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YIELD QUANTITY AND QUALITY OF FIELD CULTIVATED EGGPLANT IN RELATION TO ITS CULTIVAR AND THE DEGREE OF FRUIT MATURITY

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Abstract. Eggplant cultivars differ from one another in a number of properties, among others, earliness of fruiting and the length of fruiting period. A considerable problem regarding eggplant field cultivation in Poland is relatively high failure due to characteristics of our climate. Two-factorial field experiment established according to randomized split-plot method in three replications, aimed at the assessment of yielding of five eggplant cultivars: Avan F_1, Black Beauty, Classic F_1, Epic F_1 and Vernal F_1 (I factor). Plants were planted between 4^{th}– 7^{th} June, on the experiment years. Fruits were harvested in the stage of optimum harvesting maturity (every 7 days) and after exceeding this stage (every 10 days) (II factor). There was recorded significant diversity in eggplant yield in the years of the experiment, as well as in relation to its cultivar and the stage of fruit harvesting maturity. High temperature and sufficient amount of precipitation favored eggplant development in 2008, which was proved by yield (23.48 t ha^{-1}) higher than that in next years, average by 71.4% in the case of marketable yield and by 7.5 times higher for early yield (11.87 t ha^{-1}). Vernal F_1, Epic F_1 and Avan F_1 cultivars produced yield ranging from 23.79–18.89 t ha^{-1}, while Classic F_1 and Black Beauty featured yield lower by half. The marketable yield of elder fruits was higher than the one regarding fruits harvested in their optimum maturity stage. The results of chemical analysis proved that fruits in optimum maturity contained higher dry matter and reducing sugars in comparison to elder fruits. Yet no proof was found involving differences in biological value of the examined eggplant cultivars.

Key words: *Solanum melongena* L., variety, harvest term, marketable yield, early yield, biological value

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INTRODUCTION

An eggplant (*Solanum melongena* L.) has become increasingly appreciated vegetable in Poland due to its considerable dietary value, as well as the possibility of its versatile usage. This plant is cultivated mainly in greenhouses and in foil tunnels, as its field cultivation is of a high risk, because of climate conditions in our country [Golcz et al. 2005]. Optimum temperature for eggplant growth is within the range of 22–30ºC, while temperature fall to 17°C results in inhibition of plant development. Therefore, the highest production of this species originates from the area of a very hot climate, especially from India, China, Japan and Turkey [Lawande and Chavan 1998]. In research by Adamczewska-Sowińska and Kołota [2010], marketable yield of eggplant from field cultivation could be found within the range from 9.66 to 17.78 $t \cdot ha^{-1}$. Markiewicz et al. [2008], applying foil tunnel cultivation, obtained average yield for Epic F_1 and Solara F_1 cultivars amounting 4.27–5.22 $kg \cdot m^{-2}$. Similar yielding data were reported by Buczkowska and Kowalska [2000], as eggplant marketable yield for Epic F_1 cultivar, pollinated by an earth humblebee, numbered 5.3 kg from 1 m^2. Ambroszczyk et al. [2008] obtained marketable yield ranging 8.56–9.40 kg fruit from 1 m^2, at diverse type of plant cultivation in a greenhouse.

