Physicochemical properties of fruit of 16 saskatoon (*Amelanchier alnifolia* Nutt.) cultivars

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Zatylny, A. M., Ziehl, W. D. and St-Pierre, R. G. 2005. **Physicochemical properties of fruit of 16 saskatoon (*Amelanchier alnifolia* Nutt.) cultivars.** Can J. Plant Sci. **85**: 933–938. Physicochemical properties were assessed for the fruit of 16 saskatoon (*Amelanchier alnifolia* Nutt.) cultivars harvested in 1998–2000 from replicated trials at two sites (Saskatoon and Moonlake, SK). The cultivars included Bluff, Buffalo, Elizabeth (at Saskatoon only), Forestburg, Honeywood, JB30, Martin, Nelson, Northline, PAR 90, Parkhill, Pearson II, Pembina, Smoky, Success, and Thiessen. Fruit weight and total solids, soluble solids, pH, titratable acidity, anthocyanin content, and colour characteristics of the fruit juice extracts were measured. Fruit of Martin, Thiessen and PAR 90 had the highest fruit weights (mean = 1.63 g), and Success and Bluff the lowest (mean = 0.79 g). Total and soluble solids contents ranged among cultivars from 19.9% and 14.0 °Brix, respectively, for JB30, to 27.9% and 20.1 °Brix, respectively, for Pembina. Fruit pH ranged from 3.65 for Nelson to 4.18 for Parkhill and Smoky. Fruit of Nelson had a titratable acidity (0.63%) that was approximately twice that of Success, Pearson II, Forestburg, Honeywood, Smoky and Parkhill. The soluble solids to titratable acidity ratio (SS/TA) differed greatly among cultivars ranging from 27 for JB30 to 55 for Parkhill. The colour characteristics of the fruit juice extracts differed among cultivars in chroma and *L* values, but not in hue angle. Anthocyanin analysis by HPLC identified four peaks: cyanidin-3-galactoside, cyanidin-3- glucoside and two unknowns. Total fruit anthocyanin content ranged from 414 μg g^{-1} for Forestburg to 852 μg g^{-1} for Nelson. Correlations were found between anthocyanin content and fruit pH, titratable acidity, hue angle and L value.

Key words: *Amelanchier alnifolia*, saskatoon, fruit composition, acidity, anthocyanin content

Zatylny, A. M., Ziehl, W. D. et St-Pierre, R. G. 2005. **Propriétés physicochimiques du fruit de 16 cultivars d'amélanchier (*Amelanchier alnifolia* Nutt.)**. Can. J. Plant Sci. **85**: 933–938. Les auteurs ont évalué les propriétés physicochimiques du fruit de 16 cultivars d'amélanchier (*Amelanchier alnifolia* Nutt.) récoltés de 1998 à 2000 lors des essais en duplicata effectués à deux endroits (Saskatoon et Moonlake, Saskatchewan). Les cultivars en question s'appelaient Bluff, Buffalo, Elizabeth (Saskatoon seulement), Forestburg, Honeywood, JB30, Martin, Nelson, Northline, PAR 90, Parkhill, Pearson II, Pembina, Smoky, Success et Thiessen. Les auteurs ont évalué le poids des fruits et les solides totaux, les solides solubles, le pH, l'acidité totale, la concentration d'anthocyanine et la couleur du jus. Les cultivars Martin, Thiessen et PAR 90 avaient les fruits les plus lourds (moyenne de 1,63 g) alors que Success et Bluff se trouvaient à l'autre extrémité de l'échelle (poids moyen de 0,79 g). La teneur en solides totaux et en solides solubles varie de 19,9 % et de 14,0 °Brix, respectivement, pour JB30 à 27,9 % et 20,1 °Brix pour Pembina. Le pH des fruits fluctue de 3,65 pour Nelson à 4,18 pour Parkhill et Smoky. Les fruits du cultivar Nelson avaient une acidité totale (0,63 %) correspondant à environ le double de celle des fruits de Success, Pearson II, Forestburg, Honeywood, Smoky et Parkhill. Le ratio entre les solides solubles et l'acidité totale varie considérablement d'un cultivar à l'autre, allant de 27 pour JB30 à 55 pour Parkhill. La couleur du jus diffère également entre les cultivars, mais seulement pour la chrominance et la valeur L, pas pour l'angle de phase. L'analyse de l'anthocyanine par CLHP révèle quatre pics : le cyanidine-3-galactoside, le cyanidine-3-glucoside et deux inconnues. La concentration totale d'anthocyanine du fruit varie de 414 μg par gramme pour Forestburg à 852 μg par gramme pour Nelson. Les auteurs ont relevé une corrélation entre la concentration d'anthocyanine et le pH du fruit, l'acidité totale, l'angle de phase et la valeur L.

