



YIELDS AND QUALITY OF PEAS VARIETIES IN LATVIAN AGROCLIMATIC CONDITIONS FOR ORGANIC FARMING

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Abstract. Article summarizes results of study detecting the best varieties of peas cultivated in Latvian organic farming conditions. Study was conducted with new varieties of two species of crop peas: *Pisum arvense* L. (Pink flower varieties) – *Retrija*, *Almara* and *Vitra*, and *Pisum sativa* L. (White flower varieties) – *Lasma* and *Zaiga*. All varieties were selected in Latvia. The best among white flower varieties in terms of crop productivity was *Zaiga* variety, where yield was 1.45-1.48 t ha⁻¹. Among pink flower varieties of peas, the most productive was *Almara* variety, with crop productivity of 1.36-1.69 t ha⁻¹. *Retrija* variety of peas excels other studied varieties by total protein content and taste properties.

Keywords: Organic farming, Peas, Protein, Yield.

Introduction

Human-created artificial agroecosystems proved to be very efficient biologically. They allow providing food for constantly increasing population of the Earth. However, unlike natural systems, they are ecologically unsustainable. In order to maintain ecologically balanced agroecosystem, man must constantly maintain soil fertility, i. e., maintain or increase content of humus and nutrition elements of cultivated crops in soil. The most important peculiarity of organic farming is activation of natural nitrogen-fixing systems, which provide for nutrition of cultivated crops mainly at the account of biological nitrogen.

Pea is one of basic vegetable leguminous crops. Two species of crop peas are cultivated in the Republic of Latvia – *Pisum sativa* L. (White flower varieties) and *P. arvense* L. (Pink flower varieties). Ripe peas and unripe seeds as canned or fresh green peas are used in food. Boiled green peas (*P. arvense* L.) are Latvian national meal. Therefore Latvian breeders give great consideration to its taste properties. Special value of peas is its high content of protein balanced by amino acid composition. It can successfully replace animal origin protein in human nutrition.

In organic farming, where mineral fertilizers cannot be used, crop peas are very important as soil improverishers. Its role in providing soil with biological nitrogen is especially important. In mineralizing plant residues, it improves also phosphoric nutrition of subsequent crops significantly, and is a good precursor. Therefore, study detecting the best varieties of peas cultivated in organic farming conditions has scientific and practical meaning.

Materials and methods

Field study was conducted in 2005-2006 on certified organic farming field in Research Institute of Agriculture at LUA. Soil of research field: sod-podzol, loam. Agrochemical properties of topsoil: pH – 6.2; humus composition – 2.0-2.4%; available phosphorus composition – 246 mg/kg of soil; available potassium composition – 140 mg/kg of soil.

Study was conducted with new varieties of two species of crop peas: *P. arvense* L. (Pink flower varieties) – *Retrija*, *Almara* and *Vitra*, and *P. sativa* L. (White flower varieties) – *Lasma* and *Zaiga*. All varieties were selected in Latvia. Soil tilth, norms of seeding, terms of planting and harvesting, as well as analyses and degustation were conducted in accordance with VAAD methodology [4].

Results and discussion

Meteorological conditions in years of study were different from average perennial values both by temperature regime and by amount of precipitation, which allowed us to assess studied varieties of peas objectively.

Length of phases of vegetative seasons differed by varieties and changed by years (see Table 1).

Table 1.

Phenological factors of peas in organic farming conditions

No	Variety	Field germination, %	Productive stems pieces, n. m ²	Plant height, cm	Vegetation period, days	Lodging, 1- 9 scale
2005.						
1	<i>Zaiga</i>	72	59	81	79	5
2	<i>Lasma</i>	72	56	86	79	6
3	<i>Retrija</i>	79	71	110	78	3
4	<i>Almara</i>	73	56	98	76	3
5	<i>Vitra</i>	75	53	97	81	3
2006.						
1	<i>Zaiga</i>	93	114	71	71	6
2	<i>Lasma</i>	89	111	74	71	7
3	<i>Retrija</i>	92	108	99	74	4
4	<i>Almara</i>	92	121	84	73	4
5	<i>Vitra</i>	92	108	82	76	4

