



Soil Testing: What It Is and What It Does

by : W.O. Thom, K.L. Wells, L.W. Murdock, and F. Sikora, Department of Agronomy

What Is Soil Testing?

Soil testing is a special chemical analysis that provides a guideline for lime and fertilizer needs of soils when considered in conjunction with post-fertilizer management and cropping history. A soil testing service is available to every Kentucky citizen through the University of Kentucky Agricultural Experiment Station and Cooperative Extension Service. There is a small service charge to cover the cost of handling and laboratory operation.

Why Soil Test?

Different soil types, different fields, and often areas within the same field vary in the availability of plant nutrients. Also, a field may contain a low level of one nutrient and a high level of another nutrient. Such variations are usually due to differences in:

- previous fertilizer and lime applications
- cropping history
- nutrient contents of the parent materials, and
- losses of surface soil through erosion.

Soil testing is the best way to identify these differences and to adjust liming and fertilization practices.

Soil test results should be included in a record system for each production field on a farm, along with the amounts of lime and fertilizer applied each year, the crops grown, and the yields obtained. In an effective sampling program, each production field should be tested at least every three to four years. Some intensive cropping systems should be sampled every two to three years. Annual sampling is preferable for high cash crops, e.g., alfalfa and double-crop silage production.

Only through such a record system can fertility and/or production levels be monitored over time. This is valuable information when making decisions on fertilizer investments and production practices.

How Does It Work?

Soil samples, carefully collected according to instruction (see Kentucky Cooperative Extension Service publication AGR-16, Taking Soil Test Samples), are delivered with the necessary information to the local county Extension office. Samples are then sent to the laboratory for testing. After considering soil test levels, past fertilization and liming, cropping history, and the crop to be fertilized or limed, county Extension agents base their lime and fertilizer recommendations on guidelines in Kentucky Cooperative Extension Service publication AGR-1, Lime and Fertilizer Recommendations.

For correct lime and fertilizer rates, the soil test must be calibrated with crop yield responses to lime and fertilizer applications. Personnel from the University of Kentucky Department of Agronomy annually conduct field experiments throughout Kentucky to provide a basis for the guidelines published in AGR-1.

Recommendations in AGR-1 apply only to test levels obtained in laboratories under supervision of the University of Kentucky College of Agriculture and should not be used for soil test values from any other laboratories where testing procedures may differ.

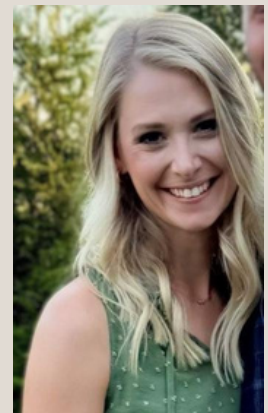


Placing soil sample into soil sample bag
Photo: Mary Dossett, Horticulture Agent



Mary Dossett

*Agent for Horticulture
Advisor for McCracken County
Extension Master Gardeners*



Savannah Gilbert
Horticulture Assistant

<https://mccracken.ca.uky.edu/>

What Tests Are Made? □

- Routine Soil Test-All samples tested by the University of Kentucky labs are routinely analyzed for pH (water), pH (buffer), and extractable phosphorus, potassium, calcium, magnesium, zinc, and an estimated CEC. □
- Greenhouse Saturation Test-This special test includes pH (water), pH (buffer), nitrate-nitrogen, soluble salts, and extractable phosphorus, potassium, calcium, and magnesium. □
- Other Special Tests-See your county Extension agent for details.

Why Is Additional Information Needed?

Along with the soil sample, you need to submit the appropriate information form (available at your county Extension office) for either:

- agricultural soils
- home gardens, lawn, and turfgrass
- commercial horticultural crops, or
- greenhouse crops.

Your county Extension agent needs the information on the appropriate form to make recommendations.

What about Nitrogen Tests?

