CENTER FOR FOOD SAFETY

February 15, 2022

SUBMITTED VIA EMAIL

California Department for Pesticide Registration
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Re: Comments on the Current Use and Potential Impacts of Pesticide-Treated Seeds

Thank you for the opportunity to comment on California Department of Pesticide Registration's (CDPR) approach to regulating pesticide-treated seeds. Following on from CDPR's November workshop, Center for Food Safety (CFS) has some concerns about treated seed use and the lack of regulation in California.

Some of the takeaways from the November workshop were:

- CDPR lacks information on the scope and nature of use of treated seeds
- There are many unreported uses of treated seeds; treated seed use is not logged in the Pesticide Use Reporting (PUR) system
- Current studies on treated seeds are insufficient to model extent of impacts in California and do not use California data
- Out of state seeds come into the state coated with pesticides not registered in California
- Some federally cancelled pesticide registrations also being used on seeds in California
- Seed treatment reporting falls under industrial, not agricultural, reporting regulations
- CDPR does not believe treated seeds are pesticides

To remedy these knowledge gaps and close the loophole that allows dangerous and unregulated chemicals to spread across the Californian landscape, CDPR must treat treated seeds as pesticides. This will allow CDPR to collect the data it desperately needs without relying on industry to fill the gaps, and ensure unregistered pesticides are not used in California.

I. Environmental Impacts of Treated Seeds

Neonicotinoids and other chemical coatings associated with treated seeds are found widely throughout the environment, and the agricultural landscape is up to 48 times more toxic to insects than it was 25 years ago.[1] These chemicals are found in the environment because the plants take up under 10% of the seed coating, leaving over 90% of the active ingredient to diffuse into the surrounding soil and soil water, and eventually into waterways. CDPR, P*esticide-Treated Seed Public Workshop*, slide 30 (Nov. 15, 2021).

In addition, neonicotinoid coatings are abraded off into the talc or other lubricant added to seed boxes to prevent coated seeds from sticking together, and the neonicotinoid-rich lubricant dust lost during planting travels long distances on the wind during planting. In short, the bulk of the coating does not remain in or on the treated articles: the seeds. The result is widespread contamination of the air, soil, marginal vegetation, waters, neighboring farms, and beehives. Pesticide contamination thus results on vast areas extending far beyond the planted fields, affecting non-target organisms and especially pollinators.

This has resulted in harm to a huge variety of wildlife, for example commercial and non-commercial bees[2], aquatic organisms, slugs[3], and bird species[4]. Humans are also becoming exposed to these pesticides through fruits such as apples, cherries, and strawberries, as well as honey and baby food.[5]

For more information on the environmental impacts of treated seeds, please see CFS's petition to EPA, attached as exhibit A.

II. CDPR Has the Legal Authority to Regulate Treated Seeds

CDPR must "provide for the proper, safe, and efficient use of pesticides . . . for protection of the public health and safety." Food and Agriculture Code (FAC) § 11501(a). The agency must protect the environment by "prohibiting, regulating, or ensuring proper stewardship of those pesticides." *Id.* § 11501(b).

Part of CDPR's remit is also to "assure consumers and users that pesticides are properly labeled and are appropriate for the use designated by the label" and that "state or local governmental dissemination of information on pesticidal uses of any registered pesticide product is consistent with the uses for which the product is registered." *Id.* § 11501(d).

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[1] Kendra Klein & Anna Lappé, *America's agriculture is 48 times more toxic than 25 years ago. Blame neonics*, The Guardian (Aug. 2019).

[2] David, A., Botías, C., Abdul-Sada, A., Nicholls, E., Rotheray, EL, Hill, EM, and Goulson, D., *Widespread contamination of wildflower and bee-collected pollen with complex mixtures of neonicotinoids and fungicides commonly applied to crops*, Env't International, 88: 169-178 (2016).

[3] Margaret Douglas et al., *Neonicotinoid Insecticides Travels Through A Soil Food Chain, Disrupting Biological Control Of Non-Target Pests And Decreasing Soya Bean Yield*, 52 J. of Applied Ecology 250-260 (2014).

[4] 3 Millot, F., Decours, A. et al., *Field evidence of bird poisonings by imidacloprid-treated seeds: a review of incidents reported by the French SAGIR network from 1995 to 2014*, Env't Sci. Pollut. Res. (2016).

[5] Hillary Craddock et al., *Trends in neonicotinoid pesticide residues in food and water in the United States, 1999–2015*, 18 Env't Health 7 (2019).

