2011 WTFRC APPLE PESTICIDE RESIDUE STUDY

Spray application 1 day before harvest

In response to industry interest in apple pesticide residues, the Washington Tree Fruit Research Commission (WTFRC) recently conducted a trial in 'Gala' at the WSU Sunrise Research Orchard near Rock Island, WA. Ten insecticides and six fungicides were applied using a Rears airblast sprayer according to either an "aggressive" (maximum label rates at minimum retreatment and pre-harvest intervals) or "standard" (typical industry rates and timings) protocol. Apples from each protocol were sampled at harvest with half of the fruit being subjected to a simulated commercial packing process. Fruit samples were delivered the day of harvest to Cascade Analytical (Wenatchee, WA) for processing in advance of chemical analysis by a Portland, OR lab specializing in pesticide residue screening.

TRIAL DETAILS

- 5th 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 chemicals applied with 8 oz Regulaid / 100 gal water / acre
- No overhead irrigation or precipitation for duration of trial

Measured residues vs. maximum residue levels (MRLs) for STANDARD industry pesticide programs utilizing typical rates, application timings, and retreatment intervals on apples. 'Gala'/M.9 Nic.29, Rock Island, WA. WTFRC 2011.

Chemical name	Trade name	Application rate[1]	Application timing(s)	Field run fruit	Washed fruit	US MRL[2]	Lowest export MRL[3]
		oz per acre	*days before harvest*	*ppm*	*ppm*	*ppm*	*ppm*
Diazinon	Diazinon 50W	64	35 & 21	<0.01	**0.017**	0.5	0.01 (EU)
Endosulfan I	Thionex 50W	64	35 & 21	<0.01	0.018	1	0.05 (EU)
Endosulfan II	Thionex 50W	64	35 & 21	0.016	0.024	1	0.05 (EU)
Methoxyfenozide*	Intrepid*	8*; 16	35; 21	<0.01	<0.01	1.5	1.5 (many)
Acetamiprid*	Assail 30SG*	1.7*; 3.4	35; 21	<0.01	<0.01	1	0.1 (EU)
Spinetoram*	Delegate WG*	3.5*; 7	35; 21	<0.01	<0.01	0.2	0.05 (many)
Chlorantraniliprole*	Altacor*	2.3*; 4.5	35; 21	<0.01	<0.01	1.2	0.3 (CAN)
Trifloxystrobin	Flint	2.5	28 & 14	0.015	0.012	0.5	0.5 (many)
Fenpropathrin*	Danitol	21.3	28 & 14	<0.02	<0.02	5	0.01 (EU)
Zn dimethyldithiocarbamate	Ziram 76DF	96	28 & 14	**1.3****	**0.23****	7	0.1 (EU)
Triflumizole	Procure 480SC	12	28 & 14	0.016	<0.01	0.5	0.5 (many)
Difenoconazole	Inspire Super	12	28 & 14	<0.01	<0.01	1	0.5 (many)
Cyprodinil	Inspire Super	12	28 & 14	<0.01	<0.01	1.7	0.05 (many)
Imidacloprid***	Nuprid 2SC***	16***	21	<0.01	<0.01	0.5	0.5 (many)
Carbaryl	Carbaryl 4L	64	21 & 3	**2.0**	**0.71**	12	0.05 (EU)
Thiophanate-methyl	Topsin 70WP	24	14 & 3	0.014	<0.0097	2	0.5 (EU)
Captan	Captec 4L	128	14 & 1	0.78	0.69	25	3 (EU)
Pyraclostrobin	Pristine	14	7 & 1	0.068	<0.01	1.5	0.3 (EU)
Boscalid	Pristine	14	7 & 1	0.24	0.050	3	2 (many)

[1] Materials applied with Rears Pak-Blast sprayer at 100 gal water/acre

[2] 30 Sep 2011. http://www.nwhort.org/AppleMRLs.html

[3] Major export markets for WA apples; 30 Sep 2011. http://www.nwhort.org/AppleMRLs.html

* Initial applications of Intrepid, Assail 30SG, Delegate WG, and Altacor (35 dbh) were made at 50% of intended rates

** Thiocarbamate residues cannot be directly measured; values are estimates based on analysis of the degradation product carbon disulfide

*** Nuprid 2SC was accidentally applied at 2.5x (16 oz) the labeled rate of 6.4 oz/acre

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 or fungal pest, or a guarantee of similar results regarding residues for any user. Apple growers should consult with their university extension staff, crop advisors, and warehouses to develop responsible pest control programs.

