



Extension FactSheet

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Best Management Practices for Boom Spraying

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Pesticides need to be applied accurately and uniformly. Too little pesticide results in poor pest control and reduced yields, while too much injures the crop, wastes chemicals and money, and increases the risk of polluting the environment. Achieving satisfactory results from pesticides depends heavily on five major factors:

1. Positive identification of the pest.
2. Choosing the least persistent and lowest toxicity pesticide that will work.
3. Selecting the right equipment, particularly the right type and size of nozzle for the job.
4. Applying pesticides accurately at the right time.
5. Calibrating and maintaining equipment to make sure the amount recommended on the chemical label is applied.

Best Management Practices (BMPs) for Effective Spraying

Following is a list of general recommendations, or steps to follow, to help pesticide applicators achieve greater accuracy and efficiency in liquid pesticide application using boom-type ground sprayers. Applicators should be well informed about the specific recommendations for a given pesticide, and should follow the federal, state, and local government laws and regulations on pesticide application.

1. Read product label for specific recommendations / requirements

1.a. Equipment selection and setup

Identify any specification of sprayer, nozzle, nozzle spacing, nozzle pattern angle, travel speed, spray release

height, or other sprayer equipment factors listed on the label.

1.b. Spray application rates (gpa)

This information helps determine nozzle flow rates to a large extent and thereby influences nozzle type, size, number, and operating pressure.

1.c. Spray classification / droplet sizes

To reduce spray drift, newer labels indicate minimum required droplet size as a spray classification category (i.e., very fine, fine, medium, coarse, very coarse, extremely coarse). The applicator selects a nozzle based on manufacturers' nozzle classification to match the label classification requirement for droplet size. Some labels indicate the minimum required droplet size classification corresponding with buffer zones or distance to sensitive areas.

1.d. Product agitation

Insufficient agitation may be a problem with large or irregularly shaped tanks. This problem is most serious when applying wettable powder-type pesticides. If there are "dead spots" or sharp corners in the tank, and if the agitation is not sufficient for a given tank, wettable powders may settle to the bottom. In other cases, dry pesticides may float on the surface a long time before a uniform concentration of pesticide in the tank is achieved. As a result, the mixture sprayed may have varying amounts of active ingredient at different times during the spray operation.

Many formulations have very specific mixing requirements in terms of the particular constituents required in the solution, the order of their addition into the solution, and

especially the agitation required to dissolve or maintain a uniform pesticide concentration in the spray solution. Though it may be only a general term, such as “moderate” or “heavy” agitation, it is critical to thoroughly mix the solution. This will increase pump flow requirements if hydraulic agitation is used. Mixing the chemical in a small container first, then pouring it into the sprayer tank helps achieve uniform mixing.

1.e. Adjuvants

Many product labels specify the use of specific adjuvants to provide good product efficacy, to influence droplet size or solution evaporation rate, to reduce drift, and to improve deposit and retention on the target.

1.f. Application type

Some pesticides are highly volatile and may require incorporation into soil after application. Follow label recommendations to avoid drift from highly volatile pesticides.

2. Identify sprayer operating capabilities (observation and operator manuals) to identify acceptable application factors

2.a. General inspection of sprayer

Carefully examine the components of the sprayer (tank, nozzles, hoses, pressure gauge, pump, etc.) to make sure they are the right type and size, and can function effectively under various operating conditions (for example, output of most pumps declines with increased pressure). Make sure no leakage is occurring anywhere in the spraying system. Pressure gauges should return to zero when the pressure is off. Check the tank agitation system to make sure the flow to the tank for agitation is sufficient and effective. Check the tire pressure. Pressure being off just a few psi can cause variations in the travel speed, which will directly affect the application rate. If the sprayer is equipped with an automatic controller of spray rate and pressure, controller operation, valve settings, and programming should be adequately understood and completed.

2.b. Nozzle spacing

Application equipment generally arrives set up with a particular nozzle spacing that is typical for the type of spraying to be performed (i.e., row crop sprayer, floater, etc.). Choose the equipment setup recommended to achieve the best results (banding, broadcast, directed spraying, etc.). Selected nozzles may be deactivated or nozzle spacing may be modified for certain applications based on the crop, spray application rate, release height, nozzle flow rate, and pattern angle. Nozzle spacing may vary from 10 to 60 inches in many applications. The limits

on nozzle spacing must be considered in selecting nozzles and their arrangement.

