



# Texas Rice

Texas A&M University System  
Agricultural Research and Extension Center  
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## Precision Ag: Realizing the Potential

**P**recision farming technology, or site-specific agriculture (SSA) as it is also known, has the potential to provide precise control over the application of water, fertilizer, and pesticide to farmland based on variations in the landscape and soil across fields. The strategy of precision farming is to detect variations in crop yields that occur across a field and to use variable application technology and micro-management techniques in an attempt to achieve more efficient use of inputs. Identification of precise locations in a field is made possible by Global Positioning System (GPS). Signals from earth orbiting satellites are used to locate positions on the face of the earth, virtually instantly and with a great degree of accuracy. A Geographic Information System (GIS) is a software package that allows the storage, retrieval, spatial-referencing, and analysis of field data.

Yield monitoring of crops can be made for areas that are, for example, as small as 100 square feet, and subsequent mapping of soil and soil nutrient variability across the field can provide information about the impact of these variables on crop performance. The challenge is to associate variations in plant responses with soil characteristics, weed populations, insect infestations, and other potentially yield limiting factors that might account



for these variations. To the extent that yield variations can be associated with nutrient supplies or pest populations, management inputs can be varied accordingly.

Yield monitoring technologies allow the yield for different areas or locations in the field to be graphically recorded and subsequently displayed in the form of a map. The Yield Monitor and the GPS guidance system can be mounted on top of a combine. Then the exact position and the corresponding yield measurements can be continuously detected and recorded for subsequent analysis. Once areas with low yields are mapped, the GPS guidance system can be used to locate areas for sampling, analysis, and problem identification.

“Precision crop management is still in the early stages,” states Susan Moran, a research hydrologist

with the U.S. Department of Agriculture and a former member of the NASA Landsat 7 Science Team, based in Tucson, Arizona, “but there is a significant number of farmers who use high technology and remote sensing data for precision crop management.”

Moran explains that a farmer, like any businessperson, needs good and timely information to succeed. To formulate an effective crop production strategy, a farmer needs to know three things: 1) which conditions are relatively stable during the growing season, 2) which conditions change continually throughout the growing season, and 3) information to diagnose why their crop is thriving in some parts of the field and struggling, or even dying, in other parts. Numbers 2 and 3 present the greatest challenges, in

continued on page 6

## From the Editor...



Welcome to the October issue of *Texas Rice*. Here it is the second week of November and *Texas Rice* is only now coming out. Even the best plans sometime go astray. The last eight weeks have been challenging, to say the least, with hurricane Rita running us out of Beaumont and repairs ongoing at the Center which are likely to continue for at least the next few months, and taking a bit more attention than we like.

With every dark cloud there can be glimmers of brightness. The outpouring of good will, the moments where neighbors and friends all pulled together, the incredible fortune the Center are all things we are very thankful for.

Our Center was fortunate to have many local heroes before, during, and after hurricane Rita. Several of our faculty and staff did a tremendous job of preparing for the hurricane, minimizing damage to the Center, and helping to bring the Center's infrastructure up-to-speed. A very large number of our staff helped prepare the Center by stocking up on critical supplies and generally battenning down the hatches. Hats off to all of them!

While most of us were part of the mandatory mass evacuation, a few unselfishly stayed behind. Several others returned to help as soon as they could. Mo Way, Mark Nunez, and Manual Gallagos stayed behind and watched over the Center during the storm. After the storm had passed through the area, Mo, Mark, Manual, Robert Freeman, Robert LaBorde, Pat Carre, and Mickey Frank helped clean up some of the mess caused by hurricane Rita. Mark Nunez brought our sewage facility back on line, (not a small accomplishment), and Robert Freeman and Robert LaBorde worked furiously to keep our two emergency generators running. Several others should be commended for helping to assess and secure project equipment and property after the hurricane, restoring our communication systems, helping with cleanup, and in general, helping to bring the Center back up to speed.

