Department of Pesticide Regulation

Karen Morrison
*Director*

Gavin Newsom
*Governor*

Yana Garcia
*Secretary for Environmental Protection*

M E M O R A N D U M

TO: Jagjinder Sahota
Environmental Program Manager II
Chief, Worker Health and Safety Branch

**HSM-25005**
*(this number was assigned after distribution)*

VIA: Ann Schaffner
Environmental Program Manager I
Worker Health and Safety Branch

Ann Schaffner

FROM: Daisy Reynaga
Environmental Scientist
Worker Health and Safety Branch
916-324-2837

Daisy Reynaga

Christine Herrera
Environmental Scientist
Worker Health and Safety Branch
916-445-4261

Christine Herrera

DATE: December 26, 2025

SUBJECT: SIMAZINE MITIGATION STATUS UPDATES

## Overview

Simazine is a selective pre- and post-emergence herbicide for the control of broadleaf and grassy weeds in agricultural and non-agricultural settings. Agricultural uses include almonds, apples, avocados, blueberries, grapes, olives, pears, and other crops. Non-agricultural uses include residential lawns, around industrial buildings and rights-of-way.

As of November 2025, there are six active registered products containing 41.9 to 90 percent simazine as the active ingredient (AI) with various formulations, including liquid, flowable concentrate, solid, flowable (dry). The product can be applied via liquid groundboom, chemigation, dry flowable groundboom, flowable low-pressure sprayer, high-pressure sprayer, backpack sprayer, broadcast, and drench (turf). All six products are California restricted materials.

In 2006, the United States Environmental Protection Agency (U.S. EPA) finalized its Reregistration Eligibility Document (RED) for simazine and the triazine family of pesticides, which resulted in proposed mitigation including formulation changes, prohibition of aerial applications, reductions in application rates, increased personal protective equipment (PPE), and an increased restricted entry interval (REI) for Christmas trees (U.S. EPA, 2006).

## Regulatory Status - Department of Pesticide Regulation (DPR)

In 2013, DPR completed a Risk Characterization Document (RCD) addressing the potential risk to human health as a result of application, dietary, and drinking water exposure to simazine (Silva, 2013). When RCDs are prepared, the most recent product labels are used to calculate exposure estimates. However, some of the formulation and application method changes required by the RED were not included on the product labels at the time DPR completed the RCD. Therefore, those changes could not be included in DPR's simazine exposure estimates.

## Regulatory Status – U.S. EPA

In 2018, U.S. EPA released its Human Health Risk Assessment in Support of Registration Review (Rickard et al., 2018). Based on the findings of its risk assessment, U.S. EPA completed an interim decision (ID) for simazine in 2020. The ID required many of the label changes that should have been implemented when the RED was published.

As of 2025, the labels registered in California reflect the changes imposed by U.S. EPA in 2020. The updated labels prohibit aerial applications, require increased PPE for mixer/loaders of water dispersible granules (WDGs) supporting groundboom applications, require increased PPE for backpack applicators to citrus (all formulations but not all products), restrict chemigation (only one product label allows chemigation), and restrict high-pressure handgun sprayer applications (mechanically pressurized handgun sprayer) to spot treatment only for label-listed crops. U.S. EPA also required reduced maximum turf application rates or post-water treatments to treated turf (U.S. EPA, 2020).

The purpose of this document is to review U.S. EPA's ID to determine if additional mitigation is required based on exposure concerns identified in DPR's RCD.

## Label Review

Label rates for most crops vary from 0.6 to 4.4 lbs AI/acre (A), with a maximum application rate of 4 lbs AI/A per calendar year for most crops and 6 lbs AI/A per calendar year for turfgrass on sod farms. The labels allow for 1 to 2 applications per year (Table 1).

