

Recommendations established by Jennifer Corso, and reviewed by Taylor Pearce, George Griffith, Conner Griffith, and Brandon Jewell

Criteria analyzed include frequency, toxicity classifications and clinical evidence

Analyte	USP	AOAC	OR, AR, WA	CO	AZ	AZ	AZ	EPA	WHO	GHS	LD50	LC50	Analytical Lab	Analytical Lab	EPA limits / Clinical Support
	ppm	ppm	ppm	ppm	Test?	ppm	ppm	Toxicity Class	Toxicity Class	Toxicity Class	mg/kg	mg/L	Level One	Instrumentation	
List Updated 12/02/19	ppm	Plant Material		Flower	Y/N or B for Banned	Sugg. for Inhalable	Sugg. for Ingestible/Other	(1-4) See chart below	(1a-U)	(1-5)			Based on Frequency (Y/N)	Primary method/instrumentation	Codex Alimentarius (UN/WHO) limits
Abamectin (Avermectins)		0.05	0.5	0.07	Y	<0.1	0.15	2	2	3	300		Infrequent	LCMS	RUP; Hops 0.2 ppm; 0.15 ppm; non-carcinogenic; reproductive toxicity (testosterone/spermatogenesis); GABA channel agonist; /neurotoxic; Some states banned use on hops re: US Hop Industry Plant Protection Committee/Hops Growers of America
Acephate	0.1	0.1	0.4		Y	0.02	0.02	3 (ingested)	2	4	945	61.7 (4 h in rats)		LCMS, GCMS	GUP; EPA 0.02 ppm for all food items and in food producing/handling establishments including bakeries and packing plants; testing for metabolite methamidophos; Organophosphate with toxic fume emission when degrading over 10-15 days, inhalation hazard; LDLo is 681 mg/kg reported death in dogs and humans for routes other than inhalation; Fetotoxin; Cholinesterase inhibitor/neurotoxin
Acequinocyl		0.1	2		Y	2.0	0.1	3	U	2	5000	0.84		LCMS	GUP; Napthoquinone derivative; Hops dried cone 15 ppm; Mitochondrial complex III electron transport inhibitor; Skin irritant; May bioaccumulate
Acetamiprid		0.1	0.2		Y	0.1	0.01	2	2	4	805 (EPA)			LCMS	Neonicotinoid insecticide with potentially low toxicity to mammals; EPA requires 0.01 ppm for food items other than those with pre-established higher tolerances; Human studies include indication of acute poisoning; chromosomal aberrations in human blood lymphocytes is significant
Aldicarb		0.1	0.4		Y	<0.1	<0.1	1	1a	1	0.93	0.5-1.5		LCMS	RUP; Carbamate; LD Oral = 5 mg/kg; Coffee bean, green 0.1 ppm, soybean 0.02 ppm; Sunflower seed 0.05 ppm; High oral/dermal toxicity; Fetotoxin w depressed AChE activity;
Ancymidol		0.1			TBD	Suggest Y	TBD	3	3	5	1721 (EPA)	0.59			Fungicide (substituted pyrimidines, growth retardant, inhibits gibberellin biosynthesis) used on ornamentals; few states test for this, list does not include CO, CA, OR; Recommending testing inhaled products at minimum (Class II toxicity according to LC50 data)
Azoxystrobin		0.02	0.2	0.02	Y (inhaled only)	<0.1	n/a	4 (3 for inhal)	U	5	>5000	0.7	Y	LCMS	GUP; Experimental fungicide; Used for powdery mildew; Citrus oil 40 ppm; Coffee green bean 0.03; Hops dried cone 20 ppm; dried tea 20; rapeseed 1.0; weak clastogenic effects in mammalian cells re: mutagenicity; Would be rated Toxicity Cat 2 for inhalation according to LC50
Bifenazate		0.01	0.2	0.02	Y (B)	0.2	0.2	4	U	5	>2000		Y (really common)	LCMS	inhibits mitochondrial cytochrome b subunit of complex III Hops 15 ppm; 20 ppm; Considered relatively non-toxic (cat IV) all routes of exposure; not approved for food use therefore little clinical data; chronic exposure > liver toxicity; suggest banning use on cannabis and testing for residue as it is seen in analytical lab tests
Bifenthrin		0.01	0.2		Y	tbd	<0.1	2	2	3	54		Y	LCMS, GCMS	RUP (a pyrethroid) toxicity cat. 2; Hops dried cones 10 ppm; hops 20 ppm; Rapeseed oil edible 0.1 ppm; EPA tolerance 0.05 on food items; most toxic ingested; dermal absorption; accumulates in adipose tissue
Boscalid		0.1	0.4		Y	0.1	5.0	4 (3 dermal)	U	5	>5000			LCMS	GUP; Canola oil 5.0 ppm; hops dried cones 35 ppm; Suggestive Evidence of Carcinogenicity, but Not Sufficient to Assess Human Carcinogenic Potential; may be genotoxic and cytotoxic in vitro human peripheral blood lymphocytes; potential endocrine disruptor
Captan		0.05			TBD				U	5	9000			GCMS	GUP; non-systemic phthalimide fungicide; used heavily on apples; residue limits for a variety of seeds including safflower and sunflower used for oil is 0.05; none of these seeds approved by Codex; lowest reported dose for humans that can cause death is 1,071 mg/kg; reported to cause skin and eye irritation (dermatitis and conjunctivitis), as well as sensitization; EPA classifies captan as A3 confirmed animal carcinogen with unknown relevance to humans; NIOSH considers agent as occupational carcinogen; 2018 cytogenetic analyses reveal potential mutagenicity in human lung, and DNA damage/inhibition in human fibroblasts, lymphocytes
Carbaryl		0.2	0.2		Y	0.2	0.2	2	2	3	246 (rats)	0.005		LCMS	GUP, wide spectrum carbamate insecticide; may produce adverse effects in humans by skin contact, inhalation or ingestion; "The hazards of carbaryl for human beings are judged to be low, because of its low vapor pressure, rapid degradation, rapid spontaneous recovery of inhibited cholinesterase, & the fact that symptoms usually appear well before a dangerous dose has accumulated in the body."
Carbofuran		0.1	0.2	B	Y (B)	<0.1	<0.1	1	1b	2	5 (rats)	52 (dogs)		LCMS	RUP; carbamate, ChE inhibitor; Use should be restricted or banned for use on cannabis; only four commodities with approved use by EPA, including green coffee beans with a residue limit of 0.1 ppm; granular formulations banned by EPA; Acute oral/respiratory toxicity in humans esp in underlying respiratory and CV disease, asthma, diabetes, mechanical obstruction of the gastrointestinal or urogenital tracts, or those in vagotonic states. EPA has established a Lifetime Health Advisory (LHA) level of 40 ppb of carbofuran in drinking water.
Chlorantraniliprole		0.2	0.2		TBD	0.2	1.5	4	U	5	>5000			LCMS	stimulates the release of calcium stores from the Sarcoplasmic reticulum of muscle cells (i.e. for chewing insect pest) causing impaired regulation, paralysis and ultimately death of sensitive species; Chocolate 1.5 ppm; Instant coffee 2.0; Palm oil 1.5; hops dried 40.0; Low risk in tobacco analysis; https://www3.epa.gov/pesticides/chem_search/hhbp/r180550.pdf
Chlordane	0.05	0.1		B	Y (B)	<0.1	<0.1	2	2	4	LDLo for humans 29-40				Organochlorine insecticide; EPA banned all use in 1988 except fire ant control on power transformers; liver microsomal enzymes within product may cause interactions between medical drugs and this pesticide. Among these are decreased effectiveness of oral anticoagulants, phenylbutazone, chlor-promazine, cortisol and other steroids (including birth control pills), diphenhydramine (Benadryl). Increased activity of thyroxin (thyroid hormone) may also occur. Probable human carcinogen (class B2); accumulates in adipose tissue; Human exposure may lead to onset of convulsions that persist for several days
Chlorfenapyr		0.1	1		Y			2	2	4	441	1.9 (rats)		LCMS	Pyrethroid, neurotoxin; Citrus oil 4.0 ppm; jojoba, sunflower and tea oil 0.4; moderately toxic by ingestion or dermally; possible carcinogen (group C); weak skin sensitizer; Long-term exposure may cause liver changes. Pathological changes in the cortex of the thymus, liver, adrenal glands, lungs and skin were observed in rabbits repeatedly fed cypermethrin
Chlormequat Chloride		0			N				2	4	670				Plant growth regulator (PGR) (quaternary ammonium compound) registered for use on ornamental plants grown in greenhouses, nurseries and shadehouses. As chlormequat chloride has no food/feed uses and no U.S. tolerances associated with its use except oat, wheat and barley, although no registrations exist.
Chlorpyrifos (-ethyl)	0.2	0.1	0.2		Y	<0.1	<0.1		2	3	135			LCMS,GCMS	RUP; organophosphate; Use should be restricted; Used in AZ on alfalfa, sunflower, pecans; oils production; acute liver toxicity and cholinesterase inhibition in humans through all routes of administration; Residue limit of microencapsulated form of 0.1 ppm on food commodities not listed in CFR for growing crops;
Clofentezine		0.1	0.2		Y			3	3	5	2000	5.2 (rat)		LCMS	organochlorine tetrazine and mite growth inhibitor/ovicide; binds to the pore region and impair chitin translocation; avocado 0.3 ppm; eye and skin irritant; likely human carcinogen [classification of C]; thyroid tumors in chronically overstimulated rat thyroid
Coumaphos		0.1			TBD	<0.1	<0.1		1b	2	7.1	341 (rats)			GUP or RUP dep. on formulation; organophosphate and AChE inhibitor; used on livestock to kill pests (mites, cattle grubs, screw-worms, lice, scabies, flies, and ticks) as an insecticide
Cyfluthrin	0.1	0.01	1		Y	<0.1	<0.1	2 (1 for eyes)	1b	2	c15			LCMS, GCMS	RUP; Spices 0.03 ppm; Hops dried cone 20 ppm (also read 4 ppm?); Tolerance of 0.05 ppm in establishments where food is also handled/processed; Toxicity category II (and I for eyes); Mode of action involves ingestion; Studies support acute and chronic kidney inflammation
Cypermethrin; alpha, zeta isomers	1	0.05	1		Y	1.0	1.0	3	2	3	150-187			LCMS	RUP; pyrethroid, neurotoxin; Citrus oil 4.0 ppm; jojoba, sunflower and tea oil 0.4; moderately toxic by ingestion or dermally; possible carcinogen (group C); weak skin sensitizer; Long-term exposure may cause liver changes. Pathological changes in the cortex of the thymus, liver, adrenal glands, lungs and skin were observed in rabbits repeatedly fed cypermethrin

