Chemical Application and Safety

Reviewed by Ben Phillips – Apr 2022

Fertilizers and pesticides are chemicals. They have formulas and regulations attached to them for the safety of humans and the greater environment.

Pesticides are designed to poison or otherwise manage pests. Many pesticide products may poison people, pets, livestock, wildlife, ornamental plants, and other non-target organisms. Pesticide applicators and their families are at increased risk of pesticide exposure. It is important to keep all pesticide exposures to an absolute minimum.

You must protect your family members, field workers, and other people from pesticide injuries. Most pesticide accidents result from careless practices or lack of knowledge about safe handling. The time you spend to learn about the safe use of pesticides is an investment in the health and safety of you, your family, and others.

The U.S. Environmental Protection Agency (EPA) places certain restrictions to chemicals applied to control insects, mites, plant diseases, weeds, nematodes, and other pests. Such restrictions may prohibit the use of a chemical or allow residue tolerances on harvested vegetables. Growers must know what chemical to use on each vegetable; how to apply the products; the post– treatment re-entry interval, if any; when to use the chemicals with respect to farm worker and/or picker safety; and the environment and the harvest of each vegetable crop.

Growers must follow all label instructions regarding harvest restrictions to assure consumers that the food is free of dangerous residues and to comply with the law to prevent seizure of their crops. Here are some rules for the safe use of chemicals:

- Only mix the amount you can use in one day.
- If you do have leftover spray mix, the best way to dispose of it is by applying it to a labeled crop in a legal manner.
- Never dispose of surplus chemicals in a way that will result in the contamination of ground or surface waters.
- Rinse all empty containers three times before disposal.
- Pour the rinse water into the spray tank. Puncture or break triple-rinsed containers to facilitate drainage and to prevent reuse for any other purpose.
- Then dispose of the container according to label directions.

Pesticide Signal Words

Each pesticide container is required by law to have signal words to quickly communicate information about the product's acute toxicity. The three signal words, as provided by the National Pesticide Information Center, are:

- CAUTION. This signal word means the pesticide is slightly toxic if eaten, absorbed through the skin, or inhaled, or it causes slight eye or skin irritation.
- WARNING. This signal word means the pesticide is moderately toxic if eaten, absorbed through the skin, or inhaled, or it causes moderate eye or skin irritation.
- DANGER. This signal word means the pesticide is highly toxic by at least one route of exposure. It may be corrosive, which would cause irreversible damage to the skin or eyes. It may be highly toxic if eaten, absorbed through the skin, or inhaled. If this is the case, then POISON must also be included in red letters on the front panel of the product label.

Minimizing Pesticide Exposure

Signal words convey the acute toxicity of a pesticide. However, exposure to any pesticide, even those without signal words, can lead to long-term health effects. It's important to take precautions to minimize exposure to any and all pesticides. Check the product label for specific instructions to minimize exposure. Some label precautions include:

- Wear the proper respiratory equipment when handling or applying.
- Wear protective clothing that covers as much of the body as possible.
- Always use rubber gloves, not leather or cloth gloves, and never use bare hands to handle pesticides.
- Do not breathe in these pesticides when opening containers or mixing into spray tanks.
- Always wash hands, arms, and face immediately after handling, and before eating or smoking.
- Never smoke while handling or applying.
- Reduce all possible hazards of coming into direct contact with spray drift, and avoid spraying if conditions are too windy.
- Shower or bathe thoroughly after each day's work, and change clothes.
- Wash spray clothes separately from the family wash, then run another complete hot water and detergent wash cycle before washing other clothes.
- Wear clean overalls, underwear, socks, and cap each day you spray.
- Always keep pesticides in their original labeled containers, and store in a safe place.
- Store and dispose of containers according to information on pesticide labels.

Worker Protection Standard

All pesticides with an "Agricultural Use Requirements" box on the label are subject to the regulations of the Worker Protection Standard (WPS). The WPS requires all employers to provide annual pesticide safety training to employees in a language that employees understand. Training must be approved by the Environmental Protection Agency. The Pesticide Educational Resources Collaborative (PERC) has a library of free EPA-approved training materials available in multiple languages on its website, including videos and flip charts.

Restricted Pesticides

Most states have laws that restrict the use of certain pesticides and that describe where such pesticides can be obtained and used. Only individuals who are licensed by the state can apply restricted use pesticides.

