

# 2025 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 fifteen insecticides/acaricides, five fungicides, and three plant growth regulators 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 11 and delivered the next day to Pacific Agricultural Labs (Sherwood, OR) and OMIC USA Laboratory (Portland, OR) for chemical residue analysis.



## TRIAL DETAILS

- 18<sup>th</sup> 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 0.54 inches of rain fell on the trial block on between pink and harvest with almost no rain occurring after petal fall

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 2025.

Chemical name	Trade name	Application rate	Application timing(s)	Measured residue	US MRL <sup>1</sup>	India MRL <sup>1</sup>	Lowest export MRL <sup>1</sup>
		oz per acre	dbh	ppm	ppm	ppm	ppm
prohexadione-Ca	Kudos 27.5WDG	12	Pink & petal fall	<0.01	3	0.01*	0.01 (Tha)
Inpyrflumaxam	Excalia	4	Petal fall	<0.01	0.01	0.01	0.01 (Can, Mex)
metamitron	Brevis SC	40	Petal fall & 10 mm	<0.01	0.01	0.01	0.01 (many)
ethephon (summer)	Ethephon 2SL	32	45 DAFB	<0.1	5	0.01*	0.1 (Can)
flutianil	Gatten	8	35	<0.01	0.15	0.01*	0.15 (many)
tolfenpyrad	Bexar	27	35 & 21	<b>0.55</b>	1	0.01*	0.01 (Twn,Tha)
indoxacarb	Avaunt	6	35 & 21	<b>0.22</b>	1	0.01*	0.1 (Can)
flupyradifurone	Sivanto prime	14	35 & 21	0.18	0.7	0.01*	0.5 (Twn)
fenbutatin	Vendex 50WP	32	35 & 21	1.5	15	0.01*	2 (Twn)
zeta-cypermethrin	Mustang Maxx	4	35 & 21	0.23	2	0.01*	0.7 (many)
acequinocyl	Kanemite	31	28	<0.05	0.4	0.01*	0.01 (Chn,Tha)
lambda-cyhalothrin	Warrior II	2.56	28	0.031	0.3	0.01*	0.2 (many)
flonicamid	Beleaf 50SG	2.8	28	0.051	0.2	0.01*	0.2 (many)
sulfoxaflor	Transform	2.75	28 & 14	0.067	0.5	0.01*	0.3 (many)
chlorantraniliprole	Altacor eVo	2.2	28 & 14	0.19	1.2	0.01*	0.4 (many)
spinosad	Entrust SC	10	28 & 14	0.040	0.2	0.01*	0.1 (many)
buprofezin	Centaur WDG	34.5	21	<b>1.2</b>	3	0.01*	1 (Twn)
Ipflufenquin	Axios 20SC	3	21 & 14	<b>0.037</b>	0.15	0.01*	0.01 (Tha)
phosmet**	Imidan 70-W**	92	14	<b>2.7</b>	10	0.01*	2 (Twn)
cyfluthrin	Baythroid XL	2.8	14	<0.05	0.5	0.01*	0.1 (many)
fenazaquin	Magister	36	14	<b>0.39</b>	0.6	0.2	0.3 (many)

<sup>1</sup> Top markets for WA apples with established MRLs; 2 December 2025. [https://mrl.db.nwhort.org/#top\\_markets](https://mrl.db.nwhort.org/#top_markets)

\*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 2025.**

Chemical name	Trade name	Application rate	Application timing(s)	Measured residue	US MRL <sup>1</sup>	India MRL <sup>1</sup>	Lowest export MRL <sup>1</sup>
		<i>oz per acre</i>	<i>dbh</i>	<i>ppm</i>	<i>ppm</i>	<i>ppm</i>	<i>ppm</i>
Inpyrfluxam	Excalia	4	Pink & petal fall	<0.01	0.01	0.01	0.01 (Can, Mex)
metamitron	Brevis SC	40	80 & 72	<b>0.02</b>	0.01	0.01	0.01 (many)
prohexadione-Ca	Kudos 27.5WDG	12	51 & 45	<b>0.04</b>	3	0.01*	0.01 (Tha)
acequinocyl	Kanemite	31	35 & 21	<0.05	0.4	0.01*	0.01 (Chn,Tha)
lambda-cyhalothrin	Warrior II	2.56	28 & 21	0.048	0.3	0.01*	0.2 (many)
flonicamid	Beleaf 50SG	2.8	28 & 21	0.079	0.2	0.01*	0.2 (many)
tolfenpyrad	Bexar	27	28 & 14	<b>0.28</b>	1	0.01*	0.01 (Twn,Tha)
flupyradifurone	Sivanto prime	14	28 & 14	0.14	0.7	0.01*	0.5 (Twn)
fenbutatin	Vendex 50WP	32	28 & 14	0.84	15	0.01*	2 (Twn)
indoxacarb	Avaunt	6	21 & 14	<b>0.17</b>	1	0.01*	0.1 (Can)
flutianil	Gatten	8	21 & 14	0.013	0.15	0.01*	0.15 (many)
zeta-cypermethrin	Mustang Maxx	4	21 & 14	0.12	2	0.01*	0.7 (many)
chlorantranliprole	Altacor eVo	2.2	21 & 7	0.15	1.2	0.01*	0.4 (many)
spinosad	Entrust SC	10	21 & 7	0.035	0.2	0.01*	0.1 (many)
phosmet**	Imidan 70-W**	92	21 & 7	<b>3.4</b>	10	0.01*	2 (Twn)
buprofezin	Centaur WDG	34.5	14	0.76	3	0.01*	1 (Twn)
sulfoxaflor	Transform	2.75	14 & 7	0.086	0.5	0.01*	0.3 (many)
ipflufenquin	Axios 20SC	3	14 & 7	<b>0.026</b>	0.15	0.01*	0.01 (Tha)
ethephon	Ethephon 2SL	48	14 & 7	<b>1.0</b>	5	0.01*	0.1 (Can)
fenazaquin	Magister	36	7	0.24	0.6	0.2	0.3 (many)
cyfluthrin	Baythroid XL	2.8	7	<0.05	0.5	0.01*	0.1 (many)

<sup>1</sup> Top markets for WA apples with established MRLs; 2 December 2025. [https://mrl.db.nwhort.org/#top\\_markets](https://mrl.db.nwhort.org/#top_markets)

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## DISCUSSION

Our 2025 trials included three plant growth regulators applied in a typical use pattern (**standard**) and also at the latest timings allowed by the respective product labels (**aggressive**); residues of metamitron, prohexadione-calcium, and ethephon were not detected in the industry standard protocol, but all three produced residues above key MRLs when sprayed at their minimum preharvest intervals. Residues were generally higher for most products when sprayed in the aggressive protocol, but that trend was not consistent. Apple producers should be mindful of the inherent variability in measuring pesticide residues and incorporate appropriate safety margins in their spray programs to allow for possible aberrant readings.

Products which produced residues in excess Maximum Residue Levels (MRLs) of key export markets in 2025 include: **Bexar, Avaunt, Centaur WDG, Axios 20SC, Imidan 70-W, Magister, Brevis SC, Kudos 27.5WDG, and Ethephon 2SL**. 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.

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](http://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](http://www.nwhort.org).



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