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List Updated 12/02/19	ppm	Plant Material		Flower	Y/N or B for Banned	Sugg. for Inhalable	Sugg. for Ingestible/Other	(1-4) See chart below	(1a-U)	(1-5)			Based on Frequency (Y/N)	Primary method/instrumentation	Codex Alimentarius (UN/WHO) limits
Daminozide		0.05	1	B	N (B)				U	5	>9600	147 (rabbits)		LCMS, GCMS	EPA banned use of agent on food crops in 1989 due to carcinogenic tendencies; no data in CFR or codex on tolerances; low toxicity suggests banning the use in AZ and recommending not testing for the substance.
Diazinon	0.5	0.1	0.2		Y	0.10	0.10	2	2	4	100 (pigs)	2.33 (rats)		LCMS, GCMS	RUP; non-systemic organophosphate; used on tobacco heavily in 1990's then cancelled for use on tobacco; Currently registered for apx 40 crops; heavily restricted due to toxicity and conversion to diazoxon by UV and moisture if not encapsulated; fat soluble
Dichlorvos (DDVP)	1	0.1	0.1		Y (B)	<0.1	0.1		1b	3	56			LCMS	RUP; Use should be restricted; Spices 0.3 ppm; 0.5 ppm for packaged processed food; 0.02 for meats; Categorized as highly toxic through all routes of administration; volatility increases toxicity through inhalation; faster onset of cholinesterase inhibition in comparison to other organophosphates; May cross placenta; positive test for mutagenicity
Dimethoate	0.1	0.1	0.2		Y	<0.1	0.1	2	2	3	60-387	1.2 (Rats)		LCMS, GCMS	RUP; wide-range organophosphate insecticide; AChE inhibitor; moderately toxic by ingestion, inhalation and dermal absorption; readily absorbed dermally; severe eye irritant; may cause delayed neuro symptoms of 1-4 weeks
Dimethomorph		2			TBD			3	3	5	3500				systemic fungicide which protects plants from molds, as well as killing molds on plants and preventing their spread; cinnamic acid derivative and a member of the morpholine chemical family; hop dried cones 60 ppm; may be clastogenic and antandrogenic; considered not likely to cause cancer in humans; may cause eye irritation
Ethoprophos (Ethoprop)		0.1	0.2		Y	0.02	0.02	1	1a	2	61			LCMS, GCMS	RUP; Organophosphate ester; highly toxic AChE inhibitor; All approved EPA tolerances on food are 0.02 ppm; Classified as likely to be carcinogenic to humans
Etofenprox		0.1	0.4		Y	0.4	5.0		U	5	>10000	>5900		LCMS	pyrethroid ether insecticide; individual residue limits established for meat/poultry products only in US, otherwise all commodities listed at 5.0 ppm; moderate skin irritant, no sensitization; animal studies show chronic effects on kidney heart and liver weights as well as histopathological changes in liver pancreas and thyroid tissue, and blood plasma chemistry
Etozazole		0.01	0.2	0.01	Y	0.1	1.0		U	5	>5000		Y	LCMS	GUP; binds to the pore region and impair chitin translocation. inhibits chitin synthase 1, genetic target; Hops dried cone 7 ppm; 15 ppm; Orange oil 1.0 ppm; Toxicity class II; concerns for liver toxicity
Fenhexamid		0.1			N			4	U	5	>5000	5.057 (rats)		LCMS	Fungicide, hydroxanilide; Few states test for the agent; Technical grade not considered an eye or dermal irritant, or sensitizing agent; No evidence of carcinogenicity or mutagenicity
Fenoxycarb		0.1	0.2		Y	0.1	0.1	3	U	5	>5000			LCMS	GUP; carbamate insect growth regulator; interferes with metamorphosis and molting; not in CFR40 list; endocrine disruptor; Cancer Classification: Group B2-probably human carcinogen
Fenpyroximate		0.1	0.4		Y	0.1	0.1	3	2	3	245	0.21 to 0.36 (rats)		LCMS	pyrazole; non-systemic contact and stomach miticide used typically in fruit; long residual activity; avocado 0.15; citrus oil 15 ppm; hop dried cones 10; refined corn oil 0.05; honey 0.1; inhibits mitochondrial electron transport at the NADH-CoQ reductase site, disrupts ATP formation
Fipronil		0.1	0.4		Y	<0.1	<0.1		2	3	91 (rats)	0.36 (rat)		LCMS, GCMS	RUP; Fiprole (or phenylpyrazole), systemic agent with contact and stomach activity; antagonizes chloride channels associated with GABAA and glutamate receptors; regulated on meats and dairy with highest ppm allowed at 1.5 for milk fats (0.05 ppm for whole milk); human exposure studies show 50% neurological symptoms followed by ocular and gastro; delayed signs of toxicity in rats (2 days) due to accumulation in adipose tissue; EPA has cancelled 60 products containing the agent
Fonicamid		0.1	1		Y	0.1	1.0	3			884 (Rat)	>4.9 (rat)		LCMS	selective pyridinecarboxamide compound used as an insecticide on aphids, whiteflies, and thrips. It disrupts insect chordotonal organs that can affect hearing, balance, movement to cause cessation of feeding through what is thought to be starvation, but the specific target site of the chemical is unknown; alfalfa hay 1.0 ppm; hops 20.0; prickly pear fruit and pads 1.5 ppm expiring 12/31/2020; some states ban use on hops; does not pose cancer risk to humans; one case of severe poisoning associated with ingestion of spinosad+fonicamid mixture;
Fludioxonil		0.02	0.4		Y	<0.1	TBD		U	5	>5000	>2.6 (rat)		LCMS	GUP; avocado 5.0; citrus oil 500 ppm; rape and safflower seed, 0.01 ppm; phenylpyrrole fungicide that interferes with glucose transport across fungal membranes; also used as an insecticide, and seed treatment/protectant; endocrine disruptor as antiandrogen in an androgen receptor reporter assay in human engineered human breast cancer cells; genotoxic in human HepG2 cells at concentrations of 4 uM. Treatment of human U251 (glial) and SH-SY5Y (neuronal) cells with fludioxonil significantly reduced cellular ATP at concentrations that were more than tenfold lower than those which significantly impaired cellular viability.; effects on energy metabolism were reflected in marked toxic effects on mitochondrial membrane potential
Flurprimidol		0			N			3	2	4	709				Plant growth regulator; only one state tests for agent; not approved for use on food - only ornamental trees and turfgrass
Hexythiazox		0.1	1		Y	0.1	2.0	4	U	5	>5000			LCMS	thiazolidinone mite ovacide; binds to the pore region and impair chitin translocation; inhibits CHS1; Used frequently with hops, 2 ppm dried cones, 3 ppm; Considered practically non-toxic on acute basis; Cancer Classification: Group C Possible Human Carcinogen; may bioaccumulate just above established threshold
Imazalil (eniconazole)		0.01	0.2	0.04	Y	<0.1	0.01		2	3	227			LCMS	GUP; imidazole fungicide, may cause contact dermatitis; potential sensitizer; Severe eye irritant; Cancer Classification: Likely to be Carcinogenic to Humans
Imidacloprid		0.01	0.4	0.02	Y	<0.1	3.0	3	2	4	450		Y	LCMS, GCMS	GUP; fungicide, strobilurin group, used for the control of scab, blackspot and powdery mildew; inhibits mitochondrial respiration by inhibiting cytochrome c reductase; strong protective, curative, eradicative, & long residual disease control. Redistribution via the vapor phase contributes to activity; EPA approved for use on 10 commodities 1.0 max ppm tolerance; Codex approved olive oil 1.0 ppm, olives for oil 0.2 ppm; may cause eye irritation; Cancer Classification: Likely to be Carcinogenic to Humans; not acutely toxic via inhalation or dermal absorption; toxic levels caused liver cancer in rats due to increased rate of cellular reproduction; toxic dose is equivalent to 20g/d in humans over one lifespan;
Kresoxim-methyl		0.1	0.4		Y	0.4	1.0	4 (dermal, eye 3)			>5000	5.6		LCMS, GCMS	GUP; non-systemic aliphatic organophosphate, ChE inhibitor; alfalfa 135 ppm; safflower oil 0.6 ppm; 1 ppm for dried hop cone; cotton seed oil edible 13 ppm; also used to treat head lice; rapidly absorbed by all routes of administration; acute neurological effects correlated to purity and vehicle; high protein intake/somatic concentration correlated to increased toxicity; causes eye irritation; metabolite malaaxon is significantly higher in neurotoxicity; suggestive evidence of carcinogenicity but not enough to make assessment in humans
Malathion	1	0.05	0.2	0.05	Y			3	3	5	1000			LCMS, GCMS	GUP; systemic, benzenoid (phenylamide) fungicide; interferes with RNA synthesis in various fungi; used on tobacco; citrus oil 7.0 ppm; hop dried cones 20 ppm; hop vines 2.0 ppm; EPA determined risk of smoking residue was no higher than that of heavy smoking; slight eye irritation seen in rabbits; evidence of low tissue residues 6 days after treatment indicated no appreciable bioaccumulation
Metalaxyl		0.2	0.2		Y				2	4	669		Y	LCMS, GCMS	

