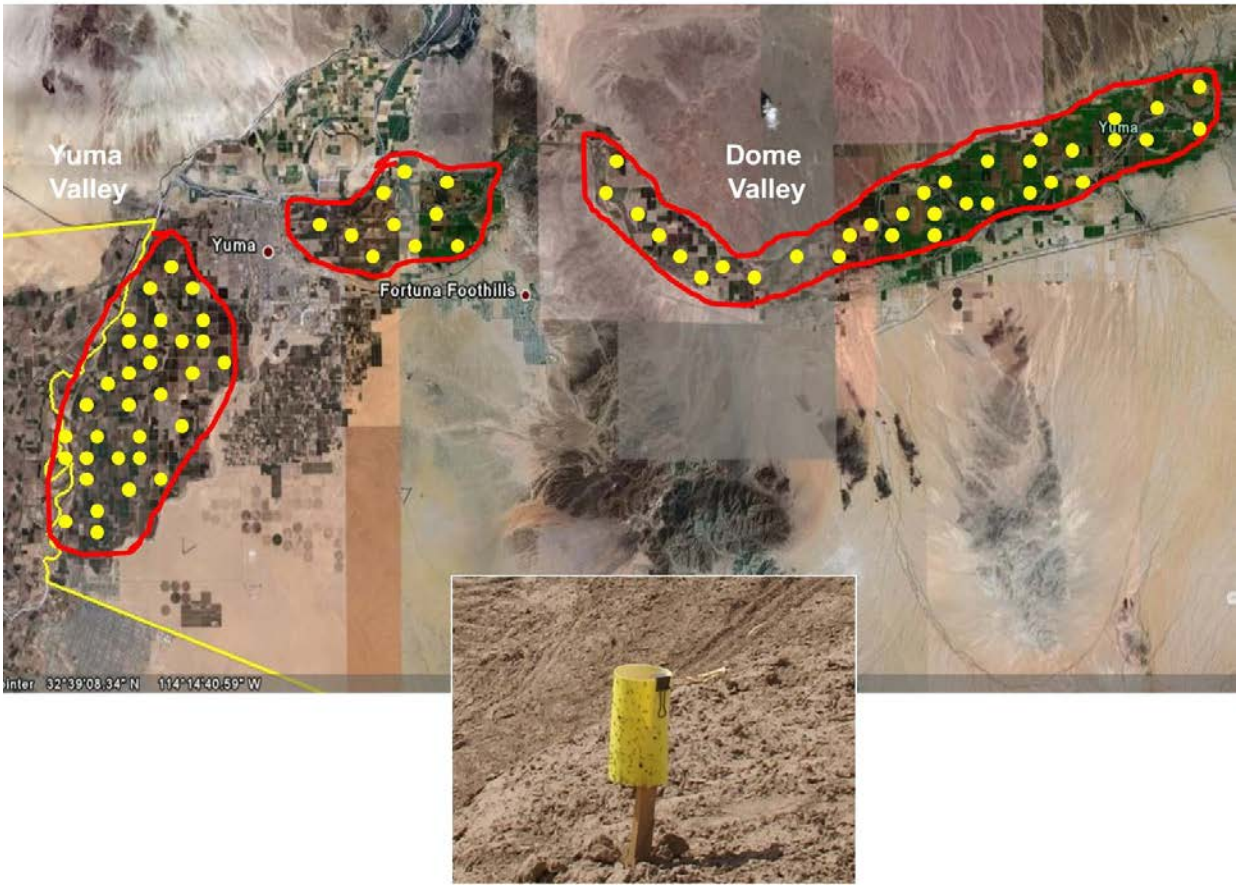
# Area wide Incidence of Whiteflies and CYSDV In Fall Melons in Yuma County, 2007-2012

John Palumbo, Kurt Nolte and Yves Carriere


This is a summary of a recently completed project that was designed to survey the area wide incidence of *Bemisia* whiteflies and Cucurbit Yellow Stunting Disorder Virus (CYSDV) in commercial melon fields throughout the Yuma Arizona growing region. Not all of the data collected in this project is shown, but overall the information presented in this report reflects the general trends we observed. In addition, historical information on insecticide usage based on 1080 data provided by the Arizona Pest Management Center and Arizona Department of Agriculture has been included to provide some perspective on the increased pest management that has taken place since the virus first became established in Yuma county.

