

Phenolic composition and antioxidant capacity of a novel variety of purple potato

J. Clark, C. Tsang and M. E. Clapham
Queen Margaret University, Edinburgh EH21 6UU, UK

There is a growing awareness of the potential health benefit of diets rich in fruits and vegetables and nutritional guidelines indicate that an increase in their consumption may reduce the risk of CVD and certain cancers⁽¹⁾. This effect has been ascribed in part to low-molecular weight phenolic compounds which can act as antioxidants due to their extensive conjugated π -electron systems which allow ready donation of electrons or hydrogen atoms from their hydroxyl moieties to free radicals⁽²⁾. Potatoes (*Solanum tuberosum* L.) provide a rich and varied source of micronutrients in the human diet, >80% of the UK population consume potatoes on a weekly basis⁽³⁾. A novel purple potato, Purple Majesty has been introduced to the UK market by Albert Bartlett. Anthocyanins are the most abundant phenolic present in purple potatoes and there is some evidence that they are able to elicit endothelium-dependent vasorelaxation and may be protective against CVD⁽⁴⁾. The aims of this study were to investigate the antioxidant potential of purple potatoes compared with white potatoes, to establish the effect of domestic processing on phenolic composition and antioxidant capacity and to compare the findings with other vegetable sources to establish whether purple potatoes could provide a rich source of antioxidants in the human diet. Purple potatoes contained higher overall levels of total phenolics and anthocyanins and had a greater antioxidant capacity compared with white potatoes. Domestic processing significantly reduced the total phenolic content of purple potatoes ($P = 0.0004$) but did not influence anthocyanins or the overall antioxidant capacity. In conclusion, cooked purple potatoes contain significantly higher antioxidant capacities than cooked white potatoes ($P = 0.0001$). Purple potatoes could provide a rich source of antioxidants in the UK diet and they compare favourably to other 'purple vegetables', for example, in this study, purple potatoes contained 105.5 mg GAE/100 g fresh weight compared to red cabbage, 439 mg GAE/100 g fresh weight⁽⁴⁾.

Potatoes	Total phenolics*		Antioxidant capacity†		Total anthocyanins‡	
	Mean	SD	Mean	SD	Mean	SD
Raw white	38.7	0.4	5.9	0.1	7.8	6.9
Cooked white	37.1	1.5	6.1	0.1	2.2	3.9
Raw purple	105.5	4.0	21.7	0.8	219.3	3.9
Cooked purple	61.5	1.6	18.8	1.0	141.4	19.6

*Total phenolics measured by Folin's method. Data expressed as mg GAE/100 g fresh weight.

†Antioxidant capacity measured by FRAP analysis. Data expressed as mm Fe II produced/100 g fresh weight.

‡Total anthocyanins measured by the pH shift method. Data expressed as mg cyanidin-3-glucoside equivalents/kg fresh weight.

1. World Health Organisation (2003). *Diet, Nutrition and the Prevention of Chronic Diseases. Technical Report Series 916*. Geneva: WHO.
2. Duthie GG, Pedersen MW, Gardner P *et al.* (1998) The effect of whisky and wine consumption on total phenol content and antioxidant capacity of plasma from healthy volunteers. *Eur J Clin Nutr* **52**, 733–736
3. Food Standards Agency (2002) *National Diet and Nutrition Survey: Adults Ages 19 to 64 Years. Volume 1 – Types and Quantities of Foods Consumed*. London: TSO.
4. Lee WY, Ikram EHK, Jalil AMM *et al.* (2007) Antioxidant and phenolic content of selected commercially available cruciferous vegetables. *Mal J Nutr* **13**, 71–80.