





Even if a pest species exists at some level within the urban environment, they are likely to be of significantly less importance and threat if they cannot gain entry into homes, food stores, eateries, schools, work places and the like.

Paradoxically, it is not typically difficult nor financially exorbitant to pest-proof the types of structures listed earlier (e.g., houses, apartment buildings, malls, etc.). Nevertheless it remains all too common to find such structures with most of their doors not pest-proofed or containing numerous unrepaired holes and penetrations through foundations walls, windows, garage doors and the like.

It is short sighted for property owners to allow the doors of a supermarket, office building, or private home for example to contain threshold gaps allowing pests entry and to repeatedly hire pest professionals to treat with a pesticide or to install traps or poison baits to kill the mice that repeatedly enter the structure year after year.

The urban entomologist Hugo Hartnack in 1939 emphasized in his classic textbook on city pests how pest prevention *via pest exclusion* -- not pesticides or traps--- within the built environment are the cornerstones of urban pest management:

***“We should have little trouble with vermin if our builders would hear and understand the “language” of vermin and would do a better job in eliminating entrances and hiding places for them.”***

City properties such as sidewalks, curbs, rail lines and sewers often go unrepaired for years allowing for pest harborage, when simple repairs can help to minimize the occurrences of important health pests/risks within neighborhoods. For instance, just one unrepaired hole in a busy pedestrian city sidewalk containing a litter basket nearby can support several families of rats.

New buildings — especially those of significant size and complexity -- can be pest-proofed concurrently as they are constructed.

This is the most efficient (and thus the smartest) approach to take in designing this critical portion of a healthy ecosystem. But rarely is this done because building professionals are not usually cognizant of future pest issues post completion or trained in even a modicum of pest biology. There is a presents an obvious gap in urban ecology—and its not a new gap.

Even earlier than Hartnack’s comment in 1939, the German entomologist F. Zacher in a 1927 publication addressing keeping structures healthy via denying pests entry, wisely advised: *“From the very start of a building’s construction, an experienced biologist should be consulted.”*

Many segments of the public often inquire of pest companies: “How much will you charge to treat my property (home, store, etc.) on a monthly basis to keep pests away?”. The better question of any commercial or residential property owner in the context of healthy urban ecosystems is: “How much will you charge to pest proof my building and to then inspect each month to monitor and possibly treat for pests?”

### **Chemical and Non-Chemical Pest Management**

Even with well-maintained urban ecosystems and the most carefully thought out structural exclusion designs, urban pests remain extremely impressive in their abilities to adapt and persist. What’s more, several of the more important health-related urban pests are simply delivered in goods within boxes and supplies even into the cleanest, most pest-proofed building in the city.

So, there can be little doubt. Pesticides and a wide range of additional pest management technologies are essential tools in maintaining healthy ecosystems via progressive urban pest management programs. But a simple understanding of the most elemental biological principals of pests clearly demonstrates that chemicals and traps rarely are the most appropriate first response to pests.

Urban ecological maintenance comes not only first, but also as the larger portion of the solutions to nearly every urban pest infestation. It’s a clear case of the 80/20 rule. A quality pest brush (vs. a weather strip) is pest management technology. So is smart purchasing of the most appropriate refuse dumpster and dumpster placement by any town’s average eatery.

### **Conclusion**

The origins of the word ecology comes from the Greek “oikos” which means “house”. Of course, our cities and towns as complex and integrated systems provide the house for not only each of our own individual houses, but for our daily lives outside of our houses in our work and recreational spaces, and our (all too taken for granted) food production, gathering, and food consumption lives.

*Homo sapiens* is our genus and species name. It means “wise man”. When it comes to urban pest management, we must put first things first. It is time to do it right. Global population statistics show that most humans (3.9 billion) now live in urban areas. Our numbers are expected to reach 6.4 billion by 2050.

