Osage County Agriculture Newsletter

EXTENSION

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Its that time of year! Spraying season, Let Rick or Cheyenne know if you need help calibrating your sprayer. They will come out to your place. Sprayer Calibration is important and can save you a lot of money or lose you a lot as well if it is not calibrated right.

Calibrating a Low-Pressure Ground Sprayer: Boom-Mounted Nozzles

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By John Long

Variables Affecting Application Rate of Spray Solution

Three variables affect the amount of pesticide mixture or spray solution applied per acre:

1. nozzle flow rate.
2. ground speed of the sprayer.
3. effective spray width per nozzle

To calibrate a sprayer accurately the effect of each of these variables on sprayer output must be understood.

1. Nozzle Flow Rate - The flow rate through the nozzle varies with orifice tip size, nozzle pressure and spray solution characteristics. Figure 2 shows a cutaway of a typical low-drift air-induction nozzle with identifiable parts labeled. The size of the nozzle is determined by the size of the pre-orifice for low drift nozzles or the main orifice for standard nozzles. **Installing nozzles with a larger or smaller orifice size is the most effective way to change a sprayer's output.**

Changes in nozzle pressure also can be used to increase or decrease sprayer output, but not as significantly as changes in orifice size. Pressure must be increased four times to double nozzle flow rate. For example, Figure 3 shows a typical catalog chart for a nozzle. For this particular nozzle, to increase the flow rate of the nozzle from 0.26 gallons per minute (GPM) at 30 pounds per square inch (psi) on the low end of the range to 0.52 GPM, pressure would need ot be increased to 120 psi (4 x 30). **Pressure adjustment should never be used to make major changes.** Most nozzles have an optimal working pressure somewhere near the middle of the manufacturer suggested range. Pressures near the low end of the range may distort the spray patter (Figure 4), while pressures near the upper end of the range tend to produce small droplets and increase physical spray drift. The pressure range of nozzles vary greatly from model to model but can vary from as low as 15 psi to upwards of 120 psi.

2. Ground Speed - The spray solution application rate varies inversely with the ground speed. Doubling the ground speed of a sprayer reduced the gallons of spray applied per acre (GPA) by one-half. For example, a sprayer applying 20 GPA at 3 mph would apply only 10 at a speed of 6 mph if all other spray conditions remained the

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Same. A sprayer calibrated at 4 mph but actually operated at 3 mph will over spray by 33%, significantly increasing chemical costs and the potential for crop damage.

3. Effective Spray Width "W" - The effective width sprayed per nozzle or cluster of nozzles also affects the spray solution application rate. Spray width per nozzle is measured differently depending on the nozzle configuration. Refer to Figure 5 for the best way to measure effective width. Doubling the effective spray width will decrease the gallons per acre (GPA) applied by one-half. For example, if a broadcast nozzle is applying 40 GPA on a 20-inch spacing, a change to a 40-inch spacing will decrease the application rate of spray solution to 20 GPA. Typically, this will require changing the nozzles to a wider fan angle or increasing boom height to maintain proper overlap. Both of these changes can have impacts on drift.

Precalibration Checks

Before calibrating a sprayer, service the entire unit. Check that all nozzles are the same size and not worn. Check for uniform nozzle output and pattern and determine exactly how much liquid the sprayer tank holds. Install a pressure gauge on the boom to determine actual pressure at the nozzles.

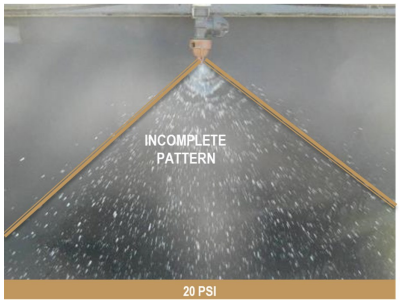
Servicing - Clean all lines and strainers, making sure the strainers are in good condition and the correct size and type for the chemical formulation to be applied. Inspect all hoses for signs of aging, damage and corroded fittings or leaks. Check the pressure gauge to determine if it is working properly. Is the pressure holding constant? Does it read zero when the pump or boom valve is shut off? The actual accuracy of the gauge is not as important as its ability to give the same reading each time the same pressure is produced. At least once a year, preferably at the beginning of the spraying season, check the gauge against another gauge known to be accurate.

