Pesticide Residues and Arsenic Found in Produce Sold in Connecticut in 2018-2019:

MFRPS ISO 17025:2017 Food Testing

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Introduction:

The Department of Analytical Chemistry (DAC) at the Connecticut Agricultural Experiment Station (CAES) provides regulatory enforcement analysis of pesticide residues found on domestic and imported food sold within the state to the Connecticut Department of Consumer Protection (DCP). This pesticide residue program ensures: 1) that pesticides on food products are used in accordance with their label and 2) that the public is protected from the deliberate or accidental misuse of pesticides. The DAC also began testing for arsenic in select food samples for the DCP in 2016.

Violations of Federal law occur when pesticides are not used in accordance with label registration and are: 1) applied in excessive amounts (over tolerance) or 2) when pesticides are accidentally or deliberately applied to crops on which they are not permitted for use (no tolerance). A more complete overview of the agencies involved, their roles, and a discussion of tolerances is found in Krol *et al.* 2006[1]. Likewise, The Food and Drug Administration (FDA) has issued nonbinding action level recommendations for arsenic in bottled water[2], and draft action levels for apple juice[3], and rice cereals for infants[4]. The results of the laboratory findings at the CAES are forwarded to the DCP for all samples submitted.

The DAC at the CAES gained accreditation for chemical testing to the International Organization for Standardization (ISO) / International Electrochemical Commission (IEC) ISO/IEC 17025:2005(E) standard on December 28, 2016. Subsequently the laboratory gained accreditation to the updated ISO/IEC 17025:2017 standard February 28, 2019. The Food Safety Modernization Act (FSMA)[5] mandated accreditation for regulatory testing labs. It is widely recognized that accreditation is a rigorous assessment, conducted by an independent science-based organization, which assures the capability and competency of a laboratory and its management systems. The DAC is currently accredited by the American Association for Laboratory Accreditation (A2LA) for: 1) Pesticide Residues in Foods by GC/MS and LC/HRMS, 2) Total Arsenic in Juice, and Solid and Semi-Solid Food Matrices by ICP/MS, and 3) AFRPS Aflatoxin Analysis by UHPLC/MS[6].

The current work reports upon the 118 samples tested in 2018 calendar year and the 118 samples tested in 2019 for pesticide residues. The results of testing for arsenic in 24 processed food samples in each year are also included. All samples were submitted by the CT DCP as part of the Manufactured Food Regulatory Program Standards (MFRPS) cooperative agreement testing program and were tested in accordance with the ISO/IEC 17025 standard. Samples are collected by the CT DCP and delivered to the CAES without prior knowledge of pesticide application.

Methods:

Samples for Pesticide Residues:

The sample extraction and cleanup procedure is based on QuEChERs chemistry. Following homogenization and extraction, samples are analyzed by liquid chromatography with high resolution mass spectrometry (LC/HRMS) and gas chromatography with tandem mass spectrometry (GC/MS/MS). Findings are reported to the DCP in mg/Kg (ppm). Based on past FDA enforcement and the enforcement levels in use in the European Union (EU), the CAES defines its Limit of Reporting (LOR) at 0.010 mg/Kg (ppm). Limits of Detection (LOD) levels and measurement uncertainty have been established for all pesticides reported.

Samples for Total Arsenic:

Samples are digested with acid and analyzed by inductively coupled plasma mass spectrometry (ICP/MS). Findings are reported to the DCP in µg/kg (ppb). In 2005, The FDA issued an action level for arsenic in bottled water at 10 µg/L (ppb)[2]. Draft guidance action levels for inorganic arsenic in apple

juice at 10 µg/kg (ppb)[3] and rice cereals for infants at 100 µg/kg (ppb)[4] were proposed by the FDA in 2013 and 2016 respectively. The CAES does not report arsenic levels lower than10 µg/kg (ppb). If no arsenic or trace levels are found, the CAES reports < 10 µg/kg (ppb). The CAES does not perform speciation to determine organic/inorganic arsenic.

Quality Assurance and Reproducibility

Calibration standards are prepared from reference materials that are traceable to the point of manufacture. Analyte spike-recoveries are evaluated with each batch of samples tested. All systems used for analysis are verified prior to use. Balances are calibrated annually and verified when used to ensure accuracy. Verification weights are National Institute of Standards and Technology (NIST) traceable through the Standard International (SI) system of units. Trends in the data produced are reviewed and analyzed. Overall method uncertainty (MU) has been established and is documented. Batch acceptability is determined using various quality control samples (QCS).