The agency is currently failing on all counts. As detailed above, treated seeds are not safe to use and are causing significant damage to the environment. Furthermore because CDPR has very little information on the scale of treated seed use in California, the agency cannot assure consumers the treated seeds, or the pesticide products used to treat the seeds, are being used consistently with their labeling or registration.

As discussed below, CDPR has the authority to require the registration of treated seeds as pesticides, either under the California definition of "pesticide" or under regulatory language based on restricted materials or protecting pollinator health. CDPR must make full use of its authority to properly carry out its mission to protect public health and the environment from the harmful effects of pesticides.

a. The California definition of pesticide includes treated seeds.

Under federal regulations, a pesticide is "[a]ny substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest." 7 U.S.C. § 136(u)(1).

Similarly in California, a pesticide is "[a]ny substance, or mixture of substances which is intended to be used . . . for preventing, destroying, repelling, or mitigating any pest." FAC § 12753(b).

These definitions are almost identical, and treated seeds clearly fit within the definition. EPA acknowledges under federal law treated seeds themselves are pesticides. The difference is that EPA exempts treated seeds from registration, while in California CDPR claims treated seeds do not meet the definition of pesticide at all. P*esticide-Treated Seed Public Workshop*, slide 15.

i. <u>The definition of pesticide includes treated seeds.</u>

Treated seeds fit within the definition of pesticide. These seeds are coated with liquid formulations of neonicotinoids or other chemicals, essentially turning the seeds into pesticide delivery devices. After the seeds germinate, the chemical coating delivers the active ingredient of the pesticide into the tissues of plants, via the growing plants' circulatory system. The tissues are typically hundreds or even thousands of times larger in dimension and mass than the seed itself, and are fundamentally different from a biological standpoint. The pesticide coating protects the plant from some pests; the coatings do not, in the vast majority of their uses, protect the seed itself against any disease or other risk to the seed.

In other words the seed coatings are a "mixture of substances" that are "intended to be used . . . for preventing, destroying, repelling, or mitigating" pests of the plant. FAC § 12753(b). Treated seeds therefore should be subject to pesticide registration in California.

ii. <u>EPA Treated Article Exemption</u>

While EPA exempts treated seeds from pesticide registration under the "Treated Article Exemption," 40 C.F.R. § 152.25, it is a matter of contention whether exempting treated seeds is a permissible reading of the regulation. The regulation exempts "[a]n article or substance treated with, or containing, a pesticide to protect the article or substance itself." However, seeds are not treated to protect the seed itself – these pesticides are systemic and intended to destroy pests of the growing plant. For more information on EPA's position on the Treated Article Exemption and discussion of why it is incorrect, please see CFS's petition to EPA, attached as exhibit A.

In the November workshop, CDPR likened treated seeds to treated paint. P*esticide-Treated Seed Public Workshop*, recording at 1:15:40. They stated that paint treated with pesticides to protect the paint itself would be exempted, whereas paint treated with pesticides intended to protect the surface that was painted would require registration. *Id.*

That illustrates why seeds *should* be registered as pesticides. Like pesticide treated paint might be intended to protect the surface the paint was used on and not the paint itself, pesticide treated seeds are intended to protect the growing plant after the seed has germinated, not the seed itself. The seeds are the vehicles that deliver the pesticide to its intended target.

iii. <u>CFS challenge to the Treated Article Exemption and subsequent litigation</u>

Because EPA's reading of the Treated Article Exemption is likely not permissible, in 2017 CFS and a number of other organizations filed a rulemaking petition explaining why EPA's position is incorrect and asking EPA to either (1) amend the Treated Article exemption to clarify that it does not apply to seeds coated with systemic pesticides, or (2) in the alternative publish a final, formal, agency interpretation in the Federal Register stating that EPA interprets the Treated Article Exemption not to apply to coated seeds. That petition is attached with these comments as exhibit A.

In the five years since filing, EPA has not answered the petition. CFS has therefore filed a lawsuit asking the courts to compel EPA to answer.

b. Other regulatory language that gives CDPR authority

i. <u>Restricted Materials</u>

DPR must regulate and control the use of agricultural chemicals that create hazards to domestic animals the environment, or farmworker and public health as "restricted materials." FAC §§ 14001, 14004.5. DPR must also regulate the use of any "environmentally harmful materials," and in doing so "shall take whatever steps [DPR] deems necessary to protect the environment." *Id.* § 14102.

