

Agronomy 212 – Crop Growth, Productivity, and Management

Learning Objectives

Spring 2008

Exam 3

Soybean – Importance and Use

1. Identify the center of origin for soybean.
2. Outline the development of soybean as major crop in the U.S.
3. Describe the two major products of soybean processing.
4. Describe the relative amounts of oil and protein in U.S. soybean and soybean meal.
5. Identify the percent protein in soy meal, soy protein concentrates, and soy protein isolates.
6. Explain the use of lecithin and soy flour in food products.
7. Explain the importance of soybean to world oilseed production.
8. Describe the world use of soybean meal relative to other protein meals.
9. Identify the top four countries in production of soybean and describe the amount of world soybean production occurring in each.
10. Describe trends in soybean production for Brazil and Argentina for the past 25 years.
11. Identify the portion of U.S., Brazilian, and Argentinean soybean exports that are shipped as whole soybeans, soybean meal, and soybean oil. Explain the impact that shipping more meal and oil would have on the U.S. economy.
12. Describe the trend in U.S. soybean exports for the past 25 years. Identify the percentage of the U.S. soybean crop that is exported.
13. Identify the important customers of U.S. soybean, soybean meal, and soybean oil. Describe the importance of the European Union and Pacific Rim countries to U.S. soybean exports.
14. Describe trends in U.S. soybean production, acres planted, and price in the last 25 years.
15. Identify the current average U.S. soybean yield. Describe the bushel per year and percent per year trend in soybean yield from for the last 25 years.
16. Identify the major and minor soybean growing areas of the U.S. List the top five states in soybean production. Identify five major soybean states outside the Corn Belt and describe why soybean can be economically grown in these states even though yield levels are one-third lower than in Iowa.
17. Describe the use of U.S. soybean meal by livestock.
18. Describe the importance of soybean oil relative to other fats consumed in the U.S.

Soybean - Development and Selection of Genetics

1. Define a variety and describe why seed harvested from varieties can be planted the next year without loss of yield potential.
2. Identify crop species sold primarily as varieties.
3. Describe situations that could result in yield differences for the same variety in different geographical locations or seasons.
4. Describe variety development.
5. Describe the original and amended Plant Variety Protection Acts and explain their importance to seed sales and crop production.
6. Describe the implications of patenting of plant varieties and genes.
7. Characterize high quality crop seed.
8. Describe the storage requirements for maintaining high quality seed.
9. Explain the classification of soybean varieties into different maturity groups.
10. Outline the procedures and describe the data release for the Iowa Soybean Performance Test.
11. Describe the use of crop performance tests for soybean variety selection.

Soybean - Planting

1. Describe the considerations for determining timing of soybean planting.
2. Identify the critical spring planting period for soybean in Iowa.
3. Calculate the spring freeze risk for soybean at specific locations in Iowa based on the mean date of last 28°F spring freeze, freeze probabilities, and knowledge of plant development.
4. Explain why corn is planted before soybean in Iowa.
5. Characterize soybean yield response to planting date for the period from May 1 to July 10 for northern and southern Iowa.
6. Calculate the soybean yield loss for a planting date after May 1.
7. Evaluate the relative tolerance of corn and soybean to late planting for the period May 10 to June 10 in Iowa.
8. Describe the impact of planting date on soybean plant height and maturity.
9. Explain factors that contribute to weed management problems in early-planted soybean.
10. Describe weed management strategies when growing organic soybeans.
11. Characterize the average rate at which the soybean crop is planted in Iowa. Identify the amount that is completed by the target completion date of May 25.
12. Identify the ideal planting depth for soybean and describe factors impacting planting depth.
13. Describe the importance of the cotyledons to soybean stand establishment and yield.
14. Characterize soybean emergence problems associated with soil surface crusting and describe the use of the rotary hoe to break soil crusts.
15. Explain the influence of soil moisture on seed germination.
16. Describe factors impacting soybean replant decisions.
17. Explain management decisions related to late planting of corn and soybean and evaluate the need to replant soybean based on stand remaining and planting date.

Soybean - Stand Densities

1. Describe factors impacting seed size and their importance to seeding rate.
2. Perform calculations with pounds of seed per acre, seeding rate, and seed weight.
3. Describe yield compensation and its importance to optimal stand density for soybean.
4. Identify soybean seeding rates from variety growth habit and row width.
5. Explain the importance of increasing seeding rate of soybean for row widths of 20 inches or less.
6. Identify expected plant densities at the seedling and mature plant stages for soybean.
7. Describe the advantages and disadvantages of over seeding soybean.
8. Describe the impact of seed size on soybean seeding rate and cost.

Soybean - Row Width

1. Characterize current row widths for soybean production in the north central U.S.
2. Describe the impact of row width on water management and soil erosion.
3. Explain the physiological concepts related to row width and light interception by crops.
4. Describe the impacts of plant size, geographical location, planting date, and genetics on row width.
5. Describe and explain the yield response of soybean to different row widths. Contrast the results of soybean row width studies performed before 1980 to results of more recent studies.
6. Characterize the impact of row width on weed management.