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University of Kentucky
College of Agriculture, Food and Environment
Cooperative Extension Service

AGMatters

May 2024 *Produce, Tobacco & Dairy News*

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Against the Grain Fall Calving

Dr. Katie VanValin, Univer. of Kentucky

Approximately 70% of the nation's cow herd calves between January 1st and June 30th each year, typically calving in February and March, a breeding season ranging from May through July, and weaning calves in the fall. On the other hand, those with fall calving herds will calve in September and October, breed from December to February, and wean in the spring. While fall-calving herds are in the minority and may seem to "go against the grain," this system offers producers unique opportunities to work with mother nature, especially in the fescue belt.

Environmental conditions are often more favorable for fall calving, starting with calving. While heat can be an issue, especially for calves born early, the cold, wet, and muddy conditions often seen in February and March are a non-issue. Cool-season forages pick up again in the fall as the summer heat begins to subside, providing a forage base for the lactating cows. Tall fescue stockpiles well and can be a good option for helping to maintain the fall calving herd. One downfall to fall calving that I often hear talked about is the need to overwinter both the lactating cow and her calf. While this is true, and conserved forage plus energy supplementation is often required to meet the nutritional requirements of the lactating cow, these costs can be offset by marketing calves into what is typically a seasonally higher market in the spring.

One of the most significant environmental differences between spring and fall calving herds is observed during the breeding season. Heat stress occurs when the combination of temperature and humidity reaches a threshold that causes cattle to generate or take on more heat than they can dissipate. Heat stress is compounded by cattle experiencing fescue toxicosis because of the vasoconstrictive effect of the ergot alkaloids found in endophyte-infected tall fescue. Heat stress has profound impacts on reproduction in both the cow and the bull, including temporary infertility. As our climate continues to change, periods of heat stress may become more prevalent during the typical May-July breeding season for spring calving herds, and of course, this will be exacerbated in herds grazing endophyte-infected fescue during this time. Fall-calving herds can avoid complications from heat stress during a winter breeding season. Profitability in the cow-calf sector starts at breeding by getting cows bred on time. In the mid-south, we are more likely to encounter challenges from mother nature during the spring-summer breeding season than during fall-winter.

Weaning is another critical dichotomy between the spring and fall calving seasons. With spring calving herds weaning in the fall, producers looking to pre-condition or background their calves may have limited forage resources for both the cow herd and weaned calves. Fall-calving cows weaning in the spring are often weaned at a time when grass growth is plentiful, and it can often grow faster

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Upcoming Events

June 6
Private Applicator Training
Christian County Office, 8AM
Hopkinsville, KY

June 10
Drone Pilot Prep Course
Hopkins County Extension Office

June 10
Pennyrile Beekeepers
Christian County Extension Office

June 18
Twilight Tour
Fairview, KY **(watch mail for flyer)**

June 21
Tobacco GAP
Christian County Extension Office, 2PM

July 8
The Business of Blooms Short Course: For Cut Flower Growers
Hardin County Extension Office

July 23
Corn, Soybean & Tobacco Field Day
UKREC, Princeton KY

Please watch your mail for a address update postcard.
We are in the process of updating our mailing lists. If you receive a card in the mail and wish to continue receiving AgMatters and event flyers, please return the postcard. Instruction will be on the card. Thank you.

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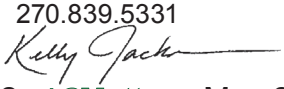

AGMatters

Velifer Uses Expand

J.C. Chong, PestTalks, 4.22.24

BASF's Velifer expands its label to include additional application methods and crops.

