



# Texas Rice

Texas A&M University System  
Agricultural Research and Extension Center  
Beaumont, Texas

Winter 2006 Volume VI Number 9

## Rice Industry Coping with LLRICE601 Contamination

On August 18, the discovery of LLRICE601 in the Southern U.S. long grain rice supply caused a significant loss in revenue for our rice producers, and posed a long-term threat to the industry. It was estimated that we lost \$144 M in revenue, with 41% of the market negatively effected (USARice Federation, 1-10-07). This is in spite of the fact that the EPA has since approved the event in LL601RICE for human and animal consumption in the U.S.

As a result of the reaction from key markets, the rice industry leaders joined together in a series of meetings to determine how to minimize this negative impact, and to insure that there are no contamination incidents in the future.

Although there is not 100% consensus, the industry has agreed that there will be no commercial production of Cheniere in 2007. Cheniere seed increase will be allowed in 2007, for 2008 and 2009 seed stocks, using Foundation Seed from 2005. This is providing that all seed stocks have tested negative for LL traits at a 0.01% detection level.

Texas seedsmen have been in contact with representatives from the Texas Department of Agriculture to discuss a protocol for sampling seed rice headed for one of the five approved testing laboratories. For a list of the labs go

to: [http://www.usarice.com/news/news\\_detail.cgi/272/5](http://www.usarice.com/news/news_detail.cgi/272/5). The Texas seedsmen indicated that they were in the process of testing all seed rice for sale in the coming year. The TDA will oversee this sampling process, although the seedsmen will be bearing the cost of testing, which in some cases will be as much as \$250 per sample.

The Arkansas State Plant Board has banned commercial production of Cheniere in 2007, which carries a \$20,000 to \$100,000 per day fine, depending on the severity of the violation. (Arkansas Plant Board, Little Rock, AR phone (501)225-1598, Also for more information on Arkansas regulations go to: [http://www.aspb.arkansas.gov/plant\\_pdfs/CIRCULAR%2011\\_EMERGENCY%20RULES\\_%20CHENIERE\\_SEED%20TESTING\\_RICE%20REGS\\_%20MB\\_TURF\\_NURSRY\\_DEC28\\_2006.pdf](http://www.aspb.arkansas.gov/plant_pdfs/CIRCULAR%2011_EMERGENCY%20RULES_%20CHENIERE_SEED%20TESTING_RICE%20REGS_%20MB_TURF_NURSRY_DEC28_2006.pdf))

Louisiana has adopted similar guidelines, closely following the USA Rice Federations recommendations. Volume 4 Issue 1 of the LSU AgCenter newsletter provides more information on the Louisiana guidelines. To receive a copy email [slinscombe@agcenter.lsu.edu](mailto:slinscombe@agcenter.lsu.edu).

Regarding decontamination, dryers and mills should be thoroughly cleaned. And any farmers who grew Cheniere in 2006, should carefully clean bins, tractors, com-

bins and on-farm storage facilities. Farmers should also rotate rice out of fields that were planted to Cheniere in 2006, and take extra care with production records. All segments of the rice industry must also dispose of any Cheniere stocks prior to July 31, 2007, including farm saved seed.

The following list of requirements for farmers selling rice in 2007 also comes from industry recommendations. They will need to have:

- A form showing planting seed with "LL- negative" test results,
- Sales receipt showing the amount of LL-negative tested seed purchased from a seed dealer,
- FSA form of certified acres planted.

While many of these recommendations came from a meeting of the USA Rice Federation, which historically has been associated with the millers, Linda Raun pointed out in an email in January to industry leaders, that there is representation for growers with the Federation umbrella. The group is called the USA Rice Producers Group. They have an equal vote in all states, and provide input to the Federation executive committee.

Obviously, there is much discussion remaining, and it is in the industry's best interest to stay united in resolving this difficult situation. \*

## From the Editor...



Occasionally during ones lifetime some of us are fortunate to meet a truly inspirational person. Through actions, words, and deeds, society as a whole is made better by such people. Unlike the occasional highly successful politician who make a name for themselves through famous backroom deals and an ability to forcefully and sometimes artfully move people in a particular direction, I am instead talking about those people who improve humanity by addressing much more basic human needs.

This past September, I was fortunate to have had the opportunity to attend the 100<sup>th</sup> birthday of Dr. Hank Beachell, one such individual. Although Hank passed away a short time later on December 13, his accomplishment will be long remembered. Hank will be recognized as having reached the highest pinnacle in serving to improve the lives of mankind by literally feeding much of humanity.

Many who work on rice will recognize Hank's name through his role as a key player in the development of IR8, the miracle rice of Asia that was responsible for increasing the food sufficiency of much of the world. Hank and the team of scientists who developed IR8 elevated the lives of many from one of abject poverty to in many cases self-sufficiency. Only a very small handful of individuals in modern society have had such a profound impact.