The help went far beyond just our own people here in Beaumont. I would particularly like to thank TAES

and USDA-ARS administration in College Station for helping our people to keep in near-constant contact, especially during the first several days, while Southeast Texans were evacuated and our faculty and staff were scattered to the wind, spanning most of Texas and into several neighboring states.

Many communities to the east of Beaumont and some to the north had much more damage. A number of our rice growers east of Houston were hard hit by the heavy winds and rain, which in some places destroyed harvested grain in storage bins, the storage bins themselves, and in many cases severely damaged late main and ratoon crops. Estimates suggest that rice that was still in the field lost from 15%, to as much as 80% of the grain. This comes at a difficult time for the U.S. rice industry, with rising costs and fairly stationary market value. Please keep the people who have been affected by hurricane Rita in your heart and through your deeds.

I would be remiss were I not to at least briefly highlight this issue of *Texas Rice*. Jay Cockrell, who is our Center's communication specialist, has done an excellent job of providing an overview of the role precision agriculture is increasingly playing in agricultural production and management. I hope you enjoy her articles and this issue of *Texas Rice*.

Please keep your suggestions coming.

Sincerely,

A handwritten signature in dark ink that reads "L. T. Wilson".

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

### Inside This Issue

Variable Rate N Applications .....	3
New Tool For Precision Agriculture .....	5
In-Field Spectral Reflectance .....	7
First Aerial Seeded Rice in Texas .....	8
Leonards Agricultural Museum .....	10
State, National and International News .....	11
Web Resources .....	12

# 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.*

### Arkansas Team Explores Variable Rate Nitrogen Applications

**F**or those in the dark about precision-agriculture, turn your gaze towards Light, Arkansas. There, in the small town in the northeast part of the state, through a team of pilots, company techs, a professor and his graduate students, Kin-Co Ag Aviation is writing prescriptions and applying dry fertilizer using variable rates. According to those close to the project, this will usher in a new set of application tools for producers and pilots.

“The word is already out,” said Casey Couch, a partner with Kin-Co. “We’ve had some inquiries from other flying services about what we’re doing, but we’ve been pretty tight-lipped about it until now. We wanted to get a handle on it before we started making claims. It wouldn’t have been good to talk loud and then not be able to deliver. Now, though, we’re able to commit to this and tell folks what we can produce.

“This will help us give customers exactly what they want, where they want it. It won’t matter whether the plane is upwind or downwind because the fertilizer drop gate will compensate. That makes me happy for farmers.”

For the sake of precision agriculture advancement, it was fortuitous that Harvey Songer’s daughter, Jennifer, ended up Bill Baker’s graduate student. Baker, a professor at Arkansas State University in Jonesboro, Ark., has worked for years in precision agriculture research and remains genuinely excited by his work.

Last fall, Jennifer began telling Harvey, who owns and operates Kin-Co, about the benefits variable-rate would bring to the flying service and farmers. “I don’t think she thought it was doing much good,” recalled Baker, “but Harvey started asking me questions. It became obvious I should be very careful with my answers because he was serious. Last December, the questions were coming quickly. By January, he’d bought equipment for two planes.”

Baker’s interest in Songer’s purchases stems from several university research grants involving variable-



While variable rate ground rigs have led the way, Kin-Co’s work using aerial applications shows great promise for larger farming operations.

rate applications on rice. According to Baker, Songer’s decision to install the equipment “lined up with where our research needed to be. A plane is what we needed. We had been doing imagery and scouting on the ground, looking at yield monitors and that type of thing, but we had never been able to write prescriptions because we had no aircraft to work with. Now, we’ve got two! Harvey decided variable-rate fertilizer application was where his business needed to be and dove right in.”

While not quite “old hat,” Songer claims variable-rate applications of liquids is common. “We’re working with liquid, as others are, but putting out fertilizer is a new deal. The computer, or controller, we’re using is a Del Norte. Auto Cal is what we use to make gate adjustments on-the-go in the aircraft.”

The Auto Cal, normally installed to keep spray rates constant, raised additional, intriguing possibilities among Kin-Co employees. Someone asked, “The system is already computing and changing things to keep rates constant - why can’t we get it to do variable rates?”

