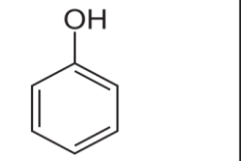
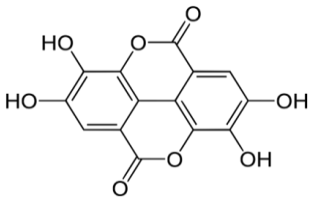
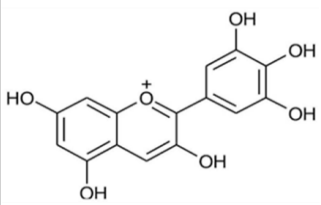
THE CHALLENGE OF COMPARING TART CHERRY POLYPHENOLS FROM THE USA AND EUROPE

Muhammad Jawad; Angela Hillman;
Robert Brannan

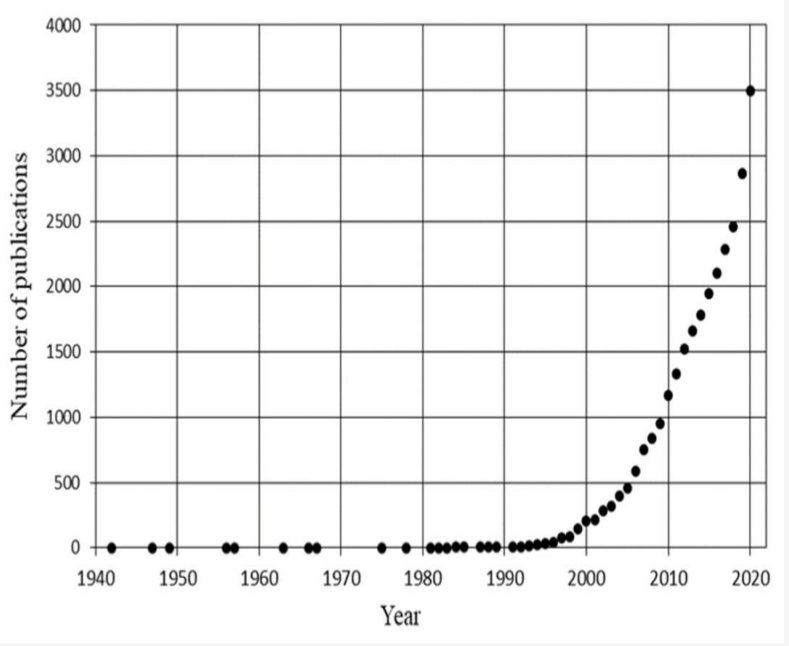
Introduction

- **What are polyphenols?**

		
Phenol group	Polyphenol	Flavonoid (e.g. anthocyanin)

- **Role in Plants?**

Despite their widespread distribution in plants, the scientific community has only recently become aware of polyphenols' antioxidant/anti-inflammatory effects.



[1]Significant increase in publications regarding polyphenols & their health benefits in the last 2 decades.

[1]Bertelli et al., 2021; https://doi.org/10.3390/foods10112595

Introduction

- **Why tart cherries matter?**

➢ Tart cherries (*Prunus cerasus* L.) are rich in polyphenols with documented bioactivity.

➢ Key phenolic groups: anthocyanins, flavonols, hydroxycinnamic acids, and flavan-3-ols, etc.

- **[1]Health significance?**

➢ Antioxidative effects

➢ Anti-inflammatory effects

➢ Cardio protective effects

➢ Sleep improvement

1 Jawad et al., 2025; https://doi.org/10.1016/j.fbio.2025.107612

Introduction

- **Problem statement?**

Cross-region/study comparisons are difficult because of:

- Differences in cultivars
- Differences in environmental conditions
- Processing and storage variability
- Variability in analytical techniques
- Difference in reporting units (FW vs. DW)

Introduction

- **Cultivar differences (USA vs. Europe)**

[1]**Montmorency tart cherry (USA):**

- Balanced cyanidin-3-rutinoside & cyanidin-3-glucoside
- Diverse hydroxycinnamic acids

[2]**European cultivars:**

- Oblačinska, Łutówka, Újfehértói Fürtös etc.
- Presence of cyanidin-3-glycosylrutinoside
- Lower hydroxycinnamic acids

1 (Jawad, Talcott et al., 2025); https://doi.org/10.3390/foods14071154
2(Sokół-Łętowska et al., 2020); https://doi.org/10.3390/molecules25194587

Introduction

- [1]**Environmental effects:**

➢ Sunlight, rainfall, soil composition, temperature stress, and cultivation practices

*Even the same cultivar can differ profoundly from year to year

- [2]**Processing and storage impacts:**

➢ Drying techniques (convective and microwave) reduce anthocyanin content

➢ Thermal concentration also reduces the total concentration of anthocyanins, but may increase some hydroxycinnamic acids

➢ Long-term storage causes progressive degradation.

