2001 FFA
State Crops Contest Exam
Agronomy Quiz Questions: Corn and Oats

Corn:

1. As a crop, corn is a member of the _____ family.
   a. composite
   b. grass
   c. legume
   d. nightshade
2. Corn grain contains high concentrations of:
   a. protein
   b. oil
   c. vitamins
   d. starch
3. Corn is thought to have originated as a species in:
   a. U.S. and Canada
   b. Mexico and Central America
   c. England and Western Europe
   d. India
4. Because of corn's reaction to temperature, it should not be planted in the spring until the soil temperature in the planting zone reaches approximately _____ degrees F.
   a. 45
   b. 50
   c. 65
   d. 86
5. Corn seed is treated with a _____ to protect it against rotting when planted in cold wet soils.
   a. fungicide
   b. herbicide
   c. insecticide
   d. Miticide
6. The _____ (plant part) protects the leaves of the corn plant during germination of the seed until it emerges from the soil.
   a. coleoptile
   b. cotyledons
   c. epicotyl
   d. mesocotyl
7. In general, corn may be planted up to ____ inches in any soil type with good emergence.
   a. one b. two c. three d. four
8. A planting rate of about _____ corn seeds per acre on a clay loam soil, high fertility with good water holding capacity would be appropriate.
   a. 5,000
   b. 14,000
   c. 28,000
   d. 52,000
9. Corn seedlings frosted in the spring when they are at the 3 or 4 leaf stage of development will probably:
   a. die
   b. not die, but fail tog row any more
   c. recover, but with a large yield loss
   d. recover with little loss in yield
10. Corn's need for phosphorous fertilizer can be best determined by:
    a. last year's crop yield
    b. this year's anticipated yield
    c. soil organic matter content
    d. soil test
11. Which of the following is **least important** in determining the nitrogen needs of corn:
    a. relative maturity rating of hybrid
    b. soil organic matter content
    c. yield goal of the crop
    d. date of planting
12. Which of the following nutrients is most mobile in the soil allowing farmers to "sidedress" corn with the nutrient and it will be available to the plant.
    a. nitrogen
    b. phosphorous
    c. potassium
    d. iron
13. What is the population of corn plants per acre if there is an average of 75 seedlings per 50 foot or row. The rows are 30 inches apart: (acre = 43,560 sq. ft.)
    a. 29,040 b. 26,136 c. 17,240 d. 11,616

14. The “growing point” of corn is first above the surface of the soil when a(n) _____ can be felt above the soil surface on the corn “stem”:
    a. first true leaf
    b. coleoptile
    c. internode
    d. node
15. Corn seed is not inoculated with nitrogen fixing bacteria (rhizobia), as is soybean seed. Why?
    a. corn seed has adequate bacteria on the seed
    b. corn plants do not fix nitrogen as soybeans do
    c. it is too time consuming and expensive
    d. the soil has an abundant supply
16. Lower corn leaves, which are “firing” (turning brown and dying) from the tip down the mid-rib is a good indication of a deficiency of:
    a. phosphorous b. potassium c. iron d. nitrogen
17. A good indicator of phosphorous deficiency in corn is:
    a. upper leaves turn purple
    b. a leaf, which develops alternate green and white stripes
    c. “firing” (brown and dying) down the margin of lower leaves
    d. “Buggy whipping” of upper leaves
18. Corn plants turning yellow and dying in a poorly drained area with standing water is caused primarily by a deficiency of _____ to the plant.
    a. oxygen (air) b. water (H_2O) c. nitrogen gas (N_2) d. carbon dioxide (CO_2)
19. Weed seedlings are most susceptible to herbicides when they are:
    a. stunted due to drought
    b. vigorous and actively growing
    c. deficient in nutrients, such as nitrogen
    d. slow growing due to cold weather
20. The lease amount of damage to corn toot systems due to cultivation occurs when the plants are at the _____ stage of development.
    a. young seedlings (3-4 leaves)
    b. tassel initiation (5-6 leaves)
    c. stem elongation (6-8 leaves)
    d. ear initiation (10-12 leaves)
21. A farmer calibrating a sprayer with a 60 foot boom has applied 0.35 gal in 50 feet. What is the rate of application in gal/acre of the sprayer? (acre = 43,560 sq. ft.)
    a. 5.1 b. 14.5 c. 30.5 d. 254.1
22. Which of the following **is not** a reason for failure of a herbicide applied post-emergence to control weeds:
    a. tied up (adsorbed) by the clay and organic matter of the soil
    b. rate of application of herbicide is too low
    c. weeds not susceptible to herbicide applied
    d. Round-up applied to Round-up Ready Corn
23. The earliest measure or indicator of corn maturity is:
    a. grain dented
    b. black layer on kernel is present
    c. husks are brown
    d. “milk line” is about half way down the kernel
24. How many bushels of corn does a farmer have to sell, if the net weight of grain on a truck is 50,400 pounds (assume 15.5 % moisture)
    a. 760 b. 840 c. 900 d. 1.039
25. Corn for silage should be harvested when the:
    a. grain is at a black layer stage
    b. grain is in “milk” or roasting ear stage
    c. plant has reached maximum wet weight stage
    d. when the whole plant moisture is about 65%

