



**Issue 24: December, 2025: This e-bulletin is aimed at health professionals, consumers, growers, farmers, packers, processors, distributors, retailers, caterers and others in the plant foods area.**

## **Beetroot: Many health positives**

Beetroot has been eaten since Roman times and by the mid-nineteenth Century it had become a very popular vegetable. Beetroot is usually boiled, baked, braised or pickled in vinegar but can also be heat processed in jars, cans and plastic pouches. Red beetroot originated from *Beta vulgaris*, which is a native of Southern Europe. A red-fleshed round or cylindrical root, it can be used as a freshly cooked hot vegetable or eaten cold with salads or consumed as a drink i.e. beetroot juice (Bord Bia, 2025). Beetroot is rich in folate (109µg/100g) and provides 27% of the daily requirement. It is a moderate source of potassium (375mg/100g) and dietary fibre (2.8%). Content of major constituents are: water (87%), carbohydrate (9.6%), protein (1.6%) and fat (0.17%) while energy content is 180kJ/100g (USDA, 2025).

### **Bioactive compounds**

Beetroot can be classed as a superfood due to its strong colour, distinct flavour and its nutritional properties (Yashwant, 2015). Beetroot is rich in bioactive compounds, including betalains, flavonoids, terpenoids, saponins, vitamins, phenolic acids (gallic, p-coumaric, caffeic), steroids, alkaloids and tannins (Stoica et al., 2025). Betalains are highly coloured pigments that have anti-inflammatory and antioxidant properties and can also be used as colouring agents for foods (Thiruvengadam et al., 2024). Violaxanthin, betanin and indica xanthin protect against oxidative stress, reduce inflammation, and may lower the risk of chronic diseases such as cancer and neurodegenerative disorders. Betanin supports heart health by reducing blood pressure, while indica xanthin helps protect DNA from oxidative damage (Rahimi et al., 2019). Knowledge to date on betalains broadens their clinical applicability thus making them potential sources of nutraceutical compounds in the development of functional foods (Martinez et al., 2024). Betalain consumption is considered safe with no major adverse effects or allergic reactions reported. Pharmacokinetics, bioavailability, stability, and enhanced stabilization of betalains are current hot research topics.

### **Beetroot processing/products**

Bottled beetroot in vinegar and heat processed beetroot in plastic pouches have been mentioned above and are everyday/traditional items on supermarket shelves. More recently, the impact of blanching versus high pressure processing (HPP; 650MPa) on the quality of beetroot slices has been compared (Paciulli et al., 2016). HPP gave only partial inactivation of polyphenol oxidase and peroxidase compared to blanching but gave better retention of betanin and also superior textural properties than blanched beetroot slices. Beetroot juices and powders are becoming increasingly popular and sought-after by consumers. For example, commercially available products are advertised as performance-enhancing legal

nutrition supplements for athletes, especially those involved in endurance sports (Wruss et al., 2015). Inorganic nitrate in beetroot is reduced in human saliva to nitric oxide which has positive impact on muscle efficiency and fatigue resistance (Bailey et al., 2009). Moderate levels of nitrate ingestion reduced resting blood pressure in clinical trials and have potential in the prevention and treatment of hypertension and cardiovascular diseases (Lundberg et al., 2011). However, excessive beetroot consumption results in high intakes of oxalic acid, nitrates, nitrite and nitric oxide which may have implications for those with kidney stones/disease and may also lead to formation of carcinogenic metabolites (Habermeyer et al., 2015).

### Effect of fermentation

Fermentation of beetroot creates an acidic environment that enhances betalain stability while addition of microbial enzymes further improves the bio-accessibility of phenolic compounds (Farid & Łopusiewicz, 2026 – in press). Thus, fermentation transforms beetroot into a valuable functional ingredient for novel foods such as probiotic beverages and synbiotic yogurts. The therapeutic effects of fermented beetroot act by modulating specific oxygenases and chain-enhancers of activated B cells signaling pathways i.e. a series of chemical reactions in which a group of molecules in a cell work together to control a cell function, such as cell division or cell death. Preclinical trials suggest that fermented beetroot bioactives have anticancer activities but well conducted clinical trials are required to confirm this. Optimising beetroot fermentation processes to ensure safety, consistency and viable probiotic counts are central to successful commercialisation.

**Conclusion:** Beetroot in moderation is an excellent component of a balanced diet.

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