Pesticide Residues in Produce Sold in Connecticut from 2014 to 2016:

ISO/IEC 17025:2005 Accreditation for the Food Safety Modernization Act (FSMA)

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Introduction:

On December 28, 2016, the Department of Analytical Chemistry (DAC) at the Connecticut Agricultural Experiment Station (CAES) received accreditation to the ISO/IEC 17025:2005 standard from the American Association for Laboratory Accreditation (A2LA) for chemical testing[5] of pesticide residues in food by gas chromatography with mass spectrometry (GC/MS) and liquid chromatography with high resolution mass spectrometry (LC/HRMS).

Prompted by several incidents of foodborne illnesses in the early part of this century, the Food Safety Modernization Act (FSMA) became law in January of 2011[1]. It is the first major piece of federal legislation to address food safety since 1938[2]. FSMA provided the Food and Drug Administration (FDA) with greater powers to develop regulations and establish safeguards to prevent contamination of the Nation's food supply which may result in foodborne illness. The FDA has issued over 12 rules as a result of the new law[3]. Specifically, Title II, section 202 of the law deals with laboratory accreditation for analyses of foods[1]. One FDA rule under FSMA requires that state laboratories submitting regulatory data to the FDA obtain laboratory accreditation. The Department of Analytical Chemistry (DAC) at the Connecticut Agricultural Experiment Station (CAES) is one of these laboratories and is now accredited for this work.

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 primary accreditation standard used throughout the world is International Organization for Standardization (ISO) / International Electrochemical Commission (IEC) ISO/IEC 17025:2005(E). Recognizing the cost involved with the accreditation process, the FDA made cooperative agreements available in 2011 and again in 2012 to help state laboratories obtain accreditation to the ISO/IEC 17025:2005(E) standard. The DAC at the CAES applied for and received funding for both of these grants. The DAC at CAES began working with the American Association for Laboratory Accreditation (A2LA) to gain accreditation to the ISO/IEC 17025:2005 standard. Following four years of arduous work, the DAC at the CAES received accreditation to the standard from A2LA for chemical testing[5] of pesticide residues in food by GC/MS and LC/HRMS on December 28, 2016.

Historically, the DAC at CAES has tested food samples for pesticide residues for the Connecticut Department of Consumer Protection (DCP) and published the findings since 1963[4]. The CAES is the de facto laboratory used by the DCP to provide regulatory enforcement analysis of pesticide residues found on domestic and imported food sold within the state. This program was put in place: 1) to ensure that pesticides on food products are used in accordance with their label and 2) to ensure that the public is protected from the deliberate or accidental misuse of pesticides.

Violations of the 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). The results of the laboratory findings at the CAES are forwarded to the DCP for all samples submitted. When violations are found on crops grown within Connecticut, the DCP notifies both the grower and the Connecticut Department of Energy and Environmental Protection (DEEP) of the results. The DEEP may perform an audit of the grower's records to ensure proper pesticide use. The DCP may also, at its discretion, recall or destroy the violative commodity /or may request re-testing of the sample. For violations occurring in samples produced outside of Connecticut, the DCP notifies the local field office of the FDA in Stoneham MA of the findings. The FDA has the regulatory authority in these instances and in these cases, relies on the laboratory results obtained at the CAES. The DCP notifies the United States Department of Agriculture (USDA) if a violation occurs on a sample labeled as organic. The USDA is responsible for the enforcement of National organic program (NOP) violations (*Vide Infra*). A more complete overview of the agencies involved, their roles, and a discussion of tolerances is found in Krol et al. 2006[6]. A comparison of the Connecticut and Federal programs was published by Krol et al. in 2014[8].

The current work reports upon the 43 samples tested in 2014, the 130 samples in 2015 and the 106 samples tested during the 2016 calendar years (January 1st through December 31st). Significant changes made in the course of reporting include 1) ending testing for the mycotoxin patulin at the end of 2014; 2) ending preservative testing at the end of 2013; 3) ending the reporting of carbendazim at the end of 2015; 4) implementation of the ISO/IEC 17025:2005 standard; 5) Setting the Limit of Detection (LOD) and the Limit of Reporting (LOR) to 10 µg/ Kg (ppb) beginning in 2014.

Methods

A substantial part of our accreditation progress toward complying with the ISO/IEC 17025 standard involved the development, validation and documentation of our work. The DAC developed and implemented a quality system which includes standard operating procedures (SOP's). These serve to document the procedures used to generate data and to report data to the customer (DCP). A brief synopsis is provided below.

Sample Collection:

Samples are collected by the CT DCP and delivered to the CAES as test items. These are collected without prior knowledge of pesticide application. Information on the inspector's collection report is entered into the electronic Analytical Chemistry Central Database (ACCD). Appropriate analysts are assigned to the samples.

Sample Extraction and Analysis:

The sample extraction and cleanup procedure is based on QuEChERs chemistry. All measurements are made gravimetrically. Fifteen grams (g) of sample homogenate is shaken with 15 g of acetonitrile. Salts are added: magnesium sulfate and sodium acetate, the mixture is shaken intensely and centrifuged for phase separation. An aliquot of the organic phase is cleaned up by dispersive SPE employing primary secondary amine (PSA) sorbent as well as magnesium sulfate for the removal of water. The extract is concentrated and phase transferred to toluene. The final extract is then analyzed by LC/HRMS and GC/MS.

Detection Limit of Pesticide Residues

EPA tolerance levels are established using the mg/Kg (ppm) convention. Residues are reported to the customer (DCP) as mg/Kg (ppm). Based on past FDA enforcement and the enforcement levels in use in the European Union, the CAES defines its Limit of Reporting (LOR) at 0.010 mg/Kg (ppm). Limits of Detection (LOD) levels are established for individual pesticides prior to reporting.

Quality Assurance and Reproducibility

Working 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 a quality control sample (QCS).

Results and Discussion

The DCP delivered fewer samples to the CAES for residue testing in 2014, 2015 and 2016 than in the past, averaging 93 samples per year in this timeframe. A new sampling agreement plan was developed in 2014 by the DCP and the CAES under a joint Manufactured Food Regulatory Program Standards (MFRPS) cooperative agreement. This marks a new chapter in pesticide residue testing at the CAES. Agreements are renewed each year and stipulate, among other things, the number of samples DCP will submit for residue testing, the types of accredited analyses (GC/MS and LC/HRMS), which will be performed, and a limit of reporting (LOR) of 0.010 mg / Kg (ppb).

It should be noted that the results of all analysis performed at the CAES were forwarded to the DCP. The laboratories at the CAES solely perform the analytical analysis of samples on behalf of the DCP, wherein all regulatory authority lies. Enforcement actions (or lack thereof) taken by the DCP, FDA or the USDA are not always communicated back to the CAES. In those cases where CAES is made aware of the outcome (i.e. stop sale, recalls, etc.) details of such are provided in the text. Recalls made by the FDA are available at: http://www.fda.gov/Safety/Recalls/. As of this writing, a review of this website indicated that none of the violations in this work related to pesticide residues in food have led the FDA to issue a recall notice in its enforcement reports.

2014

In 2014, a total of 43 samples were tested. There were 30 samples of fresh (69.8%) and 13 samples of processed (30.2%) foods. The 2014 findings are detailed in Table 1 for fresh and Table 2 for processed foods. Of the 43 samples tested, 24 (55.8%) were found to contain at least one pesticide residue while the remaining 19 (44.2%) were free from tested residues. All 80 of the residues found on the 24 samples containing residues were within the tolerances set by the EPA. Pesticide residues were found in 21 (70.0%) of the 30 fresh samples, and 3 (23.1%) of the 13 processed foods tested. A total of 80 pesticide residues comprised of 38 different Active Ingredients (AI's) were found during the course of this work. There was one sample of organic oranges tested which was found to be free of any detectable pesticide residue.

2015

In 2015, CAES tested 130 samples of fresh (99; 76.2%) and processed (31; 23.8%) foods. The 2015 findings are detailed in Table 3 for fresh and in Table 4 for processed food. Of the 130 samples tested, 62 (47.7%) contained at least one pesticide residue. No residues were detected in the remaining 68 (52.3%) of the samples tested. Of the 62 samples found to contain residues, 58 (44.6% of the total samples) contained permissible (non-violative) residues. There were 4 samples (3.1% of the total; 4.0% of the fresh) that each contained one residue that was illegal, resulting in 4 no tolerance violations. There were 14 samples (10.8% of the total) of organic food tested. Pesticide residues were found in only one sample (7.1% of the organic).

