

Agronomy 212 – Crop Growth, Management, and Productivity

Learning Objectives

Fall 2008

Exam 2

Corn - Planting

1. Describe the goals of the planting operation and the influence of timely planting on profitability.
2. Explain factors impacting the optimum date for planting of corn and other full-season summer annual crops.
3. Describe the critical spring planting period for corn in the central Corn Belt.
4. Calculate the spring freeze risk for a corn crop and locality from the mean date of last 28°F spring freeze, freeze probabilities, and knowledge of corn development.
5. Characterize corn yield response to planting date for the period from April 10 to June 10 and calculate the potential corn yield loss from a planting date after May 1.
6. Describe reduced stress risk at pollination and longer day length during grain fill as the major advantages of early corn planting. Identify other advantages to early planting of corn.
7. Explain the impact of corn planting date on time to emergence, silking date, and grain moisture content at harvest.
8. Describe the morphological and physiological effects of early planting on corn.
9. Explain the impact of planting date on the yield and energy value of corn silage.
10. Characterize the average rate at which the corn crop is planted in Iowa. Identify the amount that is completed by the target completion date of May 15.
11. Describe the factors that should be considered when planting corn earlier than April 20 in Iowa.
12. Characterize the average number of days suitable for fieldwork during the spring planting period.
13. Describe the advantages and disadvantages of different hybrid maturity management schemes.
14. Identify the ideal planting depth for corn and describe factors impacting planting depth.
15. Describe the relationship between planting depth and rate of germination, time required for emergence, and percent stand.
16. Describe factors impacting replant decisions for corn and evaluate the need to replant based on remaining stand and planting date.

Corn - Stand Density

1. Distinguish between seeding rate and plant population.
2. Describe the goal and considerations used to determine economically optimal stand densities.
3. Calculate seeds per foot of row from seeds per acre and vice versa.
4. Calculate seeding rate from target plant population and anticipated seed and seedling mortality.
5. Describe factors impacting seed and seedling mortality.
6. Calculate stand density from stand counts.
7. Estimate corn yield in the field.
8. Describe and explain the sensitivity of corn to small changes in stand density.
9. Characterize the response of corn to plant population under poor, normal, and excellent conditions.
10. Characterize trends in corn plant population among major corn producing states for the most recent ten years. Explain the reasons for the differences among states and years.
11. Describe adjustments in corn yield components to different stand densities.
12. Characterize a prolific corn hybrid and its response to different stand densities.
13. Identify final stand densities for corn based on yield goals.
14. Describe the impacts of soil fertility, geographical location, soil type, planting date, hybrid, maturity, and use on optimum stand density for corn.
15. Describe how the law of diminishing returns applies when choosing corn stand densities. Evaluate the contributions of yield and costs to determining corn stand densities.

Corn - Row Width

1. Describe the goal and considerations used to select row widths.

2. Characterize current row widths for corn production in the north central U.S.
3. Explain the theoretical benefits of narrower row widths.
4. Calculate equidistant row widths based on plant population.
5. Identify and explain cropping system considerations used when selecting row width.
6. Explain the physiological concepts related to row width and light interception by crops.
7. Describe the impacts of plant size, geographical location, planting date, and genetics on row width.
8. Describe and explain the grain yield response of corn to different row widths.
9. Describe the silage yield and quality response of corn to different row widths.
10. Describe equipment considerations for narrow row crop production.
11. Describe and calculate the application rate of insecticides and in-row fertilizers as row width is narrowed.
12. Evaluate the need for a producer to switch row width based on the old and new widths, cropping system, geographical location, and cost.

Small Grains – Importance and Use

1. Characterize the relative levels of barley, oat, rye, sorghum and wheat production in the U.S.
2. Describe the value of production for barley, corn, oats, rye, sorghum, and wheat produced in the U.S.
3. Explain the worldwide importance of wheat relative to other grains.
4. Describe the adaptation of wheat and identify climates suitable for wheat production.
5. Identify the top five wheat-exporting countries, the market share for each, and the percent of production exported by each.
6. Characterize the importance of Brazil, Asian countries, and Middle-Eastern countries as wheat importers.
7. Identify the major and minor wheat growing areas of the U.S.
8. Identify the current average U.S. wheat yield. Describe the bushel per year and percent per year trend in wheat yield over the last 25 years.
9. Characterize the influence of environment on wheat use and quality.
10. Identify the seven U.S. market classes of wheat. Describe the adaptation, growing region, quality characteristics, and uses of each class.
11. List the top five states in production of winter wheat and characterize the importance of these five states to total U.S. wheat production. Do the same for spring wheat and durum.
12. Describe the relative yield, production, and price of winter, durum, and spring wheat. Explain the relationship between these characteristics and blending of wheat grain or flour.
13. Describe the adaptation, growing region, and uses for barley, oats, rye, triticale, and grain sorghum.
14. Describe the use of fodder- and grass-type forage sorghums.

Small Grains – Management

1. Describe the versatility of small grains in agricultural systems.
2. Characterize the reasons often given for not growing small grains in a corn-soybean rotation. Explain why most of these excuses are not valid.
3. Identify recurring problems in a corn/soybean rotation that could be solved with longer crop rotations.
4. Describe the benefits of including a small grain in a rotation.
5. Characterize the availability of small grain markets in the upper Midwest U.S.
6. Identify the risks of growing small grains in the central Corn Belt and describe how to manage these risks.
7. Describe scab as a limitation to barley, triticale, and wheat production and utilization. Describe approaches for managing it.
8. Describe identifying a market and adopting a cash grain focus as the two important first steps to successful small grain production.
9. Characterize the yield potential of small grains in Iowa.
10. Describe the management practices need to profitably produce small grains.
11. Calculate the loss of yield from late planting of oats in the central Corn Belt.
12. List and describe the quality specifications for milling oats. Explain management practices that result in high quality, high value oats.
13. Describe post harvest management options available to a small grain producer.
14. Describe the methods for frost seeding red clover into winter cereal grains and utilization of the subsequent red clover crop.