Seven-year orchard performance of eleven new apple cultivars from Holovousy in comparison with some commonly grown ones

J. Blažek, J. Křelinová

Research and Breeding Institute of Pomology, Holovousy, Czech Republic

ABSTRACT: In an orchard trial that was established in the spring of 1999 on M 9 rootstock at the spacing of 4 × 1 m, eleven new apple cultivars bred in Holovousy (Angold, Julia, Nabella, Primadela, Produkta, Resista, Rubinstep, Rucla, Selena, Vysočina and Zuzana) were evaluated in comparison with three standard varieties (Gala, Golden Delicious and Jonagold) and another two with resistance to scab (Rosana and Topaz). In the first three years, the incidence of scab and mildew was evaluated under limited chemical protection. In 2000–2005 on each of 10 randomly selected trees of each cultivar, the time of flowering and optimum harvest ripening were recorded, flower set and fruit sets were rated, yield per tree and weight of 10 fruit samples were measured. Trunk diameter was measured between 2002 and 2005. The early summer apple Julia had the healthiest state and it was recommended for organic growing. Selena was the most precocious, the least vigorous and had the highest crop efficiency. The highest annual yields per tree were recorded with Produkta, but this cultivar had the highest proportion of trees with biennial bearing. Primadela achieved the highest cumulative yields, whereas Angold brought the largest fruits on average. With the obtained results, the evaluated cultivars were characterised by some important features or recommendations for growers.

Keywords: apples; cultivars; yields; fruit size; tree vigour; fruit set; time of flowering; time of harvest; yield efficiency; biennial bearing; scab; mildew

More than 50 new apple cultivars have been bred in the Czech Republic during the last two decades. About one third of the number originated in the Research and Breeding Institute of Pomology at Holovousy (Blažek 2004). A number of them were characterised by detailed descriptions (Blažek 1997, 1999, 2001; Blažek, Paprštein 1993; Blažek, Vondráček 1999; Blažek et al. 1995a,b; Čepička et al. 2000); however, most of them are still in the stage of testing. Results of the first trial established at Holovousy in 1995, which included 17 new cultivars from the Czech Republic up to that time chosen as the most promising, were published recently (Blažek et al. 2003). Roughly at the same time, new cultivars were also evaluated in commercial orchards in cooperation with growers that were willing to include these novelties on their plots for prior orchard testing (Blažek, Varga 2001; Blažek, Hlušičková 2003).

Golden Delicious, with a proportion of 23%, is presently the most commonly grown apple in commercial orchards of the Czech Republic. In new orchards established during the last 10 years, however, Jonagold and its sports have been the most frequently used. Among the new apples with resistance to scab the largest area (131 ha) was planted by Topaz (Buchtová 2005), whereas Melodie and Rosana were the most important in the country a few years ago (Blažek 2004). New cultivars that have recently been bred in the European Union are the most frequently compared to Gala, Golden Delicious or Jonagold (Sansavini et al. 2004).

The aim of this study, which was carried out between 2000 and 2005, was to evaluate orchard characteristics of 11 new apple cultivars from Holovousy in comparison with three standard varieties (Gala, Golden Delicious and Jonagold) and another two with resistance to scab (Rosana and Topaz). For this purpose a special orchard that was established in 1999 in Research and Breeding Institute of Pomology at Holovousy in the framework of the previous EUREKA project E!1868 was used.

Supported by the Ministry of Education, Youth and Sports of the Czech Republic, Project No. E!OE154.

MATERIAL AND METHODS

An experimental orchard equipped with drip irrigation was planted using virus free one-year-old trees on M 9 (T 337) in the spring of 1999 at Holovousy. The location is characterised by an average yearly temperature of 8.1°C, average rainfall of about 650 mm and altitude about 300 m. The plot is situated on a gentle south-facing slope with good air flow. The soil is medium deep, sandy clay loam, of a higher class, and well fertilised with a pH value of 6.2. Rows of trees at the spacing of 4 × 1 m were ranged along contour lines in an east-west direction. The tested cultivars were placed as single rows or as a part of the row without replications. Trees were trained as slender spindles. The orchard was maintained with clean herbicide strips under the tree canopies and with mulched grass along the alleyways. Manual fruit thinning was applied after June fruitlets dropped if necessary. Fertilising and spraying (based on integrated plant protection guidelines) consisted in normal commercial practices. An exception to this rule was instituted in the first three years of the orchard evaluation, when about a half of the fungicide treatments were applied only with an aim to observe the response of cultivars to diseases that were rated in August using a 1–9 scale (9 = no symptoms).

