Review of DPR's Neonicotinoid Risk Assessment

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Year 1 of 1 (100% Complete)

Objectives

1. Review DPR Neonic Risk Assessment
2. Conduct Independent Analysis
3. Present citrus findings to DPR

Problem and Significance

Neonicotinoids (neonics) represent a class of insecticides, chemically similar to nicotine, which affect the nerves and muscles of insects. In citrus, neonics are used to control Citricola scale, Fuller rose beetle, and the Asian Citrus psyllid (ACP), the latter which is believed to vector the disease huanglongbing (HLB).

In response to concerns for pollinator health, the California Department of Pesticide Regulation (DPR) initiated a re-evaluation of four neonicotinoid active ingredients: imidacloprid, thiamethoxam, clothianidin, and dinotefuran. DPR then developed methods to assess the risk of exposure to pollinators foraging on nectar and pollen in crops treated with neonicotinoids (CDPR 2018). From that risk assessment, DPR developed a Discussion Draft of potential mitigation measures for the use of neonicotinoids in California. With neonics being an important chemistry to fight ACP and HLB, further scientific review of the pollinator health aspects was necessary.

Benefit to Industry

An independent review of the scientific literature would provide support to DPR as they further developed measures to protect pollinators. The review would also provide valuable insight to the citrus industry in working with DPR to protect growers from the devastating impacts of HLB by maintaining safe uses of neonicotinoids.

Progress Summary

In 2020, California Citrus Mutual (CCM), with research support from the Citrus Research Board, engaged with the scientific firm Exponent to review the DPR draft proposed pollinator protection regulations which identified a maximum application rate for the Citrus Fruit Crop Group for imidacloprid (soil application) of 0.086 lb a.i./A/season.

Exponent provided a Technical Memorandum to California Citrus Mutual. CCM and Exponent reviewed with DPR staff the findings of the Technical Memorandum and formally submitted them as part of formal comments on October 30, 2020.

Conclusions

Exponent was unable to identify the basis for the maximum application rate of 0.086 lb a.i./A/season. They offered the following conclusions and recommendations to CCM and for DPR for revising the risk assessment and subsequent regulation of neonicotinoids for the Citrus Fruit Crop Group (Exponent 2020).

1) As part of a bridging strategy, the established pollen No Observed Effect Concentration (NOEC) for clothianidin should be applied to imidacloprid, as was done with thiamethoxam and dinotefuran. In lieu of a reliable imidacloprid pollen NOEC study, the weight of evidence provided by data from other toxicity endpoints indicates the use of the clothianidin pollen NOEC is appropriate.
2) All relevant data on imidacloprid concentrations in nectar following soil application on citrus from Byrne et al. (2011a,b) should be used to calculate the EEC of imidacloprid.
3) Data collected following imidacloprid applications at any rate can be used by normalizing to the maximum label application rate. Data collected under unrepresentative conditions (i.e. Hemet site) should not be included as they do not reflect citrus growing practices.
4) The minor contribution of pollen to the honey bee diet should be considered when

determining the significance of estimated risks to honey bees based on pollen exposure routes.

5) When bridging imidacloprid pollen concentrations from thiamethoxam data, the differences in carryover should be considered. Because imidacloprid does not show the tendency to accumulate over consecutive years of application (Figure 1), only the Year 1 data from the thiamethoxam studies should be applied to imidacloprid.
6) As part of the bridging strategy, reliable imidacloprid data should be utilized when possible. Substantial data characterizing the EEC of imidacloprid in citrus flower nectar is provided by Byrne et al. (2011a,b). These data can be used in conjunction with data from the thiamethoxam studies to calculate the EEC of imidacloprid in citrus pollen. Year 1 data from the studies used for bridging shows a consistent ratio between the thiamethoxam concentration in citrus nectar and citrus pollen.
7) Table 5). By applying this ratio to the established imidacloprid nectar EEC, data from both the thiamethoxam and imidacloprid studies can contribute to an estimate of the imidacloprid pollen EEC.
8) Preferably, the regulation related to imidacloprid soil applications would solely be based on data collected during imidacloprid studies. Although Byrne et al. (2011a) study provides limited pollen data, the available data shows the magnitude of imidacloprid pollen concentrations is about twice that of imidacloprid nectar concentrations. This ratio, which is similar to that determined using the thiamethoxam data, could potentially be applied to the established imidacloprid nectar EEC to estimate the imidacloprid pollen EEC: this would result in a value of 45.2 µg/kg.

Exponent's findings, recommendations, and conclusions will be foundational to further work by DPR when developing final mitigation measures for the protection of pollinators through upcoming regulatory processes.

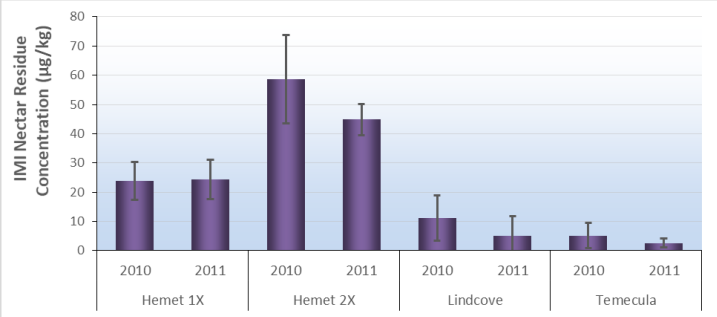

Figure 1. Average total imidacloprid residue concentration in citrus nectar following soil applications at the Hemet, Lindcove, and Temecula sites. Measurements were collected at these sites in 2010, after two years of soil applications, and in 2011, after three years of soil applications. Soil applications were made either at the maximum label application rate (Hemet 1X, Lindcove, Temecula) or double the maximum label application rate (Hemet 2X). Based on data from Byrne et al. 2011a,b.

Hive	Total Pollen Residues (µg/kg)
1	NM[1]
2	NM[1]
3	NM[1]
4	8.57
5	10.2
Median	9.39
Mean	9.39

Table 5. Summary of imidacloprid residues in pollen retrieved from pollen traps located at the entrance of 5 hives of honey bees foraging on citrus trees within treated commercial citrus blocks, Trial 7B (Byrne et al. 2011a).
[1]Not measurable due to insufficient pollen foraging.

CRB Project # 5500-224

References

Byrne, F.; Morse, J.; Visscher, P.; et al. 2011a. Determination of exposure levels of honey bees foraging on flowers of citrus trees previously treated with imidacloprid. Unpublished study prepared by University of California, Riverside. Submitted to Bayer Crop Science LP. March 30, 2011. 60 p.

Byrne, F.; Morse, J.; Visscher, P.; et al. 2011b. Report on spring 2011 nectar studies in California Citrus. Supplementary to the April 2011 Report. 13 p.

California Department of Pesticide Regulation. 2018. California Neonicotinoid Risk Determination. Viewed September 2021. https://www.cdpr.ca.gov/docs/registration/reevaluation/chemicals/neonicotinoid_risk_determination.pdf

Exponent. 2020. Evaluation of the CDPR Draft Proposed Regulation for the Use of Imidacloprid Soil Applications on Citrus. Technical memorandum. October 29, 2020.