The fungicide triadimenol was found on a sample of grapes (0.243 mg/Kg; ppm) imported from Chile. There is no US tolerance for triadimenol. In the US, triadimenol is only allowed on pineapple when combined with triadimefon. There was a sample of malanga, a dense root vegetable in the same family as taro root, from Mexico which was found to contain carbendazim (0.137 mg/Kg; ppm). Carbendazim has been used as a standalone pesticide and is also a metabolite[7]. At the end of 2015, the CAES stopped reporting on carbendazim findings. There were two samples of herbs that were found to contain illegal residues. There was a sample of parsley from Texas that was found to contain the fungicide tebuconazole (0.020 mg/Kg; ppm), and a sample of cilantro from Mexico that was found to contain the insecticide *lambda* cyhalothrin (0.020 mg/Kg; ppm). Both findings resulted in no tolerance violations because there is no accepted level for the individual active ingredients on the herbs which they were found.

No pesticide residues were detected in thirteen of the fourteen organically grown samples tested. There was a single sample of spinach that was found to contain the insecticide spinosad (0.015 mg/Kg; ppm). Spinosad is a natural product based insecticide with low toxicity to mammals. The EPA places foods into groups when assigning a tolerance. Spinach falls in Crop Group 4: Leafy Vegetables (Except BRASSICA Vegetables) Group[9]. The tolerance for spinosad on this group is 8 mg/Kg; ppm[10]. This pesticide residue amount in this sample is allowable under The National Organic Program (NOP) which dictates which foods may be sold using the name 'Organic'. In general terms, when residue testing finds a pesticide residue, and it is less than five percent of the EPA tolerance for the specific residue, the product may be sold as 'Organic'[11].

2016

The CAES tested 106 food samples for the DCP as part of the MFRPS contract in 2016. There were 88 (83.0%) fresh samples and 18 (17.0%) processed samples tested during this timeframe. The 2016 findings are detailed in Table 5 for fresh and Table 6 for processed foods. Of the 106 samples tested, 58 (54.7%) were found to contain at least one pesticide residue. There were no residues detected in the remaining 48 (45.3%) samples. Of the 58 found to contain residues, 54 (50.9% of the total samples) contained permissible (non-violative) residues. There were 4 samples (3.8% of the total) that contained a total of five residues that were illegal, resulting in 4 no tolerance violations. There were 13 samples (12.3% of the total) of organic food tested. Pesticide residues were found in only one sample (7.7% of the organic).

In 2016 there were 5 (4.5% of residues found) illegal pesticide residues found and reported on 4 samples of food. Three residues were found on three samples of fresh produce, and two residues were found on one processed sample. The organophosphate insecticide dimethoate (0.030 mg/Kg; ppm) was found on a sample of guaje from Mexico. Guaje seeds come in pods that are thin and flat. The seeds are small and green similar to shelled pumpkin seed. Guaje pods grow from a tree known as Leucaena leucocephala, known in English as the Leadtree. They are popular ingredients for cooking in Central America. There is no EPA tolerance for dimethoate on guaje[10] which resulted in a no tolerance violation.

The fungicide thiabendazole (1.81 mg/Kg; ppm) was found on a sample of malanga imported from Ecuador. Thiabendazole is widely used as a fungicide on fresh produce, and as such has a wide variety of tolerances. It has a tolerance of 0.02 ppm on many root vegetables[11], but malanga is not included on this list. The finding was reported as a no tolerance violation. It is interesting to note that in 2015, a no tolerance violation was reported for a sample of malanga from Mexico. An onion sample from Peru was found to contain residue of the organophosphate insecticide methamidophos (0.040 mg/Kg; ppm). Methamidophos is used as an insecticide in other parts of the world, but as a standalone pesticide it has no tolerance in the US. Methamidophos is also a metabolite of acephate. There are nine US tolerances for methamidophos when it is found as a result of the application of acephate. Onion, however, is not one of the commodities with a tolerance. The finding resulted in a no tolerance violation.

A sample of prunes from Idaho was found to contain two illegal residues. The processed dried plum sample (prunes) was found to contain the organophosphate insecticide dimethoate (0.053 mg/Kg; ppm) and propargite (0.172 mg/Kg; ppm). Both of these residues were illegal on prune and plums. This resulted in a no tolerance violation.

Mycotoxin Screening

In 2012, the DAC began testing apple cider and juice samples for the mycotoxin patulin. Patulin is produced by *Penicillium, Aspergillus and Byssochlamys* spp. molds, and particularly by *Penicillium expansum*, which is a common pathogen in postharvest apples and pears[12]. Fruits decayed by these molds are likely to contain patulin. Patulin is toxic upon oral administration at doses around 1.5 mg/Kg of body weight, causing premature death in rats[13]. Following an independent study conducted by the FDA, an action level of 0.050 mg/Kg (ppm) was established[14]. Patulin is destroyed by fermentation, and as such, is not found in alcoholic fruit beverages or vinegars produced from fruit juices. Patulin is only moderately degraded by thermal processing; thus, when present in apple juice, will survive pasteurization[15].

In 2012, seventeen samples of apple juices and ciders tested as part of our program. Patulin was detected 10 times (58.8%) ranging in concentration ranging from 0.002 – 0.010 mg/Kg (ppm). In 2013 there were no samples of apple cider / juice tested. In 2014, there were three samples of cider / juice tested. Patulin was found in 1 (33.3%) sample at a concentration of 0.014 mg/Kg (ppm), well below the FDA action limit of 0.05 mg/Kg (ppm)[14].

Testing for patulin was discontinued in 2015 owing to the workload associated with obtaining accreditation to the ISO/IEC 17025 standard and to the prohibitive cost associated with obtaining reference material standards.

Preservative Analysis

Testing for the Generally Recognized as Safe (GRAS)[16] preservatives potassium sorbate and sodium benzoate was discontinued in 2014 owing to the workload associated with gaining accreditation to the ISO/IEC 17025 standard. These additives are widely added to foods to increase their shelf life. Because they are introduced into food, they must also be declared on the label of the container as an additive.

Program Improvements Leading to ISO/IEC 17025 Accreditation

Summary results of the CAES pesticide residue program from 2000 to 2016 are presented in Figure 1. The two vertical lines represent significant changes made to the program.

Prior to 2006, the CAES used an in house petroleum ether extraction method with gas chromatographic (GC) analysis (GC/MS). On average, 36.7% (1324 samples; 486 with residues) of the samples were found to contain pesticide residues between 2000 and 2005. Of these 486 samples containing pesticides, 3.9% (19 samples) contained illegal residues.

In 2006, several changes were made to our program which included: 1) use of the QuEChERS extraction method in place of our in house method, 2) pesticide analysis by GC/MS *and* LC/MS using new, extremely sensitive instruments, and 3) testing for an increased number of Active Ingredients (AI's). Between 2006 and 2012-2013, on average 69.2% (1420 samples; 983 with residues) were found to contain pesticide residues. Of these 983 samples, 11.2% (110 samples) contained illegal residues.

It had always been the goal of our program to test for as many different AI residues as possible and to report any residue(s) found regardless of the level at which it had been detected. This served us very well from the inception of our program until the time we considered accreditation to the ISO standard. A level of quality control (QC) had always existed in our program. Samples containing potentially illegal residues were re-extracted and analyzed in more depth to ensure they were not incorrectly reported. If there was an EPA tolerance for a specific residue, and it was found, it would be reported. There were times when residues of 0.1 µg / Kg (ppb) were reported. Coincidentally, calibration curves were often extrapolated and under these limited situations, analyte concentrations were not bracketed by standards.

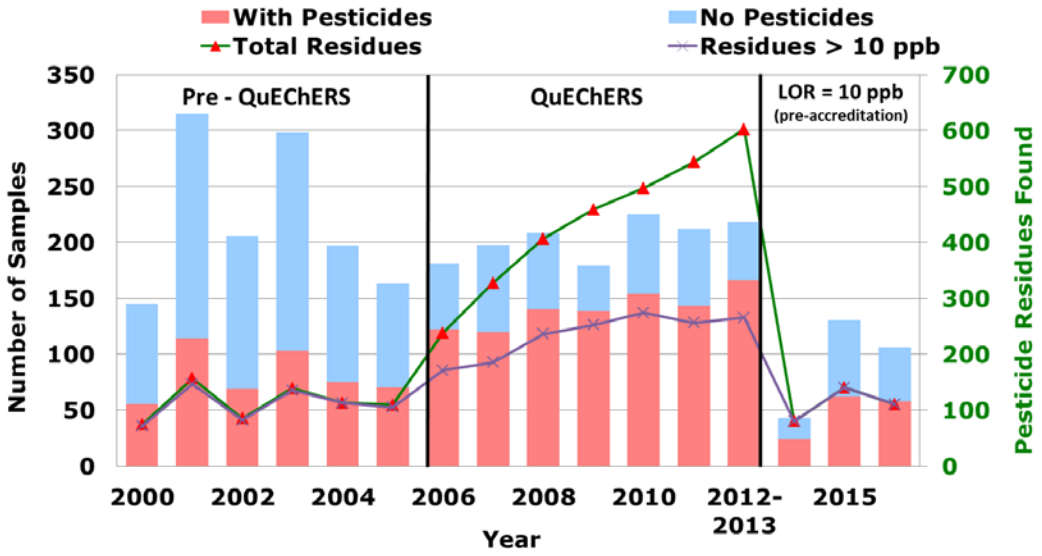
In 2014, we thoroughly scrutinized our program and instituted important quality parameters so as to report results more in line with the ISO/IEC17025 requirements. The results of these changes are seen in Figure 1 (aside from the fewer number of samples). In 2014, we defined the lower limit of reporting (LOR) for a pesticide residue at 10 µg / Kg (ppb). This is the lowest limit that FDA will typically enforce a violation[17], and the level employed throughout Europe[18]. Multi-level bracketing calibration curves employing an internal standard were introduced. Active ingredient analytes used to produce calibration standards are traceable to their source of production. Use of the AI's in standards and in dilutions is fully documented. Expiration dates for these AI's and standards produced from them were established. Records are made of their storage conditions. Balances used in the laboratory are calibrated annually, and verified daily when used. The GC/MS and LC/HRMS systems used in the analysis are verified prior to use. At least a seven point calibration curve, method and solvent blanks, sample duplicates, laboratory control samples (LCS) and duplicates (LCSD), and a quality control samples (QCS) are run with each batch of samples on the GC/MS and LC/HRMS systems. The quality control elements LCS, LCSD, and QCS represent analyte spike-recoveries, which are tracked over time, provide the most reliable indicators that the values reported are accurate.

