UNIVERSITY of TASMANIA

TIA

Tasmanian Institute of Agriculture

Assessing Sensory and Fruit Quality of Haskap berry genotypes (*Lonicera caerulea*)

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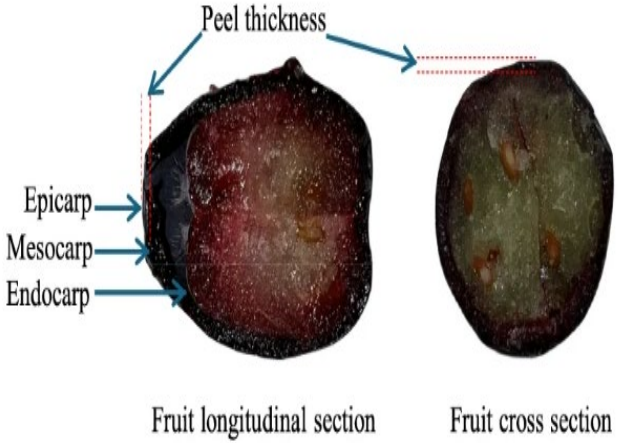
TIA is a joint venture of the University of Tasmania and the Tasmanian Government

Background of haskap berries

- Haskap is also known as blue honeysuckle or honeyberry
- Native to northern hemisphere: Siberia, Russia, Japan, Canada
- Known for extreme winter hardiness and rich bioactive compounds (hardy to -47 °C)
- Rich in polyphenols: anthocyanins (50-75%)
- Anthocyanins provide antioxidant, anti-inflammatory, and photoprotective benefits
- Typically eaten as a processed product rather than as fresh fruit (e.g., liquor, jam)

Background of haskap berries...

- Cross-pollination required; bumble bees are key pollinators
- Variability in berry size, shape and skin thickness among cultivars
- Breeding focused on flavor improvement, larger fruit size, winter hardiness
- Notable cultivars: Aurora, Boreal Blizzard, Tundra (e.g., Russia, Canada)
- Limited research on haskap in milder climates like Tasmania



Bumble bee is cross-pollinating a haskap flower

Aims

- Investigate anthocyanin content variation by genotype and season
- Evaluate electronic tongue's (e-tongue) ability to discriminate taste profiles by genotype
- Correlate anthocyanin concentration with berry size, and sensory attributes (e.g., astringency, aftertaste-astringency, sourness, richness, and saltiness)

Hypotheses:

- Anthocyanin content varies significantly by genotype (15 individuals), and season (2024 vs 2025)
- E-tongue can effectively differentiate taste profiles based on genotype
- Anthocyanin levels correlate with physical and sensory parameters

Timeline

2025-2026

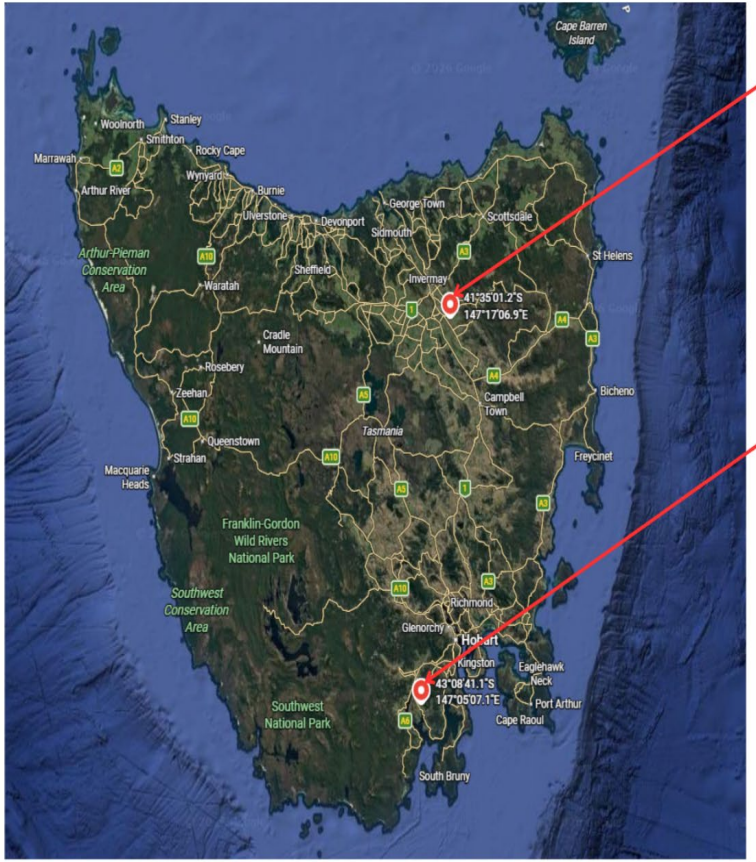
December
- Harvest
- Fresh quality assessment
- Anthocyanin assessment on genotypes