Some restricted pesticides require applicators to notify occupants of land within 1,000 feet of the area to be treated at least 24 hours before application. Occupants also must be notified of any precautions they must take to ensure the safety of livestock and humans.

The U.S. EPA, state regulatory agencies, or pesticide companies can label specific pesticide formulations as "Restricted Use Only." To learn more about your state's laws about restricted use pesticides, contact your state department of agriculture or local extension office.

Calibrating Application Equipment

It is essential to apply pesticides at the specified rates for best control and protection and to not exceed residue tolerance. Calibrate and check sprayers carefully several times a season for accurate delivery rates. Ensure equipment is clean and functional, and replace broken parts prior to calibration.

Spreaders

Some granular spreaders are gravimetric and ground-driven, meaning that a constant rate of granules are delivered by gravity out of a feed gate, and a wheel running along the ground is attached to gears and chains that drive the rotor that displaces a fixed amount of granules per revolution. This locks the spreading rate to ground speed, as long as the feed gate is set at a consistent opening. If the feed gate opening remains the same, then **changing ground speed will not affect output**. However, **doubling the rate of granules released from the feed gate with a larger opening will double the output, and halving the rate of granules released from the feed gate with a smaller opening will halve the output**.

Some granular spreaders have a metering unit that is independent from ground speed, and is run hydraulically, electrically, or through a hand crank or the tractor PTO. If the meter rate remains constant, then **halving ground speed will double output, and doubling ground speed will halve output**. If ground speed remains constant, then **doubling meter rate will double output, and halving meter rate will halve output**.

Rotary spreaders fling the material in a fan-like pattern to either side of the spreader, drop spreaders release material in a sheet-like pattern straight down directly over the footprint of the spreader, and band spreaders meter out granules along a row.

Here are suggested steps to calibrating selected spreaders.

Granular Rotary Spreader Calibration

1. Set applicator dial or dials to give desired delivery rate of granules suggested for spreading according to manufacturer's instructions.
2. Fill hopper with granules to be used.
3. Lay out a tarp that is smaller than the spread pattern. Travel across tarp at desired speed and collect granules off of the tarp into a bag, bucket, or other container.
4. Weigh granules, and multiply by fraction of an acre that the tarp represents to find delivery per acre.

   For example: granular rotary spreader that leaves 0.25 lb. on a 20 sq. ft. tarp applies 544.5 lbs. per acre:

$$\text{weight collected (0.25 lb.)} \times \frac{\text{1 acre (43560 sq. ft.)}}{\text{area of tarp (20 sq. ft.)}} = \text{output (544.5 lb./ac.)}$$

5. Adjust each setting, and recalibrate until the desired delivery rate is obtained.

Granular Band Spreader Calibration

1. Set applicator dial or dials to give desired delivery rate of granules suggested for band treatment according to manufacturer's instructions.
2. Fill hoppers with granules to be used.
3. Travel across field at planting speed for the distance required to cover 1/16 acre (2,722 sq. ft.) per row. Collect granules for each row in a bag, bucket, or other container.

   For example: granular band application for a 40-inch row requires 817 ft. to cover 1/16 acre:

$$\frac{\text{1/16 acre (2,722 sq. ft.)}}{\text{row width (3.33 ft.)}} = \text{distance of travel (817 ft.)}$$

4. Weigh granules from each row separately, and multiply by 16 to find delivery per acre for each row.
5. Adjust each setting, and recalibrate until the desired delivery rate is obtained.

Sprayers

Sprayers use a pump mechanism that runs independently from the tractor wheels, or your legs. They are often powered hydraulically, electrically, or through a hand pump or the tractor PTO. If the pressure remains constant, then **halving ground speed will double output, and doubling ground speed will halve output**. If ground speed remains constant, then **quadrupling pressure will double output, and quartering pressure will halve output.**

Boom sprayers apply a sheet-like mist along the length of the boom, band sprayers apply a narrow band over a row with one or more nozzles grouped together, wand sprayers have one nozzle used for small or irregular shaped targets, and airblast sprayers generate a high-speed directional fog.

Here are suggested steps to calibrating selected sprayers. Once output is found in gallons per acre, calculate acres per tankful of spray solution by dividing gallons per tank by gallons per acre of output, and determine the required amount of product to dilute in the tank by multiplying acres per tankful by the rate per acre of product.