Results and Discussion

Pesticide Residue Program

Abbreviations are used in Tables 1 and 2 for pesticides and for the sample source. Table 3 contains a list of the 68 different pesticides found in the 2018-2019 timeframe, the corresponding abbreviations used in Tables 1 and 2, and the number of times each pesticide was found in each year. Residues in violation of Federal Tolerance Levels[7] are highlighted in Bold Red. The sample source column lists the State in which the sample originated by its two-letter abbreviation. For those samples originating outside of the US, a three-letter code is used. Table 5 correlates the three-letter abbreviation with the country. It also provides the frequency of sampling for that country for each of the two years for the pesticide residue work. The country abbreviations are also used for the arsenic data that is presented in Table 5.

The 2018 findings are summarized in Table 1. Of the 118 samples tested in 2018, 60 (51%) were found to contain at least one pesticide residue greater than the 0.010 mg/Kg (ppm) reporting limit. There were no residues reported in the remaining 58 (49%) samples. Of the 60 found to contain residues, there were four samples that contained a total 9 residues that were illegal. These four samples were reported as no tolerance violations. There were 19 (16%) samples of organic food tested. Pesticide residues were found in two (11%) of the organic food tested. One of these was reported as a no tolerance violation. There were 6 (5%) samples of baby food tested. Of the 118 total samples, 48 (41%) were produced outside the US; 68 (58%) were from the United States; and two were of unknown origin. A total of five (4%) samples were grown in Connecticut. Samples were collected from retailers in 26 towns and cities throughout the State.

The 2019 findings are summarized in Table 2. Of the 118 samples tested in 2019, 48 (41%) were found to contain at least one pesticide residue. There were no residues reported in the remaining 70 (59%) samples. Of the 48 found to contain residues, there was one sample of snap peas from Guatemala containing an illegal residue of the fungicide tebuconazole that resulted in a no tolerance violation. There were 24 (20%) samples of organic food tested. No pesticide residues were found in any of the organic food tested. There were 10 (8%) samples of baby food tested. Of the 118 total samples, 42 (36%) were produced outside the US; 75 (64%) were from the United States; and one was of unknown origin. A total of five (4%) samples were grown in Connecticut. Samples were collected from retailers in 29 towns and cities in Connecticut

The results of all analyses performed at the CAES are reported to the DCP. All regulatory enforcement of illegal residues where CT is the source are performed by the CT DCP. In those cases where illegal residues are reported on samples whose source is outside of CT, the DCP will forward the

results of the CAES to the FDA or USDA for enforcement. Enforcement actions (or lack thereof) taken by the DCP, FDA or the USDA are not always communicated back to the CAES.

Arsenic Testing Program

Arsenic is a naturally occurring element widely found in nature and may be present in foods owing to the environment. The FDA has issued nonbinding action level recommendations for arsenic in bottled water[2], and draft action levels for apple juice[3], and rice cereals for infants[4].

There were 24 samples tested for arsenic in 2018. Of these, 7 (29%) were baby food, 8 (33%) were juices and ciders, 6 (25%) were cereals, and 3 (13%) were yogurts (Table 5). Of these 24 samples tested, six (25%) were found to contain arsenic above the 10 µg/Kg (ppb) reporting level. There was no arsenic reported in the remaining 18 (75%) samples.

In 2018 there were 5 cereal and one baby food sample that were found to contain reportable levels of arsenic. All these samples contained multiple ingredients, and all contained rice, the likely source of arsenic contamination[4]. An organic baby food was among those found to contain arsenic. The organic label does not mean a commodity is arsenic free. Results of these analysis were reported the DCP with the annotation "The method of analysis has not been validated for this sample matrix."

There were 24 samples tested for arsenic in 2019. Of these, 13 (54%) were baby food, 10 (42%) were juices and ciders, and 1 (4%) were yogurts (Table 5). Of these 24 samples tested, 1 (4%) were found to contain arsenic above the 10 µg/Kg (ppb) reporting level. There was no arsenic reported in the remaining 23 (96%) samples.

In 2019 a sample of sweet potato baby food was found to contain reportable arsenic (34 µg/Kg (ppb)). Results of this analysis were reported the DCP with the annotation "The FDA has not established a regulatory limit for the amount of arsenic in foods."

Conclusions:

Nearly all the food we eat, with the exception of organically grown produce, has been intentionally treated with pesticides during the course of its production. If the pesticides used during the production of this food have been applied in accordance with the approved use of the product, the levels resulting on the food will be below the EPA tolerance. The results of this work allow the consumer to gain a better understanding of the prevalence and levels of pesticide residues in the food they consume.

Naturally occurring arsenic may be present in some of the foods we consume. The organic designation does not seem to be an accurate reflection on the amount of arsenic in a given sample. The amount of arsenic found in samples of baby food tested seems best correlated to the amount of rice contained in the sample. The CAES does not perform arsenic speciation, which determines both organic and inorganic arsenic in a sample. Inorganic arsenic is the form of toxicological concern. Although some values of arsenic in samples may seem high, they may not truly represent the true amount of inorganic arsenic contained in a sample.

Table 1: 2018 Pesticide Residue Findings. Additional commodity information may be available upon request.

