Texas Rice Varietal Releases in the Past 100 Years

The Beaumont Center is celebrating its centennial. There have been 100 years of research and extension, from 1909 to 2009, during which a Rice-Pasture Experiment Station (Fig. 1) was established at Amelia in 1909, expanded to Substation No. 4 of the Texas Agricultural Experiment Station (TAES) in 1914 (when the USDA joined), relocated to Imes Rd, Beaumont in 1945, and renamed the Texas AgriLife Research and Extension Center at Beaumont in 2007 [4]. All these years, the identification of high yielding rice varieties to increase production and income of the farmers has been a major objective. The first rice in U.S. was from Madagascar, introduced in the Carolina colonies in 1685. Due to its popularity, it became a major crop in 1700. Large rice acreages were grown in Southeast Texas as early as 1853 and in Beaumont in 1863 [2]. In 1904, Japanese rice was introduced in the Texas Gulf Coast. This variety had an average yield of 34 barrels/acre compared to 18-20 barrels/acre for the older and current varieties then. Because of this, rice production using Japanese varieties began at Webster in Harris County. Even before the establishment of research stations in Louisiana (1909), Texas (1909), and California (1912), a rice farmer from Louisiana, S. L. Wright, has been evaluating rice introductions and selected the medium grain ‘Blue Rose’ (1911) and ‘Early Prolific’ (1915), and the long grain ‘Edith’ and ‘Lady Wright’, which were the leading varieties in the south from 1915 to 1945.

With the establishment of Rice-Pasture Station in Texas, rice collection and selection from introduced germplasm were implemented on a larger scale. Comprehensive and cooperative rice breeding was started in 1931 by TAES-USDA. Pureline breeding, the selection of desirable plants from introductions was the most popular method for varietal releases during those early years. Practically all of the U.S. varieties from 1920 to 1945 were identified through this method [1]. Dr. Hank Beachell, a USDA scientist made the first artificial crosses in Texas through hybridization, the most popular breeding method. Eleven years later, the breeding program released its first variety – Texas Patna. So far, there were 45 Texas varieties and germplasm released by USDA-ARS rice breeders Dr. Hank Beachell (1931 to 1963), Dr. Charlie Bollich (1963 to 1991), and Dr. Anna McClung (1991 to 2005) [5]. Table 1 summarizes the phenotypic changes that rice breeders incorporated into new varieties from the 1940s to the 2000s.

A study conducted by Drs. Rodante Tabien (current state rice breeder), Stanley Omar Samonte, and Anna McClung compared the grain yield, milling traits, maturity, and plant height of varieties released by the Texas rice breeding programs from 1944 to 1992 under two levels of nitrogen fertilization (85
Welcome to the June issue of *Texas Rice*. This issue is dedicated to Russell Raun. Russell was a strong presence with the Texas rice industry for a number of years, having passed away on June 4 at the age of 97. Russell was the eldest of five children and was born October 20, 1911. In 1934, he began farming 155 acres near Hahn, Texas, with two mules and a tractor. Russell was known for his tremendous skills as an innovator. Among his many accomplishments, he built his first tractor at 12, built one of the first dryers in the El Campo area in 1948, was a pioneer in the design and building of earth moving equipment in the 1950s, and was one of the first rice producers to use underground pipe to deliver water to rice fields. Russell and his brothers Norris and Lowell were also pioneers in the use of Propanil and herbicide mixes to control rice weeds. Russell spirit of discovery and inventiveness exemplified those who helped to lead the Texas rice industry into becoming a national force. Russell remained active in the rice industry and continued to serve on the Texas Rice Marketing Association Board and the Texas Rice Improvement Association’s Board of Directors up until a few years before his death. Russell will be fondly remembered by the Texas rice industry.