2.c. Nozzle flow rate and number of active nozzles

Nozzles have limitations on flow rate (gpm) and pattern. The spray application rate (gpa) is a function of the flow rate per unit of boom width, which is determined by the number of nozzles per unit of boom width and the flow rate delivered by each nozzle. More nozzles at a closer spacing, multiple nozzles at each outlet, or increased flow rates may provide an increased overall application rate. If nozzle flow rate is limited, then selecting more active nozzles per unit of boom width may be necessary to achieve the desired application rate.

2.d. Maximum nozzle flow rate

Evaluation of sprayer operating capabilities helps establish the potential flow rate required for each nozzle. The maximum flow rate of the selected nozzles will be limited by the flow rate and pressure-delivering capacity of the pump (and controlled by a pressure regulator or flow control valve) minus any agitation flow requirements. When the application rate is determined according to label instructions, then a nozzle flow rate can be determined using travel speed and nozzle spacing.

2.e. Spray pressure range

Spray pressure affects the performance of a hydraulic-nozzle sprayer in several ways. It changes the application rate and the size of droplets. Generally, the operating pressure for a typical boom-sprayer ranges from 15 to 80 psi. Most nozzles tend to produce a greater volume of spray in finer droplets at higher operating pressures. The lowest practical pressure that will provide adequate coverage and efficacy should be chosen to reduce drift. A good-quality and accurate pressure gauge should be used and should be plumbed into the boom (but can be on a dedicated remote line from the boom) so that actual boom pressure is registered. The actual pressure used to deliver the spray is determined by the pump specifications and is set by means of pressure regulator or bypass flow control.

2.f. Sprayer speed range

Sprayer speed plays a key role in achieving the desired application rate. All sprayers or tractors have an upper limit on travel speed and many have multiple discrete speed ranges that may not allow the operator to reach a specific travel speed. The range of possible sprayer speeds will partially determine the flow rate required of the nozzles for the selected application rate. A higher travel speed will require a higher nozzle flow rate to achieve a given application rate and, conversely, a higher nozzle flow rate may permit higher travel speeds to achieve a specified application rate under otherwise similar conditions. However,

higher travel speed increases aerodynamic turbulence and boom instability, which may provide greater opportunity for smaller droplets to be carried aloft by wind or thermal updrafts, and thus increase the potential for drift.

2.g. Boom height range

Boom height, nozzle spray pattern angle, and nozzle spacing influence overlap and uniformity of spray application. The proper height should be maintained at all sections of the boom. It is all right to use a tape measure rather than guess the height. Boom height affects the spray pattern overlap, deposition uniformity on the target, and the time during which the droplets are exposed to wind and evaporation, both of which directly influence drift. Spray release height should be kept to a minimum in order to reduce drift and should be consistent with nozzle manufacturer recommendations. The roughness of the terrain, boom dynamics, and instability also influence the effective release height of the spray. To achieve satisfactory coverage and reduce drift, consider an appropriate boom length and travel speed for the terrain. Nozzles placed lower into the canopy (i.e., drop nozzles) may improve targeting and reduce drift.

2.h. Adequate size hoses and fittings

It is essential that hoses and fittings on the sprayer be adequately sized to handle the pump output and total flow rate from the nozzles. If not, flow will be limited and/or pressure drop to the boom will be excessive. If the hoses and fittings are not adequate for the total flow rate of the selected nozzles, either the hoses and fittings must be replaced with larger sizes, or smaller nozzles must be selected.

2.i. Pump flow rate range

The pump must have enough pumping capacity and pressure to provide sufficient liquid flow to the nozzles and for any required agitation. Characteristic pump curves (i.e., gpm vs. psi) for different types of pumps are available from the manufacturers. A pump should be selected that will provide adequate flow for the highest anticipated flow requirement. Most pump manufacturers also recommend not exceeding 70 to 80% of the pump's capacity continuously in order to reduce wear on the pump. Do not run the pump without liquid in the tank.

2.j. Hydraulic agitation flow rates (as required)

Hydraulic agitation requirements must be considered when selecting a pump. If a particular pesticide formulation requires more agitation in order to keep the product thoroughly mixed and all particles uniformly suspended, then a higher flow-capacity pump will be required. Mechanical agitators are also available and are often preferable for suspending insoluble materials.