**Table 1.** Current actively registered products containing simazine as the AI

| Product Name | Registration Number | Registrant |
|---|---|---|
| Princep 4L | 100-526-ZG | Syngenta Crop Protection |
| Princep Caliber 90 Herbicide | 100-603-ZC | Syngenta Crop Protection |
| Princep Liquid | 100-526-ZF | Syngenta Crop Protection |
| Simazine 90DF | 19713-252-AA | Drexel Chemical Company |
| Sim-Trol 4L | 35915-11-AA-60063 | Sipcam Agro USA, Inc. |
| Drexel Simazine 4L | 19713-60-AA | Drexel Chemical Company |

Registrations for three additional products recently became inactive: Sim-Trol 4L and Sim-Trol 9DF from Oxon Italia S.P.A. became inactive on February 23, 2022, and Sim-Trol-90DF from Spicam Agro USA, INC. became inactive on December 31, 2024.

The required PPE listed on existing labels is as follows:

- For mixer/loaders handling dry flowable products and water dispersible granules supporting groundboom applications:
  - Coveralls over long-sleeved shirt and long pants
  - Chemical-resistant (CR) gloves
  - CR footwear plus socks
  - CR apron
  - A minimum of a NIOSH-approved particulate filtering facepiece respirator or elastomeric particulate respirator with any N, R, or P filter; or a NIOSH-approved powered air purifying respirator with HE filters
- For mixer/loader/applicators and other handlers handling liquid products and water dispersible granules:
  - Long-sleeved shirt and long pants
  - CR or waterproof gloves
  - Shoes plus socks
  - For Sim-Trol 4L (EPA #35915-11-AA-60063): A NIOSH-approved elastomeric half mask respirator with organic vapor (OV) cartridges, ***or*** a NIOSH-approved full-face respirator with OV cartridges, ***or*** a gas mask with OV canisters, ***or*** a powered air purifying respirator with OV cartridges
- For mixers/loader/applicators using backpack sprayers and/or mechanically pressurized handguns:
  - Long-sleeved shirt and long pants
  - CR gloves
  - Shoes plus socks
  - Coveralls over long-sleeved shirt and long pants

## Use and Sales

Approximately 96.36% of the total pounds of simazine applied is used in agricultural settings (Figure 1). Simazine is mostly applied in the winter months, with the highest use in February (Figure 2) (DPR, 2025b). On average, from 2015 to 2023, approximately 166,443 pounds of simazine were reportedly sold annually, and 102,429 pounds of simazine were applied annually (DPR, 2025a; DPR, 2025b). The annual reported pounds sold and applied have decreased over the years. However, there was a slight uptick in pounds sold in 2021, with a gradual decline resuming in subsequent years (Figure 3) (DPR, 2025b).