Oats

26. The scientific name of oats is:
    a. avena sativa b. Glycine max c, Triticum aestivum d. Zea mays
27. Oat seed may be planted as soon as the soil temperature is approximately ____ F at the depth of planting the seed.
    a. 50-60 c. 30-32
    b. 35-40 d. 20-25
28. Tillers in oats are secondary stems, which also produce grain and are produced from;
    a. extra embryos in the seed
    b. coleoptile after it emerges
    c. buds located in the crown of the plant
    d. apical bud located at the tip of the stem
29. The rate of ____ fertilization may be reduced when oats follow a legume crop rotation:
    a. nitrogen b. phosphorous c. potassium d. sulfur
30. Oats should be planted at about ___pounds per acre to ensure an adequate population for the maximum yields with April planting dates.
    a. 32 b. 48 c. 80 d. 120
31. Oat leaves, which show a yellowing and dying of the tissue along the edge of the oldest leaves, are probably suffering from a nutrient deficiency of:
    a. iron c. phosphorous
    b. nitrogen d. potassium
32. Weed control in oats during the emergence to 3-leaf stage may be done using:
    a. field cultivator c. row cultivators
    b. rotary hoe d. spring tooth harrow
33. The rate of nitrogen fertilization in oats is strongly influenced by:
    a. level of weed control c. variety grown
    b. use of the grain d. yield goal of the producer
34. Selection of a variety of oats to grow in Minnesota should consider genetic resistance to the major dieses known as :
    a. bacterial blight c. crown rust
    b. purple leaf virus d. phytophthora rot
35. The nutrient requirements for phosphorous and potassium for maximum productivity of oats can best be determined by:
    a. previous crop rotation c. texture of the soil
    b. organic matter content of the soil d. soil test
36. Selection of a herbicide for use in post emergence weed control in oats must consider:
    a. organic matter content of the soil
    b. soil texture
    c. time of the year in which the herbicide is to be applied
    d. weed species present
37. One of the most sensitive stages in the life cycle of oats to environmental stress is:
    a. early seedling growth c. pollination and early seed development
    b. tillering d. after physiological maturity of the grain
38. Oat grain may be considered mature (i.e. maximum seed dry weight) when:
    a. the moisture content of the grain is 40-50 %
    b. the glumes and peduncle have lost their green color
    c. the grain is hard as determined by feel
    d. the entire plant is harvest gold in color
39. Highest grain quality in Minnesota grown oats is achieved when the crop is planted:
    a. April 10-25 c. June 10-20
    b. May 1-10 d. planting date is not important to grain quality

40. Oats may be swathed without reduction in yield when the moisture content of the grain is approximately:
    a. 30 %
    b. 40 %
    c. 50 %
    d. at any moisture content provided the plant is given time to mature in the swath
41. Oat grain may be combined and placed directly into storage without further drying when the moisture content of the grain is approximately:
    a. 30 % c. 15.5 %
    b. 20 % d. 14 %
42. A farmer's oats were discounted for "heat damage" when they were sold. The most probable cause was:
    a. high air temperatures outside the grain storage bin
    b. high air temperatures in the field during the grain filling period
    c. high air temperature in the field before the grain was harvested
    d. high temperatures caused by molds growing on grain in storage
43. A farmer is selling oats and has a net weight of 12,800 pounds of grain on his truck. How many bushels of oats does the farmer have to sell?
    a. 229 c. 320
    b. 267 d. 400
44. One of the major factors in determining the market grade of oats offered for sale is:
    a. color of oats c. test weight of the oats (lbs./bushel)
    b. variety of oats grown d. probably use of the oats (feed or human feed)
45. A consulting company has sampled a field of oats and determined the following:
    Area sampled: 25 square feet
    Pounds of grain in the 25 square foot area = 3 lbs.
    Determine the grain yield in bushels per acre (acre = 43,560 sq. ft.)
    a. 75 b. 81 c. 109 d. 163
46. The term "groat" as used in oats refers to:
    a. glumes covering the seed
    b. nutrient content of the grain
    c. the seed without the glumes, lemma and pales
    d. secondary stems, also called tillers
47. In marketing oats, the term "dockage" is sued to describe:
    a. grain damaged in storage
    b. weed seeds, chaff, soil, etc. removed from the grain
    c. oats directly from the combine without cleaning
    d. method of marketing the oats used by large producers
48. A farmer has inspected oats in a storage bin and found rice weevil in the grain. The insects probably came from:
    a. infested seed used to grow the crop
    b. grain infested in the field before harvest
    c. insects located in the storage bin when filled
    d. insects, which have migrated from southern states (i.e. Texas)
49 Oats are members of the grass family and are known primarily as:
    a. pulses b. cereals c. oil seeds d. nurse crops
50. Oat grain compared to other cereals is highest in the nutrient:
    a. protein b. sugars c. starch d. dietary fiber