Eggplant fruits characterize low – calorie content and o high nutritional value. Kunachowicz et al. [2005] reported mean calorie value of eggplant fruit equal 87 kJ, while in investigation by Kowalski et al. [2003] the mentioned parameter amounted 71 kJ in Epic F_1 cultivar and 96 kJ in Black Beauty cultivar. In 100 g of fresh matter there is 1–1.1 g of protein with 18 amino acids, 0.1–0.2 g of fat with linoleid acid as a dominant one, 5.7–6.3 g of total carbohydrates and cellulose (2.5–3.4 g) [Kowalski et al. 2003, Kunachowicz et al. 2005, USDA 2010]. In eggplant fruit there can be found mineral salts of K, P, Ca and Mg [Golcz et al. 2005, Michałojć and Buczkowska 2008]. Kowalski et al. [2003] also pointed to the fact that it contains microelements, such as Zn, Fe, Mn, Cr, Cu and Se. Moreover, in those fruits there were also determined other precious components like omega 3 acid, omega 6 acid, beta carotene, vitamin E, vitamin K, pantothenic acid, folic acid, choline and phytosterols [Kowalski et al. 2003, Kunachowicz et al. 2005, USDA 2010]. The content of vitamin C in eggplant can be highly diverse. Kunachowicz et al. [2005] reported that it amounts 2 mg in 100 g f.m., Lawande and Chavan [1998] determined its value as 12 mg, while Ambroszczyk et al. [2008] and Kowalski et al. [2003] estimated the quantity of ascorbic acid to amount, average, 6.4 and 23.18 mg in 100 g f.m. To especially valuable components of eggplant can be classified phenolic acids and their derivatives, which feature, among others, antioxidant activity. Little information has been provided by literature about biological value of eggplant fruits in their different stage of maturity. Gajewski and Arasimowicz [2006], as well as Gajewski et al. [2006] stated that according to fruit ripening there does increase the content of polyphenolic acids and there decrease the quantity of anthocyanins. An eggplant contains considerable amount of anthocyanins, which provides for its high antioxidant value [Chanasut and Rattanapanone 2006, Azuma et al. 2008].

Eggplant cultivars differ in a number of properties, among others, earliness, length of fruiting period, color of skin and destination regarding their place of cultivation [Cebula and Ambroszczyk 1999]. Many cultivars are recommended for cultivation under covers, as well as for field cultivation. Significant biological value of an eggplant and relatively easy availability of various cultivars seems to suggest that eggplant production in the conditions of moderate climate and in field conditions, will continuously increase. That fact has made the authors to undertake research regarding usability of selected eggplant cultivars for field cultivation. Another purpose of investigation was assessment of biological value of eggplant fruit harvested in different stages of their maturity.

MATERIAL AND METHODS

In the years 2008–2010, in Research-Development Station of Vegetables and Ornamental Plants belonging to Department of Horticulture at University of Environmental and Life Sciences in Wroclaw (51º 07'N, 17º 02'E), there was conducted two-factorial field experiment, established according to randomized split-plot method, in three replications. Within the frames of the first factor, there were assessed the following eggplant cultivars: Avan F_1, Black Beauty, Epic F_1, Vernal F_1 and Classic F_1. The second factor involved harvest term – fruits were harvested every 7 days, in optimum stage of their maturity (well colored – color appropriate for particular cultivar, shiny, with soft flesh and seeds), as well as every 10 days – after exceeding optimum ripeness (fruits less firm and less shiny, with occurring and seeds getting harder). The experiment was carried out on black degraded earth, formed on medium loamy soil of IIIa class, featuring pH 6.8 and salinity ranging 113.1 $\mu s \cdot cm^{-1}$. Chemical analyses of soil proved phosphorus and potassium deficit and, therefore, their content was improved to reach values optimum for eggplant, i.e. 130 mg K dm^{-3} and 200 mg P dm^{-3}, applying fertilization with granular triple superphosphate in early spring and potassium sulphide. On 26th March eggplant seeds were sown in a greenhouse to sowing boxes in the amount of 4 g m^{-2}. After spreading cotyledons, seedlings were transplanted to pots of 12 cm diameter. Peat substrate was used as a growing medium. In the course of transplants growing, 0.2% solution of Florovit was applied twice. At the end of April, plants were moved to unheated foil tunnel in order to be hardened. Between 4th–7th June transplants were planted in the field, according to a strip – row system, in the spacing of 60 × 50 × 90 cm. Fertilization on tiller, with ammonium nitrate in the dose of 150 kg N ha^{-1} was applied directly before planting. The area of one plot equaled 3 m^2 (2 × 1.5 m). The care of eggplants consisted in weed control done by hand, as well as in irrigation applied in periods of rainfall water deficit. Single dose of water ranged 20 mm. Five weeks after planting there was applied top dressing fertilization with ammonium nitrate in the dose of 50 kg N ha^{-1}.

