

Safety in IR-4

— by Stephen Flanagan, WSR Assistant RFC and
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Safety is key in many aspects of our IR-4 work. While from a field perspective, our field research personnel have the most direct safety risks, the reality is that all IR-4 personnel are impacted by safety. Whether in the field, the lab or commuting to and from home and work we are all exposed to safety risks. Let's take some time to consider how field, lab and driving safety can be addressed and improved in our IR-4 workplace.

Field Safety

The first culprit might be fairly obvious, that is our work is related to pesticides, compounds designed to kill. For all of us involved in the direct handling and application of pesticides we are the benefactors of decades of scientific progress. This progress means we're spraying remarkably fewer organophosphate and carbamate materials and we're testing biorational materials (compounds that are effective on the pest but relatively innocuous to beneficial insects and humans) with greatly reduced mammalian toxicity. In simple terms we're spraying compounds such as insect growth regulators (IGRs) and synthetic mushroom byproducts (strobilurins) which are effective at controlling agricultural pests with the added benefit of being safer for humans and non-target organisms.

I'm a father and grandfather with over three decades of agricultural field experience and a few stories garnered from the miles. I can tell you about an early morning bike ride alongside an alfalfa field where I was sprayed by an AgCat airplane applying an insecticide that left me retching at the end of the field. I can tell you about following my boss into a California vineyard that

we both knew had been sprayed with dimethoate and how we laughed off the headaches and nausea we experienced later. In another vineyard event my whole crew was staring fixedly at an injection pump which blew a hose and proceeded to spray us all with a carbofuran solution. That last event ended up with a late night emergency run.

Why the stories? I'm not interested in anyone experiencing the fear and physical effects of being poisoned with acutely toxic pesticides. One of the aspects of our work is that we serve a critical role in bringing safer and more effective tools into the agricultural environment. Our work is the slow, detailed and progressive science that helps bring safer pest control materials to the farm. In our program, field research directors are the front line workers who directly handle and apply these pesticides.

How do we mitigate handling risks for our field researchers? I'd suggest this is a two-fold responsibility. First off as an organization we need to hold ourselves to prioritizing work on safer, biorational materials from the beginning. Secondly we need to avoid the contempt that inevitably comes with time. Training and reminding ourselves that even relatively safe (say category III: Caution) materials are still pesticides with acute and chronic health effects and therefore deserve respect. I'm always impressed when I visit a field site and observe the careful attention to detail and use of PPE (personal protective equipment) by our field researchers.

I'm now in my seventeenth year of working in the Western Region and participating in field studies. These studies have been as diverse as

aerial mosquito applications, oysterbed spike wheel injectors, and a plethora of airblast, hand boom and injection systems as well. Since coming to IR-4 I've never been directly exposed or poisoned in this work. In fact I'm not aware of any "accidents" or "events" with our research activities related to pesticide poisoning. This is a remarkable fact and speaks to the quality and care exhibited by our field research directors and also serves as a reminder to continually strive for a safe work environment.

Some of you reading this article may have met or interacted with our Idaho field researcher Will Meeks. At the time of this writing I queried Will about how he approaches safety in his field activities. I caught Will on his way to an eight day deer hunt in northern Idaho. "Regardless of whether it's Roundup ® or Paraquat ® it's all the same to me."



Will Meeks in Tyvek suit.

Will works alone as an FRD and travels long distances across Idaho to conduct his IR-4 trials. "Field work is the same as hiking or camping, if you're alone the risk is higher and requires extra caution."

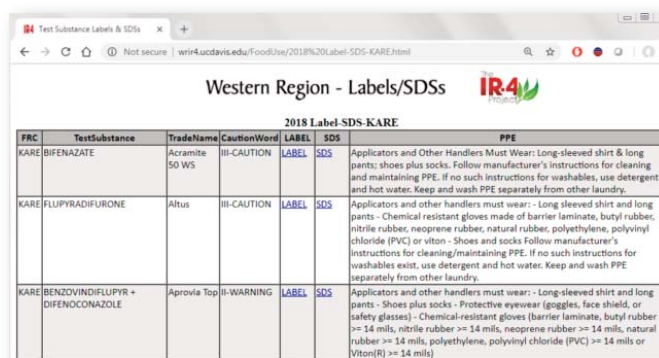
I've observed Will's pesticide applications for many years and it's remarkable whether it's been in the dark at 5 am or late in the day under blazing sun, Will is consistently suited in full mask respirator, Tyvek suit and rubber boots. Will practices what he preaches and sets an impeccable standard in personal protection.

To specifically aid FRDs in the Western Region the field office provides each Field Research Center with a comprehensive web page with links to important pesticide safety documents. Most of us are familiar with MSDS (Material Safety Data Sheets) which are now called SDS internationally. During the protocol review process we confirm the exact test substance formulations and label and generate a web page which lists each study and the corresponding SDS and label. In addition, this website has the material's hazard category (III-Caution, II-Warning, or I-Danger) and protective equipment requirements. If the material is not labeled, the label link will have an entry of "No Data" as a reminder that the material is new and has limited documents. The web page serves as a central location for safety documents and a reminder of important safety requirements associated with a particular test substance.