Mots clés: *Amelanchier alnifolia*, amélanchier, composition du fruit, acidité, concentration d'anthocyanine

Saskatoon (*Amelanchier alnifolia* Nutt.), a fruit-producing shrub or small tree of the Rosaceae family, is native to the North American great plains. In the United States it is commonly called the juneberry or serviceberry. Its dark-purple, berry-like pome fruit range in diameter from 10 to 15 mm on average, depending on the cultivar (Zatylny et al. 2002). The fruit, collected from wild stands, were traditionally used by aboriginal people and early settlers on the prairies. At present, the commercial production and marketing of saskatoons is becoming more widespread. The fruit are eaten fresh or processed into jams, jellies, syrups, pie fillings and wine.

There are approximately 26 named cultivars of saskatoon (St-Pierre 1997), 16 of which are currently being tested in replicated trials at the University of Saskatchewan, Saskatoon, SK. Some quality characteristics of fruit harvested from unreplicated orchards of 7 of these 16 cultivars were previously published (Green and Mazza 1986, 1988;

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Mazza 1986; Davidson and Mazza 1991; Rogiers and Knowles 1997, 1998, 2000). The objective of our study was to undertake a basic physicochemical characterization of the fruit of these saskatoon cultivars, grown over several years and at two locations. This research provides a comparison of some basic attributes of fruit quality, and a basis for evaluating new cultivars. Additionally, information on the fruit physicochemical properties of cultivars studied may be useful to the developing fruit processing industry in Saskatchewan.

MATERIALS AND METHODS

The fruit were harvested from replicated trials of 16 saskatoon cultivars at the University of Saskatchewan (U of S) in Saskatoon, SK, and from 15 cultivars at a grower-managed site approximately 15 km southwest of Saskatoon (Moonlake). The trial consisted of a randomized complete block design with three blocks at each of the two sites. The linear plots of each cultivar contained five plants. The cultivars included Bluff, Buffalo, Elizabeth (at U of S only), Forestburg, Honeywood, JB30, Martin, Nelson, Northline, PAR 90, Parkhill, Pearson II, Pembina, Smoky, Success, and Thiessen. All are cultivars of *A. alnifolia* except for Parkhill and Success, which appear to be hybrids of *A. stolonifera* with *A. alnifolia* (Weir 1995). Due to difficulties in propagation, the cultivars PAR 90 and JB30 (at both sites) and Forestburg at Moonlake were planted in 1992, and Nelson was planted in 1993; all other cultivars were planted in 1991.

Depending on the type of analysis, laboratory tests were conducted on two or three subsamples of fruit harvested from each cultivar in each block. All fruit were mechanically harvested with hand-held shakers (BEI, South Haven, MI), which were raked along the branches causing the fruit to fall into catch frames below. Harvested fruit were placed in plastic containers ($25 \times 19 \times 8$ cm) and put into an insulated wooden container between layers of ice substitute (Cryopak Corp., Vancouver, BC). Fruit were stored in this field cooler for up to 7 h before being frozen at –40°C in the plastic containers. Only fully mature fruit of similar size within a given sample were selected for analysis. Mature fruit (class 9) were determined according to the fruit maturity index of Rogiers and Knowles (1997) for saskatoons based on colour.

Fruit weight, total and soluble solids contents, and pH of fruit harvested from both sites were determined in 1998–2000. Fruit titratable acidity was assessed for fruit harvested from the U of S site in 1999 and 2000. Mean fruit weight was determined from the weight of frozen fruit. Total solids content was measured according to Association of Official Analytical Chemists method 920.151 (AOAC 1995) in which 15 g of fruit were dried in a vacuum oven at 70°C for 24 h. Juice was extracted from the fruit for measurements of pH and soluble solids content by manually macerating 50 g of fruit and decanting the liquid portion. Manual maceration was accomplished by placing the fruit in a sealed plastic bag and squashing the fruit to release the juice by rolling a beaker over the bag. The pH was measured using a pH meter (Orion 410) and soluble solids content was determined by refractometer as per AOAC method 932.12 (AOAC 1995). Titratable acidity was assessed according to AOAC Method 920.149 (c) (AOAC 1995) in which saskatoon fruit (20 g) were boiled for 1 h and then centrifuged at $7200 \times g$ for 15 min. The resulting supernatant was filtered through Whatman #4 filter paper and made up to 250 mL, 200 mL of which was titrated. Titratable acidity was calculated as percent malic acid.

