

Why Michigan Apple & Cherry Growers Should Care About Maximum Residue Limits

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MRL Database: 100 Insecticides

Red Unharmonized (= agreed upon by all countries)

Chemical Name	Codex	US		EU		Canada		Germany (EU)		Japan		Korea		Mexico
		PHI	MRL	PHI	MRL	PHI	MRL	PHI	MRL	PHI	MRL	PHI	MRL	
2,4-D	0.01		0.1		0.1		-		0.1		0		2	
Acequinocyl	-		0.4		0.1		0		0.1		1		0.5	
Acetamiprid	-		1		0.1		1		0.1		2		0.3	
Azinphos-methyl	2		1.5		0.1		2		0.1		2		1	
Buprofezin	3		4		0.5		-		0.5		2		0.5	
Captan	15		25		3		5		3		5		5	
Carbaryl	-		12		0.1		5		0.1		1		1	
Chlorpyrifos	1		0		0.5		0		0.5		1		1	
Fenarimol	0.3		0.2		0.3		-		0.3		1		0.3	
Fenpropathrin	5		5		0		-		0		5		5	
Kasugamycin	-		0.1		-		-		-		-		-	
Lambda Cyhalothrin	0.2		0.3		0.1		0.1		0.1		0.4		0.2	
Phosmet	3		10		0.2		10		0.2		10		10	
Thiram	5		7		5		7		5		5		0.3	
Zeta-Cypermethrin	0.7		2		1		-		1		2		-	

Example One: in EU, no more than 3 detectable MRLs or rejected so even if apples where under the MRL for 1-Captan, 2-Phosmet (Imidan), 3-Applaud and 4-Sevin the apples would be Rejected... because there are 4 detected residues.

Example Two: Even one detected residue that is legal in the US, but not in the EU would cause **Rejection**.

Example Three: Chlorpyrifos can't be used anywhere near harvest even though it may be the best, a **zero MRL** makes any residue illegal in the US so we can't spray fruit unless we're certain it will be exported.



Western Farm Press "Quote"

- For anyone who grows or processes for export, MRLs are a daily concern. The **U.S. EPA** and **California Department of Pesticide Regulation** register and regulate the use of pesticides in the USA. **Fewer and fewer foreign countries accept the US's standards.**
- Many of the major U.S. customers do not recognize EPA standards and set their own pesticide residue rules. **MRLs** are one of those standards set by many individual countries.
- There are roughly **153 countries** in the world who manufacture some chemicals and export agricultural products, therefore, there are over 150 sets of pesticide rules.
- Heightened food safety concerns and the growing number of developing countries flexing their regulatory muscle have created a labyrinth of regulations that growers and processors must navigate successfully to ship products overseas without being penalized.
- This not only includes knowing what residue levels are permitted at each destination...
- **But what chemicals are registered in which countries?**
- **And, how do the residues on your fruit degrade?**



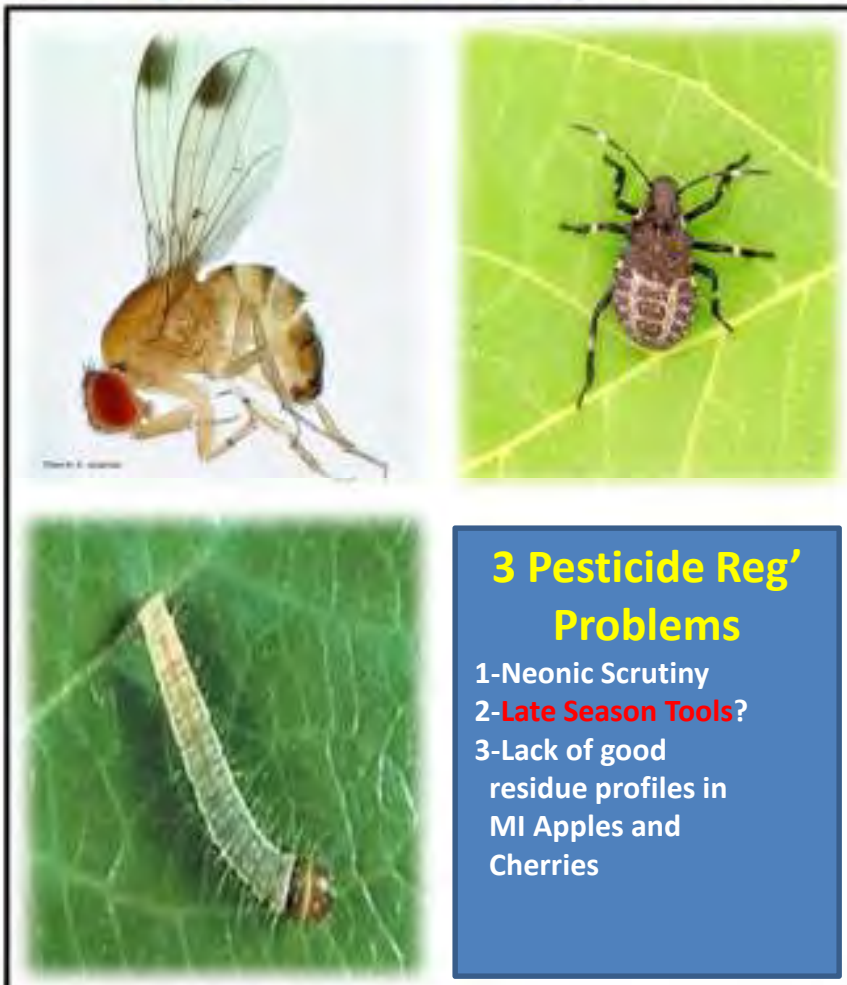
- Compounding the MRL issue is the fact that growers and handlers too **often do not know where their crop will eventually be marketed.**
- Therefore, when making **Pesticide Use Decisions**, if in doubt, **some say don't use it!**
- Others **take their chances** that there will be no pesticide residues found, if tested.
- **MRLs** are increasing the stakes and creating **Market ACCESS BARRIERS in overseas markets... and large Box Stores--**

