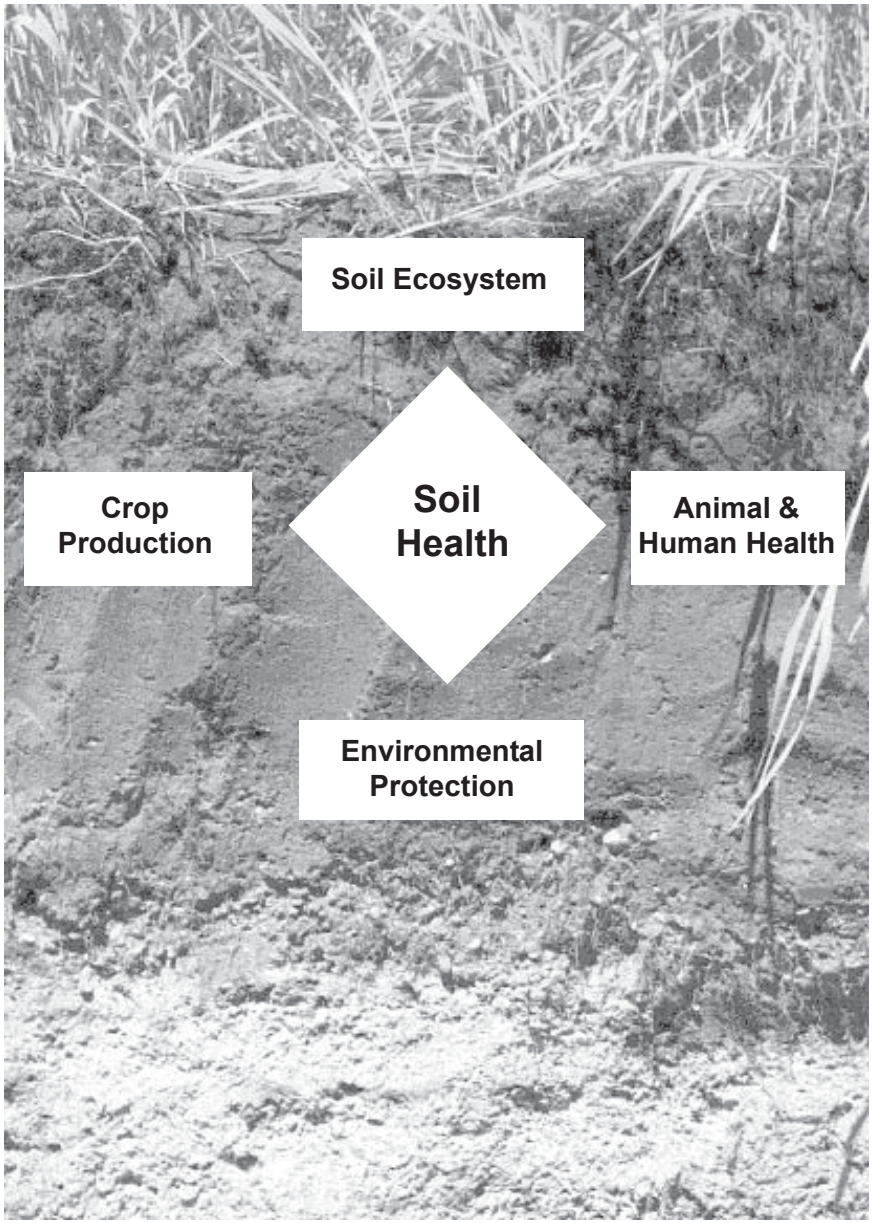
Wisconsin
Soil Health Scorecard



The Wisconsin Soil Health Scorecard was developed by the Wisconsin Soil Health Program, Department of Soil Science, University of Wisconsin – Madison. The Wisconsin Soil Health Program has been supported by the UW Center for Integrated Agricultural Systems, and Agriculture Technology and Family Farm Institute; the WI Department of Agriculture, Trade, and Consumer Protection's Sustainable Agriculture Program; the WI Fertilizer Research Council; the WI Liming Materials Research Council; and the Kellogg Foundation through the Wisconsin Integrated Cropping Systems Trial.