Boom Sprayer Calibration

1. Fill tank with water.
2. Adjust spray pressure and speed of tractor for nozzle size and output using manufacturer's directions.
3. Spray ¼ acre (10,890 sq. ft.). Distance of travel will vary with boom width.

   For example, a 22-foot boom must travel 495 feet to cover ¼ acre:

$$\frac{\text{¼ acre (10,890 sq. ft.)}}{\text{boom width (22 ft.)}} = \text{distance of travel (495 ft.)}$$

4. Measure amount of water needed to refill the tank. This amount was applied to the ¼ acre; thus, four times this amount is the gallonage per acre.

Band Sprayer Calibration

1. Fill tank with water.
2. Adjust spray pressure and speed of tractor for nozzle size and output using manufacturer's directions.
3. Spray ¼ acre (10,890 sq. ft.). Distance traveled will vary with number of nozzles on the sprayer and width of the band sprayed by each nozzle.

   For example, spraying a 20-inch band over 4 rows using 1 nozzle per row requires 1,630 ft. to cover ¼ acre:

$$\frac{\text{¼ acre (10,890 sq. ft.)}}{\text{band width (1.67 ft.)}} \div \text{number of nozzles (4)} = \text{distance of travel (1,630 ft.)}$$

4. Measure amount of water needed to refill the tank. This amount was applied to the ¼ acre; thus, four times this amount is the gallonage per acre.

Wand Sprayer Calibration

1. Fill tank with water.
2. Spray 1/128 acre (340 sq ft.) with the pace and nozzle distance you would be using for application.
3. Measure amount of water needed to refill the tank. This amount was applied to the 1/128 acre; thus, the number of fl. oz. required to refill the sprayer is equal to gallonage per acre.
4. Calculate acres per tankful of spray solution by dividing gallons per tank by gallons per acre of output, and determine the required amount of product to the tank by multiplying acres per tankful by the rate per acre of product recommended.

Airblast Sprayer Calibration

1. Fill tank with water.
2. Adjust spray pressure and speed of tractor for nozzle size and output using manufacturer's directions.
3. Spray 164 ft., measure the time to complete the course, and measure the effective spray swath. For a unidirectional unit, measure the swath from the sprayer to the end of the deposition cloud. For a bidirectional unit, measure the swath from one end to the other end of the deposition cloud. Do this three times to calculate the average time to travel 164 ft, and spray swath. Record speed and PTO speed or pressure settings for future reference.
4. Measure amount of water needed to refill the tank. This amount was applied to the fraction of an acre; thus, four times this amount is the gallonage per acre.

   For example, spraying a 10 ft. swath over a164 ft course used 2 gallons. The gallons per acre is calculated below:

$$\text{volume measured (2 gal.)} \times \frac{\text{1 acre}}{\text{43,560 sq. ft.}} \text{ area of swath (10 ft. x 164 ft.} = \text{output (53 gal/ac.)}$$

Injectors for Fertigation and Chemigation

Chemigation is the process of applying an agricultural chemical (pesticide or fertilizer) to the soil or plant surface through an irrigation system. Chemigation can be an effective application option for some materials if the irrigation system can apply the chemical/water solution uniformly over the target area with the correct water depth.

There are two philosophies to chemigating through the water: 1) premix the chemical with water in a large (100 to 500 gal) stock tank and pump right out of that with an external inline water pump or gravity feed; or 2) use a water pump to pipe through a system that meters in concentrated chemical from a much smaller container. There are three primary types of injectors: venturi injectors (brand names include Hozon, Syfonex, Mazzei), water-pressure injectors (brand name EZ-Flo), and positive-displacement injectors (brand names include Dosatron, Chemilizer, MixRite). It is common to combine methods in greenhouse fertilizer programs, using a large stock tank to acidify water, and then pumping that acidified water through a fertilizer injector.

Most late-model center pivot and linear move systems provide adequate distribution but some may not be able to apply a small enough volume of water. Solid set sprinkler systems may be effective for some pesticides but require close timing of chemical movements to get complete and uniform coverage of the field. Drip irrigation can be used effectively to apply certain pesticides and fertilizers. Traveling gun and hand move systems do not provide water distribution that has high uniformity and are not recommended. Product labels provide more information about appropriate water application amounts and which irrigation systems are recommended.

