

## The estimation of the yield and content of some chemical compounds in the fruits of chosen hot pepper (*Capsicum annuum* L.) cultivars

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### ABSTRACT

The yield and some ingredient content in the fruits of hot pepper cultivars ('Tajfun', 'Cyklon', 'Beros') were estimated. The yield of physiologically mature fruits obtained from 'Cyklon' and 'Beros' was significantly higher in comparison with 'Tajfun'. The content of dry matter, soluble solids, vitamin C, total and reducing sugars and titratable acidity was significantly higher for the physiologically mature fruits in comparison with fully grown green fruits of hot pepper. Among the tested cultivars the highest nutritive value was found for 'Cyklon' and 'Beros' fruits.

## INTRODUCTION

Fruits of hot and half-spicy pepper are prized because of their spicy and medicinal value. The fruits can be consumed as fresh, pickled or dry. They contain large amounts of sugars and mineral elements, especially Ca, Mg, Mn, Cu, and Zn (Bubicz et al. 1999). Hot pepper fruits are a rich source of such antioxidants like: vitamin C, E and beta-carotene (Bartnikowska 1995, Perucka et al. 2001, Materska et al. 2002). Also, they contain carotenoids, alkaloids and capsaicinoids (Perucka and Bubicz 1994, Perucka 1995).

The aim of this study was to estimate the yielding and the nutritive value of the fruits of three hot pepper cultivars grown in the conditions of Western Pomeranian region.

## MATERIAL AND METHODS

The experiment was carried out in the years 2001 – 2002. The quantity and quality of the yield of two Polish hot pepper cultivars: 'Tajfun', 'Cyklon', and one Czech – 'Beros' were estimated. The field experiment was set in a randomized block design with four replications. The seedlings of hot pepper were produced in the greenhouse and transplanted into the open field during the 3<sup>rd</sup> ten days of May at a density of 40 × 30 cm. During vegetation, standard cultivation and plant protection practices were conducted. Fruits were collected once on 20<sup>th</sup> September. After the harvest the quantity and quality of total yield (including its structure: physiologically mature fruits, physiologically nearly mature fruits, fully grown green fruits and incomplete grown green fruits) were evaluated. For the quantity estimation of the fruits their length, diameter and pericarp thickness were determined. For the laboratory research 30 fruits in three replications were taken. The fruit samples were chosen randomly. For the physiologically mature and fully grown green fruits of hot pepper dry matter (drying at 105°C to constant weight), total and reducing sugars (by the method of Luff-Schoorl), vitamin C as L-ascorbic acid (by the method of Tillmans), soluble solids content (using a refractometer) and titratable acidity (Krełowska-Kułas 1993), were determined. For all of the chemical determinations fresh plant material was used. The results of each year were subjected to an analysis of variance. The two years means were separated by the Tukey's test at  $p = 0.05$ .

## RESULTS AND DISCUSSION

There was a significant effect of a hot pepper cultivar on the quantity of the fruit yield found (Table 1). The highest yield of the physiologically mature fruits was obtained from 'Cyklon'. However, it did not significantly differ from the one obtained from 'Beros'. The yield of green fruits was not significantly different according to the tested cultivars. Fruits of hot pepper which were picked as a fully grown green had slightly higher length and diameter in comparison with physiologically mature fruits (Table 2).

Table 1. The yielding of hot pepper fruits of three cultivars (mean of 2001 and 2002)

Cultivar	Yield of fruits [t ha <sup>-1</sup> ]				
	Total	Physiologically mature	Physiologically nearly mature	Fully grown green	Incomplete grown green
'Tajfun'	15.78	3.65	3.75	3.87	2.14
'Cyklon'	17.43	10.15	1.98	1.56	1.56
'Beros'	25.82	9.75	6.81	3.96	1.99
LSD <sub>0.05</sub>	5.50	3.43	1.83	n.s.	n.s.

Table 2. The quality estimation of hot pepper fruits of three cultivars in different maturity stages (mean of 2001 and 2002)

Cultivar	Stage of fruit ripeness	Fruit length [cm]	Diameter [cm]		Pericarp thickness [mm]
			of top fruit part	of bottom fruit part	
'Tajfun'	1*	8.55	5.85	4.60	3.8
	2**	8.67	5.70	4.65	3.7
	mean	8.61	5.77	4.62	3.7
'Cyklon'	1*	8.37	2.75	0.90	2.9
	2**	8.73	2.81	0.88	2.8
	mean	8.55	2.78	0.89	2.8
'Beros'	1*	13.15	1.80	0.81	2.8
	2**	14.15	1.92	0.88	2.9
	mean	13.65	1.86	0.84	2.8

1\* physiologically mature fruits 2\*\* fully grown green fruits

Pericarp thickness in those both instances was very similar. Whereas, the quality estimation showed differences between the tested cultivars. Fruits of the highest diameter and pericarp thickness were noted for 'Tajfun'. 'Beros' was characterised by the longest fruits with the lowest diameter. The parameters describing nutritive

value of the fruits of hot pepper cultivars tested in the experiment were significantly dependent on the cultivar and the stage of fruit ripeness (Table 3). Significantly higher content of dry matter was found for fruits of 'Cyklon' and 'Beros'. They contained on average 2.93% more of dry matter than 'Tajfun' fruits.

