

4-9-19

Soil Health Test Bucket Checklist (USDA-NRCS National Soil Survey Center)



(* = volume discount available)


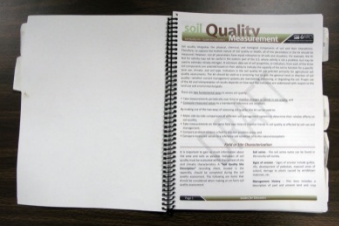

Photo	Item	Quantity	Specifications	Use	Approximate cost, provider information, and notes
	Champion Sports 6 Gallon Ball Bucket W Padded Lid	1 each	Item # E3272; six-gallon sturdy plastic with padded lid that is similar	Container for all test supplies	\$11.79 https://baseball.epicsports.com/prod/3272/champion-sports-6-gallon-ball-bucket-w-padded-lid.html?qclid=EAlaIQobChMlnO_M7pDD4QIVi4jICh2wsgX5EAQ_YAiABEgljsvD_BwE
	Binder containing Soil Health Assessment Guides for Educators and associated material	1 each	Based on original soil quality test bucket, but expanded by NRCS-led team to include interpretations, management, and other information about individual soil tests	Provide guidance for soil quality sampling and eight field soil quality tests (respiration, soil organic matter, pH, electrical conductivity, infiltration, bulk density, nitrogen, and phosphorus)	Edited and developed by Nebraska Soils Education Team and NRCS. Free pdf copies available at http://cropwatch.unl.edu/cropwatch-youth/soil_lessons and http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/health/assessment/?cid=nrcs142p2_053870
	Willow Creek fishing vest (available in L, XL, and 2XL)	1 each	Model # IK-322116	Hold soil health quick field test equipment and other supplies	\$59.99 Cabela's (recommend labeling pockets for supplies commonly used in field tests) http://www.cabelas.com/product/Cabelas-Willow-Creek-Vest/1406951.uts?WTz_l=Header%3BSearch-All+Products





Photo	Item	Quantity	Specifications	Use	Approximate cost, provider information, and notes
 <p>The chart is a guide for estimating the organic matter content of mineral soils in Illinois. It features a table with columns for 'ORGANIC MATTER Average Range' and 'COLOR'. The rows are: 7% (3 to 7%), 30% (2 to 4%), 20% (2 to 7%), 2% (1 to 2%), and 10% (1 to 2%). Below the table are instructions on how to use the chart and a note that 'Strong sunlight may eventually cause these colors to fade slightly.'</p>	Color Chart for Estimating Organic Matter	1 per bucket	University of Illinois pocket guide #AG-1941 (other methods of estimating organic matter, or local color charts may also be used)	Estimate soil organic matter in mineral soils that have a dark-colored surface layer; alternative color charts needed for other types of soils	\$110.00 for pack of 100 + shipping; \$2.25 for single copy University of Illinois Pubs Plus https://pubsplus.illinois.edu/product/color-chart-for-estimating-organic-matter-in-mineral-soils-in-illinois
 <p>A blue spiral-bound notebook and a black ink pen.</p>	Pen and field notebook	1 per bucket	Ink pen and pocket-sized notebook	Record field notes, soil quality notes, and test values	\$1.50 at various pharmacies
 <p>A black pocket-sized calculator in its original packaging.</p>	Calculator	1 per bucket	Pocket-sized calculator	Basic calculations	\$1.00 at various locations
 <p>A white permanent marker and four clear Ziploc resealable plastic bags.</p>	Permanent marker and four resealable plastic bags	1 set per bucket	Permanent marker and quart-sized resealable plastic bags	Hold soil samples in labeled bags	\$1.00 for marker and \$0.40 for four bags = \$1.40 various locations