Velifer contains the entomopathogenic fungus Beauveria bassiana strain PPRI 5339. Dip-and-dench methods have been added, so Velifer can now be used for foliar sprays, soil-directed sprays, dips and drenches in greenhouses. In addition to ornamental plants, Velifer can also be used for fruit and nut trees, vines, brambles, bushberries, fruits, vegetables, herbs, and spices. (It's important to note that application to fruit and nut trees, vines, brambles and bushberries isn't currently allowed in California.) Velifer has a 12-hour REI and zero-day PHI

All application methods are used at 3 to 13 fl. oz. per 100 gallons. For soil-direct sprays, you'll apply Velifer to the soil or media surface, and then irrigate with enough water to move the products into the root zone. For drench applications, on the other hand, you'll apply enough solution to thoroughly soak the media. These two application methods may be most useful when dealing with root-inhabiting insects, such as root aphids and root mealybugs.

Although Velifer is an oil suspension formulation, it seems to be safe for many plant species. It's still advisable to do a little phytotoxicity testing on your own.

Velifer®
Bioinsecticide/Miticide

FSMA Final Rule on Ag Water

UMASS Veg Notes

The FDA released its final rule on agricultural water for growers subject to inspection under the Food Safety Modernization Act's Produce Rule. The revised rule replaces the original requirements for preharvest water only.

The original Produce Rule required growers to create a microbial water quality profile for each of their water sources by taking several tests of the water for generic E. coli, an indicator of fecal contamination.

The new Rule does not require routine water testing but instead requires growers to do a written agricultural water assessment for each water source at least once annually. The assessment should consider factors including water use practices, crop characteristics, environmental conditions, potential impacts on water from adjacent and nearby land, and other relevant factors.

Compliance dates are based on the size of the farm—the largest farms (those averaging more than $500,000 in gross sales over the last 3 years) will have to begin complying on April 7, 2025. Smaller farms will have an additional one or two years to comply, depending on their total sales amounts.

The rules for postharvest water have not changed and inspections began this year for the largest farms. Growers using untreated ground water for postharvest activities—e.g., produce washing, cleaning of food contact surfaces, handwashing, or ice making—must test the water to make sure it's free of generic E. coli, at least 4 times in the first year and then 1 time every year after that. If any test is positive for E. coli, another 4 tests per year are required until all tests are negative.

Preventing Postharvest Disease

Kim Leonberger, Kentucky Pest News, 5.21.24

Fruits are often soft, perishable, and particularly susceptible to a range of damage during harvest and storage. Growers can experience postharvest crop losses between 25% and 50%. A significant percentage of postharvest losses are caused by plant diseases. Infection by disease-causing pathogens can occur in the field and/or through wounds during harvest. Under moist conditions or high humidity, these infections can develop into molds, rots, or other decay. Even produce destined for fresh market can develop postharvest diseases during short-term storage.

Infection in the Field

Plant diseases such as fruit rots, leaf spots, and root rots can occur while plants are growing or while fruit are maturing (Figure 1). Infections can remain latent (dormant) until produce reaches a particular stage of maturity or until certain environmental conditions are reached.

Figure 1: Bitter rot can begin in the field or greenhouse and advance in storage. (Photo: Nicole Gauthier, UKY)

Management

- Maintain a disease management program all season.
- Discard diseased and damaged produce as soon as it is visible.
- Avoid mixing diseased produce with healthy produce (e.g., in storage bins).
- Apply fungicides at harvest or after harvest if field disease was present.

Infection During Harvest & Handling

Wounds, bruising, desiccation, and exposure to temperature extremes can weaken produce and allow pathogen entry, resulting in disease. Many of the same plant pathogens that infect crops in the field can also infect wounded or damaged produce during harvest. Disease may appear soon after produce is moved to the cooler or storage, or there may be a delay in disease development.

Management

- Minimize wounds and bruises during harvest, handling, and packaging.
- Raise bins and buckets off the ground during harvest.
- Cool produce as soon as possible.
- Avoid leaving harvested produce in the heat or sun.
- Wash dirty or muddy produce and dry thoroughly before storage
- Wash and sanitize bins and equipment before each harvest.

