2024 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 twelve insecticides, six fungicides, and three miticides according to either an "aggressive" protocol intended to generate the highest possible residues while observing label guidelines (maximum 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 September 12 and delivered the next day to Pacific Agricultural Labs (Sherwood, OR) for chemical residue analysis.

TRIAL DETAILS

- 17th 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 0.18 inches of rain fell on the trial block on August 23-24 (19 days before harvest)

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 2024.

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*
flutianil	Gatten	8	35	<0.01	0.15	0.01*	0.15 (many)
benzovindiflupyr	Aprovia	7	35	0.028	0.2	0.01*	0.2 (many)
pydiflumetofen	Miravis	3.4	35	0.022	0.2	0.01*	0.2 (many)
tolfenpyrad	Bexar	27	35 & 21	**0.41**	1	0.01*	0.01 (Twn,Tha)
indoxacarb	Avaunt	6	35 & 21	**0.22**	1	0.01*	0.1 (Can)
flupyradifurone	Sivanto prime	14	35 & 21	0.11	0.7	0.01*	0.5 (Twn)
fenbutatin	Vendex 50WP	32	35 & 21	1.10	15	0.01*	2 (Twn)
zeta-cypermethrin	Mustang Maxx	4	35 & 21	0.089	2	0.01*	0.7 (many)
acequinocyl	Kanemite	31	28	<0.01	0.4	0.01*	0.01 (Chn,Tha)
lambda-cyhalothrin	Warrior II	2.56	28	0.038	0.3	0.01*	0.2 (many)
flonicamid	Beleaf 50SG	2.8	28	0.043	0.2	0.01*	0.2 (many)
cyflumetofen	Nealta	13.7	28 & 14	0.13	0.3	0.01*	0.3 (Can,Mex)
sulfoxaflor	Transform	2.75	28 & 14	0.069	0.5	0.01*	0.3 (many)
chlorantraniliprole	Altacor eVo	2.2	28 & 14	0.26	1.2	0.01*	0.4 (many)
buprofezin	Centaur WDG	34.5	21	**1.7**	3	0.01*	1 (Twn)
Ipflufenoquin	Axios 20SC	3	21 & 14	**0.033**	0.15	0.01*	0.01 (Tha)
phosmet**	Imidan 70-W**	92	14	**2.2**	10	0.01*	2 (Twn)
mefentrifluconazole	Cevya	5	14	0.065	1.5	0.01*	0.9 (Twn)
cyclaniliprole	Verdepryn	11	14	0.057	0.3	0.01*	0.2 (many)
cyfluthrin	Baythroid XL	2.8	14	<0.05	0.5	0.01*	0.1 (many)
fenazaquin	Magister	36	14	**0.49**	0.6	0.2	0.3 (many)

[1] Top markets for WA apples with established MRLs; 1 October 2024. 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 2024.

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*
benzovindiflupyr	Aprovia	7	35	0.038	0.2	0.01*	0.2 (many)
pydiflumetofen	Miravis	3.4	35	0.038	0.2	0.01*	0.2 (many)
acequinocyl	Kanemite	31	35 & 21	<0.01	0.4	0.01*	0.01 (Chn,Tha)
lambda-cyhalothrin	Warrior II	2.56	28 & 21	0.047	0.3	0.01*	0.2 (many)
flonicamid	Beleaf 50SG	2.8	28 & 21	0.043	0.2	0.01*	0.2 (many)
tolfenpyrad	Bexar	27	28 & 14	**0.48**	1	0.01*	0.01 (Twn,Tha)
flupyradifurone	Sivanto prime	14	28 & 14	0.20	0.7	0.01*	0.5 (Twn)
fenbutatin	Vendex 50WP	32	28 & 14	1.00	15	0.01*	2 (Twn)
indoxacarb	Avaunt	6	21 & 14	**0.29**	1	0.01*	0.1 (Can)
flutianil	Gatten	8	21 & 14	0.031	0.15	0.01*	0.15 (many)
zeta-cypermethrin	Mustang Maxx	4	21 & 14	0.11	2	0.01*	0.7 (many)
chlorantranliprole	Altacor eVo	2.2	21	0.34	1.2	0.01*	0.4 (many)
cyclaniliprole	Verdepryn	11	21 & 7	0.16	0.3	0.01*	0.2 (many)
cyflumetofen	Nealta	13.7	21 & 7	0.21	0.3	0.01*	0.3 (Can,Mex)
phosmet**	Imidan 70-W**	92	21 & 7	**5.8**	10	0.01*	2 (Twn)
buprofezin	Centaur WDG	34.5	14	**1.9**	3	0.01*	1 (Twn)
sulfoxaflor	Transform	2.75	14 & 7	0.17	0.5	0.01*	0.3 (many)
ipflufenoquin	AXIOS 20SC	3	14 & 7	**0.062**	0.15	0.01*	0.01 (Tha)
fenazaquin	Magister	36	7	**0.52**	0.6	0.2	0.3 (many)
cyfluthrin	Baythroid XL	2.8	7	<0.05	0.5	0.01*	0.1 (many)
mefentrifluconazole	Cevya	5	7 & 1	0.30	1.5	0.01*	0.9 (Twn)

[1] Top markets for WA apples with established MRLs; 1 October 2024. 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

Laboratory analysis revealed once again that no material tested in our 2024 study 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 did produce **residues which exceed Maximum Residue Levels** (MRLs) set in important export markets for Washington apples in both our standard and aggressive application protocols: **Bexar, Avaunt, Centaur WDG, AXIOS 20SC, Imidan 70-W, and Magister**. 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 would potentially violate India's standards.

As we have typically observed in previous studies, the aggressive application protocol often produces higher residue levels than our standard protocol. This dynamic is not fully consistent, however, as demonstrated by our current results with fenbutatin. These types of findings highlight the potential variability in pesticide residues from one sample to another. Growers and consultants should always consider that any single sample of their fruit could produce a residue that is an outlier from an expected range of results.

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.

WASHINGTON TREE FRUIT RESEARCH COMMISSION

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