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Panlasang Pinoy: Development and acceptability of authentic Filipino seasoning using anchovy (*Engraulis* spp.)

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Abstract

The study aimed to provide an organically made seasoning that the ingredients used upon development can be found in the Philippines. Since the food enhancer is made with natural spices and ingredients, this can assure the aromatic scent, rich flavor, and nutritious food enhancer compared to manufactured flavoring. This could be substitute to the wide use of Monosodium Glutamate in the Philippines. The study focuses on identifying the microbiological, physicochemical, and sensory evaluation of the proposed product. The microbial analysis with the parameters of identifying the Standard Plate Count of 4,100 CFU/g, which is comparable to <104 or less than 10,000 CFU/g in numerical terms. Anchovy Mix contains 20 CFU/g of yeast and mold using the Petrifilm technique, indicating that the product has minimal pathogenic growth and passed the evaluation of detecting the high risk of fungal growth. Sensory evaluation was undertaken to assess the acceptability of the created product, Anchovy Mix, with a total of 40 responses from randomly chosen end-users and 10 are professional food expert. Anchovy mix gathered descriptive evaluation of Extremely Like with a total of 8.57 overall acceptability from 40 responses, therefore it is concluded that the product is safe to consume.

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Introduction

Anchovy, also known by its scientific name Engraulidae or Filipino name Dilis, is a species of fish that can find worldwide. Based on the article of Animal Network Team (2018), scientists acknowledge one hundred and forty species of anchovy. A not relatively small type of fish mostly swims as a group and has a bluish-green or whitish color when still alive and a brownish or whitish color as it dries. Dilis or anchovies can be processed in different ways like it could be processed through sun drying or curing with smoke or salt, fermented, or processed as fish sauce or shrimp paste. Anchovy, when dried, has this salty taste like the sea, yet there is a distinct taste compared to salt, as well as various health advantages because it is a high source of Vitamins A and D and rich in Omega 3 fatty acids. Good source of Vitamins A and D. For most utilization, anchovies are widely used in preparing food, especially partnered with vegetables.

The Engraulidae family of forage fish includes small, silver-colored anchovies. They range from 2 to 40 cm or 1 to 15.5 inches. They are tasty and healthy despite their small. They are frequently used sparingly and are particularly well-liked in the Mediterranean diet, where they are used in various meals (Lang, 2021). Anchovies are little fish that may find in temperate ocean areas worldwide. They are typically used as a flavoring or garnish in food. Anchovies are a popular kind of fish that's been widely used to savor different dishes by just using a small amount of it. It is an excellent addition as it adds a salty, meaty, in short, umami taste. Umami taste has been one of the most popular favorite kinds of taste.

The study's general objective is to develop authentic Filipino seasoning using anchovy as its main ingredient. Specifically, this study aims to formulate dilis, onion, garlic, and pepper as Anchovy Mix, process Anchovy Mix using Homogenous Mixture Dehydration with the help of an oven to catalyze the drying process, test and analyze Anchovy Mix using Microbial Testing, Physicochemical Analysis, and Moisture Analysis, design packaging material and labeling for Anchovy Mix and lastly, evaluate the acceptability of Anchovy mix using 9-Point Hedonic Scale.

More than 100 species of anchovies may find in the Pacific, Atlantic, and Indian oceans. They are tiny saltwater forage fish. Because anchovies are directly captured in the wild, they are protected from the harmful chemicals introduced to other fish species for food production. Anchovies are, therefore, extremely sustainable as a result. According to (John, 2021), they breed swiftly and live for three to four years. One readily available marine product renowned for its high calcium concentration is anchovies. In Manila Bay, an experimental trawl fishing study was carried out. Species composition, distribution, and exploitation of dominating species were all examined in the analysis of captures. During the survey period, 146 fish and invertebrate species from 48 families were identified, with small pelagic species like anchovies and sardines accounting for most of the captures. *Sardinella gibbose*, *Sardinella fimbriata*, *Valmugil Saheli*, *Mugil cephalus*, *Encrasicholina devisi*, and *Stolephorus commersonii* had the highest rates of exploitation (E) among the six (6) prominent species (Prez, 2016).

