DPR's Response to Public Comments Received in Response to August 2020 Neonicotinoid Webinars

In August 2020, the Department of Pesticide Regulation (DPR) held two workshops to gather feedback from the public and other stakeholders on draft proposed mitigation measures to protect pollinators from adverse effects of neonicotinoid insecticides. DPR received over 9000 comments during the 80-day comment period. DPR staff reviewed the comments and revised the mitigation measures where appropriate. DPR appreciates the public feedback received during the comment period and thanks each individual and entity that submitted feedback.

This document summarizes the comments received during the comment period and provides DPR's response. DPR received a substantial number of comments with common themes. As a result, DPR grouped the comments by theme and summarized the comments to include all key points raised. Thus, each comment summary below represents the key points raised by one or more commenters.

Comments on the Scope of the Draft Regulations

Comment #1: DPR focused on nitroguanidine substituted neonicotinoids and did not include other classes of neonicotinoid pesticides in these regulations. Other classes of neonicotinoid pesticides can pose a threat to pollinators and can act synergistically with other pesticides to pose threats to pollinators.

DPR Response: DPR developed the proposed mitigation measures to mitigate risks identified during DPR's reevaluation of nitroguanidine substituted neonicotinoids. DPR initiated the reevaluation based on an adverse effects disclosure for imidacloprid that showed potentially harmful effects to honey bees. After investigating the disclosure, DPR placed certain pesticide products containing imidacloprid and the related neonicotinoid active ingredients, thiamethoxam, clothianidin, and dinotefuran, into reevaluation as they are in the same chemical family as imidacloprid. These four chemicals have similar properties and characteristics (e.g., soil mobility, half-lives, and toxicity to honey bees). The chemical family is known as the nitroguanidine-substituted neonicotinoid active ingredients, colloquially called neonicotinoids. Investigating active ingredients beyond the nitroguanidine-substituted neonicotinoid chemical family, was outside the scope of the reevaluation. Additionally, Food and Agricultural Code (FAC) section 12838 requires mitigation on the four active ingredients that were placed into reevaluation by DPR. While other active ingredients are outside the scope of the reevaluation and proposed mitigation measures, DPR continues to evaluate all pesticides for adverse impacts after they are registered.

Comment #2: DPR focused on non-native honey bee pollinators and does not analyze or mitigate the dangers posed by neonicotinoids to other pollinating insects such as native bees or butterflies or other types of pollinators such as birds.

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DPR Response:

DPR's July 2018 Neonicotinoid Risk Determination (Risk Determination) and subsequent January 2019 Addendum to the July 2018 Neonicotinoid Risk Determination (Addendum) serve as the foundation for identifying risks to pollinators and the proposed mitigation measures. The Risk Determination and Addendum focused on potential effects of neonicotinoid exposure to honey bees (*Apis mellifera*) through feeding on nectar and pollen containing neonicotinoid residues. DPR used *Apis* bees as a surrogate for other non-*Apis* species of bees (e.g., bumble bees), and based No Observed Effects Concentration (NOEC) values and subsequent proposed control measures on honey bee data. This surrogate approach, which also provides a level of protection for native bees and other non-*Apis* species, is consistent with the "Guidance for Assessing Pesticide Risks to Bees" (U.S. EPA, PMRA, and CDPR, 2014). Additionally, DPR's proposed mitigation measures, such as application rate and timing restrictions, caps for seasonal application rates, and a prohibition on applications during bloom, will provide a level of protection for all insect pollinators beyond *Apis* bees.

Comment #3: DPR does not analyze or mitigate the dangers posed by neonicotinoids to the environment, including wildlife, aquatic systems, terrestrial invertebrates, and human health, particularly for farmworkers and agricultural communities.

DPR Response: DPR developed the proposed mitigation measures to mitigate risks identified during DPR's reevaluation of neonicotinoids with respect to pollinators. The initiation and scope of the reevaluation was solely focused on the risks of neonicotinoids to pollinators. Risks beyond pollinators were not assessed and are outside the scope of the current reevaluation. However, these risks are considered upon reviewing products for registration. Additionally, DPR continues to evaluate all pesticides for adverse impacts after they are registered.

Comment #4: DPR's mitigation does not address neonicotinoid-treated seeds, which, as recent analysis suggests, could be the single largest use of neonicotinoids in California.

DPR Response: Some neonicotinoid pesticide labels allow use as a seed treatment on seeds grown for agricultural food and feed commodities. DPR and the U.S. Environmental Protection Agency (U.S. EPA) evaluated risks from residues in pollen and nectar of crops with neonicotinoid seed treatment applications in the preliminary pollinator risk assessments published by U.S. EPA (U.S. EPA and DPR, 2016; U.S. EPA, 2017a; U.S. EPA, 2017b). The preliminary assessments concluded that seed treatment applications result in low neonicotinoid residues in pollen and nectar and thus pose a low risk to honey bees. DPR concurred with this assessment in its Risk Determination. Therefore, seed treatment applications are not a part of the proposed mitigation measures. For more information on DPR's work on pesticide-treated seeds, visit https://www.cdpr.ca.gov/docs/emon/surfwtr/pest_seeds.htm.

Comment #5: DPR does not account for the use of neonicotinoids in a range of uses including: non-agricultural outdoor uses such as lawns, urban and suburban gardens and landscapes, golf

courses, structural uses, and indoor uses such as in veterinary medicine or home pest use pesticides.

DPR Response: DPR's reevaluation included pesticide products labeled for outdoor uses that would result in substantial exposure to honey bees. Within the outdoor uses, DPR focused on gathering data on neonicotinoid pesticides used in the production of an agricultural food and feed commodity because they are known to attract pollinators, commonly used at relatively high application rates, and are potentially detrimental to pollinators. DPR did not evaluate risks to indoor uses, structural uses, and non-agricultural outdoor uses such as lawns, gardens and golf courses due to lack of pollinator exposure (i.e., not attractive to bees, no food sources for bees to feed on, lower use rates) or lack of widespread use.

Comment #6: DPR does not evaluate the following neonicotinoid exposure routes for pollinators: ingestion of neonicotinoid contaminated water, neonicotinoid contaminated soil, neonicotinoid contaminated non-target plants, neonicotinoid-laden dust from neonicotinoid-treated seeds.