Backflow prevention is important to prevent injected chemicals from backflowing into the water source. EPA and many state regulations specify that each system must contain a reduced pressure zone (RPZ) backflow prevention valve, or one or two independent check valves with low-pressure drains and vacuum relief valves, between the irrigation water source and the point of chemical injection. Also, most regulations require a power interlock between the irrigation pump and the chemical injector unit, a low pressure shut down switch and a check valve on the chemical injection hose. For specific requirements, check with the appropriate local or state agency.

It is important to accurately calibrate the irrigation system and pesticide application rate. The chemigation operator must be aware of the irrigation system's application speed (acres per hour) for the chosen water application amount and the concentration of chemical solution to determine the rate of chemical injection.

More information about the special equipment, operations, and calibration of irrigation systems is available from the University of Minnesota Extension Service resources, *Chemigation Safety Measures*, and, *Applying Nitrogen with Irrigation Water*, available at extension.umn.edu or the University of Georgia's *Fertilizer Injectors: Selection, Maintenance, and Calibration (Bulletin 1237)*, or *Drip Chemigation: Injecting Fertilizer, Acid and Chlorine* (Bulletin 1130) available at extension.uga.edu/publications.

Injector Calibration

For example, you have a target ratio of 1:100 according to the manufacturer of a soluble fertilizer and want to see if your injector is making the desired concentration.

1. Fill a graduated cylinder to a measured volume with concentrated fertilizer.
2. With the irrigation system running, fully charged, and the point of injection at the same height that it will be during actual injection, place siphon hose in graduated cylinder and note the metering ratio, PSI, or flow rate on the injector.
3. Fill a bucket with the diluted solution to a pre-measured volume. It helps to install a spigot or nozzle after the injection loop and before the irrigation header mains for this purpose.
4. Remove siphon hose from graduated cylinder and measure the new level of the concentrate.
5. Subtract the final and starting volumes of the graduated cylinder and divide from your diluted volume to find the injection ratio.

   For example, a graduated cylinder is filled to 8 fl. oz. with a concentrated chemical. Then, the hose is run until 4.25 gal. (544 fl. oz.) of dilute chemical is collected in a bucket, after which the graduated cylinder measures 2.5 fl. oz. The ratio is 1:98.9, which is very close to the manufacturer's specifications of 1:100. If this calculation was not close to the desired 1:100, make adjustments to metering ratio, PSI, or flow rate of your specific injector to dial it in from there.

$$\frac{544 \text{ fl. oz.}}{(8 - 2.5) \text{ fl. oz.}} = 98.9 \text{ fl. oz. water per 1 fl. oz. concentrate}$$

How much concentrated chemical to add to tanks?

Spray tanks

Calculate acres per tankful of spray solution by dividing gallons per tank by gallons per acre of output, and determine the required amount of product to the tank by multiplying acres per tankful by the rate per acre of product recommended.

For example, a 100 gal. tank with an output of 20 gal. per acre will cover about 5 acres with one tankful. If spraying a chemical at 6 fl. oz. per acre, it requires 30 fl. oz. per tankful.

$$\frac{100 \text{ gal.}}{1 \text{ tank}} \times \frac{1 \text{ acre}}{20 \text{ gal}} = 5 \text{ acres per tankful}$$

$$\frac{5 \text{ acres}}{1 \text{ tank}} \times \frac{6 \text{ fl. oz.}}{1 \text{ acre}} = 30 \text{ fl. oz. per tank}$$

Stock tanks for injectors

For stock tanks that are used to meter in concentrated fertilizers or pesticides, calculate the volume of the fertilizer or chemical needed for your desired area. Use liquid fertilizers and chemicals directly through the injector as concentrates. For dry products, use enough water to dissolve the material.

For example, injecting a pesticide into the drip tape at 2 fl. oz. per acre in a field with 100 rows, 400 ft. long on 4 ft. centers will require 7.34 fl. oz. of pesticide.

$$100 \text{ rows} \times \frac{(4 \times 400) \text{ sq. ft.}}{\text{row space}} \times \frac{1 \text{ acre}}{43{,}560 \text{ sq. ft..}} = 3.67 \text{ acres}$$

$$3.67 \text{ acres} \times \frac{2 \text{ fl. oz.}}{\text{acre}} = 7.34 \text{ fl. oz. needed for the area}$$

Rates for Beds

You can apply fertilizer and some pesticides in a band while shaping beds or laying plastic. You can also apply it dissolved through irrigation water and delivered by drip tape to the base of the plants. In these systems, it is helpful to calculate the rate per linear bed foot (LBF) based on the product rate per acre. To do so, you will need to know:

- Bed spacing (BS): distance in feet between bed centers
- Product rate per A (RatePerA)

Use this equation to determine the rate for linear bed foot:

(RatePerA X BS) / 43,560 = RatePerLBF

Example:

Bed spacing (BS) = 5 ft. between centers of beds
Product rate per A (RatePerA) = 100 lbs./A

(100 X 5) / 43,560 = 0.0115 lb./LBF

For a crop on six 100-foot beds, there would 600 LBF to treat. The amount of product needed to supply 100 lbs./A would be:

600 LBF X 0.0115 lb./LBF= 6.9 lbs.

The Rate per Linear Bed Foot for Various Bed Spacings and Rates table provides conversions for a number of bed spacings and product rates.

Rate per Linear Bed Foot for Various Bed Spacings and Rates

Bed Spacing (ft)	Linear Bed Feet (LBF) in 1 Acre	Rate per A*					
		20	40	60	80	100	120
		Rate per LBF)					
3	14,520	0.0014	0.0028	0.0041	0.0055	0.0069	0.0083
4	10,890	0.0018	0.0037	0.0055	0.0073	0.0092	0.011
5	8,712	0.0023	0.0046	0.0069	0.0092	0.0115	0.0138
6	7,260	0.0028	0.0055	0.0083	0.011	0.0138	0.0165
7	6,222	0.0032	0.0064	0.0096	0.0129	0.0161	0.0193
8	5,445	0.0037	0.0073	0.011	0.0147	0.0184	0.022
9	4,840	0.0041	0.0083	0.0124	0.0165	0.0207	0.0248
10	4,356	0.0046	0.0092	0.0138	0.0184	0.023	0.0275

*The rates in this table are unitless. For example, if a product requires 2 fl. oz. per acre, use the “20” column and divide the answer by 10.

Conversions for Liquid Pesticides on Small Areas

Convert per acre rates to smaller areas by first converting the rate to fl. oz. or dry oz. Then, find 100 sq. ft. rates by dividing by 435.6, or 1,000 sq. ft. rates by dividing by 43.56. You can convert fl. oz. or dry oz. back to a larger unit from there. Or, use this table, which approximates the rate reductions into common measuring increments. Containers for measuring in milliliters (ml) (or the equivalent cubic centimeters, cc) are readily available in the form of graduated cylinders or syringes used for livestock.

Rate per Acre	Rate per 1,000 Square Feet	Rate per 100 Square Feet
1 pint	0.37 fl. oz. (11 ml)	0.04 fl. oz. (1.1 ml)
1 quart	1.5 fl. oz. (43 ml)	0.15 fl. oz. (4.3 ml)
2 quarts	2.9 fl. oz. (87 ml)	0.29 fl. oz. (8.7 ml)
1 gallon	5.9 fl. oz. (174 ml)	0.59 fl. oz. (17.4 ml)
25 gallons	4.5 pt. (2.1 L)	7.2 fl. oz. 213 ml)
50 gallons	4.6 qt. (4.4 L)	15 fl. oz. (435 ml)
75 gallons	6.9 qt. (6.5 L)	22 fl. oz. (653 ml)
100 gallons	9.2 qt. (8.7 L)	29 fl. oz. (870 ml)
25 pounds	9.1 oz. (0.25 kg)	0.91 oz. (25 g)
50 pounds	18 oz. (0.51 kg)	1.8 oz. (51 g)
75 pounds	28 oz. (0.80 kg)	2.8 oz. (80 g)
100 pounds	37 oz. (1.1 kg)	3.7 oz. (104 g)
1 ton	45 lb. (20 kg)	4.5 lb. (2 kg)

Check the pesticide label for the particular crop, pest, and site of your planned use.

Evaluating Water Quality and Compatibility of Pesticides Before Tank-Mixing

Water that is added to the pesticide spray tank may vary in pH, hardness and other qualities. These variations in water types may influence the effectiveness of the pesticide application. To learn about this subject, see *The Impact of Water Quality on Pesticide Performance* (Purdue Extension publication PPP-86) available from the Education Store, edustore.purdue.edu.

Read the label and follow directions. If the label states, "Do not mix with other products," that direction must be followed. If using different products, and one label states, "Add last to spray tank", that direction must be followed If the label states, "Do not use adjuvants", that direction must be followed.