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	ppm	ppm	ppm	ppm	Test?	ppm	ppm	Toxicity Class	Toxicity Class	Toxicity Class	mg/kg	mg/L	Level One	Instrumentation	
List Updated 12/02/19	ppm	Plant Material		Flower	Y/N or B for Banned	Sugg. for Inhalable	Sugg. for Ingestible/Other	(1-4) See chart below	(1a-U)	(1-5)			Based on Frequency (Y/N)	Primary method/instrumentation	Codex Alimentarius (UN/WHO) limits
Methiocarb		0.1	0.2		Y			2	1b	2	15-30	>20		LCMS	carbamate (aromatic alkyl sulfide insecticide); ChE inhibitor (reversible carbamylation of the enzyme acetylcholinesterase, causing buildup); Cancer Classification: Group D Not Classifiable as to Human Carcinogenicity; skin irritant - human exposure study found irritation occurs after 24 hours of exposure. Irritant to mucous membranes when inhaled; viewed as potential inhibitor of serine hydrolase-dependent immune functions including interleukin 2 (IL2) signalling
Methomyl		0.4	0.4		Y	<0.1	0.4	1	1b	2	17			LCMS	carbamate ester; cholinesterase inhibitor; nematocide, and an insecticide used on vegetables, tobacco, cotton, alfalfa, soy beans, and corn. (EPA, 1998); absorbed through mucosal membranes; acute toxicity in respiratory tract, ocular; human deaths reported after ingestion of various doses
Methyl parathion (parathion-methyl)	0.2	0.1	0.2	B	Y (B)	<0.1	<0.1	1	1a	2	3	34 (rats)		LCMS	RUP; organophosphate insecticide, thermally unstable; ChE inhibitor; kills insects by contact, stomach and respiratory action; acute dermal toxicity, highly toxic by inhalation and ingestion, dose-dependent; workers are restricted from entering a field treated with methyl parathion within 48 hours of treatment (EPA 1980); indoor use banned in 1998; Codex approves use on 13 commodities; may cause delayed symptoms beginning 1 to 4 weeks after an acute exposure; EPA has established a Lifetime Health Advisory (LHA) level of 60 micrograms per liter (ug/l) for 4-nitrophenol, a breakdown product of methyl parathion, in drinking water; not classifiable as a carcinogen; methyl parathion becomes toxic when it is metabolized to methyl paraoxon; acute toxicity of methyl parathion is due to inhibition of acetylcholinesterase at nerve endings, leading to an accumulation of endogenous acetylcholine; effects are manifested by muscarinic, nicotinic, and CNS signs and symptoms: sweating, salivation, diarrhea, bronchorrhea, bradycardia, bronchoconstriction, muscle fasciculations and coma; cause of death is primarily resp failure
Mevinphos		0.1		B	Y (B)	<0.1	<0.1	1	1a	1	3-12			GCMS	RUP; systemic organophosphate; neurotoxin, ChE inhibition; Not in CFR; Poisoning affects the central nervous system, the cardiovascular system, the respiratory system and the eyes; may cross placenta; TDLo for humans is 690 ug/kg over 28 days.
MGK-264		0.2	0.2		Y	0.2	0.2	3 (Dermal)						LCMS	synergist often mixed with natural pyrethrins or synthetic pyrethroids, improving potency; found in more than 1,000 registered pesticide products; in human studies, MGK 264 inhibited aromatase activity; systemic effects include central nervous excitation followed by depression; Group C Possible Human Carcinogen; considered slightly more toxic than piperonyl butoxide; tissue accumulation is negligible; inhibits MFO enzymes involved in both drug detoxification and activation, there exists a possibility that persons exposed to MGK-264 will have altered drug metabolism such that the drugs may cause toxic reactions or not be efficiently converted to their therapeutic form; Moderately toxic: probable oral lethal dose (human) 0.5-5 g/kg; between 1 oz and 1 pt (or 1 lb) for 70 kg person (150 lb); LD-50 oral and LC-50 are not available.
Myclobutanil		0.01	0.2	0.04	Y	<0.1	0.4		2	4	1600		Y Very frequent	LCMS	GUP; fungicide, inhibits the biosynthesis of ergosterol, a critical component of fungal cell membranes; Hop dried cones 10 ppm (hops has highest use rate of myclo.) and 5.0 ppm WHO tolerance; soybean oil 0.4; Corrosive. Causes Irreversible Eye Damage. Harmful if inhaled, Swallowed Or Absorbed Through Skin; Group E Evidence of Non-carcinogenicity for Humans; no tissue accumulation
Naled		0.1	0.5		Y	0.1	0.5		2	4	281	7.7		LCMS, GCMS	RUP; non-systemic contact and stomach poison in insects and mites and fumigant; organophosphate and cholinesterase inhibitor; moderately to highly toxic by ingestion, inhalation and dermal adsorption. Vapors or fumes of naled are corrosive to the mucous membranes lining the mouth, throat and lungs, and inhalation may cause severe irritation; 0.5 limit on hops; may cause dermatitis and skin sensitization; may cross placenta; Group E Evidence of Non-carcinogenicity for Humans
Oxamyl		0.5	1		Y	<0.1	<0.1	1	1b	2	5.4			LCMS	RUP; broad spectrum carbamate insecticide, ChE inhibitor; garlic bumb 0.2 ppm; highest international Codex tolerance allowed is 0.04 ppm on summer squash; rated extremely poisonous to humans; acute oral exposure has lead to human death; toxic via inhalation, ingestion and dermal routes; reversible cholinesterase-inhibiting effects, however prolonged or repeated exposure will present with similar symptoms; Lifetime Health Advisory (LHA) level for oxamyl is 200 micrograms/liter; no evidence of mutagenicity or carcinogenicity; does not accumulate in tissue
Paclbutrazol		0.05	0.4		Y	<0.1	0.4		2	4	1300		Y	LCMS	RUP; plant growth regulator and triazole fungicide; for use on ornamentals and turf; not listed in CFR 40; "Paclbutrazol has no food use registrations; therefore, a dietary (food only) risk assessment is not required. Additionally, no toxicity endpoint was identified for an acute dietary assessment" EPA Registration Review 2007.
Parathion-methyl (see methyl parathion)														LCMS	see methyl parathion (same compound)
Pendimethalin	0.1				Y	0.1	1.0	3	2	4	1050	320		GCMS	selective herbicide, dinitroaniline; used to control broadleaf weeds and grassy weed species; citrus oil 0.5 ppm; hop dried cones 0.1 ppm; used on alfalfa, olive, tobacco and cotton; may increase alkaline phosphatase level and liver weight if chronically exposed; Group C Possible Human Carcinogen; mild skin irritant
Pentachloronitrobenzene		0.2			TBD									GCMS	Fungicide; organochlorine pesticidel used on cotton; not listed in Codex and no longer approved for use by EPA; Group C Possible Human Carcinogen; prolonged exposure to PCNB can include skin sensitization and irritation, and following eye contact, conjunctivitis and keratitis; toxicity increases when dissolved in oil solution than in aqueous suspension
Permethrin	1	0.04	0.2	0.04	Y	0.4	1.0		2	4	500			LCMS	RUP; 3.0 limit used on tobacco; organic toxin in chrysanthemums; Low mammalian toxicity, classified as "likely to be carcinogenic" Neurotoxin (motor paralysis via Na+ channel disruption); Liver toxicity; used to treat head lice, scabies; dermal irritant
Phosmet	0.05	0.02	0.2		Y	<0.1	0.2	2	2	3	113 (rats)			LCMS, GCMS	RUP and GUP? non-systemic, organophosphate, ChE inhibitor, neurotoxin; mildly toxic by ingestion; very high toxicity via inhalation; eye irritant; possible human teratogen - potential brain damage seen in animal studies; Suggestive Evidence of Carcinogenicity (liver tumors [adenomas, and adenomas plus carcinomas combined] in male B6C3F1 mice at the highest dose tested)
Piperonyl butoxide	3	0.5	2		Y	0.5	3.0	4	U	5	>7500		Recommended	LCMS	GUP; Synergist and intended for use with pyrethrins, rotenone and other synthetic pyrethroids; increases toxicity of other pesticides in solution; good indicator if others are in solution esp in concentrates; dermal LD50 1880 mg/kg; sudden bronchospasm, swelling of oral and laryngeal mucous membranes, and shock (anaphylaxis) have been reported after pyrethrum inhalation
Prallethrin		0.05	0.2		Y				2	4	460			LCMS, GCMS	RUP fourth generation type I pyrethroid; semisynthetic derivative of the chrysanthemic acids; may cause contact dermatitis and respiratory allergy, asthma like symptoms; may decrease levels in the content of phosphatidyl serine, suggesting PS is a sensitive phospholipid species to pyrethroid action; may irritate the eyes; organophosphates, carbamates, or synergists may be added to improve lethality
Propiconazole		0.05	0.4		Y				2	4	550 (rat)			LCMS	GUP; triazole fungicide that has protective, curative, and systemic activity; mode of action is demethylation of C-14 during ergosterol biosynthesis, inhibiting growth; Group C Possible Human Carcinogen; respiratory tract irritant; no evidence of tissue of accumulation

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Pesticides/PGR Safety Limits by State