The answer, in large measure, came from getting the Auto Cal and Del Norte to work together. The idea was to make the Auto Cal control the dry gate while

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## Variable Rate Nitrogen Application continued...

linked with the Del Norte, normally tasked with liquid flow control. When contacted by Kin-Co, the two companies realized a joint venture was a good idea.

“The Auto Cal tells the Del Norte controller how many pounds per acre, per grid, is going out the gate as it changes during a prescription,” said Songer. “The Del Norte computes pounds applied and subtracted from the hopper load. Each load is weighed and entered into Del Norte for the total pounds in the hopper.”

“The companies, along with InTime, who we use for prescriptions, worked together for about three months to get their software to interact,” said Couch. “They did this specifically for us, when we told them what we were doing. I’m sure what we find out will be sold later, but that’s fine. We’re the guinea pigs. The folks at InTime were a big help in getting the prescriptions done.” Being pioneers means “discovering as we go along,” said Joey Massey, who works closely with Couch. “If we have problems, we call the two companies. They fix the problem and send us the solution. We just keep pushing.”

In 2005, on a May 5 test run, “the system finally clicked,” said Howard Gipson, a Kin-Co pilot. “I think everyone was excited about it. Now, it’s just a matter of slight calibrations. Most of the heavy lifting has been done.” Equipment tweaking aside, tests show the hardware works. Questions remain on prescriptions, though, particularly in northeast Arkansas rice country.

“We wanted to know if we could write prescriptions not based on imagery,” said Couch, who, along with Massey, is a former student of Baker. “Imagery is a good thing, but how about the other tools that were being ignored. We want to be able to do work off any document the farmer brings in, whether satellite imagery, a cut-sheet, a scout map or grid samples. From those, we’ll write scrips based on a customer’s instructions. All we need to know is where the variance needs to be and how much.”

First issue to address: without solid instruction, even equipment capable of variable-rate fertilizing sits idle. “We can vary the rate of nitrogen, but it has to be based on something,” said Couch. “That’s where we are now, building a base of data.” The duo, utilizing InTime prescription software, is paying close attention to cut-and-fill portions of fields, where most dis-

ease problems are. “Disease is more frequent there because rates are different,” said Massey.

Regarding the project’s focus on rice, Baker said while precision agriculture has become routine in cotton, rice is “another animal - flooding and land-leveling throw all kinds of kinks into the equation. Rice isn’t as easy to work with as cotton. For the next year, we’ll be learning how to approach rice as a variable-rate crop. We have to come up with a new bag of tricks.”

To make things work, Kin-Co also had to modify spreaders. “We wanted to find a medium swath width for a rate change from 75 pounds to 135 pounds,” said Couch. “We can do any range within that scale.” Songer hopes the new capabilities point to a series of precision agriculture advances.

“The technology has reached this point at exactly the moment when Asian soybean rust arrived. It just makes sense that, since it’s available, we use the technology to better protect our customers from rust. This could play into the rust situation in a big way because a lot of money could be spent for rust in soybeans this year.”

With fungicides, said Massey, producers typically spray at an affordable, medium rate. By using variable-rate technology, “you can cut rates where they aren’t needed and raise them in the worst-affected areas. That optimizes every penny spent. Savings to farmers will depend on the application but are inevitable,” said Massey. “In cotton, they say \$2 to \$3 per acre is saved on a typical \$10 to \$12 variable-rate application. That’s enough to pay for the plane. Harvey and I wrote a fungicide prescription the other day based on biomass in a field. In many places, it cost between \$20 and \$26 - it cut the amount of fungicide needed by half.”