I first met Hank Beachell shortly after I joined the Beaumont Center. By that time, Hank has long ago complete two successful career, first as an inbred rice breeder at the Beaumont Center, where he worked until 1963, then as an inbred rice breeder for the International Rice Research Institute in the Philippines. When I first met Hank, he could be described as a very energetic individual, in his early 90s, who could outwork many a scientist half or third his age. At that time and through the end of his life, Hank worked on his third career with RiceTec to develop hybrid rice varieties for the U.S. rice market.

The challenge that Hank faced when he began pushing to develop U.S. hybrid rice varieties in some

ways went far beyond what he faced during his previous careers as an inbred rice breeder. To give a clearer picture of Hank's challenge, hybrid rice varieties are developed by crossing parent lines or varieties that often differ tremendously from each other. The resultant offspring plants, which are referred to as F<sub>1</sub>s, are all the same and often have growth characteristics that exceed that of either parent. The hybrids are often taller, grow faster, are larger, produce more tillers and leaves, and often produce higher yields than either parent.

This "hybrid vigor", is still incompletely understood, but many attribute it to differences in metabolic pathways governing various plant physiological processes. With each set of genes from the parent plants contributing subtle differences in metabolic pathways and processes, the net effect is reduced bottlenecking in the movement and allocation of metabolites to produce and grow plant structures, with the net result being an increase in metabolic activity and efficiency.

At first appearance, a logical question to ask is why not use hybrid breeding all the time, given that hybrid vigor so often results. The answer for rice is not quite so simple. Many rice hybrids have undesirable agronomic traits. These include plants that are tall that makes them prone to lodging with our moderate winds, plants that produce an excessive amount of vegetation that makes them harder to harvest and separate the grain from the leaf and stem material without losing the grain, grain that fall from the plant at very low wind speeds, grain that lack the cooking quality desired by U.S. consumers, and grain that fissure and break at a very high rate.

Each of these negative traits individually limit the

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# Farming Rice

## a monthly guide for Texas growers

*Providing useful and timely information to Texas rice growers, so they may increase productivity and profitability on their farms.*

### Sub-Surface Drip Irrigation Study

The increased demand for water from cities and industries is a growing concern for the Texas rice industry. Because of this, it has become important to develop more efficient irrigation practices. An experiment is being conducted, with cooperation from Netafim USA, to determine the feasibility of using sub-surface drip irrigation for rice crops. Drip irrigation for rice is expected to reduce the amount of water needed to grow rice. Another advantage of the drip irrigation system could be through the use of chemigation, applying nutrients and pesticides directly to the root zone through the sub-surface drip irrigation system. The use of chemigation could reduce the total amount of nitrogen needed by the crop over the season and increase the nitrogen use efficiency of the crop.

In 2001, a study funded by the Lower Colorado River Authority (LCRA), in cooperation with The Texas Department of Agriculture and Eli Vered of Netafim, was conducted to determine the feasibility



Tape being installed at a depth of 10", which allows for disking and plowing of fields without damage.

of using a sub-surface drip irrigation system for rice production. The study included three treatments consisting of a conventionally flood-irrigated treatment, and two drip-irrigated treatments of 32- and 16-inch tape spacing. In 2001, plots were arranged in two randomized blocks, each consisting of a conventionally flood-irrigated treatment, and two drip-irrigated treatments of 32 and 16-inch tape spacing. Drip irrigation tape, Netafim Typhoon 636, was installed at a 6-inch depth. Cadet, which is a short season variety, was drill seeded at 80 lbs ac<sup>-1</sup> on June 26, 2001. In 2002, two additional blocks were established and the rice variety Cocodrie was sown at 80 lbs ac<sup>-1</sup> on April 5, a much earlier planting date than in 2001. In 2003, another block was added for a total of five randomized blocks. The rice variety Cocodrie was sown at 80 lbs ac<sup>-1</sup> on April 3. Each plot consisted of 18 rows spaced at 8 inches and 75 ft in length. Typical cultural practices of conventional flood irrigated rice were followed.

Analysis of the yield data from 2001 to 2003 showed no significant difference between the drip-ir-

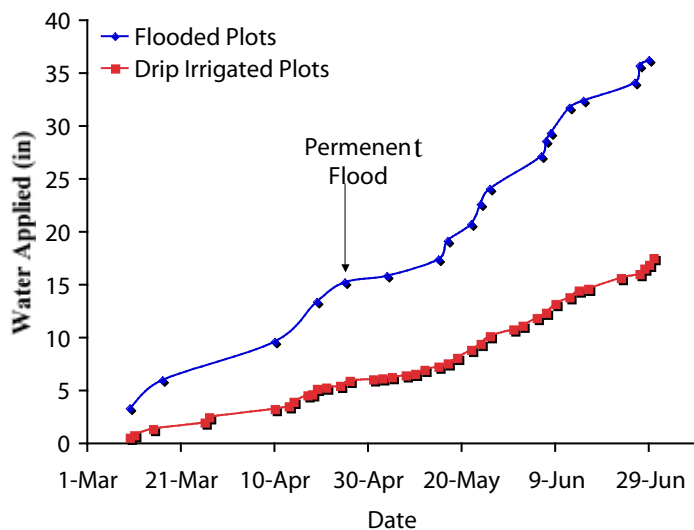


Figure 1. The amounts of water applied from March 8 to harvest.

