



# Pesticide Efficacy and Phytotoxicity Evaluations

**Lan-Xin Shi, Ph.D.**

Senior Environmental Scientist  
Plants, Pests, and Disease Program  
Research Authorizations Program  
Pesticide Evaluation Branch  
Department of Pesticide Regulation

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# Programs at Pesticide Evaluation Branch

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- Chemistry and Microbiology
- Ecotoxicology
- Plants, Pests, and Disease (PPDP)
- Research Authorizations (RAs)



# Outline

- 1) What We Do at PPDP
- 2) California Efficacy and Phytotoxicity Requirements
- 3) Efficacy and Phytotoxicity Data Evaluation
- 4) Program Challenges and Examples
- 5) Research Authorizations Review





# What We Do at PPDP

## - Evaluate **Efficacy** and **Phytotoxicity** Data

- Insecticides
- Insect Growth Regulators
- Pheromones
- Miticides
- Nematicides
- Repellents
- Fungicides
- Herbicides
- Plant Growth Regulators
- Desiccants
- Defoliants
- Spray Adjuvants







## Uses and Sites

- Agriculture
- Greenhouses
- Home & Garden
- Landscapes
- Structures
- Public Health

# Efficacy and Phytotoxicity Data Requirements



- FIFRA
- 40 CFR Section 158



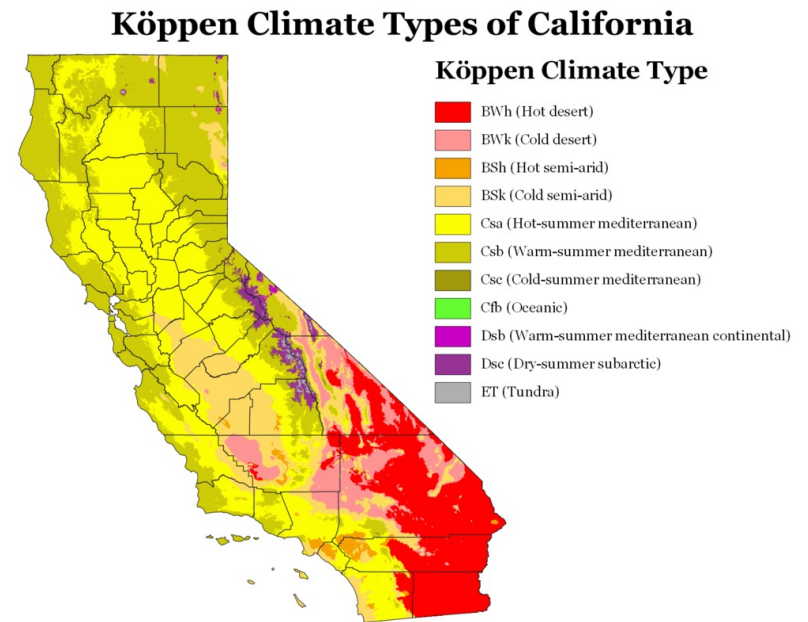
California Department of  
Pesticide Regulation

- FAC
- 3 CCR Section 6186
- 3 CCR Section 6192



# Basic Requirements

- ❖ Data supporting each efficacy claim
- ❖ Phytotoxicity
  - Target plants
  - Non-target plants
- ❖ Data shall be obtained under California or similar environmental use conditions



Data sources: 1991-2020 climate normals from PRISM Climate Group, Oregon State University, <https://prism.oregonstate.edu>; Outline map from US Census Bureau



# Tips for Creating a Good Data Package?

- Clear study objectives with defined assessment criteria demonstrating mode of action
- Demonstrated product effectiveness when used according to label directions
- Rate-response relationship to show label rates are appropriate
- Proper experimental design
  - Untreated controls
  - Randomization and replication
  - Multiple trials in diverse geographical locations
  - Statistical analysis
- Clear articulation of successful trials and explanations of deficient results



# Challenges for Evaluating Pesticides in PPDP

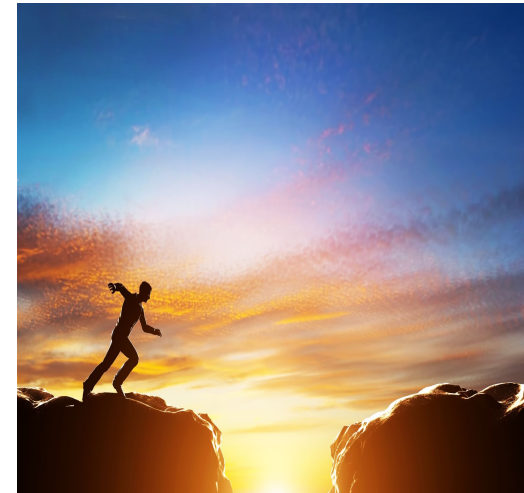
## ❖ U.S. EPA

- Does not evaluate most efficacy/phytotoxicity data
- Accepts data waivers for nontarget phytotoxicity

## ❖ Inadequate efficacy/phytotoxicity data to support

- Overly ambitious label claims and numbers of crops/pests
- Product expectations not clearly articulated on label

## ❖ Data not developed under California-like conditions



# Example 1. Multiple Application Methods

## Label Methods:

- Foliar spray
- Soil incorporation
- Seed treatment



Data are required to support each of the three labeled methods.