Fruit harvest took place between 8th July and 16th September. There was evaluated eggplant cumulative marketable yield, as well as early yield (fruit yield from three first harvests) for each particular stage of maturity. In the course of full fruiting, there were collected fruits samples to undergo chemical analyses. There were determined the following parameters: dry matter – due to gravimetric method, vitamin C – by the method of titration (PN-90/A-75101/11), nitrates (V) – using potentiometric method, reducing sugars – according to Lane-Eynon method (PN-90/A-75101/07), P and Mg – applying colorimetric method, K and Ca – by flame photometric method. The results of research were subjected to analysis of variance using Tukey test for confidence interval $\alpha = 0.05$.

RESULTS AND DISCUSSION

An eggplant is a thermophilic plant, of high water requirements, especially in the period of setting buds and fruits growth [Ertek et al. 2006, Aujla et al. 2007]. As it can be concluded from the data tabled in table 1, thermal conditions favoured eggplant growth, especially in 2008 and 2009. During the whole period of plants growing, average monthly temperatures were then higher than mean ones for many years. The amount of precipitation was different in particular years of the experiment. Their distribution was uneven and their summary quantity in plants growing period ranged from about 216 mm in 2008 and 2010 to 292 mm in 2009. The least favourable weather conditions regarding flowering and setting fruits were in 2010.

Basing on research conducted it was possible to state that significantly highest marketable yield of eggplant fruit in their optimum maturity stage (22.13 t ha^{-1}) and also after exceeding the mentioned stage (24.82 t ha^{-1}) , was harvested in 2008 (tab. 2). In subsequent years of the experiment eggplant yield was lower respectively by 38.2% and 26.1%, as well as by 56.8% 46.6%. It also turned out that yearly yield of fruit harvested in the stage exceeding fruit optimum maturity, was higher than the yield of less mature fruit. The difference did not exceed the range of 12.2% (2008) to 38.6% (2010).

Eggplant marketable yield, in the most favourable for this plant year, i.e. 2008 could be found within the range of 11.77–29.67 t ha^{-1} and was comparable with yields obtained by Ertek et al. [2006] in the conditions of continental climate with the use of irrigation. It was, at the same time, three times higher than the one obtained in research carried out by Aujla et al. [2007] in India. The highest yield of both fractions was produced by Vernal F_1 cultivar (28.75 t ha^{-1}). Average by 10.6% lower yield was harvested in cultivation of Epic F_1 and Avan F_1 cultivars. However, the mentioned difference was not statistically confirmed. Yield of Classic F_1 and Black Beauty cultivars was lower by 28.2% and 42.3% respectively. No diversity was recorded regarding the yield of fruits in their different stages of maturity, except for Black Beauty cultivar, whose yield of optimum maturity fruits was considerably of lower values than that of the remaining ones. The highest early yield was obtained from Vernal F_1 cultivar and it, average, provided for nearly 50% of marketable yield (tab. 3). Classic F_1 cultivar featured the highest share of early yield in marketable yield (60.4%).

In 2009 marketable yield of Vernal F_1, Avan F_1 and Epic F_1 cultivars reached the same statistical level, between 24.58–20.00 t ha^{-1}, while the yield of Classic F_1 and Black Beauty cultivars was significantly lower (average by 69.4%). It was also recorded that in cultivation of Epic F_1 and Avan F_1 cultivars the yield of fruits which exceeded optimum maturity stage was 1.6–1.5-times higher, to reach even three times higher values in the case of Black Beauty cultivar, in comparison to fruits in their optimum maturity stage. Those differences, however, were not proved by statistical significance. Early yield of fruit in marketable yield of optimum maturity constituted average 20.6%, while in the yield of higher – maturity fruits it provided merely for 3.5%. The most

Table 1. Mean values of air temperature and summary precipitation in growing period of eggplant field cultivation in 2008–2010*

