

2022 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 insecticide/acaricides and six 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 September 8 and delivered the next day to Pacific Agricultural Labs (Sherwood, OR) for chemical residue analysis.



TRIAL DETAILS

- 15th 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 2.35 inches of rain fell on the trial block after the application of Ethepon, but there was no measurable precipitation after the application of all other materials

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 2022.

| Chemical name | Trade name | Application rate oz per acre | Application timing(s) dbh | Measured residue ppm | US MRL ¹ ppm | India MRL ¹ ppm | Lowest export MRL ¹ ppm |
|---------------------|---------------|---------------------------------|------------------------------|-------------------------|----------------------------|-------------------------------|---------------------------------------|
| ethephon | Ethepon 2SL | 32 | 126 (May 5) | <0.1 | 5 | 0.01* | 0.8 (UAE,SAU) |
| flutianil | Gatten | 8 | 35 | <0.01 | 0.15 | 0.01* | 0.01 (UAE,SAU) |
| isofetamid | Kenja 400SC | 12.5 | 35 | <0.01 | 0.6 | 0.01* | 0.2 (Kor) |
| abamectin | AgriMek SC | 4.25 | 35 | <0.01 | 0.02 | 0.01* | 0.01 (UAE,SAU) |
| benzovindiflupyr | Aprovia | 7 | 35 | 0.021 | 0.2 | 0.01* | 0.2 (many) |
| pydiflumetofen | Miravis | 3.4 | 35 | 0.030 | 0.2 | 0.01* | 0.01 (UAE,SAU) |
| tolfenpyrad | Bexar | 27 | 35 & 21 | 0.36 | 1 | 0.01* | 0.01 (many) |
| indoxacarb | Avaunt | 6 | 35 & 21 | 0.090 | 1 | 0.01* | 0.5 (many) |
| flupyradifurone | Sivanto prime | 14 | 35 & 21 | 0.22 | 0.7 | 0.01* | 0.5 (Tai) |
| cyflufenamid | Torino | 6.8 | 28 | 0.014 | 0.06 | 0.01* | 0.06 (many) |
| acequinocyl | Kanemite | 31 | 28 | <0.025 | 0.4 | 0.01* | 0.01 (China) |
| lambda-cyhalothrin | Warrior II | 2.56 | 28 | 0.024 | 0.3 | 0.01* | 0.2 (many) |
| flonicamid | Beleaf 50SG | 2.8 | 28 | 0.045 | 0.2 | 0.01* | 0.2 (many) |
| cyflumetofen | Nealta | 13.7 | 28 & 14 | 0.11 | 0.3 | 0.01* | 0.3 (Can,Mex) |
| sulfoxaflor | Transform | 2.75 | 28 & 14 | 0.053 | 0.5 | 0.01* | 0.3 (many) |
| chlorantraniliprole | Altacor eVo | 2.2 | 28 & 14 | 0.17 | 1.2 | 0.01* | 0.4 (many) |
| afidopyropen | Versys | 3.5 | 28 & 14 | <0.05 | 0.02 | 0.01* | 0.02 (Can,Mex) |
| buprofezin | Centaur WDG | 34.5 | 21 | 0.41 | 3 | 0.01* | 1 (Tai) |
| phosmet** | Imidan 70-W** | 92 | 14 | 1.8 | 10 | 0.01* | 2 (Tai) |
| mefentrifluconazole | Cevya | 5 | 14 | 0.078 | 1.5 | 0.01* | 0.4 (UAE,SAU) |
| cyclaniliprole | Verdepryn | 11 | 14 | 0.052 | 0.3 | 0.01* | 0.2 (UAE,SAU) |
| cyfluthrin | Baythroid XL | 2.8 | 14 | <0.05 | 0.5 | 0.01* | 0.1 (many) |

