Trends in Insecticide Usage on Arizona Lettuce

John C. Palumbo, Yuma Agricultural Center

Introduction: The development of accurate data on insecticide usage is important to the assessment of IPM programs in Arizona. Reliable estimates of insecticide use patterns are one of our most objective tools for assessing change in management practices. This information allows us to build relevant databases for measuring user behaviors and adoption of new IPM technologies. For PCAs, it can translate their efforts into economic terms for their clientele and confirms their value to the lettuce industry by showing the importance of their cost-effective management in desert lettuce production. This summary provides estimates of insecticide use trends on lettuce over the past 10 years.

Methods: Growers and PCAs attended Head Lettuce Insect Losses and Impact Assessment Workshops in Yuma and completed surveys in a guided process. The workshops were conducted in an interactive manner where participants were given a presentation that established the incentives for participation, explained the crop insect loss system, and further walked the participants through the estimation process. This summary presents results from the insecticide use surveys for head lettuce produced in Yuma County, AZ and Imperial County, CA. Data on insecticide use patterns was generated by requesting that PCAs estimate the frequency of use of various products and the percentage of treated acres for each product. Estimates of total treated acreage were generated using the acreage reported from each survey participant. Ideally, this data will allow us to track changes in insecticide use patterns over time in greater detail in both fall and spring head lettuce.

Summary: A total of 22 surveys were completed in the 2014 workshop, representing a total of 27345 fall acres and 24955 spring acres from Yuma and neighboring Imperial County. In general, the most commonly used insecticides in fall and spring lettuce correspond directly to the key pests that typically occur during these growing periods. When compared by class of chemistry using the IRAC mode of action classification system, the pyrethroids, applied both as foliar sprays and through chemigation, have by far been the most commonly used insecticide class (Tables 1 and 2). This makes sense because they are one of the few inexpensive, broad spectrum insecticides still available for use in tank-mixtures for control of flea beetles, crickets, plant bugs and cabbage looper. Over the past 10 years, pyrethroid usage has remained steady. The overall use of OP/carbamates continues to decline, with the exception of Lannate and acephate which are important products for thrips management (Figure 5). Their usage is being replaced primarily by several reduced-risk chemistries. The spinosyns remain the second most commonly used class of insecticides, where greater than 95% of the lettuce acreage was treated with Radiant or Success in 2013-2014. Their use against both lepidopterous larvae (Figure 1) and thrips (Figure 5) has remained steady over the past 10 years. Foliar uses of Diamides (Coragen, Voliam Xpress, Vetica) were the third most commonly chemistry used in lettuce in 2013-2014. Since they were first registered in 2008, PCAs have steadily incorporated this new chemical class into their management programs, where in fall 2013 more diamides were used for Lep management than spinosyns (Figure 1). Furthermore, soil uses of Coragen peaked last year but were down in 2013. Ketoenol usage (Movento) on fall lettuce was down compared to 2010, but usage as an aphicide on spring lettuce remains about the same (Figure 4). . Another important class of chemistry used in fall and spring lettuce are the neonicotinoids driven primarily by imidacloprid when applied as an at-plant, soil insecticide for whiteflies and aphids (Figures 3 and 4). The usage of imidacloprid on both fall and spring lettuce has increased markedly since 2009 and is used on almost 90% of the acreage, albeit at high rates. Two new products were registered this year, Closer and Torac. Closer was used on more than 10% of spring acres and Torac on less than 5%.

From an IPM perspective, the industry has made great strides in minimizing environmental impacts in lettuce production by continuing to incorporate the newer insecticides into their insect management programs. And for the fourth season in a row, PCAs treated a greater percentage of their acreage with selective, reduced-risk products than with the broadly toxic, older chemistries (pyrethroids, organophosphates, carbamates).