Year	Month	Temperature (°C)					Precipitation (mm)				
		decade			mean monthly temperature	deviation from mean temperature for many years (1981–2000)	decade			total precipitation	deviation from mean total precipitation for many years (1981–2000)
		I	II	III			I	II	III		
2008	June	22.3	17.8	22.2	20.7	4.1	0	2.9	20.6	23.5	-53.1
	July	21.0	20.7	23.3	21.7	2.9	52.2	27.7	5.8	85.7	6.2
	August	22.3	20.9	18.1	20.3	2.3	16.6	61.0	19.0	96.6	30.9
	September	20.6	11.6	11.5	14.6	1.0	9.5	0.7	17.6	27.8	-18.2
2009	June	15.2	17.2	18.6	17.0	0.1	5.4	21.0	53.0	79.4	2.8
	July	21.2	21.1	20.6	21.0	2.2	32.1	69.8	14.0	115.9	36.4
	August	21.9	21.4	20.7	21.3	3.3	73.9	12.7	2.0	88.6	22.9
	September	18.2	16.8	15.6	16.9	3.3	3.1	0.0	3.9	7.0	-39.0
2010	June	18.6	16.0	17.9	17.5	1.2	13.4	11.4	0.0	24.8	-51.8
	July	20.4	23.3	19.3	21.0	2.2	7.0	34.6	37.5	79.1	-0.4
	August	19.8	19.3	17.5	18.8	1.0	16.2	14.0	43.8	74.0	8.3
	September	12.6	12.5	12.2	12.5	-1.1	26.0	11.8	51.0	88.8	42.8

* Meteorological data: Research – Development Station of Vegetables and Ornamental Plants, Department of Horticulture, University of Environmental and Life Sciences in Wroclaw

satisfactory yielding characterized Vernal F_1 cultivar. The remaining examined cultivars produced significantly lower yield, except for Black Beauty, whose cultivation did not provide any fruit within the first three harvest term.

In the last year of research to cultivars featuring advantageous marketable yield belonged Vernal F_1 (18.04 t ha^{-1}) and Epic F_1 (17.22 t ha^{-1}), while Avan F_1 and Classic F_1 cultivars provided lower yield, average by 47.1% and for Black Beauty – lower by 81.9%. The most considerable difference between marketable yield regarding fruits of diversified maturity stage was observed in cultivation of Black Beauty cultivar. The yield of fruits characterizing optimum maturity was 2.3 times lower than that of more mature ones. Early yield share in marketable yield in 2010 was extremely low and ranged from 3.5% (Black Beauty) to 16% (Classic F_1). The early yield did not depend on particular cultivar, it was only possible to prove that the yield of more mature fruit was significantly higher than the yield of optimum – maturity fruit.

Statistical analysis of research results for three years pointed to the fact that eggplant marketable yield was significantly related to both a cultivar and the degree of maturity of harvested fruit. The highest marketable yield was obtained in Vernal F_1 cultivar (mean value 23.79 t ha^{-1}). The same level, regarding statistics, featured Epic F_1 and Avan F_1 cultivars yielding, although their yield was by 11.5% and by 20.6% lower. It was also stated that the yield of fruit exceeding their stage of optimum maturity was, average, by 24.4% higher than the one involving optimum – maturity fruit. The highest yield in this research (24.78 and 24.07 t ha^{-1}) was recorded for Vernal F_1 and Epic F_1 cultivars when their fruits exceeded optimum maturity stage, while the lowest yield values (5.58 t ha^{-1}) characterized fruits of Black Beauty harvested in their optimum maturity. In examination by Buczkowska [2010], conducted in an unheated foil tunnel, fruit yield of Epic F_1 cultivar was 1.6 times higher. Differences in early yield of the examined eggplant cultivars were statistically confirmed. The highest yield (7.04 t ha^{-1}) featured Vernal F_1 cultivar as it provided for 29.6% of marketable yield. Average by 28.6% lower early yield was obtained in cultivation of Epic F_1, Avan F_1 and Classic F_1 cultivars and by 59.1% in Black Beauty cultivar. More considerable share of early yield in marketable yield characterized Classic F_1 as compared to the yield of the remaining cultivars which amounted 41% for fruits in optimum maturity and 37.6% when they exceeded that stage. Ambroszczyk et al. [2008] reported that in greenhouse cultivation percentage of early yield in marketable one equaled 35.8–42.8%.

