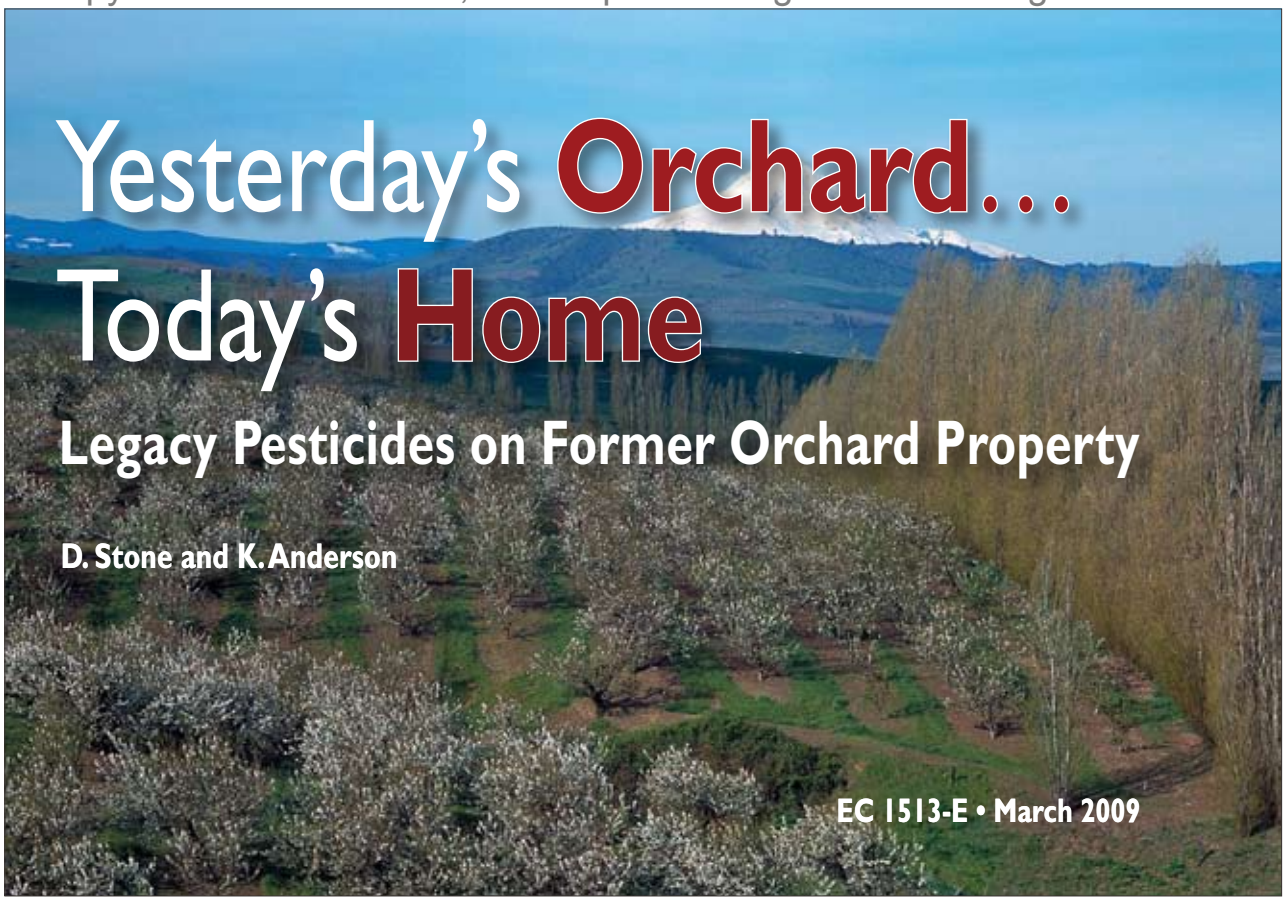

Yesterday's Orchard... Today's Home

Legacy Pesticides on Former Orchard Property

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Oregon has a rich history of orchard cultivation across the state. Today, orchards continue to be an important part of Oregon's economy and contribute to a healthy and balanced diet for the public. But, with the growth of residential development,lands that once contained orchards are being converted into homes and neighborhoods. Because of the history of pesticide use on orchard crops, there are issues to consider if you are a potential buyer of, or currently live in, a home on a former orchard.

In the past, orchard managers typically used pesticides that persisted a very long time in the environment. Some residues are still found at high levels today. The two most common pesticides used in orchards historically were lead arsenate and DDT. These pesticides are no longer registered for use in the United States. The pesticides applied in orchards today are less persistent in the environment.

