Getting into sloe business

#ACSNOLA

@stuartcantrill

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“What are they?”

Blackthorn bush (Prunus spinosa)

The recipe

Sugar

1

Sloes

2

Gin

3

Almond

A bit

Time

A lot

– When do I pick the fruit?

When it's ripe

– Do I need to prick the fruit?

If you want, or you can freeze them first

– How much sugar do I use?

Better too little than too much

– What gin do I use?

Nothing too fancy, but better than something you'd use to wash paintbrushes

– How long do I leave it?

At least 6 months, a year might be better

Sloe stuff

Moisture (g/100 g of fresh weight), nutrients composition (g/100 g of dry weight) and energetic value (kcal/100 g of dry weight) of the wild fruits (means ± SD; $n = 3$). In each row, different letters mean significant differences ($p < 0.05$).

	Strawberry-tree	Blackthorn	Rose
Moisture	59.70 ± 2.67b	60.86 ± 1.69a	48.68 ± 0.91c
Carbohydrates	93.83 ± 0.41a	88.51 ± 2.24b	93.16 ± 0.18a
Proteins	3.09 ± 0.08a	2.86 ± 0.03b	2.72 ± 0.05c
Fat	1.37 ± 0.40b	1.98 ± 0.32a	0.65 ± 0.04c
Ash	1.71 ± 0.09b	6.65 ± 2.03a	3.47 ± 0.20b
Energy	399.99 ± 1.17a	383.27 ± 7.09b	398.37 ± 0.92b

Fructose, glucose, sucrose, cellulose, starch

Strawberry-tree, blackthorn and rose fruits: Detailed characterisation in nutrients and phytochemicals with antioxidant properties
Barros, L. *et al. Food Chemistry* **120**, 247–254 (2010)

A source of vitamins...

Tocopherols, ascorbic acid and carotenoids composition (mg/100 g dry weight) of the wild fruits. The results are expressed as means ± SD ($n = 3$). In each row different letters mean significant differences ($p < 0.05$).

	Strawberry-tree	Blackthorn	Rose
α-Tocopherol	21.98 ± 0.18a	7.18 ± 0.34b	7.05 ± 0.28b
β-Tocopherol	0.44 ± 0.02a	0.06 ± 0.01c	0.19 ± 0.01b
γ-Tocopherol	1.03 ± 0.06b	1.91 ± 0.28a	1.09 ± 0.06b
δ-Tocopherol	nd	0.10 ± 0.01	nd
Total tocopherols	23.46 ± 0.26a	9.25 ± 0.64b	8.33 ± 0.34b
Ascorbic acid	15.07 ± 0.77b	15.69 ± 0.53b	68.04 ± 1.11a
β-Carotene	1.07 ± 0.09b	0.78 ± 0.01c	1.29 ± 0.26a
Lycopene	nd	nd	0.51 ± 0.08

nd, not detected.

E

C

‘A’

(Vitamin C; an orange is about 50 mg/100g)

Strawberry-tree, blackthorn and rose fruits: Detailed characterisation in nutrients and phytochemicals with antioxidant properties
Barros, L. *et al. Food Chemistry* **120**, 247–254 (2010)