Sample ID	Commodity	Sample Source	Town Collected	Organic ?	Pesticides Found mg / Kg (Parts-per Million)
ZR-90	Apple Juice	US	Fairfield	N	
ZR-91	Asparagus	PER	Fairfield	N	
ZR-92	Arugula	US	Fairfield	N	Perm-0.011; Azox-0.209; Clan-0.026; Fena-0.011; Mand-0.741; Meta-0.018
ZR-93	Beets	US	Fairfield	Y	
NS-61	Squash, Zucchini	MEX	Mystic	Y	Imid-0.024
NS-62	Starfruit	FL	Mystic	N	
NS-63	Brussels Sprouts	CA	Mystic	N	
NS-64	Blackberries	MEX	Mystic	Y	
NS-65*	Pear Puree	US	Mystic	Y	
ZR-95*	Pear Puree	US	Bethel	N	Pral-0.05; Pyri-0.045
ZR-96	Raspberries	MEX	Bethel	N	Bifz-0.042
ZR-97	Broccoli	**Unk**	Bethel	N	
ZR-98	Squash, Butternut	US	Bethel		
NS-67	Pepper, Bell	MEX	Hebron	Y	Spin-0.024
NS-68	Broccoli	**Unk**	Hebron	N	
NS-69	Kiwi	ITA	Hebron	N	
NS-70	Onion, Green	MEX	Hebron	N	DCPA-0.025
NS-71	Beet Juice	PA	Hebron	Y	
ZR-104*	Rice	MI	Cheshire	N	
ZR-105	Eggplant	MEX	Cheshire	N	Pral-0.108; Thia-0.016
ZR-106	Asparagus, White	PER	Cheshire	N	
ZR-107	Peas, Sugar Snap	GTM	Cheshire	N	Cyhl-0.020
NS-77	Chard, Swiss	FL	New London	Y	
NS-78	Mushrooms	RI	New London	Y	
NS-79	Kale	FL	New London	Y	
NS-80	Coconut	THA	New London	Y	
NS-81	Tangerines	FL	New London	N	Flud-0.016; Prop-0.017; Imaz-0.162; Thib-0.123
NS-87	Malanga	ECU	New London	N	Mycl-0.012
NS-88	Espino	BOL	New London	N	
NS-89	Daikin	**Unk**	New London	N	
NS-90	**Cilantro**	**CRJ**	**New London**	N	Azox-0.087; **Chlr-0.029; Oxyf-0.022; Tebu-0.253; Tria-0.034**
NS-91*	Rice	NY	New London	N	
NS-93	Squash, Yellow	FL	Higganum	N	Chlo-0.022; Imid-0.087; Cyaz-0050;Flon-0.125; Proa-0.259

NS-94	Pineapple	CRJ	Higganum	N	Flud-0.051
NS-95	Lettuce, leaf	CA	Higganum	N	Flon-0.010; Mand-0.026
NS-96	Turnip	NH	Higganum	N	
NS-97	Berry Juice	DOM	Higganum	Y	
MR-138	Strawberries	CA	Bloomfield	N	Meta-0.017; Bifz-0.089; Bosc-0.146; Nova-0.122; Pyra-0.026; Quin-0.037
MR-141	Blackberries	MEX	Berlin	N	
MR-142	Avocado	MEX	Berlin	N	
MR-143	Peppers, Bell	MEX	Berlin	N	Clot-0.122; Thia-0.055; Thic-0.018
NS-99	Apricots	CA	Pawcatuck	N	Cypr-0.045; Bosc-0.183; Pyra-0.044
NS-100	Cherries, Sweet	CA	Pawcatuck	N	Cyhl-0.017; Fenp-0.177; Flud-0.211; Tebu-0.143; Fenh-0.045
NS-101	Corn, Cobb	AR	Pawcatuck	N	
NS-102	Parsley	MEX	Pawcatuck	N	Meta-0.011; Azox-0.085; Flon-0.400; Pyra-0.247; Spnt-0.200
NS-103	Potatoes	CA	Pawcatuck	N	Chlp-0.246; Imid-0.013
NS-104	Fiddleheads	MA	Pawcatuck	N	
NS-108	Cauliflower	CA	Woodbury	Y	
NS-109	Chard	CT	Woodbury	Y	
NS-110	Mushrooms	CT	Woodbury	Y	
NS-111	Broccoli	MD	Woodbury	Y	
MR-155	Cassava	CRJ	E. Hartford	N	
MR-156	Lettuce, Leaf	CA	E. Hartford	N	Azox-0.016
MR-157	Cilantro	NJ	E. Hartford	N	Prop-0.034; Azox-0.013;
MR-158	Apricots	CA	Cheshire	N	Clan-0.032
MR-159	Grapes, Red	MEX	Cheshire	N	
MR-160	Artichoke, Hearts	CA	Cheshire	N	Bifn-0.015; Mycl-0.116; Clan-0.077; Thia-0.023
MR-163	Yo Choi Leaves	CAN	N. Windham	N	Acet-0.011; Dimm-0.029
MR-164	Cherries	WA	N. Windham	N	Cyhl-0.014; Flud-0.376; Bosc-0.033; Pyra-0.014; Trfu-0.010
MR-165	Yams	CA	N. Windham	N	
MR-166	Raspberries	CA	Willimantic	N	Spnt-0.107
MR-167	Plums	CA	Willimantic	N	
MR-168	Garlic	CHN	Willimantic	N	
NS-120	Mint	NJ	Rocky Hill	N	Azox-0.010
NS-121	Nectarines	CA	Rocky Hill	N	Flud-0.280; Prop-0.153;Clan-0.029; Hexy-0.020;
NS-122	Limes	MEX	Rocky Hill	N	
NS-123	Eggplant	NJ	Rocky Hill	N	
KH-05	Endive, Belgian	BEL	Danbury	N	
KH-06	Blueberries	CAN	Danbury	N	Bifn-0.067; Cypr-0.022; Flud-0.069
KH-07	Beans, Green	GTM	Danbury	N	
KH-08	Dragon Fruit	ECU	Danbury	N	
KH-09	Tomatoes	ME	Danbury	N	Clan-0.177; Pyra-0.118; Spnt-0.041; Trif-0.035

