Southwest Region
LSU AgCenter Research & Extension
Rice Research Station News
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Initiation of the Crawfish Harvest: Some Considerations

The shorter days and cooler weather of November and December usually coincide with increased consumer demand for the first crawfish of the season. Ponds will have been flooded for a couple of months and producers begin to contemplate the best time to begin harvest. The right answer will usually vary from farm to farm and will depend on several biological, economical and marketing considerations.

From a pure biological standpoint, it is usually best to remove crawfish from the population as soon as animals reach an acceptable harvest size. Crawfish exhibit a profound density dependent growth response with no apparent threshold for density under most pond culture conditions. That is, the more crowded crawfish are in ponds, the slower they grow and likely the higher the mortality (from cannibalism and aggression). At typical pond densities, there doesn't appear to be a lower density threshold where growth rate is unaffected. Therefore, removing crawfish from the population as soon as they can be sold would theoretically make room for others and spare limited food resources. Removing the largest individuals would also mitigate losses from aggression and injury. Harvesting has a relatively small impact on the population as a whole, however, especially early in the season. Other considerations for when to begin harvesting usually come into play.

Economics is usually the first and foremost factor for determining when initiation of harvesting is appropriate. Farming is, after all, about profits. Harvesting should be based on profitability, although sometimes an exception is warranted. Typically, it is unwise to harvest anytime the revenues do not exceed the costs of harvesting. The only exception might be to supply product to a major client briefly in times of their need to ensure that the client remains loyal in times of a crawfish supply glut where it can be difficult to market your product. For the most part, though, harvesting should generate profits well above the actual cost of harvesting. Often less clear is whether profits would be greater and more consistent early in the season when prices are generally higher (even though catch is often lower) or later in the season when catch is generally greater even though prices may be lower. This usually requires a judgment call, but the producer can usually benefit from good records and a historical reference to his farm. The greater the harvest delay to maximize profits, though, the more the biological aspects of overcrowding come into play.

In general, crawfish harvest begins much sooner and can be sustained earlier in the season in permanent ponds or at least in ponds in production the previous season. This is usually because of a greater number of carry-over crawfish (juveniles as well as adults) and often because these ponds are flooded earlier than rice-crawfish rotational ponds. A population of carry-over crawfish will often result in an acceptable harvestable population much sooner than relying on young-of-the-year recruits to reach harvestable size. Earlier flooding coupled with a less synchronized reproductive cycle in permanent ponds often results in earlier sustainable crops of harvest size recruits.

One misconception that some producers have is that initiation of harvesting too soon will remove too many mature females, negatively affecting annual yields. Research has shown that this is unlikely because first, harvesting, especially early in the season, is just not that efficient, and the amount of mature female crawfish removed is effectively negligible. Second, mature females captured after December would not have been likely to have contributed offspring to the harvestable population within that current season anyway. Therefore, harvesting should not be delayed because of concerns with removing mature females prematurely.

In summary, there are several considerations for determining when best to begin harvesting and how intensive to maintain subsequent harvesting operations thereafter. Economics should be the primary determinant. Crawfish sales should generate profits over and above all harvesting costs, and catch-per-unit-effort and marketing conditions will usually be the determining factors.

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Multiple age classes

Stunted growth

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Special Dates of Interest:

2010 USA Rice Outlook Conference, Dec. 8-10
Biloxi, MS
Southwest LA Rice & Soybean Clinic, Jan. 4, 2011
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Evangeline/St. Landry Rice & Soybean Producers School, Jan. 5, 2011
Ville Platte, LA
Acadia Parish Rice & Soybean Clinic, Jan. 6, 2011
Crowley, LA
37th Annual Vermilion Parish Rice School, Jan. 7, 2011
Kaplan, LA
Avoyelles/Rapides Rice Production Clinic, Jan 11, 2011
Bunkie, LA
Northeast Louisiana Rice Forum, Jan. 26, 2011
Rayville, LA
14th Annual NCSCRC "Tillage Conference", Feb. 1-2, 2011 Baton Rouge, LA

Rice Bacterial Panicle Blight Update

Rice produced in the southern United States has a long history of loss to panicle blighting of unknown cause. Earlier, panicle blighting was attributed to abiotic factors, including high temperatures, water stress or toxic chemicals near the root zone. But in 1996-97, the major cause of panicle blighting in the southern United States was identified as the bacterial plant pathogen *Burkholderia glumae*. The term “panicle blight” has been used in the United States for more than 50 years for various disorders. Therefore, bacterial panicle blight has been selected as the name of the disease. Epidemics of bacterial panicle blight occurred during the 1995, 1996, 1998, 2000 and, most recently, the 2010 growing seasons, which were years of record-high night temperatures, with yield losses in some fields estimated to be as high as 40 percent.