...and minerals

Mineral content of blackthorn fruits

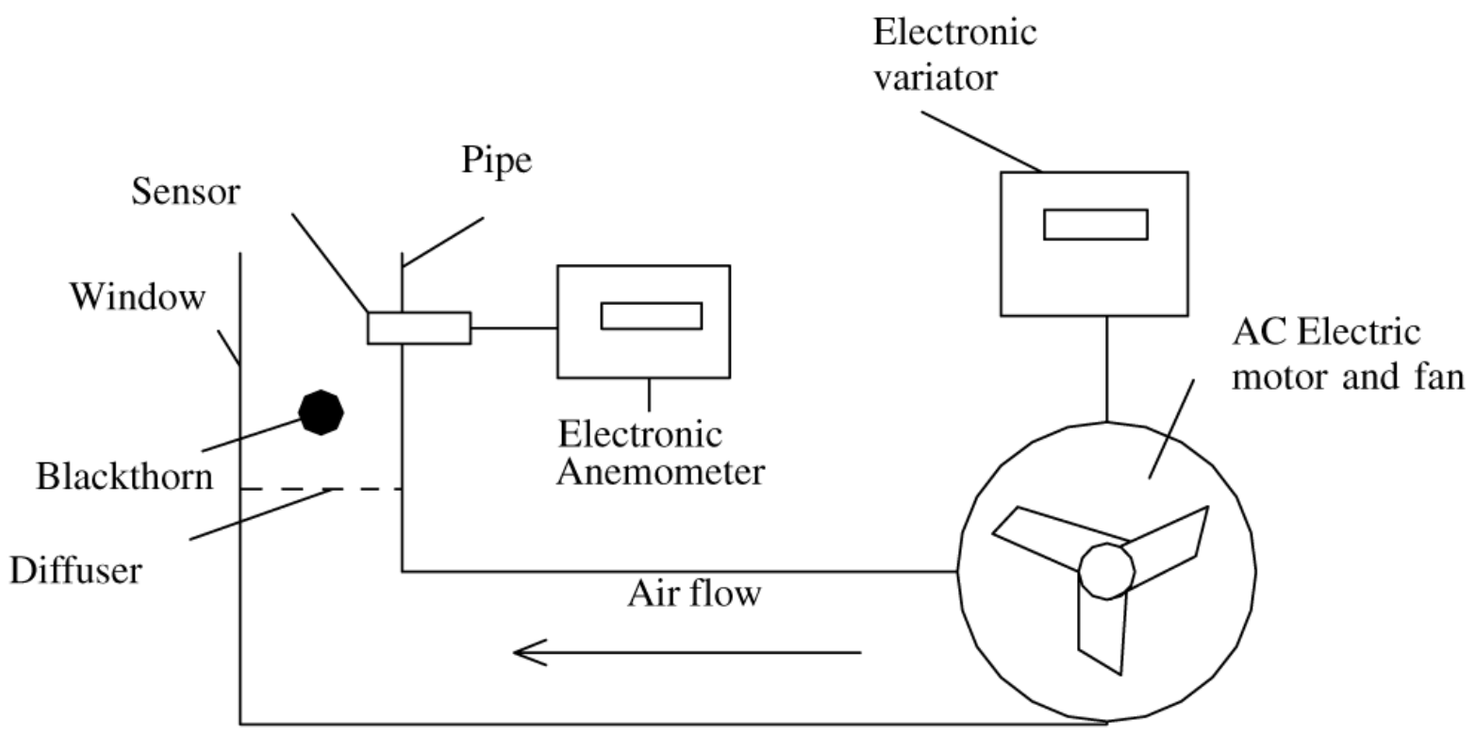
Minerals	Values (mg/kg)
Al	26.33 ± 1.88
B	26.99 ± 1.44
Ca	1524.22 ± 88.11
Cd	0.279 ± 0.02
Cr	2.28 ± 0.71
Fe	16.18 ± 1.70
K	18706.98 ± 553.02
Li	6.24 ± 0.19
Mg	968.15 ± 7.65
Mn	4.58 ± 0.06
Na	530.11 ± 75.49
Ni	1.22 ± 0.12
P	1514.54 ± 215.90
Pb	1.28 ± 0.06
S	500025.97 ± 5966.05
V	3.01 ± 0.09

Proximate composition and technological properties of fresh blackthorn (*Prunus spinosa* L. subsp *dasyphylla* (Schur.)) fruit
Marakoglu, T. *et al. Journal of Food Engineering* **68**, 137–142 (2005)

Physical properties

Some technological properties of blackthorn fruits at 69.37% m.c.d.b

Properties	Values
Volume (mm^3)	1288.5 ± 122.78
Fruit density (kg/m^3)	1111.43 ± 23.854
Bulk density (kg/m^3)	598.9 ± 2.299
Porosity (%)	46.38 ± 1.286
Projected area (cm^2)	1.454 ± 0.045
Terminal velocity (m/s)	16.14 ± 0.104
Fruit hardness (N)	0.28 ± 0.02



Phenolic composition, antioxidant and antimicrobial activity of the extracts from *Prunus spinosa* L. fruit

Veličković, J. M. *et al. Hem. Ind.* **68**, 297–303 (2014)

Table 2. HPLC Analysis of the fruit extracts (Prunus spinosa L.)

