**“Organic Components of a Brown Algae, *Sargassum cristaefolium* as a source of a Nutritious Taste Enhancer”**

BACKGROUND:

The Philippines has abundant aquatic resources. Seaweeds are one of these aquatic products which are found in lagoons and reed areas all over the country. The country is one of the few around the world which pioneered in the farming of these plants in substantial quantities. The Philippines is noted for the culture of seaweeds along with Japan, China, Korea, and Taiwan.

Seaweeds are a good source of colloidal materials which are used as gelling agents, emulsifiers, stabilizers, in pharmaceutical, cosmetic, and food products. They also contribute to important food items, fertilizers, and animal feeds. According to the Food and Agriculture Organization (FAO), commercial production of seaweeds through farming is at present limited to a few countries in East Asia making these a high value crop with a high demand in the world market.

*Sargassum* is a genus of brown algae (class Phaecophyceae) macroalga (seaweed) under the order Fucales. Numerous species are distributed throughout the temperate and tropical oceans of the world, where they generally inhabit shallow water and coral reefs. However, the genus may be best known for its planktonic (free- floating).

*Sargassum* as algae has developed multicellular structure. *Sargassum* is characterized by long, highly branchy fronds which gives its leafy appearance. Many have bladders filled with air which help these float. In the open water, these bladders keep the *Sargassum* free-floating near the surface of the water so that it can photosynthesize energy. In area where *Sargassum* is anchored to the bottom, these bladders help the seaweed stretch towards the light, creating the forests of seaweed effect which gently undulate with the water waves.

There are a number of uses for *Sargassum*. In some regions, for example, it is collected as fertilizer. It is also a food source, especially in Japan, where it may be added to soups and fermented with other ingredients in soy sauce to create a specific flavor. Many animals use *Sargassum* as home, as the seaweed provides shelter due to their abundant fronds, along with a hiding place from predators and a source of food.

Seaweeds have been harvested because of their significant contributions in many ways. The most obvious use of these multicellular is a food source. People from different cultures have discovered that many seaweeds are eligible, especially some of the red and brown algae. They are consumed in a variety of ways. They may be raw, cooked or dried. In addition, seaweeds can also add variety and taste to bland foods. The reason why the farming or mariculture of seaweeds is a growing business is because they are good source of some vitamins, minerals, and some are said to contain substantial amounts of proteins.

TASTE ENHANCERS AND FOOD PALATABILITY

Taste enhancers are food additives that have little or no flavor of their own but when added to food bring out the taste of certain food. Something added to a food primarily for the savor it imparts. It improves the flavor/quality of the food, an example is an MSG which is regarded as a flavor enhancing agent, and overall taste intensity of the foods was increased by the addition of MSG. As of the enhancement of the taste, the nutritional values of the seaweed will be incorporated inorder to yield a product that is beneficial and at the same time nutritional. Seaweed draws an extraordinary wealth of mineral elements from the sea that can account for up to 36% of its dry mass. The mineral macronutrients include sodium, calcium, magnesium, potassium, chlorine, sulfur and phosphorus; the micronutrients include iodine, iron, zinc, copper, selenium, molybdenum, fluoride, manganese, boron, nickel and cobalt.

Seaweed has such a large proportion of iodine compared to dietary minimum requirements, that it is primarily known as a source of this nutrient. The highest iodine content is found in brown algae, with dry kelp ranging from 1500-8000 ppm (parts per million) and dry rockweed (*Fucus*) from 500-1000 ppm. In most instances, red and green algae have lower contents, about 100-300 ppm in dried seaweeds, but remain high in comparison to any land plants. Daily adult requirements, currently recommended at 150 µg/day, could be covered by very small quantities of seaweed. Just one gram of dried brown algae provides from 500-8,000 µg of iodine and even the green and red algae (such as the purple nori that is used in Japanese cuisine) provides 100-300 µg in a single gram.

The amounts of seaweed ingested as food in Japan, or in supplements, is often considerably more than 1 gram a day. Studies show that the human body adapts readily to higher iodine intake, where the thyroid gland is the main tissue involved in use of iodine (it is a component of thyroid hormones). Huge portions of the world population get insufficient iodine because the land, plants, and animals that serve as common dietary sources are very low in iodine. In many countries, iodine is added to table salt to assure adequate levels are attained. However, some developing countries are still catching up and suffering from the effects of low iodine intake. China is has the largest population with a history of low iodine intake, followed by India.

Aside from iodine, seaweed is one of the richest plant sources of calcium, but its calcium content relative to dietary requirements pales in comparison to the iodine. The calcium content of seaweeds is typically about 4-7% of dry matter. At 7% calcium, one gram of dried seaweed provides 70 mg of calcium, compared to a daily dietary requirement of about 1,000 mg. Still, this is higher than a serving of most non-milk based foods.

Protein content in seaweed varies somewhat. It is low in brown algae at 5-11% of dry matter, but comparable in quantitative terms to legumes at 30-40% of dry matter in some species of red algae. Green algae, which are still not harvested much, also have a significant protein content, i.e., up to 20% of dry matter. Spirulina, a micro-alga, is well known for its very high content, i.e., 70% of dry matter.

Seaweed contains several vitamins. Red and brown algae are rich in carotenes (provitamin A) and are used, in fact, as a source of natural mixed carotenes for dietary supplements. The content ranges from 20-170 ppm. The vitamin C in red and brown algae is also notable, with contents ranging from 500-3000 ppm. Other vitamins are also present, including B12, which is not found in most land plants.

Seaweed has very little fat, ranging from 1-5% of dry matter, although seaweed lipids have a higher proportion of essential fatty acids than land plants. Green algae, whose fatty acid make-up is the closest to higher plants, have a much higher oleic and alpha-linoleic acid content. Red algae have a high EPA content, a substance mostly found in animals, especially fish. Seaweed has a high fiber content, making up 32% to 50% of dry matter. The soluble fiber fraction accounts for 51-56% of total fibers in green (ulvans) and red algae (agars, carrageenans and xylans) and for 67-87% in brown algae (laminaria, fucus, and others). Soluble fibers are generally associated with having cholesterol-lowering and hypoglycemic effects.

Palatability is the hedonic reward provided by foods or fluids that are agreeable to the “palate” in regard to the homeostatic satisfaction of nutritional, water, or energy needs. Palatability of food can be learned. It has increasingly been appreciated that this can create a hedonic hunger that is independent of homeostatic needs. Palatability of food promotes the selection, intake, absorption and digestion of food but the problem that food often becomes less palatable when their salt content is reduced, that improve the acceptance of many food. Palatability could be maintained when reducing salt (NaCl) content by addition of monosodium glutamate (MSG) that also flavor enhancing agent, combination with seaweeds which would significantly increased taste quality and decreased the desire for saltiness, but should be noted that added in excess MSG and seaweeds ill diminish the palatability of food.

It is essential to observe food palatability since it is the taste that we are going to satisfy in the research.

MSG (Monosodium glutamate)

MSG (Monosodium glutamate) is a white crystalline compound used as a food additive for a flavor enhancing agent. Addition of MSG increases the overall taste intensity of the foods. The most notable description of the change effects by the addition of MSG to the food were major increase of the flavor characteristics, continuity, mouth fullness, impact, mildness and thickness. It also increases taste quality and decreases the desire for saltiness. This compound must take it in a self limiting to avoid the effect of diminishing the palatability of foods. Monosodium glutamate also known as sodium glutamate and MSG, is a sodium salt of the naturally occurring non-essential amino acid glutamic acid. It is used as a food additive and is commonly marketed as a flavor enhancer.