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## Drip Study continued...

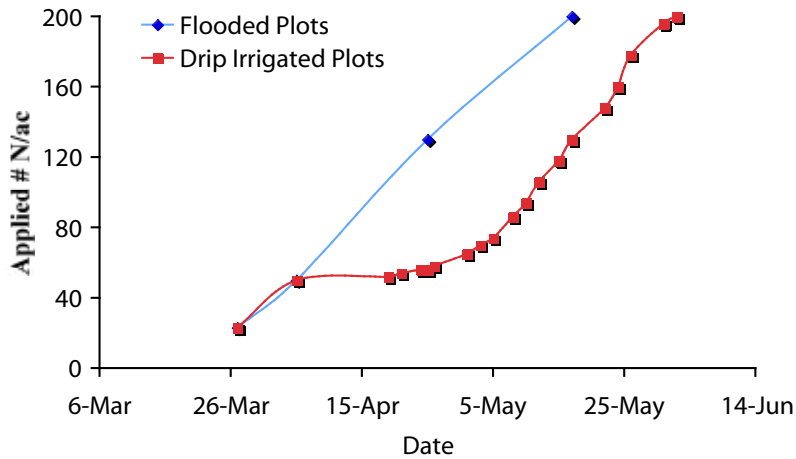


Figure 2. Total N applied throughout the main crop season.

rigated treatments and the flood-irrigated control. A year x treatment interaction exist for both drip-irrigated treatments (16- and 32-inch tape spacing). In 2001, the drip treatments had higher yields than the flood-irrigated control, but in 2002 and 2003 that trend was reversed. Yield difference between years was highly significant. Average water use of the drip-irrigated treatments for the three year period was approximately 42% that of the flood-irrigated controls. Water usage for the 16- and 32-inch drip-irrigated treatments differed by less than 0.12 ac ft during the three-year period. Results from this study suggest that sub-surface drip irrigation has the potential for large water savings, compared with conventionally flood-irrigated rice production.

In 2005, a meeting with L.T. Wilson, Jim Medley, Ilan Bar, and Eli Vered was held to discuss a large-scale drip irrigation project. A protocol and budget for the project was finalized and work began in late 2005. Four randomized blocks, each with a single sub-surface drip-irrigated plot and a conventional flood-irrigated plot were established. Plots were approximately 1.15 acres each. The field that contained the four blocks was laser leveled in late 2005 to accommodate the project. Deep cuts (approximately 22 cm) were made on the southern end of the field and shallow cuts were made at the northern end. Drip tubing was installed at a 6-inch soil depth and 30-inch row spacing. Drip tubing used was Netafim Typhoon 636 with emitters spaced at 18 inches. Cocodrie seed, treated with Release® LC, was drill-seeded onto all plots at 60 lbs ac<sup>-1</sup> on

March 8, 2006. Fertilizer applications to the drip-irrigated plots were an aerial application of 50 lbs N ac<sup>-1</sup> at planting, and beginning at permanent flood (approximately 30 days after emergence) small amounts ranging from 1 to 6 lbs N/ac/day were applied three times a week through the sub-surface irrigation system until the total of 200 lbs N ac<sup>-1</sup> was reached. The amount of water applied to move the fertilizer through the driplines was dependent on the PAN evaporation and rainfall for the period. A flow meter, placed directly after the irrigation pump, measured the volume of water applied to the drip-irrigated plots. A flow meter placed on the bonnet at the top of the field measured

the volume of water applied to the flood-irrigated plots. Plant and soil samples were collected five times during the growing season for nitrogen analyses.

For the purpose of analyses, the data collected from 2001 to 2003, 16 and 32-inch drip-irrigated treatments were considered simply as drip-irrigated. Yield analysis for the four-year period shows a significant year x treatment interaction. This interaction is due to the drip-irrigated treatment having higher yields in 2001 and 2006 but lower in 2002 and 2003 compared to the flood-irrigated control. Difference between drip and flood-irrigated for yields were not significant. Yields were significantly different between years.

Yields appear to have been affected by the laser leveling conducted on the field in December 2005.

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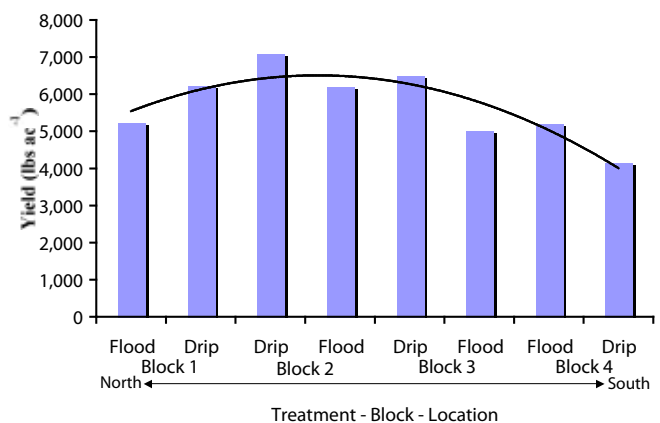


Figure 3. Individual plot yields shown from the north to the south ends of the field.