## Example 2. Application Rates and Frequencies

### Label rates:

- ❖ 1 - 10 lb/acre
- ❖ Application intervals: 7 days

### ➤ Efficacy data:

- ✓ Minimally require data at **1** lb/acre
- ✓ Ideally provide data across the entire rate range
- ✓ For **PGRs**, require data across the entire rate range

### ➤ Phytotoxicity data:

- ✓ Minimally require data at **10** lb/acre
- ✓ May include **15** or **20** lb/acre
- ✓ Consider reapplications and application timing as labeled

# Example 3. Gallons per Acre

## On a label:

❖ Ground application: 10 - 50 GPA

❖ Aerial application: 2 - 10 GPA



➤ Usually, GPA is not a concern

➤ Phytotoxicity concerns, if

- GPA is very low
- Spray mixture is very acidic or basic



# Example 4. Untreated Control

## Used with another pesticide in a treatment

- |                              |    |                            |    |                              |
|------------------------------|----|----------------------------|----|------------------------------|
| 1. <b>UTC</b>                |    | 1. UTC                     |    | 1. Adjuvant (UTC)            |
| 2. <b>Test insecticide +</b> | Or | 2. <b>Test insecticide</b> | Or | 2. <b>Test insecticide +</b> |
| adjuvant                     |    |                            |    | adjuvant                     |
|                              |    |                            |    |                              |
| 1. <b>UTC</b>                |    | Or                         |    | 1. Insecticide (UTC)         |
| 2. <b>Test adjuvant +</b>    |    |                            |    | 2. <b>Test adjuvant +</b>    |
| insecticide                  |    |                            |    | insecticide                  |



# Example 5. Untreated Control

## Used in a pest control program

### Treatment:

- Application 1. Product X
- Application 2. Product Y
- Application 3. **Test fungicide**
- Application 4. Product Z

### UTC:

- Application 1. Product X
- Application 2. Product Y
- Application 3. Product Z

# Plant Growth Regulator Effects

- **Stem elongation**
  - Inhibit or enhance
- **Flowering or fruit set**
  - Enhance flowering and fruit set or thin fruit/blooms
- **Fruit maturation, ripening**
  - Delay or accelerate
- **Fruit size**
  - Enlarge, modify shape
- **Fruit quality effects**
  - Increase components, brix, other characteristics
- **Rooting, root growth**
  - Induce roots in cuttings, enhance root growth
- **Senescence**
  - Delay or promote
- **Abscission/defoliation**
  - Delay or accelerate
- **Seed germination**
  - Break dormancy, accelerate germination
- **Sprouts, suckers, tillers**
  - Inhibit sprouting, growth
- **Budbreak/dormancy**
  - Stimulate budbreak, overcome dormancy

# Typical PGR Claims



- Increasing yields
- Increasing flowering
- Promoting root growth
- Thinning flowers and/or fruits
- Increasing fruit-set
- Accelerating ripening





## Example 6. PGR Claims

- Control soil-borne fungal diseases, promote root growth, and increase yield.



- Fungicide claim and
- PGR-like claim

- Control soil-borne fungal diseases, **resulting in** promotion of root growth and increases in yield.



- Fungicide claim

# Example 7. Data from the Public Domain

- ❖ Peer-reviewed research papers/reports from the public domain can be submitted for evaluation.
- ❖ Electronic papers (not a reference list)
- ❖ Considerations of relevance and necessity:
  - Support mode of action?
  - Application methods, rates, use sites, crops, pests, application timing etc. in the literature match those on the proposed label?

# **Additional Services for Registrants**

- **Host pre-registration meetings on new products**
- **Evaluate protocols for efficacy and/or phytotoxicity research and proposed labels**
- **Review Research Authorization (RA) requests**

# What is a Research Authorization?

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- A written authorization for research (a permit)
- Allows researchers to collect field data under California environmental use conditions to support California registration of a pesticide product or new use
- Must be obtained from DPR prior to any experimental, unregistered use of a pesticide in California
- On 10 acres or less of land or 1 surface acre or less of water



## RA

- Required on 10 acres or less of land or one surface acre of water. An EUP can be used under an RA or can be conditionally registered in California instead of an RA.
- Received and processed by the RA Program in **EVAL**.
- Data and materials evaluated by DPR scientific staff.
- Public notice or public comment period may be required prior to approval.

## EUP

- Issued by US EPA; DPR does not issue EUPs, but may conditionally register the EUP in CA.
- Not required by US EPA for research done on 10 acres or less of land, or one surface acre or less of water.
- Received and processed by **PRB**.
- Data and materials evaluated by DPR scientific staff through a formalized process.
- NOD and public comment period required prior to conditional registration of the EUP.





# Research Authorizations

- RA requests reflect the trends of pesticide products under development and what we may anticipate coming in for registration in the future
  - Biochemical pesticides
  - Microbial pesticides
  - Emerging technologies



# *Thank you*

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Questions?