

Was ist über die Effekte von Pflanzenschutzmitteln auf einheimische Amphibienlarven bekannt?

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What is known about the effects of plant protection products on native amphibian larvae?

The contamination of the environment, especially with plant protection products, is suggested to be one factor for the global amphibian decline. Amphibian reproduction ponds can be contaminated by several ways with plant protection products, which can negatively affect the development of aquatic amphibian larvae. Mainly because effects are known to be often species-specific, we reviewed the available information on the effects of plant protection products on native amphibian larvae. In general, there are few pesticide studies using native anuran larvae and especially less toxicological experience with larval urodeles. Most information is available for embryos and larvae of the common frog (*Rana temporaria*) and the fire-bellied toad (*Bombina orientalis*). The observed effects include among others increased mortality and malformation rates, growth inhibition, behavioural and developmental changes. Abiotic and biotic co-factors can increase or decrease the effects. For example, pesticide mixtures can act in synergistic and cumulative ways. Effects were sometimes observed at very low concentrations, which are understood as environmentally relevant. However, nearly nothing is known about real world contamination of aquatic amphibian habitats with plant protection products and environmentally relevant concentrations are usually modelled. Consequently, regular pesticide screening in amphibian habitats is a must. Especially more subtle effects of plant protection products (for instance, behavioural changes in larvae or endocrine effects on amphibian metamorphosis) cannot be assessed using fish larvae as surrogates (as done in current pesticide approval). Therefore, specific amphibian toxicological studies are necessary.

Key words: Amphibia, Anura, Urodela, pesticides, insecticides, herbicides, fungicides, environmental contamination.

Zusammenfassung

Umweltverschmutzung, besonders der vermehrte Einsatz von Pflanzenschutzmitteln, ist ein vermuteter Grund für die weltweiten Rückgänge von Amphibienpopulationen. Fortpflanzungsgewässer von Amphibien können über verschiedene Wege mit Pflanzenschutzmitteln kontaminiert werden, die sich negativ auf die Entwicklung aquatischer Amphibienlarven auswirken können. Vor allem weil bekannt ist, dass solche Auswirkungen oftmals artspezifisch sind, stellen wir in diesem Artikel eine Literaturübersicht vor, was bisher über die Effekte von Pflanzenschutzmitteln auf die Larven einheimischer Amphibienarten bekannt ist. Insgesamt gibt es wenige wissenschaftliche Studien, welche aquatische Entwicklungsstadien von einheimischen Anuren als Testorganismen nutzten. Besonders wenige Daten sind für aquatische Lar-