Pesticides and fish mortality

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This article is essentially an account of the way in which man is unintentionally contaminating his environment. This is a world-wide problem, but for the most part the scope is limited to the situation in Myanmar. Rice and fish are staple foods in Myanmar and fish production is intimately connected with paddy cultivation. Agricultural land, being inundated during the months of the rainy season provides extensive feeding and growing ground for the annual brood of fish. There is no doubt that the fish harvest in some regions is as important as paddy harvest for it provides the cultivator a welcome addition to his income and the village with much needed protein, vitamins and calcium in their diet.

Fish are not only the main source of protein for human consumption but also the presence of fish in paddy fields results in an increase yield of paddy sometimes as much as 15 per cent. This is due to the fact that fish eat large quantities of worms, insect larvae, algae and weeds which are either directly or indirectly injurious to paddy. Therefore, there is much need to take effective measures for the development and conservation of fresh-water resources.

Pesticides are indispensable for modern farming. However, accidental damage to fish as a result of use of pesticides has come to constitute an important problem. People in Myanmar often apply pesticides quite indiscriminately and carelessly. Ironically this practice is making even relatively less harmful pesticides more destructive.

Fish are very much susceptible to pesticides. The author, in his research work on the study of insecticidal pollution of water in 1976, found that Clarias batrachus (Nga-Khu) had been killed within 24 hours when placed in water containing as little as 0.0004 parts per million of Endrin. The young or smaller fish down to smallest fry are most sensitive to the pesticides than the older ones. Therefore, known spawning, breeding and nursery areas may require special care and caution. Pesticides may find their way into fish-bearing water either accidentally as a result of sprays, spills, washing used containers from the adjacent ground, or deliberately as when they are used for the control of aquatic weeds, vectors of diseases or pests of irrigated crops. Large scale or repeated application of pesticides may cause considerable contamination to great distances down the stream. Unusual rain fall necessitates retreatment of many areas. Each rain washes down more pesticides into the streams killing more fish.

To preserve and maintain the distribution and abundance of fish, toxic substances must not be present in concentrations that are acutely toxic to fish. Hence, if these pesticides are to be used without endangering fisheries the first essential data is to measure their toxicity to fish. Since the degree of toxicity to fish in water is usually unpredictable by chemical means, experimental determination by appropriate biological assay methods using fish as bio-indicator is usually applied. The bio-assay results on the acute toxicity of pesticides to fish may help the farmer to maintain pest control efficiently within the limits safe for fisheries.

Investigation on the acute toxicity of commonly used ten different modern pesticides to common carp Cyprinus carpio (Shwe-war-nga-gin), was recently undertaken by the author. The experimental results showed that EPN 45% EC was the most toxic of the pesticides tested with the 96-hour Median Tolerance Limit (TLM) value of 0.27 ppm. Ninety-six hour TLM values of Padan 50% Sp, Brestan 10% WP, Furadan 3-G Elsan 50% EC, Sumithion 50% EC, Kitazin 40% EC and Diazinon 40% EC ranged between 0.6 ppm and 5.2 ppm. Kitazin 17% G and Topsin 70% WP had the 96 hour TLM values of 14.0 ppm and 34.0 ppm respectively.

Median Tolerance Limit values of pesticides were also computed into rank A, B and C. A-ranked pesticides such as Kitazin 17% G and Topsin 70% WP were not toxic to fish at the normal application rate and could be used practically without any special precautions. Padan 50% SP. Brestan 10% WP, Furadan 3-G Elsan 50% EC, Sumithion 50% EC, Kitazin 40% EC and Diazinon 40% EC were classified into rank B. They would not constitute a hazard to

shortages in fuel and timber and destroy plant and animal life. Run-off will quicken and soil erosion will accelerate, resulting in desertification and drought.

B. Water

1. Fresh water

Fresh water resources include rivers, lakes and groundwater. The hydrological cycle must be maintained to meet the needs of an increasing population for safe drinking water. The supply of safe and clean drinking water is decreasing, and one of the reasons is that many of the lakes and rivers are being polluted by industrial and human wastes.

2. Oceans

Oceans cover 70 % of the earth's surface and their effect on weather and climate is a recognized fact. They not only provide many varieties of fish which are a source of food for the world's population, they are also rich in mineral resources, among which oil and gas are the most important. But, they have become the dumping ground for the world's wastes. The oil spilled from tankers also adds to the pollution of the oceans. Pollution has led to the destruction of marine life such as seals, turtles and various kinds of fish.

C. The Atmosphere

1. Air pollution

Air pollution in cities and industrial areas have long been recognized as a hazard to health. Industrial plants release sulphur dioxide and nitrogen oxides into the atmosphere, where they interact with moisture and fall as acid rain. Advanced technology and industrialization have caused the concentrations of gases such as carbon dioxide, methane and chlorofluorocarbons(CFCs) in the atmosphere to increase. The increase of these gases result in a global warming of the earth and depletion of ozone in the stratosphere.

2. Greenhouse effect

The impact of global warming due to the buildup of carbon dioxide, methane and nitrous oxide in the atmosphere is known as the greenhouse effect. The increase in the earth's surface temperature will result in rising sea levels and changes in climate, which in turn will have a severe effect on agriculture.

3. Ozone depletion

Industrial uses have increased the atmospheric concentration of CFCs, halons and methane gases which cause the destruction of ozone in the stratosphere. The increase of these gases are responsible for the ozone hole over Antarctica, and the continuing decline of stratospheric ozone will have three different kinds of effects - biological, chemical and climatological. Depletion of the ozone layer which protects us from excessive ultraviolet radiation is caused mainly by human use of CFCs and aerosols.

Public information

It is important to provide information to the public, so that people will become aware of environmental change and the resulting problems, which will have severe effects on health, agriculture and living conditions. Environmental problems are caused by human activities, technological processes and misuse of natural resources. We are mainly responsible for the global environmental change and it is up to us to prevent further deterioration of the environment.

BOOKS & ARTICLES ON ENVIRONMENT

As of 1st November 1990, 53 Publications on environment are available at the library of the Department of Meteorology and Hydrology out of which 31 were received from the Ministry of Foreign Affairs.