January

February

March
- E-tongue assessment

April
- Anthocyanin assessment on storage temperature

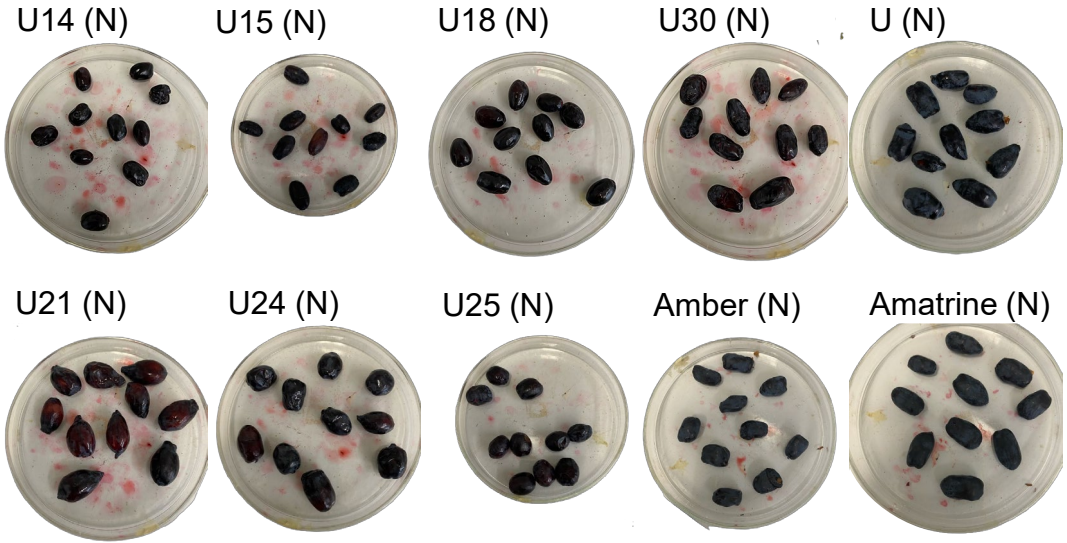


Harvest site 1 (Evandale)

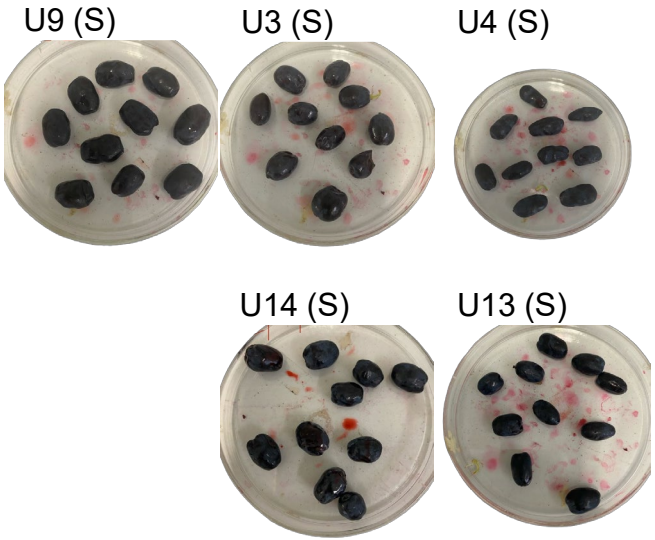
Harvest site 2 (Cygnet)

Harvested 15 genotypes across 2 Tasmanian orchards

U= Unknown, N= Northern Tasmania, S= Southern Tasmania



Northern Tasmania (Evandale)



Southern Tasmania (Cygnet)

Materials and Methods

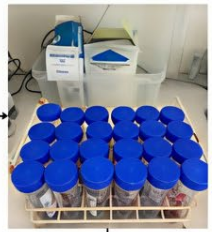
- Physical assessments: berry size (length, and diameter)
- Physicochemical assessments: anthocyanin concentration
- Sensory taste assessment: e-tongue used for objective taste profiling

Digital caliper
(Fruit size)

Protocol for determining anthocyanin concentration

Step 1: Homogensise samples

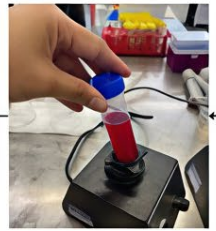
Step 2: weight 2g



Step 3: Add Acidified Methanol

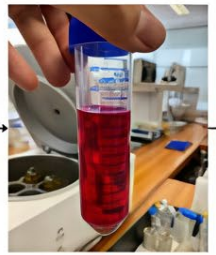
Step 4: Ultrasound

Step 5: Vortex in mixer



Step 6: Rotate samples

Step 7: Centrifugate



Step 8: Add pH buffer

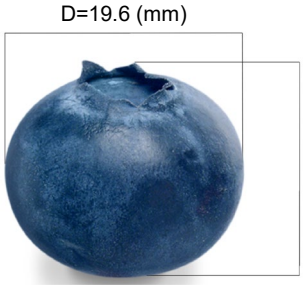
Step 9: Spectrophotometer

Sensory taste assessment

Eight taste properties (sourness, astringency, aftertaste astringency, richness, saltiness, umami, bitterness, and aftertaste bitterness) were measured with an electronic tongue system (Insent TS-5000Z Taste Sensing System)

