

# Atrazine and Environment

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## Abstract

Environmental pollution caused by pesticides became a serious problem. In fact consequences residual amount of herbicides and their metabolic have been found in drinking water and food items which is turn increased the threats to human health and toxicity risk for other living organisms, like fishes and amphibians of surface water has been well reported Global concern and become a vital issue at local, national and global level.

In this article, author would like to explain the pollution causes by Atrazine as a widespread problem in many aquatic environments.

Atrazine herbicides set belong to S-triazine family of herbicide, which are the most common and significant water pollution in fresh marine and ground water.

**Keywords:** Atrazine, Herbicide Toxicity Haematological Parameter, Environment.

## Introduction

Atrazine herbicide belong to S-triazine family of herbicides which is one of the most effective aquatic pullulans in fresh, marine rain and ground water. It controls, plants through different mechanism including inhibition of biological process like cell divisions enzyme function, root growth, leaf development interference with the synthesis of pigments and inhibition of photosynthesis which is photosynthesis inhibitor.

## Review of Literature

Chemical control of weeds by herbicides and weedicides are in common use throughout the world. It cannot be stopped because its use is very easy as well as economical too, but at the same time its bad effects are also faced by agriculturists and piscicultunsis Herbicides have been proved successful in the control of herbs in terrestrial agriculture system Residual mass of herbicides flows down the aquatic body and ultimately causes unprecedented ecological damages mainly through their effects on the non-target organism including fish.

Herbicides make up about 40% of the production of pesticides in the world. They have been shown to cause deleterious effects on fish health (Banhawy et al 1996). Synthetic herbicides are commonly used by farmers to control weeds and nuisance aquatic vegetations around rivers, lakes, reservoirs and other water bodies. However, these pesticides ultimately find the way to these water bodies inducing adverse impact on fishes living therein (Rsuda et al 195).

The widespread use of herbicides has resulted in a steady increase in water pollution evoking considerable damage of phytoplankton and zooplankton, thus depleting the essential source of the food chain for fish (Monotones et al 1995). Atrazine an organic compound consisting of an S-triazine-ring is a widely used herbicide Its use is controversial due to its effects on non target species, such as amphibians. Its use is banned in the European Union but is still one of the most widely used herbicides in the U.S. and Asian Countries. The half-life of atrazine in soil is 13 to 261 days. Its endocrine effects, possible carcinogenic effects and epidemiological connection to low sperm levels in men has led several researchers to call for banning it in the US.

One of the crucial problems faced by pisciculturists is the control of aquatic weeds since its profusion causes imbalance in aquatic soluble nutrients and other essentials Weeds severely restrict plankton production, limits the living space for Fish imbalance in dissolve o, budget, promote accumulation of deposits leading to siltation provide shelter to predatory and weed - fishes, molluscs and aquatic insects and obstruct netting operation (Jringram, 1983).

The aquatic weed problems have been increasing day by day and have attracted the attentions of pisciculturists. The extent of this problem can be realized from the fact that water - hyacinth (*Eichorniacrassipes*)



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alone accounts for about 0.5 million hectares in India. The area infested with other aquatic weeds is estimated to be an additional 3,20,000 ha, which represents a potential annual loss of fish-crop of 1,60,000 MT per year. Recently another serious weed *Salvinia molesta* has been found to be spreading very rapidly and is now considered the second major national weed problem. Among submerged weeds, *Hydrilla Verticillata* is the most important and difficult to control. Persistent algal - blooms and other blue-green algae seriously affect fish culture in ponds and become even more problematic in intensive culture programs (Ramprabhu and Ramchandran 1984).

Weedicides and herbicides have proved successful in the control of weeds in the aquaculture system. However, the production of increasing number of pesticides and herbicides has caused unprecedented ecological damage mainly through their effect on non-target organism including fish. The widespread use of herbicides has resulted in a steady increase in water pollution, evoking considerable damage of phytoplankton and zooplankton, thus depleting the essential source of the food chain for fish (Montanes et al 1995).

Atrazine is one of the most commonly used herbicides in the United States. It is widely used in Asian continent and specially the India too. Atrazine is considered as a controversial organic compound due to its bad effects on the non target organism. Tyrone Hayes a Scientist at UC Barkeley found evidence that it is a teratogen causing demasulinization in male frogs even at low concentrations and an estrogen disruptor Male Frogs affected by atrazine could reach testosterone labels below females.

Atrazine is used to stop pre and post - emergence broad leaf and grassy weeds in major crops by binding to the plastoquinone binding protein in photosystem II. Inhibiting electron transport. Atrazine and its derivatives are also used in many industrial processes including the production of some dyes and explosives. Atrazine is the most widely used herbicide in conservation tillage system, which are designed to prevent soil erosion.