Regarding recent work, this past summer, Baker’s team obtained aerial imagery (multispectral) on rice. They were looking for opportunities to save money using the VR technology available on Harvey Songers airplanes. They did VR prescriptions on “cut soils” using DAP, mid season nitrogen, and fungicide for sheathblight. According to Baker, there is great potential for VR applications in rice, leading to significant savings for farmers. \*

*For more information email Dr. William Baker at [wbaker@astate.edu](mailto:wbaker@astate.edu)*

# Student Builds New Tool For Precision Agriculture Education

A variable rate sprayer that can be carried in a pickup truck provides a valuable new tool for teaching precision agriculture. The sprayer was designed and built by University of Arkansas graduate student Aaron Dickinson of Decatur for his master's thesis project in agricultural and extension education.

"We saw a need for the university and the Cooperative Extension Service to have a model to use for teaching precision agriculture," Dickinson said. "For teaching technology like this, it's common to use models for demonstration, but there wasn't any such equipment for teaching variable rate technology."

Dr. Don Johnson, professor of agricultural and extension education in Dale Bumpers College of Agricultural, Food and Life Sciences, and Dickinson's graduate advisor, said the model sprayer built by his student is a valuable tool in his courses.

"We teach precision agriculture to students who are preparing to become agricultural teachers or technical representatives for agricultural companies," Johnson said. "Having a working model that the students can get their hands on and operate just like the real thing is a major advantage to their education and experience."

Variable rate technology includes a number of different applications, including spraying liquids, applying dry fertilizers and planting seed. Precision agriculture is a system of micromanaging agricultural fields by monitoring inputs - fertilizer, pesticides, herbicides and other applications - to get the best crop yields without wasting resources or money. The system also helps protect the environment by reducing excess chemicals that may otherwise run off fields in rainwater, and by using buffer zones that act as filters to catch excess nutrients in runoff water.

Dickinson used off-the-shelf components, the same



Graduate student Aaron Dickinson programs a compact variable rate sprayer for a field test at the Arkansas Agricultural Research and Extension Center in Fayetteville. Dickinson designed and built the sprayer as a training tool for teaching precision agriculture in Dale Bumpers College of Agricultural, Food and Life Sciences at the University of Arkansas and for Arkansas Cooperative Extension Service training and demonstrations.

ones used in full-scale variable sprayer rigs, so the device would function exactly like the equipment farmers might use in their fields. He modified them only as necessary to fit a more compact and portable configuration.

The result is a self-contained trailer that fits in a pickup truck and can be towed by any vehicle available at a demonstration site. Only water is used in the spray tank to avoid the precautions necessary when using agricultural chemicals.

"Students or farmers can examine or touch any part of it without restrictions," Dickinson said. Field tests demonstrated that the unit will perform like full-size equipment, and as a suitable working model for teaching precision agriculture. Dickinson successfully defended his master's thesis in August, and is scheduled to graduate in December.

According to Dr. Johnson, the VR sprayer is currently being used in his Fundamentals of Ag Systems class, as a means to show students practical applications in precision ag. The Crop Soil and Environmental Science department provided the GIS software for the sprayer, so they will also be using the equipment for training purposes. \*

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Variable rate applicators, like the experimental model shown here, have the potential to save farmers money, and prevent excess chemicals from entering the environment.

traditional farming operations, but especially for those trying to adopt precision farming practices. Conditions that continually change throughout the growing season include insect and weed populations, disease outbreaks and water availability.

A number of scientific studies over the last 25 years have shown that measurements in visible, near-infrared, thermal infrared, and microwave wavelengths of light can indicate when crops are under stress (Moran 2000). Using satellite- and aircraft-based remote sensors to precisely measure the wavelengths of radiant energy that are absorbed and reflected from the land surface, scientists can diagnose a wide range of growing conditions.

Satellites and aircraft have the advantage of allowing farmers to survey their entire land in mere minutes. “In the early days, when farmers had small fields, they knew from practical experience which sub-areas were wetter and more fertile,” notes Craig Daughtry, a research physical scientist at the U.S. Department of Agriculture in Beltsville, MD. “But as farms have grown from a few hundred acres to [as much as] 50,000 acres, farmers start to lose touch with their fields. Remote sensing provides a tool for looking at changes on small scales of space and time.”