Results of statistical analysis proved that eggplant fruit of diverse degree of maturity did significantly differ in the content of dry matter and reducing sugars (tab. 4). Fruits harvested in their optimum maturity stage contained higher amount of dry matter and reducing sugars in comparison to elder fruits. The content of vitamin C and nitrates (V) remained at the same significance level.

As it has been proved on the basis of research results, the content of nutritional components and antioxidant activity depends on eggplant cultivar [Okmen et al. 2009]. At conducted research wasn't found any effect of a cultivar on the presence of analyzed components. Slightly higher amounts of dry matter could be observed in Avan F_1 (10.66 %) and Vernal F_1 (10.0%) and of reducing sugars – in Epic F_1 (2.69%) and Classic F_1 (2.66%) cultivars, in fruits in optimum maturity stage. Raigón et al. [2008] reported that in greenhouse cultivation the content of dry matter in eggplant fruits ranged from 4.69%

Table 2. Marketable yield of eggplant fruits harvested in different stages of maturity, in 2008––2010 (t ha^{-1})

Cultivar	2008			2009			2010			2008–2010		
	A	B	mean	A	B	mean	A	B	mean	A	B	mean
‘Vernal F_1’	27.83	29.67	28.75	24.11	25.06	24.58	16.44	19.63	18.04	22.80	24.78	23.79
‘Epic F_1’	24.67	27.28	25.97	15.44	24.56	20.00	14.07	20.37	17.22	18.06	24.07	21.06
‘Avan F_1’	25.89	25.00	25.44	17.56	26.22	21.89	7.41	11.26	9.33	16.95	20.83	18.89
‘Classic F_1’	20.50	20.78	20.64	8.17	7.00	7.58	8.00	10.59	9.30	12.22	12.79	12.51
Black Beauty	11.77	21.39	16.58	3.06	8.86	5.96	1.92	4.44	3.19	5.58	11.56	8.57
Mean	22.13	24.82	23.48	13.67	18.34	16.00	9.57	13.26	11.41	15.12	18.81	16.96
LSD α = 0.05 for:												
year												3.98
cultivar (I)			5.28			11.31			8.03			5.14
fruit maturity stage (II)			n. s.			n.s.			2.74			2.72
interaction (I × II)			n. s.			n.s.			n.s.			n.s.

A – Fruits in optimum maturity stage
B – Fruits after exceeding their optimum maturity stage

Table 3. Early yield of eggplant fruits harvested in their different stages of maturity, in 2008––2010 (t ha^{-1})

Cultivar	2008			2009			2010			2008–2010		
	A	B	mean	A	B	mean	A	B	mean	A	B	mean
‘Vernal F_1’	13.78	14.83	14.31	7.06	2.00	4.53	1.11	3.48	2.30	7.31	6.77	7.04
‘Epic F_1’	12.72	10.94	11.83	2.44	0.28	1.36	2.14	2.74	2.44	5.77	4.65	5.21
‘Avan F_1’	12.72	11.67	12.19	3.00	0.94	1.97	0.30	1.26	0.78	5.34	4.62	4.98
‘Classic F_1’	12.06	12.89	12.47	1.56	0.00	0.78	1.41	1.56	1.48	5.01	4.81	4.91
Black Beauty	7.82	9.22	8.52	0.00	0.00	0.00	0.00	0.22	0.11	2.61	3.15	2.88
Mean	11.82	11.91	11.87	2.81	0.64	1.73	0.99	1.85	1.42	5.21	4.80	5.00
LSD α = 0.05 for:												
year												0.89
cultivar (I)			2.99			0.92			n.s.			1.15
fruits maturity stage (II)			n. s.			1.09			0.80			n.s.
interaction (I × II)			n. s.			n.s.			n.s.			n.s.