KH-10	Peaches, Donut	NY	Danbury	N	Capt-0.445; Cyhl-0.050; Fenp-0.029; Bupr-0.125
MR-171	Chayote	CRJ	Hartford	N	
MR-172	Peppers, Hot	DOM	Hartford	N	Imid-0.010; Acet-0.026
MR-173	Orange, Navel	CHL	Hartford	N	Flud-0.020; Chlr-0.035; Imaz-0.724; Thib-0.285; Acet—0.016
MR-174	Thyme	COL	Hartford	N	Imid-1.55
KH-17	Apricot	CA	New Haven	N	Meth-0.041
KH-18	Onions, Green	MEX	New Haven	Y	
KH-19	Yucca, root	CRJ	New Haven	N	
KH-20	Okra	HND	New Haven	N	
KH-21	Pears	CA	New Haven	N	Pyri-2.13
KH-22	Lemons	CHL	New Haven	N	Chlr-0.040; Acet-0.030; Cypm-0.031; Flud-2.51; Pyrp-0.105; Imaz-1.10
MR-177	Peaches	CT	S. Glastonbury	N	Imid-0.013; Phos-0.010; Pyra-0.052
MR-178	Apples	CT	S. Glastonbury	N	Phos-0.080; Pyra-0.028; Spir-0.042
MR-179	Plums	CT	S. Glastonbury	N	Pyra-0.016
MR-180T	Radish, Greens	CAN	E. Windsor	N	
MR-180R	Radish, Roots	CAN	E. Windsor	N	
KH-40	Rutabaga	CAN	Woodbury	N	Chlr-0.010
KH-41	Squash, Acorn	MA	Woodbury	Y	
KH-42	Plums, Prune	MA	Woodbury	N	Cypr-0.026; Acet-0.098; Clan-0.024; Fenb-0.015; Pyra-0.054
KH-43	Limes	MEX	Southbury	N	Azox-0.052; Imaz-1.24; Thib-0.087; Flud-0.723
ZJ-118	Brussels Sprouts	US	Lisbon	N	Bifn-0.015
ZJ-119	Onion	US;CHN IND	Lisbon	N	
ZJ-120	**Cinnamon**	**US; CHN IND**	**Lisbon**	Y	**Bifn-0.072**
ZJ-121	Parsley	US	Lisbon	N	Prop-1.39; DCPA-0.010
ZJ-122	Basil	US	Lisbon	N	Cyaz-2.48
ZJ-123	**Thyme**	**US**	**Lisbon**	**N**	Azox-0.213; **Difn-0.229; Meta-0.027; Cyhl-0.108**
KH-50	Squash, Butternut	MEX	Trumbull	Y	
KH-51	Pomegranate	CA	Trumbull	N	Bifn-0.037; Imid-0.011
KH-52	Cranberry	MA	Trumbull	N	
KH-52	Mushrooms	US	Monroe	N	
ZJ-124	Cilantro	CA, AZ	Waterford	N	Cypm-0.089; Clan-0.019
ZJ-125	Onion, Green	MEX	Waterford	N	
ZJ-126	**Artichoke**	**CA**	**Waterford**	**N**	**Dimm-0.016;** Esfn-0.017; Perm-0.030; Mycl-0.047; Azox-0.396; Imid-0.015; Clan-0.018; Difl-0.127; Meth-0.08; Thia-0.101
ZJ-127	Cantaloupe	MEX	Waterford	N	Bupr-0.011

