



# Contributing to the Science of Pesticide Risk Assessments for Pollinators

Environmental Law Institute

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on behalf of the Pollinator Research Task Force

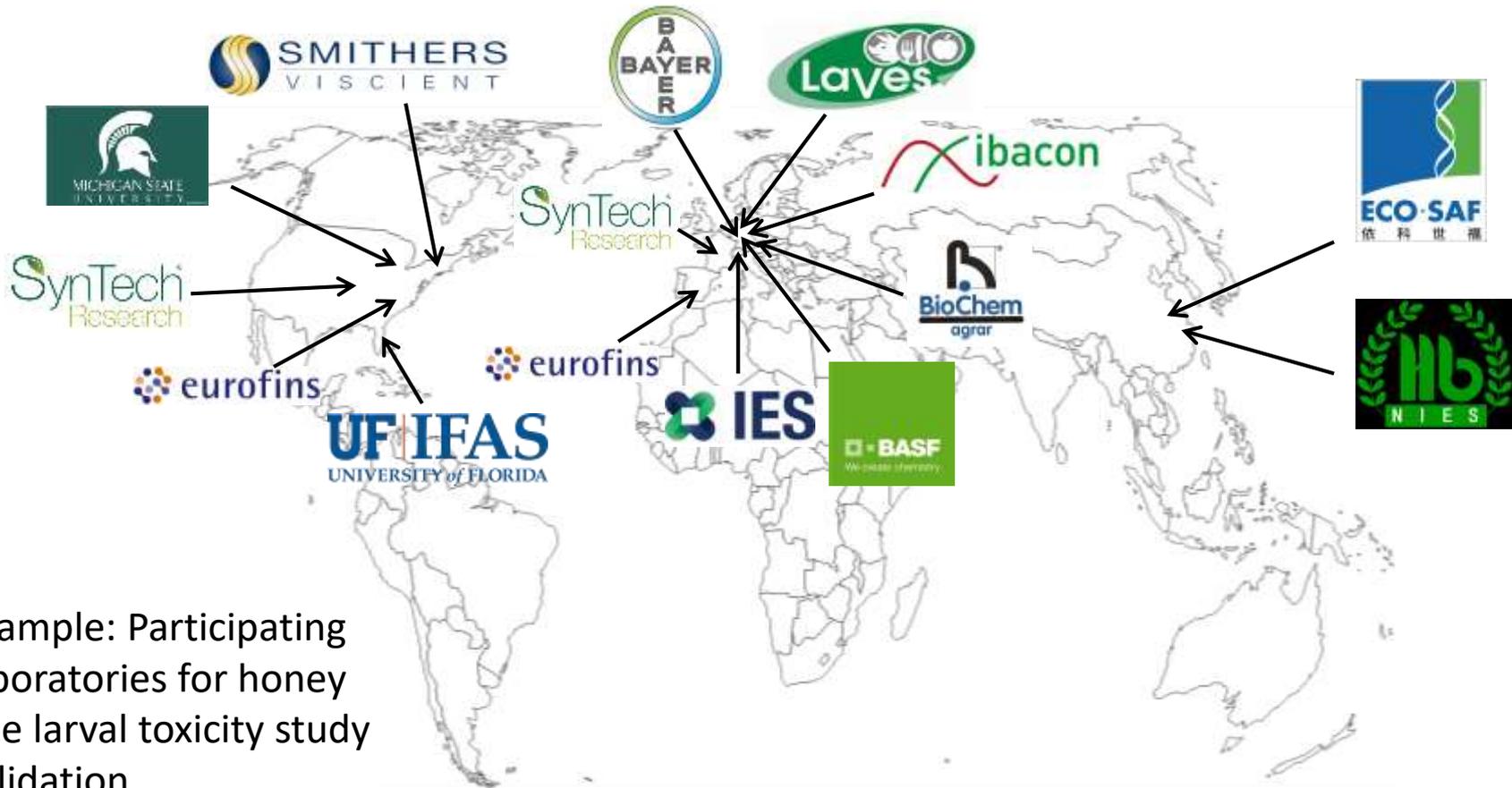
# PRTF History and Purpose

- Established in 2015
- To further improve testing and pesticide risk assessment approaches for pollinators as the science continues to evolve
  - Review and summarize existing knowledge
  - Develop new data sets
  - Develop/improve/validate test methods and risk assessment tools
- Prioritize projects through consultation with US EPA and Health Canada PMRA

# PRTF is comprised of 8 member companies

- BASF Corporation
- Bayer CropScience LP
- Corteva Agriscience
- FMC Corporation
- Mitsui Chemicals Agro, Inc.
- Syngenta Crop Protection, LLC
- UPL NA Inc.
- Valent U.S.A. LLC

# Projects are highly collaborative among PRTF members and independent laboratories



Example: Participating laboratories for honey bee larval toxicity study validation

# Many of the projects directly relate to the current EPA regulatory assessment framework

## EPA BeeREX v.1.0

**Table 1. User inputs (related to exposure)**

Description	Value
Application rate	1
Units of app rate	lb a.i./A
Application method	foliar spray
Are empirical residue data available?	no

**Table 5. Results (highest HQs)**

Exposure	Adult	Larval
Acute contact	0.225	NA
Acute dietary	1.285	0.106
Chronic dietary (EPA)	2.142	0.589

**Table 2. Toxicity data**

Description	Value (µg a.i./bee)
Adult contact LD50	12
Adult oral LD50	15
Adult oral NOAEL (NOEDD)	193
Larval LD50	25
Larval NOAEL (NOEDD)	

**Table 3. Estimated concentration in pollen and nectar**

Application method	P.C. (mg a.i./flg)	N.P. (µg a.i./mg)
foliar spray	0.11	
soil application	NA	NA
seed treatment	NA	NA
tree trunk	NA	NA

