

## Agronomy 212

Name: \_\_\_\_\_

First Exam

Exam number: \_\_\_\_\_

Spring 2007

Section I. Please answer either (a) True or (b) False. Mark (b) if any parts of the statements are false. (20 points)

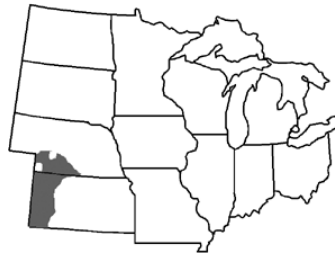
1. The Northern Great Plains farm resource region is characterized by wheat, cattle, and sheep farms. It has the largest farm size and smallest population of all the U.S. farm resource regions.
2. Michigan has a winter wheat, corn, and soybean farming region.
3. In 2004, seven of the top eight U.S. states in total cash receipts from crops were states outside the North Central region.
4. Government policy and laws are major factors determining farming regions. i.e. They made the list of eight reasons for farming regions presented in Agronomy 212.
5. Corn is produced in greater quantities (metric tons) worldwide than all other crops except wheat and rice.
6. Corn is the number one cash crop grown in the U.S.
7. Most of the starch in a corn kernel is found in the embryo.
8. U.S. corn yields have been increasing by 8 Bu/acre/year over the last 30 years. If this trend continues, the U.S. will be producing 300 Bu/acre by the year 2020.
9. Pigs currently consume more U.S. corn than any other animal group.
10. The amount of U.S. corn fed in the Corn Belt is less than the amount fed outside the Corn Belt.
11. Egypt is one of the top six importing countries for U.S. corn.
12. Calcium magnesium acetate (CMA) is a fiber made from corn used to make blankets and degradable plastics.
13. Glyphosate resistant (RoundUp Ready) crops are an example of plants transformed to produce an alternate enzyme for the one blocked by the herbicide.
14. A late-season corn hybrid in southern Iowa could also be considered an early-season hybrid in northern Iowa.
15. To hedge production risks, crop producers should buy seed from two or more seed companies.
16. In a commercial seed corn field (i.e. a field used to produce hybrid seed), the female plants have their tassels removed.

17. Because it takes 5 to 7 generations to develop a corn inbred, it typically takes seed companies 5 to 7 years to create new inbreds.
18. The entire genome of the bacteria, *Bacillus thuringensis*, is expressed in Bt crops.
19. Iowa Corn Performance Tests are replicated 6 times at each location.
20. Iowa Corn Performance Test results are first available to corn growers through the Iowa Crop Improvement Association web site.

**Section II. Please select the best choice. (30 points)**

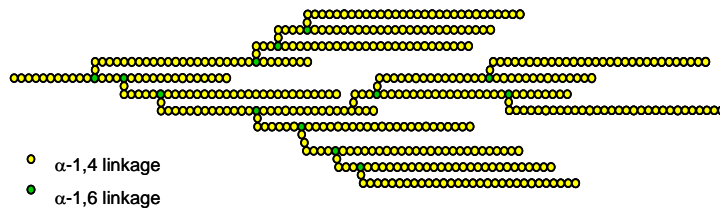
21. What U.S. Farm Resource Region is best characterized by cotton, rice, poultry, and hog farms?
  - a. Northern Crescent
  - b. Northern Great Plains
  - c. Eastern Uplands
  - d. Basin and Range
  - e. Mississippi Portal
22. The USDA separates the U.S. into four main regions when describing the distribution of farms and land in farms. Which of the following statements best describes the North Central region?
  - a. It has less of the U.S. land in farms than the Northeast region.
  - b. It has fewer farms than the West region.
  - c. It has more land in farms than any other region.
  - d. It has more farms than any other region.
  - e. It has the least amount of U.S. land in farms of the four regions.