DPR Response: In the Risk Determination and Addendum, DPR evaluated risks to bees from contaminated pollen and nectar sampled in the crop residue studies. Exposure through feeding on contaminated pollen and nectar, represents the two likeliest routes of exposure to pollinators. Other exposure routes, such as ingestion of neonicotinoid contaminated water, neonicotinoid contaminated soil, neonicotinoid contaminated non-target plants, neonicotinoid-laden dust from neonicotinoid-treated seeds, are a result of contamination or potential offsite movement of neonicotinoids and are expected to result in less exposure when compared to feeding on pollen and nectar of commodities with direct applications of neonicotinoids. DPR did not evaluate risks to non-target plants due to label mitigation measures regarding nearby non-crop blooming plants, or lack of widespread or registered use. Additionally, neonicotinoid pesticides are not registered for use on wildflowers and weeds, so any intentional application would be illegal, and any accidental application, such as through drift, is prohibited by Spray Drift Management label requirements.

Comments on the Use of Data in Developing Mitigations

Comment #7: DPR used the NOEC values as a threshold to determine risks to colonies. However, a slight exceedance of a NOEC value should not be considered a risk of concern and does not imply colony level impacts. It is important to consider all evidence, including the LOEC value and field studies (e.g., imidacloprid citrus field study DPR study ID 259131), when interpreting the potential biological significance and necessity of mitigations for a use with a small NOEC exceedance.

DPR Response: DPR's scientific analysis supporting the proposed restrictions is based on Tier II analysis comparing results of crop residue studies to endpoints determined in colony feeding studies. The specific field study cited by the commenter was determined to be supplemental as it

did not provide imidacloprid residues in pollen. However, DPR did use this study to evaluate potential risks to pollinators and is ultimately supporting the application rate tested in the cited field study. In addition to the field study cited by the commenter, a limited number of Tier III full field studies were available. However, DPR believes that the Tier II studies used as the scientific basis for the proposed restrictions are more controlled (while still being sufficiently realistic), scientifically valid, and more abundant. DPR believes basing the proposed restrictions on a Tier II analysis is a more reliable, protective, and consistent approach. The goal of Tier II colony feeding studies is to obtain a dose response, a no observed effects concentration (NOEC) and a lowest observed effects concentration (LOEC) value at the colony level. The NOEC is the highest tested treatment concentration that did not elicit a colony-level effect, and the LOEC is the next higher concentration that was tested and found to elicit colony-level effect. Due to the dosing regime in colony feeding studies, there is uncertainty as to whether bees exposed to neonicotinoid concentrations between the NOEC and the LOEC will suffer colony-level effects. It is possible that an application rate slightly above the NOEC value would not result in hive impacts. However, without data on that rate it is unknown. To be protective, DPR based its risk determinations on NOEC values. Comparing exposure to a NOEC value during risk assessment is a standard scientific approach used by many different scientific agencies and within DPR.

Comment #8: DPR bridged residue data in cases where the active ingredient lacking data is not registered in California for that use. If a company were to submit additional data for registration of a use that is not currently registered, would the regulations be revised based on supporting data?

DPR Response: Upon receipt of new data indicating a need for additional mitigation and considering other department priorities, DPR will consider updating the regulations.

Comment #9: For grapes and potatoes, the proposed maximum annual application rate is the same as the current label maximum application rate for clothianidin. It appears as if the clothianidin application rate was chosen as the benchmark rate at which all proposed rates were set. It is not appropriate to use one active ingredient as the benchmark for all neonicotinoids. This proposal of the same application rate does not account for the potency or efficacy differences of the different neonicotinoid active ingredients.

DPR Response: DPR is proposing application rate and timing restrictions for each active ingredient/crop group based on the available residue data for that crop group that did not exceed the established NOEC values for that active ingredient. Residue data was not available for every active ingredient on every crop group necessitating the need to bridge crop residue data across active ingredients. In these cases, DPR compared the 90th percentile of total residues (summation of parent molecule and bee-toxic metabolites) to the NOEC value for the active ingredient with missing data. The only acceptable residue data that did not exceed any NOEC value for grapes and foliar application to potatoes were from trials conducted with clothianidin.

Comment #10: The proposed mitigation can be difficult to understand what data was used to bridge across active ingredients.

DPR Response: In January 2022, DPR prepared a memorandum titled "Update to the Identification of Crop Residue Studies for Development of Proposed Pollinator Protection Regulations in Response to the Neonicotinoid Reevaluation." that identifies the crop residue studies that DPR is currently using to support the application rates and timing restrictions contained in the proposed regulations (DPR, 2021). The memorandum will be available for public review and comment along with the text of the proposed regulations.

Comment #11: Data substitution should use statistical methods to account for differences in use patterns. Where data are available that can be used to reduce uncertainty in the evaluation of potential risk, DPR should utilize statistical techniques that can account for differences in use patterns.

DPR Response: DPR's risk determination did not assign a risk for every possible application rate and timing. Rather, DPR made risk determinations for the specific rates and timings tested in crop residue trials. DPR did not use statistical methods or extrapolate outside of the available crop residue data to make risk determinations for rates and timings that were not tested. Only a few residue studies are available for each crop group, and there are multiple differences and confounding factors limiting the ability to identify meaningful trends or comparisons between these studies. Ultimately, DPR determined that there is inadequate data to support applying statistical techniques to account for differences in use patterns. Therefore, DPR is proposing application rate and timings that were tested and resulted in measured residues that did not exceed the respective NOEC. Restricting application rates and timings to those that have been tested, and limiting the amount of statistical manipulation of data, ensures a higher degree of certainty in the level of residues to be expected.

Comment #12: DPR's residue bridging and risk determination approach must consider application timing. When a use lacks acceptable quantitative residue data it is appropriate to estimate the residues for the use of interest by bridging from another active ingredient or crop within the crop group if the application in the study is made at a comparable growth stage for the use under evaluation or the impact of application timing differences (e.g., less plant metabolism or degradation) are considered.

DPR Response: DPR's bridging strategy considered the application rates and application timings in each crop residue trials. The proposed application rates and timing are the highest tested application rate, and the latest tested application timing. DPR bridged both the application rate and timing of each study. For example, to evaluate the risk associated with imidacloprid soil applications to grapes post bloom, DPR used post-bloom clothianidin soil applications, DPR did not rely on available pre-bloom clothianidin soil application residue data.

Comment #13: Residues in nectar and pollen scale with application rate. Directly bridging from a study performed with a different active does not allow for an evaluation of risks at the appropriate rate. However, the quantitative residues from the study can simply be scaled to adjust for the application differences and estimate the residues in pollen and nectar for a different active applied at a different rate.

