Aidilla completed a Bachelor of Science degree with Honours in Molecular Bioscience, followed by a Masters in Nutrition in her home country of Malaysia. After working as an academic fellow and later a tutor in the Department of Agriculture and Food Science, at the Universiti Malaysia Terengganu, she was sponsored by the government of Malaysia to undertake full-time PhD at UWA. Upon completion of her PhD she will take up a lecturing position at her former university in Malaysia.

Her current research investigates the links between plant polyphenol compounds and dietary health. Dietary polyphenols have been associated with reduced risk of cardiovascular disease. Fruit such as plums are a rich source of polyphenolic antioxidants. The objective of her study was to evaluate and quantify total phenolic content, selected individual polyphenols and total antioxidant capacity in 32 new Western Australia plum cultivars.
Plum Polyphenol Composition In Relation To Total Antioxidant Capacity

Aidilla Mubarak

Supervisors: Assc. Prof Michael Considine, Prof Kevin Croft, Prof Jonathan Hodgson
Acknowledgement

• Supervisors
• Dr Ewald Swinny (ChemCentre)
• Dr Simon Ching (PathWest)
• Department of Agriculture and Food, Western Australia
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• Malaysian Ministry of Higher Education
Polyphenols

- Secondary metabolites of plants
  - Quercetin
  - Chlorogenic Acid
  - Catechin

- Widely dispersed in plants
- Diverse biological functions
Why is polyphenol important?

Quality in fruits

- Visual appearance
- Taste
Why is polyphenol important?

- Interest from consumers and food manufacturers. Why?
  - Prevention of diseases
  - Acts an antioxidant

Why is polyphenol important?
Dietary sources
Distribution In Fruits

- Varies with different factors

Different cultivar  |  Storage condition
Polyphenol distribution in apple skin of different cultivars

Concentration
µg/g FW

Apple Cultivars

Polyphenol distribution in apple skin and flesh

<table>
<thead>
<tr>
<th>Apple cultivars</th>
<th>Skin</th>
<th>Flesh</th>
<th>Skin</th>
<th>Flesh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cortland</td>
<td>140</td>
<td>90</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Red Delicious</td>
<td>80</td>
<td>30</td>
<td>60</td>
<td>60</td>
</tr>
</tbody>
</table>

Information on phenolic content
- few cultivars
- single group of compounds

Polyphenol compositions among different cultivars of plums is important – breeding program
To quantify polyphenols and antioxidant capacity of 32 new Western Australia plum cultivars (DAFWA)

To demonstrate a correlation between polyphenols composition and the antioxidant capacity
Methods

Selected individual polyphenol identified & quantified:

*Reversed-phase HPLC-DAD*

Total antioxidant capacity quantified:
Antioxidant inhibition of oxygen radicals (AIOR) assay

Total phenolic content measurement:
*Folin Ciocalteu’s colorimetric reaction*

32 Western Australian Plum
Major polyphenol compound in plums

- Neo-chlorogenic acid
  Mean: $29 \pm 54$ mg/kg
  Range: $0 - 221$ mg/kg

- Quercetin
  Mean: $52 \pm 41$ mg/kg
  Range: $9 - 240$ mg/kg
Variation of polyphenol amongst cultivars

Neochrome acid

Quercetin

Plum cultivars
Total Phenolic Content in Plum

Mean: 701 ± 322 mg/kg GAE
Range: 222 – 1711 mg/kg GAE
Total Antioxidant Capacity in Plum

Mean: 13720 ± 6142 mol/kg TE
Range: 4795 – 36187 mol/kg TE
<table>
<thead>
<tr>
<th>Measurements</th>
<th>N</th>
<th>Pearson Correlation</th>
<th>Sig. (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Phenolic Content</td>
<td>32</td>
<td>0.954 **</td>
<td>0.000</td>
</tr>
<tr>
<td>Neo-chlorogenic acid content</td>
<td>32</td>
<td>0.242</td>
<td>0.182</td>
</tr>
<tr>
<td>Quercetin content</td>
<td>32</td>
<td>0.180</td>
<td>0.324</td>
</tr>
</tbody>
</table>
Conclusion

- Total phenolic content – positive relationship with the antioxidant capacity (P<0.001)
- Neochlorogenic acid & quercetin glycoside – predominant polyphenols
- Do not individually account for the antioxidant capacity
Future analysis

- Ascorbic acid, glutathione and total thiols
- Controlled human intervention study: effect of chlorogenic acid on cardiovascular function