Colour characteristics of fruit harvested from both sites were determined in 1999 and 2000. Colour measurements were conducted on the extracted fruit juice rather than on the fruit surface. Previous research (R. St-Pierre, unpublished) on colour determination of the fruit exterior (using a HunterLab ColorFlex colourimeter) produced large deviations in the results; the primary cause was probably due to light reflectance at numerous angles off the rounded fruit surfaces during measurement. Visually undetected differences in fruit maturity, and variations in the waxy cuticle layer surrounding the fruit also may have added to the variability. Therefore, measurements of fruit colour were conducted on extracted juice. The juice was extracted in the same manner as for pH and soluble solids determination. Colour characteristics were measured using a Miniscan XE colourimeter (Hunter Assoc., Reston, VA). The hue angle and chroma were calculated to determine the colour and vividness of the fruit juice, respectively. The degree of lightness of the juice was indicated by the Hunterlab *L* value.

Fruit anthocyanin content was determined from fruit harvested from only the U of S site in 1999 and 2000. Extracts were prepared for anthocyanin analysis by blending for 20 s on low speed 20 g of thawed fruit with an extracting solvent of 50 mL of 0.1% HCl in methanol. The mixture was stored at 4°C overnight, then filtered through Whatman #4 filter paper. The resulting cake was rinsed with approximately 200 mL of the extracting solvent. The filtrate was made up to 250 mL with extracting solvent. Extracts were stored at –40°C. Prior to HPLC injection, extracts were filtered through 0.45-μm filters.

HPLC analysis of anthocyanin extracts was performed using a Waters Chromotograph gradient component system (Milford, MA) equipped with a Waters 600E multisolvent delivery system, Waters 717 plus autosampler, and a Waters 996 photodiode array detector. A 5-μL injection of extract was separated on a NovaPak C18 column (4 μm, 3.9×150 mm, 3.9×20 mm NovaPak Sentry guard column; Waters, Milford, MA). The solvents used for component separation were 10% formic acid in water (solvent A) and 0.1% HCl in methanol (solvent B) (Kalt et al. 1999). The elution profile was as follows: linear gradient 0–20 min, 10–65% B; linear gradient 20–25 min, 65–100% B; and isocratic 25–30 min, 100% B (Extrasynthese, Genay Cedex, France). The flow rate was 1 mL min^{-1} and absorbance data were collected at 520 nm. Standard curves were generated by injecting different volumes of standard solutions of the anthocyanins cyanidin-3-galactoside (42 ng μL^{-1}) (Extrasynthese, Genay Cedex, France) and cyanidin-3- glucoside (41.6 ng μL^{-1}) (Extrasynthese, Genay Cedex, France). These standards were used because cyanidin 3-galactoside and cyanidin 3-

Table 1. Fruit physicochemical characteristics of saskatoon cultivars harvested from Moonlake, SK, and the University of Saskatchewan (U of S), Saskatoon, SK, in 1998–2000