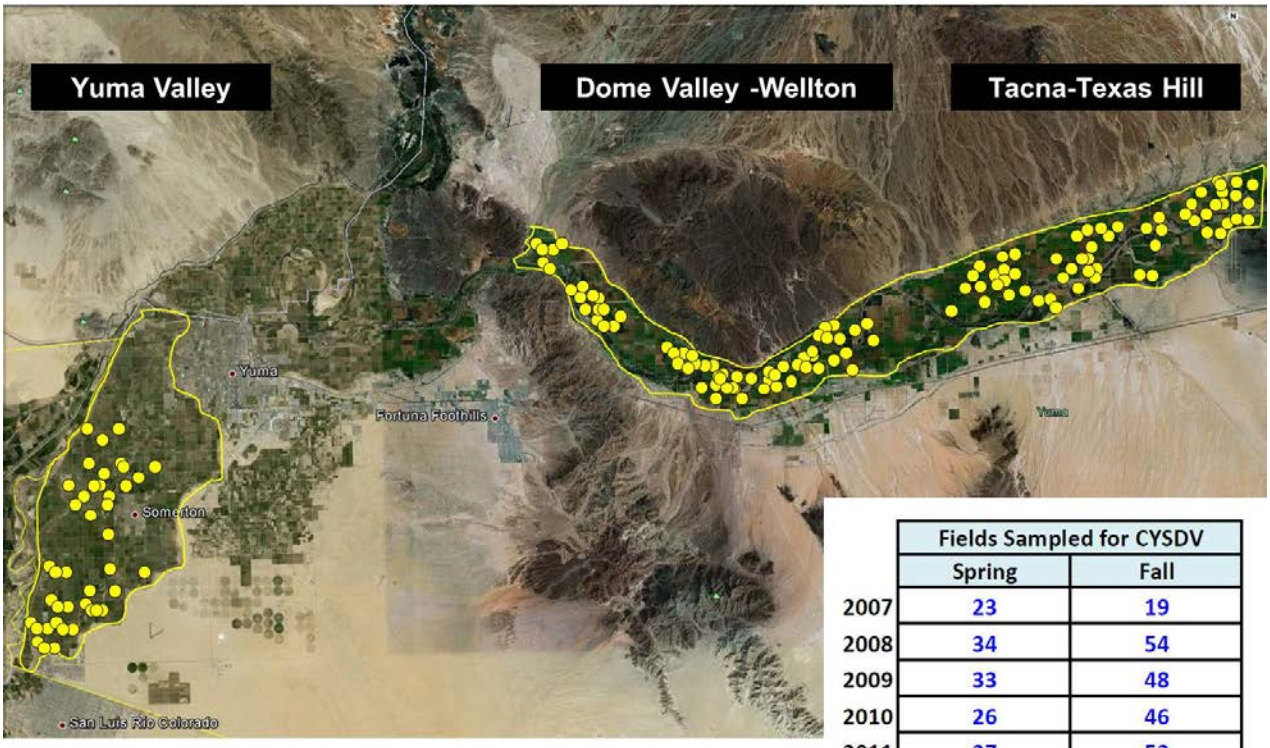
## Areawide Incidence of Whiteflies, 2007-2009




The project was initiated in the spring of 2007 to monitor and record the area wide incidence of whitefly movement using yellow sticky traps located throughout the growing regions. A total of 78 sticky traps were located throughout the Yuma growing region as shown above. Traps were collected and replaced on a 1-2 week interval throughout the year. Whitefly numbers were counted on each trap under 20X magnification.