Time, min	Compound	Ethanol extract contents mg L^{-1}	Ethanol–water extract content mg L^{-1}	Water extract content mg L^{-1}
15.6	Neochlorogenic acids	12.26±0.2	16.95±0.3	–
19.8	Caffeic acids	2.12±0.1	9.73±0.2	–
20.8	Myricetin	–	8.86±0.2	–
23	Cyanidin-3-*O*-glucoside	1.1±0.1	0.9±0.1	1.1±0.1
24	Cyanidin-3-*O*-rutinoside	1.1±0.1	3.1±0.2	1.5±0.1
25	Peonidin-3-*O*-glucoside	–	1.2±0.1	2.2±0.1
26.5	Quercetin	4.02±0.2	3.83±0.2	–

Phenolic acids: neochlorogenic and caffeic acids

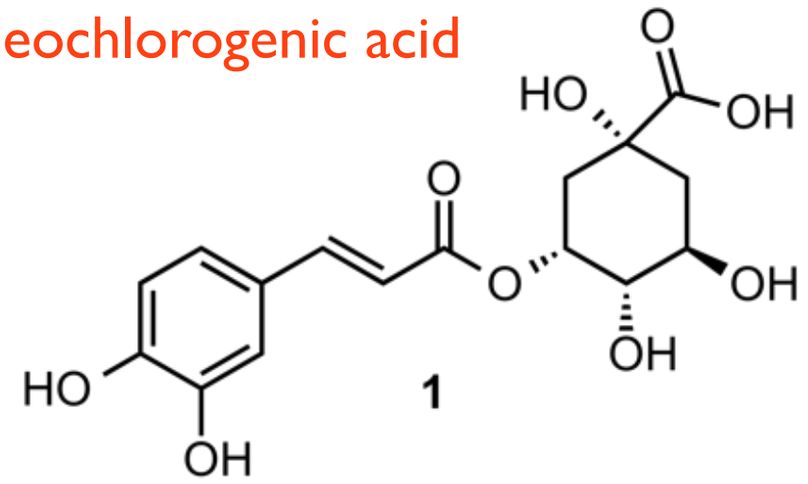
Flavonoids: quercetin and myricetin

Anthocyanins: cyanidin-3-O-glucoside

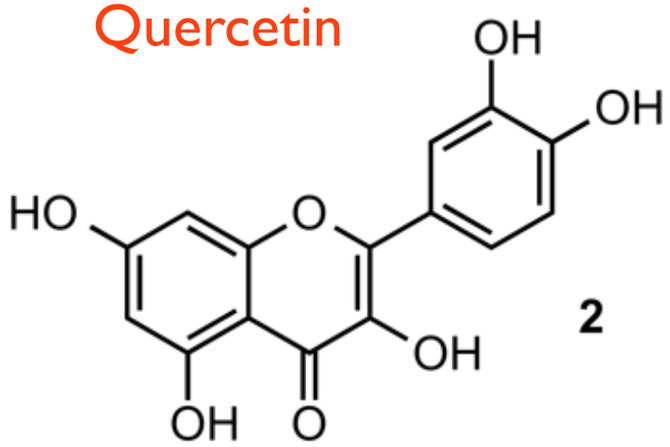
cyanidin-3-O-rutinoside

peonidin-3-O-glucoside

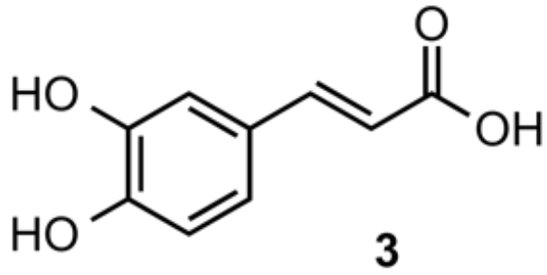
Neochlorogenic acid



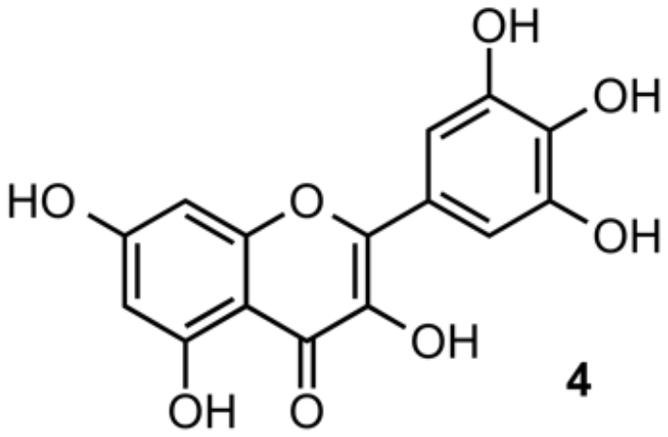
Quercetin

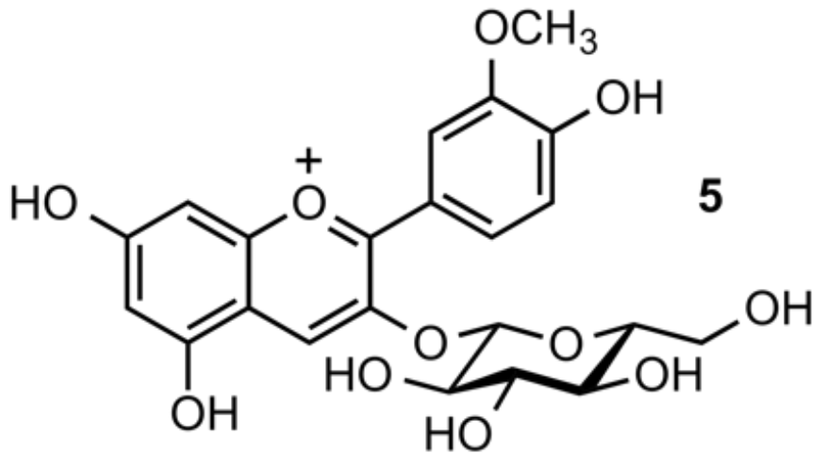


Caffeic acid

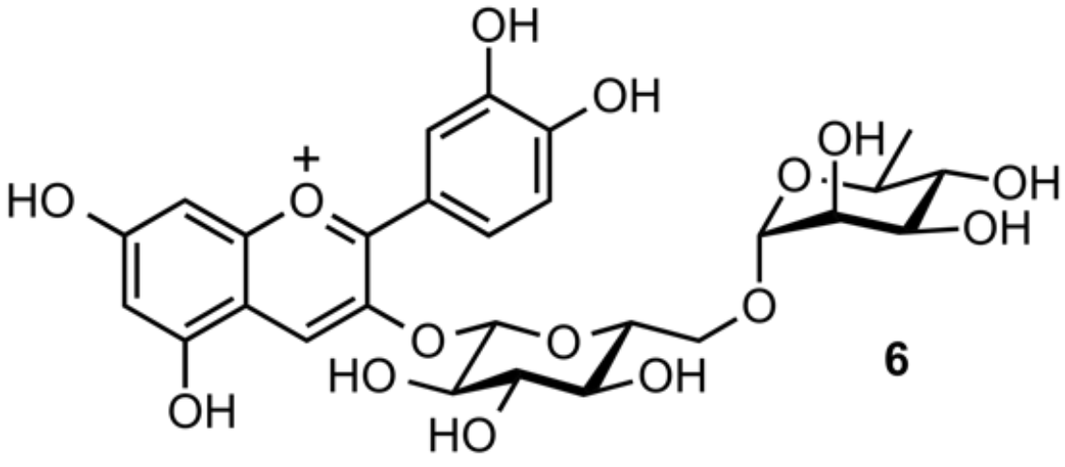


Myricetin

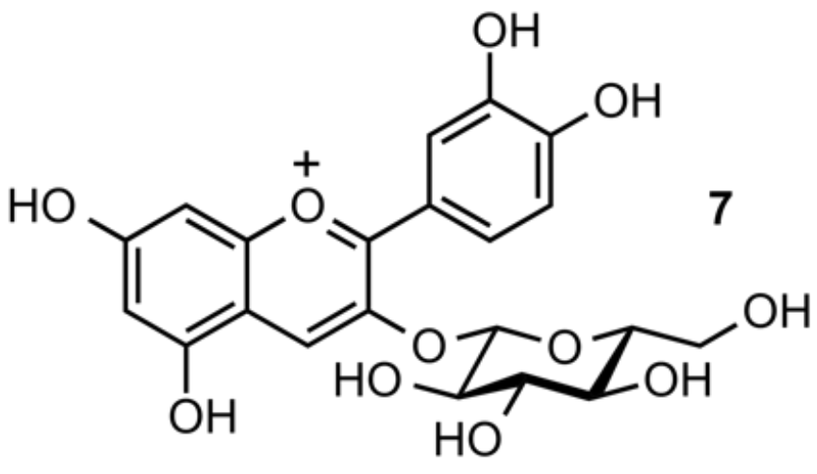




Peonidin-3-O-glucoside



Cyanidin-3-O-rutinoside



Cyanidin-3-O-glucooside

Antimicrobial properties

Table 3. Antimicrobial activity of ethanol fruit extracts (Prunus spinosa L.); Zone of inhibition (mm); Data are expressed as the mean of three replicates ± standard deviation