Analyte	USP	AOAC	OR, AR, WA	CO	AZ	AZ	AZ	EPA	WHO	GHS	LD50	LC50	Analytical Lab	Analytical Lab	EPA limits / Clinical Support
	ppm	ppm	ppm	ppm	Test?	ppm	ppm	Toxicity Class	Toxicity Class	Toxicity Class	mg/kg	mg/L	Level One	Instrumentation	
List Updated 12/02/19	ppm	Plant Material		Flower	Y/N or B for Banned	Sugg. for Inhalable	Sugg. for Ingestible/Other	(1-4) See chart below	(1a-U)	(1-5)			Based on Frequency (Y/N)	Primary method/instrumentation	Codex Alimentarius (UN/WHO) limits
Propoxur		0.05	0.2		Y			2	2	3	23-83			LCMS	GUP not approved for use in food crops (therefore not listed in EPA CFR40 or Codex). Main replacement for DDT. Insecticide and molluscicide for snails. Non-systemic carbamate, reversible neurotoxic ChE inhibitor; toxic if swallowed; not reported to accumulate in mammalian tissue; prolonged exposure will present symptoms similar to acute exposure, with inconclusive potential for permanent behavioral changes; negative effects on offspring, including reduced birthweight and CNS development; Group B2 Probable Human Carcinogen, Confirmed animal carcinogen; shown to induce DNA damage in human lymphocytes
Pyrethrins		0.5	1		Y	0.5	1.0		2	4	200-2600			LCMS, GCMS	RUP; natural insecticides; action is by competitively interfering with sodium cationic conductances in the lipid layer of nerve cells, blocking nerve impulse transmissions; GABA channel inhibition; modulation of nicotinic cholinergic transmission; used primarily to control human lice, mosquitoes, cockroaches, beetles and flies; organophosphates, carbamates, or synergists may be added to improve lethality; absorbed most quickly through respiration with low chronic toxicity reported in humans aside from allergic dermal and respiratory reactions, to include asthmatic breathing, sneezing, nasal stuffiness, headache, nausea, incoordination, tremors, convulsions, facial flushing and swelling, and burning and itching sensations.
Pyridaben		0.1	0.2		Y	<0.1		3	2	4	161	0.62		LCMS, GCMS	GUP; organochlorine acaricide/insecticide, metabolic inhibitor that interrupts electron transport chain complex 1 (NADH: ubiquinone oxidoreductase inhibitor); Citrus oil 10 ppm, hops dried cones 10 ppm; Not listed in Codex; Several formulations cancelled by EPA; Group E Evidence of Non-carcinogenicity for Humans; shown to be a ChE inhibitor in animal studies; toxic if inhaled; can cause mild eye injury; may accumulate in fat over time
Spinetoram		0.1			N			3		5	>5000				2nd gen spinosyn insecticide; aka ethyl spinosad; considered toxicologically equivalent to spinosad; Beet sugar molasses 0.75 ppm; citrus oil 3.0; tea both dried and instant 70 ppm; Some states banned use on hops re: US Hop Industry Plant Protection Committee/Hops Growers of America
Spinosad		0.06	0.2	0.06	Y	<0.1	3.0	3	3	5	3738	5.18 (rat)		LCMS	Biolarvicide; combo of spinosyn A and D analogues; considered toxicologically equivalent to spinetoram; Beet sugar molasses 0.75 ppm; citrus oil 3.0; tea both dried and instant 70 ppm but no registrants; Some states banned use on hops re: US Hop Industry Plant Protection Committee/Hops Growers of America; tox class 3 inhalation and dermal; 4 for oral; used to treat head lice;
Spirodiclofen					Y	0.1	0.2	3						LCMS	tetronic acid insecticide used primarily to treat spider mites; inhibitor of acetyl-coenzyme A carboxylase (ACCase) and cause significant reduction in total lipid biosynthesis; skin sensitizer
Spiromesifen		0.01	0.2	0.03	Y	0.1	0.2	3			>2000			LCMS	tetronic acid insecticide used primarily to treat whiteflies as well as mites; coffee bean green and roasted 0.2 ppm; potential skin sensitizer; inhibitor of acetyl-coenzyme A carboxylase (ACCase) and cause significant reduction in total lipid biosynthesis
Spirotetramat		0.02	0.2	0.02	Y	0.1	0.2	3	3	4	>2000			LCMS	tetronic acid insecticide used to treat aphids; inhibitor of acetyl-coenzyme A carboxylase (ACCase) and cause significant reduction in total lipid biosynthesis; skin sensitizer
Spiroxamine		0.1	0.4		Y	<0.1	<0.1	see notes	2	4	460	2.0		LCMS, GCMS	synthetic fungicide (spiroketalamine). Disrupts membrane function. Inhibits sterol biosynthesis in membranes Only approved by EPA for use on 5 crops; hops was removed from approval list/lost US label; known skin and respiratory tract irritant; Technical spiroxamine has a moderate to high acute toxicity; it is a Category III by the oral route, II by the dermal, IV by inhalation and eye irritation; caused severe dermal irritation (Category I). Strong skin irritant; many of its effects are due to irritant properties. Subchronic studies indicate spiroxamine toxicity target organ is the liver, and mucous membranes of the esophagus and forestomach were keratinized and hyperplastic due to strong irritant properties.
Tebuconazole		0.01	0.4	0.01	Y				2	4	595	5.1		LCMS, GCMS	GUP; fungicide used to treat powdery mildew; hops dried cones 30 ppm; orange oil 10; coffee roasted bean 0.3, 0.1; sunflower oil 0.2; Cancer Classification: Group C Possible Human Carcinogen
Thiacloprid		0.1	0.2		Y	<0.1	<0.1	2	2	4	396			LCMS	RUP; Nicotinoid insecticide; target nAChE receptors; cancelled by manufacturer Bayer, in effect 2016;
Thiamethoxam		0.05	0.2		Y	0.02	0.02	3	U	5	>5000			LCMS	RUP; neonicotinoid, similar to imidacloprid; coffee green bean 0.2 ppm; hops dried cone 0.1 ppm, 0.09 ppm; dermal LD50 >2000; Used on alfalfa in AZ; Regulated in food handling establishments at 0.02 ppm residual; Classified as likely carcinogen for humans; Most toxic when inhaled or transdermally; minimal acute risk if ingested; investigated for use on tobacco: https://www3.epa.gov/pesticides/chem_search/cleared_reviews/csr_PC-060109_21-Jun-00_a.pdf
Trifloxystrobin		0.01	0.2		Y	<0.1	0.9	4 (3 eyes)	U	5	>5000	4.65 (Rats)		LCMS	GUP; fungicide, beta-methoxyacryl ester, used for powdery mildew; coffee green bean 0.02 ppm; hops dried cone 11 ppm, olive oil virgin 0.9 ppm; strong dermal sensitizer and eye irritant (tox class 3; consider LC50 value)

* denotes LC/LC information obtained from *The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification 2009*

WHO Classification Scheme		LD50 (mg/kg)	
		Oral	Dermal
1a	Extremely Hazardous	<5	<50
1b	Highly Hazardous	5-50	50-200
2	Moderately Hazardous	50-2000	200-2000
3	Slightly Hazardous	>2000	>2000
U	Unlikely to present acute hazard	>5000	>5000

^ denotes LD/LC information obtained from link <https://extension.psu.edu/toxicity-of-pesticides>

- References:**
 Cornell PEMP and EXTOXNET <http://pmpem.cce.cornell.edu/>
 CFR Title 40 Part 180
 Toxnet HSDB <https://toxnet.nlm.nih.gov/>
 USDA NAL <https://www.nal.usda.gov/main/>
 Codex Alimentarius <http://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pe/>
 NPIC NPRO
 PubMed
 PubChem
 Relevant peer-reviewed toxicological literature

GHS Classification Scheme		LD50 (mg/kg)		LC50 (mg/L)	
		Oral	Dermal	Inhalation	
1	Fatal if swallowed	<5	<50	<0.5	fatal if inhaled
2	Fatal if swallowed	5-50	50-200	>0.5 <2.0	fatal if inhaled
3	Toxic if swallowed	50-300	200-1000	>2.0 <10.0	toxic if inhaled
4	Harmful if swallowed	300-2000	1000-2000	>10.0 <20.0	harmful if inhaled
5	May be harmful if swallowed	2000-5000	2000-5000	dose equiv to oral	may be harmful if inhaled

EPA Classification Scheme LD50 (mg/kg) LC50 (mg/L)

Recommended testing = 61 agents
 TBD = 6 agents
 Recommended no testing = 5

Recommendations established by Jennifer Corso, and reviewed by Taylor Pearce, George Griffith, Conner Griffith, and Brandon Jewell

Criteria analyzed include frequency, toxicity classifications and clinical evidence

Pesticides/PGR Safety Limits by State

Analyte	USP	AOAC	OR, AR, WA	CO	AZ	AZ	AZ	EPA	WHO	GHS	LDS0	LC50	Analytical Lab	Analytical Lab	EPA limits / Clinical Support
	ppm	ppm	ppm	ppm	Test?	ppm	ppm	Toxicity Class	Toxicity Class	Toxicity Class	mg/kg	mg/L	Level One	Instrumentation	
List Updated 12/02/19															
	Plant Material			Flower	Y/N or B for Banned	Sugg. for Inhalable	Sugg. for Ingestible/Other	(1-4) See chart below	(1a-U)	(1-5)			Based on Frequency (Y/N)	Primary method/instrumentation	Codex Alimentarius (UN/WHO) limits
								Oral	Dermal	Inhalation					
					1	≤50	≤200	≤0.2							Fatal (poisonous) if swallowed [inhaled or absorbed through skin]
					2	50-500	200-2000	0.2-2.0							May be fatal if swallowed, [inhaled or absorbed through the skin].
					3	500-5000	2000-20000	2.0-20							May be fatal if swallowed, [inhaled or absorbed through the skin].
					4	>5000	>20,000	>20							No precautionary statements required.
					40 CFR Part 156.62 Updated as of 11/12/2019										