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As more and more of the tourist industry's supply side seeks to integrate sustainable practices, going green is becoming recognized as a beneficial competitive strategy in the food sector (Baluyot, 2024). In the Philippines, several species of anchovy thrive in the country's beautiful waters, but in some conditions, these small, peculiar fish is widely distributed differently because of what you call "hydrographic condition" where they can multiply safely and sound. Anchovies can come in different sizes, but the most dominant species or the most used species of anchovy cultivated by the people from now and back then is the *Stolephorus* anchovy, also known as Dulong or Lobo-Lobo, that are primarily found in Sorsogon and

other places of region five or Bicol region. As mentioned in the work of Alba *et al.* (2016) in Sorsogon Bay, Philippines, this was the most dominant Species. But there are additional species termed *Stolephorus* ssp. that is also employed in drying besides Dulong or Stolephorid. In the study of Hata *et al.* (2016), that is bigger and has transparent skin with silvery lines on its body. In the Philippines, a group of tiny fish captured in fine-mesh nets is called *Stolephorus Ronquillo Dulong* (Table 1).

Table 1. List of top 20 Species recorded from 2014 to 2015 trawl fishing in Manila Bay

Species	Biomass (kg/km²)	RA (%)
Encrasicholina devisi	59.85	15.23
Sardinella gibbosa	51.16	13.02
Sardinella frimbiata	40.25	10.25
Rhabdamia cypselurus	39.63	10.09
Sardinella lemuru	25.69	6.54
Photololigo edulis	23.70	6.03
Johnius belangerii	19.77	5.03
Lagocephalus lagocephalus	16.24	4.13
Mugil cephalus	15.98	4.07
Valanugil seheli	11.53	2.93
Stolephorus commersonii	6.78	1.73
Tylosurus crucodilus	6.55	1.67
Trichiurus lepturus	6.34	1.61
Arius maculatus	5.86	1.49
Eleuteronematetradactylum	5.42	1.38
Leiognathus equulus	4.83	1.23
Megalops cyprinoides	3.63	0.92
Mene maculate	3.53	0.90
Parastromateus niger	3.38	0.86
Stolephorus indicus	3.31	0.84
Other Species (126)	39.43	10.04
Total		100.00

RA=Relative Abundance

Source: Bendaño *et al.,* 2017 (The Philippine Journal of Fisheries)

Including anchovies in a diet can help maintain a smooth complexion, prevent breakouts, and even decrease the chances of developing wrinkles related to premature aging. Furthermore, nutritionists recommend it to prevent atherosclerosis, diabetes, and rickets. It is served to children in preschool and school institutions, which proves its safety and benefits. Species like anchovy or sardine also act as food quality enhancers and preservatives (Ramirez *et al.*, 2021). Kikunae Ikeda, a scientist from Japan, attempted to comprehend what gave dashi soup its distinctive flavor in 1908. Ikeda described umami, or "deliciousness" in Japanese, as the "fifth flavor." Anchovies, truffles, tomatoes, and scallops are just a few foods that naturally contain glutamic acid, the amino acid that gives food its umami flavor (Culinary Inst., 2020). In addition, monosodium glutamate is a common food ingredient. Anchovies are one example of a fish with low glutamate content. Anchovies provide 630 mg of glutamate per 100 grams (Brennan, 2020).

Anchovies are nose-turners, but many chefs use them as a secret ingredient to enrich flavors. This little fish packs different flavors, such as sweet, sour, bitter, and salty. The fifth flavor, known as umami, provides multiple layers of savory taste to a dish and makes it more appealing (Baxter, 2021). Anchovies are the easiest way to inject an umami taste into dishes (Waverman, 2019). As stated in the study by Nast (2019), anchovy does not taste fishy or like the sea. When the anchovy is converted into powder, it becomes easy to incorporate into dishes and dissolve as there is no added anchovy, and it adds more flavor due to its promised umami taste that makes the food distinct. Obsession with anchovies may stem from scientists' and food experts' belief that they have a fifth taste. Anchovies are another substitute for getting monosodium glutamate in the kitchen. In addition to that, dried anchovy fish is one of the famous traditional fish products, which can be added to curries and pickles because of their intense flavor (Aniesrani, 2022).

