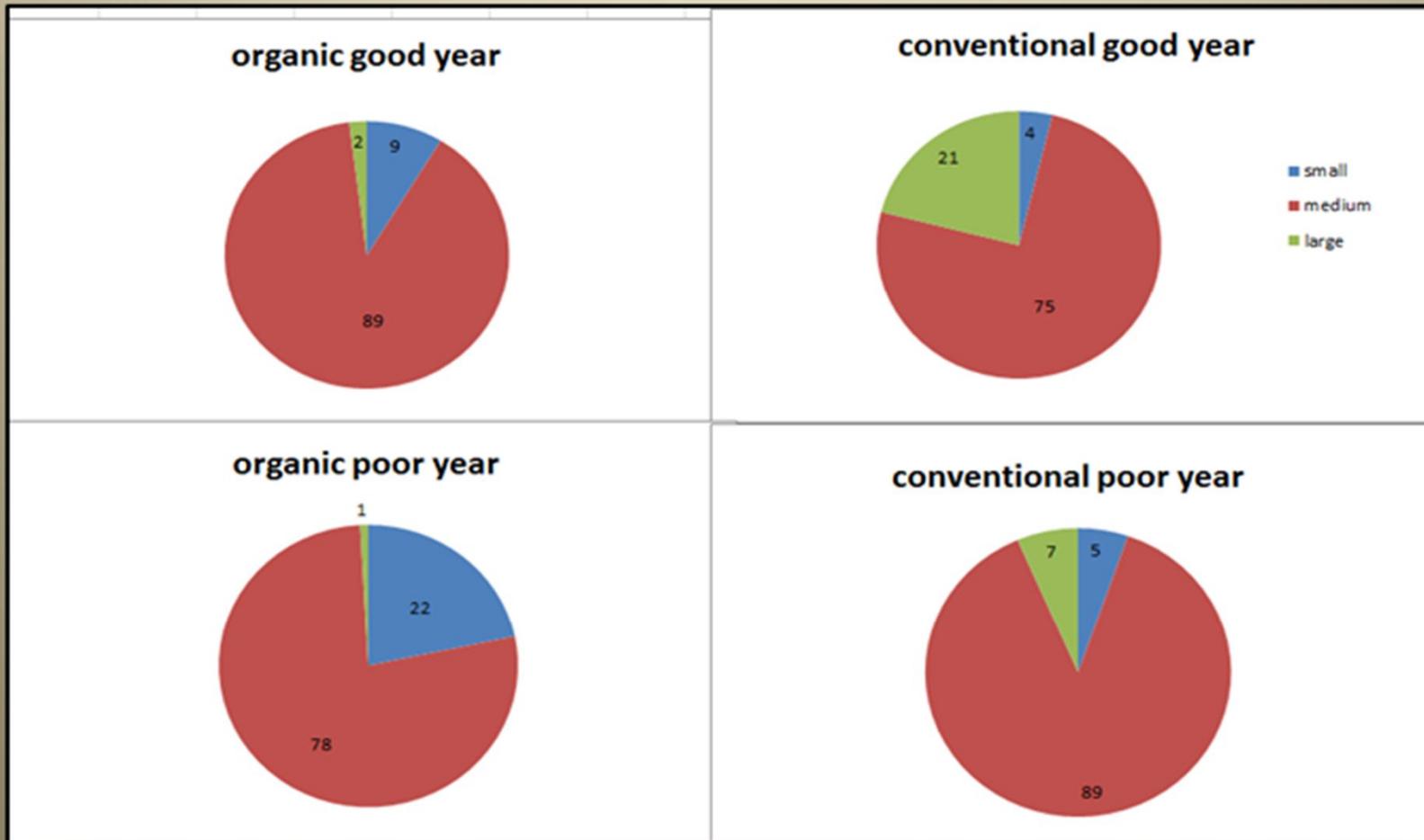
Effect of crop production system and year on plant morphological and physiological parameters



Effect of crop production system and year on yield and tuber size distribution.