Testing Roll-Out: Two phases based on frequency seen and/or toxicity. Phase 2 will be composite and include all pesticides being tested already in Phase 1.					
Analyte	AZ	Phase 1	Phase 2	Analytical Lab	EPA limits / Clinical Support
List Updated 12/02/19	Test?	Nov 2020	Nov 2021	Level One	Codex Alimentarius (UN/WHO) limits
	Y/N or B for Banned		(add to Phase 1 list)	Frequency of Appearance (Y/N)	
Abamectin (Avermectins)	Y	x		Infrequent	RUP; Hops 0.2 ppm; 0.15 ppm; non-carcinogenic; reproductive toxicity (testosterone/spermatogenesis); GABA channel agonist; /neurotoxic; Some states banned use on hops re: US Hop Industry Plant Protection Committee/Hops Growers of America
Acephate	Y	x			GUP; EPA 0.02 ppm for all food items and in food producing/handling establishments including bakeries and packing plants; testing for metabolite methamidophos; Organophosphate with toxic fume emission when degrading over 10-15 days, inhalation hazard; LDLo is 681 mg/kg reported death in dogs and humans for routes other than inhalation; Fetotoxin; Cholinesterase inhibitor/neurotoxin
Acequinocyl	Y		x		GUP; Napthoquinone derivative; Hops dried cone 15 ppm; Mitochondrial complex III electron transport inhibitor; Skin irritant; May bioaccumulate
Acetamiprid	Y	x			Neonicotinoid insecticide with potentially low toxicity to mammals; EPA requires 0.01 ppm for food items other than those with pre-established higher tolerances; Human studies include indication of acute poisoning; chromosomal aberrations in human blood lymphocytes is significant
Aldicarb	Y	x			RUP; Carbamate; LD Oral = 5 mg/kg; Coffee bean, green 0.1 ppm, soybean 0.02 ppm; Sunflower seed 0.05 ppm; High oral/dermal toxicity; Fetotoxin w depressed AChE activity;
Ancymidol	TBD		x		Fungicide (substituted pyrimidines, growth retardant, inhibits gibberellin biosynthesis) used on ornamentals; few states test for this, list does not include CO, CA, OR; Recommending testing inhaled products at minimum (Class II toxicity according to LC50 data)
Azoxystrobin	Y (inhaled only)	x		Y	GUP; Experimental fungicide; Used for powdery mildew; Citrus oil 40 ppm; Coffee green bean 0.03; Hops dried cone 20 ppm; dried tea 20; rapeseed 1.0; weak clastogenic effects in mammalian cells re: mutagenicity; Would be rated Toxicity Cat 2 for inhalation according to LC50
Bifenazate	Y (B)	x		Y (really common)	inhibits mitochondrial cytochrome b subunit of complex III Hops 15 ppm; 20 ppm; Considered relatively non-toxic (cat IV) all routes of exposure; not approved for food use therefore little clinical data; chronic exposure > liver toxicity; suggest banning use on cannabis and testing for residue as it is seen in analytical lab tests
Bifenthrin	Y	x		Y	RUP (a pyrethroid) toxicity cat. 2; Hops dried cones 10 ppm; hops 20 ppm; Rapeseed oil edible 0.1 ppm; EPA tolerance 0.05 on food items; most toxic ingested; dermal absorption; accumulates in adipose tissue
Boscalid	Y	x			GUP; Canola oil 5.0 ppm; hops dried cones 35 ppm; Suggestive Evidence of Carcinogenicity, but Not Sufficient to Assess Human Carcinogenic Potential; may be genotoxic and cytotoxic in vitro human peripheral blood lymphocytes; potential endocrine disruptor
Captan	TBD		x		GUP; non-systemic phthalimide fungicide; used heavily on apples; residue limits for a variety of seeds including safflower and sunflower used for oil is 0.05; none of these seeds approved by Codex; lowest reported dose for humans that can cause death is 1,071 mg/kg; reported to cause skin and eye irritation (dermatitis and conjunctivitis), as well as sensitization; EPA classifies captan as A3 confirmed animal carcinogen with unknown relevance to humans; NIOSH considers agent as occupational carcinogen; 2018 cytogenetic analyses reveal potential mutagenicity in human lung, and DNA damage/inhibition in human fibroblasts, lymphocytes
Carbaryl	Y	x			GUP, wide spectrum carbamate insecticide; may produce adverse effects in humans by skin contact, inhalation or ingestion; "The hazards of carbaryl for human beings are judged to be low, because of its low vapor pressure, rapid degradation, rapid spontaneous recovery of inhibited cholinesterase, & the fact that symptoms usually appear well before a dangerous dose has accumulated in the body."
Carbofuran	Y (B)	x			RUP; carbamate, ChE inhibitor; Use should be restricted or banned for use on cannabis; only four commodities with approved use by EPA, including green coffee beans with a residue limit of 0.1 ppm; granular formulations banned by EPA; Acute oral/respiratory toxicity in humans esp in underlying respiratory and CV disease, asthma, diabetes, mechanical obstruction of the gastrointestinal or urogenital tracts, or those in vagotonic states. EPA has established a Lifetime Health Advisory (LHA) level of 40 ppb of carbofuran in drinking water.
Chlorantraniliprole	TBD	x			stimulates the release of calcium stores from the Sarcoplasmic reticulum of muscle cells (i.e. for chewing insect pest) causing impaired regulation, paralysis and ultimately death of sensitive species; Chocolate 1.5 ppm; Instant coffee 2.0; Palm oil 1.5; hops dried 40.0; Low risk in tobacco analysis; https://www3.epa.gov/pesticides/chem_search/hhbp/R180550.pdf
Chlordane	Y (B)		x		Organochlorine insecticide; EPA banned all use in 1988 except fire ant control on power transformers; liver microsomal enzymes within product may cause interactions between medical drugs and this pesticide. Among these are decreased effectiveness of oral anticoagulants, phenylbutazone, chlor-promazine, cortisol and other steroids (including birth control pills), diphenhydramine (Benadryl). Increased activity of thyroxin (thyroid hormone) may also occur. Probable human carcinogen (classed B2); accumulates in adipose tissue; Human exposure may lead to onset of convulsions that persist for several days
Chlorfenapyr	Y		x		Pyrrrole (ox phos uncoupling agent, resulting in disruption of production of ATP); biological activity relies upon other chemical agents; Not approved for food use except dried tea with threshold at 70 ppm and fruiting veg group 8-10 at 1.0 ppm; Tox class 2 for technical grade; formulated grade tox class 3; Suggestive Evidence of Carcinogenicity;

Testing Roll-Out: Two phases based on frequency seen and/or toxicity. Phase 2 will be composite and include all pesticides being tested already in Phase 1.					
Analyte	AZ	Phase 1	Phase 2	Analytical Lab	EPA limits / Clinical Support
List Updated 12/02/19	Test?	Nov 2020	Nov 2021	Level One	Codex Alimentarius (UN/WHO) limits
	Y/N or B for Banned		(add to Phase 1 list)	Frequency of Appearance (Y/N)	
Chlormequat Chloride	N				Plant growth regulator (PGR) (quaternary ammonium compound) registered for use on ornamental plants grown in greenhouses, nurseries and shadehouses. As chlormequat chloride has no food/feed uses and no U.S. tolerances associated with its use except oat, wheat and barley, although no registrations exist.
Chlorpyrifos (-ethyl)	Y	x			RUP; organophosphate; Use should be restricted; Used in AZ on alfalfa, sunflower, pecans; oils production; acute liver toxicity and cholinesterase inhibition in humans through all routes of administration; Residue limit of microencapsulated form of 0.1 ppm on food commodities not listed in CFR for growing crops;
Clofentezine	Y	x			organochlorine tetrazine and mite growth inhibitor/ovicide; binds to the pore region and impair chitin translocation; avocado 0.3 ppm; eye and skin irritant; likely human carcinogen [classification of C]; thyroid tumors in chronically overstimulated rat thyroid
Coumaphos	TBD		x		GUP or RUP dep. on formulation; organophosphate and AChE inhibitor; used on livestock to kill pests (mites, cattle grubs, screw-worms, lice, scabies, flies, and ticks) as an insecticide
Cyfluthrin	Y		x		RUP; Spices 0.03 ppm; Hops dried cone 20 ppm (also read 4 ppm?); Tolerance of 0.05 ppm in establishments where food is also handled/processed; Toxicity category II (and I for eyes); Mode of action involves ingestion; Studies support acute and chronic kidney inflammation
Cypermethrin; alpha, zeta isomers	Y	x			RUP; pyrethroid, neurotoxin; Citrus oil 4.0 ppm; jojoba, sunflower and tea oil 0.4; moderately toxic by ingestion or dermally; possible carcinogen (group C); weak skin sensitizer; Long-term exposure may cause liver changes. Pathological changes in the cortex of the thymus, liver, adrenal glands, lungs and skin were observed in rabbits repeatedly fed cypermethrin
Daminozide	N (B)				EPA banned use of agent on food crops in 1989 due to carcinogenic tendencies; no data in CFR or codex on tolerances; low toxicity suggests banning the use in AZ and recommending not testing for the substance.
Diazinon	Y	x			RUP; non-systemic organophosphate; used on tobacco heavily in 1990's then cancelled for use on tobacco; Currently registered for apx 40 crops; heavily restricted due to toxicity and conversion to diazoxon by UV and moisture if not encapsulated; fat soluble
Dichlorvos (DDVP)	Y (B)	x			RUP; Use should be restricted; Spices 0.1 ppm; 0.5 ppm for packaged processed food; 0.02 for meats; Categorized as highly toxic through all routes of administration; volatility increases toxicity through inhalation; faster onset of cholinesterase inhibition in comparison to other organophosphates; May cross placenta; positive test for mutagenicity
Dimethoate	Y	x			RUP; wide-range organophosphate insecticide; AChE inhibitor; moderately toxic by ingestion, inhalation and dermal absorption; readily absorbed dermally; severe eye irritant; may cause delayed neuro symptoms of 1-4 weeks
Dimethomorph	TBD		x		systemic fungicide which protects plants from molds, as well as killing molds on plants and preventing their spread; cinnamic acid derivative and a member of the morpholine chemical family; hop dried cones 60 ppm; may be clastogenic and antiandrogenic; considered not likely to cause cancer in humans; may cause eye irritation
Ethoprophos (Ethoprop)	Y	x			RUP; Organophosphate ester; highly toxic AChE inhibitor; All approved EPA tolerances on food are 0.02 ppm; Classified as likely to be carcinogenic to humans
Etofenprox	Y	x			pyrethroid ether insecticide; individual residue limits established for meat/poultry products only in US, otherwise all commodities listed at 5.0 ppm; moderate skin irritant, no sensitization; animal studies show chronic effects on kidney heart and liver weights as well as histopathological changes in liver pancreas and thyroid tissue, and blood plasma chemistry
Etoxazole	Y	x		Y	GUP; binds to the pore region and impair chitin translocation. inhibits chitin synthase 1, genetic target; Hops dried cone 7 ppm; 15 ppm; Orange oil 1.0 ppm; Toxicity class III; concerns for liver toxicity
Fenhexamid	N				Fungicide, hydroxylanilide; Few states test for the agent; Technical grade not considered an eye or dermal irritant, or sensitizing agent; No evidence of carcinogenicity or mutagenicity
Fenoxycarb	Y	x			GUP; carbamate insect growth regulator; interferes with metamorphosis and molting; not in CFR40 list; endocrine disruptor; Cancer Classification: Group B2-probably human carcinogen
Fenpyroximate	Y	x			pyrazole; non-systemic contact and stomach miticide used typically in fruit; long residual activity; avocado 0.15; citrus oil 15 ppm; hop dried cones 10; refined corn oil 0.05; honey 0.1; inhibits mitochondrial electron transport at the NADH-CoQ reductase site, disrupts ATP formation
Fipronil	Y	x			RUP; Fiprole (or phenylpyrazole), systemic agent with contact and stomach activity; antagonizes chloride channels associated with GABAA and glutamate receptors; regulated on meats and dairy with highest ppm allowed at 1.5 for milk fats (0.05 ppm for whole milk); human exposure studies show 50% neurological symptoms followed by ocular and gastro; delayed signs of toxicity in rats (2 days) due to accumulation in adipose tissue; EPA has cancelled 60 products containing the agent

