



# International IPM

The benefits of a global perspective  
on Oregon pest management

By Heidi Haponen

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For more than 50 years, the College of Agricultural Sciences at Oregon State University has been home to the state's leading-edge pest management research. While the organization of the effort has evolved over time, the goals have largely remained the same—to define economically sustainable pest management for Oregon's agricultural industries with reduced risks to human health and the environment.

**T**oday, the research center is known as Oregon IPM and over its 53-year history it has gained insights from an increasingly connected global community that has had significant impacts on Oregon agriculture. Similarly, the insights gleaned in Oregon have had wide-reaching benefits for international communities in Africa, South America, Asia and beyond.

This symbiotic relationship of shared learning and understanding has led to the growing interest in what is known as “International Integrated Pest Management” and it is an area of particular expertise at OSU.

## Finding Common Ground

According to Katie Murray, former associate professor of practice and Statewide IPM Coordinator, one thing that has anchored that international perspective has been the growing recognition of the value that social sciences play in the implementation of effective pest management strategies.

With a background in applied anthropology, Murray has focused much of her recent work on finding ways to bring diverse voices to the table from people who can help solve challenges, including overcoming resistance to changing pesticide management practices, or increasing access to the support that is needed to adopt and apply best practices.

For example, in Oregon, the center has established a partnership with the potato industry and in the past several years it has launched the Resilient Potato Production working group with the NW Potato Research Consortium that spans three states: Washington, Oregon and Idaho. According to the Consortium’s director, Andy Jensen, potatoes are long known to suffer from challenging pest issues—including up to 30 diseases, insect, and weed problems—and is historically heavily reliant on pesticides.

Because of the high risks associated with pests and diseases that impact potato crops, with significant scrutiny given to the look of the potato at the point of sale, changing this pesticide-reliant system has



**Above:** Potato tuberworm on the surface of a potato. Oregon State University Agricultural Research and Extension Center, Hermiston, Oregon.

**Below:** Malawi farmworker adjusts a sprinkler irrigation pipe in a maize field which has been attacked by fall armyworm. The infestation by fall armyworm is worse during winter cropping as fewer maize fields lead to higher concentrations of worms per field.



Inoculating potato plants in a research greenhouse at OSU's Hermiston Agricultural Research and Extension Center.



*“IPM is not local. It’s global. You have to be vigilant about what is happening across the world because it allows us to see not only what is happening now, but what might be happening five or ten years down the line.*

historically been met with skepticism. But the Resilient Potato Production working group is seeking to change that by bringing diverse voices to the table to brainstorm solutions. This includes the development of methods that factor the hazards and risks throughout the supply chain into IPM decision making. It turns out that varying perceptions of risk by different actors in the potato production system have had an impact on the capacity of potato producers to change practices and adapt to an ever-changing environment.

“Oregon IPM Center is the only reason we are tackling some of these things,” Jensen explained. “And it’s largely because of their ability to bring different perspectives to the table that we’ve been able to find any kind of success.”

That ability to find common ground amongst diverse stakeholders to encourage participation in changing the status quo is the kind of anthropologic approach that Murray, along with now-retired former Oregon IPM director, Paul Jepson, led globally in places like Malawi and Kenya, as well as in Oregon.

“In order to have an effective IPM Strategic Plan, you need to develop a deep understanding of both the needs and the practical realities of farmers,” Murray said. “Whether you are in central Oregon or a village in Kenya, the same approach applies and in sharing knowledge from one place to the other, everyone wins.”

According to Sam Angima, the assistant dean for Outreach and Engagement at OSU’s College of Agricultural Sciences, the essence of effective pest management comes from shared ideas and experiences.

“IPM is not local. It’s global. You have to be vigilant about what is happening across the world because it allows us to see not only what is happening now, but what might be happening five or ten years down the line,” Angima said. “That requires cross-cultural collaboration and a real understanding of the needs of farmers around the world.”

Regina Eddy, with the U.S. Agency for International Development (USAID), echoes that perspective. She has partnered with Oregon IPM Center on global pest issues such as locusts and, most recently, fall armyworm, which has had devastating effects on Africa’s maize crops. Together, they convened workshops of global experts across three different parts of Africa. This resulted in an initial IPM guide on managing pests.

