UF IFAS Extension UNIVERSITY of FLORIDA

HS1301

2018–2019 Florida Citrus Production Guide: Fresh Fruit Pesticide Residue Limits[1]

Mark Ritenour[2]

Current production practices often include the use of various pre- and postharvest chemicals, many of which are pesticides. To be used, these materials must be labeled for use on citrus and used only according to label instructions. Chemical residues on the fruit after harvest are a concern to regulators and the public alike because of their potential negative health effects. Therefore, the US and other countries set maximum residue limits (MRLs) on fresh produce for various chemicals. It is unlikely for United States MRLs to be exceeded when label instructions are followed. However, when importing countries' MRLs are lower than US MRLs, then use of these pesticides usually must be modified or discontinued to keep from exceeding the country's tolerances. In addition, individual buyers may set their own, more restrictive standards. Similar to buyer-imposed food safety standards, buyer-imposed MRL standards, especially from large buyers, can significantly impact how pesticides are used in the field and packing facility.

Table 1 list the MRLs (in part-per-million) for various chemicals used on fresh Florida citrus for the US, CODEX, and important export countries. The limit of detection for chemical residues on citrus fruit is often around 0.01 ppm, depending on the testing laboratory and chemical of interest. When no tolerance is stated, any detectable residue will violate tolerances. Violations may lead to rejected loads of product, restrictions on future shipments, and even increased requirements for the entire industry to a given market. Because MRLs change frequently, see the Global MRL Database (https://www.globalmrl.com) or the University of Florida's Postharvest Resources website (http://irrec.ifas.ufl.edu/postharvest) for the most current information and links to MRL databases for select countries. Table 1 and the websites are intended as an initial reference source and no guarantee is made to their accuracy. Always verify these values with other knowledgeable sources within specific markets of interest.

1. This document is HS1301, one of a series of the Horticultural Sciences Department, UF/IFAS Extension. Original publication date July 2017. Revised May 2018. Visit the EDIS website at https://edis.ifas.ufl.edu for the currently supported version of this publication.

2. Mark Ritenour, professor, Department of Horticultural Sciences, UF/IFAS Indian River Research and Education Center, Fort Pierce, FL 34945.

Table 1. Maximum Residue Limits (MRLs) in part-per-million (ppm), by country. Abbreviations: grapefruit (G), orange (O), tangerine (T), lemon (L). Materials EXEMPT from US tolerances or only labeled for application to NONBEARING trees are NOT included.

Chemical Name	Trade Names (examples only, not inclusive	US Citrus	Canada Citrus	CODEX Citrus	EU (G and O only)	Japan (G and O only)	Taiwan (G and O only)	Korea (G and O only)
2,4-D (2,4-Dichlorophenoxyacetic acid)	Citrus Fix, Hivol	3	2	1	1	2	2	0.15
Abamectin	Agri-Mek, Clinch, Zephyr, ABBA, Epi-mek, Reaper	0.02	0.02	0.02	0.015	0.01 (0.1 proposed)	0.01	0.02
Acequinocyl	Kanemite	0.35	0.35		0.2 (G); 0.4 (O)	2	0.2	1
Acetamiprid	Assail	1	0.5	1	0.9	2	0.5	0.5
Acibenzolar-S-methyl	Actigard	0.02			0.01			0.2
Azoxystrobin	Abound, Graduate A+	15	15	15	15	10	10	10
Beta-cyfluthrin	Baythroid XL	0.2		0.3	0.02	2	0.3	2
Bifenthrin	Brigade, Capture, Telstar, Fanfare	0.05		0.05	0.1 (0.01 proposed)	2	0.5	0.5
Boscalid	A component of Pristine	2	3	2	2	10	5	2
Bromacil	Bromo, Hyvar	0.1				0.1	0.5	0.1
Buprofezin	Applaud, Centaur	2.5	4 (O, T)	1	1	3 (G), 2 (O)	0.5	0.5
Carbaryl	Sevin	10	10	15	0.01	7	1	7
Carfentrazone-ethyl	Aim	0.1			0.01 (0.1 proposed)	0.1	0.1	0.1
Chlorantraniliprole	Altacor, part of VoliamFlexi	1.4	0.7	0.7	0.7	0.5	0.5	1
Chlorpyrifos	Lorsban, Nufos	1	1	1	0.3	1	1	1
Ciothianidin	Belay	0.07 (FL Sect. 18)		0.07	0.06	2	1	1
Cryolite	Kryocide	7					7	
Cyfluthrin	Baythroid	0.2		0.3	0.02	2	0.3	2
Difenoconazole	A component of Quadris Top	0.6	0.8	0.6	0.6	0.6	0.6	0.6
Diflubenzuron	Micromite	3		0.5	1 (proposed limit to non-edible crops)	3	1	3
Dimethoate	Dimethoate, Cygon	2	1.5	5	0.02	2	2	2
Diuron	Diuron, Direx, Karmex	0.05, 0.5 (L)	1		0.01	0.8 (G), 0.05 (O)	0.05 (G), 0.2 (O)	1
EPTC (S-Ethyl dipropylthiocarbamate)	Eptam	0.1			0.01	0.1		
Fenbuconazole	Enable	1	1	0.5 (G, O, T), 1 (L)	1	1	0.01	0.5
Fenbutatin Oxide	Vendex	20	2	5	5	5	2	5
Fenpropathrin	Danitol	2	2	2	2	5	0.5	2
Fenpyroximate	Portal	0.5	0.5	0.5	0.5	1	0.5	0.5