Table 1. The top insecticide chemistries used on Lettuce, Fall 2014

Chemistry	Fall Lettuce			
	IRAC group	% treated acres	No. sprays	Sprayed[1] acres
Pyrethroids - Foliar	3	96.7	3.3	87260
Spinosyns	5	96.0	2.0	52502
Diamides- Foliar	28	98.5	1.1	29628
Neonicotinoids -Soil	4A	90.6	1.0	24774
Pyrethroids - Chemigation	3	74.7	1.0	20426
OP/Carbamates	1	37.3	1.0	10199
Chitin Synthesis inhibitor	16	36.7	1.2	10990
Avermectins	6	32.9	1.0	8996
Neonicotinoid -Foliar	4A	19.1	1.2	6267
Ecdysone agonsists	18	19.2	1	5250
Diamides -Soil	28	14.6	1.0	3992
Ketoenols	23	10.5	1.0	2871
Sulfoxamine	4C	2.2	1.0	602
Indoxacarb	22	1.6	1.0	438
Selective feeding blockers	9	0.8	1.0	218
METI I	21	0.0	0.0	0

Chemistry	Spring Lettuce			
	IRAC group	% treated acres	No. sprays	Sprayed acres
Pyrethroids - Foliar	3	97.6	2.8	68197
Spinosyns	5	98.7	2.1	51724
Neonicotinoids -Soil	4A	88.3	1.0	22035
OP/Carbamates	1	64.5	1.0	16096
Diamides- Foliar	28	47.2	1.0	11779
Ketoenols	23	41.4	1.1	11365
Pyrethroids - Chemigation	3	19.9	1.0	4966
Selective feeding blockers	9	15.2	1.1	4172
Neonicotinoid -Foliar	4A	15.7	1.0	3918
Chitin Synthesis inhibitor	16	12.5	1.0	3119
Avermectins	6	12.2	1.0	3045
Sulfoxamine	4C	11.8	1.0	2945
Ecdysone agonsists	18	6.8	1.0	1697
METI I	21	3.4	2.0	1697
Indoxacarb	22	0.8	1.0	200
Diamides -Soil	28	0.0	0.0	0

[1] Total acres treated estimated by multiplying : % acres treated * number of times treated * acreage estimated by participating PCAs in the 2014 survey.

Table 2. The top 12 insecticides applied to lettuce, Fall and Spring 2014

		Fall Lettuce			
	Product	**IRAC group**	**% treated acres**	**No. sprays**	**Sprayed acres**
1	**Pyrethroids -** Foliar	3	96.7	3.3	87260
2	**Radiant**	5	88.9	2.0	48619
3	**Imidacloprid**	4A	87.4	1.0	23900
4	**Pyrethroids -** Chemigation	3	74.7	1.0	20427
5	**Vetica**	28	36.7	1.2	12043
6	**Coragen (Foliar)**	28	34.7	1.0	9489
7	**Proclaim**	6	32.9	1.0	8996
8	**Voliam Xpress**	28	25.7	1.1	7730
9	**Lannate**	1	23.0	1.0	6289
10	**Intrepid**	18	19.2	1.0	5250
11	**Coragen (Soil)**	28	14.6	1.0	3992
12	**Orthene (acephate)**	1	12.9	1.0	3528

		Spring Lettuce			
	Product	**IRAC group**	**% treated acres**	**No. sprays**	**Sprayed acres**
1	**Pyrethroids -** Foliar	3	97.6	2.8	68197
2	**Radiant**	5	91.6	2.1	48003
3	**Imidaclopird**	4A	88.3	1.0	22035
4	**Movento**	23	41.4	1.1	11365
5	**Lannate**	1	32.2	1.1	8839
6	**Orthene** (acephate)	1	28.2	1.0	7037
7	**Pyrethroids -** Chemigation	3	19.9	1.0	4966
8	**Voliam Xpress**	28	16.7	1.1	4584
9	**Beleaf**	9C	14.6	1.1	4008
10	**Coragen** -Foliar	28	13.3	1.0	3319
11	**Vetica**	16+28	12.5	1.0	3119
12	**Proclaim**	6	12.2	1.0	3045

[1] Total acres treated estimated by multiplying : % acres treated * number of times treated * acreage estimated by participating PCAs in the 2014 survey.

