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A COMPARISON OF THE PHYSICAL PROPERTIES AND CHEMICAL COMPONENTS OF IRISH GROWN ORGANIC AND CONVENTIONAL CARROTS

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ABSTRACT

Organically farmed foods have seen a significant rise in popularity over the past decade. The objective of this study was to establish if there are differences in the physical properties and chemical components of Irish grown organic and conventional carrots (*cv Nairobi*). Three batches of raw organic carrots and three batches of raw conventional carrots were tested. The physical characteristics (chroma, hue, cylindrical form of the root, maximum compressive load) and chemical components (pH, ^{o}Brix, dry matter, GC-MS) were measured. Analysis of variance showed no significant differences ($P \geq 0.05$) for chroma, hue, cylindrical form of the root or the maximum compressive load values of organic and conventional carrots. Similarly, the growing systems did not affect the pH or dry matter values of the carrots. However, a significant difference ($P \leq 0.05$) was reported for ^{o}Brix values, with the conventional carrot samples having a higher value. Major volatile compounds identified in both the organic and conventional carrot samples were terpinolene, β-pinene, α-pinene, sabiene, p-cymene, γ-terpinene, caryophyllene, humulene and β-bisabolene. With the exception of soluble solids, no significant differences were found in the physical properties and chemical components of Irish grown organic and conventional carrots.

INTRODUCTION

Organic farming is a system of agriculture that focuses on the use of renewable resources and the preservation of the environment, but avoids the use of synthetic fertilisers, pesticides, growth additives and other chemicals[1]. While, conventionally farmed foods are produced using a set of farming practices or materials which are not consistent with the organic production system[2]. Conventional farming relies on the use of synthetic fertilisers, fungicides, herbicides, insecticides and pesticides to maintain high yields. The objective of this study was to establish if there are differences in the physical properties and chemical components of Irish grown organic and conventional carrots.

MATERIALS AND METHODS

Three batches of organically farmed and three batches of conventionally produced carrots[a] (*cv Nairobi*.) were washed, dried, peeled and cut into batons (2x1x1cm). The carrot batons were packed into OPP+ bags (100g) and were stored in a refrigerator at 4°C, until required for instrumental analysis.

[a]Organic carrots were treated with green manures, liquid seaweed and compost teas. Conventional carrots were fed with NPK fertiliser, Amistar and Folicur (fungicides) and Karate (pesticide).

The physical (colour[3], size[4] and texture[5]) and chemical properties (pH[6], °Brix [6], dry matter[7], GC/MS[8]) of Irish grown organic and conventional carrots were measured.

RESULTS AND DISCUSSION

A comparison between both types of carrot found no significant differences ($P \geq 0.05$) for the physical properties and chemical components, with the exception of °Brix ($P \leq 0.05$). For the physical analysis, chroma values of 49.31±0.61 and 49.02±0.47, hue values of 43.80±0.96 and 44.30±1.01, *C*-values of 0.94±0.15 and 0.91±0.13, and maximum compressive load values of 52.41N±5.43 and 53.38N±4.69, were recorded for organic and conventional carrot samples respectively. For the chemical analysis, pH values of 6.05±0.15 and 6.05±0.12, dry matter values of 12.25%±1.11 and 12.35%±1.16, and °Brix values of 6.90±0.20 and 7.43±0.41 were documented for organic and conventional carrots respectively. The conventional carrot had a higher °Brix mean reading than the organic, sample indicating that the conventional carrot has a higher sugar content. Regarding, GC/MS analysis, a total of twenty-four organic and twenty-four conventional carrot volatiles were positively identified. The major volatile compounds identified in both the organic and conventional carrot samples were terpinolene, β-pinene, α-pinene, sabiene, p-cymene, γ-terpinene, caryophyllene, humulene and β-bisabolene.

CONCLUSIONS

The results showed the growing systems had little effect on the colour, *C*-value, maximum compressive load, pH, dry matter and the volatile profile of both types of carrot.

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