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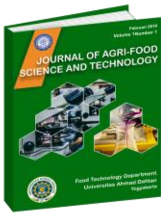

The Substitution of Purslane Weed (*Portulaca oleracea L.*) Flour and Glucomannan Powder on Organoleptic and Proximate Test of Instant Noodles

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ABSTRACT

Instant noodles are a food product that the public highly favors because of their diverse taste, easy presentation, and economical price. Instant noodles cannot be considered whole food because they do not meet the needs of balanced nutrition for the body. Purslane flour (Portulaca oleracea L.) contains macronutrients and micronutrients in the form of carbohydrates, protein, dopamine, potassium salts, tannins, saponins, vitamin A (β-carotene), Vitamin B, Vitamin C, nicotinic acid and natural antioxidants related to fatty acids omega 3 by 44.29%. This study contributed to compare the effectiveness of the substitution of Purslane flour and glucomannan powder on organoleptic test instant noodles. This study was an experiment with a completely randomized design of two-factorial with six treatments including the formulation of purslane flour 25%, 30%, and 35%, while glucomannan formulation of 5%, 10%, 15% with two temperature treatments, 50 °C, and 60 °C. We conducted an organoleptic test with statistical analysis t-test and descriptive. The substitution of purslane flour and glucomannan in instant noodles gave the best organoleptic characteristics in the K2S2 treatment (the formulation of 60% wheat flour, 30% purslane flour, and 10% glucomannan at a drying temperature of 60 °C) with proximate analysis content of 12.26% moisture, 5.53% ash, 5.13% fat, 13.91% protein, and 63.14% carbohydrates.

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1. INTRODUCTION

Instant noodles are a food product that the public highly favors because of their diverse taste, easy presentation, and economical price. Based on World Instant Noodles Association (WINA (World Instant Noodles Association), 2022), Indonesia is one of the world's second-largest instant noodle consumers after China/Hong Kong, with consumption figures reaching 14.260 million. Instant noodles cannot be classified as whole food due to their insufficient provision of balanced nutrition, notably characterized by low levels of protein ranging from

8.5% to 12.5%, alongside deficiencies in essential nutrients like dietary fiber and vitamins (Chowdhury et al., 2020; Lestari et al., 2016). Instant noodles are often criticized as unhealthy because of the adverse effects caused by consuming excess noodles because most instant noodles are made from wheat flour (Adejuwon et al., 2020). Consuming excess noodles can result in an unbalanced supply of nutrients that enter the body, especially malnutrition, dietary issues, and health problems related to nutrients, as well as cardiometabolic disorders like obesity, hypercholesterolemia, and metabolic syndrome (Huh et al., 2018; Qumbisa et al., 2020; Sikander et al., 2017).

Wheat flour in instant noodles has a high carbohydrate and protein content, but the content of vitamins, energy, minerals, and dietary fiber is low (Cindy et al., 2016; Pakhare et al., 2018). One of the efforts to reduce dependence on instant noodles made from wheat flour is to substitute wheat flour with local food ingredients and functional food ingredients to meet consumer nutrition. Purslane plant (*Portulaca oleracea* L.) is one of the wild plants that is considered a weed by the community. Purslane plants can be found easily around the environment. However, people still often think of it as a wild plant that has no benefits. In fact, most people consider it as a weed plant and serve as food for crickets (Irmawati et al., 2017).

Portulaca oleracea L. is an annual herbaceous plant belonging to the genus *Portulaca* and the family *Portulacaceae* characterized by succulent leaves, fleshy stem, small yellow or white flowers, and tiny black seeds (Rahimi et al., 2019). Purslane flour is recognized for its nutritional richness, boasting a wide range of micronutrients and macronutrients crucial for maintaining optimal health and vitality (Bekmirzaev et al., 2021). This plant is particularly abundant in carbohydrates, protein, sterols, and polysaccharides (Farag & Shakour, 2019; Tang et al., 2021). Moreover, Purslane serves as a significant source of omega-3 fatty acids, particularly alpha-linolenic acid (44.29%) and linoleic acid (24.03%) (Hussien, 2016). Additionally, it offers a plethora of vitamins, including vitamin A, C, E, and various B-complex vitamins (Li et al., 2016). Furthermore, purslane contains beneficial compounds like dopamine, potassium salts, tannins, saponins, melatonin, and terpenes (Almasoud & Salem, 2014; Filannino et al., 2017; Mulik et al., 2016). In this study, the inclusion of purslane flour serves the purpose of substituting carbs found in wheat flour. Moreover, it enhances the nutritional value of instant noodles, particularly due to its omega-3 content, making it a healthier meal option.

