

RECORDKEEPING MANUAL

FOR NORTH CAROLINA PRIVATE
PESTICIDE APPLICATORS

NC STATE
EXTENSION



Important Contact Information for North Carolina Pesticide Applicators

Phone Numbers:



Emergencies

- For any emergency.....911



Carolinas Center Poison Control Center (24 hours)

- For aid in human poisoning cases.....1-800-222-1222



North Carolina Department of Agriculture and Consumer Services (NCDA&CS)

- For pesticide labeling, licensing, disposal, and compliance assistance.....919-733-3556



North Carolina State University

- For pesticide training/licensing manuals and schools.....919-515-3113

Websites:

• North Carolina Department of Agriculture & Consumer Services

<http://ncagr.gov/SPCAP/pesticides/index.htm>

• Pollinator Protection

<http://www.ncagr.gov/pollinators/NCPollinatorProtection.htm>

• Driftwatch (registry mapping program for crops and apiaries)

<http://www.ncagr.gov/pollinators/Driftwatch.htm>

• North Carolina Cooperative Extension (information for County Extension Centers)

<https://www.ces.ncsu.edu>

• Pesticide Safety Education Program

<https://pesticidesafety.ces.ncsu.edu/>

• Pesticide Environmental Stewardship

<https://pesticidestewardship.org>

• NC Agromedicine Institute

<http://www.ecu.edu/cs-dhs/agromedicine/>

Original edition authored by Wayne Buhler, PhD, and formatted by Lynn Padgett.

Current edition authored by Wayne Buhler, PhD, and Allison Ballantyne with formatting by Andrea Crozier.

Reviewed and edited by the Structural Pest Control and Pesticides Division, NCDA&CS.

Local Emergency Information

Use this page to record the name, location, and contact information for the nearest Emergency Room/Urgent Care facility to your location. This information should be posted in a central location.

Local Emergency Room/Urgent Care Information

Name of Facility _____

Address _____

City _____ State _____ Zip _____

Phone Number _____

If you suspect pesticide poisoning:

- Move victim to fresh air
- Follow first aid procedure on label
- Call 911

Information required for treatment of pesticide poisoning:

- Label of pesticide
- Active ingredient(s) of pesticide
- Length of exposure
- Type of exposure (dermal, oral, ingestion)

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Disclaimer:

The information in this manual is for educational purposes only. Individuals who use agricultural chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. The use of a brand or common name of a product does not imply endorsement by North Carolina State University or the North Carolina Department of Agriculture and Consumer Services nor discrimination against similar products not mentioned.

Recordkeeping Manual

for North Carolina Private Pesticide Applicators

Grower/Applicator Information

Owner/Operator _____

Address _____

Company/Farm Name _____

Phone Number _____

Applicator Name

Certification Number & Expiration Date

A. _____

A. _____

B. _____

B. _____

C. _____

C. _____

D. _____

D. _____

E. _____

E. _____

F. _____

F. _____

G. _____

G. _____

H. _____

H. _____

I. _____

I. _____

Reference Sheets

Part of the recordkeeping regulation requires the certified private applicator to record the brand name and the Environmental Protection Agency (EPA) registration number of any restricted-use pesticide applied. The Worker Protection Standard (WPS) requires the certified private applicator to record active ingredient(s). You will be able to save time by listing the brand/product name, EPA registration number, and active ingredient(s) of the pesticides you apply on these reference pages and entering the corresponding number(s) to complete your record form. **Use of these pages is voluntary.**

<u>Brand Name</u>	<u>EPA Registration Number</u>	<u>Active Ingredient(s)</u>
1) _____	1) _____	1) _____
		1a) _____
		1b) _____
2) _____	2) _____	2) _____
		2a) _____
		2b) _____
3) _____	3) _____	3) _____
		3a) _____
		3b) _____
4) _____	4) _____	4) _____
		4a) _____
		4b) _____
5) _____	5) _____	5) _____
		5a) _____
		5b) _____

Brand Name

EPA Registration Number

Active Ingredient(s)

6) _____

6) _____

6) _____

6a) _____

6b) _____

7) _____

7) _____

7) _____

7a) _____

7b) _____

8) _____

8) _____

8) _____

8a) _____

8b) _____

9) _____

9) _____

9) _____

9a) _____

9b) _____

10) _____

10) _____

10) _____

10a) _____

10b) _____

11) _____

11) _____

11) _____

11a) _____

11b) _____

Brand Name**EPA Registration Number****Active Ingredient(s)**

12) _____

12) _____

12) _____

12a) _____

12b) _____

13) _____

13) _____

13) _____

13a) _____

13b) _____

14) _____

14) _____

14) _____

14a) _____

14b) _____

15) _____

15) _____

15) _____

15a) _____

15b) _____

16) _____

16) _____

16) _____

16a) _____

16b) _____

17) _____

17) _____

17) _____

17a) _____

17b) _____

Recordkeeping Manual

for North Carolina Private Pesticide Applicators

This manual contains forms that will help you keep the records required by federal and state regulations for restricted use pesticides and for compliance with the Worker Protection Standard (WPS). These forms are intended for use by private pesticide applicators certified in North Carolina and for those who apply agricultural use pesticides. They are not intended for use by applicators licensed as commercial pesticide applicators. A form similar to the one found in this manual, as well as a different recordkeeping form created for commercial pesticide applicators, can be found at the following website: <https://pesticidesafety.ces.ncsu.edu/recordkeeping-forms/>.

The information recorded on the forms in this manual serves as an official record for your compliance with the law. This manual was designed for use in the field or office. If you use a sharp, dark pencil to write on the forms, your marks are less likely to be destroyed by rain, coffee spills, or other accidents. Please write clearly so that those who inspect your records can easily understand them.

You may use other methods to keep your records as long as they contain the required information. Handwritten notes, computer-generated records, and other recordkeeping systems are also acceptable.