The most effective, most commonsensical, and most sustainable efforts lie with healthy and maintained urban ecosystems which then results in more natural suppression of urban pest populations. These natural systems can be then be supplemented with chemical and non-chemical tools as necessary. That means we live up to our scientific name in the use of our one and our only “house”.

*Dr. Robert Corrigan has been working in urban IPM programs for over 25 years. He is an urban entomologist, an urban rodentologist, and president of RMC Pest Management Consulting.*

If you are conducting research in the area of community-scale IPM, we encourage you to contact EPA’s Lee Tanner (tanner.lee@epa.gov) about articles for future issues.

# Re-envisioning Agrichemical Input Delivery: *Solid Set Delivery Systems for High Density Fruit Production*

By Matthew Grieshop & Paul Owen-Smith  
Michigan State University

## The Concept

Temperate fruit production is in the midst of a planting density revolution, with apples leading the way. Over the past 25 years, apple orchards have been transforming from low density, freestanding tree systems to high-density, trellised tree systems. This has been accomplished by the careful engineering of tree canopy architectures from individual tall spheres into continuous narrow “fruiting walls” (Robinson, 2007).

These intensive systems have greatly increased production efficiency and early returns on investment. However, the delivery of agricultural chemicals—pesticides, foliar nutrients and plant growth regulators—to these systems still relies on tractor-pulled airblast sprayers designed for large, broad canopies.

Meanwhile, growers have been faced with an unprecedented range of challenges including: consumer demand for reduced pesticide inputs, increasing urban/rural overlaps, the promulgation of Maximum Residue Limits (MRLs) for international markets, loss of traditional pesticides to national regulations, rapid development of pest resistance, an influx of invasive insect pests, an increasingly volatile labor market and a less predictable climate.

Growers’ responses to these issues have included the adoption of expensive technologies (e.g. insect netting for spotted wing drosophila \$10,000+ an acre, wind machines \$4,000+ per acre) and the development of mechanical replacements for human labor (e.g. picking platforms and harvest assist machines).

Solid Set Canopy Delivery Systems (SSCDS) provide a single solution for many of the new problems growers are facing while replacing costs associated with tractor driven sprayers. Solid Set Canopy Delivery Systems are a logical evolution of agricultural chemical delivery for modern, high-density orchards. SSCDS consist of a network of microsprayers positioned in the tree canopy/trellis and connected to a pumping/mixing station. This approach was first demonstrated by Agnello and Landers (2006) in a small proof of concept study in NY.

Application of inputs from a fixed system versus a tractor-based system provides many potential advantages to growers utilizing high-density apple systems.

Targeted applications via the SSCDS could virtually eliminate applicator exposure problems common to tractor based sprayers, while increasing the ability to apply sprays during critical weather periods, including when the ground is too wet for heavy equipment.

The adoption of SSCDS will make frequent applications at low rates possible for modern agricultural chemicals, including foliar nutrients, bio-pesticides, and reduced-risk pesticides—to improve efficacy of “soft impact” integrated pest management (IPM) programs. Commercialized SSCDS will also require less skilled labor to operate compared to tractor based sprayers due to a 4-10 fold decreased application time and because the systems will not rely on heavy machinery.

Development of new input delivery technologies is extremely meaningful to a specialty crop such as apples because pesticide inputs can account for up to 50% of a grower’s yearly production costs.

With this in mind, we initiated a major exploration of SSCDS in a multiple year US Department of Agriculture (USDA) funded project in NY, WA and MI beginning in 2011. The experiences shared in this article come from the project team based at Michigan State University (MSU) and cover some of our findings in the first three years of research and development of this revolutionary approach towards apple pest management.

## Solid Set Canopy Delivery System Design



Figure 1: SSCDS system at MSU Clarksville Research Center making an application.