The problem with remote sensing by satellite is threefold. First, the data is often not available in a timely fashion. Currently, the number of satellites in orbit can provide a snapshot of a given field only once every 10 days or so. That means by the time a pest

outbreak is realized, it would be too late to do anything about it. Second, the resolution of agricultural use satellites is not very high. Given, we have satellites equipped with instruments that can read newsprint from orbit, but their use in agriculture is cost prohibitive.

This situation could rapidly improve in the future as more companies enter the field, and more satellites are placed in orbit.

DigitalGlobe, an imagery and information company based in Longmont, CO., is building a constellation of high-resolution, earth imaging satellites and a comprehensive geo-information product store that allows customers to quickly access and order a wide variety of imagery and derivative information products.

Space Imaging, Inc., also based in Colorado, has an imagery product suite consisting of satellite data derived from the IKONOS, IRS, and IRS RESOURCESAT sensors. Since its launch in September 1999, IKONOS earth imaging satellite (originally deployed by NASA) has provided a reliable stream of image data. The Indian Remote Sensing (IRS) system has emerged as one of the most high-profile programs in the commercial imaging industry. The focus of the IRS program is to develop space technologies and applications in support of national development. Since 1994, Space Imaging, Inc. has partnered with a division of the Indian Space Research Organization, to exclusively market and distribute IRS satellite products and ground stations outside of India.

Airplanes can also be used for remote sensing, and the turnaround time on delivery of information is much faster, often within 24 hours. InTime, Inc., based in Cleveland, Miss. is one such company offering this service. The company uses a combination of geospatial technologies to offer farmers real-time imagery of their crops. This is done with infrared digital photos that provide valuable information for making site-specific crop management decisions. By taking advantage of this technology, farmers can potentially save on the chemicals and products they use in their fields.

InTime uses a patented process that begins with high resolution aerial photographs, taken from a fixed wing Cessna airplane, which measure the variability of crop health within a given field. The digital infra-

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red images are converted into a scout map that correlates to different levels of plant biomass. The scout map can then be transferred to a hand-held computer equipped with a GPS receiver. The hand-held allows the farmer to walk in the field and visually document plant health in site-specific areas, which is called ground truthing. Because it is in real time, a marker on the screen of the hand-held shows the farmer exactly where he is in the field as he scouts the area. A comparison of the ground truthed and aerial measurements for a range of plant vigor allows future aerial measurements to be used to rapidly access the vigor of a crop across different areas of the field. Once the location has been scouted, rate recommendations are made for each individual zone of plant vigor as indicated by the map.

Using InTime's Web site, the map image can then be quickly converted to a variable rate prescription application map for the field. Variable rate equipped applicators, both ground and aerial, can then be programmed to apply the correct quantities of product to the field or site automatically. Another product offered by InTime measures variability in crop moisture, and shows areas where drought stress is imminent.

Many companies offer hardware and/or software for processing the aerial and satellite images for use in agricultural applications. Site-Specific Technology Development Group (SST, Inc.) of Stillwater, Oklahoma was incorporated in 1994 with the goal of developing an agricultural information management system that helps growers maximize management, efficiency, and yield. Currently, SST's system equips agriculturalists at all levels with software and services suited to their businesses, whatever the size.

The Arizona based company, Satloc, LLC, was formed in 1991 to develop and manufacture swath guidance systems for use in the aerial applications market (crop dusters and forestry applications). In 1994, Satloc expanded its product offering to address the broader market for precision farming products. They build and design GPS receivers and differential GPS (DGPS)-based precision lightbar guidance, flow control, and automated steering systems primarily for the agricultural industry. Products include ruggedized hardware enclosures, interfaces and displays, antennas, receivers, data analysis and mapping software for

continued on page 12

## In-Field Spectral Reflectance to Determine N Needs

Precision agriculture is based on using the inherent spatial and temporal variability in a field as a basis to manage farm operations. This is a site-specific approach and can reduce input costs, result in higher crop productivity, and decrease environmental pollution. There are two basic methods of implementing site-specific management (SSM) for the variable-rate application (VRA) of crop production inputs: map-based and sensor-based.