Cultivar	Weight/fruit (g)	Total solids (%)	Soluble solids (°Brix)	pH	Titratable acidity[z] (% malic acid)	SS/TA[y]
Bluff	0.80*a*	20.9*abc*	14.5*ab*	3.97*d*	0.435*bc*	33.0*ab*
Buffalo	0.95*abc*	22.6*cd*	16.5*bc*	4.00*d*	0.420*b*	38.8*bc*
Elizabeth	N/A[x]	N/A	N/A	N/A	0.464*bcde*	N/A
Forestburg	1.14*d*	20.6*abc*	15.3*abc*	4.17*f*	0.308*a*	45.8*cd*
Honeywood	1.07*cd*	21.7*abcd*	15.8*abc*	4.14*ef*	0.311*a*	49.7*de*
JB30	1.35*e*	19.9*a*	14.0*a*	3.78*c*	0.495*cdef*	26.9*a*
Martin	1.66*f*	20.8*abc*	15.3*abc*	3.71*b*	0.519*def*	29.8*a*
Nelson	1.03*cd*	25.1*e*	18.8*de*	3.65*a*	0.631*g*	30.3*a*
Northline	1.06*cd*	23.0*d*	16.5*bc*	3.78*c*	0.529*ef*	32.7*ab*
PAR 90	1.59*f*	20.9*abc*	15.1*abc*	3.70*ab*	0.534*f*	28.0*a*
Parkhill	0.97*bc*	22.6*cd*	17.2*cd*	4.18*f*	0.321*a*	55.4*e*
Pearson II	1.11*cd*	21.4*abcd*	15.8*abc*	4.16*f*	0.301*a*	52.5*de*
Pembina	0.85*ab*	27.9*f*	20.1*e*	3.95*d*	N/A[w]	N/A[w]
Smoky	1.09*cd*	21.5*abcd*	16.0*abc*	4.18*f*	0.312*a*	49.8*de*
Success	0.79*a*	21.9*bcd*	15.3*abc*	4.09*e*	0.291*a*	53.9*de*
Thiessen	1.62*f*	20.4*ab*	14.8*ab*	3.76*bc*	0.455*bcd*	31.4*ab*
Mean	1.14	22.1	16.1	3.95	0.422	39.9
Standard error	0.066	0.80	1.04	0.046	0.023	4.36

[z]Titratable acidity was analysed from fruit only from the U of S site and for the years 1999 and 2000.
[y]Soluble solids to titratable acidity (SS/TA) ratio calculated only for the U of S site for the years 1999 and 2000.
[x]Elizabeth was not grown at the Moonlake site and was excluded from the statistical analysis of the two sites together.
[w]Pembina was deleted from the statistical analysis due to missing data as a result of insufficient fruit in 2000.
a–f Means within a column followed by the same letter are not significantly different using LSD ($P \leq 0.05$).

glucoside were found to account for about 61 and 21% of the total anthocyanin content in saskatoons, respectively (Mazza 1986). Amounts of the anthocyanins in the saskatoon fruit were determined from the standard curve, with unidentified anthocyanins calculated as cyanidin-3-galactoside.

Statistical analyses were conducted on the subsample means. Data were checked for normality prior to analysis. Analysis of variance was accomplished using the mixed model procedure (Proc Mixed) of SAS Version 6.11 (SAS Institute, Cary, NC). Site and year were considered as random factors. Mean separation among cultivars was accomplished using the least significant difference (LSD) test. Pearson correlation coefficients between anthocyanin content and the other fruit quality parameters were calculated using SYSTAT Version 8.0 (SPSS, Chicago, IL).

RESULTS AND DISCUSSION

Fruit differed among cultivars in weight, total solids, soluble solids, anthocyanin content, pH, titratable acidity, and the ratio of soluble solids to titratable acidity. The colour of the fruit juice extracts differed among cultivars in chroma and *L* value, but not in hue angle.

Mean fruit weight of the cultivars ranged from 0.79 to 1.66 g (Table 1). The fruit weights of cultivars Martin, Thiessen and PAR 90 (mean = 1.63 g) were greater than those of all the other cultivars. JB30 also had a high fruit weight (1.35 g), whereas Success and Bluff had the lowest fruit weights, although not significantly different from Pembina and Buffalo (mean = 0.79 g). These findings are consistent with those previously reported for these cultivars (Zatylny et al. 2002). Fruit of Pembina and Nelson had higher levels of total and soluble solids than did all other cultivars (Table 1). Total and soluble solids contents ranged from 19.9% and 14.0 °Brix, respectively, for JB30 to 27.9% and 20.1 °Brix, respectively, for Pembina. Fruit pH ranged from 3.65 to 4.18, and was highest for the cultivars Parkhill, Smoky, Forestburg, and Pearson II (mean = 4.17) although not different from that of Honeywood (Table 1). The pH of the fruit of Nelson, PAR 90, Martin, Thiessen, JB30 and Northline was lower than that of all the other cultivars and ranged in value from 3.65 for Nelson to 3.78 for Northline. Titratable acidity ranged from 0.29 to 0.63% (Table 1). Fruit of Nelson had the highest titratable acidity (0.63%) among cultivars, which was approximately twice that of Success, Pearson II, Forestburg, Honeywood, Smoky and Parkhill (mean = 0.31%). Green and Mazza (1986) found values similar to ours for fruit titratable acidity of Smoky and Northline, but lower values for that of Honeywood.

