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Study the physico-chemical characteristics of quinoa, soybean and ragi seeds

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Abstract
Quinoa is a nutrient powerhouse, boasting high levels of protein (16–18%), over 37% of essential amino acids, and a variety of vitamins and minerals. Quinoa's high protein concentration gives it a high biological value. soybean is utilised because of its high oil content (18–25%) and protein content (38–50%) as a raw material for the production of oil, and soy waste is utilised as animal feed. in soybeans. Finger millet (ragi) has a higher nutritional value than rice and other cereals. The physical properties of Quinoa, soybean and ragi were Finger millet was found to have the highest true density (1.3 g/ml), whereas sorghum The lowest actual densities were found in pearl millet (1.3 g/ml) and at (1.2 g/ml). Bulk density measurements varied from 0.76 to 0.79 (g/ml). ragi had actual densities of 0.83 g/ml and 1.4 g/ml, respectively, whereas finger millet had the highest bulk density (0.83 g/ml). The angles of repose were for quinoa (32°), soybean (29°′), and ragi (28°).

Keywords: quinoa, soybean, ragiseed, physicochemical properties

Introduction

Quinoa seed is typically planted in low soils because it can withstand both drought and frost (Vilche *et al*., 2003) The Incas appreciated these crops for their excellent nutritional value and their simplicity of cultivation. could be milled allowed rural communities to benefit from it as well (Comai *et al*., 2007; Repo-Carrasco *et al*., 2003; Bhargava *et al*., 2006) [3, 5, 4].

Quinoa protein has a low prolamine content (0.5-0.7%), indicating that it is gluten-free and thus nonallergenic. Quinoa had a total dietary fibre level of 13.4%, including 2.4 percent of the fibre is soluble and 11.0 percent is insoluble (Ruales and Nair 1994). Quinoa has a lipid-lowering impact and contains 4.4–8.8% crude fat, with 55–63% of the total fatty acids coming from the essential fatty acids linoleic and linolenic acid. (Alvarez *et al.,* 2010) [12].

Quinoa was chosen one of the crops chosen by the Food and Agriculture Organization to promote food security in the twenty-first century because it is drought, stress, and salinity tolerant and can be produced in marginal areas. 2013 has been designated as the International Year of Quinoa by the United Nations (UN), with the aim of increasing global awareness of food security, nutrition, and the eradication of poverty (Sharma and Lakhawat, 2017) [13].

In India, soybean (Glycine max L.) is a significant oilseed crop. In Madhya Pradesh was India's biggest soybean-growing state in 2007-08, with 395 million hectares under cultivation. During the 2007-08 season, With a yield of 1124 kg/ha and an area of 8.88 million hectares, India produced 9.99 million tonnes of soybeans (Anonymous, 2008a) [14]. Soybean production in Maharashtra was 3924 thousand tonnes over 2651 thousand hectares (Anonymous, 2008b) [14].

Soybean is utilised as a starting ingredient in the production of vegetable oils, and soy waste is fed to animals. Soybeans have a high nutritional value and are a widely consumed food due to their high oil content (18–25%) and protein (38–50%). (Muller *et al*., 1998) [1].

In Western countries, soy production and consumption have soared. In Asian countries, soybeans are used to make a wide range of fermented and non-fermented foods, such as soy sauce, miso, natto, yoghurt, kinako, protein crisp, desserts, and soy milk, which is subsequently processed into tofu, aburage, and yuba (Hammond and Jez, 2011) [2].

According to Sripriya *et al*. (1997) [7], finger millet (Eleusine Coracana), an important staple food for people in low socioeconomic categories and those suffering from metabolic illnesses like diabetes and obesity, is a good source of carbohydrates, protein, dietary fibre, and minerals (Mathanghi and Sudha, 2012) [9]. It is important because of its superior capacity for storage and nutritional value (Shashi *et al*., 2007) [8]. It has significantly more dietary fibre and minerals than wheat and rice, as well as a well-balanced protein profile (Ravindran, 1991) [6].

In ancient India, poets were offered Honey and milk-boiled finger millet (Achaya, 1992) [15]. Milling, malting, fermentation, popping, and decortication are all used to process finger millet. It is eaten locally in the form of unleavened bread and soup known as Many residents in the Kokan region eat ambil and papad. Now obtainable are finger millet noodles, vermicelli, spaghetti, Indian sweet (halwa) concoctions, papads, soups, and bakery goods (Achaya, 2009) [15].

Materials And Methods

The investigation was conducted at the Department of Food Process Engineering, Vaugh Institute of Agricultural Engineering and Technology, Sam Higginbottom University of Agriculture, Technology, and Sciences, Prayagraj.

Quinoa seeds were purchased in direct farm at Prayagraj (UP), which were pure and healthful., quinoa seed, soybean seed, ragi seed.

