

Updates to Missouri's Private Pesticide Applicator Manual

Safe and effective crop protection product handling and use involves following product labels as well as studying the newest applicator manuals to stay abreast of current laws and best application practices. To help guide Missouri applicators in safe and effective pesticide handling and use, Missouri's 2007 Private Pesticide Applicator Reference Manual (MU Extension publication M87) was revised in 2021 and scheduled to be published in 2022. The update was needed because, aside from the Missouri manual being 14 years old, the Environmental Protection Agency's final Certification Standards for Pesticide Applicators rule became effective on March 6, 2017. This revised standard, known as the C&T Rule, is reflected in the 2022 update.

The updated publication M87 uses the 2014 National Pesticide Applicator Certification Core Manual as a template. The National Core Manual is a defensible document compiled and edited by a collaboration of the nation's pesticide safety education experts and supported by the Council for Agricultural Science and Technology and the National Association of State Departments of Agriculture Research Foundation. The updated M87 blends the 2007 Missouri manual and the National Core Manual to capture the expertise and defensibility of the National Core Manual while creating a state-specific manual for Missouri's private applicators. The updated M87 adds pertinent material from the Core Manual that was absent from the 2007 version while avoiding redundant material. The National Core Manual template was customized to state-specific information where appropriate, such as the mention of karst topography and fine-textured soils common in Missouri. Additionally, the new plant agriculture section reflects Missouri's primary crops including soybeans, corn, and pasture.

Technical details

The 2022 update includes revision of web links, phone numbers, and revising the term Material Data Safety Sheet (MSDS) to Safety Data Sheet (SDS). Syrup of ipecac was deleted from the first aid kit list as it is no longer recommended by poison control and health professionals. Photos and illustrations were identified for replacement to create a more realistic presentation. Resistance figures are updated in the new manual, with instances of 440 pathogens, 263 weeds, and 623 arthropods exhibiting at least one record of pesticide resistance.

Several omissions were identified in both the National and Missouri manuals, and these were included in the 2022 update. For example, the updated manual advises applicators to avoid leaning over during the proper use of a backpack sprayer because the sprayer's vent hole can release product. Another caution, about safety glasses, advises that all safety glasses used for pesticide application include both brow and side protection because many glasses lack one or both shield positions. The new manual also cautions applicators to store personal protective equipment (PPE) out of sunlight; an example is leaving safety glasses on the dashboard of vehicles, where ultraviolet rays degenerate the PPE. A fourth example of an omission found in both the National and Missouri manuals is the recommendation for proper wind speed measurements. Too many applicators rely on regional weather reports rather than site-specific information. The new manual recommends that wind speed should be measured at sprayer boom height with an anemometer prior to application.

Competency standards and C&T Rule

The Final C&T Rule imposes a minimum age limit of 18 for applicators of restricted-use products (RUPs), along with the requirement that applicators must be able to read and understand the label; these are outlined in the updated 2022 Missouri manual. The Final C&T Rule also increases the previous private applicator competency standards from five to 11, mirroring the commercial applicator requirements. These include:

Written by
Sam Polly, Pesticide Safety Education Program (PSEP) Coordinator, Division of Plant Science and Technology

1. Label and labeling comprehension
2. Safety
3. Environment
4. Pests
5. Pesticides
6. Equipment
7. Application techniques
8. Laws and regulations
9. *Omitted* (Not applicable to Missouri private applicators)
10. Stewardship
11. Ag pest control

The 2007 Missouri manual was written to reflect five general competency standards under the previous C&T Rule: recognizing pests, reading and understanding labeling, applying pesticides in accordance with the labeling, recognizing environmental conditions and avoiding contamination, and recognizing poisoning symptoms and procedures to follow in the case of a pesticide accident. These are reflected above by chapters 4, 1, 7, 3, and 2, respectively. While the new standards are interspersed throughout both the 2007 and the National Core manuals, the new manual is rearranged by chapter to reflect the competency standards in the final C&T Rule. This new arrangement aligns the Missouri manual chapters and training topics in the same order as EPA's final rule competency standards. This creates a clear path for training and demonstrating compliance with the final rule. Chapter 2, Safety, had three logical divisions, so this chapter was separated into three sub-chapters during manual revision: 2a – Pesticide Hazards, First Aid & Safety; 2b – Safety – Personal Protective Equipment; and 2c – Safety – Emergency or Incident Response. Chapter 10, Stewardship, had two logical divisions so it was separated into two sub-chapters: 10a – Stewardship – Transportation, Storage, Security & Risk Communication; and 10b – Stewardship – Professional Conduct.

