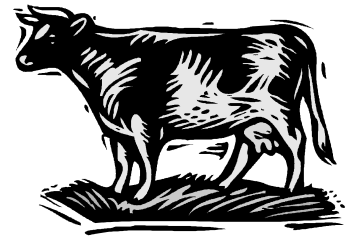


# Muddy Hands

Soil and Water Information for Educators Brought to You by the Lake County Soil and Water Conservation District



## Growing Agricultural Knowledge

While our network of freeways and four lane roads may lead you to a different conclusion, Lake County is still an agricultural county. In 2007, the most recent data available, Lake County's farmers sold over \$88 million in farm products. We were first in the state and 38th in the nation in production of nursery and greenhouse products. Lake County also has a high proportion of fruit and vegetable crops, and Christmas tree sales.

Historically, Ohio was settled by farmers. People came west because the land was inexpensive, and Ohio was well-connected to New York and New Orleans via water routes. After the completion of the Erie Canal in 1825, an Ohio farmer could put his product on a boat and ship it anywhere in the world. Early crops included grain, hay, hemp and tobacco, as well as the fruit for which the Great Lakes region was to become famous.

As the Industrial Revolution reached the Midwest, factories started to spring up near major ports in Ohio. However, these factories were also shaped by the farming communities around them. Early industry in Ohio was in shipbuilding (to transport agricultural and mineral resources), farm equipment, and farm products such as tobacco.

The growth of cities relies on the availability of both land and food. As Cleveland, Akron and Youngstown grew, it became harder for city residents to have their own cow or chickens or garden. This gave the farmers a nearby

population where they could market fresh farm products. A dairy farmer could get up early, milk his herd, and take the milk and cream into town to sell to urban residents, or send it in on the interurban railroad. (The modern farmers' markets are a return to the idea of local growers selling their produce to their neighbors.)

At the same time, people who lived in cities often looked to escape the heat and smoke in the summer. The farmland of Lake and Ashtabula counties was breezy, with the lake nearby for the hottest days. To some extent, this hasn't changed, as many Lake County residents live in this area because of the plentiful open, green spaces, recreation opportunities, and the ability to commute to jobs in Cleveland.

Now, local agriculture is again in the news, as we are all being encouraged to eat locally. Fortunately, in Lake County and northeast Ohio, that leaves us with great diversity on our plates, especially in late summer and into the fall.

You can incorporate agriculture into your science and social studies curricula. Challenge your students to pack their lunches with only local foods, or to bring in a locally grown snack. Have a tasting that compares local apples to grocery store apples, or that samples unusual varieties of peppers. Invite growers in to talk about how they plan their business and what subjects from school they use in their work - though you will probably have to schedule this between Christmas and March when farmers are not as busy.

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Did you know that Lake SWCD offers numerous **classroom programs** tailored to the Ohio Standards in science and social studies?

Our programs are **free** and can be scheduled anytime from October through April.

The newest educational tool here at the District is a **Drinking Water and Waste Water**

**Treatment model.** This tabletop display uses everyday food items to demonstrate how we get clean water and how we process sewage.





## Tasty Classroom Activities

### Windowsill Agriculture



Not every school can take a field trip out to visit a farm. Why not turn your classroom into a small-scale farm? If you have a window (whether or not it gets direct sun) you can have a window vegetable garden. All you need are some containers with drainage, soil mix, and seeds.

To keep impatient students interested, you should select plants that are quick to

germinate, and produce edible parts. This will also keep you from having to maintain plants over holiday breaks. Radishes and lettuces are a great choice for the classroom. Onions, beans, and cucumbers will also sprout quickly, but beans and cucumbers will need a lot of room to grow, and need pollinators to fruit. Older students can set up experiments about growing mediums, watering and sunlight regimes, or compare and contrast varieties of a plant. Younger students can learn about parts of the plant as they appear, and snack on the products.

### Food Science - Create your own Sensory Panel

A sensory panel is a group of people who test food by consuming it. They are trained to compare textures, flavors, aftertaste and mouth feel. Sensory panels are used to develop and refine products. They test new flavors of potato chips or candy or decide if low-fat ice cream is flavorful enough. You can set up a sensory panel in your own classroom.

**Threshold of taste:** how much is enough, how much is too much?

Students will perform a serial dilution, and use their diluted products to determine their threshold for tasting something. The class can then compile their data and use it to review fractions and percentages, or graphing.