Neither the amount of organic matter nor the amount of nitrate has proven to be a reliable indicator of available nitrogen for field crops grown under Kentucky conditions. For this reason, present nitrogen recommendations for field crops are based on past cropping history, soil management, soil properties, and experimental data.

The University of Kentucky Soil Testing Lab does provide an optional organic matter and a greenhouse saturation test (the latter includes nitrate-nitrogen). These tests are most useful for greenhouse, landscaping, and specialty crops. However, the nitrate-nitrogen results from this test may be used in unusual situations to help determine if large amounts of nitrogen have been lost during extended wet periods or flooding, or if nitrogen levels are adequate for crop growth from heavily manured fields.

More recently, some states have used soil nitrate concentration when corn is 8 to 12 inches high to adjust N fertilizer rates at sidedressing. Kentucky has limited research data to demonstrate consistent results from this testing. The greatest opportunity for this test may be in fields receiving manure or organic N nutrient sources.

What about Tests for Secondary Nutrients and Micronutrients?

Predicting deficiencies for secondary nutrients and micronutrients from a soil test is much more difficult than for the major nutrients. Most micronutrient tests and recommendations were developed for specific soil types and conditions, and it is difficult to adapt these tests to a wide range of soil types and other conditions.

Calcium and magnesium levels are determined routinely in the Soil Testing Lab. Calcium deficiency in field crops has not been observed in Kentucky. Many field trials have been conducted with applications of magnesium on several Kentucky field crops. These trials have shown only slight yield increases at a few locations where testing has indicated extremely low magnesium levels and have shown no response to additional magnesium at locations with low magnesium soil tests. However, the soil test will indicate when the possibility of a response exists.

The **zinc** test can detect low soil levels but does not always reliably determine when crop yield responses will occur in a specific year. As in the case for many of the micronutrients, weather and soil conditions strongly influence the availability of soil zinc to the plant. Field trials in Kentucky have indicated that low zinc test levels in Central and South Central counties are more likely to indicate zinc deficiency (corn and snapbeans) than in other areas of the state. Low zinc levels combined with high phosphorus and pH levels are usually associated with zinc deficiency. Guidelines for interpreting the zinc soil test for corn are listed in AGR-1.

Deficiencies of **boron, molybdenum, and manganese** in certain crops do exist in some areas of Kentucky. Because of the rather specific crop needs for boron, molybdenum, or manganese, producers should contact their county Extension agent about the need for these micronutrients.

For field crops grown on Kentucky soils, the addition of iron, copper, or sulfur has resulted in no measured yield increase. The University will continue to monitor these nutrients in crops and soils but will not offer testing until economic yield or quality increases have been shown.

What Is Cation Exchange Capacity?

Because of the negative charges in their chemical structure, most clay minerals and soil organic matter have the ability to attract or retain positively charged ions (cations) of calcium (Ca⁺⁺), magnesium (Mg⁺⁺), potassium (K⁺), aluminum (Al⁺⁺⁺), hydrogen (H⁺), and others. Attraction between the clay minerals and these ions is weak enough that an exchange between ions can occur; those ions most strongly attracted or occurring at higher concentrations in the soil solution may displace other ions from exchange sites on the clays.

The capacity of a soil to retain cations under specific conditions is called the cation exchange capacity (CEC). This property affects the availability of potassium, calcium, and magnesium to plants. The term used to report CEC is milliequivalents/100 grams (me/100g) of soil.

A recent addition to the Kentucky soil test results reports a calculated CEC that uses results from the current extractant in the Kentucky Soil Test Lab (Mehlich III). This extractant is different from most standardized research procedures used to measure CEC. The information on the soil test report is strictly an estimate of potentially exchangeable ions based on the amount of potassium, calcium, and magnesium extracted by the Mehlich III extractant, and an estimate of hydrogen from the buffer pH reading. Therefore, the CEC reported as part of the soil test results is usually higher and should not be directly compared to results conducted by the research method.