The map-based SSM method is based on the use of maps to represent crop yields, soil properties, pest infestations, and VRA plans. The sensor-based SSM method provides the capability to vary the application rate of crop production inputs with no mapping involved.

The sensor-based method utilizes sensors to measure the desired soil properties or crop characteristics on the go. Measurements made by such a system are then processed and used immediately to control a variable-rate applicator.

Research conducted by Dr. Victor Alchanatis, at the Institute of Agricultural Engineering in Israel, is geared towards developing techniques for real time assessment of nitrogen status of corn using a mobile sensor with the potential to regulate nitrogen application based on data from that sensor.

Specifically, the research attempted to determine the system parameters necessary to optimize reflectance spectra of corn plants as a function of growth stage and nitrogen status. An adaptable, multi-spectral sensor and the signal processing algorithm to provide real time, in-field assessment of corn nitrogen status were developed.

At this point, the major challenge is to develop sensors that will work accurately in field conditions at realistic working speeds. Sensor-based application systems must be capable of accomplishing the sensing, data processing, and application rate adjustment steps in one machine pass. Dr. Alchanatis is currently working to accomplish these goals for use in a wide variety of cropping systems. \*

*For more information email Dr. Victor Alchanatis at [victor@volcani.agri.gov.il](mailto:victor@volcani.agri.gov.il)*

# Historic Perspective: First Aerial Seeded Rice in Texas

It was spring along the South East Coast in Texas and the watered rice paddy on the Dishman and Sisk Farm near Amelia shimmered in the morning sun. The date was April 9, 1946. In the cockpit of a 220 horsepower Stearman with a 700-pound capacity hopper, pilot K.W. “Kinky” Shane was ready for the first successful seeding of rice by air in Texas.

As the mists cleared and the flagmen took their places, Shane took off and swept down on the 90-acre field. His first pass revolutionized the coastal rice growing industry.

From that point on, farmers could get a head start on weeds, seed their crop at the proper time, and fertilize when necessary. Rice immediately attained a position of importance approaching that of cotton. Aerial cropping became a necessity rather than a luxury for planters throughout the region.

Airplane crop dusting was actually an old story in Texas. Pioneer operators like “Pappy” Blackwell, Heard Cardin, “Slats” Rogers, and Curtis Quick had been going strong as far back as the late 1920’s.

Others were engaged in ag flying, at least on a part-time basis, all through the Rio Grande Valley. As far back as 1929, clover had been successfully seeded by



This Stearman Airplane was used to aerial seed the first rice crop in Texas in 1946. It was donated to the Agricultural Museum in Winnie by George Mitchell, Jr. and family.

air on the Ed Hebert farm in Jefferson County. However, the great “explosion” in the industry did not occur until directly after World War II.

Shane and his friend Gilbert Mapes were among the pioneers who entered the game at this time. Funk & Burnham Aviation Service in Dallas had procured Shane’s services and went to work building a 200 horsepower Continental Stearman – the legendary Number 21 that later carried out the first Texas rice seeding job.

Mapes and Shane contracted two brothers, Fields and “Poley” Mitchell, whose names became legendary in ag flying circles. They purchased Number 21 and subsequently flew the rice job. Thus was born M & M Air Service, one of the top ag flying firms ever to be organized in Texas.

The Mitchells were superb salesmen with initiative, nerve, and the time to invest heavily in the fledgling ag flying business. Under their direction, M & M Air Service grew rapidly and established itself as a leader both in Texas and nationally. The Stearmans, which made up the early fleet, were increasingly driven with higher horsepower as engines and new techniques became available. By 1950, M & M was operating one of the largest and most modern ag fleets in America.

As the natural result of the Mitchell brothers’ success, new ag flying firms mushroomed in Texas, particularly in the Beaumont area. They included Farm Air Service, organized by Jim Sedberry and Norman Chase. “Red” Allen and Harry Kellam were affiliated with this firm for a period of time. Eventually Sedberry sold out to A.C. Wagley. But the firm continued operating at Nome, Texas, by Chase’s sons, Donald and Ronald, until 2001.