The occurrence of bacterial panicle blight is increasing not only in the southern United States but also in other rice-growing countries of Central and South America and Asia. Because this disease is favored by prolonged high temperatures during the growing season, it is considered a greater threat to rice production because of potential global warming. *Burkholderia gladioli*, another species, was recently reported as associated with this disease in Japan and the southern United States.

The symptoms of bacterial panicle blight include seedling blighting, sheath rot and panicle blighting. The panicle may have one to all of the florets blighted with grains not filling or aborted. Affected panicles develop in circular patterns in the field. Florets are initially white or light gray on the basal third, with a reddish-brown margin separating this area from the rest of the floret, which becomes straw-colored (Figure 1). Floret stems (panicle branches) stay green after the unaffected grain matures. The florets eventually become gray, with growth of saprophytic fungi or bacteria on the surface. The seed borne bacteria cause seedling blights in other countries, but most of the damage in the United States is associated with the developing grain. Sheath damage appears as a reddish brown discoloration of the flag leaf sheath.

The disease cycle is not fully understood. The bacteria are mainly seed borne but also survive in the soil. The bacteria appear to survive between emergence and grain formation as an epiphytic population on the leaves and sheath, spreading upwards as the plant grows. This population infects the grain at flowering and causes grain abortion or rotting during grain filling.

Cultural control has concentrated on reducing nitrogen fertilization to reduce disease severity but has not been very successful. Planting early allows the rice to avoid the high temperatures later in the season, but early hot weather can eliminate the benefit. Chemical control has centered on using copper compounds and Oxolinic acid (Starner) as foliar sprays. The copper compounds were weakly effective but often phytotoxic and are not recommended. Oxolinic acid was effective under light to moderate severity but weak when severe diseases developed. Attempts to label Starner in the United States were not successful. No pesticides are currently recommended for control of this disease in the United States. Several varieties have partial resistance.

Current rice bacterial panicle blight research is concentrating on several areas. First, research on the virulence mechanism of *Burkholderia glumae* through molecular genetic studies is being conducted. Multiple virulence factors, including toxoflavin, mobility and lipase, are responsible for the pathogenic ability of the *B. glumae*. We hope new novel control methods can be developed using this information. Second, we are conducting genetic and molecular biological studies on the disease resistance of rice to bacterial panicle blight to determine how the plant fights infection and to develop molecular markers for breeding. Finally, we are making efforts to develop new rice varieties/lines resistant to bacterial panicle blight, including population development, screening breeding materials and obtaining new sources of resistance. More than 5,000 lines are being evaluated each year for disease resistance. Disease resistance has been identified in several rice varieties and lines, including Jupiter, Nipponbare, LM-1, TeQing and the experimental line LA 2065. Inoculated disease nurseries have been developed to evaluate resistance levels of breeding lines. The bacteria are sprayed onto the plants twice, once at panicle emergence and again at 100 percent heading. Bacterial concentration is critical for effective evaluations because too high of a concentration causes all lines to appear susceptible, and if the concentration is too low, diseases do not develop and all lines appear resistant. A concentration of approximately 1x108 CFU/ml is used. Lines are evaluated using a 0 to 9 scale, where 0 indicates no disease (immunity) and 9 indicates 90-100 percent sterility (very susceptible). Most of the lines evaluated range between a 3 (moderately resistant) and an 8 (susceptible) rating. Efforts to incorporate this resistance into commercial varieties are progressing.

