

Don't Just Spray - Survey.

Revisiting IPM as a Modern and Effective Pest Management Strategy

Pesticide use, including insecticides, is a key component in growing most crops in the US. Many of our largest crops are increasingly moving toward an "insurance-based" approach to pest management—deploying a suite of pesticides in advance—regardless of pest levels. But there is an alternative approach. It's a philosophy developed over 50 years ago called Integrated Pest Management. IPM recognizes that pesticides can be useful tools, but should only be called upon as a last resort, after other control measures prove inadequate and pests threaten the crop. Given some of the challenges surrounding growing crops that depend on insect pollinators, it's time to revisit these approaches.



CONVENTIONAL SYSTEM

Conventional systems proactively implement aggressive chemical control measures **before** pests threaten a crop, anticipating a worst case scenario.

VS



INTEGRATED PEST MANAGEMENT

IPM focuses on prevention of pests or their damage through a combination of techniques and cultural practices. Pesticides are used only **after** monitoring indicates they are needed.



THE POLLINATORS: Bees, flies, & others

Pollination is the transfer of pollen grains produced by one flower to another to help flowering plants produce fruits and seeds. Without this transfer, these plants cannot bear fruit. They require special agents—pollinators—like the honey bee to perform this essential service.



THE PEST: Striped Cucumber Beetle

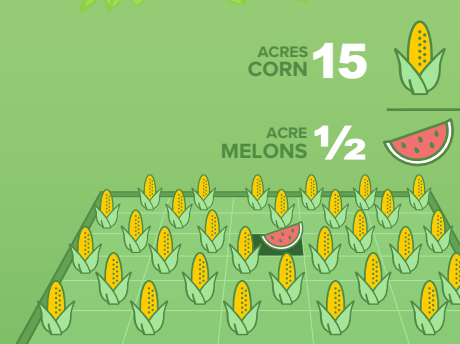
The striped cucumber beetle, though small, causes significant amounts of damage to crops. Damage is seen in the early part of the year as overwintering beetles emerge, but it continues throughout the entire growing season through feeding and transmitting bacterial wilt disease.



Setup



- WEEKLY
- N° BEETLES
1. Wanatah
 2. Columbia City
 3. Lafayette
 4. Butlerville
 5. Vincennes
- SITES IN INDIANA



	THIAMETHOXAM seed treatment	<input checked="" type="checkbox"/> NO seed treatment
	IMIDACLOPRID in transplant water	<input checked="" type="checkbox"/> NO soil drenching insecticides
	Prophylactic PYRETHROID sprays	<input checked="" type="checkbox"/> Spray only in response to economic thresholds

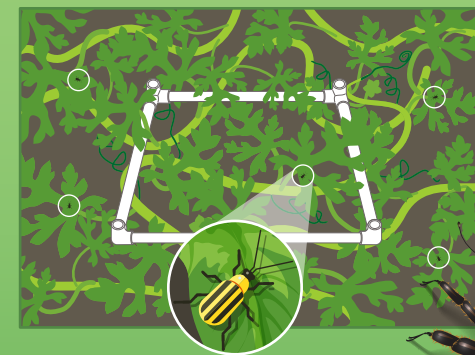
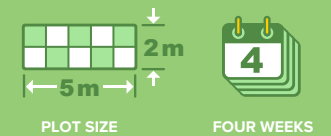
FLORAL SURVEYS

Randomly selected clusters of male and female flowers were observed to measure pollinator abundance, number of floral visits and pollination events.



MELON YIELD

Five by two meter subplots were scattered throughout the main watermelon plot. These were checked in four consecutive weekly harvests.



HOW WE MEASURED

Striped cucumber beetles were counted on each developing plant within a fabricated boundary. This was continued each week until harvest. **Five beetles per plant** is the threshold for IPM treatment.



EXPERIMENTAL FIELDS

Five sites were chosen throughout Indiana for this project, and weekly sampling throughout 2017 and 2018 were used for analysis. For each analysis, watermelon plants were visually sampled for striped cucumber beetles, which were used to estimate pest pressure.

TYPICAL SITE

Paired plots were established at each site in which 15 acres of corn and a half acre of watermelons were planted. On one plot, corn received a conventional insecticide treatment of the neonicotinoid thiamethoxam, while watermelons received the neonicotinoid imidacloprid and a pyrethroid. On the other plot, no insecticide treatments were given to crops unless in response to established economic thresholds.