Q How do I know whether an orchard was on the property?

Depending on the property location, it may be relatively easy to determine whether an orchard used to be there. Sources of information on past land use include local planning and zoning agencies, the current property owner, long-time residents in the neighborhood, and the agricultural agent in the OSU Extension office serving that county.

Generally:

- If the property is on current or recent federal or state land, it is unlikely to have contained an orchard.
- If the property elevation is high (above 3,000 feet), it is unlikely that orchard trees grew there.

If you discover that an orchard was on the property, ask additional questions including:

- What years did the orchard operate?
- Do records of pesticide use exist?
- Were pesticides stored on the premises? Is there any record of a spill, fire, or cleanup?
- What is the source of drinking water? If it is a well, can you locate a copy of the well log to determine depth, casing, and year drilled?

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Q What pesticides were commonly used in orchards?

If the property contained orchards that date back to the early 1900s, it is likely that arsenic-containing compounds were used to control pests. In the 1800s, the two major types of pesticides that contained arsenic were called Paris Green (a mixture of copper and arsenic) and London Purple (a mixture of calcium, arsenic, and organic matter). These pesticides were used extensively on fruit trees in Oregon until the late 1800s, when lead arsenate came to be preferred, especially in apple orchards, because of its excellent control of codling moths, a major pest of apples.

In the 1940s, the "legacy" pesticides, especially DDT, began to replace lead arsenate in orchards. Key legacy pesticides are DDT, chlordane, toxaphene, aldrin, dieldrin, and endrin. It is likely that their metabolites, or breakdown products, would be detected today. DDT and these other legacy pesticides were banned in the United States beginning in 1972.

If an orchard recently grew on the property, modern-day pesticides may have been used, including insecticides, acaricides (to control mites), herbicides, and fungicides. These chemicals tend to be much less persistent than arsenic, lead, and the legacy pesticides listed above.

If you have a well located on a former orchard that is used for drinking water or irrigating fruits and vegetables, consider taking these steps:

- Identify which pesticides were used on the property, and
- Contact the National Pesticide Information Center (1-800-858-PEST) to discuss which of these pesticides, if any, are likely to be found in well water.

Q What happens to these pesticides in the environment?

The behavior of pesticides in the environment is governed by their chemical properties. For example, compounds with low boiling points, such as gasoline, evaporate quickly into the atmosphere. In contrast, compounds with high boiling points — for example, salt or arsenic — are very soluble in water and disperse into ground and surface waters. Compounds with high lipid (fat) solubility, such as oil or DDT, are only slightly soluble in water and tend not to be dispersed or transported readily by water.

Figure 1 illustrates the movement of chemicals in air, soil, and water. The natural environment is more complicated, of course, than this illustration can indicate, and it is difficult to predict the precise movement and breakdown of a chemical on a specific property. This information can be obtained, however, through environmental sampling.

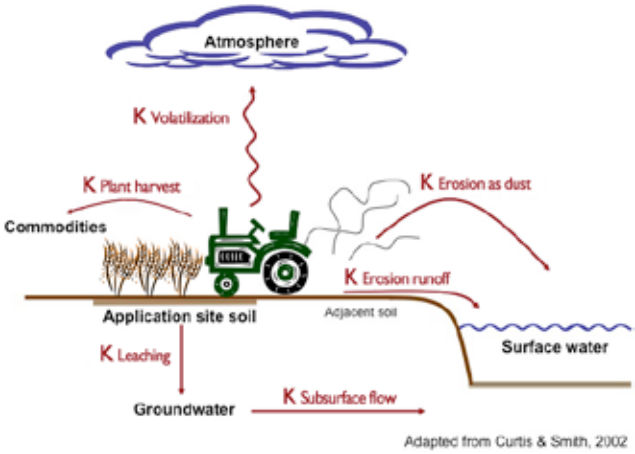

Figure 1. Movement of chemicals in the environment.

Q In sampling for residues, what should I consider?

Before you sample, contact an analytical laboratory; see OSU Extension publication EM 8677, Laboratories Serving Oregon, http://extension.oregonstate.edu/catalog/html/em/em8677/ for details. Each laboratory has guidelines and specific instructions for sampling, appropriate containers to use, and shipping. Some laboratories may have sampling bags or jars they prefer you to use, depending on the analysis. Soil and water can be tested for a variety of trace metals, such as lead, and for trace organic compounds, such as pesticides; however, not all laboratories perform all analytical tests, so you may need to call around to find an appropriate analytical laboratory for your situation.