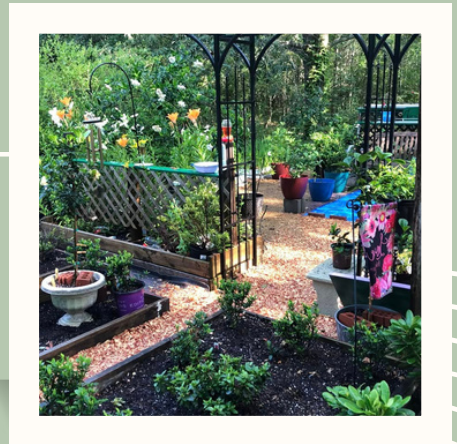
Fortunately, most Kentucky agricultural soils are rather uniform in their CEC due to the vast majority having a silt loam texture. The few high-clay soils occurring in certain areas have much higher CECs, and the rare sandy loams have much lower CECs. Because these variations are localized, county Extension agents can use their personal knowledge of the local soils to make any adjustment in fertilizer rates for those occasional soils with unusually low or high CEC's.



Horticulture Assistant, Savannah Gilbert, taking a soil sample
Photo: Mary Dossett, Horticulture Agent

Master Gardener Spotlight

Richard Monkman



Avid Gardenia Grower

Richard is an avid gardener and his love for gardenias has grown into a beautiful passion of the flower. He started over 20 years ago collecting several varieties of gardenia buds and turned them into beautiful trees and bushes. His oldest gardenia is a tree he has had for over 20 years.



Master Gardener Spotlight



His passion started as a young couple with his wife Jessie. At their home, on an acre of ground, they planted Peonies and Roses of all color and breeds. As years went by, his love for flowers grew into growing and collecting Gardenias. When his wife fell ill, she loved looking outdoors and seeing the beautiful gardenias that he had grown and the smell of the flower. When she passed in 2019, he set a goal to have a Gardenia garden named after her (Jessie Mae's Garden) of Gardenias and other varieties of flowers. It is obvious he has a passion to grow these flowers because of his excessive research on everything he could learn about the Gardenia. He has continued experimenting with the Gardenia plant by changing the colors of the flower, testing the soil, and propagating the plants. He loves to give plants away in addition to framed pictures of gardenias to people who are kind to him. He grows everything in her honor.



He belongs to a group on facebook called the Gardenia Lovers. Since joining, he has grown close with the members by connecting with people from all over the world and giving them advise on how to grow and care for the Gardenias.

It shows that if you stay true to what you love, it keeps you young at heart. Richard will soon be 90 and probably has the largest individual garden of gardenias.



Mini Greenhouses Are a Great Tool for Gardeners

Looking to get a jump on your garden this year? Even if the temperatures haven't soared into the typical "planting season" range yet, you don't have to wait to start growing some of your favorite vegetables. Many cool-season veggies like radishes, spinach, cabbage, broccoli, lettuce and onions can be planted in Kentucky from mid-March to early April. These hardy varieties can handle a bit of frost, making them a perfect choice for early spring gardening. However, another useful technique for getting a head start is creating a mini greenhouse in your garden bed.

Before you jump in, make sure to prep your soil by turning it over or lightly tilling it. Next, for a couple of weeks, lay some black plastic film over the area you plan to plant. The black plastic works like a cozy blanket for your soil, soaking up the sun's warmth and helping the earth underneath to heat up faster. By the time you're ready to sow seeds or transplant your young plants, the soil will be a few degrees warmer—just enough to give those early vegetables a significant advantage.

Once the soil is warmed, remove the black plastic and get your plants in the ground. After planting, you'll want to build a simple frame around your garden bed. You can use wood, metal, or even PVC pipe—whatever you have handy. Cover the frame with clear polyethylene film to form your mini greenhouse. Weigh down the edges of the film with boards, bricks or stones so it won't blow away in the wind but will still allow easy access to the plants inside. This clear cover protects tender plants from chilly spring temperatures while still letting in that valuable sunlight.

Of course, plants still need air circulation and watering, so remember that you'll have to check on them regularly. On warm, sunny days, it's crucial to lift part of the plastic cover to let fresh air in; otherwise, your mini greenhouse could overheat. Remember to secure the cover to the ground again on cold nights.