Anchovies have a wealth of vitamins and minerals that are incredibly beneficial to health. These are most well-known for being a source of omega-3 fatty acids, which support heart and brain health (Table 2). Additionally, anchovies contain selenium, which may lower the risk of several cancers if consumed often. Enjoy them in various recipes and dishes, fueling and enhancing the mind (Lang, 2021). Aside from being a great and flavorful addition to different dishes, it also holds the key to unlocking some unexpected health benefits that can cure and avoid such significant health risks and problems. Though, excessive intake of anchovies might also result

in some health problems as it is high in sodium, especially if it has been cured or dried. That is why it has been claimed that just a tiny amount is already enough to season a dish. Furthermore, it claimed that now and then, these tiny fish can also be a great source of protein, vitamins, and such for a healthier diet. Occasional consumption of dishes from this fish has a beneficial effect on the Cardiovascular, Digestive, and Nervous Systems. It offers an excellent source of protein, healthy fats, vitamins, and minerals, a crucial building block used within your body to repair tissues, create muscle mass, and boost metabolism. Anchovies are also rich in vitamin A, which can help you reduce the appearance of eye degradation and muscular degradation, as well as cataracts (Joseph, 2019).

Table 2. Nutritive value of anchovy

Principle	Nutrient value	Percent of RDA
Energy	131 Kcal	6.5%
Calories	95 g	--
Carbohydrates	0 g	0%
Protein	20.35 g	36%
Total Fat	4.84 g	42%
Cholesterol	0 mg	0%
Dietary Fiber	0.5 g	1%
Vitamins		
Folates	9 µg	2%
Niacin	14.02 mg	88%
Pyridoxine	0.143 mg	11%
Riboflavin	0.256 mg	20%
Thiamin	0.055 mg	5%
Vitamin-A	50 IU	1.6%
Vitamin-B12	16% Daily	
Value		
Vitamin-C	0 mg	0%
Vitamin-D	69 IU	17%
Vitamin-E	0.57 mg	7%
Vitamin-K	0.1 µg	4%
Electrolytes		
Sodium	104 mg	7%
Potassium	383 mg	8%
Minerals		
Calcium	147 mg	15%
Iron	3.25 mg	40%
Magnesium	41 mg	10%
Phosphorus	174 mg	25%
Zinc	1.72 mg	16%
Omega-3 fatty acids (PUFA)		
EPA (20:5 n-3)	0.538 g	--
DPA (22:5 n-3)	0.029 g	--
DHA (22:6 n-3)	0.911 g	--

Source: Day and Golding (2016)

One of the best fish options is anchovies, as mentioned in the article Advice from the Environmental Working Group because they are low in mercury and high in omega three. And based on World Health Organization, the tolerable upper limit of mercury in food is 0.5 milligram /kilogram of fish. Because anchovies are small, they are at the bottom of the food chain and do not accumulate significant mercury levels. These little fish's strength is their salty funkiness. Furthermore, when dissolved in a sauce or emulsified into a dressing, anchovies have a rich, umami flavor that adds a layer of complexity. (Joseph, 2019).

Materials and methods

This section of the paper reiterates the input process of the Conceptual Model used in the study. It includes scientific analyses such as Microbial Analysis, Moisture Analysis, Histamine, and Physicochemical Analysis. And systematic approaches such as formulating testing, designing packaging, labeling, and evaluating the product in gathering information on the proposed study. The raw materials used are anchovy, garlic, onion, and pepper. Additionally, the equipment or utensils used in generating the prototype of the project are a rice winnower, oven, grinder, and sifter. The study has different processes such formulating the prototype product, testing using scientific measures like Microbial Analysis, Physicochemical Analysis, Moisture Analysis, and Histamine Analysis. Formulating design for the product and labeling for product information. The formulation of the product and its final output undergone the evaluation to know and understand the acceptability of the development of the study. The conceptual Model shows how the researchers utilized the resources and acquired knowledge in formulating and understanding the procedure needed to fulfill the study's goals that embody the holistic output of the proposed body of knowledge which is the Anchovy Mix.

The development of Anchovy Mix was introduced to create a new variety of seasoning mix.

The fundamental ingredient is one of the country's primary products, precisely anchovy. This developed product has undergone the process of both sun and oven drying to help thoroughly dry the fish and utilizes a food grinder to make the crispy dried fish into a well-powdered substance and highly soluble when added to water while cooking and may not affect the texture of food when added to ready to eat kind of food. The product is expected to help improve one's appetite in eating, especially for children who do not like to eat vegetables. Part of this expectation, researchers guaranteed the quality and safeness of the product consumption as it has undergone different analyses such as Microbial, Physicochemical, and Histamine Analysis, and each analysis showed promising results for the product.

