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A Newsletter From Virginia Tech Pesticide Programs

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Organic Pesticides

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If you have ever found yourself standing in the grocery store pondering the difference between conventionally grown produce and organic produce, you're not alone. Beyond produce, you may notice that many products are also labeled organic, including milk, beef, chicken, and eggs. A variety of factors influence purchasing decisions, such as visual quality, price, ingredients, and expiration dates. Some consumers are less focused on conventional versus organic, but others place strong emphasis on the organic label. What makes some consumers more likely to buy organically labeled products? A big reason – and misconception – is the belief that organic foods are grown without any pesticides.

What Does Organic Mean?

When a product states, "organically grown," that does not mean "pesticide-free." Organic production allows the use of pesticides; however, most pesticides allowed for organic growing practices come from naturally occurring substances found in plants, animals, or minerals. Typically, these substances are considered slightly to non-toxic to humans when used as directed; however, they are still considered pesticides. Keep in mind that the term "natural" does not always mean "safe." Some naturally occurring substances are very toxic, so even if you are using a naturally derived organic pesticide, you still need to practice safe use and follow the label instructions.

You may notice some products in the grocery store display a United States Department of Agriculture (USDA) Organic seal (fig. 1). The seal is allowed

only for agricultural operations that are certified to produce USDA organic commodities. USDA enforces rules and regulations for the production, handling, and labeling of all products it certifies as organic. Farms and businesses that are USDA organic certified must comply with the guidelines surrounding pesticide use and other production inputs.

Figure 1. The USDA Organic seal.

What Types of Ingredients Are Used in Organic Pesticides?

Organic pesticides include different ingredients based on the type of pest they are designed to control. Herbicides control weeds, insecticides control insects, and fungicides control fungi that cause plant diseases (fig. 2). Examples of ingredients used in organic-approved pesticides include:

- Herbicides – Plant oils, salt, soap salts, and several acid ingredients.
- Insecticides – Plant and mineral oils, soap salts, and biological ingredients like pyrethrins and spinosad.
- Fungicides – Sulfur, plant and mineral oils, soap salts, microorganisms, and some copper-based ingredients.

Interestingly, a few of these substances were some of the first pesticides ever used!

Figure 2. Examples of organic pesticides.

Are Synthetic Pesticides Allowed in Organic Production?

While USDA organic guidelines prohibit most synthetic pesticides, a limited number of synthetic products are allowed for organic production. Examples include:

- Sanitizers and disinfectants such as alcohols (ethanol and isopropanol), sodium hypochlorite (bleach), and hydrogen peroxide which is used for cleaning tools and equipment.
- Insecticides and fungicides such as insecticidal soaps, lime sulfur, horticultural oils, and copper sulfate.

The guidelines are quite stringent for USDA organic certified farms and businesses. For the home gardener, however, there are no rules or regulations governing pesticide choice, and deciding whether to use synthetic or organic pesticides is a personal matter.

Selecting and Using Organic Pesticides

If you are interested in using organic pesticides, you will find there are many options. As you browse pesticide products in your local garden center, look for labels that say "OMRI Listed" or "For Organic Gardening." OMRI stands for the Organic Materials Review Institute, which evaluates inputs (such as fertilizers, pesticides, and livestock care products) used in organic agriculture. The organic gardening logo was created by the USDA and the Environmental Protection Agency to indicate the pesticide is approved for organic use. If the pesticide is OMRI-approved or intended for organic growing, these logos will appear on the front panel of the label (fig. 3). Some products may have one or both logos.

Figure 3. The OMRI-approved logo (top) and the organic gardening logo (bottom).

Whether organic or synthetic, all pesticides are intended to kill or control pests and must be used with respect and caution. Read the pesticide label and follow the directions for use. Make sure the pest you intend to control and the intended application site are listed on the label. Use the recommended dose, wear the personal protective clothing and equipment listed, and take note of environmental hazards.

Reminder to Practice IPM

Integrated pest management (IPM) is highly encouraged in organic production. IPM is a holistic approach that considers multiple control methods to reduce pest damage while minimizing harm. Controls can be cultural, mechanical/physical, biological, and chemical. Depending on the pest, some control methods may be more effective than others. However, this multifaceted approach provides several pest management solutions while protecting people, animals, and the environment.

Protecting Wells and Groundwater From Pesticide Contamination

Kathleen Miller – Extension Associate

Introduction

Our actions as pesticide applicators have the potential to affect the water quality in our surrounding community. With more than 1.6 million Virginians relying on private wells or springs for their drinking water, it is imperative that applicators practice safe and responsible pesticide use.