Every year phenological data concerning flowering or time of optimum harvest ripening (based on standard indicators) were gathered, flower set and fruit set (just before harvest) were rated, and the yield per tree and weight of 10 fruit samples were measured. At the end of the growing seasons 2002 and 2005, tree trunk diameters were measured and used for the calculation of trunk-cross-section area (TCSA). The tendency for biennial bearing was expressed as a percentage of trees that were out of bearing (having a flower set rated by a rank of 3 or less).

For most of the evaluations 10 trees of each cultivar were chosen by random selection, which were measured or rated separately and used as replications. These data were tested by analysis of variance. Cultivar means were separated by Tukey's "least significance difference" test at $P < 0.05$.

Table 1. Mean rating (1–9) of mildew and scab resistance between 2000 and 2002

Cultivar	Mildew	Scab
Angold	7.3	8.4
Gala	8.2	6.5
Golden Delicious	8.1	5.4
Jonagold	7.9	6.9
Julia	8.8	8.7
Nabella	8.5	7.8
Primadela	7.1	9.0
Produkta	8.4	8.5
Resista	6.8	9.0
Rosana	7.9	9.0
Rubinstep	8.3	7.6
Rucla	8.0	7.3
Selena	7.7	9.0
Topaz	8.2	9.0
Vysočina	7.8	9.0
Zuzana	7.9	8.0