The ratio of fruit soluble solids to titratable acidity (SS/TA) differed greatly among the cultivars, ranging from 26.9 to 55.4 (Table 1). Fruit of Parkhill, Success, Pearson II, Smoky, and Honeywood had an SS/TA ratio 73% higher on average than that of JB30, PAR 90, Martin, Nelson, Thiessen, Northline, and Bluff. This latter group of cultivars likely would have a longer shelf-life due to a lower SS/TA ratio. Galleta et al. (1971) found that blueberries high in acidity or with low ratios of soluble solids to acid could be stored for longer periods. Ballinger and Kushman (1970) concluded that fruit high in acidity tend to have a better fresh fruit keeping quality because the acidity inhibits the growth of fruit-rotting organisms. Ballinger et al. (1978) also calculated that blueberries with SS/TA ratios greater

than 30 did not store well and should be processed. Although the ratio associated with storability may be different for saskatoons, it is conceivable that fully ripe saskatoons may have limited suitability for the fresh market due to a more limited shelf-life and may need to be sorted out prior to marketing. The low SS/TA ratios found in this study were primarily due to the acidity of the fruit, and were similar to those found for saskatoons by Green and Mazza (1986) for the cultivars Honeywood, Smoky and Northline. In general, the SS/TA ratios of saskatoon fruit were found to be much higher than those of blueberries due to the lower acidity levels of saskatoons as compared to blueberries (Galletta et al. 1971; Ballington et al. 1984; Ballinger et al. 1978). However, this may also be partially associated with the stage of ripeness at which blueberries are harvested. Blueberry fruit that were fully ripe or overripe had acidity and SS/TA ratios in ranges similar to those of fully ripe saskatoons assessed in the current study (Ballinger et al. 1978).

The colour characteristics of the extracted fruit juice of the cultivars indicate that no differences in fruit juice colour hue existed among the cultivars (Table 2). Juice chroma values ranged from 23.6 for Success to 34.1 for Martin. *L* values ranged from 14.8 for Bluff to 21.8 for Martin. The cultivars Martin, Thiessen, PAR 90 and JB30 were among those with the most vivid and lightest juice colour as represented by high chroma values (mean = 33.4) and high *L* values (mean = 21.4), respectively. Colour analysis of the extracted juice yielded more consistent results than did colour measurements of the fruit exterior. Knowing the differences in fruit juice colour among cultivars will be directly applicable to the development of any products produced from fruit juice and to products in which the juice leaches out of the fruit, such as jams and pie fillings, because the colour of the fruit juice affects the colour of the final product.

Fruit anthocyanin content varied among cultivars (Table 3). Four peaks were found at 520 nm (Fig. 1). The first was identified as cyanidin-3-galactoside and the second as cyanidin-3- glucoside. The remaining two peaks were not identified. Cyanidin-3-galactoside consistently accounted for the largest percentage of total peak area, followed by cyanidin-3-glucoside, then unknown 1 and unknown 2. Total fruit anthocyanin content on a fresh weight basis ranged from 414 to 852 μg g^{-1}. Fruit of Bluff, Nelson and Northline had the highest total anthocyanin content (mean = 776 μg g^{-1}). High total anthocyanin content was associated primarily with a high content of cyanidin-3-galactoside, especially for Northline, but Bluff and Nelson also had the highest contents of cyanidin-3-glucoside, and the unidentified Peak 3. Northline had the lowest cyanidin- 3-glucoside content of the cultivars. Total anthocyanin contents were lower than those reported by Green and Mazza (1986) for Honeywood, Smoky and Northline. The discrepancy may be due, at least in part, to differences in methodology. Green and Mazza (1986) employed the pH differential method of Fuleki and Francis (1968), which is expected to produce larger values due to the absorbance of other compounds and the use of only one molar extinction coefficient. The HPLC method employed in this study was considered more accurate in both respects. However, total anthocyanin contents measured in this study may be low because the absorbance of anthocyanins at wavelengths other than 520 nm was not determined. Differences in growing location and climate, fruit maturity levels and storage conditions prior to analysis may also have contributed to the differences in anthocyanin contents found between the two studies.