## Drip Study continued...



Figure 4. By mid-May there was a noticeable yellowing of the rice plants growing between the drip irrigation tapes. Photo shows standing water from recent rains.

Individual plot yields show a decrease toward the southern and northern ends of the field (Fig. 3). The deeper cuts, as much as 22 cm, were made on the extreme southern end of the field. Initial cuts were made at the north end of the field, but that soil was later replaced. Plots located in the portions of the field that were least disturbed showed higher yields. Drip-irrigated plots had higher yields in three of the four blocks. The relatively poor yield from the drip-irrigated plot in block 4, the southern most block, is attributed to the severe cuts that were made in that location during the laser leveling procedure.

In early May, yellowing of the plants growing between the drip irrigation tapes was noticed (Fig. 4). Plants growing directly over the irrigation tape were very green. By late May, a noticeable difference in plant height and color could be seen between plants growing directly over the irrigation tape and those between the tapes. The standing water from rainfall was drained from the drip-irrigated plots to spread the urea further from the tape. After draining the standing water and increasing the amount

of water applied during fertilizer applications, the yellowed plants began to 'green up'. It appeared that at least 0.3 inch of water needed to be applied to spread the urea to a mid-point between the tapes.

Yield sub-samples were collected at harvest. Four samples were collected from each of the flood-irrigated plots and 8 from each of the drip-irrigated plots. The 8 samples from the drip-irrigated plots consisted of 4 from rows directly over the drip irrigation tape and 4 from rows growing between the tapes. Analysis of the data shows significant differences between blocks and between treatments (Table 1). Plants growing immediately over the drip irrigation tape were noticeably healthier than those growing between the drip irrigation tapes and plants growing in the adjacent flood-irrigated plots. Difference in yield sub-samples between the flood-irrigated and 'over the tape' and 'between the tape' in the drip-irrigated plots were greater than 1,000 lbs ac<sup>-1</sup>.

Water usage in 2001 was only 17% of the amount used for the flood-irrigated control, mainly due to the very short season and the high amount of rainfall that year. Water use for the drip-irrigated treatment in 2002 and 2003 was 55 and 47%, less than the amount used for the flood-irrigated control. Water use for the drip-irrigated treatment in 2006 was approximately 48% of the amount used for the flood-irrigated control.

Results have shown that sub-surface drip irrigation can save as much as half the water normally used by conventional flooding. Rather or not drip irrigation will affect yield in a positive or negative remains to be seen. The yield results of 2006 were affected not only by the deep cuts made during laser leveling, but also by the fertilizer distribution problem on the drip-irrigated plots. Also, unlike the 2001 to 2003 seasons, weeds did not appear to be a problem in 2006. As stated before, weeds were likely suppressed by heavy rains that kept standing water in the drip-irrigated plots. The 2007 growing season promises to be very informative.\*

Article by J.C. Medley and L.T. Wilson

Table 1. Analysis of yield sub-samples collected from the drip- and flood-irrigated plots in 2006

Source	Yields
Block**	
1	5896 bc <sup>1</sup>
2	7169 a
3	6911 ab
4	4978 c
Treatment**	
Flood	6285 b
Drip (over tape)	7373 a
Drip (between tape)	5057 c
** Highly significant (p<0.0001)	
Yields within each source followed by the same letter are not significantly different.	

# An Analysis of the On-Farm Conservation Practices and Irrigation Efficiency for Lakeside Irrigation District - Eagle Lake



The San Antonio region and the lower Colorado River Basin both face long-term water shortages. Agriculture in the lower Colorado Basin could face shortages of up to one-third of the water it needs in dry years by 2060. Meanwhile, San Antonio faces its own long-term water shortages, and water demands in its metropolitan area will nearly double by 2050.

The Lower Colorado River Authority (LCRA) and San Antonio Water System (SAWS) have partnered to help conserve and develop water for the San Antonio region and the Lower Colorado River Basin. An agricultural conservation study is one of several studies involved in the LCRA/SAWS water project. The study focuses on examining the feasibility of conserving irrigation water used by rice farmers in the LCRA irrigation divisions in Colorado, Wharton, and Matagorda counties.

