

Hybrid berry cultivars in the genus *Rubus* tested in the Research Institute of Horticulture in Skierniewice

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Summary: Four hybrid berry cultivars, new in Poland, have been tested. They were: Boysenberry, Tayberry, Tummelberry and Loganberry. The experiment took place between 2005 and 2010 in Skierniewice, central Poland. The goals were to assess the yield and fruit quality as well as the resistance to adverse local winter conditions. The statistical analysis of the obtained data showed that there were significant differences between years and cultivars in the yield and fruit mass. In 2008 all cultivars had a higher yield than in 2007, increased, on average by 37%. The highest yield (2.9 kg) in 2007 as well as in 2008 (3.3 kg) had Tayberry cultivar. However, Tummelberry had the heaviest fruits. In 2007 it reached almost 6.0 g per fruit and in 2008 almost 7.0 g. The remaining cultivars had smaller fruits, on average 4.3 g in weight in 2007 and 5.4 g in 2008. The experiment also indicated that cultivars that we studied performed better when some freeze protection was applied.

INTRODUCTION

Rubus collection tested in the Research Institute of Horticulture in Skierniewice counts 142 genotypes. The collection consists of cultivars and clones of raspberry and blackberry, also wild types of *Rubus* genus and berry hybrids (Wójcik-Seliga and Wójcik-Gront, 2013). The hybrid berry is a cross between a raspberry and a blackberry (Clark and Finn 2011, Wood et al. 1999). Hybrid berries are botanically blackberries but they also have red raspberry in their pedigree. Fruits of these hybrids are quite large and cylindrical and their color, when ripe, is dark red. They taste more sweet than blackberries. Four of these hybrid berry cultivars are discussed in this article: Boysenberry, Tayberry, Tummelberry and Loganberry. The first known hybrid berry was 'Loganberry', bred in 1883 by a Californian James Logan, whose last name was used to create the cultivar's name. Loganberry de-

rived the cultivar (*Rubus* × *loganobaccus*) from a red raspberry 'Red Antwerp' (*Rubus idaeus*) and the blackberry variety 'Aughinbaugh' (*Rubus ursinus* vel *Rubus vitifolius*) (Rieger 2006). The Loganberry is a vigorous, nearly trailing plant. Its berries are wine-red, tart and high-flavored. Over 30 years later in one of the farms in California, a next hybrid was found and its name probably comes from its grower i.e. 'Boysenberry' as well (Karp 2010). Boysenberry is a cross between a red raspberry (*Rubus idaeus*), a blackberry (*Rubus fruticosus*), a dewberry (*Rubus aboriginum*) and a Loganberry (Vaughan 2009). Boysenberries are trailing plants. Their fruits are very large, reddish-purple and sweet-tart flavored. In the short period of time after the discovery, both cultivars gained their enthusiasts between consumers and growers. 'Tayberry' and 'Tummelberry' were bred in the Scottish Horticultural Research Institute, Invergowrie, Scotland in the eighties of the

last century. In comparison to Loganberry the fruits of these cultivars are sweeter, much larger, and more aromatic. Among allotment gardeners in Poland the most popular hybrid berry is Tayberry because its plants are well resistant to adverse weather. Like any other popular berries, the hybrid berries are low in calories, high in fiber and contain antioxidants (Ames et al. 1993; Heinonen et al. 1998; Ding et al. 2006; Pantelidis et al. 2007). They are a good source of vitamin C, phosphorus and iron. Due to the taste, appearance and health benefits of the hybrid berry's fruits they are attractive to farmers and allotment gardeners.

The goal of the described experiment on hybrid berry cultivars was their morphological and use value evaluation. Many of the shrubs in the genus *Rubus* come from foreign breeding programs. In the experiments on hybrid berries conducted in Skierniewice, there are also denoted cultivars that are resistant to severe winter weather conditions that are frequent in Poland.

MATERIAL AND METHODS

The goal of the experiment set up in the Research Institute of Horticulture in Skierniewice in 2005-2010 was to evaluate the growth and yielding of four hybrid berry cultivars: Boysenberry, Tayberry, Tummelberry and Loganberry. In the experiment, phenological observations and plants susceptibility to diseases and pests were also conducted. All treatments on hybrid berries were performed in accordance with the rules applicable in blackberry plantations. The hybrid

berries were planted in rows. The distance between rows with plants was 3 m and between plants in a row 2.5 m. There was no plant protection treatment applied because the plants were resistant to pests. For watering the plants, drip irrigation was used. Before planting the plants the field was prepared by applying manure and after planting mixed fertilizers were used between the rows in the early spring of each year of the experiment. In the spring primocanes were tied to bamboo stakes, giving shrubs a V form. After harvesting all fruiting canes were cut down. Before winter, during first three years of the experiment (2005-2008), primocanes were covered with straw to protect them from winter damage. Only in the last two years of the experiment (2009-2010) no winter protection was used. The goal was to check how well the plants would deal with low temperatures in winter. We compared the yield and mass of 100 fruits between these cultivars in years 2007-2008. The first crop was observed already in 2006 but it was not taken into account in the statistical analysis. In the experiment, all fruits from each plant were collected, then weighted and counted. The crop was collected every other day besides weekends. The yield data were analyzed with Statgraphics, a Statistical Graphics Software System (<http://www.statgraphics.com>). The results are presented in Table 1.

