Overuse of fungicides penconazole in agricultural production – a potential risk for genetic material

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Abstract

The aim of this study is to evaluate the genotoxic effect of fungicide penconazole after 9 days of treatment. The damage impact of pesticides in genetic base, certify by micronclеus test in erythrocytes of fish. We testing the fungicide Penconazole at fish, in different concentration, diluted in fresh water. At each aquaria placed 10 fish. We use 5 aquaira, at four of them, treate the fish with fungicide, and one of them use as control group. Accordig to the obtain results we can conclude that fungicids penconazole has genotoxic effect for genetic base.

Keywords*: genetical, potentital, risk, fungicids, agriculture.*

Introduction

Environmental quality control requires the monitoring of various indicators, including the assessment of pesticide residues. Research on bioindicators is instrumental in detecting the toxic effects caused by these. Processes in the bioconcentration and transformation of pesticides have been studied mainly in fishes. This is due to these animals living in direct contact with aquatic sediments adjacent to areas where

Micronuclei are cytoplasmic chromatin-containing bodies formed when acentric chromosome fragments or chromosomes lag during anaphase and fail to become incorporated into daughter cell nuclei during cell division. Because genetic damage that results in chromosome breaks or spindle abnormalities leads to micronucleus formation, the incidence of micronuclei serves as an index of these types of damage (Fagr *et al.* 2008).

Because counting of micronuclei is much faster and less technically demanding, the micronucleus assay has been widely used to screen for chemicals that cause these types of damage (Fagr *et al.* 2008) and the damage resulting from it.
Changes in chromosome number evidenced by micronucleus formations may affect gene activity or gene transmission by altering the position, order, or number of certain genes in a cell. Such changes often, but not always, lead to a genetic imbalance that is harmful to the organism or its progeny (Hartwell *et al.* 2000).

Materials and methods

We used one species of fish, Carasius aureatus. After the capture, they placed in aquariums with aerated tap water and taken to the laboratory. After acclimation to reduce the stress of capture and transport, fish treated in aquarium with insecticide for five days.
Slides stained with Giemsa. The frequency of erythroblasts, micronuclei and nuclear abnormalities estimated by counting 2000 cells in extensions. At each aquarium put 10 fish.
Golden fish (Carasius aureus) chosen for this study because it is very adapt for investigation, also due to proven sensivity to genotoxic chemicals. In each aquarium put ten (10) fish, total number of fish is 50 fish. Concentration of insecticide (Chemical Abstracts name tiametoxam (3-(2-chlortizol-5-ilimetil)-5metil(1,3,5)osadiaznam-4-iliden-N-nitroamin), it was in first aquarium 15ml insecticide tara / 40 liter water, in second aquarium 12 ml insecticide tara / 40 liter water, in third aquarium 10 ml insecticide tara / 40 liter water, in fourth aquarium 8 ml insecticide tara / 40 liter water. Fifth aquarium use as control, without insecticide tara, contain only drinking water.
Experimental design: Fish Carasius aureus placed in five different aquaria, each one containing tap water (negative control) and four different aquaria containing different dilution of insecticide tara.The fish was cut in caudal region and smears of peripheral blood were made on free clean slides.
Slide preparation and staining: For each fish, prepare three slides. Slides were coded, for each fish. The smears are air-dried and fixed in absolute ethanol for 25 minute. Treatment it was 5 day. After fixation, the slides were stained in aqueous Giemsa (diluted in distilled water ratio 1:3) for 45 minute.

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Results and discussion

The frequency of micro nucleated (MN) erythrocytes estimated for each fish, in each aquaria are presented in table1. At first aquaria, we detect the 63 micronuclei (MN), which is higher compared with other aquaria and with control group. At second aquaria, we determine 56 MN, while the third has 48 and fourth aquaria have 36 MN, at 2000 erythrocyte. The average number of micronucleus (MN) at all groups treated with insecticide mospilan are 50.75 MN/2000 erythrocytes, statistically are significantly higher compared with control group (P<0.001). The average number of micronclei at control group is 4 MN/2000 erythrocytes.

Table 1. Average number (per aquarium) of micronuclei(MN) in 2000 erythrocytes of peripheral blood of fish Carasius aureus after 9 days treatment in different concentration of insecticide penconazole

Aquarium	Average number of MN/2000 erythrocytes per aquarium	Significancy -P
Aquarium 1(15 ml insecticide /40 l water): Aquarium controll	63	P<0.001
Aquarium 2 (12 ml insecticide /40 l water): Aquarium controll	56	P<0.001
Aquarium 3(10 ml insecticide /40 l water): Aquarium controll	48	P<0.001
Aquarium 4(8 ml insecticide /40 l water): Aquarium controll	36	P<0.001
Aquarium control- without insecticide	4	
Average number of MN at treaed fish, without control group	203:4= 50.75 MN	

Micronucleus bioassay offers several types of unique information as a bioindicator for chromosomal aberrations not available from other methods: (1) the integrated effect of a variety of environmental stresses on the health of an organism and the population, community, and ecosystem; (2) early warning of potential harm to human health based on the responses of wildlife to pollution; and (3) the

effectiveness of remediation efforts in decontaminating waterways (Villela *et al.*, 2006). In fish, the micronucleus test is usually based on erythrocytes, but liver and gill tissues have been used (Al-Sabti and Metcalfe 1995).

The average of erythrocytes in our study was similar to those observed by Ranzani-Paiva *et al.* (2000) in *Prochilodus lineatus* from the Paraná river.

Conclusion

Based on this investigation we can conclude that fungicide penconazole has highly geneotoxic effect in genetic material(DNA) of of erythrocytes of fish *Carasius aureus* The frequency of micronuclei from first till fourth aquaria, are significantly higher ($P<0.001$) at treated fish, compared with control group of fish.

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