Scorecard Instructions

The Wisconsin Soil Health Scorecard assesses a soil's health as a function of soil, plant, animal and water properties identified by farmers. The scorecard is a field tool to monitor and improve soil health based on field experience and a working knowledge of a soil.

The scorecard is best completed near or just following harvest. Periodic and seasonally expressed properties (soil smell, seed germination, infiltration, etc.) should be recorded during the growing season to increase its effectiveness. When scoring you soil's health, please:

1. **Read each question completely. Focus only on the property being graded.**

2. **Choose the answer that best describes the property and enter score between 0 and 4 in the box provided. The scale corresponds to healthy (3-4 pts.), impaired (1.5-2.5), and unhealthy (0-1).**

3. **Answer as many questions as possible to ensure an accurate evaluation of your soil's health.**

4. **Enter NA (not answered) if a question does not apply to your farm, and go to the next question.**

The scorecard was developed by the University of Wisconsin's Soil Health Program from structured interviews with 28 farmers in conjunction with the Wisconsin Integrated Cropping Systems Trial [1]. Superscript numbers indicate the relative importance and rank of the property. Farmers who were interviewed operated conventional and low-input cash grain and dairy farms typical of southeast Wisconsin. Typical soils are formed in silt over glacial till or outwash. Applying this scorecard to other locations should be done with caution. Modifications of this scorecard for other cropping systems and other regions requires structured input from additional farmers.

[1] D.E. Romig, M.J. Garlynd, and R.F. Harris. 1994. Farmer-based soil health scorecard. p.288. Agronomy abstracts. ASA, Madison, WI.

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SOIL—Questions refer primarily to the plow layer

Descriptive Properties Score

1. EARTHWORMS[3]

0 Little sign of worm activity
2 Few worm holes or castings
4 Worm holes and castings numerous

2. EROSION[4]

0 Severe erosion, considerable topsoil moved, gullies formed
2 Moderate erosion, signs of sheet and rill erosion, some topsoil blows
4 Little erosion evident, topsoil resists erosion by water or wind

3. TILLAGE EASE[5]

0 Plow scours hard, soil never works down
2 Soil grabs plow, difficult to work, needs extra passes
4 Plow field in higher gear, soil flows, & falls apart, mellow

4. SOIL STRUCTURE[7]

0 Soil is cloddy with big chunks, or dusty and powdery
2 Soil is lumpy or does not hold together
4 Soil is crumbly, granular

5. COLOR (moist)[13]

0 Soil color is tan, light yellow, orange, or light gray
2 Soil color is brown, gray, or reddish
4 Soil color is black, dark brown, or dark gray

6. COMPACTION[11]

0 Soil is tight & compacted, cannot get into it, thick hardpan
2 Soil packs down, thin hardpan or plow layers
4 Soil stays loose, does not pack, no hardpan

7. INFILTRATION[12]

0 Water does not soak in, sits on top or runs off
2 Water soaks in slowly, some runoff or puddling after a heavy rain
4 Water soaks right in, soil is spongy, no ponding

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SOIL—Questions refer primarily to the plow layer

Descriptive Properties Score

8. DRAINAGE[6]
- 0 Poor drainage, soil is often waterlogged or oversaturated
- 2 Soil drains slowly, slow to dry out
- 4 Soil drains at good rate for crops, water moves through

9. WATER RETENTION[14]
- 0 Soil dries out too fast, droughty
- 2 Soil is drought prone in dry weather
- 4 Soils holds moisture well, gives and takes water easily

10. DECOMPOSITION[16]
- 0 Residues and manures do not break down in soil
- 2 Slow rotting of residues and manures
- 4 Rapid rotting of residue and manures

11. SOIL FERTILITY[20]
- 0 Poor fertility, nutrients do not move, potential is very low
- 2 Fertility not balanced, needs help
- 4 Fertility is balanced, nutrients available, potential is high

12. FEEL[21]
- 0 Soil is mucky, greasy, or sticky
- 2 Soil is smooth or grainy, compresses when squeezed
- 4 Soil is loose, fluffy, opens up after being squeezed