Recordkeeping Requirements for Restricted Use Pesticides

The 1990 Farm Bill requires private certified pesticide applicators to keep records of all applications of federally restricted use pesticides. The information required is summarized on page 7. These records must be kept for **2 years**. However, you may want to keep them longer for reference in making future pest management decisions.

Although applicators have 14 days to record information for restricted use applications (not associated with WPS), it is a good idea to fill out the recordkeeping form immediately after application to be sure that you have an accurate and detailed record.

If you hire a commercial applicator to apply a restricted use pesticide, you should obtain the necessary recordkeeping information from him/her. Commercial applicators are required to provide their clients with a copy of this record within 30 days of application. Application information is also required for fields receiving spot treatments.

Recordkeeping Information for the Worker Protection Standard

The Worker Protection Standard (WPS) is a federal regulation that is intended to reduce the risk of pesticide poisoning and injury among agricultural workers. Private applicators who hire pesticide handlers and/or workers must display application information and the Safety Data Sheet (SDS) for each applied product in a centrally located area accessible to all employees within 24 hours of the pesticide application and before workers enter that area. Both must be displayed for 30 days after the restricted entry interval (REI) expires. This display of information applies to *all* pesticides with “Agricultural Use Requirements” printed on the label, not just restricted use pesticides. Once records are removed from the central posting area they must be kept, along with the SDS, for **2 years** from the end of the REI. They shall be made available to workers, handlers, medical personnel, and designated representatives upon request. For more information on the WPS, including the most recent revisions, visit: <https://www.epa.gov/pesticide-worker-safety/agricultural-worker-protection-standard-wps>



The Hand/Head Keep Out symbol appears in the column headings on the field record sheets to mark information required for worker protection. This includes the location/identification of the field treated; brand name; EPA registration number; active ingredient(s) of pesticide applied; crop, commodity, or site treated; the month, day, year of application; beginning and ending time of the application; and the REI. Most of this information can be found on the pesticide label. Workers, handlers, government officials, health care workers, and employers of commercial handlers hired to work on the farm or business must have access to this information. Commercial applicators must provide this information, with the exception of ‘end time,’ to the agricultural employer before making pesticide applications. Information must be displayed for 30 days after the end of the REI. If there is no REI on the label, the information should be displayed for 30 days after the application.

The revised WPS requires annual training for workers and handlers. This training must be documented and records of it kept for two years. Verification of training must be provided to workers/handlers upon request.

Employers of Spanish-speaking individuals may want to post a Spanish explanation of the WPS Field Record (see page 51).

What are the Changes to the Worker Protection Standard with Regards to Respirators?

Prior to 2017, the WPS only required employers to provide an employee with a respirator and to ensure it fit properly. Under the revised WPS, the employer must provide any employee that uses pesticides requiring a respirator with a medical evaluation, fit testing, and respirator training in compliance with the Occupational Health and Safety (OSHA) Respiratory Protection Standard CFR 1910.134. Fit testing and respirator training must be conducted annually, while records indicating their completion must be maintained for two years. Detailed information on the above requirements is available on pages 46 and 47, and recordkeeping forms for fit testing and respirator training can be found on pages 48 and 49.

Who Has Access to Your Records?

Your records can be inspected at any time by authorized representatives of the NCDA&CS who present identification. In addition, a licensed health-care professional, or someone working under a licensed health-care professional's supervision, can request this information at any time following an application when treating individuals who may have been exposed to pesticides. The WPS revision requires you to provide specific application information, the SDS, and circumstances of application/exposure to treating medical personnel following any application where individuals

may have been exposed to pesticides. Any worker or handler's designated representative (documented in writing) may also request access to pesticide application information and SDS for the time period that the worker or handler was employed at the establishment.

The Benefits of Keeping Records

The records you keep of your pesticide use are not only required by the law, but they will also help improve your farming operation. Additionally, records may:

- help you evaluate how well a chemical worked, particularly if you have used reduced rates or alternative application techniques;
- help you determine how much pesticide you will need in a future year, so that you will not have to store or dispose of extra chemicals;
- help to prevent carry-over injury and improve rotation decisions;
- protect you from legal action if you are accused of improper pesticide use;
- be required by food processors to evaluate the potential for residues;
- be required by lenders and land developers to evaluate potential environmental liability before lending money or buying land;
- provide data to respond to surveys conducted by federal agencies and universities that can impact future availability of some pesticides through re-registration;
- be used to respond to the public's concern regarding pesticide use; or
- serve as the key to a successful integrated pest management program.

***QUICK REFERENCE CHART OF PESTICIDE RECORDKEEPING REQUIREMENTS
FOR RESTRICTED USE AND AGRICULTURAL USE PESTICIDES***










REQUIRED ITEMS	<u>Restricted Use Pesticides</u> Requirements for Private Applicators	<u>Agricultural Use Pesticides</u> Worker Protection Standard Requirements for Agricultural Employers
Brand Name/Product Name	✓	✓
EPA Registration Number	✓	✓
Total Amount of Pesticide Applied	✓	—
Date of Application	✓	✓ Plus beginning and ending time of application
Description/Location of Treated Area	✓	✓
Crop, Commodity, or Site Treated	✓	✓
Size of Area Treated	✓	—
Name of Certified Applicator	✓	—
Certification Number	✓	—
Active Ingredient(s)	—	✓
Restricted Entry Interval (REI)	—	✓
Complete Record	Within 14 days of application; keep 2 years	Within 24 hours of application or before entry occurs; display for 30 days after the REI expiration; keep 2 years

How To Complete the Field Record Form (shaded columns are optional)

- The information in columns marked with the Hand/Head Keep Out symbol (right) must be provided to field workers/handlers for *all pesticides with "Agricultural Use Requirements" on the label.*



