Heavy Metal Pollution in Aquaculture

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Abstract: In most aquatic ecosystems, fishes are hosts to parasites and sometimes these parasites can affect fish biology. Some of the most dramatic cases occur when fishes are intermediate hosts for larval parasite. Pollution of environmental waters is a serious and growing problem all over the world. Fish accumulate pollutants directly from contaminated water and indirectly by ingestion the contaminated organisms. The effect of environmental stress on fish parasites vary depending the susceptibility or increasing the abundance of intermediate hosts and vectors. Pollutants can also decrease parasitism if infected hosts suffer differentially high mortality; parasites are more susceptible to pollution than their hosts. Pesticides are a broad class of chemicals and biological agents that are specifically designed and applied to kill a pest. Specific types of pesticides target specific types of pests: insecticides kill insects, fungicides kill fungi and bacteria, herbicides kill weeds and other unwanted plant vegetation, molluscacides kill mollusks, acaricides kill spiders, and so on. Pesticide use dates back to ancient times. Pesticides are capable of killing fish and other aquatic life directly wit in a short period of time and indirectly affect fish by interfering with their food supply or altering the aquatic habitat, even when the concentrations are too low to affect fish directly. Such indirect effects greatly reduce the abundance of food organisms which in turn reduces the growth and probability of survival of the fish. Kafr El-Sheikh governorate shares largely in Egyptian fish production and the spacious domain of fish agriculture in Egypt, but until now a little is know about the parasitic fish diseases affecting its cultured fishes different external and internal parasitic diseases.
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Introduction

Fish become the hope for overcoming protein shortage problem all over the world, it have been extensively used as a cheap source of protein rich diet for human consumption in Egypt.

As a step of realizing the maximum production of the cultured fish come the importance of producing healthy and disease free fish **(Mahfous, 1997).** The majority of fish diseases might be occurred as a result of parasitic infection or environmental pollution **(Hussain et al, 2003).** About 80% of fish diseases are parasitic especially warm water fish **(Eissa, 2006).** Pollution as well as killing fish directly can also impairing fish defense mechanisms (immuno supperssion) **(Khans 1990).**

Parasitic infection of fishes occurs when susceptible fishes are exposed to the parasite under certain environmental stress conditions caused by temperature, eutrophication, sewage, metabolic products of fishes, industrial pollution, and pesticides **(Snieszko, 2006).** The relationship between parasitism and pollution is not simple and in essence involves a double edged phenomenon, in which parasitism may increase the host susceptibility to toxic pollutants or in which pollutants may result in an increase (or in some a decrease) in the prevalence of certain parasites **(Sinderman 1990).**

Pesticides are a broad class of chemicals and biological agents that are specifically designed and applied to kill a pest. Specific types of pesticides target specific types of pests: insecticides kill insects, fungicides kill fungi and bacteria, herbicides kill weeds and other unwanted plant vegetation, molluscacides kill mollusks, acaricides kill spiders, and so on. Pesticide use dates back to ancient times.

The organophosphorous insecticide malathion is used to control pests, which attack many economic crops, **(Anderson, 1990).** In Egypt, the Ministry of Agriculture recommended the use of malathion against pests which attack vegetable crops, ornamental plants, medicinal and aromatic plants and for protection of stored grains. Malathion is also used to control different mosquito and fly species, household insects, animal ectoparasites and human head and body lice **(Roberts, 1989).** The wide use if malathion is attributed to its relatively low mammalian toxicity. But like DDT and other pesticides that have been found to cause irreparable damage to human and environmental health, malathion may pose a greater risk than the product label would lead one to believe.

Shown to be mutagenic, a possible carcinogen, implicated in vision loss, causing myriad negative health effects in human and animal studies, damaging to nontarget organisms, and containing highly toxic impurities, malathion has a legacy of serious problems **(Cabello et, al. 2001).**

Malathion accumulate in fish mainly in the visceral fat, where as the gills and muscles retain a lower amount subsequently, with an increase in fat consumption. For example, at the time of migration and hibernation, pesticides may enter the more sensitive organs and induce poisoning **(Bruno and Stamps, 1987), (Bennett and Wolke, 1987) (Pickering and Duston,1983).** It has been presumed for decades that environmental pollutants especially pesticides can affect one or more of the immunological functions in the fish. It is almost common knowledge cat fish frequently then become more susceptible to various diseases given the extreme variety of pesticides used **(Vergut and Studnicka, 1994), (Areechon and Plumb, 2000). (Anderson, 1990)** suggested a decreased disease resistance in fish exposed to various pesticides. There is so little is known about how pesticides affect the immune systems of fishes **(Cabello et, al. 2001).**

It is well known that certain blood parameters serve as reliable indicators of fish health **(Bond, 1979)** as many parasites can life in a host, sometimes causing damage to it. Therefore, the changes associated with hematological parameters due to various parasites establish a database, which could be used in diseases diagnosis and in guiding the implementation of the treatment or preventive measures. These measures are essential in fish industry **(Roberts, 1981).**

Blood parameters are considered physiological indicators of the whole body and therefore are important to diagnosis the structural and functional status of fish exposed to pollutants **(Adhikari and Betal. 2004).**

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