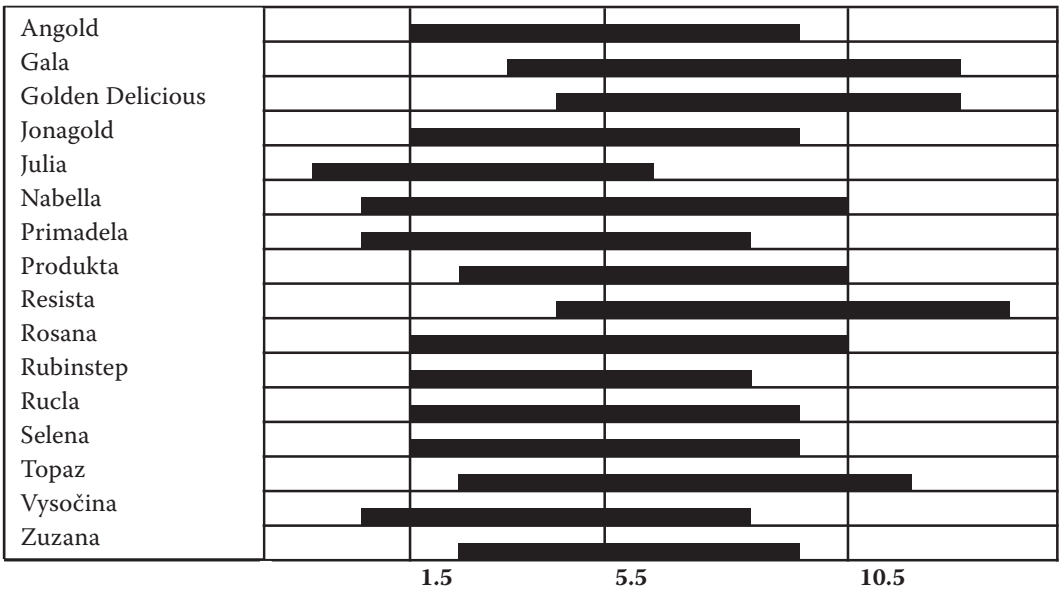

Fig. 1. Mean time of flowering between 2000–2005

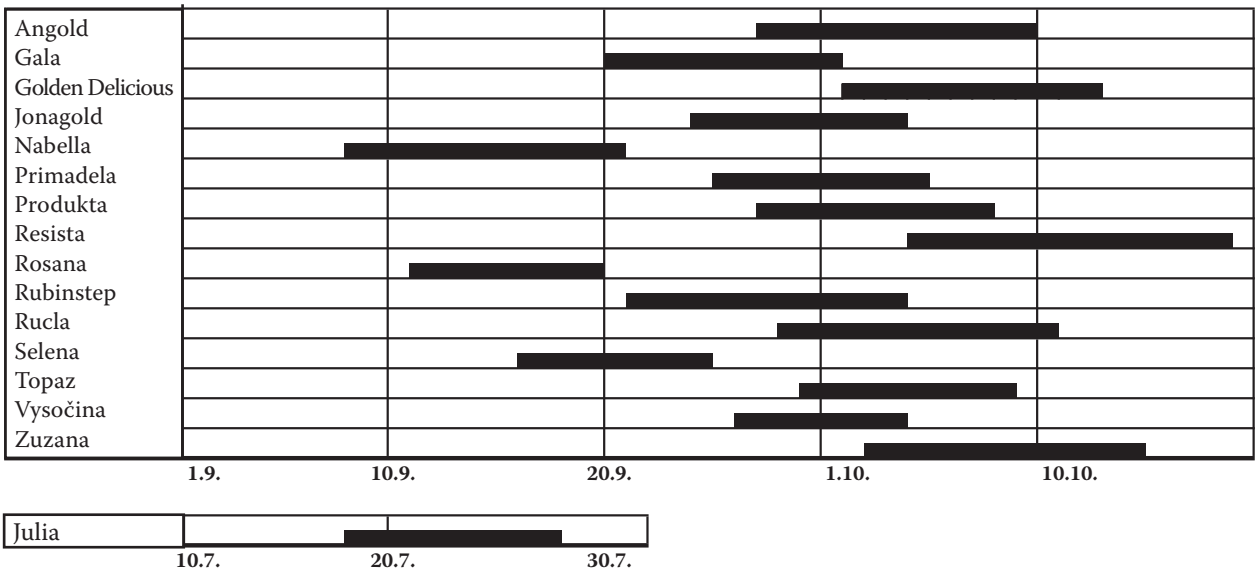

Fig. 2. Mean time of harvest maturity between 2000–2005

RESULTS AND DISCUSSION

Incidence of diseases

The highest mildew infection was observed on average on Resista (Table 1). This cultivar suffered from the disease a little more than Jonagold, which was the most susceptible of all the standards in this study. Higher incidence of the mildew was further observed on Primadela, Angold and sometimes also on Selena. On the contrary, the highest resistance to the disease was noted on Julia, followed by Nabella and Produkta.

All cultivars that had been released as scab resistant ones carrying Vf gene (Primadela, Resista, Rosana, Selena, Topaz and Vysočina) remained in this study without any symptoms of the disease (Table 1). A very high level of resistance against scab was also observed on Julia, Produkta and Angold. All the remaining cultivars from Holovousy could be classified as moderately resistant to scab because they scored better than Jonagold, whereas Golden Delicious proved to be the most susceptible to the disease. These results with most of the cultivars comply with our previous findings (Blažek 2004).

Time of flowering

The start of tree flowering fluctuated in particular years within a three-week time span, from April 22nd to May 8th. Julia was the earliest cultivar with respect to flowering whereas Resista was the latest (Fig. 1). The mean difference between both cultivars was equal to 4 days on average. Cultivars Nabella, Primadela and Vysočina belonged to the early flowering group but the majority of new varieties could be classified as medium early ones. The length of flowering was largely positively dependent on the flower set.

Time of harvest maturity

Julia was in an exceptional position in this comparison; it belongs to a group of very early summer apples (Fig. 2). All the remaining cultivars reached

Table 2. Tree size expressed as trunk-cross-section area (cm^2) in 2002 and 2005

Cultivar	2002	2005
Angold	13.5	22.7
Gala	17.0	30.3
Golden Delicious	16.5	28.7
Jonagold	21.7	38.1
Julia	17.1	30.2
Nabella	13.4	28.6
Primadela	18.4	31.0
Produkta	16.5	33.1
Resista	15.9	30.9
Rosana	13.8	27.5
Rubinstep	12.2	26.0
Rucla	16.4	28.2
Selena	12.7	19.2
Topaz	15.5	25.8
Vysočina	13.7	26.4
Zuzana	19.4	35.7
Mean	15.5	28.1
L.S.D. $P \geq 0.05$	3.8	4.1

optimum harvest maturity in September or at the beginning of October. The sequence started with Nabella, Rosana and Selena and ended with Golden Delicious, Zuzana and Resista. Cultivars also differed greatly in the length of maturity. The shortest length was found in Vysočina and also in Rosana and Selena. These cultivars had a tendency for premature fruit drop that increased with advanced fruit ripening. On the other hand, a longer time of harvest maturity was found in Nabella, Rubinstep, Angold and Resista, whose fruits hung well on the tree for a very long time.

Tree vigour

The tested cultivars differed considerably in their tree size, which was measured by the trunk-cross-section area (TCSA) both in 2002 and 2005 (Table 2). The values of the standard cultivars Gala and Golden Delicious were comparable to records of Widmer and Krebs (2000). The most vigorous were trees of Jonagold followed by Zuzana, Produkta and Primadela. These findings in the case of Produkta and Zuzana were quite different from our earlier observations from commercial orchards where both cultivars showed below-average tree vigour (Blažek, Varga 2001). The difference could be explained by the fact that in this trial the virus-free material was used for the first time. The strength of growth in the case of Jonagold was also obviously increased by a low fruit set due to flower damage by frosts in 2001 and 2005.

On the other hand, the smallest trees were found in Selena followed by Angold and Topaz. The weak growth of Selena and Angold is in agreement with results of our previous trial (Blažek et al. 2003).