- This information must be posted *within 24 hours of the pesticide application and remain on display for 30 days after the end of the REI.*

FIELD/ID LOCATION  ① Old Creek Field					
Crop, Commodity, or Site Treated 	Date (mo/day/yr)	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
② Cotton	③ 5/3/18	④ 241-337	⑤ Prowl 3.3EC	⑥ Pendimethalin	⑦ 24 hrs
	10:00 	100-642	Cotoran 4L	Fluometuron	
	2:00 				

- Write the **Location of the Field** (not the farm or business). The field may be identified on a farm map, a USDA map and number, a common field name (for example, Old Creek Field), or a legal description. If the site treated is a greenhouse or storage facility, give it a unique name or number.
- Fill in the **Crop, Commodity, or Site Treated**. If the location is a greenhouse, record the crop and site location. If you are treating livestock, record the type of animals treated (hogs, cattle, etc.).
- Fill in the **Month, Day, and Year** of application in the top field. In the **Begin Time/End Time** (next two fields) you must post the time you began the application and the end time of the application. This helps determine re-entry time. Also, each day of application shall be recorded as a separate application record. Circle AM or PM.
- The **EPA Registration Number** is located below the ingredients statement on most labels. It is **not** the same as the EPA establishment number (for example, EPA Reg. No. 241-337). If you

completed pages 2 through 4 as suggested, you may write the appropriate number in space 4.

- Write the **Brand or Product Name** of the pesticide. Multiple lines may be used to record tank mixes. Information on all products used in a tank mix is required. If you completed pages 2 through 4 as suggested, you may write the appropriate number in space 5.
- Copy the **Active Ingredients** (common name) from the label for all products used in the application. If you completed pages 2 through 4 as suggested, you may write the appropriate number in space 6.
- The pesticide label lists the **Restricted Entry Interval**. The application information for workers must remain posted until *30 days after the end of the REI*. When there is no REI, the notice must remain for 30 days after the application date. If you apply pesticides in a tank mix with different REIs, write down the longest REI.

Note: “Spot Treatments” are applications made to less than 1/10th of an acre. Application of an herbicide along a fence row or an insecticide applied to a fire ant mound would be examples of spot treatments. (*Note: Greenhouse and nursery treatments do not qualify as spot treatments.*) For spot treatments, write down the location of area treated

(for example, poison ivy along fence row of Baker Farm), indicate “spot treatment,” and record:

- EPA registration number;
- brand name; and
- month, day, year;
- location.
- total amount applied;

(Shaded columns denote optional information; not required by law.)

Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage, wind and weather; crop status
⑧ B.B. Smith 200028265	⑨ 1.5 pts/acre X 2 qts/acre X X	⑩ 20 acres	⑪ = 3.75 gallons = 10 gallons =	⑫ Sunny, wind speed 3-5 mph. Light grass infestation Gallonage = 10 gallons/acre. Banded at planting

⑧ If the **Name** and **Certification Number** are the same as the person on the applicator information form on page 1, you may record the letter listed for the applicator. If anyone else is applying the pesticide, record the applicator’s name and certification number.

⑨ The pesticide label will tell you the application **Rate** per unit (for example, 1.5 pints per acre or 1 pound active ingredient per acre). Record the rate you actually use. This information is not required in your records but will be helpful in calculating total amount applied when multiplied by size of area treated.







⑩ Record the **Size of Area Treated**. This may be acres, linear feet, bushels, cubic feet, square feet, or number of animals, etc. For special applications (for example, alternate middles, weed wicks, band applications) record the total area covered. A 20-acre field treated using an alternate middle

approach would still be recorded as 20 acres. See note on spot treatments at the top of this page.

⑪ The **Total Amount Applied** is figured as the amount of product multiplied by the area treated. If you have filled out columns 9 and 10, multiply them to get the total amount. Record the total quantity of pesticide used — *not the quantity after water or carrier added*.







⑫ When you are filling out the application record, you may find it helpful to record information about the sprayer equipment, the pests, the weather (particularly wind speed and direction, but also temperature and humidity), and the crop status. This will help you know whether an application was effective and improve future pest-management decisions. It will also be helpful in problem solving if the pesticide fails to control the target pest or moves off target. Putting information in this column is optional.

FIELD ID/LOCATION

Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				







Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage; wind and weather; crop status
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
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	X		=	

FIELD ID/LOCATION

Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
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	AM PM				







Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage; wind and weather; crop status
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
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Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
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	End Time 				
	AM PM				
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	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
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Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
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	X		=	
	X		=	
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	Begin Time				
	End Time 				
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	X		=	
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	X		=	
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	X		=	

FIELD ID/LOCATION

Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				







Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage; wind and weather; crop status
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
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FIELD ID/LOCATION

Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
	AM PM				
	AM PM				
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	AM PM				







Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage; wind and weather; crop status
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
	X		=	
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FIELD ID/LOCATION

Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
	AM PM				
	AM PM				
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	AM PM				







Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage; wind and weather; crop status
	X		=	
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	X		=	

FIELD ID/LOCATION

Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
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	AM PM				
	AM PM				
	AM PM				







Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage; wind and weather; crop status
	X		=	
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FIELD ID/LOCATION

Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
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Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage; wind and weather; crop status
	X		=	
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	X		=	
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FIELD ID/LOCATION

Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
	AM PM				
	AM PM				
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Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage; wind and weather; crop status
	X		=	
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	X		=	
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	X		=	

FIELD ID/LOCATION

Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				
	AM PM				







Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage; wind and weather; crop status
	X		=	
	X		=	
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	X		=	
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FIELD ID/LOCATION

Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
	AM PM				
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Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage; wind and weather; crop status
	X		=	
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	X		=	
	X		=	
	X		=	
	X		=	
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FIELD ID/LOCATION

Crop, Commodity, or Site Treated 	Mo/Day/Yr	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
	AM PM				
	AM PM				
	AM PM				
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	AM PM				