## Area wide Incidence of CYSDV in Yuma

***2007-2012***

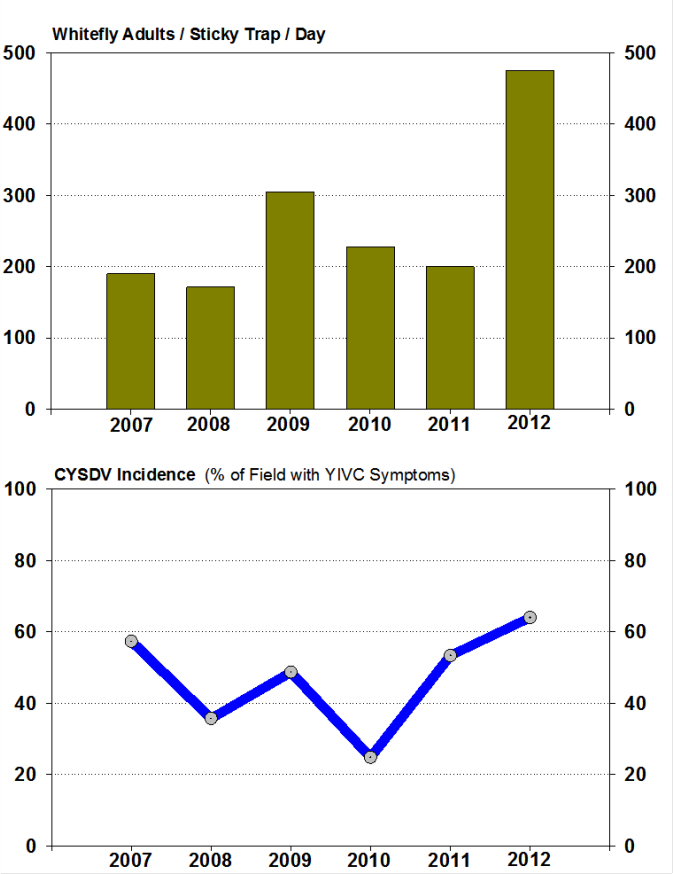



| | Fields Sampled for CYSDV | |
|---|---|---|
| | Spring | Fall |
| 2007 | 23 | 19 |
| 2008 | 34 | 54 |
| 2009 | 33 | 48 |
| 2010 | 26 | 46 |
| 2011 | 27 | 52 |
| 2012 | 27 | 40 |