Poley and Fields Mitchell, the brothers who started M&M Air Service. The plane in the photograph is one of 42 WWII Navy Cadet Trainers that the brothers purchased early in the company’s history at a U.S. Government auction for \$56 each.

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## First Aerial Seeded Rice in Texas continued...

During this period of rapid agricultural aviation expansion, Kinky Shane returned to Funk & Burnham until 1947, when he left and organized Shane Air Service, Shane initially had two partners: Floyd Smith and Belford Duplantis. They eventually sold their interests to Walter Burrell. Shane and Burrell operated this firm until about 1952, when Shane retraced his steps to M & M, then a giant in the industry.

Mapes, one of the founders, eventually sold his interest to the Mitchell brothers, making M & M Air Service strictly a Mitchell operation. Tragically, Fields Mitchell was killed in a freakish gas accident from a pipeline leak in 1964.

Ownership of the firm passed to Fields's son, George. Anyone remotely involved in agriculture aviation knows George Mitchell and is aware of his contributions to the industry, through his family business and leadership skills.

Pilots and shop men play a tremendous role in any firm's success, and M & M was no exception. Pilots like Earl West, J.K. West, Johnny Killough, Jack Hardin, Charles Trickey, Earl Atkins, and Eldred Chester were integral parts of M & M Air Service and elevated the standards of ag flying a great deal. Shop foreman Eddie McCane was an innovative maintenance man and equipment builder, and with the help of fine mechanics like James Rutledge, the M & M fleet was a model for other firms to follow.

Early in his career, George Mitchell began displaying a strong interest in national agricultural aviation affairs. This became very evident in the early 1960s, when the Federal Aviation Administration began regulating agricultural aviation.

The original FFA proposal, know as "Part 55," was distributed and discussed nationwide. George Mitchell was in the middle of such discussions, wherever they might be.

He became an active supporter of the idea of a national association for aerial applicators and subsequently, one of the first presidents of the National Agricultural Aviation Association in 1973. His career has been highlighted by numerous national and state honors and awards. His involvement continues in the present and he recently contributed a mint-condition



George Mitchell's sons, Mark, Andy and David, are all very active in the family business. Pictured here in front of a modern plane equipped with a GPS/GIS system, specialized spreaders that allow for variable rate application, and other leading edge technology. Fully equipped, these planes cost upwards of \$1.2M.

Stearman aircraft to the National Agricultural Aviation Museum in Jackson, Mississippi. He also contributed the historic Stearman Number 21 to the Agricultural Museum in Winnie, with the desire to keep this airplane on home turf.

George's sons and daughter, Paul, David, Mark, Lisa and Andy Mitchell were raised in M&M Air Service. They are the third generation in the company under the same family ownership and management. Paul passed away in 1993, and Lisa departed the company in 2004 for other pursuits. David is presently operations manager, assisted by Mark who is also an ag pilot. Andy is an ag pilot, and a single engine air tanker (SEAT) fire pilot.

M&M Air Service has changed with the times, now using turbine powered airtractors and on-board GPS-GIS computer/software packages for guidance. The state-of-the-art technology has permitted M&M to diversify into other fields of agricultural aviation, such as fertilizing pine tree forests, as well as brush and woodland firefighting.

These opportunities have come at the right time, but require extensive travel out of the local area. Rice production work (M&M's past core business) has declined in recent years due to the decrease in rice acreage. M&M's new focus has kept the family business together, and moving into the future. \*

# Looking at History From the Seat of a Tractor - Leonards Agricultural Museum

Where can you go to see turn of the century farm equipment, vintage airplanes, mule-driven plows, and a 1910 Harmon hand-made saddle? Those in Southeast Texas rice country should look no further than the Leonards Agricultural Museum, located adjacent to Winnie-Stowell Chambers County Park, just off of Hwy 124 in Winnie. The museum is maintained by the East Chambers Agricultural Historical Society (ECAHS), which was chartered as a non-profit corporation in June of 1984.