Using this covering strategy can extend your growing season by a month or even six weeks on both ends, meaning you'll start gardening earlier in the spring and keep going later into the fall. (There is no need for the black plastic soil pre-treatment for fall planting.) In fact, if Kentucky's climate stays mild, some tough cool-season crops like spinach may stay alive throughout winter under this protective setup but may be damaged if temperatures drop to the single digits or below. Better yet, once you remove the plastic as warm weather arrives, you can use the same bed for summer crops like tomatoes or peppers—just remember they need plenty of time to mature if you're planning another round of production under plastic in the fall.

For more information on producing a successful garden this year, contact McCracken County Extension Office.

Source: Rick Durham, Department of Horticulture extension professor



Winning the War on Weeds: Why Spring Pre-emergence Herbicides are Beneficial

Spring is here, and you might be itching to give your lawn a little TLC. While many people think “it’s spring, better grab the fertilizer,” the truth is that the very best time to boost lawn health is actually in the fall. That’s when conditions are prime for the grass to build strong roots. However, one of the most important (and often overlooked) spring lawn care practices is applying a preemergence herbicide.

If you want a thick, healthy lawn this summer, stop weeds before they even get started. If you wait until you can see them sprouting up, you’re already fighting an uphill battle. Postemergence herbicides, which you spray onto actively growing weeds later, can be more expensive and less effective. By applying a preemergence herbicide now, you’ll knock out those weed seeds before they even sprout, saving you time, energy and money down the road.

The best time to apply is when the soil temperature at a two-inch depth averages between 50-55°F for about five consecutive days. You can check soil temperatures online through resources like [Kentucky Mesonet](#), or use a simple soil thermometer. If you’re not into checking soil temps, another trick is to watch for forsythia blooms. When those bright yellow flowers are in full bloom, it’s usually a good sign that it’s time to apply. In Kentucky, this typically happens in March to early April.

For the best results, many lawn care professionals recommend a two-application approach. The first should be made when soil temperatures indicate it’s time, and the second about six to eight weeks later to extend protection throughout the season. Always follow the instructions on the herbicide label to ensure you don’t exceed the recommended annual use rate.

While a preemergence herbicide is an excellent tool for preventing weeds, it’s not a magic fix. Another great way to keep weeds at bay is by maintaining a thick, healthy lawn that naturally shades out any potential invaders. Raising your mower height can be one of the most effective ways to do this, as taller grass helps block sunlight from reaching weed seeds.

Source: Kenneth Clayton, plant and soil sciences extension associate



Not every lawn will need a preemergence herbicide every year. If your lawn is already thick and weed-free, you may not need to apply one at all. However, if you've had issues with grassy weeds in the past or notice bare patches where weeds might take hold, it's a good investment. If you skipped fertilizing in the fall, you can apply a moderate amount of fertilizer in the spring along with your herbicide. Just be careful not to overdo it, or you might end up feeding the weeds instead.

Taking a preventative approach now will save you time, money, and frustration later in the season. By applying a preemergence herbicide at the right time and focusing on overall lawn health, you'll be setting yourself up for a lush, weed-free lawn all summer long.

More information can be found at the University of Kentucky Martin-Gatton College of Agriculture, Food and Environment publication here:

You can also contact McCracken County Extension office for more information on how to create a successful yard this spring.



Plant Disease Diagnostic Lab Highlights

The following plant disease highlights have been compiled from samples diagnosed in the University of Kentucky Plant Disease Diagnostic Laboratory from January 1 – February 28, 2025.