The last day of June marks the 35th Eagle Lake Field Day. I hope you can attend the field day. The afternoon program will consist of field tours by our Texas AgriLife Research and USDA employees. Garry McCauley will provide an overview of his weed research that he conducts jointly with Scott Senseman and Mike Chandler, who are members of the Soil and Crop Sciences Department in College Station, Dante Tabien and Anna McClung will discuss their rice varietal development programs, Lee Tarpley will discuss fertilizer and physiology research, and Mo Way will discuss entomology research.

The afternoon tour will be followed by an evening program and meal, with Reverend Ardie Nelson providing the invocation, Davis Wadell welcoming our guests, Ted Wilson introducing the keynote speaker, and Bob Popanos, who will provide an update on the U.S. and international rice market and an overview of the future of niche rice markets in Texas.

Please mark July 9 and plan to attend the Beaumont Center Field Day as well. This field day is very special, marking the 100th anniversary of the Center’s existence. The day starts at 8:00 AM with a field tour, with Dr. Dante Tabien providing an overview of the Beaumont Center rice varietal development program, Shannon Pinson discussing rice genetics research, Lee Tarpley discussing plant physiology and fertilizer management research, Fugen Dou, who joined the Center in May as a nutrient management scientist, will briefly describe his research plans, Mo Way will discuss his entomological research, Shane Zhou, who joined the Center in late-June as a plant pathologist will describe his research plans, and Ming Chen will conduct a rice tasting, showing different types of rice that are available to the consumer. As part of the field tour, passby’s will include the plant hybrid and inbred photosynthesis studies, which focus on identifying the characteristics of hybrids that afford them their higher yields, and the Texas Rice Improvement Associations yield contest, which allows our visitors to see how well they can predict rice crop yield performance.

The field tour will be followed by a morning program. Ted Wilson will introduce guests and keynote speakers and will provide a brief overview of the Center’s history. This will be followed by Bill Dugas, who is Interim Director of AgriLife Research.
Emergency Exemption Section 18 for Rice Stink Bug

Rice stink bugs primarily damage rice grain by causing peck. The adults do most of the peck, but late instar nymphs can also cause significant peck damage. Rice stink bugs inflict damage to all stages of grain development (heading, milk, soft dough and hard dough), but the earlier rice stink bugs infest a field, the higher the incidence of peck. Thus, in general, controlling infestations during heading and grain milling stages is very crucial to managing peck.

Tenchu 20SG recently received an Emergency Exemption Section 18 for rice stink bug. This excellent rice pest management tool has much longer residual activity than other labeled insecticides used against rice stink bug. Our replicated data confirm commercial field data collected in 2008, which show Tenchu 20SG to possess between 7 and 11 days residual activity. Last year, Tenchu 20SG received a Crisis Exemption in Texas and was applied to about 25,000 acres with excellent results. The active ingredient in Tenchu 20SG is dinotefuran, which is in the neonicotinoid class of insecticides. Dinotefuran is safe to mammals, but has some toxicity to honey bees, which raised a red flag when EPA reviewed the Section 18 submission. EPA’s questions were answered for the time being, but EPA is requesting more data for future registration. Mitsui Chemical, manufacturer of Tenchu 20SG, plans to pursue a full federal label, so this is good news. Farmers must be good stewards when applying Tenchu 20SG (this goes for any pesticide). Only apply Tenchu 20SG when rice stink bug populations warrant treatment. Basically, use the revised treatment thresholds (Table 1) [1], which are higher than the old treatment thresholds, which were estimated 20 years ago. Also, apply Tenchu 20SG no more than 2 times during the growing season. The rates are 7.5 to 10.0 oz/acre application and the preharvest interval is 7 days. In 2008, some farmers were able to get by with a single Tenchu 20SG application to control rice stink bug.