¹ Top markets for WA apples with established MRLs; 17 Oct 2022. <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 2022.**

| 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 | 48 | 86 (June 15) | <0.1 | 5 | 0.01* | 0.8 (UAE,SAU) |
| benzovindiflupyr | Aprovia | 7 | 35 | 0.018 | 0.2 | 0.01* | 0.2 (many) |
| pydiflumetofen | Miravis | 3.4 | 35 | 0.034 | 0.2 | 0.01* | 0.01 (UAE,SAU) |
| isofetamid | Kenja 400SC | 12.5 | 35 & 21 | <0.01 | 0.6 | 0.01* | 0.2 (Kor) |
| acequinocyl | Kanemite | 31 | 35 & 21 | <0.025 | 0.4 | 0.01* | 0.01 (China) |
| abamectin | AgriMek SC | 4.25 | 28 | <0.01 | 0.02 | 0.01* | 0.01 (UAE,SAU) |
| lambda-cyhalothrin | Warrior II | 2.56 | 28 & 21 | 0.043 | 0.3 | 0.01* | 0.2 (many) |
| flonicamid | Beleaf 50SG | 2.8 | 28 & 21 | 0.062 | 0.2 | 0.01* | 0.2 (many) |
| tofenpyrad | Bexar | 27 | 28 & 14 | 0.25 | 1 | 0.01* | 0.01 (many) |
| flupyradifurone | Sivanto prime | 14 | 28 & 14 | 0.13 | 0.7 | 0.01* | 0.5 (Tai) |
| indoxacarb | Avaunt | 6 | 21 & 14 | 0.086 | 1 | 0.01* | 0.5 (many) |
| flutianil | Gatten | 8 | 21 & 14 | 0.012 | 0.15 | 0.01* | 0.01 (UAE,SAU) |
| chlorantraniliprole | Altacor eVo | 2.2 | 21 & 7 | 0.27 | 1.2 | 0.01* | 0.4 (many) |
| cyclaniliprole | Verdepryn | 11 | 21 & 7 | 0.100 | 0.3 | 0.01* | 0.2 (UAE,SAU) |
| cyflumetofen | Nealta | 13.7 | 21 & 7 | 0.12 | 0.3 | 0.01* | 0.3 (Can,Mex) |
| phosmet** | Imidan 70-W** | 92 | 21 & 7 | 3.6 | 10 | 0.01* | 2 (Tai) |
| cyflufenamid | Torino | 6.8 | 14 | 0.018 | 0.06 | 0.01* | 0.06 (many) |
| buprofezin | Centaur WDG | 34.5 | 14 | 0.46 | 3 | 0.01* | 1 (Tai) |
| afidopyropen | Versys | 3.5 | 14 & 7 | <0.05 | 0.02 | 0.01* | 0.02 (Can,Mex) |
| sulfoxaflor | Transform | 2.75 | 14 & 7 | 0.13 | 0.5 | 0.01* | 0.3 (many) |
| cyfluthrin | Baythroid XL | 2.8 | 7 | <0.05 | 0.5 | 0.01* | 0.1 (many) |
| mefentrifluconazole | Cevya | 5 | 7 & 1 | 0.19 | 1.5 | 0.01* | 0.4 (UAE,SAU) |

¹ Top markets for WA apples with established MRLs; 17 Oct 2022. <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

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. Four products we tested, however, did produce **residues which exceed Maximum Residue Levels (MRLs)** set in important export markets for Washington apples: **Miravis, Bexar, Gatten, and Imidan 70-W**. 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.

Results from this year's study found no detectable residues of ethephon, whether it was applied as a chemical thinner (early May) or later in the season (mid-June) to promote return bloom. Not surprisingly, residues tended to be higher in the "aggressive" protocol than in the "standard" protocol. Overall, there were fewer potential violations for residue levels in our samples than we have found in most years, in part because some countries have relaxed some MRLs due in part to effective negotiating efforts from US trade officials and representatives of the Northwest Horticultural Council.

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.



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