Instant noodles have chewy characteristics (Obadi & Xu, 2021), so the addition of glucomannan serves to form a chewy texture in food (Takeno et al., 2022). Glucomannan is one of the water-soluble dietary fibers and is a mannan polysaccharide usually obtained from plant tubers such as porang (Alamsyah, 2019; Ren et al., 2016). Glucomannan can be used as a substitute for food formulas because glucomannan has a grinding agent function so that it can be used as an ingredient to bind food products and make food textures supple and elastic (Ayu Sari & Bambang Widjanarko, 2015; Kaya et al., 2015). Therefore, this study analyzed and compared the best formulations of instant noodle products using purslane flour and glucomannan, which were acceptable in organoleptic analysis and Proximate analysis.

2. MATERIALS AND METHODS

2.1. Materials

The study examined purslane flour, glucomannan powder (CV Wikonjac brand), and wheat flour (bogasari cakra kembar brand). Other items utilized comprise of salt (dolphin brand), garlic powder, eggs, and water. The analytical material employed consists of organoleptic test parameters. The equipment utilized for the processing of purslane and glucomannan instant noodles comprises ovens, blenders, and analytical scales. Organoleptic test equipment typically consists of a controlled environment, utensils made of silver, and a flat surface for placing the samples.

2.2. Research Methods

This research is an experimental study in Completely Randomized Design, with two factorial factors, namely the combination of wheat flour: purslane flour: and glucomannan consisting of K1 (70%: 25%: 5%); K2 (60%:30%:10); K3 (70%:25%:5%) and variations in drying temperature S1 (50°C) and S2 (60°C), namely K1S1 (70%:25%:5%); K2S1 (60%:30%:10); K3S1(70%:25%:5%) at various drying temperatures S1 (50 °C) and S2 (60 °C). This research has four stages, namely 1) the process of making purslane flour, 2) making instant noodle formulations, 3) organoleptic testing, and 4) comparative testing on the best treatment from organoleptic tests. The conceptual framework of this research has been presented in Figure 1.

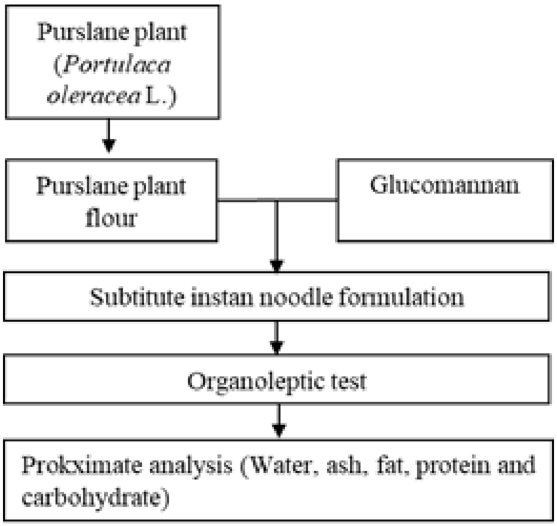

Figure 1. The conceptual framework of this research

2.3. Production of Purslane Flour

Making purslane flour is based on modified study by (Hussien, 2016; Supriatin et al., 2019), wherein fresh purslane was washed and its leaves and stems were removed to be dried in an oven at 50 °C for 14 hours. Subsequently, the dehydrated purslane was blended with a 60-mesh mash filter.

2.4. Instant Noodle Production

The manufacture of instant noodle substitutes using the six treatments listed in Table 1. Mixing the comparison formulations of wheat flour, purslane flour and glucomannan for 100 grams of composite flour with various treatment temperatures of 50 °C (Khatkar & Kaur, 2018) and 60 °C and the addition of other ingredients in Table 2.

Table 1. Treatment of material combinations with variations in temperature.