Tuber size distributions in two production systems in good and poor growing years



Conclusions

In the conventional system all plant growth and tuber yield parameters were significantly higher than in the organic system. Unfavorable weather conditions in 2013 resulted in weaker growth of plants, which significantly reduced tuber yield and lower production of large tubers compared to 2012.

Plant biomass production and LAI associated with cultivars and weather conditions had a greater influence on tuber yield and size distribution than the production system.

In the years of unfavorable weather conditions, more significant losses in yield can be expected in the organic than conventional production systems.

In the second study conducted in the years 2014-2016 the effect of such indicators of plant productivity as : LAI, leaf greenery index (SPAD) and chlorophyll a fluorescence on the yield of potato tubers grown in two production systems, ie organic and conventional was tested.

Characteristics of four potato cultivars evaluated in organic and conventional production systems during 2014- 2016

Cultivar	Maturity	Resistance to Phytophthora infestans
Ignacy	early	3
Michalina	early	3
Malaga	mid early	3.5
Oberon	mid early	3.5

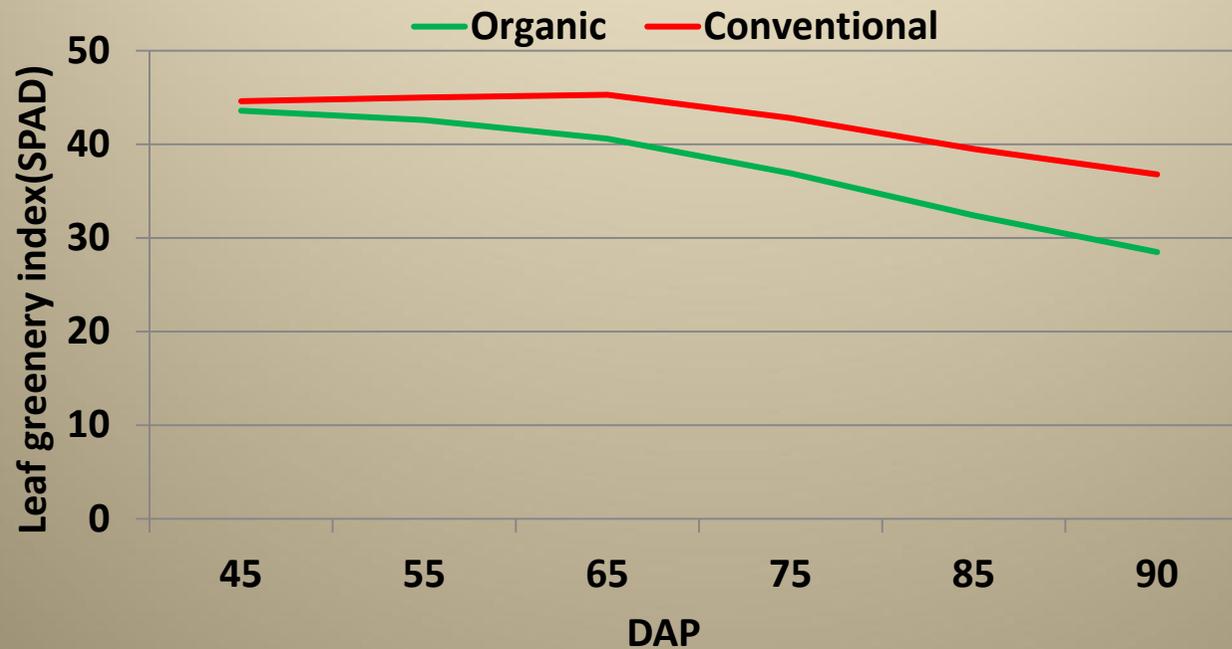
Significance of tested parameters.