As described above, treated seeds are agricultural chemicals that create hazards to animals, insects, public health, and the environment. CDPR can therefore regulate these seeds as restricted materials. Once CDPR finds that treated seeds should be restricted materials, the agency can adopt regulations which govern the possession and use of treated seeds. FAC § 14005. This would include prescribing "the time when, and the conditions under which, [treated seeds] may be used or possessed in different areas of the state, and may prohibit [their] use or possession in those areas. *Id.* § 14006. These kinds of regulations would both allow CDPR to collect valuable data and limit environmental harm resulting from widespread unregulated use of treated seeds.

At a minimum, once designates as restricted materials, users of treated seeds would require a permit. *Id.* § 14006.5. CDPR could condition permits on the permittee complying with reporting requirements, as well as deny permits based on local conditions such as bee activity. *Id.* § 14006.5(e).

ii. Pollinators

CDPR is charged with protecting pollinator health. This is because honey bees are vital to the pollination of many of California's crops, which are critical to the national food system and essential to the economy of the state. Agriculture—pesticides—bees, 2014 Cal. Legis. Serv. Ch. 578 (A.B. 1789). The California legislature has found and declared that "[s]cientists now largely agree that a combination of factors is to blame for declining pollinator health, including . . . acute exposure to a variety of pesticides, and specifically neonicotinoids. *Id.* Therefore, CDPR must "adopt any control measures necessary to protect pollinator health." FAC § 12838.

There are clear links between neonicotinoid-coated seeds and harm to pollinators such as bees.[6] A significant proportion of the neonicotinoid chemicals in the environment stem from treated seeds, so treated seeds are an area CDPR should enact control measures to protect pollinator health.

c. Organics

Finally, there was some confusion at the workshop as to the permissibility of treated seeds being used to grow Organic products. Seeds treated with synthetic insecticides and fungicides cannot be labeled as Organic.

The National Organic Program (NOP) prohibits the use of synthetic pesticides as seed coatings for organic seeds. To qualify as organic, a product must be produced and handled without the use of synthetic substances, unless an exception applies. 7 C.F.R. § 205.105. The types of insecticide and fungicide that commonly coat seeds are not in the list of synthetic substances allowed for use in organic crop production. *See* 7 C.F.R. § 205.601. Similarly in California, seeds treated with prohibited materials will not be certified by California Certified Organic Farmers (CCOF).[7] Therefore, CDPR should not permit treated seeds to be used in growing Organic produce.

To the extent there are any seeds coated with permitted substances, "[a]ll persons who sell, at retail, products sold as organic shall keep accurate and specific records . . . [a]ll substances applied to the product or used in or around any area where product is kept, including the quantity applied and the date of each application." Health and Safety Code § 110840. This provides CDPR with an avenue for data collection on these types of treated seeds.

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[6] Anson Main et al., *Impacts of neonicotinoid seed treatments on the wild bee community in agricultural field margins*, 786 Sci. of the Total Env't (2021).

[7] CCOF, *Can I use treated seed?* (last visited Feb. 14, 2022), available at https://www.ccof.org/faq/can-i-use-treated-seed.

III. Information on the relative environmental impact of pesticide-treated seeds versus other application methods

Douglas & Tooker (2016) conducted a meta-analysis of North American and European field studies that quantified the effect of seed-applied neonicotinoids on the community of arthropod natural enemies. There were two analyses: one comparing neonicotinoid-treated plots to untreated controls, and another in which the control group was pyrethroids (applied in various ways depending on the cropping system – 41% of observations were soil-applied and 59% were foliar sprays). The results showed that:

1) Neonicotinoid seed treatments reduced abundance of natural enemies by ~16% in a given year, compared to untreated controls, and
2) Contrary to their expectations, this negative effect did not differ significantly from that of pyrethroids, based on nine studies in which neonicotinoid seed treatment were compared with them.

We also wish to bring up a point that is often overlooked in discussions of relative environmental impact. While there are instances in which seed treatments address pest issues of concern to farmers, in which case it makes sense to compare them to other pesticides, in many cases the most likely alternative to a seed treatment and thus the proper comparator is no pesticide at all. This is borne out particularly for neonicotinoid seed treatments in field crops such as corn and soybean, where rates of *any* chemical insecticide use are historically quite low. For example, the percent of corn acres treated with insecticides nationally from 1990 to 2018 has never exceeded 31% (in 1990),[8] but today it is estimated that nearly 100% of corn acres are planted with neonicotinoid-treated seed (Unglesbee 2021).

