

2021 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 eleven insecticide/acaricides and eight fungicides and one plant growth regulator according to either an "aggressive" protocol intended to generate 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. Fruit samples were collected at commercial maturity on August 26 and delivered the next day to Pacific Agricultural Labs (Sherwood, OR) for chemical residue analysis.



TRIAL DETAILS

- 14th 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 gal / acre
- All pesticides applied with 8 oz Regulaid / 100 gal water / acre
- A total of 0.21 inches of rain fell on the trial block after the application of Ethephon, but there was no measurable precipitation in July or August, when all other materials were sprayed

Measured residues vs. maximum residue levels (MRLs) for **STANDARD** industry apple pesticide programs in 100 water/acre utilizing typical rates, timings, and retreatment intervals. 'Gala'/M.9 Nic.29, Rock Island, WA. WTFRC 2021.

Chemical name	Trade name	Application rate	Application timing(s)	Measured residue	US MRL ¹	India MRL ¹	Lowest export MRL ¹
		oz per acre	dbh	ppm	ppm	ppm	ppm
ethephon	Ethephon 2SL	32	121 (Apr 27)	<0.1	5	0.01*	0.8 (many)
flutianil	Gatten	8	35	<0.01	0.15	0.01*	0.01 (many)
isofetamid	Kenja 400SC	12.5	35	0.083	0.6	0.01*	0.2 (Kor)
abamectin	AgriMek SC	4.25	35	<0.01	0.02	0.01*	0.01 (many)
benzovindiflupyr	Aprovia	7	35	0.013	0.2	0.01*	0.2 (many)
pydiflumetofen	Miravis	3.4	35	0.013	0.2	0.01*	0.01 (many)
diazinon	Diazinon 50W	16	35	<0.01	0.5	0.01*	0.1 (Can)
spinetoram	Delegate WG	7	35 & 21	0.011	0.2	0.01*	0.05 (many)
spinosad	Entrust	3	35 & 21	<0.01	0.2	0.01*	0.1 (many)
tolfenpyrad	Bexar	27	35 & 21	0.20	1	0.01*	0.01 (many)
myclobutanil	Rally 40WSP	10	35 & 21	0.27	0.5	0.01	0.5 (many)
fenpropathrin	Danitol	18	35 & 21	0.26	5	0.01*	0.01 (many)
difenoconazole	Inspire Super	12	28	0.030	5	0.01	0.5 (China)
cyprodinil	Inspire Super	12	28	0.057	1.7	0.01*	0.05 (Indo)
cyflufenamid	Torino	6.8	28	0.012	0.06	0.01*	0.01 (Thai)
buprofezin	Centaur WDG	34.5	28	0.68	3	0.01*	1 (Tai)
afidopyropen	Versys	3.5	28 & 14	<0.05	0.02	0.01*	0.01 (many)
bifenazate	Acramite 50WS	16	14	0.18	0.7	0.01*	0.2 (China)
phosmet	Imidan 70-W**	92	14	2.8	10	0.01*	2 (Tai)
mefentrifluconazole	Cevya	5	14	0.089	1.5	0.01*	0.01 (many)
cyclaniliprole	Verdepryn	11	14	0.061	0.3	0.01*	0.01 (many)

¹ Top markets for WA apples with established MRLs; 29 Sept 2021. <https://nwhort.org/export-manual/>, <https://bcglobal.bryantchristie.com/>

*No tolerance posted; MRL is based on national default value (0.01 ppm in India)

**Imidan 70-W was mixed with a buffering agent to reduce tank pH to 5.5 per standard industry practice

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 against any insect, acarid, or fungal pest, 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.