Table 1 provides a comparison of the new chapters with the corresponding chapters from the 2007 Missouri and 2014 National core manuals.

New sections

Two new sections were added to the updated Missouri manual: a Site and Timing Assessment (pre-application assessment) and a Professional Image section. These are outlined below.

Site and timing assessment

The site and timing assessment is one of the first and most important components in planning a pesticide application. This component should consider economic

Table 1. New PPAT manual chapters compared with the Missouri 2007 manual and 2014 National Core Manual.

Number	Competency Standard	2007 Missouri	2014 National
1	Label Comprehension	5	3
2a	Safety - Pesticide Hazards, First Aid & Safety	8, 9	5
2b	Safety - Personal Protective Equipment	6	6
2c	Safety - Emergency or Incident Response	No entry	9
3	Environment	3	7
4	Pests	1, 2	1
5	Pesticides	4	4
6	Equipment	7	11
7	Application Methods	4, 7	10, 11
8	Laws and regulations	8, 9, 10	2
9	NA	NA	NA
10a	Stewardship - Transportation, Storage, Security & Risk Communication	8, 9	8, Apdx D
10b	Stewardship - Professional Conduct	No entry	12
11	Ag Pest Control	No entry	No entry

threshold, correct pest growth or life stage for effective application, weather forecasts and label requirements, endangered species, pollinator presence and activity, proximity to water resources, soil conditions including runoff and infiltration potential, sensitive crop proximity, worker presence, and irrigation schedules during the planning stage.

On the application day prior to mixing the pesticide product, perform a reconnaissance to visually confirm the field is clear of people, animals, vehicles, and equipment. Check the wind speed, preferably with an anemometer, and know the wind direction. Ensure the irrigation system is off. In summary, pre-application assessments should:

- Ensure the pest's economic threshold has been reached
- Confirm that the crop and pest are at an appropriate growth stage for application
- Monitor weather for precipitation, temperature, and wind speed
- Assess endangered species and habitat
- Locate pollinators and habitat
- Identify water features such as wells, streams, or ponds
- Assess soil texture and water table depth as needed

- Identify nearby crops sensitive to, or not labeled for, the product
- Coordinate with managers and workers to vacate the application site
- Coordinate with the irrigation manager

Professional image

Those in the agriculture industry should take the initiative to shift the public view of agriculture in a positive direction. This is very important for pesticide applicators. Lawsuits about crop protection products such as glyphosate, dicamba, atrazine, and chlorpyrifos—along with growing complaints from residential neighborhoods expanding into agricultural districts—illustrate the importance of maintaining a healthy professional image communicating that agriculture is the public’s friend. Steps for building and maintaining a positive impression include:

- Safe, educated, and effective site-specific pesticide and fertilizer applications
- Maintaining a clean, organized barnyard with well-maintained buildings, fences, and equipment
- Properly disposing waste
- Employing visible best management practices such as windbreaks, vegetative filter buffers along swales, and surface water treatment wetlands
- Managing soil erosion and sedimentation
- Wildlife habitat maintenance and creation including snags, brush piles, and edge habitat
- Maintaining and protecting streams, wetlands, and ponds
- Conservation measures such as native vegetation patches and forest preservation
- Developing good relationships with neighbors
- Taking time to educate neighbors and the public at every opportunity
- Identifying potential conflicts and creating allies with such individuals or groups. Examples include collaboration with local beekeepers if you use insecticides, volunteering with local watershed groups, or joining a conservation organization like Quail Forever or the Missouri Prairie Foundation. Learn their interests and concerns to see how your farm can contribute to the local cause to develop trust and lasting partnerships.

A shift is needed for the long-term preservation of agriculture. Instead of attempting to maximize profit by farming every available acre, agriculture producers can instead use swales, corners, riparian zones, and less fertile soil areas for conservation features that invest in the region’s water quality, wildlife, and community. While this proactive approach takes work and sacrificing a little land, it is cheap insurance against the wasted time

and money spent on future litigation and public battles. Such measures show a good faith effort by agriculture to steward the environment we all share, which develops public confidence. Now is the time to grab this opportunity to build relationships before pesticide lawsuit commercials and anti-pesticide websites turn the public against agriculture.

