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THE YIELD STRUCTURE AND TECHNOLOGICAL TRAITS OF FRUITS OF SEVERAL SWEET PEPPER CULTIVARS FROM A SINGLE HARVEST

Ewa Rożek, Renata Nurzyńska-Wierdak, Maria Kosior
University of Life Sciences on Lublin

Abstract. Sweet pepper (*Capsicum annuum* L. *var. macrocarpum*) is a valuable vegetable from the Solanaceae family. The increased interest in open field pepper cultivation results from higher demand for this vegetable of the processing industry. Preservation and freezing are the main directions of pepper processing. Due to a long growing period and high thermal requirements of this species, a based problem in open field pepper cultivation in Poland is to obtain the largest possible amount of fully red fruits. The present study, conducted during the period 2009–2010, evaluated quantity and quality yield of several sweet pepper cultivars that are currently most frequently grown in the Lublin region for the processing industry. Fruits were picked in a single harvest. The present study determined marketable yield and its structure, depending on the fruit colour stages, as well as basic technological traits of fruits such as fruit weight, pericarp thickness, share of placenta in fruit weight, and technological yield. 'Socrates F_1', 'King Arthur F_1', and 'Red Knight F_1' were the most productive cultivars. The highest red fruit yield was obtained in the cultivars 'King Arthur F_1' and 'Red Knight F_1', and they also produced the largest fruits. Red fruits accounted for 50.8% of marketable yield, on average, for the cultivars compared. Among the domestic cultivars, 'Caryca F_1' was distinguished by a thick pericarp and a high share of placenta in fruit weight. Technological yield of fruits of the evaluated cultivars was in the range of 83.5–91.7%.

Key words: *Capsicum annuum* L. *var. macrocarpum*, cultivar, marketable yield

INTRODUCTION

Pepper (*Capsicum annuum*) is a vegetable of high biological value which is a significant source of components exhibiting antioxidant properties [Deli et al. 1996; Szajdek and Borowska 2004; Materska and Perucka 2005; Deepa et al. 2006; Nawarro et al. 2006; Perucka et al. 2010]. It is a rich source of vitamin C, carotenoids, and sugars

Corresponding author – Adres do korespondencji: Ewa Rożek, Department of Vegetable Crops and Medicinal Plants, University of Life Sciences in Lublin, Leszczyńskiego 58, 20-068 Lublin, Poland, e-mail: ewa.rozek@up.lublin.pl

[Hornero-Mendez et al. 2000; Perucka et al. 2010]. The content of capsaicin alkaloid, which gives a pungent taste of pepper fruits, determines by two botanical varieties, var. microcarpum (hot pepper) or var. macrocarpum (sweet pepper), individual cultivars are classified.

Pepper is a thermophilous plant and that is why, under the Polish conditions, more stable yields are obtained from protected cultivation [Buczkowska and Bednarek 2005; Kuczuk 2011]. Fruits from protected cultivation are supplied directly to the market, while those from open field cultivation are mostly used by the processing industry. Many domestically bred cultivars are suitable for growing in unheated tunnels and in years with favourable thermal conditions also for open field cultivation. These cultivars are usually characterized by better earliness of maturity compared to foreign cultivars, but frequently also worse technological traits such as lower fruit weight and a thinner wall.

In recent years, an increasing trend in open field sweet pepper cultivation has been observed in Poland [Michalik 2010]. The increased interest in open field pepper cultivation results from higher demand for this vegetable of the processing industry. Favourable argonomic traits of processing pepper cultivars include the following: significant earliness, productivity, medium plant height (this makes it possible to grow pepper plants without supports), and resistance to diseases, in particular bacterial ones. The most important technological traits are as follows: fruit size (large fruits), thick and fleshy peripheral walls, and a small placenta (a small amount of waste during processing). Processing plants purchase raw material sorted out according to fruit colour (red, turning red, green) and raw material is often pre-treated by the producer (fruits are cut into 2–4 parts, with their placenta removed).

