GRATON PESTICIDES (GRAPE) STUDY: *Exposure potential from groundwater and air in California Wine Country*

RESULTS
March 2022

Funded by the California Breast Cancer Research Program

SASS Safe Agriculture Safe Schools Sonoma County

UCSF University of California San Francisco

CPR Californians For Pesticide Reform

USGS science for a changing world

California Breast Cancer Research Program

Breast Cancer Action

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GRAton PEsticides (GRAPE) Study: Purpose and Scope

The purpose of this study is to determine if pesticides are contaminating the drinking water and outdoor ambient air in Graton, California.

In the Spring of 2021, we sampled six sites throughout Graton, Calif. Sites were selected based on proximity to agriculture, well depth, and well type (i.e., dug versus drilled).

We sampled ambient air using silicone bands secured outdoors onsite for one month from April 3, 2021, through May 3, 2021.

We sampled outdoor untreated well water and indoor tap water on May 3, 2021. Well depths ranged from 25-120 feet, two of which were hand-dug and four were drill-bored. Four sites were adjacent to agriculture and two sites were within one mile of agriculture.

The silicone bands and water samples were tested by the U.S. Geological Survey (USGS) for 187 pesticides (herbicides, insecticides, and fungicides). In addition, the USGS also measured for 57 potential endocrine disrupting chemicals and ran a bioassay screening for estrogenicity, which is the presence of estrogen hormones (estriol, estradiol, and estrone.)

Research Partners:

Sonoma Safe Ag Safe Schools
Californians for Pesticide Reform
University of California San Francisco
U.S. Geological Survey
Breast Cancer Action

Research Funder:

California Breast Cancer Research Program award # B26AB2209

Air monitoring silicone bands were deployed in Graton residents' yards to detect pesticide drift

Pesticides Tested

3,4-Dichloroaniline
3,5-Dichloroaniline
Acetamiprid
Acetochlor
Acibenzolar-S-Methyl
Allethrin
*Aminomethylphosphonic acid (AMPA)
Atrazine
Atrazine, Desethyl
Atrazine, Desisopropyl
Azoxystrobin
Benefin
Bentazon
Benzobicyclon
Benzovindiflupyr
Bifenthrin
Boscalid
Boscalid Metabolite - M510F01 Acetyl
Broflanilide
Bromuconazole
Butralin
Carbaryl
Carbendazim
Carbofuran
Chlorantraniliprole
Chlorfenapyr
Chlorothalonil
Chlorpyrifos
Chlorpyrifos Oxon
Clomazone
Clothianidin
Clothianidin Desmethyl
Coumaphos
Cyantraniliprole
Cyazofamid
Cyclaniliprole
Cycloate
Cyfluthrin
Cyhalofop-Butyl
Cyhalothrin
Cymoxanil
Cypermethrin
Cyproconazole
Cyprodinil
DCPA
DCPMU
DCPU
Deltamethrin
Desthio-Prothioconazole
Diazinon
Diazinon Oxon
Dichlorvos
Difenoconazole
Dimethomorph
Dinotefuran
Dithiopyr
Diuron
EPTC
Esfenvalerate
Ethaboxam
Ethalfluralin
Etofenprox
Etoxazole
Famoxadone
Fenamidone
Fenbuconazole
Fenhexamid
Fenpropathrin
Fenpyroximate
Fipronil
Fipronil Desulfinyl
Fipronil Desulfinyl Amide
Fipronil Sulfide
Fipronil Sulfone
Flonicamid
Florpyrauxifen-Benzyl
Fluazinam
Flubendiamide
Fludioxonil
Flufenacet
Fluindapyr
Flumetralin
Fluopicolide
Fluopyram
Fluoxastrobin
Flupyradifurone
Fluridone
Flutolanil
Flutriafol
Fluxapyroxad
Fomesafen
*Glufosinate
*Glyphosate
Halauxifen-methyl ester
Hexazinone
Imazalil
Imidacloprid
Imidacloprid desnitro
Imidacloprid Olefin
Imidacloprid Urea
Imidacloprid, 5-Hydroxy
Indaziflam
Indoxacarb
Ipconazole
Iprodione
Isofetamid
Kresoxim-Methyl
Malathion
Malathion Oxon
Mandestrobin
Mandipropamid
Metalaxyl
Metalaxyl Alanine Metabolite
Metconazole
Methoprene
Methoxyfenozide
Methylparathion
Metolachlor
Myclobutanil
Naled (Dibrom)
Napropamide
Nitrapyrin
Novaluron
Oryzalin
Oxadiazon
Oxathiapiprolin
Oxyfluorfen
p,p'-DDD
p,p'-DDE
p,p-DDT
Paclobutrazol
Pendimethalin
Penoxsulam
Pentachloroanisole (PCA)
Pentachloronitrobenzene (PCNB)
Penthiopyrad
Permethrin
Phenothrin
Phosmet
Picarbutrazox
Picoxystrobin
Piperonyl Butoxide
Prodiamine
Prometon
Prometryn
Propanil
Propargite
Propiconazole
Propyzamide
Pydiflumetofen
Pyraclostrobin
Pyridaben
Pyrimethanil
Pyriproxyfen
Quinoxyfen
Resmethrin
Sedaxane
Simazine
Sulfoxaflor
Tebuconazole
Tebuconazole t-Butylhydroxy
Tebufenozide
Tebupirimfos
Tebupirimfos Oxon
Tefluthrin
Tetraconazole
Tetramethrin
t-Fluvalinate
Thiabendazole
Thiacloprid
Thiamethoxam
Thiamethoxam Degradate (CGA-355190)
Thiamethoxam Degradate (NOA-407475)
Thiobencarb
Tolfenpyrad
Triadimefon
Triadimenol
Triallate
Tribufos
Tricyclazole
Trifloxystrobin
Triflumizole
Trifluralin
Triticonazole
Valifenalate
Vinclozolin
Zoxamide

