PROXIMATE COMPOSITION OF A BRACKISHWATER ALGA

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Most algae are highly useful plants. They are the primary source of food for animal life in aquatic environments. Because of their photosynthetic activities, they oxygenate water in their immediate surroundings as well as provide organic compounds, such as polysaccharides, amino acids, DNA, enzymes and other related substances. These compounds are then used by organisms like the corals which give exudates that are eaten by fish.

About 80 species of marine algae have been an important part of the food of Oriental people. Most of these are the red and brown algae. Locally, the green and brown ones are more popular than the red species. A few algae provide substances such as hydrocolloids and agar for various food and medicinal preparations.

In Scotland, and Chile, certain marine algae have been used as fodder for cattle and sheep and others as feeds supplement for hogs and poultry.

In Ireland, coarse algae have been used as soil conditioner and fertilizer.

The blue-green algae have been found to fix elemental (gaseous) nitrogen, thus improving the fertility of water.

An examination of studies made on algae reveals that researches on algae all over the world have been focused on marine and freshwater species. Researches on brackishwater algae have been limited and that an alga of this class might be found to be of economic significance has not been studied. This alga belongs to a division *Chlorophyta* (grass-green algae), class *Charophyceae,* general *Chara* (Fig. 1). The Charophycae has erect branched thallus differentiated into a regular succession of nodes and internodes. Each node bears a whorl of branches of limited growth (the "leaves") but branches capable of unlimited growth may arise axilliary to the leaves. This minute, rootless green plant which is locally known as "lumot" gives the appearances of a mass of green carpeting in fish ponds. It grows so thick that fishpond owners thin it out occasionally. However, aside from being a source of food for fish, it also affords excellent cover to young fishes and is very good for spawning the surface egg-layers. When exposed to excessive sunlight, its color changes from green to brown to black depending upon its degree of exposure.

Fig. 1

Experimental Procedures

1. Sample Preparation

Samples of the plant were collected from a fishpond in

Lala, Lanao del Norte. A part of the samples was dried under the sun for three days and then sealed in a container. Another portion was dried for eight hours in an oven maintained at 100-110°C and placed in a dessicator. A third portion was kept fresh by placing it in an air-tight container in a refrigerator.

2. Analyses

The water, ash, fat, fiber and protein contents were determined using the conventional methods of analyses: toluene, straight ash combustion, Soxhlet extraction, sulfuric acid-sodium hydroxide digestions, and Kjedahl-Gunning methods, respectively.

In the determination of water content by the toluene method, a certain amount of sample was boiled with toluene. Water vaporized with toluene and condensed back through a reflux condenser. From the volume of water collected and corresponding density was calculated the percentage of water.

Crude fat was determined by extraction with petroleum ether using a Soxhlet extraction setup for about 16 hours. The percentage of fat was calculated from the loss in weight of the sample.

The amount of crude fiber was determined by digestion of a given quantity of sample, first with sulfuric acid solution and then with sodium hydroxide. The residue from the digestion processes after being washed with water and ethanol was dried to constant weight in an oven at 100-110°C, after which it was ignited to constant weight in a muffle furnace with a temperature of about 600°C. The percent crude fiber was calculated from the loss in weight of the dried sample after incineration.

The percentage of protein was calculated from the modified Kjedahl method (Kjedahl-Gunning) where the sample was digested with sulfuric acid, then treated with sufficient sodium hydroxide and subjected to distillation. The distillate was titrated with standardized hydrochloric acid.

The mucilaginous content was determined by extracting it with boiling water, filtration and subsequent gelation of the solution. The gel was then carefully dried in an oven maintained at 50-70°C.

The results of the analyses are shown in the following table.

Proximate Composition (% Wt) of Compsopogon coeruleus

Sample Type	Water	Ash	Fat	Fiber	Protein	NFE	Mucilaginous Extract
Raw (Fresh)	62.43	0.10	0.09	0.42	5.42	31.02	1.04
Oven-dried	0.10	1.46	1.12	2.82	14.16	80.34	2.76
Sun-dried	5.27	0.99	0.28	1.05	13.49	78.92	3.92

Discussions and Recommendations

In general, the variations in contents of the fresh, oven and sun-dried samples may be accounted for by the differences in water content.

The fresh alga has a protein content which is greater than those of fresh coconut (5.00), coconut residue (sapal) (3.36), cow-peas (3.0), cabbage (2.60), sweet potato (0.80) and pasture grass-es.

The protein content of the dried plant is greater than that of corn (9.8), rice bran (11.0) and sorghum (11.0). Its fiber content ranges from three to 10 times lower than most feed ingredients. The same is true of its fat percentage. The carbohydrates or nitrogen-free extract, however, is approximately twice those of rice bran and copra meal and almost the same as that of corn. A portion of these carbohydrates is composed of mucilaginous substances.

Ash content indicates the amount of minerals present in the sample. The low value obtained show that its mineral content is not significant.

The data show that the plant has all the qualities of a very good feeds ingredient, especially for growing animals. In fact, the dried sample has the smell of fish meal. It has all the advantages over other seaweeds–high protein and carbohydrates, low in fiber and fats, and fast growth rate.

Its high nitrogen content would also make the plant a good base for fertilizer. Another advantage of algae as fertilizer over other organic materials is that they are free of weeds and spores of crop diseases.

Whether the plant will be used for feeds or fertilizer, its preparation will not involve the use of sophisticated powdering equipment as it disintegrates into fine particles when dried.

The mucilaginous extract from the alga could be agar, carageenan, or other substances. It is highly possible that it can be used as stabilizer or thickeners in ice cream and other food or medicinal preparations. An investigation into this aspect may be worthwhile conducting.

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