During the 2014-2016 period of this report, the number of samples containing pesticide residues fell from 69.2% (QuEChERS) to 51.6% (279 samples; 144 with pesticides) as shown in Figure 1. This was a direct result of the 10 µg/ Kg LOR that was established in 2014.

The average number of pesticide residues found per year increased from 113 (677 total from 2000 – 2005) to 439 (3071 total from 2006 – 2012/2013) and has fallen again to 110 (330 total from 2014 –

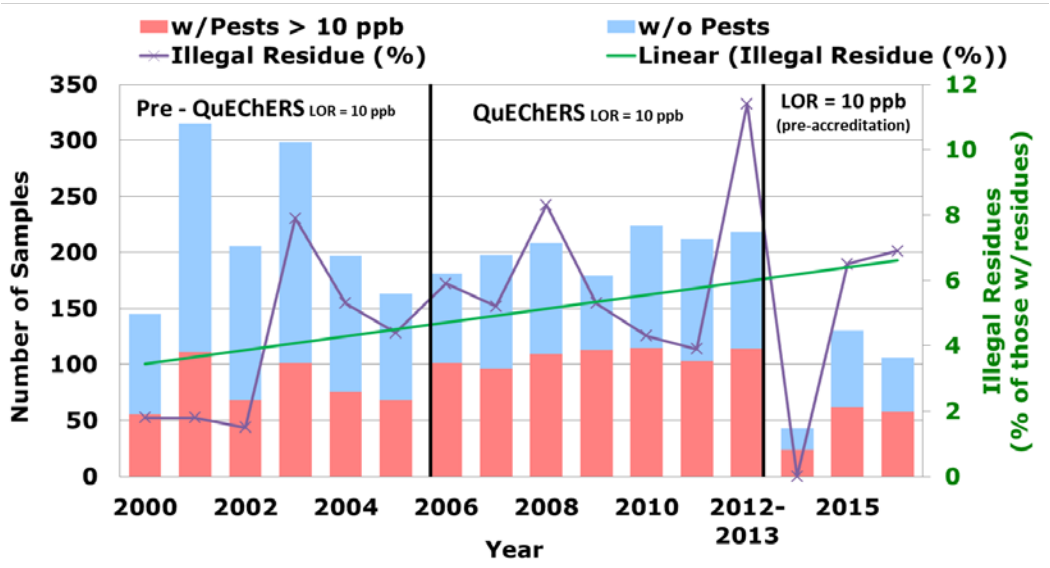
2016). The green line in Figure 1 (secondary axis) shows the total number of individual residues found each year. The data from 2000 – 2016 was re-examined using the 10 µg/ Kg LOR. If only the pesticide residues greater than 10 µg/ Kg (ppb) are considered, the average number of residues increased less dramatically from 108 (652 from 2000 - 2005) to 234 (1639 total from 2006 - 2012/2013) and then falls back to 110 (330 total from 2014 - 2016) as shown by the purple line in Figure 1.

Figure 1: Pesticide Residues in Food Sold in Connecticut 2000-2016.



The results of adjusting the data from 2000 – 2016 to the 10 µg/ Kg (ppb) reporting level are shown in Figure 2. From 2000 -2005, 37.0% (1296 samples; 479 with residues) of the samples contained residues. The number increased to 52.9% (1420 samples; 751 with residues from 2006-2013, and remained similar from 2014-2016 when 51.6% (279 samples; 144 with residues) were reported. The 15% increase in samples containing residues between 2000 2005 and 2006 – 2016 is attributable to residues determined LC/HRMS which are not amenable to GC/MS analysis. Comparisons of the CT program to other Federal programs have been published elsewhere by Krol *et al.* in 2014[8].

Figure 2: Data normalized to reflect the 10 µg/ Kg (ppb) reporting level



The percentage of those samples containing illegal residues was also adjusted and examined. From 2000 to 2005, the average violation rate based on samples containing pesticide residues was 4.0% (19 illegal; 479 samples with residues). Between 2006 and 2013, on average the violation rate was 6.4% (48 illegal; 751 samples with residues). This level remained nearly the same from 2014 to 2016, when the average violation rate was 5.6% (8 illegal; 144 samples). The increase in average violation rate from 4.0% in 2000-2005 to a 6.3% from 2006-2016 is very likely attributable to residues determined LC/HRMS which are not amenable to GC/MS analysis.

Only the analytes that are tested may be reported. From 2000 – 2005 analysis were performed solely by GC, and on average 21 different active ingredients were reported each year. Between 2006 and 2013 the number had risen to 57, and from 2006 – 2016 averaged 54. At the time of this writing, the CAES routinely tests for 233 different analytes in each sample submitted. It should be noted that percent recovery and LOR values have been established for each of these 233 analytes. These analytes, in addition to numerous others, are re-validated with each batch of samples tested by spike-recovery in the LCS, LCSD and QCS samples. This ongoing re-validation is directly related to our ISO/IEC 17025 accreditation.

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.

In our continuing effort to provide the best possible analytical results to the residents of Connecticut and to our FDA partner at the National level, the DAC at the CAES sought and gained accreditation by A2LA to the ISO/IEC 17025:2005 standard for chemical testing of pesticide residues in food by GC/MS and LC/HRMS on December 28, 2016[5]. This was by no means a trivial feat. Staff worked tirelessly to create a quality management system, and institute critical quality assurance elements to assure that the data produced within our laboratory is as robust and accurate as possible.

The overall results of the analysis performed between 2014 and 2016, prior to gaining our accreditation to the ISO standard, have been shown to be nearly identical to the data produced since 2006 when appropriately normalized to a reporting limit of 10 µg/ Kg (ppb). Important QC elements introduced into our program since 2014 allow the data that is produced to be validated with each batch of samples tested, ensuring that the findings are correct.

From 2014-2016, the vast majority of total residues found (321; 97.3%) were found to be within the tolerances set by the EPA. Of the 279 samples tested, 144 (51.6%) were found to contain pesticide residues. This is consistent with those samples tested between 2006-2013 when adjusted to the 10 µg/ Kg (ppb) reporting level. In the latter time period, of the 1420 samples tested, 751 (52.6%), were found to contain pesticide residues. From 2000 to 2005, there were 1296 samples tested, 479 (37%) were found to contain residues. The approximate 15 % increase in samples found to contain pesticide residues is directly attributable to the introduction of LC/HRMS in 2006. This technique has the ability to test for analytes that are not amenable to GC analysis, and has been very beneficial to our program.

There are relatively few individual illegal residues found of the food we tested. Of the 321 residues found from 2014-2016, only 9 (2.8%) samples contained illegal residues. Of the 1639 residues found from 2006-2013, 55 (3.4%) were illegal, and of the 652 residues found from 2000-2005, 26 (4.0%) were illegal. For the most part, the number of individual violative residues found has been unchanged since 2000.

In the past, the focus of our market basket program had been primarily on testing roughly equal samples that were grown in Connecticut and those grown elsewhere. This allowed residents of the State to decide if they chose to eat food grown in CT or elsewhere based upon the pesticide burden found. In 2012,

for instance, 50.2% (107 of 213 samples) were grown within the state. By 2016 only 3 (2.8%) of the 106 samples had been grown within the State. We note that the determination of sampling regime is made by our regulatory partner, DCP.