Flower and fruit sets

Selena was the most precocious cultivar in this study and brought forth the significantly highest crop in the second year after planting (Table 3). The flower and fruit sets in 2000 also indicated Rubinstep, Julia, Golden Delicious and Topaz as cultivars with an early bearing capacity. On the contrary, Resista and Angold produced very few flowers and fruits that year, which might also be due to some mildew infection. The poor fruit set of Rosana and Zuzana in 2000 was preceded by damage of the flowers by a late spring frost.

With respect to all the evaluated years, the lowest flower and fruit sets were regularly observed on Zuzana. This phenomenon was related to the tip bearing habit of the cultivars that produced a very small number of spurs on branches with a tendency to generate "bare wood". In the case of some other cultivars, lower flower and fruit sets in some years were induced by their tendency for biennial bearing. The highest flower set was generally observed on Nabella. The promotion of flower bud formation in this cultivar was in relation to its self-thinning ability, which protects it from the over-cropping of the trees.

Annual and cumulative yields

The highest cumulative yield per tree (66.5. kg) in this study was harvested from trees of Primadela

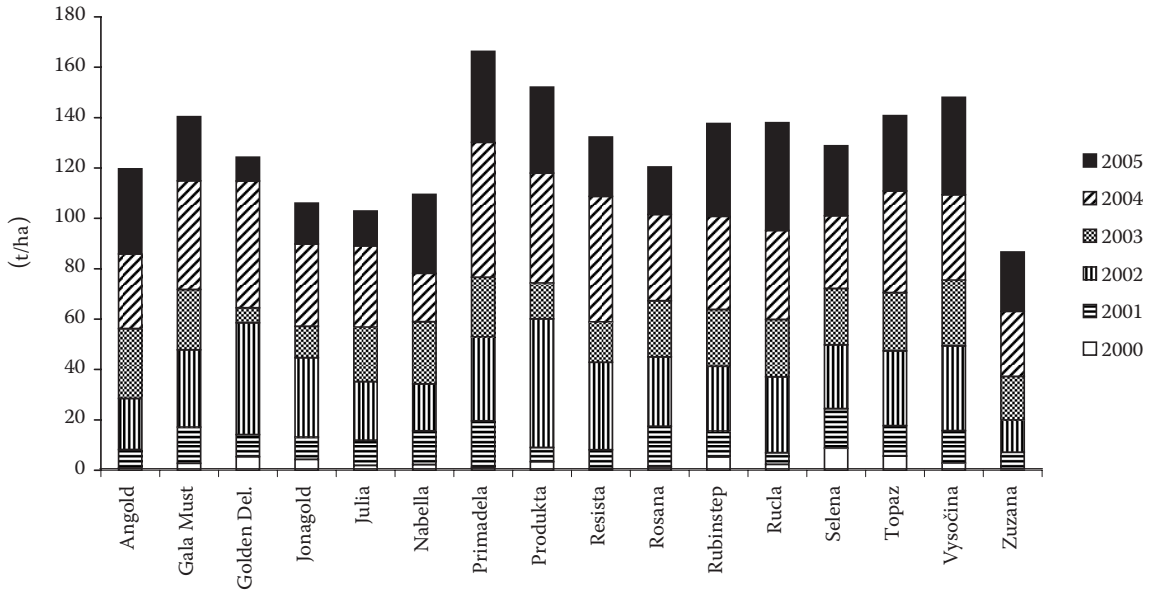

Fig. 3. Yields (t) calculated per 1 ha

Table 3. Flower and fruit set evaluated on a 1–9 rating scale between 2000 and 2005