Applicator Name and Number	Rate	Size of Area Treated	Total Amount Applied	Field Notes: target pest(s); sprayer nozzles, speed, pressure, gallonage; wind and weather; crop status
	X		=	
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	X		=	
	X		=	
	X		=	
	X		=	
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A Summary of the Worker Protection Standard & Respirator Fit Testing

Familiarize yourself with the EPA manual, *How to Comply With the 2015 Revised Worker Protection Standard for Agricultural Pesticides: What Owners and Employers Need to Know*. The manual is available in PDF format at <https://www.epa.gov/sites/production/files/2016-10/documents/htcmanual-oct16.pdf>. The NCDA&CS Structural Pest Control and Pesticide Division has hard copies available upon request (919-733-3556). The **primary requirements for compliance** are listed below:

1. Provide **annual** training to both workers and handlers. Refer to Training Criteria for Workers and Handlers in Appendix B of the *How to Comply* manual for information on specific training topics.
2. Ensure that specific information (see bulleted items below) is displayed at a **central location** on an agricultural establishment that is readily accessible at all times during normal work hours and can be easily seen and read by workers and handlers. This information must also be made available to employees, or their designated representatives, upon written request.
 - The EPA approved poster (contact the NCDA&CS for a North Carolina specific copy), found at <http://pesticideresources.org/wps/cp.html>, or an equivalent written document noting the same information.
 - The OSHA Safety Data Sheet (SDS) for each pesticide product (www.cdms.net/Label-Database).
 - Pesticide application information (use the appropriate recordkeeping page of this manual);
 1. Location and description of the treated area(s),
 2. Brand name,
 3. Active ingredient(s),
 4. EPA registration number,
 5. Restricted Entry Interval,
 6. Crop, Commodity, or Site Treated
 7. Date(s) and times application started and ended.
3. Comply with the **minimum age requirement**: Children under 18 are prohibited from handling pesticides with the exception of family members.
4. In the event of possible poisoning or injury, provide **emergency transportation** to a medical care facility along with the following information for medical personnel treating the patient:
 - Copies of the applicable SDS, the pesticide product name, EPA registration number and active

- ingredient(s) for each pesticide product to which the person may have been exposed.
 - Type of application or how the pesticide was used on the agricultural establishment.
 - The circumstances that could have resulted in exposure to the pesticide.
5. Keep workers and others out of the “**Application Exclusion Zone**” during pesticide application and post **no-entry** signs for required products (refer to the *How to Comply* manual).
 6. **Keep records** of pesticide applications as well as farmworker training (use this manual for both of these requirements), and make them and other information required by the WPS available for inspection by an employee of the EPA or NCDA&CS.
 7. Provide **decontamination supplies** including clean water, single-use towels, and soap.
 8. Provide **personal protective equipment** and ensure that respirators are used correctly (see next section).

Respirator Fit Testing Guidelines for North Carolina Pesticide Applicators

The EPA requires that all individuals working with pesticides labeled for respiratory protection complete the following 3 items **prior to** respirator use:

1) Medical Clearance

A medical clearance will determine if you are physically fit to wear a respirator and must be completed by an employee before the fit test. It is designed to identify general medical conditions that could result in serious medical consequences with the use of a respirator, so honest answers are critical. Each item listed below must be known in order to complete the medical clearance:

- type and weight of respirator
- length of time and frequency of respirator use
- level of effort that will be involved while wearing the respirator
- other protective clothing or equipment to be worn during respirator use
- temperature and humidity extremes at work

The following options are available to complete the required medical clearance:

- a. The employer must identify and pay for a physician or licensed health care professional (PLHCP) to

perform a medical evaluation using the Occupational Safety and Health Administration (OSHA) medical questionnaire or equivalent method. A list of providers is available from the NC Agromedicine Institute (see inside front cover). The employer must allow the employee to complete this evaluation during normal working hours or at a time and place that is convenient for the employee. The PLHCP must provide the employee with a statement of medical clearance to return to the employer. Although the medical clearance is technically good for as long as the PLHCP indicates, most providers grant one year unless a major change in health occurs.

- b. The employee may fill out a printed copy of the medical questionnaire. The employer must ensure that a follow-up medical examination is provided for the employee to discuss the questionnaire or examination results. The employer or supervisor must not look at or review the employee answers, and he/she must tell the employee how to deliver or send this questionnaire to the health care professional for review.
- c. Online options are available at <https://www.respexam.com/Default.asp>, <https://www.resptest.com/>, or <https://www.respclearance.com/>. These options could grant medical clearance immediately, or may require a visit to a PLHCP for an in-person evaluation. If a referral is required, the employer is responsible for providing a PLHCP for the appointment.

2) Fit Test

A respirator fit test must be conducted in compliance with Appendix A of the OSHA Standard 1910.134, found at <https://www.osha.gov/>. The fit test determines if the respirator forms a complete seal with the person's face. The fit test must be performed with the same make, model, style, and size of the respirator that will be used when handling pesticides. The employer must ensure that the person conducting the fit test has completed the respiratory protection training outlined in Respirator Training below. Additionally, for qualitative fit tests, the employer shall ensure that those administering the test are able to prepare test solutions, calibrate equipment, perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order. OSHA does not offer a training or issue a physical card or certificate indicating a person is qualified to conduct this type of test. Although they are not required by OSHA, there are a number of training opportunities to obtain a fit testing certificate. Contact the NC Agromedicine Institute for more information on training opportunities. Find a full explanation of OSHA approved fit testing options at www.osha.gov.

There are two types of tests, qualitative and quantitative:

- a. The qualitative test is pass/fail and relies on the employee's sense of taste and smell to detect a substance introduced into an enclosure. This type is designed primarily for half-face respirators.
- b. The quantitative test uses a machine to measure the actual amount of leakage and does not rely on your senses to detect a leak. This type is designed for any type of tight-fitting respirator and is usually conducted at occupational clinics.