Much collaborative effort went into gaining approval for Tenchu 20SG. I thank Tony Britten, Lois Rosi, Angel Chiri, Debbie Edwards, Meredith Laws, and Libby Pemberton of the EPA for a thorough review of the submission. EPA has a very tough job balancing environmental and agricultural interests. I thank Ed Gage of the TDA for supporting the submission and working hard to answer EPA’s questions. Drs. Ron Landis and Rob Hummel of the Landis International provided invaluable guidance. Finally, I thank Glenn Crane, Cliff Mock, Michael Hensgens (G&H Seed), Dwight Roberts (US Rice Producers Association), David Wilde, Randy Waligura, Arthur Anderson, Daniel Berglund, and many other rice farmers for supporting this Section 18. If you have questions about Tenchu 20SG, do not hesitate to contact me at (409) 658-7394 or moway@aesrg.tamu.edu.

For more information, please refer to the following reference:


<table>
<thead>
<tr>
<th>Projected Yield (lb/acre)</th>
<th>Heading</th>
<th>Milk</th>
<th>Soft Dough</th>
<th>Hard Dough</th>
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<tbody>
<tr>
<td>4500</td>
<td>8</td>
<td>10</td>
<td>17</td>
<td>47</td>
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<td>6000</td>
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<td>7500</td>
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<td>79</td>
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<tr>
<td>9000</td>
<td>16</td>
<td>21</td>
<td>34</td>
<td>94</td>
</tr>
</tbody>
</table>

† RSBs include adults and older nymphs (4th and 5th instars).
Rice Stink Bug ...

tamu.edu/eLibrary/Bulletins/2008_Rice_Production_Guidelines.pdf. *

* Article by Dr. M.O. Way, Texas AgriLife Research and Extension Center at Beaumont.

Introducing our Integrated Cropping Systems Nutrient Management Scientist – Fugen Dou

Rice is an important crop in the coastal prairie areas of Texas. Compared to other crops, rice has fundamental differences in water management, which affect the physical, chemical, and biological properties of rice soil. Consequently, the nutrient status in rice paddies is different too. To better manage soil fertility and soil quality, more information through research is needed. This is how our Integrate Cropping Systems Nutrient Management Scientist, Dr. Fugen Dou, briefly explained the importance and complexity of soil fertility and management in irrigated lowland rice that motivates his research at our AgriLife Research and Extension Center at Beaumont. Fugen joined the faculty and staff of our Center on May 1, and his immediate plans at our Center include research on the possible relationships between soil organic matter decomposition and N availability as affected by environmental factors. Another plan is to apply the DAYCENT model (a new version of Century Model with a time step of day; DAYCENT is a process-based terrestrial biogeochemical model) that will be used in determining the significant factors affect rice grain yield.

Fugen Dou has a Ph.D. in Soil Science from Texas A&M University (obtained in May 2005), an M.S. degree in Plant Nutrition and Soil Science from the Chinese Academy of Agricultural Sciences (obtained in July 2000), and a B.S. degree in Soil Science and Agricultural Chemistry from the Zhejiang Agricultural University (obtained in July 1993). Fugen has experience as a postdoctoral research associate at the University of California at Davis (2007 to 2009) and at the International Arctic Research Center of the University of Alaska (2005 to 2007). His research at UC Davis included modeling soil aggregate and organic carbon (C) dynamics to explore the capability of C sequestration in terrestrial ecosystems, studying the aggregate turnover rates affected by plant residues and environmental factors, and modeling C changes in the soil profile in relation to soil physical factors. His research at Alaska included characterizing the spatial variation of soil C, N, and other nutrients along the coastline of northern Alaska, evaluating the water-extractable organic C during coastal erosion, studying the changes in dissolved organic C during organic matter decomposition, and characterizing the distribution of eroded terrestrial C in sediments using \(^{13}\text{C}\) and \(^{14}\text{C}\).

Fugen was born in Anji County, Zhejiang Province, China. His wife, Xian Yu, has an M.S. degree in Economics from Texas A&M University, a second M.S. degree in Statistics from the University of Alaska Fairbanks, and is currently pursuing her Ph.D. in Statistics at the University of Texas at Dallas. They have a son, Wengxuan Dou (9 years old), who was born in Beijing, China, and is currently in the 3rd grade at the Mohawk Elementary School in Richardson, TX.

