

# Pesticide Leaching Risk Assessment in the Tropics: Evaluation of the Windows Pesticide Screening Tool (WIN-PST) for Use in Hawaii

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## Objective

Determine whether Hawaii NRCS should adopt the Windows Pesticide Screening Tool (WIN-PST) to assess pesticide leaching risk for Conservation Planning



## Context

- NRCS Conservation Planners must now consider pesticide leaching risk in management planning where appropriate.
- Planners need an acceptable pesticide leaching risk assessment tool to assist them in their work.
- The Windows Pesticide Screening Tool (WIN-PST) is supported nationally but has not been validated for use on tropical soils like those found in Hawaii.
- A locally developed and validated leaching risk assessment model (the Comprehensive Leaching Risk Assessment System -- CLERS) is currently being used in Hawaii by the State of Hawaii Department of Agriculture (HDOA).

## System scope

- WIN-PST has a larger database of chemicals and soils and provides more output information including an assessment of runoff risk.
- CLERS provides more flexibility to change chemical attributes.
- WIN-PST provides options to consider management practices and soil properties.

## Consistency with Field Data

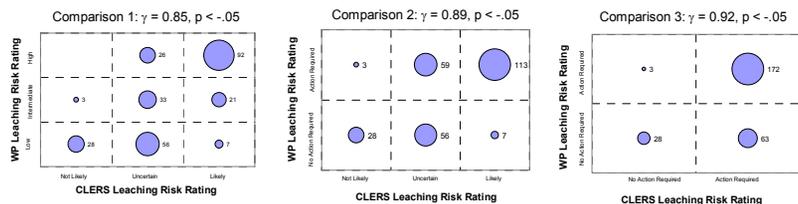
- Field study conducted for 5 chemicals: ametryn, atrazine, chlorpyrifos, fenamiphos and hexazinone on three soils: Hilo, Molokai, Wahiawa (Gavenda et. al., 1996)
- Predictions from both systems agreed with field data except for fenamiphos where both systems predicted that leaching was likely, but no leaching was found.
- However, a more detailed field study on fenamiphos (Schneider et. al., 1990) found evidence of leaching consistent with the risk assessments from both systems.

Pesticide	Soil Series	Leaching Risk Rating		
		Gavenda et. al.	Win-PST	CLERS
Ametryn	Molokai Series	Intermediate	Intermediate	Uncertain
	Wahiawa Series	Intermediate	Intermediate	Uncertain
	Hilo Series	High	Intermediate	Uncertain*
Atrazine	Molokai Series	High	High	Likely
	Wahiawa Series	Very High	High	Likely
	Hilo Series	Very High	High	Uncertain*
Chlorpyrifos	Molokai Series	Low	Low	Uncertain
	Wahiawa Series	Low	Low	Uncertain
	Hilo Series	Low	Low	Uncertain*
Fenamiphos	Molokai Series	Low	High	Uncertain
	Wahiawa Series	Low	High	Uncertain
	Hilo Series	Low	High	Uncertain*
Hexazinone	Molokai Series	High	High	Likely
	Wahiawa Series	High	High	Likely
	Hilo Series	High	High	Likely*

\*Since the Hilo soil was not included in CLERS, the Pane soil (also an Andisol) was substituted in this analysis.

## Leaching Risk Assessments

WIN-PST and CLERS leaching risk assessments were significantly positively correlated for a sample set of 38 common pesticides and 7 agricultural soils.



WIN-PST Action Required → leaching risk rating of "very high", "high" or "intermediate"  
CLERS Action Required → leaching risk of "likely" or "uncertain"

## Conclusions and Recommendations

- Hawaii NRCS should adopt WIN-PST as the official pesticide leaching risk assessment tool for Conservation Planning.
- Hawaii NRCS technical staff should continue to work with the NRCS Water and Climate Center, the University of Hawaii, and members of the Tropical Technology Consortium to evaluate and improve the accuracy of WIN-PST in the tropics.
- Update WIN-PST soils database to reflect new soils information (especially the Island of Hawaii and in the Pacific Basin)
- Identify possible adjustments in input parameters to account for unique tropical conditions like deep organic matter in Andisols
- Assess the impact of intense, concentrated rainfall events on pesticide leaching including effects of macropore flow
- Identify and address other concerns and inconsistencies (knowledge gaps) as they appear through ongoing use of the system in the field

## Soils and chemicals used in system comparisons

Chemical Name	Use	Chemical Name	Use
2,4,5 T	Herbicide	Fenamiphos	Insecticide
2,4 D	Herbicide	Glyphosate	Herbicide
Aldicarb	Insecticide	Heptachlor	Insecticide
Aldicarb oxalate*	Insecticide	Hexazinone*	Herbicide
Ametryn	Herbicide	Imidacloprid	Insecticide
Anilazine*	Herbicide	Malathion	Insecticide
Atrazine	Herbicide	Methomyl	Insecticide
Bromacil*	Herbicide	Methoxyfenosulfuron	Insecticide
Captafol*	Insecticide	Methyl bromide	Insecticide
Carbofuran	Insecticide	Methidathion	Insecticide
Chloridane	Insecticide	Oxamyl	Insecticide
Chlorpyrifos	Insecticide	Paraquat	Herbicide
Cyazotam*	Herbicide	Prometryn	Herbicide
DBCP*	Insecticide	Propazine*	Herbicide
Dicamba	Herbicide	Simazine	Herbicide
Duron*	Herbicide	Toxaphene*	Insecticide
EDB*	Insecticide	Trichlorfon	Insecticide
Endosulfan*	Insecticide	Triolopy	Herbicide

\*Chemicals that are not found in products registered for use in Hawaii in 2003 but were used in the past.

## References

Gavenda, R. T., R. E. Green and R. C. Schneider, 1996. Leaching of pesticides in selected Hawaii Oxisols and Andisols as influenced by soil profile characteristics. HITAHR Research Series 075. University of Hawaii.

Schneider, R. C., R. E. Green, W. J. Apt, D. P. Bartholomew and E. P. Caswell, 1990. Field movement and persistence of fenamiphos in irrigated prealpine soils. Pesticide Science 30: 243-257.