Laws and regulations

Laws and regulations are a continually shifting force in the world of agriculture and pesticide application. A summary of updates on pesticide related laws and regulations found in new manual can be seen in MU Extension publication, G855, [Pesticide Laws and Regulations](https://extension.missouri.edu/publications/g855) (<https://extension.missouri.edu/publications/g855>).

Endangered Species Act

While the Endangered Species Act (ESA) was mentioned in the 2007 manual, the updated manual covers the usage of EPA’s required Bulletins Live! Two so applicators ensure they minimize potential risk to endangered species listed in the area. The ESA is proving to be a challenge to product registration, making understanding and compliance critical.

Worker Protection Standard

The Worker Protection Standard found in the Agricultural Use Requirements on pesticide labels was updated in 2015. These changes are outlined in the updated manual and the following MU Extension publications:

- [G856, Worker Protection Standard Overview](https://extension.missouri.edu/publications/g856). (<https://extension.missouri.edu/publications/g856>)
- [G857, Worker Protection: Employer’s Guide to Worker Protection Standard Compliance](https://extension.missouri.edu/publications/g857). (<https://extension.missouri.edu/publications/g857>)
- [G858, Agricultural Owners, Family Labor and the Worker Protection Standard](https://extension.missouri.edu/publications/g858). (<https://extension.missouri.edu/publications/g858>)

Clean Water Act

The Clean Water Act (CWA) was absent in previous manuals. The CWA establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972 [33 U.S.C. §1251 et seq. (1972)]. “Clean Water Act” became the Act’s common name with amendments in 1972.

Under the CWA, EPA has implemented pollution control programs and developed national water quality criteria recommendations for pollutants in surface waters. The CWA made it unlawful to discharge any pollutant from a point source into navigable waters unless a permit was obtained. The 1972 amendments maintained existing requirements to set water quality standards for all contaminants in surface waters and recognized the need for planning to address the critical problems posed by nonpoint source pollution. Expanded state-level regulations to comply with the CWA have led to costly violation notices and federal lawsuits aimed at farmers in certain parts of the country.

Safe Drinking Water Act

Another important legal standard absent from previous manuals, the Safe Drinking Water Act (SDWA), was originally passed by Congress in 1974 [42 U.S.C. §300f et seq. (1974)] to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources—rivers, lakes, reservoirs, springs, and ground water wells. SDWA authorizes the EPA to set national health-based standards for drinking water to protect against both naturally occurring and man-made contaminants that may be found in drinking water.

Threats to drinking water considered under the SDWA include improperly disposed of chemicals; animal wastes; pesticides; human threats; wastes injected underground; and naturally occurring substances. National drinking water standards are legally enforceable, which means that both EPA and states can take enforcement actions against water systems not meeting safety standards. EPA and states may issue administrative orders, take legal actions, or fine utilities. EPA and states also work to increase water utilities' understanding of, and compliance with, standards. This makes upstream applicator care more important than ever.

Missouri Wildlife Code

Under 3 CSR 10-4.110, it is illegal for “any deleterious substance to be placed, run, or drained into any of the waters of this state in quantities sufficient to injure,

stupefy, or kill fish or other wildlife which may inhabit such waters.” Few applicators are aware of this state regulation. Related litigation seen across the U.S. made this an important regulation to include in the updated manual.

Missouri Code prohibition on open burning

Open Burning Requirements (10 CSR 10-6.045) makes it illegal to burn plastic or trade generated waste. This regulation was inserted in the updated manual to eliminate any confusion about proper disposal of pesticide containers.

Missouri Code prohibition on solid waste

Missouri statute 16 CSR 260.212 defines illegal dumps and codifies the illegal nature of dumping pesticide containers or other trash in the state. This is a common problem, and it is this type of crime that gives agriculture a bad public image. Proper disposal is a cost of doing business and must become the agricultural industry's standard operating procedure moving forward.

Summary

The updated Missouri Private Pesticide Applicator Reference Manual includes several technical details absent in previous manuals, incorporates applicable components of EPA's final C&T Rule, adds sections on Site and Timing Assessment and Professional Image, and incorporates new and previously omitted laws and regulations. Agriculture is in a new era where declining public opinion, anti-pesticide lawsuits, increasing regulations, and other issues such as water quality management create increasing challenges. It is imperative that agricultural producers and pesticide applicators follow labels and study the appropriate pesticide applicator reference manuals for their own safety, for public and environmental health, and to help build a positive image for the agricultural industry.