Photo	Item	Quantity	Specifications	Use	Approximate cost, provider information, and notes
	HI98331 Soil Test™ Direct Soil Conductivity Tester	1 per bucket	Hanna Instruments #HI98331 calibrated with 1.41 Deci Siemens/m (0.01M KCl) standardized solution; includes plastic sheath cover, must be calibrated periodically	Measure total EC of soil, EC of 1:1 soil and water mixture or compost, or measure EC of water. Also, for measuring air and soil temperature. EC measurement for non-saline soils can be used to estimate soluble nutrients in soil water and nutrient cycling/tie-up in soil.	\$119.00 Hanna Instruments 270 George Washington Highway, Smithfield, RI 02917 (1-800-426-6287) Hanna Instruments #HI98331
	Hanna 1413 µS/cm; 1.41 Deci Siemens/m Conductivity Standard	1 per bucket	HI7031L 1413 µS/cm Conductivity; 1.41 Deci Siemens/m Standard (500mL Bottle).	After calibration of EC probe with standard solution, check resistance reading using resistor attached to EC probe case. Record calibration measurement on probe.	\$11.00 Hanna Instruments (address and phone number above) https://hannainst.com/hi7031l.html
	Calibrated coffee measuring scoop	1 per bucket	29.5 ml (1/8 cup)	Measure soil and water for 1:1 mixture	\$1.50 Ecko brand at any grocery store or \$1.67 Mainstays brand at Walmart




Photo	Item	Quantity	Specifications	Use	Approximate cost, provider information, and notes
	Two 40-dram vials	1 set per bucket	Specimen bottles at least 3" (7.6 cm) tall that hold 107 to 140 ml (marked at 107 ml)	Container for 1:1 soil and water mixture for nutrient tests and for water measurement for infiltration test	Any brand of specimen bottle that meets specifications. For infiltration test, 107 ml of water is needed for 1" depth if 3" ring is used (amount of water needed for 1" depth varies depending on size of ring).
	Hach nitrate/nitrite test strips	1 per bucket	25 strips and bottle with color chart for nitrate/nitrite	Nitrate/nitrite test in hand, 1:1 soil and water mixture nitrate/nitrite test, or nitrate/nitrite test for water	\$23.09 Hach Co. #2745425 Hach Co. Purchase Orders PO Box 608 Loveland, CO 80539-0608 https://www.hach.com/nitrate-and-nitrite-test-strips/product?id=7640211606
	Hach ortho-phosphate test strips	1 per bucket	50 strips and bottle with color chart for phosphate	Phosphorus test in hand or 1:1 soil and water mixture phosphorus test	\$29.54 Hach Co. #2757150 (address above) https://www.amazon.com/Hach-2757150-Reactive-Phosphorus-Orthophosphate/dp/B00R3ER39M



Photo	Item	Quantity	Specifications	Use	Approximate cost, provider information, and notes
	HydriOn pH paper and dispenser	1 roll per bucket	Roll of pH test paper 15' long with pH range of 1 to 13. Paper for various pH ranges is available; order according to range of pH for soils in the local area	In-field pH test for soil and water or 1:1 soil and water mixture	\$5.96 Micro Essential HydriOn 93 https://www.microessentiallab.com/ProductInfo/F01-WIDRG-000130-SRD.aspx Strips can be ordered from various suppliers and have a narrower pH range.
	Aluminum cylinder and driving cap (picture shown with driving cap and bevel) (Wood block and mallet can be substituted for driving cap.)	2 sets per bucket	3" outside diameter steel sections 5" long. Bevel bottom of ring with a mark around the ring at 3" from bottom. It is important that ring has narrow walls and is beveled correctly at bottom.	Measure bulk density, infiltration, water content, porosity, and respiration of soil.	Local metal shops can fabricate.







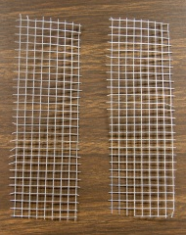
Photo	Item	Quantity	Specifications	Use	Approximate cost, provider information, and notes
	2-lb dumbbell, or rubber mallet and wood block	1 per bucket	"Cap strength" neoprene 2-lb dumbbell, or rubber mallet with wood handle and 2" x 4" wood block	Drive cylinder into ground using driving cap (see previous item) or wood block	Dumbbell: \$3.00 Walmart #0255613042 Stanley rubber mallet: \$14.88 Walmart #5121857432 2" x 4" wood block (buy from any supplier or use scrap piece of wood)
	U-DIG-IT Stainless Steel Folding Shovel w/Case	1 per bucket	Amazon #381440 Walmart #552937128	Dig, excavate, and mix soil	\$7 to \$15 Amazon; Walmart and various other suppliers
	Small tape measure 6-10' long	1 per bucket	Tape measure with lock button and English and metric units	Measure soil sampling depth, row space, cylinder dimensions, etc.	\$2.50 various hardware stores