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Table 1: Summary of Pesticides Found in Fresh Fruits and Vegetables Sold in Connecticut in 2014.

Commodity Origin Pesticide	Samples with Residues (Total)	Found by[1] GC or LC or BOTH	Number of Times Detected	Residue Range (ppm)	Average Residue (ppm)	EPA Tolerance (ppm)
Apples (8 Samples)						
Connecticut	7 (7)					
Acetamiprid		LC	6	0.015-0.045	0.027	1
Boscalid		LC	2	0.025-0.060	0.043	3
lambda Cyhalothrin		GC	4	0.010-0.070	0.041	0.3
Cyprodinil		BOTH	3	0.010-0.028	0.018	1.7
Dinotefuran		LC	1	0.024		2
Esfenvalerate		GC	1	0.022		1
Flumioxazin		LC	1	0.017		0.02
Fluxapyroxad		LC	2	0.013-0.014	0.014	0.8
Phosmet		BOTH	2	0.012-0.045	0.029	10
Pyraclostrobin		LC	1	0.011		1.5
Thiacloprid		LC	1	0.011		0.3
Thiophanate Methyl		LC	2	0.064-0.070	0.067	2
Unknown (US)	1 (1)					
Carbendazim		LC	1	0.027		none[ref7]
Asparagus (1 Sample; 1 Foreign)						
Foreign (Peru)	0 (1)					
Beans (1 Sample)						
Unknown (US)	0 (1)					
Blueberries (2 Samples; 2 Foreign)						
Foreign (Chile)	1 (1)					
Azinphos Methyl		LC	1	0.055		0.5
Phosmet		LC	1	0.011		10
Fenbuconazole		LC	1	**0.003 <10ppb**		0.3
Foreign (Argentina)	1 (1)					
Boscalid		LC	1	**0.007 <10 ppb**		13
Cyprodinil		LC	1	**0.006 < 10ppb**		3
Fludioxonil		LC	1	0.043		2
Broccoli (1 sample; 1 Foreign)						
Foreign (Mexico)	0 (1)					
Brussels sprouts (1 sample; 1 Foreign)						
Foreign (Mexico)	1 (1)					
Bifenthrin		GC	1	0.035		0.6
Cyfluthrin		GC	1	0.020		2.5
lambda Cyhalothrin		GC	1	0.025		0.4
Difenoconazole		LC	1	0.011		1.9
Dimethomorph		LC	1	0.045		6
Imidacloprid		LC	1	0.041		3.5
Phosmet		LC	1	0.011		0.1
Spiromesifen		LC	1	0.016		2

Cantaloupe (1 Sample)						
California	0 (1)					
Cucumber (1 Sample)						
Florida	1 (1)					
Bifenthrin		GC	1	0.084		0.4
Propamocarb		LC	1	0.111		1.5
Thiophanate Methyl		LC	1	0.126		1
Eggplant (1 Sample; 1 Foreign)						
Foreign (Mexico)	1 (1)					
Thiamethoxam		LC	1	0.014		0.25
Garlic (2 Sample; 1 Foreign)						
Foreign (China)	0 (1)					
Kiwifruit (1 Sample; 1 Unknown)						
Unknown	1 (1)					
Cyprodinil		BOTH	1	0.298		0.75
Oranges (1 Sample; 1 *Organic*)						
California, *Organic*	0 (1)					
Pears (3 Samples)						
Connecticut	2 (2)					
Acetamiprid		LC	1	0.025		1
Boscalid		BOTH	1	0.266		3
lambda Cyhalothrin		GC	2	0.033-0.050	0.041	0.3
Esfenvalerate		GC	1	0.037		1
Fenpyroximate		LC	1	0.015		0.3
Phosmet		GC	1	0.065		10
Pyraclostrobin		LC	1	0.044		1.5
Pyridaben		LC	1	0.077		0.5
Thiophanate methyl		LC	1	0.031		2
Trifloxystrobin		GC	1	0.011		0.5
Washington State	1 (1)					
Boscalid		BOTH	1	0.043		3
Imidacloprid		LC	1	0.016		0.6
Spirodiclofen		LC	1	0.068		0.8
Peppers, Bell (1 Sample; 1 Foreign)						
Foreign (Mexico)	1 (1)					
Difenoconazole		BOTH	1	0.042		0.6
Imidacloprid		LC	1	0.032		1
Myclobutanil		BOTH	1	0.010		4
Oxamyl		LC	1	0.048		2
Pyriproxyfen		LC	1	0.020		0.8
Spiromesifen		LC	1	0.015		0.45
Potato, Sweet (1 Sample; 1 Unknown)						
Unknown	0 (1)					
Squash, Butternut (1 Sample)						
New York	0 (1)					

Tomatoes (4 Samples; 4 Foreign)

Foreign (Mexico) 3 (4)					
Azoxystrobin	BOTH	1	0.068		0.2
Chlorothalonil	GC	1	0.051		5
Clothianadin	LC	1	0.014		0.2
Dinotefuran	LC	1	0.093		0.7
Flonicamid	BOTH	2	0.018-0.144	0.081	0.4
Imidacloprid	LC	1	0.054		1

1. **GC** indicates found by Gas Chromatography (GC) – Mass Spectrometry (MS); **LC** indicates found by Liquid Chromatography (LC) – Mass Spectrometry (MS)

Table 2: Summary of Pesticides Found in Processed Fruits and Vegetables Sold in Connecticut in 2014.

Commodity / Origin / Pesticide	Samples with Residues (Total)	Found by[1] GC or LC or BOTH	Number of Times Detected	Residue Range (ppm)	Average Residue (ppm)	EPA Tolerance (ppm)
Baby Food (6 Samples; 6 Unknown)						
Apple/Blueberry (1 Sample; 1 Unknown)						
Unknown	0 (1)					
Pea (2 Samples; 2 Unknown)						
Unknown	0 (2)					
Peach (1 Sample; 1 Unknown)						
Unknown	0 (1)					
Pear/Apple/Strawberry/Pineapple (1 Sample; 1 Unknown)						
Unknown	0 (1)					
Rice Cereal (2 Samples; 2 Unknown)						
Unknown	0 (2)					
Sweet Potato (1 Sample; 1 Unknown)						
Unknown	0 (1)					
Juices/Ciders (5 Samples; 2 Foreign; 2 Unknown)						
Apple Cider/Juice (3 Samples; 2 Unknown)						
Connecticut	1 (1)					
Patulin		LC	1	0.014		0.05
Phosmet		GC	1	0.012		10
Unknown (US)	2 (2)					
Pyrimethanil		LC	2	0.010-0.011	0.011	40
Thiabendazole		LC	2	0.010-0.011	0.011	12
Grape Juice (1 Sample; 1 Foreign)						
Foreign (Argentina)	0 (1)					
Pear Juice (1 Sample; 1 Foreign)						
Foreign (Argentina)	0 (1)					

1. **GC** indicates found by Gas Chromatography (GC) – Mass Spectrometry (MS); **LC** indicates found by Liquid Chromatography (LC) – Mass Spectrometry (MS)

Table 1 Summary:

2014 FRESH TOTALS:	SAMPLES	30	
	WITH RESIDUES	21	(70.0%)
	VIOLATIVE SAMPLES	0	
	ORGANIC SAMPLES	1	(3.3%)
	ORGANIC WITH RESIDUES	0	
	ORGANIC VIOLATIVE	0	
NATIONAL ORGANIC PROGRAM VIOLATION		0	

TOTAL DIFFERENT ACTIVE INGREDIENTS FOUND:	35	
TOTAL NUMBER OF RESIDUES FOUND:	74	
TOTAL NUMBER OF ILLEGAL RESIDUES FOUND:	0	
CONNECTICUT GROWN SAMPLES	10	(33.3%) of fresh

Table 2 Summary:

2014 PROCESSED TOTALS:	SAMPLES	13	
	WITH RESIDUES	3	(23.1%)
	VIOLATIVE SAMPLES	0	
	ORGANIC SAMPLES	0	
	ORGANIC WITH RESIDUES	0	
	ORGANIC VIOLATIVE	0	
NATIONAL ORGANIC PROGRAM VIOLATION		0	

TOTAL DIFFERENT ACTIVE INGREDIENTS FOUND:	4	
TOTAL NUMBER OF RESIDUES FOUND:	6	
TOTAL NUMBER OF ILLEGAL RESIDUES FOUND:	0	
CONNECTICUT GROWN SAMPLES	1	(7.7%) of proc

TOTAL NUMBER OF TIMES PATULIN WAS FOUND	1	(20%) Of Juice/Cider Tested

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2014 Combined Fresh and Processed Summary:

2014 SUM TOTALS:	SAMPLES	43	
	WITH RESIDUES	24	(55.8%)
	VIOLATIVE SAMPLES	0	
	ORGANIC SAMPLES	1	(2.3%)
	ORGANIC WITH RESIDUES	0	
	ORGANIC VIOLATIVE	0	
NATIONAL ORGANIC PROGRAM VIOLATION		0	

TOTAL DIFFERENT ACTIVE INGREDIENTS FOUND:	38	
TOTAL NUMBER OF RESIDUES FOUND:	80	
TOTAL NUMBER OF ILLEGAL RESIDUES FOUND:	0	
CONNECTICUT GROWN SAMPLES	11	(25.6%) of all

TOTAL NUMBER OF TIMES PATULIN WAS FOUND	1	(20%) Of Juice/Cider Tested

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Table 3: Summary of Pesticides Found in Fresh Fruits and Vegetables Sold in Connecticut in 2015.