DPR Response: See response to Comment #11 above. DPR did not scale residue data or extrapolate outside of the available crop residue data to make risk determinations for application rates that were not tested. Ultimately, DPR determined that there is inadequate data to support applying statistical techniques to account for differences in use patterns.

Comment #14: The imidacloprid NOEC endpoint used by DPR for identifying risk via nectar exposure is inconsistent with prior conclusions by the department. The nectar NOEC currently used is 23 µg ai/ kg compared to the NOEC of 25 µg ai/kg in the conclusion of the Data Evaluation Report for the imidacloprid colony feeding study in the 2018 California Neonicotinoid Risk Determination.

DPR Response: The imidacloprid nectar NOEC of 23 µg ai/kg is the mean measured concentration of active ingredient in the feeding solution provided to honey bee colonies. DPR previously used an endpoint for the imidacloprid nectar colony feeding study (Bocksch, 2014) based on nominal concentrations. After further consideration, DPR determined that the mean measured value is a more accurate representation of the concentration that colonies were exposed to during the study, thus, the endpoint used to identify risk was not based on a nominal value as previously concluded in the 2018 California Neonicotinoid Risk Determination. The decision to use a mean measured concentration for the imidacloprid nectar NOEC is consistent with U.S. EPA's approach (U.S. EPA, 2020).

Comment #15: The imidacloprid NOEC endpoint used by DPR for identifying risk via pollen exposure, 97.5 µg/kg, is based on the highest concentration tested in a pollen colony feeding study (Dively et al., 2015). Due to a lack of higher treatment levels tested to establish a LOEC, there is uncertainty in the NOEC value and the true imidacloprid endpoint may be higher than 97.5 µg/kg. The other available pollen colony feeding study was for clothianidin, which tested higher concentrations to establish a LOEC; therefore, there is more confidence in the NOEC value from this study. DPR used the NOEC of 372 µg/kg from the clothianidin pollen colony feeding study as a surrogate endpoint for thiamethoxam and dinotefuran, which did not have data available. DPR should similarly use the clothianidin NOEC of 372 µg/kg as a surrogate to identify risk from exposure to imidacloprid in pollen.

DPR Response: In response to public comments and feedback received during the scientific peer review process, DPR scientists reviewed the imidacloprid pollen colony feeding study and determined that the uncertainties associated with this study were too great and that the study was not scientifically acceptable (Tafarella et al., 2021). DPR found the clothianidin pollen colony feeding study to be scientifically sound and quantitatively acceptable to assess risk to honey bee

colonies. Therefore, DPR used the pollen NOEC for clothianidin as a surrogate for imidacloprid, dinotefuran, and thiamethoxam. DPR used 372 µg ai/kg feed as the final pollen NOEC for all four neonicotinoids (Troiano et al., 2018; Tafarella et al., 2021).

Comment #16: DPR should use the most representative data to evaluate risk and determine mitigation. Residue studies performed with imidacloprid should take precedent over studies with other actives for risk determinations of imidacloprid uses. Rather than use the citrus nectar residue data from an imidacloprid study that did not generate pollen data, DPR substituted data from a thiamethoxam study. DPR omitted residue data from the imidacloprid exposure evaluation when residues were not quantified in both nectar and pollen for crops producing both matrices. The residue data available for the single matrix should not be omitted because it is sufficient for evaluating the risk from exposure to that matrix for the use pattern and can be used for calculating expected residues in the matrix without data.

DPR Response: DPR agrees that active ingredient-specific data is most representative and, when available, gave precedence to active ingredient-specific data in the evaluation of risk and mitigation determination. The final application rate and timing that DPR used to determine the mitigation of imidacloprid use on citrus was based on an imidacloprid study that only sampled nectar (Study EBTNL056-7). In the absence of pollen residue data, thiamethoxam studies with applications conducted at the same rate and similar timings were referenced to approximate the levels of imidacloprid residues in pollen that might be expected. These residues did not exceed the pollen NOEC for imidacloprid. This method of bridging residue data across active ingredients is consistent with the methods employed throughout the risk determination. DPR determined that the imidacloprid study was acceptable to set the application rate and timing for the mitigation on citrus, as the nectar residues were below imidacloprid's nectar NOEC and pollen residues from another active ingredient with similar rate and timing were below the imidacloprid pollen NOEC.

Comment #17: The proposed crop-specific application restrictions only apply where managed pollinators are being used and overlook the impacts to native pollinators where managed non-native pollinators are not used.

DPR Response: DPR determined that a one-size fits all approach for mitigation does not adequately mitigate risk to pollinators as different crops pose various levels of risk; however, all crops that could serve as food sources for pollinators have additional protections beyond what is currently required. After identifying risks based on residue data, DPR evaluated commodity-growing practices to assess when treated commodities may present less risk to pollinators. DPR incorporated a multi-level mitigation approach based on the relative attractiveness of each crop to bees in accordance with U.S. Department of Agriculture's (USDA) 2017 report entitled, "Attractiveness of Agricultural Crops to Pollinating Bees for the Collection of Nectar and/or Pollen." In the proposed regulations, there are generally three types of restrictions proposed for each crop group: (1) prohibition of applications during bloom, (2) a seasonal application cap, and (3) crop-specific application rate and timing restrictions based on available data. DPR applies

these restrictions based on a multi-level mitigation approach. For crop groups that are highly attractive to bees, all three restriction types are applicable at all times. For crop groups that are moderately attractive to bees, restrictions 1 and 2 are always applicable. However, the rate and timing restrictions (restriction 3) only apply when managed pollinators are brought into the field for pollination services. DPR also proposes exemptions from the proposed regulations for crops that are not attractive to bees or crops that are harvested before bloom. This multi-level mitigation approach offers higher levels of restriction when crops are expected to provide a large portion of the bees' diet. Additionally, the approach offers lower levels of restriction when crops are not expected to provide a significant portion of the bees' diet, as the expected level of exposure will not pose a significant adverse risk to bees.

Comment #18: DPR's proposed regulations do not protect honey bee queens, the most important member of the colony. The queen's reproductive success or failure determines the fate of the colony and thus protection is critical.