Some small part of this increase may be associated with changes in agronomic conditions such as earlier planting and higher seed costs, but on the whole there is no significant new pest problem that would explain such a dramatic increase in the extent of chemical insecticide use.[9] This is also borne out by the now-extensive literature demonstrating that these seed treatments and common fungicide seed treatments do not increase yield, on average, much less justify their cost to the farmer (Arnason 2013, EPA 2014, Krupke et al. 2017, Mourtzinis et al. 2019, Pecenka et al. 2021). For additional references, see Krupke and Tooker (2020).

Indeed, the often superfluous application of neonicotinoid insecticides using seeds as the delivery vehicle can have detrimental impacts to the crop itself. For instance, Douglas et al. (2015) documented a soybean yield reduction attributable to predation of neonicotinoid-treated soybean seedlings by slugs (which are unaffected), whose populations increase thanks to release from control by ground beetles, which are poisoned when they attack them. Growing resistance to neonicotinoids in thrips and other insects is predictable, given their prophylactic seed treatment

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[8] USDA Quick Stats, accessed 2/14/2022.

[9] Indeed, the tripling of percent area treated with chemical insecticides since 1990 is even less justified in view of the widespread planting of Bt corn, which targets the most significant of above- and below-ground pests of corn, since a range of aboveground pests and the corn rootworm, since the mid-1990s.

use, every year, across hundreds of millions of acres of cropland, and is already leading to a dramatic increase in insecticide use in cotton (Huseth et al. 2018). These are classic outcomes of heedless pesticide use: suppression of natural enemies, leading to an exacerbation of pest pressure and reduced yield; and rapid evolution of resistance. Seed treatments are akin to the scheduled calendar spraying that used to be the norm in U.S. agriculture – the deleterious effects of which spurred the development of Integrated Pest Management (IPM).

Agronomists have repeatedly called out seed treatments as "anti-IPM," since they are by their very nature prophylactic, "used" whenever such seeds are planted, irrespective of whether susceptible pests are even present, much less at economically damaging levels (Douglas and Tooker 2015, Hitaj et al. 2020, Krupke and Tooker 2020). That these aspects of seed treatments are not better known is attributable to misinformation from the pesticide industry and its academic collaborators (Tooker et al. 2017), which promote the anti-IPM "insurance" approach as a pretext to sell farmers on treated seeds (Unglesbee 2021). However, in this regard it is important to note that farmers often have little knowledge of seed treatments, and to exacerbate matters are often given few if any alternatives to treated seeds (Hitaj et al. 2020, Unglesbee 2021).

The CDPR cannot hope to meaningfully promote IPM practices, or protect its citizens and environment from seed treatment pesticides, without consistent, reliable data on the scope and intensity of their uses. *Ad hoc* solicitation of piecemeal information from industry and others with specialized knowledge in this area, as in this request for comments, is entirely inadequate. CDPR must use its statutory authority to regulate the use of these ubiquitous seed treatment pesticides, and as a first step use that authority to acquire accurate usage information. This could then form the basis for proper risk assessments of seed treatments.

IV. Information focused on other active ingredients utilized in pesticide treated seeds

Fungicidal seed treatments are also often detrimental, and are receiving increasing attention in the scientific literature (e.g. Lamichhane et al. 2020).

Seed-eating mammals and birds are threatened by some seed-applied fungicides.[10] For instance, EPA identified chronic risk quotients of up to 16 for birds that consume difenoconazole-treated seeds (CFS 2021a, p. 16). Other triazole fungicides used as seed treatments include, but are not limited to, tebuconazole, triadimenol, prothionconazole and triticonazole (Lamichhane et al. 2020; Bayer 2019). The persistence of these triazole fungicides, together with their lipophilicity, amplifies risks to aquatic organisms as well (CFS 2021a, pp. 17-18; Roman et al. 2021).

Fungicides that are systemic, like the triazoles, also pose risks to pollinators since they translocate to nectar and pollen. For instance, EPA identified risks to adult worker honeybees

[10] This is in addition to the similar threat posed by neonicotinoids, of course. EPA found severe acute risks to birds from consuming imidacloprid-treated seeds: less than one treated sorghum or wheat seed exceeds the acute level of concern for small birds; while just 1-4 treated cotton, sorghum or wheat seeds similarly threaten small/medium-size birds (CFS 2020, p. 23).

from exposure to tetraconazole in the nectar of bee-attractive crops, with pseudo-risk quotients[11] of >6.2 for berry vines, >9.0 for fruiting vegetables, >9.5 for cucurbit vegetables (squash family), >11.4 for soybeans, and >15.2 for canola, peas, beans and peanuts (CFS 2021b, pp. 19-20). While these scenarios did not involve seed treatment use, the systemic nature of triazoles makes movement to nectar and pollen and associated risk likely in this scenario as well. Indeed, fungicides like tebuconazole comprised the majority of pesticide residues in the pollen of both honey bees and bumble bees stored in colonies and nests near oilseed rape fields in the UK (David et al. 2016), while fungicides like tetraconazole were frequently detected in pollen and bees themselves in Poland (Roszko et al. 2016).

