

## HHRA Comments on “*Sustainable Pest Management: Roadmap for California*”

We respond herein to the Department of Pesticide Regulation’s request for public comments to inform the prioritization and implementation of the *Sustainable Pest Management: Roadmap for California*. Our comments are submitted on behalf of the Heartland Health Research Alliance (HHRA), a 501(c)(3) organization that seeks to inform decisions that shape agriculture by advancing research on the public health effects of food and farming. See [www.hh-ra.org](http://www.hh-ra.org)

The co-authors are Dr. Charles Benbrook, ED of the HHRA and Mark Lipson, HHRA’s Director of Policy and Regulatory Engagement. In 1991-1993, Dr. Benbrook led a comprehensive program evaluation of DPR’s procedures, risk assessment processes, interactions with US EPA, and efforts to promote Integrated Pest Management (IPM). This assessment was part of a series of independent program evaluations called for by newly-elected Governor Pete Wilson. The evaluations focused on the many entities within the CA-state government that were brought together upon the formation of Cal-EPA.

The hope and purpose of these evaluations was to identify and help address key program challenges. The 1983 DPR report *Challenge and Change: A Progressive Approach to Pesticide Regulation in California* articulated the findings and recommendations from Benbrook’s evaluation. The comments herein draw on recommendations in *Challenge and Change* that have yet to be fully or effectively implemented.

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### Overview

The joint “Roadmap” effort by Cal-EPA, DPR and CDFA marks an ambitious attempt to appraise and rethink the State’s approach to pest management and pesticide regulation. It calls for a comprehensive effort among many actors to aggressively reduce reliance on high-risk pesticide use patterns and set the state on a path towards ecologically-based pest management referred to in these comments as biointensive Integrated Pest Management, or bioIPM. We applaud the intent and scope of the “Roadmap” effort and offer these comments for consideration as “Roadmap” implementation unfolds.

We applaud the DPR for taking on the arduous task of determining how the adverse environmental, public health, and farm community impacts stemming from excessive reliance

on pesticides can be curtailed in California via targeted regulatory action, new investments in bioIPM infrastructure, and farmer and market-driven innovation.

The many people who participated in the open, transparent stakeholder process leading to the “Roadmap” have done a commendable job identifying the many pieces of a complex puzzle that must fall into place in order to achieve the goals described in the “Roadmap” report, and do so without undermining the productivity and profitability of California’s remarkable and globally significant agricultural sector.

Our comments focus on how to assure the many sound recommendations for change called for in the “Roadmap” will constructively and cost-effectively support attainment of core “Roadmap” goals. We also share our thoughts on essential pieces of the puzzle that are not addressed in the “Roadmap” and which warrant careful consideration as DPR/C DFA moves ahead in efforts to meet the aggressive targets for reducing pesticide use and adverse impacts.

We begin with some 30,000 foot comments on the forces and factors that will impact, and indeed will likely determine, whether and to what extent the DPR/C DFA will be able to deliver on the promises embedded in the “Roadmap.” We then address some of the specific recommendations in the “Roadmap” document, focusing on what it will take for them to constructively support progress toward stated goals. Last, we revisit some of the recommendations in Chapter V of *Challenge and Change* entitled “SAFER PEST CONTROL SYSTEMS” and suggest a system to monitor progress toward stated “Roadmap” goals.

## **Real World and Political Realities Driving Change and Standing in the Way**

In striving to achieve “Roadmap” goals, DPR, C DFA and the California pest management community should expect little help from the U.S. EPA. As has happened in the past, the demand for and ability to bring about constructive change in farming systems and technology is strong and growing in California, but is marginalized and receding at the federal level.

Achieving “Roadmap” goals in collaboration with the USDA and EPA would be easier and less disruptive, but it is unrealistic for CA institutions and pest management professionals to expect much help. Unfortunately, it is likely that many national leaders in both the public and private sectors will voice skepticism about “Roadmap” goals similar to comments now directed toward the pesticide-related components of the EU “Farm to Fork” program.

Indeed, the efforts and progress in California in pursuit of “Roadmap” goals will be fascinating to track and compare to developments in the EU as “Farm to Fork” is implemented. Perhaps insights will be gained between these two similar efforts to address a pressing global problem – already excessive and rising reliance on too many high-risk pesticides.

It is our view that in general and for many years, DPR has been as aggressive and successful as possible in reducing reliance on high-risk pesticides and pesticide uses given existing state and federal statutory authorities, processes, and policies. ***New regulatory authority, changes in***

***policies, and mandates for change are essential pieces of the puzzle at both the State and federal level if meaningful progress is to be made and sustained.<sup>1</sup>***

Of course amending pesticide law in California and in DC is difficult and fraught with political undercurrents, but there should be broad support for the most important, commonsense reforms needed to attain “Roadmap” goals. One possible set of new authorities and processes are described later in these comments.

