Title: Predicting honey bee sensitivity based on the conservation of the pesticide molecular initiating event

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Abstract:
Concern surrounding the potential adverse impacts of pesticides to honey bee colonies has led to the need for rapid/cost efficient methods for aiding decision making relative to the protection of this important pollinator species. Neonicotinoids represent a class of pesticides that are widely used to exterminate pest insects through their action on the nicotinic acetylcholine receptor (nAChR) and have been under scientific investigation for their lethal/sublethal effects on various non-target insects, including the honey bee. The goal of our research was to demonstrate how knowledge of nAChR conservation across insect species can aid in predictions of honey bee sensitivity to neonicotinoids. Our strategy makes use of available protein sequence and conserved functional domain information, as well as queries of individual amino acid residues linked to species sensitivity, to compare molecular target similarity across insect species and predict relative sensitivity. These analyses could aid in defining the taxonomic domain of applicability for the action of these insecticides on the nAChR. Our results indicate that the nAChR is highly conserved across many insect species, including pollinators. Therefore, assuming similar absorption, distribution, metabolism, elimination and dosage implications across species, we would predict that honey bees are likely to be sensitive to neonicotinoids that target the nAChR. In conjunction with defined adverse outcome pathway constructs pertaining to insecticide molecular initiating events, this strategy could be useful for routine evaluation of potential sensitivity of honey bees to insecticides. *The contents of this abstract neither constitute nor reflect official US EPA policy.*

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