DPR Response: DPR's proposed regulations are based on an assessment of Tier II colony feeding studies that considered impacts to honey bee queens. The study protocols for these Tier II colony feeding studies were developed collaboratively through the efforts of DPR, U.S. EPA, and PMRA scientists, and in consultation with industry experts. In colony feeding studies, colonies are provided a food source that has been spiked with a known and measured concentration of a specific pesticide and measurements of hive health (i.e., Colony Condition Assessments) are taken at multiple time points prior to, during, and after the exposure period. The parameters examined in these Tier II colony feeding studies include presence of a queen, queen supersedure or replacement, condition of brood, presence of eggs, and development of larvae and pupae, all of which are measures of queen performance. Thus, DPR believes that basing the proposed regulations on effects levels determined from Tier II colony feeding studies considers impacts to bee queens.

Comment #19: DPR's proposed general restrictions limiting use to one "active ingredient" and one "application method" per year will impact the industry's ability to control pests, impact Integrated Pest Management strategies and have an environmental impact. In certain instances, growers have a need to use multiple active ingredients and application methods, such as when experiencing a serious infestation of lygus, aphid or whitefly in a single year.

DPR Response: In response to comments expressing a need for flexibility when responding to specific pest pressures throughout the growing season, DPR reevaluated the available information. We determined that a seasonal application cap limiting compounding residues from multiple active ingredients or application types would not be expected to pose risk to pollinators and are no longer proposing a general restriction of only one application method and one neonicotinoid active ingredient per growing season. The cap is specific to each crop group and is based on the combination of the soil application rate at and below which, and foliar application rate at and below which, observable effects were not present for honey bees. Although the soil and foliar application rates were tested independently of one another,

the resulting residues for each type of application were well below the respective NOECs for most crop groups. Thus, combining such applications, as would be allowed by this cap, is not expected to pose risk to pollinators. These growing season caps mitigate risk to pollinators when multiple active ingredients and application methods are used.

Comments #20: DPR should align with all other regulatory authorities and accept residue data from both hand and bee collection methods in the absence of scientific evidence against use of one of the methods. All pollen and nectar residue data should be considered for making mitigation decisions, especially when limited data are available for a crop group. For some crops, collection of pollen and nectar by hand is not possible due to flower structure or low amounts of pollen and nectar actually produced. In one case, DPR excluded the only available soybean study and proposed to prohibit uses in the legume vegetable crop group because honey bees were used to collect nectar rather than collecting it by hand and anthers were used as a surrogate for pollen.

DPR Response: In response to comments expressing a need for flexibility in residue collection methods, DPR conducted additional residue sample comparisons to account for sample timing as well as compare flower-collected samples to bee-collected samples (rather than only hive-collected samples). Based on the available residue studies with both bee-collected and flower-collected samples, DPR concluded that the sample residues were not directly comparable when grouped by similar sample timing. For example, bee honey stomach nectar and flower-collected nectar samples from a melon study (VP-39242) were paired by sampling day and resulting flower residue concentrations were approximately 11 times greater than residues from bee-collected samples (Tafarella et al., 2021).

In cases where no flower-collected residue data was available for a crop group, DPR made an exception and used bee-collected residue data with a conversion factor to account for the large differences in bee and flower sample collected residues. DPR acknowledges that collecting nectar and pollen directly from flowers can be difficult and has identified legumes (soybean) as a crop group where only bee-collected samples are available. In the only available soybean residue study, efforts were made to collect samples from flowers, but due to flower structure and low amounts of matrices products, bees were utilized to collect samples. Due to the inability to collect residues directly from soybean flowers and that no flower-collected residues are available for the entire crop group, DPR will use the bee honey stomach nectar residues from the only available soybean studies to assess risks for this crop group (Tafarella et al., 2021).

Comments Related to Economic Analysis

Comment #21: The economic assessment does not cover all affected crops, including those that will experience significant impacts. The assessment acknowledges that the crops examined account for only slightly more than 60% of California's field crop, fruit, nut, vegetable and melon production and 89-90% of neonicotinoid use that could be affected by the regulation.

DPR Response: The California Department of Food and Agriculture's economic analysis focused on the eight major commodities that would be most affected by the regulations. Those focal commodities account for 89-90% of neonicotinoid use that could be affected by the regulation. DPR accounted for the remaining 11% of use and other uncertainties through extrapolation techniques covered in a memorandum titled "Estimated Economic and Fiscal Impact of the Proposed Regulations Mitigating Impacts to Pollinators from Neonicotinoids" (Clendenin, 2021).

***Comment #22*:** The economic assessment does not include insecticide use data from after California's ban on non-granular chlorpyrifos applications which makes it challenging to understand what impacts DPR's proposed restrictions will have.

DPR Response: CDFA and DPR used the most currently available PUR data to inform the economic analysis. DPR has seen a general decline in organophosphate use (including chlorpyrifos), and a general increase in neonicotinoid use in the last twenty years, which is reflected in the PUR data. Additionally, CDFA's analysis accounts for the ban on nongranular chlorpyrifos by not including chlorpyrifos as an alternative available to growers when switching from neonicotinoids.

***Comment #23*:** The economic assessment acknowledges that neonicotinoids are an important control option for Asian Citrus psyllid (ACP), and that DPR's proposed restrictions amount to a de facto ban on imidacloprid use in citrus because the allowable rates would not be efficacious. The assessment, however, does not fully acknowledge the impacts of eliminating neonicotinoids as an ACP control option as its calculates the cost of replacing imidacloprid with foliar applications of other insecticides that are only partially effective against ACP. The current proposal would allow, growers to petition CDFA for emergency declarations to allow imidacloprid applications. However, the analysis assumes that emergency controls will be sufficient to prevent established ACP populations and will not create delays that allow ACP populations to grow.