23. What farming region of the North Central U.S. does the gray area in the drawing indicate?
  - a. Range
  - b. Irrigated corn and winter wheat
  - c. Winter wheat and sorghum
  - d. Corn, soybean, and winter wheat
  - e. Seasonal grazing



24. What North Central U.S. state has a winter wheat and grain sorghum production region?
  - a. Missouri
  - b. Illinois
  - c. Kansas
  - d. Indiana
  - e. Ohio
25. What Iowa farming region has about 75% of its land available for row crop production?
  - a. Eastern livestock
  - b. Dairy
  - c. Western livestock
  - d. Both a and b
  - e. Both a and c

26. What is the major determinant of farming regions in Iowa?
- Topography
  - Plant diseases
  - Climate
  - Government policy and laws
  - Distance from metropolitan areas
27. What crop had greater worldwide production area (hectares) than corn when averaged over the period of 2001-2005?
- Soybean
  - Sorghum
  - Wheat
  - Cotton
  - Both c and d
28. High lysine corn is a specialty type of \_\_\_\_\_ corn.
- Pop
  - Sweet
  - Flour
  - Flint
  - Dent
29. What corn type is used to make corn nuts?
- Waxy corn
  - High lysine corn
  - Flour corn
  - Flint corn
  - Sweet corn
30. What molecule from a corn kernel is represented in the drawing?
- Zein
  - Amylose
  - Amylopectin
  - Oil
  - None of the above



31. How much protein is found in kernels of a typical dent corn hybrid?
- 4%
  - 8%
  - 14%
  - 24%
  - 70%
32. Which of the following is one of the top four countries in world corn production?
- Canada
  - Columbia
  - Russia
  - China
  - Australia

33. What country exports more than half of its corn production?
- Brazil
  - Ukraine
  - Argentina
  - China
  - South Africa
34. Which of the following statements regarding U.S. corn use is NOT true?
- Fifteen (15) to 20% of U.S. corn is exported each year.
  - The number of bushels used for food, seed, and industrial uses has increased over the last decade.
  - The number of bushels used for feed has been increasing over the last decade.
  - Japan, as the number one customer of U.S. corn, buys more than twice as much corn as any other country.
  - Corn exports from the U.S. in 2005 were greater than they were in 1980.
35. What type of corn starch is used as a stabilizer and thickener in food products, such as gravy and pie filling?
- Amylose
  - Multi acetic acid
  - Amylopectin
  - Polylactic acid
  - Fructose
36. What amino acid is most limiting in corn-based human and swine diets?
- Methionine
  - Tryptophan
  - Valine
  - Lysine
  - None of the above
37. Which of the states listed does NOT contain at least some land in the U.S. Corn Belt?
- Minnesota
  - South Dakota
  - Kansas
  - Michigan
  - Pennsylvania
38. Which of the following scenarios does NOT describe a genotype by environment (G x E) interaction? (Four of the examples are GxE interactions and one is NOT.)
- Hybrids A and B both have 10% more yield when planted at location 1 compared to location 2.
  - Yield for Hybrid A increases by 35 Bu/acre when nitrogen application is increased from 150 to 225 lbs/acre, but yield for Hybrid B declines by 3 Bu/acre for the same increase in nitrogen.
  - Yield for Hybrid A does not change when plant population is increased from 30,000 to 40,000 plants per acre, but yield for Hybrid B decreases by 20 Bu/acre for the same population increase.
  - Hybrid A out yields hybrid B by 20 Bu/acre at location 1 and hybrid B out yields hybrid A by 20 Bu/acre at location 2.
  - Hybrid A yields 210 Bu/acre a location 1 and 150 Bu/acre at location 2 and Hybrid B yields 130 Bu/acre at location 1 and 175 Bu/acre at location 2.
39. Genetics of which of the following crops can be obtained as hybrids, but are more widely available as varieties. i.e. The genetics are NOT commonly available as hybrids.
- Corn
  - Barley
  - Sorghum
  - Sunflower

