Arkansas/Louisiana/Mississippi
Certified Crop Adviser
Performance Objectives

October 2009
AR/LA/MS REGIONAL CERTIFIED CROP ADVISER
PERFORMANCE OBJECTIVES

November, 2009

I. SOIL FERTILITY COMPETENCY AREA
II. WATER MANAGEMENT, AND IRRIGATION COMPETENCY AREAS
III. PEST MANAGEMENT COMPETENCY AREAS
IV. PRECISION AGRICULTURE COMPETENCY AREA
V. CROP PRODUCTION COMPETENCY AREAS
   A. Cotton
   B. Soybeans
   C. Rice
   D. Wheat
   E. Corn and Grain Sorghum
   F. Forage and Pasture Crops
I. SOIL FERTILITY COMPETENCY AREA

A. Commercial Fertilizer.
1. Describe acceptable application methods for the following fertilizers.
   - urea, UAN solution, ammonium nitrate, triple superphosphate, ammonium polyphosphate, diammonium phosphate, potassium chloride
2. Describe the sources and acceptable methods for application of calcium, magnesium and sulfur fertilizers.
3. Describe the sources and acceptable methods for application of zinc, boron, and molybdenum fertilizers.
4. Describe economical, environmental, and crop problems associated with limited and excess N and P fertilization.

B. Alternative Fertilizer Sources and Properties.
1. Describe the advantages and disadvantages associated with alternative fertilizers, such as manures, poultry litter, and legumes grown for N.

1. Describe neutralizing values, chemical properties, physical properties, and handling precautions of the following liming materials.
   - calcitic limestone, dolomitic limestone
   - fly ash, paper mill sludge, and basic slag.
2. Describe the factors that determine the amount of lime that is needed to correct soil acidity.
3. Describe the importance of time of application, mixing with soil, and depth of incorporation of liming materials on desirable soil pH and crop response.
4. Describe how liming can reduce or eliminate manganese and aluminum toxicities.
5. Describe how liming affects availability of soil and fertilizer P to plants.

D. Soil Test Reports, Fertilizer Recommendations and Calculations.
1. Calculate fertilizer and lime recommendations from a soil test report.
2. Be able to modify fertilizer recommendations as circumstances change such as a change in crop to be grown or depth of soil sample taken.
3. Calculate NPK content of solid and liquid fertilizers based on label information and use that information in a fertilizer recommendation.
II. WATER MANAGEMENT AND IRRIGATION COMPETANCY AREAS

A. Irrigation.
   1. Describe when to irrigate and how much water to apply.
   2. Describe when to terminate irrigation including factors such as crop and type of irrigation.
   3. Describe how the following can be used in areas with limited groundwater for irrigation.
      variety selection
      residual herbicides
      delayed irrigation onset
      no-till and deep till
      early irrigation termination

III. PEST MANAGEMENT COMPETANCY AREA

A. Describe how resistant or tolerant populations of pests (weeds, insects, diseases, nematodes) develop.
B. Describe how the following can be used to manage pesticide resistance.
   crop rotation
   pesticide rotation
   till and no-till
   narrow and wide-row
   variety selection
C. Be knowledgeable of the information contained on pesticide labels and how to read and use this information.
D. Describe how GMOs are used in pest management.
E. Describe way to minimize pesticide drift to non-target organisms.

IV. PRECISION AGRICULTURE COMPETANCY AREA

A. Describe the advantages and disadvantages of precision agriculture for:
   soil test recommendations and fertilizer applications
   pest management and pesticide applications
   variety selection
   tillage operations
V. CROP PRODUCTION COMPETENCY AREAS

A. Cotton.

1. General.
   a. Define the following factors used in variety selection.
      yield
      agronomic performance (i.e. irrigated vs dryland)
      maturity
      fiber quality
      pest/pesticide reaction
   b. List the germination requirements (standard germination, cool test germination) for cottonseed.
   c. Define heat units and DD60.
   d. Describe growth and development including germination, emergence, rooting pattern, fruiting characteristics and sequence, and flower pollination type and timing.
   e. Describe boll setting by fruiting node, position and the dollar value of important positions.
   f. Describe the growth and development of fiber (length, strength, micronaire, uniformity).
   g. Define cutout (i.e. NAWF = 5).
   h. Describe how to determine when a boll is mature.
   i. Describe the maximum seed cotton moisture that cotton can be placed in a module.
   j. Compare harvest aid chemicals as to their strengths and weaknesses. (defoliation, growth inhibition, desiccation, boll opening)
   k. Know affects of temperature on defoliant activity.