Table 2. Colour characteristics of the fruit juice of saskatoon cultivars harvested from sites at Moonlake, SK, and the University of Saskatchewan (U of S), Saskatoon, SK, in 1999 and 2000

Cultivar[z]	Hue angle (°)	Chroma	*L*
Bluff	17.5	25.9*ab*	14.8*a*
Buffalo	16.8	27.4*abc*	14.9*a*
Forestburg	19.7	28.1*bc*	19.4*bcde*
Honeywood	19.4	27.5*abc*	18.5*abcde*
JB30	18.5	32.5*d*	21.4*de*
Martin	18.0	34.1*d*	21.8*e*
Nelson	17.3	31.5*cd*	16.4*ab*
Northline	17.9	30.7*cd*	17.6*abcd*
PAR 90	18.1	33.3*d*	20.5*cde*
Parkhill	17.4	26.3*ab*	15.4*ab*
Pearson II	19.3	28.1*bc*	18.5*abcde*
Pembina	18.2	27.7*abc*	17.0*abc*
Smoky	19.7	27.2*abc*	18.2*abcde*
Success	20.2	23.6*a*	15.6*ab*
Thiessen	18.1	33.6*d*	21.8*e*
Mean	18.4	29.2	18.1
Standard error	0.94	2.00	1.32

[z]The cultivar Elizabeth was excluded from the statistical analysis as this cultivar was not grown at the Moonlake site.
a–e Means within a column followed by the same letter are not significantly different using LSD ($P \leq 0.05$).

Correlations were found between anthocyanin content and fruit pH ($r = –0.41$, $P < 0.001$), titratable acidity ($r = 0.53$, $P < 0.001$), hue angle ($r = –0.43$, $P < 0.001$) and Hunterlab *L* value ($r = –0.31$, $P = 0.038$). These results indicate that fruit with high acidity tended to have higher anthocyanin content, and darker (lower *L* value), more purple (lower hue angle) juice. Similar correlations in saskatoon were previously found between anthocyanin content and fruit pH, acidity, and hue angle (Green and Mazza 1986). No relationships were found between anthocyanin content and fruit weight, total solids, soluble solids or chroma values.

Anthocyanin content is largely responsible for the colour of the fruit skin and flesh and thus influences the marketability of the fruit. Anthocyanins are vulnerable to degradation during processing and storage (Perera and Baldwin 2001). A reduction in anthocyanin content has been observed during the cold storage of saskatoon fruit (Rogiers and Knowles 1998, 2000). Rogiers and Knowles (2000) reported that the greatest reduction in anthocyanin content of saskatoons (cvs. Northline, Smoky, Pembina and Thiessen) occurs within the first 11 d of cold storage at 0.5°C. Fruit high in anthocyanin content may be desirable to ensure that minimum acceptable levels remain after loss through storage or processing. In general, the anthocyanin content of saskatoons was found not to be as high as in blueberries. Anthocyanin contents determined for blueberry by

Table 3. Anthocyanin contents of the fruit of saskatoon cultivars harvested from the University of Saskatchewan (U of S), Saskatoon, SK, site in 1999 and 2000. Anthocyanin contents are presented as per gram fresh fruit weight

Cultivar	Peak 1 cyanidin-3-galactoside (μg g^{-1})	Peak 2 cyanidin-3-glucoside (μg g^{-1})	Peak 3 unidentified[z] (μg g^{-1})	Peak 4 unidentified (μg g^{-1})	Total anthocyanin content (μg g^{-1})
Bluff	454*e*	159.4*d*	91.9*d*	71.6*c*	777*gh*
Buffalo	344*d*	148.6*cd*	76.7*c*	70.1*c*	639*ef*
Elizabeth	255*abc*	111.1*ab*	63.1*ab*	54.5*ab*	484*abcd*
Forestburg	205*a*	97.6*ab*	60.0*ab*	51.2*a*	414*a*
Honeywood	227*ab*	96.7*ab*	60.1*ab*	51.6*ab*	435*ab*
JB30	326*cd*	124.0*bc*	69.7*bc*	60.2*b*	580*def*
Martin	316*cd*	116.9*ab*	64.5*b*	56.2*ab*	554*bcde*
Nelson	509*e*	172.9*d*	94.3*d*	75.4*c*	852*h*
Northline	483*e*	88.6*a*	70.7*bc*	56.9*ab*	699*fg*
PAR 90	324*cd*	125.3*bc*	65.6*bc*	59.6*ab*	574*cde*
Parkhill	295*bcd*	114.2*ab*	62.4*ab*	57.0*ab*	529*abcde*
Pearson II	216*a*	96.6*ab*	60.6*ab*	51.3*a*	424*a*
Smoky	231*ab*	103.4*ab*	63.5*b*	53.9*ab*	452*abc*
Success	261*abc*	91.7*a*	52.1*a*	52.7*ab*	457*abcd*
Thiessen	256*abc*	111.6*ab*	62.0*ab*	54.7*ab*	466*abcd*
Mean	313	117.2	68.0	54.5	556
Standard error	24.6	9.51	3.69	2.83	40.4