The study comprises of three major activities: 1) collection of baseline data (e.g. size, shape, delivery system) for fields in rice production in LCRA irrigation divisions, 2) determination of current conservation practices for fields in rice production, and 3) development of a web-based tool, *Rice On-Farm Water Conservation Analyzer (RiceWCA)*, by researchers at the Beaumont Center. When completed, the tool will be able to rapidly estimate the costs and water savings associated with implementing a wide range of rice on-farm conservation measures. The web-based tool will provide estimates of water use as a function of currently used on-farm water management practices, and will estimate the potential water savings and costs associated with varying degrees of implementation of on-farm water conserving measures in the LCRA divisions. RiceWCA will be one of the strategic planning tools used by LCRA to determine how to best conserve

water to meet demands for water in the Lower Colorado River basin and surrounding cities. The ultimate beneficiaries of this study will be the rice producers who implement the most cost-effective conservation measures.

On-farm water conservation can be broadly categorized into five conservation practices: 1) precision grading, 2) multiple inlets, 3) conservation tillage, 4) lateral improvement, and 5) tailwater recovery. An understanding of the current extent of each conservation practice is a key to analyzing the potential of water conservation through conservation improvement in the future. This article focuses on analysis of the current precision grading practices for rice production in LCRA Lakeside Irrigation Division and describes how the practices are characterized for the subsequent use by RiceWCA.

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**Table 1. Classification of Field Precision Grades**

Classification	Elevation Change (ft)	Characteristics
Bench Grade	0.05	Levees are straight with low density
Constant Slope	0.15	Levees are not straight with medium density
Contour Grade	0.25	Levees are mostly contoured with high density



## Conservation Practices continued...

**Table 2. Percentage of field area in each classification (Lakeside District 1999-2004)\***

Year	Bench Grade (%)	Constant Slope (%)	Contour (%)
1999	1.4	55.4	43.2
2000	1.4	51.1	47.5
2001	2.4	56.0	41.6
2002	2.2	52.4	45.3
2003	9.0	49.3	41.7
2004	6.8	55.6	37.6

\* Only fields with levee counts are included in the analysis

### Field Classification

As part of the LCRA-SAWS water project, rice fields were classified into three precision-graded categories based on the density (levees per acre) and shape of the levees when examined from aerial photos. The three categories were *Bench Grade*, *Constant Slope*, and *Contour Grade*. A field may be classified into a single grade if its levee density is relatively uniform across the entire field. A field may also be classified into any combination of the above three grades with



Aerial view of rice fields. Above: Contour graded, with closely spaced and curving levees. Below: Bench graded, with fewer levees that are straight and further apart.



each represented by a percent of the field and its levee density.

*Bench Grade:* Levees generally are far apart (low levee density) and relatively straight. Average elevation change between adjacent levees within a paddy (or cut) for Bench Grade is assumed to be 0.05 foot (Table 1).

*Constant Slope:* Levees are moderately far apart (medium levee density) and are often straight or relatively straight. Average elevation change between adjacent levees within a paddy (or cut) for Constant Slope is assumed to be 0.15 foot (Table 1).

*Contour Grade:* Levees are very close (high levee density) to each other, are mostly contoured and rarely straight. Average elevation change between adjacent levees within a paddy (or cut) for Contour Grade is assumed to be 0.25 foot (Table 1).

### Baseline Precision Grading Practices

Tables 2 through 4 present the results of classifications for fields in Lakeside Irrigation District between 1999 and 2004. Table 2 shows the percentages of the field classifications by year. For example: In 2004, 6.8% of the fields in rice that year (by acreage) were bench graded, 55.6% were classified as constant-slope, and 37.6% were classified as contour grade.

Since fields in rice rotation for one year may be quite different from fields in rice rotation the year before, the percentage of fields with a specific precision grade may also decrease or increase from year to year. In general, fields with Bench Grade increase over the years and fields with Contour grade decrease over the years.

Levee spacing refers to the distance between two adjacent levees in a rice field. Table 3 presents levee spacing for fields with different classifications. The average levee spacings are 349, 159, and 73 feet for

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## Conservation Practices continued...

**Table 3. Field classification and levee spacing (Lakeside District 1999-2004)**

Year	Bench Grade			Constant Slope			Contour		
	# of Fields	Area (Acre)	Levee Spacing (ft)*	# of Fields	Area (Acre)	Levee Spacing (ft)	# of Fields	Area (Acre)	Levee Spacing (ft)
1999	2	359	356 ± 305	136	14436	160 ± 79	144	11253	71 ± 31
2000	3	328	305 ± 82	143	12053	161 ± 62	157	11195	73 ± 29
2001	6	589	320 ± 223	148	13667	154 ± 57	157	10145	76 ± 35
2002	8	541	335 ± 171	147	12770	163 ± 67	158	11039	72 ± 31
2003	18	2256	373 ± 214	140	12311	155 ± 62	154	10419	72 ± 29
2004	18	1761	404 ± 211	153	14326	160 ± 58	147	9697	76 ± 34
<b>Average</b>			<b>349</b>			<b>159</b>			<b>73</b>

\* Mean ± standard deviation

*Bench Grade*, *Constant Slope*, and *Contour*, respectively. Based on the assumption that all fields are square in shape, levee spacing was estimated by taking the square root of the field area (in square feet), and dividing it by the number of levees plus one that were counted in the field through inspection of aerial photos. The values in the “Levee Spacing” columns show the variability of the data and resulting calculations. For example: In 2004 there were 153 fields classified as *Constant Slope* with an average levee spacing of 160 feet. The calculated levee spacings ranged from 102 feet to 218 feet.