**Figure 1.** Agricultural vs non-agricultural use of simazine in California from 2013 to 2023 (DPR, 2025a)

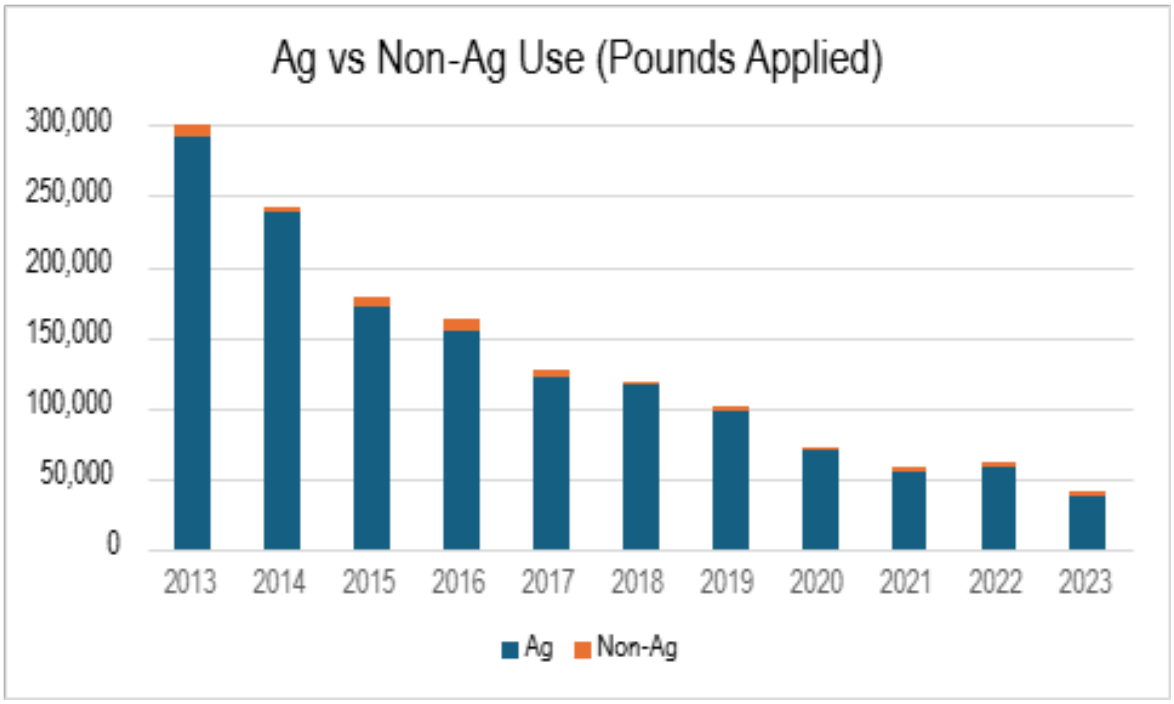



**Figure 2.** Annual monthly average pounds of simazine applied from 2013 to 2023 (DPR, 2025b)

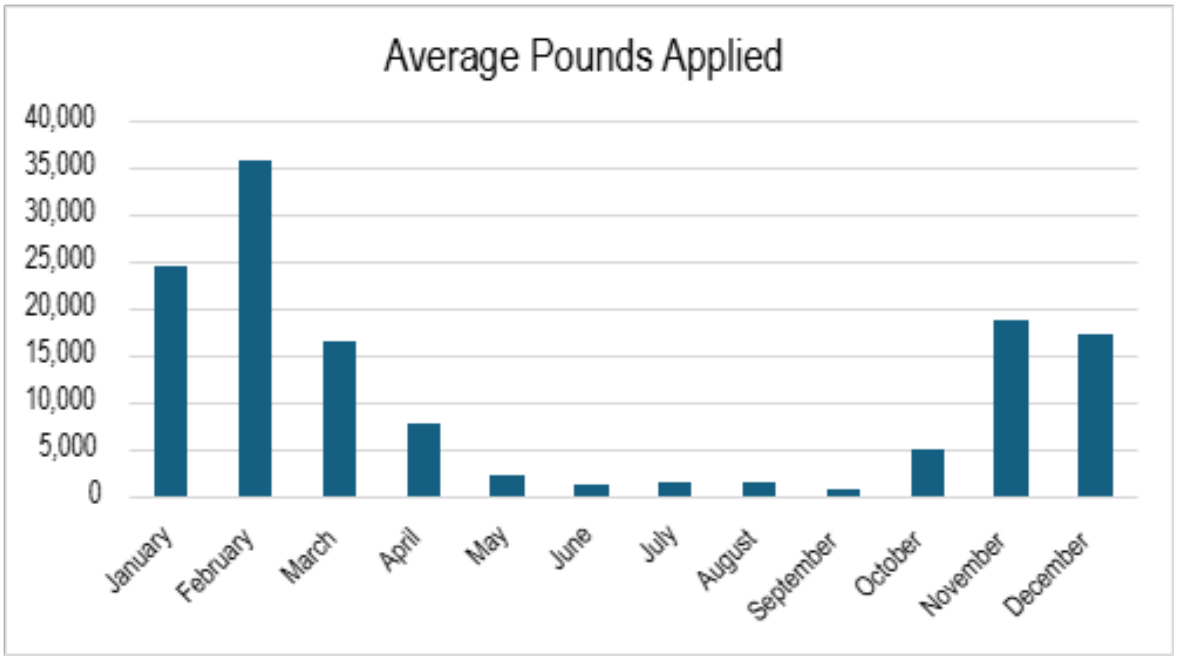
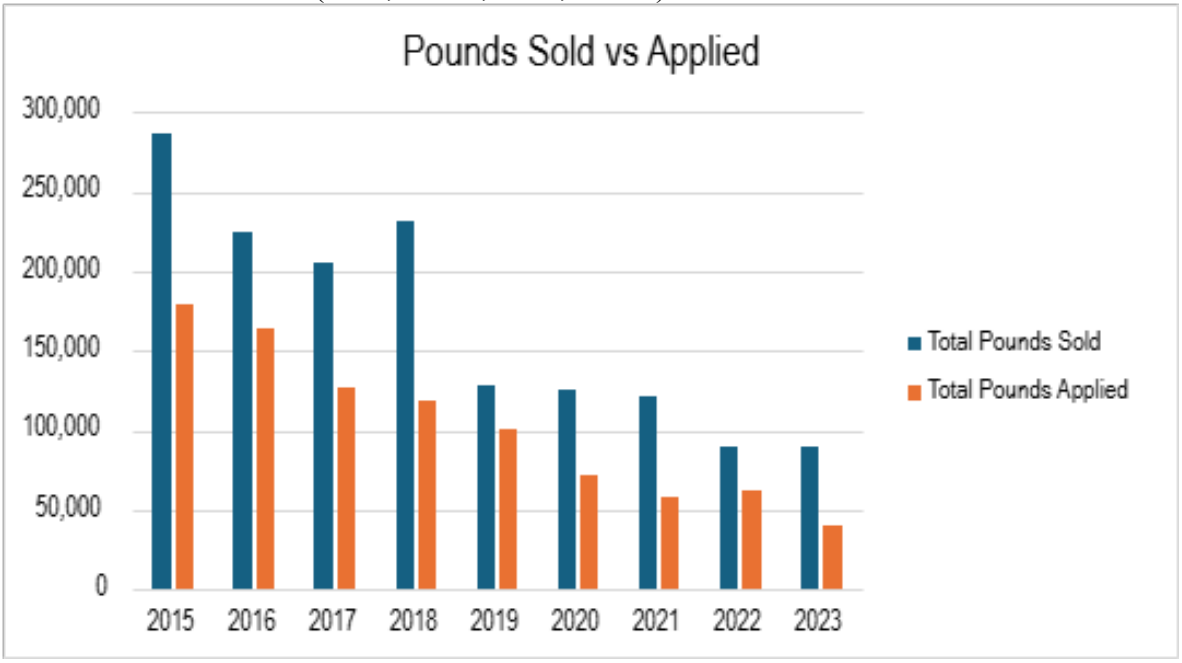


**Figure 3.** Total pounds of simazine sold versus applied (agricultural and non-agricultural sites) between 2015 and 2023 (DPR, 2025a; DPR, 2025b)




## Pesticide Illness Reports (2010-2023)

From 2012 to 2023, four minor severity incidents involving simazine were reported in the OPP Incident Data System (IDS). These incidents occurred between January 1, 2012, and January 12, 2017. Additionally, a National Pesticide Information Center (NPIC) query from 2012 to 2017 identified one minor severity incident involving simazine (U.S. EPA, 2020).

A query of California Pesticide Illness Surveillance Program (PISP) incidents from 2010 to 2022, identified one incident involving simazine. This incident occurred in 2012 and was classified as possibly associated with exposure to simazine. In this incident, an applicator was applying diquat and simazine together at a nursery with a ground rig, experienced symptoms of dizziness, nausea, and vomiting, and was subsequently taken for medical care (DPR, 2025d).

## U.S. EPA/DPR Risk Characterization Comparisons

There are major differences in how risk assessment estimates were calculated between DPR and U.S. EPA. DPR based the majority of its risk assessments on the results of studies conducted on laboratory animals exposed to simazine (DPR, 2013). U.S. EPA used physiological based pharmacokinetic (PBPK) modeling to model dermal and inhalation route exposures, programmed with data obtained from studies using atrazine (another chlorotriazine), as the approach to estimate risk assessment for simazine (Rickard et al, 2018).