Fit tests must be conducted **annually** and for each type of respirator you plan to wear, including particulate-filtering face masks (formerly known as dust/mist masks). If any drastic changes in physical appearance occur within the year that cause the seal to become compromised, an additional fit test must be done. Loose fitting respirators (e.g., helmets, hoods) do not require fit testing but do require medical clearance.

Records must be kept for two years. An example of an individual fit test record can be found on page 48 and examples of individual and group records can be found at the Pesticide Safety Extension Portal at <https://pesticidesafety.ces.ncsu.edu>.

3) Respirator Training

Employers must provide training, as explained in OSHA Standard 1910.134(k), found at <https://www.osha.gov/>, to ensure a pesticide handler knows how to use a respirator properly. This training must include:

- how to use the respirator effectively in emergency situations;
- why the respirator is necessary and how improper fit, use, or maintenance can compromise the protective effect of the respirator;
- the limits and capabilities of the respirator;
- how to inspect, put on/remove, and check the seals of the respirator;
- how to maintain and store the respirator correctly; and
- how to recognize medical signs and symptoms that may limit or prevent effective use of the respirator.

Training must be provided prior to initial use, unless acceptable training was provided by another employer within the past 12 months. Re-training is required annually and when workplace conditions change, a new type of respirator is used, or when inadequacies in the employee's use or knowledge indicates need. A Respirator Training Record form can be found on page 49.

For helpful links and information, please see the Respirator Fit Test factsheet on the NC Pesticide Safety Education Program website (<https://pesticidesafety.ces.ncsu.edu>).

RESPIRATOR FIT TEST RECORD

Date: _____

Fit testing conducted in compliance with OSHA Standard 1910.134(F). ☐

If other local, state or federal regulations apply (such as MSHA), you may list them here:

Company: _____
Address: _____
City: _____
State: _____ Zip: _____ Tel: _____
Name of Fit Tester: _____
Signature: _____

Type of OSHA accepted fit test protocol used: (Qualitative): _____ Saccharin _____ Bitrex™ _____ Isoamyl Acetate _____ Irritant Smoke

(Quantitative): Portacount Model _____ Occupational Health Dynamic Model #: _____

Name (please print)	Signature	Date of Medical Clearance	Respirator Fit Tested (Make, Model, Style, Size) (Ex. 3M 6800, full-face, medium)	Fit Test		Could not be fit tested due to:
		Cleared with limitations (Indicate Y – yes or N – no)		Pass	Fail	
				<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	
				<input type="checkbox"/>	<input type="checkbox"/>	

Respirator Training										
Training Agenda: <ul style="list-style-type: none"> Why a respirator is necessary and how improper fit, usage, or maintenance can compromise the protective fit of a respirator Limitations and capabilities of a respirator How to use the respirator effectively in emergency situations, including situations in which a respirator malfunctions How to inspect, put on and remove, use and check the seals of a respirator Procedures for maintenance and storage How to recognize medical signs and symptoms that may limit or prevent effective use of a respirator 										
Skills Check										
Employee	Inspects respirator (v)		Puts respirator on correctly (v)		Conducts positive seal check (v)		Conducts negative seal check (v)		Demonstrates how to clean & store respirator(v)	
	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
Participant (print Name)		Participant (Sign Name)				Primary Language (v)				
						<input type="checkbox"/> English <input type="checkbox"/> Spanish				
						<input type="checkbox"/> English <input type="checkbox"/> Spanish				
						<input type="checkbox"/> English <input type="checkbox"/> Spanish				
						<input type="checkbox"/> English <input type="checkbox"/> Spanish				
Date of Training:		Trainer:				Training conducted in: <input type="checkbox"/> English <input type="checkbox"/> Spanish				

WPS TRAINING VERIFICATION RECORD










Keep records for 2 years

EPA Approval Number of the WPS Training Material Used:

[illegible]

ENTENDIENDO EL REGISTRO DE LAS APLICACIONES DE PESTICIDAS

En cada operación agrícola, el patrón debe mantener un registro de las aplicaciones de pesticidas. El registro, contiene información que es importante para usted como trabajador agrícola.

FIELD/ID LOCATION  ① Old Creek Field					
Crop, Commodity, or Site Treated 	Date (mo/day/yr)	EPA Registration Number 	Brand Name 	Active Ingredient(s) 	Restricted Entry Interval (REI) 
	Begin Time				
	End Time 				
② Cotton	③ 5/3/18	④ 241-337	⑤ Prowl 3.3EC	⑥ Pendimethalin	⑦ 24 hrs
	10:00  PM	100-642	Cotoran 4L	Fluometuron	
	2:00  PM				

- ① **Field ID#/Location** significa:
La identificación del sitio de labor en el rancho. En el registro hay una página por cada sitio. Su patrón debe explicarle los sitios que existen en su rancho.
- ② **Crop, Commodity, or Site Treated** significa:
La cosecha, el producto, o el sitio que recibió la aplicación del pesticida.
- ③ **Mo/Day/Yr Begin/End Time** significa:
El Mes/Día/Año (Mo/Day/Yr) y la hora (Begin/End Time) de empezar y terminar.
- ④ **EPA Reg. Number** significa:
El número de registro de la EPA. (La Agencia para la Protección del Medio Ambiente.) Este número se encuentra en la etiqueta del pesticida.
- ⑤ **Brand Name** significa:
El nombre del pesticida que se usó.

- ⑥ **Active Ingredients** significa:
Los ingredientes activos en el pesticida; es decir los que controlan la plaga.
- ⑦ **Restricted Entry Interval (REI)** significa:
REI son las horas o el tiempo después de la aplicación del pesticida cuando no se permite la entrada al sitio de aplicación.
- ⑧ **Applicator Name and Number** significa:
Nombre y número de certificación de la persona que aplica pesticidas.