Key – 2001 Crops Exam

1. b	**11. a**	**21. a**	**31. d**	**41. d**
2. d	**12. a**	**22. a**	**32. b**	**42. d**
3. b	**13. b**	**23. c**	**33. d**	**43. d**
4. b	**14. d**	**24. c**	**34. c**	**44. c**
5. a	**15. b**	**25. d**	**35. d**	**45. d**
6. a	**16. d**	**26. a**	**36. d**	**46. c**
7. b	**17. a**	**27. b**	**37. c**	**47. b**
8. c	**18. a**	**28. c**	**38. b**	**48. c**
9. d	**19. b**	**29. a**	**39. a**	**49. b**
10. d	**20. a**	**30. c**	**40. a**	**50. d**

2001 FFA
State Crops Contest

Practicum # 1 Calibration of equipment (50 points)

You are applying fertilizer. Your soil test recommends 30 lbs. Of P (phosphorous) per acre. Your fertilizer dealer has the following forms of dry fertilizer available.

a. diammonium phosphate (8-46-0) at $339.00/ton
b. super phosphate (0-19-0) at $240.00/ton
c. triple super phosphate (0-45-0) at $265.00/ton

A. Which fertilizer is the cheapest based on cost of nutrients provided per pound of fertilizer applied? (10 points)

In calibrating the fertilizer spreader on a trial run you determined 64 pounds was distributed on an area of 60 feet wide by the distance traveled in 2 minutes at 8 mph. Show your work. Right procedure, wrong answer = half credit.

B. The area covered is? (10 points)

C. Assume 33 lbs of commercial fertilizer was applied per acre. What is the amount (pounds) of actual P applied per acre for diammonium phosphate? (10 points) (Note: $P_2O_5 = 0.43\ P$)

D. Your spreader cart holds 3 ton of fertilizer. How many acres can you cover per cart at the calibration of 33 lbs/A? (10 points)

E. The total amount of commercial fertilizer needed for a 72.2 acre field using triple super phosphate. (10 points)

Practicum # 2 (50 points)

You are a crop consultant assisting one of your clients with corn management problems. The seed to be planted has a germination of 90 %. A plant density of 28,000 plants per acre is desired.

A. How many seeds should be planted per acre assuming that usually only 90 % of germinating seeds emerge? (8 points)

B. At the two-leaf stage you are doing stand checks. You have made 10 counts with an average of 36 plants in 30 feet of row. The row spacing is 30 inches. What is the actual stand achieved? (Note: 43,560 sq feet per acre) (8 points)

C. A less than desired stand was determined to be due to soil insects. Which of the following insects could be the problem? (Circle all potentially correct answers) (6 points)

a. corn borer b. root worm c. black cutworm d. wire worm e. white grub

D. What three questions can you ask to help determine the specific insect problem. (10 points)

E. Corn borer was a problem last year.

1. what cultural practice could be used to minimize first brood infestation this year? (4 points)

2. Would you recommend this practice to a farmer? Explain your rationale. (4 points)

F. You have scouted your corn field for corn borer at the late whorl stage. You sampled 10 plants in 10 locations in your field. You found an average of 1.9 borers per plant. Using the data in Table 1 (below) determine whether a chemical treatment at a cost of $18.00/acre is justified. Corn is currently worth $1.90/bu. Average yield last year was 155 bu/A. Assume your treatment will only control two thirds (66.7%) of the larva. (10 points)

Show your work

Table 1. Corn loss caused by European corn borer (ECB) for various corn growth stages (R.A.Higgens, R.E. Lynch and F.L. Poston).