“It is critical that these guidelines are drafted with the end-user in mind,” Eddy said. “As academics, we are great at creating papers, but the full context of how pest management is applied in different agricultural settings is key – whether you are in Oregon or Malawi.”

By way of example, Eddy went on to describe the use of protective equipment in developing nations. One key challenge that the manufacturers don’t always take into consideration is the illiteracy rate so common in much of the global agricultural community. According to Eddy, upwards of 50%



Creative Commons photo by Melissa Cooperman/IFPRI



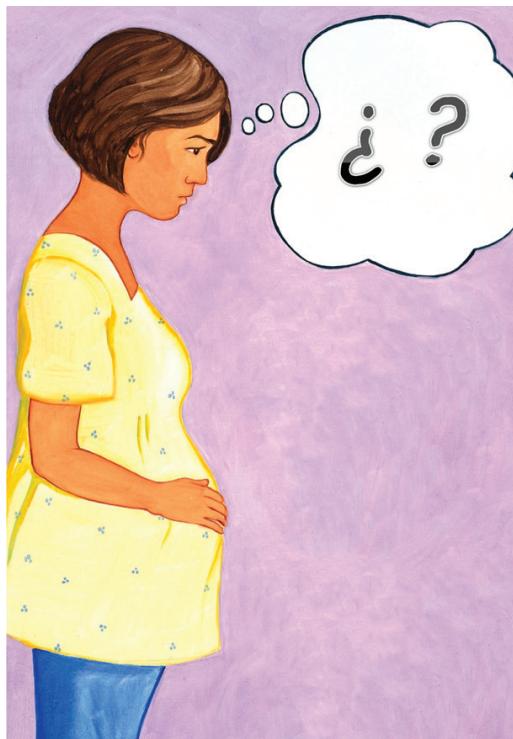
## Protéjase y proteja a su familia de la exposición a pesticidas en el hogar.

**Los pesticidas se encuentran en productos caseros que usamos para matar microbios, insectos, malezas y roedores.**

**Mantenga estos productos caseros fuera del alcance de los niños.**

Aprenda más: [beav.es/JrU](http://beav.es/JrU) PERC Pesticide Educational Resources Collaborative

*It's about risk management no matter where you are. How much of a short-term risk are you willing to take to protect against potentially long-term threats?*



## Protéjase y proteja a su familia de la exposición a pesticidas en el hogar.

**La exposición a pesticidas puede causar daños serios a bebés en el útero.**

**Evite la exposición al lavarse inmediatamente al llegar a su casa.**

The National Pesticide Information Center (NPIC) at Oregon State partnered with the Virginia poison center, as well as the American Association of Poison Control Centers to create materials that could be used to help educate people about the hazards of pesticide exposure.

of farmworkers in communities where USAID works are unable to read. So, if pesticides come with instructions for using protective equipment, and those instructions cannot be read, they simply are not followed, and people will apply toxic chemicals to crops with their bare hands.

In addition to not having the necessary instructions to understand how to use protective equipment, there is a general lack of access to this equipment.

"The fact of the matter is that 95% of people in places like Ghana do not have access to protective equipment – not even gloves," said Eddy.

This is where Oregon IPM Center's consensus-building strategies have come in to support expanding the approach to pesticide management.

One area Eddy explained they've begun to explore with the private sector is sending gloves with the chemicals along with instructions that are drawn rather than written so that they can be used in multiple nations regardless of native language or literacy.

Creating a guide that is dependent on illustrations to convey meaning rather than written words has been a tool that Jepson and his colleagues have employed for years in their work with global farming communities. It's a proven, simple tool to enhance understanding and make best practices in pesticide and pest management available to more people.

"Issues happening in Ghana, South America, Brazil, are the same," Angima added, "When we can see how people accept or reject the science it helps to disseminate information here."

In addition, Oregon IPM Center has developed a number of other comprehensive pest management strategies that have been deployed around the world. Illustrated guides have become the go-to resource with content largely based on science and partnerships built here in Oregon and applied through a lens that provides a global perspective to pest management.