Results And Discussion

Studying physical attributes is important because it provides the foundational information for constructing the employed for harvesting and post-harvest tasks are machinery and equipment.

Determining whether a product will be accepted by consumers requires a grasp of its physical qualitative attributes.

Quinoa, soybean's and ragi various physical characteristics, including their weight, volume, bulk density, actual density, angle of repose, and porosity per thousand kernels were examined; the findings are shown in Table 4.1.

Table 1: Physical properties of quinoa, soybean and ragi seed

Physical Parameters	Mean value		
	Quinoa	Soybean	Ragi
Bulk Density (g/ml)	0.76	0.66	0.83
True Density (g/ml)	1.25	1.42	1.31
Angle of Repose (Degrees)	32	29	28
Porosity (%)	39.2	53	36

*Each value represents the average of three determinations

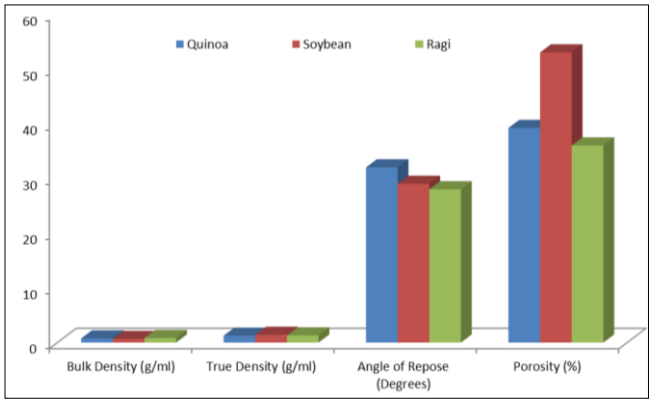

Fig 1: Physical properties of quinoa, soybean and ragi seed

Bulk density, True density, and angle of repose of the chosen quinoa, ragi, and soya bean were examined. Table 4.1 lists the findings about the physical characteristics of millet grains.

The ratio of corneous and floury endosperm inside the kernels determines true density. A grain's hardness is indicated by its density. Finger millet was found to have the highest true density (1.3 g/ml), whereas sorghum (1.2 g/ml) and pearl millet (1.3 g/ml) had the lowest true densities.

Different cultivars have different bulk densities (g/ml) and angles of repose depending on their kind, variety, moisture content, quality, and contamination level. Bulk density values varied from 0.76 to 0.79 (g/ml). ragi had actual densities of 0.83 g/ml and 1.4 g/ml, respectively, whereas finger millet had the highest bulk density (0.83 g/ml). Angle of repose is crucial for constructing processing equipment since it indicates how freely seeds flow. It was noted what the angles of repose were for quinoa (32°), soybean (29°′), and ragi (28°). The values for the physical characteristics that were reported in this investigation were in agreement.

Chemical composition of quinoa, ragi and soybean seed

Quinoa, ragi, and soya bean's chemical makeup was investigated, and the results are listed in Table 4.2.

Table 2: Chemical composition of quinoa, ragi and soybean seed

Chemical Parameters	Mean value (%)		
	Quinoa	Ragi	Soybean
Moisture	5.54	7.40	6.54
Fat	3.18	2.40	7.15
Carbohydrates	69.40	74.12	31.59
Protein	17.03	11.22	42.78
Ash	1.4	1.02	4.43
Crude Fibre	3.44	3.82	7.41

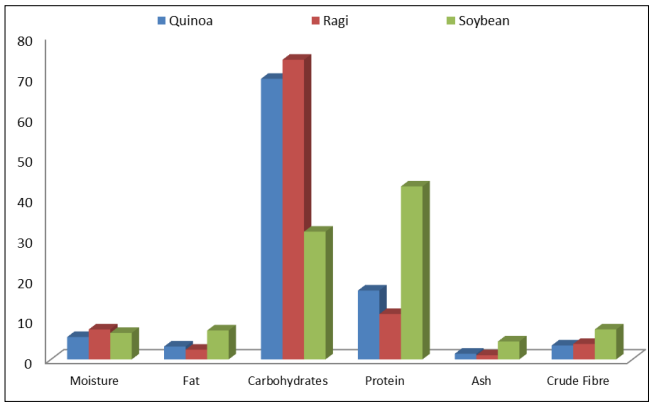

Fig 2: Chemical composition of quinoa, ragi and soybean seed

Each value is an average of three determinations

Table 4.2 shows the chemical equivalents for quinoa, ragi, and soybean seed. Between 5.54, 7.40 and 6.54% of the material was moisture, 3.18, 2.40 and 7.15 % of it was fat, 69.40 74.12 and 31.59 % of it was carbohydrate, 17.03, 11.22 and 42.78 % of it was protein, 1.4, 1.02 and 4.43 % of it was ash, and 3.44, 3.82 and 7.41 % of it was crude fibre.