This paper presents the yield characteristics of two domestic and three foreign sweet pepper cultivars that are currently most frequently grown in the Lublin region as raw material for the processing industry. The present study determined basic technological traits of fruits, such as fruit weight, pericarp thickness, and share of placenta in fruit weight, as well as yield and its structure depending on the fruit colour stage.

MATERIAL AND METHODS

The present study was carried out during the period 2009–2010 in horticultural farm (51º18' N, 22º45' E) located near Lublin. The objects of the study were 5 sweet pepper cultivars recommended both for growing in unheated foiltunnels and for open field cultivation: 'Caryca F_1', 'Roberta F_1', 'Socrates F_1', 'King Arthur F_1', and 'Red Knight F_1'. The experiment was established on grey-brown podzolic soil with a pH of 6.9. Cauliflower was the forecrop for pepper. In the year preceding pepper cropping, organic fertilization was applied at a rate of 30 $t \cdot ha^{-1}$ and in spring nutrients were replenished in the soil up to the following levels ($mg \cdot dm^{-3}$): N – 100, P – 80, K – 220, Mg – 70, Ca – 1200. The fertilizer YaraMila Complex and calcium nitrate were applied. Seedlings were produced in a heated foil tunnel in seedling trays with 125 cm^3 cells. In 2009 seedlings were planted on 25 May, while in 2010 at the beginning of June (2.06) due to heavy rain. They were planted at a spacing of 62.5 × 40 cm and with a density of

Phot. 1. The plants of Red Knight F_1 cv. Photo E. Rożek
Fot. 1. Rośliny odmiany Red Knight F_1. Fot. E. Rożek

Phot. 2. The plants of Roberta F_1 and Socrates F_1 cv. Photo E. Rożek
Fot. 2. Rośliny odmian Roberta F_1 i Socrates F. Fot. E. Rożek

3.85 pcs · m^{-2}. The area of one experimental plot was 5.2 · m^{-2} and 20 plants were grown in each plot. The experiment was set up in quadruplicate. Plants were hand weeded during the growing period as well as crop protection was used against diseases (grey mould, Sclerotinia stem rot) and pests (aphids). During periods of high soil water deficit, plants were irrigated by drip lines (the distance between drippers 20 cm, the dose 25 mm). Irrigation was used five times in 2009 and six times in 2010. From the fruit set

stage, plants were sprayed with 1% ammonium nitrate five times. Pepper fruits were picked in a single harvest at the beginning of October (5.10.2009, 4.10.2010). Healthy fruits with a diameter of more than 5 cm were included in marketable yield. Grading criteria used by processing plants were applied during sorting. Peppers were divided into red fruits (fully coloured), green fruits (without streaks evidencing the beginning of colour change), and fruits turning red. Number of fruits per plant, fruit colour stage and average fruit weight, marketable yield and its structure per 1 m^2, pericarp thickness, and technological yield (the share of pericarp weight in fruit weight expressed in percent) were determined for all cultivars.

Phot. 3. The plants of Caryca F_1 cv. Photo E. Rożek
Fot. 3. Rośliny odmiany Caryca F_1. Fot. E. Rożek

The obtained results were analysed using analysis of variance for one-way and two-way cross-classification. The significance of differences was evaluated with Tukey's confidence intervals at the level of significance $\alpha = 0.05$.