Disease in Storage

Improper storage conditions can provide ideal environments for disease-causing organisms to infect (Figure 2). Healthy produce can become diseased in storage when moisture is too high, temperatures are too warm, and pathogens are present.

Figure 2: Conditions such as excess moisture and improper storage may allow for disease development. (Photo: Nicole Gauthier, UKY)

Management

- Separate produce by type, harvest date, and field origin.
- Cool produce as soon as possible while remaining within the safe range for the specific produce
- Monitor storage temperature and humidity.
- Increase ventilation.
- Raise produce off the floor.
- Reduce surface wetness by maintaining equipment and keeping produce dry.
- Follow a strict sanitation program, which is critical.
- If fruits and vegetables must be washed before storage, they should be completely dry before storage.
- Keep all surfaces clean; sanitize regularly.
- Wash and sanitize all bins, tools, and harvest materials before bringing them into coolers or storage units.
- Inspect stored produce regularly and discard damaged and diseased material immediately.

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than our cow herd can graze it.

Keeping with the theme of working with mother nature, one consideration with fall calving herds is to delay weaning until calves are a bit older. Running fall-born calves on grass can be a great way to take advantage of the relatively cheap cost of gain while adding value and pounds to the calf. Once calves have reached 5-6 months of age, the cow produces much less milk compared to peak lactation, as the calf, at this point, is getting most of its nutrients through grazing. Keeping the calf on the cow a bit longer in the spring can also help to prevent fall cows from becoming overly conditioned after weaning. By delaying weaning later into spring, fall calving producers can also avoid the cool, wet, and muddy conditions often seen in March. March in the mid-south seems to be one of the dreariest months of the year, and I have found myself saying on more than one occasion, "I don't like weaning in March for the same reasons I don't like calving in March."

Nearly ¾ of the nation's cow herd calves in the first part of the year, and there is a reason for that. As a nutritionist, I know fall calving has its challenges, and managing winter feeding is a big one. It is critically important that those fall-calving cows don't lose condition during the breeding season while typically consuming stored forages.

However, when considering the big picture or the overall system, fall calving can have much to offer cow-calf producers in the fescue belt. In the fall calving system, we can work with Mother Nature and avoid extreme heat and fescue toxicosis during the breeding season and cold, wet, and muddy conditions at both calving and weaning (if timed correctly). In return, fall-calving herds can market calves at a time of the year when markets are expected to reach their seasonal highs. Fall calving won't be for every operation, but it is something to consider when managing cows in the fescue belt. Sometimes it pays to go against the grain.

Scrumptious Strawberry Salad

Cooperative Extension Service

INGREDIENTS

- 5 cups spinach
- 1/2 large cabbage head, chopped
- 1 cup golden raisins
- 1 cup halved red grapes
- 1 pint sliced strawberries
- 1/2 small red onion, sliced
- 1.2 cup toasted and chopped pecans (optional)

Dressing

- 3/4 cup plain non-fat Greek yogurt or plain regular yogurt
- 3 tbs honey
- 6 tbs apple cider vinegar
- 3 tbs olive oil
- 1/2 tsp Dijon mustard
- 1 tsp poppy seeds
- 1 tsp salt
- 1/2 tsp pepper

DIRECTIONS

1. Combine all salad ingredients together in a large bowl.
2. Prepare salad dressing by mixing all ingredients together in a jar, cover, and shake well to combine.
3. Pour dressing over salad mixture and toss to combine.

Yield: 8, 2-cup servings

NOTES

Nutrition facts per serving: 240 calories, 10 g fat, 1 g saturated fat, 0 mg cholesterol, 340 mg sodium, 33 g carbohydrate, 4 g fiber, 27 g sugars, 6 g added sugar, 5 g protein

Bacterial Spot & Speck of Tomato

Kim Leonberger, Kentucky Pest News, 7.11.23

Bacterial spot and speck look similar, and differentiating between these diseases can be challenging. Leaves, stems, and fruit may become infected, resulting in reduced fruit quality or yield losses. Preventative practices are critical for disease management to avoid damage and losses.