Again, as has happened in the past, the CA legislature could take up and pass a bill or bills dealing with the most pressing gaps in DPR’s and CDFA’s ability to drive change. If they do so, the “Roadmap” may bring about substantial reductions in use of high-risk pesticides. Progress in California could show the rest of the country that change can indeed happen without ag collapsing and fresh produce disappearing from grocery store shelves (see the infamous advertisement below). One can hope that the political stars will align some day in DC so that similar changes can be incorporated in federal law and policy.

As a practical matter in the State of California, it is inconceivable that DPR regulatory interventions lessening use of high-risk pesticides will move forward at scale in the absence of effective measures to assure that growers will have access to effective and affordable tools and bioIPM systems that collectively limit pest-induced loss of yield, crop quality, and grower net income per acre.

Sequencing regulatory actions reducing reliance on high-risk pesticides with the emergence and adoption of effective alternatives is a complex challenge given the diversity of CA agriculture and the economic importance of the ag sector as a driver of jobs and economic activity. There are three important opportunities that the State and DPR can and should exploit in working toward attainment of the long-term goals in the “Roadmap”:

1. Accelerate development, availability and adoption of biopesticides that will augment soil health and enhance effectiveness of biological controls as essential tactics and strategies in prevention-based bioIPM. Many of the Roadmap’s recommendations are germane to this shift. The task of agency leadership is to emphasize and effectuate this focus.
2. Markedly expand acreage in transition to organic systems by investing in:
  - Organic farming system R+D;
  - Research on the impacts of organic farming on food and worker safety, biodiversity and soil health, and food nutrient density;

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<sup>1</sup> See Benbrook, Charles, Perry, Melissa J., Belpoggi, Fiorella, Landrigan, Philip J., Perro, Michelle, Mandrioli, Daniele, Antoniou, Michael N., Winchester, Paul, & Mesnage, Robin; “Commentary: Novel strategies and new tools to curtail the health effects of pesticides,” *Environmental Health*, 2021, 20(1); DOI: 10.1186/s12940-021-00773-4.

- Non-chemical bioIPM infrastructure, grower and PCA education, consumer and public health community education, and export market promotion to expand the flow of CA-grown organic fruits, vegetables, and nuts into Pacific Rim and other food safety and health-conscious markets; and
  - Programs that will increase the supply of organic foods served in schools and day care centers, health care facilities, and government-supported food security and nutrition programs.
3. Recognize that climate change and the need to reallocate how water is used in the State will lead to significant changes in the crops grown in California. In particular, high-value, nutrient dense human food crops will account for an incrementally larger share of crop production and water use in the State, and less land and water will be devoted to low-value, water-intensive commodity crops (e.g. cotton, corn) and animal-feed crops (especially alfalfa and irrigated pasture).

On every acre converted to organic production, the process of restoring soil health and water quality will begin. Farm worker and bystander exposures to toxic pesticides will not just be cut by 50%, they will essentially end. California agriculture will position itself to capture a larger share of expanding, health-conscious markets worldwide.

The higher levels of organic matter on organically managed fields will deliver a trifecta of other benefits: capturing and holding more carbon in the soil, increasing the rate at which rainfall moves down into the soil profile and the amount of moisture stored in the soil, and promoting microbial biocontrol of soil-borne insects and plant pathogens.

State-driven efforts to accelerate the transition to organic systems are timely given the resources dedicated at the federal level (\$300 million in USDA programs for organic transition from the Inflation Reduction Act). Growers and food companies in the State could, and hopefully will benefit substantially from the billions of dollars of federal and private sector capital which is now, and will continue flowing into efforts to promote and reward adoption of climate-smart farming systems.

As the “Roadmap” notes, the new UC-ANR Organic Agricultural Institute and new UC Cooperative Extension positions supporting organic production are promising developments that will hopefully usher in a wider commitment to provide technical and research support to those willing to transition more land to organic.

# The World Without Lorsban



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insecticide in the West. And with its help, growers have produced quality fruit, vegetables, and fiber unparalleled anywhere in the world.

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The transition of the bulk (i.e. 75% or more) of fruit, vegetable, nut, wine, and cut flower production in California to organic systems is technically feasible by 2050. From apples to zucchini and roses to wine, organic production will assure higher prices and more profit for growers and food value chains. The willingness of consumers and export markets to pay a premium for high-quality organic products will underwrite further investments in dedicated organic infrastructure, lowering costs and increasing the share of profit that stays on the farm and in rural communities.

***Constructive change that is market driven and self-financing is change that all Californians should embrace.***

One deep-set problem must be overcome in California in order for organic farming to fulfill its potential in achieving “Roadmap” goals and other positive outcomes for people and the planet. Today, many people in food and farming circles view organic farming as a threat or a step backwards. “Us versus them” polarization is all too common when proposals are advanced to support and expand organic production.<sup>2</sup>

Imagine if the same sort of negative undercurrents had festered and gained strength as each new version of CA-developed software or iPhones were released, or when other technology-driven innovations with roots in California sought their place in global markets?

In California organic farming systems and technologies have matured to the point where concerns are no longer warranted over the ability of organic farming to produce adequate supplies of fruits, vegetables, nuts, and other critical, nutritious human foods.