RESULTS AND DISCUSSION

Field-grown pepper is characterized by a quite long growing period. In the earliest cultivars, single fruits begin to ripen in the second half of August and harvest lasts throughout September and in the first half of October, if only subzero temperatures do not occur earlier. Kowalczyk and Wnęk [2007] showed that pepper cultivation required high manual labour input and that it could be mechanized only to a small extent. These authors estimated total labour input in open field pepper cultivation at 716 man-hours $\cdot$ ha^{-1} and the mechanization rate at barely 25%. Manual fruit picking is the most labour-consuming, since its share in the labour input structure is 31.9%. Due to late fruit ripening and colouration, in the cultivation of processing pepper cultivars a single harvest can be economically justified in years unfavourable for fruit ripening. Manual labour input is then lower and plants are not mechanically damaged, which often happens during multiple harvest. The study of Buczkowska [2001] showed that in the case of hot pepper

the number of harvests had no effect on marketable fruit yield but only on the number of physiologically mature fruits.

Table 1. Average of temperature and sums of rainfalls in the vegetation period of peppers
Tabela 1. Średnie temperatury i sumy opadów w okresie wegetacji papryki

Month Miesiąc	Temperature – Temperatura (°C)			Rainfalls – Opady (mm)		
	2009	2010	mean średnio 1951–2005	2009	2010	mean średnio 1951–2005
May Maj	13.6	14.5	13.0	71.1	156.7	57.7
June Czerwiec	16.4	18.0	16.2	125.5	65.6	65.7
July Lipiec	19.9	21.6	17.8	57.1	101.0	83.5
August Sierpień	19.0	20.2	17.1	54.7	132.8	68.6
September Wrzesień	15.3	12.5	12.6	21.0	119.0	51.6
October Październik	6.9	5.6	7.8	103.6	11.2	40.1

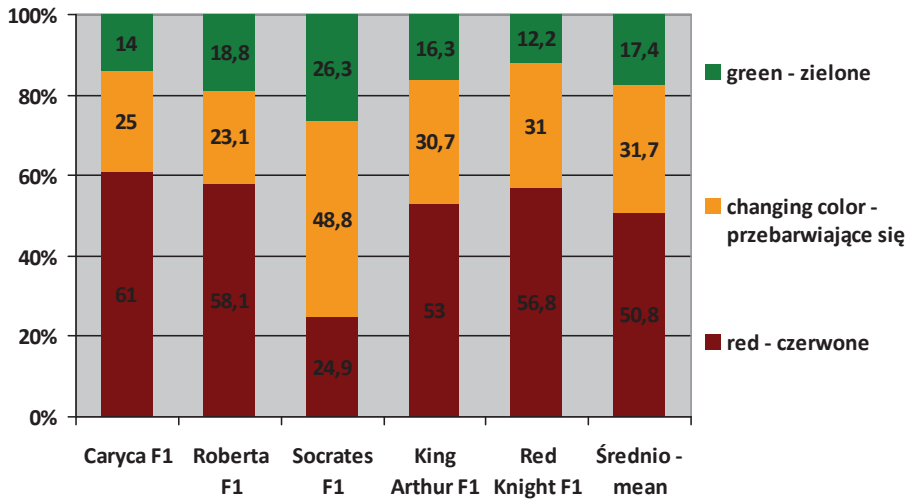

Fig. 1. Fruit share at different stages of ripeness in marketable yield of 5 pepper cultivars
Rys. 1. Udział owoców w różnym stadium dojrzałości w plonie handlowym 5 odmian papryki

According to Buczkowska and Bednarek [2005], both thermal and moisture conditions equally decide about success in pepper cultivation. During the 2009 growing season, there were much higher temperatures in July, August, and September compared to

