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## **Response: A call for clarity: embracing the debate on pesticide regulation to protect pollinators**

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We thank Odemer and colleagues for a thoughtful and informative response to our recent Forum article on reforms to current pesticide regulatory practices to better support pollinator health (Fisher et al. 2023). One important clarification is that our Forum article not focused on the EU, but was rather a general discussion of global pesticide regulatory practices, with a predominate focus on the Environmental Protection Agency (EPA) in the United States (US). While we included some discussion of the regulatory standards of the European Food Safety Authority (EFSA) in response to reviewer comments, we deliberately refrained from attempting an international comparison of the pesticide regulations, given the substantial variations observed from country to country.

Currently, the pesticide registration process in the US is informed by the evaluation and approval of active ingredients and not entire formulations (EPA 2023a). We suggest that moving toward evaluation of plant protection products as formulations as performed by the European Union (EU) is a needed improvement for the U.S. system.

As pointed out by Odemer and colleagues, the EFSA requires a renewal of each active ingredient after ten years. This approach provides more comprehensive pesticide evaluation and stronger pollinator protection than current EPA standards, which do include re-evaluation procedures within 15 years but do not specify limits on all formulations containing the same active ingredients (EPA 2023b). In our Forum article we suggested a more thorough post-approval monitoring process that would evaluate exposure effects on various non-target species as well as the environmental fate of applied substances. In the US, this is a particularly pertinent suggestion since the United States Geological Survey (USGS) recently scaled back the extent of their monitoring and reporting of pesticide use (Gewin 2023). The EPA has designated, and recently reaffirmed, coated seeds as "treated articles" under 40 C.F.R. §152.25(a) (EPA 2022, 2023c) because the EPA affirms that pesticides applied seeds are intended to protect the seed itself and not beyond the treated article. This "treated article" designation almost certainly exempts the treated seeds from the regulatory standards of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). We suggest that evaluation of the effects of newly approved pesticides on nontarget organisms in the field for a period of time after registration would lead to rapid identification of unanticipated negative environmental impacts.

The efforts of the EFSA in advancing the incorporation of diverse bee species in pesticide risk assessments are laudable. We are also encouraged by and support ongoing efforts by the International Commission on Plant-Pollinator Relationships (ICPPR) and others to develop

standardized procedures for testing pesticide safety (Franke et al. 2021, Klein et al. 2022). However, it is our understanding that such evaluations of pesticide effects on diverse pollinator species are not mandatory for the pesticide approval process and that tests on the honey bee (*Apis mellifera*) remain the primary basis for pesticide registration review decisions in Europe and the US.

Given the diversity of resources, agricultural practices, and pollinator species, different countries may require their own framework for regulating pesticides (OECD, 2023). We agree with Odemer and colleagues on the importance of stimulating a broad conversation engaging diverse stakeholders and we hope that discussion stemming from our publication and responses to our suggested solutions will help stimulate further dialogue and foster cooperation for the protection of pollinators.

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