S \ K	K1	K2	K3
S1	K1S1	K2S1	K3S1
S2	K1S2	K2S2	K3S2

The formulation ratio of wheat flour%: purslane flour%: glucomannan% at temperatures S1 (50 °C) and S2 (60 °C). K1S1 (70%:25%:5%:50 °C), K2S1 (60%:30%:10%:50 °C), K3S1 (50%:35%:15%:50 °C), K1S2 (70%:25%:5%:60 °C), K2S2 (60%:30%:10%:60 °C), and K3S2 (50%:35%:15%:60 °C).

Table 2. Ingredients for making substitute noodles.

Material	K1	K2	K3
Wheat flour (%)	70	60	50
Purslane plant flour (%)	25	30	35
Glucomannan (%)	5	10	15
Salt (g)	2	2	2
Garlic powder (g)	1	1	1
Egg (ml)	10	10	10
Water (ml)	30	30	30

Composition on 100 g Instant noodle substitute composite flour.

2.5. Organoleptic Analysis

After the completion of instant noodle production, a sensory analysis was conducted using hedonic (organoleptic) tests. The method used was a modified version of the research conducted by (Halim et al., 2022; Styaningrum et al., 2023), the tests were carried out randomly on 25 semi-trained panelists who were students of Muhammadiyah University of Surakarta. The panelists were selected based on their age range of 18-21 years and their consumption of noodles at least once a week. They were asked to evaluate and determine several aspects of the hedonic test assessment, such as color, smell, taste, texture and acceptability. The organoleptic tests used were in Table 3.

Table 3. Organoleptic test parameters.

Color	Teste	Odor	Texture	Acceptability	Score
Dark brown	Bland, not tasty	Unpleasant	Not chewy	Do not like	1
Brown green	Not bland, no tasty	A little unpleasant	Less chewy	Do not like it much	2
Army green	Not bland, quite tasty	Normal	Chewy enough	Just like	3
Evening green	Not Bland, tasty	Typical purslane	Springy	Like	4
Red green	Not bland, very tasty	Typical noodles	Very chewy	Really like	5

2.6. Proximate Analysis

2.6.1. Moisture Content Analysis with Thermogravimetric Method

The cup is dried in an oven at 105 °C for 1 hour before cooling in a desiccator for 15 minutes and then weighed to determine its moisture content. Finally, 3 grams of noodles are weighed and placed in the dried cup. The sample (noodles) and cup are then dried in an oven at 105 °C for 6 hours. After cooling for 15 minutes in a desiccator, the cup is weighed again. Finally, the drying process continues until a steady weight is reached. Equation 1 shows the formula for calculating moisture content, which uses the weights (W1, W2, W3, and W4) (AOAC, 1995).

$$Water\ content\ (\%) = \frac{(\mathrm{W2} - \mathrm{W1}) - (\mathrm{W3} - \mathrm{W1})}{(\mathrm{W3} - \mathrm{W1}) - (\mathrm{W4} - \mathrm{W1})} \text{ x } 100\% \quad (1)$$

Description:

W1 = Intial weight of cup (g)
W2 = Weight of cup after drying at 105 °C for 1 hour and cooling in desiccator (g)
W3 = Weight of cup with sample (noodles) after drying at 105 °C for 6 hours and cooling

in desiccator (g)
W4 = Weight of cup with sample (noodles) after further drying until constant weight is obtained (g)

2.6.2. Ash Content with Dry Method

The dry ashing method is used to determine the amount of ash present. The idea behind this examination is to oxidize all organic materials at temperatures as high as 550°C, and then weigh the residue that remains after the process of combustion. The cup that will be used is first dried in an oven set to 100–105 °C for 30 minutes or until a consistent weight is achieved. Following that, it is allowed to cool in a desiccator for half an hour before being weighed (B1). Five grams of the sample are added to the cup, whose weight is known beforehand, and burned on an electric stove or Bunsen burner until no smoke is released. After that, it is put in a muffle furnace and burned at 400 °C until the sample weight doesn't change or it turns to grey ash. After that, the furnace is heated to 550 °C for a period of 12 to 24 hours. The sample is then weighed once again after being chilled for 30 minutes in a desiccator (B2). The ash content value is calculated based on equation (2).

$$Ash\ content\ (\%) = \frac{(B2 - B1)}{5} \text{ x } 100\% \tag{2}$$

Description:
B1 = Initial weight of the cup (g)
B2 = Weight of the cup with ash residue after the burning process (g)

In this formula, we divide the weight of the ash residue (B2−B1) by the weight of the sample (5 g) to normalize the ash content calculation based on the weight of the sample used. We then multiply the result by 100 to express the ash content as a percentage.