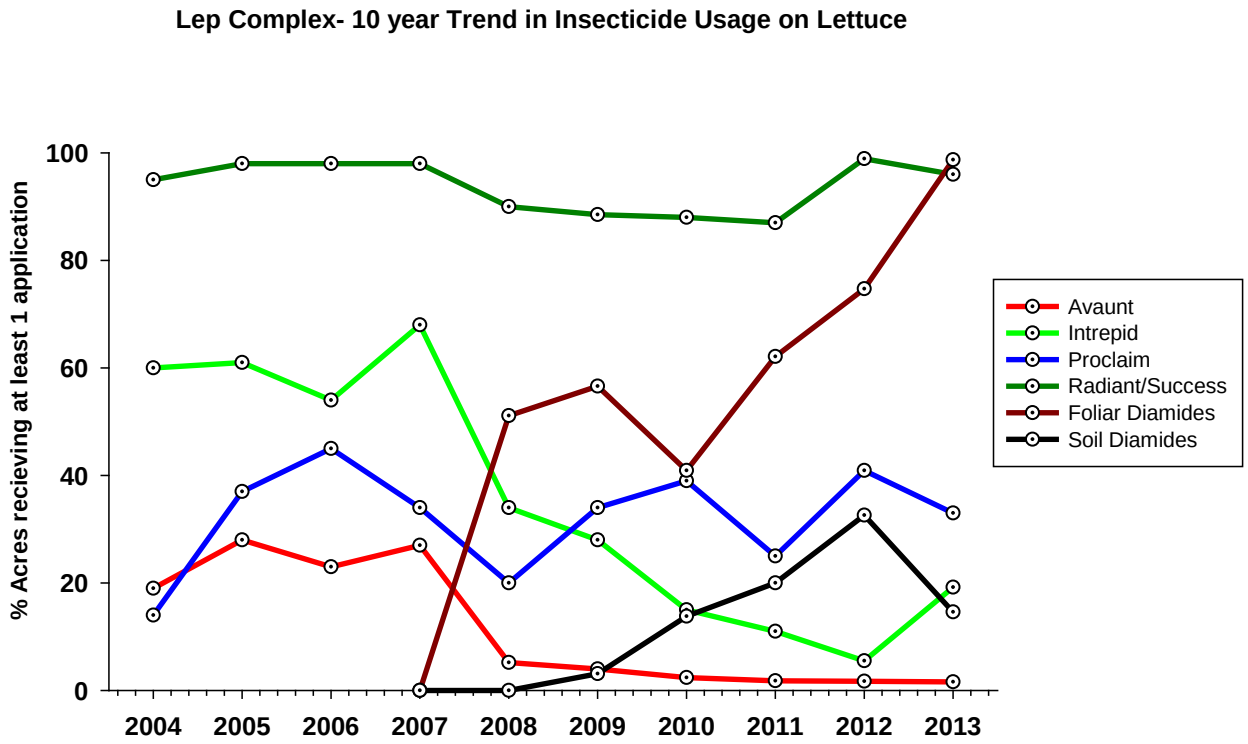

Figure 1. Trends in insecticide use for control of lepidopterous larvae in fall lettuce, 2004-2013