1 Zagoskina et al., 2023; DOI: 10.3390/ijms241813874
2 Repajić et al. 2015; doi: 10.17113/ftb.53.02.15.4151

Introduction

- **Analytical variability:**

➢ USA (TSQ LC-MS/MS, full polyphenolic profiling, validation against external standards)

➢ Europe (HPLC-UV/DAD, UPLC-PDA, spectrophotometry)

*This difference leads to the underestimation of minor phenolic compounds

- **Data reporting: FW vs. DW:**

➢ In European studies →FW (depends heavily on water content and distorts absolute values)

➢ In the recent USA study →DW (normalize moisture difference and improve comparability)

Introduction

- **Why does this matter for clinical trials?**

➢ Most clinical studies assume that "all the tart cherry products contain similar doses of polyphenols."

➢ **But the evidence shows:**

1. Difference between the products
2. Missing minor compounds that may contribute to the bioactivity
3. No consistent reporting of actual phenolic doses

*This may explain the contradictory clinical outcomes

Introduction

- [1]**Practical impact on clinical research:**

➢ Under or overdosing participants

➢ Inconsistent responses

➢ Poor reproducibility

➢ Misleading product claims

➢ Industry/Regulatory limitations

1 Jawad et al., 2025; https://doi.org/10.1016/j.fbio.2025.107612

Materials and methods

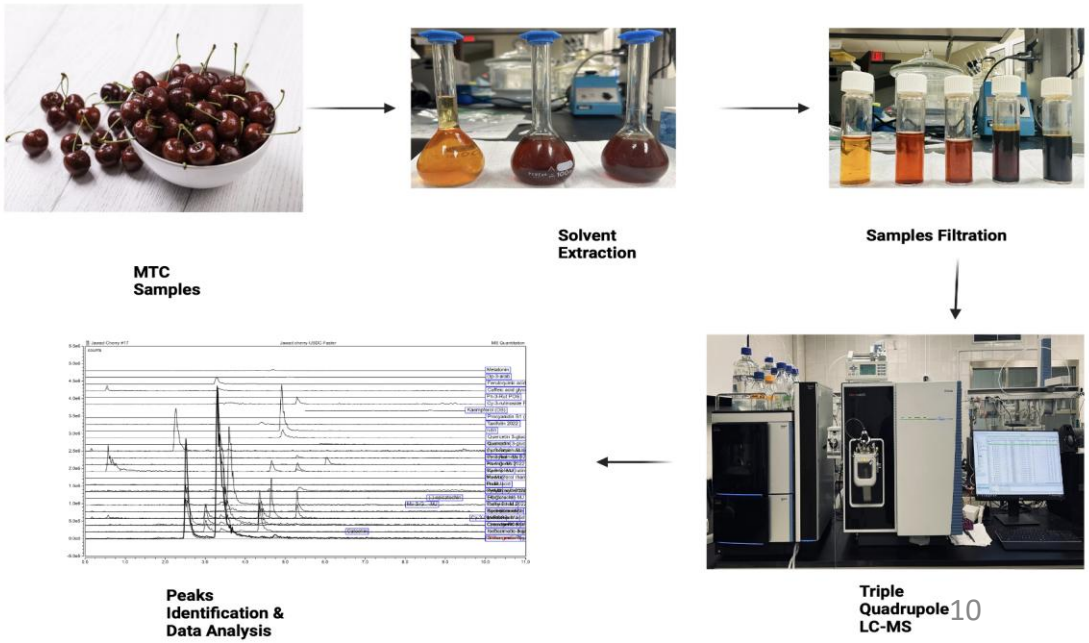
- [1]**Our study approach:**

➢ **A single cultivar:** Montmorency

➢ **Five different forms**: Frozen whole fruit, powder, sweet-dried, unsweet-dried, and juice concentrate

➢ Instrument: TSQ Altis Triple Quadrupole LC-MS/MS

➢ Data reporting: ppm DW



1 (Jawad, Talcott et al., 2025); https://doi.org/10.3390/foods14071154

Results and discussions

- **Major findings:**

➢ Montmorency had a balanced anthocyanin profile.