En caso del envenenamiento por un pesticida, llame al 911 (o al número de emergencia en su comunidad) o al siguiente número:

Carolinas Poison Center 1-800-222-1222

Para más información sobre La Ley de Pesticida, llame al siguiente número:

Pesticide Section (919) 733-3556

Sprayer Calibration (1/128th of an Acre Method)

Wayne Buhler, Ph.D., Pesticide Education Specialist
North Carolina State University

To use pesticides successfully, you must be able to measure and adjust the amount of pesticide applied to the target area. It is well worth the time to calibrate your sprayer so that you know it is actually applying the product at the right rate in a uniform pattern. You need to calibrate your sprayer routinely.

If the sprayer applies too little pesticide, you may have poor pest control and extra costs for additional applications as well as crop losses. If you apply too much pesticide, you may damage the crop, end up with too much residue in the crop and soil, and be fined for illegal applications. You will also have wasted money for unneeded pesticide.

Choose the right nozzle size, type, and alignment for your application needs. Pesticide labels, equipment catalogs, and dealers have information that will help you select the right nozzles.

There are a number of different calibration methods that work equally well. The procedure described below can be done with a few common tools and basic arithmetic.

Clean the Sprayer Before Calibrating

- 1) Remove nozzles, screens, and in-line strainers in order to clean them in soapy water with a soft brush. Remove any deposits from the nozzle orifice with a non-metallic object or compressed air. (Never use a knife or wire to clean nozzles, as this will ruin your equipment.)
- 2) In a location away from any wells or water supplies, rinse the spray tank thoroughly and partially fill it with clean water.
- 3) Start the sprayer and flush hoses and boom with plenty of water.
- 4) Turn the sprayer off and put nozzles back on the boom. All nozzles should be the same size and type.
- 5) Restart the sprayer, adjust pressure for proper field application, and inspect nozzles for proper spray pattern. Replace any nozzle that produces an irregular spray pattern. Recheck for even pattern.

Check Nozzles for Uniform Output

- 1) Find a container marked in ounces. With the sprayer operating at the desired pressure, catch the output from each nozzle for 20 seconds and write down the number of ounces.

- 2) After catching the spray from every nozzle, add the amounts caught and divide by the number of nozzles to get the average output per nozzle.
- 3) If the output from any nozzle is more than 10 percent above or below the average, clean or replace that nozzle.
- 4) Recheck the output from any cleaned or replaced nozzles. Use the new output to figure a new average. If more than 2 nozzles have output rates 10 percent above or below the average, replace all of them, and repeat steps 1, 2, and 3 to be sure the flow rate is uniform.

Nozzle Output Check – Example

Nozzle	Output Test #1 (Ounces after 20 seconds)	Output Test #2 (Ounces after 20 seconds)
1	16	16
2	13	14
3	15	15
4	15	15
5	16	16
6	15	15
7	17	17
8	19	16
Total	126 ounces	124 ounces
	÷ by 8 nozzles	÷ by 8 nozzles
Average	= 15.75 ounces	= 15.5 ounces

Output Test #1

- Average 15.75 (round to 15.8). Ten percent of 15.8 is 1.58 (round to 1.6).
- Acceptable range (average plus or minus ten percent): 14.2 to 17.4 ounces (15.8 ± 1.6).
- In this case nozzle 2 and nozzle 8 should be checked. When output is too low, the nozzle may be clogged and cleaning may bring it into the correct output range. When output is too high, the nozzle is probably worn out and should be replaced.

Output Test #2

- Average 15.5. Ten percent of 15.5 is 1.5.
- Acceptable range: 14 to 17 (15.5 ± 1.5). All nozzles now fall within the acceptable range.

Check Boom Height and Nozzle Spacing

Refer to the manufacturer's guidelines to find out what boom height and nozzle spacing will give the spray pattern overlap and/or band width that you need. You can check the spray pattern by spraying water on a dry pavement or other smooth surface. Streaking may result from damaged nozzle tips or an uneven or improper boom height. Adjust until pattern is even.

How To Calibrate the Sprayer

This method is based on the fact that a gallon is 128 ounces so that the number of ounces of pesticide per nozzle applied to 1/128th of an acre is equivalent to the number of gallons applied to 1 acre. Table 1 shows how many linear feet the sprayer must travel to give the equivalent of 1/128th of an acre at various nozzle spacings and band or row widths. When the sprayer travels this distance, each nozzle will have sprayed 1/128th of an acre.

STEP 1: DISTANCE

Using Table 1, find the distance you need to travel for your nozzle spacings, band or row widths. Mark off this distance in a field, allowing space for the sprayer to reach full operating speed before reaching the first marker of the test course.

STEP 2: TIME

Fill the tank half full with water (no pesticide). Make at least two runs over the marked distance with all of the equipment (cultivator, disk, planter, etc.) that will be used during the application engaged. Also, use the gear and throttle settings that will be used during actual spraying. Figure the average time in seconds that the sprayer takes to travel the marked distance. Do not spray during this procedure.

STEP 3: OUTPUT COLLECTION/GPA

Park the tractor and adjust sprayer pressure to the level that will be used for application. Using a container marked in ounces, catch the output from a single nozzle for the length of the average travel time (from Step 2). The number of ounces collected from one nozzle is equal to the output of the entire sprayer in gallons per acre (GPA). (Because you have already determined that output from each nozzle is within 10 percent of the average output, it is not necessary to collect output from every nozzle during this step.)

Note: When more than one nozzle is used per row or band, the spray collected from one nozzle should be multiplied by the number of nozzles directed at the row or band. All nozzles in this

group must be the same size and have uniform output. This combined output, in ounces, from all nozzles directed at the row or band is equal to the gallons per acre being applied to that row.