When improved from one grade level to another, the elevation change between adjacent levees is reduced, the number of levees is reduced, and there is an increase in levee spacing. Table 4 presents the average increase in levee spacing (i.e. reduction in levee density) associated with grade improvement. Improvement from *Contour* grade to *Bench Grade* involves an average of 78% increase in levee spacing (or reduction in number of levees); improvement from *Contour* grade to *Constant Slope* involves an average

of 54% increase in levee spacing; and improvement from *Constant Slope* to *Bench* grade involves an average of 53% increase in levee spacing.

The major goal of the LCRA/SAWS project is to identify how to better conserve water so that farmers can continue to receive all of the water needed for agricultural production, while providing water to meet the increasing demands by urban clientele in San Antonio. The results presented in this article focus on the historic status of precision grading in the Lower Colorado River Districts. In a subsequent article, we will focus on explaining how this information will be used to estimate the water use from current on-farm water conservation practices, and the costs and projected water savings were further on-farm conservation measures adopted. \*

Article by Yubin Yang, L.T. Wilson, Jim Stansel, and Jenny Wang, with assistance from Parsons Engineering, Austin, Texas. The authors would like to give special thanks to L.G. Raun, Ronald Gertson, Haskell Simon, Mike Burnside and Larry Harbers for providing useful inputs to this study.

**Table 4. Average increase in levee spacing with precision leveling (Lakeside District 1999-2004)**

Year	Contour → Bench Grade (%)	Contour → Constant Slope (%)	Constant Slope → Bench Grade (%)
1999	80.1	55.6	55.2
2000	76.2	54.8	47.4
2001	76.2	50.5	51.9
2002	78.6	56.0	51.3
2003	80.7	53.7	58.4
2004	81.3	52.7	60.5
<b>Average</b>	<b>78.4</b>	<b>54.1</b>	<b>52.8</b>



## Part 2: LCRA/SAWS: A Water Plan for the Future

*The following commentary is the second in a two part series submitted by Ronald Gertson, Region K Water Planner for the LCRA/SAWS project.*

### Off-Channel Reservoirs

Though the LCRA/SAWS Water Project (LSWP), studies have been ongoing for several years now, it was not until the Lower Colorado River Authority (LCRA) unveiled its list of potential off-channel reservoir sites that it began to garner a high level of public attention. The potential for cherished land to be lost to reservoir sites stirs up justifiable emotions.

Let's back up, though, and see how such reservoirs fit into the plan. Recall that the LSWP calls for the storage of a portion of storm water that enters the Colorado River basin below the current dams.

Due to the large rainfall events characteristic of the Texas gulf coast, a large amount of water that enters the Colorado River below the Highland lakes cannot currently be stored for reliable long-term use. These vast untapped water resources can only be utilized if new storage capacity is created in these lower counties.

Relatively flat topography and seemingly insurmountable environmental concerns combine to make the on-channel storage associated with a new dam in these lower counties less than feasible as demonstrated by earlier LCRA studies.

The alternative to on-channel storage is off-channel storage. The off-channel reservoir(s) preliminarily envisioned in the LSWP would have 35 foot tall levees and would encompass a combined total of as much as 10,000 acres of land. Such reservoirs would be filled by one or more high-volume pumping stations at the river that would transport river water into the reservoir(s) via 2 pipelines as large as 12 feet in diameter.

Many have questioned why these reservoirs are being sited in our counties when they are to benefit San Antonio. It would be highly inefficient and cost-prohibitive to pump such huge volumes of water such a great distance in the short periods of time in which such flows are available for capture.

By placing the reservoirs close to the source of the available flows, maximum water can be captured in short periods of time into close-at-hand reservoirs by high-volume pumps and then pumped over extended

periods of time to final destinations using lower capacity pumps and pipelines.

Typical high-flow events on the lower Colorado can pass in three to ten days. The filling of off-channel reservoirs has to happen during these brief periods of high flow. Environmental concerns prevent any low or average river flows from being utilized, therefore the capture of flood or high flow events must be maximized for the project to be feasible.

It is important to note that the LCRA has indicated that these off-channel reservoirs will not be available for recreation due to the highly fluctuating water levels and tremendous water volumes at inlet and outlet locations. It is also important to note that the LCRA has promised to keep county governments whole with regard to potential losses in tax revenue resulting from land being removed from the tax rolls for reservoir sites.

Some concerned landowners have indicated that no amount of money could entice them to willingly sell land to the LCRA. However, according to LCRA General Manager Joe Beal, a number of landowners have indicated a willingness to enter negotiations. Mr. Beal has further indicated that the LCRA intends to purchase the needed land from willing sellers to the maximum extent possible.

