COLOUR AND ANTHOCYANINS IN BLACK CURRANT JUICE

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Introduction

One of the most important quality aspects in relation to blackcurrant juice is the colour. The dark red-purple colour of black currant juice is demanded by the industry and the consumers, - the colour is important in relation to enhanced profit for the juice industry. The colour in black currant juice is determined by the content and type of pigments. The anthocyanins are the dominant pigments in black currant juice [1].

The objective of this study was to screen juices that were processed from berries of different organically grown blackcurrant cultivars with respect to the content of anthocyanins and the colour, so that berries from the most appropriate cultivars can be selected for juice processing.

Materials and methods

Plant material

At Department of Horticulture, twelve blackcurrant cultivars were planted in spring 2003 in an unsprayed organic production system. Berries were machine harvested in summer 2005 and 2006, respectively, at the optimum time for the single cultivar and kept frozen at -24°C until processing. The berries were processed at Agrana Juice A/S using a laboratory juice separator. After processing the juice samples were kept frozen at -24°C until analysis in May the following year (2006 and 2007, respectively).

Analysis of anthocyanins

The content and distribution of anthocyanins in the juice samples were determined using a modified method of Hong and Wrolstad (1990)[2]. The samples were analysed in two replicates. After thawing, the samples were filtered through a 0.45 µm SRP 25 filter (Bie & Berntsen, Rødovre, Denmark) directly into brown 4 mL HPLC vials and analysed immediately by high-performance liquid chromatography (HPLC). The HPLC analysis was performed on a Shimadzu/Merck HPLC system (Holm & Halby A/S, Brøndby, Denmark) equipped with a diode array detector (DAD) operating between 240–600 nm. The DAD was employed at 350 and 500 nm. Separations were performed at 35°C on a RP-18 column (Purospher STAR RP-18, 250 × 4.6 mm, Merck KGaA, Darmstadt, Germany). The mobile phase was water with 5% acetonitrile and 0.5% trifluoroacetic acid (TFA) (v/v) (solvent A) and 80% acetonitrile with 0.5% trifluoroacetic acid (TFA) (v/v) (solvent B) . The gradient used started with solvent A and reached 11% of solvent B after 11 min, 15% of solvent B after 36 min, 22% of solvent B after 50 min and 90% of B after 90 min. The flow rate was 1.0 mL/min and the injection volume 20 µL. Quantification of the four major anthocyanins delphinidin-3-glucoside, delphinidin-3-rutinoside, cyaniding-3-glucoside and cyaniding-3-rutinoside was made by external calibration curves using standards (Sigma-Aldrich Co., Brøndby, Denmark).

Figure 2 shows that there is a rather high variation in the anthocyanin content between the juices from the different cultivars. The anthocyanin content relates to the dark red colour of the juice (Figure 2). Juices with the highest total content of anthocyanins seem to have the darkest red colour (Figure 2).

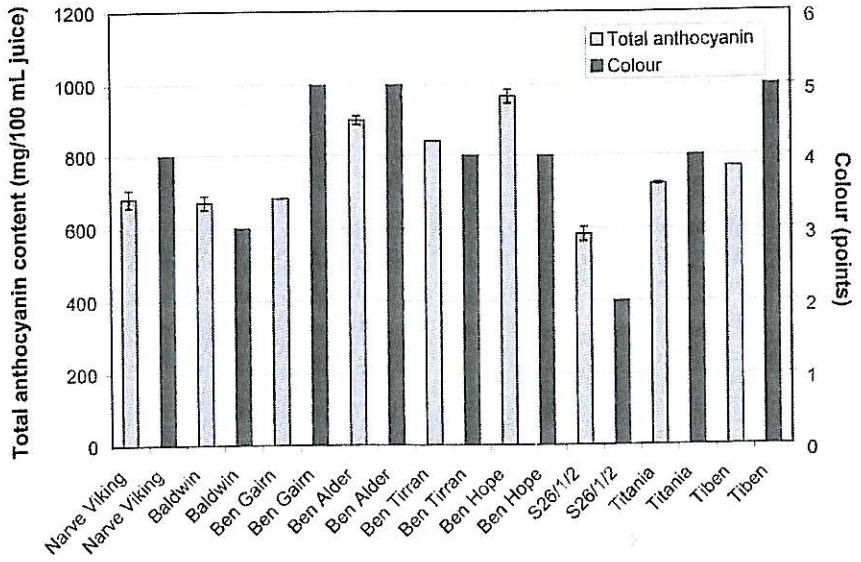

Figure 2. Colour (1= light red colour, 5= dark red colour) and the total content of anthocyanins (mg/100 mL juice) in juices from different cultivars that were harvested in 2005 and analyzed in 2006.

Conclusion

A high variation in the content of anthocyanins and colour of black currant juice were found between different cultivars. This can be used by the juice industry to produce dark red juice with high content of anthocyanins.

Acknowledgement

We thank the The Directorate for Food, Fisheries and Agri Business for financing this research and Agrana A/S and GlaxoSmithKline (GSK) for contributions to the project.

References

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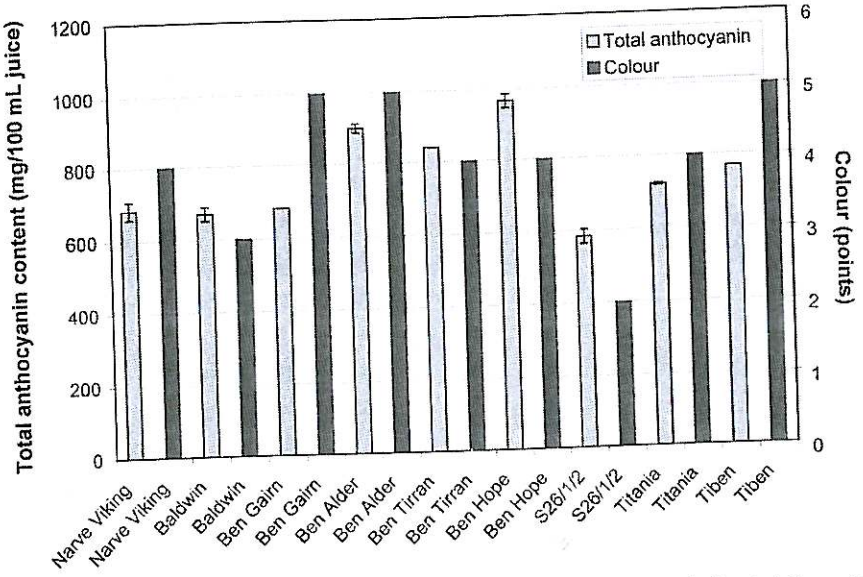

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