13. SURFACE CRUST[24]
- 0 Soil surface is hard, cracked when dry, compacted
- 2 Surface is smooth with few holes, thin crust
- 4 Surface does not crust, porous, digs easily with hand

14. SURFACE COVER[23]
- 0 Soil surface is clean, bare, residue removed or buried following harvest
- 2 Surface has little residue, mostly buried
- 4 Surface is trashy, lots of mulch left on top or cover crop used

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SOIL—Questions refer primarily to the plow layer

Descriptive Properties Score

15. HARDNESS[28]
- 0 Soil is hard, dense or solid, will not break between two fingers
- 2 Soil is firm, breaks up between fingers under moderate pressure
- 4 Soil is soft, crumbles easily under light pressure

16. SMELL[25]
- 0 Soil has a sour, putrid or chemical smell
- 2 Soil has no odor or a mineral smell
- 4 Soils has an earthy, sweet, fresh smell

17. SOIL TEXTURE[31]
- 0 Texture is a problem, extremely sandy, clayey or rocky
- 2 Texture is too heavy or too light, but presents no problem
- 4 Texture is loamy

18. AERATION[35]
- 0 Soil is tight, closed, almost no pores
- 2 Soil is dense, has a few pores
- 4 Soil is open, porous, breaths

19. BIOLOGICAL ACTIVITY[36]
- 0 Soil shows little biological activity, no signs of soil microbes
- 2 Moderate biological activity, some wormlike threads, moss, algae
- 4 Biological activity high, white wormlike threads, moss, algae plentiful

20. TOPSOIL DEPTH[38]
- 0 Subsoil is exposed or near surface
- 2 Topsoil is shallow
- 4 Topsoil is deep

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SOIL—Questions refer primarily to the plow layer

Analytical Properties Score

Values are for typical soils of southeast Wisconsin

21. ORGANIC MATTER[1]

0 Organic matter less than 2% or greater than 8%
2 Organic matter 2 to 4% or 6 to 8%
4 Organic matter between 4 and 6%

22. pH[8]

0 Soil pH less than 6.4 or greater than 7.2
2 Soil pH 6.4 to 6.7 or 7.0 to 7.2
4 Soil pH between 6.7 and 7.0

23. SOIL TEST – N, P, & K[9]

0 Two or more nutrient levels very low, law of minimum at work
2 Soil test values are below recommended levels, need extra inputs
4 All nutrient levels at recommended levels

24. MICRONUTRIENTS[30]

0 Severe shortages of trace minerals (magnesium, zinc, sulfur, boron, etc.)
2 Micronutrients at a minimal level or not balanced
4 Levels of micronutrients high and balanced

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PLANTS—Questions concern typical years with adequate rainfall and temperatures

Descriptive Properties Score

25. CROP APPEARANCE[2]

0 Overall crop is poor, stunted, discolored, in an uneven stand
2 Overall crop is light green, small, in a thin stand
4 Overall crop is dark green, large, tall, in a dense stand

26. NUTRIENT DEFICIENCY[15]

0 Crop shows signs of severe deficiencies (blighted, streaky, spotty, discolored, leaves dry up)
2 Crop falls off or discolors as season progresses
4 Crop has what it needs, shows little signs of deficiencies

27. SEED GERMINATION[34]

0 Seed germination is poor, hard for crop to come out of ground
2 Germination is uneven, seed must be planted deeper
4 Seed comes up right away, good emergence

28. GROWTH RATE[19]

0 Crop slow to get started, never seems to mature
2 Uneven growth, late to mature
4 Rapid, even growth, matures on time

29. ROOTS[17]

0 Plant roots appear unhealthy (brown, diseased, spotted), poorly developed, balled up
2 Plant roots are shallow, at hard angles, development limited, few fine roots
4 Plant roots are deep, fully developed with lots of fine root hairs

30. STEMS[40]

0 Stems are short, spindly, lodging often a problem
2 Stems are thin, leaning to one side
4 Stems are thick, tall, standing, straight

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PLANTS—Questions concern typical years with adequate rainfall and temperatures