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Fig. 1. Early damage on grain

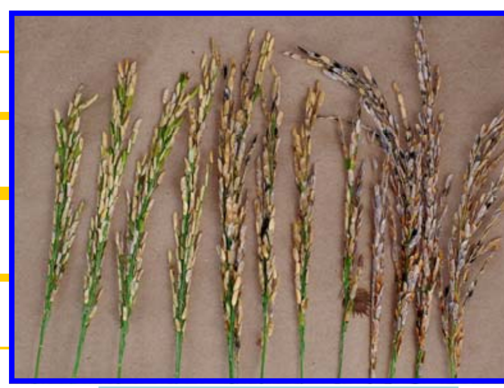


Fig. 2. Sheath rot associated with bacterial panicle blight

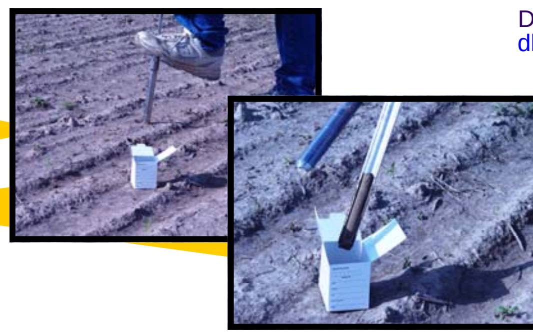
Changes in LSU AgCenter Soil Testing

Providing the most reliable soil test based fertilizer recommendations calibrated by research conducted specifically on Louisiana soils is one of the priorities of the LSU AgCenter Soil Testing and Plant Analysis Laboratory (STPAL). To that end, many changes have occurred over the past half-decade to make sure that the STPAL soil test recommendations continue to improve. Everyone should be fairly familiar with the soil test extraction changes made in 2005. If you remember, most nutrients tested in the laboratory required a handful of different soil test extractions. Nutrients like potassium, magnesium, sodium and calcium were extracted by one soil test extraction (ammonium acetate) procedure. Micronutrients like copper, iron, manganese and zinc required a different soil test extraction (DTPA extraction) procedure. Phosphorus required its own extraction, which was the infamous Bray II soil test extraction. The use of multiple soil test procedures for the different elements worked well for the most part, but, to be blunt, it is more expensive to run separate extractions for the various plant essential elements and extends the turnaround time for submitted samples.

The Mehlich III soil test is a multi-element extraction that can be used to test for all of the plant essential nutrients at one time. So, on Aug. 15, 2005, the STPAL switched its basic soil test to include the Mehlich III soil test extraction. The change was seamless and done without interruption to LSU public soil testing services. The old soil test extractions and the Mehlich III soil test extraction do not provide the same numerical value of extractable nutrients. Therefore, before switching to a new extraction procedure, a lot of work had to go into making sure that the calibration (the interpretation of the results) was accurate and precise. Without it, it would be like changing the thermostat in your house from the Fahrenheit to the Kelvin scale overnight. Do you know what setting you would set your thermostat to in the Kelvin scale? I like mine at 297°K.

Statistical regression analysis between soil test extraction results for more than 300 submitted Louisiana soil samples was used to create the new calibration tables from the old tables. This worked exceptionally well for almost all of the plant essential elements. Phosphorus was the only exception because it worked well only about 95 percent of the time. The problem was in the calcareous, high pH soils. I am happy to report that since that time we have gathered enough field trial data to make a stand-alone phosphorus soil test interpretation table, which has no ties to the old Bray II soil test extraction. The following soil test phosphorus interpretation was entered into the soil database in October this year. The table can be used for all soil types and crops. Phosphate fertilizer is recommended when soil test values fall into the very low, low and medium categories.

Soil Test P Ratings Based on the Mehlich III Soil Test			
Very Low	Low	Medium	High
----------ppm---------			
≤ 10	11 - 20	21 - 35	36+



Soil testing at the Rice Research Station

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Pest of the Quarter

Brown Spot

Brown spot caused by the fungus *Cochliobolus miyabeanus* is one of the most prevalent rice diseases in Louisiana. It is also called Helminthosporium leaf spot. When *C. miyabeanus* attacks the plants at emergence, the resulting seedling blight causes sparse or inadequate stands and weakened plants (Figure 1). Leaf spots are present on young rice, but the disease is more prevalent as the plants approach maturity, and the leaves begin to senesce. Yield losses from leaf infection or leaf spots are probably not serious. Brown spot is an indicator of unfavorable growing conditions, including insufficient nitrogen, inability of the plants to use nitrogen because of rice water weevil injury, root rot or other unfavorable soil conditions.

