IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 2, October 2026
Impact Factor: 8.2

Development and Acceptability of Alugbati (Basella alba)-Based Seasoning

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Abstract: *This study developed an Alugbati (Basella alba)-based seasoning and compared the sensory acceptability of three formulations. A developmental-descriptive design was implemented at the Food Technology Innovation Center of Surigao del Norte State University. A purposively selected panel of 120 respondents (20 food technology faculty, staff, or experts and 100 students) evaluated color, aroma, flavor, saltiness, texture, and composite appeal using a nine-point hedonic scale. Mean scores and standard deviations were calculated, and one-way analysis of variance with pairwise comparisons was used to evaluate formulation differences at the 0.05 level. All three formulations received generally favorable acceptability scores. Formulation C had the highest composite-appeal mean (7.17), followed by B (7.08) and A (6.78). Significant formulation differences were reported for aroma ($F = 5.38$, $p = 0.01$) and composite appeal ($F = 4.76$, $p = 0.01$), but not for the other four attributes. Acceptability of Formulation C did not differ significantly by age or sex. Per 5-g serving, Formulation C contained 20 kcal, 3 g carbohydrate, 1 g protein, and 0 g fat. The findings support further optimization of Alugbati seasoning, particularly its aroma, and additional shelf-life and food-safety testing prior to commercialization.*

Keywords: Alugbati; Basella alba; plant-based seasoning; sensory acceptability; food product development

I. INTRODUCTION

Interest in value-added foods prepared from locally available plant ingredients has increased alongside demand for products with recognizable ingredients and desirable sensory quality. Alugbati (Basella alba), a leafy vegetable widely grown in the Philippines, contains nutrients and phytochemicals that make it a candidate for incorporation into processed foods. Reviews of Basella alba describe the plant as an underutilized edible leafy vegetable with food-development potential [1], [2]. The transformation of its perishable leaves into powder could enable incorporation into convenient seasonings while increasing options for local agricultural utilization.

Existing work on leafy vegetable powders supports the technical rationale for such development. Dehydration is commonly used to reduce the moisture of leafy vegetables before storage and processing [3]. Powder functionality also depends on particle characteristics; work on powdered foods has described the effect of particle size on flowability and rehydration [4]. Importantly, the incorporation of Alugbati leaves into food products is not entirely new. Soriano et al. [5] examined Alugbati leaf powder as an ingredient for fresh egg noodles, providing an example of value addition through product fortification. However, evidence specific to Alugbati-based seasoning formulations and their sensory acceptability remains limited in the manuscript literature reviewed.

Additional research provides context for product processing. Research on Basella alba documents medicinal use, morphological differences, and mucilage properties [6], [7], [8], but does not substantiate health claims for the seasoning. Studies of spinach drying and leafy-vegetable enrichment of pasta, noodles, and biscuits show related food-processing applications [9], [10], [11], [12], [13]. Work on vegetable nutritional quality, carotenoids, antioxidants, drying, and vegetable-fiber systems also informs product evaluation [14], [15], [16], [17], [18]. These reports support direct analysis of the finished seasoning rather than assumptions about nutrient retention or efficacy.

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DOI: 10.48175/IJARSCT-38840

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Sensory performance is especially important for a seasoning, because a product can be nutritious or locally sourced yet unacceptable when its color, aroma, flavor, salinity, or texture differs from consumer expectations. Dried leafy material may impart characteristic plant notes, while the added garlic, onion, pepper, and salt alter the flavor balance. A controlled comparison of formulations is therefore needed before pilot-scale production. This study aimed to (1) describe the sensory characteristics and acceptability of three Alugbati seasoning formulations; (2) test for differences in acceptability across formulations; (3) examine the acceptability of the preferred formulation by respondent profile; and (4) describe the nutritional composition of that formulation.

II. METHODOLOGY

Research design and setting

The research used a developmental design with descriptive and exploratory components. Product formulation, expert critiquing, and consumer acceptability assessment were undertaken at the Food Technology Innovation Center of Surigao del Norte State University, Surigao City, Philippines. The design evaluated formulated seasoning products rather than clinical effects or long-term storage performance.

Seasoning preparation and formulations

Fresh Alugbati leaves were selected, washed, oven-dried at 50–60°C, ground, and sieved into fine powder. Garlic and onion were similarly processed as powders, after which the dried ingredients were mixed and packed in airtight sachets. The source manuscript reports a nominal blend containing 2.00 g Alugbati powder, 0.75 g garlic powder, 0.05 g onion powder, 1.00 g salt, and 0.25 g white pepper. Three formulations were prepared at reported relative Alugbati levels of 100%, 50%, and 25%, with other ingredients held constant. Exact ingredient weights for each of the three variants were not separately tabulated in the source and should be confirmed for reproducibility.

Respondents and measurement

Purposive sampling yielded 120 evaluators: 20 food technology faculty, staff members, or experts (16.7%) and 100 students (83.3%). Participants were oriented to the procedure, provided coded samples, and asked to rinse their mouths between samples. A sensory evaluation instrument incorporated descriptive ratings and a nine-point hedonic acceptability scale (1 = dislike extremely; 9 = like extremely). Attributes included color, aroma, flavor, saltiness, texture, and composite appeal. The preferred formulation underwent nutritional assessment, reported on a 5-g serving basis.