A – Fruits in optimum maturity stage
B – Fruits after exceeding their optimum maturity stage

Table 4. The content of dry matter, reducing sugars, N-NO_3^- (V) and vitamin C in fruits of the examined eggplant cultivars harvested in different stage of maturity (mean for 2008–2010)

Cultivar	Dry matter (%)			Reducing sugars (%)			N-NO_3^- (V) (mg kg^{-1} f. m.)			Vitamin C (mg 100 g^{-1} f. m.)		
	A	B	mean	A	B	mean	A	B	mean	A	B	mean
'Vernal F_1'	10.00	9.01	9.51	2.59	2.51	2.55	42.58	47.33	44.95	5.05	4.26	4.66
'Epic F_1'	8.75	8.57	8.66	2.69	2.13	2.41	43.59	41.30	42.44	5.01	4.00	4.50
'Avan F_1'	10.66	9.01	9.83	2.13	2.31	2.22	36.40	31.50	33.95	5.56	4.66	5.11
'Classic F_1'	9.38	9.16	9.27	2.66	2.22	2.44	42.67	53.91	48.29	5.33	5.04	5.19
Black Beauty	9.30	8.15	8.73	2.49	2.37	2.43	45.19	48.13	46.66	5.22	6.03	5.63
Mean	9.62	8.78	9.20	2.51	2.31	2.41	42.09	44.43	43.26	5.24	4.80	5.01
LSD α = 0.05 for:												
cultivar (I)			n.s.			n.s.			n.s.			n.s.
fruits maturity stages (II)			0.69			0.12			n.s.			n.s.
interaction (I × II)			n.s.			n.s.			n.s.			n.s.

A – Fruits in optimum maturity stage
B – Fruits after exceeding their optimum maturity stage

Table 5. The content of P, K, Mg and Ca in fruits of the examined eggplant cultivars harvested in different stages of maturity (mean for 2008–2010) (% d.m.)

Cultivar	P			K			Mg			Ca		
	A	B	mean	A	B	mean	A	B	mean	A	B	mean
'Vernal F_1'	0.25	0.26	0.25	3.85	3.87	3.86	0.18	0.20	0.19	0.12	0.12	0.12
'Epic F_1'	0.24	0.21	0.22	3.50	3.59	3.54	0.17	0.20	0.18	0.12	0.11	0.12
'Avan F_1'	0.24	0.26	0.25	3.62	3.82	3.72	0.17	0.18	0.17	0.13	0.10	0.11
'Classic F_1'	0.21	0.22	0.22	3.68	3.87	3.78	0.20	0.24	0.22	0.14	0.11	0.13
Black Beauty	0.48	0.23	0.36	3.83	3.88	3.86	0.19	0.19	0.19	0.12	0.14	0.13
Mean	0.28	0.24	0.26	3.70	3.80	3.75	0.18	0.20	0.19	0.13	0.12	0.12
LSD α = 0.05 for:												
cultivar (I)			n.s.			n.s.			n.s.			n.s.
fruits maturity stages (II)			n.s.			n.s.			n.s.			n.s.
interaction (I × II)			n.s.			n.s.			n.s.			n.s.

A – Fruits in optimum maturity stage
B – Fruits after exceeding their optimum maturity stage

