

Evaluating Surface Water Impacts from California Cannabis Cultivation

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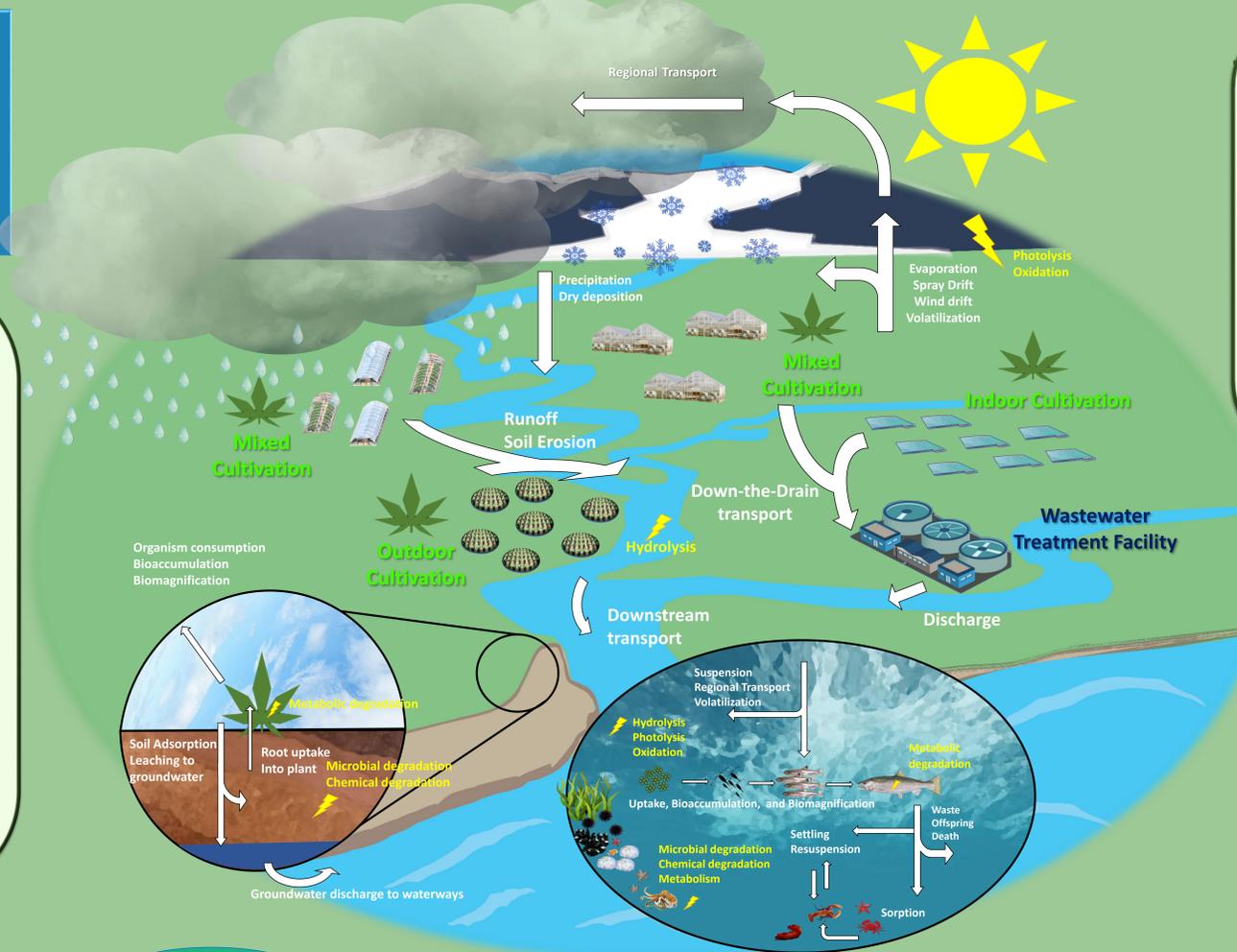
¹: California Department of Pesticide Regulation, Environmental monitoring: Surface Water Protection Program