Please join the faculty and staff of the Beaumont/Eagle Lake Center in welcoming Dr. Fugen Dou and his family (Fig. 1) to Texas. *

Fig. 1. Dr. Fugen Dou and his family, wife Xian Yu and son Wengxuan Dou.

* Article by Dr. S. Omar PB. Samonte, Texas AgriLife Research and Extension Center at Beaumont.
On June 11, 2009, the Beaumont Center hosted the Lamar University Science Summer Camp supported by Exxon Mobile. This annual learning experience is headed by Dr. Otilia Urbina, Professor of Education in the Education Department at Lamar University in Beaumont. Students who participate in this Camp range from 6th to 8th grade and are carefully screened by Dr. Urbina, her staff, and cooperating teachers. Furthermore, the students must exhibit an aptitude for science and earn all As and Bs in their studies. The Camp lasts for 2 weeks during which time the students are housed and fed at Lamar University.

The students arrived by bus at the Center at 9 am and stayed until almost 4 pm. They were given a general introduction about the Center and ushered into the auditorium where they viewed two videos on rice production and management. My crew, including Becky Pearson and Sebe Brown, and our Center’s Office Associate, Daun Humphrey, assisted me in organizing and teaching the students. The discussion following the videos centered on the different sciences involved in rice production. We discussed about photosynthesis, fertilization, agronomy, botany, plant pathology, entomology, mathematics, genetics, molecular biology, and many other branches of science. After the videos and discussions, we toured the fields and observed egrets, killdeer, fulvous whistling ducks, and other wildlife inhabiting a flooded rice field. The students understand that a flooded rice field provides valuable habitat for many wildlife species. We then observed and sampled an energy cane field under attack by sugarcane borer. The students were divided into teams and each team counted the number of “deadhearts” in a row of energy cane. Competition was keen to see which team observed the most deadhearts. Deadhearts were dissected so the students could observe the destructive larvae and pupal cases. Dr. Gene Reagan, sugarcane entomologist from LSU, paid our group a visit and instructed the students on botanical traits specific to sugarcane. The topics of renewable and non-renewable resources were discussed with many questions aimed at the students. Fortunately, Dr. Otilia provided adult mentors to help the students stay on track. By this time, the students were tired and hungry, but Sebe Brown stimulated their interest and disgust by eating a live sugarcane borer larva dissected from a damaged energy cane stalk!!! Sebe instantly became a hit with the students. Incidentally, Sebe recently graduated from Texas A&M University with a B.S. degree in Entomology. The students adjourned to the auditorium for lunch and refreshments. After lunch, the students were broken up into groups, some groups visited the USDA Cereal Chemistry Lab where Naomi Gipson demonstrated and explained the milling process (Fig. 1). The students saw first-hand how science is integral to determining the cooking characteristics of rice. The other groups visited a soybean field and collected and identified insects (Fig. 2). Soybean plants of different varieties were brought to the auditorium where students were again divided into teams. Each team was given a different variety from which leaves, flowers, and pods were counted. The students collated the data and ranked the varieties according to growth habit and maturity. Thus, the students actually performed some elementary statistics and learned to interpret data. Groups then switched so that all groups visited

![Fig. 1. Naomi Gipson teaching students rice chemistry techniques.](image1)

![Fig. 2. Students sampling a soybean field for insects.](image2)

Continued on next page
the Cereal Chemistry Lab and conducted the soybean experiments. At the end of the day, students were given a short quiz to test their comprehension of the day’s activities.

On Thursday, June 18, Sebe Brown will attend the Summer Science Camp graduation ceremony at Lamar University where he will award the top 3 students, based on the quiz scores, a plaque and a small cash remittance.

All in all, the Summer Science Camp was a big hit with the students - they learned up close and personal some of the fundamentals of science and had a lot of fun during the day. These kids are our future and need to be literate in science to improve our world and society.