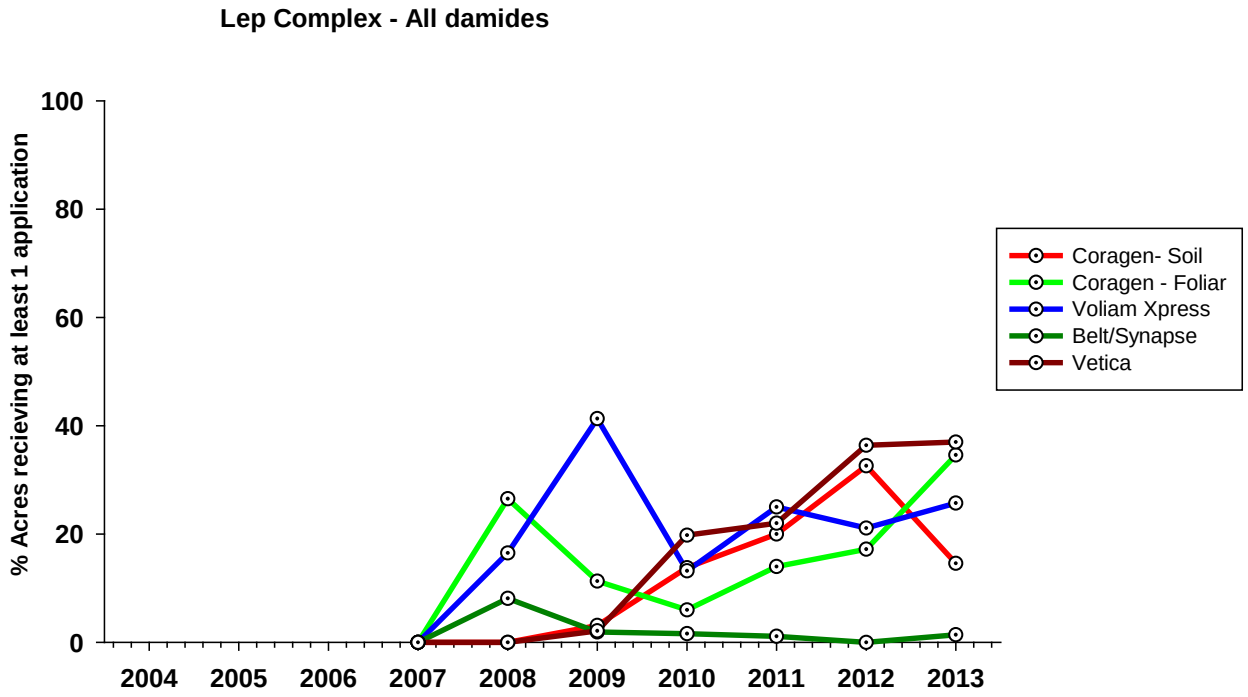

Figure 2. Trends in diamide insecticide use for control of lepidopterous larvae in fall lettuce, 2004-2013