Figure 2: SSCDS applicator (Courtesy of Jay Brunner WSU)



Figure 3: Upper, single microsprayer

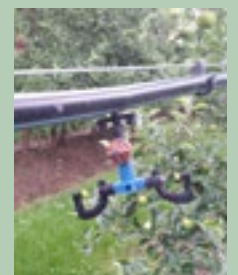


Figure 4: Lower, double microsprayer

**Project Goals:** Engineering of the system and the collection of proof of concept data including:

1. Develop, engineer, and optimize SSCDS for orchard-scale use and materials delivery
2. Evaluate Coverage provided by SSCDS compared to standard airblast applications
3. Evaluate pest management provided by SSCDS
4. Determine relative costs of SSCDS vs. current airblast sprayers

**System Design:** The prototype SSCDS developed at MSU, Cornell and Washington State University consist of the canopy delivery system (Fig. 1) and applicator (Fig. 2). The canopy delivery system is a network of polyethylene irrigation tubing run through the orchard block in a continuous loop with an input and output line that attaches to the applicator. The applicator consists of a pumping system, air compressor, and tank for mixing, providing and recapturing spray material.

SSCDS were established in an apple orchard at the MSU Clarksville Research Center (Fig. 1). Single horizontally oriented microsprayers were inserted at 6' intervals on the upper hose (Fig. 3). Twin vertically oriented microsprayers were inserted at 6' intervals into a "T" bracket on the lower line (Fig. 4). Microsprayers on the two lines were staggered providing fluid coverage every 3' in the tree canopies.

**Coverage:** Coverage evaluation is of critical importance for any new input delivery system. Simply put, without adequate coverage, pest management relying on traditional insecticides and fungicides is likely to fail. We have evaluated SSCDS coverage using three approaches: 1) water-sensitive cards, 2) tartrazine dye, and 3) laboratory bioassays of insect pests exposed to foliage treated with insecticides in the field. Spray cards allow us to characterize the coverage provided on both the top and bottom of leaves. Dye tests provide a robust test of leaf deposition. Bioassays provide data on how coverage translates into insect pest management.

**Coverage Conclusions:** The results from our three coverage measurement (water-sensitive cards, dye deposition, and insect bioassay) evaluations strongly suggest that our prototype SSCDS provides equivalent coverage to an airblast sprayer. The spatial arrangement of coverage was variable between the two trials relative the tops and bottoms of leaves as well as distribution of coverage from the bottom to the top of the tree canopy (Fig. 5), however SSCDS provided at least as much deposition as our airblast sprayer (Fig. 6) as well as the ability to kill a target pest (OBLR). The next logical question was whether SSCDS could provide adequate, season long pest management.

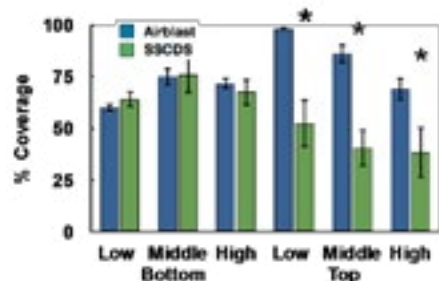


Figure 5: Mean ± SEM % coverage on spray cards facing down (bottom) or up (top).

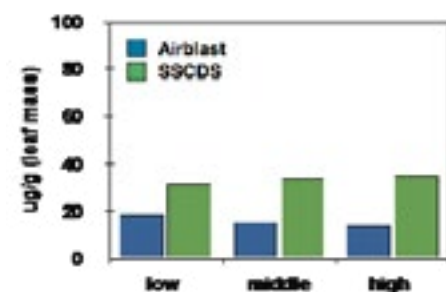


Figure 6: Mean ug/g tartrazine/leaf mass from coverage trial at three canopy heights

**Pest Management Efficacy:** Season-long insect pest and disease management data were collected in 2013 and 2014. The SSCDS was directly compared with conventional airblast application of materials in the apple research plots to evaluate efficacy of insect and disease pest management programs using the two methods of delivery.