Photo	Item	Quantity	Specifications	Use	Approximate cost, provider information, and notes
	Solvita Field CO2 Test Kit (respiration kit)	1 per bucket	8 Low-Level CO2 probes; 4 Incubation jars (lids affixed with gas-tight gaskets); 1 Color Chart for reading soil CO2; 1 Instruction Manual with interpretation guide	24-hour soil respiration and mineralized nitrogen test comparison	\$99.00 Solvita Field CO2 Kit Woods End Laboratories, Inc. PO Box 297 290 Belgrade Road Mt. Vernon, ME 04352 https://solvita.com/product/field-test-kit-6pk/
	Small measuring containers	2 per bucket (not placed in bucket)	Opaque 5-quart containers with English and metric units	Soil and water collection or measurement	\$1.70* at various hardware stores
	Plastic cylinder (clear cups)	4 per bucket	16-oz Solo clear plastic cups	Aggregate stability comparison and slaking test and demonstration	\$2.00/pack Target or others
	Wire mesh	2 rolls per bucket	1/4" mesh cut to fit onto top of cup (3' rolls)	Hold soil clod in cup for aggregate stability comparison and slaking test and demonstration	\$1.00 per two 3' rolls Menards, Home Depot, Lowes

4-9-19



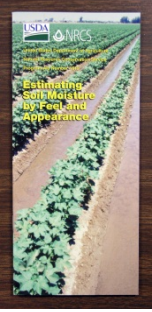

Photo	Item	Quantity	Specifications	Use	Approximate cost, provider information, and notes
	Flat, serrated dinner knife	1 per vest	5" handle and 3.25" blade	Trim soil from bottom and around edge of cylinder for bulk density and AWC tests	\$0.40 various locations
	Cellophane squares and rubber bands	4 per bucket	Clear cellophane gift wrap or no-cling wrap used for flowers (not too sticky so easily removed)	To apply water uniformly for infiltration test and to cap ring for transport	Grocery or hobby stores or floral shops
	"Estimating Soil Moisture and Texture by Feel and Appearance" brochure	1 per bucket	NRCS program aid number 1619	Estimate soil moisture and texture	Free pdf copies available at https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_051845.pdf Also available at http://cropwatch.unl.edu/cropwatch-youth/soil_lessons .
	Plastic bottle with dispenser	1 per bucket	Small bottle (6 oz or larger) with dispenser	Storing and use of distilled water for soil tests	\$2.55* U.S. Plastic Corporation #60140 (discount for >48) https://www.usplastic.com/catalog/item.aspx?sku=60140



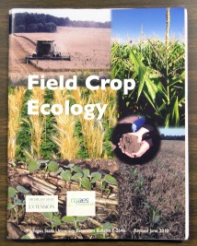
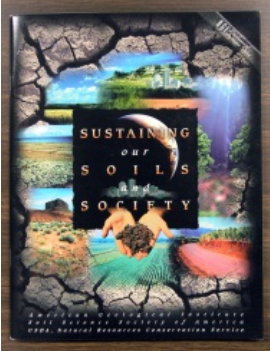
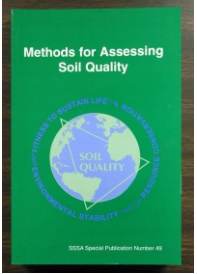
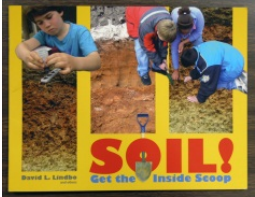