the long-term average (tab. 1), while in 2010 temperatures higher than the long-term average prevailed from May until the end of August. The second year of the study was characterized by very short intensive rainfall events alternated with longer periods without rainfall. In both years of the study, it was necessary to supply water by irrigation due to soil water deficit. Marketable fruit yield of the pepper cultivars (fig. 1) was evaluated in the range of 3.64–6.39 kg · m^{-2} (tab. 2). Significantly lower yield was obtained in the domestic cultivars (3.64–4.15 kg · m^{-2}) compared to the foreign ones (6.07–6.39 kg · m^{-2}). Yield of the domestic cultivars was slightly higher than in the study of Michalik [2007] who obtained 3.1–3.2 kg · m^{-2} from several field-grown cultivars and much higher than in the study of Szafirowska and Elkner [2008] in which average yield of three sweet pepper cultivars ('Caryca F_1', 'Mercedes', 'Roberta F_1') was 2.16 kg · m^{-2}. Marketable yield of the cultivar 'Roberta F_1' in the present study was higher than that reported by Szafirowska and Elkner [2009] who obtained 1.85–3.34 kg · m^{-2} as well as higher than that in the study of Buczkowska and Bednarek [2005] who estimated yield at 3.26 kg · m^{-2}. In the study of Jadczak and Grzeszczuk [2008] conducted under the climatic conditions of Western Pomerania, the highest yield of field-grown sweet pepper ranged 3.39–3.56 kg · m^{-2}.

Table 2. Marketable yield of 5 pepper cultivars (mean 2009–2010)
Tabela 2. Plon handlowy 5 odmian papryki (średnio z lat 2009–2010)

Cultivar Odmiana	Yield – Plon (kg · m^{-2})			Marketable yield Plon handlowy (kg · m^{-2})
	red fruit owoce czerwone	changing color fruit owoce przebarwiające się	green fruis owoce zielone	
Caryca F_1	2.22 b	0.91 c	0.51 c	3.64 B
Roberta F_1	2.41 b	0.96 c	0.78 bc	4.15 B
Socrates F_1	1.59 c	3.12 a	1.68 a	6.39 A
King Arthur F_1	3.23 a	1.87 b	1.03 b	6.13 A
Red Knight F_1	3.45 a	1.88 b	0.74 bc	6.07 A
Mean – Średnio	2.58 A	1.75 B	0.95 C	

Means signed with the same letter do not differ significally
Średnie oznaczone tą samą literą nie różnią się istotnie

Pepper fruits can be consumed at different ripening stages and their chemical composition changes as the fruit colour changes [Deli et al. 1996; Kołton et al. 2011]. In nutritional terms, the red stage is the optimal fruit ripening stage. During this time, peppers contain the highest amount of biologically active substances, carotenoids, and monosaccharides [Nawarro et al. 2006; Perez-Lopez et al. 2007; Szafirowska and Elkner 2008; Szafirowska and Elkner 2009]. As fruits start to change their colour from green to intensely red, the amount of carotenoid pigments and vitamin C increases. Red peppers contain the highest amount of β-carotene, capsanthin, quercetin, and luteolin [Sun et al. 2007]. Together with colour change, the antioxidant activity of the pepper

fruit increases. Perucka [2004] showed that red hot peppers were characterized by the highest carotenoid content. Provitamin A carotenoids (β-carotene and β-cryptoxanthin) and a red pigment, capsanthin, were predominant in red fruits. In the study of Orłowski et al. [2004], hot peppers harvested at the physiological maturity stage also contained significantly more dry matter, extract, vitamin C, total and reducing sugars as well as they were characterized by higher total acidity compared to green peppers.

A major problem in open field pepper cultivation in Poland is to obtain the largest possible amount of fully red fruits. Earliness of a cultivar, which is an equally important trait as productivity, is evidenced by the number of physiologically mature fruits upon harvest. In this respect, the cultivars 'King Arthur F_1' (3.23 kg · m^{-2}) and 'Red Knight F_1' (3.45 kg · m^{-2}) proved to the best, whereas significantly lower red fruit yield was obtained from the cultivars 'Caryca F_1' (2.22 kg · m^{-2}) and 'Roberta F_1' (2.41 kg · m^{-2}, tab. 2). The cultivar 'Socrates F_1' was characterized by the longest growing period. During fruit picking, ripe fruits accounted for 24.9% of total yield in this cultivar (fig. 1), peppers turning red for 48.8%, while green ones for 26.3%. In the other cultivars, this structure looked much better: fully red fruits accounted for 49.0–61.0%, while green ones for 14–26%. Plants of the studied cultivars produced on average from 7.5 ('Caryca F_1') up to 9.4 ('Roberta F_1') fruits per plant. The fruit structure taking into account fruit colour is shown in fig. 2. The cultivar 'Caryca F_1' was found to have the lowest number of healthy fruits and a high number of fruits with symptoms of bacterial diseases, in particular in 2009.