#### **Insect Pest Management Efficacy:**

Insecticide programs at both locations utilized reduced risk products (e.g. acetamiprid, chlorantraniliprole, *Bacillus thuringiensis kurstaki*, and thiacloprid). We made assessments for codling moth, Oriental fruit moth, plum curculio and obliquebanded leafroller. Results from both years were consistently promising with SSCDS plots providing insect control equivalent to airblast sprayers.

**Disease Management Efficacy:** Apple scab management was compared between SSCDS and airblast applicators. A copper spray was applied at green tip followed by a series of fungicide applications made at approximately 1-week intervals for 4 weeks. The SSCDS provided comparable apple scab control to the airblast treatment in 2013 and 2014.

**Pest Management Conclusions:** Our initial evaluation of SSCDS provide strong proof of concept supporting that this technology is capable of providing pest management services comparable to those provided by traditional airblast sprayers. One of the most striking differences we noticed in conducting these trials was the speed and quietness of SSCDS applications versus tractor based applications. Sprays delivered through SSCDS were put on in only 12 seconds of application time with two 5 hp water pumps! Our airblast applications took five to 10 minutes to apply and created a great deal more noise.

#### **Implications and Economics**

**Implications:** Our proof of concept data makes a strong case for further development of SSCDS technology. The next phases of research will focus on novel applications and engineering. One of our next questions to address will be whether SSCDS could be used to make short-interval, reduced-rate applications of pesticides to better manage coverage to meet both pest management and MRL needs. SSCDS also promise to provide growers with a unique opportunity to alter orchard microclimates through evaporative cooling.

Preliminary research conducted by Jim Flore (MSU) has shown that SSCDS could provide a new approach to evaporative cooling through the application of water mists during the early spring. Our hypothesis was that the many low water volume microsprayers used in our SSCDS could provide cooling at a fraction of the rates used by conventional sprinklers. We set up small scale SSCDS at two different apple and cherry sites in Michigan. Microsprayers were placed above and within the canopy to deliver misting based on ambient air temperature and humidity.

Our mist cooling system delayed bloom by 7-10 and 4-10 days in apples and sweet cherries, respectively (Fig 7). Furthermore, our systems provided this delay using a range of 6-9 ac inches of water. This is a 4-6x reduction in water compared to evaporative cooling systems utilizing impact sprinklers! Fruit maturity dates for apples and cherries were not affected by cooling. We are confident that with further refinement this system could provide 7-14 days of bloom delay with only 3-5 acre-inches of water (per acre of protected fruit).

**Economics:** Solid Set Canopy Delivery Systems require significant up-front capital investment. Capital investment costs can vary, depending on the presence or absence of trellis training system, the capacity of that training system, and the design of the SSCDS. Initial estimates of SSCDS operating costs, including system installation, exceed conventional systems.

Conventional air-blast applications of pesticides generally require \$36 per acre including equipment. Costs for operating the MSU SSCDS were estimated at \$60 per acre. We expect commercialization to conservatively reduce SSCDS costs by 20% or more yielding an expected cost of \$48 per acre. While more expensive to operate, it is important to note that SSCDS may provide additional value to growers in the form of services that airblast sprayers cannot provide.

These include: protection from frosts or sunburn, potential irrigation applications as well as the ability to more rapidly apply inputs under adverse ground conditions. The next step in economic evaluation will depend on collecting data on the relative value of these services.

### Next Steps

Although we have provided proof of concept data for SSCDS use in high density apples, a great deal of work remains before the technology will be ready for commercialization and expansion into additional perennial fruit systems. Our prototype SSCDS systems have major engineering challenges that we are preparing to tackle: 1) development of a hybrid pneumatic/hydraulic system, 2) optimization of microsprayers, 3) automated fault detection and 4) real-time mixing and monitoring of agrichemical applications. Our current prototypes requires 2-3 times the delivered volume of inputs

to apply the needed amount to the crop because of the large volume of piping.