[z]Amounts of unknowns were calculated as cyanidin-3-galactoside.
a–h Means within a column followed by the same letter are not significantly different using LSD ($P \leq 0.05$).

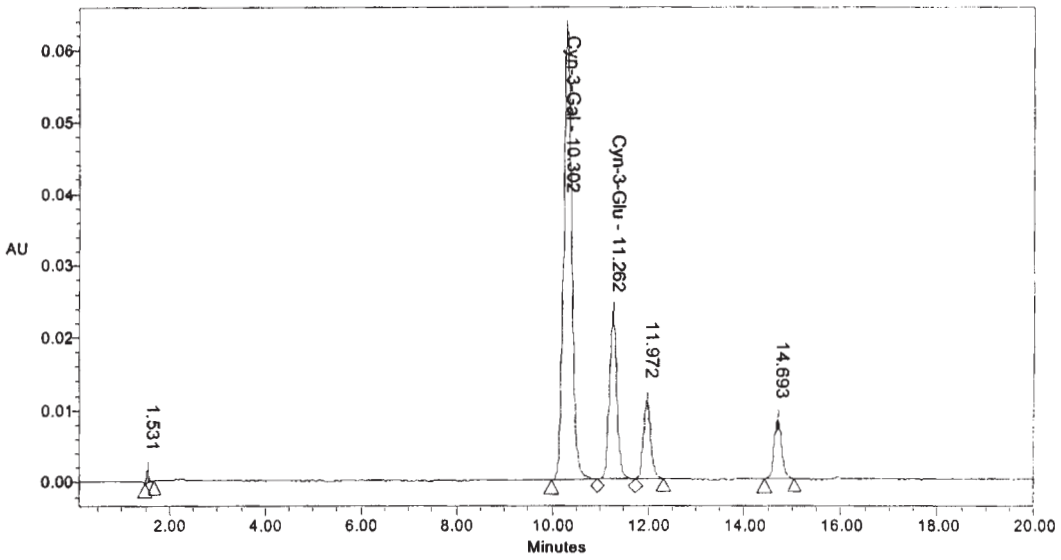

Fig. 1. An example of a chromatogram of fruit extract showing the anthocyanin profile of saskatoon fruit.

HPLC ranged from 830 to 2550 μg g^{-1} FW (Kalt et al. 1999) and from 1093 to 2607 μg g^{-1} FW (Gao and Mazza 1994).

Of the cultivars evaluated in this study, Nelson stands out as having fruit with high contents of total and soluble solids, high acidity, low SS/TA, low pH, and high anthocyanin content, suggesting that this cultivar may be the most suited for storage for fresh consumption and for processing where a high total solids content is desirable to maximize usable product. However, the cultivars most desirable for fresh fruit consumption are largely determined by their flavour, fruit size and appearance. It was noted that the fruit of Nelson, in spite of having superior physicochemical properties, did not have the most appealing flavour when eaten fresh. Nelson also produced smaller fruit than did a number of other cultivars. For these reasons, fruit of Nelson may be better suited for processing. Fruit of JB30, PAR 90, Martin, Thiessen and Northline all had low SS/TA indicating that they may have better storage properties. The fruit of these cultivars are larger than that of Nelson and have been noted as having good flavour when eaten fresh. Nevertheless, further research is required to determine which cultivars are best suited for fresh consumption based on storage studies and sensory evaluations of fresh fruit. Likewise, the assessment of processed fruit products needs to be conducted to determine which cultivars produce fruit most suited for processing.

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