Groundwater travels slowly through the pores and fractures in rock and sediment within an area known as the saturation zone. Wells are drilled into this zone to draw water for drinking, irrigation, and other essential uses. The significance of groundwater extends beyond human use. Groundwater quality influences the health of aquatic ecosystems because surface water and groundwater are interconnected through the hydrologic cycle.

Sources of Pesticide Pollution

Environmental pesticide contamination occurs through point source or nonpoint source pollution (fig. 4). Both can lead to ground water contamination. Point source pollution originates from a specific, identifiable source. Examples include:

- Pesticide spills during mixing or loading.
- Improper disposal of pesticide rinsate.
- Back-siphoning of pesticides into a water supply.

Nonpoint source pollution comes from a wide, nonspecific area and is often influenced by weather. Examples include:

- Broadcast applications to agricultural fields applied above the labeled rate.
- Erosion of pesticide-contaminated soil into surface water.
- Runoff from agricultural fields and residential areas.

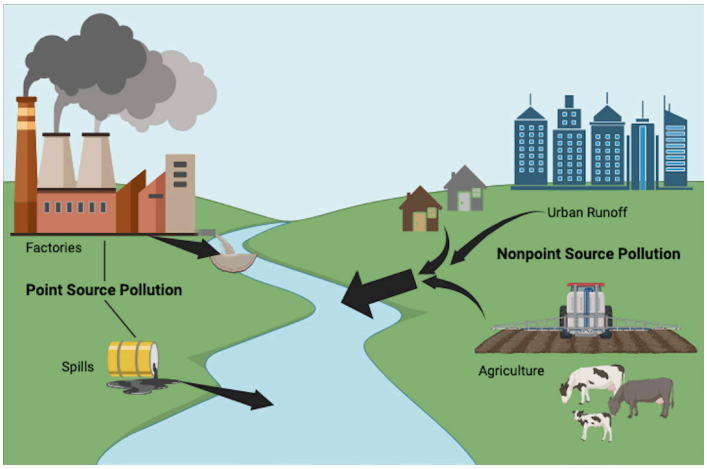

Figure 4. Point source pollution originates from a specific, identifiable source; whereas nonpoint source pollution comes from a wide, nonspecific area.

Factors That Affect Groundwater Contamination Risk

Once pesticides are released from a point or nonpoint source, three major factors determine how they move through the environment and whether they may contaminate groundwater:

1. Chemical properties of the pesticide.
2. Soil and geologic conditions at the pesticide release site.
3. Practices of the pesticide user.

Chemical Properties Affecting Pesticide Movement

A pesticide's likelihood of moving offsite in water depends on three chemical properties: solubility, adsorption, and persistence.

- Solubility is the ability of a pesticide to dissolve in a solvent (i.e., water).
- Adsorption is the process by which a pesticide binds to soil particles.
- Persistence is the ability of a pesticide to remain in the environment and retain its effectiveness for an extended period because it breaks down slowly.

Pesticides that are highly soluble, weakly adsorbed, and persistent are most likely to move into water.

Two main routes for pesticide movement in water are runoff, which occurs across the soil surface, and leaching, which occurs downward through the soil. Runoff from impermeable surfaces can carry pesticides into ditches, streams, ponds, and other surface waters. On permeable surfaces such as soil, grass, or gravel, water leaches downward and may transport pesticides into the groundwater system.

Runoff and leaching typically occur when pesticides are overapplied or when excessive amounts of water (from precipitation, irrigation, etc.) move across or through the treated area. If heavy precipitation is expected, all outdoor pesticide handling activities – including mixing, loading, application, cleaning, and disposal – should be postponed. Waiting for dry outdoor conditions reduces the potential for both runoff and leaching.

Soil and Geologic Conditions Affecting Pesticide Movement

As groundwater travels through layers of sediment, the earth acts as a natural filter. However, the depth, flow path, and travel time of groundwater vary widely, and filtration effectiveness depends on the underlying geology. Virginia's five distinct geologic regions create diverse surface and groundwater pathways making it important for applicators to understand local soil and geologic conditions.

The three major soil characteristics affecting pesticide movement are texture, structure, and organic matter content.

- Soil texture indicates the proportion of sand, silt, and clay particles in the soil. Soils with a coarser texture (e.g., sandy) allow water to rapidly move through the matrix.
- Soil structure describes the arrangement of soil particles. Compact soils are less permeable compared to soils with a more porous structure.
- Soil organic matter content influences the soil's ability to hold water. Soils with higher organic matter content can hold water longer than those with a lower content.

Soils that are coarse-textured, highly porous, and low in organic matter allow water (and potentially pesticides) to move quickly downward, increasing leaching risk.