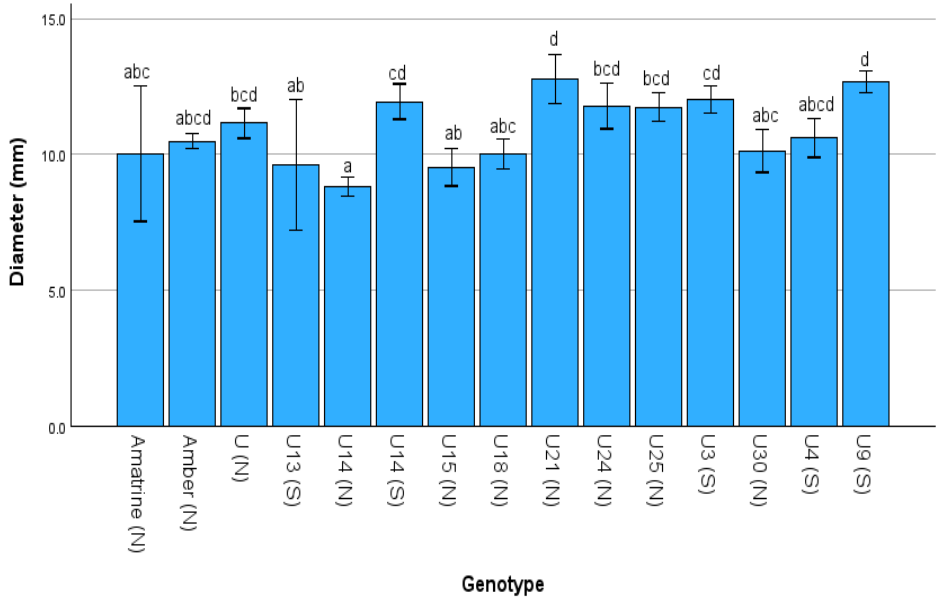
Results

Haskap berry size and shape significantly varied with genotype (1-way ANOVA found significant berry size and shape x genotype, P < 0.001)