Descriptive Properties Score

31. LEAVES[33]

0 Leaves are yellow, discolored, few in number
2 Leaves are small, narrow, light green
4 Leaves are full, lush, dark green

32. RESISTS DROUGHT[27]

0 Plants dry out quickly, never completely recover
2 Plants suffer in dry weather, slow to recover
4 Plants withstand dry weather, fast to recover

33. RESISTS PESTS AND DISEASE[29]

0 Plants damaged severely by diseases & insects
2 Plants stressed by diseases & insects
4 Plants tolerate pests & disease well

34. MATURE CROP[18]

0 Seedhead or pod misshapened, grain is not ripe, shriveled, poor color
2 Seedhead small, unfilled, grain slow to ripen
4 Seedhead large, grain fill, ripe, with food color

Analytical Properties Score

Values are typical for soils of southeast Wisconsin

35. YIELD[10]

0 Corn: less than 85 bushel/acre, Alfalfa: 2 to 6 ton/acre
2 Corn: 85 to 130 bushel/acre, Alfalfa: 2 to 6 ton/acre
4 Corn: greater than 130 bushel/acre, Alfalfa: greater than 6 ton/acre

36. FEED VALUE[41]

0 Feed has poor nutritional value (energy, protein, minerals), supplements must be used
2 Feed is unbalanced in energy, protein, or minerals, may require supplements
4 Feed is balanced, high in nutritional value, supplements used infrequently

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PLANTS—Questions concern typical years with adequate rainfall and temperatures

Analytical Properties Score

37. TEST WEIGHT[32]

0 Grain test weight is low, takes a deduction
2 Grain test weight is average
4 Grain test weight is high

38. COST OF PRODUCTION AND PROFIT[26]

0 Production and input costs high yet profit is low
2 Profits are variable, yields maintained with high input costs
4 Profits are dependable, high, yields maintained with low input costs

ANIMALS—Questions should not relate to improper housing, poor water or inclement weather

Descriptive Properties Score

39. HUMAN HEALTH[37]

0 Human health is poor, recurrent health problems, recovery is difficult and long
2 Occasional health problems, slow recovery time
4 Human health is excellent, resists diseases, long life, quick recovery time

40. ANIMAL HEALTH[42]

0 Continuous animal health problems, poor performance and production
2 Occasional animal health problems, performance average
4 Animal health excellent, exceptional performance and production

41. WILDLIFE[43]

0 Signs of wildlife rare, animals do not appear healthy
2 Infrequent signs of wildlife; songbirds, deer, turkey etc. uncommon
4 Wildlife is abundant; gulls behind plow, songbirds, deer, turkey, etc. are common

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WATER

Analytical Properties Score

42. CHEMICALS IN GROUNDWATER[22]

0 Chemicals found in groundwater above allowable levels
2 Chemicals found in groundwater below allowable levels
4 No chemicals present in groundwater

☐

Descriptive Properties Score

43. SURFACE WATER[39] (open water flowing from fields – lakes, marshes, streams, etc.)

0 Surface water is very muddy or slimy
2 Surface water is brownish with dirt and silt
4 Surface water is clear and clean

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Interpreting the Soil Health Scorecard's Results

Review the scorecard and tally the number of indicator properties that reside within the three categories of health listed below. Divide the number in each health category by the total number of questions answered (a maximum of 43) and multiply by 100% for the percentage within each category.

Health Category	Number	%
Healthy (score of 3 - 4)	☐	☐
Impaired (score of 1.5 – 2.5)	☐	☐
Unhealthy (score of 0 - 1)	☐	☐
Total	☐	100%

Scorecard users should examine the distribution of indicator properties within the three categories of health. Ideally, one would prefer to see all of the properties score in the *healthy* category. Even of 90% or more of the indicators you scored are *healthy*, your soil may still have serious problems with the remaining properties. For indicators either in the *impaired* and *unhealthy* categories, careful consideration is necessary to identify what caused the property to be in a less-than-optimum condition. *Impaired* indicator properties should be closely monitored over time to determine whether they are deteriorating or improving. *Unhealthy* properties need immediate attention and corrective action. You may also wish to give higher priority to those properties farmers considered more important as indicated by their relative rank in superscript.