ZJ-128	Lemons	CA	Waterford	N	Azox-0.024;Imaz-0.844; Thib-0.640
ZJ-129	Avocado	US	Waterford	N	Cyhl-0.011; Cypm-0.249; Perm-0.105; Meth-0.017
AD-1	Figs	CA	New Britain	N	
AD-2	Lettuce, Head	CA	New Britain	N	Fena-0.286; Cyhl-0.049
AD-3	Pears	OR	New Britain	N	Imid-0.066; Acet-0.079; Pyri-0.143; Spir-0.023
AD-4	Avocado	MEX	New Britain	N	
AD-5	Potato	US	New Britain	N	
AD-7*	Carrots	MI	New Britain	N	
AD-9*	Peach	NY	New Britain	N	Cypr-0.014
AD-10	Limes	MEX	New Britain	N	Imaz-0.071
AD-11	Peppers, Bell	CA	New Britain	N	
AS-12	Tomatoes	MEX	New Britain	N	

* - Denotes Baby Food

Table 2: 2019 Pesticide Residue Findings. Additional commodity information may be available upon request.

Sample ID	Commodity	Sample Source	Town Collected	Organic ?	Pesticides Found mg / Kg (Parts-per Million)
KH-71	Clementine	ESP	Stratford	N	Prop-0.265; Imaz-1.34
KH-72	Celery	CA	Stratford	N	Bosc-0.024
KH-73	Cucumber	MEX	Stratford	N	Proa-0.016
KH-74	Apple Pear	CA	Stratford	N	Flud-0.406; Acet-0.024; Bosc-0.155; Meth-0.029; Pyra-0.044; Sprt-0.021
KH-75	Cabbage, Green	FL	Stratford	N	
KH-76	Pineapple	CRJ	Stratford	N	Flud-0.052; PipB-0.079
ZJ-132	Strawberries	CA	E. Haven	N	Flon-0.016
ZJ-133	Blueberries	PER	E. Haven	N	
ZJ-134	Oranges	CA	E. Haven	N	Imaz-1.34; Thib-1.59
ZJ-135*	Sweet Potato	NJ	E. Haven	Y	
ZJ-137	Watermelon Juice	FL	E. Haven	N	
KH-78	Mango	PER	Vernon	N	
KH-79	Cantaloupe	HND	Vernon	N	
KH-80	Orange Juice	FL	Tolland	N	Imaz-0.173; Thib-0.332
KH-82*	Peach	CHL	Tolland	N	Cyhl-0.017
ZJ-141	Tomatoes	MEX	Mansfield Center	Y	
ZJ-142	Apples	WA	Mansfield Center	N	DipA-0.0460; Thib-0.240
ZJ-143	Plums	CHL	Mansfield Center	N	
ZJ-144	Mushrooms	US	Mansfield	N	
ZJ-145	Nectarines	CHL	Mansfield	N	Flud-0.525; Acet-0.028; Ipro-0.326; Pyri-0.096; Spin-0.027; Thic-0.042

ZJ-146	Lettuce, Leaf	CA	Mansfield	N	Cyhl-0.016; Imid-0.047; Cymo-0.012; Mand-0.039; Spin-0.016
ZJ-147	Squash, Green	MEX	Branford	N	
ZJ-148	Broccoli	MEX	Branford	N	
ZJ-149	Grapes, Green	CHL	Branford	N	Cypr-0.212; Tebu-0.033; Acet-0.124; Clan-0.059; Fenh-1.00; Meth-0.038; Mycl-0.011
ZJ-150	Dates	**UNK**	Branford	N	
ZJ-151	Kale	GA	Branford	N	Azox-0.268; Imid-0.051; Pyra-0.431
ZJ-152	Peppers, Sweet	FL	Branford	Y	
KH-88	Blueberries	CHL	Westport	N	Phos-0.190
KH-89	Kiwi	ITA	Westport	Y	
KH-90*	Blueberry	MI	Westport	N	
KH-91*	Apple	NY	Westport	Y	
AD-34*	Sweet Potato	NY	Winsted	Y	
AD-36	Radish	FL	Winsted	N	
AD-37	Peas, Snap	GTM	Winsted	N	
AD-38	Eggplant	MEX	Winsted	N	
AD-39	Broccolini	CA	Winsted	N	
ES-7162	Apple Juice	TUR	Canaan	N	
ES7163	Celery	CA	Canaan	Y	
ES-7164	Avocado	MEX	Canaan	N	Perm-0.051
ES-7165	Potato	FL	Canaan	N	
AD-40	Ginger, Root	THA	Canterbury	N	
AD-41	Corn, on Cobb	FL	Canterbury	N	
AD-42	Pepper, Jalapeno	NDL	Canterbury	N	
AD-43	Squash, acorn	FL	Canterbury	N	
AD-44	Apple Juice	FL	Plainfield	N	Flud-0.033
ES-7167	Apple Juice	IL	Waterbury	Y	
ES-7168	Apples	CAN	Waterbury	N	Flud-0.231; Mycl-0.012
ES-7169	Lettuce, Head	CA	Waterbury	N	
ES-7170	Kale	MD	Waterbury	N	
ES-7171	Beans, green	FL	Waterbury	N	Flud-0.180
AD-46	Nectarines	CA	Enfield	N	
AD-47	Peaches	SC	Enfield	N	Clot-0.011; Dino-0.062; Pyra-0.032; Cyfl-0.018; Cypm-0.014; Flud-0.163
AD-48	Mushrooms	NJ	Enfield	N	Thib-0.103
AD-49	Grapes, Red	MEX	Enfield	N	Mycl-0.040; Tebu-0.042
AD-50	Cherries, Juice	IL	Ellington	N	
ES-7172	Blueberries	GA	Orange	Y	
ES-7173	Mango	MEX	Orange	N	
ES-7174	Peaches	GA	Orange	N	Flud-0.909; Perm-0.092; Azox-0.015; Clot-0.034
ES-7175	Apricots	CA	Orange	N	Bosc-0.026; Ipro-0.033; Meth-0.336
ES-7177	Apple, Juice	TUR	Orange	Y	
AD-56	Chives	FL	Stafford Springs	N	

