RESULTS – Soil Health Pre-Test

Instructions to test-takers: There may be more than one right answer, choose all answers that apply. Do not guess – because we are trying to measure knowledge/confidence gained, it's better to leave a question blank than to answer it and accidentally guess right! Don't spend too much time, or "google" anything – no one except you will know your "score". Again, we are testing how much you improved over the course of the training, not how much you know at any given time.

Evaluation – answers in bold are the correct answers. Numbers in red indicate the number of test takers who chose each answer (26 trainees took the pre-test).

SOIL HEALTH BMPs (6 questions)

1. Of the methods listed below, which effectively reduce soil compaction AND are considered best management practices for soil health?
    a. 0 Deep Ripping
    b. 0 Deep ripping twice with second pass at 90 degree angle
    c. 26 Planting a cover crop
    d. 3 Allow the freeze/thaw cycle to take care of it
    e. 7 Use equipment with tracks rather than tires
2. When converting from conventional (annual) tillage to continuous no-till, what are the biggest benefits when fist starting?
    a. 22 Prevents erosion by leaving residue cover
    b. 18 Increases biological activity in the soil
    c. 1 Increases crop yields
    d. 23 Decreases fuel costs
3. In general, how long does it typically take to see soil improvements when using No-Till/strip-till and cover crops together?
    a. 6 One year
    b. 21 3-5 years
    c. 0 More than 10 years
4. According to recent studies, how much, on average, can organic matter be expected to increase under no till and cover crops?
    a. 0 1%/year in the top 7"
    b. 1 1%/year in the top 3"
    c. 8 0.2%/year in the top 7"
    d. 15 0.2%/year in the top 3"
5. Does applying manure help in building healthy soil?
    a. 23 Yes, manure provides the humic and fluvic acids which promote soil biology
    b. 0 No, manure provides no additional benefits over commercial fertilizers
    c. 0 No, manure may kill the cover crops
    d. 2 Yes, and the more the better

SOIL HEALTH TESTS/EVALUATION (2 questions)

6. Of the following tests, which measure(s) physical, chemical and biological properties of soil?
    a. 18 Cornell
    b. 6 Haney
    c. 5 Solvita
    d. 1 Earthfort
7. What is a good method to determine if soil compaction is an issue in a given field?
    a. 23 Using a soil penetrometer
    b. 15 Digging a soil pit
    c. 9 Testing for compaction with a tile probe
    d. 24 Inspecting root growth and soil structure with a shovel

SOIL BIOLOGY (3 questions)

8. One of the most familiar players in the soil food web, earthworms perform which of these important functions?
   - **a. 19 Blending together different components of soil**
   - b. 21 Consume dead vegetation
   - **c. 26 Opening air pockets in the soil**
   - **d. 7 Increasing microbe populations**
   - e. 0 Provide critical pollinator links
9. Protozoa are single-celled organisms that prey largely on bacteria. When protozoa consume soil bacteria:
   - a. 1 The soil smells like spoiled milk
   - b. 0 Protozoa grow a second cell
   - **c. 17 Key nutrient nitrogen is released**
   - **d. 5 Bacteria populations dramatically decrease**
10. Mycorrhizal fungi have hyphae which do what?
   - a. 0 Nothing
   - **b. 23 Transport nutrients and water to the plant that otherwise would not be available**
   - c. 2 Improve corn stand-ability
   - d. 0 Reduce nutrient uptake
   - **e. 12 Make more soil water available to the plant**
   - **f. 14 Aid in disease control**

NUTRIENT MANAGEMENT (5 questions)

11. Legumes fix nitrogen from the air. When does maximum N fixation occur?
   - a. **14 Pre-bud (just before it blooms)**
   - b. 9 7-14 days after it is in full bloom
   - c. 0 Immediately after burndown
   - d. 0 When glyphosate is used to terminate legumes
12. When is nitrogen that has been scavenged by a grass cover crop typically available to the following cash crop?
   - a. 0 Immediately after burndown
   - b. 3 About 2-3 weeks after burndown
   - **c. 6 Not until residue is nearly complete broken down (mid-summer)**
   - d. 0 Not until the following year
   - **e. 19 Depends on the C: N ratio**
13. Which element is most important in improving soil functions?
   - a. 1 Nitrogen
   - **b. 16 Carbon**
   - c. 0 Phosphorus
   - d. 9 Oxygen
14. Which of the following factors must be considered when planning for nutrient management on farms with very active soil biology (eg. Farms that are using (no-till and cover crops):
   - **a. 20Traditional NPK testing may show fertility deficiencies because nutrients needed by the plant are tied up in the soil biology.**
   - **b. 12Carbon:Nitrogen ratios at the time of planting**
   - c. 0 The "4R's" no longer apply.
   - **d. 11 "Starter" or "pop up" fertilizer becomes more important with decreased tillage.**
15. There are 17 "essential plant elements". Of the following 8, which are NOT derived from the soil?
   - a. 0 Potassium
   - **b. 8 Carbon**
   - **c. 19 Oxygen**
   - d. 0 Zinc
   - e. 0 Phosphorus
   - f. 1 Boron
   - **g. 18 Hydrogen**

h. 1 Sulfur

COVER CROPS (10 questions)

16. When would warm season cover crops typically be planted:
    a. 9 Immediately after soybean harvest
    b. 17 Within 3 -4 weeks after wheat harvest
    c. 7 Interseeded when corn is at V5 growth stage
    d. 14 Immediately after corn harvest
    e. 18 On prevent-plant acres
17. When seeding cover crops prior to corn harvest, how do you know the best time to do the seeding?
    a. 0 Not recommended because too much cover crop seed gets caught in the vegetation
    b. 5 When there is approximately 75% of sunlight hitting the ground at noon.
    c. 17 When there is approximately 50% sunlight hitting the ground at noon
    d. 6 About 6 weeks prior to expected harvest of corn, while crops are still green.
18. Which of the following are best management practices for annual ryegrass termination prior to planting the cash crop?
    a. 20 Burndown should not occur until all plants are actively growing
    b. 20 Herbicide must be applied before 4-5 hours before the sun sets
    c. 12 Residual herbicides may interfere with glyphosate translocations
    d. 6 Water should be reduced to 8-12 gal/ac
    e. 4 pH should be neutral
19. Which of the following is true about certified seed?
    a. 8 It is better than non certified seed
    b. 13 It must have a blue tag verifying certification of the seed in the bag
    c. 15 It has guaranteed genetics
    d. 14 It provides plants with consistent performance under similar conditions
    e. 10 It costs more
20. VNS seed for cover crops:
    a. 5 Should never be used
    b. 14 Can be a safe cover crop source if it has been cleaned and tested under each states requirements
    c. 0 Has guaranteed genetics
    d. 12 Can be raised for self use, but should be cleaned, germ tested and free of weed seed.

More "pre" workshop data: On their applications to the program, applicants were asked to "Please rank your comfort level with the following topics on a scale of 1-5. (*1=no knowledge or experience, 3= comfortable with topic but need to learn more, 5=very knowledgeable, I could teach this!)"*

Topic	Average
Understanding how soil biology affects chemical and physical soil properties	2.7
Management of cover crops (selection, planting timing & options, termination)	3.5
Successful no-till & strip-till equipment and management	2.9
Understanding options to improve nutrient efficiency	3.0
Short- and long-term economics of farming to improve soil health	2.7
Potential benefits for utilizing cover crops for grazing purposes	2.9