ISSN Print: 2664-844X
ISSN Online: 2664-8458
NAAS Rating (2026): 4.97
IJAFS 2026; 8(5): 283-285
www.agriculturaljournals.com
Received: 27-03-2026
Accepted: 30-04-2026

Ranu Panwar
M.Sc. Scholar, Department of Food and Nutrition, College of Community Science, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India

Dr. Mamta Singh
Assistant Professor, Department of Food and Nutrition, College of Community Science, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India

Chavan Tejas Anil
M.Sc. Scholar, Department of Food and Nutrition, College of Community Science, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India

Corresponding Author:
Ranu Panwar
M.Sc. Scholar, Department of Food and Nutrition, College of Community Science, Swami Keshwanand Rajasthan Agricultural University, Bikaner, Rajasthan, India

Effect of different drying methods on the drying characteristics of Kachri and physical properties of *Kachari (Cucumis callosus)*

Ranu Panwar, Mamta Singh and Chavan Tejas Anil

DOI: https://www.doi.org/10.33545/2664844X.2026.v8.i5d.1518

Abstract
The present investigation entitled *"Effect of Different Drying Methods on the Drying Characteristics and Physical Properties of Kachari (Cucumis callosus)"* was undertaken with the objective of evaluating the influence of traditional and modern drying techniques on the quality of *kachari* powder. Fresh *kachari* fruits were subjected to three drying methods sun drying, shade drying and hot air oven drying both with and without peel, followed by grinding and storage in high-density polyethylene (HDPE) pouches. The dried powders were analysed for sensory properties (colour, aroma, texture, and overall acceptability) using a six-point hedonic scale and for Physical characteristics such as yield, hydration capacity, and swelling index. Results revealed significant differences among drying treatments. Sun-dried powder without peel achieved the highest sensory scores (colour 5.6, aroma 5.5, texture 5.4, overall acceptability 5.6; "liked very much"), while oven-dried powder with peel scored the lowest (overall acceptability 4.1; "liked slightly"). Physical evaluation showed that sun-dried samples possessed higher hydration capacity (6.5±0.05%) and swelling index (5.6±0.57 ml/g) than shade- or oven-dried counterparts. Shelf-life studies demonstrated that sun-dried powder retained sensory acceptability with minimal decline over 30 days of storage. The findings suggest that sun drying without peel is the most effective method for producing high-quality *kachari* powder, ensuring superior sensory attributes and stable physical properties, while oven drying, although faster, compromises product quality. The study highlights the potential of optimized drying for value addition and commercialization of this underutilized arid fruit.

Keywords: *Kachari (Cucumis callosus)*, drying methods, sun drying, shade drying, oven drying, physical properties, sensory evaluation, arid fruit processing

1. Introduction
The arid and semi-arid regions of Rajasthan are home to unique horticultural resources that sustain rural diets under harsh agro-climatic conditions. Among them, *kachari* (*Cucumis callosus*), also known as wild melon or small gourd, is a hardy cucurbit adapted to sandy soils, high temperature, and minimal irrigation. Traditionally, it has been valued for its culinary applications in chutneys, pickles, spice blends, and as a natural tenderizer in meat dishes (Patel and Panwar, 2022) [5]. Despite its adaptability and cultural significance, *kachari* remains underutilized and under-researched outside its native region.
Nutritionally, *kachari* is a good source of carbohydrates, dietary fiber, vitamin C, calcium, and iron, along with bioactive compounds such as polyphenols and carotenoids (Samadia *et al.*, 2024) [7]. These properties highlight its potential as a functional food. However, the fruit's high moisture content and short harvesting season render it highly perishable, leading to substantial post-harvest losses therefore preservation through drying is essential to extend its shelf life and improve usability. Drying reduces water activity, thereby inhibiting microbial growth and enzymatic reactions (Meena *et al.*, 2016) [3]. The choice of drying method directly influences the sensory qualities, rehydration characteristics, and consumer acceptability of the final product. Traditional methods like sun and shade drying are widely used due to their simplicity and cost-effectiveness, while modern approaches such as oven drying provide controlled conditions but may compromise quality due to thermal stress. Although extensive research has been conducted on drying effects in related cucurbits such

as pumpkin, bottle gourd, and bitter gourd, systematic studies on *Cucumis callosus* are limited. Thus, this study aimed to evaluate the effect of sun drying, shade drying, and oven drying (with and without peel) on the drying characteristics, physical properties, sensory acceptability, and short-term storage stability of *kachari* powder.

