AGRONENTY 375
KEY
Exam II - November 14, 2003
100 points possible

4 pts. 1. 2938 / 23.5 = 125 Days Relative Maturity

4 pts. 2. a) Planting date.
b) Tillage system.
c) Soil fertility level.
d) Planting precision.
e) Row width.
f) N application rate.
g) N application timing.
h) Plant population.

10 pts. 3.  a) Grain yield and profit potential increase as total season length increases to provide greater total interception of solar radiation.

b) Increased harvest index due to affect of low temperature early (vegetative growth) and high temperature mid- to late season (grain development). Increases harvest index contributes directly to increased yield.

c) Plant height is reduced due to the low temperature affect on early growth. This results in less potential for lodging and greater tolerance to high plant populations.

d) Pre-harvest losses are reduced as early-planted corn matures quickly and dries down early in the fall while temperatures are high and relative humidity is low.

e) Early planting results in a broad choice among alternative hybrids.

f) Early planting allows replanting with the first-choice hybrids.

g) Early planting generally results in an avoidance of high temperature and drought stress during pollination.

8 pts. 4. All of these strategies improve the efficiency of N fertilizer use by the crop. Without these precautions, the potential for N loss through leaching and / or denitrification is particularly high for Fall applications because of the
extended time that fertilizer nitrogen would be exposed to loss when Fall applied. Application of N as ammonia only, allows for maximum security from loss as ammonia reacts with soil moisture to produce ammonium (NH4+), a cation which is held by a soil’s exchange sites. Fall N application is not recommended unless a soil has a C.E.C. of at least 10 meq / 100 grams as a means of assuring adequate capacity to retain Fall applied ammonium. At temperatures below 50 F (particularly at more northern latitudes where temperatures generally remain low once this threshold is passed), and in the presence of a chemical nitrification inhibitor such as N - Serve, the conversion of ammonium (NH4+) to nitrite (NO2-) (and ultimately to nitrate (NO3-) is slowed sufficiently to lessen the potential for N loss to acceptable levels.

5 pts.  5. In a wet yet poor soil drainage may contribute to N deficiency symptoms in mid to late season as significant amounts of the Spring applied fertilizer N may be lost through denitrification when soils are waterlogged and oxygen supply is limited for a prolonged period of time.

6 pts.  6. a) Cost effective, efficient. Side-dressing results in very low levels of loss and maximum N availability to the developing crop.

b) Allows N rate adjustment as conditions dictate in the spring.

c) Allows a switch to soybeans where losses are extreme.

d) Lowest potential for environmental contamination (least leaching of nitrate).

5 pts.  7. a) \[110 + [1.36 (180 - 100)] - 30 \text{ Lb. Credit} = 188.8 \text{ Lbs N/Acre}\]

2 pts.  b) \[188.8 / .82 = 230.2 \text{ Lbs. NH}_3\text{ per acre}\]

5 pts.  8. a) \[(180 \text{ Bu/Acre}) (0.37 \text{ Lbs P}_2\text{O}_5/\text{Bu}) = 66.6 \text{ Lbs P}_2\text{O}_5/\text{Acre}\]

2 pts.  b) \[66.6 / 0.46 = 144.8 \text{ Lbs 0-46-0/Acre}\]

5 pts.  9. a) \[[(180 \text{ Bu/Acre}) (0.27 \text{ Lbs K}_2\text{O}/\text{Bu})] + 20 = 68.6 \text{ Lbs K}_2\text{O/Acre}\]

2 pts.  b) \[68.6 / 0.60 = 114.3 \text{ Lbs K}_2\text{O/Acre}\]

6 pts.  10. a) Early planting date (cool soils)

b) No-till soils with heavy surface residue

c) Poor soil drainage

d) Very low soil test (e.g. P1 ≤ 15 ppm or 30 Lbs/acre, K ≤ 75 ppm or 150 Lbs/acre)
e) Low rates of fertilizer application (especially where soil test levels are relatively low).
f) Dry soils.
4 pts.  11.  a) Average seed to seed spacing is $25 / 5 = 5$ inches.
   (1 seed / 5 in.) (12 in. / ft.) (17,424 ft. / acre) = 41,817.6 seeds/ acre

4 pts.  b) $x \quad x^2$
   
   $4 - 5 = 1 \quad 1$ \quad Sum of squares of differences / \quad r - 1 = 130 / 4 = 32.5 = S^2
   2 - 5 = 3 \quad 9
   15 - 5 = 10 \quad 100
   3 - 5 = 2 \quad 4
   1 - 5 = 4 \quad 16
   \quad S = \quad 5.7 \quad inches

4 pts.  c) 3 bu / acre yield penalty for each inch of standard deviation greater than 2.

   5.7 - 2.0 = 3.7 inches of standard deviation greater than 2.

   (3.7) (3) = 11.1 bushels per acre potential yield penalty.

4 pts.  12.  a) Scout the field during beetle flight during July, August, and September (or until
   the treatment threshold is exceeded) in 2003 (in anticipation of planting next
   Spring). This allows an indication of the numbers of eggs being laid which will
   then hatch into larvae to feed on roots in next year's corn.

4 pts.  b) The threshold for first year corn after corn (at a current year population of
   26,000 plants per acre) is an average 0.5 beetles per plant. At levels of infestation
   equal to or greater than this, soil applied insecticide is recommended at planting
   for corn in this field next year.

4 pts.  c) Scout the 2005 soybean field using sticky traps spaced at approximately 100
   yard intervals (avoiding field borders). Traps should be in place during egg
   laying by corn rootworm beetles (at this latitude this occurs during July, August
   and September). The economic threshold indicating the need for soil insecticide at
   planting is an average of 5 beetles per trap per day (e.g. 35 or more beetles trapped
   over a seven day period).

6 pts.  13.  The lowest economic control threshold may be found when young larvae are
   present on relatively old (e.g. V6 or older) plants. This combination presents the
   greatest risk as young larvae have the longest time yet to feed while plants at V6
   or older have the growing point above ground where it is vulnerable.

6 pts.  14.  $(0.044 \text{ Tabular value}) \times (0.70 \text{ infestation}) \times ($2.25/bu) \times (180 \text{ bu/acre}) \times (0.80 \text{ control}) =$
   $9.98 \text{ preventable loss if field treated.}$

   Don't treat since the cost of treatment is $15 (treatment would result in a net
   economic loss of $15 - $9.98 or $5.02 per acre).
Moldboard plowing would most reduce the potential for economic loss to European Corn Borer. Larvae overwinter in corn residue and after pupation European Corn Borer moths would normally emerge from this residue if it is left on the surface. However, the burying of corn residue by moldboard plowing prevents moth emergence in those fields and will significantly lessen the potential for economic loss (assuming minimal moth inflight from adjacent unplowed fields).

Corn Rootworm eggs laid in mid to late summer overwinter in the soil. Larval emerge normally emerge in the soil after egg hatch in the Spring and so are unaffected by tillage.

Black Cutworm does not overwinter successfully in Indiana. Moths flying during the early Spring will lay eggs with priority in no till fields previously in soybeans. However, the impact of tillage on the potential for economic loss to Black Cutworm for corn following corn is relatively minor.