



ESTIMATING THE FRUIT QUALITY AFTER APPLICATION THE PRUNING OF BLUE HONEYSUCKLE BUSHES

IWONA SZOT * & TOMASZ LIPA

Abstract. The study was performed at University of Life Science in the eighth year after plant's establishment in 2001. In 2008 the "crown thinning" of blue honeysuckle cv. 'Atut' and 'Duet', to improve light penetration and air circulation, was done. In the next year during the "crown reduction" the shortening branches to 5 cm height from ground surface was applied. Effect of treatments on fruit quality in 2010 was evaluated. Berries from pruned bushes characterized significantly by bigger mass of individual fruit and length of fruit, however the diameters of fruit were similar to that from non-pruned bushes. Berries from non-pruned bushes had significantly higher content of soluble solids, sugar and acidity and lower content of anthocyanins as compared to fruits from pruned bushes. Significantly bigger fruit with regard to their weight, length and diameter stated in the 2nd harvest. Fruits from 2nd harvest had much more soluble solids, sugar, anthocyanins and acid versus that harvested in the 1st term.

Key words: *Lonicera caerulea*, fruit, size, chemical properties, crown thinning, crown reduction, lesser known edible fruit

University of Life Sciences in Lublin, 58 Leszczyńskiego str., 20-068 Lublin, Poland; *szoti@autograf.pl

Introduction

Blue honeysuckle has a good chance of occurrence in Polish plantations not only because of the health-promoting properties of the fruit (CHAOVANALIKIT *et al.* 2004; GRUIA *et al.* 2008; JURIKOVA *et al.* 2012). Small habitat requirements and genetic features argue for its cultivation. The plant is interesting because of its high resistance to frost, high tolerance to pests and diseases, very early time of ripening berries, relatively small soil requirements and low production costs (SZOT & WIENIARSKA 2012; SZOT & LIPA 2012). There are not many works about the ways of cultivation this innovative plant. Aim of this study was to evaluate the growing of bushes and determining the fruit quality of two blue honeysuckles cultivars 'Atut' and 'Duet' after application of pruning and at various term of harvesting.

Material and methods

The study was carried out at University of Life Science in Lublin. The plantation of two blue honeysuckle (*Lonicera caerulea* L. var. *kamtschatica* Sevest.) cultivars 'Atut' and 'Duet'

was established in the spring of 2001 near Lublin in Poland (NL: 51°, EL: 22°). Bushes were planted in a bed system with spacing 1 × 1 × 1.2 m. Mutual shading of crowns was found in the seventh year of cultivation (in 2008). To increasing light penetration and air circulation in the beginning of August the "crown thinning" was done by selective removal of branches throughout the bush. In the beginning of September in 2009 the „crown reduction" was done – it was reduction in overall size of the crown by shortening branches to 5 cm height from ground surface. The pruning treatment included 20 bushes of each cultivar. The remaining non-pruned bushes (20 replications of each cultivar) were the control. Fruit were harvested in two term: in 10th and 20th of June – cv. 'Atut', and in 12th and 22nd of June – cv. 'Duet'.

Effect of treatments on fruit quality in 2010 were evaluated on the basis of the following indices: mass of individual fruit – in 50 replications; mean mass of 100 fruits in 6 replications; length and diameter of fruits in 50 replications– using of electronic caliper; dry matter content (%) in 5 replications – with the oven-drying method; soluble solids content (%)

Table 1. The influence of bushes training on some physical and chemical properties of fruits and branches of *Lonicera caerulea* var. *kamtschatica*.

Characteristics	The way of training	
	Non-pruned bushes	Pruned bushes
The mass of individual fruit (g)	1.50 a*	1.64 b
The mass of 100 fruits (g)	133.71 a	137.33 a
The length of fruit (mm)	18.70 a	20.99 b
The diameter of fruit (mm)	12.52 a	12.63 a
Dry matter (%)	13.21 a	13.27 a
Soluble solids (%)	11.52 b	11.01 a
Sugar (%)	8.57 b	7.80 a
Acidity (%)	8.08 b	6.93 a
Anthocyanins (%)	0.60 a	0.71 b

*Means within the row followed by the same letter are not significantly differ by Tukey's Multiple Range Test at $P \leq 0.05$.

in 10 replications – with an Abbé refractometer; total sugar content (%) in 5 replications was determined according to the Loof-School method (KREŁKOWSKA-KUŁAS 1993); acidity (%) in 5 replications – potentiometrically by titration with 0.1 N NaOH solution and was converted to malic acid (YERMAKOV *et al.* 1987); anthocyanins content (%) in 5 replications – colorimetric method, converted to cyaniding chloride.

