ble cropping system has been around for a long time, adoption has been modest. Recent changes in crop varieties and production technologies make double-cropping a more viable alternative. There are some drawbacks to double-cropping. Primary among these is the inability in some years to plant and harvest the main crop in a timely fashion. This, in turn, may result in decreased yield compared to the mono-crop system. One of the primary risk factors associated with double-cropping is the lack of moisture at planting time. Data for this analysis was obtained from an irrigated experiment. Therefore, the ability to irrigate is one critical assumption of this analysis. Double-cropping systems also offer some benefit to the environment because year-long cropping practices with winter cover or grain crops increase surface residue, reduce erosion, and help improve surface water quality. Combining these year-long cropping systems with no-till production practices helps build organic matter in southern soils.

The basic approach used here is to take results of the agronomic experiments and apply standardized budgeting techniques to generate a series of enterprise budgets representing each of the production systems. Commercial scale production technology is assumed in developing the budgets. Enterprise budgets provide the basic information for comparing the cropping systems within a risk framework. Gross margins from the enterprise budgets are analyzed using stochastic dominance techniques. This technique considers both the expected value and the variance in gross margins from each of the production systems. Data for the analysis includes results over the life of the experiment (2001-2009).

Data from the experiments were converted to rotational acre basis, so that this analysis is based on the productivity of an acre of land. For example, if we are considering a soybean and wheat double crop, each acre devoted to that cropping pattern would have costs and returns associated with those two crops. Alternatively, if we are considering a rotational cropping pattern, such as cotton one year and corn the next, each acre would be divided so that one half would be cotton and the other half corn with the associated costs and returns. This would represent a whole farm, half of which would be in cotton and the other half in corn annually. More complicated rotations are similarly represented.

The original experimental design for this experiment included 15 different cropping systems including double-crops, rotations, and mono-cropping. For purposes of this paper, only a subset of those experiments is included in the analysis. This sub-set is composed of those tests that had the highest average return per rotational acre over the life of the experiment. A set of double-cropping and/or rotational cropping systems are compared to the mono-crop alternatives.

Alternative cropping systems are compared within a framework that considers not only profitability but risk. This study utilizes stochastic dominance techniques to evaluate the alternative systems. Previous studies based on these experiments indicated that, for the data considered, the wheat-cotton double-cropping system was, on average, most profitable. The current study evaluated data over the life of the experiment within a stochastic dominance framework. Results of this analysis indicated that the wheat-cotton double-crop was also the preferred cropping system considering risk.

14th Annual National Conservation Systems Cotton & Rice Conference

RICE PRESENTATIONS

Program 15R-2

Rice Blast Management Methods

Presented by Dr. Don Groth
Professor, Research Coordinator, LSU AgCenter

Blast, caused by the fungus Pyricularia oryzae, is the most important rice disease in the world. In the United States, it is only second to sheath blight in importance due to its erratic occurrence. If you compare sheath blight to blast in damage potential, sheath blight would only reduce yields 25% in a field under the worst situation while blast is capable of completely destroying the crop. Blast is one of the most explosive and damaging diseases and must be managed aggressively. Yield losses as high as 90% have been reported in commercial fields. Management of blast is based on a combination of host resistance, cultural management, and fungicide application. These management practices are not effective unless the grower knows the basic pathogen biological information and has an understanding of how the disease develops. Biological, epidemiological, environmental, and cultural information will be presented on rice blast. Water management, field selection, fertilization, and fungicide timing are critical for control. This information will be combined to develop an effective blast management system.

Blast can be found on the rice plant from the seedling stage until maturity. In the United States blast appears at two primary times, during tillering and heading growth stages. The leaf blast stage occurs primarily from the seedling stage to just past tillering, peaking at mid-tillering. The rotten neck phase appears as the panicle is emerging until maturity. Blast has several names based on the plant part it is infecting. These include leaf blast, neck blast or rotten neck blast, depending if the head brakes over or off, panicle blast when the panicle branches are infected, or node blast when the culm nodes are infected.

Blast is favored by long dew periods, high relative humidity, light winds, and warm days and cool nights. Other factors that favor blast are excessive N levels, late planting, sandy light soils, tree-lined fields, and a high percentage of susceptible varieties being grown in the area. **However, the most favorable agronomic practice that favors blast is the loss of flood.** Blast is several times more severe under upland conditions than when flooded. If the flood must be removed for insect control, herbicide damage, straighthead control, or some other reason, reestablish the flood as soon as possible and scout regularly for blast.

The fungus is spread by windborne spores that can spread long distances. The fungus infects the tissue, a lesion is formed and spores are produced that cause more infections in as little as 7-10 days. Blast is one of the most explosive plant diseases in the world and acts like a bioherbicide killing plants to the ground. Blast tends to be more severe in later planted rice because spore pressure is higher later in the season due to spores from earlier rice.