Of course organic farmers in the State will have to deal with unexpected problems and farming system challenges, just as ***all farmers do year in and year out***. But overall, well-established and skillfully managed organic farms promote soil and plant health, raise healthier animals, and are more resilient in the face of biotic (pests, diseases) and abiotic stresses (drought, too much water, nutrient imbalances).

Promoting health and resiliency are among the inherent attributes on organic farms that everyone involved in CA agriculture should embrace and build upon. If done so systematically over time, supplies will rise, price premiums will narrow, as will the ability of organic farmers to adapt and innovate. Our hope is that agricultural leaders and institutions in California will discover effective ways to transform “us versus them” to “all of us together” for the benefit of all.

In implementing the “Roadmap” the CA government should prioritize preparing farmers in the State to effectively address emerging and likely future pest management challenges in fruit, vegetable, nut, and other specialty crops. Changes in water storage, allocation and

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<sup>2</sup> “Use versus them” tensions also persist within the organic community and often stand in the way of progress.

conservation in the arid west, and where major crops are grown, will emerge over time from future state-federal cooperation and policy initiatives. A big question looming over California agriculture is will these changes be planned and thoughtfully brought about recognizing the need for fairness and support for those called upon to change, or will dramatic changes be driven by raw emotion and emergency actions in the wake of undeniable crises.

Three other overarching points warrant attention. The scale and way pesticides are used can turn a low-risk pesticide based on standard toxicity testing into a high-risk one in the real world. The multiple, documented adverse impacts stemming from how glyphosate-based herbicides are now used are among the clearest examples. Accordingly, in implementing the “Roadmap”, we urge DPR and the State of California to address inherently high-risk Priority Pesticides, as well as high-risk patterns of use of pesticides that can, and often have been used safely for many years.

The phrase “Sustainable Pest Management” (SPM) as an umbrella for the Roadmap’s many recommendations does not strike us as a particularly compelling “Northstar” in light of the scope of change envisioned in the “Roadmap”. It is a safe and acceptable label that accommodates the diverse stakeholders at the table, but will it inspire and sustain the scope of change needed to achieve the Roadmap’s core goals?

Finally, in the Roadmap’s conception of SPM, the pillar of “economic vitality” is described as “a broader consideration of economic benefits and impacts”. This broader consideration should be explicitly recognized as *full cost accounting* for all the upstream and downstream effects of pest management systems.

Fidelity to this understated element of the “Roadmap” would be a major turning point in itself. The multiple collateral costs of pesticides e.g., for climate, farmworker and public health, soil and water quality and other considerations have rarely been integrated into pesticide policy and regulation. Likewise the collateral benefits of more agroecological methods of pest management have not been well recognized. The Roadmap seems to have few details on how a broader economic analysis will be pursued in achieving SPM. We urge the agencies to develop more specific strategies for full cost accounting in all spheres of the Roadmap’s implementation.

## **Comments on Component Parts of the “Roadmap”**

We applaud the focus on both agricultural and non-ag pest management challenges and opportunities to reduce high-risk pesticide uses.

As noted in the introduction to the work of the Urban Subgroup, it is likely that non-ag applications of pesticides account for a disproportionate share of high-risk exposure episodes relative to the pounds of pesticide active ingredients applied. We believe there is significant and readily attainable risk reduction that can be locked in quickly by DPR and at low cost to

everyone in several non-ag application scenarios, e.g. requiring a person applying a glyphosate-based herbicide to wear gloves and ***not just shorts and sandals***.

### The Definition of “Priority Pesticides”

It is highly likely that well less than 10% of the pounds of pesticide active ingredients applied in the State of California account for 80% or more of the high-risk applications.

One challenge for the “Roadmap” process is to identify these 10% of uses so that they can be phased out or altered via label changes to largely eliminate significant risks. The “Roadmap” document provides few details on the process and criteria that will be used to identify the pesticides and uses that become subject to the provisions in the “Roadmap” intended to phase out or markedly lessen reliance applications of Priority Pesticides.

We urge DPR and stakeholders to quickly agree on an initial set of Priority Pesticides. These would include:

- Most, if not all remaining uses of OPs and carbamates,
- Volatile and toxic soil fumigants,
- Insecticides clearly linked to the decline in pollinators and/or above and below-ground biodiversity, and
- Chemicals implicated in documented applicator and farmworker poisoning episodes and/or increased risk of cancer or reproductive problems.

As stated above, further discussion of Priority Pesticides and pesticide uses is warranted in order to address relatively low-toxicity pesticides that are currently used in ways that routinely lead to relatively high exposures, and hence elevated and in some cases unacceptable risks.

For example, excessive reliance on glyphosate-based herbicides (GBHs) has triggered the emergence and spread of dozens of weed phenotypes resistant to glyphosate, causing farmers to spray additional herbicides more often and at higher rates.