➢ Flavonols (quercetin, kaempferol derivatives) were detected

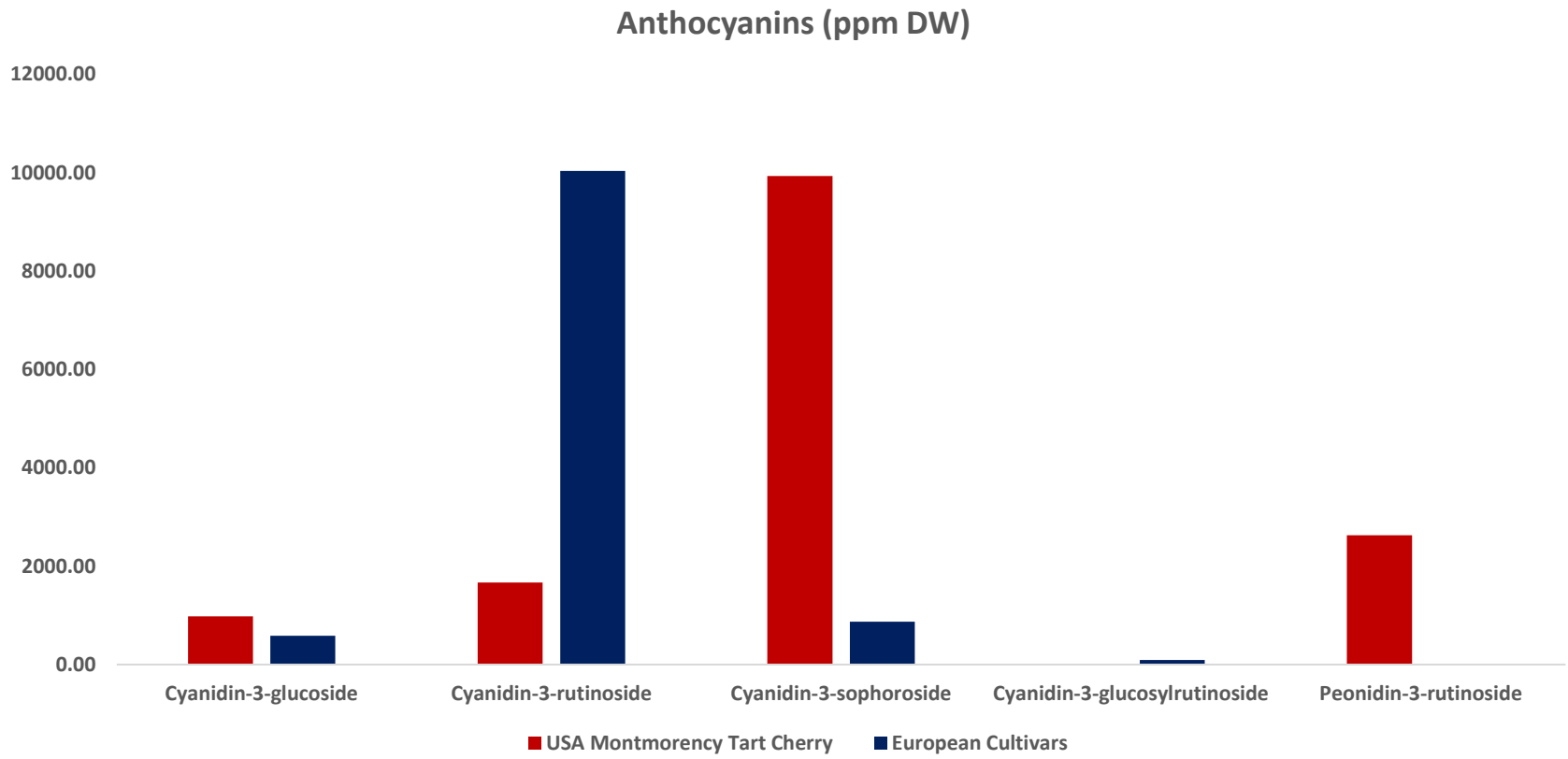
➢ Hydroxycinnamic acids are well quantified (chlorogenic acid, ferulic acid, etc.)