2. Fertility.
   a. Describe nitrogen required per bale of cotton by soil type.
   b. List the N, P and K removal in lb per bale.
   c. Describe the pros and cons of applying urea containing fertilizers.
   d. Describe methods of nitrogen application to achieve maximum efficiency.
f. Describe the effects of crop rotation with soybean, corn and grain sorghum.
g. Describe situation(s) where magnesium is needed.

3. Water Management.
a. Describe water needs over the growing season.
b. Compare pivot vs furrow irrigation (amount applied, frequency of application)

4. Pest Management.
a. Describe the following weed problems and list control strategies.
   - morningglory
   - johnsongrass
   - pigweed
   - prickly sida
   - volunteer crops resistant to glyphosate
b. Describe techniques used to determine threshold populations of insects including scouting.
c. Describe the following insect problems, threshold levels and list control strategies.
   - cotton boll worm
   - tobacco bud worm
   - tarnished plant bug
   - aphids
   - thrips
   - spider mites
   - stinkbugs
d. Describe when a boll is safe from attack by the following.
   - boll worm
   - bud worm
   - plant bug
   - boll weevil
e. Describe the differences between fall army worm larvae and cotton bollworm larvae and why it is important to differentiate the species in the field.
f. Describe difference between potassium deficiency and Verticillium wilt.
g. Describe differences between *Rhizoctonia* and *Pythium* seedling diseases and give their control.

h. Describe the following disease problems and list control strategies.

- seedling disease
- *Verticillium* wilt
- boll rot
- *Fusarium* wilt/root knot nematode complex


a. Describe situations where conservation tillage should be used.

b. Compare weed control practices and N fertilizer management in conservation tillage versus conventional tillage.

B. Soybean.

1. General.

a. Describe reduced tillage and no-till systems.

b. Define the following factors used in variety selection.

- maturity
- lodging
- disease and pest resistance
- herbicide tolerance
- yield

c. Define the following seed quality components.

- varietal performance and purity
- physical purity
- germination/vigor

d. Describe seeding rates, recommended planting dates and row spacings.

e. Describe the planting guidelines that should be considered prior to planting.

f. Describe the relationship between physiological maturity and germination.

g. Describe determinate and indeterminate growth habit.

h. Describe the concept of maturity groups and their influence on planting and harvest dates.

i. Describe symbiotic nitrogen fixation.
2. Fertility.
   b. Describe the role and application methods for molybdenum.
   c. Define the soil pH where a yield response to lime is expected.
   d. Describe K deficiency and Cl toxicity.

3. Water Management.
   a. Describe water needs over the growing season.
   b. Describe a typical irrigation program.

4. Pest Management.
   a. Describe the following weed problems, competitive effects, effects on yield, and list control strategies.
      Palmer pigweed (Palmer amaranth)
      common cocklebur
      sicklepod
      morningglories
      hemp sesbania
      Indian joint vetch
      Northern joint vetch
   b. Describe the benefits of ppi/pre vs post emergence weed control program.
   c. In a reduced tillage system, describe criteria for successful weed control.
   d. Describe the following insect problems, sampling procedures, threshold levels, and list control strategies.
      stink bug
      loopers
      corn ear worm
      sorghum midge
      3 cornered alfalfa hopper
e. Describe the following disease problems and list control strategies including variety selection.

   stem canker
   sudden death syndrome
   *Phytophthora* root rot
   frogeye leaf spot
   charcoal rot
   pod and stem blight
   Asian soybean rust

f. Describe how to and when to use a fungicide seed treatment and foliar fungicides during the growing season.

g. Describe the following nematode problems and list control strategies.

   soybean cyst nematode
   root knot nematode
   reniform nematode

C. Rice.

1. General.

   a. List the major reason rice is grown under flooded conditions.
   b. List and describe tillering, internode elongation, green ring, panicle initiation, panicle differentiation, and booting stages of rice.
   c. Describe the DD50 program including the degree day calculation.
   d. Describe land selection and seedbed preparation.
   e. List the factors used in variety selection.
   f. List seed quality components.
   g. List seed treatments and why they are used.
   h. Describe outcrossing and how it is likely to occur.
   i. Describe pure line and hybrid rice and management differences between the two.
   j. List the ideal grain moisture at harvest for pure line and hybrid rice varieties.

2. Fertility.

   a. List N, P and K removal in lb per bushel.
   b. Describe N management including sources, rates and timing.
d. Under what soil and environmental conditions is Zn deficiency likely to develop.

3. Water Management.
   a. Describe typical water management for drill seeded and water seeded systems including.
      flushing vs flooding
      permanent flood
      continuous, pinpoint, and delayed flood
   b. Describe typical water use for different soil textures.
   c. Describe how to manage poor quality irrigation water.
   d. Describe when a rice field should be drained to prevent straighthead
   e. Describe water management in preparation for harvest.

