

Cocktail effect of Profenophos and Abamectin used in paddy cultivation on Asian common toad (*Duttaphrynus melanostictus*)

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Inappropriate use of pesticides causes many harmful effects to humans and other non-target organisms. Mixing two or more chemicals into a spraying tank is a common practice among many farmers in Sri Lanka. This study determined the lone and cocktail effect of two commonly used agrochemicals, Profenophos and Abamectin on the Asian common toad under laboratory conditions. First, five days post-hatch tadpoles were exposed to two pesticides to determine 48 hr lethal concentrations (LC₅₀). Then, a chronic exposure to a series of ecologically relevant concentrations (Profenophos: 0.125, 0.25, 0.5, 1.0, 2.0 ppm Abamectin: 0.01, 0.02, 0.03, 0.04, 0.05 ppm) and a mixture of the two concentrations was carried out. Control was set up using de-chlorinated tap water. Survival, behavior and development of malformations were observed daily until metamorphosis. Growth measurements were taken in tadpoles at 15 days, 30 days post-hatch and metamorphosis. Low LC₅₀ value of 3.78 ppm for Profenophos and extremely low value of 0.12 ppm for Abamectin were recorded. This indicates Abamectin was highly toxic *D. melanostictus* than Profenophos. Chronic exposure to ecological relevant doses had greatly reduced the survival of tadpoles in Profenophos (Chi square test, $\chi^2 = 133.8$, $p = 0.001$), Abamectin ($\chi^2 = 105.5$, $p = 0.001$) and the cocktail ($\chi^2 = 137.5$, $p = 0.001$). All the exposures caused reduction in growth parameters: snout vent length (SVL) and body weight. A significant reduction in SVL and weight in 15 days post-hatch tadpoles was observed (one way ANOVA, $p = 0.001$). Moreover, pesticide exposed tadpoles took a longer time to metamorphose and showed abnormalities in movement. Exposed tadpoles also developed malformations. Profenophos caused scoliosis and kyphosis, while Abamectin caused edema and the cocktail exposed tadpoles developed both scoliosis and edema. The effects of the cocktail exposure on survival, growth and development of malformations were higher than the individual effects. Relatively few studies have been conducted to determine the cocktail effects of pesticides on amphibians but such exposures are common scenario for larval amphibians in nature as many farmers mix and spray pesticides. The importance of educating farmers about proper usage of pesticides is highlighted here.

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