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The effect of biocide exposure on the survival, growth and development of abnormalities in hour glass tree frog (ANURA: RANIDAE)

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A number of environmental stressors, such as biocide contaminants, trematode infections and UV-B exposure, have been hypothesised as responsible for recent increase in limb abnormalities and severe range reduction in amphibians throughout the world. In this study, the effect of four

commonly used biocides (two herbicides - glyphosate and 3, 4 DPA and two insecticides – chlopyrifos and dimethoate) on the survival, growth and development of abnormalities in the common hourglass tree frog, *Polypedates cruciger* were determined. The LD_{50} values of the four biocides for *P. cruciger* were determined by exposing 5 days post-hatch tadpoles, to a concentration series of the respective chemicals. Survival was recorded weekly and growth and development were assessed at metamorphosis by measuring their snout-vent length, weight and the time required for forelimb emergence in 50% of the tadpoles in a given treatment (TE_{50} value). Exposure of tadpoles to higher concentrations (>0.05 ppm) caused significant reduction in survival (χ^2= 24.87. df= 3, p=0.001), while lower concentrations (<0.05 ppm) resulted in growth retardation and an elevated incidence of abnormalities, which were dose-dependant (χ^2= 68.55. df= 3, p=0.001). Exposed tadpoles that took more time (80-147 days) to metamorphose were smaller than the tadpoles in the control group (36 days). The observed abnormalities mainly were lordosis (tail bending and vertebral column curvature) and lumps (almost everywhere on the body). The percentage abnormalities decreased with the age of the tadpole. However, growth retardation and abnormalities due to biocides makes them more susceptible to other environmental stressors. The study revealed that the all four biocides significantly affected the survival, growth and development of abnormalities on *P. cruciger*, which could possibly impose severe threats to natural populations. This study provides the first empirical evidence of the effect of biocides on the survival, growth and the development of abnormalities of a frog species, *P. cruciger* in Sri Lanka.

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