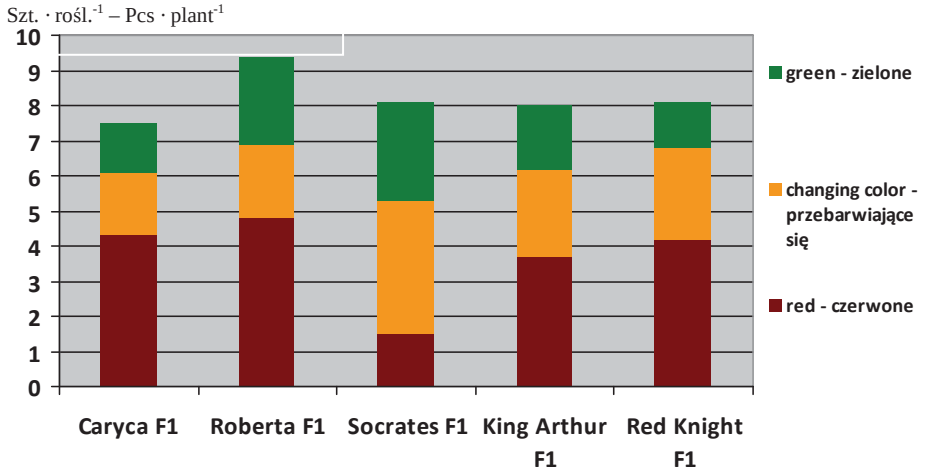

Fig. 2. Number of fruits per plant, depending on the degree of ripeness (mean 2009–2010)
Rys. 2. Liczba owoców z 1 rośliny z uwzględnieniem stopnia dojrzałości (średnio z lat 2009–2010)

Fruit size is a cultivar-specific trait modified by growing conditions. Pepper is a plant sensitive to soil water deficit [Kaniszewski 2005]. Dorji et al. [2005] showed that soil moisture deficit contributed to a reduction in fruit weight and in the number of

fruits per plant. Larger fruits can be obtained by reducing plant density or by using flat polyurethane textile covers [Michalik 2007, Žnidarčič and Ban 2010]. In the studies of Szafirowska and Elkner [2008, 2009], average fruit weight of the cultivar 'Caryca F_1' ranged 102.21–138.6 g, whereas for cv. 'Roberta F_1' it was 111.6–115.4 g. Michalik [2007] obtained fruits with a weight of 64.2–71.3 g in several domestic pepper cultivars. This study confirms that domestic cultivars produce smaller fruits compared to foreign ones. Plants of the cultivars 'Caryca F_1' and 'Roberta F_1' produced significantly smaller fruits (tab. 3) with their average weight of 84.9–134.2 g, depending on the stage of ripeness. Plants of cv. 'Sokrates F_1' produced the largest fruits, while fruits of the cultivars 'King Arthur F_1' and 'Red Knight F_1' were slightly smaller.