Test microorganism	Extract (10 mg mL^{-1})		Reference antibiotic	Reference antimicotic	Negative control
	20 µL	50 µL	Tetracycline (30 µg)	Nistatin (30 µg)	Ethanol, 96%
Salmonella abony NCTC 6017	–	19.0±0.2	28.0±0.3	–	–
Escherichia coli ATCC 25922	11.0±0.1	24.0±0.3	30.0±0.3	–	–
Pseudomonas aeruginosa ATCC 9027	13.0±0.15	23.0±0.3	19.0±0.2	–	–
Bacillus subtilis ATCC 6633	–	–	36.0±0.4	–	–
Staphylococcus aureus ATCC 6538	13.0±0.2	18.0±0.2	34.0±0.3	–	–
Candida albicans ATCC 10231	14.0±0.2	23.0±0.3	–	20.0±0.3	–
Aspergillus niger ATCC 16404	–	–	–	19.0±0.3	–

Blackthorn fruit extract exhibits a high phenolic content and a high antioxidant activity, and can be used as an antioxidant in food and pharmaceutical industries.

Wikipedia: Although anthocyanins have been shown to have antioxidant properties *in vitro*, there is no evidence for anthocyanin antioxidant effects in the body after the plant is consumed. Unlike controlled test-tube conditions, the fate of anthocyanins *in vivo* shows they are poorly-conserved (less than 5%), with most of what is absorbed existing as chemically-modified metabolites that are excreted rapidly.

Composition and antioxidant activity of red fruit liqueurs
Sokoł-Łetowska, A. *et al. Food Chemistry* **157**, 533–539 (2014)

The aim of this study was to compare polyphenol content (especially anthocyanins) and antioxidant activity in colour liqueurs made from 10 species of colour fruits, and to specify the changes they undergo during storage for 6 months at temperatures of 15 and 30 °C.

3.5 years

1.5 years

A lot of data...

Phenolic compound contents in fruit liqueurs not stored (0) and stored for 3 and 6 months.

