

Roasted nigella sativa seed as a functional ingredient in foods and beverage—exploratory studies

Boshra Varastegani

University of Minho, Malaysia

Abstract

Nigella sativa L., also known as black cumin or black seed, is extensively used for culinary purposes in many parts of the world. Upon roasting and grinding the seed appears dark brown with aroma and taste similar to roasted coffee bean. Since the roasted seed is rich in caffeine and bioactive compounds, the potential for utilizing it as a powdered coffee-like beverage product can be tremendous. In addition, the seed extracts could be developed into a nutraceutical product or used as a functional additive in food.

The caffeine content, solubility and antioxidant activities; expressed as free radical-scavenging (DPPH) and ferric reducing antioxidant power (FRAP) of (*Nigella sativa* seed) roasted-NSS used in the study was 3.8 %, 72.5 %, 45 mmol/mg and 27.4% respectively. Following spray drying, the caffeine content of (*Nigella sativa* powder-gum arabic) NSP-AG and (*Nigella sativa* powder-maltodextrin) NSP-MD dropped significantly ($P<0.05$) to 1.6 and 1.9 % respectively, whilst the antioxidant activities (FRAP) dropped significantly ($P<0.05$) to 32 and 31 mmol/mg in NSP-AG and NSP-MD respectively. Solubility of NSP-MD and NSP-AG were 92.6 and 91.9 % respectively, that were significantly higher ($P<0.05$) than that of roasted-NSS (72.5 %).

The oxidative stability of beef burgers incorporating *Nigella sativa* Super critical CO₂ extraction (SC-NSX), Roasted *Nigella sativa* Super critical CO₂ extraction (SC-roasted NSX) was compared with that of commercial-grade green tea extract (GTE) as positive control separately adding 200 and 500 mg/kg before kept at -18 °C for a period up to three months. The chemical composition, TBARS, protein oxidation, proximate, cooking yield, pH, colour, and textural properties and sensory attributes were assessed while held in storage at -18 °C at 3 months. The incorporation of natural antioxidants however resulted in a significant ($\square<0.05$) decrease in TBARS (58%–62%) and protein oxidation (31–45%) as compared to control. Regarding the sensory characteristics, Furthermore, a vast improvement ($P<0.05$) in cooking yield and textural properties was observed and noted. Although, incorporating NSX and GTE into the beef patties did not have a major influence ($P>0.05$) on sensory acceptability, proximate composition, pH and colour of the patties.

Introduction:

Nigella sativa Linn. is an annual herbaceous flowering plant, belongs to the family Ranunculaceae. *Nigella sativa* is native to south and southwest Asia wherein the plant is cultivated and grows. *Nigella sativa* is widely cultivated in Mediterranean countries, middle Europe and western Asia. It grows to 20–30 cm tall, with finely divided, linear leaves. Flowers are usually colored pale blue and white, with five to ten petals. In the natural form, the flowers are bluish with a variable number of sepals and are characterized by the presence of nectaries. The gynoecium is composed of a variable number of multi-ovule carpels, developing into a follicle after pollination, with single fruits partially connected to form a capsule-like structure. The fruit is a large and inflated capsule composed of three to seven united follicles, each containing seeds.

Phytosterols are important part of human diet and are gaining greater interest due to their nutraceutical and medicinal benefits in lowering low density lipoprotein and total cholesterol level. Phytosterols are also important as characteristic compounds for assessing the quality of vegetable oils and food labeling. The total sterols content of black cumin seed oil as estimated by different researchers was found to be between 18 and 42% of the unsaponified matter. The major sterols identified were β -sitosterol, campesterol, stigmasterol, and 5-avenasterol. Tocopherols exhibited attractive scavenging potentials of free radicals which are believed to terminate lipids peroxidation.

Conclusion:

The chemical composition, TBARS, protein oxidation, proximate, cooking yield, pH, colour, and textural properties and sensory attributes were assessed while held in storage at -18 °C at 3 months. The incorporation of natural antioxidants however resulted in a significant ($\square<0.05$) decrease in TBARS (58%–62%) and protein oxidation (31–45%) as compared to control. Regarding the sensory characteristics, Furthermore, a vast improvement ($P<0.05$) in cooking yield and textural properties was observed and noted. Although, incorporating NSX and GTE into the beef patties did not have a major influence ($P>0.05$) on sensory acceptability, proximate composition, pH and colour of the patties.