The sampling technique is the most important step in any laboratory analysis. Sampling location also is important. Drainage areas, low-lying areas, and property boundaries are likely sampling spots. Other possible sampling locations are areas where pesticides were stored, mixed, or disposed of on the property; these areas are more likely to have pesticide residues.

Sampling should be representative of your environment, which may mean taking more than one sample on your property. If you have only one well, then a single water sample is adequate. The soil samples should reflect your intended use for that area. For example, surface soil samples may be adequate in many cases, but a garden should be sampled to represent the entire root zone for vegetables (typically 8–12 inches deep). Areas to examine for contamination include children's play areas, high-traffic walkways, soil near a building's air intakes, and areas where pets stay.

Q How could my family be exposed to residues?

The three potential exposure pathways are ingestion, inhalation, and skin contact (**Figure 2**).

Ingestion is the most important pathway and can occur in several ways, including:

- Accidentally eating soil containing residue, such as during the hand-to-mouth activity typical for infants and children
- Drinking well water contaminated with pesticides
- Eating certain vegetables and crops grown in soils with high levels of pesticide residues

The two other exposure pathways (skin contact and inhalation) typically are less relevant than ingestion from a health standpoint because arsenic doesn't go through the skin, and it will not vaporize at room temperature.

Chronic, or long-term, exposure to pesticide residues may have adverse health effects. Arsenic-contaminated drinking water consumed over long periods increases the risk of certain types of cancer. Exposure to elevated levels of lead, especially for children, can result in problems with learning, memory, and behavior. Many of the legacy pesticides, such as DDT, have been associated in some studies with various adverse health outcomes.

Figure 2. The three exposure routes for a chemical in the environment.

Q If I find elevated pesticide residues, what can I do?

The Oregon Department of Environmental Quality can help you determine whether a pesticide residue in your sample is elevated (i.e., above background levels or at levels that may be a health concern). It is important to understand that the presence of DDE (the primary breakdown product of DDT)—or of other pesticides or lead arsenate residue—does not mean that a health effect is likely or even possible. Impacts to health require sufficient exposure to the residue and depend on numerous complex factors.

You can minimize your exposure to residue in bare soil by:

- Using grass, paving, bark chips, or other surface barriers to prevent contact with the exposed soil and to minimize dust, which could be inhaled
- Removing shoes before entering the home to reduce the amount of residue tracked inside

If you have a well, you can have it tested for metals and legacy pesticides. The Oregon Department of Human Services' Drinking Water Program has a list of accredited labs in Oregon that can test drinking water and domestic wells for real estate transactions. For a copy of the list, call 971-673-0405 or visit http://www.oregon.gov/DHS/ph/gm/tests.shtml.

Besides getting a test for legacy pesticides, consider also testing for nitrates if the well is on or near former agricultural land, including a former orchard. Nitrate

testing is important especially if you have infants or young children. Areas of Oregon that have issues with nitrate contamination in groundwater include parts of the southern Willamette Valley, the Umatilla Basin, and a region of Malheur County.

If you detect pesticides, nitrates, or other contaminants in your well water, there are various treatment options for your home. Learn more from the Oregon Drinking Water Program (see contact information above) or from the National Sanitation Foundation at 1-800-NSF-MARK (800-673-6275).

If you grow fruits and vegetables and are concerned about residues, you can build raised beds and bring in clean soil from another location. This is especially important if you plan to grow root vegetables and leafy vegetables, which take up more arsenic and lead than fruits and other vegetables. Because the plants take up residues directly, residues cannot be removed by washing or scrubbing.

Photo: Lynn Ketchum, OSU Extension Service

For more information

The Oregon Department of Environmental Quality (DEQ) provides guidelines on developing former agricultural lands for residential uses. For a copy of the guidelines, "Guidance for Evaluating Residential Pesticides on Lands Formerly Used for Agricultural Production," call DEQ's Land Quality Division at 800-452-4011 (toll free) or download from http://ww.deq.state.or.us/lq/pubs/docs/cu/GuidanceEvalResidualPesticides.pdf

For information on pesticides, contact the National Pesticide Information Center at 800-858-7378 (toll free) or online at http://www.npic.orst.edu/ NPIC operates under a cooperative agreement between Oregon State University and the U.S. Environmental Protection Agency.

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