Liqueur	Months	Anthocyanins mg cy-3-glu/100 ml				Flavonols mg quercetin/100 ml				Sum of phenolic acids mg chlorogenic or ellagic acid/100 ml				Sum of phenolic compounds mg/100 ml			
		15 ns	15 s	30 ns	30 s	15 ns	15 s	30 ns	30 s	15 ns	15 s	30 ns	30 s	15 ns	15 s	30 ns	30 s
Chokeberry	0	167.4^{c}	170.7^{a}	157.2^{d}	169.4^{c}	13.4^{bc}	16.4^{a}	15.2^{ab}	16.3^{a}	47.5^{b}	44.2^{c}	49.0^{a}	48.2^{ab}	228.2^{ab}	231.4^{a}	221.5^{ab}	233.9^{a}
	3	100.0^{f}	123.6^{e}	21.2^{i}	42.8^{h}	15.5^{ab}	15.9^{ab}	12.2^{bc}	14.9^{ab}	46.7^{bc}	42.1^{c}	48.5^{ab}	48.7^{ab}	162.1^{d}	181.6^{c}	81.9^{f}	106.5^{e}
	6	42.6^{h}	58.2^{g}	1.2^{k}	3.0^{j}	4.7^{d}	7.6^{d}	4.3^{d}	7.9^{cd}	37.4^{d}	34.5^{d}	37.3^{d}	36.5^{d}	84.7^{f}	100.2^{e}	42.9^{g}	47.4^{g}
Cornelian cherry	0	14.0^{c}	14.7^{b}	14.4^{b}	15.3^{a}	1.7^{ab}	1.0^{ab}	1.0^{ab}	1.1^{a}	9.4^{ab}	9.8^{a}	10.0^{a}	9.9^{a}	25.1^{a}	25.6^{a}	25.4^{a}	26.2^{a}
	3	5.5^{d}	6.7^{d}	0.8^{f}	1.2^{f}	0.8^{ab}	1.1^{ab}	0.9^{ab}	1.0^{ab}	9.2^{ab}	9.3^{ab}	8.9^{b}	9.2^{ab}	15.6^{b}	17.2^{b}	10.6^{c}	11.4^{c}
	6	2.4^{e}	3.6^{e}	0.0^{g}	0.0^{g}	0.0^{b}	0.0^{b}	0.0^{b}	0.0^{b}	6.1^{c}	5.9^{c}	6.1^{c}	6.0^{c}	8.5^{d}	9.5^{cd}	6.0^{d}	6.0^{d}
Blackberry	0	26.6^{a}	22.4^{a}	22.1^{a}	22.6^{a}	1.9^{a}	1.6^{a}	1.4^{a}	1.5^{a}	8.9^{b}	9.4^{ab}	9.5^{ab}	9.4^{ab}	37.4^{a}	33.4^{a}	33.0^{a}	33.6^{a}
	3	14.7^{b}	15.4^{b}	0.2^{d}	0.4^{d}	0.9^{ab}	1.0^{ab}	0.0^{c}	0.0^{c}	7.9^{c}	9.7^{a}	8.6^{b}	10.2^{a}	23.6^{b}	26.1^{b}	8.8^{d}	10.6^{cd}
	6	8.8^{c}	9.7^{c}	0.0^{d}	0.0^{d}	0.4^{b}	0.6^{b}	0.0^{c}	0.0^{c}	7.4^{c}	8.7^{b}	8.8^{b}	10.6^{a}	16.6^{c}	19.0^{bc}	8.8^{d}	10.6^{cd}
Mahonia	0	26.8^{a}	25.2^{a}	26.0^{a}	24.0^{a}	4.3^{a}	4.3^{a}	4.6^{a}	4.4^{a}	139.1^{a}	129.4^{c}	138.2^{a}	126.6^{c}	170.2^{a}	158.9^{ab}	168.8^{a}	155.0^{b}
	3	10.5^{c}	14.1^{b}	0.3^{f}	1.1^{e}	4.6^{a}	4.9^{a}	4.7^{a}	5.5^{a}	125.2^{c}	132.6^{b}	122.2^{d}	131.5^{b}	140.4^{b}	151.7^{ab}	127.3^{c}	138.1^{d}
	6	2.6^{d}	7.4^{c}	0.0^{f}	0.0^{f}	3.9^{b}	4.0^{b}	3.1^{b}	3.5^{b}	108.3^{e}	109.4^{e}	106.7^{e}	109.2^{e}	114.8^{cd}	120.8^{c}	109.8^{d}	112.7^{e}
Raspberry	0	12.0^{a}	13.8^{a}	12.2^{a}	13.6^{a}	1.2^{b}	1.2^{b}	1.2^{a}	0.9^{b}	18.4^{ab}	19.0^{a}	18.3^{b}	18.5^{a}	31.6^{a}	34.0^{a}	31.7^{a}	33.0^{a}
	3	5.7^{b}	7.2^{b}	0.8^{d}	1.7^{c}	1.4^{a}	1.4^{a}	1.4^{a}	1.0^{b}	18.1^{b}	18.6^{a}	17.5^{b}	18.2^{b}	25.3^{b}	27.2^{b}	19.7^{c}	20.9^{c}
