

2019–2020 Florida Citrus Production Guide: Fresh Fruit Pesticide Residue Limits¹

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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 United States and other countries set maximum residue limits (MRLs) on fresh produce for various chemicals. It is unlikely for US MRLs to be exceeded when label instructions are followed. However, when importing countries' MRLs are lower than US MRLs, 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 lists the MRLs (in parts per million) for various chemicals used on fresh Florida citrus for the United States, 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.

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The use of trade names in this publication is solely for the purpose of providing specific information. It is not a guarantee or warranty of the products named, and does not signify that they are approved to the exclusion of others of suitable composition.

Use pesticides safely. Read and follow directions on the manufacturer's label.

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Table 1. Maximum Residue Limits (MRLs) in parts 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, not inclusive)	US Citrus	Canada Citrus	CODEX Citrus	EU (G & O only)	Japan (G & O only)	Taiwan (G & O only)	Korea (G & O only)
2,4-D (2,4-Dichlorophenoxyacetic acid)	Citrus Fix, Hivol	3	2	1	1	2 (1 proposed)	2	0.15
Abamectin	Agri-Mek, Clinch, Zephyr, ABBA, Epi-mek, Reaper	0.02	0.02	0.02	0.04	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	0.1	0.015	0.01	0.01	0.01	0.2
Aldicarb	TEMIK	0.3	0.1	0.2	0.02	0.2 (G) 0.01 (O)	0.01	0.02
Alpha-cypermethrin		0.35	0.1	0.5 (G), 0.3 (O, T, L)	2	2	2	2
Azoxystrobin	Abound, Graduate A+	15	15	15	15	10	10	10
Beta-cyfluthrin	Baythroid XL	0.2	0.1	0.3	0.02	2	0.3	2
Bifenthrin	Brigade, Capture, Telstar, Fanfare	0.05	0.1	0.05	0.05	2	0.5	0.5
Boscalid	A component of Pristine	2	3	2	2	10	5	2
Bromacil	Bromo, Hyvar	0.1	0.1		0.01	0.1	0.5	0.1
Buprofezin	Applaud, Centaur	2.5	0.1 (G, L), 4 (O, T)	1	1	3 (G), 2 (O)	0.5	0.5 (G), 2.5 (O)
Carbaryl	Sevin	10	10	15	0.01	7	1	0.5 (G), 7 (O)
Carbon disulfide		0.1 (G, O, L)	0.1	2 (O)	5	0.01	2	5 (G), 2 (O)
Carfentrazone-ethyl	Aim	0.1	0.1		0.01	0.1	0.1	0.1
Chlorantraniliprole	Altacor, part of VoliamFlexi	1.4	0.7	0.7	0.7	0.7	0.5	0.6
Chlorpyrifos	Lorsban, Nufos	1	1	1	1.5	1	1	1
Clothianidin	Belay	0.07	0.1	0.07	0.06	2	1	1
Cryolite	Kryocide	7	0.1		0.01	0.01	7	0.01
Cyantraniliprole	Minecto Pro	0.7	0.7	0.7	0.9	0.7		0.7
Cyflumetofen		0.3	0.3	0.3	0.3	10	1	0.3
Cyfluthrin	Baythroid	0.2	0.1	0.3	0.02	2	0.3	2
Deltamethrin		0.3 (O)	0.1	0.02	0.04	0.5	0.05	0.01
Difenoconazole	A component of Quadris Top	0.6	0.8	0.6	0.6	0.6	0.6	0.6
Diiflubenzuron	Micromite	3	0.1	0.5	1 (proposed limit to non-edible crops)	3	1	3
Dimethoate	Dimethoate, Cygon	2	1.5	5	0.01	2	2	2
Diquat dibromide		0.05	0.1	0.02	0.02	0.04 (G), 0.03 (O)		0.02
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