Blueberry size

A



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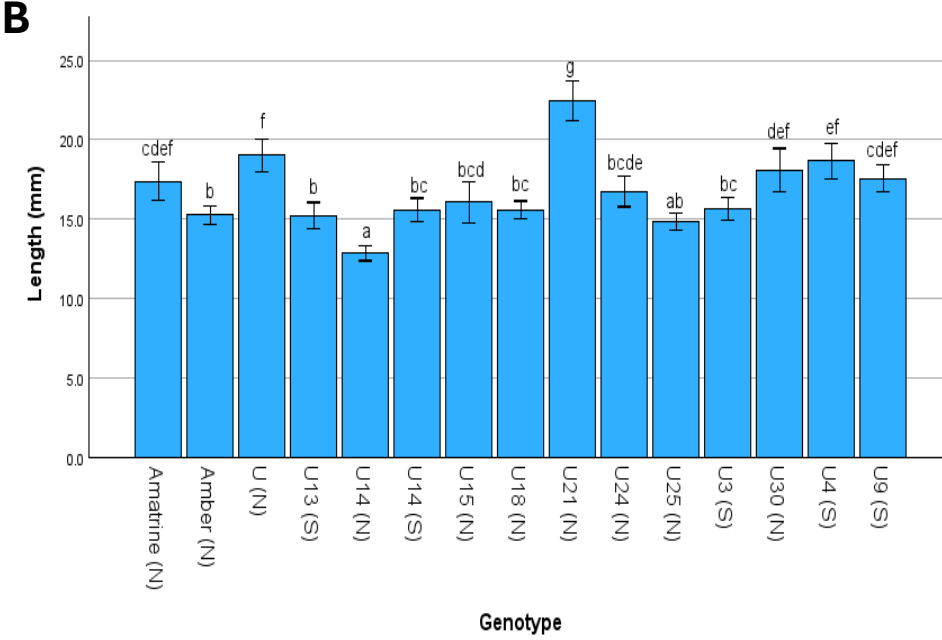
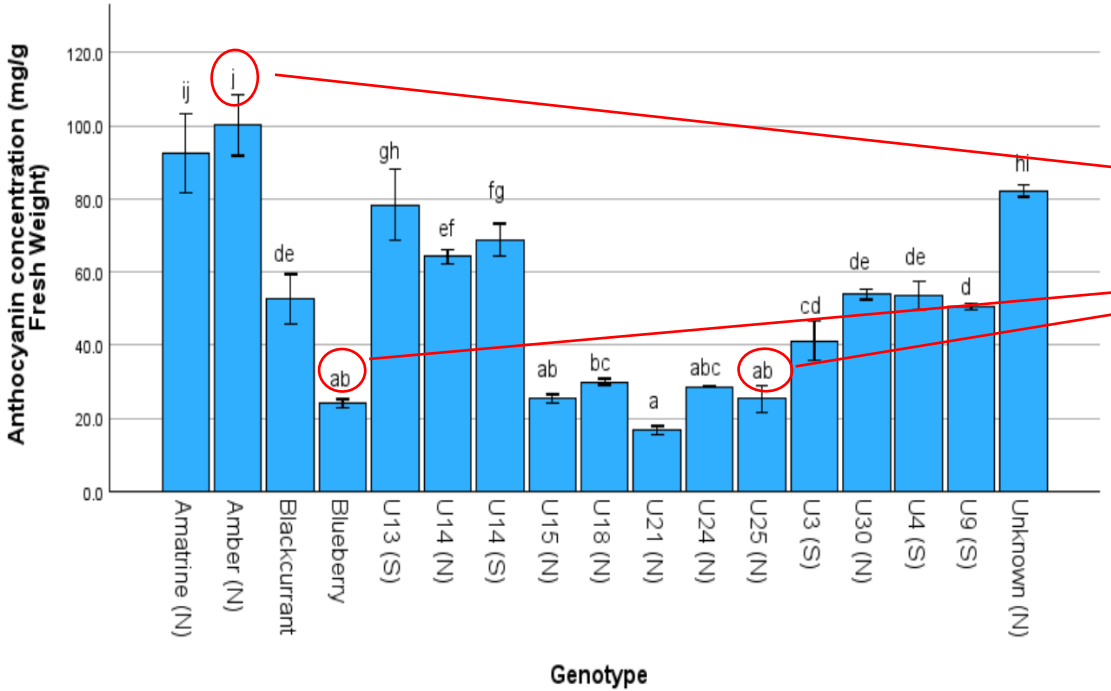
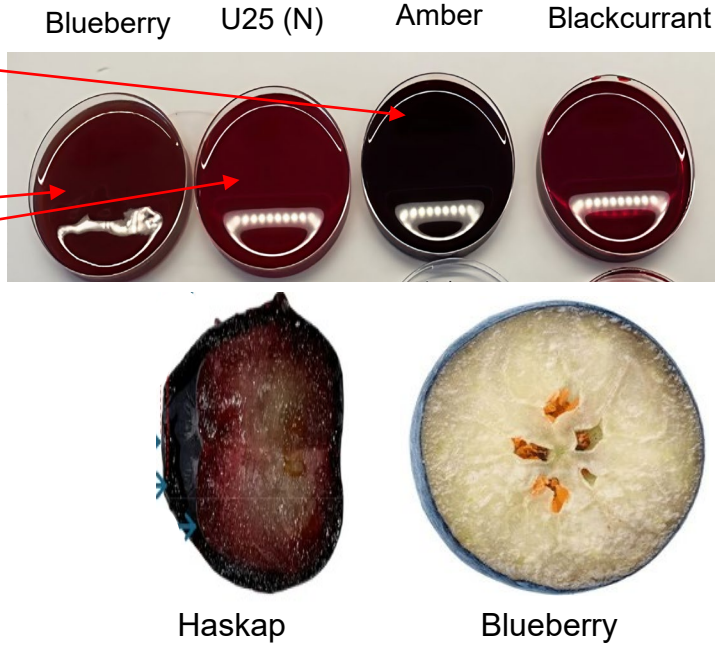
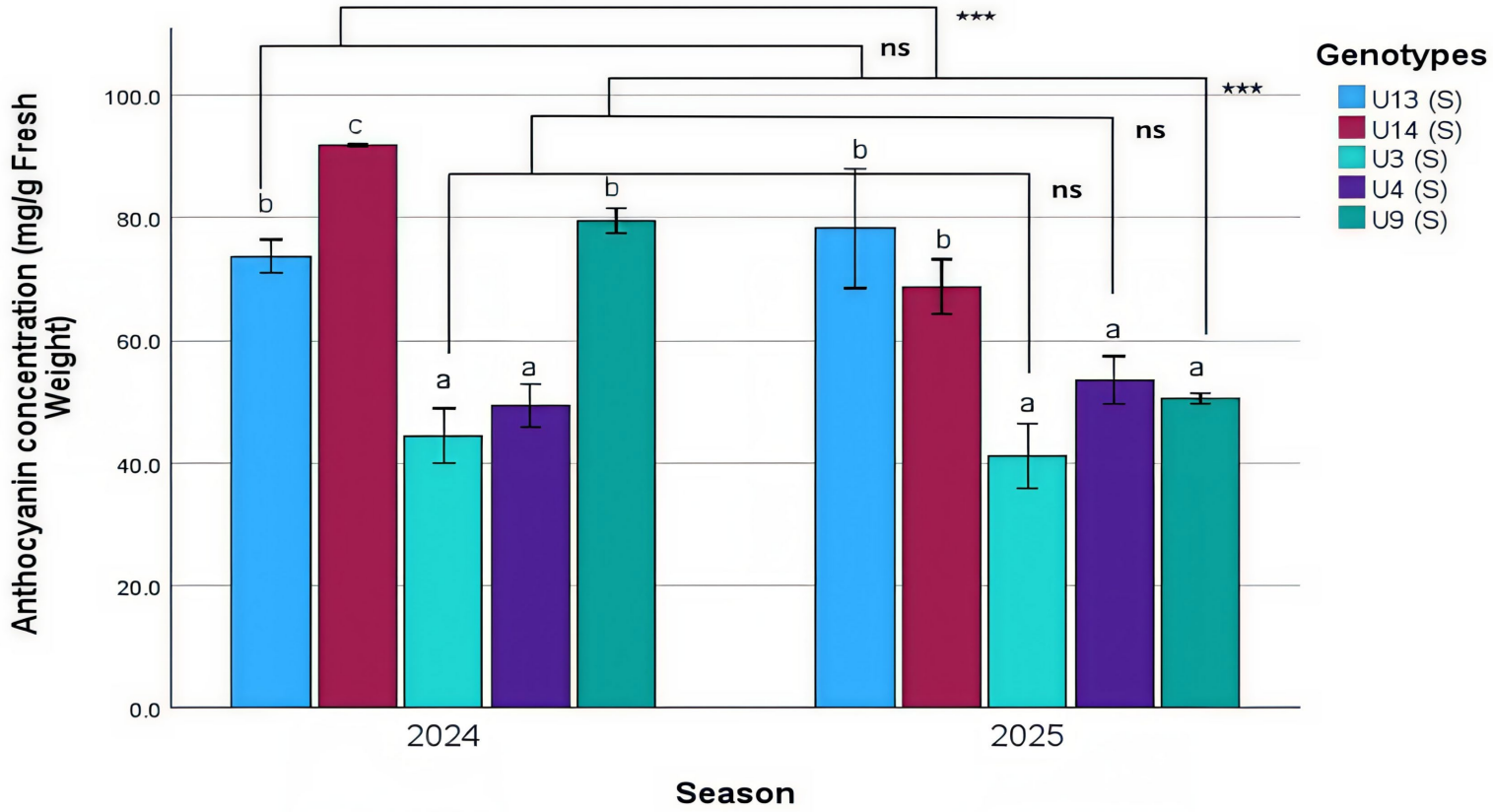