#### About Atrazine

Atrazine is a herbicide of the triazine class. It is used to prevent pre-emergence broadleaf weeds in crops such as maize (corn) and sugarcane and on turf, such as golf courses and residential lawns. Atrazine's primary manufacturer is Syngenta and it is one of the most widely used herbicides in US and Australian agriculture.

As of 2001, atrazine was the most commonly detected pesticide contaminating drinking water in the United States. Studies suggest it is an endocrine disruptor, an agent that can alter the natural hormonal system. However, in 2006 the U.S. Environmental Protection Agency (EPA) had stated that under the Food Quality Protection Act "the risks associated with the pesticide residues pose a reasonable certainty of no harm", and in 2007, the EPA said that atrazine does not adversely affect amphibian sexual development and that no additional testing was warranted. EPA's 2009 review concluded that "the agency's scientific bases for its regulation of atrazine

are robust and ensure prevention of exposure levels that could lead to reproductive effects in humans". However, in their 2016 Refined Ecological Risk Assessment for Atrazine, it was stated that "it is difficult to make definitive conclusions about the impact of atrazine at a given concentration but multiple studies have reported effects to various endpoints at environmentally-relevant concentrations. " EPA started a registration review in 2013.

The EPA's review has been criticized, and the safety of atrazine remains controversial. Its use was banned in the European Union in 2004, when the EU found groundwater levels exceeding the limits set by regulators, and Syngenta could not show that this could be prevented nor that these levels were safe.

#### Use of Atrazine

Atrazine is a herbicide that is used to stop pre- and post-emergence broadleaf and grassy weeds in crops such as sorghum, maize, sugarcane, lupins, pine, and eucalypt plantations, and triazine-tolerant canola.

In the United States as of 2014, atrazine was the second-most widely used herbicide after glyphosate, with 76 million pounds of it applied each year. Atrazine continues to be one of the most widely used herbicides in Australian agriculture. Its effect on corn yields has been estimated from 1% to 8%, with 3-4% being the conclusion of one economics review. In another study looking at combined data from 236 university corn field trials from 1986-2005, atrazine treatments showed an average of 5.7 bushels more per acre than alternative herbicide treatments. Effects on sorghum yields have been estimated to be as high as 20%, owing in part to the absence of alternative weed control products that can be used on sorghum.

Damita Miles Orlando Mercier Atrazine "As of 2001, atrazine was the most commonly detected pesticide contaminating drinking water in the United States. Studies suggest it is an endocrine disruptor, an agent that can alter the natural hormonal system.

1. IUPAC Name 2 Chloro 4- (ethylamine) -6- (Isopropyl aminel. S triazine
2. Molecular formula -  $C_8H_{14}ClN_5$
3. Molecular Mass - 215.68 gm mol<sup>-1</sup>
4. Density - 1.187 g / cm
5. Melting Point - 175<sup>0</sup> C
6. Boiling point - 200<sup>0</sup> C
7. Appearance - Colorless Solid
8. Solubility in water 0.007 gm / 100ml

According to Extension Toxicology Network the oral LD<sub>50</sub> for atrazine are as follows:

1. In Rats - 3090 mg / kg
2. In mice - 1750 mg / kg
3. In Rabbit - 750 mg / g
4. In hamstars - 100 mg / kg

Since its introduction in 1950, atrazine has become widely used herbicide in the U.S. It is the top selling product for Syngenta, the largest chemical corporation in the world Atrazine has become the most frequently detected contaminant of ground surface and drinking water in the mid western united states and is one of the most controversial crop protectors in the market. Used initially to control the

growth of annual broadleaf weeds on such row crops as corn and sugarcane. Atrazine is now applied to commercial golf courses, industrial centers, lawns and along roadsides According to the Environmental Protection Agency (EPA) over 76 million pounds of atrazine are applied to crops each year. Despite its widespread use in the United States, the European Union banned atrazine in 2003, citing it as a major contaminator to water contamination. Besides these banned in US. and its controversial nature, atrazine is frequently used in Asian continent and presently contaminating the water bodies where pisciculture are in practice.

#### **Conclusion**

It is concluded that atrazine induces oxidative stress, DNA damage, lipid peroxidation and endocrine disruption on the developmental stages of different aquatic living organism. Most of these parameters could be used as indicators for environmental aquatic pollution. The acute and chronic exposures to Atrazine may lead with changes in the behavioural, haematological and Biochemical parameters of various aquatic living organism. The alterations of these parameters may provide a better understanding of these toxicological end point of aquatic pollutants and to ascertain a safer level of these chemical in the aquatic environment for the protection of aquatic living organisms with reference to this. Article can able to provide guidelines to aquaculturist for the proper aquaculture without the pad bal effects of Atrazine.

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