Testing Roll-Out: Two phases based on frequency seen and/or toxicity. Phase 2 will be composite and include all pesticides being tested already in Phase 1.					
Analyte	AZ	Phase 1	Phase 2	Analytical Lab	EPA limits / Clinical Support
List Updated 12/02/19	Test?	Nov 2020	Nov 2021	Level One	Codex Alimentarius (UN/WHO) limits
	Y/N or B for Banned		(add to Phase 1 list)	Frequency of Appearance (Y/N)	
Flonicamid	Y	x			selective pyridinecarboxamide compound used as an insecticide on aphids, whiteflies, and thrips. It disrupts insect chordotonal organs that can affect hearing, balance, movement to cause cessation of feeding through what is thought to be starvation, but the specific target site of the chemical is unknown; alfalfa hay 1.0 ppm; hops 20.0; prickly pear fruit and pads 1.5 ppm expiring 12/31/2020; some states ban use on hops; does not pose cancer risk to humans; one case of severe poisoning associated with ingestion of spinosad+flonicamid mixture;
Fludioxonil	Y	x			GUP; avocado 5.0; citrus oil 500 ppm; rape and safflower seed, 0.01 ppm; phenylpyrrole fungicide that interferes with glucose transport across fungal membranes; also used as an insecticide, and seed treatment/protectant; endocrine disruptor as antiandrogen in an androgen receptor reporter assay in human engineered human breast cancer cells; genotoxic in human HepG2 cells at concentrations of 4 uM. Treatment of human U251 (glial) and SH-SY5Y (neuronal) cells with fludioxonil significantly reduced cellular ATP at concentrations that were more than tenfold lower than those which significantly impaired cellular viability.; effects on energy metabolism were reflected in marked toxic effects on mitochondrial membrane potential
Flurprimidol	N				Plant growth regulator; only one state tests for agent; not approved for use on food - only ornamental trees and turfgrass
Hexythiazox	Y	x			thiazolidinone mite ovacide; binds to the pore region and impair chitin translocation; inhibits CHS1; Used frequently with hops, 2 ppm dried cones, 3 ppm; Considered practically non-toxic on acute basis; Cancer Classification: Group C Possible Human Carcinogen; may bioaccumulate just above established threshold
Imazalil (enliconazole)	Y	x			GUP; imidazole fungicide, may cause contact dermatitis; potential sensitizer; Severe eye irritant; Cancer Classification: Likely to be Carcinogenic to Humans
Imidacloprid	Y	x		Y	GUP; chloro-nicotinyl insecticide; 3 ppm dried hop cones; 0.05 canola and safflower seed; toxicity class II; nicotinic inhibition > acetylcholine accumulation; action through stomach; causes irreversible blockage of postsynaptic nicotinic acetylcholine receptors
Kresoxim-methyl	Y	x			GUP; fungicide, strobilurin group, used for the control of scab, blackspot and powdery mildew; inhibits mitochondrial respiration by inhibiting cytochrome c reductase; strong protective, curative, eradicated, & long residual disease control. Redistribution via the vapor phase contributes to activity; EPA approved for use on 10 commodities 1.0 max ppm tolerance; Codex approved olive oil 1.0 ppm, olives for oil 0.2 ppm; may cause eye irritation; Cancer Classification: Likely to be Carcinogenic to Humans; not acutely toxic via inhalation or dermal absorption; toxic levels caused liver cancer in rats due to increased rate of cellular reproduction; toxic dose is equivalent to 20g/d in humans over one lifespan;
Malathion	Y	x			GUP; non-systemic aliphatic organophosphate, ChE inhibitor; alfalfa 135 ppm; safflower oil 0.6 ppm; 1 ppm for dried hop cone; cotton seed oil edible 13 ppm; also used to treat head lice; rapidly absorbed by all routes of administration; acute neurological effects correlated to purity and vehicle; high protein intake/somatic concentration correlated to increased toxicity; causes eye irritation; metabolite malaoxon is significantly higher in neurotoxicity; suggestive evidence of carcinogenicity but not enough to make assessment in humans
Metalaxyl	Y	x		Y	GUP; systemic, benzenoid (phenylamide) fungicide; interferes with RNA synthesis in various fungi; used on tobacco; citrus oil 7.0 ppm; hop dried cones 20 ppm; hop vines 2.0 ppm; EPA determined risk of smoking residue was no higher than that of heavy smoking; slight eye irritation seen in rabbits; evidence of low tissue residues 6 days after treatment indicated no appreciable bioaccumulation
Methiocarb	Y	x			carbamate (aromatic alkyl sulfide insecticide); ChE inhibitor (reversible carbamylation of the enzyme acetylcholinesterase, causing buildup); Cancer Classification: Group D Not Classifiable as to Human Carcinogenicity; skin irritant - human exposure study found irritation occurs after 24 hours of exposure. Irritant to mucous membranes when inhaled; viewed as potential inhibitor of serine hydrolase-dependent immune functions including interleukin 2 (IL2) signaling
Methomyl	Y	x			carbamate ester; cholinesterase inhibitor; nematocide, and an insecticide used on vegetables, tobacco, cotton, alfalfa, soy beans, and corn. (EPA, 1998); absorbed through mucosal membranes; acute toxicity in respiratory tract, ocular; human deaths reported after ingestion of various doses
Methyl parathion (parathion-methyl)	Y (B)		x		RUP; organophosphate insecticide, thermally unstable; ChE inhibitor; kills insects by contact, stomach and respiratory action; acute dermal toxicity, highly toxic by inhalation and ingestion, dose-dependent; workers are restricted from entering a field treated with methyl parathion within 48 hours of treatment (EPA 1980); indoor use banned in 1998; Codex approves use on 13 commodities; may cause delayed symptoms beginning 1 to 4 weeks after an acute exposure; EPA has established a Lifetime Health Advisory (LHA) level of 60 micrograms per liter (ug/l) for 4-nitrophenol, a breakdown product of methyl parathion, in drinking water; not classifiable as a carcinogen; methyl parathion becomes toxic when it is metabolized to methyl paraoxon; acute toxicity of methyl parathion is due to inhibition of acetylcholinesterase at nerve endings, leading to an accumulation of endogenous acetylcholine; effects are manifested by muscarinic, nicotinic, and CNS signs and symptoms: sweating, salivation, diarrhea, bronchorrhea, bradycardia, bronchoconstriction, muscle fasciculations and coma; cause of death is primarily resp failure