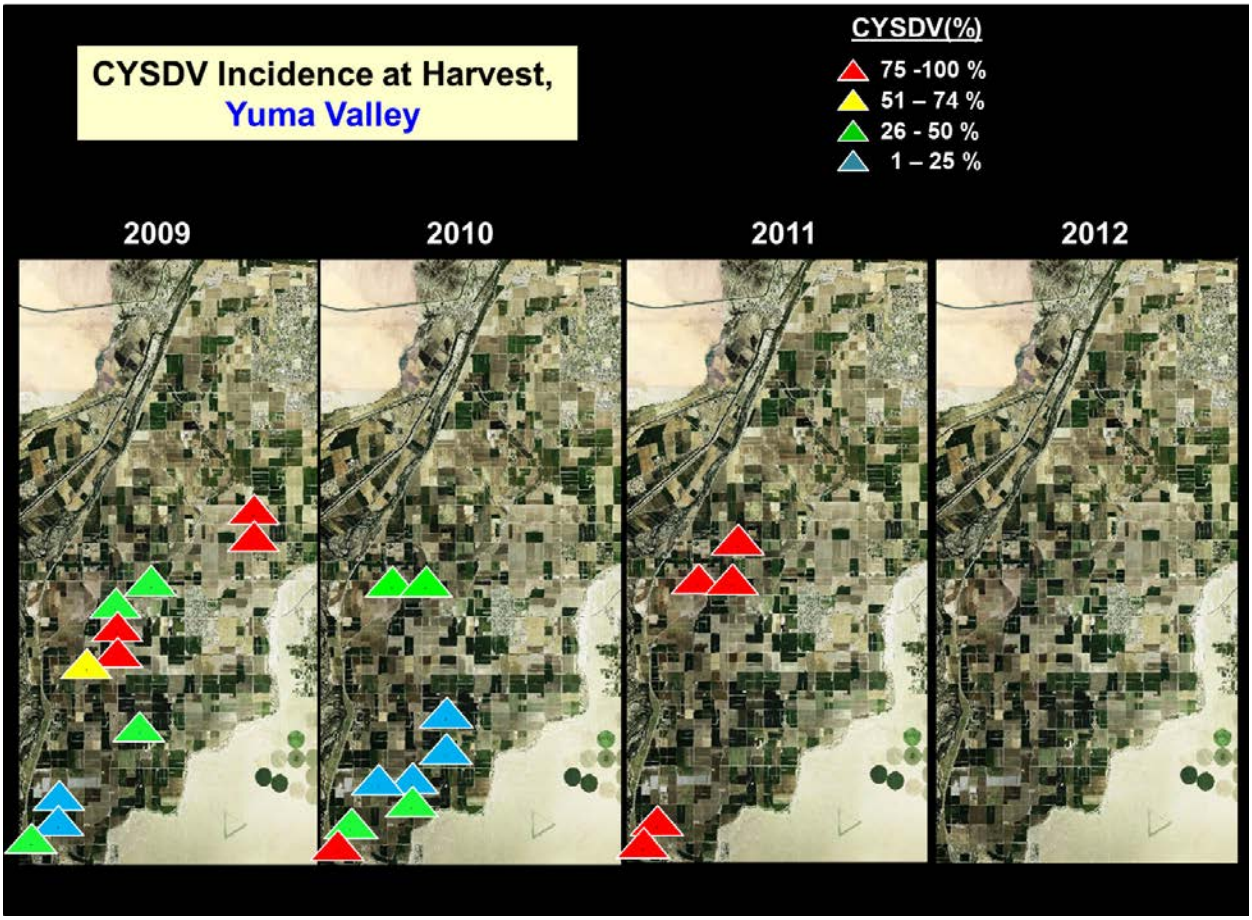
In association with the whitefly trapping, a concurrent project was initiated in the spring of 2007 to monitor and record the areawide incidence of CYSDV in melon fields in the Yuma area. The number of fields that were monitored in each growing season and locations are shown in the table above. At various time intervals throughout the fall growing season the percentage of each field infected with CYSDV was estimated. In spring melons, fields were monitored for the presence or absence of plants with CYSDV symptoms.

Area-wide trapping with yellow sticky traps was discontinued at the end of 2009. The project was modified in 2010 to more closely monitor the whitefly abundance using yellow sticky traps placed on the edge of each fall melon field located throughout the growing region. Traps were collected and replaced on a 1-2 week interval throughout the fall growing season. Finally, similar to the previous years, the percentage of each field infected with CYSDV was estimated at various time intervals throughout the fall growing season

