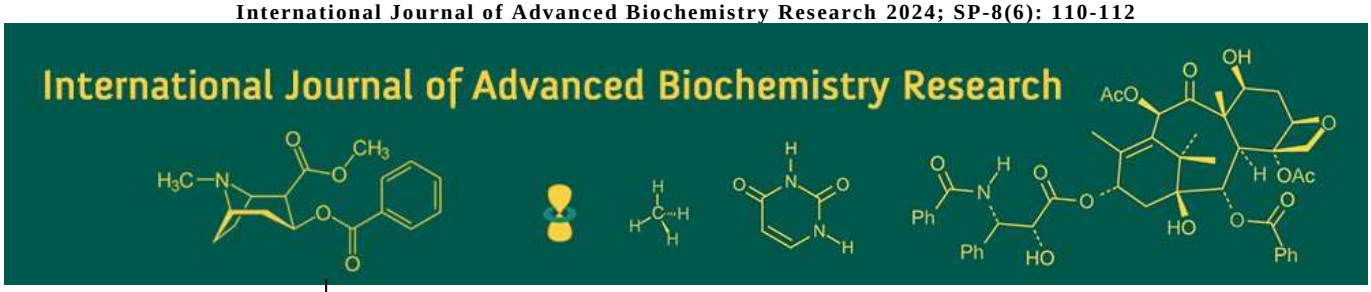

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; SP-8(6): 110-112
www.biochemjournal.com
Received: 22-03-2024
Accepted: 26-04-2024

A Vitoli Chishi
M.Tech Scholar, Department of Processing and Food Engineering, College of Technology and Engineering, Maharana Pratap University of Agriculture and Technology, Udaipur; Rajasthan, India

Sanjay Kumar Jain
Professor, Department of Processing and Food Engineering, College of Technology and Engineering, Maharana Pratap University of Agriculture and Technology, Udaipur; Rajasthan, India

Narayan Lal Panwar
Professor and Head, Department of Renewable Energy Engineering, College of Technology and Engineering, Maharana Pratap University of Agriculture and Technology, Udaipur; Rajasthan, India

Nikita Wadhawan
Professor and Head, College of Dairy and Food Technology, Maharana Pratap University of Agriculture and Technology, Udaipur; Rajasthan, India

Bheru Lal Salvi
Professor and Head, Department of Mechanical Engineering, College of Technology and Engineering, Maharana Pratap University of Agriculture and Technology, Udaipur; Rajasthan, India

Corresponding Author:
A Vitoli Chishi
M.Tech Scholar, Department of Processing and Food Engineering, College of Technology and Engineering, Maharana Pratap University of Agriculture and Technology, Udaipur; Rajasthan, India

Development of value-added product from sumac fruit

A Vitoli Chishi, Sanjay Kumar Jain, Narayan Lal Panwar, Nikita Wadhawan and Bheru Lal Salvi

DOI: https://doi.org/10.33545/26174693.2024.v8.i6Sb.1266

Abstract
Sumac (*Rhus javanica*) is an underutilized fruit growing naturally during the rainy season. It is a perishable fruit with nutritional and therapeutic qualities. It can either be used as a spice to improve the flavour and taste or also may be eaten as fruit. The fruits were dried to make powder and were dried in sun, shade and tray dryer. The average length, width and thickness of sumac were 5.45 mm, 4.54 mm and 2.52 mm, respectively. The average value of moisture content, vitamin-C, fibre, protein, ash, pH, TSS and titratable acidity were 10.3% (wb), 13.1 mg/100g, 22.1%, 2.80%. 4.57%, 3.29, 2.28 ºBrix and 3.32% respectively.

Keywords: Sumac, physical properties, chemical properties, *Rhus javanica*

1. Introduction
Sumac (*Rhus javanica*) also known as Chinese sumac is native to East and South Asia, is a member of the Anacardiaceae family. The sumac plant is a small, deciduous tree or shrub that can reach heights of 2 to 10 meters [1]. In the highlands of India's Northeastern states, it is widely distributed. The fruits are traditionally used for medical purposes in Nagaland and the other states of the Northeast. It is used to treat stomach and duodenal ulcers, diarrhoea, and dysentery [2]. Sumac leaves have been utilized in Mediterranean countries not only as a condiment but also as a tanning agent (4.0%) and the dried fruits as a treatment for gastrointestinal disorders [3]. In certain nations, it is occasionally used in place of peppers. It is frequently used as a spice in Middle Eastern countries and added straight to salads to give them a lemony flavor [4]. Sumac fruits are used as tonic and diuretic, and also useful in dysentery and diarrhoea. A gargle prepared from the fruit is used in catarrhal infections of the pharynx, and the paste is topically applied to ulcers and piles. In folk medicine, it is used for treatment of indigestion, anorexia, haemorrhages, and hyperglycaemia [5]. The pharmaceutical industry has been using underutilized fruits as a key source of raw materials to create medications for a variety of ailments, including cancer, diabetes, jaundice, and nutritional deficiencies [6]. This plant is abundant in flavonoids and their related glycosides [7]. The sumac fruits were cleaned and subjected to different drying methods such as sun drying, shade drying and tray drying at 55, 60 and 65 °C. Most people probably know it best as a spice in food. People have also utilized it in culinary and conventional herbal medical techniques. In certain nations, it is occasionally used in place of peppers. It is frequently used as a spice in Middle Eastern countries as salad seasoning [4].
The objectives of the study are to (i) Study the selected properties of sumac fruit and (ii) To develop value-added product from sumac fruit.