Results and discussion

The pruning improves the leaves to fruit ratio (MAUST *et al.* 1999) by increasing the access of light into the interior part of bushes and thus improving the fruit coloring and their uniform ripening (PRITTS 2004). Fruit size was significantly dependent on the treatment of bushes. Berries from pruned bushes characterized significantly bigger mass of individual fruit and length of fruit; however the diameters of fruit were similar to that from non-pruned bushes (Tab. 1). Berries from non-pruned bushes had significantly higher content of soluble solids, sugar and acidity and lower content of anthocyanins as compared to fruits from pruned bushes.

Size is an important characteristic which determines the quality. MAŁODOBRY *et al.* (2008) reported that in the berries of blue honeysuckle,

fruits of more than 1 g were valuable. Studied cultivars were significantly different in fruit size and their chemical properties (Tab. 2). Berries of cv. 'Duet' characterized significantly bigger mass of individual and 100 of fruits, as well as the diameter of fruit, however had significantly shorter fruits as compared to cv. 'Atut'. The characteristic feature of both cultivars was smooth peel with a natural waxy surface. This feature also pointed out GAŚTOŁ *et al.* (2004). Fruits of 'Atut' stand out from the content of dry matter, soluble solids, sugar, anthocyanins and acidity in relation to berries of 'Duet'.

SKUPIEŃ *et al.* (2009) studied the blue honeysuckle cultivar 'Czarna' and non-specified seedling „N” and founded that fruit quality and their chemical composition depended on the time of ripening. Studies have shown that the fruit collected later were larger, characterized by a different chemical composition than a fruit harvested at the beginning of fruiting. In fruits from the later harvest the soluble solids content increased, while the total acidity decreased approximately 20%. There was also a significant increase in content of anthocyanins and total polyphenols in fruits from later harvest. They stated, that better fruit quality from later ripening may have resulted from higher temperatures later in the season. Thus, the fruit collected earlier grew in less favorable weather conditions. The term of harvest had significant influence on

Table 2. The influence of cultivar on some physical and chemical properties of fruits and branches of *Lonicera caerulea* var. *kamtschatica*.

Characteristics	Cultivar	
	'Atut'	'Duet'
The mass of individual fruit (g)	1.37 a*	1.77 b
The mass of 100 fruits (g)	117.91 a	153.12 b
The length of fruit (mm)	20.63 b	19.06 a
The diameter of fruit (mm)	11.79 a	13.36 b
Dry matter (%)	14.39 b	12.09 a
Soluble solids (%)	11.43 b	11.10 a
Sugar (%)	8.33 b	8.03 a
Acidity (%)	8.32 b	6.70 a
Anthocyanins (%)	0.68 b	0.63 a

*Means within the row followed by the same letter are not significantly differ by Tukey's Multiple Range Test at $P \leq 0.05$.

Table 3. The influence of cultivar on term of harvest on physical and chemical properties of *Lonicera caerulea* var. *kamtschatica* fruits.

Characteristics	Term of harvest	
	1 st harvest	2 nd harvest
The mass of individual fruit (g)	1.40 a*	1.74 b
The mass of 100 fruits (g)	129.25 a	141.78 b
The length of fruit (mm)	18.50 a	21.19 b
The diameter of fruit (mm)	11.79 a	13.34 b
Dry matter (%)	13.75 a	12.73 a
Soluble solids (%)	10.49 a	12.04 b
Sugar (%)	6.99 a	9.38 b
Acidity (%)	6.76 a	8.26 b
Anthocyanins (%)	0.55 a	0.76 b

*Means within the row followed by the same letter are not significantly differ by Tukey's Multiple Range Test at $P \leq 0.05$.

studies features (Tab. 3). Significantly bigger fruits with regard to their weight, length and diameter were stated in the 2nd harvest. Fruits from 2nd harvest had much more soluble solids, sugar, anthocyanins and acidity versus that harvested in the 1st term.

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