Anthocyanin content significantly varied with haskap genotype, blueberry and blackcurrant (1-way ANOVA found significant anthocyanin concentration x genotype, P < 0.001)





Anthocyanin concentration significantly varied with season x haskap genotype interaction (2-way-ANOVA, P < 0.001)



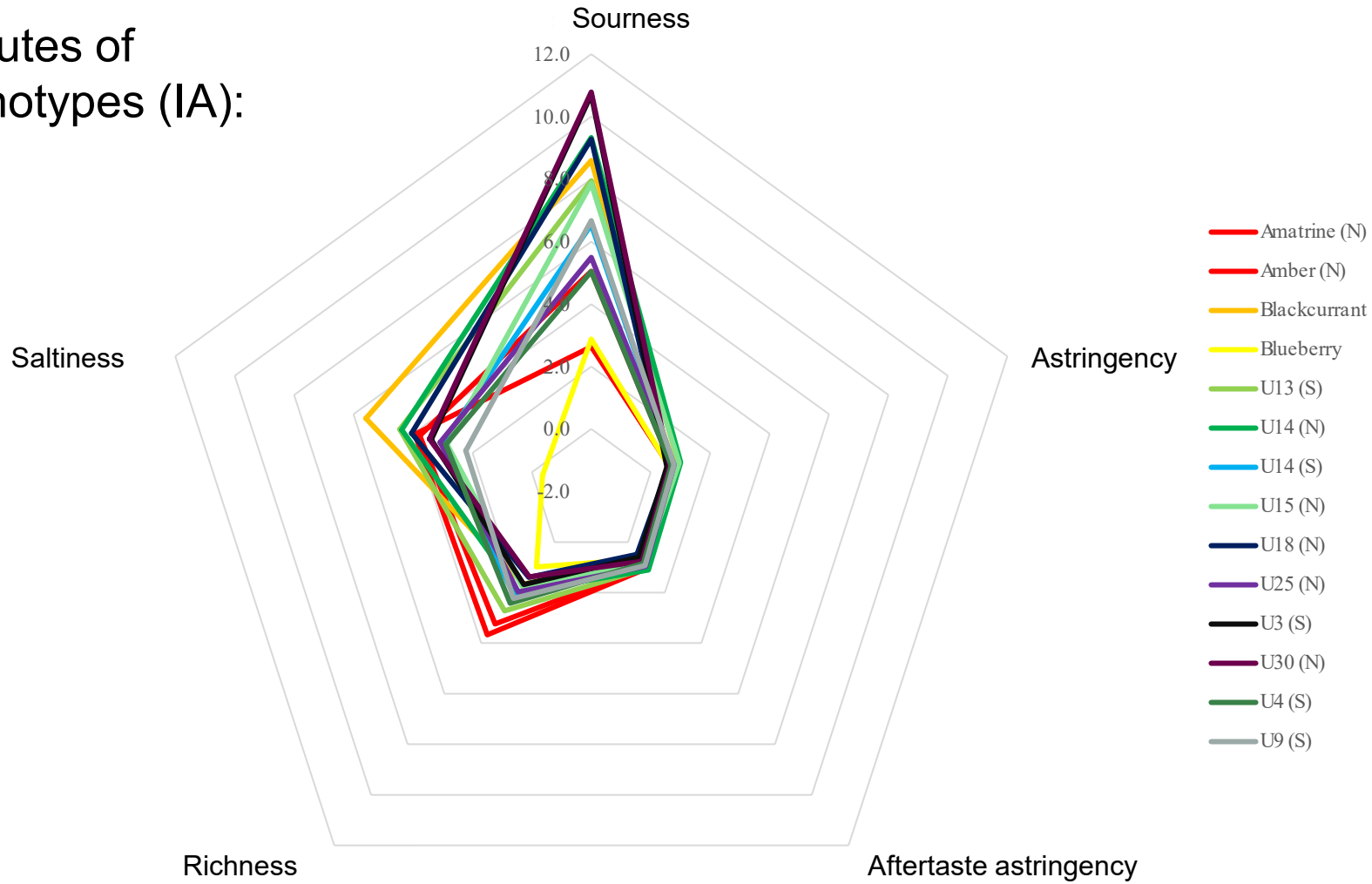
*P ≤ 0.05 **P < 0.01 *** < 0.001, ns = non-significant