Chemical Name	Trade Names (examples only, not inclusive	US Citrus	Canada Citrus	CODEX Citrus	EU (G and O only)	Japan (G and O only)	Taiwan (G and O only)	Korea (G and O only)
Ferbam	Ferbam	4		10 (T), 2 (O)		2	2	5 (G), 2 (O)
Flazasulfuron		0.01			0.01	0.1	0.2	
Fluazifop-P-butyl	Fusilade	0.03	0.03		0.01	0.1 (0.05 proposed)	0.01	
Fludioxonil	Graduate, Graduate A+	10	10	10	10	10	5 (7 proposed)	10
Flumioxazin	Chateau	0.02			0.02	0.1		0.1
Flupyradifurone	Sivanto	3	3		0.01	3	1	0.3
Formetanate Hydrochloride		1.5 (G, O), 0.03 (T), 0.6 (L)	0.4 (G), 0.9 (O), 0.03 (T), 0.09 (L)		0.01	2	1.5	
Fosetyl-aluminum	Aliette	5	9		75	150	10	0.05
Glufonsinate-ammonium		0.15	0.1	0.05	0.05	0.2	0.1	0.05
Glyphosate	Roundup, Durango, Touchdown, and others	0.5			0.1 (G) 0.5 (O)	0.5	0.1	0.5
Hexythiazox	Savey	0.6	0.5	0.5	1	2	1	0.5
Hydrogen cyanide		50				50		5
Imazalil	Freshgard 700,	10	5	5	5	5	5	5
Imidacloprid	Admire, Alias, Provado, Couraze, Nuprid, Pasada, Widow	0.7	1 (proposed phase out)	1	1	0.7	1	0.7
Indaziflam	Alion	0.01	0.01					0.05
Malathion	Malathion, Atrapa, Fyfanon	8		7	2	7	2	0.5
Metalaxyl-M, Mefenoxam	Ridomil Gold, Subdue, UltraFlourish	1	5	5	0.7	0.7	0.5	
Metaldehyde	OR-Cal Slug and Snail Bait	0.26			0.05	0.7		0.05
Methomyl		2	1	1	0.01	10	1	1
Methoxyfenozide	Intrepid 2F	3	10	2	2	3	2	3
Methyl bromide		30		30	30	30		30
NAA (1-naphthaleneacetic acid)	Fruit Fix	0.1 (O, T)			0.06	5 (O)		
Naled	Dibrom	3	3			0.2		
Norflurazon	Solicam	0.2				0.2	0.2	0.1
Oryzalin	Oryzalin, Surflan	0.05			0.01	0.08 (proposed deletion)		0.05
Oxamyl	Vydate	3		5	0.01	5	0.5 (G), 1 (O)	5
Oxytetracycline		0.4				0.2		
Paraquat Dichloride	Paraquat, Gramoxone, Boa	0.05		0.02	0.02	0.05	0.2	0.05
Pendimethalin	Prowl, Pendimax	0.1			0.05	0.05	0.01	0.05