Commodity Origin Pesticide	Samples with Residues (Total)	Found by[1] GC or LC or BOTH	Number of Times Detected	Residue Range (ppm)	Average Residue (ppm)	EPA Tolerance (ppm)
Anise, Phenyl (2 Samples, 1 *Organic*)						
California	0 (1)					
California, *Organic*	0 (1)					
Apples (3 Samples)						
Connecticut	2 (2)					
Acetamiprid		LC	2	0.020-0.052	0.036	1
Captan		GC	2	0.089-0.579	0.334	25
Carbaryl		GC	1	0.065		12
Carbendazim		LC	2	0.023-0.031	0.027	none[ref7]
Washington	0 (1)					
Artichoke (1 Sample)						
California	0 (1)					
Asparagus (3 Sample; 2 Foreign)						
Connecticut	0 (1)					
Foreign (Peru)	1 (2)					
Chlorpyrifos		BOTH	1	0.025		5
Avocado (1 Sample; 1 Foreign)						
Foreign (Mexico)	0 (1)					
Bananas (1 Samples; 1 Foreign)						
Foreign (Costa Rica)	1 (1)					
Azoxystrobin		BOTH	1	0.205		2
Boscalid		GC	1	0.010		0.4
Myclobutanil		BOTH	1	0.152		4
Beans, Green (3 Samples)						
Connecticut	1 (1)					
Boscalid		BOTH	1	0.032		1.6
Carbendazim		LC	1	0.037		none[ref7]
Georgia	0 (1)					
North Carolina	0 (1)					
Beets, Root (1 Sample; 1 *Organic*)						
California, *Organic*	0 (1)					
Blackberries (1 Sample; 1 Foreign)						
Foreign (Mexico)	0 (1)					
Blueberries (5 Samples; 4 Foreign, 1 *Organic*)						
Foreign (Argentina)						
Organic	0 (1)					
Foreign (Canada)	1 (1)					
Acetamiprid		LC	1	0.012		1.6
Foreign (Chile)	2 (2)					
Boscalid		BOTH	1	0.032		4.5
Cyprodinil		BOTH	1	0.030		3

Fenhexamid		BOTH	2	0.036-0.090	0.063	5
Fludioxonil		GC	1	0.031		2
Imidacloprid		LC	1	0.015		3.5
Phosmet		BOTH	2	0.160-0.244	0.202	10
Bok Choy (2 Samples, 1 *Organic*)						
California	0 (1)					
California, *Organic*	0 (1)					
Broccolini (1 Sample)						
California	0 (1)					
Brussels Sprouts (3 Sample, 1 Foreign, 1 Unknown)						
California	1 (1)					
Azoxystrobin		LC	1	0.040		3
Difenoconazole		LC	1	0.025		1.9
Dimethomorph		LC	1	0.037		6
Indoxacarb		LC	1	0.017		12
Pyraclostrobin		LC	1	0.044		5
Thiamethoxam		LC	1	0.040		4.5
Foreign (Mexico)	1 (1)					
Azoxystrobin		BOTH	1	0.029		3
Permethrin		GC	1	0.129		1
Unknown (US)	0 (1)					
Cabbage (3 Samples)						
Connecticut	0 (1)					
Massachusetts	0 (1)					
Florida	0 (1)					
Cantaloupe (1 Sample)						
Arizona	1 (1)					
Dinotefuran		LC	1	0.050		0.5
Carrots (2 Samples)						
California	0 (1)					
Georgia	1 (1)					
Boscalid		GC	1	0.052		1
Cauliflower (1 Sample, 1 *Organic*, 1 Foreign)						
Foreign (Canada)						
Organic	0 (1)					
Celery (1 Sample)						
California	0 (1)					
Cherries (1 Sample, 1 Foreign)						
Foreign (Canada)	1 (1)					
Boscalid		LC	1	0.145		3.5
Imidacloprid		LC	1	0.017		3
Pyraclostrobin		LC	1	0.012		2.5
Cilantro (Coriander) (1 Sample; 1 Foreign; **1 Violation**)						
Foreign (Mexico)	1 (1)					
***lambda* Cyhalothrin**		**GC**	**1**	**0.020**	**NO TOLERANCE**	**0**

Clementines (1 Sample, 1 Foreign)						
Foreign (Morocco)	1 (1)					
Imazalil		LC	1	1.10		10
Thiabendazole		LC	1	0.100		5
Corn (1 Sample)						
Pennsylvania	0 (1)					
Cranberry (1 Sample)						
Massachusetts	1 (1)					
2,6 Dichlorobenzamide		LC	1	0.015		0.1
Cucumber (2 Samples, 1 Foreign)						
Maryland	1 (1)					
2,6 Dichlorobenzamide		LC	1	0.040		0.5
Thiamethoxam		LC	1	0.021		0.2
Foreign (Mexico)	1 (1)					
Propamocarb		LC	1	0.153		1.5
Eggplant (2 Samples, 1 Foreign)						
Maryland	0 (1)					
Foreign (Canada)	0 (1)					
Endive (1 Sample, 1 Foreign)						
Foreign (Belgium)	1 (1)					
Metalaxyl		LC	1	0.014		5
Grapefruit (1 Sample)						
California	1 (1)					
Fludioxonil		GC	1	2.70		10
Thiabendazole		LC	1	3.60		10
Grapes (2 Samples, 2 Foreign, **1 Violation**)						
Foreign (Chile)	2 (2)					
Boscalid		LC	1	0.481		4.5
Cyprodinil		LC	1	0.127		5
Fenhexamid		BOTH	1	0.437		4
Myclobutanil		BOTH	1	0.059		1
Spirotetramat		LC	1	0.033		0.3
Triadimenol		**LC**	**1**	**0.243**	**NO TOLERANCE**	**0**
Kale (1 Sample)						
Connecticut	1 (1)					
Captan		GC	1	0.154		0.5
Kiwifruit (1 Sample, 1 Foreign)						
Foreign (Italy)	1 (1)					
Fludioxonil		GC	1	2.26		20
Leek (1 Sample, 1 Foreign)						
Foreign (Netherlands)	0 (1)					
Lemon (1 Sample, 1 Unknown)						
Unknown (US)	1 (1)					
Azoxystrobin		BOTH	1	0.390		15
Chlorpyrifos		BOTH	1	0.018		1
Imazalil		LC	1	0.650		10
Thiabendazole		LC	1	0.419		10

Lettuce (2 Samples)						
California	1 (1)					
Flonicamid		LC	1	0.011		4
Fluopicolide		LC	1	0.534		25
Connecticut	0 (1)					
Limes (2 Samples, 2 Foreign)						
Foreign (Mexico)	2 (2)					
Imazalil		LC	1	0.499		10
Thiabendazole		LC	1	0.100		10
Malanga (1 Sample, 1 Foreign, **1 Violation**)						
Foreign (Ecuador)	1 (1)					
Carbendazim		**LC**	**1**	**0.137**	**NO TOLERANCE**	**0**
Mango (1 Sample, 1 Foreign)						
Foreign (Mexico)	0 (1)					
Mint (1 Sample)						
New Jersey	1 (1)					
Chlorpyrifos		LC	1	0.010		0.8
Imidacloprid		LC	1	0.012		8
Mushroom (2 Samples)						
Pennsylvania	1 (2)					
Thiabendazole		LC	1	0.345		40
Nectarine (1 Sample, 1 Foreign)						
Foreign (Chile)	1 (1)					
Acetamiprid		LC	1	0.020		1.2
Fludioxonil		GC	1	0.290		5
Okra (1 Sample)						
Florida	1 (1)					
Chlorothalonil		LC	1	0.034		6
lambda Cyhalothrin		GC	1	0.012		0.2
Onion (3 samples, 1 Foreign, 1 Unknown)						
Idaho	0 (1)					
Foreign (Mexico)	1 (1)					
Azoxystrobin		BOTH	1	0.078		7.5
Unknown (US)	0 (1)					
Orange (1 Sample, 1 Foreign)						
Foreign (Dominican Republic)	0 (1)					
Parsley (3 Samples, 1 *Organic,* **1 Violation**)						
Connecticut *Organic*	0 (1)					
New Jersey	0 (1)					
Texas	1 (1)					
Tebuconazole		**LC**	**1**	**0.020**	**NO TOLERANCE**	**0**
Parsnips (1 Sample, 1 *Organic*)						
Wisconsin, *Organic*	0 (1)					
Peach (2 Samples)						
Connecticut	1 (1)					
Acetamiprid		BOTH	1	0.038		1.6
lambda Cyhalothrin		GC	1	0.012		0.5

