

2018 WTFRC APPLE PESTICIDE RESIDUE STUDY

Since 2011, the Washington Tree Fruit Research Commission (WTFRC) has conducted annual trials to evaluate pesticide residues on 'Gala' apples. This year, we applied seven insecticide/acaricides, four fungicides, and one plant growth regulator with a Rears Pak-Blast sprayer according to either an "aggressive" protocol intended to simulate a worst-case scenario with the highest possible residues while observing label guidelines



(maximum label rates at minimum retreatment and pre-harvest intervals) or a "standard" protocol following more typical industry use patterns for rates and timings. Each treatment protocol was sprayed at both 100 (concentrate) and 200 (dilute) gallons of water per acre while holding the rate of pesticide per acre constant. Fruit samples were collected at commercial maturity on August 29 and delivered the next day to Pacific Agricultural Labs (Sherwood, OR) for chemical residue analysis.

TRIAL DETAILS

- 11th leaf 'Pacific' Gala / M.9 Nic.29 trained to central leader/spindle on 3' x 10' spacing
- 2 x 25 gal Rears Pak-Blast sprayer calibrated to 100 or 200 gal / acre
- All pesticides applied with 8 oz Regulaid / 100 gal water / acre
- No measurable precipitation recorded during trial except 0.01" of rain on Aug 25 (4 days before harvest)

Measured residues vs. maximum residue levels (MRLs) for uniformly applied STANDARD industry apple pesticide programs in 100 or 200 gal water/acre utilizing typical rates, timings, and retreatment intervals. 'Gala'/M.9 Nic.29, Rock Island, WA. WTFRC 2018.

Chemical name	Trade name	Application rate	Application timing(s)	100 gal/acre	200 gal/acre	US MRL ¹	Lowest export MRL ¹
		oz per acre	dbh	ppm	ppm	ppm	ppm
Ethephon	Ethephon 2SL	36	58	0.22	0.35	5	0.01 (UAE)
Spinetoram	Delegate WG	7	35 & 21	0.022	.031	0.2	0.05 (many)
Cyantraniliprole	Exirel	13.5	35 & 21	0.16	0.22	1.5	0.8 (many)
Spinosad	Entrust	3	35 & 21	0.029	0.091	0.2	0.1 (many)
Tolfenpyrad	Bexar	27	35 & 21	0.46	0.65	1	0.01 (many)
Myclobutanil	Rally 40WSP	10	35 & 21	0.27	0.41	0.5	0.01 (UAE)
Novaluron	Rimon	32	35 & 21	0.38	0.52	3	2 (CAN, TAI)
Fluxapyroxad	Merivon	5.5	28	0.054	0.11	0.8	0.8 (Canada)
Pyraclostrobin	Merivon	5.5	28	0.033	0.071	1.5	0.5 (many)
Etoxaazole	Zeal	2	28	0.054	0.089	0.2	0.07 (many)
Difenoconazole	Inspire Super	12	28	0.025	0.024	5	0.01 (India)
Cyprodinil	Inspire Super	12	28	0.061	0.054	1.7	0.05 (INDO)
Ziram*	Ziram 76DF	96	21	1.26	0.36	7	2.5 (Taiwan)
Fenpropathrin	Danitol	18	14	0.33	0.41	5	0.01 (many)

¹ Top markets for WA apples with established MRLs; 16 October 2018. <http://www.nwhort.org/AppleMRLs.html>, <https://www.globalmrl.com/>

* Dithiocarbamate residues cannot be directly measured; total Ziram values are estimates based on analysis of the degradation product CS₂

For more information, contact Tory Schmidt (509) 669-3903 or email tory@treefruitresearch.com

Measured residues vs. maximum residue levels (MRLs) for uniformly applied **AGGRESSIVE** industry apple pesticide programs in 100 or 200 gal water/acre utilizing maximum labeled rates, and minimum preharvest and retreatment intervals. 'Gala' /M.9 Nic.29, Rock Island, WA. WTFRC 2018.

Chemical name	Trade name	Application rate <i>oz per acre</i>	Application timing(s) <i>dbh</i>	100 gal/acre <i>ppm</i>	200 gal/acre <i>ppm</i>	US MRL ¹ <i>ppm</i>	Lowest export MRL ¹ <i>ppm</i>
Ethephon	Ethephon 2SL	36	35	0.42	0.57	5	0.01 (UAE)
Spinosad	Entrust	3	21 & 7	0.085	0.11	0.2	0.1 (many)
Etoxazole	Zeal	3	14	0.081	0.13	0.2	0.07 (many)
Spinetoram	Delegate WG	7	14 & 7	0.062	0.084	0.2	0.05 (many)
Cyantraniliprole	Exirel	20.5	14 & 5	0.20	0.40	1.5	0.8 (many)
Fluxapyroxad	Merivon	5.5	7 & 1	0.32	0.51	0.8	0.8 (Canada)
Pyraclostrobin	Merivon	5.5	7 & 1	0.30	0.47	1.5	0.5 (many)

¹ Top markets for WA apples with established MRLs; 16 October 2018. <http://www.nwhort.org/AppleMRLs.html>, <https://www.globalmrl.com/>
NOTE: Residue results for several materials are not reported in this table due either erroneous application or lack of product.

DISCUSSION

As in the previous 7 years of studies, no residue from a pesticide applied following label-recommended rates and timings exceeded the US Environmental Protection Agency's tolerance. Pesticides which produced residues above MRLs for important export markets included **Ethephon 2SL, Bexar, Rally 40WSP, Zeal, Inspire Super, Danitol, Entrust, and Delegate WG**. In most cases, these potentially problematic findings have less to do with the actual amount of residue generated by these products than with the fact that some nations have very stringent MRLs; these tolerances are frequently set at the limit of quantitation (LOQ), or smallest amount that can be reliably measured by modern analytic methods, essentially creating a *de facto* ban on importation of apples treated with these products. Growers hoping to market their fruit to such nations should consider avoiding use of those materials altogether.

In general, we found higher residues in 2018 from dilute (200 gal water/acre) than concentrate (100 gal water/acre) applications, suggesting that the higher carrier volume improved coverage. This trend is consistent with our results from comparing 200 gal/acre (concentrate) vs. 400 gal/acre (dilute) applications in a 2016 cherry study, but counter to results from our 2017 apple and 2018 cherry studies, where concentrate applications generally produced higher residues than dilute. These contradictions make interpretation of our cumulative data set quite difficult; simply put, our results to date have shown no consistent effect of water carrier volume on pesticide residues.

Reports from previous pesticide residue studies on apple and cherry which provide a broader context for these results are available on the WTFRC website at www.treefruitresearch.com. We encourage growers and consultants to stay abreast of current information on international MRLs, which often change in response to trade negotiations and/or political developments. For more information, visit the Northwest Horticultural Council website at www.nwhort.org.



Results of this lone unreplicated trial are shared for informational purposes only and should not be construed as endorsements of any product, reflections of their efficacy, or a guarantee of similar results regarding residues for any user. Apple growers should consult their extension team members, crop advisors, and warehouses to develop responsible pest control programs.