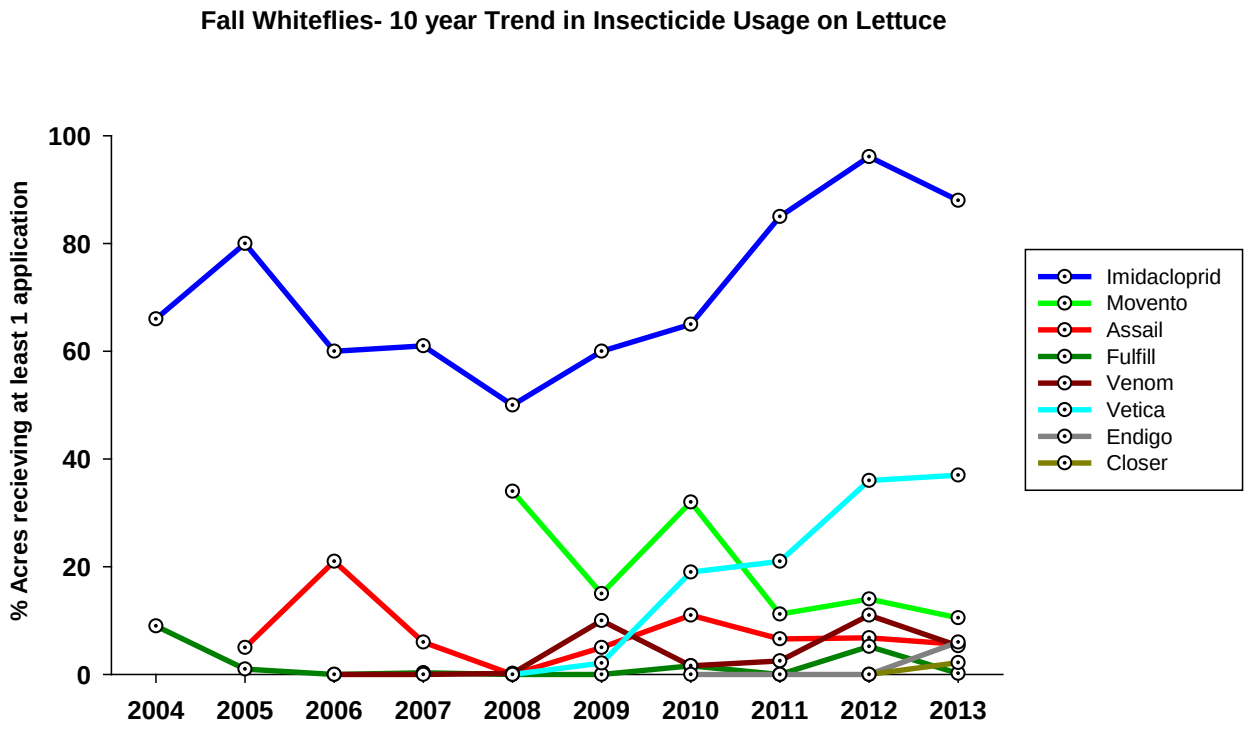

Figure 3. Trends in insecticide use for control of whiteflies in fall lettuce, 2004-2013

