

Optimization and Comparative Analysis of Potato Peel Incorporation in Nankhatai

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ABSTRACT

INTRODUCTION

Food waste constitutes about one-third of global food production, with Pakistan producing 2.9 million tons of potatoes in 2014 from a total of 381.7 million tons worldwide (Majeed & Muhammad, 2018). Potato peels are significant source of nutrients such as fiber, protein, vitamins, and omega fatty acid (Jimenez-Champi *et al.* 2023). Microwave drying preserves more phenolics than cabinet drying, while cabinet drying enhances nutritional quality compared to sun drying. Moreover, potato peels serve various purposes in food, medicine, and environmental management (Çetin, 2022) (Akter *et al.*, 2023).

OBJECTIVE

To enhance nutritional value of nankhatai by incorporating potato peel flour, along with the evaluation of sensory attributes.

MATERIALS AND METHODS

For conduction of present study, raw materials, including all-purpose flour, gram flour, sugar, shortening, baking powder, and potatoes for peel extraction, were procured from local markets.

The sample preparation process for Potatoes includes several steps: collecting and washing the potatoes, followed by peeling through boiling or direct peeling methods. The peels are then split into two groups, with one group being sun-dried and the other dehydrated using a dehydrator, resulting to four distinct samples.

- Boiled Sundry potato peel.
- Boiled Dehydrate potato peel.
- Peeled Sundry potato peel.
- Peeled Dehydrate potato peel.

Table 1. Treatment Used in Product Development.

Treatment Code	Description
N0	Control
N1	Product containing powder (PS)
N2	Product containing powder (PD)
N3	Product containing powder (BS)
N4	Product containing powder (BD)

Ingredients were weighed, baking powder, semolina, potato peel flour, all-purpose flour, gram flour, and cardamom were added after sugar and ghee were combined to create a cream (Patil, 2020). The dough was formed into balls, baked for 25 minutes at 170°C, cooled, placed in polythene pouches, and stored at room temperature.

RESULT

This study compared the effects of sun-drying and dehydrating on potato peel composition. According to proximate composition of potato peels, dehydrated peels generally have lower moisture and higher nutrient content than sun-dried peels. Among the nutrients, nitrogen-free extract (carbohydrates) has the highest values, while ash has the lowest.

Table 2. Proximate Composition of Potato Peel Powder from Various Drying Methods.

Proximate	Treated samples			
	Boiled sundry	Peeled sundry	Peeled dehydrate	Boiled dehydrate
Moisture	10.01%	7.13%	4.20%	6.51%
Fat	3.10%	3.15%	3.93%	3.46%
Ash	0.19%	4.60%	5.12%	0.51%
Protein	5.13%	10.01%	11.24%	6.40%
Dietary fiber	7.65%	11.80%	12.93%	10.05%
Nitrogen free extract	81.57%	70.37%	70.82%	83.12%

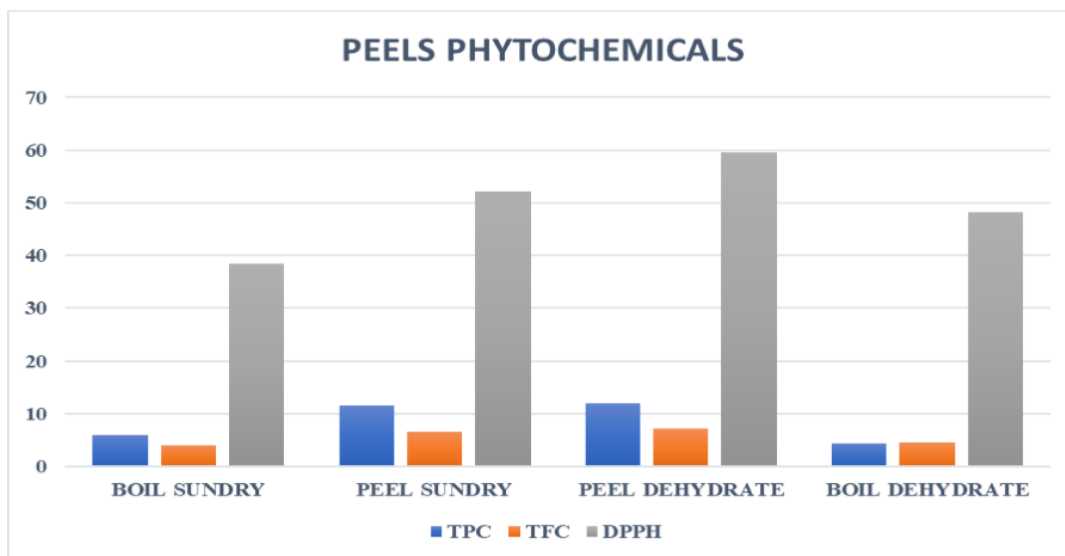


Figure 1. Phytochemical composition of potato peel powder from various drying methods.