From phase „full shoots” to phase „full ripening” peas varieties needed 76 to 81 days in 2005, and just 71 to 76 days in 2006. During sowing in 2005 conditions were cold and humid, shoots showed on the 12th date. Cold and humid spring season of 2005 affected development of peas, which blossomed in the first decade of July only. Accordingly, ripening was delayed, too. The first to ripe was *Almara* variety (18 August), ripening of other varieties was delayed by 3 to 5 days. During sowing (02.05) in 2006 conditions were dry and warm, but as soon as the second decade of May, precipitations were 156% of norm, average air temperature was normal. Peas shoots showed on the 7th day. Blossoming began on 24 June. Warm and humid July weather favoured peas development. On 25 August such varieties as *Zaiga*, *Lasma* have ripened, length of vegetative seasons was 71 days.

Considering conditions of crop cultivation on organic fields, crop production of studied varieties of peas was relatively high (Table 2). The best among white flower varieties by crop productivity was *Zaiga* variety, where yield was 1.45 t ha⁻¹ in 2005, and 1.48 t ha⁻¹ in 2006. The most productive of pink flower varieties was *Almara* variety. Crop productivity was 1.69

All studied peas varieties had small seeds, but they had higher content t ha⁻¹ in 2005, and 1.36 t ha⁻¹ in 2006. However, by taste properties *Retrija* variety was noted during degustation (8 points), and high appraisal by this factor also had *Lasma* variety in 2006. Summer 2006 was dry and hot. All tested varieties of pea had small seeds. While TKW of *Almara* variety was 204.0 g in 2005, the same factor in 2006 was the lowest at 154.1 g. Large seeds are peculiarity of *Retria* variety, where TKW was 380.0 and 306.5 g (in 2005 and 2006, respectively). Similar pattern of TKW factor decrease was also observed with other varieties. of total protein, compared to 2005. The highest content among pink flower varieties had *Retrija* variety (31.4%). Average crop productivity, when seeding this variety in demonstration experiments, was 2.5 t/ha, content of total protein - 25.19%. Content of irreplaceable amino acids was 5.58 %, including, lysine 1.36%, tryptophan 0.21%, methionine 0.15%. [1] The highest content of total protein in all years of study among white flower varieties of peas had *Zaiga* variety and

was 26.6-26.7%. However, by taste properties it was worse than *Lasma* variety. Thus, all studied peas varieties give stable and quality yield in organic farming conditions. Peas are used both in feed and food. Thanks to its balanced composition, pea protein can replace protein of animal origin in our menu.

Table 2.

Crop productivity and quality of peas seeds in organic farming conditions

No	Varieties	Species	Yield, t ha ⁻¹	TKW, g	Taste properties (soaked), 1 - 9 scale	Protein %
2005.						
1	<i>Zaiga</i>	<i>Pisum sativum L.</i>	1.45	236.8	6	26.7
2	<i>Lasma</i>	<i>P.sativum L</i>	1.42	262.0	6	25.6
3	<i>Retrija</i>	<i>P.arvense L</i>	1.54	380.0	8	25.8
4	<i>Almara</i>	<i>P.arvense L</i>	1.69	204.0	6	26.5
5	<i>Vitra</i>	<i>P.arvense L</i>	1.59	223.7	6	26.8
2006.						
1	<i>Zaiga</i>	<i>P. sativum L.</i>	1.49	188.3	7	26.6
2	<i>Lasma</i>	<i>P.sativum L</i>	1.29	191.4	8	25.5
3	<i>Retrija</i>	<i>P.arvense L</i>	1.06	306.5	8	31.4
4	<i>Almara</i>	<i>P.arvense L</i>	1.36	154.1	7	29.0
5	<i>Vitra</i>	<i>P.arvense L</i>	1.25	197.9	6	28.8
LSD ₀₅ (2005)			0.16			
LSD ₀₅ (2006)			0.13			

Conclusions

1. All studied varieties of peas are suitable for organic farming cultivation in climatic conditions of the Republic of Latvia on sod-podzol sandy-loam soil.
2. The best among white flower varieties by crop productivity was *Zaiga* variety, where yield was 1.45-1.48 t ha⁻¹. The most productive among peas pink flower varieties was *Almara* variety with crop productivity of 1.36-1.69 t ha⁻¹. *Retrija* variety of peas excels the rest of studied varieties by content of total protein and taste properties.

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