Physicochemical Characteristics and Technological Application for Utilization of Quinoa Cultivated in Egypt

By

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ABSTRACT

Quinoa seeds are considered main sources of protein for vegetarians and in developing countries. However, the seed coat is rich in bitter-tasting saponins, which should be removed before consumption. So, this study was carried out to throw some light on the effect of the washing and germination process as the traditional methods to reduce saponins from two varieties of quinoa seeds planted in Egypt namely white or sweet quinoa (SQS) and chipaya or bitter quinoa seeds (BQS). However, little is known about the effects of these methods on the chemical composition and nutritional value.

The results revealed that the washing process for 20 min by water in two phases with continuous stirring for 10 min each, is an effective method to depress saponins up to 45.36% in SQS and 61.75% in BQS, unlike the germination process. Both the two processes increase the protein, crude fiber, and ash content with decrements of ether extract and carbohydrates. The seeds and sprouts contain important antioxidant substances such as saponins, alkaloids, phenolic, and flavonoid compounds. Also, quinoa seeds and their sprouts are an important functional food material, containing proteins with high biological value, balanced amino acid composition, unsaturated fatty acids, as well as macro and microelements. In addition, the effect of cooking treatment on physical properties, chemical composition, and organoleptic properties in SQS and BQS were studied. Washed and germinated quinoa flours of SQS and BQS were successfully used as a food additive in the preparation of beef burger as the source of crude fiber.

Table of contents

LIST OF APPREVIATION

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SQS	Sweet quinoa seed
BQS	Bitter quinoa seed
CP	Crude protein
EE	Ether extract
CF	Crude fiber
NFE	Nitrogen free extract
TC	Total carbohydrates
PCs	Phenolic compounds
TP	Total phenolics
TF	Total flavonoids
EAA	Essential amino acids
BV	Biological value
PER	Protein efficiency ratio
USFA	Unsaturated fatty acids
SFA	Saturated fatty acids
HC	Hydration coefficient
SC	Swelling coefficient
FAO	Food Agriculture Organization
WHO	World Health Organization
HPLC	High performance liquid chromatography
DPPH	1, 1-diphenyl-2-picrylhydrazyl
FCR	Folin-Ciocalteu reagent
GSQS	Germinated sweet quinoa seed
GBQS	Germinated bitter quinoa seed
AA	antioxidant activity