Soapy fruit during simulated packing

FRUIT WASHING DETAILS

1. 3 minutes of gentle agitation in 90°F water with 80 ppm chlorine
2. 30 seconds on brush bed with EpiClean soap (Pace International)
3. 30 second overhead rinse with cool water
4. 2 minutes dry time on clean brush bed
5. No waxes applied

CONCLUSIONS

Neither aggressive nor standard use patterns of all but three products evaluated produced residues which exceed either US or foreign MRLs. Application of **Diazinon 50W** produced residues very near the European Union (EU) MRL, which has essentially been set at the current limit of quantification; even though diazinon residues are not reported for field run fruit, they were detected just below the reporting limit. **Ziram 76DF** residue levels also exceeded EU tolerances, but are inherently imprecise in that current instrumentation does not allow for direct quantification of thiocarbamate residues; aggressive use of Ziram also produced a residue (2.8 ppm) very near MRLs for Taiwan (2.5 ppm) and India (3 ppm) in unwashed fruit. All applications of **Carbaryl 4L** tested produced residues far in excess of the EU MRL for carbaryl, which is also set at the current limit of quantification; unwashed apples also exceeded the carbaryl MRL for Taiwan (1 ppm). Washing fruit in a simulated packing process generally reduced residue levels for most products tested; diazinon and endosulfan residues were relatively persistent in our study. For more information on MRLs, visit the Northwest Horticultural Council website, www.nwhort.org.

Measured residues vs. MRLs for AGGRESSIVE pesticide programs utilizing maximum label rates and minimum pre-harvest and retreatment intervals on apples. 'Gala'/M.9 Nic.29, Rock Island, WA. WTFRC 2011.

Chemical name	Trade name	Application rate[1]	Application timing(s)	Field run fruit	Washed fruit	US MRL[2]	Lowest export MRL[3]
		oz per acre	*days before harvest*	*ppm*	*ppm*	*ppm*	*ppm*
Diazinon	Diazinon 50W	64	35 & 21	<0.01	**0.010**	0.5	0.01 (EU)
Endosulfan I	Thionex 50W	64	35 & 21	<0.01	0.010	1	0.05 (EU)
Endosulfan II	Thionex 50W	64	35 & 21	0.015	0.016	1	0.05 (EU)
Trifloxystrobin	Flint	2.5	28 & 14	0.018	0.012	0.5	0.5 (many)
Fenpropathrin	Danitol	21.3	28 & 14	<0.02	<0.02	5	0.01 (EU)
Methoxyfenozide	Intrepid	16	28 & 14	<0.01	<0.01	1.5	1.5 (many)
Zn dimethyldithiocarbamate	Ziram 76DF	128	28 & 14	**2.8***	**0.10***	7	0.1 (EU)
Imidacloprid**	Nuprid 2SC**	24**	21	<0.01	<0.01	0.5	0.5 (many)
Triflumizole	Procure 480SC	16	21 & 14	0.028	0.010	0.5	0.5 (many)
Difenoconazole	Inspire Super	12	21 & 14	<0.01	<0.01	1	0.5 (many)
Cyprodinil	Inspire Super	12	21 & 14	<0.01	<0.01	1.7	0.05 (many)
Acetamiprid	Assail 30SG	8	21 & 7	<0.01	<0.01	1	0.1 (EU)
Carbaryl	Carbaryl 4L	96	21 & 3	**3.1**	**0.62**	12	0.05 (EU)
Spinetoram	Delegate WG	7	14 & 7	<0.01	<0.01	0.2	0.05 (many)
Chlorantraniliprole	Altacor	4.5	14 & 5	<0.01	<0.01	1.2	0.3 (CAN)
Captan	Captec 4L	128	14 & 1	1.1	0.82	25	3 (EU)
Thiophanate-methyl	Topsin 70WP	24	7 & 1	0.037	0.017	2	0.5 (EU)
Pyraclostrobin	Pristine	18.5	7 & 1	0.078	0.014	1.5	0.3 (EU)
Boscalid	Pristine	18.5	7 & 1	0.35	0.089	3	2 (many)

[1] Materials applied with Rears Pak-Blast sprayer at 100 gal water/acre

[2] 30 Sep 2011. http://www.nwhort.org/AppleMRLs.html

[3] Major export markets for WA apples; 30 Sep 2011. http://www.nwhort.org/AppleMRLs.html

* Thiocarbamate residues cannot be directly measured; values are estimates based on analysis of the degradation product carbon disulfide

**Nuprid 2SC was accidentally applied at 3.75x (24 oz) the labeled rate of 6.4 oz/acre

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