Fenbuconazole	BOTH	1	0.023	1
Pyraclostrobin	BOTH	1	0.063	2.5
New Jersey 1 (1)				
Boscalid	BOTH	1	0.020	3.5
Captan	GC	1	0.021	15
Fenpropathrin	LC	1	0.012	1.4
Pears (1 Sample, 1 Unknown)				
Unknown 1 (1)				
Boscalid	BOTH	1	0.043	3.5
Ethoxyquin	LC	1	0.031	15
Fludioxonil	LC	1	0.245	1.4
Pea (2 Samples, 2 Foreign)				
Foreign (Guatemala) 0 (1)				
Foreign (Mexico) 0 (1)				
Pepper (5 Samples, 3 Foreign)				
Connecticut 0 (1)				
Florida 1 (1)				
Azoxystrobin	BOTH	1	0.013	3
Clothianadin	LC	1	0.024	0.8
Chlorantraniliprole	LC	1	0.027	1.4
Endosulfan	GC	1	0.085	2
Fenpyroximate	LC	1	0.053	0.2
Flonicamid	LC	1	0.073	0.4
Methoxyfenozide	LC	1	0.024	2
Quinoxyfen	BOTH	1	0.057	1.7
Foreign (Canada) 1 (1)				
Propamocarb	LC	1	0.019	2
Foreign (Holland) 0 (1)				
Foreign (Mexico) 1 (1)				
Acetamiprid	LC	1	0.023	0.2
Boscalid	BOTH	1	0.043	3
Clothianadin	LC	1	0.017	0.8
Metalaxyl	LC	1	0.082	1
Thiamethoxam	LC	1	0.050	0.25
Plum (1 Sample, 1 Foreign)				
Foreign (Chile) 1 (1)				
Iprodione	LC	1	0.197	20
Pomegranate (1 Sample)				
California 1 (1)				
Fludioxonil	LC	1	0.018	5
Potato (1 Sample, 1 Unknown)				
Unknown (US) 1 (1)				
Chlorpropham	GC	1	4.18	30
Imidacloprid	LC	1	0.036	0.4
Radicchio (1 Sample)				
California 1 (1)				
Boscalid	LC	1	0.020	60

Radish (1 Sample, 1 Foreign)						
Foreign (Canada)	0 (1)					
Raspberry (1 Sample)						
California (US)	1 (1)					
Boscalid		LC	1	0.025		4.5
Imidacloprid		LC	1	0.025		2.5
Iprodione		LC	1	0.096		15
Sorrel (Dock) (1 Sample, 1 *Organic*)						
Connecticut						
Organic	0 (1)					
Spinach (1 Sample, 1 *Organic*)						
Massachusetts						
Organic	0 (1)					
Spinosad		LC	1	0.015	<5% of Tolerance	8
Squash (3 Samples, 1 Foreign, 1 Unknown)						
Connecticut	0 (1)					
Foreign (Mexico)	0 (1)					
Unknown	0 (1)					
Strawberries (2 Samples)						
Connecticut	1 (1)					
Boscalid		LC	1	0.160		3
Cyprodinil		LC	1	0.013		1.5
Pyraclostrobin		LC	1	0.046		1.4
Florida	1 (1)					
Cyprodinil		BOTH	1	0.014		1.5
Fenhexamid		GC	1	1.17		3
Fludioxonil		GC	1	0.049		2
Pyraclostrobin		LC	1	0.150		1.4
Spinetoram		LC	1	0.196		1
Sweet Potato (1 Sample)						
North Carolina	1 (1)					
Dicloran		GC	1	1.21		10
Tomatillo (1 Sample, 1 Foreign)						
Foreign (Mexico)	1 (1)					
Clothianadin		LC	1	0.011		0.2
Tomato (1 Sample)						
New Jersey	0 (1)					
Turnip Greens (1 Sample)						
Georgia	1 (1)					
Azoxystrobin		BOTH	1	1.19		25
Cypermethrin		GC	1	0.165		14
Pyraclostrobin		GC	1	0.054		0.4
Watercress (1 Sample, 1 Organic)						
Connecticut *Organic*	0 (1)					

1. **GC** indicates found by Gas Chromatography (GC) – Mass Spectrometry (MS); **LC** indicates found by Liquid Chromatography (LC) – Mass Spectrometry (MS).

Table 4: Summary of Pesticides Found in Processed Fruits and Vegetables Sold in Connecticut in 2015.

Commodity Origin Pesticide	Samples with Residues (Total)	Found by[1] GC or LC or BOTH	Number of Times Detected	Residue Range (ppm)	Average Residue (ppm)	EPA Tolerance (ppm)
Baby Food (3 Samples, 1 *Organic*, 3 Unknown)						
Rice Cereal (3 Samples, 1 *Organic*, 3 Unknown)						
Unknown (US)	1 (1)					
Malathion		LC	1	0.027		8
Unknown	1 (1)					
Captan		GC	1	0.039		0.05
Unknown, *Organic*	0 (1)					
Fruits, Vegetables, Spices (4 Samples, 1 Foreign, 2 Unknown)						
Brussels Sprouts (1 Sample)						
Maryland	0 (1)					
Peaches (1 Sample, 1 Unknown)						
Unknown	0 (1)					
Pomegranate (1 Sample, 1 Foreign)						
Foreign (India)	0 (1)					
Thyme (1 Sample, 1 Unknown)						
Unknown	0 (1)					
Juices/Ciders/Smoothies (24 Samples; 8 Foreign; 8 Unknown)						
Fruit Smoothie (1 Sample)						
California	1 (1)					
Fludioxonil		GC	1	0.075		10
Imazalil		LC	1	0.031		10
Propiconazole		LC	1	0.034		8
Thiabendazole		LC	1	0.016		10
Apple Cider/Juice (14 Samples, 8 Foreign, 3 *Organic*, 4 Unknown)						
Pennsylvania, *Organic*	0 (1)					
Washington	1 (1)					
Boscalid		LC	1	0.021		3
Carbaryl		BOTH	1	0.012		15
Foreign (Argentina)	1 (2)					
Thiabendazole		LC	1	0.058		5
Foreign (Canada)	1 (1)					
Acetamiprid		LC	1	0.062		1
Foreign (China)	0 (2)					
Foreign (New Zealand)	0 (1)					
Foreign (Poland)	0 (1)					

Foreign (Turkey)					
Organic	0 (1)				
Unknown, *Organic*	0 (1)				
Unknown	2 (3)				
Carbendazim		LC	1	0.026	none[ref7]
Diphenylamine		LC	1	0.015	10
Fludioxonil		GC	1	0.019	5
Pyrimethanil		GC	1	0.017	40
Thiabendazole		LC	1	0.035	5
Black Currant Juice (1 Sample)					
Connecticut	0 (1)				
Cranberry Juice (2 Samples)					
California	0 (1)				
Massachusetts	0 (1)				
Grape Juice (1 Sample, 1 Unknown)					
Unknown	0 (1)				
Pomegranate Juice (1 Sample, 1 Unknown)					
Unknown	0 (1)				
Orange Juice (1 Sample, 1 Unknown)					
Unknown (US)	0 (1)				
Sweet Potato Juice (1 Sample, 1 Unknown)					
Unknown (US)	0 (1)				
Watermelon Juice (2 Samples)					
Illinois	1 (2)				
Cyprodinil		LC	1	0.178	0.7

1. **GC** indicates found by Gas Chromatography (GC) – Mass Spectrometry (MS); **LC** indicates found by Liquid Chromatography (LC) – Mass Spectrometry (MS).