Plant stage	Loss bu/A (ECB/plant)	% loss (ECB/plant)
Early whorl	7.7	5.5
Late whorl	6.2	4.4
Pretassel	9.2	6.6
Pollen shedding	6.2	4.4
Kernels initiated	4.2	3.0

Key

1-A C-triple super Phosphate

1-B 8 mph x 5280 ft/mi /2 min/60 min/hr = 1408 feet
1408 feet x 60 ft width = 84,480 sq ft

1-C a = 33 lbs x 0.46 x 0.43 = 6.5 lbs P/A

1-D a = 6000 lbs/cart / 33 lbs/A = 181 A

1-E c = 30 lbs/A / (0.45 x 0.43) x 72.2 = 11,194 lbs

2-A 28,000 / 90 germination / 0.9 emergence = 34,567 seeds/A

2-B 30 ft x 2.5 foot wide rows = 75 sq ft/plot

$$\frac{43{,}560 \text{ sq ft/A}}{75 \text{ sq ft/plot}} = 5808 \text{ plots/A}$$

5808 plots/A x 36 plants/plot = 20,908 pl/A

2-C c. black cutworm d. wire worm e. white grub

2-D a. What was the previous crop? (If sod, pasture, alfalfa, white grub likely problem – check for root feeding injury)
b. Did plants emerge, then get cut off above the roots? Turn grey? (cutworm)
c. Were seeds tunneled? (If so wireworm)
d. What tillage system?
1.) Spring plowed? (alfalfa or red-clover – likely seedcorn maggot)
2.) Fall plowed with heavy manure application? (seed corn maggot)
3.) No till after soybeans in low areas? (wireworm)
e. Level of weed control last year? (No till with poor weed control and low area creates haven for cutworm)

State Crops Contest
Grain Grading

Sample 1. Soybeans

Sample Information (1020 grams)
Contained 5 green garlic bulblet and 1.2 % whole corn and 0.3% cracked corn. The sample is discolored due to weathering. Odor is natural.

Work Sample (129 grams)
Test weight – 53.4 lbs/bu
Moisture – 16.5 %
Material through a 8/64 inch round hole sieve – 0.55%
Badly ground damaged soybeans – 5.045%
Soybean splits – 29.449%
Black soybeans – 1.8%

Key
U.S. No. 3 Yellow Soybeans, Garlicky
Factors:

Test weight – 53.4
Damaged kernels total – 5.0%
Splits – 29.4 %
FM = Corn whole 1.2% = 0.3% cracked corn and material through 8/64-0.6% = 2.1%

Sample2. Wheat
Sample information (999 grams)
Sample mostly Hard Red Spring Wheat
Test weight of 59.2 lbs
Dockage 1.09%
Garlicky odor with 5 dry garlic bulblets
Odor of smut – 13 smut balls
Material through a 0.064 x 3/8 oblong sieve – 1.06%

Work sample (30 grams)
Heat damaged barley – 0.2%
Sprout damaged wheat – 3.7%
Wild oats – 0.846%
Durum wheat – 2.8%
Soft red winter wheat – 7.2%
Hard and vitreous kernels – 62%

Key
U.S. No. 3 Northern S pring Wheat,light smutty,dockage 1.1%

FM – (other grain + other matter,0.2% barley = 0.8% wild oat)=1.0%
Defects(damaged wheat and other grains + other grains and FM (not dockage) + shrunken and broken) = (heat damaged barley 0.2% + sprouted wheat 3.7%) + (0.2% barley,0.8% wild oat) +(ShBk – 1.1%) = 6.0%
Contrasting class – Durum 2.8%
Wheat of other classes – Durum 2.8% + Soft Red Winter – 7.2%) = 10 %

Sample 3. Oats

Sample information

Heat damaged barley – 0.22%
Not heat damaged barley – 0.21%
Wild buckwheat weed – 0.81%
Cultivated buckwheat – 1.01%
Ergot – 0.18%
Material through a 0.064 x 3/8 inch sieve and on top of 5/64 triangular sieve – 20.5%
Insect bored kernels – 0.945%
Wild oats – 2.045%

Key
U.S. No. 2 Extra Heavy oats, Ergoty, Thin

Sound oats – [100 – (other grain + damaged oats total + wild oats + FM) = 0.4 barley + 1.0 buckwheat +0.9% insect bored + 2.0% wild oats + 0.81% wild buckwheat + 0.5% material through 5/64] = 94.4%
Heat damaged – 0.2%