

First experiences with two preceding crops in strawberry organic farming

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Abstract

Two different preceding crop plants phacelia (*Phacelia tanacetifolia* Benth) and white mustard (*Sinapis alba* L.) were tested in organic planting of strawberry cv. 'Honeoye' and 'Symphony' affecting yield parameters and reducing risks of plant losses caused by root diseases. Field experiments were established from frigo strawberry plants. The effect of two preceding crop plants on yield, refractometric dry matter content and number of died plants were evaluated. The vitality of strawberry plants was assessed as a number of runners, newly created plants and their weight.

Keywords

Strawberry, preceding crop, yield parameters,

Introduction

The importance of organic crop production increases in the Czech Republic, in agreement with consumers' demands, and the interest of soft fruit growers. In 2007 the area of strawberries grown in ecological system was poor, but in 2008 the area reached 2.42 ha. (MZe). Damages of strawberry plants are influenced by many factors, i. e. weather, soil conditions, occurrence of pathogens, etc. Significant role in strawberry growing plays the preceding crop. The aim of this study is to compare the effect of preceding plants phacelia and white mustard on yield parameters and vitality of strawberry plants.

Material and Methods

Experiments were carried out in the locality Semily. This locality is situated in North Bohemia. There are clay-loamy soils, altitude 495 m above sea level, average temperature 5.8 °C, average year precipitation 820 mm.

Two different strawberry varieties 'Honeoye' and 'Symphony' and two preceding crops phacelia (*Phacelia tanacetifolia* Benth.) and white mustard (*Sinapis alba* L.) were tested. Plant green material of preceding crops was chopped and shallow ploughed. The soil was fertilized by farm manure in dosage 40 tonnes per hectare in autumn 2008. Field experiments were established from frigo strawberry plants in March 2009 in four replications. Every plot consisted of 14 plants which were organised on ridges in double-rows 20 x 30, 80 cm apart. The ridges were covered by black non-woven agrotexile made of 100 % polypropylene resistant to solar radiation, as well as to attack by mildew, various types of microorganisms, fungi, and insects. The space between ridges was mulched by cereal straw to avoid weed growing.

The number of bearing plants in the first growing season, mean weight of fruits, refractometric dry matter content and number of died plants were evaluated. The vitality of strawberry plants was assessed as number of runners, newly created plants and their weight.

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Results and Discussion

The lowest number of bearing plants and mean weight of fruits were by cv. 'Honeoye' grown after white mustard. The biggest fruits were by cv. 'Symphony' after phacelia – mean weight of fruits was 15.86 g. Significant differences were not found. Regarding to creation of only few fruits per plot, the data are illustrative only (Tab. 1).

Values of refractometric dry matter content were similar for both cultivars grown after phacelia – 'Symphony' 9.51 and 'Honeoye' 9.54°Brix, respectively. Refractometric dry matter content at 'Honeoye' after white mustard was 9.90°Brix and at 'Symphony' 10.41°Brix, respectively. Differences between cultivars and preceding crops were not statistically significant (Tab. 2).

The highest number of died plants was at cv. 'Honeoye' after phacelia. Lower number of died plants was at cv. 'Honeoye' after white mustard but it was almost 27%. There were few or no died plant at cv. 'Symphony'. Differences between evaluated cultivars were significant (Tab. 3).

Number of runners at cv. 'Honeoye' was low – after phacelia 2.75 pieces and after white mustard 3.83 pieces, respectively. Higher number of runners was at cv. 'Symphony' – after phacelia 8.41 a after white mustard 10.46 pieces, respectively. Differences between cultivars were statistically significant, by cv. 'Symphony' significant differences were recorded also between preceding crops (Tab. 4).

Weight of removed runners and newly created plants was at cv. 'Honeoye' 22,05 g after phacelia, 32.65 g after white mustard. Higher weight of removed biomass was at cv. 'Symphony' – 78.13 g after phacelia and 128.54 g after white mustard. Differences were statistically significant. Number of newly created plant was similar at cv. 'Honeoye' at both preceding crops – 3.00 and 2.96 pieces per plant, respectively. The effect of preceding plant on formation of new plants at cv. 'Symphony' was considerable. Each plant at plot after phacelia created 8.57 new plants while at plots after white mustard 11.65 new plants (Tab. 5). At cv. 'Symphony' statistically significant differences were found between both preceding plants. Number of newly created plants and the weight of removed biomass were in correlation with number of runners.

Decline of strawberry plants during growing season is usually caused by pests or soil-borne pathogens as are *Phytophthora* spp., *Verticillium* spp., *Rhizoctonia* spp., *Cylindrocarpon radiclecola*, *Fusarium* spp. and others. In general, strawberry should not normally be replanted after a preceding strawberry crop (OEPP/EPPO, 1994).

The influence of different preceding plants on soil-borne parasitic nematodes was studied (Tuovinen et al., 2006). Duniway (2000) referred experiments with brassicaceae (broccoli and Brussels sprouts) and rye as preceding strawberry crops. None of the rotations reduced the incidence of *Verticillium* wilt in the subsequent strawberry crop significantly, but physical removal of residues from the preceding strawberry crop did reduce disease.

Tab. 1: Yield parameters

Cultivar	Preceding crop.	Number of bearing plants (%)		Mean weight of fruits (g)	
Honeoye	white mustard	3.75	a	9.90	a
Symphony	white mustard	6.75	a	11.32	a
Honeoye	phacelia	6.75	a	11.46	a
Symphony	phacelia	6.75	a	15.89	a

Tab. 2: Refractometric dry matter content (°Brix)

Cultivar	Preceding crop.	Refractometric dry matter content (°Brix)	
Symphony	phacelia	9.51	a
Honeoye	phacelia	9.54	a
Honeoye	white mustard	9.90	a
Symphony	white mustard	10.41	a

Tab. 3: Number of died plants per plot

Cultivar	Preceding crop.	Number of died plants per plot		
		(pieces)	(%)	
Honeoye	phacelia	6.00	42.86	b
Honeoye	white mustard	3.75	26.79	ab
Symphony	white mustard	0.50	3.57	a
Symphony	phacelia	0.00	0	a

Tab. 4: Number of runners

Cultivar	Preceding crop.	Number of runners	
Honeoye	phacelia	2.75	a
Honeoye	white mustard	3.83	a
Symphony	phacelia	8.41	b
Symphony	white mustard	10.46	c

Tab. 5: Weight of removed runners and newly created plants

Cultivar	Preceding crop.	Weight of removed biomass (g)		Number of newly created plants	
Honeoye	phacelia	22.05	a	2.96	a
Honeoye	white mustard	32.65	a	3.00	a
Symphony	phacelia	78.13	b	8.57	b
Symphony	white mustard	128.54	c	11.65	c

Conclusion

Number of bearing plants, weight of fruits and refractometric dry matter content were not significantly affected by preceding crops in the first growing season. There were considerable differences among plots in these parameters. Vitality of plants was highly affected by preceding crop only by cultivar 'Symphony'. Cultivar 'Honeoye' had significantly lower vitality than 'Symphony' after both preceding crops. The experiment will continue next years.

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