Fruit

Blueberry – Phytophthora root/crown rot

Strawberry – Botrytis fruit rot, powdery mildew, fungus gnat injury, spider mite injury

Vegetables

Cabbage – Rhizoctonia stem/root rot, soil compaction

Garlic – Dry bulb mite injury

Herbaceous Ornamentals

Geranium — Pythium root/crown rot

Plumeria – Whitefly infestation

Gardenia – Spider mite injury

Woody Ornamentals

Arborvitae — Phyllosticta needle blight

Boxwood — Volutella canker, Macrophoma dieback, boxwood mite, winter injury

Dogwood – Botryosphaeria dieback

Taxus – Phytophthora root/crown rot

By Julie Beale, Diagnostician/Lab Director, and Sara Long, Assistant Diagnostician



Broccoli Brunch Casserole

Nonstick cooking spray	1 1/2 cups shredded, part skim mozzarella cheese, divided	1 teaspoon ground black pepper
8 ounces ground turkey sausage	8 eggs	1/2 teaspoon salt
3 1/2 cups broccoli florets, chopped	1 cup part skim ricotta cheese	1 Roma (Plum) tomato , thinly sliced
	1/4 cup skim milk	

Preheat oven to 350 degrees F. **Spray** a 9-by-13-inch baking dish with nonstick cooking spray. **Place** a medium-sized skillet over medium heat. **Sauté** sausage until evenly brown, **drain** well, **crumble**, and **cool slightly**. In a medium bowl, **mix** cooked sausage, broccoli, and a 1/2-cup of mozzarella. In a separate bowl, **whisk** eggs until frothy and then **combine** with a 1/2-cup of mozzarella, ricotta cheese, milk, pepper, and salt. **Spoon** the sausage mixture into the prepared baking dish. **Spread** the egg mixture over the sausage mixture. **Sprinkle** with the remaining mozzarella,

and **arrange** the tomato slices on top. **Cover** with foil, and **bake** 30 minutes. **Uncover**, and **bake** for an additional 15 minutes. Let **stand** for 10 minutes before serving.

Yield: 8 slices

Nutritional Analysis:

260 calories, 16g total fat, 7g saturated fat, 0mg cholesterol, 550mg sodium, 7g total carbohydrate, 1g fiber, 1g total sugars, 0g added sugars, 20g protein, 6% DV vitamin D, 25% DV calcium, 10% DV iron, 6% DV potassium.

Peach Leaf Curl

Peach leaf curl results in disfigured leaves during spring and summer; twigs and fruit may also become infected. Successful management of peach leaf curl occurs in fall or early spring, even though symptoms are not seen until leaves emerge.

Peach Leaf Curl Facts

- Symptoms begin to appear shortly after bloom and are characterized by thick, folded, puckered, and curled leaves (Figure 1). Infected leaves typically exhibit a red or purplish coloration (Figure 2). Diseased leaves develop a powdery gray coating, turn brown, and wither before dropping from the tree.
- Twigs and fruit may become infected.
- Repeated defoliation from peach leaf curl can increase trees' sensitivity to cold injury.
- Initial infection occurs in late winter or early spring prior to bud swell. There is no further spread of the disease during the growing season.
- Rain and temperatures between 50° and 70° F are required for infection.
- Caused by the fungus *Taphrina deformans*.



Figure 1: Peach leaf curl symptoms include thick, folded, puckered, and curled leaves. (Photo: Paul Bachi, UK)



Figure 2: Peach leaf curl results in a red or purplish coloration on peach leaves. (Photo: Paul Bachi, UK)

Management Options

A single preventative fungicide application prior to dormancy (50% to 100% leaf drop) or in early spring (delayed dormant, just before bud break) often provides sufficient management. In severe cases, both fall and spring applications may be necessary. Homeowners can apply fungicides that contain chlorothalonil or copper. Always follow label directions when utilizing fungicides.

If peach leaf curl is present, the following management techniques can be used.

- Thin fruit heavily to reduce stress on the tree.
- Provide good growing conditions and irrigation to reduce tree stress.
- Replant with cultivars that have an increased tolerance of the disease, such as 'Redhaven'.
- Fungicides are not effective once the disease is present.