	6	2.8^{bc}	2.8^{bc}	0.1^{e}	0.2^{e}	1.4^{a}	1.4^{a}	1.5^{a}	1.3^{b}	13.8^{c}	13.1^{c}	13.1^{c}	11.9^{d}	17.9^{cd}	17.4^{d}	14.6^{de}	13.4^{e}
Blackcurrant	0	33.0^{b}	35.8^{a}	31.1^{b}	35.9^{a}	2.8^{a}	2.9^{a}	2.6^{a}	2.9^{a}	2.9^{ab}	3.2^{a}	2.9^{b}	2.5^{c}	38.3^{a}	41.6^{a}	36.3^{a}	41.1^{a}
	3	5.3^{d}	9.4^{c}	0.4^{f}	1.0^{e}	2.1^{b}	2.4^{ab}	1.8^{b}	2.5^{a}	2.5^{c}	2.9^{b}	2.4^{c}	3.2^{a}	$9.6b^{c}$	14.4^{b}	4.3^{d}	6.4^{c}
	6	0.19^{f}	0.3^{f}	0.0^{g}	0.0^{g}	2.4^{ab}	2.6^{a}	1.5^{b}	2.1^{b}	3.0^{a}	2.7^{b}	2.6^{b}	2.5^{c}	5.3^{c}	5.2^{c}	4.1^{d}	4.6^{d}
Black rose	0	79.8^{a}	80.8^{a}	78.4^{a}	83.3^{a}	4.1^{a}	4.1^{a}	4.0^{a}	4.1^{a}	56.0^{a}	55.4^{a}	55.8^{a}	58.4^{a}	139.9^{a}	140.3^{a}	138.2^{a}	145.8^{a}
	3	20.0^{b}	29.0^{b}	0.4^{d}	3.6^{c}	2.1^{bc}	2.5^{b}	1.6^{c}	1.9^{bc}	48.4^{ab}	49.5^{ab}	41.6^{b}	40.4^{b}	70.5^{b}	81.0^{b}	43.6^{c}	45.9^{c}
	6	3.1^{c}	5.8^{c}	0.0^{e}	0.0^{e}	3.0^{b}	5.5^{a}	0.6^{d}	5.5^{a}	30.4^{c}	27.5^{c}	28.3^{c}	30.4^{c}	36.5^{c}	38.8^{c}	29.0^{d}	35.9^{c}
Sloe	0	19.0^{a}	20.3^{a}	19.2^{a}	20.8^{a}	6.1^{ab}	8.0^{a}	7.6^{b}	8.2^{a}	122.6^{b}	126.3^{ab}	121.5^{b}	128.1^{a}	147.6^{a}	154.6^{a}	148.4^{a}	157.1^{a}
	3	12.1^{b}	14.0^{ab}	2.7^{c}	3.8^{c}	6.8^{a}	7.1^{a}	5.7^{a}	7.0^{a}	120.8^{b}	127.8^{a}	121.5^{b}	130.9^{a}	139.6^{ab}	149.0^{a}	129.9^{b}	141.7^{a}
	6	7.2^{b}	9.4^{b}	0.1^{d}	0.4^{d}	6.5^{a}	7.0^{a}	4.3^{b}	6.3^{a}	120.0^{b}	128.0^{a}	120.0^{b}	131.3^{a}	133.7^{b}	144.4^{a}	124.4^{b}	138.0^{b}
Strawberry	0	11.4^{a}	12.4^{a}	11.3^{a}	12.4^{a}	1.1^{a}	1.2^{a}	1.1^{a}	1.2^{a}	8.2^{b}	8.6^{b}	8.2^{b}	8.6^{b}	20.8^{b}	22.2^{b}	20.7^{b}	22.3^{c}
	3	3.6^{b}	5.9^{b}	0.1^{c}	0.6^{c}	0.9^{a}	1.0^{a}	0.8^{a}	0.8^{a}	8.8^{b}	9.8^{a}	9.9^{a}	10.1^{a}	13.4^{bc}	16.7^{b}	10.8^{c}	11.5^{c}
	6	1.0^{c}	1.5^{c}	0.0^{d}	0.0^{d}	1.0^{a}	1.0^{a}	0.9^{a}	1.0^{a}	9.6^{ab}	10.2^{a}	11.6^{a}	11.3^{a}	11.5^{c}	12.7^{bc}	12.5^{c}	12.3^{a}
Sour cherry	0	23.5^{a}	25.1^{a}	23.5^{a}	24.9^{a}	5.4^{b}	6.2^{a}	5.8^{a}	6.1^{a}	20.8^{a}	22.4^{a}	21.2^{a}	22.3^{a}	49.7^{a}	53.6^{a}	50.5^{a}	53.4^{a}
	3	15.5^{b}	18.5^{ab}	5.1^{c}	6.7^{c}	6.2^{a}	6.7^{a}	5.5^{b}	6.0^{a}	20.6^{a}	21.8^{a}	19.9^{ab}	21.1^{a}	42.3^{ab}	47.0^{a}	30.6^{b}	33.8^{b}
	6	$8.4b^{c}$	9.3^{b}	1.7^{d}	1.4^{d}	4.4^{b}	5.0^{b}	5.1^{b}	4.5^{b}	18.7^{b}	20.0^{ab}	19.3^{ab}	17.7^{b}	31.5^{b}	34.3^{b}	26.1^{c}	23.6^{c}