3. Read nozzle manufacturer's guide and identify:

3.a. Nozzle types available

A wide variety of nozzles are available for different applications. Application rate, spray pattern, and droplet size requirements may all influence nozzle type selection. The type of nozzle must include a specific nozzle that is able to provide the flow rate needed to achieve the desired application rate with the selected equipment settings. Mount nozzles tightly to their positions. Use identical nozzles in all positions. Fence row nozzles may be an exception.

3.b. Nozzle flow rate

If the application rate, nozzle spacing, and travel speed have been selected, then the specific nozzle flow rate that is required may be calculated. Several sizes of the same nozzle may provide the required flow rate because they have a relatively wide range in flow rate, usually by a factor of two or three. Selecting a nozzle size and operating pressure to produce a droplet classification that will minimize drift is usually possible.

3.c. Spray pressure range

A particular nozzle size may provide different flow rates based on the operating pressure. Selecting a nozzle size that will provide the specified flow rate at a lower operating pressure will often tend to reduce drift for a given equipment setup and operating environment.

3.d. Nominal spray angle

Nozzles are available that provide a variety of spray pattern angles. Wider spray pattern angles permit lower spray release heights to provide adequate spray pattern overlap and better coverage for a given nozzle spacing. Increased nozzle spacing requires a broader spray pattern angle to achieve complete overlap. If spray pattern overlap is specified in the product label, then it will also influence the required nominal spray angle of the nozzle. If nozzle spacing is limited, this may dictate the spray pattern angle required for a given range of acceptable boom heights.

3.e. Spray classification / droplet sizes

If a nozzle has been found that provides the required flow rate and pattern at a specified operating pressure, it should be confirmed that the nozzle produces the desired spectrum of droplets, both for improved efficacy, as may be required for specific target pest control, and to reduce drift. Label requirements may specify nozzles that produce a certain droplet size spectrum, such as fine, medium, coarse, very coarse, etc. Carefully check the label to determine the optimum droplet size and proper nozzle size for a spray application. Reduce drift by ensuring that the nozzle produces a minimal volume of smaller droplets (those less than 150 to 200 microns) at the specified operating pressure.

See OSU Extension fact sheets AEX-523 and AEX-524 for detailed information on “low-drift” nozzles. These publications are available at your local Extension office and at the following web address: <http://ohioline.osu.edu/aex-fact/index.html>.

4. Determine sprayer setup for acceptable application rate

4.a. Pick the nozzle spacing (if this factor can be varied on the sprayer)

Once a general nozzle type has been found that will produce the proper flow rate with an acceptable droplet size, the nozzle spacing may be selected. The spray pattern angle and desired boom height are needed in order to determine the precise nozzle spacing required to achieve proper overlap and adequate coverage. If drop nozzles are used, crop row spacing will determine nozzle spacing.

4.b. Pick the spray rate

The application rate, in gallons per unit area, is to be selected based on label requirements, which are frequently specified as some minimum. However, the actual spray application rate may be greater than the specified minimum and, once an application rate has been selected, the nozzle flow rate, nozzle spacing, and sprayer travel speed determine the actual spray application rate.

4.c. Pick the sprayer speed

Next, identify the sprayer travel speed based on the label requirements, sprayer capability, terrain, aerodynamic effects, and boom stability requirements to reduce drift.

4.d. Calculate the required nozzle flow rate

Calculate the required nozzle flow rate resulting from the nozzle spacing, spray application rate, and sprayer speed selected using the following equation:

$$NFR (gpm) = \frac{AR (gpa) * TS (mph) * NS (in)}{5940}$$

Where: NFR = Nozzle Flow Rate

AR = Application Rate

TS = Travel Speed

NS = Nozzle Spacing (for broadcast application)

The travel speed should be measured in the field where the spraying will be done. At the same gear setting, a tractor may have different ground speeds if the ground conditions vary (soil type, moisture). Also, do not rely on the tachometer or speedometer on the tractor or sprayer. They often do not display the actual ground speed as a result of several factors such as tire slippage and improper tire pressure. Many sprayers today are equipped with more accurate speed measurement devices such as radar guns.

4.e. Pick the specific nozzle type and size, considering spray classification and nozzle flow rate requirements

Next, select the specific nozzle tip size. Presumably, a preliminary review of the nozzle tip flow ranges has already been performed and a nozzle of the desired type is available in an appropriate size. Selection of the type and size of tip is based on its capacity to provide the required flow rate for the equipment setup and to produce the proper pattern and droplet spectrum classification according to label requirements.