* Article by Dr. M.O. Way, Texas AgriLife Research and Extension Center, Beaumont, TX.

Texas Rice Varieties ...

lb/acre N and 170 lb/acre N) [3]. In addition to making accurate comparisons of their agronomic trait parameters since the old and new varieties were grown and evaluated side-by-side, the study estimated the contributions of plant breeding to the improvement of the rice crop. Varieties accounted for 82, 27, 26, and 45% of the variation in plant height, whole and total milled rice percentage, and grain yield, respectively. The trends and rates of change of trait parameters of varieties released from 1944 to 1992 were that plant height decreased (-1.10 cm/yr at 85 lb/acre N and -1.28 cm/yr at 170 lb/acre N), number of days to heading decreased (-0.23 days/yr at 85 lb/acre N and -0.21 days/year at 170 lb/acre N), whole milled rice percentage increased (0.051%/yr at 85 lb/acre N and 0.066%/yr at 170 lb/acre N), total milled rice percentage (0.029%/yr at 85 lb/acre N and 0.035%/yr at 170 lb/acre N) increased, and grain yield increased (26.3 kg/ha/yr at 85 lb/acre N and 42 kg/ha/yr at 170 lb/acre N). This showed that the germplasm of the rice breeding program and rice varieties released were improving towards desirable plant types.


Fig. 2. Some of the varieties evaluated for their yield and yield components at Beaumont, TX, in 2008. Photo taken 100 days after emergence shows that Texas Patna had not yet headed, while Century Texas Patna and Dawn still had green grain. Labelle, Lemont, and Jefferson were close to maturity, while Presidio had reached maturity. Lemont, Jefferson, and Presidio are semi-dwarf varieties.

Continued on next page
Texas Rice Varieties...

Table 1. Varieties released and their traits relative to previously released varieties [5].

<table>
<thead>
<tr>
<th>Period</th>
<th>Varieties Released</th>
<th>Traits Bred into Varieties</th>
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<tbody>
<tr>
<td>1940s</td>
<td>Texas Patna, Bluebonnet, TP 49</td>
<td>↑ straw strength, ↓ height, ↓ maturity</td>
</tr>
<tr>
<td></td>
<td>Improved Bluebonnet, Bluebonnet 50, Century Patna 231</td>
<td>↑ grain type, ↑ yield, ↑ ratoon crop, ↑ straw strength, ↓ height, ↓ maturity</td>
</tr>
<tr>
<td>1960s</td>
<td>Gulfrose, Belle Patna, Bluebelle, Dawn</td>
<td>↑ hoja blanca and blast resistance, ↑ yield, ↑ ratoon crop, ↑ straw strength, ↓ height, ↓ maturity</td>
</tr>
<tr>
<td>1970s</td>
<td>Labelle, Lebonnet, Brazos, Newrex</td>
<td>↑ grain size, ↑ parboiling and processing quality, ↑ blast resistance, ↑ yield, ↑ ratoon yield, ↓ maturity</td>
</tr>
<tr>
<td>1980s</td>
<td>Bellemont, Lemont, Skybonnet, Pecos, Gulfmont, Rexmont, Rico 1, Maybelle, Jasmine 85</td>
<td>↑ milling quality, ↑ sheath blight tolerance, ↑ aromatic, ↑ parboiling and processing quality, ↑ blast resistance, ↑ improved yield, ↑ ratoon potential, ↑ straw strength, ↓ height (semi-dwarfness)</td>
</tr>
<tr>
<td>1990s</td>
<td>Texmont, Rosemont, Dellmont, Jackson, RU8703196, B82-761, Jefferson, Dixiebelle, Madison, Cadet, Jacinto</td>
<td>↑ specialty processing quality, ↑ aroma, ↑ blast and sheath resistance, ↑ multi-gene or broad-spectrum blast resistance, ↑ yield, ↑ straw strength, ↓ maturity</td>
</tr>
<tr>
<td>2000s</td>
<td>Saber, Bolivar, Sierra, Lavaca, Lotus, Neches, Cala, Hidalgo, Carolina Gold Select, Sabine, Presidio</td>
<td>waxy rice, ↑ specialty processing quality, ↑ milling yield, ↑ aroma, ↑ parboiling quality, ↑ disease resistance, ↑ yield, ↑ cooked volume, ↑ ratoon yield, ↑ long grain, ↓ maturity</td>
</tr>
</tbody>
</table>