Bacterial Spot & Speck Facts

Bacterial spot begins as small, circular, brown spots on leaves (Figure 1), often with a wet or greasy appearance. Over time, spots may merge resulting in large blighted areas. In severe cases, defoliation may occur. Small lesions may form on green fruit and appear as raised blisters or scabs.

Bacterial speck may affect leaves, stems, and fruit. Leaf lesions are small, circular, and brown and often surrounded by a yellow border (Figure 3). Lesions spread and come together, resulting in large dead areas. Defoliation may occur in severe cases. Small, sunken specks may develop on green fruit.

Conditions for infection are different for each disease. Bacterial spot disease favors warm, humid, or rainy conditions, while bacterial speck is more likely to occur during periods of cool, wet weather.

Both bacterial spot and speck can be introduced via infected seeds or transplants. Pathogens can overwinter in infected crop debris from the previous season.Both bacterial spot and speck pathogens are spread by water such as irrigation or rain.

Bacterial spot is caused by the bacterial pathogen Xanthomonas campestris pv. vesicatoria, and bacterial speck is caused by the bacterial pathogen Pseudomonas syringae pv. tomato.

Figure 1: Bacterial spot begins as small, circular, brown spots on leaves. (Photo: Kenny Seebold, University of Kentucky)

Figure 2: Bacterial speck leaf lesions are small, circular, and brown and often surrounded by a yellow border. (Photo: Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org)

Management

- Plant pathogen-free seed and transplants.
- Disinfect tools and implements
- Manage weeds in and near plantings.
- Avoid overhead irrigation and working with plants when leaves are wet.
- Increase plant spacing.
- Promptly remove and destroy diseased plant material.
- Rotate with non-host crops.
- Destroy crop residues after harvest
- Deep plow to bury residual inoculum.

Publication Spotlight

Managing Algae and Moss Inside Greenhouse (e-Gro Alert)

Both algae and moss can thrive inside the greenhouse under moist conditions and can spread very quickly.

This makes them a problem for growers that tend to overwater. They are also extremely prevalent in propagation environments where the warm air and root-zone temperatures, low light intensities, high humidities and media moisture levels, and frequent waterings create an environment that is highly suitable for the proliferation of algae and moss.

This publication from e-Gro discusses management option to control algae and moss in your greenhouse.

Contact the Christian County Extension office to request a free copy - (270) 886-6328


e-GRO Alert

Managing Algae and Moss Inside Greenhouses

2024 Sponsors

Greenhouses are structures commonly used to grow a wide variety of plants ranging from ornamentals to food crops. Within these controlled environments, growers are better able to control parameters such as light intensity, photoperiod, light quality, air and root-zone temperature, irrigation quantity and frequency, humidity, and plant nutrition. Weeds can propagate within a greenhouse and are commonly found in or around cultivated crops.

Figure 1. Algae covering the benches and shade cloths within a propagation greenhouse at Michigan State University. (Photo credits: Charlie Smith, 2024).

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Two varieties of weed that may often be neglected when discussing weeds in a greenhouse are algae and moss. Both algae and moss can thrive inside the greenhouse under moist conditions and can spread very quickly. This makes them a problem for growers that tend to overwater. They are also extremely prevalent in propagation environments (Fig.1) where the warm air and root-zone temperatures, low light intensities, high humidities and media moisture levels, and frequent waterings create an environment that is highly suitable for the proliferation of algae and moss.

www.e-gro.org

Combating Cucumber Beetles

Fruit and Vegetable Magazine, 10.19.22

Every year, growers anxiously anticipate harvesting their crops. They spend countless hours in the field preparing for harvest season and invest significantly in crop protection products. As you can imagine, it can be very disappointing to find your crop destroyed by pests, such as striped and spotted cucumber beetles.