Table 3. Proximate Composition of Nan Khatai Incorporated with Potato Peels Powder

Proximate	Treated samples			
	Boiled sundry	Peeled sundry	Peeled dehydrate	Boiled dehydrate
Moisture	9.0%	7.3%	5.4%	8.1%
Fat	6.72%	6.53%	7.01%	6.10%
Ash	0.2%	2.4%	3.0%	1.8%
Protein	6.55%	7.62%	10.79%	10.01%
Dietary fiber	8.6%	13.6%	14.0%	12.71%
Nitrogen free extract	77.53%	76.15%	73.80%	83.99%

Table 4. Physicochemical Analysis of Nankhatai Samples.

<u>PARAMETERS</u>		<u>BOILED SUNDRY</u>	<u>PEELED SUNDRY</u>	<u>PEELED DEHYDRATE</u>	<u>BOILED DEHYDRATE</u>
TPC (mg GAE/gm)		5.53	6.79	19.53	18.40
DPPH (%)		6.45	7.10	20.90	19.9
COLOUR	L*	63.22	64.10	66.31	65.41
	a*	3.11	3.01	3.32	3.41
	b*	26.15	27.04	27.81	27.40
TEXTURE (N)		0.71	1.51	1.98	0.5
VOLUME (cm3)		1.13	2.17	1.25	2.08
SPREAD RATIO		3.19	3.85	4.60	4.18

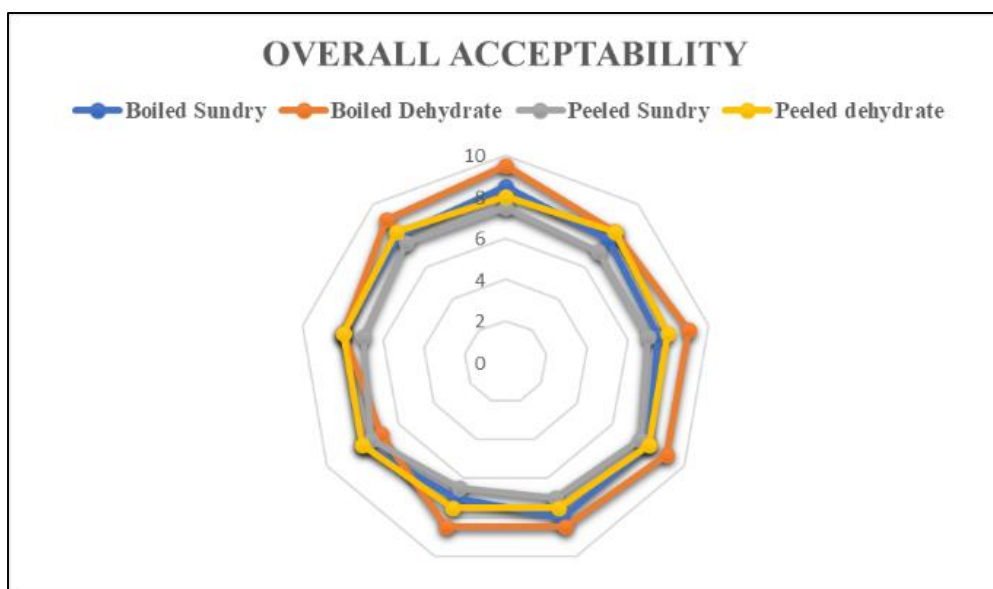


Figure 2. Sensory evaluation of overall acceptability for Nan-khatai incorporated with different potato peel powder sample.

CONCLUSION

Globally, food waste has become a main focus of research in commercial industries. The purpose of the study was the comparative analysis of Potato Peel Powder incorporated in Nankhatai to evaluate the effect of boiled, peeled and drying techniques on product quality. It was concluded that nutritional composition along with consumer acceptability was improved for boiled dehydrated peels containing nankhatai.

Keywords: Jensen Inequality, Concave Utility, Convex Analysis, Expected Utility, Risk Aversion.

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