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EPTC (S-Ethyl dipropylthiocarbamate)	Eptam	0.1	0.1		0.01	0.1		0.01
Etofenprox		5	0.1		1	5	0.01	5
Etoxazole		0.1 (O, T)	0.1	0.1 (O, T)	0.1 (O)	0.7 (O)	0.7 (O)	0.01 (O)
Fenazaquin		0.5 (O, T, L)	0.1		0.5	0.01	0.5	2
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	1	0.5	0.6	0.5	1	0.5	0.5
Ferbam	Ferbam	4	0.1	10 (T), 2 (O)	0.01	2	2	5 (G), 2 (O)
Flazasulfuron		0.01	0.1		0.01	0.1	0.2	0.01
Fluazifop-P-butyl	Fusilade	0.03	0.03	0.01	0.01	0.05	0.01	0.01
Fludioxonil	Graduate, Graduate A+	10	10	10	10	10	5 (7 proposed)	10
Flufenoxuron		0.3 (O)	1 (O)	0.4 (O)	0.3 (O)	2 (O)	0.01 (O)	1 (O)
Flumioxazin	Chateau	0.02	0.01		0.02	0.1		0.01
Fluopyram		1	1	0.4 (G), 0.6 (O, T), 1 (L)	0.01	1	0.01	1
Flupyradifurone	Sivanto	3	3	0.7 (G), 4 (O), 1.5 (T, L)	0.01	3	1	3
Fluxapyroxad		1	1	0.3 (O)	0.3	0.01	0.01	1
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	0.01
Fosetyl-aluminum	Aliette	9	9	50 (O)	75	150	10	0.05
Glufosinate- ammonium		0.15	0.1	0.05	0.05	0.2	0.1	0.05
Glyphosate	Roundup, Durango, Touchdown, & others	0.5	0.1		0.1 (G) 0.5 (O)	0.5	0.1	0.5
Hexythiazox	Savey	0.6	0.5	0.5	1	1	1	0.5
Hydrogen cyanide		50	0.1		0.01	50		5
Imazalil	DECCOZIL EC-289, Freshgard 700, Fungaflor 500EC	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		0.01	0.01		0.01
Malathion	Malathion, Atrapa, Fyfanon	8	0.1	7	2	7	2	0.5
Mesotrione		0.01	0.1		0.01	0.01		0.01
Metaflumizone		0.04	0.1		0.05	0.01	0.01	1
Metalaxyl-M, Mefenoxam	Ridomil Gold, Subdue, UltraFlourish	1	5	5	0.7	0.7	0.5	0.01
Metaldehyde	OR-Cal Slug & Snail Bait	0.26	0.1		0.05	0.7		0.05

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Methomyl		2	1	1	0.01	10	1	1
Methoxyfenozide	Intrepid 2F	3	10	2	2	3	2	3
Methyl bromide		30	0.1	30	30	30		30
NAA (1-naphthaleneacetic acid)	Fruit Fix	0.1 (O & T)	(0.1 default)		0.06	5 (O)	exempt	
Naled	Dibrom	3	3		0.01	0.2		0.01
Norflurazon	Solicam	0.2	0.1		0.01	0.2	0.2	0.1
Oryzalin	Oryzalin, Surflan	0.05	0.1		0.01	0.08		0.05
Oxamyl	Vydate	3	0.1	5	0.01	5	0.5 (G), 1 (O)	5
Oxathiapiprolin		0.06	0.1		0.01	0.01		0.05
Oxydemeton-methyl		1 (G, O, L)	0.1	0.2 (L)	0.01	0.5	0.01	0.01
Oxytetracycline (sect. 18)		0.4	0.1		0.01	0.2		0.01
Paraquat Dichloride	Paraquat, Gramoxone, Boa	0.05	0.1	0.02	0.02	0.05	0.2	0.05
Pendimethalin	Prowl, Pendimax	0.1	0.1	0.03	0.05	0.05	0.01	0.05
Phosmet	Imidan	5	0.1	3	0.5	5	1	3
Phosphine		0.01	0.01		0.01	0.01		0.01
Piperonyl Butoxide	Evergreen EC	8 (O)	8 (O)	5				
Propargite	Comite, Omite	5 (G, L), 10 (O)	5	3	0.01 (G), 4 (O)	3	5	5
Propiconazole	Banner, Bumper, Tilt, Orbit, PropiMax	8	8	9 (O)	5 (G) 9 (O)	8	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 (O)	1 (O)	1 (O)	0.05 (O)	1 (O)
Pyridaben	Nexter	0.9	0.9		0.5	1	2	0.01
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)	0.7
Rimsulfuron	Matrix	0.01	0.1		0.01	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		0.1	1	0.01	1
Simazine	Simazine, Princep, Sim- Trol	0.25 (G, O, L)	0.1		0.01	0.2	0.01	0.25
SOPP (2 Phenylphenol, O-phenylphenol, OPP)	DECCOSOL 125, FreshGard 5	10	10	10	10	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	Envior	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	2	0.1		0.01	0.02		0.01
Sulfentrazone		0.15	0.1		0.01	0.05		

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Sulfoxaflor	Closer	0.7	0.7	0.15 (G) 0.8 (O, T) 0.4 (L)	0.15 (G) 0.8 (O)	2	0.7	0.3 (G), 0.7 (O)
Tebuconazole		1 (O)	1 (O)		0.9 (O)	5 (O)	0.01 (O)	0.01 (O)
Tebufenozide		2	0.1	2	2	2	1.5	1
Teflubenzuron		0.6 (O) 0.8 (L)	0.6 (O), 0.1 (G, L, T)	0.5 (O)	0.01 (G), 0.5 (O)	1	0.01	0.01
Thiabendazole (TBZ)	Freshgard 598, Alumni, DECCO Salt No. 19	10	10	7	7	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	0.8	1.5		0.01	3	0.5	2
Trifloxystrobin	Gem	0.6	0.6	0.5	0.5	3	0.5	0.5
Trifloxysulfuron		0.03	0.1		0.01	0.01		0.01
Trifluralin	Trifluralin, Treflan, Trilin	0.05	0.1		0.01	0.05	0.05	0.05
zeta-cypermethrin	Mustang	0.35	1	0.3 (O, T, L), 0.5 (G)	2	2	2	2