Table 3 Summary:

2015 FRESH TOTALS:	SAMPLES	99	
	WITH RESIDUES	53	(53.5%)
	VIOLATIVE SAMPLES	4	(4.0%)
	ORGANIC SAMPLES	10	(10.1%)
	ORGANIC WITH RESIDUES	1	(10.0%) of org
	ORGANIC VIOLATIVE	0	
NATIONAL ORGANIC PROGRAM VIOLATION		0	

TOTAL DIFFERENT ACTIVE INGREDIENTS FOUND:	47	
TOTAL NUMBER OF RESIDUES FOUND:	124	
TOTAL NUMBER OF ILLEGAL RESIDUES FOUND:	4	(3.2%) of fresh residues
CONNECTICUT GROWN SAMPLES	14	(14.1%) of fresh

Table 4 Summary:

2015 PROCESSED TOTALS:	SAMPLES	31	
	WITH RESIDUES	9	(29.0%)
	VIOLATIVE SAMPLES	0	
	ORGANIC SAMPLES	4	(12.9%)
	ORGANIC WITH RESIDUES	0	
	ORGANIC VIOLATIVE	0	
NATIONAL ORGANIC PROGRAM VIOLATION		0	

TOTAL DIFFERENT ACTIVE INGREDIENTS FOUND:	13	
TOTAL NUMBER OF RESIDUES FOUND:	16	
TOTAL NUMBER OF ILLEGAL RESIDUES FOUND:	0	
CONNECTICUT GROWN SAMPLES	1	(3.2%) of proc

2015 Combined Fresh and Processed Summary:

2015 SUM TOTALS:	SAMPLES	130	
	WITH RESIDUES	62	(47.7%)
	VIOLATIVE SAMPLES	4	(3.1%)
	ORGANIC SAMPLES	14	(10.8%)
	ORGANIC WITH RESIDUES	1	(7.1%) of org
	ORGANIC VIOLATIVE	0	
NATIONAL ORGANIC PROGRAM VIOLATION		0	

TOTAL DIFFERENT ACTIVE INGREDIENTS FOUND:	51	
TOTAL NUMBER OF RESIDUES FOUND:	140	
TOTAL NUMBER OF ILLEGAL RESIDUES FOUND:	4	(2.9%) of residues found
CONNECTICUT GROWN SAMPLES	15	(11.5%) of all

Table 5: Summary of Pesticides Found in Fresh Fruits and Vegetables Sold in Connecticut in 2016.

Commodity Origin Pesticide	Samples with Residues (Total)	Found by[1] GC or LC or BOTH	Number of Times Detected	Residue Range (ppm)	Average Residue (ppm)	EPA Tolerance (ppm)
Apples (6 Samples, 1 Foreign, 2 *Organic*, 1 Unknown)						
Connecticut	2 (2)					
Acetamiprid		LC	2	0.078-0.088	0.083	1
Cyfluthrin		GC	1	0.011		0.5
Fenbuconazole		GC	1	0.049		0.4
Phosmet		GC	1	0.095		10
Massachusetts	1 (1)					
Boscalid		GC	1	0.058		3
Deltamethrin		GC	1	0.013		0.2
Imidacloprid		LC	1	0.024		10
Phosmet		GC	1	0.185		0.5
New York	1 (1)					
Boscalid		GC	1	0.177		3
Fenpropathrin		GC	1	0.071		
Phosmet		GC	1	0.126		10
Pyraclostrobin		LC	1	0.044		1.5
Foreign (New Zealand)						
Organic	0 (1)					
Unknown (US)						
Organic	0 (1)					
Artichoke (1 Sample)						
California	1 (1)					
Permethrin		GC	1	0.011		5
Pyraclostrobin		GC	1	0.227		3
Asparagus (4 Samples, 3 Foreign)						
California	0 (1)					
Foreign (Canada)	0 (1)					
Foreign (Mexico)	0 (2)					
Avocado (1 Sample, 1 Unknown)						
Unknown	0 (1)					
Banana (1 Sample, 1 Foreign)						
Foreign (Guatemala)	1 (1)					
Azoxystrobin		BOTH	1	0.017		2
Imazalil		BOTH	1	0.089		3
Myclobutanil		LC	1	0.039		4
Thiabendazole		LC	1	0.042		3
Bean, Green (2 Samples, 1 Foreign)						
California	1 (1)					
Chlorantraniliprole		LC	1	0.017		2
lambda Cyhalothrin		GC	1	0.017		0.2

Foreign (Guatemala)	1 (1)				
Azoxystrobin		BOTH	1	0.017	2
Beet, Garden (2 samples, 1 Foreign, 1 Unknown)					
Foreign (Canada)	0 (1)				
Unknown (US)	0 (1)				
Beet, Greens (1 sample, 1 Unknown)					
Unknown (US)	1 (1)				
Indoxacarb		LC	1	0.028	6
Blueberries (4 Samples, 3 Foreign)					
Georgia	1 (1)				
Captan		GC	1	0.745	20
Cyprodinil		BOTH	1	0.034	3
Fludioxonil		GC	1	0.098	2
Foreign (Canada)	1 (1)				
Boscalid		BOTH	1	0.041	4.5
Imidacloprid		LC	1	0.018	3.5
Foreign (Chile)	1 (2)				
Chlorantraniliprole		LC	1	0.041	2.5
Broccoli raab (1 Sample)					
California	0 (1)				
Brussels sprouts (2 Samples)					
California	1 (2)				
Azoxystrobin		BOTH	1	0.031	3
Imidacloprid		LC	1	0.040	3.5
Carrot (1 Sample, 1 *Organic*)					
California, *Organic*	0 (1)				
Cauliflower (1 Sample)					
California	0 (1)				
Celery (3 Samples)					
California	1 (2)				
Boscalid		BOTH	1	0.021	60
Chlorantraniliprole		LC	1	0.016	13
Propiconazole		LC	1	0.027	5
Pyraclostrobin		LC	1	0.037	29
Massachusetts	0 (1)				
Cherry (1 Sample)					
California	1 (1)				
Fenhexamid		LC	1	0.021	10
Tebuconazole		LC	1	0.064	5
Cilantro (Coriander) (2 Samples, 1 Foreign)					
California	1 (1)				
Chlorantraniliprole		LC	1	0.013	25
Foreign (Mexico)	1 (1)				
Boscalid		GC	1	0.011	150
Clementine (Orange) (1 Sample, 1 Foreign)					
Foreign (Israel)	1 (1)				
Imazalil		LC	1	0.840	10
Thiabendazole		LC	1	0.850	10

Collards (1 sample)						
Georgia	1 (1)					
2,6 Dichlorobenzamide		LC	1	0.013		18
Azoxystrobin		BOTH	1	0.095		25
Chlorantraniliprole		LC	1	0.012		11
Dimethomorph		LC	1	0.010		30
Imidacloprid		LC	1	0.017		3.5
Corn (1 Sample)						
Florida	1 (1)					
lambda Cyhalothrin		GC	1	0.010		0.05
Cucumber (3 Samples, 3 Foreign)						
Foreign (Canada)	1 (1)					
Propamocarb		LC	1	0.069		1.5
Foreign (Honduras)	1 (1)					
Propamocarb		LC	1	0.081		1.5
Foreign (Mexico)	0 (1)					
Dill (dillweed) (1 Sample, 1 Unknown)						
Unknown	0 (1)					
Eggplant (2 Samples, 2 Foreign)						
Foreign (Honduras)	2 (2)					
Imidacloprid		LC	2	0.011-0.075	0.043	1
Escarole (2 Samples, 1 Foreign)						
California	0 (1)					
Foreign (Canada)	0 (1)					
Grape (2Samples, 1 Foreign)						
California	0 (1)					
Foreign (Chile)	1 (1)					
Metrafenone		LC	1	0.068		4.5
Guaje (1 Sample, 1 Foreign, **1 Violation**)						
Foreign (Mexico)	1 (1)					
Dimethoate		**LC**	**1**	**0.030**	**NO TOLERANCE**	**0**
Guava (1 Sample, 1 Foreign)						
Foreign (Mexico)	0 (1)					
Kale (1 Sample)						
Massachusetts	0 (1)					
Kiwifruit (2 Samples, 2 Foreign, 1 *Organic*)						
Foreign (Italy)	1 (1)					
Fludioxonil		GC	1	0.470		20
Foreign (Italy)						
Organic	0 (1)					
Lemon (1 Sample)						
California	1 (1)					
Azoxystrobin		BOTH	1	0.380		15
Fludioxonil		GC	1	1.22		10
Imazalil		LC	1	1.78		10
Simazine		GC		0.011		0.25
Thiabendazole		LC	1	1.24		10