DPR Response: Based on public comments and peer review feedback on the use of pollen NOECs, such as in comment #15 above, DPR reevaluated available information. Upon reevaluation, DPR determined a revision to the imidacloprid pollen NOEC was justified. The revised imidacloprid pollen NOEC allowed modifications to imidacloprid application rates and timing restrictions in the mitigation proposal for several crop groups, including citrus. Additionally, DPR made other revisions to the proposal including a seasonal application cap limiting compounding residues from multiple active ingredients or application types. DPR is no longer proposing a general restriction of only one application method and one neonicotinoid active ingredient per growing season. In July 2021 DPR received a revised economic analysis on the updated mitigation proposal titled "Economic and pest management evaluation of proposed regulation of nitroguanidine-substituted neonicotinoid insecticides: eight major California commodities" (Goodhue et al., 2021). Additionally, in the previous economic analysis CDFA found that neonicotinoids are critical to control ACP. While the previous mitigation measures

proposed a reduction of neonicotinoid uses in citrus, uses to treat ACP could be exempt from the proposed regulations under the emergency exemption clause. Thus, CDFA exempted these applications from the analysis. More recently DPR revised the emergency exemption text in the proposed regulations in response to feedback received (such as comment #36 below). Upon reevaluation of the emergency exemption text, DPR found that the language was too narrow and did not allow for timely applications to address quarantine pests, as intended. The revised text allows for applications to occur under the following 3 scenarios: (1) An application made to address a local emergency pursuant to Government Code section 8630, (2) An application made to address a local emergency declared by the U.S. Department of Agriculture or the California Department of Food and Agriculture, or (3) An application to control a quarantine pest declared by the U.S. Department of Agriculture or the California Department of Food and Agriculture. In each of these scenarios the operator of the property shall obtain the written recommendation from a licensed agricultural pest control adviser and retain the written recommendation for at least two years after the application occurs. Previously, the exemptions only allowed for applications to occur once an emergency was declared by CDFA or USDA pursuant to Section 8630. Applications of neonicotinoids to treat other pests were included in the economic analysis. For these uses, CDFA consulted with expert citrus researchers at the University of California and the University of California Cooperative Extension to determine alternative active ingredients for each target pest. With expert consultation, CDFA determined that there are effective alternative treatments and, as such, no additional significant losses would occur due to the restrictions on neonicotinoids.

***Comment #24*:** The strawberry industry is currently losing approximately $100 - $200M per year due to damage caused by lygus even with the limited use of thiamethoxam. The economic impact analysis by CDFA does not accurately reflect the economic losses for strawberries. The 2020 report concluded that the losses were a little less than $400,000 and estimated a 30.6% increase in costs with the loss of thiamethoxam. The 2020 report assumes imidacloprid use would be allowed, however, the estimates did not consider the loss in viable crops due to the inability to control lygus and other pests.

DPR Response: CDFA consults with the University of California and the University of California Cooperative Extension Researchers to determine alternative active ingredients for each target pest and crop. With expert consultation, CDFA determined that there are effective alternative treatments and, as such, there would be no additional losses from lygus due to the restrictions on thiamethoxam. Losses that occur with the current uses of neonicotinoids (prior to proposed regulations) are not accounted for in the analysis, as the analysis focuses on direct impacts and changes that would occur as a result of the regulations.

***Comment #25*:** The economic analysis does not include losses owing to the more rapid development of resistance to remaining active ingredients by pests and the lack of alternative pest management tools.

DPR Response: As stated in the report, CDFA did not estimate the economic costs of increased pest resistance due to the proposed regulation. The degree to which any specific case of resistance would be impacted by this regulation depends greatly on many factors including how much resistance is currently found to the existing alternatives. In the absence of information that enables plausible quantification of an identifiable risk, CDFA did not impose an arbitrary assumption on the magnitude of the expected cost of the realization of uncertainty or on its upper bound.

***Comment #26*:** The economic evaluation conducted by the Department of Food and Agriculture assumed only the cost of transitioning to alternative active ingredients and did not consider yield loss. If applications (either in rate, product or method) are not conducted effectively and in an appropriate timeframe, yield and product quality will decline; these costs should be realized.

DPR Response: CDFA's economic analysis included estimations for yield loss. However, CDFA found no predicted yield loss for any of the 8 focal crops as a direct result of the mitigation proposal.

***Comment #27*:** The Department did not consider the impacts of the proposed mitigations on national and international trade. If farmers cannot use neonicotinoids as a control measure, the result will be reduced exports, state-imposed trade barriers or an increased reliance on other chemistries, thereby increasing overall insecticide use.

DPR Response: In response to other public comments, such as comment #36 below, DPR revised the proposed regulation emergency exemption provisions surrounding quarantine pests. This revision should lessen the impact. Regarding the economic analysis report, indirect impacts on international trade from potential but unknown instances of increased resistance, MRL issues, or future invasive species are beyond the scope of the report. As noted above, in the absence of information that enables plausible quantification of an identifiable risk, CDFA did not impose an arbitrary assumption on the magnitude of the expected cost of the realization of uncertainty or on its upper bound.

Comments Related to Organization and Clarity of the Draft Regulations

Comment #28: DPR should create a decision tree or other tool to help growers and PCAs understand permissible applications based on both the federal label and state regulations as it is not always easy to decipher the net result of EPA and proposed DPR restrictions

DPR Response: DPR will consider this for outreach documents post rulemaking.

Comment #29: DPR exempted ant and roach baits, and products formulated as a gel from their reevaluation. DPR should provide clarity regarding whether these excluded uses are also excluded from the mitigations.

DPR Response: The draft regulations are focused on foliar and/or soil applications of products containing one or more neonicotinoid active ingredients when used for the production of certain agricultural food and feed commodities. Neonicotinoid products formulated as ant/roach baits and gel baits are not labeled for soil or foliar applications to agricultural food and feed commodities. Thus, the draft regulations would not apply. Pollinator exposure to such applications is expected to be minimal.

Comment #30: DPR should clarify the reason for listing crops in the mitigations that do not use managed pollinators (e.g., cereals, grapes)

DPR Response: DPR's mitigation proposal aims to provide various levels of protection for all pollinators, not just managed pollinators. DPR included crops in the mitigation proposal that do not use managed pollinators (e.g., cereals, grapes). The fact that growers do not use managed pollinators for a given crop does not mean that the crop is unattractive to pollinators. For example, many crops within the cereal grains crop groups are moderately attractive to bees, especially between heading and inflorescence. Barley, oats, rice, rye, triticale, and wheat which are not attractive to bees, are proposed for exemption from the neonicotinoid use restrictions. Similarly, grapes are moderately attractive to pollinators. DPR incorporated a multi-level, tiered mitigation approach based on the relative attractiveness of each crop to bees.

Comment #31: EPA's Proposed Interim Decision contains new crop growth stage restrictions for soil and foliar applications in cucurbits and fruiting vegetables. While these growth stage restrictions are not final, it is important to note that some of DPRs proposed growth stage restrictions are different from EPA's.

DPR Response: In the revised draft regulations, DPR made several revisions to the crop growth stages. However, not all growth stages will align as DPR and EPA have conducted separate analyses and have different mitigation proposals. Additionally, as noted, EPA's proposed mitigation is not final, thus, DPR may not fully align with U.S. EPA as their proposal may change in the future.