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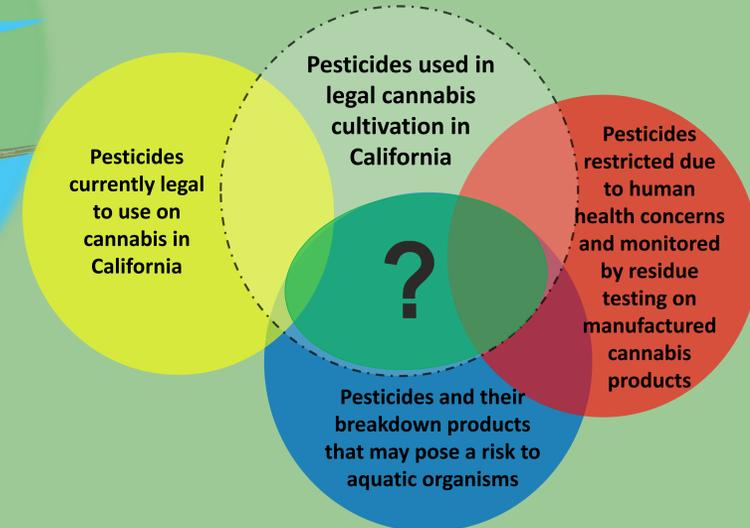
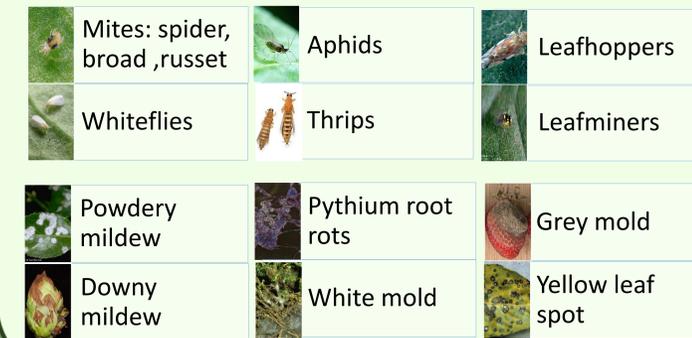
The Surface Water Protection Program's (SWPP) goal is to "characterize pesticide residues, identify the sources of the contamination, determine the mechanisms of off-site movement of pesticides to surface water, and develop site-specific mitigation strategies. These are done primarily through **surface water monitoring** in consultation with other agencies, and **research to characterize the factors that lead to off-site movement.**"¹

Regulating Cannabis in California

- Recreational cannabis was legalized in California on January 1st, 2018.
- California Bureau of Cannabis Control (BCC) is the lead agency for cannabis regulation.
- BCC requires all end-use manufactured cannabis products to pass licensed laboratory testing before being sold.
 - BCC is currently testing for 66 active ingredients found in pesticides.
- California Department of Food and Agriculture (CDFA) is responsible for issuing cannabis cultivation licenses.
- There are no registered pesticides for use on Cannabis
- California Department of Pesticide Regulation (CDPR) has issued cannabis pesticide use guidelines.
- CDPR has provided examples of pesticides that cannot be used on Cannabis. Some of the pesticides that cannot be used include:
 - Those not registered for a food use in California
 - California Restricted Material (including Federal Restricted Material)
 - Those on the Groundwater protection list
- CDPR's SWPP is developing an environmental monitoring study to evaluate the impacts offsite transport of pesticides from legal cannabis cultivation to California's surface water.



Examples of Cannabis Pests



Importance

Legal cannabis cultivation is a commodity that requires novel research across many fields, and also presents regulatory and pesticide registration challenges. Cannabis cultivation laws and regulations vary throughout the United States and among counties and cities within California. As these laws continue to change, it is possible that new products will be submitted to be registered specifically for cannabis. Gaining an understanding of pest pressures, pesticide use, and the potential for off-site pesticide transport in cannabis cultivation will set an important foundation for protecting human health and the environment. SWPP will develop monitoring strategies and priorities for cannabis cultivation in California similar to that of other agricultural commodities.



Developing an Environmental Monitoring Study

Key Study Questions

- What pesticides are being used in legal cannabis cultivation in California?
- What are the primary pesticide transport pathways offsite for pesticides used in cannabis?
- How do pesticide use patterns, composition, and transport pathways differ among indoor, outdoor, and mixed grows? Does this vary among regions in California?
- Which watersheds and sewer sheds in California are at the highest risk of exposure to pesticides used on legal cannabis cultivation?
- What is the pesticide load from legal cannabis cultivation to wastewater and/or surface waters?
- How does legal cannabis cultivation impact aquatic organisms in California?
- How can CDPR integrate cannabis into a long term monitoring project?

Pesticide analysis

Targeted

Quantitative analysis of selected compounds using GC or LC MS/MS.

Non-targeted

Qualitative analysis confirming presence of compounds using mass spectral libraries.

Examples of EPA registered compounds toxic to aquatic organisms that are NOT exempt from residue tolerance requirements

Compounds	Class	Residue Testing	Toxicity Threshold (ng/L)
Diflubenzuron	Benzoylurea		0.59
Fipronil sulfone *	Pyrazole metabolite		5.7
Imidacloprid	Neonicotinoid	X	11
Trichlorfon	Organophosphorus		5.8
Dichlorvos (DDVP)	Organophosphorus	X	5.9
Chlorpyrifos-methyl	Organophosphorus		10
Fipronil	Pyrazole	X	11
Gamma Cyhalothrin	Pyrethroid		0.25
Alpha-cypermethrin	Pyrethroid		0.59
Zeta-cypermethrin (Cypermethrin S)	Pyrethroid		1.3
Bifenthrin	Pyrethroid	X	1.4
Permethrin	Pyrethroid	X	2
Lambda Cyhalothrin	Pyrethroid		4
Tefluthrin	Pyrethroid		4.1
Deltamethrin	Pyrethroid		4.4
Tralomethrin	Pyrethroid		5
Beta Cypermethrin	Pyrethroid		7.4
Cyfluthrin	Pyrethroid	X	10
Beta Cyfluthrin	Pyrethroid		10

* denotes that a compound is a breakdown product.