Only water samples were analyzed, as a method for measuring bands was not available.

AIR

General Findings

Ambient Air (Silicone Bands)

Based on the findings, pesticide drift was detected at all sites sampled throughout the community of Graton.

Pesticide drift happens when droplets, vapor, or dust travel away from the target application site. It can happen during and after the application and can spread distances more than 2 miles. Sources of pesticide drift include agricultural and residential use.

The sampling method used silicone bands secured in participants' yards for 1 month. From April 3, 2021, through May 3, 2021, the bands collected pesticides, but were also subject to potential degradation from weather, etc. These results do not include data for glyphosate, glufosinate, or aminomethylphosphonic acid (AMPA) as they were not available for this study.

To learn more about the detected pesticides, refer to Resources pages 11-19.

Air (silicone band) findings:

INSECTICIDES

- Chlorantraniliprole was detected at Site 5

HERBICIDES

- Pendimethalin was detected at all six sites
- Dithiopyr was detected at Sites 2 and 3

FUNGICIDES

- Azoxystrobin: Sites 1 and 6
- Difenoconazole: Sites 1, 5, 6
- Propiconazole: Site 2
- Tebuconazole: Site 2
- Triflumizole: Site 2

WATER

General Findings

Outdoor (Ambient Groundwater) and Indoor (Tap Water)

Based on the findings, there were no pesticides detected that exceed drinking water or health advisory levels.

Elevated estrogenic activity was observed at five sites that warrant further investigation. We are planning to conduct a second round of water sampling as soon as possible in order to better understand the observed estrogenicity.

To learn more about estrogenic activity and how these results compare to other studies in the United States, refer to *Resources: Estrogenic Activity, page 10*.

Water findings:

HERBICIDES

- Trifluralin detected in the indoor tap water at Sites 1 and 2 at levels below health advisory standards