The Large Box-Store/Chains: Story

- Baby food Manufacturers have long controlled pesticide residues through their own residue testing facilities...
- Now a number of large box store chains are beginning to set **MRL-like standards for certain pesticides...**
- Varies with the marketing chain
- Therefore, beware of whom you sell to, **you can easily encounter residue standards that exceed US standards...**

Michigan Tree Fruit: The MRL Challenge... Close to Harvest Sprays

Late Season Invasives, OBLR & Changing Pesticide Regulations:



MRLs: A Growing Challenge

- US & International Laws
- Quality in the Market Place
 - Residues >>> important!
- **Processed, Dried & Fresh** Issues
- **Dynamic: MRLs Change / Evolve**
 - EU & USEPA: Neonics & Bees
 - Gaming: International Market Place
 - Processors, Packer/Shippers, Growers
- **FQPA = Fewer Water Soluble AI's**
 - Some Pesticides Residues last longer...easily detected!
 - Dried cherry harvest without water????
- **Anyone** can detect Residues, but are they “**legal**” residues?

What we need to know?

“To Export Safely”

1-What pesticides are registered and approved in which Countries and Which Stores? And, what materials are banned in which overseas markets? How are MRLs changing country to country annually?

2-What MRLs exist for which pesticides in each likely export destination?

- Also, your crop might be *trans-shipped* once it arrives to another country with different MRLs than the first destination... (*historical cherry issue...*)

3-How do residues on your fruit degrade (breakdown or go away)?

Key Factors in Estimating MRL Degredation:

- Spray date(s) + Rate(s) + Deposition + Weather + Fruit-Handling Factors = harvest residues...
- But also: **Where are residues measured in transport/shipping?** –initial handling, Pack-out, processing, storage, trans-shipping, dock hold, transport systems, direct market storage...
- MRL Management Requires: Intimate Knowledge of the trade path and the ‘risk’ you can “live-with” ... (is your comfort with the probability of failure: 1 in 2? or 1 in 20,000?)
- Risk assessment requires residue decline studies, and mathematical probability estimates (modeling).

4-Most Commodities just say this (above) is too complicated...therefore, just shoot for the most restrictive market we might sell to and that’s our standard...

- What is the best strategy for MRLs on Your Crop?

New Zealand's Process for Assuring that No Shipment to a Foreign Market will Trigger MRL!

Processes in establishing pre harvest interval (PHI) and MRL advisory tools for growers

Pipfruit NZ experience

- A significant and multiple year data base of residue results x spray application details are required to initially develop a model
 - PNZI had 15 years of residue data to fall back on for determining PHIs to meet REGULATORY MRLs
 - PNZI used a new 3 year series of residue data collected over the period of introduction of a restrictive low input programme designed to meet EU private MRL standards
- Wall Charts for regulatory PHIs are issued to growers each season start (ATTACHED)
- Initially a spread sheet model was developed for the private standard programme aiming at a residue likelihood based on PHI and number of applications (see attached residue risk table). This was provided to all growers and trialled for 2 seasons with improvements each season
- Private Standards vary and growers wanted the ability to follow a programme specific to the buyer they were supplying so a web based tool was developed from the spread sheet used previously and the 3 year residue data base
- This permitted growers to search by **trade name or active ingredient** and receive a **PHI** for 100% EU MRL, 80%, 70%, 50%, 30% and <10% of the EU regulatory MRLs. In the following screen shots of the web tool for each of the 3 categories (**BACTERICIDES AND FUNGICIDES; INSECTICIDES AND MITICIDES; SPECIAL USE PRODUCTS**) these are the columns headed; **E E80 E70 E50 E30 EAF**. A notes section was incorporated to assist growers decide the risks associated with a particular product
- The system appears to have worked well with requested to extend it further for other market destinations with special requirements e.g., Russia, Thailand, Indonesia, Malaysia