Our proposed solution is to use air to deliver “packets” of liquid to microsprayers via a distributed reservoir system with pneumatic pressure to fill and evacuate the reservoirs – consolidating the current 4 stage application into 2 stages (charging/filling and application/cleaning) and eliminating the need for a return line. Presently, the microsprayers used in our systems are based around commercially available sprinkler bodies and nozzles.

While we have experienced good performance from these components, it is likely that specialized bodies and nozzles could improve the throw distance and particle size consistency. Automated fault detection may be possible using thermal detectors. Metering and monitoring of pesticide applications could also be integrated into this system.

MSU engineers have been engaged to evaluate these aspects of the system but at present this work is unfunded.

We expect that solving the engineering challenges listed above would require an investment of \$200,000-300,000 over a 2-3 year period with an additional \$100,000-\$200,000 budgeted towards continuing field testing of coverage, pest management and microclimate modification. Theoretically any crop utilizing a supportive trellis could utilize this technology this includes: grapes, hops, apples, pears, and some stone and berry fruits.

For more information, visit [www.canopydelivery.msu.edu](http://www.canopydelivery.msu.edu)

### Acknowledgements

*Our project was funded by the USDA Specialty Crops Research Initiative Project 2011-01494 and generous contributions from the Michigan Cherry Committee, Michigan Apple Committee, Michigan State Horticultural Society and MSU Project GREEN as well as contributions of land, labor, and materials from individual MI tree fruit growers. We would like to provide a special thank you to John Nye of Trickle Irrigation for his work on conceptualizing our prototype system. Lastly, many thanks to our important MSU SSCDS team members: Ron Perry, Larry Gut, George Sundin, John Wise, Jim Flore, Greg Lang, Emily Pochubay, Mike Haas, Nick Zachary, and Pete McGhee.*

### References Cited

- Agnello, A. M., and A. J. Landers. 2006. Current progress in development of a fixed spray pesticide application system for high-density apple plantings. *NY Fruit Quarterly* 14 (4): 22-26. [www.nyshs.org/fq/06winter/NYFQWinter06.pdf](http://www.nyshs.org/fq/06winter/NYFQWinter06.pdf)
- Robinson, T.L. 2007. Effect of tree density and tree shape on light interception, tree growth, yield, and economic performance of apples. *Acta Hort.* 732:405-414.

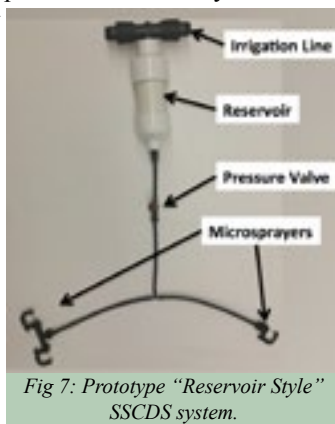


Fig 7: Prototype “Reservoir Style” SSCDS system.

# School IPM in the Pacific Northwest

## *School IPM Success Recognized in Washington*

On October 1st, the [Washington State School IPM Enhancement Project](#) recognized school districts making strides in school IPM implementation. The project formed a joint partnership with Washington State University and EPA Region 10 to build a strong program to help school districts adopt IPM, a smart, sensible, and sustainable approach to managing pests that focuses on reducing the unnecessary use of pesticides and the conditions that encourage pests. The project accomplishments included forming focus groups to clarify the support schools need for their IPM programs, developing state partnerships, documenting what works and doesn't in an IPM program, and recognizing school districts that are doing it right!



*Nancy Larson, Bellevue School District; Tom Green, IPM Institute; Forrest Miller, Lake Washington School District; Carrie Foss, Washington State University; Jon Kollman, Lake Washington School District; Rick Leavitt, Federal Way Public Schools; David Johnson, Mukilteo School District; Gary Schimmel, Kelso School District; Gary Spears, Kelso School District; Jim Jones, EPA (L-R)*

Speakers at the event included Thomas Green, President of the IPM Institute of North America, and Jim Jones, Assistant Administrator for EPA's Office of Chemical Safety and Pollution Prevention. Dr. Green spoke about the benefits of IPM for schools, such as reducing the risk of pests and pesticide exposure, creating a healthier school environment, and saving schools money in treatment and energy costs. Mr. Jones spoke about the roles everyone has, from the federal government down to the school district staff, in making IPM a widespread practice.