4.f. Identify nozzle tip operating pressure

If the nozzle tip has been selected and it is known that the hydraulic pump has adequate flow and pressure capacity, then the precise operating pressure required to deliver the desired flow rate may be selected from the nozzle tip operating pressure/flow rate specifications table usually provided with the tip.

4.g. Identify exact nozzle tip spray classification at the selected operating pressure

Use the manufacturer’s specifications or other data from a reputable droplet measurement instrument to be sure the nozzle does, in fact, provide the appropriate spectrum of droplets at the selected operating pressure.

4.h. Ensure nozzle classification matches label classification

The actual droplet spectrum produced by the nozzle should be compared to labeling or other requirements for droplet size. If the nozzle produces an excess volume of spray in fine droplets, it will be necessary to return to Step 4e and repeat the selection process until an acceptable droplet spectrum is obtained.

4.i. Select boom height based on nozzle angle and spray overlap

Confirm nozzle angle and boom height necessary to achieve the desired overlap with the actual nozzle spray pattern angle of the selected nozzle and tip. Select the minimum applicable boom height to reduce spray drift.

5. Calibrate the sprayer

Calibration is the only way to determine whether a sprayer is actually applying a chemical at the recommended rate. For safety, calibrate with only water as the spray solution. There are several calibration procedures, which are available from nozzle or sprayer equipment manufacturers and your local Extension office.

Calibrate your sprayer as often as feasible because the flow rate of nozzles, especially those made from brass, increases as they become worn. A University of Nebraska study indicates a direct correlation between the number of calibrations performed by the applicator, and spraying accuracy. Most current sprayers are

equipped with automatic controllers. Accuracy of these controllers must be checked as part of the calibration process. See OSU Extension fact sheet AEX-520 for detailed information on calibration of boom sprayers. This publication is available at your local Extension office and at the following web address: <http://ohioline.osu.edu/aex-fact/index.html>.

5.a. Verify flow rate

Measure the nozzle output flow rate over a specified time period. All nozzles should produce a flow rate within $\pm 10\%$ of the original output of the nozzle at that given pressure. Any nozzle falling outside the appropriate range should be replaced.

5.b. Check pressure

Maintaining the desired pressure at the nozzle is essential to achieve the desired flow rate. The pressure reading seen on a spray rate controller or on the gauge near the pressure relief valve often indicates pressure closer to the pump, not at the nozzle. Therefore, a second pressure gauge should be used to check the pressure at the nozzle. There will always be some pressure drop between the pump and the nozzles, but this can be minimized by having hoses of the proper size on the sprayer, using a manifold to distribute the spray mixture evenly to several boom sections, and by reducing the number of fittings, valves, etc., along the spray line between the pump and the nozzles.

5.c. Check travel speed

Ground speed is another important factor influencing the application rate. Doubling the travel speed of a sprayer reduces the application rate by one-half. Reducing the travel speed by one-half doubles the application rate.

Several factors could cause your travel speed to vary. To determine the true ground speed, measure a distance in the field, and drive this distance at your normal spraying speed. Record the travel time in seconds. To determine the travel speed in miles per hour, divide the distance in feet by the time in seconds, and multiply the resulting number by 0.68. For example, if the driving distance is 205 feet and the travel time is 20 seconds, the travel speed is approximately 7 miles per hour. Measure the travel speed in the field where spraying will be done. Tire slippage, which varies depending on the surface conditions, may skew the travel speed if you are depending on the tractor tachometer/speedometer for the speed measurement.

5.d. Check uniformity

Maintain uniform deposition of spray material on the target across the boom. Uniformity of deposition is often just as important as the amount deposited. Non-uniform coverage can result from simple reasons such as using misaligned or clogged nozzles, using nozzles with different fan angles, or from uneven nozzle height across the boom. These common problems result in streaks, untreated areas,

or over-application of chemicals. A portable patternator can be used to check spray uniformity.

6. Mixing chemicals

6.a. Compatibility of products mixed

If a mixture of two or more pesticides must be sprayed, one should be aware of the risk of creating undesirable outcomes when these products are mixed in the sprayer tank or the induction hopper. Even if the products are compatible with one another, undesirable outcomes may still occur if they are not mixed in a specific order. These undesirable outcomes may include: a) sudden increase in the density and/or viscosity of the tank mixture making it impossible to spray, b) a reduction in biological efficacy due to antagonism of products, and c) separation in the tank. Most pesticide labels give detailed information on compatibility and sequence of mixing for a given pesticide when it is mixed with other products.