ENVIRONMENTAL TOXICANTS

- Estrogenic activity detected at Sites 1, 3, 4, 5, and 6

Site-Specific Findings

YOUR STUDY ID #_____

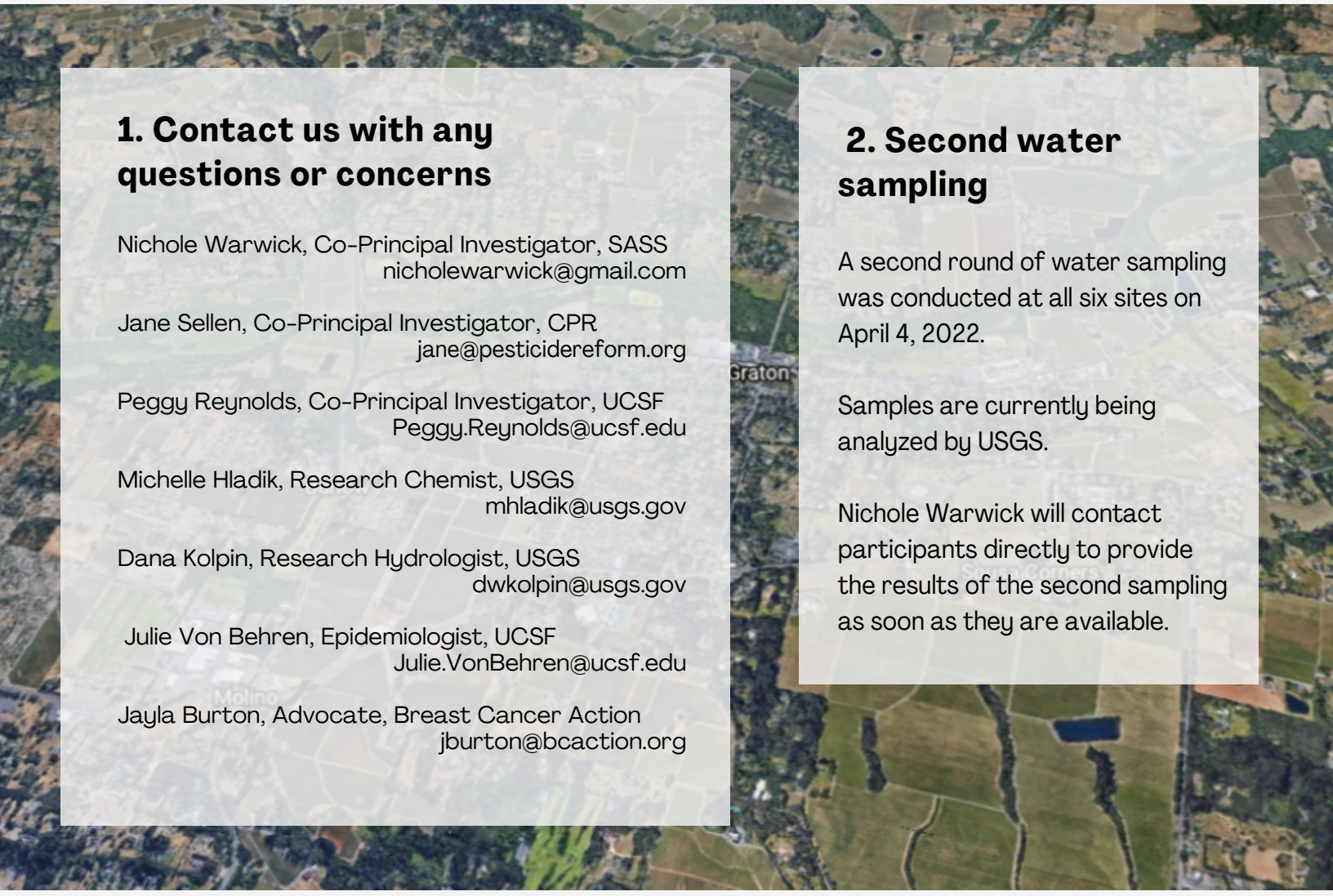
STUDY ID # (address is confidential)	AIR Concentrations are in micrograms per band (µg/band)	WATER Concentrations are in micrograms per liter (µg/L)
1	Azoxystrobin 0.0027 µg/band Difenoconazole 0.004 µg/band Pendimethalin 0.0036 µg/band	Trifluralin 0.0013 µg/L (tapwater) Estrogenicity 0.00104 µg/L (tapwater)
2	Dithiopyr 0.001 µg/band Pendimethalin 0.0031 µg/band Propiconazole 0.0118 µg/band Tebuconazole 0.0117 µg/band Triflumizole 0.0047 µg/band	Trifluralin 0.0015 µg/L (tapwater)
3	Dithiopyr 0.0012 µg/band Pendimethalin 0.0020 µg/band	Estrogenicity 0.00079 µg/L (tapwater)
4	Pendimethalin 0.0033 µg/band	Estrogenicity 0.00376 µg/L (groundwater)
5	Chlorantraniliprole 0.0011 µg/band Difenoconazole 0.0011 µg/band Pendimethalin 0.003 µg/band	Estrogenicity 0.00107 µg/L (groundwater)
6	Azoxystrobin 0.0193 µg/band Difenoconazole 0.0329 µg/band Pendimethalin 0.002 µg/band	Estrogenicity 0.00213 µg/L (groundwater)

Next Steps

A second round of water sampling has been done and results are forthcoming.

We do not know the cause of the measurable estrogenicity, but we are dedicated to more fully understanding what is in the water. The research team is donating staff time (beyond what the study funds) and has secured additional funding for materials and analysis to support a second round of water sampling to better understand the high levels of estrogenicity observed in the water.

We are grateful to the USGS, Californians for Pesticide Reform, Preserve Rural Sonoma County, Conservation Action Fund for Education, Jonas Fund for Children's Environmental Health, and Sonoma Safe Ag Safe Schools for their generous donations funding the second sampling.