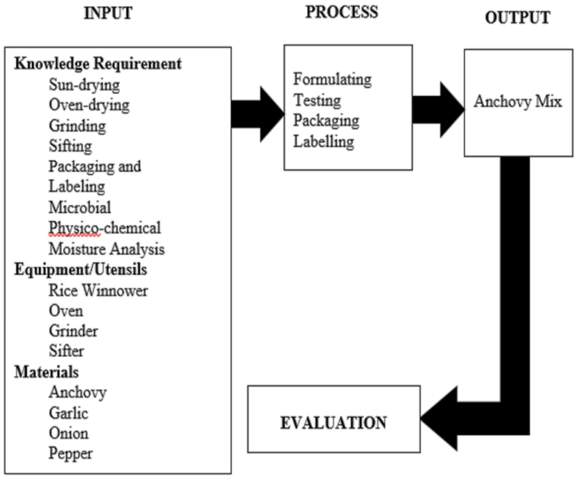

Fig. 1. Conceptual model of the study

Results and discussion

The primary analysis used was the microbial analysis with the parameters of identifying the Standard Plate Count of 4,100 CFU/g, comparable to <104 or less than 10,000 CFU/g in numerical terms. The approved Standard Plate Count for raw fish or fermented food should be less than or equal to 106-107 CFU/g. Anchovy Mix, on the other hand, which has undergone a different drying technique, is predicted to have low biotic growth and must and should not exceed 104 CFU/g. More specifically, Anchovy Mix passed the Standard Plate Count for Category 3 (RTE) with a tolerable range of 103 and a marginal of 103-105 CFU/g, as well as Category 4 (Salted Fish/Dried Food), which is not relevant at all. Coliform and *Escherichia coli* (*E. coli*) were negative, indicating no biological threats. Molds for non-ready-to-eat and ready-to-eat food with an appropriate number of microorganisms established by a specified method must be limited to 102.CFU/g. Anchovy Mix contains 20 CFU/g of yeast and mold using the Petrifilm technique, indicating that the product has minimal pathogenic growth and passed the evaluation of detecting the high risk of fungal growth.

Additionally, The BAM Method yielded a negative result in identifying *Vibrio parahaemolyticus* in 50 grams. The physicochemical examination of the Anchovy Mix shows that the ash analysis using the Gravimetric Method reveals that the ultimate weight of the product after the procedure is 46.83 grams. The Kjeldahl Method yields 34.60 grams of crude protein. Using the Gas Chromatography Method, the cholesterol was found to be 219.02 mg or 0.219 grams. According to John DeBeer, a level of 50 ppm or less is typical and acceptable for eating, whereas food exceeding 50 ppm is dangerous and may be poisonous for ingestion. The Moisture Content of the Anchovy Mix was determined using Standard Drying and a Moisture Analyzer. The average drying temperature was 105 degrees Celsius for roughly 10 minutes, with a starting weight of 3.00g± 0.50g. The highest acceptable moisture range was 10%. To make it easier to understand, the Anchovy Mix passed the Moisture Analysis with 5.90% moisture after drying.

A sensory assessment was undertaken to assess the acceptability of the created product, Anchovy Mix, with a total of 40 respondents from randomly chosen respondents, with 10 of these respondents being professionals in the handling of food goods. Of the 40 respondents, Aroma received a mean score of 8.43, with the corresponding outcome of Like Very Much. Color has a Like Extremely rating of 8.65. Taste of 8.73 with Extremely Like. Texture received an 8.55 with a Like Extremely result, while General Acceptability received an 8.68 with a

Like Extremely result. And for the ten professional respondents, it was stated that 8.9 mean scores from respondents claimed that they liked the product very much based on its Aroma, an 8.1 mean score for color showed that the respondents liked the product very much, 7.9 liked the taste of the product very much, 8.3 mean scores liked the texture of the product very much, and 8.5 mean scores liked the general acceptability of the product very much. The findings of 30 responses from randomly selected samples were summarized. The Aroma had a mean of 8.26 and a matching outcome of Like Very Much. Color has a rating of 8.6, the taste has a rating of 8.73, texture has a rating of 8.6, and General Acceptability has a rating of 8.73.

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