General Comments

- Balancing product use and MRL restrictions impacts effective phytosanitary measures and ends up as a compromise if short residual life products are unavailable
- If growers do not know where their product will end up they follow the most restrictive programme
- It is important that a good residue dataset is available that can be correlated with spray diaries (product use data) to determine PHI for a specific residue
- Don't start off too restrictive in the PHI recommendations – you need the data to refine the down to be as restrictive as needed rather than start off restrictive – growers get upset with too big a PHI jump but need to see there are consequences of the programme changes. We started aiming for the EAF or <10% EU MRL target and because the programme PHIs were restrictive we didn't have the residue data to assess by how much to relax the restrictions to just start getting residues.
- The major issue is restricting the programme to no more than 3 residues detected / sample Fungicides by their very nature are longer term residues (to be protective)and the IGRs have very long residue tails.
- Any post harvest use of fungicides, DPA etc need to be factored in to the residue count as these will leave a residue

New Zealand's Goal: In England, your shipment is rejected if > 3 residues are detected at any level....EAF = England Access Factor = Less than 15% of England's MRL

Example: MRL Database for New Zealand Apple Growers 2009...it's updated annually!

EUROPEAN PROGRAMME PHIs & RESIDUE LIKELIHOOD (This guideline is by no means 'absolute' and was compiled from available residue programme data collected under commercial field use conditions. Actual use and climate may affect residues obtained)					
PRE HARVEST INTERVAL	TRADE NAME	ACTIVE INGREDIENT	LIKELIHOOD OF A SINGLE APPLICATION AT STATED PHI LEAVING A RESIDUE	LIKELIHOOD OF TWO APPLICATIONS AT STATED PHI LEAVING A RESIDUE	LIKELIHOOD OF THREE APPLICATIONS AT STATED PHI LEAVING A RESIDUE
INSECTICIDES AND MITICIDES					
PRE BLOOM	APOLLO 555C, ACHILLES				
PRE BLOOM	APRICALD 455C, OYATON 505W				
PRE BLOOM	PURMOR, PRITER				
To 15 NOV	LUFENURON				more than 1 application will result in a residue
To 1 DEC	PRODIGY				more than 1 application will result in a residue
To 1 DEC	COMAC, MIMIC				
To 10 DEC	AVANT				
To 31 DEC	FENAMITE				
70 DAYS	ALTAZOR				
55 DAYS	CALYPSO, TOPSTAR				
55 DAYS	DAZINON				Not recommended from European supply
28 DAYS	MIT-EMEC				
28 DAYS	COMAC, MIMIC				
15 DAYS	DELEGATE				more than 1 application not recommended
14 DAYS	AVD, VERDEX				
14 DAYS	SUCCESS				
3 DAYS	PROCLAIM				
1 DAY	OIL SPRAYS				
0 DAY	MADEX, CARBOVUFOSINE, V				
0 DAY	BACTUR, BACTURABLE C, DIPS				
BACTERICIDES AND FUNGICIDES					
BEFORE FULL BLOOM	BAVISTIN DF, CARBENDAZIM				
To 30% Petal fall	CHORUS				
To 30% Petal fall	SCALA				
To 30% Petal fall	FLINT STAR				
To 30% Petal fall	PRISTINE				
To 100% Petal fall	KEYSTREPTO				
To 31 OCT	HIMODS EW, NEPTUNE				
To 30 Nov	SCORETOWS, EMERALD 500W				
To 30 Nov	DELAN WD, ALARS				
To 30 Nov	NUSTAR, NOVALL 250W				
To 30 Nov	TOPAS 200EW, STARA				
70 DAYS	FLINT				
45 DAYS	STROBY				
45 DAYS	EUPAREN MULTI				
35 DAYS	DITHANE, RAINSHIELD / NEOT				
35 DAYS	POLYRAM				
35 DAYS	RUBIGAN FLO				
35 DAYS	SYS THAMEXON, VALICUS 300				
28 DAYS	MICAR GRANUFLO				
28 DAYS	THRIFAN DF				
14 DAYS	CAPTAN, ORTHOODE, MERRAN	CAPTAN	100%	100%	100%
14 DAYS	DOONE, AKLAME, SYLIT PLUS	DOONE	10%	4%	10%
1 DAY	COPPER PRODUCTS WETTABLE SULPHURS, LIME SULPHUR	COPPER & SULPHUR BASED PRODUCTS	100%	100%	100%

New Zealand Strategy

1- Take their worst-case MRL country (UK)

2- Develop a Chart from in-orchard sampling (annually = real data!)