Suzanne Blatt, research entomologist from Agriculture and Agri-food Canada (AAFC), knows this feeling all too well. As a research specialist in tree fruit and vegetable integrated pest management (IPM) at the Kentville Research and Development Centre (KRDC) in Nova Scotia, Blatt began working on the striped and spotted cucumber beetle project in 2020 in collaboration with Perennia. She and her team have been researching a more sustainable method to keep crops safe from these pesky beetles.

Striped and Spotted: Recognizing Native Beetles

The spotted (left) and striped cucumber beetles. Photo courtesy of Ric Bessin, University of Kentucky.

The striped cucumber beetle (Acalymma vittatum) and the spotted cucumber beetle (Diabrotica undecimpunctata) are common pests during the growing season. Both beetles are small, bright yellow and about 0.5-1 centimetre in length. The striped cucumber beetle has three black stripes, while the spotted cucumber beetle has about ten black spots on its back. Fields that have been invaded by these pests will find it difficult to grow cucurbit plants, which include melons, pumpkins, zucchini, squash and cucumber, because the beetles love to feed on these. The spotted cucumber beetle is also known as the southern corn rootworm.

Striped and spotted cucumber beetles overwinter as adults in the hedgerows around fields and move into the field in late spring/early summer, making it hard to get rid of them.

Damage to Crops

The striped and spotted cucumber beetles are an agricultural concern for growers, as a large number of them can feed on and destroy newly transplanted or germinating cucurbit plants. The adult beetles feed on the leaves and flowers, while the larvae are soil-dwellers and will feed on the roots of the plant. Both types of damage affect the plants' ability to grow. If there are enough of these pests, they will chew away the flower and growers will not see any crops that season.

These beetles also transmit bacterial wilt. Bacterial wilt is a disease that reduces the plants' ability to function properly and the leaves will eventually die. Loss of leaves will lead to the plant being unable to produce a sizeable squash. Striped and spotted cucumber beetles carry the bacteria in their gut and when they feed it is transmitted to the plant.

"Home gardeners and commercial growers alike can lose their squash and zucchini plants to these beetles," Blatt says. "For the home gardener, it's the loss of their home-grown fresh vegetables, but for the commercial grower, it's the loss of income."

Trial and Error of Trap Cropping

In 2020, Blatt and her team initially explored the use of trap crops and companion plants in a "push-pull strategy" in squash. Nasturtiums (companion plant) acted as a repellent and would push the beetles away from the crop, while a different variety of squash called Baby Blue Hubbard (the trap crop) was planted around the crop. The trap crop would attract the beetles to feed and lay their eggs in this new location. When populations of the beetle were low to moderate, Blatt observed less damage to the crop in plots which had a trap crop while the companion plant experienced some damage.

When the team repeated the trial in 2021, the beetle populations had grown significantly and created such high pressure that they didn't see any benefit of either trap crop or companion plant. They did however learn two interesting facts that will help their research moving forward:

- Butternut squash is the least likely to be damaged by the pest.
- Nasturtiums (an annual plant with edible leaves) alter where the squash bug (another pest to squash) will lay its eggs.

"We were cautiously excited about our results from 2020, as these types of strategies have been used by home gardeners with some success," Blatt said. "Studies in the United States showed a broad range of effects depending upon squash plant/trap crop combination and pest pressure. The work we did highlights the need to manage the trap crop in some way so we can reduce the second flush of adults and larval feeding."

Next Steps in the Research

While Blatt's exploratory research continues on preventing the striped and spotted cucumber beetles from destroying cucurbit plants, the next step is working to refine the trap crop system. Blatt will be combining trap cropping with entomopathogenic nematodes (a group of microscopic thread worms that will infect insects present in the soil and release a bacterium that causes death) to try and reduce the impact of the second flush of adults.

Using entomopathogenic nematodes is not a new practice, but the product can become pricey for commercial growers. Blatt hopes that applying these nematodes to only the trap crop will help reduce that cost. This method could also reduce the need for an additional tractor pass in the field, thus saving time and fuel.