2. Materials and Methods

2.1 Procurement of Raw Material

Fresh, mature *kachari* fruits were procured from local markets of Bikaner district, Rajasthan. Uniform fruits free from visible defects were selected for the study.

2.2 Preparation of Samples

The fruits were washed thoroughly under running potable water, blotted dry, and divided into peeled and unpeeled groups. They were sliced into uniform pieces (5-8 mm thickness) to ensure consistency in drying.

2.3 Drying Methods

- **Sun drying:** Slices were spread in a single layer on clean plastic sheets under direct sunlight (25-35 °C). Fruits were covered with muslin cloth to prevent contamination, drying required 5-6 days.
- **Shade drying:** Slices were dried in a well-ventilated area, protected from direct sunlight, at 21-30 °C, for approx 7 days.
- **Oven drying:** Slices were placed on trays and dried in a hot air oven at 40-60 °C for 10-12 hours.

Drying was considered complete when slices became brittle and reached constant weight.

2.4 Grinding and Storage

The dried slices were ground into powder using an electric grinder (Costa *et al.*, 2009) and stored in HDPE pouches at room temperature (25±2 °C) preserving its nutritional and medicinal properties ((Verma, 2024) [8].

2.5 Sensory Evaluation

Ten semi-trained panelists evaluated colour, aroma, texture, and overall acceptability using a six-point hedonic scale (0 = dislike extremely, 6 = like extremely). The most acceptable powder was further assessed for shelf-life over 30 days at 0, 15, and 30-day intervals.

2.6 Physical Properties of Powder

Physical quality parameters were determined to evaluate the functional suitability of the powders.

Yield (%): Calculated as the weight of powder obtained from 1 kg of fresh fruit. (Negi, 2003) [4]

$$\text{Yield (\%)} = \frac{\text{Weight of product}}{\text{Weight of raw material}} \times 100$$

Hydration Capacity (%): Determined by soaking 1 g of powder in 10 mL distilled water overnight at room temperature (Bishnoi and Khetarpal, 1993) [1]. Excess water was filtered, and the weight gain was measured.

$$Hydration\ Capacity\ (\%) = \frac{\text{Final weight (g)} - \text{Initial weight (g)}}{\text{Initial weight (g)}} \times 100$$

Swelling Index (mL/g): Measured by recording volume increase after adding 1 g of powder to 10 mL water in a graduated cylinder and allowing to stand for 1-2 hours (Bishnoi and Khetarpal, 1993) [1].

$$\textbf{Swelling index } \left(\frac{ml}{g}\right) = \frac{\textbf{Volume after soaking(ml)} - \textbf{Volume before soaking (ml)}}{\textbf{Weight of sample(g)}}$$

2.7 Statistical Analysis

All experiments were conducted in triplicates. Observations for sensory scores and physical properties were expressed as mean±standard deviation (SD). Arithmetic mean and SD were calculated using standard formulae (Gupta, 2000). Analysis of variance (ANOVA) was applied to determine significant differences ($p \leq 0.05$) among treatments.

3. Results and Discussion

3.1 Sensory Evaluation

Sun drying without peel secured the highest sensory scores for colour (5.6), aroma (5.5), texture (5.4), and overall acceptability (5.6; "liked very much"). Shade drying with peel also performed well (overall acceptability 5.4). Oven drying, particularly with peel, was the least acceptable (overall acceptability 4.1).

High scores for sun drying may be attributed to natural retention of pigments and volatiles under moderate conditions. Oven drying likely caused browning and loss of aroma compounds due to higher heat exposure.

