Department of Pesticide Regulation

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MEMORANDUM

TO: Dr. Karen Morrison
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FROM: Brigitte Tafarella
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DATE: September 7, 2022

SUBJECT: Updated Calculations for Conversion Factor Method to Use Bee-Collected Soybean Nectar Residues in Neonicotinoid Risk Determination

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In April 2022, DPR received public comments from Bayer CropScience LP in response to the proposed mitigation measures for the nitroguanidine-substituted neonicotinoid active ingredients: imidacloprid, thiamethoxam, clothianidin, and dinotefuran. These comments noted that there was contamination of flower-collected nectar samples with pollen particles in a set of samples DPR included in its calculation of a nectar conversion factor that was used when assessing risks for the legume crop group. DPR reviewed the original study report and confirmed that these samples were contaminated and that the data from these samples should not be included in its method to calculate a nectar conversion factor. Once the contaminated samples were removed, using the same analytical methodology previously employed, DPR's nectar conversion factor to assess risks for legumes changed from 11:1 (flower-collected: bee-collected) to 6:1 (flower-collected: bee-collected). This resulted in a change to the application rate and timing restrictions for crops in the legume vegetable crop group in the text of the proposed regulations. This memo documents and describes the changes based on updated calculations for this conversion factor method.

Background on Use of Conversion Factor Method to Use Bee-Collected Soybean Nectar Residues in Neonicotinoid Risk Determination

The crop residue trials considered in the neonicotinoid reevaluation did not always collect nectar and pollen directly from flowers for residue analysis. In a few trials, samples of nectar and/or pollen were also collected from bee stomachs, pollen traps, and/or hive comb (stored food). DPR conducted an additional investigation into the difference in residues recovered from the various collection sources for nectar and pollen. Based on this analysis, DPR determined that the magnitude of residues recovered from nectar and/or pollen that have been processed and handled by bees (i.e., samples collected from bees or within the hive) may not be representative of the magnitude of residues expected in samples collected directly from flowers. Thus, DPR only considered samples that were collected directly from flowers in the current residue percentile calculation. This analysis and decision were documented in a memo titled "Additional Information Related to the Department of Pesticide Regulation's (DPR's) 2018 California Neonicotinoid Risk Determination and Addendum" (Tafarella, 2020).

However, DPR acknowledges that collecting nectar and pollen directly from flowers can be difficult for some crops. DPR previously identified legumes (soybean) as a crop group in which only bee-collected samples are available (Tafarella et al., 2022). Due to difficulty in collecting residues directly from soybean flowers and the unavailability of flower-collected residues for the entire legumes crop group, DPR used the bee honey stomach nectar residues from the only available soybean study (TK0250070, Document Number 52691-0577) to assess risks for this crop group. As noted above, there are significant differences between residues in nectar and pollen collected directly from flowers as opposed to nectar and pollen collected from bees or from inside the colony. Since the differences were sufficiently large, DPR developed a conversion factor to convert nectar residues collected from bee honey stomachs, in the soybean study, to the equivalent flower-collected nectar residue, as detailed in the 2022 memo titled, "Response to the External Scientific Peer Review Comments on DPR's Neonicotinoid Risk Determination" (Tafarella et al. 2022).

Updated Data and Calculations

DPR calculated the conversion factor using data from a melon study (VP-39242, Document Number 52884-0283), which included flower- and bee-collected nectar sampled on the same day. Samples from each of these matrices were paired by sampling date, and then a "flower-collected" to "bee-collected" ratio was calculated for each sampling period (Table 1). In the original calculation (Tafarella et al., 2022), the 90th percentile (both discrete and continuous) of the ratios resulted in a conversion factor of 11:1 (flower-collected: bee-collected). However, after removing the contaminated samples from Trial C in Mebane, North Carolina from the calculation, the 90th percentile (both discrete and continuous) of the ratios resulted in a **conversion factor of 6:1** (flower-collected: bee-collected).