AD-57	Asparagus	MEX	Stafford Spring	N	
AD-58	Mushroom	PA	Stafford Spring	N	Cyro-0.173
AD-59	Carrots	CA	Stafford Spring	Y	
AD-60	Sweet Potato	NJ	Somers	Y	
KH-102	Sweet Potato	CA	Norwalk	N	
KH-103	**Peas, Snap**	**GTM**	**Norwalk**	**N**	**Tebu-0.274**; Cyhl-0.014
KH-104	Corn, Bi-Color	MD	Norwalk	N	
KH-105	Apricots	US	Norwalk	Y	
KH-106	Beans, Green	US	Norwalk	N	
AD-62	Peppers, Bell	NLD	Dayville	N	
AD-63	Mint	NJ	Dayville	N	Terb-0.024
AD-64	Chicory	NLD	Dayville	N	
AD-65	Beans, Green	CA	Dayville	N	
AD-66*	Banana Puree	TX	Danielson	N	
KH-134	Avocados	MEX	Darien	N	Meth-0.053
KH-135	Carrots	CA	Darien	Y	
KH-136	Broccoli	PA	Darien	Y	Spin-0.130
KH-137	Grapes	CA	Darien	N	Bosc-0.420; Cypr-0.135; Fenh-0.107; Pyra-0.144; Trif-0.020; Flud-0.174
KH-138	Apple Puree	NJ	Darien	Y	
KH-147	Apples, Cortland	NY	Stamford	N	Bifn-0.066; Cypr-0.024
KH-148	Apples. Gala	NY	Stamford	N	Bifn-0.107; Cyhl-0.011; Cypr-0.027; Difn-0.014
KH-149	Peaches, Yellow	NJ	Stamford	N	Bosc-0.027; Cyhl-0.015; Perm-0.035
KH-150	Apples	CT	Stamford	N	Indo-0.037; Spin-0.015; Thim-0.034
KH-151*	Apple-Blueberry	MI	Stamford	N	
AD-68	Cucumber	ESP	Manchester	N	Dimm-0.021; Proa-0.072; Pyme-0.019
AD-69	Lemon	ARG	Manchester	N	Flud-1.30; Imaz-0.318; Pyri-1.70; Prop-1.55
AD-70	Apple Cider	CT	Manchester	N	
AD-72	Mango	MEX	Manchester	N	
AD-73	Shallots	FL	Manchester	N	
JP-39*	Apples	MI	Cheshire	Y	
JP-40	Peas, Snow	MD	Cheshire	N	Dimo-0.011
JP-41	Apples, Macoun	CT	Cheshire	N	Acet-0.027
JP-42	Figs	CT	Cheshire	N	
ES-7184*	Apple Puree	NY	Cheshire	N	Acet-0.013; Pyri-0.100
ES-7185	Potatoes	CAN	Cheshire	N	Clot-0.015; Bifn-0.019; Chlp-1.22
ES-7186	Strawberries	CA	Cheshire	N	Bosc-0.123; Meta-0.013; Pyra-0.014; Pyri-0.644; Quin0.031
ES-7187	Apple, Fuji	CT	Cheshire	N	Cypr-0.017; ThiM-0.015; Fenp-0.013
JP-47	Blackberries	CA	W. Haven	N	Pyri-0.045; Fenh-0.011
JP-48	Shallots	CA	W. Haven	Y	
JP-49	Cucumbers	CAN	W. Haven	N	
JP-50*	Bananas	MI	W. Haven	N	
ES-7188	Mango	PA	Canton	Y	