2.6.3. Protein Content Analysis with Kjeldahl Method

The first step is to prepare the essential instruments and materials for the decomposition process. Following that, about 2 grams of material are weighed, and 1 gram of selenium is added to the Kjeldahl tube. Next, 20 ml of concentrated sulfuric acid (H_2SO_4) is added to the mixture. The scrubber and speed digester are then activated, and the combination digests for about an hour before cooling. Next, turn on the chiller and leave the Kjeldahl master for roughly 15 minutes. Following that, the process continues with distillation, titration, cleaning, and protein content analysis (AOAC, 1995). The protein content value is calculated based on equation (3).

$$Protein\ content\ (\%) = \frac{(V1 - V2)\ \times N\ \times 0.014\ \times fk\ \times fp}{W} \times 100\% \tag{3}$$

Description:
V1 = The volume of 0.02 N HCl required to titrate the sample is determined
V2 = The volume of HCl used for the blank titration is determined by its normality
N = Normality of HCL
fk = Protein from food in general 6.25
fp = Dilution factor

2.6.4. Fat Content Analysis with Soxhlet Method

The fat content was determined using the Soxhlet technique. The fat flask was dried in an oven at 105 °C, cooled in a desiccator, and weighed. The sample, weighing 5 grams, was wrapped in filter paper and placed in an extraction instrument (Soxhlet) with hexane solvent. Reflux was done for six hours. The fat solvent was then distilled in the fat flask until it was completely evaporated, after which the fat flask was dried in an oven at 105 °C. The flask was then chilled in a desiccator. Drying in the oven continued until a consistent weight was reached. Equation 4 shows the formula for calculating fat content (AOAC, 1995). The fat content value is calculated based on equation (4).

$$Fat\ content\ (\%) = \frac{(Wf - Wi)}{Ws} \times 100\% \tag{4}$$

Description:
Wf = Final weight of fat flask with fat residu (g)
Wi = Intitial weight of flat flask (g)
Ws = Weight of the sample (g)

2.6.5. Carbohydrates Content Analysis with by-Different Method

The carbohydrate content was determined using the by-difference approach. The process entails deducting the percentages of moisture, ash, protein, and fat from 100% in order to ascertain the carbohydrate content (AOAC, 1995). The carbohydrates content value is calculated based on equation (5).

$$\begin{aligned} &Carbohydrates\ content\ (\%) \\ &\quad = 100\% \times (water\ \% + Ash\% + protein\% + fat\%) \end{aligned} \tag{5}$$

3. RESULT AND DISCUSSION

3.1. Organoleptic Analysis

The results of the independent T-test on the mean difference in organoleptic treatment analysis did not have a significant (not significant) effect on the organoleptic test of color, taste, odor, texture and acceptability with an overall assessment of the substitute instant noodle formulation ($p > 0.05$) in Table 4. all organoleptic formulas of instant noodle products substituted with wheat flour, purslane flour and glucosamine powder can be accepted by the panelists.

3.1.1. Color

Color is one indicator of organoleptic properties as an assessment of the quality of a product that affects a person's eating. The original color and dyes influence the color of food products due to chemical processing reactions such as oxidation or caramelization and food coloring. The results of organoleptic tests on instant noodle substitution can be seen in Table 4, that the combination of instant noodle substitution formulations at variations in drying temperature did not have a significant effect ($p>0.05$) on instant noodle substitution. The results of the panelists' preference analysis on the color of the K1S2 instant noodle substitution formulation (70% wheat flour, 25% purslane flour, and 5% glucomannan) at a drying temperature of 60 °C were higher than other instant treatment. The dark color produced in substitute instant noodles is obtained from the addition of purslane flour, which causes the color change to become darker because of the pectin content, which has water-binding properties so that the instant noodles are denser and difficult to penetrate (Simamora & Rossi, 2017; Yahya et al., 2016).

Table 4. Results of organoleptic test analysis.