Pesticide Use Guide: How to Further Reduce Risks			
 Mitigations are steps that you can take, in addition to protective clothing, to reduce risks to people and to the environment. + ALWAYS FOLLOW THE LABEL INSTRUCTIONS			
<b>No additional mitigations required: LOW-RISK to Health &amp; LOW-RISK to Environment</b>		<ul style="list-style-type: none"> <li>Azadirachtin</li> <li>Bacillus thuringiensis</li> <li>Beauvaria bassiana</li> <li>Cypermethrin-gamma</li> <li>Flubendiamide</li> <li>Methoprene</li> <li>Pyrethrum</li> <li>Pyriproxyfen</li> </ul>	
<b>One Mitigation to Protect:</b>		<ul style="list-style-type: none"> <li>Acetamiprid</li> <li>Cyhalothrin-gamma</li> <li>Novelone</li> <li>Pyridyl-fenflufenazon</li> </ul>	Don't apply near water, or when wind is blowing towards water
		<ul style="list-style-type: none"> <li>Fenitrothion</li> </ul>	Minimize use, don't apply near places where animals feed; don't spray treated crop to feed animals
		<ul style="list-style-type: none"> <li>Indoxacarb</li> <li>malathion</li> <li>spinosad</li> <li>spinetoram</li> </ul>	Cover hives when applying; cut down flowering weeds; don't use near foraging bees
		<ul style="list-style-type: none"> <li>Prevent entry to field after applying. Do not apply near schools or homes.</li> </ul>	
<b>Multiple Mitigations Required</b>	<ul style="list-style-type: none"> <li>Abamectin</li> <li>Acetopropiconazole</li> <li>Cypermethrin-alpha</li> <li>Cypermethrin-beta</li> <li>Dimethoate</li> <li>Benfurcarb</li> <li>Bifenthrin</li> <li>Cartharyl</li> <li>Cyproconazole</li> <li>Cyfluthrin</li> <li>Cyfluthrin-beta</li> <li>Dichlorvos</li> <li>Cyazophosphamide</li> <li>Carbofuran</li> <li>Cyhalothrin</li> <li>Cyhalothrin-beta</li> <li>Malathion</li> <li>Metolcarban</li> <li>Pyrethrum</li> <li>Pyriproxyfen</li> <li>Spinosad</li> <li>Teflubenzuron</li> <li>Triflumuron</li> <li>Unknown Effect</li> </ul>		
<b>Highly Hazardous Pesticides: DO NOT USE</b>	<ul style="list-style-type: none"> <li>Carbofuran</li> <li>Cyhalothrin</li> <li>Cyhalothrin-beta</li> <li>Dichlorvos</li> <li>Dimethoate</li> <li>Endosulfan</li> <li>benzoate</li> <li>Fipronil</li> <li>Imidacloprid</li> <li>Methamidophos</li> <li>Methyl</li> <li>Unknown Effect</li> </ul>		

Pesticide Selection Guide for Fall Armyworm			
Single-Layer Clothing Required:			
   			
<b>LOW-RISK to Health &amp; LOW-RISK to Environment</b>			
<b>Effective</b> <ul style="list-style-type: none"> <li>Azadirachtin</li> <li>Bacillus thuringiensis (subsp. <i>Alzwaii</i>)</li> <li>Chlorantraniliprole</li> <li>Imidacloprid</li> <li>Methoprene</li> <li>Pyrethrum</li> </ul> <b>Not Effective</b> <ul style="list-style-type: none"> <li>Bacillus thuringiensis (subsp. <i>Kurstaki</i>)</li> <li>Beauvaria bassiana</li> <li>Methoprene</li> </ul> <b>Unknown Effect</b> <ul style="list-style-type: none"> <li>Pyriproxyfen</li> </ul>			
<b>LOW-RISK to Health &amp; HIGH-RISK to Environment</b>			
<b>Effective</b> <ul style="list-style-type: none"> <li>Lufenuron</li> <li>Novelone</li> <li>Spinosad</li> <li>Teflubenzuron</li> <li>Triflumuron</li> </ul> <b>Not Effective</b> <ul style="list-style-type: none"> <li>None</li> </ul> <b>Unknown Effect</b> <ul style="list-style-type: none"> <li>None</li> </ul>			
<b>Double-Layer Clothing, Eye &amp; Respiratory Protection Required; Restrict Entry To Treated Field:</b>			
   			