Adverse public health impacts of GBHs are not caused by the innate toxicity of the products. Such impacts arise from application methods and scenarios that leave significant portions of a person’s body and clothing drenched with spray solution, coupled with the mythology that GBHs are safe and non-toxic (and even safe enough to drink). The near-complete absence on GBH labels of use directions designed to reduce applicator and farm worker exposures, cautionary statements and warnings, and PPE requirements has turned one of the least toxic herbicides ever discovered into one implicated in a long and growing list of adverse health outcomes.<sup>3</sup>

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<sup>3</sup> In the last two months NIH and CDC scientists have reported that applicator exposure to GBHs increases markers of oxidative stress (Chang et al, *Journal of the National Cancer Institute*. doi.org/10.1093/jnci/djac242); and, a team of UC scientists published a troubling paper linking exposures to GBHs as children grow up to metabolic syndrome and liver damage (Eskenazi et al., *Environmental Health Perspectives*. Doi:10.1289/EHP11721).



We stress in these comments that DPR should extend its focus to high-risk uses of low-risk pesticides because of the benefits to farmers and other pest managers from the continued availability of products that can be used safely, and perhaps even indefinitely. We urge DPR and stakeholders to assess both the toxicity of products and current exposure levels and scenarios in identifying Priority Pesticides. For highly toxic products known to harm people and/or non-target organisms under most realistic use patterns (e.g. chlorpyrifos insecticides), phase outs are the appropriate policy response. But for many lower-tox products, excessive risks linked to high-exposure episodes and patterns can be mitigated via formulation and use patterns changes, coupled with responsible warnings and PPE requirements.

DPR will need new authorities and mechanisms to phase out Priority Pesticides and relatively high-risk pesticide use patterns. Such changes must significantly reduce the evidentiary burdens on DPR to advance, defend, and implement changes in pesticide use. To reduce the frequency and importance of risk trading, DPR needs new tools to reduce risks simultaneously across multiple pesticides bought and applied for the same or similar purposes.<sup>4</sup>

Two examples of ripe opportunities for DPR to avoid risk trading and quickly reduce or eliminate some of the most worrisome pesticide risk drivers in the State are: (1) the need for across the board reductions and phase outs in the use of toxic soil fumigants, and (2) ending preharvest, crop desiccation uses of most herbicides and plant growth regulators that are now applied to accelerate harvest operations (such uses almost always lead to higher residues in food).

## Keystone Actions

Each of the “Keystone Actions” described in the “Roadmap” are essential components of long-term success.

Action A – Prioritize Prevention is obviously a critical necessity. The “Roadmap” is heavy on initiatives to prevent the flow of new pests into California and/or quickly detect them so action can be taken to isolate and hopefully eradicate them.

But prevention must also target endemic pests. We urge DPR/CDFA, growers, researchers and everyone involved in pest management to identify and exploit opportunities to prevent economically meaningful losses to pests by changing farming systems and how land, buildings, and other physical infrastructure is managed in the State. A single change in a farming system can sometimes eliminate or largely control a half-dozen pest problems.

We highlight throughout these comments options to promote bioIPM systems that, by design, do two things well. Such systems lessen pest pressure by undercutting the ecological niches and

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<sup>4</sup> Risk trading happens when a regulatory agency restricts or bans one pesticide and farmers adapt by switching to the next-best, but sometimes still high-risk pesticide alternative.

vacuums pests need to thrive. Second, such systems reduce the places and circumstances where pest population levels can take off by assuring that natural enemies and biodiversity will come into play and contribute to prevention efforts.

Action D – The “Roadmap” briefly touches on mill tax rate reforms, an obvious way to start shifting where private companies invest their R+D dollars in bringing new pesticides and pest-control technology to market.

We urge the CA legislature to pass a bill that incrementally shifts the mill tax burden from biopesticides and reduced risk products to moderate to high-risk products. As a general rule and in the interests of sound public policy, the mill tax rate on low-risk pesticides should be no more than one-quarter of the rate paid on high-risk products.

### **Sustainable Pest Management Tools and Systems; Avoiding Resistance**

We applaud the emphasis on soil health as a pillar of bioIPM systems and in particular, as a necessity in reducing reliance on high-risk soil fumigants and soil-applied insecticides. But the “Roadmap” document does not incorporate in its discussions of soil health a critical attribute of healthy soils – the absence of pest phenotypes resistant to the pesticides and/or control measures deployed against them.

Almost by definition, profitable crop production becomes less sustainable as the number and prevalence of resistant pests increases. The presence of resistant pests in a crop field is one of the most reliable indicators of whether crop production on the field is likely to be profitable. The presence of resistant pests is also a critical metric that is relatively easily monitored.

To monitor progress in adoption of effective bioIPM systems, the two metrics that DPR, CDFA, researchers and growers should use are the presence and severity of resistant pests and the pesticide-related “toxicity [to pests] units” required to bring a crop to harvest. The later metric can be quantified relatively easily by DPR by coupling an index of toxicity per unit of applied pesticides<sup>5</sup> with the detailed records of pesticide use collected via the PUR system. We return to these metrics in the monitoring-progress section of these comments.