According to DPR's RCD for simazine, a margin of exposure (MOE) below 100 (10x uncertainty factor for interspecies sensitivity and 10x factor for intraspecies variation) for handler exposure, or 300 (10x uncertainty factor for interspecies sensitivity, a 10x factor for intraspecies variation, and a 3x uncertainty factor based on insufficient data for children with pica who eat soil) for bystander/residents exposure would indicate an exposure risks of concern. DPR evaluated acute, seasonal, annual, and lifetime exposures to simazine.

According to U.S. EPA's risk assessment, an MOE below the level of concern (LOC) of 30 (3x toxicokinetic component of uncertainty, 10x uncertainty factor for intraspecies variability) would show an exposure risk of concern. U.S. EPA evaluated short-term, but not annual or lifetime exposures to simazine.

Despite these differences in the MOEs obtained, DPR and U.S. EPA have similar scenarios with high exposure concerns. These scenarios are focused on handler/agricultural, and resident/bystander scenarios. However, after mitigation by U.S. EPA on resident/bystander scenario to treated turf lawns, exposure scenarios of concern remain for handler/agricultural exposures (U.S. EPA, 2020).

## Scenarios of Concern

Simazine products are available for agricultural and non-agricultural use. Given this information, the simazine exposure scenarios are grouped as follows:

- Agricultural applicators only;
- Agricultural mixer/loaders only;
- Agricultural mixer/loader/applicators (worker does all three tasks in one application event);
- Non-agricultural mixer/loader/applicators; and
- Bystander/resident exposure to treated soil and treated turf.

The RCD identified several acute, seasonal, and annual scenarios of concern (MOE > 100) for all of the above-mentioned exposure scenarios, where differences in the formulation of the pesticide were observed (Silva, 2013). Table 2 shows the MOEs for each exposure scenarios of concern estimated by DPR and U.S. EPA.

U.S. EPA identified acute risk estimates of concern for certain mixing/loading/applying using handheld spray (backpack sprayer, pressurized handgun) for agricultural and non-agricultural uses (MOE > 30), with dermal exposures being the highest contributors to the combined (dermal and inhalation) risk estimates. However, U.S EPA did not identify seasonal, annual, or lifetime durations of exposure; therefore, the Agency did not calculate MOEs for those exposures (U.S. EPA, 2020).

**Table 2.** Exposure scenarios of concern for DPR compared to U.S. EPA[a]

| Formulation/Application Method | Acute MOE | | Seasonal MOE | Annual MOE | Lifetime MOE |
|---|---|---|---|---|---|
| | DPR[b] | U.S. EPA[c] | DPR | DPR | DPR |
| Applicator (Ag Use) | | | | | |
| Liquid/Groundboom | **34** | 220–1400 | **15** | **84** | 997 |
| Mixer/Loader (Ag Use) | | | | | |
| Liquid/Groundboom | **5** | 120–730 | **3** | **14** | 145 |
| Liquid/Chemigation | **2** | 42–320 | **1** | **6** | **60** |
| Dry Flowable/ Groundboom | **14** | 30–8150 | **6** | **34** | 363 |
| Mixer/Loader/Applicator (Ag Use) | | | | | |
| Flowable/High-pressure | **5** | 2.7–22 | **1** | **8** | 806 |
| Flowable/Backpack | **9** | 18–310 | **3** | **16** | 171 |
| Mixer/Loader/Applicator (Non-Ag Use) | | | | | |
| Flowable/High-pressure | **12** | 110 | **14** | **19** | 207 |
| Flowable/Backpack | **21** | 14-56 | **29** | **40** | **42** |

[a] U.S. EPA did not calculate MOEs for seasonal, annual, or lifetime exposures.

[b] DPR: Target MOE ≥ 100. Bolded MOEs are below the target.

[c] U.S. EPA: Target MOE ≥ 30.