Over 70 years ago a local stakeholder group of concerned citizens worked hard to get the Colorado River tamed in order to provide flood control and reliable irrigation water for these lower counties. That effort resulted in the creation of the invaluable Highland lakes system.

When Lakes Buchanan and Travis were constructed, some 50,000 acres of land was required. According to Mr. Beal, after LCRA purchased the bulk of the needed land, only fourteen small parcels had to be acquired through condemnation to gain the necessary land for these lakes.

We find ourselves in a similar situation today. This time, though, the land that could be inundated belongs to neighbors and friends as opposed to distant, upstream landowners. Do we have the vision to see what is best for the future of our local counties and the whole state of Texas as our forefathers did?

Will future generations look back with pride on the wise local leadership of their forefathers in this

## LSWP continued...

current generation? Only time will tell. There is much more to be learned before one can even say what the wise course is. Let's stay the course of study and learn what needs to be learned in order to make a wise and informed choice.

### The LSWP and Groundwater

Other than reservoir siting, the groundwater element of the LSWP has drawn the most local ire, resulting in perhaps the most misrepresentation. Individuals who want to see the project come to a halt have repeatedly attempted to use the groundwater component as a means of stirring up opposition.

As a reminder, key elements of the LSWP include surface water development through off-channel reservoirs, on-farm irrigation water conservation, irrigation delivery system water conservation, and groundwater development for meeting impending irrigation shortages.

Before detailing the groundwater component, this would be a good point to come to grips with what would likely happen if the LSWP is not implemented. As previously mentioned, the irrigation districts in these three lower counties rely heavily on interruptible water, and that water will grow much less reliable over time as upstream municipalities grow and use the water supplies for which they have already contracted with the LCRA.

Without new water supplies and/or major water conservation for the irrigation districts, irrigation water will grow to be so unreliable that farmers will begin drilling their own groundwater wells and no longer use what would become the unreliable district water. As the districts lost acreage LCRA would eventually be forced to cease their operations due to negative cash flow. At that point, any producer desiring to continue irrigation operations would have to rely entirely on groundwater.

In the long run, the result of the "no LSWP" scenario would be a complete reliance upon groundwater for irrigation. This would likely result in pumping that would exceed the sustainable capacity of the aquifer, and the groundwater conservation districts would have to step in and place limits on what could be pumped.

In contrast to the "no LSWP" scenario, the LSWP would develop groundwater to a limited extent sufficient to make up for the irrigation shortages that

would otherwise be experienced without the LSWP. This would increase the reliability of the interruptible irrigation water thereby preventing the necessity for farmers to move to 100 percent groundwater.

The goal is for the irrigation districts to maximize the use of surface water to the extent it is available and supplement it with groundwater when surface water is insufficient. This is called conjunctive use of surface water and groundwater.

HB 1629 and the LSWP Definitive Agreement both prohibit the sale of groundwater to SAWS. The agreement limits groundwater utilization to a project life annual average of 36,000 acre-feet, a ten year rolling annual average of 62,000 acre-feet, and a single year maximum of 95,000 acre-feet over the three county irrigation area. The project life is 50 years, plus a possible 30 year extension.

These numbers were preliminarily set by the Region K Water Planning Group based on the results of limited, localized water models used to simulate the drawdowns that would be experienced in and around the irrigation districts.

A much more extensive multi-county groundwater model is currently being developed by URS Corporation through LSWP study funding. This new model should provide much more definitive answers to what the impact of such pumping would be on the aquifer.

The groundwater conservation districts (GCDs) for Wharton and Matagorda Counties are actively engaged in the groundwater model development process and are poised to react to potential negative impacts that may be demonstrated by the model. The LCRA has committed to working within the requirements of the GCDs even in Colorado County where there currently is no GCD.

Much has been made of the fact that preliminary plans call for the LCRA to utilize as many as 70 irrigation wells spaced throughout the irrigation districts. This number of wells would certainly be capable of producing much more water than the maximum amounts currently intended. What must be understood is that this large number of wells is for the purpose of spreading the pumping over a larger area, thereby reducing localized impacts. Rather than pumping large quantities from only a few wells and causing significant local drawdowns, the intent is to

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## LSWP continued...

pump smaller quantities from a number of wells and to rotate this pumping in such a way as to allow for natural recharge to occur.

To further minimize fears that the LCRA is merely attempting to develop local groundwater for future sale to other locations, LCRA General Manager Joe Beal has stated that LCRA is willing for the wells to be locally owned and leased to the LCRA for the LSWP project.

Worth noting is the fact that the cost of providing this groundwater to firm up irrigation supplies is to be born by SAWS, not LCRA or the local irrigators. Such groundwater development would not currently be possible if its cost had to be born by the irrigators.

On behalf of the LCRA, Mr. Beal has committed to seeing that any and all negative impacts that may result from the proposed groundwater development will be thoroughly mitigated in such a way that local cities, businesses and individuals will not be negatively impacted by the groundwater development.