Table 3. Average marketable fruit weight of 5 pepper cultivars (mean 2009–2010)
Tabela 3. Średnia masa owocu handlowego 5 odmian papryki (średnio z lat 2009–2010)

Cultivar Odmiana	Fruit – Owoce (g)		
	red czerwone	changing color przebarwiające się	green zielone
Caryca F_1	134.2 c	133.1 c	97.0 c
Roberta F_1	133.5 c	119.0 c	84.9 c
Socrates F_1	250.0 a	222.2 a	161.7 a
King Arthur F_1	226.1 b	196.2 b	143.8 b
Red Knight F_1	217.3 b	187.9 b	147.0 b
Mean – Średnio	192.2 C	171.7 B	126.9 A

Note: see Table 2 – patrz tabela 2

Table 4. Pericarp thickness of 5 pepper cultivars, depending on the degree of ripeness (mean 2009–2010)
Tabela 4. Grubość ścianki owocu 5 odmian papryki w zależności od stopnia dojrzałości (średnio z lat 2009–2010)

Cultivar Odmiana	Fruit – Owoce		
	red czerwone (mm)	changing color przebarwiające się (mm)	green zielone (mm)
Caryca F_1	8.8 a	7.2 a	5.8 a
Roberta F_1	6.6 b	6.2 b	4.7 b
Socrates F_1	8.4 a	7.3 a	6.4 a
King Arthur F_1	8.5 a	7.3 a	6.3 a
Red Knight F_1	9.0 a	8.1 a	6.7 a
Mean – Średnio	8.3 A	7.2 B	6.0 B

Note: see Table 2 – patrz tabela 2

Pericarp thickness is a very important commercial trait that determines the usefulness of fruits for preservation and freezing. In the study of Jadczak et al. [2010], field-grown domestic cultivars had a 4.1–6.7 mm thick pericarp. In the present study, fruits of the cultivar 'Roberta F_1' were assessed to be the worst in terms of this trait, whereas in the other cultivars fruits had significantly thicker walls (tab. 4). Red fruits of all the cultivars were characterized by the thickest pericarp (on average 8.2 mm), while green ones had the thinnest pericarp (6.0 mm). This is attributable to the fact that among fruits turning red, but in particular in the case of green ones, a part of them were not still fully grown.

Table 5. Share of placenta in fruit weight (%)
Tabela 5. Udział łożyska w masie owocu (%)

Cultivar Odmiana	Share of placenta – Udział łożyska			Mean Średnio
	red fruit owoce czerwone	changing color fruit owoce przebarwiające się	green fruit owoce zielone	
Caryca F_1	17.2	16.4	15.9	16.5
Roberta F_1	13.9	12.4	6.4	10.9
Socrates F_1	9.9	7.9	7.2	8.3
King Arthur F_1	13.6	12.5	10.5	12.2
Red Knight F_1	13.8	13.1	10.6	12.4
Mean – Średnio	13.6	12.5	10.1	

Table 6. Technological fruit yield of 5 pepper cultivars depending on the stage of ripeness (%)
Tabela 6. Wydajność technologiczna owoców 5 odmian papryki w zależności od fazy dojrzałości (%)

Cultivar Odmiana	Fruit – Owoce			Mean Średnio
	red czerwone	changing color przebarwiające się	green zielone	
Caryca F_1	82.8	83.6	84.1	83.5
Roberta F_1	86.1	87.6	93.6	89.1
Socrates F_1	90.1	92.1	92.8	91.7
King Arthur F_1	86.4	87.5	89.5	87.8
Red Knight F_1	86.2	86.9	89.4	87.6
Mean – Średnio	86.4	87.5	89.9	

Another commercially important trait determining the amount of waste during the preparation of fruits for processing is the share of placenta in fruit weight. This evaluation parameter was in the range of 8.3% ('Socrates F_1') – 16.5% ('Caryca F_1', tab. 5). Technological yield of the cultivars evaluated was 91.7% ('Socrates F_1') – 83.5% ('Caryca F_1', tab. 6), respectively.

CONCLUSIONS

The highest marketable yield and red fruit yield were obtained from the cultivars 'King Arthur F_1' and 'Red Knight F_1'. These cultivars, together with cv. 'Socrates F_1', were also distinguished by high fruit weight and a thick pericarp. 'Caryca F_1' and 'Roberta F_1' were characterized by the highest share of fully red fruits in marketable yield. Among the domestic cultivars, 'Caryca F_1' had a higher proportion of seed core in fruit weight and a thicker pericarp compared to 'Roberta F_1'. The share of placenta in fruit weight in the evaluated cultivars was 8.3–16.5%, while their technological yield 83.5–91.7%.