DPR calculated MOEs based on oral and dermal exposures derived from animal studies and identified exposures of concern (MOEs < 100) for occupational handlers in agricultural settings for acute, seasonal, annual and lifetime exposures. In contrast, U.S. EPA calculated MOEs based on total of dermal and inhalation exposures derived from physiologically-based pharmacokinetic (PBPK) modeling for acute exposures only. U.S. EPA identified exposures of concern for scenarios with MOEs < 30. U.S. EPA identified multiple crops or targets for each exposure scenario, each with a different MOE. The range of MOEs listed in Table 2 represents the MOEs for each crop/target/exposure combination (all listed crops/targets for U.S. EPA's MOEs are available in the Agency's 2018 Occupational Risk Assessment (Rickard et al, 2018).

## U.S. EPA Mitigation of Simazine for Occupational Handlers

U.S. EPA's ID determined mitigation measures via product label amendments for occupational handler exposure risks of concern in agricultural and non-agricultural settings. These measures are discussed in the paragraphs below.

### Agricultural Settings

For all dry flowable and water dispersible granule formulations, mixer/loaders for groundboom applications and/or mixer/loaders, cleaners of equipment or spills, or other handlers otherwise exposed to the concentrate, are required to wear baseline attire (long sleeved shirt, long pants,

shoes plus socks), CR gloves, and a dust/mist respirator. Additionally, some labels require mixer/loaders to wear a double layer of clothing or coveralls. For all liquid formulations, handlers are required to wear baseline attire (long sleeved shirt, long pants, shoes plus socks) and waterproof or CR gloves. High-pressure handgun sprayer applications are restricted to spot treatment applications only for crops listed on the label. For backpack sprayer applications, coveralls are required in addition to the currently label-listed PPE (long sleeved shirt, long pants, and shoes plus socks). These measures only address DPR's exposure concerns for mixer/loader/ applicators in agricultural settings using a flowable via backpack pack to treat grapefruit and oranges (Table 3). All other occupational exposure scenarios in agricultural settings will need further mitigation.

**Non-Agricultural Settings**

High-pressure handgun sprayer applications are restricted to spot treatment only. For backpack sprayer applications, additional PPE is required over listed PPE with the addition of a coverall over long-sleeved shirt, long pants, and shoes plus socks. Use on golf course and landscape turf does not require mitigation and can be used at the current maximum application rate of 2 lbs AI/A. These measures do not address DPR's exposure concerns for mixer/loader/applicators in non-agricultural settings (Table 3) and will need further mitigation.

**Table 3.** U.S. EPA mitigation measures to address acute exposure concerns for handlers (ag and non-ag use) compared to DPR concerns

| Application Method and Formulations | U.S. EPA Mitigation Actions (U.S EPA, 2020) | Exposures mitigated? |
|---|---|---|
| ***Applicator (Ag Use)*** | | |
| Liquid groundboom | Maximum application rate reduction[a] to 4 lbs AI/a | No |
| ***Mixer/Loader (Ag Use)*** | | |
| Liquid groundboom | Maximum application rate reduction[a] to 4 lbs AI/a | No |
| Liquid chemigation | None | No |
| Dry flowable groundboom | Coveralls, CR apron, dust/mist respirator[b] | No |
| ***Mixer/Loader/Applicator (Ag Use)*** | | |
| Flowable high-pressure | Spot treatment only for applications to orchard trees, berries, sweet corn and nursery/ornamentals[c] | No |
| Flowable backpack | Coveralls when treating grapefruit and oranges[d] | Yes (use on grapefruit and oranges);<br>No (all other uses) |

| Application Method and Formulations | U.S. EPA Mitigation Actions (U.S EPA, 2020) | Exposures mitigated? |
|---|---|---|
| ***Mixer/Loader/Applicator (Non-Ag Use)*** | | |
| Flowable high-pressure | None | No |
| Flowable backpack | None | No |

[a] Maximum application rate is 4 lbs AI/a on all labels (U.S. EPA (2020).