Nozzle Output and Pattern - Check for uniformity of nozzle output and the spray angles, spacing and height are consistent. To check for uniform nozzle output, install the selected nozzle tips and check to be sure the tank is clean. Then partially fill the tank with clean water and operate the sprayer at a pressure within the recommended range. Place a container, such as a quart jar, under each nozzle and check to see whether all the jars fill at about the same time (Figure 6). Replace any nozzle tips with an output that significantly varies compared to the output of the rest of the tips, have an obviously different fan angle or have a non-uniform appearance in spray pattern. The rule of thumb is nozzles with flow rates greater than 10% above a new nozzle of identical make should be replaced.

An effective way to determine whether a uniform pattern is being produced and whether the boom is at the proper height is to spray some water on a warm, dry, light-colored surface like a concrete pad or gravel drive and observe the drying pattern. If the pattern is not uniform, some strips will dry slower than others will.

Tank Capacity - Checking tank capacity may seem unnecessary, but unless the exact capacity of the sprayer's tank is known, it may lead to serious problems. This precalibration check should be made at least once, and the data should be recorded. When determining application rates of spray solution, the use of an inaccurate tank capacity is a common cause of many cases of under- and over-application. A tank thought to hold 200 gallons, but which actually holds 250 gallons, results in a built-in calibration error of 25%. The best and easiest way to accurately determine tank capacity is to fill the tank using any convenient container for which an exact capacity is known. Another effective way of measuring tank capacity is to fill or drain the tank while measuring with an accurate flow meter.

A third way is to weigh the sprayer both empty and full. The difference between the two weights is the weight of the water in the tank. The capacity of the tank in gallons can then be determined by dividing this weight by 8.33 pounds, which is the weight of one gallon of water.



Horn Flies and Insect Growth Regulators (IGR)

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As spring arrives and temperatures start to creep up it is time to make horn fly control decisions. Especially, if you plan to utilize an insect growth regulator (IGR) products to suppress horn fly populations. IGR's are commonly found in mineral supplements and are passed through the animal. The IGR products are present in the manure where horn flies lay their eggs. IGR products are effective against horn flies because they lay their eggs in only fresh manure where the IGR is actively killing the immature stages. Developing larvae are not able to complete their development to the pupal stage. When considering IGR supplements the cost can be fairly efficient if you are already feeding mineral supplements. Some supplements will only increase by a $1.00 /hd if you are only adding a IGR to your mineral. However, if you are located in an area where anaplasmosis is a problem then the supplement cost can go up substantially mainly due the anaplaz medication that is included with the mineral.

Horn flies are a common fly species associated with livestock. They are a small black fly and feed on cattle in an inverted position with their head facing down. Both male and female horn flies take blood from the host and feed 20 to 30 times a day. Horn flies continually stay on the animal and only leave the animal for short periods to lay eggs. Typical feeding areas on cattle include the back, side, belly and legs. Horn fly populations begin building up in the spring as early as April and last until the 1st frost. The life cycle of horn flies lends itself to building large populations on cattle if control is not implemented. Horn flies complete an entire generation in as few as 14 days during the summer months, which leads to numerous generations of flies over six or seven months. Horn flies have complete metamorphosis which consists of eggs, larvae, pupae, and adults. The adult female fly must lay her eggs in fresh cow manure. The eggs hatch within 48 hours into 1st instar larvae which feed in the manure pat and progressively grow into 2nd and 3rd instar larvae. Larvae of the horn fly develop only in fresh cattle manure. Third instar larvae crawl from the manure pat to a drier area and pupate. Inside the pupal case the adult fly forms and the adult will emerge from the pupal case and seek a suitable host, which are typically cattle. During mid fall adults do not emerge and the horn fly spends the winter in the pupal stage.

Horn flies can have significant impact on growing cattle. The main impact is the reduction in weight gain especially in weaning weights for spring born calves. Some studies have attributed a 1.5 lbs of extra gain per week when horn flies are controlled. The reduction in weight occurs mainly because of stress on the cow which can then result in reduced milk flow or production. This stress is caused by horn flies because they are a blood feeding insect. The loss of blood and stress from biting activity results in direct economic impacts (reduced weights). Considering today's market value for cattle the impact is even larger.

Mineral supplements that have IGR's are effective only when most of the cattle in a herd are consuming the required amount and mineral supplements work best when non treated cattle are not nearby as populations of horn fly will exchange from one herd to another. Some other things to consider when applying IGR's to control horn fly populations:

1.) Start before you have a horn fly problem
2.) Start feeding supplements with IGR's within 15-20 days after the last hard freeze
3.) If large adult populations start to build up on your cattle consider using additional control strategies such as pour-ons, insecticide ear tags, or spraying the animals with an approved insecticide

The role of IGR's in a horn fly control program can be very significant if used in a more preventative manner. Since IGR's only control immature stages and if your neighbors are doing nothing for horn flies then you may want to consider alternative control strategies.