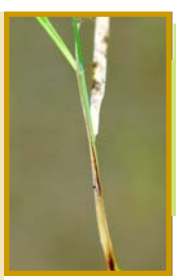

Fig. 1

Seedling disease caused by the brown spot fungus.

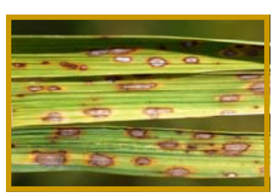

Fig. 2

Typical brown leaf spot symptoms.

Leaf spots are found throughout the season. On young leaves, the spots are smaller than those on older leaves. The spots may vary in size and shape from minute dark spots to large oval to circular spots (Figure 2). The smaller spots are dark brown to reddish-brown. The larger spots have a dark brown margin and a light, reddish-brown or gray center with a gold halo. The spots on the leaf sheath and hulls are similar to those on the leaves. The pathogen also attacks the coleoptiles, leaves, leaf sheath, panicle branches, glumes and grains. The fungus causes brown, circular to oval spots on the coleoptile leaves of the seedlings.

Damage from brown spot can be reduced by maintaining good rice growing conditions by proper fertilization, crop rotation, land leveling, proper soil preparation and water management. Seed-protectant fungicides reduce the severity of seedling blight caused by this seedborne fungus. Some varieties are less susceptible than others.

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Rosette Spoonbill

Sustainable Rice Production in Louisiana

Fulvous Whistling Duck

Sustainable agriculture is a term heard more frequently. But, what is "sustainable" agriculture? There are, in fact, a multitude of definitions and interpretations. In its simplest form, the concept can be described as the production of food and fiber using practices that will ensure the ability to continue to do the same into the future. Stated a little differently, sustainable agriculture is based on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their needs.

Basic to sustainable agriculture is conservation, which includes soil and water resources. Without these two, agriculture is nonexistent. Agricultural producers and industry leaders have long understood the importance of maintaining these resources. In fact, this understanding led to the creation of the USDA Soil Conservation Service in 1935, whose main function was working with producers and landowners to minimize the effect of agriculture and forestry production on soil loss. The name of this agency was later changed to the Natural Resource Conservation Service to recognize the expanded role of the agency, especially in the areas of water conservation and quality.

Louisiana rice production can cite specific examples of improvements in conservation. Ten years ago, most southwest Louisiana rice was grown using a seeding method known as water seeding-pinpoint flooding. This method was used to control the weedy relative of rice known as red rice. It involved working a seedbed in water prior to seeding and then draining the field shortly after broadcast-seeding from an airplane. One drawback of this system was the necessity of draining fields while the floodwater still contained a large amount of suspended soil sediments, which remained from the seedbed preparation. This could lead to soil erosion from the rice field, as well as increasing the sediment load of the receiving water body. However, this practice is seldom used today because most producers have adopted the use of Clearfield technology, which allows for drill or dry broadcast seeding. In addition, many rice producers have incorporated minimum or no-till techniques into their production systems. This further minimizes soil loss and improves water quality. Clearfield technology was used on more than 70 percent of Louisiana and 60 percent of the southern U.S. rice acreage in 2010. This technology is available today because of research conducted over the past 20 years at the Rice Research Station.

Sustainable agriculture also involves reducing the "carbon footprint" of various activities. This is a general reference to the production of greenhouse gases associated with climate change. In fact, in many instances, attempts are made to measure the carbon footprint of every activity associated with the production of a crop, as well as that crop's end products. For example, in rice, this would include not only the carbon equivalent production associated with the field of rice itself but also that associated with the production of the fuel, fertilizer and pesticides needed to produce, harvest and dry the crop, as well as those associated with the processing, transportation, packaging, etc., necessary to make the end product available on the grocery store shelf.