Parameter	Organoleptic Test Mean Value					
	K1S1 (70%:25%:5 %:50 °C)	K2S1 (60%:30%:1 0%:50 °C)	K3S1 (50%:35%:1 5%:50 °C)	K1S2 (70%:25%:5 %:60 °C)	K2S2 60%:30%:10 %:60 °C)	K3S2 (50%:35% :15%:60 °C)
Color	2.72 ± 1.021[a]	2.80 ± 1.190[a]	2.76 ± 1.422[a]	3.12 ± 1.394[a]	2.72 ± 1.458[a]	2.52 ± 1.327[a]
Taste	2.64 ± 1.319[a]	2.72 ± 0.980[a]	2.76 ± 1.422[a]	3.12 ± 1.054[a]	3.36 ± 1.114[a]	2.80 ± 1.155[a]
Odor	3.16 ± 1.143[a]	3.16 ± 0.943[a]	2.64 ± 1.221[a]	3.20 ± 1.225[a]	3.68 ± 0.988[a]	3.20 ± 1.155[a]
Texture	3.12 ± 1.166[a]	3.28 ± 0.891[a]	3.20 ± 1.041[a]	3.24 ± 1.052[a]	3.16 ± 1.214[a]	3.28 ± 0.936[a]
Acceptabi-lity	3.12 ± 1.166[a]	2.92 ± 1.038[a]	3.00 ± 1.155[a]	3.12 ± 1.236[a]	3.32 ± 0.852[a]	3.24 ± 1.128[a]

Numbers followed by the same letter notation on the same line show no significant difference in ($p > 0.05$).

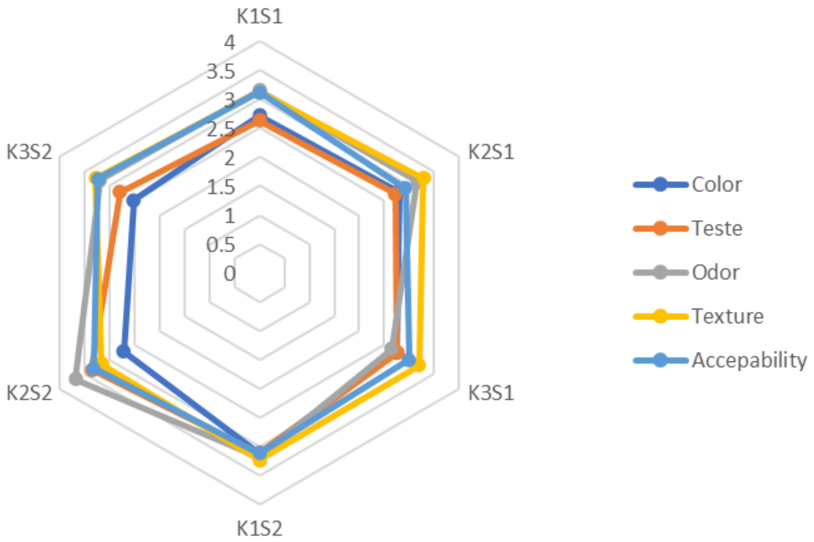

Figure 2. Organoleptic characteristics of instan noodle.

3.1.2. Taste

Taste is an essential indicator of organoleptic characteristics as a consideration for panellists to accept or not a food product. The results of organoleptic analysis on the taste of substituted instant noodles can be seen in Table 4, that the formulation of instant noodles substituted with purslane flour and glucomannan did not have a significant effect ($p > 0.05$) on the taste of noodles. The analysis showed that the panelists' preference for taste in the K2S2 substitution instant noodle formulation (60% wheat flour, 30% purslane flour, and 10% glucomannan) with a drying temperature of 60 °C was higher than the other instant noodle formulas in Figure 2.

3.1.3. Odor

Odor is an essential indicator in assessing the level of acceptance of the delicacy of a food product by panelists to test organoleptic characteristics. The results of the organoleptic test on the odor of substituted instant noodles can be seen in Table 4, that the addition of purslane flour and glucomannan did not have a significant effect ($p > 0.05$) on the odor of substituted instant noodles. The panelists preferred the odor of the instant noodle formulation with K2S2 substitution treatment with K2S2 substitution (60% wheat flour, 30% purslane flour, and 10% glucomannan) with a drying temperature of 60 °C, which was higher than the other instant noodle formulas in Figure 2.