abc…, The same letters for each liqueur indicate homogenous groups ($p < 0.05$) – calculated for liqueur from each fruit.
*15 ns-liqueurs without sugar stored in 15 °C; 15 s-liqueurs with sugar stored in 15 °C; 30 ns-liqueurs without sugar stored in 30 °C; 30 s-liqueurs with sugar stored in 30 °C.

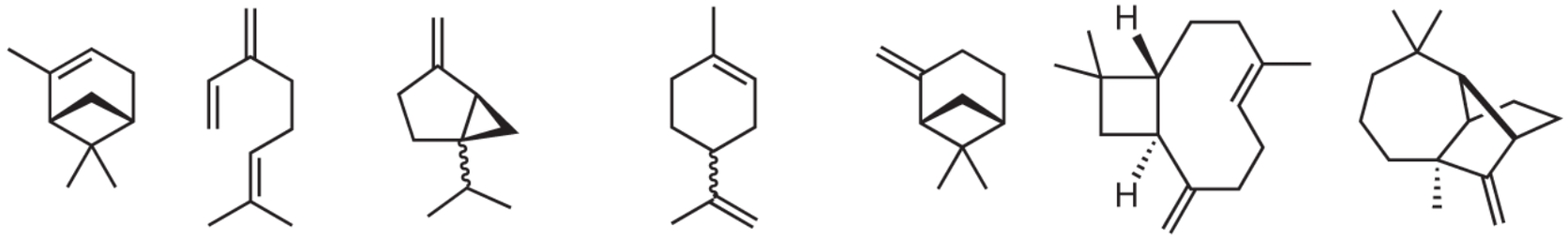
Composition and antioxidant activity of red fruit liqueurs
Sokoł-Łetowska, A. *et al. Food Chemistry* **157**, 533–539 (2014)