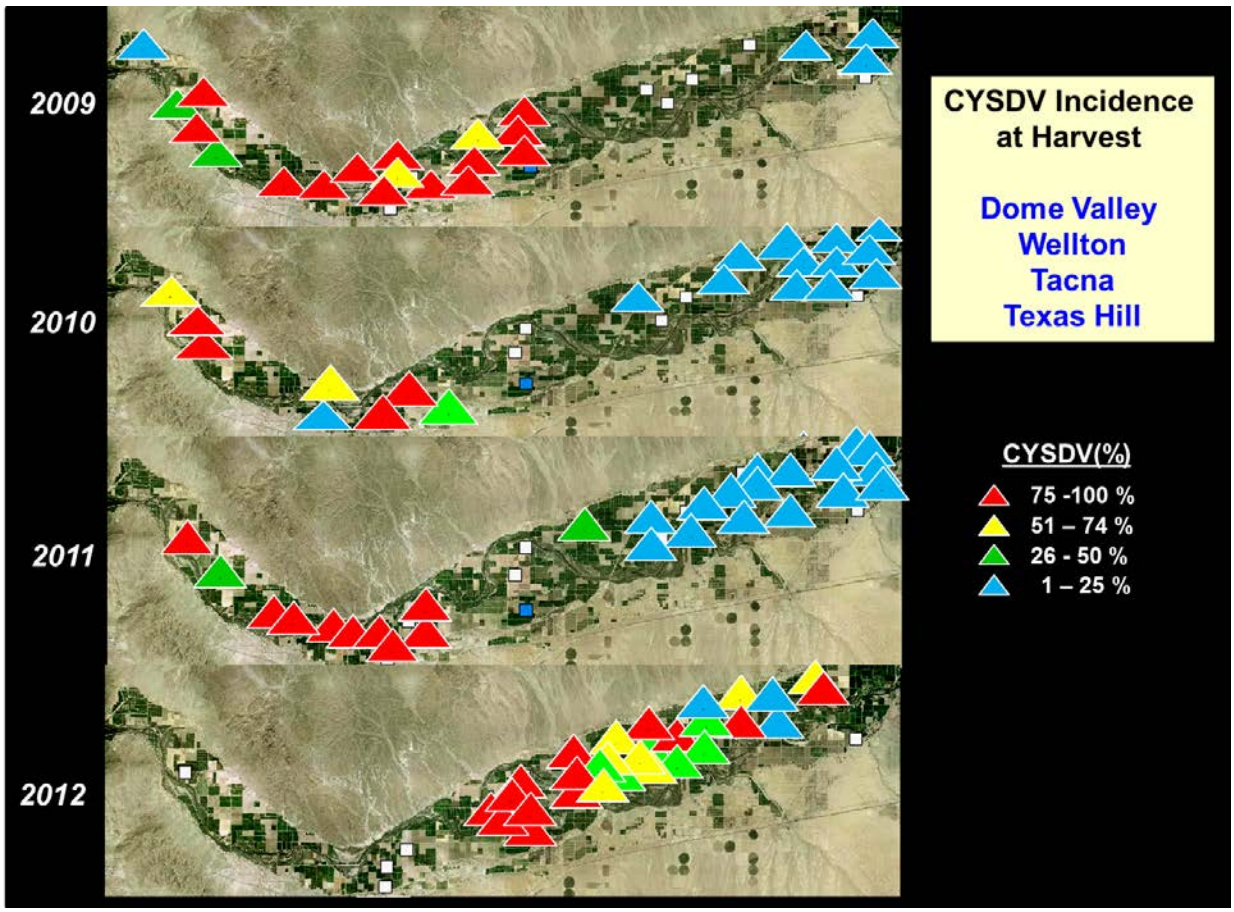
## Area wide Incidence of Whiteflies/CYSDV




The data above shows an overall summary of whitefly trap counts and % CYSDV Incidence in fall melons in the Yuma Valley and Dome Valley/Wellton/Texas Hill areas during the 2007-2012 growing seasons when averaged across all fields and locations. The upper graph shows whitefly trap counts during the fall season where whitefly pressure varied among years. Over the past 6 years, whitefly abundance was highest in 2012. Although CYSDV incidence varied from year to year, virus incidence in 2012 was higher than the initial outbreaks in 2007. The virus continues to be an important pest of fall melons in Arizona.




Area wide maps showing the incidence of CYSDV on fall melons in the Yuma Valley from 2009 – 2012 are shown above. Estimates of virus in 2009 showed that CYSDV incidence at harvest was greatest in the center of the Valley, and was associated with high whitefly abundance. Melons grown on the eastern edge of the valley (right side) with high CYSDV incidence were adjacent to a housing development and a field where melons had been grown the previous spring. The melons on the southern end of the valley (bottom) where CYSDV incidence was ~5-10% (blue triangle) were produced under fabric row covers. In 2010, overall less CYSDV was observed, and was highest in the southern part of the valley. However in 2011, there were fewer melon fields, but all of them had very high rates of CYSDV infection at harvest. This may explain why melon growers chose not to plant melons in the valley in 2012.