**Table 4. Daily consumption of food, pesticide dose and resulting dietary HQs for all bees**

Life stage	Caste or task in hive	Average age (in days)	Jelly (mg/day)	Nectar (mg/day)	Pollen (mg/day)	Total dose (µg a.i./bee)	Acute HQ	Chronic HQ	
Larval	Worker	1	1.9	0	0	0.00333	2.09E-09	9E-09	
		2	9.4	0	0	0.01634	0.000033	0.0004	
		3	19	0	0	0.03268	0.000069	0.0008	
		4	0	60	18	6.781	0.06790	0.2719	
	Queen	5	0	128	3.6	12.696	0.126	0.5438	
		6+	0	139	3.6	14.696	0.14696	0.5878	
		1	1.3	0	0	0.00203	2.09E-09	9E-09	
		2	9.4	0	0	0.01634	0.000033	0.0004	
Adult	Worker (pollen cleaning and capping)	3	23	0	0	0.5283	0.0000763	0.001	
		4+	41	0	0	0.8561	0.0000551	0.00062	
		6-10	0	60	6.65	7.395	0.29328	0.4198	
		6 to 17	0	148	9.6	16.456	0.63624	1.0971	
	Worker (comb building, cleaning and food handling)	11 to 18	0	60	17	6.787	0.27148	0.4525	
		Worker (foraging for pollen)	12	0	43.5	0.941	4.70563	0.01758	0.3133
		Worker (foraging for nectar)	18	0	292	1.941	32.1491	1.29498	2.1416
		Worker (water intake)	18	0	29	2	3.41	0.1364	0.2273
Queen (of hive in winter)	19	0	236	0.8662	26.890322	1.034001	1.7233		
	Queen (laying 1500 eggs/day)	Entire broodage	525	0	0	0.9775	0.0221	0.0385	

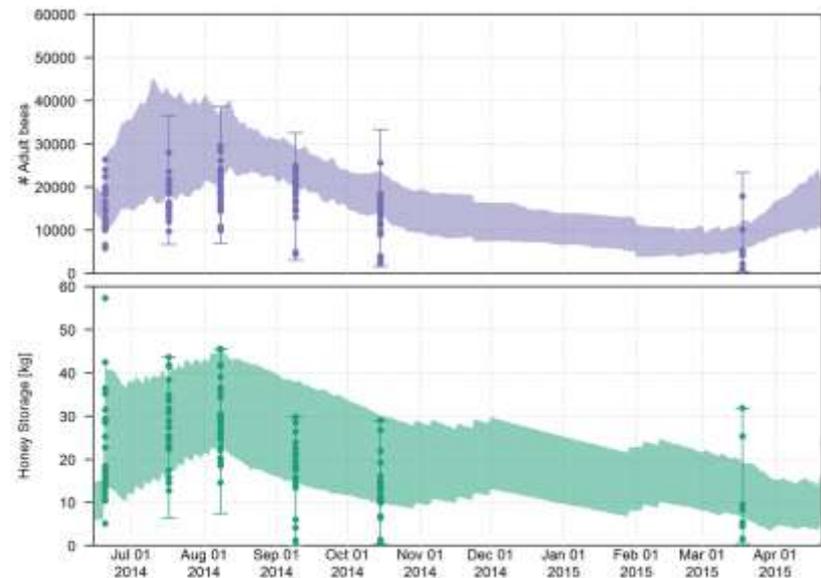
- Validation of honey bee larval toxicity bioassay
- Increase predictiveness of “residual toxicity of foliage” bioassay
- Contribution of guttation water as an exposure route
- Refinement of nectar consumption estimate of an adult forager
- Default residue estimates in nectar and pollen following a foliar or soil application

# The PRTF has conducted diverse projects to fulfill our mission

- Laboratory Studies and Endpoints
  - Investigating alternative agents for chronic honey bee studies
  - Relevance of the weight of emerged bees as a regulatory endpoint in the chronic larval honey bee toxicity study
  - Comparison of larval acute and chronic endpoints for redundancy and relevance to risk assessment
  - Comparison of acute endpoints between formulated products and active ingredients

# The PRTF has conducted diverse projects to fulfill our mission (cont.)

- Population Modeling
  - Conducted model simulations to improve predictions of overwintering colony survival



# BEEHAVE model: Adaptation to North America and over-wintering

- Calibrated BEEHAVE model with North American specific data sets from field study controls
- Evaluated predictions of over-winter colony survival and strength
- Determined factors affecting predictability
- Considered role of modeling in pesticide risk assessment based on comparisons with field data sets
- Two papers accepted for publication in *Environmental Toxicology and Chemistry*

# The PRTF has conducted diverse projects to fulfill our mission (cont.)

- Exposure Assessment
  - Whole colony consumption of nectar and pollen: lit review
  - Non-*Apis* and native bee exposure workshop



# Characterizing how non-*Apis* bee exposure differs from the honey bee

- Workshop hosted by US EPA in January 2017
- PRTF was part of a multi-stakeholder organizing committee and participant
- Goal to understand and identify potential pesticide exposure to native or non-*Apis* bees vs. honey bees
- Six resulting publications
  - Environmental Entomology
  - Open Access, Dec. 2018
  - Identified research needs



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# Summary and Conclusions

- The PRTF has successfully addressed several areas to improve the North American pesticide risk assessment process for pollinators.
- Consultation with the North American Regulatory Authorities and collaboration with external partners have been essential

Wisk, J. and D. Schmehl 2021. “Pollinator Research Task Force – Contributing to the Science of Pollinator Risk Assessment for Pesticides” in D. E. Barnekow and M. E. Krolski, Eds. Data Generation for Regulatory Agencies: a collaborative approach. ACS Publications.



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