Opinion
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The effect of heavy metals on Asian swamp eel (*Monopterus albus*)

Abstract

Asian swamp eel, *Monopterus albus* belongs to the family synbranchidae of the order synbranchiformes. It is commonly lives in the paddy fields. Therefore, it is easily exposed to the fertilizers and pesticides, which are used to control the pest organisms and diseases in paddy field, these fertilizers and pesticides might have a toxic effect on the eel, therefore, this study aimed to evaluate the effect of fertilizers and pesticides on *Monopterus albus* through collecting the available data from the previous studies. In conclusion, it was shown that *Monopterus albus* exposed to different types of toxic heavy metals but it is able to survive and it is still safe to be consumed, this might be explained due to the nature of swamp eel as they are capable to live in hard environment.

Keywords: metals, toxicity, *M. albus*, pesticides, paddy

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Introduction

Asian swamp eel *Monopterus albus* (*M. albus*) is widely distributed in tropical and subtropical freshwaters from South to East Asia.[1] It is distributed in the rice fields, rivers and ponds, due to large scale use of pesticides in rice fields, eel populations are decreasing very quickly.[2] Heavy metal means any metallic element which has high density and is toxic even at low concentration.[3] Fish has commonly used as a biological monitor to determine the levels of heavy metals pollution, considering them as one of the indicators for pollution studies in the freshwater system.[4]

Methodology

This research was a review study, the data was collected using articles in *multiple* databases mainly Scopus about heavy metals uptake by Asian swamp eel (*M. albus*).

Heavy metals uptake by Asian swamp eel

It was recorded that some farmers at Sheikhupura, Pakistan used polluted water from industrial effluents to irrigate the paddy fields which eventually might lead to an increase in the heavy metals pollution in the rice fields' soil and plants.[5] The common habitat of *M. albus* is in paddy fields. Therefore, exposing them to the fertilizers and pesticides, which are used to control the pest organisms and diseases in the paddy field. The farmers usually use a variety of fertilizers and pesticides to ensure the quality of rice produced. *It has been reported that* 6 hrs of exposure *to* (2.5 mg L^{-1}) *fenitrothion cause a notable increase in the mucus secretion on the bodies of* swamp eels which act as a defense response against pesticide toxicity to protect the vital organs, such as gills.[6]

M. albus species from the paddy field of Kelantan state (Peninsular Malaysia) was assessed for the analysis of the heavy metals, the presence of zinc (Zn) and copper (Cu) metals concentration were the highest accumulated in the kidney, liver, bone, gill, muscle and skin. However, according to Malaysian Food Regulation, the metals are within the safety limit for intake volume per day needed.[7] Furthermore, another study was conducted to evaluate the health risk of fertilizers and pesticides from Cu and Zn in the paddy field through the consumption of *Monopterus albus* Kelantan Malaysia and it was proven that the eel is safe to be eaten.[9]

A previous study also showed that Cu, Zn, and nickel (Ni) were accumulated in the muscle tissues of *M. albus* collected from rice fields. Nevertheless, the metal concentrations were within the safety ranges, which indicate that *M. albus* can be safely eaten.[8] It has been found that the concentrations of cadmium (Cd), and lead (Pb) were found high in the muscle tissues of *M. albus*, Whereas, there was high amounts of Zn and Cu in the liver, while the Cd, Pb, and Ni were highly observed in the gills.[10]

Conclusion

Aquatic environments are more likely to get pollution, rice field also received many pollutants from fertilizers and pesticides which might be toxic to Asian swamp eel. Even though the current review study revealed that eel is safe to be consumed but it is highly

recommended to monitor the health *M. albus* to avoid health problems to consumers.

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Conflicts of interests

Author declares that there are no conflicts of interests.

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