1. Contact us with any questions or concerns

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2. Second water sampling

A second round of water sampling was conducted at all six sites on April 4, 2022.

Samples are currently being analyzed by USGS.

Nichole Warwick will contact participants directly to provide the results of the second sampling as soon as they are available.

Next Steps

Continued...

3. Debrief for participants

Once we receive the results from the second water sampling, we will host a meeting (via zoom) for you, the participants, to meet with the researchers, scientists, and advocate to discuss the results and next steps (date to be determined).

This meeting will provide you the opportunity to ask questions, express any concerns, and connect with the other research participants.

This meeting is optional yet encouraged. If you are unable or disinclined to join us, you can communicate with us via email.

4. Community engagement

We will provide information about the study results, including ways to limit potential exposures, and engage the community in dialogue regarding groundwater contamination and pesticide drift.

We will listen to the community's concerns and provide support with evidence-based advocacy.

We will also share the results with the farming community in Graton and other rural agricultural resiential areas in Sonoma County to increase communication and understanding among community stakeholders.

Acknowledgements

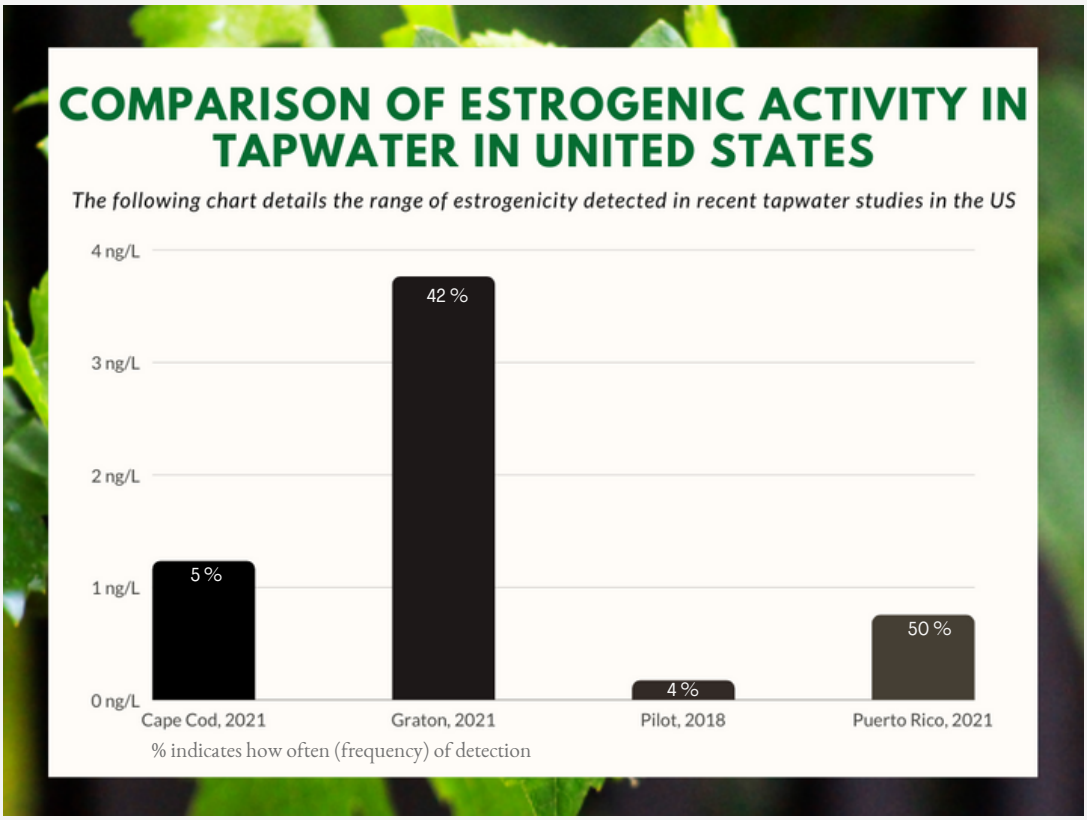
We thank the Graton community and Graton Against Synthetic Pesticides (GASP) for initiating and supporting this research project. Thanks to the teams at the USGS, CPR, UCSF, and SASS for their professional support throughout this research project.

Special thanks to our funder the California Breast Cancer Research Program, and thanks to the SASS coalition organizations Preserve Rural Sonoma County, Conservation Action Fund for Education, CPR, and Jonas Children's Environmental Health Fund for providing additional funding for the second round of sampling.