➢ Naringenin is the only flavanone detected in the Montmorency fruit

(Jawad, Talcott et al., 2025); https://doi.org/10.3390/foods14071154

Results and discussions

- **Comparison with European cultivars:**



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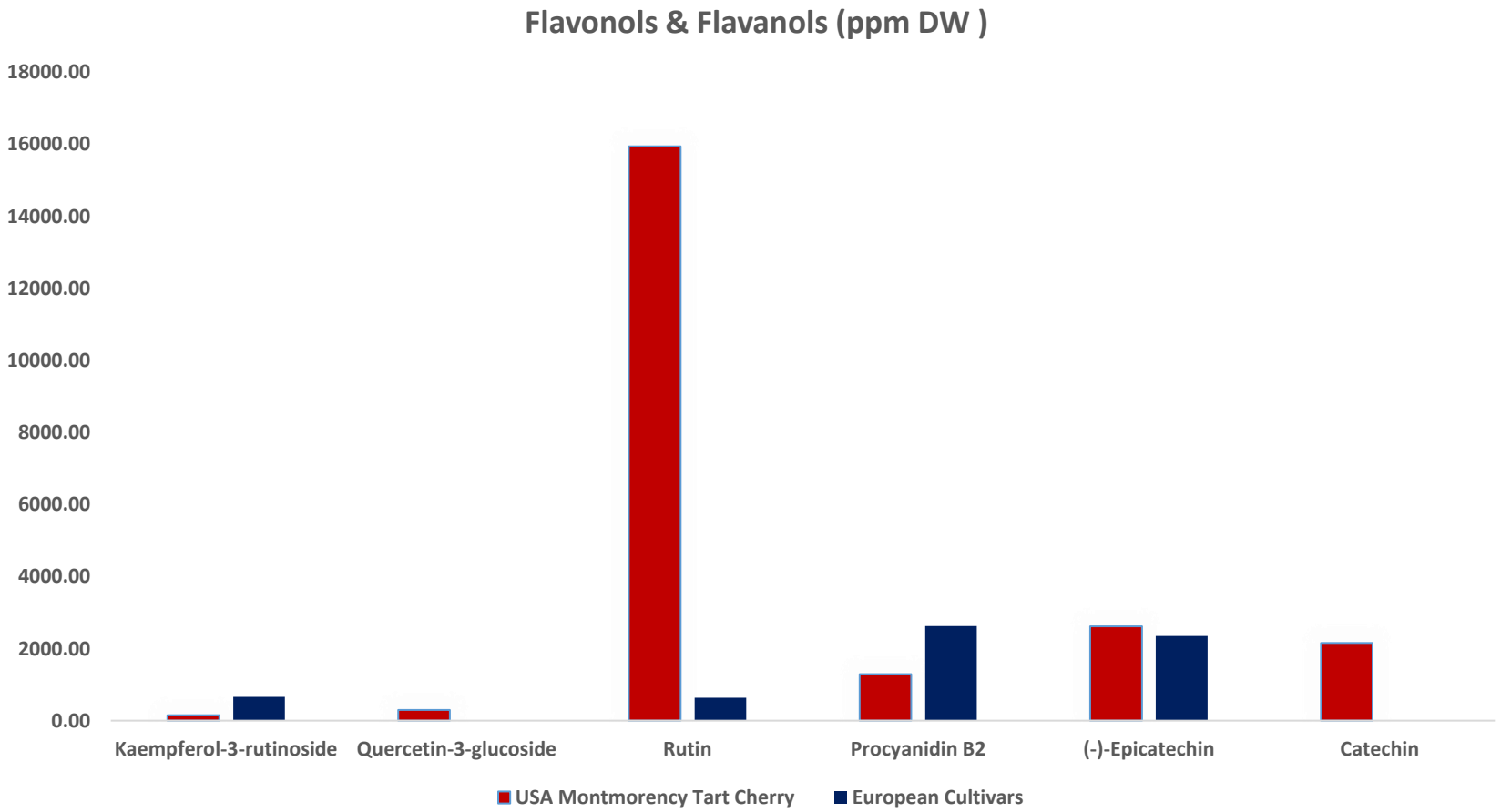