3.1.4. Texture

The texture is an important indicator of the characteristics of instant noodles, high-quality noodles are consistently recognized for their elastic, and chewy texture (Wang et al., 2019). Texture can be assessed from the sensory system through the touch of the hand or the sense of taste when eating by biting and chewing. The results of the organoleptic test on the texture of substituted instant noodles can be seen in Table 4, that the addition of purslane flour and glucomannan has no significant effect ($p > 0.05$) on the texture of substituted instant noodles. The chewy texture of instant noodles substituted with purslane flour and glucomannan is obtained from the addition of glucomannan and the pectin content contained in purslane, which both have properties as water binders and food additives.

3.1.5. Acceptability

Acceptability is a parameter that includes the overall combined organoleptic analysis that represents the panelists' acceptance scores for food products. The results of the organoleptic analysis of acceptability can be seen in Table 4, that the best acceptability of substitute instant noodle formula is in the K2S2 treatment (60% wheat flour, 30% purslane flour, and 10% glucomannan) at a drying temperature of 60 °C compared to other treatments. However, the overall treatment did not significantly differ in the acceptability of the instant noodle formulations substituted with purslane flour and glucomannan with the overall acceptability rating of the treatment "just like."

3.2. Proximate Analysis

Through the results of organoleptic analysis, K2S2 treatment (60% wheat flour, 30% purslane flour, and 10% glucomannan) at a drying temperature of 60 °C was the best acceptability treatment from the panelists. After that, the proximate test (moisture, ash, fat, protein, and carbohydrates) was carried out on the K2S2 treatment so that the results of Table 5.

3.2.1. Moisture Content

The oven temperature in the instant noodle drying process is crucial for altering the moisture content, hence impacting the texture, durability, and nutritional value of the final product. The results of proximate tests on substitute instant noodles with the addition of purslane flour and glucomannan in Table 5 show that the K2S1 (14.36%), K2S2 (12.26%), and K1S2 (11.24%) treatments have a moisture content below 14.5%, which is the maximum limit of SNI standard (3551:2012) for moisture content in instant noodles using the oven drying process. The moisture content of instant noodle products is a significant determinant in evaluating their quality, encompassing biological, physical, and chemical dimensions. The level of moisture content influences the resistance level of the finished product; the higher the moisture content, the lower the resistance level (Anggraini et al., 2023).

3.2.2. Ash Content

According to the findings of Table 5 of this study, the production of instant noodles substituted for purslane flour and glucomannan utilizing temperature changes of 50°C and 60°C yields ash levels ranging from 5.50% to 7.65%. The ash content in this study was higher than the average ash content, which is between 1-2%. However, there have been various studies on developing instant noodle substitutes with an ash concentration of more than 2%, such as research (Nawaz et al., 2023) on instant noodle alternatives for Sweet Potato Flour, which yielded ash contents ranging from 4.65% to 5.80%. Aside from that, the SNI standard (3551:2012) contains no minimum or maximum restrictions for the ash content of instant noodles.

High ash level in instant noodles may suggest the presence of additional minerals and non-organic components in the product. Ash is a mineral element that remains after the substance has been burned and is carbon free. Ash content can alternatively be regarded as a component that does not readily evaporate and remains behind in the combustion and incandescence of organic molecules. The drying process has an impact on this; the longer the time and higher the temperature, the lower the ash content. Food processing will reduce mineral content for a variety of reasons, including drying heat (Anggraini et al., 2023).

Table 5. Result of proximate content.

