

**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.

### **C. Soil pH and Liming Materials.**

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.

- e. Describe nutrient deficiency symptoms in cotton for N, P, K, S and boron.
  - 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

5. Conservation Tillage.

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.

- a. List N, P, and K removal in lb per bushel.
- 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.

- c. Describe the symptoms associated with P, K, S and Zn deficiencies.
- 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 bermudagrass, 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](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.

<http://msucares.com/pubs/index.html>

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/>