



POTENTIAL HEALTH BENEFITS OF ROASTED AND GERMINATED *ELEUCINE COROCANA*

Science

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ABSTRACT

Millets are gaining importance and are replacing the junk foods among the adolescents in the present situation. The traditional processing techniques enhances the physicochemical accessibility of micronutrients, decrease the content of antinutrients or increase the content of compounds that improve bioavailability. Hence, the present study emphasizes on the impact of the traditional processing methods such as roasting and germinating with respect to their nutritional and phytochemicals in ragi. It was observed that the ragi in the germinated form possess appreciable levels of macronutrients and the phytochemicals.

KEYWORDS

Eleusine corocana, Nutrient profile, phytochemicals, roasted and germinated ragi

INTRODUCTION: Millets are being used as nutraceuticals as they are rich in antioxidants much higher than the major cereal crops. They are reportedly beneficial in curing asthma, migraine, blood pressure, diabetic, heart disease, atherosclerosis and heart attack. The high fibre content in millets prevents gall stone formation. The whole grain consumption has health promoting effects like prevention of insulin resistance, heart disease, diabetes, ischemic stroke, obesity, breast cancer, childhood asthma and premature death (Balasubramaniam, 2013). Millet, a nutritious staple crop in many developing countries, can be made even more nutritious when the grains are sprouted. An attempt was made in the present study to evaluate the impact of roasting and germinating process in *Eleusine corocana* (ragi).

MATERIALS AND METHODS:

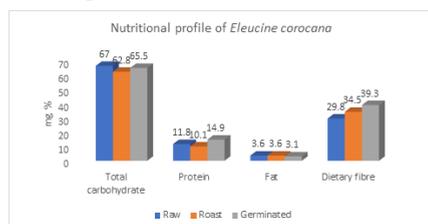
Processing of the millets - The *Eleusine corocana* (ragi) were first cleaned thoroughly and made free from dust, dirt, and foreign matter. Any seeds which were spoiled or with cracked hull were discarded and the remaining seeds were surface sterilized with 0.1% (w/v) potassium permanganate solution. A part of the ragi were roasted in a dry pan at about 50°C for 3mins. Roasting process is terminated when a nice aroma develops. For sprouting, ragi were soaked in distilled water for 4h at room temperature (RT). The excess water was drained, sample further rinsed with distilled water, seeds placed in a single layer on filter paper in sterile petri dishes and placed in the muslin cloth at the room temperature, 90% RH for 24h. Germinated ragi were dried in an oven overnight at 60°C. The processed ragi were then cooled in a desiccator, powdered using a electric blender at moderate speed (5,000 rpm) and sieved through mesh size of 600 microns.

Analysis: The processed and unprocessed millet were analysed for the total carbohydrate, protein, fat and dietary fibre. The qualitative analysis of phytochemicals viz. phenolics, flavonoids, alkaloids and saponins present in the ragi was done by the Method of Treese and Evans(1989).

RESULTS:

Millets are the store houses of many chemical components including nutrients, phytochemicals, and non-nutritive plant protective functional constituents. The results of the macro nutritional status of the raw, roasted and germinated ragi are shown in fig 1.

Fig 1: Nutritional profile



Phytochemical analysis :

Phytochemical testing to detect for the presence of different chemical group of phytochemicals alkaloid, tannin, terpenoids, phenolic compound and flavonoids are depicted in table-1.

Table- 1- Phytochemical analysis of ragi

Phytochemicals	Ragi		
	C	R	G
Alkaloids	+	+	+
Glycosides	+	--	+
Tannins	+	--	--
Phytosterol	+	--	--
Terpenoids	+	+	+
Steroids	--	--	+
Phenolic compound	+	+	+
Flavonoids	+	+	+

C-raw control; R-roasted ragi ; G- germinated ragi
(+) indicates presence (--) indicates absence

DISCUSSION:

From our results it is observed that the proportion of carbohydrate is high when compared to protein, fat and dietary fibre. In the assessment of nutritional status of the processed ragi, a decrease in the carbohydrate and fat levels were observed in germinated form when compared to the raw and roasted millets. However, the levels of protein were found to decline in the roasted form and increased in the germinated form. Levels of dietary fibre were observed to be increased in roasted and germinated form when compared to the raw controls.

The reduction in carbohydrate content could be attributed to increased activity of alpha-amylase which hydrolyses starch to simple sugar. Total fat content in the processed millets were observed to be low when compared to unprocessed ragi which may be attributed to the breakdown of fats to fatty acid and glycerol. This is in accordance with the studies of Anthony and Babatunde (2014). The levels of protein and dietary fibre were observed to be increased in the germinated millets. Increased protein levels reflects the activation of the proteolytic enzymes during germination. The observed decline levels in the roasted form is due to the denaturation induced by the impact of temperature during the roasting process. The germinated millets showed an appreciable fibre content compared to the unprocessed samples. Germination increased the crude fibre content in all the selected millets. The nutraceutical profile was found to be in appreciable levels in the germinated ragi.

Germination is a biochemical process which involves transition of a seed from dormant state to vital active state. It has been reported to improve the nutritive value of foods. Several studies on the effect of germination on legumes have found that germination can increase protein content and dietary fibre bioavailability (Rao and Prabhavathi, 1982; Hussein and Ghanem, 1999; Ghavidel and Prakash, 2007 and Rusydi *et al* 2011). This is in accordance to the present study. As germination is economical and more effective in improving nutritional value it can be accepted as functional food and nutraceuticals because they provide adequate dietary fibers, proteins and energy required for human health.

Millets is a good source of phytochemicals. The antinutrient tannin and phytosterols were found to be in decreased amount after processing methods such as germination and roasting. Phenolics are known to impart antioxidant properties and serve as radical scavengers thereby imparting several health benefits like reducing the risk of cancer, diabetes, cardiovascular diseases etc, They also contribute to improving colour and sensory attributes of food. (Troszynska *et al.*, 2006., Cevallos-Casals and Cisneros-Zevallos, 2010). Among the control and roasted ragi the phytoconstituents were found to be appreciable levels in the germinated ragi.

CONCLUSION: Among the different processing techniques, the germinated form of ragi was found to be efficient in the nutritional profile. The study can be extended to all millets. It is therefore suggested to educate about the potential health benefits among all groups of people and promote millet by increase its consumption. Awareness among the people helps to create a positive attitude towards the millet helps the public to get rid off from the life style diseases.

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