The information shown in Table 4.2 showed that ragi had the largest percentage of carbohydrates (74.12%) and the lowest percentage of fats (2.40%).

It is evident from Table 4.2 that soybean had the highest values for fat (7.15%) and protein (42.78%), respectively. Additionally, it was discovered that soybean contained 7.41% crude fibre, 4.43 % ash, and 31.59% carbohydrate. Similar outcomes were seen by (Kokani & Ranganathan, 2018) [10].

Table 4 revealed what was seen. 2.40 percent fat, 74.12 % carbohydrates, 11.22 % protein, 1.02 percent ash, 3.82 percent fibre, and 7.40 percent moisture made up the composition Ragi 1.5% fat content was reported by Verma and Patel in 2013 [11], although Gopalan *et al* (2004).

Conclusion

The study was concluded that Quinoa is a key ingredient in the production of carbohydrates. However, we learned that soybeans are a significant source of fibre. Legumes provide the food with protein, flavor, texture, and bulk. Finger millet flour was chosen for the formula because of its high concentration of soluble fibre, which includes mainly proteins and minerals that are very good for human health. Higher amounts of protein, fat, and fibre (17.03, 3.18, and 3.44, respectively) are found in quinoa flour.

Protein, fibre, carbohydrate, and minerals are abundant in ragi flour. Thus, it provides highly effective blood glucose management for diabetic individuals. Regular users of finger millet are reported to have a number of health benefits, including diabetic, antioxidant, hypercholesterolemia, antimicrobial, and protection from chronic diseases linked to nutrition.

References

1. Muller U, Weber W, Hoffmann A, Franke S, Lange R, Vieths S. Commercial soybean lecithins: A source of hidden allergens? Zeitschrift Lebensmitteluntersuchung Und-Forschung A,1998:207:341-351.
2. Hammond BG, Jez JM. Impact of food processing on the safety assessment for proteins introduced into biotechnology-derived soybean and corn crops. Food Chem. Toxicol,2011:49:711-721.

3. Comai S, Bertazzo A, Bailoni L, Zancato M, Costac VL, Allegri G. The content of proteic and non proteic (free and protein-bound) tryptophan in quinoa and cereal flours. Food Chemistry,2007:100(1):1350-1355.
4. Bhargava A, Shukla S, Ohri D. Chenopodium quinoa: an Indian perspective. Industrial Crops and Products,2006:23:73-87.
5. Repo - Carrasco R, Espinoza C, Jacobsen SE. Nutritional value anduse of the Andean crops quinoa (Chenopodium quinoa) andka˜ niwa (Chenopodium pallidicaule). Food Rev Int,2003:19:179-189.
6. Ravindran G. Studies on millets: proximate composition, mineral composition, phytate and oxalate content. Food Chemistry,1991:39(1):99-107.
7. Sripriya G, Usha A, Chandra TS. Changes in carbohydrate, free amino acids, organic acids, phytate and HCl extractability of minerals during germination and fermentation of finger millet (Eleusine coracana). Food Chemistry,1997:58(4):345-350.
8. Shashi BK, Sunanda S, Shailaja H, Shankar AG, Nagarathna TK. Micronutrient composition, antinutritional factors and bio-accessibility of iron in different finger millet (Eleusine coracana). Karnataka Journal of Agricultural Sciences,2007:20(3):583-585.
9. Mathanghi SK, Sudha K. Functional and phytochemical properties of finger millet (Eleusine coracana) for health. International Journal of Pharmaceutical Chemical and Biological Sciences,2012:2(4):431-438.
10. Kokani RC, Ranganathan TV. Processing of Thalipeeth Flour-Blend from Various Cereal-Pulse Malt Flour and Its Quality Evaluation during Storage. International Journal of Science and Research,2018:7(2):922-929.
11. Verma V, Patel S. Value added products from nutri-cereals: Finger millet (Eleusine coracana). Emirate Journal of Food Agriculture,2004:25(3):169-176.
12. Alvarez JL, Arendtb EK, Gallaghera E. Nutritive value of pseudocereals and their increasing use as functional gluten free ingredients. Trends in Food Science and Technology,2010:21(02):106-113.
13. Sharma G, Lakhawat S. Nutrition facts & functional potential of quinoa (Chenopodium quinoa), an ancient Andean grain: a review. Journal of Pharmacognosy and Phytochestry,2017:6(4):1488-1489.
14. Anonymous. Economic survey of Maharashtra 2007-08. Directorate of Economics and Statistics, Govt. of Maharashtra, 2008b, 173.
15. Achaya KT. Finger Millet (Eleusine coracana L.): A Review of Its Nutritional Properties, Processing, and Plausible Health Benefits. Advances in Food and Nutrition Research,1992:69(1):1043-4526.