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## JOHN'S CORNER

### Organic Fertilizers and Nutrients – 7. Fish Products

*By John Ferguson*

This week I want to continue with specific organic fertilizers and look at fish based products. For centuries fish have been used as a natural fertilizer from the American Indians to the indigenous people of South America in making biochar.

The best fish products come from the ocean and contain all the nutrients and trace elements found in seawater. However freshwater fish can be used with great results but they do not have the same levels of trace elements and are not as common in the market.

Most fish based products begin their life as a by-product of commercial fishing, whether it is remains of the filleting process or just excess waste that was previously dumped back into the ocean or into a landfill, thus it is a recycled product. Some brands may also use by-catch from shrimping or other fishing, rather than releasing the unwanted sea life but it is not as common. There are also species of fish that are harvested not for human food but as a protein source (ex. menhaden) to make other products that may be used.

Fish based products are available in four general types; fish meal, fish emulsion, amended fish emulsion and fish hydrolysate.

Fish meal is produced by grinding up the fish feedstock, cooking it to remove the oils, then removing the protein for use in animal feed, then after drying the remaining material is sold as fish meal.

Fish emulsion is produced by grinding up the fish feedstock and cooking it to remove the oils. Fish oil is a valuable product (used in nutritional supplements to body lotion and creams, paints and cosmetics)



hence it is often removed from the fish by some type of heating process, most often steaming or cooking. The cooking process also destroys some of the amino acids and proteins, hormones, enzymes, vitamins, etc. that were originally present. The remaining material becomes fish emulsion. Since heat was applied to boil down the material killing any bacteria present, it does not require acid to stabilize the product and leaves the remaining product with a much higher nitrogen content than hydrolysate. Natural fish emulsion will have fertilizer values of 5-1-1.

Amended fish emulsion is produced by taking regular fish emulsion and adding Urea to boost the nitrogen levels even higher for marketing purposes. Hence it is not a true organic product and not as beneficial. Often sold in discount stores and big box stores as it is a lower quality product.

Fish hydrolysate is produced by using all parts of the fish (guts, bones, cartilage, scales, meat, etc.), grinding them up to very fine pieces, and then using enzymes to break down the fish. This is known as cold processing. This method retains the oils which contain the essential nutrients, complex proteins and carbohydrates, fats, vitamins, enzymes and hormones. As a result fish hydrolysate works better with soil biology as it is a better quality food source for the microbes. This is why it is also used in making high quality compost teas. Since microbes like this type product, acids (phosphoric or sulfuric) are often used to stabilize the products which prevents bacteria from becoming active and creating gasses that can burst the container. Additionally, some fish species have strong odors (e.g. salmon) in which the enzyme process and acids greatly reduce.

Like all products the quality and value of fish products varies greatly. Wild caught fish from northern waters (higher oil content) work best. Farm raised fish tend to have antibiotics, heavy metals and other chemicals that wild caught fish does not. If very large species of fish are used (e.g. tuna, mackerel, sword fish, etc.) there will be some heavy metals (e.g. mercury) present in the product not found in other brands that use smaller fish. Note: The better brands test regularly to ensure there are no heavy metals while the cheaper ones do not.

#### **USAGE:**

Fish (emulsion or hydrolysate) are often used as root zone drench to provide nutrients to enrich the soil and stimulate microbial growth.



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Many gardeners have found they both work very well as a foliar application to help feed and strengthen plants.

For actively aerated compost tea (AACT) fish hydrolysate works better as it feeds a greater range and diversity of beneficial microbes. Fish emulsion feeds mostly bacteria while fish hydrolysate has the fish oil as well as simpler proteins and feeds fungus and the bacteria.

TIP: For a number of years I grew huge beautiful disease and pest free ferns that were planted in 100% Composted Native Mulch and fertilized with the Ocean Harvest brand.

A article in the Journal HortScience Vol. 48(6) June 2013 tested several types of organic fertilizers including hydrolyzed fish as compared to the same nutrients applied using synthetic fertilizers. The researchers found that plants (Amaranth, Celosia, Gboma, and Long Bean) had increased disease and insect resistance, the shelf life after harvest was increased, and greatly increased their anti-oxidant capacity.

A article in the Journal HortScience Vol. 48(5) May 2013 tested several organic fertilizers against synthetic fertilizers on Marigolds. They found that Marigolds fertilized with liquid fish emulsion produced the highest quality plants.

Researchers at McGill University in Canada found that fish emulsion applied to soils infected with the verticillium fungus which attacks a broad range of plants, reduced the disease spores by 99% in only 6 days. They also found similar results on damping off, a pythium fungal disease on cucumbers.  
American Phytopathological Society.

Other researchers have found that hydrolysate from salmon contain significant cancer growth inhibitors while those from sardines have gut health and anti-hypertension benefits. It would be interesting to see if the same health benefits can be obtained from eating fruits and vegetables fertilized with fish hydrolysate.



The 1992 report by the United Nations Conference on Environment and Development evaluated the mineral content of the world's farm and rangeland soil. They found dramatic reduction in minerals on every continent and in North America between 1892 and 1992 we lost 85% of our minerals! This lack of minerals is behind many plant, animal and human health problems. Fish emulsion and hydrolysate are tools to help re-mineralize our soils.

There are many good brands on the market, however a few I am familiar with are:

Neptune's Harvest - good product from North Atlantic cod fish, been around for years with great results

**PacificGro** - made with processed salmon waste from North Pacific and loved by many AACT folks.  
Available in 55 gallon drums.

Ocean Harvest - from San Jacinto Environmental and part of the Microlife<sup>TM</sup> line of organic fertilizers. It is my personal favorite that I use regularly. In addition to the fish hydrolysate, it mixes in seaweed, molasses and humic acid to make a more well rounded product.

#### SUMMARY:

Every day more and more research is appearing that prove organic fertilizers just work better, save money, prevent problems and are far safer than synthetic. Fish emulsion and fish hydrolysate are part of this family of organic fertilizers and are great tools in a gardener's nutritional toolbox.

#### PROS:

- fish products are fast acting when used as a foliar application
- contain many minor and trace elements
- hydrolysate contains beneficial hormones
- stimulates the rapid growth of good microbes in the soil
- contain some carbon as an energy source for the microbes
- increase microbial diversity



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- strengthen a plants natural immune system
- encourage beneficial microbes that suppress pathogens
- nitrogen and other nutrients are in a readily available form for plants and microbes
- great for use in making compost teas

**CONS:**

- usually a liquid concentrate that has to be mixed before use
- some brands have a distinct smell that some find odorous
- possible PCB's in farm raised fish from other countries found in the cheaper brands
- cheaper brands often contain heavy metals

**NOTE:** In going through my library of journal articles on fish emulsion I found one that had been miss-filed that was on seaweed. Researchers from The University of Florida found that citrus (Sweet Orange) treated with seaweed greatly increased drought tolerance in container grown plants. HortScience Vol. 46(4) April 2011