Cultivar	2000		2001		2002		2003		2004		2005		Total	
	flower	fruit	flower	fruit	flower	fruit	flower	fruit	flower	fruit	flower	fruit	flower	fruit
Angold	1.4	1.2	3.7	3.7	4.5	5.8	6.2	4.5	5.8	5.9	3.9	4.3	4.2	4.2
Gala	2.3	1.6	5.5	4.6	8.1	7.8	7.4	5.4	7.8	7.9	6.9	5.6	6.3	5.5
Golden Delicious	2.7	2.4	5.9	3.6	7.4	8.0	3.1	2.8	7.9	8.0	3.3	3.3	5.1	4.7
Jonagold	2.4	1.7	5.0	3.7	6.8	7.5	4.6	4.0	7.3	6.9	6.3	4.5	5.4	4.6
Julia	2.2	2.6	4.1	3.8	5.2	6.9	6.2	5.5	7.5	6.9	6.5	4.5	5.3	5.0
Nabella	2.1	1.6	5.7	4.4	8.5	6.6	8.9	6.5	8.8	5.7	8.6	6.5	7.1	5.2
Primadela	1.6	1.8	6.0	5.5	8.4	7.7	7.4	5.3	6.9	6.6	6.8	6.5	6.2	5.5
Produkta	2.0	2.0	6.4	4.7	8.3	8.4	3.0	3.3	6.2	6.1	2.6	3.3	4.8	4.6
Resista	1.3	1.2	4.0	4.3	7.1	7.9	3.5	3.6	8.4	8.3	4.1	5.8	4.7	5.2
Rosana	1.5	1.3	7.2	5.7	8.0	8.3	7.9	6.8	7.8	7.4	5.7	5.8	6.3	5.9
Rubinstep	1.9	2.8	3.3	4.1	5.6	6.5	6.4	5.9	5.7	7.2	7.6	7.0	5.1	5.6
Rucla	1.7	1.8	3.9	3.0	4.5	5.7	5.1	6.0	6.9	6.4	7.7	6.8	5.0	5.0
Selena	5.1	4.5	4.2	4.2	7.4	6.8	6.1	5.9	6.6	6.8	5.7	5.4	5.8	5.6
Topaz	2.5	2.4	4.5	3.5	8.2	7.5	7.6	5.1	6.6	6.5	5.6	6.2	5.8	5.2
Vysočina	1.8	1.5	5.0	5.4	8.5	8.2	8.0	7.0	7.4	6.6	7.1	6.8	6.3	5.9
Zuzana	1.5	1.3	3.0	4.0	4.1	5.1	4.0	4.3	5.1	4.7	5.0	5.2	3.8	4.1
Ø	2.1	2.0	4.8	4.2	6.9	7.2	5.9	5.1	7.0	6.7	5.8	5.5	5.4	5.1
L.S.D. $P \geq 0.05$	1.2	1.4	1.7	1.3	1.0	0.9	1.8	1.5	1.1	0.8	2.0	1.7	1.1	0.8

cv. (Table 4). In 2004, this cultivar also brought the highest value of annual crop per tree – 21.5 kg, which corresponds to 53.6 tons per ha (Fig. 3). The second most productive cultivar was Produkta with mean cumulative yield per tree equal to 60.8 kg. In 2002 the cultivar reached the highest mean annual harvest of 20.4 kg per tree, but in the following years these average yields were always lower because of the biennial bearing of a part of the trees. Produkta had the most trees off bearing on average (32%) from all the cultivars under evaluation. Vysočina cv. was placed close behind Produkta with respect to cumulative harvest followed by Topaz and Gala. All these cultivars produced annual yields around 40 tons per hectare.

Zuzana proved to be the least productive cultivar, which had a cumulative yield per tree of only 34.7 kg. The summer apple Julia also produced rather low yields on average. It was surprising, however, that roughly the same low level of cumulative yield was obtained also on Jonagold, which is otherwise generally considered as a productive cultivar. One of the main causes of the low cumulative yield of the cultivar here was frost damage to the flowers in 2003 and 2005, and also a certain proportion of trees with biennial bearing.

Biennial bearing

Most of the trees off bearing on average were observed in Produkta (32%), followed by Golden Delicious (26.5%) and Resista (20%). A certain significant tendency for irregular bearing was further noticed in Angold, Selena, Jonagold and Rubinstep (Table 4). On the contrary, Julia, Nabella, Primadela and Vysočina were classified as entirely regular here.

The gathered data concerning the alternation of cropping with Golden Delicious might be seen as a bit overburdened, but both in 2003 and 2005 the majorities of these trees were practically without any crop. Therefore the yields of Golden Delicious were about half the value reached in other trials (Stehr 1996). The tendency towards biennial bearing with this cultivar is usually much lower (Crassweller et al. 2001). The main causes of the irregularity in this study obviously were high yields of these trees in previous years and probably also certain leaf damage as a consequence of calcium chloride applications when the weather was hot and unfavourable conditions at the time of floral bud development.

The results of the evaluation regarding biennial bearing in this study mostly comply with observations of the characteristic in the previous trial (Blažek et al. 2003). The proportions of trees off bearing in the present evaluation were generally lower. This improvement could be explained by the use of drip irrigation here.

Cropping efficiency

Taking into consideration yields in relation to tree size, the most efficient in cropping was Selena

Table 4. Annual and cumulative yields in kg per tree and mean percentage of trees with biennial bearing