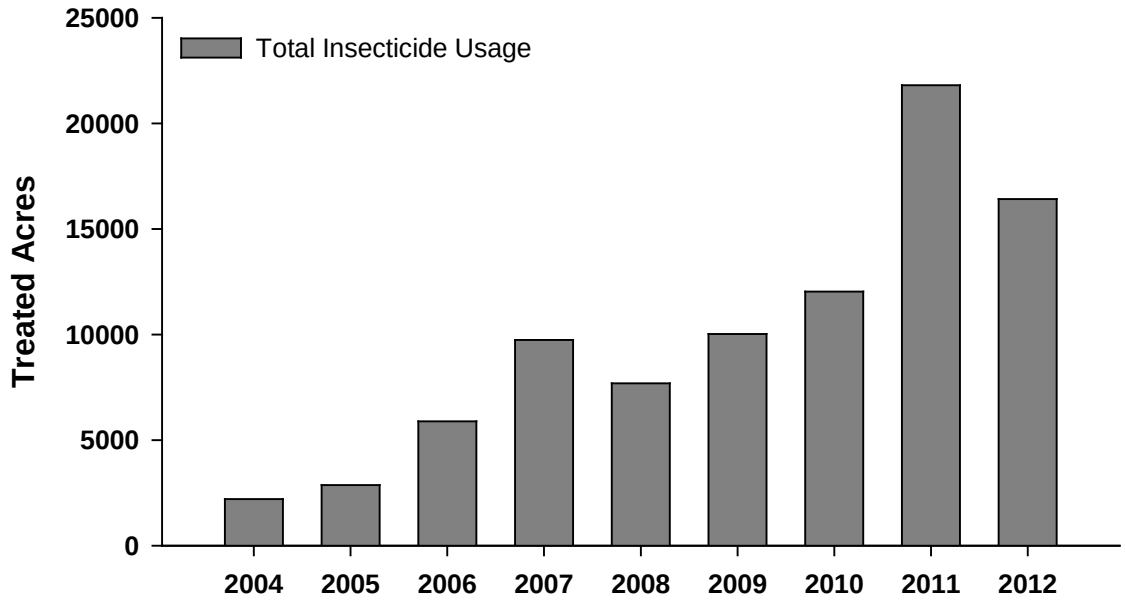

Area wide maps of the Dome Valley-Wellton-Texas Hill areas where fall melons were produced from 2009-2012 are shown above. Estimates of virus show that CYSDV incidence in 2009 was greatest in the center of the region near Wellton. Most of these melons fields had > 75% virus (red triangles). These same areas also had the highest whitefly abundance as indicated by sticky traps. Several of the fields were grown near spring melon watermelons fields. On either end of the valley, CYSDV was much lower and suggests that isolation form host crops may play a key role in minimizing virus incidence on fall melons. The melons on the eastern end (right side) of the valley where CYSDV incidence was ~5-10% were produced under fabric row covers. In contrast, CYSDV incidence on fall melons in 2010 was considerably lower, even though the whitefly numbers were higher than 2009 numbers, and alfalfa was grown adjacent to many of the fields. This was particularly evident in the center region near Wellton. The Texas Hill area (far right) had the very overall lowest incidence of both whiteflies and CYSDV even though less than half of this acreage was grown under row covers. CYSDV incidence was highest in the Dome Valley area. A similar trend was observed in 2011 where fields in the Wellton area had very high infection rates while fields planted further east had much lower incidence of CYSDV. In 2012, the fall melons were concentrated from Ave. 33E to Ave. 47 E. As anticipated, the virus incidence was very high near Wellton, but was also higher in some of the fields grown further east; many at higher rates than seen in previous years. Not surprising, spring melons were scattered throughout the region the previous spring.

## CYSDV Incidence on Spring Melons

| Spring Season | Acres | Date YIVCs symptoms 1st observed | % acres with CYSDV at Harvest | % of Field with YIVC at Harvest |
|---|---|---|---|---|
| 2007 | 700 | 2-Jul | 11.8 | 0.01 |
| 2008 | 2507 | 13-May | 21.6 | 0.1 |
| 2009 | 1871 | 22-Apr | 82.1 | 1 |
| 2010 | 2411 | 26-May | 18.3 | 0.1 |
| 2011 | 1933 | 10-Jun | 22.2 | 0.01 |
| 2012 | 1464 | 11-May | 47.5 | 0.1 |