Local geological characteristics also affect groundwater vulnerability. Regions with karst topography are highly susceptible to groundwater contamination because sinkholes and caverns serve as a quick connection between surface and groundwater, allowing little time for pesticides to be filtered or break down. In contrast, regions characterized by high clay content generally have a lower risk of groundwater contamination.

The depth to the water table also matters. Water tables are typically closer to the soil surface in spring and fall and deeper during summer. Humid regions have shallower water tables than drier regions, increasing the potential for contamination.

Applicator Practices and Groundwater Protection

As a certified pesticide applicator, you are responsible for handling pesticides safely to prevent any possibility of contamination. The best way to ensure safe pesticide use and protect groundwater is to follow all pesticide label instructions exactly. Take special notice of environmental hazards listed within the "Precautionary Statements" section of the product label. Any additional safety measures regarding groundwater protection will be listed there (fig. 5).

ENVIRONMENTAL HAZARDS

This pesticide is toxic to aquatic invertebrates. **DO NOT** apply directly to water, to areas where water is present or to intertidal areas below the mean high-water mark. **DO NOT** apply when weather conditions favor drift from treated areas. Runoff and drift from treated areas may be hazardous to aquatic organisms in neighboring areas. **DO NOT** contaminate water when disposing of equipment washwaters or rinsate.

[redacted] can travel (seep or leach) through soil and can enter groundwater which may be used as drinking water. [redacted] has been found in groundwater. Users are advised not to apply [redacted] to sand and loamy sand soils where the water table (groundwater) is close to the surface and where these soils are very permeable, i.e., well-drained. Your local agricultural agencies can provide further information on the type of soil in your area and the location of groundwater.

Product must not be mixed or loaded within 50 feet of intermittent streams and rivers, natural or impounded lakes and reservoirs. Product must not be applied within 66 feet of points where field surface water runoff enters perennial or intermittent streams and rivers or within 200 feet of natural or impounded lakes and reservoirs. If this product is applied to highly erodible land, the 66 foot buffer or setback from runoff entry points must be planted to crop, or seeded with grass or other suitable crop.

Product must not be mixed or loaded, or used within 50 feet of all wells including abandoned wells, drainage wells, and sink holes. Operations that involve mixing, loading, rinsing, or washing of this product into or from pesticide handling or application equipment or containers within 50 ft. of any well are prohibited, unless conducted on an impervious pad constructed to withstand the weight of the heaviest load that may be positioned on or moved across the pad. Such a pad shall be designed and maintained to contain any product spills or equipment leaks, container or equipment rinse or wash

Figure 5. The "Environmental Hazards" section of the pesticide label lists safety precautions for groundwater protection.

Before making an application, inspect the site for sensitive areas such as wells, surface water, and

sinkholes, and implement safeguards to prevent contamination. When filling spray tanks, protect the water source by maintaining an air gap between the hose and the spray mixture to prevent back-siphoning. Virginia regulations also require a check valve, anti-siphoning device, or backflow preventer when filling from a water supply. Always mix and load pesticides away from sensitive areas to ensure that any accidental spills cannot flow toward drains, wells, or water sources. Installing a containment pad at the mixing and loading site provides an additional layer of protection.

Blast From the Past

Stephanie Blevins Wycoff – Extension Associate

Virginia Spray Bulletin

The Virginia Spray Bulletin (fig. 6), known today as the Spray Bulletin for Commercial Tree Fruit Growers, has a long-standing history within Virginia Tech and Virginia Cooperative Extension.