As discussed above, the conversion factor was developed as an alternative method to use bee-collected residue for the determination of risk when collecting nectar residues directly from flower was not possible, as with legume crops. Thus, the risks for the legume crop group were estimated using the updated conversion factor of 6:1 to compare bee-collected nectar data from the soybean study to the respective No Observed Effect Concentrations (NOEC) values. Based on the updated conversion factor, 90^{th} percentile nectar residues from the soybean study no longer exceed the nectar NOEC for thiamethoxam; thus, applications of this active ingredient to legumes will no longer be prohibited. Applications of both dinotefuran and thiamethoxam at a maximum application rate of 0.126 lbs. ai/A/season and application timing up until bloom are permitted for the legume crop group. Applications of imidacloprid and clothianidin to the legume crop group are still prohibited.

Table 1. Clothianidin melon study (VP-39242): At each sampling date, one nectar sample from flowers and three nectar samples from bee honey stomachs were collected. The flower nectar sample is used to calculate the ratio with each corresponding bee-collected sample.

Trial ID	Date Sampled	Days After Last Application	Flower-Collected Residue (ug/kg)	Bee-Collected Residue (ug/kg)	Flower: Bee Ratio
A - Paso Robles, California	7/29/2016	38	9.19	0.58	15.75
A - Paso Robles, California	7/29/2016	38	9.19	0.41	22.39
A - Paso Robles, California	7/29/2016	38	9.19	1.48	6.23
B - Jeffersonville, Georgia	8/2/2016	33	10.62	2.79	3.81
B - Jeffersonville, Georgia	8/2/2016	33	10.62	5.95	1.78
B - Jeffersonville, Georgia	8/2/2016	33	10.62	2.43	4.38
A - Paso Robles, California	8/3/2016	43	6.66	2.68	2.48
A - Paso Robles, California	8/3/2016	43	6.66	2.49	2.67
A - Paso Robles, California	8/3/2016	43	6.66	1.34	4.97
B - Jeffersonville, Georgia	8/8/2016	39	4.94	3.80	1.30
B - Jeffersonville, Georgia	8/8/2016	39	4.94	7.55	0.65
B - Jeffersonville, Georgia	8/8/2016	39	4.94	1.01	4.88
A - Paso Robles, California	8/10/2016	50	4.78	2.06	2.32
A - Paso Robles, California	8/10/2016	50	4.78	1.44	3.32
A - Paso Robles, California	8/10/2016	50	4.78	1.39	3.44
B - Jeffersonville, Georgia	8/15/2016	46	4.39	2.27	1.94
B - Jeffersonville, Georgia	8/15/2016	46	4.39	2.66	1.65
B - Jeffersonville, Georgia	8/15/2016	46	4.39	0.90	4.89
A - Paso Robles, California	8/17/2016	57	2.84	1.55	1.83
A - Paso Robles, California	8/17/2016	57	2.84	1.22	2.34
A - Paso Robles, California	8/17/2016	57	2.84	0.87	3.28
B - Jeffersonville, Georgia	8/22/2016	53	2.98	7.02	0.42
B - Jeffersonville, Georgia	8/22/2016	53	2.98	2.39	1.25
B - Jeffersonville, Georgia	8/22/2016	53	2.98	0.41	7.28
A - Paso Robles, California	8/24/2016	64	2.41	2.48	0.97
A - Paso Robles, California	8/24/2016	64	2.41	0.69	3.52
A - Paso Robles, California	8/24/2016	64	2.41	0.92	2.63
B - Jeffersonville, Georgia	8/29/2016	60	2.08	0.95	2.18
B - Jeffersonville, Georgia	8/29/2016	60	2.08	0.68	3.05
B - Jeffersonville, Georgia	8/29/2016	60	2.08	1.19	1.74
		Continuous 90th Percentile of the Flower to Bee Ratio			6.34
		Discrete 90th Percentile of the Flower to Bee Ratio			6.23

References

1. Tafarella, B., (2020). "Additional Information Related to the Department of Pesticide Regulation's (DPR's) 2018 California Neonicotinoid Risk Determination and Addendum." Pesticide Registration Branch, California Department of Pesticide Regulation. Memorandum dated February 3, 2020.
2. Tafarella, B., Clendenin, B. (2022). "Response to the External Scientific Peer Review Comments on DPR's Neonicotinoid Risk Determination." Pesticide Evaluation Branch and Pesticide Registration Branch, California Department of Pesticide Regulation. Memorandum dated February 1, 2022.