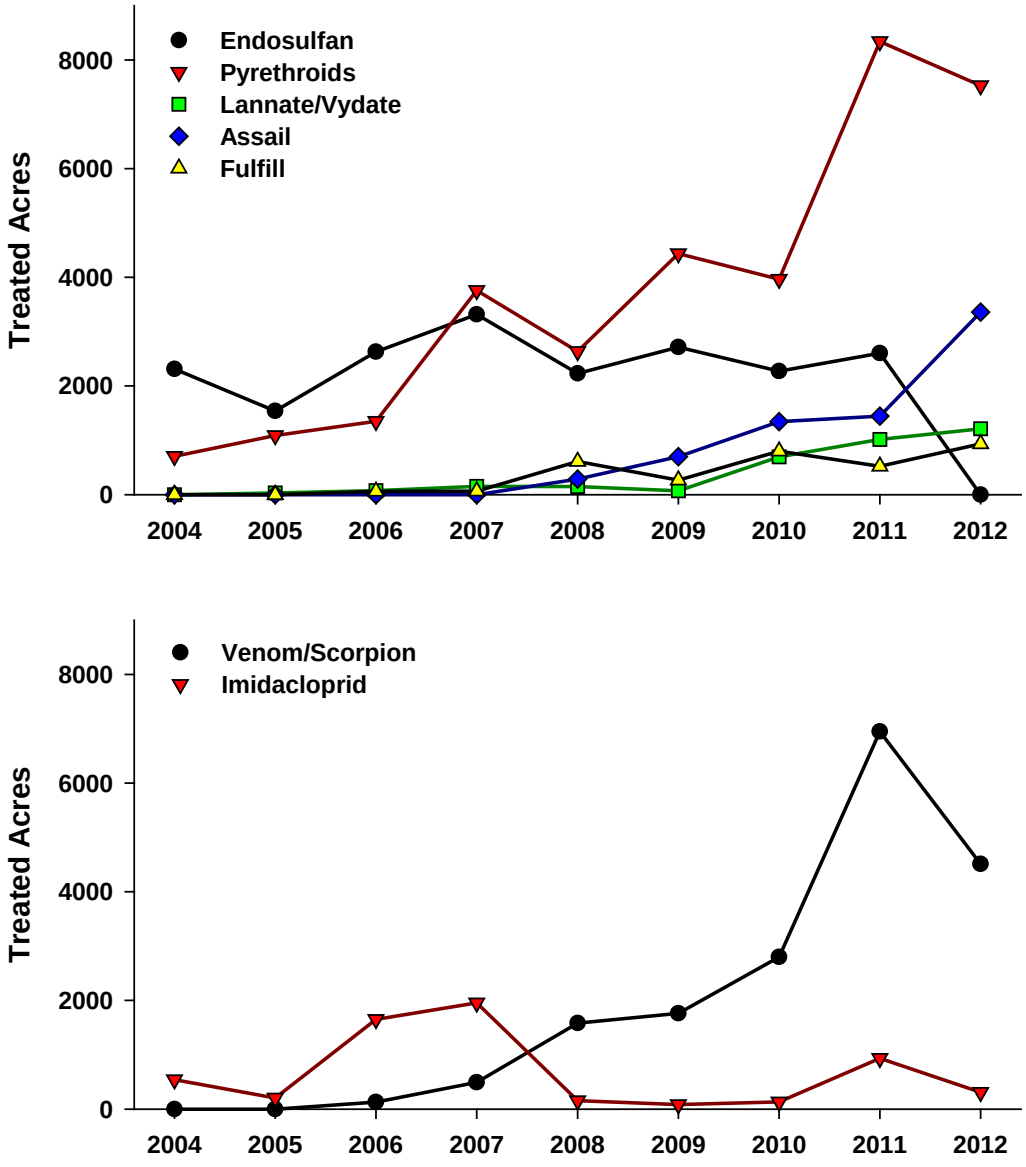
The above data shows the incidence of CYSDV on spring melons in the Yuma Valley when whitefly abundance is generally much lower. In the 6 year period since the virus became established in the desert, CYSDV incidence in spring melons was highest in 2009. This was consistent with warmer winter temperatures and unusually high whitefly numbers on the spring melons. Not surprising, CYSDV incidence was very high in the subsequent 2009 fall melons. CYSDV incidence was much lower in spring 2010 where CYSDV symptoms were found in less than 20% of the melon fields. Subsequently, CYSDV incidence was low on melons grown in the fall of 2010. CYSDV incidence in 2011 was comparable to levels seen in the spring of 2008. In 2012 CYSDV incidence was higher on spring melons, as was the subsequent infection seen on fall melons that year.