Table 1. Calibration Travel Distance

Nozzle Spacing, Band Width, or Row Width* (inches)	Distance** (feet)
6	681
8	511
10	408
12	340
14	292
16	255
18	227
20	204
22	186
24	170
26	157
28	146
30	136
32	128
34	120
36	113
38	107
40	102
42	97
44	93
46	89
48	85

*Use nozzle spacing to determine driving distance for broadcast sprays. Use band width to determine driving distance for banded sprays (including post-directed herbicide sprays). Use row width for foliar sprays directed to the crop.

**For other spacings, the distance (in feet) can be figured as:

$$\text{Distance (ft.)} = \frac{4084}{\text{nozzle spacing, band or row width (in.)}}$$

STEP 4: HOW MUCH TO USE

After calibrating the equipment, figure the amount of pesticide and carrier to put in the tank to get the desired application rate based on the application method. See the examples for various application methods.

Adjustments for Non-Water Carriers

If you will be using a carrier other than water, the GPA number you get from following Steps 1, 2, and 3 can be adjusted by using a conversion factor from Table 2. Multiply the GPA value from Step 3 by the conversion factor to get the correct output for the solution being sprayed.

Example: From Step 3, you have found a GPA of 20 gallons per acre. If you will be applying the pesticide with 28 percent nitrogen solution, the conversion factor is .89, and you will multiply $20 \times .89$ to find an actual application rate of 17.8 GPA.

Table 2. Conversion Factors for Non-Water Carriers

Weight of Solution in pounds per gallon	Conversion Factor
6.60 (kerosene)	1.26
7.00	1.09
8.00	1.02
8.34 (water)	1.00
9.00	0.96
10.00	0.91
10.65 (28% nitrogen solution)	0.89
10.80 (30% nitrogen solution)	0.88
11.00 (7-27-7 fertilizer)	0.87
11.06 (32% nitrogen solution)	0.87
11.40 (10-34-0 fertilizer)	0.86
11.50 (12-0-26)	0.85
11.60 (11-37-0 fertilizer)	0.85
12.00	0.83
14.00	0.77

Sprayer Calibration Examples

EXAMPLE 1: BROADCAST APPLICATION

- Field size: 30 acres
- Planned application: Broadcast herbicide
- Nozzle spacing: 22 inches
- Rate per acre: 2 pints

Step 1: Based on a 22-inch nozzle spacing, you need to drive 186 feet (from Table 1).

Step 2: You determine that it takes 32 seconds to drive 186 feet.

Step 3: Output per nozzle for 32 seconds is 13 ounces. This means your sprayer is applying 13 gallons per acre.

Step 4: To figure out how much herbicide is needed to treat the field:

- Multiply the number of acres (30) by the gallons-per-acre output (13) to determine the amount of total spray solution needed to treat the field:

$$\begin{array}{r} 30 \text{ acres} \\ \times 13 \text{ gallons per acre} \\ \hline 390 \text{ gallons spray solution} \end{array}$$

- The amount of herbicide needed to treat the field is:

$$\begin{array}{r} 30 \text{ acres} \\ \times 2 \text{ pints per acre} \\ \hline 60 \text{ pints or 7.5 gallons} \end{array}$$

- Add 7.5 gallons of herbicide to 382.5 gallons of water (390 - 7.5) to treat the 30-acre field.

EXAMPLE 2: BANDED APPLICATION USING ONE NOZZLE PER ROW

- Field size: 30 acres
- Planned application: Herbicide in 12-inch band over corn rows spaced 36 inches apart
- Label rate (broadcast): 1.5 quarts per acre

Step 1: Based on a band width of 12 inches, you need to drive 340 feet (Table 1).

Step 2: You determine that it takes 58 seconds to drive 340 feet.

Step 3: Output per nozzle for 58 seconds is 12.5 ounces. This means your sprayer is applying 12.5 gallons per *treated* acre. **Note:** When you apply pesticides in a band, you are treating only a fraction of the total area of the field. This area is referred to as *treated* acres. To determine how many treated acres there are in a specified field acreage, multiply the field acreage by the ratio of the band width to the row width:

$$\begin{array}{r} \text{Field acres} \\ \times (\text{Band width divided by row width}) \\ \hline = \text{Treated acres} \end{array}$$

In this example,

$$\begin{array}{r} 30 \text{ acres} \\ \times (12\text{-inch bands divided by } 36\text{-inch rows}) \\ \hline 10 \text{ treated acres} \end{array}$$

Step 4: To figure out how much herbicide is needed to treat the field:

- Multiply the number of treated acres by gallons per treated acre to determine the amount of total spray solution needed to treat the entire field:

$$\begin{array}{r} 10 \text{ treated acres} \\ \times 12.5 \text{ gallons per treated acre} \\ \hline 125 \text{ gallons spray solution} \end{array}$$

- Determine the amount of herbicide needed to treat the 30-acre field by multiplying the number of treated acres by the labeled broadcast rate:

$$\begin{array}{r} 10 \text{ treated acres} \\ \times 1.5 \text{ quarts per acre} \\ \hline 15 \text{ quarts or } 3.75 \text{ gallons} \end{array}$$

- Add 3 gallons and 3 quarts of herbicide to 121 gallons and 1 quart of water (125 gallons - 3.75 gallons of herbicide = 121.25 gallons) to treat the 30-acre field.

EXAMPLE 3: DIRECTED FOLLAR SPRAY APPLICATION USING MORE THAN ONE NOZZLE PER ROW

- Field size: 30 acres
- Planned application: 3-nozzle application of fungicide to crop planted in 40-inch rows
- Label rate (broadcast): 2.5 quarts per acre

Step 1: Based on a row spacing of 40 inches, you need to drive 102 feet (Table 1).