### **Reliance on Stakeholder Groups and Dialogue**

Throughout the “Roadmap” critical roles are described for various working groups and stakeholder dialogues. Such public participation in policy reform processes is desirable, and indeed usually essential in bringing about consensus and constructive, sustained change.

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<sup>5</sup> Pest-specific “toxicity units” or “kill potential” is a function of the number and breadth of pests controlled by a given pesticide application, the typical degree of control achieved, and the duration of control. These parameters are often the focus of considerable research by universities and are used in making recommendations to growers. DPR/CDFA could convene experts in various combinations of pests and pesticide uses to approximate these “kill potential” values across registered products.

But in the case of the “Roadmap”, the path ahead is paved with ample good intentions and many opportunities for dialogue and consensus building that has a tenuous at best connection to meaningful action.

Instead, we urge DPR and political leaders in the State to identify specific, concrete tasks and roles for various stakeholder and dialogue processes. The most important would be a public process leading to an initial recommended list of Priority Pesticide candidates.

The stakeholder group could be given the task of identifying those pesticides and pesticide uses that contribute most prominently to recognized and documented adverse public health and environmental outcomes. In short, they should be asked to identify the approximate 10% of pesticides and pesticide uses that account for the bulk of the high-exposure and high-risk applications in the State.

DPR should be given the opportunity to add or subtract certain pesticides and/or pesticide uses from those recommended by the stakeholder group if DPR determines changes in the Priority Pesticide list would more assuredly achieve important reductions in adverse outcomes.

Once the initial list is established and DPR begins to take necessary actions to reduce use and exposures, an annual public process could be instituted whereby members of the public, PCAs, growers, farmworkers, university researchers and pesticide registrants can petition DPR to either remove or add a given pesticide, or a pesticide use pattern, onto or off the Priority Pesticide list. DPR would issue clear instructions describing the justifications and data that would be considered in acting upon such requests.

Inevitably, conflicting recommendations will be submitted. For those that entail hard to resolve tradeoffs, DPR could seek guidance from various the stakeholder groups.

A similar approach and process could be put in place to organize and focus the input of stakeholder groups tasked with advising on R+D priorities, educational initiatives, pest prevention programs, and other core “Roadmap” pillars. But the key to attracting quality public participation will be assuring that the recommendations coming out of these dialogues and stakeholder processes have a meaningful and direct impact on the decisions that get made and the actions taken and not taken.

The above recommendations arise from and reflect an important goal and set of practical realities. First, pesticide risk assessment science is imperfect and neither members of the public nor DPR can ever be certain they understand the nature and magnitude of all risks arising from a given pesticide use pattern.

Second, the adverse impacts of pesticide use patterns change over time and as a function of how widely and frequently a given product is used. Frequency and scale of use can markedly change the nature of the adverse impacts stemming from use of a given pesticide.

Third, greater reliance on expert judgement is warranted, coupled with less weight on complex risk assessment processes that depend on data that is rarely available and/or is of questionable quality.

We urge DPR and political leaders in the State to alter the evidentiary burden placed on DPR and the risk estimates it traditionally has developed to justify risk mitigation measures. In addition, added weight should be placed on the observations and experiences of people who have direct knowledge of how pesticides are currently being used, how well they are working, and who and what may be suffering adverse consequences as a result of how they are currently being applied.

### **Options to Promote Safer Pest Management Systems**

Chapter V in *Challenge and Change* is entitled “Safer Pest Control Systems” and presents seven recommendations. The chapter begins with this passage:

“DPR’s scientific efforts and regulatory tools are designed to validate the presumption that a pesticide will be safe if used in accordance with label directions. The challenge of the 1990s is to design pesticide regulation that can lead to safer pest control in agriculture. Because of DPR’s focus on individual products, it has been able only indirectly to advance the development and adoption of safer pest control systems.”

This passage is as true and relevant in 2023 as it was 30 years ago when *Challenge and Change* was released. But how can DPR, or any regulatory agency, “advance...safer pest control systems”?

Chapter V begins with a case study of how an inter-agency effort including DPR, growers and PCAs successfully mitigated a serious environmental challenge arising from then-current pesticide use in rice production systems. The secret to success was gaining an understanding of production system components that led to pesticide movement away from production fields and into the Sacramento River. The challenge going forward is building such investigations and insights more systematically into the routine activities of DPR, CDFA, and university research scientists.

One theme runs through Chapter V -- More significant and sustained progress in reducing the adverse impacts of pesticides, known and unknown, can be achieved by farming system changes that lessen pest pressure than by trying to understand and mitigate the risks arising from applications of each specific pesticide. *Challenge and Change* makes this point on page 85 in summarizing the benefits of the approach DPR used in mitigating risks from rice pesticide use:

“It demonstrates the value of finding improved ways to manage pesticides *within the farming systems in which they are used*. It confirms that DPR can design...systems-based plans that allow growers to retain access to pesticides while still meeting environmental quality goals.”