Cultivar	2000	2001	2002	2003	2004	2005	Total	% of trees with BB
Angold	0.3	2.9	8.1	11.1	11.8	13.5	47.9	19.1
Gala	1.1	5.8	12.3	9.6	17.3	10.2	56.1	2.4
Golden Delicious	2.2	3.5	17.8	2.4	20.1	3.8	49.7	26.5
Jonagold	1.7	3.5	12.6	5.0	13.1	6.5	42.4	16.6
Julia	0.8	4.0	9.3	8.6	12.9	5.6	41.2	0
Nabella	0.9	5.3	7.5	9.9	7.7	12.5	43.8	0
Primadela	0.5	7.4	13.3	9.4	21.5	14.5	66.5	0
Produkta	1.3	2.3	20.4	5.7	17.5	13.7	60.8	32.0
Resista	0.2	3.0	13.9	6.4	19.9	9.5	52.9	20.0
Rosana	0.5	6.4	11.1	8.9	13.7	7.6	48.2	6.7
Rubinstep	2.1	4.1	10.3	9.0	14.8	14.8	55.0	12.0
Rucla	0.9	1.9	12.0	9.1	14.1	17.1	55.2	5.2
Selena	3.5	3.3	10.1	9.0	11.6	11.1	48.5	17.1
Topaz	2.2	4.8	11.9	9.3	16.1	12.0	56.3	15.5
Vysočina	1.1	5.2	13.5	10.4	13.5	15.5	59.2	0
Zuzana	0.2	2.6	5.1	6.9	10.3	9.4	34.7	1.3
Mean	1.2	4.3	11.8	8.2	14.7	11.1	51.3	10.9
L.S.D. $P \geq 0.05$	0.8	1.9	5.0	3.7	4.3	5.2	6.8	

Table 5. Tree size, cumulative yield and cropping efficiency index

Cultivar	TCSA in 2005 (cm^2)	Cumulative yield 2000–2006 (kg/tree)	Cropping efficiency index (kg/cm^2)
Angold	22.7	47.9	2.1
Gala	30.3	56.1	1.9
Golden Delicious	28.7	49.7	1.7
Jonagold	38.1	42.4	1.1
Julia	30.2	41.2	1.4
Nabella	28.6	43.8	1.5
Primadela	31.0	66.5	2.1
Produkta	33.1	60.8	1.8
Resista	30.9	52.9	1.7
Rosana	27.5	48.2	1.8
Rubinstep	26.0	55.0	2.1
Rucla	28.2	55.2	2.0
Selena	19.2	48.5	2.5
Topaz	25.8	56.3	2.2
Vysočina	26.4	59.2	2.2
Zuzana	35.7	34.7	1.0
Mean	28.1	51.3	1.8
L.S.D. $P \geq 0.05$	4.1	6.8	0.5

with an index value of 2.5 kg per 1 cm^2 of TCSA (Table 5). The same rating of the cultivar was also observed in the previous trial (Blažek et al. 2003). Higher values of the index were further found in Topaz, Vysočina, Angold, Primadela and Rubinstep. The lowest value of the index, on the contrary, was found in Zuzana – equal to 1 kg per 1 cm^2 of TCSA only. Practically the same unsatisfactory level of the cropping efficiency was also noted in Jonagold.

Fruit size

Angold had the largest fruits in this evaluation with mean fruit weight equal to 221.5 g (Fig. 4). This observation is fully supported by earlier findings (Blažek et al. 2003). The second cultivar in this respect was Jonagold, which had fruit weight equal to 207.7 g and the third was Produkta (202.3 g). Mean fruit weight of Jonagold was the same size level as recorded in literature (Andziak, Tomala 2000). The most variable in the size of fruits was Zuzana, in which mean fruit weight of 237 g was noted in one year and only 161 g in another. The summer cultivar Julia had the smallest apples of a mean weight 141.8 g, followed by Rucla (157.7 g).

Remarks and conclusions on cultivars from Holovousy

- Angold was resistant to scab but needed more protection against mildew. Early fruit thinning and additional foliar nutrition that could remove biennial bearing and improve the flower set (for obtaining smaller fruits) were also needed.
- Julia with resistance to both diseases seems to be the best suitable for organic growing. The tree needs early thinning by pruning for improvement of light penetration into the canopy and enough regeneration of new shoot growth.
- Nabella with respect to disease resistance seems to be also suitable for organic growing. The trees