## Insecticide Usage on Fall Melons




Another source of information that sheds some light on how intensively growers have been managing whiteflies on fall melons is the insecticide use data for fall melons grown in Yuma County developed from the Pesticide Use Database maintained by the University of Arizona, Pest Management Center. The above graph shows a summary of the total acreage of melons treated with key insecticide active ingredients (see graphs below) from Aug through Nov each year from 1080's submitted to the AZ Department of Agriculture. The data clearly show a steady increase in insecticide use following the introduction of CYSDV in Yuma County in 2006. Insecticide usage peaked in 2011 where treated acreage was almost 8-fold greater than the 2005 growing season when virus was not present. It is fairly safe to assume that the increased insecticide usage on fall melons in Yuma County can be attributed largely to vector management.

## Insecticide Usage on Fall Melons




Among individual insecticide products, endosulfan and pyrethroids have been the predominantly used foliar products to date, and Venom/Scorpion has been the primary soil insecticides used at planting. With the cancellation of the endosulfan tolerance last summer, use of Assail foliar sprays increased about 2-fold. The use of Fulfill and Vydate/Lannate has slowly increased over the past 4 years. These increased trends are significant when considering that fall melons acreage has decreased slightly over the past 6 years.

## Summary / Observations

CYSDV was first reported infecting fall melons in Yuma County in 2006. Since that time, overall incidence rates of CYSDV at harvest has ranged from 20-60%. Whitefly abundance has remained relatively steady over the same period with the exception of unusually very heavy pressure in 2012. Similarly, CYSDV incidence was also very high in 2012. Based on these observed trends, fall melons produced in the Yuma Valley and the Wellton regions appear to be at a high risk of CYSDV infection.

These observations may be explained in part by a preliminary examination of the trapping and CYSDV data in 2011 and 2012 using Geostatistical analysis. The data suggest that several factors play key roles in whitefly abundance and CYSDV infection on fall melons. First, whitefly counts on sticky traps were significantly correlated with CYSDV infection at harvest on the fall melon crops. Perhaps more importantly, the data indicated that whitefly abundance on fall melons was shown to be greatest in areas close to cotton production, and near locations where melons were produced the previous spring.

Furthermore, these same crops appear to have a significant influence on CYSDV infection on fall melons. Thus fall melons produced near cotton or where melons were grown in the spring had higher incidence of CYSDV. In addition, the earlier a field was infected with virus (i.e., pre-bloom stages), the more likely it would have high levels of infection at harvest. As a result, late planted melons were at a higher risk of infection. Surprisingly, alfalfa, a potential reservoir of the virus, was not associated with either high levels of whitefly abundance or CYSDV infection. Similarly, fall melons grown near broccoli, cabbage, or cauliflower (other highly preferred whitefly hosts) were also not associated with virus infection, suggesting that aggressive management of whiteflies in these crops significantly reduces the numbers of adult vectors in the area.

In conclusion, these observations lend support to our IPM recommendations for non-chemical management of CYSDV and whiteflies in fall melon crops. When possible, melon producers should isolate fall melon plantings as far away as possible from cotton and areas where melons were grown the previous spring in order to minimize whitefly infestations and associated virus infection.

**Acknowledgements**

*Funding for this project was provided in part by a Specialty Crops Block Grant, USDA-AMS, administered by the Arizona Department of Agriculture. Thanks to Wayne Dixon, Al Fournier and Peter Ellsworth at the UA- Arizona Pest Management Center for providing the summarized 1080 Pesticide Use Data shown in this report.*