Testing Roll-Out: Two phases based on frequency seen and/or toxicity. Phase 2 will be composite and include all pesticides being tested already in Phase 1.					
Analyte	AZ	Phase 1	Phase 2	Analytical Lab	EPA limits / Clinical Support
List Updated 12/02/19	Test?	Nov 2020	Nov 2021	Level One	Codex Alimentarius (UN/WHO) limits
	Y/N or B for Banned		(add to Phase 1 list)	Frequency of Appearance (Y/N)	
Mevinphos	Y (B)	x			RUP; systemic organophosphate; neurotoxin, ChE inhibition; Not in CFR; Poisoning affects the central nervous system, the cardiovascular system, the respiratory system and the eyes; may cross placenta; TDLo for humans is 690 ug/kg over 28 days.
MGK-264	Y		x		synergist often mixed with natural pyrethrins or synthetic pyrethroids, improving potency; found in more than 1,000 registered pesticide products; in human studies, MGK 264 inhibited aromatase activity; systemic effects include central nervous excitation followed by depression; Group C Possible Human Carcinogen; considered slightly more toxic than piperonyl butoxide; tissue accumulation is negligible; inhibits MFO enzymes involved in both drug detoxification and activation, there exists a possibility that persons exposed to MGK-264 will have altered drug metabolism such that the drugs may cause toxic reactions or not be efficiently converted to their therapeutic form; Moderately toxic: probable oral lethal dose (human) 0.5-5 g/kg; between 1 oz and 1 pt (or 1 lb) for 70 kg person (150 lb); LD-50 oral and LC-50 are not available.
Myclobutanil	Y	x		Y Very frequent	GUP; fungicide, inhibits the biosynthesis of ergosterol, a critical component of fungal cell membranes; Hop dried cones 10 ppm (hops has highest use rate of myclo.) and 5.0 ppm WHO tolerance; soybean oil 0.4; Corrosive. Causes Irreversible Eye Damage. Harmful If Inhaled, Swallowed Or Absorbed Through Skin; Group E Evidence of Non-carcinogenicity for Humans
Naled	Y	x			RUP; non-systemic contact and stomach poison in insects and mites and fumigant; organophosphate and cholinesterase inhibitor; moderately to highly toxic by ingestion, inhalation and dermal adsorption. Vapors or fumes of naled are corrosive to the mucous membranes lining the mouth, throat and lungs, and inhalation may cause severe irritation; 0.5 limit on hops; may cause dermatitis and skin sensitization; may cross placenta; Group E Evidence of Non-carcinogenicity for Humans
Oxamyl	Y	x			RUP; broad spectrum carbamate insecticide, ChE inhibitor; garlic bumb 0.2 ppm; highest international Codex tolerance allowed is 0.04 ppm on summer squash; rated extremely poisonous to humans; acute oral exposure has lead to human death; toxic via inhalation, ingestion and dermal routes; reversible cholinesterase-inhibiting effects, however prolonged or repeated exposure will present with similar symptoms; Lifetime Health Advisory (LHA) level for oxamyl is 200 micrograms/liter; no evidence of mutagenicity or carcinogenicity; does not accumulate in tissue
Paclbutrazol	Y	x		Y	RUP; plant growth regulator and triazole fungicide; for use on ornamentals and turf; not listed in CFR 40; "Paclbutrazol has no food use registrations; therefore, a dietary (food only) risk assessment is not required. Additionally, no toxicity endpoint was identified for an acute dietary assessment" EPA Registration Review 2007.
Parathion-methyl (see methyl parathion)					see methyl parathion (same compound)
Pendimethalin	Y				
Pentachloronitrobenzene	TBD		x		Fungicide; organochlorine pesticide used on cotton; not listed in Codex and no longer approved for use by EU; Group C Possible Human Carcinogen; prolonged exposure to PCNB can include skin sensitization and irritation, and following eye contact, conjunctivitis and keratitis; toxicity increases when dissolved in oil solution than in aqueous suspension
Permethrin	Y	x			RUP; 3.0 limit used on tobacco; organic toxin in chrysanthemums; Low mammalian toxicity, classified as "likely to be carcinogenic" Neurotoxin (motor paralysis via Na+ channel disruption); Liver toxicity; used to treat head lice, scabies; dermal irritant
Phosmet	Y	x			RUP and GUP? non-systemic, organophosphate, ChE inhibitor, neurotoxin; mildly toxic by ingestion; very high toxicity via inhalation; eye irritant; possible human teratogen - potential brain damage seen in animal studies; Suggestive Evidence of Carcinogenicity (liver tumors [adenomas, and adenomas plus carcinomas combined] in male B6C3F1 mice at the highest dose tested)
Piperonyl butoxide	Y	x		Recommended	GUP; Synergist and intended for use with pyrethrins, rotenone and other synthetic pyrethroids; increases toxicity of other pesticides in solution; good indicator if others are in solution esp in concentrates; dermal LD50 1880 mg/kg; sudden bronchospasm, swelling of oral and laryngeal mucous membranes, and shock (anaphylaxis) have been reported after pyrethrum inhalation
Prallethrin	Y		x		RUP fourth generation type I pyrethroid; semisynthetic derivative of the chrysanthememic acids; may cause contact dermatitis and respiratory allergy, asthma like symptoms; may decrease levels in the content of phosphatidyl serine, suggesting PS is a sensitive phospholipid species to pyrethroid action; may irritate the eyes; organophosphates, carbamates, or synergists may be added to improve lethality
Propiconazole	Y	x			GUP; triazole fungicide that has protective, curative, and systemic activity; mode of action is demethylation of C-14 during ergosterol biosynthesis, inhibiting growth; Group C Possible Human Carcinogen; respiratory tract irritant; no evidence of tissue of accumulation

Testing Roll-Out: Two phases based on frequency seen and/or toxicity. Phase 2 will be composite and include all pesticides being tested already in Phase 1.					
Analyte	AZ	Phase 1	Phase 2	Analytical Lab	EPA limits / Clinical Support
List Updated 12/02/19	Test?	Nov 2020	Nov 2021	Level One	Codex Alimentarius (UN/WHO) limits
	Y/N or B for Banned		(add to Phase 1 list)	Frequency of Appearance (Y/N)	
Propoxur	Y	x			GUP not approved for use in food crops (therefore not listed in EPA CFR40 or Codex). Main replacement for DDT. Insecticide and molluscicide for snails. Non-systemic carbamate, reversible neurotoxic ChE inhibitor; toxic if swallowed; not reported to accumulate in mammalian tissue; prolonged exposure will present symptoms similar to acute exposure, with inconclusive potential for permanent behavioral changes; negative effects on offspring, including reduced birthweight and CNS development; Group B2 Probable Human Carcinogen, Confirmed animal carcinogen; shown to induce DNA damage in human lymphocytes
Pyrethrins	Y		x		RUP; natural insecticides; action is by competitively interfering with sodium cationic conductances in the lipid layer of nerve cells, blocking nerve impulse transmissions; GABA channel inhibition; modulation of nicotinic cholinergic transmission; used primarily to control human lice, mosquitoes, cockroaches, beetles and flies; organophosphates, carbamates, or synergists may be added to improve lethality; absorbed most quickly through respiration with low chronic toxicity reported in humans aside from allergic dermal and respiratory reactions, to include asthmatic breathing, sneezing, nasal stuffiness, headache, nausea, incoordination, tremors, convulsions, facial flushing and swelling, and burning and itching sensations.
Pyridaben	Y	x			GUP; organochlorine acaricide/insecticide, metabolic inhibitor that interrupts electron transport chain complex 1 (NADH: ubiquinone oxidoreductase inhibitor); Citrus oil 10 ppm, hops dried cones 10 ppm; Not listed in Codex ; Several formulations cancelled by EPA; Group E Evidence of Non-carcinogenicity for Humans; shown to be a ChE inhibitor in animal studies; toxic if inhaled; can cause mild eye injury; may accumulate in fat over time
Spinetoram	N				2nd gen spinosyn insecticide; aka ethyl spinosad; considered toxicologically equivalent to spinosad; Beet sugar molassas 0.75 ppm; citrus oil 3.0; tea both dried and instant 70 ppm; Some states banned use on hops re: US Hop Industry Plant Protection Committee/Hops Growers of America
Spinosad	Y	x			Biolarvicide; combo of spinosyn A and D analogues; considered toxicologically equivalent to spinetoram; Beet sugar molassas 0.75 ppm; citrus oil 3.0; tea both dried and instant 70 ppm but no registrants; Some states banned use on hops re: US Hop Industry Plant Protection Committee/Hops Growers of America; tox class 3 inhalation and dermal; 4 for oral; used to treat head lice;
Spirodiclofen	Y		x		tetronic acid insecticide used primarily to treat spider mites; inhibitor of acetyl-coenzyme A carboxylase (ACCase) and cause significant reduction in total lipid biosynthesis; skin sensitizer
Spiromesifen	Y	x			tetronic acid insecticide used primarily to treat whiteflies as well as mites; coffee bean green and roasted 0.2 ppm; potential skin sensitizer; inhibitor of acetyl-coenzyme A carboxylase (ACCase) and cause significant reduction in total lipid biosynthesis
Spirotetramat	Y	x			tetronic acid insecticide used to treat aphids; inhibitor of acetyl-coenzyme A carboxylase (ACCase) and cause significant reduction in total lipid biosynthesis; skin sensitizer
Spiroxamine	Y	x			synthetic fungicide (spiroketalamine); Disrupts membrane function. Inhibits sterol biosynthesis in membranes Only approved by EPA for use on 5 crops; hops was removed from approval list/lost US label; known skin and respiratory tract irritant; Technical spiroxamine has a moderate to high acute toxicity; it is a Category III by the oral route, II by the dermal, IV by inhalation and eye irritation; caused severe dermal irritation (Category I). Strong skin irritant; many of its effects are due to irritant properties. Subchronic studies indicate spiroxamine toxicity target organ is the liver, and mucous membranes of the esophagus and forestomach were keratinized and hyperplastic due to strong irritant properties.
Tebuconazole	Y	x		Y	GUP; fungicide used to treat powdery mildew; hops dried cones 30 ppm; orange oil 10; coffee roasted bean 0.3, 0.1; sunflower oil 0.2; Cancer Classification: Group C Possible Human Carcinogen
Thiacloprid	Y	x			RUP; Nicotinoid insecticide; target nAChE receptors; cancelled by manufacturer Bayer, in effect 2016;
Thiamethoxam	Y	x			RUP; neonicotinoid, similar to imidacloprid; coffee green bean 0.2 ppm; hops dried cone 0.1 ppm, 0.09 ppm; dermal LD50 >2000; Used on alfalfa in AZ; Regulated in food handling establishments at 0.02 ppm residual; Classed as likely carcinogen for humans; Most toxic when inhaled or transdermally; minimal acute risk if ingested; investigated for use on tobacco: https://www3.epa.gov/pesticides/chem_search/cleared_reviews/csr_PC-060109_21-Jun-00_a.pdf
Trifloxystrobin	Y	x			GUP; fungicide, beta-methoxyacryl ester, used for powdery mildew; coffee green bean 0.02 ppm; hops dried cone 11 ppm, olive oil virgin 0.9 ppm; strong dermal sensitizer and eye irritant (tox class 3; consider LC50 value)
	Recommended testing = 61 agents				
	TBD = 6 agents				
	Recommended no testing = 5				