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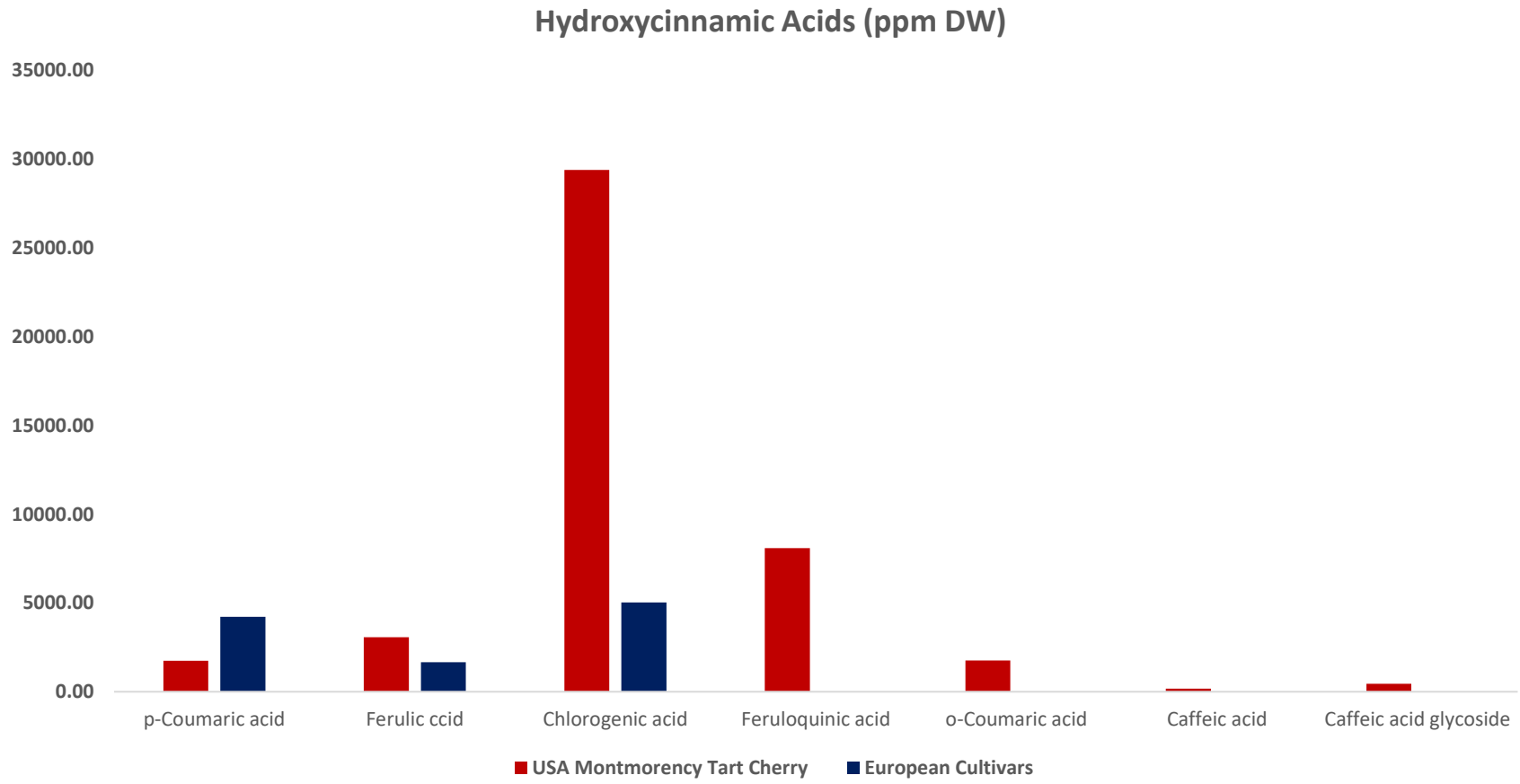

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Results and discussions

- **Comparison with European cultivars:**

➢ Greater phenolic variability across European cultivars

➢ Lower minor phenolic compounds detection in European cultivars

*This data should be considered contextual, not equivalent

Results and discussions

- **Discussion**

➢ The polyphenolic dose in clinical trials can not be validated due to excessive variability

➢ Difficult to establish the minimum effective dose

➢ Impossible to compare the USA vs. EU findings due to different cultivars, analytical methods, and reporting units.

➢ Challenges in building nutritional recommendations related to tart cherry polyphenols.

Conclusions and recommendations

- **Conclusions**

➢ Variability in cultivar, environment, processing, methods, and reporting creates major scientific challenges.

➢ Montmorency's study may provide a foundation for tart cherry polyphenol research.

➢ Adoption of standardized analytical and reporting protocols is necessary to ensure reproducibility and clinical outcomes.

Conclusions and recommendations

- **Recommendations**

➢ Report all polyphenol values on DW basis.

➢ Use of sensitive analytical techniques such as LC-MS/MS or UHPLC-MS should be employed.

➢ Should specify cultivars, processing methods, storage conditions, and harvest/location

➢ Require full phenolic profiles for clinical interventions

➢ Encourage cross-regional polyphenolic comparison

References

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Thank you for your attention!

Muhamad JAWAD

Mobil: +17402749797

E-mail: mj841722@ohio.edu

Address: Grover Center E170 Athens
Campus, Ohio
University, USA(45701)