

The tocopherol content of roasted New Zealand grown hazelnuts.

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Introduction



Flavour, colour, texture and appearance are significantly enhanced by roasting hazelnuts. Compared to raw nuts, the roasted product has a delicate, uniquely nutty and widely appreciated taste. Roasting also removes the pellicle of hazelnut kernels, inactivates enzymes and destroys undesirable micro-organisms. Thermal treatments of the nuts leads to changes in a number of the nutrients and to physiologically active substances such as vitamins and antioxidants. While the effects of roasting conditions on oil stability, colour and moisture content have been studied the composition and stability of the vitamin E contents have not been fully investigated.

Hazelnuts are commonly stored as cool as possible in-shell, until required and then processed by removing the shell and then commonly roasted to improve their flavour. Even a rapid roasting process leads to a small loss of moisture and a modest rise in temperature of the nuts. Each heat treatment leads to a loss of the pellicle which improves the appearance of the processed nut. While the heat treatment improves the taste and appearance, there may be a loss of some heat labile nutrients, particularly tocopherols which are important antioxidants and required to maintain the stability of the polyunsaturated fatty acids in the oil.

Method



In this experiment fresh hazelnuts (CV Whiteheart), grown in Canterbury, were shelled and processed using three different methods. They were lightly roasted for 1.4 minutes resulting in a final temperature of 61.0°C, roasted for 4.5 minutes to a temperature of 94.5°C or fully roasted for 5.4 minutes to a temperature of 110.6°C. The individual tocopherol content of the extracted oil was measured using HPLC analysis.

Results

Roasting the hazelnuts had the effect of decreasing the moisture content and increasing the total oil content (Table 1). The oil from the raw nuts contained a total of 33.0 mg total tocopherols /100 g fresh weight which was made up of 52.1% α , 2.7% β , 42.7% γ and 2.4% δ tocopherols. For all of the roasting treatments there was a decrease in total tocopherols. Lightly roasting the nuts led to a 20.3% loss of total tocopherols, while roasting led to a 37.8% loss and the full roast led to a 38.5% loss of total tocopherols from the nuts. Almost all of the losses of tocopherols in the processed nuts occurred in the γ fraction.

Table 1. Mean proximate content of raw and processed hazelnuts.

Process	Proximate analysis (g/100 g FW)			
	Ash	Protein	Moisture content	Total oil
Raw	2.3	14.4	4.9	63.8
Light roast	2.3	14.9	4.0	66.5
Roast	2.2	15.3	1.9	66.7
Full roast	2.3	15.8	1.4	68.0

Table 2. Mean tocopherol content of raw and processed hazelnuts

Process	Tocopherol (mg/100 g FW)				
	α	β	γ	δ	Total
Raw	17.2	0.9	14.1	0.8	33.0
Light roast	21.5	1.1	3.8	0.4	26.8
Roasted	18.2	0.7	1.4	0.1	20.5
Full roasted	18.2	0.8	0.8	0.4	20.3

Conclusions

- Increasing the roast level decreased the moisture content and increased the total oil content.
- All roasting treatments decreased the total tocopherol content.
- A higher roasting temperature resulted in a greater loss of total tocopherols.
- The majority of the loss was due to the γ -tocopherol fraction.
- Nuts roasted for the longest time (full roast) had the highest score in a taste test (data not shown).