RESULTS AND DISCUSSION

The statistical analysis of data showed that there were significant differences between years and cultivars in yield and fruit

Table 1. First and last picking, yield and fruit weight for 4 hybrid berry cultivars grown in Skierniewice, Poland

Cultivar	Mean of first and last picking in 2007-2008	Fruit yield (kg/plant)			Weight of 100 fruits (g)		
		2007	2008	mean 2007-2008	2007	2008	mean 2007-2008
Boysenberry	28.06-24.07	2.1	3.1	2.6 ^{ab}	424	587	506 ^b
Tayberry	25.06-31.07	2.9	3.3	3.1 ^b	431	514	473 ^a
Tummelberry	26.06-20.07	2.3	2.4	2.4 ^a	568	680	624 ^c
Loganberry	25.06-31.07	1.8	3.4	2.6 ^{ab}	462	526	494 ^{ab}

values in the columns marked by the same letter are not significantly different (at the 95% confidence level) according to the Fisher's test

mass (Table 1). On average all hybrid berry cultivars: Tayberry, Loganberry, Tummelberry, Boysenberry had first ripe fruits quite early i.e. at the end of June. The last harvest date divided the cultivars into two groups one with cultivars Tummelberry and Boysenberry that finished harvest in the second half of July and the other with cultivars Loganberry and Tayberry finishing about a week later. So the range in fruit harvesting duration was from 24 to 36. In 2007 an average yield in all hybrid berries was around 2.3 kg and in 2008 around 3.0 kg. From 2007–2008, an increase in yield was on average 37%. The highest increase over 80% was noted in the yield of Loganberry then Boysenberry around 50% and the lowest yield increase had Tayberry and Tummelberry and it was below 12%. Cultivar Tummelberry had the heaviest fruits. In 2007 it was almost 6.0 g per fruit and in 2008 almost 7.0 g. The remaining cultivars had smaller fruits, on average 4.3 g in 2007 and 5.4 g in 2008. In the experiment it was found out that thornless American varieties 'Loganberry' and 'Boysenberry' are more sensitive to frost. Scottish varieties 'Tayberry' and 'Tummelberry' are thorny, and were less damaged by frost. Covering them with straw before winter can protect them from temperatures even as low as -20°C .

CONCLUSIONS

Hybrid berries are mostly planted in small gardens. For producers who are looking for cultivars giving big, tasty fruits with a long shelf life, hybrid berries might be an attractive alternative to blackberries. As shown in the experiment in an open field, hybrid berries were harvested for rather short period of time comparing to some raspberry cultivars - only around 30 days. That can be a downside to producers but they can extend the harvest period by using covers like plastic tunnels and greenhouses.

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REFERENCES

- Ames B.M., Shigena M.K., Hagen T.M. 1993. Oxidants, antioxidants, and the degenerative diseases of aging. *Proceedings of the National Academy of Sciences USA*, 90: 7915–7922.
- Clark J.R., Finn Ch.E. 2011. *Blackberry Breeding and Genetics*. Fruit Vegetable and Cereal Science and Biotechnology. Global Science Books p. 27-43
- Ding M., Feng R., Wang S.Y., Bowman L., Lu Y., Qian Y., Castranova V., Jiang B.H., Shi X. 2006. Cyanidin-3-glucoside, a natural product derived from blackberry, exhibits chemopreventive and chemotherapeutic activity. *Journal of Biological Chemistry*, 281: 17359-17368.
- Heinonen I.M., Meyer A.S., Frankel E.N. 1998. Antioxidant activity of berry phenolics on human low-density lipoprotein and liposome oxidation. *Journal of Agricultural and Food Chemistry*, 46: 4107-4112.
- Karp D. 2010. "Boysenberry, a California treasure". *Los Angeles Times*.
- Pantelidis G.E., Vasilakakis G.A., Diamantidis G. 2007. Antioxidant capacity, phenol, anthocyanin and ascorbic acid content in raspberries, blackberries, red currants, gooseberries and Cornelian cherries. *Food Chemistry*, 102: 777-783
- Rieger M. 2006. *Introduction to Fruit Crops*. Routledge. p. 91
- Vaughan, J.G., Geissler C.A. 2009. *The New Oxford Book of Food Plants*. Oxford University Press. p. 88.
- Wood G.A., Andersen M.T., Forster R.L.S., Braithwaite M., Hall H.K. 1999. History of Boysenberry and Youngberry in New Zealand in relation to their problems with Boysenberry decline, the association of a fungal pathogen, and possibly a phytoplasma, with this disease. *New Zealand Journal of Crop and Horticultural Science*, 27: 281-295
- Wójcik-Seliga J., Wójcik-Gront E. 2013. Evaluation of blackberry and hybrid berry cultivars new to Polish climate-Short communication. *Horticultural Science*, 40: 88–91.



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