(1983), Labelle (1972), Dawn (1966), Century Patna 231 (1951), and Texas Patna (1942) (Fig. 2). This year, the second field experiment of this study is ongoing, with two elite lines RU0703190 and RU0703144 added to the varieties already being tested.

Data from last year’s field experiment on tiller and panicle density, number of spikelets and grain per panicle, and filled grain mass per panicle were determined. Unfortunately, grain yield was not determined due to damage caused by Hurricane Ike. Preliminary results indicated that varieties released from 1942 to 2005 showed a trend of increasing tiller and panicle density, increasing number of spikelets and filled grain per panicle, and increasing filled grain weight per panicle. Texas Patna had 356 tillers/m² and 206 panicles/m², while Presidio had 562 tillers/m² and 524 panicles/m²; Texas Patna had 81 spikelets/panicle and 61 filled grain/panicle, while Presidio had 203 spikelets/panicle and 148 filled grain/panicle; and Texas Patna had a 1.14 g filled grain mass/panicle, while Presidio had a 2.95 g filled grain mass/panicle. Yield component parameter ratios of Presidio over Texas Patna indicated that Presidio had 158% more tillers per unit area, 254% more panicles per unit area, 251% more spikelets/panicle, 243% more filled grain per panicle, and about 259% heavier panicle than Texas Patna.

Studies such as these not only demonstrate the significant progress that has been achieved in rice breeding for Texas over the past 100 years, it also shows the improving value of the breeding program’s germplasm and helps in planning strategies to continuously improve the performance of the new rice varieties.

For more information, please consult the following references:

Texas Rice Varieties ...

As of June 19, 2009, about 94% of the estimated rice acreage in Texas had reached the permanent flood stage, and about 75% had reached panicle differentiation. Furthermore, about 18% of the rice crop acreage had reached the heading stage.

Weekly updates on the acreage and percentage of rice grown in Texas that are in the various growth stages are available at our website at http://beaumont.tamu.edu/CropSurvey/CropSurveyReport.aspx.

From the Editor ...

and Associate Vice-Chancellor of the College of Agriculture and Life Sciences with Texas A&M University. Bill will present the Texas House of Representatives referendum commemorating the Center’s 100th anniversary. His presentation will be followed by two keynote presentations, the first by Garry McCauley who will discuss the past, present, and future of agronomic and weed management of rice in Texas and the U.S., which in turn will be following by a presentation by Mo Way on the past, present, and future of entomology and plant pathogen management. The morning program will be followed by a barbeque luncheon, with an afternoon tour of the Center’s cellulosic bioenergy crop research and organic rice research.

Special thanks to Joe Mike Crane for sponsoring the evening meal and to all of our sponsors who make the field days at Eagle Lake and Beaumont possible. Also, special thanks to Texas Rice Producers Board and Texas Rice Research Foundation for their generous support of research through the years, and to both Texas AgriLife Research and USDA Agricultural Research Service for their continued funding of research at Beaumont and Eagle Lake.

Please keep on sending us your suggestions.

Sincerely,

L.T. Wilson
Professor & Center Director
Jack B. Wendt Endowed Chair in Rice Research

Texas Rice Varieties ...


* Article by Drs. Stanley Omar PB. Samonte, Rodante E. Tabien, and Lloyd T. Wilson, Texas AgriLife Research and Extension Center at Beaumont.

Rice Crop Update

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