Step 2: You determine that it takes 15 seconds to drive 102 feet.

Step 3: Output per nozzle for 15 seconds is 6 ounces. Assuming all nozzles are the same type and have uniform output, the group output from the 3 nozzles per row equals 18 ounces (3 nozzles x 6 ounces per nozzle). This means your sprayer is applying 18 gallons per acre. If all the nozzles are not the same type, measure the output from each nozzle of the group and add them together. This total, in ounces, is equal to gallons per acre.

Step 4: To calculate how much fungicide is needed to treat the field:

- Multiply field acres by the gallons-per-acre output to determine the amount of total spray solution needed to treat the field.

$$\begin{array}{r} 30 \text{ acres} \\ \times 18 \text{ gallons per acre} \\ \hline 540 \text{ gallons spray solution} \end{array}$$

- The amount of fungicide needed to treat the field is:

$$\begin{array}{r} 30 \text{ acres} \\ \times 2.5 \text{ quarts per acre} \\ \hline 75 \text{ quarts or } 18.75 \text{ gallons} \end{array}$$

- Add 18 gallons and 3 quarts of fungicide to 521 gallons and 1 quart of water (540 gallons - 18.75 gallons of fungicide = 521.25 gallons of water) to treat the 30-acre field.

Sprayer Calibration Notes

Date Calibrated					
Sprayer Brand					
Sprayer Type					
Sprayer Model					
Nozzle Type and Size					
Boom Height					
Pressure					
Speed (mph)					
Throttle (rpm)					
Tractor Model					
Tractor Gear					
Spray Volume (gallons/acre)					

Adapted from *Pesticide Applicator Log* by James Dill, James Dwyer, and Leigh Morrow. University of Maine Cooperative Extension. 1993.

<i>Table of Measurements</i>	
STANDARD MEASURE	METRIC CONVERSION
LENGTH: 1 ft = 12 in 1 yd = 3 ft 1 mi = 5,280 ft 1 mph = 88 ft/1 min	LENGTH: 1 in = 25.4 mm = 2.54 cm 1 ft = 304.8 mm = 30.48 cm 1 yd = 914.4 mm = 91.44 cm = 0.914 m 1 mi = 1,609 m = 1.61 km 1 mm = 0.03937 in 1 cm = 0.394 in = 0.0328 ft 1 m = 39.37 in = 3.281 ft 1 km = 3,281 ft = 0.621 mi
AREA: 1 sq in = 0.007 sq ft 1 sq ft = 144 sq in 1 sq yd = 1,296 sq in = 9 sq ft 1 ac = 43,560 sq ft = 4,840 sq yd	AREA: 1 sq in = 6.45 sq cm 1 sq ft = 929 sq cm 1 sq yd = 8,361 sq cm = 0.8361 sq m 1 ac = 4,050 sq m = 0.405 h 1 sq cm = 0.155 sq in 1 sq m = 1,550 sq in = 10.76 sq ft 1 h = 107,600 sq ft = 2.47 ac
VOLUME: 1 tsp = 0.17 fl oz 1 tbs = 3 tsp 1 fl oz = 2 tbs = 6 tsp 1 cup = 8 fl oz = 16 tbs 1 pt = 2 cups = 16 fl oz 1 qt = 2 pt = 32 fl oz 1 gal = 4 qt = 8 pt = 128 fl oz = 231 cu in <i>Note: To convert liquid ounces to gallons, multiply by 0.0078125 (0.008)</i>	VOLUME: 1 fl oz = 29.5 ml = 0.0295 L 1 pt = 437 ml = 0.437 L 1 qt = 945 ml = 0.945 L 1 gal = 3,785 ml = 3.785 L 1 ml = 0.033 fl oz 1 L = 33.8 fl oz = 2.112 pt = 1.057 qt = 0.264 gal
WEIGHT: 1 oz = 0.0625 lb 1 lb = 16 oz 1 ton = 2,000 lb 1 gal of water = 8.34 lb	WEIGHT: 1 oz = 28.35 g 1 lb = 454 g = 0.4536 kg 1 ton = 907 kg 1 gal of water = 3.786 kg 1 g = 0.035 oz 1 kg = 35.27 oz = 2.205 lb
CONCENTRATION: 1 part per million (ppm) = 0.00001 percent = 0.013 oz in 100 gal of water 1 percent = 10,000 ppm 0.1 percent = 1,000 ppm 0.01 percent = 100 ppm 0.001 percent = 10 ppm	CONCENTRATION: 1 part per million (ppm) = 1 milligram/liter = 1 milligram/kilogram 1 percent = 10 grams/liter 0.1 percent = 1,000 milligrams/liter 0.01 percent = 100 milligrams/liter 0.001 percent = 10 milligrams/liter
TEMPERATURE: To convert degrees Celsius (C) to degrees Fahrenheit (F): multiply by 1.8 and add 32. Example: 30 degrees C = 86 degrees F. (30 X 1.8 + 32). To convert degrees Fahrenheit (F) to degrees Celsius (C): subtract 32 and multiply by 0.56. Example: 50 degrees F = 10 degrees C (50 - 32 X 0.56).	

acacre	hhectare (1h=10,000	mimile	mmmillimeter
cm.....centimeter	square meters)	ozounce	qt quart
fl ozfluid ounce	ininch	ptpint	sqsquare
ftfoot or feet	kgkilogram	mmeter	tbstablespoon
ggram	kmkilometer	mgmilligram	tspteaspoon
galgallon	Lliter	minminute	ydyard
	lbpound	mlmilliliter	

Adapted from *The Safe and Effective Use of Pesticides* by Patrick Marer, Mary Louise Flint, and Michael Stimmann. University of California. Publication 3324. 1988.



Before using any pesticide...

read the LABEL carefully and use
only as directed.

All pesticides can be harmful to human
health and the environment if misused.

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