Parameter	Proximate test mean value					
	K1S1 (70%:25%: 5%:50 °C)	K2S1 (60%:30%: 10%:50 °C)	K3S1 (50%:35%: 15%:50 °C)	K1S2 (70%:25%: 5%:60 °C)	K2S2 60%:30% :10%:60 °C)	K3S2 (50%:35% :15%:60 °C)
Moisture	14.52 ± 0.007[a]	14.36 ± 0.021[a]	23.57 ± 0.042[b**]	11.24 ± 0.049[c*]	12.26 ± 0.219[d]	17.83 ± 0.091[e]
Ash	6.78 ± 0.042[a]	6.93 ± 0.028[a]	7.52 ± 0.113[b**]	5.50 ± 0.042[c*]	5.53 ± 0.113[c]	7.05 ± 0.141[b]
Fat	5.24 ± 0.021[a]	5.35 ± 0.014[a**]	3.93 ± 0.155[b*]	4.29 ± 0.070[b]	5.13 ± 0.021[a]	4.20 ± 0.353[b]
Protein	13.21 ± 0.23[b]	10.64 ± 0.62[a*]	11.07 ± 0.01[a]	14.25 ± 0.56[b**]	13.91 ± 0.42[b]	11.24 ± 0.62[a]
Carbohyd rates	53.91 ± 0.32[a]	60.24 ± 0.17[b*]	62.73 ± 0.55[c]	58.80 ± 1.03[d]	63.16 ± 0.11[d]	64.72 ± 0.54[e**]

Mean ± The standard deviation of the treatment of wheat flour formulation, specifically involving purslane flour and glucomannan at the drying temperature, is being discussed. If the average value followed by the same letter in the column is seen, it suggests that the treatments do not differ significantly (P>0.05).

3.2.3. Fat Content

This study discovered that the fat content ranged from 3.93% to 5.35%. There was no significant difference (p> 0.05) among treatments K1S1, K2S1, and K2S2. Meanwhile, treatment K3S1 showed no significant difference between K1S2 and K3S2. According to the SNI standard (3551: 2012), there is currently no precise restriction for fat content in instant noodles. However, this study produced a greater fat content than (Kumalasari et al., 2022), which varied from 0,42%-1.34% while utilizing the same oven drying process for instant noodles. Furthermore, the inconsistent fat content results in this study are thought to be caused by external influences, such as the use of cooking oil to coat the noodle shape machine, which could affect the consistency of the research findings.

3.2.4. Protein Content

Based on the findings of Table 5 of this study, manufacturing instant noodles with the substitution of purslane flour and glucomannan at temperature changes of 50°C and 60°C results in a protein content varying from 10.64% to 14.25%. These findings show that this study complies with SNI requirements (3551:2012), which specify a minimum protein content of 8% in instant noodles. Aside from that, the SNI standard (3551:2012) has no maximum requirement for the protein content of instant noodles. This study produced significantly lower protein content than another study (Pongpichaiudom & Songsermpong, 2018), which achieved 14.55% protein content in microwave-dried instant noodles. However, the results of this study are higher when compared to the results of research (Putera & Adi, 2021) on Instant Noodle Substitution using 28% Pineapple Stem Flour and 7% Red Kidney Bean Flour, which generates 11.2% protein content in a 100 g piece of instant noodles.

3.2.5. Carbohydrates Content

Table 5 shows the carbohydrate content of instant noodles in this study, which ranged from 53.91% to 64.72%. The instant noodles with the lowest carbohydrate content were identified in treatment K1S1 (53.91%), while treatment K3S2 had the highest carbohydrate level. Based on the findings of this study, the carbohydrate content rose as the treatment component changed from K1 to K2. This increase in carbohydrate content could be ascribed to differences in the composition of added substitutes such as purslane flour and glucomannan, which include carbs, polysaccharides, and pectin adequate to replace the carbohydrates found in wheat flour. These findings are similar with prior research (Nawaz et al., 2023), which showed that substituting sweet potato flour increased carbohydrate content from 68.35% to 69.96%. Furthermore, this study suggests that when temperature variations increase, so does the carbohydrate content of instant noodles. These findings are consistent with (Pongpichaiudom & Songsermpong, 2018) research, which suggests that temperature can affect carbohydrate content in food because high temperatures can cause starch gelatinization, which alters the carbohydrate structure in food and increases the availability of carbohydrates for digestion and absorption by the body.

4. CONCLUSIONS

The substitution of purslane flour and glucomannan in instant noodles gave the best organoleptic characteristics in the K2S2 treatment, namely the formulation of 60% wheat flour, 30% purslane flour, and 10% glucomannan at a drying temperature of 60 °C with a proximate content of 12.26% moisture, 5.53% ash, 5.13% fat, 13.91% protein, and 63.14% carbohydrates. This best formulation has the potential to be developed in the Omega-3 content test and can be mass-produced at the industrial and household levels by oven-drying and frying methods.

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