ES-7189	Cucumber	NJ	Canton	N	
ES-7190	Blueberry	CA	Canton	N	Acet-0.038;Difn-0.025; Fenh-0.074; Pyri-0.013
ES-7191	Peach Puree	NJ	Canton	N	
ES-7193	Cucumbers	MEX	Bristol	N	Dino-0.026; Meta-0.029
ES-7194	Cranberries	CAN	Bristol	N	
ES-7195	Lettuce, Head	AZ	Bristol	N	Mand-0.490; Perm-0.063
ES-7196	Limes	MEX	Bristol	N	Azox-0.281; Imaz-0.472; Thib-0.573
ES-7197	Oranges	CA	Bristol	Y	
ES-7198	Apple, Juice	TUR	Bristol	Y	
JP-54	Raspberries	MEX	Shelton	N	Azox-0.310
JP-55	Mushrooms	PA	Shelton	Y	
JP-56	Squash, Butternut	US	Shelton	Y	
JP-57	Cilantro	US	Shelton	N	
JP-58	Potatoes	US	Shelton	N	
JP-59	Sweet Potato	US	Shelton	Y	

* - Denotes Baby Food

Table 3: The 68 Pesticides Found in 2018-2019; their Abbreviations and Frequency (2018, 2019).

Acet – Acetamiprid (6, 6)	Dimo – Dimethoate (0, 1)	PipB – Piperonyl Butoxide (0, 1)
Azox – Azoxystrobin (10, 4)	Dino – Dinotefuran (0, 2)	Pral – Prallethrin (2, 0)
Bifn – Bifenthrin (5, 3)	DipA – Diphenylamine (0, 1)	Proa – Propamocarb (1, 2)
Bifz – Bifenazate (2, 0)	Esfn – Esfenvalerate (1, 0)	Prop – Propiconazole (4, 2)
Bosc – Boscalid (3, 6)	Fena – Fenamidone (1, 0)	Pyme – Pymetrozine (0, 1)
Bupr – Buprofezin (2, 0)	Fenb – Fenbuconazole (1, 0)	Pyra – Pyraclostrobin (9, 5)
Capt – Captan (1, 0)	Fenh – Fenhexamid (1, 4)	Pyri – Pyrimethanil (3, 6)
Chlo – Chlorothalonil (1, 0)	Fenp – Fenpropathrin (2, 1)	Pyrp – Pyriproxyfen (1, 0)
Chlp – Chlorpropham (1, 1)	Flon – Flonicamid (3, 1)	Quin – Quinoxyfen (1, 1)
Chlr – Chlorpyrifos (4, 0)	Flud – Fludioxonil (9, 10)	Spin – Spinosad (1, 2)
Clan – Chlorantraniliprole (8, 1)	Hexy – Hexythiazox (1, 0)	Spir – Spirodiclofen (2, 0)
Clot – Clothianidin (1, 3)	Imaz – Imazalil (6, 5)	Spnt – Spinetoram (3, 2)
Cyaz – Cyazofamid (2, 0)	Imid – Imidacloprid (9, 2)	Sprt – Spirotetramat (0, 1)
Cyfl – Cyfluthrin (0, 1)	Indo – Indoxacarb (0, 1)	Tebu – Tebuconazole (2, 4)
Cyhl – Cyhalothrin, lambda (7, 5)	Ipro – Iprodione (0, 2)	Terb – Terbacil (0, 1)
Cymo – Cymoxanil (0, 1)	Mand – Mandipropamid (2, 2)	Thia – Thiamethoxam (4, 0)
Cypm – Cypermethrin (3, 1)	Meta – Metalaxyl (4, 2)	Thib – Thiabendazole (5, 5)
Cypr – Cyprodinil (4, 5)	Meth – Methoxyfenozide (3, 4)	Thic – Thiacloprid (1, 1)
Cyro – Cyromazine (0, 1)	Mycl – Myclobutanil (3, 3)	ThiM – Thiophanate Methyl (0, 2)
DCPA – Dacthal (2, 0)	Nova – Novaluron (1, 0)	Trfu – Triflumazole (1, 0)
Difl – Diflubenzuron (1, 0)	Oxyf – Oxyfluorfen (1, 0)	Tria – Triadimefon (1, 0)
Difn – Difenoconazole (1, 2)	Perm – Permethrin (3, 4)	Trif – Trifloxystrobin (1, 1)
Dimm – Dimethomorph (2, 1)	Phos – Phosmet (2, 1)	

Table 4: Source Country Abbreviations; Frequency Sampled for Pesticide Residues (2018, 2019).