The samples stored at a temperature of 30 °C had antioxidant activity from 3% to 11% lower than the fresh samples. After 6 months, anthocyanins degraded almost completely in the samples stored at 30 °C and at 15 °C there was from 0% (blackcurrant liqueurs) to 47% (sloe liqueurs) of their initial content and slightly more in sweet liqueurs.

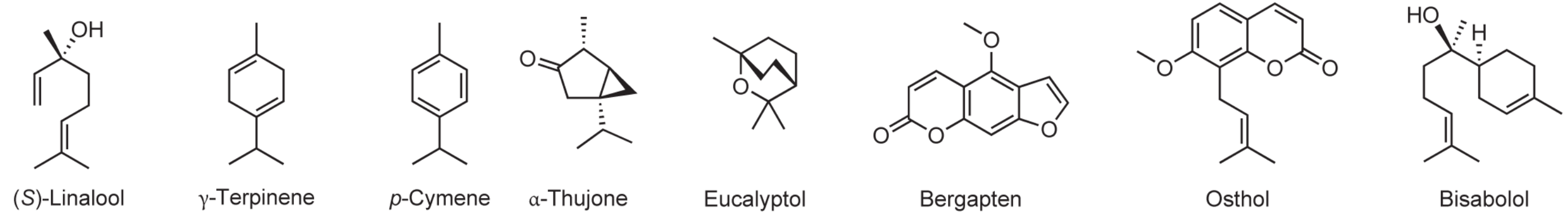
During prolonged storage the anthocyanins and other phenolic compounds probably underwent polymerization and condensation processes with other polyphenols and phenolic acids. Due to the multitude of compounds participating in the reactions, the establishment of the mechanism of degradation of anthocyanins and other polyphenols is difficult. It is known that they are easily oxidized in multistage processes.

As a result of the transformations in anthocyanins and flavonols, there is a change of colour to brown.

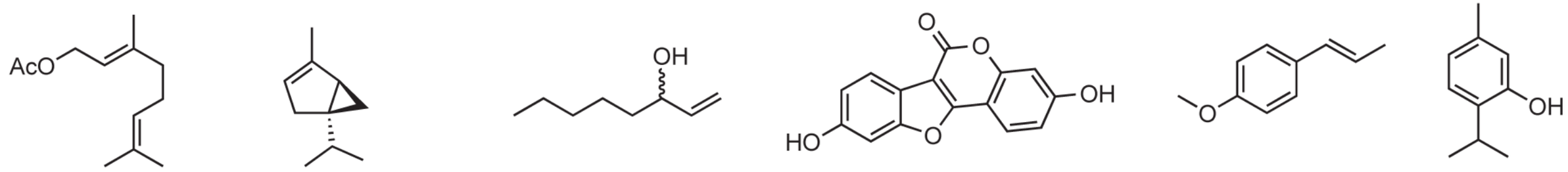
Sloe gin, not sloe ethanol...



α-Pinene | Myrcene | (+)-Sabinene | (*R/S*)-Limonene | β-Pinene | Caryophyllene | (+)-Junipene



(*S*)-Linalool | γ-Terpinene | *p*-Cymene | α-Thujone | Eucalyptol | Bergapten | Osthol | Bisabolol



Gerenyl acetate | α-Thujene | 1-Octen-3-ol (mushroom alcohol) | Coumestrol | Anethole | Thymol

From: Bruce Gibb's Thesis article '101 libations'
Nature Chem. **9**, 725–726 (2017)

Nevermind the bullace

Sloe Bullace? Damson

Nevermind the bullace

Nevermind the bullace

There's a lot of interbreeding...

Definitely damsons

Definitely damsons

Nevermind the bullace

Nice plums


Cornish
vanilla ice cream
by Sainsbury's
MADE WITH
CORNISH
CLOTTED
CREAM

Nice plums

Nice plums in gin

Cherry picking results

Quince charming

Blackberry whisky

...and gin and brandy

A quick word on foraging

(i) All fungi are edible

(ii) Some fungi are only edible once

– Terry Pratchett

Apples & oranges

Raspberries too

Just experiment!

Fruit, sugar, alcohol, time...