

Yield structure of seven strawberry cultivars

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Key words: *Fragaria ananassa* Duch., yields, mean weight

ABSTRACT

The experiment was conducted in the years 1998 – 2000 at the Experimental Station of the Horticultural Faculty in Garlica Murowana near Kraków. In four replications of the experiment seven strawberry cultivars were investigated: 'Elsanta', 'Gerida', 'Honeoye', 'Kama', 'Pandora', 'Senga Sengana', and 'Vega'. The highest total marketable yield from the years 1998 – 2000 was recorded for the cultivars 'Honeoye', 'Senga Sengana', and 'Vega.' 'Kama' gave yields at a medium level. The smallest total marketable yield was obtained from the cultivars 'Gerida' and 'Elsanta'. 'Senga Sengana' gave the highest total yield of unmarketable fruit and 'Honeoye' and 'Pandora' the lowest. 'Elsanta' and 'Pandora' produced fruits of the highest mean weight; 'Gerida' and 'Honeoye' yielded fruits of the medium weight, and the lowest weight of fruits was found in the case of 'Kama', 'Senga Sengana', and 'Vega'. 'Kama', 'Vega', and 'Honeoye' can be determined as early cultivars (>50% of total yields being harvested towards the end of May and during the first 10 days of June). The medium-early cultivars are 'Elsanta', 'Gerida', and 'Senga Sengana' (about 50% of the total yield

harvested from 10th-20th June). 'Pandora' is a late cultivar (>70% of yield harvested during 20th-30th June and 30th June-10th July).

INTRODUCTION

The most important biological and economic traits of new strawberry cultivars were evaluated in numerous experiments, the results permitting producers to select the most valuable cultivars and also to prolong the period of supplying dessert fruits for the fresh market. The aim of the present experiment was to compare the yield structure of seven strawberry cultivars.

MATERIAL AND METHODS

In the years 1998 – 2000 an experiment established on brown soil in four replications consisting of 30 plants each, was carried out using the method of randomised blocks in an independent design at the Experimental Station of the Horticultural Faculty in Garlica Murowana near Kraków. Young fresh strawberry plants of 'Elsanta', 'Gerida', 'Honeoye', 'Kama', 'Pandora', 'Senga Sengana', and 'Vega' supplied by the Fruit Research Experimental Station in Brzezna were planted in spring 1997 (April 27) spaced 25 x 40 cm apart in a field covered with black non-woven mulch. Every year the plantation was fertilized with ammonium nitrate at the dose of 90 kg N ha⁻¹ (a half of the dose applied before and a half after flowering). Two sprays with the pesticide Mitac 200 EC limiting the occurrence of strawberry mite and red spider and three sprays with the fungicide Euparen 40 WP against grey mould were applied every year. Irrigation of plants was not applied in that experiment.

The measurements included marketable yield, the yield of unmarketable fruit (fruits with signs of disease or very small $\varnothing < 15\text{mm}$), and the weight of 100 fruits (mean weight of all harvests). The results were statistically tested using the Student t test to evaluate the significance of differences at the significance level $p = 0.05$.

The investigated strawberry cultivars were divided into three groups according to the maturation period: in the group of early cultivars 55-70% of fruit were harvested at an early date (end of May and the first 10 days of June), in the group of medium-early cultivars for 46-58% of yields the harvest time occurred from 10th to 20th of June, and in the group of late cultivars 70-76% of the yield were harvested during the last 10 days of June and the first 10 days of July.

RESULTS AND DISCUSSION

The following weather conditions prevailed in the period of the experiment: the highest average annual temperature of 10°C was recorded in 1999 (with a many-year average of 8.9°C). In the other two years of the experiment the average annual temperature was slightly higher (in 2000 – 9.3°C and in 1998 – 9.6°C). The highest annual total precipitation was recorded in 1998 – 716 mm (many-year average of annual precipitation of 625 mm) while the years 1999 and 2000 were characterised by many-year averages approximating to the annual (634 mm and 689 mm, respectively).

The data given in Table 1 show that in the first year of bearing the highest marketable yield was given by ‘Senga Sengana’. The yields of the remaining cultivars were lower. In the second year of fruiting ‘Honeoye’ gave the highest yield, ‘Pandora’, ‘Vega’, and ‘Elsanta’ were bearing at a medium-high level, while the poorest yield was recorded for ‘Gerida’, ‘Senga Sengana’, and ‘Kama’. In the successive year the highest marketable yield was recorded for ‘Senga Sengana’.