Seed-applied fungicides harm both mycorrhizal fungi and rhizobia bacteria, thus compromising soil and plant health (Hage-Ahmed et al. 2018). In a greenhouse study involving peas and chickpeas, seed-applied fungicides containing metalaxyl or carbathiin were shown to restrict mycorrhizal colonization, reduce the diversity of mycorrhizal species, and also inhibit phosphorous uptake by their plant partners (Jin et al. 2013). In a field study, fungicides (carbendazim + thiram) applied to alfalfa seed reduced the nitrogenase activity of the mature plants' rhizobial partner, *Sinorhizobium meliloti*, by up to roughly 90%. The herbicide imazethapyr, applied to soil directly after sowing, had a similar effect, as did the combination of fungicides and herbicide (Niewiadomska and Sawicka 2002). In a laboratory study, the heavily-used fungicide propiconazole was shown to adversely affect both plant and fungal partners of a mycorrhizal association: the fungicide reduced hyphal development and spore production of the mycorrhizal fungi *G. irregulare*, and also reduced the root length of colonized chicory plants (Calonne et al. 2012).

CDPR must also consider possible additive and synergistic effects among seed-applied pesticides, or between those applied via seed and by other means.

Neonicotinoids have frequently been found to synergize with ergosterol biosynthesis inhibitor (EBI) fungicides (reviewed in Wood and Goulson 2017), which include the triazoles discussed above. Thompson et al. (2014) exposed honey bees to sprayed fungicides at realistic, worst-case scenario concentrations and various neonicotinoids. They found mild synergism on a contact basis between thiamethoxam and tebuconazole (synergism ratio of 2.6) and on an oral basis between clothianidin and tebuconazole (synergism ratio of 1.9), with synergism ratio equivalent to the LD_{50} of the neonicotinoid divided by that of the neonicotinoids plus fungicide mixture. Similarly, Sgolastra et al. (2016) found synergism in three bee species (*A. millifera* [honey bee], *B. terrestris* [buff tailed bumble] and *O. bicornis* [red mason bee]) exposed to LD_{10} doses of clothinadin and a non-lethal dose of the fungicide propiconazole, in the form of increased mortality for the mixture. When sprayed on honey bees, a binary mixture of products containing tetraconazole and imidacloprid synergistically increased the lethality of imidacloprid by 20% (Zhu et al. 2017). Raimets et al. (2018) found that the EBI fungicide imazalil increased the lethality to bumblebees of fipronil and thiamethoxam as well as the pyrethroid cypermethrin. The mechanism with respect to pyrethroids and perhaps the other insecticides is EBI fungicides' well-known

[11] Pseudo-risk quotients because they are derived by dividing the estimated environmental concentration by the LOAEL (no NOAEL established in the relevant tests).

inhibition of detoxifying cytochrome P450 enzymes in bees and other organisms (Cedergreen 2014).

Tsevtkov et al. (2017) found that both clothianidin and thiamethoxam were twice as acutely toxic to honey bee workers with co-exposure to field-realistic levels of the fungicide boscalid, which is used as a seed treatment on brassicas, cucurbits, bulb vegetables and cotton. See:
https://assets.greenbook.net/18-12-09-03-08-2017-Coronet_NVA_2016-04-314-0290.pdf

More research is needed on the ecological risks posed by fungicides when applied as seed treatments, but the findings above demonstrate that fungicides present clear hazards to a range of organisms, either alone or especially in synergistic combination with neonicotinoid and other insecticides. The fact that numerous seed treatments comprise both neonicotinoids and synergizing fungicides, many of the latter also systemic in nature like the neonics, suggests hazards to pollinators from exposure via pollen, nectar, guttation drops, etc. in particular.

V. Conclusion

CDPR's November workshop showed that the agency does not have much data regarding treated seeds, and unregistered and cancelled pesticides are being used in California. To attain a full picture of how treated seeds are being used in California, CDPR must reverse its stance that treated seeds do not fall within the definition of pesticide, and require that treated seeds are registered as pesticides. Alternatively, CDPR can designate treated seeds as restricted materials and enact regulation to control possession and use of treated seeds, or use its authority to protect pollinators to promulgate treated seed regulations. Finally, treated seeds cannot be used in Organic operations.

Respectfully Submitted,

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