Data analysis and ethics

Frequencies and percentages summarized respondent characteristics. Mean and standard deviation described the sensory ratings. One-way analysis of variance (ANOVA), followed by reported Scheffé pairwise comparisons, tested differences among formulations at $\alpha = 0.05$; the manuscript also reported group comparisons for the acceptability of Formulation C by age and sex. The researchers reported institutional permission or clearance, informed consent, confidentiality measures, sanitation practices, and disclosure of ingredients and possible food allergies.

III. RESULTS AND DISCUSSION

Sensory characteristics and acceptability

Descriptive evaluation characterized Formulations A and B as greenish brown and Formulation C as medium green. Aroma and flavor were described as distinctly savory for all variants. Formulation A was rated moderately salty, whereas B and C were described as having a more balanced, “just right” level of saltiness. These characteristics suggest that reductions or changes in the Alugbati component affected appearance and salt perception, although the descriptive scores alone do not establish a preferred formulation.

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TABLE I: SENSORY ACCEPTABILITY OF ALUGBATI-BASED SEASONING (MEAN ± SD; NINE-POINT SCALE)

Attribute	A	B	C
Color	6.62 ± 1.54	6.73 ± 1.69	6.76 ± 1.48
Aroma	6.20 ± 1.86	6.44 ± 1.72	6.68 ± 1.64
Flavor	6.26 ± 1.96	6.44 ± 1.85	6.65 ± 1.69
Saltiness	6.50 ± 1.64	6.83 ± 1.62	6.87 ± 1.60
Texture	6.75 ± 1.40	6.79 ± 1.49	7.00 ± 1.35
Composite appeal	6.78 ± 1.64	7.08 ± 1.51	7.17 ± 1.49

Table I shows that mean ratings ranged from 6.20 to 7.17 on the nine-point scale. Formulation C produced the highest mean for every measured acceptability attribute, although the differences were not necessarily statistically significant. Composite appeal ranked C first (7.17), B second (7.08), and A third (6.78). The lowest ratings across variants concerned aroma (6.20–6.68), indicating that aroma improvement may be more consequential than further changes to color or texture. Descriptive differences should be interpreted against the inferential findings rather than treated as proof of superiority.

Statistical comparison of formulations

TABLE II: ONE-WAY ANALYSIS OF VARIANCE FOR ACCEPTABILITY ACROSS THE THREE FORMULATIONS

Attribute	F	p value	Interpretation
Color	0.44	0.64	Not significant
Aroma	5.38	0.01	Significant
Flavor	2.90	0.06	Not significant
Saltiness	3.03	0.06	Not significant
Texture	2.19	0.11	Not significant
Composite appeal	4.76	0.01	Significant

As shown in Table II, aroma and composite appeal varied significantly among the three formulations (both reported $p = 0.01$), whereas color, flavor, saltiness, and texture did not ($p > 0.05$). The reported pairwise analysis specifically identified differences between A and C for aroma (mean difference $A - C = -0.483$, $p = 0.006$) and composite appeal ($A - C = -0.392$, $p = 0.022$). Comparisons between A and B and between B and C were not statistically significant for these outcomes. Thus, the strongest supported inference is that C performed better than A for aroma and composite appeal; its numerical advantage over B is descriptive, not a demonstrated significant difference.

Acceptability according to respondent profile

Age-group and sex-group comparisons of Formulation C were nonsignificant for all six attributes (age: $p = 0.36–1.00$; sex: $p = 0.49–0.79$). These results indicate no detected subgroup differences within the sample, but do not establish equivalent acceptance across the general population because the evaluators were purposively recruited and predominantly university students. Although the original stated objectives also referred to civil status and educational attainment, the supplied table contains test results only for age and sex.

Nutritional composition and product implications

TABLE III: REPORTED NUTRITIONAL COMPOSITION OF FORMULATION C PER 5-G SERVING

Nutrient	Quantity
Energy	20 kcal
Total fat	0 g
Carbohydrate	3 g

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Nutrient	Quantity
Protein	1 g

The nutritional data in Table III describe a small serving with minimal fat and modest carbohydrate and protein contributions. Although the formulation is plant-based, the reported analysis does not by itself establish antioxidant activity, micronutrient adequacy, a sodium advantage over commercial products, or a particular health benefit. Such claims would require verified nutrient, phytochemical, sodium, and comparative analyses. Moreover, storage stability and microbial safety were not established by the sensory and nutritional tests reported here. The findings instead provide an initial basis for refining a locally sourced seasoning and designing follow-up shelf-life, sodium, safety, and market studies.

IV. CONCLUSION

All three Alugbati (Basella alba)-based seasoning formulations received generally favorable sensory ratings from the 120 evaluators. Formulation C had the highest descriptive mean composite appeal (7.17) and showed significantly better aroma and composite appeal than Formulation A in the reported pairwise tests. Color, flavor, saltiness, and texture did not differ significantly among the variants, and no significant age- or sex-related differences in Formulation C acceptability were detected. A 5-g serving of the preferred formulation was reported to provide 20 kcal, 3 g carbohydrate, 1 g protein, and no fat. The product merits further development, with priority given to aroma optimization, standardization of formulation ratios, independent verification of chemical and nutritional results, and assessment of sodium content, microbiological safety, shelf life, and consumer acceptance in more representative samples before commercial claims are made.

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