3- Annually Publish a Wall Chart to put right in the Spray Shed, Office & back door of their house...so every grower and their hired hands don't screw-up!

4- Annual Pre-harvest residue sample: **Required by law** before harvesting/transport to plant/packer-shipper...

5- Additional random sample residue testing from each receiving station...

If the industry wants an MRL Chart

Here is a Plan! But it is not the ONLY plan possible!



Is a grower MRL Chart a Key to the Industry's Future?

- 1- Use all available data to get a jump-start...but is there such a thing as a cheap MRL?
 - Can the tree fruit industries develop a focused effort on MRLs?
 - Can we get a good 1st MRL chart done before the 2014 season starts... **get going now!**
 - MSU can get growers trained, but not before an MRL Chart is developed!
 - ANY SYSTEM will need **Updating Annually** as new materials and pesticide changes come...
 - This effort will be on-going...
- 2- How can we get all available sound residue data now? (**reliable** and **pertinent** pesticide residues)
 - IR-4: mostly not too useful: target upper max residues = **US Legal upper residues...**
 - EPA: aligned with IR-4, but focused primarily on Major Crops, yet regulates minors too
 - Databases (we already have access Minor Crop Farmer Alliance's International Database)
 - But the MCFA database only tells us what is permissible, **not what you have on your fruit!**
- 3- We will need to- **Generate our own data (data is expensive \$\$\$) for many/most situations...**
- 4- What are the \$\$\$, and methods that we need to get started? Example Strategy Below:
 - **Apple & Cherry Commodity Support... this will cost \$\$\$**
 - Processors, Packer-Shippers, Dryers....Cooperate? Collaborate? Provide MRL testing? Lead?
 - Can we get both an Apple and a Cherry Industry Plan Together in 2013?
 - MSU can help, but industry must move ahead: **Industry's Decisions in 2013 and beyond...**
 - **Focused Effort Needed** = Strategic Plan and Explicit 'buy-in' from key sectors of Industry...
 - **Grants: 2013-2017 Technical Assistance for Specialty Crop & Block Grants: 2013-4**
 - (Are these 'a Fit' for MI Tree Fruit Industries and their MRL needs?)
- 5- **Growers need \$\$\$ to get 'safe with MRLs':** Processors, MSU, US Funding Agencies, GREEN, USDA-NIFA, IR-4, donors & Foundations can help, **but MRLs will take a concerted effort by the industry!**

Current (Jan. 2013) Cherry Residues in some key Michigan markets: Note the Differences!

Chemical	Trade Name	U.S.	Codex	EU/UK	Australia	Canada	Japan	Korea	Taiwan
Acetamiprid	Assail	1.2	1.5	0.5	1	1.2	2	1.5 ^c ←	1 ←
Azinphos-Methyl	Guthion	2	2	0.05	2	1	2	1	2 ←
Azoxystrobin	Abound	1.5	2	2	1.5		3	2 ←	1 ←
Bifenazate	Acramite	2.5	2	0.01	2.5		2	0.3	2

Yet this chart has little relevance
until we know what the residue is at harvest ...
or, for overseas MRLs, when the fruit is tested in the UK or Taiwan...

If you use Voliam flexi (8oz @ 3rd Cover) for cherry fruit fly & OBLR what will your residue be?

- 1- after the cooling pad?**
- 2- after the cooling pad & processing?**
- 3- after the cooling pad and after freezing for 6 months?**
- 4- after harvesting dry and after the drier?**

Remember, now you have 2 residues to account for = thiamethoxam & chlorantraniliprole...

Flubendiamide	Belt	1.6	2	2	1.6		2	0.7 ←	1
Fludioxonil	Scholar	5	5	5	5	5	5	1 ←	5 ←

Take home messages:

- 1- **MRLs Are Not Going Away Any Time Soon...**
- 2- True safety, where MRLs are concerned, **won't be cheap...**
- 3- **A partnership is needed:** Industry- especially processors, dryers, packer-shippers must help with leadership, resources and direction!
- 4- Charts of MRLs in different markets and Countries is not sufficient... **we must have residue data from our conditions:** days to harvest, cooling pad, hydro-cooling, drying, etc...
- 5- The Apple and Cherry industries need to know what their MRLs will be after harvest, after processing, after drying, after storage....**whatever your processes are...**
- 6- This MRL effort will take cooperation, effort, time and \$\$\$...
- 7- Some maintenance MRL work will be necessary to maintain exports & **even US markets** ...periodically over the years...
- 8- **MRLs are not just an Overseas issue!**

Don't Shoot The Messenger!