Table 1: Organoleptic acceptability of *kachari* powder prepared by different drying methods (Mean ±SD)

Sensory attributes	With peel			Without peel		
	Sun	Shade	Oven	Sun	Shade	Oven
Colour (Mean ±SD)	4.6±0.69	5.3±0.82	4±1.05	5.6±0.69	4.4±1.07	4.7±0.48
Aroma (Mean ±SD)	4.8±0.78	5.2±0.78	4±1.15	5.5±0.70	4.5±1.08	4.4±0.96
Texture (Mean ±SD)	4.6±0.69	5.2±0.78	4.4±1.42	5.4±0.69	4.4±0.84	4.6±0.96
Overall Acceptability (Mean ±SD)	4.7±0.67	5.4±0.69	4.1±1.28	5.6±0.69	4.4±0.96	4.5±0.84

Values are mean± SD of ten panelist

3.2 Physical Properties

Table 2: Physical properties of *kachari* powder prepared by different drying methods

Physical properties	*kachari* powder (Mean ±SD)
Yield (%)	12±0.17
Hydration capacity (%)	6.5±0.05
Swelling index (ml/g)	5.6±0.57

- **Yield:** Highest in oven drying (12.4%), followed by shade drying (11.7%), and lowest in sun drying (11.1%).
- **Hydration capacity:** Maximum in sun drying without peel (6.5%), indicating better reconstitution.
- **Swelling index:** Highest in sun drying without peel (5.6 mL/g), confirming superior water absorption ability.

3.3 Shelf-Life Study

Sun-dried powder without peel retained high acceptability over 30 days, with overall scores declining slightly from 5.6 (day 0) to 5.4 (day 30). Aroma showed the greatest decline, while colour and texture remained largely stable. The powder showed no visible spoilage, confirming HDPE packaging as suitable for short-term storage.

Table 3: Shelf-life evaluation of sun-dried *kachari* powder (without peel

S. No.	Powders	Mean score of sensory characteristics on six-point hedonic rating scale			
		Colour (Mean ±SD)	Aroma (Mean ±SD)	Texture (Mean ±SD)	Overall Acceptability (Mean± SD)
1.	0 day	5.60±0.69	5.5±0.70	5.4±0.0	5.6±0.69
2.	15th day	5.40±0.51	5.40±0.51	5.6±0.51	5.6±0.51
3.	30th day	5.20±0.42	5.30±0.48	5.50±0.52	5.40±0.51

3.4 Comparative Discussion

Findings confirm that moderate drying (sun/shade) preserves sensory and functional qualities better than oven drying. while oven drying offers time efficiency, it compromises consumer acceptability, limiting its suitability for *kachari* powder production.

4. Conclusion

The study demonstrated that drying method significantly influences the sensory and physical properties of *kachari* powder. Sun drying without peel was identified as the most suitable technique, producing powders with superior colour, aroma, texture, hydration capacity, and swelling index, while maintaining stability during 30 days of storage

These findings highlight the potential for sun-dried *kachari* powder as a value-added product in chutneys, pickles, spice blends, and traditional recipes. Promoting its commercial production could enhance utilization of this underexploited arid fruit, reduce post-harvest losses, and provide new livelihood opportunities in arid regions.

References

1. Bishnoi S, Khetarpaul N. Variability in physico-chemical properties and nutrient composition of different pea cultivars. Food Chemistry. 1993;47(4):371-373.
2. Gupta SP. Statistical Methods. 31st rev ed. Sultan Chand and Sons; 2000.
3. Meena SR, Singh RS, Sharma BD, Singh D. Most favourite traditional cucurbitaceous vegetables and their utilization pattern in Thar Desert of western Rajasthan, India. Indian Journal of Traditional Knowledge. 2016;15(3):385-394.
4. Negi A. Development and incorporation of fruit powder for value addition of cereal-based food products [doctoral dissertation]. Hisar: CCS Haryana Agricultural University; 2003.
5. Patel MR, Panwar NL. Drying kinetics, quality assessment and socio-environmental evaluation of solar-dried *Cucumis callosus*. Energy Nexus. 2022;7:100065.
6. Ramyashree S. Development of process for value-added products of kachari (*Cucumis callosus*) [doctoral dissertation]. Maharana Pratap University of Agriculture and Technology; 2023.
7. Samadia DK, Haldhar SM, Ram H, Verma AK, Gurjar PS. Kachari melon diversity and varietal development in arid climates. Journal of Agricultural Ecology. 2024;18:14-27.
8. Verma D. Utilization of hill lemon peel for preparation of candy using different sweeteners [doctoral dissertation]. Dr. Yashwant Singh Parmar University of Horticulture and Forestry; 2024.