Follow these steps to do a jar test of a new mixture of chemistries to ensure compatibility in the tank. These ratios will approximate 25 gallons per acre. Between each ingredient, let it stand for a few minutes to see if there is a reaction. If solids form, the material turns greasy, or heats up, don't use it in the field. The allowable separation in the jar depends on the amount of agitation in your equipment.

1. In a 1 quart jar, add 1 pint of the same water or liquid fertilizer that will be used in the field.
2. Add and agitate 1 ½ teaspoon of any wettable dry product(s) for each pound per acre to be used. Formulation abbreviations include W, WP, WDG, DF, D, or G.
3. Next, add and agitate 1 teaspoon for each quart per acre of any liquid flowables and suspensions to be used. Formulation abbreviations include FS, F, WS, SC.
4. Next, add and agitate 1 teaspoon for each quart per acre of any microencapsulated or emulsifiable concentrates to be used. Formulation abbreviations include ME, EC, or E.
5. Finally, add and agitate 1 teaspoon for each quart per acre of any surfactants and solutions to be used. Formulation abbreviations include CS, S, or L.

Storing Pesticides for Next Season

Growers who store pesticides always should consider safety and product quality, whether they will store products for a few weeks or a year or more. It is best not to have leftover pesticides. However, there usually are surplus pesticides at the end of the season because preseason purchases often are very economical.

Before storing pesticides always:

1. Read product labels. Certain formulations or products have special storage requirements printed there.
2. Make certain the label is in good condition (legible) to know what is in the container and for directions for safe, effective, and legal use.
3. Write the purchase or delivery date on the label. Store the oldest materials near the front of the storage area and use older or opened products first. Products that are several years old may not be effective.
4. Keep an up-to-date inventory of pesticides to assist in purchase decisions and in emergencies.
    a. Maintain storage temperatures between 32 F and 100 F with good ventilation and out of direct sunlight.
5. Store herbicides away from other pesticides to prevent use mix-up, contamination, and possible plant damage. Never store pesticides with food or seed or near food or drinking water.
6. Permanently identify and lock pesticide storage areas.
7. Keep a supply of cat litter or other absorbent material in the storage to scatter over spills of liquid chemicals.
8. Have a Class B inflammable liquids fire extinguisher.

Empty Containers

Most states have regulations that regulate the disposal of pesticide containers. The regulations often require that hazardous materials containers be disposed of in designated hazardous waste sites unless commercial applicators meet triple-rinsing and other requirements.

However, farmers and private applicators may be exempt from the regulations as long as they follow all label instructions when disposing of waste pesticides and containers.

Pesticide Poisoning

800-222-1222 will automatically connect you to the poison center nearest you. Personnel at this number will give first aid instructions and direct callers to treatment centers. For immediate emergency treatment or ambulance service, always call 911.

For pets, call the Animal Poison Control Center at 888-426-4435, or the Pet Poison Helpline at 800-213-6680. A consultation fee may apply.

Pesticide Spills

For information about cleaning up or otherwise dealing with **non-emergency pesticide spills**, you can contact the National Pesticide Information Center at 800-858-7378 and the pesticide manufacturer for SDS and label information.
For emergency pesticide spills, pesticide fires, or pesticide transportation accidents first call 911, then call your state agency who handles spill response.

- Illinois Emergency Management Agency
  800-782-7860
- Indiana Department of Environmental Management
  888-233-7745
- Iowa Department of Natural Resources
  515-725-8694
- Kansas Department of Health and Environment
  785-291-3333
- Michigan Department of Agriculture and Rural Development
  800-405-0101
- Minnesota Duty Officer
  800-422-0798
- Missouri Department of Natural Resources
  573-634-2436
- Ohio Environmental Protection Agency
  800-282-9378

When federal notification is required, call the National Response Center at 800-424-8802.

Pesticide Use and Greenhouses, Chemigation, and Respirators

Before using any pesticide, always read the product label for mention of greenhouse, chemigation, and respirator restrictions. See the tables for Fungicides, Herbicides, Insecticides, and Nematicides.

Labels

For complete label and Safety Data Sheet (SDS) information, search one of the following databases.
cdms.net/label-database
agrian.com/labelcenter/results.cfm
greenbook.net

To check if a pesticide is registered at the federal level, search this database.
iaspub.epa.gov/apex/pesticides/f?p=PPLS