On page 86, *Challenge and Change* echoes themes stressed in the “Roadmap” report:

“Four components of regulation are needed to accelerate the evolution and profitable use of safer pest control systems: timely regulation of safer products; restricted application of ecologically disruptive products; increased use of genetic, cultural, and biological alternatives to conventional pesticides; and experimental efforts to design and license pest control systems.”

Recommendation #28 calls for timely registration of safer products, as does the “Roadmap”. Key ways to make this happen include establishing a Generally Recommended as Safe (GRAS) list of active ingredients, minimum data requirements, and lower mill rates for biopesticides. Ideas advanced in *Challenge and Change* include simpler processes leading to experimental use permits for biopesticides; less rigorous efficacy data requirements, and assessments and approvals applicable to classes of pesticides (e.g. pheromones, *Bt* products, and insect growth regulators).

Recommendation #29 calls for a “Provisional Registration” option for safer pesticides. The conditional registration authority set forth in the Federal Insecticide, Fungicide, and Rodenticide Act accelerates the path to market for potentially high-risk pesticides. A provisional registration option for safer pesticides would make a similar bet, but in this case on behalf of safer products and prevention-based bioIPM. Such a new registration option will allow DPR to approve and make available safer and reduced risk biopesticides perhaps one to two years sooner than currently the case.

A series of ideas to foster DPR engagement in planning pest management research priorities is the focus of recommendation #31. Specific ideas include closer collaboration with the US IPM program. It also calls for:

“Maintain and update a list of high risk use patterns that are crop-target pest(s)-pesticide combinations.”

“Seek ways to accelerate the targeting and research effort toward high risk use patterns.”

And echoing the many roles of advisory committees and consultations in the DPR/CDFA “Roadmap” report, *Challenge and Change* calls for DPR and UC IPM leaders to:

“Involve and communicate with the agricultural community regarding efforts and priorities leading to safer systems of pest control – including growers, researchers, and food processors.”

Recommendation #32 addresses options to design, test and license pest control systems. Certified applicator training and licensing is designed to enhance knowledge and awareness among people applying high-risk pesticides. Could DPR promote adoption of prevention-based

bioIPM by licensing or otherwise encouraging safer pest control systems, or components within such systems like resistance management practices or area-wide use of mating disruption?

*Challenge and Change* notes on page 93 that a provision in the California Code of Regulations gives DPR the authority to incorporate UC-IPM recommended practices into pesticide regulation via labeling and/or the application permitting process. Perhaps this option warrants a fresh look.

The lack of meaningful resistance management practices on federal pesticide labels has allowed resistance to become a much more serious problem, with no end in sight. Failure to act to curtail the spread of resistant pests is driving up overall pesticide use, exposures and risk. As the “Roadmap” is implemented, further consideration should be given to whether and how UC-IPM recommended practices can be more effectively encouraged.

The emergence and spread of resistant pests is a clear sign of a failing pest management system. Growers and PCAs need accurate, up-to-date information on the presence of resistant phenotypes in deciding what products to use when pest populations exceed action thresholds. But the information available on resistance is too often spotty and inaccurate.

Recommendation #34 calls for DPR to work with the UC system to develop and disseminate an annual survey of resistant pests as a practical step in identifying regions and crops in jeopardy because of steady increases in the number and diversity of resistant pests.

The number and spread of pests resistant to a given pesticide should also be among the criteria used in identifying Priority Pesticides because resistance too often leads to heavier pesticide use and more serious problems in the future. In cases where the initial resistance management practices called for by DPR prove ineffective, annual reports on the presence of resistant phenotypes would alert growers and DPR where more aggressive actions are warranted to curtail the emergence and spread of newly resistant pests.

### **Changes in State and Federal Pesticide Use and Regulatory Laws**

Three vital changes in federal and state pesticide law and policy warrant near-term action if there is to be any chance of achieving and sustaining the goals set forth in the “Roadmap.”

1. All ingredients and their concentrations in formulated pesticide products should be fully disclosed on product labels. Surfactants and coformulants can dramatically change pesticide product risk profiles, yet growers, farmworkers, and the public health community are kept in the dark under current policy.
2. DPR and EPA should require that core toxicology and worker-safety-relevant tests should be done both on active ingredients **and** common formulations.
3. Most of the critical toxicology testing of pesticide active ingredients and major formulations should be carried out by scientists not affiliated with or supported by pesticide registrants. The funding to support independent safety testing of new active

ingredients, or fulfill data gaps, should become a routine part of registration and reregistration fees.

### **An Alternative Approach and Policy Paradigm To Achieve Core “Roadmap” Goals**

All pesticides with a valid California registration could be placed on:

- The Priority Pesticide list, or
- The GRAS list of biopesticides and other very low-risk products, and
- A list encompassing all pesticides and pesticide uses not on one of the above two lists.

The process outlined above to establish an initial Priority Pesticide list could be replicated in order to establish the initial GRAS list of very-low risk pesticides and uses.

Both lists would be subject to an annual public comment and review process in which any stakeholder could request DPR to add or delete certain pesticides or pesticide uses from one of the lists.