Comment #32: DPR needs to provide additional clarification on some of the foundational assumptions and data points used to develop the proposed mitigations and associated noticing materials. The draft regulations were released prior to the citation of studies used as a basis for the mitigation. This does not support the Department's science-based procedures and needs to more clearly detail the data points and assumptions used to develop the proposed mitigations.

DPR Response: Given the complexity of the mitigation proposal, DPR decided to share the draft mitigation proposal during development stages and provide an informal comment period to receive critical feedback from the public. The approach was beneficial as it allowed DPR to consider and evaluate feedback and make several justified changes in the mitigation proposal before initiating formal rulemaking. As a part of the formal rulemaking process, DPR plans to

provide several additional documents that will provide additional clarification on the foundations assumptions and data points used to develop the proposed mitigations.

Comment #33: It is unclear in the recent mitigations proposed by DPR if seed treatments will still be permitted.

DPR Response: The mitigation proposal will impact soil and foliar applications of neonicotinoids when used in the production of certain food and feed agricultural applications. The proposed regulation will not impact neonicotinoid seed treatments.

Comment #34: DPR should provide clarification of the term "indeterminate" as it relates to bloom phases.

DPR Response: The word "indeterminate" has been removed from the revised proposal.

Comments Related to Definitions and Exemptions

Comment #35: Clarification on the terminology "bloom" is needed. The bloom definition seems to conflict with the Citrus Bee Protection Regulations bloom definition of 75 percent of the blossom petal on the north side of tree have fallen. The difference between the two definitions is significant and increases the bloom period by a month and would have serious consequences for controlling pests.

DPR Response: The proposed regulation includes a definition for the term "bloom." For citrus, the definition incorporates by reference the definition in the citrus bee protection regulations to ensure consistency in those regions.

Comment #36: The emergency exemption text is not clear how CDFA/USDA emergency declaration interacts with the procedure outlined in California's Government code 8630. The text written as is, only allows for the exemption when there is an infestation, which is far too late for controlling invasive pest species. DPR should consider alternative approaches to allowing applications to take place in emergency situations, when no viable alternatives are available, or when CDFA determines that immediate treatment is needed.

DPR Response: In response to feedback received, DPR reevaluated the emergency exemption text and found that by referencing California's Government Code 8630 the language was too narrow and did not allow for timely applications to address quarantine pests, as intended. DPR made edits to the emergency exemption text and added alternative approaches to allow applications to take place in emergency situations. The revised text allows for applications to occur under the following 3 scenarios: (1) An application made to address a local emergency pursuant to Government Code section 8630, (2) An application made to address a local emergency declared by the U.S. Department of Agriculture or the California Department of Food and Agriculture, or (3) An application to control a quarantine pest declared by the U.S. Department of Agriculture or the California Department of Food and Agriculture. In each of

these scenarios the operator of the property shall obtain the written recommendation from a licensed agricultural pest control adviser and retain the written recommendation for at least two years after the application occurs.

Comment #37: Clarify if and/or how the rules pertain to transplanted tomatoes from greenhouse to field.

DPR Response: Proposed section 6990 (c) provides an exemption from the regulation for agricultural commodities grown inside an enclosed space (greenhouse) provided all listed criteria are met. Once the tomato plant is transplanted to the field (outdoors) the application of neonicotinoids to the plant are subject to the restrictions in the proposed regulation. Tomato is in the fruiting vegetable crop groups (crop groups 8 and 8-10).

Comments Related to General Application Restrictions

Comment #38: The general application restrictions for bloom results in major impacts for indeterminate bloom. Essentially, this restriction results in total prohibitions all season long as the crop will continuously be blooming. DPR should consider whether this crop specific outcome was intended from a general mitigation and consider the impact of this on growers' ability to manage pests and resistance.

DPR Response: DPR evaluated all residue data to determine common trends in order to identify broader risks to pollinators. The collective evaluation of all residue trials conducted during bloom found that applications made during bloom present high risks for pollinators. Pollinators frequently visit crops when they are in bloom to feed on nectar and pollen of flowers. Applications made during bloom were determined to present two types of risks to pollinators: (1) unacceptable levels of residues in pollen and nectar, and (2) acute contact risks associated with the deposition of spray droplets from foliar applications onto bees. Therefore, for most of the crop groups, DPR proposes to prohibit applications of neonicotinoids during bloom. This proposed restriction may have a large impact on indeterminate blooming crops. However, DPR finds this restriction to be necessary to mitigate risks to pollinators.

Comment #39**:** With regards to the general application restrictions that prohibit multiple AIs or multiple application methods, these restrictions represent a significant new direction in insecticide regulation. Neonicotinoid active ingredients do not have the same pest spectrum and use patterns. There are many situations where two different neonicotinoids active ingredients or application methods would be used in the same growing season to control different pests. These provisions have overlapping impact and together would significantly diminish a grower’s ability to provide efficacious pest control with the most appropriate tool at the appropriate time and impact integrated pest management strategies.

Lastly, these restrictions would by regulation eliminate the competition between many neonicotinoid products in a growing season and tie future product choice to decisions made

earlier in a season. In some crops, different pests are best targeted by either a foliar or a soil application. In many cases, soil applications are applied earlier in the season, and foliar applications are made later in the season. Pesticides used later in the season would likely no longer be able to be used and thus these restrictions would create an uneven playing field between competitors and active ingredients.

DPR Response: In response to comments expressing a need for flexibility when responding to specific pest pressures throughout the growing season, DPR reevaluated the available information. Upon reevaluation, DPR determined that a seasonal application cap limiting compounding residues from multiple active ingredients or application types would not be expected to pose risk to pollinators and are no longer proposing a general restriction of only one application method and one neonicotinoid active ingredient per growing season. The cap is specific to each crop group and is based on the combination of the soil application rate at and below which, and foliar application rate at and below which, observable effects were not present for honey bees. Although the soil and foliar application rates were tested independently of one another, the resulting residues for each type of application were well below the respective NOECs for most crop groups. Thus, combining such applications, as would be allowed by this cap, is not expected to pose risk to pollinators. These growing season caps mitigate risk to pollinators when multiple active ingredients and application methods are used.

Comments Related to Alternative Mitigation Approaches, Integrated Pest Management (IPM), and Insecticide Resistance Management (IRM)

Comment #40: Improved communication between growers and beekeepers is the most effective way to protect managed pollinators while allowing growers to protect their crops. More collaboration is needed and not regulation. With improved communication between growers and beekeepers the types of restrictions proposed by DPR are not necessary. Additionally, existing stewardship efforts should be given more weight when determining appropriate mitigations including the CA managed pollinator protection plan (MP3), BeeWhere, consortium efforts such as BeSure!, and promotion of Best Management Practices (BMPs).