Measured residues vs. maximum residue levels (MRLs) for **AGGRESSIVE apple pesticide programs in 100 gal water/acre utilizing maximum labeled rates, and minimum preharvest intervals. 'Gala'/M.9 Nic.29, Rock Island, WA. WTFRC 2021.**

Chemical name	Trade name	Application rate	Application timing(s)	Measured residue	US MRL ¹	India MRL ¹	Lowest export MRL ¹
		<i>oz per acre</i>	<i>dbh</i>	<i>ppm</i>	<i>ppm</i>	<i>ppm</i>	<i>ppm</i>
ethephon	Ethephon 2SL	32	79 (June 8)	0.14	5	0.01*	0.8 (many)
benzovindiflupyr	Aprovia	7	35	0.015	0.2	0.01*	0.2 (many)
pydiflumetofen	Miravis	3.4	35	0.036	0.2	0.01*	0.01 (many)
isofetamid	Kenja 400SC	12.5	35 & 21	0.012	0.6	0.01*	0.2 (Kor)
diazinon	Diazinon 50W	16	35 & 21	0.043	0.5	0.01*	0.1 (Can)
abamectin	AgriMek SC	4.25	28	<0.01	0.02	0.01*	0.01 (many)
tofenpyrad	Bexar	27	28 & 14	0.39	1	0.01*	0.01 (many)
fenpropathrin	Danitol	18	28 & 14	0.46	5	0.01*	0.01 (many)
difenoconazole	Inspire Super	12	21 & 14	0.088	5	0.01	0.5 (China)
cyprodinil	Inspire Super	12	21 & 14	0.19	1.7	0.01*	0.05 (Indo)
flutianil	Gatten	8	21 & 14	0.026	0.15	0.01*	0.01 (many)
myclobutanil	Rally 40WSP	10	21 & 14	0.43	0.5	0.01	0.5 (many)
spinosad	Entrust	3	21 & 14	<0.01	0.2	0.01*	0.1 (many)
cyclaniliprole	Verdepryn	11	21 & 7	0.053	0.3	0.01*	0.01 (many)
phosmet	Imidan 70-W**	92	21 & 7	6.1	10	0.01*	2 (Tai)
cyflufenamid	Torino	6.8	14	0.023	0.06	0.01*	0.01 (Thai)
buprofezin	Centaur WDG	34.5	14	1.1	3	0.01*	1 (Tai)
spinetoram	Delegate WG	7	14 & 7	<0.01	0.2	0.01*	0.05 (many)
afidopyropen	Versys	3.5	14 & 7	<0.05	0.02	0.01*	0.01 (many)
bifenazate	Acramite 50WS	16	7	0.12	0.7	0.01*	0.2 (China)
mefentrifluconazole	Cevya	5	7 & 1	0.37	1.5	0.01*	0.01 (many)

¹ Top markets for WA apples with established MRLs; 29 Sept 2021. <https://nwhort.org/export-manual/>, <https://bcglobal.bryantchristie.com/>

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**Imidan 70-W was mixed with a buffering agent to reduce tank pH to 5.5 per standard industry practice

CONCLUSIONS

As we have observed in every study since 2011, no spray program produced a residue that exceeded the tolerance level set by the US Environmental Protection Agency; these findings are further evidence that apple growers following directions on product labels should expect their fruit to be in full compliance for domestic sales regarding pesticide residues. Several products we tested, however, did produce **residues which exceed Maximum Residue Levels (MRLs)** set in important export markets for Washington apples including: **Miravis, Bexar, Danitol, Inspire Super, Gatten, Verdepryn, Imidan 70-W, Torino, Centaur WDG, and Cevya**. India has yet to post tolerances for most pesticides used by WA apple growers; in the absence of a posted MRL, the default tolerance in India is 0.01 ppm, essentially meaning that any product which produced a detectable residue in our study would potentially violate India's standards. Trade representatives from the USDA and Northwest Horticultural Council continue to work with Indian authorities to encourage them to post more MRLs, which should make compliance more feasible.

Our 2021 study reports findings for the first time for mefentrifluconazole, pydiflumetofen, and cyclaniliprole, as well as ethephon applied at standard timings for chemical thinning (late April) or promotion of return bloom (early June). While ethephon is an old product, Canada is expected to reduce its current MRL for ethephon on apples from 3.0 to 0.1 ppm in late 2022; our first year of results at these timings indicate no detectable residues for apples treated with ethephon at chemical thinning timing and a relatively modest residue for fruit sprayed in early June, well below most current export MRLs from other countries.

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.org. 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, www.nwhort.org.



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