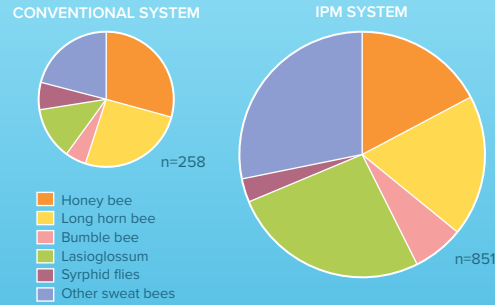


POLLINATOR COMMUNITIES



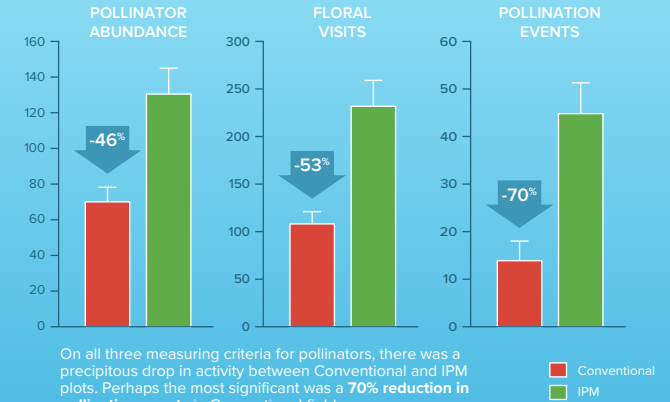
The reduction in pollination activity is apparent in Conventional fields. In all categories numbers have dropped, and we lose **70%** of pollination efficiency.

Difference in Watermelon Pollinator Communities



Each pie represents 25 pollinator surveys (375 total minutes) across 5 Purdue Agricultural Centers. Using a bee vacuum, all pollinators seen visiting watermelon flowers during the survey were collected, frozen, and later identified into these broad taxonomic groups.

Pollinators Contributing to Higher Yield



Results

The impact that Conventional methodologies have on pollinators and the crops that need them is clear. Pollinator activities drop, and watermelon yields were significantly reduced in the fields practicing this methodology.

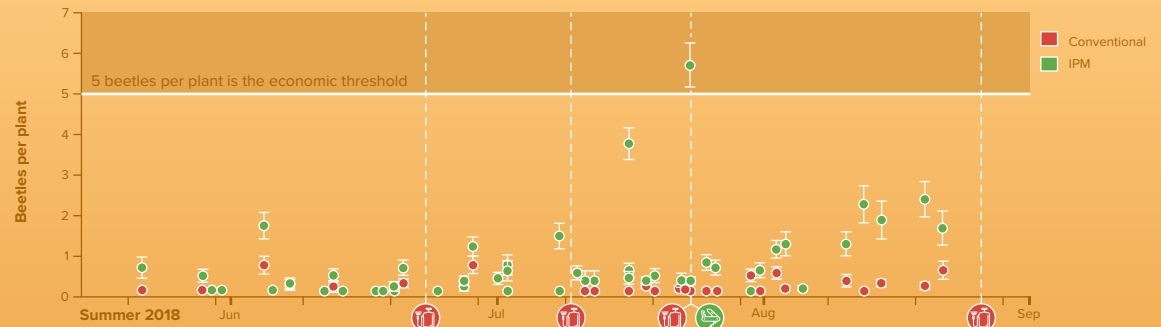
What may come as a surprise is that pest beetle numbers are remarkably consistent (and relatively low) with both control methods. This means that in Conventional fields, pesticide sprays were used unnecessarily and were ultimately counter-productive. It also indicates that the IPM approach can be just as effective in reducing damaging pests, while still enabling pollinators to do their good work—helping melons to thrive even in a landscape dominated by corn.

STRIPED CUCUMBER BEETLE



Both Conventional and IPM plots exhibited remarkably similar beetle numbers. The IPM treatment required insecticide treatment on only a **single occasion**.

Striped Cucumber Beetles in Watermelon Fields Across Indiana



Throughout the summer of 2018, cucumber beetle counts remained far under the 5 beetles for plant threshold across all sites and in each plot, Conventional and IPM. On only one day in July was the threshold exceeded at one of five sites, requiring an IPM treatment.

WATERMELON YIELD



Watermelon yields showed a **clear drop-off** when Conventional systems were employed. The largest reduction in yield was **38%**.

2018 Watermelon Subplot Yields



Watermelon yields showed a reduction when conventional methods were used, these were statistically significant at 2 of the sites, and the largest reduction in yield was 38%.



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