2. Materials and Methods
2.1 Raw material and preparation
Matured and ripe samples of sumac were collected from Chungtia village, Mokokchung, Nagaland. The fruits were carefully shipped to Udaipur, Rajasthan, in order to carry out the research work in the laboratory. Samples that were mature enough to dry and visually defect-free were carefully selected. The raw materials were washed before being subjected to drying.

2.2 Sample analysis

2.2.1 Physical properties

Physical properties such as Length, width, thickness were evaluated with a digital vernier calliper, arithmetic mean diameter and geometric mean diameter were calculated with the values of length, width and thickness using Eqn (i) & (ii), sphericity was calculated as suggested by Mohsenin, 1980, volume was calculated using Eqn (iii) and thousand kernel mass was determined with an electronic balance.

$$D_a = \frac{(L+W+T)}{3} \quad \text{(i)}$$

$$D_g = (LxWxT)^{1/3} \quad \text{(ii)}$$

$$V = (\pi\ abc)/6 \quad \text{(iii)}$$

2.2.2 Chemical properties

Chemical properties such as moisture content was determined by using a hot air oven and following the method outlined in AOAC (2016) [11]. Using a muffle furnace, the total ash content of sumac was determined in accordance with AOAC (2016) [11]. The fiber content of sumac was determined using the Fibra-plus device according to the method outlined in AOAC, 2005. The crude protein content of sumac was estimated according to AOAC (2016) [11] utilizing the Micro-Kjeldahl apparatus. The TSS (ºBrix) of sumac fruit juice was measured by using calibrated automatic hand refractometer and using a digital pH meter from Michigan, the pH of the juice was determined. The vitamin-C content was determined by 2,6-Dichlorophenol Indophenol visual titration method and the titration method was used to determine the titratable acidity of sumac [8].

2.3 Colour and water activity analysis

The colour values (L*, a* and b*) were determined using a Hunter lab colorimeter and the water activity (a_w) was determined using a water activity meter.

2.4 Development of value-added product

The samples dried through different drying methods and air temperatures will be ground to powder form for further use.

2.5 Statistical analysis

Results were subjected to the analysis of variance (ANOVA) using MS Excel single factor to compare means at a significance level of 5%.

3. Results and Discussion

3.1 Sample analysis

3.1.1 Physical properties

The physical properties of sumac, such as three principal dimensions, mass, mean diameters and sphericity are presented in Table 3.1 with their mean values and standard deviations. The dimension of sumac fruit, viz. longest (length, L), intermediate (width, W) and transverse (thickness, T), were measured at a moisture content of 10.3±0.76 percent (wet basis) and the average values were found to be 5.45±0.72 mm, 4.54±0.51 mm and 2.52±0.28 mm, respectively. The average values for geometric mean diameter (GMD) and arithmetic mean diameter (AMD) were found to be 3.95±0.42 and 4.16±0.46 mm, respectively. These values are helpful in calculating the projected area of fruit and design of the aperture size of the sorting or grading machine [9].

The value of sphericity was found to be 0.73±0.04 and the thousand kernel mass was found to be 19.1±0.07. The calculated mean value for volume was found to be 33.45±10.10 mm³, respectively.

Table 1: Physical properties of fresh sumac

Sl. No.	Parameter	Mean	Max	Min	±SD
1.	Longitudinal axis (Length, L mm)	5.45	6.46	4.43	0.72
2.	Intermediate axis (Width, W mm)	4.54	5.16	3.60	0.51
3.	Transverse axis (Thickness, T mm)	2.52	2.99	2.09	0.28
4.	Arithmetic mean diameter D_a (mm)	4.16	4.73	3.43	0.46
5.	Geometric mean diameter D_g (mm)	3.95	4.53	3.30	0.42
6.	Sphericity (decimal)	0.73	0.77	0.65	0.04
7.	Thousand kernel mass (g)	19.1	19.2	19.0	0.07
8.	Volume(mm³)	33.4	48.8	18.8	10.1

3.1.2 Chemical properties

The biochemical properties of sumac, such as moisture content, fibre, protein, ash, pH, total soluble solids (TSS), vitamin-C and Titratable acidity (TA) were estimated, and their mean, maximum, minimum and SD values were tabulated (Table 3.2) and were found to be 10.3±0.76 (%), 22.1±3.33 (%), 2.80±0.52 (%), 4.57±0.14 (%), 3.29±0.10, 2.28±0.70 (^{0}Brix), 13.1±0.22 (mg/100g) and 3.82±1.46 (%), respectively.