Carrie Foss, Washington State University Urban IPM Director, recognized the school districts of Kelso, Mukilteo, Lake Washington and Federal Way for receiving IPM Institute of North America's *IPM STAR* certification. [IPM STAR](#) is a certification program that raises the bar for districts implementing sustainable school IPM programs. Other Washington school districts that previously received *IPM STAR* certification include Bellevue, Marysville, Colville, Pasco, Walla Walla, South Kitsap, North Thurston, and Vancouver.

WSU organized coalition events to provide school districts the opportunity to network and learn about IPM from their peers. This event was part of a statewide school IPM implementation project, supported by EPA's School IPM program. This project builds upon existing partnerships and tools, including [WSU's School IPM Clearinghouse](#) and the [Urban Pesticide Education Strategy Team](#), a group of WA stakeholders who address urban pesticide issues. For more information on EPA's School IPM program, visit [www2.epa.gov/managing-pests-schools](http://www2.epa.gov/managing-pests-schools).

## *EPA Grantees Implement IPM in Pacific Northwest Schools*

In 2012, Washington State University and Oregon State University formed the Pacific Northwest (PNW) School IPM Consortium, with funding from EPA, to promote school IPM. The initial goal of the project was to impact 30%, or nearly 470,000 students in Washington and Oregon. The project far exceeded its goal, impacting 39% of students in Washington and 49% of school districts in Oregon. Over 670,000 students in the Pacific Northwest now attend school districts with IPM programs.

The universities took a multi-pronged approach to increase IPM implementation in the PNW. They started by forming a consortium of stakeholder organizations in Washington, Oregon, and Alaska to coordinate and promote school IPM in their respective states. Then, they formulated an education and training plan to reach stakeholders, school district staff, and parents. Multiple IPM coalition events and working sessions were held in both Oregon and Washington. Hands-on training was offered to school district staff. School IPM was also taught as a part of Washington's pesticide applicator recertification training, resulting in a measureable increase in school IPM knowledge among the 1,000 licensed pesticide applicators. Twelve newsletters were distributed broadly in Washington and Oregon, with up to 80% of the recipients sharing the newsletters with others in their districts. Seven school districts in Washington were evaluated under a third-party *IPM STAR* certification program.

The universities disseminated their successful model of school IPM implementation through collaboration and education in a national webinar. Work on school IPM in the Pacific Northwest continues with the [Washington State School IPM Enhancement Project](#), in partnership with EPA, and [Oregon State University's School IPM program](#), partially supported by USDA.

## EPA News in Brief

### *EPA Updates Standards to Increase Safety and Protect the Health of America's Farmworkers*

EPA has announced increased protection for the nation's two million agricultural workers and their families. The revised standards give farmworkers health protections under the law similar to those already afforded to workers in other industries. EPA's updates reflect extensive stakeholder involvement from federal and state partners and the agricultural community including farmworkers, farmers and industry.



- [Press release](#)
- [Blog by EPA Administrator McCarthy and Department of Labor Secretary Thomas Perez](#)
- [New site and resources including a factsheet, comparison chart and Q/A](#)

#### Videos

- [EPA's Revised Worker Protection Standard](#)
- [EPA's Revised Worker Protection Standard: Thoughts from a Former Farmworker](#)
- [Amy Liebman, Migrant Clinicians Network, Supports EPA's Revised Worker Protection Standard](#)
- [Farmer Speaks in Favor of EPA's Revised Worker Protection Standard \(in Spanish, with English subtitles\)](#)

#### En Español

- [Web](#)
- [Comunicado de prensa](#)
- [Blog](#)

These revisions will publish in the Federal Register within the next 60 days. A [pre-publication version](#) is available now.