Wheat Disease Update

Carl Bradley, Kentucky Pest News, 5.14.24

Powdery Mildew

Powdery mildew is being observed in some wheat fields in the state (Figure 1). My general historical observations of powdery mildew of wheat in Kentucky have been limited, with very few observations in commercial fields over the past 10 seasons. So, observing powdery mildew this late in the season, and in some cases as high up on the plant as the flag leaf, is somewhat surprising. The mild winter may have allowed the fungus to develop more than normal, and spring conditions have allowed it to continue to thrive, especially on wheat varieties with low to medium levels of resistance to powdery mildew.

Figure 1. Powdery mildew on a wheat leaf (Photo: Carl Bradley, UK).

Plants that were sprayed with a fungicide for management of Fusarium head blight around anthesis (Feekes growth stage 10.51) should be somewhat protected against powder mildew, but protection will only occur on leaves that the fungicide contacted and areas of the leaf not already infected with the powdery mildew fungus at the time of fungicide application. At the current stage of wheat fields in the state, no management options are available. For management of powdery mildew next season, choose varieties with resistance to powdery mildew, avoid over-fertilization of wheat fields, and scout fields prior to flag leaf emergence for powdery mildew and other foliar diseases. Application of an effective fungicide at the flag leaf stage may be necessary if powdery mildew has developed extensively on lower leaves at that time of the season.

Bacterial Streak

Figure 2. Symptoms of bacterial leaf streak on wheat (Photo: Carl Bradley, UK).

Bacterial streak is another foliar disease that is being observed on a few highly susceptible varieties in the state (Figure 2). Symptoms of bacterial streak may resemble those that are caused by fungal pathogens; however, since bacterial streak is caused by a bacterium, foliar fungicides will not provide any control of bacterial streak.

Generally, bacterial streak has not been a major yield reducer in Kentucky, but it can be commonly observed disease in wet springs on susceptible varieties. The bacterial streak pathogen can also infect seeds, causing a disease known as black chaff, so it is important to purchase new, pathogen-free seed each year to help avoid bacterial streak and black chaff.

Fusarium Head Blight

Symptoms of Fusarium head blight are starting to be observed in Kentucky wheat fields (Figure 3). When much of the wheat crop was at the anthesis stage (Feekes growth stage 10.51) a few weeks ago, the risk for Fusarium head blight was low in most of the state. However, favorable conditions for this disease have developed for much of the state over the past week, due to rainy and cloudy weather.

Figure 3. Wheat head with beginning symptoms of Fusarium head blight (Photo: Carl Bradley).

Despite the recent favorable weather for Fusarium head blight, I believe that it may have come too late for it to be severe in Kentucky wheat fields, especially for farmers that planted moderately resistant varieties and applied an effective fungicide at anthesis. There will be some late infections that occur due to the recent favorable weather, but it is unlikely if these late infections result into major Fusarium head blight problems this year but expect to see mild levels of this disease in some wheat fields this year, especially in fields that were not sprayed with a fungicide at anthesis and/or in fields that were planted to a susceptible variety.

The next few days should be a good time to scout your fields for Fusarium head blight symptoms. Growers with moderate to high levels of should consider making adjustments to their combine that would allow low test-weight, scabby kernels to be blown out the back of the combine. Research conducted at the Ohio State University indicated that adjusting the combine's fan speed between 1,375 and 1,475 rpms and shutter opening to 90 mm (3.5 inches) resulted in the lowest discounts that would have been received at the elevator due to low test weight, % damaged kernels, and level of the mycotoxin deoxynivalenol (DON; vomitoxin) present in the harvested grain (Salgado et al., 2011).