Photo	Item	Quantity	Specifications	Use	Approximate cost, provider information, and notes
	*AccuGrow Soil Test Strips (pH, nitrate, phosphate, and potassium)	1 per bucket	#571802 Ten see-through test strips for pH, nitrate, phosphate, and potassium	For use with soil slurry; excellent for in-hand test or 1:1 test method. A table that provides quantitative calibration conversions (to ppm and lbs per acre) for A, B, C, and D qualitative readings is available (conversion table).	\$23.99* Environmental Test Systems PO Box 4659 Elkhart, IN 46514 Email etsorders@hach.com https://www.walmart.com/ip/AquaChek-AccuGrow-571802-pH-Nitrogen-Phosphorus-Potassium-Soil-Test-Strips/49603590 *These strips are an alternative for Hach strips for nitrate/nitrite and phosphate tests and for Hydrion pH rolls shown in the list above.
	Ohaus CL 2000 portable electronic balance	1 per bucket, (not placed in bucket)	Comes with 3 AAA batteries (AC/DC adapter available for additional cost)	2,000-g capacity balance for weighing soil, water, and containers for bulk density, porosity, and moisture calculations	\$65.40 Hogentogler & Co., Inc, PO Box 2219 Columbia, MD 21045-1219 (410-381-2390) https://www.hogentogler.com/ohaus/cl-series-portable-electronic-balances.asp

Photo	Item	Quantity	Specifications	Use	Approximate cost, provider information, and notes
	"Field Crop Ecology"	1 per bucket	Michigan State University Extension publication E2646	Soil ecology primer for teacher reference and other educational purposes	\$17.00 per copy A & R Communications 117 Central Services Michigan State University East Lansing, MI 48824 (517-432-1555, ext. 228)
	"Sustaining Our Soils and Society"	1 per bucket	American Geosciences Institute publication	Background information on the role of soils in sustaining society	\$9.95 per copy American Geosciences Institute 4220 King Street Alexandria VA 22302-1502 Email pubs@agiweb.org ; phone 703-379-2480, ext. 101 Free pdf copies available at http://www.agiweb.org/pubs/pubdetail.html?item=603601 .
	"Methods for Assessing Soil Quality"	1 per bucket	Soil Science Society of America Special Publication 49 (issued 1996)	Reference for scientists on soil quality testing (highlighted index of most pertinent sections provided to educators)	\$25.00 per copy Soil Science Society of America https://dl.sciencesocieties.org/publications/books/articles/sssaspecialpub/methodsforasses/frontmatter Contains scientific information and background on most common methods of assessing soil quality.

4-9-19

Photo	Item	Quantity	Specifications	Use	Approximate cost, provider information, and notes
	"SOIL! Get the Inside Scoop"	1 per bucket	Soil Science Society of America publication	Soil science primer for students in kindergarten through 12th grade	\$13.00 per copy Soil Science Society of America
	Spade, hand soil probe, and flag on wire (A penetrometer can also be added to the bucket for assessing soil compaction.)	1 of each item per bucket (not placed in bucket)	Various suppliers	Spade for digging and analyzing soil structure, texture, roots, biota, compaction, structure, etc.; probe for gathering soil samples; and flag or penetrometer to assess and compare compaction.	Various suppliers and costs

Have questions about ordering supplies or their uses? Contact Michael Kucera at michael.kucera@lin.usda.gov.

CONVERTING LETTER QUANTITY READINGS TO AMOUNTS

For AccuGro Soil Test Strips

The chart below is based on a Silt Loam soil/medium texture with an estimated bulk density of 1.29 g/cm³ and a sampling depth of 8" (20.3 cm). To convert mg/L (ppm) to pounds/acre-8 " multiply the analysis concentration given below by 2.18

Nutrient	Concentration mg per Liter				Amount lbs per Acre			
	A	B	C	D	A	B	C	D
Nitrogen	0.5	2.5	7.0	20	1	5.5	15.3	43.6
Phosphorus	1	4	10	25	2.2	8.7	22	55
Potassium	0	15	55	125	0	33	120	273

For soils with a different bulk density multiply the 2.18 factor by the new bulk density divided by 1.29. Likewise, for a different soil sampling depth, multiply the 2.18 factor by the new sampling depth in inches divided by 8.