Rice has somewhat of a negative reputation in this area because there is a fairly large amount of methane (one of the greenhouse gases) produced in growing rice – primarily as a result of the aquatic nature of that production. It is interesting to note that the amount of methane produced in an acre of rice production is much less than that produced by an acre of vegetative marsh along the Louisiana coast. Some might consider it ironic that Louisiana rice production is being questioned because of the methane associated with that production, while every effort is being made to maintain and expand our area of coastal marshes.

An additional area of interest related to sustainable agriculture is biodiversity or, more specifically, how crop production affects the biodiversity of the region where that crop is grown. Here, rice production has many positives. The environmental conditions under which rice is grown produce excellent biodiversity and provide habitat for a multitude of species. The co-production of crawfish in many rice fields in the fall and spring following rice harvest enhances environment impacts in the region. Because rice is produced under flooded conditions, the environment in rice fields is different from most other agronomic crops.

Another factor to note about rice production in southwest Louisiana is that it occurs primarily in the coastal prairies, which are just to the north of the coastal marshes of that region. It is well-documented that this region is facing a substantial problem related to the annual losses of the state's coastal marshes, especially fresh and intermediate marsh. Thus, rice production in this area will only become more important in the future in providing habitat to waterfowl, as well as other water birds.

While there has been a move to more drill-seeding in southwest Louisiana rice production with the advent of Clearfield rice, a substantial amount of rice in the region is still water-seeded. In a water-seeded system, fields are flooded beginning in January or February. These fields provide ideal habitat for high priority shorebird species, such as sandpipers, dowitchers, yellowlegs and stilts during this period. When these fields are worked in the water prior to planting, they also are frequented by rosette spoonbills, as well as egrets and herons. Later in the growing season, after the rice has been established and the plants are flourishing, this becomes excellent habitat for numerous species such as rails, gallinules and fulvous whistling ducks.

Everyone is aware of the importance of harvested rice fields re-flooded in the fall as a critical habitat for migratory waterfowl. In fact, the rice fields and coastal marshes of southwest Louisiana typically provide habitat for more migratory waterfowl than any similarly sized region in the continental United States. In addition, harvested rice fields flooded for crawfish production are excellent habitat areas for numerous water birds during the fall, winter and spring following the rice crop. Thus, in the area of biodiversity, rice is a model crop in many respects.

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water resources

drill seeding

pesticides

soil erosion

water seeding

greenhouse gases

fuel and fertilizer

processing & transportation

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Focus

Brian Broussard Brings Strong Work Ethic to Job

Brian Broussard started working at the Rice Research Station just months after graduating from Crowley High School in 1984. He was hired in October 1984 by the station's interim director, T. Wayne White, before Joe Musick became director.

Broussard said the station's shop foreman, Donnie Stutes, father of a classmate, asked him if he needed a job. "It was just a stroke of luck." At the time, Broussard was working part-time on a farm south of Crowley, unsure what he would do for a living.

He started on the farm crew working with the foundation seed program, and he's been in the job since then.

Broussard works in the winter to prepare the fields for planting, then works on every aspect of the crop for the foundation seed. After harvest, he works to clean and bag the seed.

His father was the manager of a store in Crowley. Brian spent summers working on the farm of his uncle, Vincent Zaunbrecher, who grew rice and soybeans near the town of Jones.

"I was always interested in farming," he said. "I like farming and working outside."

Broussard said the new seed cleaning facility brought a significant change in his job when it started operation in 1996.

"Now that we have this new cleaning system, I like it too," he said.

The old cleaning machinery was difficult and tedious to clean in preparation for each different variety. "That was some long days," he said.

He previously worked with a crew of nine employees, and but now the work requires only four.

"In two days, we can have it cleaned and ready to do the next variety," he said.

Broussard said he enjoys working at the station and enjoys working with the fellow employees.

Broussard's supervisor, Larry White, said Broussard is a hard-working employee. "When I give Brian an assignment, I don't have to worry about whether the job will be done, and I know it will be done correctly."

Broussard also works for Bill Leonards, station farm manager, who said Broussard brings a strong work ethic to the job. "He's always doing more than what his job requires," Leonards said.

When Broussard isn't on the job, he's spending time with his wife, Marian, and their daughter and two sons. Deer and turkey hunting are his passion, and he is working on a camp at Bundick's Lake.

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