### *EPA Signs Cooperative Agreement with the Association of Farmworker Opportunity Programs to Support Farmworker Training*

EPA has entered into a cooperative agreement with the Association of Farmworker Opportunity Programs (AFOP) to develop and administer a pesticide safety training program for farmworkers, their families and other members of the agricultural community. The AFOP cooperative agreement will support a national network of over 150 pesticide safety trainers in more than 30 states to provide pesticide worker safety training to migrant and seasonal farmworkers and their families. The training will include educational material appropriate for low-literacy and multilingual audiences.

Pesticide safety training helps prevent pesticide exposure incidents for farmworkers and their families. With the recently announced revisions to the Worker Protection Standard, farmworkers will now receive annual training on many topics, including proper use of personal protective equipment and how to reduce take-home exposure. Previously, federal law only required training once every five years.

The total funding for the five-year period of the cooperative agreement is about \$2.5 million, with \$500,000 available for the first year of the agreement. The application solicitation for this agreement was announced in April 2014.

To learn more about pesticide worker safety, visit [www2.epa.gov/pesticide-worker-safety](http://www2.epa.gov/pesticide-worker-safety).



## ***EPA Registers New Biochemical Miticide to Combat Varroa Mites in Beehives***

EPA has registered a new biochemical miticide, potassium salts of hops beta acids (K-HBAs), which is intended to provide another option for beekeepers to combat the devastating effects of the Varroa mite on honey bee colonies and to avoid the development of resistance toward other products. Rotating products to combat Varroa mites is an important tactic to prevent resistance development and to maintain the usefulness of individual pesticides.



The registrant, Beta Tech Hop Products, derived K-HBAs from the cones of female hop plants. To control mites on honey bees, the product is applied inside commercial bee hives via plastic strips.

Varroa mites are parasites that feed on developing bees, leading to brood mortality and reduced lifespan of worker bees. They also transmit numerous honey bee viruses. The health of a colony can be critically damaged by an infestation of Varroa mites. Once infested, if left untreated, the colony will likely die.

As with all biochemical active ingredients, this one is naturally-occurring with minimal toxicity and a non-toxic mode of action against the target pest. There are numerous advantages to using biopesticides, including reduced toxicity to organisms not intended to be affected, effectiveness in small quantities, and reduced environmental impact.

More information on this registration can be found at [www.regulations.gov](http://www.regulations.gov).

Find out about other EPA efforts to address pollinator loss at [www2.epa.gov/pollinator-protection](http://www2.epa.gov/pollinator-protection)

Learn more about biopesticides: [www2.epa.gov/pesticides/biopesticides/](http://www2.epa.gov/pesticides/biopesticides/)

## ***EPA Launches New Pesticides Website***

EPA's Pesticides website has a new look, feel, and address. Many of our stakeholders have noticed our gradual move to new versions of our content as part of the larger EPA effort to build a more user-friendly website. With the new pesticides website, information should now be easier than ever to access, regardless of the type of electronic device you use, including tablets and smartphones.

With the transition to our new site completed, web page addresses will be different. The majority of the old pesticide pages will redirect to the new web areas, but we encourage you to update your bookmarks. Our new "Page Not Found" notification will help you find what you are looking for by providing suggested search terms, links to our A-Z index, and other helpful links.

If you have trouble locating information, try using the search feature available on every EPA web page and in the [archive](#).