Sprayer Math

S.B. Scheufele, Vegetable Notes, 5.2.24

When you hear "did you calibrate your sprayer?" do you feel a wave of anxiety and rush to change the subject? Well, I have a secret for you: calibrating your sprayer is not a complicated laboratory science experiment. It's just another way of saying, "did you put the right amount of water and pesticide (or fertilizer) in your sprayer, and is the right amount coming out of it?" By using just a few pieces of easily measured information, calibrating your sprayer will cost-effectively improve your pest control.

Two Pieces of Info Needed:

1. How much water you need. This could mean:

a. How much water you need to cover the crop (is it a tiny seedling you can cover with one nozzle or is it now vined out and you need an 8' boom with 4 or 5 nozzles?)

b. How much water do you need to drench the soil at the base of the plant for an in-furrow treatment?

c. How much water you need to evenly cover the soil with a pre-emergent herbicide?

Different applications will require different nozzles, boom heights, and pressures for ideal coverage (the label will state ideal settings for applying the pesticide). These settings will affect the amount of water needed to spray your field. Whatever you are spraying, you need to know how much water it will take you to do the job before you start.

2. How much pesticide you need. This could be the amount of pesticide needed for a certain area (e.g. 1 acre of pumpkins or three 200 ft beds of tomatoes). You will find this information on the pesticide label, and it might be expressed in different units, e.g. 1 pound/A or 3.2 fl oz/1000 row feet or 3% v/v.

There are a few different ways to do the math, which can make it confusing. Pick a method that makes sense to you, take notes on what you did and how you spray each crop, and then do the same thing next time.

This is the method I like to use:

Fill the sprayer tank—whether using a backpack or tractor-mounted sprayer—with some amount of water, time yourself walking or driving at a constant speed as you spray a known area of crop, e.g. 10 bed feet, with beds on 5-foot centers (50 ft2 total). Did you get good coverage? If not, adjust the nozzles, pressure, speed, etc. until you have the coverage you are happy with. Time yourself as you spray that 10 feet a few times and take the average. We'll say it took 14 seconds to spray 10 bed feet. Then put a measuring pitcher or cylinder under the spray nozzle and collect the spray for that amount of time—14 seconds. If you have more than one nozzle, collect the spray from each nozzle independently to make sure they are all emitting the same amount of water +/- 10%. For this example, let's say you collected 5.76 oz of spray in 14 seconds. You now know how much water you used to spray a known area and you can do some cross-multiplication to get the total amount needed for the total area you will spray. E.g. 5.76 oz per 10 bed feet is equal to 5,018 oz/A or ~40 gal/A. See below for the math:

$$43{,}560\ ft^2 = 1A$$

$$\frac{5.76\ fl\ oz}{50\ ft^2} = \frac{X\ fl\ oz}{43{,}560\ ft^2}$$

$$X = 5{,}018\ oz$$

$$5{,}018\ fl\ oz\ \left(\frac{128\ fl\ oz}{1\ gal}\right) = 39.2\ gal$$

$$\mathbf{39.2\ gal/A}$$

We know we are going to apply an insecticide to control aphids. The label lists the application rate for that crop-pest combination as 4 oz/A. So we would add 4 oz (equal to 118.3 milliliters or a ½ cup) to 40 gallons in the tank

So now you know how to do your sprayer math, the first step in calibration.

Calibrating also requires double-checking that your filters or nozzles aren't clogged or worn out and that the right amount of spray is coming out—that is the kind of calibration that your pesticide inspector might be looking for. Proper calibration will also ensure that you are getting the coverage you expect and the right amount of pesticide out there to do the job well. Every time you double check the amount of water coming out of your sprayer and make sure it matches the need for your crop you are calibrating. If you get complacent and do the same thing year after year without ever confirming you are still getting the same result, you will not be getting the control you expect and you will be misapplying pesticides, resulting in off-label applications that can contribute to environmental harm or pests developing resistance to chemicals that were repeatedly applied at too low a rate. Always follow all the label instructions, use the proper personal protective equipment (PPE) listed on the label, and be safe!