

Name _____

AGRONOMY 375
February 20, 2009
Exam 1

There are 15 questions. One bonus question is also included at the end of the exam. A total of 100 points is possible.

Best wishes for your success !

- 6 pts 1. How does a producer know how near optimum efficiency they are with the input mix for a portion of a field in a crop production system? Please explain.
- 6 pts. 2. Is management to optimize crop input use efficiency (as referred to in question 1 above) profitable **and** consistent with good environmental stewardship and sustainability? Please explain. Assume crop management for the long run (i.e. greater than 10 years).
- 8 pts. 3. Please provide an example which illustrates how GIS and related technologies could be used to as a management tool to improve the efficiency of a crop production system in Indiana.
- 6 pts. 4. If not soil sampling on a grid, what two major considerations should be kept in mind to determine where within a field soil samples should be collected to accurately represent P and K levels as a basis for routine fertilizer recommendations ?
- a)
- b)

- 4 pts. 5. What soil sampling depth is to be used for the determination of P and K soil test levels as a basis for routine P and K fertilizer recommendations in each of the following;
- a) Twist Chisel Plowed Field?
- b) No-Till Coulter Planted Field?
- 3 pt. 6. a) What Critical Level (ppm) is recommended as an Economic Goal for Phosphorus (P₁) soil tests for corn and soybean production in the U.S. Corn Belt?
- 2 pt. b) What P₁ soil test range defines the maintenance plateau range for corn and soybean production?
- _____ ppm to _____ ppm
- 2 pt. c) What P₁ soil test range defines the drawdown range for corn and soybean production?
- _____ ppm to _____ ppm
- 3 pt.. d) What annual buildup recommendation (pounds P₂O₅ / acre) should be made to increase the soil test level from 11 ppm to the Critical Level for corn and soybean production. (Buildup only. Please do not include a maintenance component).
- 3 pt. 7. a) What Critical Level (ppm) is recommended as an economic goal for Potassium soil tests for corn, soybean and wheat production on a soil with a C.E.C. of 12 in the U.S. Corn Belt?
- 2 pt. b) What Potassium soil test levels define the maintenance plateau for corn soybean and wheat production?
- _____ ppm to _____ ppm
- 2 pt. c) What Potassium soil test levels define the drawdown range for corn, soybean and wheat production in the U.S. Corn Belt?
- _____ ppm to _____ ppm
- 3 pt. d) What annual Buildup recommendation (pounds K₂O / acre) should be made to increase the soil test level from 85 ppm exchangeable K to the Critical Level in the U.S. Corn Belt? (Buildup component only. Please do not include a maintenance component).

6 pts. 8. Please distinguish between a primary symptom and a secondary symptom with respect to cause and effect crop diagnostic relationships (provide an example of each).

6 pts. 9. Briefly describe the line transect method noting what it measures and how the measurement conducted.

10 pts 10. Describe two early - growing season differences in the physical properties of the upper soil profile (e.g. top few inches) under a no-till and a conventionally plowed field in a poorly-drained central Indiana soil.

Please explain why these differences exist and note how they influence early root development by corn or soybean plants.

- 6 pts 11. a) Briefly describe how latitude, soil drainage, and previous crop inter-relate as via a key factor, which can strongly influence the corn, yield potential and adaptability of different tillage/planting systems in Indiana.
- 2 pts. b) Describe an environment / tillage- planting system combination in which this key factor would be strongly limiting to corn yield.
- 2 pts. c) Describe management variations in this environment /tillage - planting system which could be used to lessen the negatives described in question b) above.
- 4 pts. 12. Note four visible soil or crop symptoms of soil compaction
- a)
 - b)
 - c)
 - d)
- 5 pts. 13. List five problems associated with poor soil drainage in a corn and soybean production environment in Indiana.
- a)
 - b)
 - c)
 - d)
 - e)

- 2 pts. 14. a) What is the typical depth of placement for pattern field tile systems installed for subsurface drainage in Indiana corn and soybean production systems?
- 3 pts. b) Please describe one method by which surface drainage can be managed in corn and soybean production systems.
- 4 pts. 15. Herbicides are commonly used for the chemical control of weeds in crop systems. However, crop systems also generally include cultural and mechanical controls for weeds as well. Briefly give an example of a cultural weed control component of a corn or soybean production system used either today or in the past.
- 5 pts. **BONUS** Could higher crop yields be gained by raising P and K soil test levels to a position even higher than the economic (critical) P and K soil test level for a given soil? If so, why not increase P and K soil test levels up to a point where corn and soybean yield are never limited with regard to soil test levels of those two nutrients? If not, why not? Please explain.