E-tongue results (ID): Summary of one-way ANOVA outputs

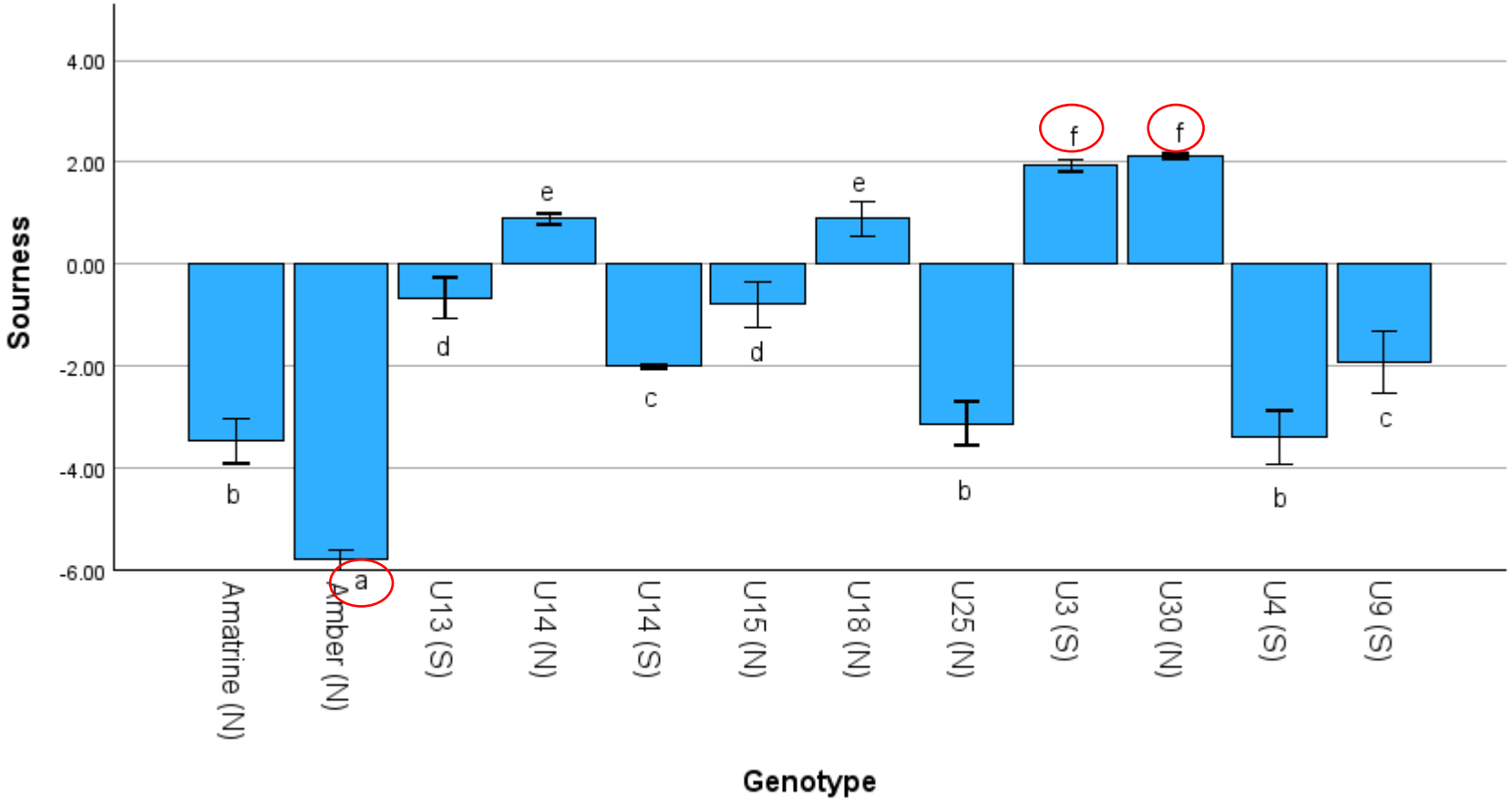
Parameter	P value
	Genotypes
Sourness	***
Astringency	***
Aftertaste Astringency	***
Richness	***
Saltiness	***