Check out the new website at [www2.epa.gov/pesticides](http://www2.epa.gov/pesticides)

To help you find some of our most requested information, below are the updated URLs for some of our most popular web areas:

- Pesticide Registration: [www2.epa.gov/pesticide-registration](http://www2.epa.gov/pesticide-registration)
- Bed Bugs: [www2.epa.gov/bedbugs](http://www2.epa.gov/bedbugs)
- Worker Safety: [www2.epa.gov/pesticide-worker-safety](http://www2.epa.gov/pesticide-worker-safety)
- Pollinator Protection: [www2.epa.gov/pollinator-protection](http://www2.epa.gov/pollinator-protection)
- Endangered Species: [www2.epa.gov/endangered-species](http://www2.epa.gov/endangered-species)
- Reporting Unintended Exposure and Harm from Pesticides: [www2.epa.gov/pesticide-incidents](http://www2.epa.gov/pesticide-incidents)
- Biopesticides: [www2.epa.gov/pesticides/biopesticides](http://www2.epa.gov/pesticides/biopesticides)
- Pesticide Labels: [www2.epa.gov/pesticide-labels](http://www2.epa.gov/pesticide-labels)
- School IPM: [www2.epa.gov/managing-pests-schools](http://www2.epa.gov/managing-pests-schools)
- Pest Control and Pesticide Safety for Consumers: [www2.epa.gov/safepestcontrol](http://www2.epa.gov/safepestcontrol)

## Upcoming Events

### [Lyme & Other Tick-Borne Diseases: Science Bridging the Gap](#)

Nov. 14-15, 2015  
Warwick, RI

### [Entomological Society of America - Entomology 2015, Synergy in Science: Partnering for Solutions](#)

Nov. 15-18, 2015  
Minneapolis, MN

### [National Environmental Health Association Annual Educational Conference and Exhibition](#)

Jun. 14 -16, 2016  
San Antonio, TX

### [National Association of School Nurses Annual Conference](#)

Indianapolis, IN  
Jun. 29-July 2, 2016

### [International Congress of Entomology](#)

Sept. 25-30, 2016  
Orlando, FL

### [National Pest Management Association - PestWorld 2016](#)

Oct. 18-21, 2016  
Seattle, WA

### [School IPM Webinars](#)

Presented by EPA's Center of Expertise for School IPM

- Nov. 10, 2015 -- Writing an IPM Policy for Your School District
- Dec. 15, 2015 -- Bed Bugs in Schools
- Jan. 26, 2016 -- *Stop School Pests* and *iPestManager* - School IPM Educational Programs
- Feb 23, 2016 -- Procuring IPM-Based Pest Management Services
- Mar. 15, 2016 -- IPM for Turf on School Grounds
- Apr. 19, 2016 -- Vertebrate Turf Pests
- May 17, 2016 -- Ants - The #1 Pest in Schools
- Jun. 7, 2016 -- Termite Mitigation in Schools - A Holistic Approach

## Grant Opportunity

### Southern IPM Center's IPM Enhancement Grants Program

Deadline: Nov. 20, 2015

Apply: <http://bit.ly/1gUmkaD>

The IPM Enhancement Grants Program is a foundational mechanism used by the Southern IPM Center to address important issues affecting the region that has produced many significant outputs and favorable outcomes addressing global food security challenges including invasive species, endangered species, pest resistance, and impacts resulting from regulatory actions.

Any IPM setting is applicable to the IPM Enhancement Grant program, including agriculture, urban and school, forestry and recreation. Project directors can apply for one of three project types:

- Seed (up to \$30,000) - Successful proposals will have a strong potential to initiate, enable, facilitate and/or catalyze effective solutions to important IPM issues and challenges. These projects plant a seed that has good potential to grow into a solution.
- Capstone (up to \$30,000) - Successful proposals build on previous research and development efforts for projects involving outreach, implementation, and/or educational approaches.
- IPM Working Group (up to \$40,000) - See the RFA for requirements

For questions, contact:

Joe LaForest ([laforest@uga.edu](mailto:laforest@uga.edu), 229-386-3298) or Danesha Seth Carley ([danesha\\_carley@ncsu.edu](mailto:danesha_carley@ncsu.edu), 919-513-8189)