[b] Per U.S. EPA (2020), mixer/loaders handling dry flowable formulations in support of groundboom applications have to wear coveralls, CR apron, and dust/mist respirator in addition to gloves and basic work attire.

[c] Per U.S. EPA (2020), occupational handlers making applications to orchard trees, berries, sweet corn and nursery/ornamentals by mechanically pressurized handgun have to use spot treatment only.

[d] Per U.S. EPA (2020), occupational handlers treating grapefruit and oranges by backpack application must wear coveralls over long sleeve shirts and long pants.

## U.S. EPA Mitigation of Simazine for Residential and Bystander/Recreational Risks

U.S. EPA also identified post-application residential and bystander/recreational exposure concerns for simazine. These exposure risks were mitigated by either reducing the turf application rate from 2 lbs AI/A to 1.6 lbs AI/A and irrigating with 0.5 inch of water immediately after application, or by using a maximum turf application rate of 0.65 lbs AI/A without irrigating following the application. These measures address residential and bystanders/recreational risks identified in DPR's RCD.

## DPR Mitigation Recommendations

U.S. EPA's ID determined mitigation measures to address identified occupational, residential, and bystanders/recreational exposure risks of concern for simazine. Although residential and bystanders/recreational risks identified in DPR's RCD were addressed by U.S. EPA's mitigation actions, DPR identified to need for further mitigation was needed for certain occupational handler scenarios in both agricultural and non-agricultural settings. Further mitigation of these exposure risks is possible by limiting the amount of AI handled per day, reducing application rates, increasing PPE, or increasing engineering controls.

## References

Crowl, L. 2016. Simazine Mitigation Scoping Document (HSM-16003). Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento, CA.

Dong, M. 2013. Human Pesticide Exposure Assessment for Simazine (A Selective Pre- and Post-Emergence Herbicide) (HS-1840). Department of Pesticide Regulation, California Environmental Protection Agency, Sacramento CA.

DPR. 2025a. Pesticide Use Reporting (PUR), Pesticide Use Annual Summaries: Simazine (2015-2023). Department of Pesticide Regulation, California Environmental Protection Agency. https://calpip.cdpr.ca.gov/main.cfm. Accessed November 2025.

DPR. 2025b. Reports of Pesticides Sold in California 2020-2024. https://www.cdpr.ca.gov/mill-assessment/. Accessed November 2025.

DPR. 2025c. Simazine Pesticide Illness Reports 1992-2023. Pesticide Illness Surveillance Program, California Pesticide Illness Query (CalPIQ). Department of Pesticide Regulation, California Environmental Protection Agency. https://apps.cdpr.ca.gov/calpiq/ Accessed November 2025.

DPR. 2025d. California Pesticide Electronic Submission Tracking (CalPEST). Department of Pesticide Regulation, California Environmental Protection Agency. https://calpest.cdpr.ca.gov/. Accessed October 2025.

Rikard, K. et al. 2018. Simazine Human Health Risk Assessment for Registration Review to Support the Registration of Proposed Uses on Citrus Fruit (Crop Group 10-10), Pome Fruit (Crop Group 11-10), Stone Fruit (Crop Group 12/12), Tree Nuts (Crop Group 14-12), and tolerance Amendment for Almond Hulls. U.S. Environmental Protection Agency. https://www.regulations.gov/document/EPA-HQ-OPP-2013-0251-0119.

Silva, M. 2013. Simazine Risk Characterization Document. Medical Toxicology Branch, Department of Pesticide Regulation, California Environmental Protection Agency https://www.cdpr.ca.gov/wp-content/uploads/2024/10/simazine.pdf.

U.S. EPA. 2006. Reregistration Eligibility Decision (RED) Document for Simazine Case Number 0070. Washington, DC https://www.regulations.gov/document/EPA-HQ-OW-2008-0747-0058.

U.S. EPA. 2020. Simazine Interim Registration Review Decision Case Number 0070. Washington, DC. https://www.epa.gov/sites/default/files/2020-09/documents/simazine_id_signed.pdf.