Home Vegetable Garden Insect Pest Control

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By Eric Rebek, David Hillock

Identifying Insects

Identifying insects and other arthropods can be a daunting task, so become familiar with common pest species and use a hand lens with at least 10X magnification to aid in identification of very small specimens. Color photos and descriptions of the most common insect pests are included in this fact sheet. Once the pest is properly identified, it can be classified by the type and amount of damage it causes.

Identifying the Damage

Damage is classified by how and where pests feed.

Chewing damage – Insects with chewing mouthparts tear off plant tissue and chew it. Examples include beetles, caterpillars, and grasshoppers, which feed on fruit or leaves and often leave holes in affected plant tissue. These insects defecate on plants and soil, leaving behind excrement (frass) that may be brown, black, or green.

Sucking damage – Insects with piercing-sucking mouthparts insert their straw- or needle-like mouthparts into plant tissue and 'suck' plant sap and other liquids. Examples include squash bugs, aphids, and stink bugs. Many insects that feed in this manner defecate a sticky liquid (honeydew) that often builds up on leaves or fruit, leaving a shiny residue that may support the growth of sooty mold. Damaged foliage will turn yellow and eventually become brown and necrotic or malformed. Thrips and mites also feed on plant juices, but their mouthparts differ slightly.

Key Pests

Pests that feed directly on the harvested portion of the plant are often the most destructive. Hence, little tolerance is given for these key pests and they should be controlled when found in large numbers in the garden. Examples include corn earworm and tomato fruitworm. Many insects and mites feed on leaves or on parts of the plants that will not be harvested. Most gardeners can tolerate low numbers of these in the garden. They often serve a useful purpose because they attract and help maintain populations of predatory or parasitic insects or mites that also feed on and control key pests. You must decide how many of these pests you are willing to tolerate, keeping in mind that large numbers can cause leaf curl and other damage and reduce the vigor of your garden plants. Examples include aphids and spider mites. A list of commonly grown vegetables and associated arthropod pests are provided in Table 1.

Controlling Pests

Ideally, pests should be prevented from becoming a problem in the first place. Pest problems can be prevented by selecting crops that are well adapted to the local climate and soil. Also, pests are kept in check by maintaining a healthy crop through cultural practices such as proper fertility and irrigation. Finally, prevent small infestations from becoming a major problem by removing pests early. Pest monitoring enhances the success of early pest detection and elimination. If additional control options are warranted, numerous strategies can be adopted. Often, the most effective control is achieved by combining control tactics. Additional information about maintaining garden plant health can be found in Oklahoma Cooperative Extension Service Publications HLA-6013, *Summer Care of the Home Vegetable Garden*, HLA-6007, *Improving Garden Soil Fertility* and HLA-6032, *Vegetable Varieties for the Home Garden in Oklahoma*

Table 1. Commonly grown vegetables and associated pests,

Asparagus	• Asparagus beetle • Aphids
Beans	• Bean leaf beetles • Aphids • European corn borer • Leafhoppers • Corn earworm
Cole crops (broccoli, cauliflower, cabbage, collards, kale, mustard, turnips)	• Diamondback moth • Cabbage looper • Aphids
Cucurbit crops (cucumbers, melons, squash, pumpkins)	• Cucumber beetles • Squash bug • Aphids • Spider mites
Sweet Corn	• Corn earworm • Armyworms • Mites • Seedcorn maggot • Flea beetles • European corn borer • Cutworms
Tomatoes (peppers, eggplant, potato)	• Tomato fruitworm • Hornworms • Blister beetles • Flea beetles • Colorado potato beetle • Aphids • Spider mites • Stick bugs • Leaffooted bugs • Leafhoppers • Cutworms
Okra	Aphids
Onion	Thrips
Peas	• Aphids • Stink bugs • Loopers
Spinach	• Aphids • Stink bugs • Loopers
Lettuce	• Aphids • Spider mites

UPCOMING EVENTS:

- Cattlemen's convention: Tradeshow and Luncheon on the 17th at the Osage County fairgrounds
- Ranch tour will go north on 99 with barbeque being held at Tallgrass prairie preserve.
- Look for Economics of Fertilizing Bermuda grass flyer in June on our Facebook page.

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