Resources

Estrogenic Activity

Contaminants of Emerging Concern (CECs), including estrogenic or estrogenic like compounds, have been an issue of global concern due to their potential negative effects on wildlife and human health. We do not know the cause of estrogenicity, but we are dedicated to more fully understanding what is in the water. The following chart compares the estrogenic compounds discovered in Graton with similar recent studies in the United States.



- Cape Cod, Massachusetts Tap Water Study (Bradley et al., 2021)
  - 20 samples: 10 groundwater public supply, 10 private wells
  - Range: below detection to 0.00123 µg/L
  - Frequency of detection: 5% (only measured estrogenicity in a single sample)
- Graton Pesticides GRAPE Study
  - 12 private well samples (6 households with an outdoor and an indoor sample)
  - Range: below detection to 0.00376 µg/L
  - Frequency of detection: 42%
- Pilot Tapwater Study (Bradley et al., 2018)
  - 26 samples: 14 surface water public supply, 6 groundwater public supply, 6 private wells, 1 bottle water
  - Range: below detection to 0.00017 µg/L
  - Frequency of detection: 4% (only measured estrogenicity was from the bottle water source)
- Puerto Rico Tapwater Study (Bradley et al., 2021)
  - 7 commercial public supply, 7 residential (6 SW, 1 private well)
  - Range: below detection to 0.00075 µg/L
  - Frequency of detection: 50%

Resources

Pesticide: Azoxystrobin

CID 3034285

Azoxystrobin

GHS Classification

https://pubchem.ncbi.nlm.nih.gov/compound/3034285#datasheet=LCSS&section=GHS-Classification&fullscreen=true

Pictogram(s)	 Acute Toxic Environmental Hazard
Signal	Danger
GHS Hazard Statements	H331: Toxic if inhaled [Danger Acute toxicity, inhalation] H400: Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard] H410: Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P261, P271, P273, P304+P340, P311, P321, P391, P403+P233, P405, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)

GHS Classification:

GHS, the Globally Harmonized System of Classification and Labeling of Chemicals, was developed by the United Nations as a way to bring into agreement the chemical regulations and standards of different countries. GHS includes criteria for the classification of health, physical and environmental hazards, as well as specifying what information should be included on labels of hazardous chemicals as well as safety data sheets. To learn more about the GHS Classifications, including hazard and precautionary statements specific to this pesticide, go to: https://pubchem.ncbi.nlm.nih.gov/ghs/ghs_9.html

U.S. Environmental Protection Agency Pesticide Fact Sheet:

https://www3.epa.gov/pesticides/chem_search/reg_actions/registration/fs_PC-128810_07-Feb-97.pdf

Pesticide Action Network Human and Environmental Health Pesticide Info:

https://pesticideinfo.org/chemical/PRI1372

Safety Data Sheet:

https://www.syngenta-us.com/sds-label/abound_flowable

Resources

Pesticide: Chlorantraniliprole

CID 11271640

Chlorantraniliprole

GHS Classification

https://pubchem.ncbi.nlm.nih.gov/compound/11271640#datasheet=LCSS&section=GHS-Classification&fullscreen=true

Pictogram(s)	 Irritant; Environmental Hazard
Signal	Warning
GHS Hazard Statements	H319 (17.33%): Causes serious eye irritation [Warning Serious eye damage/eye irritation] H335 (17.33%): May cause respiratory irritation [Warning Specific target organ toxicity, single exposure; Respiratory tract irritation] H400 (82.67%): Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard] H410 (82.67%): Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P261, P264+P265, P271, P273, P280, P304+P340, P305+P351+P338, P319, P337+P317, P391, P403+P233, P405, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)
ECHA C&L Notifications Summary	*Aggregated GHS information provided by 225 companies from 3 notifications to the ECHA C&L Inventory. Each notification may be associated with multiple companies.* *Information may vary between notifications depending on impurities, additives, and other factors. The percentage value in parenthesis indicates the notified classification ratio from companies that provide hazard codes. Only hazard codes with percentage values above 10% are shown.*

GHS Classification:

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U.S. Environmental Protection Agency Pesticides Fact Sheet:

https://www3.epa.gov/pesticides/chem_search/reg_actions/registration/fs_PC-090100_01-Apr-08.pdf

Pesticide Action Network Human and Environmental Health Pesticide Info:

https://pesticideinfo.org/chemical/PRI14722

Safety Data Sheet:

https://s3-us-west-1.amazonaws.com/www.agrian.com/pdfs/DuPont_Altacor_Insect_Control_MSDS2.pdf

Resources

Pesticide: Difenoconazole

CID 86173

Difenoconazole

GHS Classification

https://pubchem.ncbi.nlm.nih.gov/compound/86173#datasheet=LCSS&section=GHS-Classification&fullscreen=true