ARG – Argentina (0, 1)	DOM – Dominican Republic (2, 0)	NLD – Netherlands (0, 1)
BEL – Belgium (1, 0)	ECU – Ecuador (2, 0)	PER – Peru (2, 2)
BOL – Bolivia (1, 0)	ESP – Spain (0, 2)	THA – Thailand (1, 1)
CAN – Canada (5, 4)	GTM – Guatemala (2, 2)	TUR – Turkey (0, 3)
CHL – Chile (2, 5)	HND – Honduras (1, 1)	US – United States (68, 75)
CHN – China (3,0)	IND – India (2, 0)	UNK – Unknown (2, 1)
COL – Columbia (1, 0)	ITA – Italy (1, 1)	**Others for Arsenic Analysis**
CRJ – Costa Rica (5, 1)	MEX – Mexico (20, 14)	BRA – Brazil
		CHE - Switzerland

Table 5: Findings of Arsenic in Samples Tested in 2018-2019. Additional commodity information may be available upon request.

Sample ID	Brand Name; Commodity	Sample Source	Town Collected	Organic	Amount Found µg / Kg (Parts-per Billion)
2018 Arsenic Results:					
ZR-89	Mango Juice	CA	Fairfield	N	< 10
NS-66	Pear-Kiwi-Kale BF	NY	Mystic	Y	< 10
NS-72	Beet Juice	PA	Hebron	Y	< 10
ZR-94	Pear-Pea BF	MN	Bethel	N	< 10
NS-82	Tangerine Juice	FL	New London	Y	< 10
ZR-103	Puff Cereal (Rice)	MI	Cheshire	N	45*
NS-92	Rice Baby Cereal	NY	New London	N	110*
NS-98	Acerola Berry Puree	DOM	Higganum	N	< 10
MR-139	Pear Juice	ARG	Bloomfield	N	< 10
MR-140	Bevvie Crisps BF (Rice)	MI	Bloomfield	Y	16.1*
NS-112	Apple-Pears-Rice BF	NY	Woodbury	Y	< 10
NS-113	Cupauacu Juice Blend	BRA	Woodbury	Y	< 10
NS-124	Peach Yogurt Melts	MI	Rocky Hill	N	< 10
NS-125	Pumpkin-Corn BF	NJ	Rocky Hill	Y	< 10
MR-175	Puffs Baby Cereal BF (Rice)	MI	Hartford	N	53.9*
MR-176	Farina Baby Cereal	CHE	Hartford	N	< 10
MR-181	Pomegranate Juice	CA	East Windsor	N	< 10
MR-182	Prune Juice	CA	East Windsor	N	< 10
KH-44	Strawberry Yogurt Melts	MI	Southbury	N	< 10
KH-45	Apple-Pumpkin Melts	NY	Southbury	N	< 10
KH-54	Puff Blueberry Cereal (Rice)	MI	Monroe	N	47**
KH-55	Puff Banana Cereal (Rice)	MI	Monroe	N	51**
AD-6	Carrot Sitter BF	MI	New Britain	N	< 10
AD-8	Peach BF	NY	New Britain	N	<10
2019 Arsenic Results					
ZJ-136	Sweet potato-Carrot-Apple BF	CA	East Haven	Y	< 10
ZJ-138	Watermelon Juice	FL	East Haven	N	< 10

KH-81	Orange Juice	FL	Tolland	N	< 10
KH-83	Peach BF	CHL	Tolland	N	< 10
KH-92	Blueberry Yogurt Blend	MI	Westport	N	< 10
KH-93	Apple Blend BF	NY	Westport	N	< 10
AD-35	Sweet Potato BF	NY	Winsted	Y	34**
ES-7161	Apple Juice	TUR	Canaan	N	< 10
AD-45	Peach-Passion Fruit Juice	FL	Plainfield	N	< 10
ES-7166	Apple Juice	TUR	Waterbury	Y	< 10
AD-51	Cherry Juice	IL	Ellington	N	< 10
ES-7176	Apple Juice	TUR	Orange	Y	< 10
AD-61	Apple-Spinach BF	NJ	Somers	N	< 10
KH-107	Green Bean BF	MI	Norwalk	N	< 10
AD-67	Banana-Pumpkin-Celery BF	TX	Danielson	Y	< 10
KH-139	Apple-Carrot-Mango BF	NJ	Darien	Y	< 10
AD-71	Apple Cider	CT	Manchester	N	< 10
KH-152	Apple-Blueberry BF	MI	Stamford	N	< 10
JP-38	Apple-Kale-Fig BF	MI	Cheshire	Y	< 10
ES-7183	Apple BF	NY	Cheshire	N	< 10
JP-51	Banana BF	MI	West Haven	N	< 10
ES-7192	Peach Nectar	CAN	Canton	N	< 10
ES-7199	Apple Juice	TUR	Bristol	Y	< 10
AD-61	Sweet Potato BF	NJ	Somers	Y	< 10

BF – Baby Food

* The method of analysis has not been validated for this sample matrix.

** The FDA has not established a regulatory limit for the amount of arsenic in foods

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