***P ≤ 0.05 **P < 0.01 *** < 0.001 and ns = non-significant**

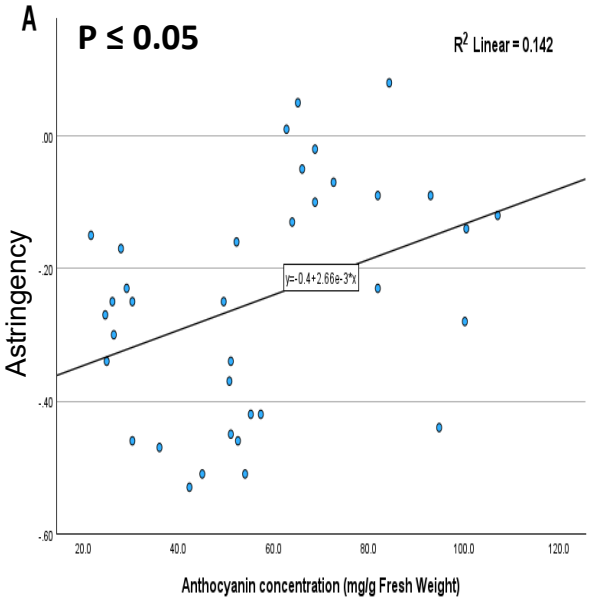
Taste attributes of haskap genotypes (IA):

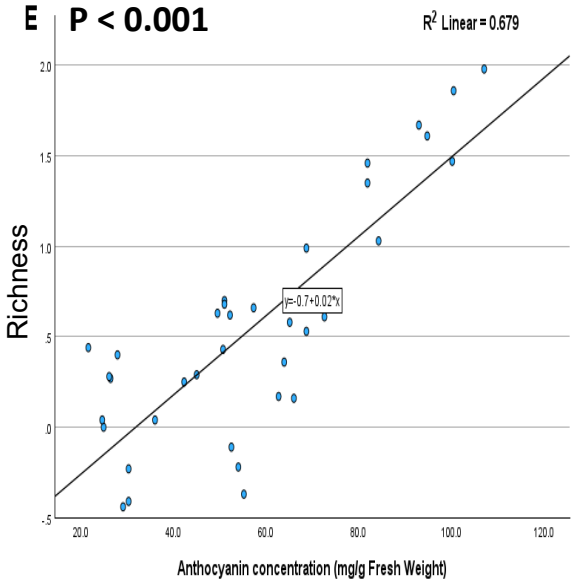


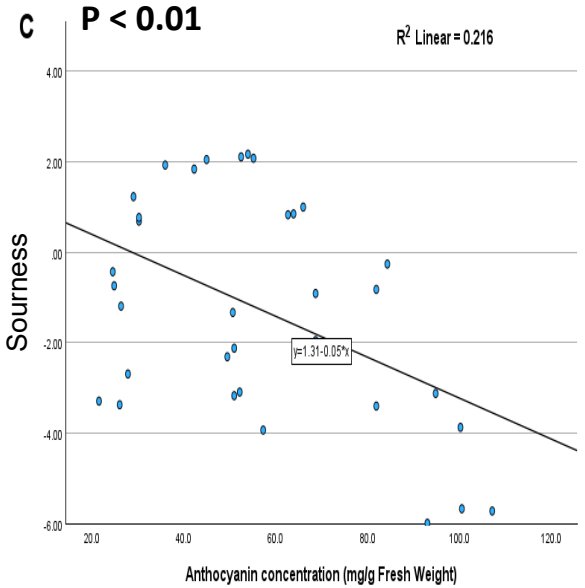
Sourness is dominant taste attribute of haskap genotypes (ID)