4. Pest Management.
   a. Describe the following weed problems and list control strategies.
      barnyardgrass
      red rice
      broadleaf signalgrass
      sprangletop
      Fall panicum
      ducksalad
      alligator weed
      hemp sesbania
      jointvetch
      palmleaf morningglory
      Texas weed
   b. List the sedges that are weeds in rice.
c. Describe the following disease problems and list control strategies.
   - blast
   - sheath blight
   - panicle blight
   - narrow brown leaf spot
   - kernel smut
   - false smut

d. Describe the following insect problems and control strategies.
   - water weevil
   - stink bug

e. Describe Clearfield rice and the advantages and disadvantages associated with its use.

f. Describe glyphosate injury symptoms on rice.

g. Describe Newpath injury symptoms on conventional rice

D. Wheat.

   1. General.
      a. Define the following:
         - planting date
         - seeding rates
         - freeze injury
      b. Define seed quality components.
      c. Describe the role of vernalization in wheat production

   2. Fertility.
      a. List N, P and K removal in lb per bushel.
      b. Describe when a preplant or fall nitrogen application should be made in wheat.
      c. Describe how liming can eliminate aluminum and manganese toxicity.
3. Pest Management
   a. Describe the following weed problems and list control strategies.
      - wild garlic
      - annual ryegrass
      - annual bluegrass
      - dock
      - cheat
      - mayweed
   
   b. Describe the following disease problems and list control strategies.
      - leaf rust
      - speckled leaf blotch
      - glume blotch
      - stripe rust
      - bacterial streak
      - barley yellow dwarf
      - take-all
   
   c. Identify the following insect problems and list control strategies.
      - Hessian fly
      - aphids & green bugs
      - armyworms

E. Corn and Grain Sorghum

1. General.
   a. Describe recommended plant populations and row spacing and their relationship to yield potential.

2. Fertility.
   a. List N, P and K removal in lb per bushel.
   b. Describe the role of P fertilization as related to early planting corn.
   c. Describe the difference between fertilizer needs when corn is grown for silage vs grain.
   d. Describe magnesium, sulfur and zinc needs of corn.
3. Water Management.
   a. Describe water needs over the growing season.
   b. Describe a typical irrigation program.

4. Pest Management.
   a. Describe the following weed problems and list control strategies.
      johnsongrass
      broadleaf signalgrass
      pitted morningglory
      entireleaf morningglory
      common cocklebur
      Fall Panicum
   b. Describe the following disease problems and list control strategies.
      Anthracnose
      gray leaf spot
      southern corn leaf blight
      charcoal rot
      mycotoxins
      maize dwarf mosaic virus
   c. Describe the following insect problems and list control strategies.
      southern corn root worm
      European corn borer
      southwestern corn borer

F. Pasture and Forage Crops.
   1. General.
      a. Describe planting methods and equipment needs for forages and forage systems.
      b. List the inoculation needs of forage legumes.
      c. List bermudagrass quality components.
      d. Describe management practices used in endophyte-infected fescue.
e. Describe the following non-nutrient toxicities
   - Prussic acid (HCN)
   - fescue toxicity
   - bloat
   - Ergot poisoning
f. Describe pure live seed and know how to calculate pure live seed.
g. Describe the three major phases of forage growth and how they affect forage quality.
h. Calculate % protein from % total N.
i. List and define forage quality components.
j. Differentiate haylage and silage.

2. Fertility.
a. Describe a typical fertilization program for berumudagrass, bahiagrass, sorghum
   sudan, tall fescue, eastern gamagrass, ryegrass, orchardgrass, clover and alfalfa
b. Describe the following nutrient imbalances and toxic accumulations.
   Nutrient imbalances
   - grass tetany (hypomagnesemia)
   - milk fever
   - micronutrient deficiencies
   Toxic accumulations
   - nitrate

3. Pest Management.
a. Describe the following weed problems and list control strategies.
   - annual winter weeds in bermudagrass for hay or pasture
   - broadleaf weeds in grass hay and pasture
   - thistle in pastures
   - johnsongrass in alfalfa
   - smutgrass in pastures
   - cogongrass in pastures
b. Describe current control practices for army worm.
Study Materials are Published by the University of Arkansas and Mississippi State University Extension Services

For a listing of on-line and published study materials go to these web addresses:

http://www.uaex.edu/Other_Areas/publications/pubsWeb.asp
At the UA web site, sort by category and enter the crop name (e.g. cotton, soybean, rice, etc.) for a list of publications on that crop.

At the MSU web site, enter the crop name or refine your search by entering crop plus another identifier (e.g. cotton diseases or soybean irrigation).

Some of these publications are available on-line, others are available through county and state Extension offices.

Information on fertilizers, soils and soil fertility can also be found by searching the following web sites:

http://www.ipni.org/
http://soils.usda.gov/