DPR would periodically seek guidance from advisory bodies regarding whether to act on various requests. When turning down a request, DPR would provide an explanation sufficient to inform the petitioner what they would need to do in the future to possibly alter the decision DPR made on an earlier request.

The above approach, and the establishment of these three lists, would open up new regulatory policy options and mechanisms. For example, new legislation could require DPR to place all Priority Pesticides or priority uses on a 3 to 5-year phase out schedule, with DPR given the latitude to determine the number of years.

Likewise, new legislation and DPR policies would lighten the regulatory burden on GRAS pesticides and uses in ways that make it easier for registrants to gain approvals for new uses and altered use patterns, and simpler for PCAs and growers to rely on such products.

Over time, high-risk pesticide uses would come to an end, while reliance will increase on other products, some of which may one day warrant additions to the Priority Pesticide list.

Manufacturers would have a clear and significant incentive to discover and formulate products that will meet the criteria governing inclusion on the GRAS list, or which will at least keep a product off the Priority Pesticide list, or move a product currently on the Priority Pesticide list off of it.

Such changes in policy and process would empower DPR to more efficiently identify and select high-risk use patterns and accelerate their replacement with hopefully mostly GRAS products. DPR’s overall efforts on behalf of citizens, growers, and pest managers in the State could become increasingly efficient because it would allow DPR scientists and risk assessors to seek

science insights and real-world information from a much wider array of people and perspectives, as opposed to mostly data generated by pesticide registrants.

It would allow DPR to draw upon insights gained with pesticides within families of chemistry, or sharing common use patterns, or applied in specific regions. Lessons learned in detailed assessments of certain pest problems, accessible bioIPM options, and pesticide application methods could be applied to other, similar crop-pest scenarios, rather than requiring DPR to create a comprehensive risk assessment and set of regulatory interventions on each specific pesticide as if no useful knowledge and insights had been previously generated and gained.

An approach like the one described herein would create three essential dynamics that are currently lacking and are needed to achieve the ambitious goals set out in the “Roadmap”.

First, over time the process will increase reliance on GRAS and lower-risk pesticides and reduce use of high-risk ones.

Second, a much more diverse set of players, experts, and stakeholders will share the burden now vested largely with DPR in identifying high-risk versus generally low-risk pesticide use patterns. This approach differs greatly from the current, limited capacity of pesticide risk assessment methods to accurately quantify risks based on the diversity of ways pesticides are applied in the real world.

Third and by design, the above approach to pesticide regulation should continuously target DPR risk mitigation measures on those products accounting disproportionately for adverse human health and environmental impacts, while shifting acre-treatments and control measures toward those that will gradually make it rarely necessary for farmers to apply a high risk pesticide.

The above process fundamentally changes how pesticide regulators would incrementally support progress toward safer bioIPM systems. Today, pesticide regulators rely on mostly industry data to set “acceptable” exposure thresholds, and then they must conduct detailed exposure and risk assessments to identify when, where and why certain pesticide use patterns result in exposures above acceptable thresholds.

In many cases, the outcome of the above process has a tenuous connection to actual, real-world high-risk pesticide uses. There are many places in both the EPA’s and DPR’s pesticide risk assessment process where data gaps and lack of credible methods to quantify risks are endemic. Plus, the science simply does not exist to link specific applications to all possible adverse outcomes.

In short, pesticide regulators are able to address only a small share of the actual adverse effects likely arising from pesticide use, and the tools they can deploy in mitigating such risks are blunt and sometimes ineffective.



The alternative approach suggested above would go about the task of regulating pesticides differently. It would draw on the best available science and experience to differentiate high-risk pesticide uses from generally low risk ones. It would incrementally force the higher-risk options off the market, irrespective of whether EPA or DPR can prove resulting exposures exceed legally set “safe” use thresholds. It would continuously and incrementally reduce use of higher risk products by shifting acre-treatments to safer chemistry and by reducing the overall need for pesticides via prevention-based, bioIPM systems.

### **Monitoring Progress and Refining Goals**

Because of the availability of detailed Pesticide Use Report (PUR) data in the State that captures comprehensive data down to the field level, DPR/CDFA can develop and deploy sophisticated metrics to track attainment of “Roadmap” goals. We recommend that DPR, CDFA and the UC system develop a four-part system to track progress in achieving “Roadmap” goals.<sup>6</sup>

Track Trends in Use PUR data can be used by crop, and crop-region combinations to establish baseline levels of pesticide use and track changes year to year. Key metrics to build into the system include pesticide rates of application, number of acre-treatments and pounds of active ingredient applied.

Once DPR has designated an initial Priority Pesticide list, as well as products that are determined to pose modest risks as currently used, all pesticide applications can be divided into three categories: Priority Pesticides, GRAS products, and all others. Data on pesticide use by crop and crop-region combinations can then be broken into the above three categories. Progress toward “Roadmap” goals would occur when the share of total use accounted for by Priority Pesticides falls over time and the share of GRAS applications and pounds applied rises as a percent of total applications and pounds applied.