Pictogram(s)	 Irritant; Environmental Hazard
Signal	Warning
GHS Hazard Statements	H302+H332 (20.32%): Harmful if swallowed or if inhaled [Warning Acute toxicity, oral; acute toxicity, inhalation] H302 (100%): Harmful if swallowed [Warning Acute toxicity, oral] H319 (67.38%): Causes serious eye irritation [Warning Serious eye damage/eye irritation] H332 (20.86%): Harmful if inhaled [Warning Acute toxicity, inhalation] H400 (98.4%): Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard] H410 (97.86%): Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P261, P264, P264+P265, P270, P271, P273, P280, P301+P317, P304+P340, P305+P351+P338, P317, P330, P337+P317, P391, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)
ECHA C&L Notifications Summary	*Aggregated GHS information provided by 187 companies from 11 notifications to the ECHA C&L Inventory. Each notification may be associated with multiple companies.* *Information may vary between notifications depending on impurities, additives, and other factors. The percentage value in parenthesis indicates the notified classification ratio from companies that provide hazard codes. Only hazard codes with percentage values above 10% are shown.*

GHS Classification:

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U.S. Environmental Protection Agency Pesticide Fact Sheet:

https://archive.epa.gov/pesticides/chemicalsearch/chemical/foia/web/pdf/128847/128847-003.pdf

Pesticide Action Network Human and Environmental Health Pesticide Info:

https://pesticideinfo.org/chemical/PRI2666

Safety Data Sheet:

https://www.syngenta-us.com/sds-label/inspire_super

Resources

Pesticide: Dithiopyr

CID 91757

Dithiopyr

GHS Classification

https://pubchem.ncbi.nlm.nih.gov/compound/91757#datasheet=LCSS&section=GHS-Classification&fullscreen=true

Pictogram(s)	 Environmental Hazard
Signal	Warning
GHS Hazard Statements	H400 (100%): Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard] H410 (100%): Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P273, P391, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)
ECHA C&L Notifications Summary	*Aggregated GHS information provided by 58 companies from 2 notifications to the ECHA C&L Inventory. Each notification may be associated with multiple companies.* *Reported as not meeting GHS hazard criteria by 3 of 58 companies. For more detailed information, please visit ECHA C&L website.* *Of the 1 notification(s) provided by 55 of 58 companies with hazard statement code(s).* *Information may vary between notifications depending on impurities, additives, and other factors. The percentage value in parenthesis indicates the notified classification ratio from companies that provide hazard codes. Only hazard codes with percentage values above 10% are shown.*

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U.S. Environmental Protection Agency Pesticide Fact Sheet:

https://archive.epa.gov/pesticides/chemicalsearch/chemical/foia/web/pdf/128994/128994-040.pdf

Pesticide Action Network Human and Environmental Health Pesticide Info:

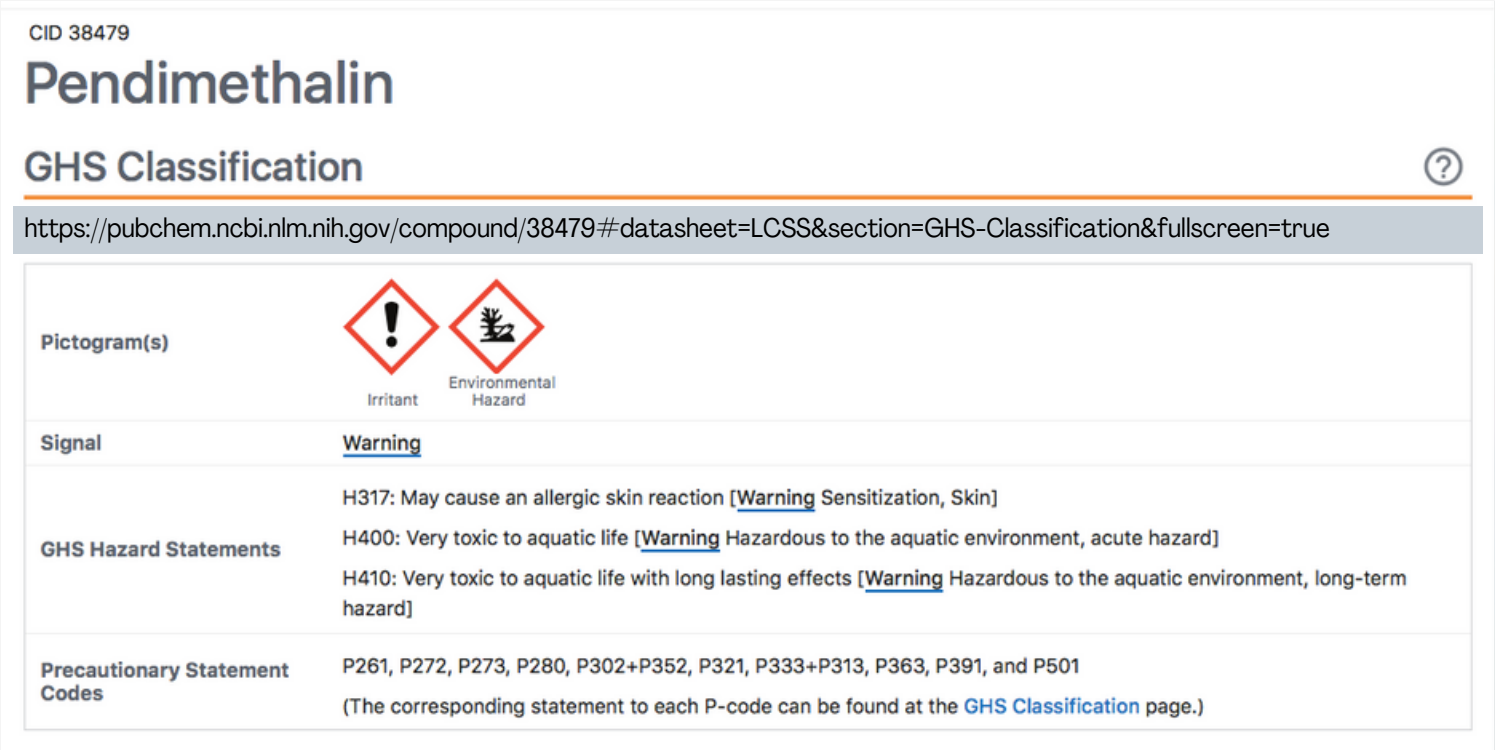
https://pesticideinfo.org/chemical/PRI2874

Safety Data Sheet:

https://s3-us-west-1.amazonaws.com/www.agrian.com/pdfs/Dithiopyr_2L_MSDS1d.pdf

Resources

Pesticide: Pendimethalin



CID 38479

Pendimethalin

GHS Classification

https://pubchem.ncbi.nlm.nih.gov/compound/38479#datasheet=LCSS&section=GHS-Classification&fullscreen=true

Pictogram(s)	Irritant; Environmental Hazard
Signal	Warning
GHS Hazard Statements	H317: May cause an allergic skin reaction [Warning Sensitization, Skin] H400: Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard] H410: Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P261, P272, P273, P280, P302+P352, P321, P333+P313, P363, P391, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)

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https://pubchem.ncbi.nlm.nih.gov/ghs/ghs_9.html

U.S. Environmental Protection Agency Pesticide Fact Sheet:

https://www3.epa.gov/pesticides/chem_search/reg_actions/reregistration/fs_PC-108501_1-Jun-97.pdf

Pesticide Action Network Human and Environmental Health Pesticide Info:

https://pesticideinfo.org/chemical/PRI4809

Safety Data Sheet:

https://s3-us-west-1.amazonaws.com/www.agrian.com/pdfs/ProwlR_H2O_Herbicide_MSDS1p.pdf

Resources

Pesticide: Propiconazole

CID 43234

Propiconazole

GHS Classification

https://pubchem.ncbi.nlm.nih.gov/compound/43234#datasheet=LCSS&section=GHS-Classification&fullscreen=true

Pictogram(s)	 Irritant, Health Hazard, Environmental Hazard
Signal	Danger
GHS Hazard Statements	H302: Harmful if swallowed [Warning Acute toxicity, oral] H317: May cause an allergic skin reaction [Warning Sensitization, Skin] H360D: May damage the unborn child [Danger Reproductive toxicity] H400: Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard] H410: Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P201, P202, P261, P264, P270, P272, P273, P280, P281, P301+P312, P302+P352, P308+P313, P321, P330, P333+P313, P363, P391, P405, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)

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https://pubchem.ncbi.nlm.nih.gov/ghs/ghs_9.html

U.S. Environmental Protection Agency Pesticide Fact Sheet:

https://www3.epa.gov/pesticides/chem_search/ppls/085678-00070-20200501.pdf

Pesticide Action Network Human and Environmental Health Pesticide Info:

https://pesticideinfo.org/chemical/PRI5378

Safety Data Sheet:

https://s3-us-west-1.amazonaws.com/www.agrian.com/pdfs/Propiconazole_14_3_MSDS1q.pdf