to 7.29%, while Cebula and Ambroszczyk [1999] determined the mentioned parameter at the level of 6.63–7.57%. The higher values of vitamin C featured more mature fruits of Black Beauty cultivar (6.03 mg·100 g^{-1} f.m.). That quantity was comparable to the highest one obtained in greenhouse research by Cebula and Ambroszczyk [1999]. Kowalski et al. [2003] reported that in cultivation in an unheated foil tunnel, Black Beauty cultivar characterized higher content of reducing sugars and vitamin C than Epic F_1 cultivar. N-NO_3^- (V) reaches its highest values for Black Beauty cultivar (45.19 mg·kg^{-1} f.m.) regarding fruits in optimum maturity stage, as well as in fruits of Classic F_1 (53.91 mg·kg^{-1} f.m.) harvested after the mentioned stage. Macroelements content in dry matter of eggplant fruit was within the range of 0.21–0.48% P, 3.50–3.88% K, 0.17–0.24% Mg, 0.10–0.14% Ca and it did not depend on experimental factors (tab. 5). Similar amount of P, K and Mg was determined for eggplant fruit in field experiment carried out by Russo [1996]. In fruits originating from cultivation in a foil tunnel the quantity of P, Ca and Mg proved to be higher [Golcz et al. 2005] or slightly lower, considering K and Mg in investigation by Michałojć and Buczkowska [2008]. In research by Raigón et al. [2008], the Black Beauty cultivar belonged to distinctive ones, as far as K and Ca content was concerned, while it contained smaller amount of phenolic acids in comparison to 30 other cultivars subjected to examination. At conducted research Black Beauty variety also contained highest amount of phosphorus (0.36%) and potassium K (3.86%), however Kowalski et al. [2003] reported that in cultivation in an unheated foil tunnel, Black Beauty cultivar contained lower quantities of potassium, magnesium and phosphorus than Epic F_1.

CONCLUSIONS

1. The yield of eggplant fruits significantly depended on particular cultivar. The highest marketable (23.79 t ha^{-1}) and early yield (7.04 t ha^{-1}) of eggplant fruits was obtained for Vernal F_1 cultivar.

2. Marketable yield of fruits harvested after exceeding their optimum maturity stage (18.81 t ha^{-1}) was, average, by 24.4% higher and early yield (4.80 t ha^{-1}) – by 7.9% lower in comparison to the yield of fruits harvested in their optimum harvesting maturity.

3. Fruits harvested in their optimum maturity stage contained significantly higher amounts of dry matter and reducing sugars as compared to older fruits.

4. The content of vitamin C, N-NO_3 (V) and macroelements in fruits of eggplant was not related to cultivar and fruits maturity stage.

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WIELKOŚĆ I JAKOŚĆ PLONU OBERŻYNY UPRAWIANEJ W POLU W ZALEŻNOŚCI OD ODMIANY I STOPNIA DOJRZAŁOŚCI OWOCÓW

Streszczenie. Odmiany oberżyny różnią się wieloma cechami, m.in. wczesnością i długością okresu owocowania. Polowa produkcja oberżyny w Polsce może być zawodna ze względu na cechy naszego klimatu. Dwuczynnikowe doświadczenie polowe założone metodą losowanych podbloków w trzech powtórzeniach miało na celu ocenę plonowania pięciu odmian oberżyny: Avan F_1, Black Beauty, Classic F_1, Epic F_1, Vernal F_1 (czynnik I). Rośliny sadzono, w zależności od roku, w terminie 4–7 czerwca. Owoce zbierano w fazie optymalnej dojrzałości zbiorczej (co 7 dni) oraz po jej przekroczeniu (co 10 dni) (II czynnik). Wykazano istotne zróżnicowanie plonu oberżyny w latach prowadzenia badań w zależności od odmiany i fazy dojrzałości zbiorczej owoców. Wysoka temperatura i dostateczna ilość opadów sprzyjały rozwojowi oberżyny w 2008 r., czego dowodem był większy plon handlowy (23,48 t ha^{-1}) niż w pozostałych latach (średnio o 71,4% i 7,5-krotnie wyższy plon wczesny owoców – 11.87 t ha^{-1}). Odmiany Vernal F_1, Epic F_1 i Avan F_1 plonowały na poziomie 23,79–18,89 t ha^{-1}, natomiast plon odmian Classic F_1 i Black Beauty był średnio o połowę mniejszy. Plon handlowy owoców starszych był większy aniżeli zbieranych w fazie dojrzałości optymalnej. Na podstawie wyników analiz chemicznych dowiedziono, że owoce w dojrzałości optymalnej zawierały istotnie więcej suchej masy i cukrów redukujących w porównaniu z owocami starszymi. Nie wykazano natomiast różnic między wartością biologiczną badanych odmian oberżyny.

Słowa kluczowe: *Solanum melongena* L., odmiana, termin zbioru, plon handlowy, plon wczesny, wartość biologiczna

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