<b>HIGH-RISK to Health &amp; HIGH-RISK to Environment</b>			
<b>Effective</b> <ul style="list-style-type: none"> <li>Acrophtalmicin</li> <li>Cyhalothrin-gamma, lambda</li> <li>Cypermethrin-alpha, beta</li> <li>Deltamethrin</li> <li>Etofenprox</li> <li>Emamectin benzoate</li> <li>Fenvaerate + indoxacarb</li> </ul> <b>Not Effective</b> <ul style="list-style-type: none"> <li>Abamectin</li> <li>Acetopropiconazole</li> <li>Benfurcarb</li> <li>Cartharyl</li> <li>Cyproconazole</li> <li>Diazinon</li> <li>Dimethoate</li> <li>Malathion</li> <li>Pyrimiphos-methyl</li> <li>Profenofos</li> <li>Thiocarb</li> </ul> <b>Unknown Effect</b> <ul style="list-style-type: none"> <li>Benzethonium</li> <li>Carbofuran</li> <li>Carbosulfan</li> <li>Clofenviroc</li> <li>Imidacloprid</li> <li>Pyridyl-fenflufenazon</li> </ul>			
<b>HIGHLY HAZARDOUS to Health and/or Environment - DO NOT USE</b>			
<b>Effective</b> <ul style="list-style-type: none"> <li>Cyhalothrin-beta</li> <li>Methomyl</li> </ul> <b>Not Effective</b> <ul style="list-style-type: none"> <li>Carbofuran</li> <li>Carbosulfan</li> <li>Clofenviroc</li> <li>Imidacloprid</li> </ul> <b>Unknown Effect</b> <ul style="list-style-type: none"> <li>Thiamethoxam</li> <li>Trichlorphon</li> <li>Phorate</li> <li>Methamidophos</li> <li>Monocrotophos</li> </ul>			

So, while these tools are based on knowledge gleaned from Oregon agriculture, they now have been refined by global application and the lessons learned in that process are coming full circle to benefit Oregon agriculture.

## Closing the Circle

Which brings us back to potatoes and the struggle to bring comprehensive pest management solutions to a crop that suffers from diverse and challenging pests and diseases.

"There's not much of a difference between a round table in Ghana of experts and farmers and one in Eastern Oregon," said Jepson. "It's about risk management no matter where you are. How much of a short-term risk are you willing to take to protect against potentially long-term threats?"

"In the field of IPM, there's a lot of head scratching about implementation," Murray added. "We know what to do and we have all the lists and strategies but are left wondering why people aren't adopting it more."

At the end of the day, Oregon IPM is as much about toxicology and entomology as it is human understanding.

"Much of what we deal with is the challenge of finding reasonable ways for people to move away from products and practices that they know pose risks," Murray added.

Helping people get comfortable with change is at the center of pest management that relies less on higher-risk approaches and more on sustainable solutions.

"We are at the frontier of doing the best science at OSU," added Jepson. "The next step that we've embraced at Oregon IPM Center is to make that science applicable, adaptable, and reasonable for every party involved—here in Oregon and around the world."

"The fact is, IPM has been around for 80 years," he added, "yet we're still perfecting how to employ it. With all the advances in pesticides, we're still losing about the same amount of yield to pests as we did 100 years ago."

While the science of pest management from a solution side may take place in a research lab or field, the application of those solutions requires collaboration between the private sector, governments, and academics. A solution that never sees the light of day because it lacks proper applicable tools, basic understanding of its use, or consensus around efficacy, helps no one.

To paint a crude analogy, if someone is bleeding and a bandage has been created to stop the bleeding, but no one can agree on how to get that bandage to the bleeding person or how to best apply it to the wound, or even if the bandage is a better solution than simply letting the person bleed—the bandage has no real value. It might as well not exist.

Oregon IPM Center is in the business of not only creating the bandage and the instructions for how to apply it to numerous types of wounds, but it is also helping people understand the benefits of the bandage to begin with.

"These are not easy conversations, and changing the way we manage pests and pesticides is incredibly complicated," Jepson added. "But if we continue to engage in these discussions with diverse stakeholders around the world and here in Oregon, we will make progress. We already have." 

**Top left:** Fall armyworm feeding on maize. Creative Commons photo by the International Institute of Tropical Agriculture (IITA).

**Left:** Sample pages from the Pesticide Selection & Use Guide: Fall Armyworm, published by the Oregon State University IPM Center.