Tested parameter	Crop production system	Cultivar	Year
LAI	++	-	-
SPAD	++	+	-
Fv/Fm	-	-	-
PI	++	+	-
Total yield (t·ha ⁻¹)	++	-	-

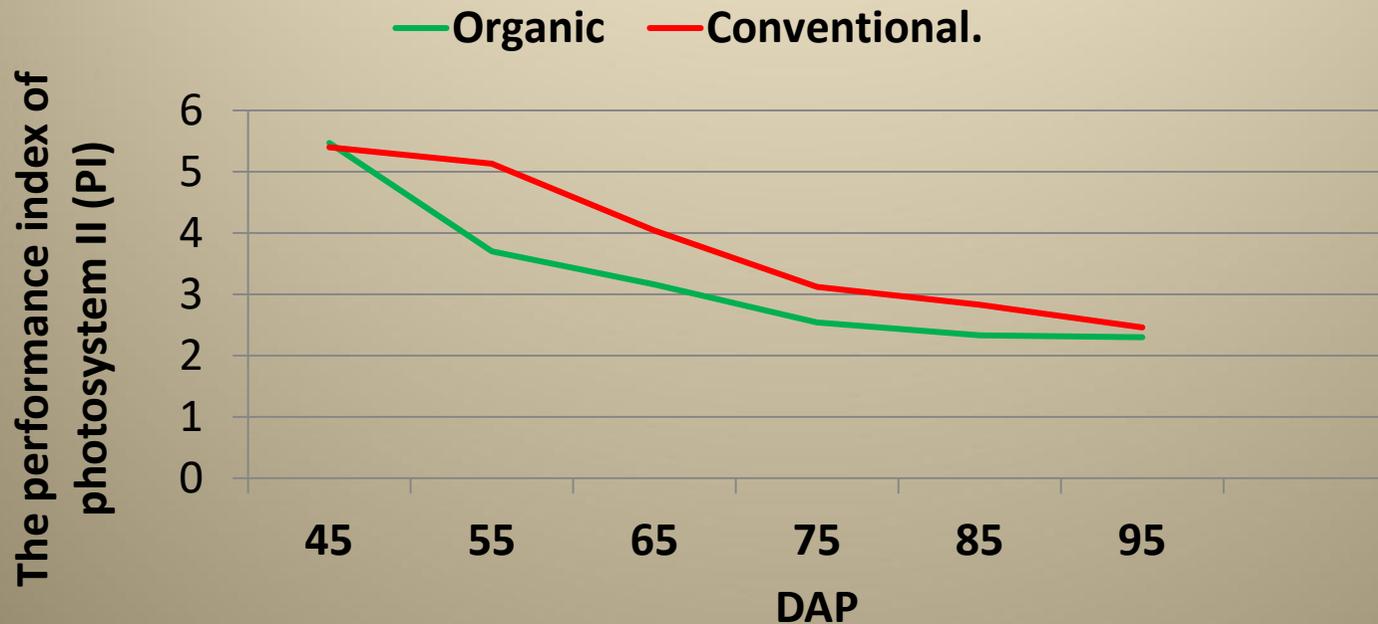
Differences of plant morphological and physiological parameters depending on the crop production system.

Tested parameter/Production system	Conventional	Organic	Decrease in relation to conventional system (%)
LAI	2.97	1.81	39.0
SPAD	42.3	37.4	11.5
Fv/Fm (ratio of variable to max. fluorescence)	0.79	0.79	0
PI (performance index of photosystem II)	3.82	3.28	14.1
Yield (t·ha⁻¹)	51.4	35.7	30.5

Effect of production system (conventional and organic) on leaf greenness (SPAD index) from 45 to 95 days after planting (DAP).



**Effect of production system (conventional and organic)
on PI – the performance index of photosystem II from 45
to 95 days after planting (DAP)**



Correlation coefficients between the chosen morphological-physiological parameters and tuber yield

Production system	LAI- tuber yield		SPAD- tuber yield		PI- tuber yield	
	p	r ²	p	r ²	p	r ²
Conventional	0.006	0.702	0.022	0.570	0.032	0.381
Organic	0.007	0.687	0.028	0.520	0.030	0.323

Conclusions

The obtained relationship between the studied indicators and yield of tubers showed the highest correlation between the leaf area index and the final yield. This indicator seems to be the key, because the good development of the plant proves their good nourishment, and thus of life processes running properly. The slightly higher correlation in the conventional system provide for greater stability of the plant growth in this production system. In the organic system plants are exposed to a stronger adverse factors.

**Thank you for your
attention**