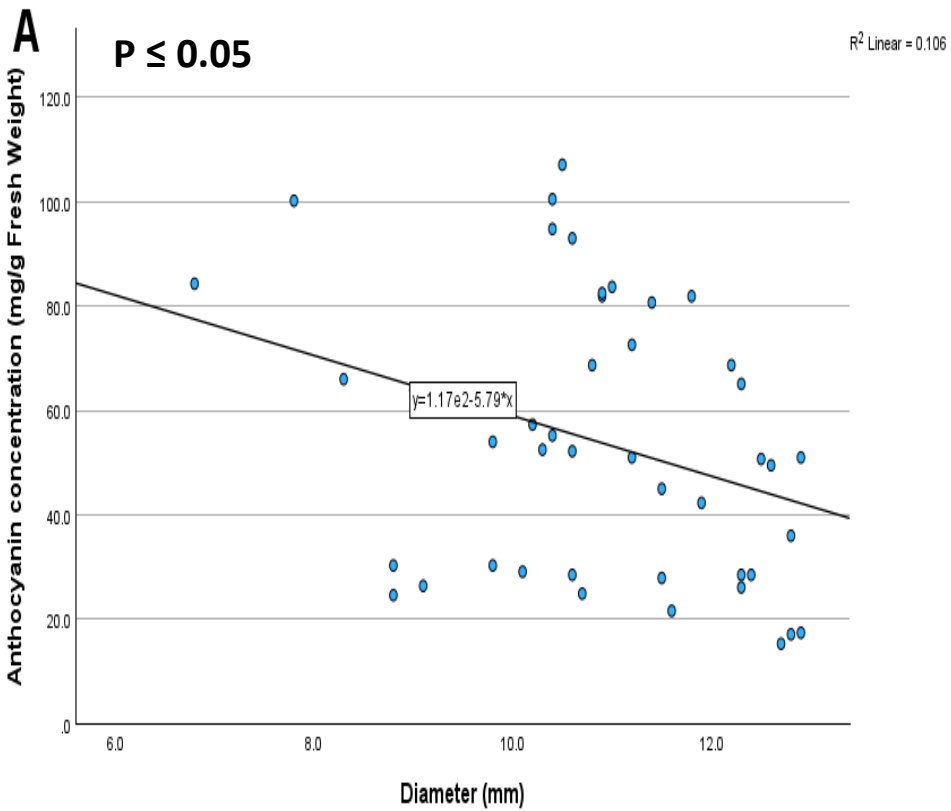
Correlations between taste attributes and anthocyanin concentration (ID)

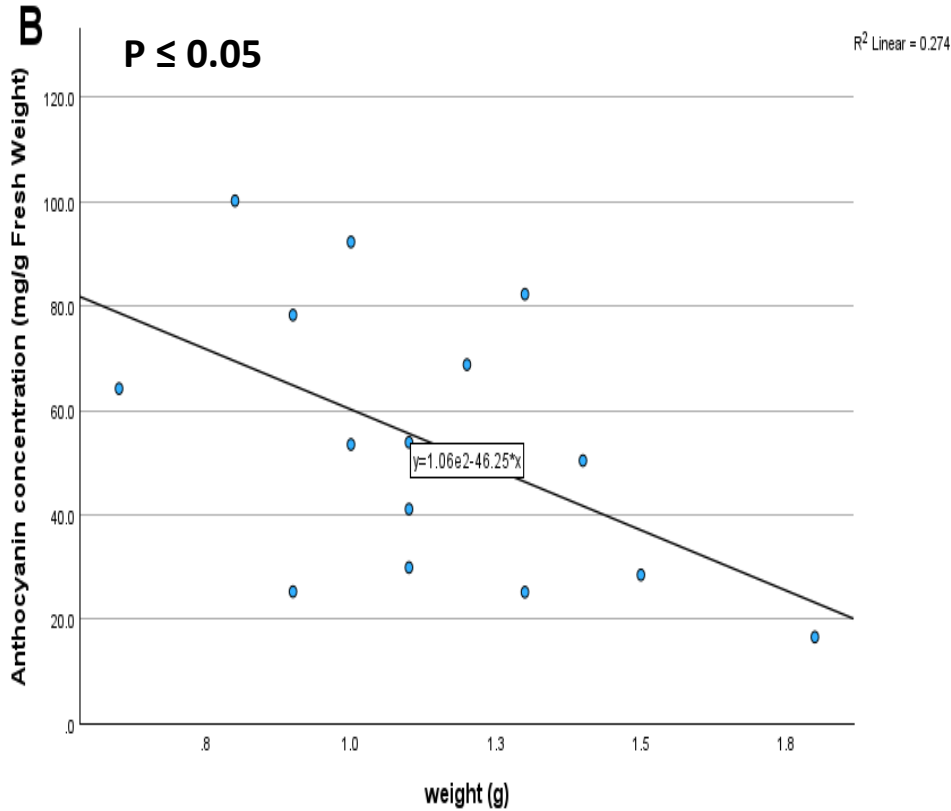






Correlations between berry size and anthocyanin concentration





Conclusion

Genotype had highly significant effects on:

- Anthocyanin concentration (ranged from 16.6 to 100 mg/g fresh weight) with Amatrine and Amber exhibiting the highest anthocyanin concentrations, and blueberries was the second lowest
- Fruit size (ranging from 9 to 13 mm)
- E-tongue analysis showed dominant taste attribute was sourness
- Anthocyanin concentration varied with season depending on genotype

Conclusion…

Anthocyanin concentration correlated:

- Positively with astringency, and richness
- Negatively with sourness, fruit weight and fruit diameter

We can grow good quality haskap berries in milder climates such as Tasmania

Future Research

- Develop and apply standardized sensory assessment protocols including electronic tongue (e-tongue) technologies to better characterize the complex taste profile of haskap (bitterness, aftertaste bitterness, and umami) and support breeding for flavor

- Expand research on how genotype, environment, and orchard management practices interact to influence phytochemical content and fruit quality in diverse climates, including milder temperate zones

Acknowledgements

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Thank you