Lab Safety

As with the field, the lab faces very similar safety concerns. Not only does the lab need to handle the purified pesticide (>95% purity), but they are faced with concentrated acids and bases, powerful oxidizing agents and cancer-causing organic solvents. In

some cases, the reagents are far more toxic than the pesticide of interest. To mitigate the risk using these chemicals, UC Davis has gone to great lengths to provide training and access to free PPE (lab coats and eye protection). In addition, the lab has gone through a major shift in attitude towards personal safety. Long ago, it wasn't uncommon to find certain analysts wearing shorts (cough cough, Matt) without a lab coat or eye protection, or to see a cup of coffee warming on top of a hot gas chromatograph right next to the beaker of hexane for washing the



Western Region - Labels/SDSs

2018 Label-SDS-KARE

FRC	TestSubstance	TradeName	CautionWord	LABEL	SDS	PPE
KARE	BIFENAZATE	Acramite 50 WS	III-CAUTION	LABEL	SDS	Applicators and Other Handlers Must Wear: Long-sleeved shirt & long pants; shoes plus socks. Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.
KARE	FLUPYRADIFURONE	Altus	III-CAUTION	LABEL	SDS	Applicators and other handlers must wear: - Long sleeved shirt and long pants - Chemical resistant gloves made of barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinyl chloride (PVC) or viton - Shoes and socks Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.
KARE	BENZOVINDIFLUPYR + DIFENOCONAZOLE	Aprovia Top	II-WARNING	LABEL	SDS	Applicators and other handlers must wear: - Long-sleeved shirt and long pants - Shoes plus socks - Protective eyewear (goggles, face shield, or safety glasses) - Chemical-resistant gloves (barrier laminate, butyl rubber >= 14 mils, nitrile rubber >= 14 mils, neoprene rubber >= 14 mils, natural rubber >= 14 mils, polyethylene, polyvinyl chloride (PVC) >= 14 mils or Viton(R) >= 14 mils)

A sample of the Kearney Agricultural Center's Label and SDS page

injection syringe. Currently, many of the sample extractions, which used to simply occur on the bench, are now conducted in a fume hood or in sealed tubes to minimize exposure to organic solvents. And where possible, the overall amount of organic solvent has been reduced from approximately 400 mL per sample to 40 mL. This reduction helps us in two ways; first we reduce



Julie Coughlin, Guy Kyser, and Michelle Mitchell using safety precautions in the lab.

the exposure during sample analysis and second, we minimize the amount of solvent that must be handled for waste disposal.

Driving Safety

The safety aspects of handling pesticides and laboratory reagents are specific to our field and lab personnel. A universal safety topic for all of us at IR-4 is driving. We all get behind the wheel. We all push ourselves and end up fatigued behind the wheel. It might be on the New Jersey Turnpike, I-85 in the Carolinas, Highway 99 in the San Joaquin Valley, or innumerable interstates and rural two lane roads. Regardless of our professional role or where we live, we all are exposed and at risk when we are driving. According to the Center for Disease Control the effects of drowsy driving

are akin to drunk driving (1). We're all keenly aware of the dangers of driving under the influence, but do we have the same awareness around lack of sleep? The above mentioned CDC article states that staying awake for 18 hours is equivalent to a blood alcohol content (BAC) of .05% and staying awake for 24 hours is comparable to a BAC of .10%.

"Drowsy driving is estimated to be a factor in 20 percent of fatal crashes. A new study from AAA states that drivers who skimp on the seven hours of sleep experts recommend increase their risk of a crash exponentially. Missing one to two hours of sleep doubles a driver's crash risk, while foregoing two or three hours increases the risk of a crash by 400 percent, according to the AAA Foundation for Traffic Safety study." (2)

Long field days, delayed travel plans and snarling commutes all translate into fatigue and the potential to become a drowsy driver. As Will Meeks said to me on the phone today "It's about not doing something stupid that means you end up dead." In my years before IR-4 life I consulted and conducted research studies throughout California. In those years I estimate that I drove over 750,000 miles and can relate to several of the

Drowsy Driving Warning Signs

- Yawning or blinking frequently
- Difficulty remembering the past few miles driven
- Missing your exit
- Drifting from your lane
- Hitting a rumble strip

"Drowsy Driving" warning signs listed below.

Take some extra time to get where you're going, slow down, pull over and take a nap when you start to feel drowsy. Most of us have experienced these symptoms, but let's remind ourselves of the dangers and take steps to mitigate the risks.

In Summary

So what do we do? Maybe I'm finally at the age where slowing down a bit actually seems beneficial. The work will get done. As Matt Hengel mentioned in the lab section, we can ensure that PPE is provided and used as well as revising our procedures to minimize exposure. Do your field personnel have adequate PPE? Are they using it? Have you reviewed your MSDS and label safety documents? Have you reviewed your facility procedures with an eye toward safety? These are all questions worth examining to improve safety.

The riskier aspects of our work in handling pesticides and driving long distances can be mitigated with thought and some planning ahead. In our western region webinars, we emphasize safety reminders, but ultimately individual safety is a personal responsibility. We have significant experience and a record of safety in our organization, but let's keep in mind that the work has its dangers and requires us all to be careful out there. 🌱

(1) www.cdc.gov/sleep/about_sleep/drowsy_driving.html

(2) cars.usnews.com/cars-trucks/best-cars-blog/2016/12/drowsy-driving-worse-than-drunk-driving