

Characterization of the Nordic Food – a competitive advantage for the Nordic countries

Pernille Baardseth, Stine Grimmer & Grethe I. Borge

Nofima AS, Norwegian Institute of Food, Fisheries and Aquaculture Research, PB 210, NO-1431 Ås, Norway

Quality along the valuechain



Background

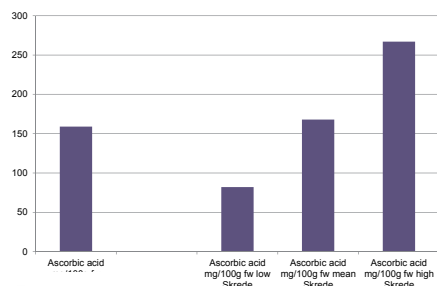
The definitions of the Mediterranean diet are unclear, and this diet is not sufficiently characterized, therefore it has not obtained an health claim (EFSA Journal 2011, 9(6), 19 pp). A competitive advantage for the Nordic countries will be to identify the content and quality of nutrients and compounds with physiological activity in Nordic food from raw materials to effect on health, i.e. follow the content and quality along the value chain. Here exemplified by plant food.

Challenges

Information about food composition, especially water soluble vitamins and phytochemicals, from food composition tables (FCT) is incomplete.

- Inadequate information about variation in vitamin content within a product (illustrated by fresh black currant).
- Lacking information about vitamin C content following processing and handling (illustrated by processed swede rods).
- Lacking information about phytochemical content like polyphenols, anthocyanins and glucosinolates and their effects on health (illustrated by curly kale)

A) Vitamin C in black currant



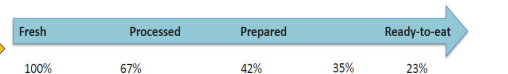
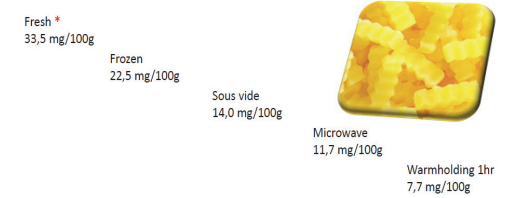
Vitamin C content in black currant was 159 mg/100g fw in Food Composition Table, while Skrede analyzed the content to 168 mg/100g fw with a range of 82 to 267 mg/100g fw (n=38). On the other hand the literature show up to 540 mg vitamin C/100g fw in black currant.

Vitamin C content in frozen, cooked and warmhold swede rods was analyzed to 7.7 mg/100g fw i.e. 23 % of the fresh swede. FCT show only vitamin C in fresh swede.



Skrede et al Acta Agriculturae Scandinavica, Section B, 2011, 62(3), 193-208.

B) Vitamin C in swede rods



*Norwegian Food Composition Table = Vitamin C in fresh swede 35 mg/100g
Baardseth et al J Sci Food & Agric 2010, 90, 1245 - 1255



C) Phytochemicals in curly kale

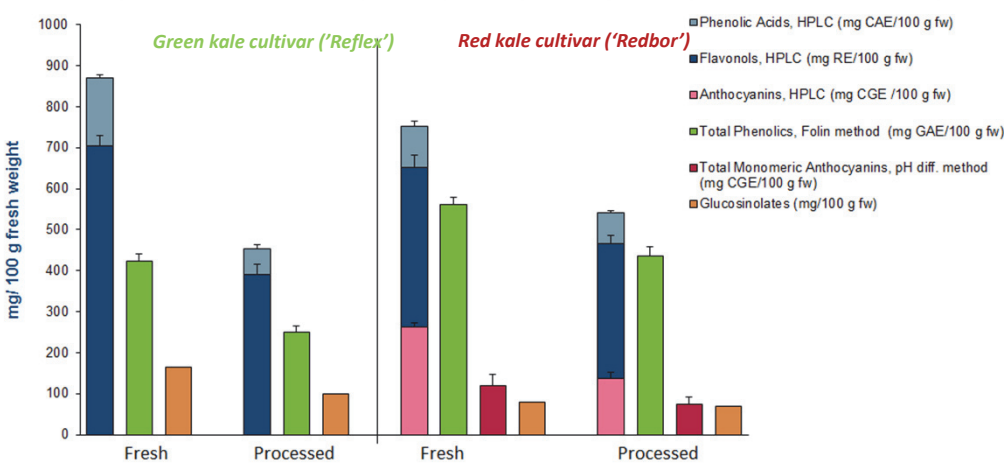


Figure 1. Concentrations of health-related phytochemicals in fresh and thermally processed curly kale, in two different cultivars, a green cultivar ('Reflex') and a red cultivar ('Redbor').

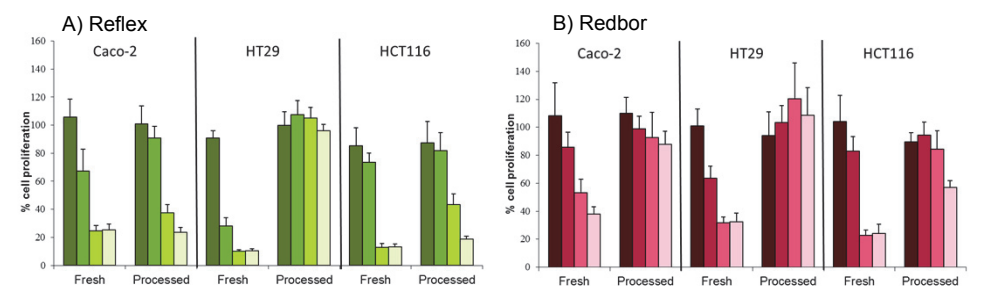


Figure 2. Effects on colon cancer cell proliferation (MTT assay) of fresh and thermally processed A) green and B) red cultivars of curly kale. The cells were exposed to increasing TP concentrations (10, 50, 100 and 150 µg GAE/mL).

Olsen et al. JAFAC, 2012, 60, 7375-7383
*Olsen et al JAFAC 2009, 2010 (data not shown here)

- Health-related phytochemicals in green and red curly kale have been identified and quantified and the variation over three years*
- Thermal processing reduced the amount of phenolic acids, flavonols and anthocyanins.
- The extracts of both green and red curly kale inhibited the cell proliferation of three human colon cancer cell lines (Caco-2, HT-29 and HCT 116), and fresh plant material had a significant stronger antiproliferative effect than extracts from processed kale.

Conclusion

The vitamin C content in fruit and vegetables can vary according to varieties and growing condition. It is very sensitive to degradation during processing. The vitamin C content recorded in Food Composition Tables can therefore be very misleading. Other phytochemicals are not recorded in these FCT neither in raw materials nor in processed products. Fresh plant foods must be characterized, and there is a need of documentation on the effects of food processing, in vitro and in vivo bioactivity and health effects. More documentation is needed on health-related quality through the value-chain.