Pesticides/PGR Safety Limits by State

Analyte	USP	AOAC	MN	OR, AR, WA	MI	MO	MD	IA	MT		FL, HI	PA	CA			NH	RI	MA	CT	CO	NV
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		ppm	ppm	ppm			ppm	ppm	ppm	ppm	ppm	ppm
		Plant Material							Flower	Extract			All	Inhalable	Other					Flower	
Abamectin (Avermectins)		0.05		0.5	0.5	0.5	0.5		0.5	2.5	1	0.1		0.1	0.3	0.01	0.01		0.01	0.07	0.05
Acephate	0.1	0.1	0.1	0.4	0.4	0.4					1	0.1		0.1	5	0.01					
Acequinocyl		0.1		2	2	2			2	10	1	0.1		0.1	4	0.01	0.01		0.02		4
Acetamiprid		0.1		0.2	0.2	0.2	0.2	0.2			1	0.1		0.1	5	0.01					
Aldicarb		0.1		0.4	0.4	0.4	0.4	0.4			1	0.1	< 0.1			0.01					
Ancymidol		0.1					0.2														
Azoxystrobin		0.02		0.2	0.2	0.2	0.2	0.2			1	0.1		0.1	40	0.01				0.02	
Bifenazate		0.01		0.2	0.2	0.2	0.2	0.2	0.2	1	1	0.1		0.1	5	0.01	0.01	0.01	0.1	0.02	15
Bifenthrin		0.01		0.2	0.2	0.2	0.2		0.2	1	1	0.1		3	0.5	0.01	0.01	0.01	0.05		0.05
Boscalid		0.1		0.4	0.4	0.4	0.4	0.4			1	0.1		0.1	10	0.01					
Captan		0.05										0.1		0.7	5						0.05
Carbaryl		0.2		0.2	0.2	0.2	0.2	0.5			1	0.1		0.5	0.5	0.01					
Carbofuran		0.1		0.2	0.2	0.2	0.2	0.2			1	0.1	< 0.1			0.01				B	
Chlorantraniliprole		0.2		0.2	0.2	0.2	0.2	0.2			1	0.1		10	40	0.01					
Chlordane	0.05	0.1	0.05										< 0.1							B	
Chlorfenapyr		0.1		1	1	1					1	0.1	< 0.1			0.01					
Chlormequat Chloride		0				0.2			1	5						0.01	0.01				
Chlorpyrifos (-ethyl)	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.6			1	0.1	< 0.1			0.01					
Clofentezine		0.1		0.2	0.2	0.2	0.2				1	0.1		0.1	0.5	0.01					
Coumaphos		0.1											< 0.1								
Cyfluthrin	0.1	0.01	0.1	1	1	1	1		1	5	1	0.1		2	1	0.01	0.01	0.01	0.02		4
Cypermethrin	1	0.05	1	1	1	1		18			1	0.1		1	1	0.01					0.5
Daminozide		0.05		1	1	1	1		1	5		0.1	< 0.1			0.01	0.01			B	0.5
Diazinon	0.5	0.1	0.5	0.2	0.2	0.2		2.6			1	0.1		0.1	0.2	0.01					
Dichlorvos (DDVP)	1	0.1	1	0.1	1	1		0.1			1	0.1	< 0.1			0.01					
Dimethoate	0.1	0.1	0.1	0.2	0.2	0.2	0.2				1	0.1	< 0.1			0.01					

Pesticides/PGR Safety Limits by State

Analyte	USP	AOAC	MN	OR, AR, WA	MI	MO	MD	IA	MT		FL, HI	PA	CA			NH	RI	MA	CT	CO	NV
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		ppm	ppm	ppm			ppm	ppm	ppm	ppm	ppm	ppm
		Plant Material							Flower	Extract			All	Inhalable	Other					Flower	
Dimethomorph		2										0.1		2	20						60
Ethoprophos		0.1		0.2	0.2	0.2		0.4			1	0.1	< 0.1			0.01					
Etofenprox		0.1		0.4	0.4	0.4		0.4			1	0.1	< 0.1			0.01					
Etoxazole		0.01		0.2	0.2	0.2	0.2		0.2	1	1	0.1		0.1	1.5	0.01	0.01	0.01	0.01	0.01	7
Fenhexamid		0.1										0.1		0.1	10						30
Fenoxycarb		0.1		0.2	0.2	0.2			0.2	1		0.1	< 0.1			0.01	0.01				
Fenpyroximate		0.1		0.4	0.4	0.4	0.5				1	0.1		0.1	2	0.01					
Fipronil		0.1		0.4	0.4	0.4	0.4	1			1	0.1	< 0.1			0.01					
Flonicamid		0.1		1	1	1	1	1			1	0.1		0.1	2	0.01					7
Fludioxonil		0.02		0.4	0.4	0.4	0.4				1	0.1		0.1	30	0.01					0.2
Flurprimidol		0					0.2														
Hexythiazox		0.1		1	1	1	1				1	0.1		0.1	2	0.01					
Imazalil		0.01		0.2	0.2	0.2	0.2		0.2	1	1	0.1	< 0.1			0.01	0.01	0.01	0.1	0.04	
Imidacloprid		0.01		0.4	0.4	0.4	0.4	0.4	0.4	2	1	0.1		5	3	0.01	0.01	0.01	0.05	0.02	0.5
Kresoxim-methyl		0.1		0.4	0.4	0.4	0.4				1	0.1		0.1	1	0.01					
Malathion	1	0.05	1	0.2	0.2	0.2	0.2				1	0.1		0.5	5	0.01				0.05	
Metalaxyl		0.2		0.2	0.2	0.2	0.2	0.2			1	0.1		2	15	0.01					
Methiocarb		0.1		0.2	0.2	0.2	0.2	0.4			1	0.1	< 0.1			0.01					
Methomyl		0.4		0.4	0.4	0.4	0.4	0.4			1	0.1		1	0.1	0.01					
Methyl parathion		0.1		0.2	0.2	0.2		8.5				0.1	< 0.1			0.01				B	
Mevinphos		0.1											< 0.1							B	
MGK-264		0.2		0.2	0.2	0.2					1	0.1				0.01					
Myclobutanil		0.01		0.2	0.2	0.2	0.2	0.3	0.2	0.6	1	0.1		0.1	9	0.01	0.01	0.01	0.02	0.04	4
Naled		0.1		0.5	0.5	0.5	0.5				1	0.1		0.1	0.5	0.01					
Oxamyl		0.5		1	1	1	1	1			1	0.1		0.5	0.2	0.01					
Paclobutrazol		0.05		0.4	0.4	0.4	0.4		0.4	2	1	0.1	< 0.1			0.01	0.01		0.4		0.5

Pesticides/PGR Safety Limits by State

Analyte	USP	AOAC	MN	OR, AR, WA	MI	MO	MD	IA	MT		FL, HI	PA	CA			NH	RI	MA	CT	CO	NV
	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm		ppm	ppm	ppm			ppm	ppm	ppm	ppm	ppm	ppm
		Plant Material							Flower	Extract			All	Inhalable	Other					Flower	
Parathion-methyl	0.2		0.2								1										
Pendimethalin (herbicide)	0.1		0.1																		
Pentachloronitrobenzene		0.2											0.1	0.2							0.2
Permethrin	1	0.04	1	0.2	0.2	0.2	0.5	1.1			1	0.1	0.5	20	0.01				0.04		
Phosmet	0.05	0.02	0.05	0.2	0.2	0.2	0.2				1	0.1	0.1	0.2	0.01						
Piperonyl butoxide	3	0.5	3	2	2	2	1				1	0.1	3	8	0.01						10
Prallethrin		0.05		0.2	0.2	0.2					1	0.1	0.1	0.4	0.01						
Propiconazole		0.05		0.4	0.4	0.4	0.4				1	0.1	0.1	20	0.01						
Propoxur		0.05		0.2	0.2	0.2					1	0.1	< 0.1		0.01						
Pyrethrins		0.5		1	1	1	1		1	5	1		0.5	1	0.01				0.05		1
Pyridaben		0.1		0.2	0.2	0.2		0.2			1	0.1	0.1	3	0.01						
Spinetoram		0.1										0.1	0.1	3							1.7
Spinosad		0.06		0.2	0.2	0.2	0.2		0.2	1	1	0.1	0.1	3	0.01	0.01		0.01	0.06	0.06	10
Spiromesifen		0.01		0.2	0.2	0.2	0.2		0.2	1		0.1	0.1	12	0.01	0.01	0.01	0.02	0.03		
Spirotetramat		0.02		0.2	0.2		0.2		0.2	1	1	0.1	0.1	13	0.01	0.01		0.2	0.02	0.02	10
Spiroxamine		0.1		0.4	0.4	0.4		2				0.1	< 0.1		0.01						
Tebuconazole		0.01		0.4	0.4	0.4		0.4			1	0.1	0.1	2	0.01					0.01	
Thiacloprid		0.1		0.2	0.2	0.2	0.2	0.2			1	0.1	< 0.1		0.01						
Thiamethoxam		0.05		0.2	0.2	0.2	0.2	0.2			1	0.1	5	4.5	0.01						0.2
Trifloxystrobin		0.01		0.2	0.2	0.2	0.2		0.2	1	1	0.1	0.1	30	0.01	0.01	0.01	0.05			11

NH must use organic pesticides

§29.427 Pesticide residue standards.

The maximum concentration of residues of the following pesticides allowed in flue-cured or burley tobacco, expressed as parts by weight of the residue per one million parts by weight of the tobacco (ppm) are:

CHLORDANE	3	Banned in 1988 by EPA	Utilized on tobacco but not on list:
DIBROMOCHLOROPROPANE (DBCP)	1		Chlorantraniliprole
DICAMBA (Temporary)	5		Metalaxyl
ENDRIN	0.1		
ETHYLENE DIBROMIDE (EDB)	0.1		
FORMOTHION	0.5		
HEXACHLOROBENZENE (HCB)	0.1		
METHOXYCHLOR	0.1		
TOXAPHENE	0.3		
2,4-D (Temporary)	5		
2,4,5-T	0.1		
Sum of ALDRIN and DIELDRIN	0.1		
Sum of CYPERMETHRIN and PERMETHRIN (Temporary)	3		
Sum of DDT, TDE (DDD), and DDE	0.4		
Sum of HEPTACHLOR and HEPTACHLOR EPOXIDE	0.1		

[54 FR 24663, June 9, 1989; 54 FR 27855, July 3, 1989]"