Table 1. Mean marketable yields of seven strawberry cultivars in the years 1998 – 2000 (kg per 30 plants)

Cultivar	Year			Total in 1998 – 2000
	1998	1999	2000	
‘Elsanta’	6.4 a*	9.7 cd	6.9 ab	23.0 ab
‘Gerida’	7.3 ab	6.5 a	8.2 abc	22.0 a
‘Honeoye’	7.6 ab	13.9 e	10.2 cd	31.7 d
‘Kama’	9.0 bc	8.9 bc	9.3 bc	27.2 bc
‘Pandora’	7.7 ab	11.5 d	6.6 a	25.8 c
‘Senga Sengana’	10.7 c	7.3 ab	12.3 d	30.3 cd
‘Vega’	7.4 ab	10.7 cd	10.1 cd	28.2 cd

* Means followed by same letter are not significantly different at $p = 0.05$

In the three-year studies ‘Honeoye’, ‘Senga Sengana’, and ‘Vega’ produced the highest total marketable yield. Daugaard and Lindhard (2000) reported very high yields of ‘Pandora’ in Denmark. Masny et al. (1996) classified ‘Senga Sengana’, ‘Gerida’, and ‘Honeoye’ in the group with the highest yielding. Laszlovszky-Zmarlicka et al. (1997) obtained the highest total yield from two years of fruiting for ‘Pandora’, ‘Vega’, ‘Senga Sengana’, and ‘Kama’, while in the case of ‘Gerida’ the yields were lower. According to Gwozdecki et al. (1994) the highest total yields from two years characterized ‘Senga Sengana’ and ‘Gerida’ while the yields given by ‘Honeoye’ were lower. Żurawicz and Dominikowski (1995) found the same level of bearing for ‘Elsanta’, ‘Kama’, and ‘Senga Sengana’. Małodobry et al. (1997, 1999) determined that in the case of ‘Elsanta’ the total yield from two years greatly exceeded (1997) or was equal (1999) to the yield obtained from ‘Senga

Sengana'. These authors (1999) classified 'Vega', 'Senga Sengana', 'Kama', and 'Elsanta' in the group of the most fertile cultivars. According to Gwozdecki (2000) in a group of 12 strawberry cultivars compared, 'Senga Sengana' was among the very fertile cultivars, lower yields being observed in the case of 'Kama' and 'Elsanta'. Masny et al. (2000) observed a fairly good yielding of 'Kama' and poorer yields of 'Senga Sengana' in a group of 14 cultivars compared. In the experiments conducted by Ugolik and Kantorowicz-Bak (1993) the results of three-year bearing classified 'Senga Sengana' in the most fertile group while the yields of 'Kama' were much lower.

The level of unmarketable fruit yield of different cultivars varied in the successive years (Table 2). In 1998 the greatest number of such fruits was found in 'Kama'. In the following two years the highest yield of unmarketable fruit was obtained for 'Senga Sengana'. Also Laszlovszky-Zmarlicka et al. (1997) recorded the highest yield of unmarketable fruit in this cultivar.

Table 2. Mean unmarketable yield of seven strawberry cultivars in the years 1998 – 2000 (kg per 30 plants)

Cultivar	Year			Total in 1998 – 2000
	1998	1999	2000	
'Elsanta'	0.9 a	4.2 b	4.2 b	9.3 b
'Gerida'	0.6 a	4.4 b	4.7 b	9.7 b
'Honeoye'	0.7 a	1.4 a	1.2 a	3.3 a
'Kama'	1.3 b	4.7 b	4.8 b	10.8 b
'Pandora'	0.8 a	1.5 a	1.6 a	3.9 a
'Senga Sengana'	0.9 a	7.5 c	8.5 c	16.9 c
'Vega'	0.8 a	2.8 ab	2.8 ab	6.4 ab

Explantations: as in Table 1

The highest fruit weight (Table 3) characterized the 'Elsanta' and 'Pandora'. 'Gerida' and 'Honeoye' produced fruit of medium weight, the lowest fruit weight being obtained from 'Kama', 'Senga Sengana', and 'Vega'. A similar level of fruit weight was observed by Laszlovszky-Zmarlicka et al. (1997) in the cultivars mentioned above. According to Masny et al. (2000) the lowest weight of fruit was found in the yield of 'Kama' and 'Senga Sengana'. Żurawicz and Dominikowski (1995) classed fruit of 'Kama' with the group of the smallest weight. 'Senga Sengana' produced fruit of a greater weight, while 'Elsanta' was in the group of the medium fruit weight.