40. Which of the following statements regarding inbreds and/or hybrids is NOT true?
- Hybridization works best in naturally cross-pollinating crop species like corn.
  - Grain produced from hybrid corn plants cannot be saved and planted the next generation without a loss in yield potential.
  - Both inbreeding depression and segregation of genes occurs in the F<sub>2</sub> generation (the second generation after the inbreds are mated).
  - When first introduced, corn hybrids gave as much as 50% better performance than open-pollinated varieties.
  - All of the statements are true.
41. Which of the following is NOT an improvement made to corn through conventional breeding?
- Increased tolerance to crowding
  - Longer anthesis-silk interval
  - More erect leaves
  - Improved tolerance to second generation corn borer
  - Smaller tassels
42. What term describes a DNA sequence used to switch a transgene on and off in a plant?
- Promoter
  - Enzyme
  - Nucleic acid
  - Reporter gene
  - Toxin
43. Which of the following statements regarding transgenic crops (such as Bt corn and Round-Up Ready soybean) is NOT true?
- The two most common methods used for transforming corn and soybean are the particle gun and Agrobacterium-mediated transformation.
  - Agrobacterium is the most versatile method for transforming crop plant species.
  - Use of plant transformation techniques to create transgenic crops has NOT eliminated the need for conventional breeding methods in the development of modern crop hybrids.
  - The success rate for plant transformation is 20% or less (i.e. 20% or less of the cells targeted for transformation successfully express a transgene).
44. Which of the following statements regarding corn genetics is NOT true?
- Inbreeding depression is the loss of fitness from increased homozygosity, which in turn exposes recessive deleterious traits.
  - Homozygosity is having two identical alleles of the same gene.
  - Nearly all plants in a field of hybrid corn plants being grown for grain have a similar genotype and phenotype.
  - Segregation is the separation of allelic genes at meiosis.
  - All of the statements are true.
45. There are two independent corn hybrid tests performed in Iowa each year. One is the Iowa Corn Performance Test conducted by the Iowa Crop Improvement Association and Iowa State University. The other is called:
- Best Independent Genetics (B.I.G)
  - Farmer's Independent Research of Seed Technologies (F.I.R.S.T)
  - Superior Corn Genetics Test (SCGT)
  - Best Corn in Iowa Genetics Test (BCIGT)

46. What should be the first step of the corn hybrid selection process if a producer wants to obtain the best genetics for crop production using a crop performance test? (Assume you are basing your decision on profits.)
- Locate a seed source and check price.
  - Identify the highest yielding hybrid or variety in the test.
  - Find all entries in a crop performance test that had a yield equal to or greater than the highest yield minus the LSD for the test.
  - Analyze two or more consecutive years of data to determine stability of performance.
  - Use information in addition to yield to eliminate less desirable choices.
47. Which of the following traits is NOT reported in the Iowa Crop Performance Test?
- Relative maturity in days
  - Tunneling by stalk boring insects
  - Moisture content
  - Lodging
  - Two year means for yield if a hybrid was entered both years
48. The yield for a hybrid was 202.2 Bu/acre and the harvest moisture was 19%. What is the adjusted gross value (AGV) for this hybrid at 15.5% moisture with a price of \$3.50 per bushel, a shrink factor of 1.35, and drying costs of \$0.06 per point of moisture per bushel?
- \$636.57 per acre
  - \$679.35 per acre
  - \$648.70 per acre
  - \$621.55 per acre
  - None of the above
- Adjusted gross value = gross value – drying cost**

Gross value = dry yield x price per bushel

Dry yield = yield – (shrink factor x (moisture % - 15.5))

Drying cost = yield x (moisture % - 15.5) x drying cost per point per bushel
49. In studying an Iowa Corn Performance Test report, you see that hybrid A produced a yield of 193.6 Bu/A while hybrid B yielded 187.6 Bu/A. The  $LSD_{0.05}$  reported for yield in this test was 9.3 Bu/A. Reported values for moisture were 21.3 and 22.4% and lodging was 4% and 3% for hybrids A and B, respectively. Select the most appropriate statement concerning these two hybrids.
- Based on statistical probabilities, there is greater than a 95% chance that hybrid A is higher yielding than hybrid B.
  - Based on statistical probabilities, there is less than a 5% chance that hybrid A and hybrid B have the same yield.
  - You can be 100% confident that hybrid A is superior to hybrid B under all management and environmental conditions.
  - Based on grain yield, both hybrid A and hybrid B are acceptable choices for planting.
  - All of the statements are true.
50. You have narrowed down the selection of hybrids for a particular field to two. Hybrid 1 had \$610 per acre Adjusted Gross Value (AGV) in the Iowa Corn Performance Test and costs \$220 per bag. Hybrid 2 had \$592 per acre AGV in the same test and costs \$180 per bag. Which of the following statements is true if your seeding rate is 36,000 seeds per acre and there are 80,000 seeds in a bag of hybrid seed corn?
- Hybrid 1 is the better buy because the revenue per acre is \$18 greater for Hybrid 1 than Hybrid 2.
  - Hybrid 1 is the better buy because the difference between revenue per acre and seed cost per acre is \$18 greater for Hybrid 1 than Hybrid 2.
  - Hybrid 2 is the better buy because the seed cost per acre is \$40 less for it than Hybrid 1.
  - Hybrid 2 is the better buy because the difference between revenue per acre and seed cost per acre is \$18 greater for Hybrid 2 than Hybrid 1.
  - It's a toss up. Neither hybrid has more than a \$1 per acre advantage over the other hybrid.