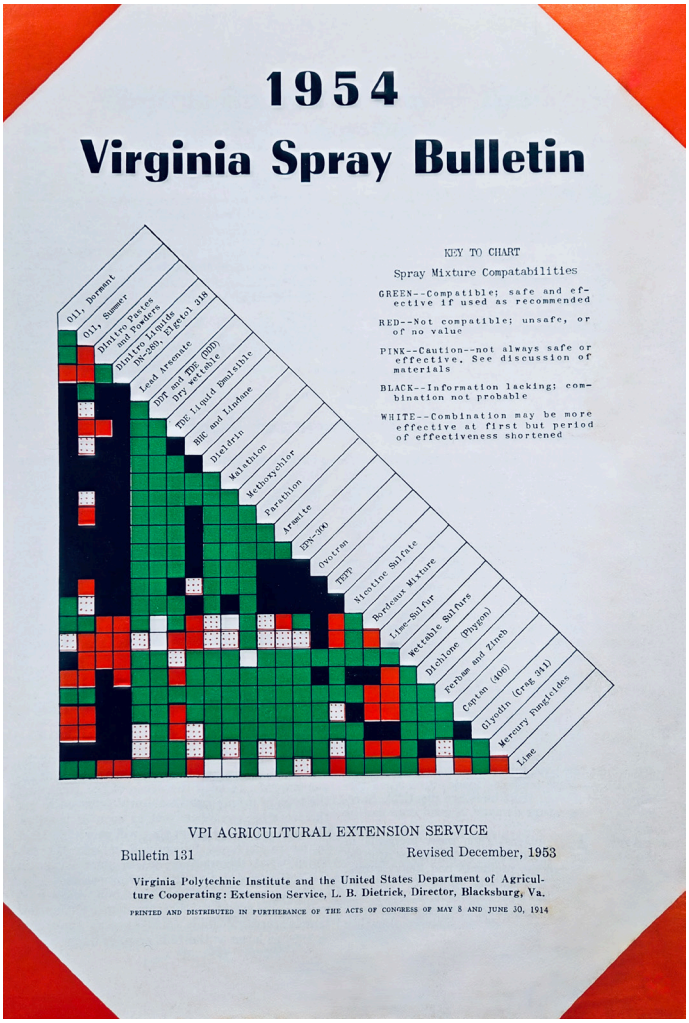

Figure 6. Virginia Spray Bulletin, 1954.

This guide contains recommendations and best management practices for pesticide use in orchards. The bulletin is a living document that has been in use for over 100 years. Early Virginia Spray Bulletins were often reproduced and included in Virginia Department of Agriculture Bulletins and popular press, like The Southern Planter (Roane, 2003). Today, the bulletin is a multi-state collaboration of specialists from Virginia Tech, West Virginia University, and University of Maryland who update this publication annually to help growers manage pests of tree fruit. Special thanks to Dr. Douglas Pfeiffer for sharing the 1954 version of this bulletin with VTPP.

Reference

Roane, C. W. (2003). A history of plant pathology in Virginia (1888-1997). University Archives, Virginia Tech.

Program Updates

VTPP Updates

2026 IPM Workshop and Pesticide Safety Educators Workshop

Mark your calendars for the 2026 IPM Workshop and Pesticide Safety Educators Workshop (PSEW), our annual in-service trainings for VCE, Agriculture and Natural Resources agents and specialists. The IPM workshop will be held on Wednesday, Sept. 2 and Thursday, Sept. 3 at the Hotel Roanoke. PSEW will overlap with the IPM workshop and be held Thursday, Sept. 3 and Friday, Sept. 4 at the same location. The IPM workshop is designed to equip agents with relevant and practical IPM information they can incorporate into their regular programming, as well as provide resources for developing more specialized IPM programming in their counties. PSEW updates agents and specialists on pesticide applicator training procedures and practices, as well as recognizes the outstanding teamwork enjoyed between the Virginia Department of Agriculture and Consumer Services, Office of Pesticide Services (VDACS-OPS), VCE and VTPP. Registration and information for both events will be available later this summer.

VCE Recognition Awards

VDACS-OPS is opening the nomination period for the Virginia Cooperative Extension Recognition Awards Program for excellence in pesticide safety education programming. Agents who conducted programs between April 1, 2025, and March 31, 2026, may be

nominated for an award. Award categories include Outstanding Pesticide Safety Education Program and Environmental Programs (pesticide collection and plastic pesticide container recycling). Nominations are due by June 30, 2026. For more information and the due by June 30, 2026. For more information and the nomination packet, visit the VTPP website or contact Rachel Parson at rparson@vt.edu or 540-231-4639.

VDACS Update

Pesticide Collection Program
Virginia's Pesticide Collection Program helps agricultural producers, licensed pesticide dealers, pest control companies, golf courses, and homeowners safely dispose of unwanted pesticides. The program is managed by VDACS in collaboration with VCE and the Division of Consolidated Laboratory Services.

Since its launch in 1997, the program has successfully collected and destroyed over 1.9 million pounds of pesticides. Funded by pesticide fees collected by VDACS, it operates without using general fund tax dollars. The Pesticide Collection Program is available at no cost to eligible participants.

How the Pesticide Collection Program Works
Participants are required to transport their unwanted agricultural and commercial pesticides to a central collection site, where a hazardous waste disposal contractor packages the pesticides for proper disposal. If a participant is unable to safely transport the pesticides, the program may arrange for the pesticides to be containerized for transport.

Virginia's Pesticide Collection Program is organized into five regions, with each region hosting a collection event annually. Once all five regions have been served, the program begins a new cycle.

How to Participate
1. Complete the pre-registration form.
2. Return the pre-registration form 30-days before the collection event to: Marlene Larios at marlene.larios@vdacs.virginia.gov or fax 804-371-2283.
3. Select the pesticide collection location and date for drop-off.

Resources and Questions
Eligible participants are encouraged to contact their local Virginia Cooperative Extension office or VDACS-OPS for additional information. A list of pesticide collection event dates, times, locations, and participating localities is available online.

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