Lettuce (1 sample)						
California	0 (1)					
Malanga (1 Sample, 1 Foreign, **1 Violation**)						
Foreign (Ecuador)	1 (1)					
Thiabendazole		**LC**	**1**	**1.81**	**NO TOLERANCE**	**0**
Mango (3 Sample, 3 Foreign, 1 *Organic*)						
Foreign (Ecuador)	0 (1)					
Foreign (Mexico)	0 (1)					
Foreign (Mexico)						
Organic	0 (1)					
Milpero (Tomatillo) (1 Sample, 1 Foreign)						
Foreign (Mexico)	1 (1)					
Chlorantraniliprole		LC	1	0.020		1.4
Propamocarb		LC	1	0.100		2
Tebuconazole		BOTH	1	0.100		1.3
Mint (1 Sample)						
New Jersey	1 (1)					
Chlorpyrifos		BOTH	1	0.060		0.8
Mushrooms (1 Sample)						
Maryland	1 (1)					
Thiabendazole		LC	1	0.237		40
Mustard seed (1 Sample, 1 Unknown)						
Unknown	0 (1)					
Nectarine (1 Sample)						
California	1 (1)					
Fludioxonil		LC	1	0.078		
Nopal (Prickly Pear Cactus) (1 Sample, 1 Foreign)						
Foreign (Mexico)	0 (1)					
Onion (2 Samples, 2 Foreign, **1 Violation**)						
Foreign (Peru)	1 (1)					
Methamidophos		**LC**	**1**	**0.040**	**NO TOLERANCE**	**0**
Foreign (Mexico)	1 (1)					
Azoxystrobin		BOTH	1	0.011		1
Dimethomorph		LC	1	0.036		0.6
Orange (1 Sample, 1 Foreign)						
Foreign (Uruguay)	1 (1)					
Imazalil		BOTH	1	6.22		10
Pyrimethanil		LC	1	0.088		10
Parsnip (1 Sample, 1 Foreign)						
Foreign (Canada)	1 (1)					
Boscalid		LC	1	0.030		0.05
Peach (2 Samples)						
California	1 (2)					
Fenbuconazole		GC	1	0.012		1
Fludioxonil		GC	1	1.55		5
Methoxyfenozide		LC	1	0.05		3
Propiconazole		LC	1	0.247		4
Pyraclostrobin		BOTH	1	0.106		2.5

Spinosad	LC	1	0.023	0.2
Pear (1 Sample, 1 Foreign)				
Foreign (Argentina) 1 (1)				
Chlorantraniliprole	LC	1	0.019	1.2
Pea (snap) (1 Sample)				
Massachusetts 0 (1)				
Pepper (3 Samples, 1 Unknown)				
Florida 1 (1)				
Imidacloprid	LC	1	0.015	1
New Jersey 1 (1)				
Dimethoate	LC	1	0.022	2
Unknown 1 (1)				
Boscalid	BOTH	1	0.014	3
Difenoconazole	BOTH	1	0.034	0.6
Pineapple (1 Sample, 1 Foreign)				
Foreign (Costa Rica) 1 (1)				
Triadimefon	LC	1	0.055	2
Plantains (1 Sample, 1 Foreign)				
Foreign (Columbia) 1 (1)				
Imazalil	BOTH	1	0.211	3
Thiabendazole	LC	1	0.156	3
Plum (1 Sample)				
California 1 (1)				
Fludioxonil	GC	1	0.574	5
Potato (1 Sample)				
Washington 1 (1)				
Azoxystrobin	BOTH	1	0.070	8
Chlorpropham	GC	1	6.04	30
Difenoconazole	BOTH	1	0.270	4
Fludioxonil	GC	1	0.207	6
Spinach (2 Sample, 1 *Organic*)				
California 1 (1)				
Acetamiprid	LC	1	0.040	3
Fenamidone	LC	1	0.019	60
Mandipropamid	LC	1	0.201	20
Permethrin	GC	1	0.791	20
Massachusetts				
Organic 0 (1)				
Squash (5 Samples, 2 Foreign, 1 Unknown)				
Connecticut 1 (1)				
Chlorothalonil	GC	1	0.033	5
Mandipropamid	LC	1	0.017	0.6
Methomyl	LC	1	0.067	0.2
New York 0 (1)				
Foreign (Mexico) 2 (2)				
Dinotefuran	LC	1	0.017	0.5
Thiamethoxam	LC	1	0.038	0.2

Unknown (US)	1 (1)				
Carbaryl		LC	1	0.017	3
Strawberry (1 Sample)					
California	1 (1)				
Boscalid		GC	1	0.169	3
Pyraclostrobin		LC	1	0.055	1.4
Tomato (1 Sample)					
Florida	1 (1)				
Cyprodinil		LC	1	0.013	1.5
Turnip (1 Sample)					
Michigan	0 (1)				
Watermelon (1 Sample)					
Florida	0 (1)				

Table 6: Summary of Pesticides Found in Processed Fruits and Vegetables Sold in Connecticut in 2016.

Commodity / Origin / Pesticide	Samples with Residues (Total)	Found by[1] GC or LC or BOTH	Number of Times Detected	Residue Range (ppm)	Average Residue (ppm)	EPA Tolerance (ppm)
Baby Food (6 Samples, 2 *Organic*, 5 Unknown)						
Apple (1 Sample, 1 Unknown)						
Unknown (US)	0 (1)					
Beans, green (1 Sample, 1 Unknown))						
Unknown (US)	0 (1)					
Pear (1 Sample, 1 *Organic*, 1 Unknown)						
Unknown (US)	0 (1)					
Prune (dried plum) (1 sample, 1 *Organic*, 1 Unknown)						
Unknown (US)	0 (1)					
Rice Cereal (1 Sample)						
Virginia	0 (1)					
Oatmeal (1 Sample, 1 Unknown)						
Unknown (US)	0 (1)					
Fruits, Vegetables, Spices (3 Samples, 1 Foreign, **1 Violation**)						
Garlic, Freeze dried (1 Sample, 1 Foreign)						
Foreign (Germany)	0 (1)					
Lettuce, chopped (1 Sample)						
California	1 (1)					
Dimethomorph		LC	1	0.097		0.5
Plums, dried (prunes) (1 Sample, **1 Violation**)						
Idaho	1 (1)					
Dimethoate		**BOTH**	**1**	**0.053**	**NO TOLERANCE**	**0**
Propargite		**LC**	**1**	**0.172**	**NO TOLERANCE**	**0**
Juices/Ciders/Beverages (9 Samples; 5 Foreign; 4 Organic, 3 Unknown)						
Bai beverage (1 Sample)						
Unknown	0 (1)					
Acai Juice (1 Sample, 1 Foreign, 1 *Organic*)						
Foreign (Brazil)						
Organic	1 (1)					
Carbaryl		LC	1	0.014	<5% of Tolerance	3
Apple Cider/Juice (3 Samples, 2 Foreign, 2 *Organic*)						
California, *Organic*	0 (1)					
Foreign (China)	0 (1)					
Foreign (Turkey)						
Organic	0 (1)					
Grape Juice (2 Samples, 2 Foreign, 1 Organic)						
Foreign (Argentina)	0 (1)					

Foreign (Argentina)					
Organic	0 (1)				
Peach Juice (1 Sample, 1 Unknown)					
Unknown	1 (1)				
Pyrimethanil		LC	1	0.055	10
Tomato Juice (1 Sample, 1 Unknown)					
Unknown	0 (1)				

Table 5 Summary:

2016 FRESH TOTALS:	SAMPLES	88	
	WITH RESIDUES	54	(61.4%)
	VIOLATIVE SAMPLES	3	(3.4%)
	ORGANIC SAMPLES	7	(8.0%)
	ORGANIC WITH RESIDUES	0	
	ORGANIC VIOLATIVE	0	
	NATIONAL ORGANIC PROGRAM VIOLATION	0	

TOTAL DIFFERENT ACTIVE INGREDIENTS FOUND:	44	
TOTAL NUMBER OF RESIDUES FOUND:	105	
TOTAL NUMBER OF ILLEGAL RESIDUES FOUND:	3	(2.9%) of fresh residues
CONNECTICUT GROWN SAMPLES	3	(3.4%) of fresh

Table 6 Summary:

2016 PROCESSED TOTALS:	SAMPLES	18	
	WITH RESIDUES	4	(22.2%)
	VIOLATIVE SAMPLES	1	(5.6)
	ORGANIC SAMPLES	6	(33.3%)
	ORGANIC WITH RESIDUES	1	(16.7%) of org
	ORGANIC VIOLATIVE	0	
	NATIONAL ORGANIC PROGRAM VIOLATION	0	

TOTAL DIFFERENT ACTIVE INGREDIENTS FOUND:	4	
TOTAL NUMBER OF RESIDUES FOUND:	5	
TOTAL NUMBER OF ILLEGAL RESIDUES FOUND:	2	(40.0%) of proc. residues
CONNECTICUT GROWN SAMPLES	0	(0%) of proc

2016 Combined Fresh and Processed Summary:

2016 SUM TOTALS:	SAMPLES	106	
	WITH RESIDUES	58	(54.7%)
	VIOLATIVE SAMPLES	4	(3.8%)
	ORGANIC SAMPLES	13	(12.3%)
	ORGANIC WITH RESIDUES	1	(7.7%) of org
	ORGANIC VIOLATIVE	0	
	NATIONAL ORGANIC PROGRAM VIOLATION	0	

TOTAL DIFFERENT ACTIVE INGREDIENTS FOUND:	45	
TOTAL NUMBER OF RESIDUES FOUND:	110	
TOTAL NUMBER OF ILLEGAL RESIDUES FOUND:	5	(4.5%) of residues found
CONNECTICUT GROWN SAMPLES	3	(2.8%) of all