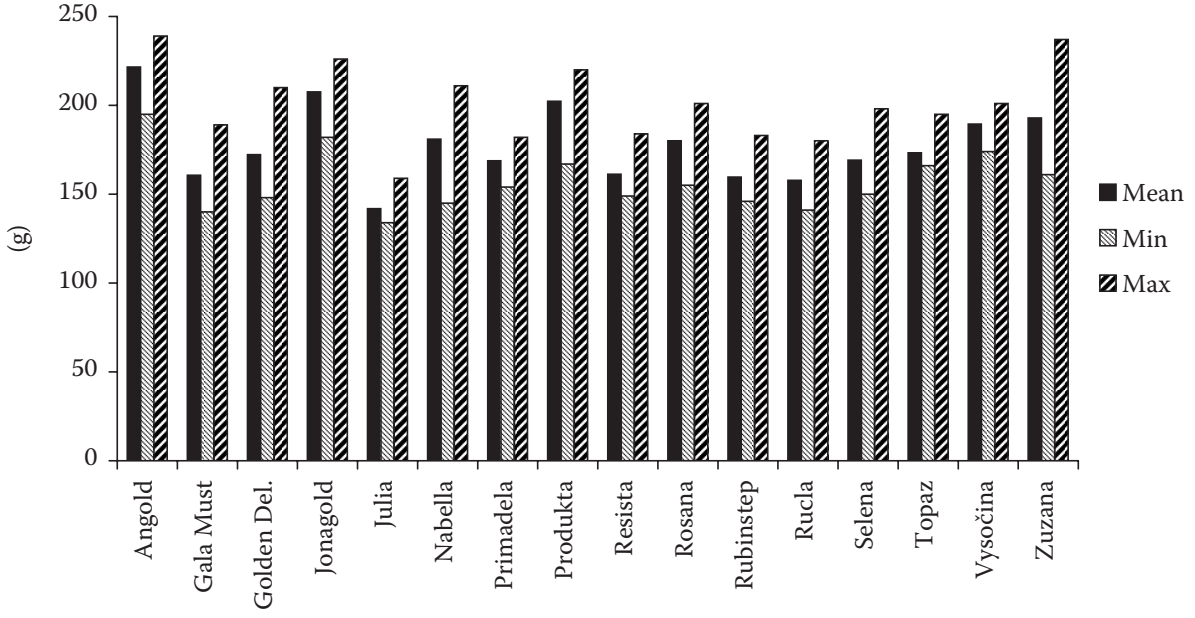

Fig. 4. Mean weight of fruits between 2000–2005

would require better pollination for the improvement of fruit set but they need no fruit thinning.
- Primadela was remarkable for high and regular productivity but despite being resistant to scab, it needs protection against mildew. In some years better fruit thinning may be desirable for the improvement of size and regularity of fruits.
- Produkta was remarkable regarding its resistance to both diseases. The tree would need early fruit thinning as a protection against biennial bearing and in some years also more summer pruning for restriction of its growth.
- Resista needs protection against mildew. The tree requires more care in the first years for the improvement of bearing and restriction of excessive growth. Later on, more pruning and early fruit thinning are needed for removing the tendency for biennial bearing.
- Rubinstep, with a compact growth habit and tip bearing, required special care for the training of trees in the first years for the improvement of cropping. With more aging of the trees, however, yields became satisfactory.
- Rucla required better protection against mites, as it is very susceptible to the pest. In some years the flower set was frequently too low. Therefore, additional foliar nutrition is recommended for the cultivar and also spraying with calcium.
- Selena being the most precocious and cropping efficient required more care for the preservation of regular bearing. For this purpose more severe winter pruning, early fruit thinning and additional nutrition are recommended. The use of a more vigorous rootstock or more dense tree spacing should also be helpful. Symptoms of magnesium deficiency were also often observed on leaves of the cultivar indicating its greater demands for a higher content of the element.
- Vysočina proved to be well and a regular cropping cultivar with resistance to scab and with moderate susceptibility to mildew. The only problem observed with it was some premature dropping of fruits.
- Zuzana had rather unsatisfactory performance in this trial mainly because of poor cropping. This was related to an upright compact growth habit and excessive vigour of the trees that were not suitable for the training of slender spindles. Some improvement could be expected if more dwarf rootstocks (M 27?) were used.

References

ANDZIAK J., TOMALA K., 2000. Wplyw podkladki na stan fizjologiczny jablek odmiany Joanagold. Zeszyty Naukowe Instytutu Sadownictwa i Kwiaciarstwa, *8*: 79–85.

BLAŽEK J., 1997. Nová odrůda jabloně Angold. Vědecké práce ovocnářské, *15*: 143–148.

BLAŽEK J., 1999. Odrůda jabloně Resista. Vědecké práce ovocnářské, *16*: 109–112.

BLAŽEK J., 2001. Odrůda jabloně Rubinstep. Vědecké práce ovocnářské, *17*: 163–165.

BLAŽEK J., 2004. Response to diseases in new apple cultivars from the Czech Republic. Journal of Fruit Ornamental Plant Research, Special Edition, *12*: 241–250.

BLAŽEK J., HLUŠIČKOVÁ I., 2003. Influence of climatic conditions on yields and fruit performance of new apple cultivars from the Czech Republic. Acta Horticulturae, *622*: 433–448.

BLAŽEK J., PAPRŠTEIN F., 1993. Růst, výnosy a kvalita plodů nové rezistentní jabloně Selena ve srovnání s odrůdami tržního sortimentu. Vědecké práce ovocnářské, *13*: 119–128.

BLAŽEK J., VARGA A., 2001. Tree vigour of new apple cultivars grown in the Czech Republic and some factors influencing it. Horticultural Science (Prague), *28*: 130–137.