REFERENCES

Buczkowska H., 2001. Ocena wpływu wielokrotności zbioru na plon handlowy owoców kilku odmian papryki ostrej. Zesz. Nauk. AT-R Bydgoszcz. Rolnictwo 43, 21–26.

Buczkowska H., Bednarek H., 2005. Ocena plonowania dwóch odmian papryki słodkiej w polu w odniesieniu do warunków termicznych. Acta Agrophysica 5(3), 567–575.

Deepa N., Charanjit K., Balraj S., Kapoor H. C., 2006. Antioxidant activity in some red sweet pepper cultivars. J. Food Comp. Analysis 19, 572–578.

Deli J., Matus Z., Tóth G., 1996. Carotenoid composition in the fruits of *Capsicum annuum* cv. Szentesi Kosszarvu during ripening. J. Agric. Food Chem. 44 (3), 711–716.

Dorji K., Behboudian M.H., Zegbe-Dominguez J.A., 2005. Water relations, growth, yield and fruit quality of hot pepper under deficit irrigation and partial rootzone drying. Scientia Hortic. 104, 2, 137–149.

Hornero-Mendez D., Gómez-Ladrón de Guevara R., Minguez-Mosquera M.I., 2000. Carotenoid biosynthesis changes in five red pepper (*Capsicum annuum* L.) cultivars during ripening. Cultivar selection for breeding. J. Agric. Food Chem. 48 (9), 3857–3864.

Jadczak D., Grzeszczuk M., 2008. The estimation of yielding and biological value of some cultivars of sweet pepper grown in the climatic conditions of Western Pomeranian Region of Poland. Acta Hort. 830, 369–376.

Jadczak D., Grzeszczuk M., Kosecka D., 2010. Quality characteristics and content of mineral compounds in fruit of some cultivars of sweet pepper (*Capsicum annuum* L.). J. Elementol. 15(3), 509–515.

Kaniszewski S., 2005. Nawadnianie warzyw. PWRiL. Warszawa.

Kołton A., Wojciechowska R., Leja M., 2011. Effect of maturity stage and short-term storage on the biological quality of sweet pepper fruits. Veget. Crops Res. Bull. 74, 143–152.

Kowalczyk Z., Wnęk A., 2007. Wielkość i struktura nakładów pracy w uprawie gruntowej oraz pod osłonami wybranych warzyw. Inż. Roln. 7 (95), 93–99.

Kuczuk A., 2011. The productive-economic results of paprika cultivation in organic farming conditions. J. Res. App. Agric. Eng. 56(3), 243–249.

Materska M., Perucka I., 2005. Antioxidant activity of the main phenolic compounds isolated from hot pepper fruit (*Capsicum annuum* L.). J. Agric. Food Chem. 53(3), 1750–1756.

Michalik Ł., 2007. Wzrost i plonowanie papryki słodkiej (*Capsicum annuum* L.) uprawianej w polu w warunkach klimatycznych Olsztyna. Rocz. AR Pozn. 383, Ogrodnictwo 41, 571–575.

Michalik Ł., 2010. The effect of non-woven pp fabric covers on the yielding and the fruit quality of field-grown sweet peppers. Acta Sci. Pol., Hortorum Cultus 9(4), 25–32.

Nawarro J. M., Flores P., Garrido C., Martinez V., 2006. Changes in the contents of antioxidant compounds in pepper fruits at different ripening stages, as affected by salinity. Food Chem. 96 (1), 66–73.

Orłowski M., Grzeszczuk M., Jadczak D., 2004. The estimation of the yield and content of some chemical compounds in the fruits of chosen hot pepper (*Capsicum annuum* L.) cultivars. Fol. Hortic. 16(2), 11–16.