Resistant varieties are available. This resistance comes in two forms, single gene and multigenic. They are also called race specific and horizontal resistance since the single gene resistance normally protects against one or a few races of the fungus while the horizontal or field resistance protects against most or all races of the fungus. Single gene resistance tends to be effective for shorter periods of time until the fungus can adapt to or overcome it while field resistance tends to be more stable over longer periods of time. However, almost every resistant variety will become susceptible over time as the fungus adapts to the variety.

Scouting for blast should begin early in the season starting at tillering and continuing through heading. Leaf blast usually appears in high areas of the field where the flood is shallow or has been lost. Areas of heavy N fertilization and edges of the field are also potential sites. If leaf blast is found in the field or has been reported in the area on that variety, a fungicide application is advisable. The fungicide is not applied at the vegetative stages of the rice unless stands are being lost to the disease. The most important management practice at this stage is to reestablish or increase the flood to ensure all of the soil is covered with water (2-4 inches). Avoid applying too much additional N if topdressing is necessary. Remember that correct disease identification is critical since several other diseases and crop damages mimic leaf blast. Most of these other symptoms do not warrant fungicide application.

Fungicide timing is critical for blast control. If a single application is being used, the best timing is when 50-70% of the heads emerging (Heading) but not 100% completely emerged (Headed). Application before or after this stage will not provide good control. As a rule of thumb, you lose 100 lb/A/day the fungicide application is delayed. If disease pressure is high, when the plants have a large number of leaf blast lesions on them, two fungicide applications may be necessary to obtain effective control. The first application should be applied between mid-boot and very early heading to protect early emerging heads and reduce spore numbers, and the second between 50-90% heading to protect the majority of the heads. If rotten neck or panicle symptoms have already appeared, fungicides will have little if any activ-

ity against this disease.
Rules of blast control:
1.Plant resistant varieties
2.Maintain the flood
3.Manage the crop to reduce blast pressure, including planting early, use optimum not excessive N, plant in heavier soils if possible
4.Avoid planting more susceptible varieties in sandy soils
5.Apply fungicide in a timely manner.

Program 16R-2

▸ Determination Of Optimum Plant Populations For Clearfield® Rice Varieties Using Conventional And Fall-Stale Seedbed Tillage

Presented by Dr. Dustin L. Harrell
Assistant Professor, LSU AgCenter

During the 20th century, the only method to suppress red rice in commercial rice production was the use of some variation of water seeding. After the release of Clearfield® rice varieties for commercial rice production in 2002, water seeding was no longer the only management practice that could be used for red rice control. Red rice could now be controlled with the use of imidazolinone (Clearfield®) herbicides, and a shift toward more drill-seeded acres began to occur. With each passing season, rice producers became more comfortable using a grain drill to plant rice and using the Clearfield® herbicide program. Today, drill seeding is the predominant seeding method of rice in Louisiana. Clearfield® technology does have a price though, and all rice farmers are aware of the cost difference between rice seed with and without the Clearfield® trait. In fact, as producers have gotten more comfortable with drill seeding and using the Clearfield® herbicide program over the last decade, seeding rates used by many producers have gotten lower and lower with each passing year. So much so that today, in an effort to save money, many producers are drill seeding using seeding rates lower than the official LSU official recommendations, many times with great success. Currently, the LSU AgCenter recommends 60 to 90 pounds per acre for drill-seeded rice with a target plant population of 10 to 15 plants per square foot. This research was conducted to determine if seeding rate recommendations can be adjusted without compromising yield and profitability.

Several trials were initiated in 2010 in an effort to define the optimum seeding rates and target plant populations for almost all currently available Clearfield® rice varieties. Separate trials were used to evaluate 'CL111,' 'CL131,' 'CL151,' 'CL142,' 'CL181,' and 'CL261.' Treatments include nine seeding rates (5, 10, 15, 20, 25, 30, 35, 40, and 45 seed per square foot (approximately 10 to 110 pounds of seed per acre depending on variety) and two tillage systems (conventional tillage vs. fall-stale seedbed). Seed was treated with gibberellic acid, mancozeb (ethelene bisdithiocarbamate), and Dermacor X100. Seed for each plot was counted with a seed counter on a seed per plot basis. Rice was drill seeded to soil moisture (½ inch) using an Almaco no-till grain drill. Plant populations were determined 2 weeks after emergence. Agronomic data obtained included days to 50% heading, plant height at maturity, grain yield, number of panicles, filled and unfilled grain per panicle, 1000 grain weight, and milling.

Plant population at 2 weeks after emergence was not significantly affected by any of the tillage 2- or 3-way interactions with variety and/or seeding rate, suggesting that when seedbed conditions are not limiting (moisture, weed pressure, seeding depth, etc.) seedling emergence and survival should be equivalent between conventional and stale seedbed tillage systems. A variety by seeding rate interaction was significant ($P \leq 0.001$) for seedling plant population. All varieties had a linear relationship between seeding rate and plant population.