Chemical Name	Trade Names (examples only, not inclusive	US Citrus	Canada Citrus	CODEX Citrus	EU (G and O only)	Japan (G and O only)	Taiwan (G and O only)	Korea (G and O only)
Phosmet	Imidan	5		3	0.5	5	1	0.05
Phosphine		0.01	0.01		0.01	0.01		0.01
Piperonyl Butoxide	Evergreen EC	8 (O)	8 (O)	5		5	5	0.05
Propargite	Comite, Omite	5 (G, L), 10 (O)	5	3	0.01	3	5	5
Propiconazole	Banner, Bumper, Tilt, Orbit, PropiMax	8	8	9 (O)	5 (G) 9 (O)	0.05	4	8
Pyraclostrobin	Headline	2	2	2	1 (G) 2 (O)	2	1	2
Pyrethrins	Pyrellin (+ Rotenone), Evergreen (+ Piperonyl Butoxide)	1 (O)	1 (O)	0.05	1	1 (O)	0.05	1 (O)
Pyridaben	Nexter	0.9	0.9		0.5	1	2	2
Pyrimethanil	Penbotec	10	10	7	8	10	7	7
Pyriproxyfen	Distance, Esteem, Knack	0.5	0.5	0.5	0.6	0.5	0.3 (G), 0.5 (O)	0.01
Rimsulfuron		0.01			0.01			
Saflufenacil	Treevix, Kixor	0.03	0.03	0.01	0.03	0.03	0.03	0.03
Sethoxydim	Poast Plus	0.5			0.1	1		1
Simazine	Simazine, Princep, Sim-Trol	0.25 (G, O, L)			0.01	0.2	0.01	0.25
SOPP (2 Phenylphenol, O-phenylphenol, OPP)	FreshGard 5	10	10	10	5	10	10	10
Spinetoram	Delegate	0.3	0.3	0.07 (O)	0.2	0.7	0.2	0.05
Spinosad	Entrust, Naturalyte, Justice, Spintor	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Spirodiclofen	Envidor	0.5	0.5	0.4	0.5	2	0.5	0.4
Spirotetramat	Movento	0.6	0.6	0.5	1	1	0.5	0.5
Streptomycin	FireWall	0.15 (G) 2 (O, T, L) (Section 18)				0.02		
Sulfentrazone		0.15				0.05		
Sulfoxaflor	Closer	0.7	0.7	0.15 (G) 0.8 (O, T) 0.4 (L)	0.15 (G) 0.8 (O)	(2 proposed)	0.7	0.3 (G) 0.7 (O)
Tebufenozide		0.8		2	2	2	1.5	1
Teflubenzuron		0.6 (O) 0.8 (L)	0.8 (O)		0.01	1	0.01	0.7
Thiabendazole (TBZ)	Freshgard 598, Alumni	10	10	7	5	10	10	10
Thiamethoxam	Actara, Platinum, part of VoliamFlexi	0.4	0.4	0.5	0.15	1	0.4 (G) 1 (O)	1
Tolfenpyrad	APTA	1.5	1.5			3	0.5	
Trifloxystrobin	Gem	0.6	0.6	0.5	0.5	3	0.5	0.5

Chemical Name	Trade Names (examples only, not inclusive	US Citrus	Canada Citrus	CODEX Citrus	EU (G and O only)	Japan (G and O only)	Taiwan (G and O only)	Korea (G and O only)
Trifluralin	Trifluralin, Treflan, Trilin	0.05			0.01	0.05	0.05	0.05
zeta-cypermethrin	Mustang	0.35	1	0.3, 0.5 (G)	2	2	2	2
	Tolerance for unlisted materials=>	None	0.1	None	0.01	0.01	None	None