DPR Response: In addition to the proposed mitigation measures, DPR plans to continue to promote improved communication between growers and beekeepers. While improved communication between growers and beekeepers and existing stewardship programs are important, alone they are not sufficient to mitigate risks to pollinators.

Comment #41: EPA evaluated the risk to pollinators from the use of several neonicotinoid pesticides including imidacloprid and thiamethoxam on citrus and other agricultural commodities. EPA decided that benefits of using imidacloprid and thiamethoxam outweighed any harm that was caused to pollinators from the uses and thus, the agency did not propose risk mitigation on several uses, including citrus and grapes. DPR should consider EPA's approach.

DPR Response: DPR did not exempt applications based on the benefits. Rather, DPR is proposing mitigation for each crop group and only allows for exemptions from the regulation in emergency situation or for the control of quarantine pests such as ACP.

Comment #42: As per the FAC §§ 14001-14015, DPR must list neonicotinoids as Restricted Use Materials.

DPR Response:. DPR did consider making neonicotinoids products restricted materials as an alternative mitigation proposal, but, determined that it was not necessary to mitigate risk to pollinators. In the case of neonicotinoids, the grower would need to obtain a permit from the local CAC to apply neonicotinoids in addition to complying with the restrictions identified in the proposed regulations. With the comprehensive nature of the restrictions proposed under these regulations, DPR does not anticipate the need for CACs to establish additional local restrictions. Thus, the mitigation measures implemented would be the same, but the means by which the mitigation is carried out would be slightly different as applicators would need to obtain a permit from the local CAC. Additionally, most agricultural applications of neonicotinoids are already applied by certified applicators. Based on this, DPR determined that listing the neonicotinoid active ingredients as restricted materials would not offer any significant additional environmental protections for pollinators because the restrictions are enforceable without site-specific permitting, and would require applicators to take an unnecessary additional step, apply for a permit, to make the same application. Designating neonicotinoid active ingredients as restricted materials would result in additional costs for growers, including obtaining licensing or certification, getting a permit, and preparing and delivering to the CAC notices of intent for each proposed application. As noted above, this alternative is not necessary to protect pollinator health, as it does not add significant additional environmental protections for pollinators, and thus is not included in the mitigation proposal.

Comment #43: DPR's mitigation proposal makes several restrictions that would eliminate industry's ability to control invasive species such as ACP. Restrictions such as reduced application rates, would require three times as many pesticide applications to control the same pest. This increased use of pesticides would reduce populations of beneficial insects, which would cause outbreaks of insects that are presently controlled through natural biocontrol or the systemic effect of imidacloprid. This would devastate IPM programs and increase the use of pesticides to control outbreaks of secondary pests.

DPR Response: As previously described in response to comment #23 above, DPR made several revisions to the mitigation proposal including some revised application rates, establishing seasonal application caps per crop group to replace the previous restrictions against using multiple neonicotinoids, and revised exemptions for application in emergency situations to control quarantine pests such as ACP. These revisions are expected to provide greater flexibility to employ IPM strategies and control critical pest such as ACP.

Comments Related to Specific Crop Groups

Comment #44: California strawberry varieties are self-pollinating and do not rely on managed or native pollinators for improved yield, quality, or appearance. Strawberries are not a preferred food source for commercial bees. In the draft proposed regulation, DPR categorized strawberries as "moderately attractive" to bees with the other berries (i.e., blueberries, raspberries, blackberries) that require managed pollinators. However strawberries are the only berry that do not require or use managed pollinators. There is no evidence that current uses in strawberries impact bees. Despite this, DPR's proposes significant restrictions. The proposed restrictions do not consider differences in crop attractiveness as well as the use of managed pollinators. Nor do they differentiate among various berries when the use of managed pollinators for production is a significant regulatory factor.

DPR Response: The fact that a crop, such as strawberries, does not rely on pollinators for pollination does not mean that pollinators will not be attracted to the crop. Strawberries are attractive to honey bees, native bees, and solitary bees (USDA, 2017). Based on this, it is reasonable to conclude that bees will visit the crops during the bloom period, especially when other food sources are unavailable. While strawberries may not use managed pollinators for pollinating their crops, restrictions are still needed to protect non-managed pollinators. DPR's analysis of residue data found that use of neonicotinoids in berry and small fruit crops posed high residues at levels that are potentially toxic to bees.

Comment #45: DPR's designation of the cereal grains crop group as moderately attractive and implementing similar levels of mitigation as with other crop groups deemed moderately attractive is overly conservative.

DPR Response: DPR's designation of cereal grain crop group as moderately attractive is consistent with the approach used to designate other moderately attractive crop groups (USDA 2017). DPR made exemptions for cereal crops which are not attractive to honey bees, bumble bees, and solitary bees. Most cereal grain crops are exempt for the restrictions, but DPR finds the designation of some non-exempt cereal grains as moderately attractive, to be appropriate.

Comment #46: With regards to citrus, DPR's draft proposal effectively cancels the soil and foliar uses of imidacloprid since the reduced rates would not be effective in controlling target pests such as ACP, citrus leafminer and citricola scale. Additionally, thiamethoxam is critical for exports to Korea. The most significant use for foliar applications of thiamethoxam are for Fuller rose beetle (FRB) control. Growers usually make one application in the spring and another in the fall to meet a regulatory protocol required by Korean phytosanitary regulatory authorities. Before packers can export to Korea, they must follow a protocol that requires two pesticide applications and other measures to control FRB. Under the draft mitigation proposal, growers will face a dilemma in deciding how to use neonicotinoid pesticides.

DPR Response: As previously described in response to comment #23 above, DPR made several revisions to the mitigation proposal for the citrus crop group that will result in greater flexibility to manage and treat critical pests. Changes include revised rates for imidacloprid, establishing seasonal application caps per crop group to replace the previous restrictions against using multiple neonicotinoids, and revised exemptions for application in emergency situations or to control quarantine pests such as ACP.