Perez-Lopez A.J., Moises del Amor F., Serrano-Martinez A., 2007. Influence of agricultural practices on the quality of sweet pepper fruits as affected by the maturity stage. J. Sci. Food Agric. 87(11), 2075–2080.

Perucka I., 2004. Zmiany zawartości karotenoidów w owocach papryki odmiany Bronowicka Ostra zachodzące podczas dojrzewania i zastosowania etefonu. Acta Sci. Pol., Technol. Aliment. 3(1), 85–92.

Perucka I., Materska M., Jachacz L., 2010. Ocena jakości preparatów otrzymanych z wysuszonych owoców papryki (*Capsicum annuum* L.). Żywność. Nauka. Technologia. Jakość 1(68), 30–39.

Sun T., Xu Z., Wu C.-T., Janes M., Prinyawiwatkul W., No H.K., 2007. Antioxidant activities of different colored sweet bell peppers (*Capsicum annuum* L.). J. Food Sci. 72, 98–102.

Szafirowska A., Elkner K., 2008. Yielding and fruit quality of three sweet pepper cultivars from organic and conventional cultivation. Veget. Crops Res. Bull. 69, 135–143.

Szafirowska A., Elkner K., 2009. The comparison of yielding and nutritive value of organic and conventional pepper fruits. Veget. Crops Res. Bull. 71, 111–121.

Szajdek A., Borowska J., 2004. Właściwości przeciwutleniające żywności pochodzenia roślinnego. Żywność. Nauka. Technologia. Jakość 4 (41), 5–28.

Žnidarčič D., Ban D., 2010. Plant population and cultural practices on yield of bell peppers (*Capsicum annuum* L.). 45th Croatian & 5 th Int. Symp. of Agric. 624–628.

STRUKTURA PLONU I CECHY TECHNOLOGICZNE OWOCÓW KILKU ODMIAN PAPRYKI SŁODKIEJ POCHODZĄCYCH ZE ZBIORU JEDNORAZOWEGO

Streszczenie. Papryka słodka *Capsicum annuum* L. *var. macrocarpum* jest cennym warzywem z rodziny psiankowatych. Wzrost zainteresowania uprawą papryki na polu wynika z większego zapotrzebowania przemysłu przetwórczego na to warzywo. Główne kierunki przetwarzania papryki to konserwowanie i mrożenie. Ze względu na długi okres wegetacji i duże wymagania termiczne tego gatunku podstawowym problemem w uprawie polowej papryki w Polsce jest uzyskanie jak największej ilości owoców w pełni wybarwionych. Podczas badań przeprowadzonych w latach 2009–2010 oceniono wielkość i jakość plonu kilku odmian papryki słodkiej najczęściej obecnie uprawianych na Lubelszczyźnie z przeznaczeniem do przemysłu przetwórczego. Zbiór owoców przeprowadzono jednorazowo. Określono wielkość plonu handlowego i jego strukturę uwzględniającą fazy wybarwienia owoców oraz podstawowe cechy technologiczne owoców, takie jak masa, grubość perykarpu, udział łożyska w masie owocu i wydajność technologiczna. Najplenniejszymi odmianami były 'Socrates F_1', 'King Arthur F_1' i 'Red Knight F_1'. Największy plon owoców czerwonych oraz owoce o największej masie uzyskano u odmian 'Red Knight F_1' i 'King Arthur F_1'. Średnio dla porównywanych odmian owoce czerwone stanowiły 50,8% plonu handlowego. Wśród odmian hodowli krajowej 'Caryca F_1' wyróżniała się grubym perykarpem i dużym udziałem łożyska w masie owocu. Wydajność technologiczna owoców ocenianych odmian kształtowała się w granicach 83,5–91,7%.

Słowa kluczowe: *Capsicum annuum* L. *var. macrocarpum*, odmiana, plon handlowy

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