Table 2: Chemical properties of fresh sumac

Sl. No.	Content	Mean	Max	Min	±SD
1.	Moisture (% w.b)	10.3	11.6	9.00	0.76
2.	Fibre (%)	22.1	25.6	16.7	3.33
3.	Protein (%)	2.80	3.50	2.10	0.52
4.	Ash (%)	4.57	4.70	4.45	0.14
5.	pH	3.29	3.33	3.18	0.10
6.	TSS (^{0}Brix)	2.28	3.00	1.40	0.70
7.	Vitamin-C (mg/100g)	13.1	13.3	12.8	0.22
8.	Titratable acidity (%)	3.82	6.00	2.25	1.46

3.2 Colour and water activity analysis

Table 3: Colour and water activity properties of sumac

Sl. No.	Parameter		Mean	Max	Min	±SD
1	Colour value	L*	48.1	49.4	45.6	1.52
	(Whole fruit)	a*	4.88	4.94	4.80	0.05
		b*	10.5	11.1	10.2	0.44
		Chroma	11.6	12.1	11.3	0.39
		Hue angle	65.2	66.6	64.1	1.06
		Colour index	9.61	10.3	8.82	0.68
2	Water activity (a_w)		0.37	0.39	0.32	0.02

3.3 Development of Sumac Powder

The sumac fruits dried in open sun, shade and tray dryer (55, 60 and 65 °C) were ground in a mixer grinder. The ground sumac powder can be used directly as a seasoning in different dishes and can be consumed directly as well. Total five samples were made based on the type of drying and air temperature.

4. Conclusion

This study shows some selected physical and chemical properties of sumac fruit and value addition of the fruit into powder by drying in three different methods such as sun drying, shade drying and tray drying at different air temperatures such as 55 ℃, 60 ℃ and 65 ℃. Further investigations should be carried out to compare the nutritional, bioactive and antioxidant properties of dried powders by different drying methods and its reconstituted products.

5. References

1. Khoshkharam M, Shahrajabian MH, Sun W, Cheng Q. Sumac (*Rhus coriaria* L.): a spice and medicinal plant - a mini review. Am J Plant Res. 2020;4(2):517-523.
2. Kim KJ, Kim YH, Yu HH, Jeong SI, Cha JD, Kil BS, You YO. Antibacterial activity and chemical composition of essential oil of Chrysanthemum boreale. Planta Med. 2003;69:274-277.
3. Özcan M, Haciseferoğulları H. A condiment Sumac (*Rhus coriaria* L.) fruits: Some physico-chemical properties. Bulg J Agric Sci. 2004;30:74-84.
4. Alsamri H, Athamneh K, Pintus G, Eid AH, Iratni R. Pharmacological and antioxidant activities of *Rhus coriaria* L. (Sumac). Antioxidants. 2021;10:73.
5. Asgarpanah J, Saati S. An overview on phytochemical and pharmacological properties of *Rhus coriaria* L. Res J Pharmacogn. 2014;1:47-54.
6. Nandal U, Bhardwaj RL. The role of underutilized fruits in nutritional and economic security of tribals: a review. Food Sci Nutr. 2014;54(7):880-890.
7. Ouyang MA, Wein YS, Zhang ZK, Kuo YH. Inhibitory activity against tobacco mosaic virus (TMV) replication of pinoresinol and syringaresinol lignans and their glycosides from the root of Rhus javanica var. roxburghiana. J Agric Food Chem. 2007;55:6460-6465.
8. Ranganna S. Handbook of analysis and quality control for fruits and vegetable products. 2nd ed. New Delhi: Tata McGraw-Hill publication Co. Ltd.; c2000. pp. 1-30.
9. Vivek K, Mishra S, Pradhan RC. Physicochemical characterization and mass modelling of sohiong (*Prunus nepalensis* L.) fruit. J Food Meas. 2017.
10. Mohsenin NN. Physical properties of plant and animal materials. Gordon and Breach Science Publication; c1980. p. 56-91.
11. AOAC. Association of Official Analytical Chemist official methods of analysis. 20th ed; c2016.
12. Athmaselvi KA, Jenney P, Pavithra C, Roy I. Physical and biochemical properties of selected tropical fruits. Int Agrophys. 2014;28:383-388.