A longer-run task and challenge that the California pesticide regulatory and IPM communities should take on is estimating the trends in the need for chemical interventions to avoid economically unacceptable losses in crop yields or quality. Such a method would translate the above data on the extent of pesticide use into a measure of “kill power” or “control efficacy” per acre treated and per pound of active ingredient applied. In general, a system requiring incrementally more “kill power” is a system bound to become obsolete for one, and usually several reasons (excessive cost, control failures, ever-deeper environmental footprints).

Standard measures of pesticide efficacy in the control of common target pests would be drawn upon in making such estimates. As noted earlier, three attributes of a given pesticide would be taken into account: the identity and number of pests controlled in the fields where the product is actually applied, the typical expected degree of control, and the longevity of control.

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<sup>6</sup> These metrics can be applied by any group of growers, food companies, government agencies or countries that choose to systematically reduce pesticide risks. These or similar performance parameters will likely play a role in monitoring progress in Europe toward attainment of “Farm to Fork” goals.

UC IPM specialists, PCAs, growers and industry representative track and discuss these performance-based parameters every season and work to maximize “kill power” via how, when and where a given product is applied. Developing a “kill power” metric would make it possible to accurately track whether a given IPM system is working better year to year, less well, or has remained comparably effective. It would also serve as a valuable way to target investments in UC IPM and industry pest management research and technology development to those crop-region combinations where system efficacy is slipping at a worrisome rate.

Presence of Resistant Pest Phenotypes As noted above, there are both practical and policy reasons for California to track the spread of resistant pests. Few will argue that an IPM system is working well if the annual challenges posed in controlling resistant pests typically grow more complex year to year. Resistant pests should also be monitored by crop-region combinations in a way that makes it easy to align data on resistance with pesticide use metrics.

Dietary Risk Levels The data and methods now exist for DPR and CDFA to develop baseline levels of pesticide dietary risk in food crops grown in the State. CDFA tests for pesticide residues in thousands of samples of CA-grown foods annually, as well as in food brought into the State from abroad. These state-generated data can be combined with CA samples tested by the USDA’s Pesticide Data Program to establish a baseline level of residues and dietary risks by crop and food.

A system like HHRA’s [Dietary Risk Index](#) can be used to quantify levels of dietary risk per year based on the distribution of residue levels in a given food, each pesticide’s chronic toxicity as reported in DPR and/or EPA health risk assessments, and the average serving sizes of food.

Based on HHRA’s work and applications of the DRI, it is clear that the majority of pesticide dietary risk arises from consumption of a surprisingly small number of foods and also from a small number of pesticides typically found in those foods.<sup>7</sup> As a result, DPR and CDFA can identify those pesticide uses that sometimes lead to worrisome residues in food, and the many that typically do not.

This capability will provide DPR an important new tool in determining which pesticide-food combinations warrant possible placement on the Priority Pesticide list and which do not relative to dietary exposures and risk. It would also be the best way to track whether regulatory interventions imposed to remove a pesticide use from the Priority Pesticide list are working as hoped in reducing the frequency and levels of residues in food.

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<sup>7</sup> The CA-grown foods and pesticides most often associated with high-risk residues can now be identified by DPR/CDFA using California residue data via the methods described in the open access paper by Benbrook C. “Missing the mark -- new methods needed to detect and address high-risk pesticide residues in the global food supply”, *Regul Toxicol Pharmacol*. 2023 Feb;138:105328. doi: 10.1016/j.yrtph.2022.105328. Epub 2023 Jan 2. PMID: 36603761.

System Stability Many factors can undermine the effectiveness of IPM systems. There are many ways to measure and track the degree to which an IPM system is sustainable and meeting the needs of growers, the ag industry, the general public and the environment.

We recommend that DPR, CDFA and the UC IPM system collaborate in developing summary statistics that reflect the degree to which current IPM systems, technology and pesticide use is meeting the goals set forth in the “Roadmap”. These summary statistics would include the above described metrics reflecting changes in pesticide use, the presence and severity of resistant pest populations, and trends in dietary risk levels.

The statistics would be calculated and reported on a crop-region basis. This will support efforts across all players in targeting those crop-region combinations where pest management system efficacy is slipping and likely to lead to more use of possibly higher-risk products. As such data and tracking methods improve, the resulting “Leading Indicators” of pest management system stability and performance can be drawn upon in identifying needed and hopefully cost-effective interventions.

The lack of solid monitoring data will impair the ability of government institutions, growers and IPM professionals to incrementally reduce the adverse impacts arising from pesticide applications. The availability of such monitoring data will provide all stakeholders and government officials the ability to determine what is working and what is not, where problems persist in need of more attention and action to mitigate risks, and how to choose the mix of investments and interventions most likely to effectively curtail those pesticide uses most likely to be associated with unacceptable risk outcomes.

We hope that DPR and CDFA efforts to achieve “Roadmap” goals will include adequate and sustained guidance and institutional support. Both will be essential in order to develop the new tools and monitoring methods needed to determine whether the pest management state-of-the-art in California is meeting the needs of growers and expectations of people dependent, in one way and often several, on the bounty of the state’s annual harvest.