This is one more area where there are more questions than answers at this time, but hopefully the above material at least demonstrates that there are definite boundaries within which the project must operate. Whether or not these boundaries are sufficient will hopefully be demonstrated by the very thorough groundwater studies currently under way.

### Water Conservation an LSWP Key

Water conservation on area rice farms and irrigation canals is key to the success of the LCRA/SAWS Water Project (LSWP). The large scale implementation of major water saving practices for agriculture has been projected to be capable of freeing up as much as 118,000 acre-feet of water that then could be used to help meet growing San Antonio demands.

The Region K Water Planning Group identified the following practices as potential agricultural water conservation measures:

- Precision leveling of rice fields
- Multiple inlet delivery systems along rice fields
- Automation of canal delivery structures
- Small regulating reservoirs within the irrigation systems
- Lining of canals in highly permeable areas
- Development of rice varieties that would result in the use of less water

All of these measures are currently being evaluated for utilization in the LSWP based. If the LSWP is implemented then SAWS will fund these measures to the extent necessary for the project.

Precision leveling involves the use of laser-controlled dirt movers to shape the land to either zero slope or a consistent slight slope while also at times installing a number of permanent levees. This leads to an increased ability to micro-manage water depths and also in greater utilization of rainfall events thus minimizing the need for canal-delivered water.

Multiple inlet systems complement precision leveling by providing a water delivery structure for each 25 acre segment of a field. This enables more precise delivery of water to each section of the field.

Historically, many irrigators have watered a hundred or more acres from one inlet funneling water down across many contour levees along the way and over-filling large portions of a field in an effort to get irrigation water to the lower reaches of the field. The slightest rain event can wreak havoc with already burdened levees, sometimes breaching the levees resulting in a complete loss of the irrigation water.

Automating canal structures is intended to minimize the inadvertent management loss of water that results from imprecise manual manipulation of the canal check structures in a gravity-fed, open canal delivery system. Canal riders or coordinators currently travel hundreds of miles daily to manually adjust hundreds of management structures to see that the correct amounts of water are being delivered to the correct fields at the right times. In such a dynamic system, this ultimately results in “management” losses that are necessary just to keep water flowing to all fields and sections of the canal.

By automating various canal management structures and electronically monitoring water levels throughout the system, more precise and efficient delivery of water can be achieved thereby conserving water. Regulating reservoirs within the canal systems placed at strategic locations would also help to minimize management losses by capturing those losses in small 25 to 100 acre reservoirs for later re-introduction to the canal system.

The irrigation districts often receive sufficient rainfall that farmers order all of their water turned off.

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## LSWP continued...

Canal delivery pumps are turned off at that time, but a large amount of water is already in the delivery system that over a period of days leaks out and the system loses its charge. Regulating reservoirs would be a way of preserving some of this charge for use when the system cranks back up.

Canal lining is a very expensive way of achieving conservation. Fortunately, the soil profile in the largest portion of the irrigation districts provides excellent water holding capacity. This is the same soil quality that makes this area good for rice production. It is thought, though, that there are short sections of canals that may be losing enough water to infiltration that canal lining would be cost effective.

The development of new water-conserving rice varieties may actually prove to be the most cost-effective way of achieving conservation. The concept is to develop varieties that produce more rice by increasing the length of the growing season and eliminating second crop. Increasing the length of the growing season would theoretically negate a producer's ability to farm a second crop thereby reducing his over-all use of water. The goal would be for the producer to maintain the same income level by increasing his yield on the first crop alone. This varietal development is currently underway with the Texas Agricultural Extension Service at Beaumont taking the lead in partnering with the LCRA.

The LSWP offers great potential for gain in our lower counties. I am optimistic that ways will be found of overcoming the obstacles so as to provide for the water needs of our region.

For additional information please visit the LSWP website at <http://www.lcra.org/lswp/>.

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<http://beaumont.tamu.edu>

*Texas Rice* is published 9 times a year by The Texas A&M University System Research and Extension Center at Beaumont. Interviews, writing and layout by Jay Cockrell. Editing by Ted Wilson, Jay Cockrell and Brandy Morace, with additional support by Jim Medley. Information is taken from sources believed to be reliable, but we cannot guarantee accuracy or completeness. Suggestions, story ideas and comments are encouraged.

## From the Editor...

chances of a variety being commercially acceptable. The challenge for the hybrid breeder is identifying which combinations of parental crosses results in plants that have acceptable agronomic traits, produce increased yields, and have superior grain quality. This challenge is made that much more difficult because the hybrids do not have traits that are intermediate between the two parents and are therefore difficult or impossible to predict based on the traits possessed by each parent.

Suffice it to say, Hank has been successful in advancing hybrid rice production in the U.S. to the point where it is a vibrant part of the U.S. rice market. Throughout his career, Hank worked to help humanity. From several successful varietal releases while employed at the Beaumont Center, to his phenomenal impact feeding the world while working for IRRI, to his recent work with RiceTec, Hank Beachell will long be remembered.

Please continue sending your comments and suggests for how we may further improve *Texas Rice*.

Sincerely,



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