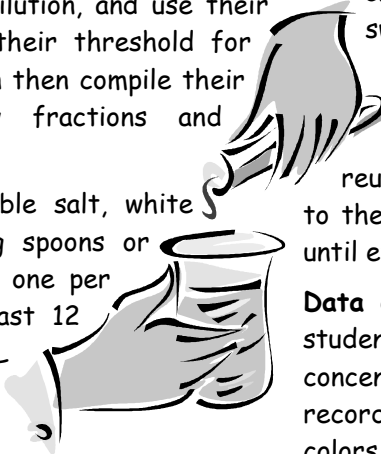
**You will need:** Table sugar, table salt, white vinegar, distilled water, stirring spoons or rods, cups (one per taster, plus one per compound), cotton swabs (at least 12 per taster), gram scale, 10 mL graduated cylinder, 100 mL graduated cylinder.

**To make serial dilutions:** Start with 90 mL of distilled water and 10 g of sugar. Stir these until the sugar is completely dissolved. This is a 10% sugar solution. Measure out 10 mL of this solution and pour the rest into a cup labeled "10% sugar solution". Take the 10 mL of 10% solution and add 90 mL of water. This is a 1% sugar solution. Again remove 10 mL and pour the rest into a labeled cup. Follow the same steps to create a 0.1% solution and a 0.01% solution. Be sure to save 10 mL of the final solution in case you need to

make further dilutions. Do the same with the salt and the vinegar.

**To conduct the tasting:** Have each student set up a data table. Across the top they should have columns for "sugar," "salt," and "vinegar." Down the left side they should have 10%, 1%, 0.1%, etc. with space for further dilutions if necessary. Give each student a cup of distilled water, and a supply of cotton swabs. Starting with the 10% solution, have each student dip a clean, unused cotton swap into the cup and use the swab to smear the solution all over their tongue. If they can taste something, they put an X in the appropriate box on their data sheet. Make sure used cotton swabs are discarded and not reused. Work from the most concentrated solution to the weakest, and make more dilutions if necessary until every student can no longer taste a flavor.

**Data evaluation:** Recreate the data table so all the students can see it. Have each student report the last concentration they could taste for each flavor. Also record gender (perhaps using hash marks of different colors for girls or boys). The general population statistics indicate that girls can taste weaker solutions than boys and younger people can taste weaker concentrations than older people. Food scientists use this type of information to determine how much of an additive they can place in a product without affecting flavor. For instance, Omega-3 fatty acids tend to have a fishy or grassy flavor. Since consumers want Omega-3 fats because of perceived health benefits, food marketers like to add them to food if the flavor is not affected.



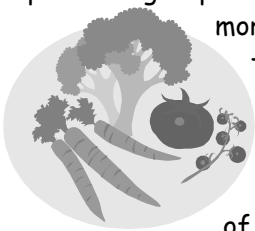


## Edible Plant Anatomy

What is a fruit? Why is a vegetable a vegetable?

It is probably a good thing that we tend to lump "fruits and veggies" together when we're advising kids about nutrition and balanced diets. But what are we saying when we talk about a 'vegetable'? What makes a fruit a fruit? In culinary terms, a fruit belongs in a pie, and a vegetable belongs beside a main dish. But botanically, several of our well-know vegetables are really fruits, and a few things we treat as fruit are really vegetables.

If you ask a botanist, he or she will tell you that a fruit is a reproductive structure that contains a seed. Botanically, a simple salsa of tomatoes and peppers is actually a fruit salad. Squash, pumpkin, eggplant, and cucumber are also fruits. Botanical fruits also appear in the 'grains' food group in the form of corn, and in the 'proteins' group as beans. Would lima beans or peas be more popular with kids if they were thought of as fruits?



So if fruits have seeds, what are vegetables? Basically the term is a catch-all for any other edible parts of plants. These include stems (celery, rhubarb), leaves (spinach, lettuce, chard), flower buds (squash, broccoli, cauliflower), and root structures (carrots, radishes, potatoes).

OK, botany lecture aside, what does this mean for the classroom? Try teaching about plants by having your students sort pictures of food into categories based on their traits. Assign plant part names (stem, fruit, leaf, etc.) to each part of the room and have students place each food into the correct place. For older students, they can identify different types of fruits as well.

## Agricultural Roots

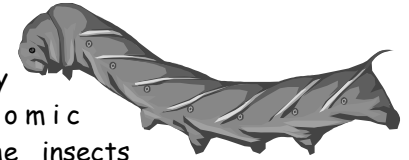
Farming isn't just about food. Chances are many students are wearing an agricultural commodity right now. Cotton in denim jeans, t-shirts and sweatshirts, and wool in sweaters, jackets, and stocking caps are all farm products. Even the paper you are reading this text from is likely a silvicultural (tree farming) product. Challenge your students to identify as many farm products as they can in their classroom or their home.



## Career Corner

### Economic Entomology

Entomologists study insects. Economic entomologists study the insects that affect crop production. This could include working with beneficial insects such as pollinators—finding ways to promote wild populations or domesticate valuable insects. Entomologists also work to control outbreaks of harmful insects that can decrease crop yields. Classic examples include boll weevils and grasshoppers, but many native and non-native insects threaten crops. Economic entomologists can engineer pesticides that target a specific insect, or work to develop Integrated Pest Management (IPM) plans. Research is often done in both the lab and the field. For students looking at a career in entomology, biology and biochemistry are good places to start as an undergraduate.