Table 3. Chemical composition of fruits of three hot pepper cultivars (mean of 2001 and 2002)

Cultivar	Stage of fruit ripeness	Dry matter [%]	Soluble solids content [%]	Total sugars [%]	Reducing sugars [%]	Vitamin C [mg 100g <sup>-1</sup> ]	Titrateable acidity [% citric acid]
'Tajfun'	1*	10.04	9.35	5.72	5.31	248.3	0.27
	2**	7.44	5.65	2.74	1.92	162.6	0.13
	mean	8.74	7.50	4.23	3.61	205.4	0.20
'Cyklon'	1*	12.93	11.45	7.16	6.92	213.3	0.32
	2**	10.42	5.35	4.24	3.40	176.1	0.18
	mean	11.67	8.40	5.70	5.16	194.7	0.25
'Beros'	1*	14.06	12.80	8.12	7.64	251.2	0.30
	2**	9.30	5.55	3.49	2.64	198.0	0.13
	mean	11.68	9.17	5.80	5.14	224.6	0.21
Mean for ripeness stage	1*	12.34	11.20	7.00	6.62	237.6	0.30
	2**	9.05	5.52	3.49	2.65	178.9	0.15
LSD <sub>0.05</sub> for:							
cultivar		0.50	1.14	0.39	0.41	n.s.	0.01
stage of fruit ripeness		0.34	0.74	0.26	0.28	22.7	0.01
interaction		0.58	1.28	0.46	0.48	n.s.	0.02

1\* physiologically mature fruits

2\*\* fully grown green fruits

Irrespective of the cultivar physiologically mature fruits were characterised by significantly higher content of dry matter, in comparison with fully grown green fruits. The level of dry matter determined in the experiment was similar to the one published by Perucka and Bubicz (1994), but lower in comparison to data given by Buczkowska and Najda (2002). In the opinion of these authors hot pepper fruits may contain even 14.7% of dry matter. The content of total and reducing sugars was not much different to data put in the literature (Buczkowska and Najda 2002). Hot pepper fruits are seen to be a rich source of vitamin C. Its content in the physiologically mature fruits amounted on average to 237.6 mg 100 g<sup>-1</sup>. Vitamin C content in fully grown green fruits was significantly lower (on average by 58.7 mg 100 g<sup>-1</sup>). Buczkowska and Najda (2002) gave in their report lower level of vitamin C for hot pepper fruits (on average 214.5 mg 100 g<sup>-1</sup>). There were no significant differences found in vitamin C content among hot pepper cultivars tested in the conducted experiment. The highest content of soluble solids was

found for fruits of 'Cyklon'. Irrespective of the cultivars tested in the experiment significantly higher amount of soluble solids was determined for physiologically mature fruits of hot pepper.

## CONCLUSIONS

1. Hot pepper cultivars tested in the experiment had a significant effect on the quantity of the yield of physiologically mature fruits. The highest one was obtained for 'Cyklon' and 'Beros'.
2. Fully grown green fruits of all tested cultivars were characterised by the higher length and diameter in comparison with physiologically mature fruits. Among the tested cultivars the highest diameter and pericarp thickness were noted for 'Tajfun' and length for 'Beros'.
3. Fruits of 'Cyklon' and 'Beros' were characterised by significantly higher content of dry matter, soluble solids, total and reducing sugars, in comparison with 'Tajfun'. Significantly higher amount of all chemical compounds determined in the experiment was found for the physiologically mature fruits.

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OCENA PLONOWANIA I ZAWARTOŚCI NIEKTÓRYCH SKŁADNIKÓW  
CHEMICZNYCH W OWOCACH WYBRANYCH ODMIAN PAPRYKI OSTREJ  
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Streszczenie: W przeprowadzonym doświadczeniu oceniano plonowanie oraz wartość odżywczą trzech odmian papryki ostrej ('Tajfun', 'Cyklon' i 'Beros'). Istotnie większy plon owoców dojrzałych fizjologicznie zebrano w przypadku odmian 'Cyklon' i 'Beros' w porównaniu z odmianą 'Tajfun'. Owoce zbierane w fazie dojrzałości fizjologicznej zawierały istotnie więcej suchej masy, ekstraktu, witaminy C, cukrów ogółem i redukujących oraz odznaczały się wyższą kwasowością ogólną, w porównaniu z owocami zielonymi. Spośród badanych odmian papryki ostrej istotnie większą wartością odżywczą charakteryzowały się owoce odmian 'Cyklon' i 'Beros'.

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