As given in Table 4 ‘Kama’, ‘Vega’, and ‘Honeoye’ can be estimated as early-ripening cultivars, ‘Elsanta’, ‘Gerida’, and ‘Senga Sengana’ as medium-early, and ‘Pandora’ as a late cultivar.

Table 3. Mean weight of 100 fruits of seven strawberry cultivars in the years 1998 – 2000 (g)

Cultivar	Year			Mean in 1998 – 2000
	1998	1999	2000	
‘Elsanta’	1115 e	1614 f	1380 e	1369.7 de
‘Gerida’	990 c	1390 d	1180 d	1186.7 cd
‘Honeoye’	1030 cd	1340 cd	1066 c	1145.3 c
‘Kama’	850 a	875 a	880 a	868.3 a
‘Pandora’	1015 c	1480 e	1420 ef	1305.0 d
‘Senga Sengana’	920 b	970 b	907 b	932.3 ab
‘Vega’	875 ab	990 b	966 b	943.7 ab

Explantations: as in Table 1

Table 4. Percentage of total yields of the investigated cultivars harvested in the “early”, “medium-early”, and “late” harvest time in the years 1998 – 2000

Cultivar	Year		
	1998	1999	2000
‘Elsanta’	52 (10 th -20 th June)	55 (10 th -20 th June)	41 (10 th -20 th June)
‘Gerida’	52 (10 th -20 th June)	55 (10 th -20 th June)	46 (10 th -20 th June)
‘Honeoye’	70 (1 st -10 th June)	65 (1 st -20 th June)	65 (30 th May-10 th June)
‘Kama’	65 (1 st -10 th June)	65 (1 st -20 th June)	55 (30 th May-10 th June)
‘Pandora’	70 (20 th -30 th June)	76 (30 th June-10 th July)	75 (20 th -30 th June)
‘Senga Sengana’	57 (10 th -20 th June)	55 (10 th -20 th June)	58 (10 th -20 th June)
‘Vega’	64 (1 st -10 th June)	65 (1 st -20 th June)	55 (30 th May-10 th June)

CONCLUSIONS

1. The biggest marketable yield was noted for ‘Honeoye’, ‘Senga Sengana’, and ‘Vega’, however the smallest yield was found for ‘Elsanta’ and ‘Gerida’.
2. The biggest unmarketable fruit yield was obtained for ‘Senga Sengana’ and the smallest one for ‘Honeoye’, ‘Pandora’, and ‘Vega’.
3. Cultivars ‘Pandora’, ‘Elsanta’, and ‘Gerida’ produced the biggest fruits while ‘Kama’ and ‘Senga Sengana’ the smallest.

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STRUKTURA PŁONOWANIA SIĘDMIU ODMIAN TRUSKAWKI

Streszczenie: Doświadczenie założone w 4 powtórzeniach prowadzono w latach 1998 – 2000 w Stacji Doświadczalnej Wydziału Ogrodniczego w Garlicy Murowanej koło Krakowa. Uwzględniono sadzonki odmian: ‘Elsanta’, ‘Gerida’, ‘Honeoye’, ‘Kama’, ‘Pandora’, ‘Senga Sengana’ i ‘Vega’. Największą sumę plonu handlowego (z lat 1998 – 2000) otrzymano dla ‘Honeoye’, ‘Senga Sengana’ i ‘Vega’, na średnim poziomie plonowała ‘Kama’. Najmniejszą sumę plonu

handlowego miały odmiany 'Gerida' i 'Elsanta'. Suma plonu owoców nieprzydatnych do spożycia kształtowała się następująco: największa była w przypadku 'Senga Sengana', a najmniej tych owoców otrzymano dla 'Honeoye' i 'Pandora'. Owoce 'Pandora' i 'Elsanta' cechowały się największą masą, średnią masę miały owoce odmian 'Gerida', 'Honeoye', a najmniejsza była masa owoców 'Kama', 'Senga Sengana' oraz 'Vega'. Odmiany 'Kama', 'Vega' i 'Honeoye' można ocenić jako wczesne (>50% plonu całkowitego przypada pod koniec maja i 1 dekadę czerwca), średnio-wczesne odmiany to 'Elsanta', 'Gerida' i 'Senga Sengana' (około 50% plonu całkowitego przypada na 2 dekadę czerwca), późną odmianą jest 'Pandora' (>70% plonu całkowitego przypada na 3 dek. czerwca i 1 dekadę lipca).

Received October 22, 2003; Accepted July 05, 2004