Additional Information

- Peach Leaf Curl & Plum Pockets ([PPFS-FR-T-01](#))
- Backyard Peach & Stone Fruit Disease, Pest and Cultural Practices Calendar ([PPFS-FR-T-22](#))
- Homeowner's Guide to Fungicides ([PPFS-GEN-07](#))
- Commercial Midwest Fruit Pest Management Guide ([ID-232](#))

By Kimberly Leonberger, Plant Pathology Extension Associate, and Nicole Gauthier, Plant Pathology Extension Specialist

Cultural Calendars for Commercial Tree Fruit Production

Integrated pest management (IPM) includes the combination of biological, cultural, physical, and chemical tools in efforts to manage diseases and pests while minimizing risks associated with pesticides. Cultural practices are an integral part of an IPM program and should be incorporated into all commercial systems, whether large or small, conventional or organic.

Figure 1. These cultural calendars are available for apple and peach production.

These publications, which focus on commercial tree fruit production, provide recommended cultural practices at the various growth stages/production periods. Each serves as a supplement to published spray manuals and scouting guides.

The cultural calendars are available online.

- *Cultural Calendar for Commercial Apple Production* **[PPFS-FR-T-25](#)**
- *Cultural Calendar for Commercial Peach Production* **[PPFS-FR-T-26](#)**



For additional publications on fruit diseases, visit the UK [Plant Pathology Extension Publications](#) webpage.

By Cheryl Kaiser, Plant Pathology Extension Support, and Nicole Gauthier, Plant Pathology Extension Specialist

EPA Webinar – Getting to the Root of the Problem: Promoting Pollinators Through Plant Selection

Plant selection is an important consideration when developing pollinator-friendly landscapes and gardens. This webinar will provide useful information for gardeners, landscape professionals, 4H clubs, and others interested in learning how to select, purchase, and maintain plants that are especially supportive of native pollinators, such as bees, butterflies, and songbirds. An expert team from the University of Georgia's State Botanical Garden will be highlighting plants including Robin's plantain fleabane, spotted beebalm, white wood aster, American witch-hazel, lamb's ear, daylilies, and chrysanthemums. Broadened knowledge of native, pollinator-friendly plants will empower attendees to make more informed decisions at local nurseries and plant retailers.

This webinar will be offered on April 22 from 2 PM to 3:30 PM ET. There will be four speakers: Cora Keber (University of Georgia's State Botanical Garden), Heather Alley (State Botanical Garden of Georgia), Jennifer Ceska (State Botanical Garden of Georgia), and Jason Young (State Botanical Garden of Georgia). The presentation will be followed by a 30-minute question-and-answer session.

Kentucky pesticide CEU credits have been requested, so, by attending this session, you can earn free CEU credit that can be used to help renew your commercial pesticide certification.



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HORTICULTURE WALKING CLUB

When:

11:00-12:00

Every Thursday May - June

(Will not meet June 19th)

Where:

Greenway Trail

(Meet at skate park entrance)



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Lexington, KY 40506



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Webinar Event

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Alpha-gal Syndrome

Learn more about AGS (red meat allergy)
and how to reduce your risk with University
of Kentucky Cooperative Extension



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- ✓ AGS basics
- ✓ Tick bite prevention
- ✓ Diet & lifestyle management
- ✓ Q/A session



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7-8:30pm EDT

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2025 Horticulture Programs

5:00 - 6:00 P.M.

McCracken County Extension Service
2025 New Holt Rd Paducah, KY 42001

Please RSVP for each program
by calling (270) 554-9520

JAN 7 Winter Sowing

FEB 4 "Evergreens" Propagation (on-site)

MAR 4 Native Plants

APR 1 Fairy Gardens

SOLD OUT

MAY 6 Container Gardening

SOLD OUT

JUN 3 Floral Arranging

SOLD OUT

JUL 1 Love Shack Farm (on-site)

AUG 5 Drying & Pressing Cut Flowers

SOLD OUT

SEP 2 Lawn Management

OCT 7 Pumpkin Planters

SOLD OUT

NOV 5 Holiday Wreaths

SOLD OUT