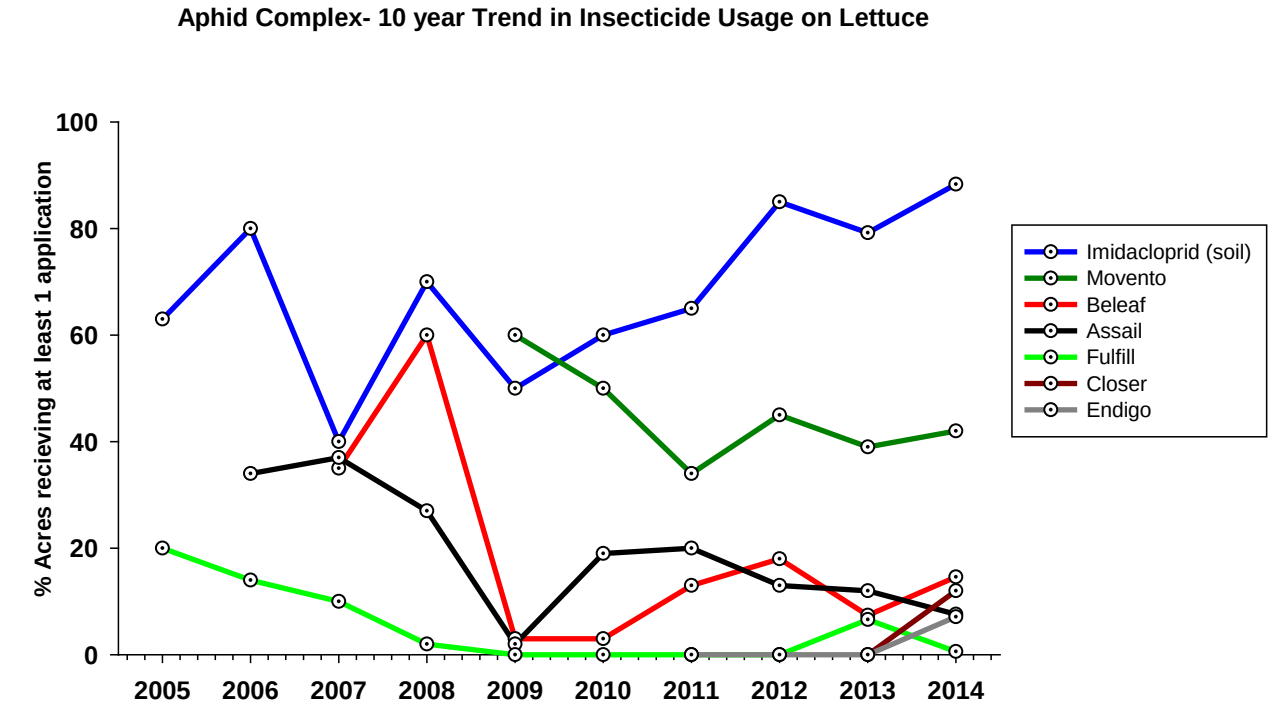

Figure 4. Trends in insecticide use for control of aphids in spring lettuce, 2005-2014

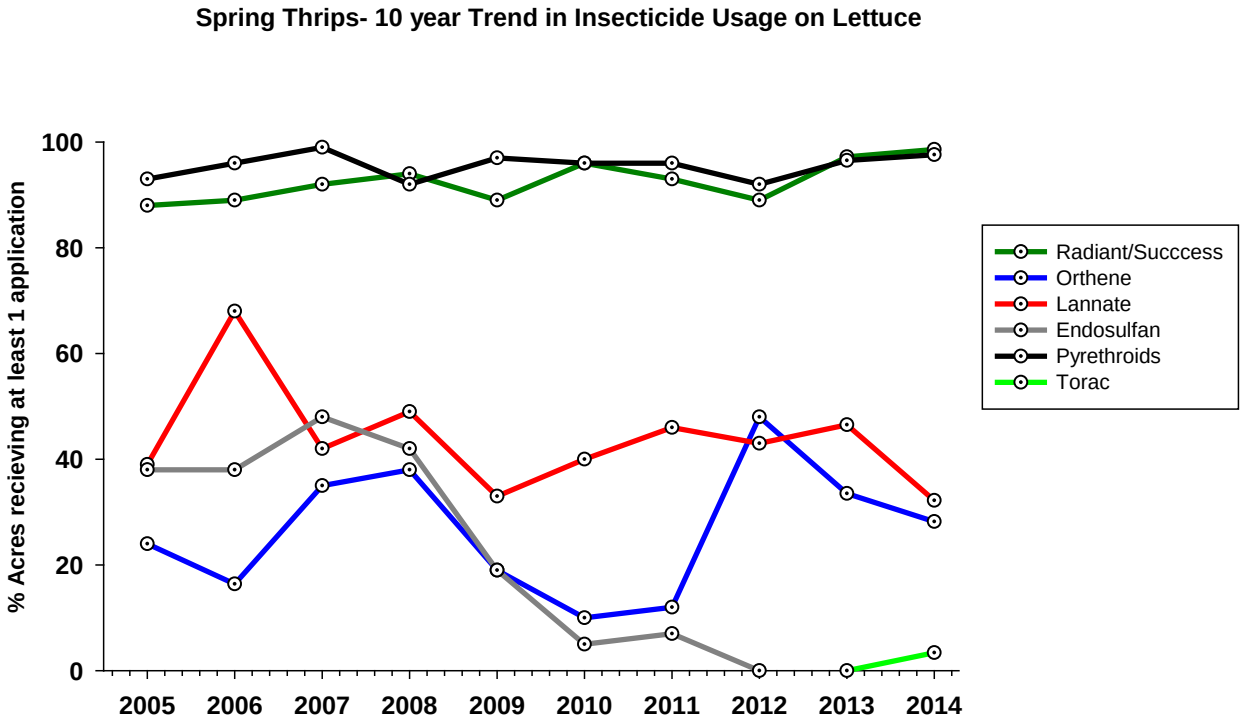

Figure 5. Trends in insecticide use for control of thrips in spring lettuce, 2005-2014