Comment #47: Citrus nurseries grow the vast majority of trees under protected structures, screens, or glass due to ACP. The protected structures are capable of excluding insects far smaller than bees. Thus, it would be highly improbable that pollinators would come into contact with young citrus nursery trees grown inside such structures. The remaining citrus nurseries, grown outdoors, contain trees that are immature and produce few blossoms. DPR should consider exempting nurseries from regulations due to extremely low risk for foraging bees. CDFA regulations also require treatment of citrus nursery stock before shipping to retail nurseries. Currently, neonicotinoids are the only systemic insecticides approved to meet the requirement of a soil drench application with a systemic insecticide capable of controlling ACP. Treatment of citrus nursery stock prior to shipment is an essential use; it protects the trees from ACP infestation, thereby minimizing the risk of spreading ACP and HLB through the pathway of citrus nursery stock.

DPR Response: DPR included in the proposed draft regulations, an exemption for commodities grown inside an enclosed space, insect exclusionary structure, or insect exclusionary netting provided set guidelines are followed. Under these growing conditions, pollinators would be intentionally kept away from the crops during the crucial period of bloom. Therefore, these types of applications are unlikely to pose a risk to pollinators as there is no route of exposure through nectar or pollen. Additionally, DPR revised the exemptions for application in emergency situations or to control quarantine pests such as ACP.

The added and revised exemption will likely address most citrus nurseries, as described in the comment. However, DPR is not including a blanket exemption for nurseries from the proposed regulations, as there are risks to pollinators from applications to outdoor nurseries.

Comment #48: Unlike other cucurbit crops, such as cucumber, watermelon, or melons, Cucurbita crops are well known to be highly attractive to a wide variety of bees (and other insects) because of the copious amounts of nectar and pollen provided. DPR should re-classify cucurbit crops in the genus *Cucurbita* (pumpkins, squash, zucchini, gourds) as highly bee attractive.

DPR Response: DPR's designation of the cucurbit crop group as moderately attractive is consistent with the approach used to designate other moderately attractive crop groups. Cucurbit crops in the genus *Cucurbita* (pumpkins, squash, zucchini, gourds) are attractive to honey bees, as opposed to highly attractive (USDA, 2017). DPR finds the designation as moderately attractive, to be appropriate. With the moderately attractive designation, restrictions such as the

prohibition of applications during bloom and the seasonal application cap will apply to all cucurbit crops. Many cucurbit crops use managed pollinators, and in these cases additional application rate and timing restrictions will apply.

Comment #49: With regards to fruiting vegetables, the 2017 USDA study considers processing tomatoes (Lycopersicon esculentum) to be unattractive to honey bees as a food source. Further, the study finds that tomatoes and peppers do not require or use bee pollination. Risk, in these cases, must necessarily be built on both residue values and pollinator access and attractiveness to the crop which contains the residue in question. Tomatoes and peppers, do not meet this criteria.

DPR Response: The mitigation proposal was developed using both residue studies and pollinator access/attractiveness to the crop. DPR excluded crops that were listed in the USDA study as unattractive to all pollinators. While the USDA study lists processing tomatoes as unattractive to honey bees, it also lists tomatoes as attractive to bumble bees and native bees (USDA, 2017). DPR took a conservative approach in designating crops as attractive, as these mitigation measures are broad and provide protection for all insect pollinators. Additionally, tomatoes and peppers may not rely on pollinators for pollination, however, that does not mean that pollinators will not be attracted to the crop or have exposure. While certain crops may not use managed pollinators for pollinating their crops, restrictions are still needed to protect non-managed pollinators.

Comment #50: For crop groups such as leafy greens, prohibiting use in crops that are not harvested before flowering, creates unnecessary risk and liability concerns in situations where a crop is not harvested due to lack of a market or other unplanned circumstances.

DPR Response: While the pollen and nectar of bulb vegetable crops are attractive to bees under certain conditions (USDA, 2017), requiring the crop to be harvested before bloom mitigates potential risk by ensuring that neonicotinoid laden floral resources are not available to bees. Unless the crop is harvested before bloom, pollinators may be exposed to various levels of neonicotinoid residues when visiting the crop during bloom. DPR does not have specific residue data for this crop group. Without residue data, DPR cannot ensure current application rates and timings are safe or low risk to pollinators. Therefore, it is necessary to prohibit neonicotinoid applications if the crop is not harvested before bloom. When crops are not harvested before bloom, this restriction mitigates potential risks to pollinators from soil and foliar neonicotinoid applications made to bulb vegetable crops. In situations where neonicotinoids have already been applied to a crop but the crop no longer needs to be harvested due to lack of a market or other unplanned circumstances, the crop may be discarded prior to bloom to avoid risks and violations.

Comment #51: With regards to oilseed, DPR states that, except as provided in subsection (c), if managed pollinators will be used to pollinate crops in the oilseed crop group during the growing season, certain application rate and timing restrictions are required. Cotton does not use managed pollinators, thus, it is not necessary to restrict applications when managed pollinators are used for cotton.

DPR Response: While the use of managed pollinators for cotton is not a current practice, it may be for other oilseed crops. Additionally, crop growing practices may change over time. Thus, DPR wishes to preserve consistency in approach across the regulations in the event that practices change. If cotton does not rely on managed pollinators, then these regulations do not apply.

Comment #52: In the past, melon growers have been able to use foliar insecticides during bloom by following the label instructions and several standard practices: (1) discuss control options with the beekeepers prior to making any foliar spray application when bees are present, (2) apply insecticides by ground application to avoid direct spray contact or drift, and (3) only apply insecticides at night when bees are safely out of the field. Since flowers are closed at night, exposure of bees to insecticide residues via pollen nectar in blooms should be negligible. By the next morning, insecticide sprays on treated foliage have dried prior to bees re-entering the field. Thus, exposure of the active ingredients to honey bees on treated foliage will be negligible if the insecticide is applied at night and according to current label restrictions.

DPR Response: In addition to the proposed mitigation measures, DPR plans to continue to promote improved communication between growers and beekeepers as well as applying pesticides with application methods and application timing that are lower risk to bees. While these standard practices are important, alone they are not sufficient to mitigate risks to pollinators. Neonicotinoids are systemic insecticides that are transported through the vascular system of plants to all tissues, including leaves, nectar, and pollen. Applications of neonicotinoid pesticides prior to bloom may still contaminate the pollen and nectar that bees forage on while visiting crops during the bloom period. Pollinators may still be exposed for an extended duration after an application. While applying pesticides at night may help to prevent immediate contact exposure by allowing the pesticide to dry, it does not eliminate risks to pollinators associated with residues of neonicotinoids found in their food sources (pollen and nectar).

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