6.b. Determine the amount of chemical to mix

Pesticides must be mixed in sufficient liquid carrier to get uniform recommended coverage over the sprayed area. The applicator should be able to calculate the exact amount of actual chemical required to add to the spray solution in order to satisfy the label requirement. The dilution rate should be in compliance with the label.

6.c. Determine tank capacity

For accuracy, the exact amount of carrier solution in the tank must be determined before calculating the amount of chemical to add to the tank. The accuracy of liquid volume markings on the exterior of tanks should be verified. Inaccurate tank markings can cause underapplication or overapplication of the active ingredient. For example, a tank rated at 300 gallons may actually hold 315 gallons. This mistake could result in a 5% error (underapplication) in active ingredient per acre. Measuring how much the tank holds can be done either by using a flow meter or by weighing the sprayer on a scale when the tank is empty and full, and then converting the difference in weight to gallons of water (1 gallon of water weighs 8.34 pounds). Once the accuracy of markings on the tank is verified or the markings are corrected, then the right amount of carrier should be put in the tank.

6.d. Cleanliness and pH of water

Use only water that looks clean enough to drink. Most problems with sprayers can be traced to foreign materials in the water. They clog screens and wear out nozzles and pumps. Any water pumped from ditches, ponds, or lakes should be filtered before filling the tank. Take necessary precautions to ensure that these water sources are not contaminated due to backflow or overflow from the sprayer.

Water pH may change efficacy level and stability of some chemicals. Check the chemical label and take precautions

to change the pH level of water to that recommended by the chemical.

7. Spray additives

A wide variety of spray adjuvants serve different purposes, including reducing droplet evaporation and drift. Many product formulation labels require the use of specific adjuvants and include detailed mixing and agitation instructions for these adjuvants, which may require consideration of solution properties that affect droplet evaporation and drift. Some formulations and adjuvants may have different specific gravity or fluid characteristics than the water used for calibration, for example, and may require special adjustment. Drift reduction may or may not be realized because of an increase in relative droplet size span. Some adjuvants may increase the larger droplet sizes and simultaneously decrease the size of smaller droplets. Some formulations and adjuvants may produce long-chain polymers that may be subject to shearing by pump, lowering their effectiveness in reducing the volume of spray contained in smaller, drift-prone droplets. Drift-retardant chemicals should be used as a second line of defense against drift only after exercising other drift mitigation factors such as switching to low-drift nozzles, using nozzles with larger orifices, or lowering the spray pressure.

8. Determine the most effective time to spray

Use of pesticides may not be economically justified because of a low level of pest infestation in the field. Scout the target area and consider the pest threshold levels before spraying. If the conditions don't warrant application of pesticides, wait until the time when the pesticide applied will provide the highest level of control, or consider just spraying infested patches. Spraying patches may be easier for weeds than it is for insects and disease.

9. Site assessment

The applicator should have a thorough understanding of the vicinity surrounding the treated area, as determined by prior planning, on-site visits, aerial maps, discussions with site neighbors, etc. This information should be used to plan the spray timing, suitable weather conditions, necessary equipment, and other drift mitigation techniques to minimize spray drift on sensitive areas or any perceived sensitive areas.

10. Reduce spray drift

Spray drift accounts for about 75% of all non-compliance cases investigated by the Ohio Department of Agriculture. Drift can never be completely eliminated; however, it can be reduced to a minimum if pesticides are applied under favorable weather conditions and by

adopting proven drift reduction strategies. These strategies are outlined in OSU Extension Bulletin 816, *Reducing Spray Drift*, available at your local Extension office and at the following web address: <http://ohioline.osu.edu/b816/index.html>.

Drift reduction strategies include:

- a) Use nozzles that produce coarser droplets when applying pesticides on targets that do not require small, uniformly distributed droplets.
- b) Keep application rate up, and use nozzles with larger orifices.
- c) Switch to “low-drift” nozzles when buying new ones.
- d) Keep more than one size and type of nozzle on the boom ready to switch when the need arises.
- e) Consider using air-assisted or electrostatic sprayers, which were developed for drift reduction.
- f) Use nozzles with a wider spray angle so you can keep the boom closer to the spray target.
- g) Make sure pressure gauges are accurate, and keep spray pressure down.
- h) Follow label recommendations to avoid drift with highly volatile pesticides.
- i) Avoid spraying on extremely hot, dry, or windy days, especially if sensitive areas are nearby.
- j) Spray during moderately unstable atmospheric conditions (very slight vertical updraft). Avoid spraying in stable atmospheric conditions or when inversions can significantly trap upward movement of very small spray droplets and result in drift fallout. Spraying during morning, late afternoons, or night often avoids high wind and may be suitable, though these times have greater propensity for stable atmospheric conditions to avoid.
- k) Because wind speed is a major factor in drift, avoid spraying near sensitive crops that are downwind. Leave a buffer strip of effective width, and spray the strip later when the wind shifts or dies down. New label requirements may use a drift model to determine the required buffer width. By exercising various drift-reduction techniques, this buffer zone may be reduced to a minimum.
- l) Use a reliable wind speed meter to accurately determine wind speed, and make spraying decisions accordingly.

11. Keep records

Pesticide applicators are now required to record wind speed and direction. Recording additional information such as type and size of nozzles used, spray pressure, temperature, and relative humidity may play a key role in the

outcome of drift-related litigation. Save sprayer-controller spraying logs and GPS information when possible.

12. Follow safety guidelines

Read the sprayer operator's manual and chemical labels to review recommended procedures for safe use of chemicals and the equipment. Wear protective clothing when calibrating, spraying, and cleaning equipment. Goggles, rubber gloves, and respirators or masks should be standard equipment when handling pesticides.

13. Handling pesticide waste and empty containers

Recent studies indicate that improper handling and disposal of pesticide waste are responsible for most environmental contamination cases. Pesticide waste can be reduced significantly by following these practices:

- a) Reduce pesticide consumption by following IPM practices, purchasing only what is needed, and improving application accuracy.
- b) Eliminate leftover spray mixture by carefully calibrating the sprayer, mixing the proper amount of pesticide for a given area, or by using in-line injection equipment.
- c) Rinse containers immediately.
- d) Reduce rinsate.
- e) Choose pesticides packaged in returnable/refillable containers.

Emptied and properly rinsed pesticide containers should be disposed of properly. One recommended approach is to participate in the voluntary pesticide container collection programs that have been established in most states. For more information, see OSU Extension Bulletin 819, *Reducing Pesticide Waste*, available at your local Extension office and at the following web address: <http://ohioline.osu.edu/b819/index.html>.

14. A final check before spraying

Make sure all vital parts of the sprayer are functioning properly before starting any spraying job. Check for leaks and make sure the framework of the sprayer is securely fastened together and to its carrier.

15. Periodic checks during spraying

Observe the output pattern of nozzles periodically. Streaks in the pattern indicate that foreign materials are

inside the nozzles. Remove and clean the nozzles using a soft brush for the tip and screen. Never clean nozzles with a pin, a knife, or other metal object because it can completely change the spray pattern, flow rate, and droplet size characteristics of a nozzle. Maintain the sprayer in peak condition by periodic inspections and repairs. Carry extra nozzles, washers, other spare parts, and tools for quick repairs in the field.

16. Clean sprayer often

Many pesticides cause rapid corrosion of metal parts in a spraying system. Pesticides should be washed from the whole system immediately after use. Cleaning a sprayer not only increases its life, but also reduces the chance of cross contamination of chemicals and prevents crop injury. Always try to end the day with an empty tank. If you will be using the same chemical the next day, flushing the sprayer with clean water is sufficient. Use a special, recommended cleaning solution whenever pesticides are changed, or for the final cleaning at the end of the season.

17. Applicator continuing education

Everyone involved in pesticide application should be continually educated on the safe and proper handling and application of the pesticides they use.

Summary

The Best Management Practices (BMPs) for boom spraying presented in this publication should be practiced by pesticide applicators to accomplish practical and effective spray applications in the field according to mandatory label instructions, including performing the application in such a manner as to minimize spray drift. Successful applicators are those who are aware of label requirements and instructions; understand equipment capabilities, the spray solution and adjuvant characteristics, and the field conditions present for the desired application; calibrate sprayers frequently; and minimize pesticide consumption and waste.

Staying up-to-date on labeling, regulations, technology, methods, and BMPs through continuing education is a professional responsibility and is the most important factor in achieving effective, economical, safe, and environmentally acceptable application of pesticides.

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This fact sheet, as well as other information on boom spraying, is available at Ohio State University Extension's web site "Ohioline" (<http://ohioline.osu.edu>) by clicking on "Search" and entering "boom spraying" in the search box.

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