### Food Science

Did you know that people get paid to 'play with their food' all day? Food scientists figure out how to make 'low carb' cereal, high protein snack bars, and flavored mozzarella cheese. They also have the important job of keeping our food supply safe. Research done by food scientists establishes the 'Best if used by' dates on your dairy and egg products, and figures out how to keep your bread from molding. They also develop new uses for agricultural products and byproducts. Perhaps the best part of being a food scientist is the sensory analysis panels. These scientists explore flavor, aftertaste, texture, and other traits of food products - by eating them! For students who are interested in a career in food science, chemistry, and molecular biology are good backgrounds.

### Farming

No, seriously! Agriculture is a viable career option even today, even if your parents aren't farmers. Many older farmers are looking for younger people to take over their operation, and consumers are more interested in locally grown produce than ever before. Farmers work hard, but there are great rewards for people who like to be outdoors and work with their hands. A future farmer should have some background in biology and soil science, and also some business or marketing savvy.

## Muddy Hands

### Stormwater Sidebar

On the surface, urban runoff and agriculture might not seem related, but if you step back and take a look at an entire watershed, land use planning is an important part of managing stormwater. Agricultural areas are places where water can soak into the ground. That means that less water from each rain event ends up flooding our rivers and streams.



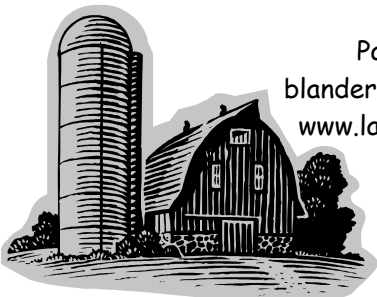
Unfortunately, in some parts of Lake County, development and agriculture exist in close quarters. This can cause disagreements on both sides of the fence. Most urban runoff picks up pollutants as it runs across parking lots and other impervious surfaces. These pollutants end up in surface and groundwater, which is often the source of irrigation water for farmers.

Farmers also have a role to play in preventing nonpoint source pollution. Managing soil resources to diminish erosion risks includes simple techniques such as using cover crops, and maintaining buffer areas, or vegetated strips between crop plantings and ditches or streams. Irrigation runoff can be controlled by using better technology to reduce the amount of watering. And, perhaps most importantly where there are animals on a farm, a thoughtful plan for managing the amount of manure each animal will generate will keep nutrients and pathogens out of our streams.

We all live in the same Lake Erie watershed - we need to work together to protect water quality.

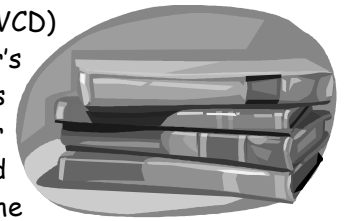
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### Free Books!

Every year, Ohio Federation of Soil and Water Conservation Districts (OFSWCD) holds a Summer Supervisor's School. This event helps educate Soil and Water employees and elected officials. As part of the commitment to education, participants are asked to donate books about natural resources. This year, Summer Supervisor's School was held in Northeast Ohio, so Lake SWCD received a stack of books to give away! If you would like some of these books for your classroom or school library, write a short paragraph or two telling us how you'd like to use these books. Most of the titles are for beginner readers, but there are a few appropriate for older elementary students or middle school science class, so be sure to let us know what age level(s) you are interested in. Please submit your request by e-mail to [blanders@lakecountyohio.gov](mailto:blanders@lakecountyohio.gov) or by mail to Beth Landers, Lake SWCD, 125 E. Erie St, Painesville OH 44077. Deadline is April 2nd.



### Cross-curriculum Connections.

While agriculture is usually considered a science topic, it is also a very important factor in why the United States defended the wilderness of Ohio during the War of 1812. After the Northwest Territory was secured, Ohio was crossed by locks, dams, and canals that carried people into Ohio and their goods out again.

Agriculture also shaped who came to Ohio and where they settled when they got here. Farmers from Germany and Ireland settled in wide, fertile valleys and developed small farming communities. Each of these Ohio communities resembles the nation the early settlers came from. Coal miners and brick and glass makers were more likely to settle in the Appalachian foothills of southeast Ohio. People from the eastern United States came to the Western Reserve and built new towns that resembled their old towns. To this day, places like Painesville and Chardon resemble small New England towns.

No matter where you set foot in the landscape of Ohio, chances are pretty good that you are within a few hundred feet of an agricultural feature, either a relic from the past, a modern working farm, or part of the distribution system for agricultural products.