BLAŽEK J., VONDRÁČEK J., 1999. Nová odrůda jabloně Zuzana. Vědecké práce ovocnářské, *16*: 113–116.

BLAŽEK J., KLOUTVOR J., PAPRŠTEIN F., VONDRÁČEK J., 1995a. Nová odrůda jabloně Nabella. Vědecké práce ovocnářské, *14*: 119–125.

BLAŽEK J., PAPRŠTEIN F., JANEČKOVÁ M., 1995b. Nová odrůda jabloně Julia. Vědecké práce ovocnářské, *14*: 109–117.

BLAŽEK J., KŘELINOVÁ J., BLAŽKOVÁ J., 2003. Výsledky pokusu se 17 vybranými odrůdami jabloní vyšlechtěnými v České republice, který byl hodnocen v letech 1996–2002 v Holovousích. Vědecké práce ovocnářské, *18*: 7–23.

BUCHTOVÁ I., 2005. Situační a výhledová zpráva ovoce. Praha, Ministerstvo zemědělství ČR: 62.

CRASSWELLER R.M., SMITH D.E., TUKEY L.D., 2001. Performance of Golden Delicious and Delicious apples on dwarfing rootstocks. Acta Horticulturae, *557*: 47–54.

ČEPIČKA J. et al., 2000. Popis odrůd hlavních ovocných druhů. Holovousy, Ovocnářská Unie ČR: 78.

SANSAVINI S., DONATI F., COSTA F., TARTARINI S., 2004. Advances in apple breeding for enhanced fruit quality and resistance to biotic stresses: New varieties for the European market. Journal of Fruit Ornamental Plant Research, Special Edition, *12*: 13–51.

STEHR R., 1996. Selektionen von Golden Delicious. Mitteilungen OVR, *51*: 11–13.

WIDMER A., KREBS C., 2000. Einfluss von Pflanzdichte und Baumform auf Ertrag und Fruchtqualität bei den Apfelsorten Golden Delicious und Royal Gala. Erwerbsostbau, *42*: 137–143.

Received for publication February 17, 2006
Accepted after corrections March 11, 2006

Sedmiletá pěstitelská charakteristika jedenácti nových kultivarů jabloní vyšlechtěných v Holovousích v porovnání s vybranými rozšířenými odrůdami

ABSTRAKT: V pokusném sadu založeném na jaře roku 1999 ve sponu 4 × 1 m na podnoži M 9 bylo hodnoceno 11 nových odrůd jabloní (Angold, Julia, Nabella, Primadela, Produkta, Resista, Rubinstep, Rucla, Selena, Vysočina a Zuzana), vyšlechtěných ve Výzkumném a šlechtitelském ústavu ovocnářském Holovousy, s. r. o., ve srovnání se třemi významnými pěstovanými odrůdami (Gala, Golden Delicious a Jonagold) a dalšími dvěma odrůdami rezistentními vůči strupovitosti (Rosana a Topaz). V prvních třech letech byl v této výsadbě u odrůd hodnocen výskyt strupovitosti a padlí v podmínkách omezené chemické ochrany. V letech 2000–2005 byla u každého z deseti náhodně vybraných stromů jednotlivých odrůd zaznamenávána doba kvetení a doba optimální sklizňové zralosti, dále násada květů, násada plodů a hmotnost vzorku deseti plodů. Průměr kmenů byl měřen v letech 2002 a 2005. Odrůda letní jabloně Julia měla nejlepší zdravotní stav a je proto doporučována pro biologické pěstování. Odrůda Selena se vyznačovala nejranějším nástupem stromů do období plodnosti, jejich nejslabším růstem a nejvyšší specifickou plodností. Nejvyšších ročních výnosů u jednotlivých stromů bylo dosahováno u odrůdy Produkta, avšak tato odrůda se zároveň vyznačovala nejvyšším průměrným podílem stromů se střídavou plodností. Primadela dosáhla nejvyšší úrovně kumulovaného výnosu, zatímco odrůda Angold měla v průměru největší plody. Na základě všech dosažených výsledků jsou hodnocené odrůdy charakterizovány důležitými vlastnostmi a doporučeními pro pěstitelskou praxi.

Klíčová slova: jabloně; odrůdy; výnos; velikost plodů; vzrůstnost stromů; násada květů; doba kvetení; doba sklizně; specifická plodnost; střídavá plodnost; strupovitost; padlí

Corresponding author:

Ing. Jan Blažek, CSc., Výzkumný a šlechtitelský ústav ovocnářský Holovousy, s. r. o., Holovousy 1,
508 01 Hořice v Podkrkonoší, Česká republika
tel.: + 420 493 692 821, fax: + 420 493 692 833, e-mail: blazek@vsuo.cz