Resources

Pesticides: Tebuconazole

CID 86102

Tebuconazole

GHS Classification

https://pubchem.ncbi.nlm.nih.gov/compound/86102#datasheet=LCSS&section=GHS-Classification&fullscreen=true

Pictogram(s)	 Irritant, Health Hazard, Environmental Hazard
Signal	Warning
GHS Hazard Statements	H302: Harmful if swallowed [Warning Acute toxicity, oral] H361d ***: Suspected of damaging the unborn child [Warning Reproductive toxicity] H400: Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard] H410: Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P201, P202, P264, P270, P273, P281, P301+P312, P308+P313, P330, P391, P405, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)

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U.S. Environmental Protection Agency Pesticide Fact Sheet:

https://www3.epa.gov/pesticides/chem_search/cleared_reviews/csr_PC-128997_25-Jul-00_a.pdf

Pesticide Action Network Human and Environmental Health Pesticide Info:

https://pesticideinfo.org/chemical/PRI6108

Safety Data Sheet:

https://www.cdms.net/LDat/mpBGH003.pdf

Resources

Pesticide: Triflumizole

CID 91699

Triflumizole

GHS Classification

https://pubchem.ncbi.nlm.nih.gov/compound/91699#datasheet=LCSS&section=GHS-Classification&fullscreen=true

Pictogram(s)	 Irritant, Health Hazard, Environmental Hazard
Signal	Danger
GHS Hazard Statements	H302: Harmful if swallowed [Warning Acute toxicity, oral] H317: May cause an allergic skin reaction [Warning Sensitization, Skin] H360D: May damage the unborn child [Danger Reproductive toxicity] H373: Causes damage to organs through prolonged or repeated exposure [Warning Specific target organ toxicity, repeated exposure] H400: Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard] H410: Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P201, P202, P260, P261, P264, P270, P272, P273, P280, P281, P301+P312, P302+P352, P308+P313, P314, P321, P330, P333+P313, P363, P391, P405, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)

GHS Classification:

GHS, the Globally Harmonized System of Classification and Labeling of Chemicals, was developed by the United Nations as a way to bring into agreement the chemical regulations and standards of different countries. GHS includes criteria for the classification of health, physical and environmental hazards, as well as specifying what information should be included on labels of hazardous chemicals as well as safety data sheets. To learn more about the GHS Classifications, including hazard and precautionary statements specific to this pesticide, go to: https://pubchem.ncbi.nlm.nih.gov/ghs/ghs_9.html

U.S. Environmental Protection Agency Pesticide Fact Sheet:

https://www3.epa.gov/pesticides/chem_search/cleared_reviews/csr_PC-109801_02-May-12.pdf

Pesticide Action Network Human and Environmental Health Pesticide Info:

https://pesticideinfo.org/chemical/PRI6404

Safety Data Sheet:

https://s3-us-west-1.amazonaws.com/agrian-cg-fs1-production/pdfs/Luna_Experience_MSDS1p.pdf

Resources

Pesticide: Trifluralin

CID 5569

Trifluralin

GHS Classification

https://pubchem.ncbi.nlm.nih.gov/compound/5569#datasheet=LCSS&section=GHS-Classification&fullscreen=true

Pictogram(s)	 Irritant, Health Hazard, Environmental Hazard
Signal	Warning
GHS Hazard Statements	H317: May cause an allergic skin reaction [Warning Sensitization, Skin] H351: Suspected of causing cancer [Warning Carcinogenicity] H400: Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard] H410: Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]
Precautionary Statement Codes	P201, P202, P261, P272, P273, P280, P281, P302+P352, P308+P313, P321, P333+P313, P363, P391, P405, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)

GHS Classification:

GHS, the Globally Harmonized System of Classification and Labeling of Chemicals, was developed by the United Nations as a way to bring into agreement the chemical regulations and standards of different countries. GHS includes criteria for the classification of health, physical and environmental hazards, as well as specifying what information should be included on labels of hazardous chemicals as well as safety data sheets. To learn more about the GHS Classifications, including hazard and precautionary statements specific to this pesticide, go to:
https://pubchem.ncbi.nlm.nih.gov/ghs/ghs_9.html

U.S. Environmental Protection Agency Pesticide Fact Sheet:

https://www.epa.gov/sites/default/files/2016-09/documents/trifluralin.pdf

Pesticide Action Network Human and Environmental Health Pesticide Info:

https://pesticideinfo.org/chemical/PRI6406

Safety Data Sheet:

https://s3-us-west-1.amazonaws.com/agrian-cg-fs1-production/pdfs/Treflan_4D_MSDS2.pdf

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