Winnie rice farmer Robert Bauer has served as president of the society since the early 90's. He believes that the organization serves a vital function in educating the public about the role agriculture has played in the economic growth of our region. "We have school kids from all over the district come on field trips to the museum," said Bauer. "They really like looking at all the old tractors, and especially the airplane."

The airplane is a 220 horsepower Stearman, donated by M&M Air Service, which was used to plant the first rice crop in Southeast Texas by air during the spring of 1946. The museum also has a large collection of tractors, one that dates back to 1914, several early 20<sup>th</sup> century pieces that were drawn by mule teams, and a collection of barbed wire that dates back to the 1800's.

Mr. and Mrs. Ferdinand Leonards of Winnie donated the majority of the older equipment and made



Ferdinand Leonards (left) with fellow rice farmer Stevie Devillier. Leonards has a long history and involvement in rice production. He ran the first self-propelled rice combine on his family's property in Crowley, Louisiana in 1943, and hasn't missed a year since then. In April, Leonards will turn 91, with no plans for retirement in sight.

a generous donation for construction of the museum building. The ECAHS made possible the relocation and renovation of the 1905 Santa Fe Train Depot that was located on Broadway Street in Winnie. Much of the original furniture, fixtures and equipment were restored as well. Today, it serves as headquarters for the Winnie Area Chamber of Commerce and the ECAHS.

Also part of the museum display is an early 20<sup>th</sup> century farmhouse porch area. Just off the back steps is a 30-gallon cast iron kettle. According to Bauer, the school kids find this fascinating. "They can't believe people used to make soap and wash clothes over a fire." The kids also enjoy the functioning miniature train set owned operated at the museum by Milton Gaus.

Bauer is proud to point out that the museum is fully maintained through fundraising efforts of the ECAHS. Bauer, along with vice-president John Gaulding, secretary Girleen McCall, treasurer Melissa Hodges, and a Board of Directors, which includes over 20 area farmers and community leaders, plan and execute fundraising activities that will preserve this valuable resource for future generations.

One on-going fundraising activity is the 'memorial sidewalk' just outside the depot's main entrance. Engraved bricks can be purchased by people interested in honoring friends or loved ones. All proceeds go towards maintenance of the museum.\*

*For more information call Melissa Hodges at 409-296-2231.*



L to R: Melissa Hodges, Mary and Robert Bauer.

# State, National and International News...

## **Salt-resistant Gene of Rice Cloned in China**

Chinese scientists have successfully cloned SKC1, a salt-resistant functional gene of rice, the use of which is expected to raise and stabilize the rice output of the country.

“Chinese scientists are to cultivate a variety of salt-proof rice strains with the cloned SKC1 genes in the coming several years,” said Lin Hongxuan, a research fellow with the State Key Lab of Plant Molecule of the Shanghai Academy of Bio-sciences, under the Chinese Academy of Sciences, who participated in the research program.

Lin said the SKC1 gene was cloned from a kind of ancient salt-resistant rice variety native to the Shanghai area. The research results were published in the “Nature Genetics” magazine in October. Lin hopes to cooperate with agricultural departments to input the SKC1 gene into quality rice varieties through crossbreeding.

*From [www.chinaview.cn](http://www.chinaview.cn)*

## **Rice Researchers Fight Straighthead Disease And Improve Grain Quality**

Rice breeding lines that resist a costly disease, as well as lines with desirable grain characteristics, have been identified by Agricultural Research Service (ARS) scientists in Arkansas. Wengui Yan, a research geneticist at the ARS Dale Bumpers National Rice Research Center in Stuttgart, Ark., leads efforts to analyze the U.S. Department of Agriculture Rice Core Collection. With 1,791 entries, this genebank has been

estimated to contain more than 70 percent of the genetic variation in the National Small Grains Collection’s 18,408 rice accessions.

Utilizing the core collection, Yan and his ARS colleagues identified germplasm accessions that are very resistant, or even immune, to straighthead, a plant disease that causes the entire rice head to remain upright at maturity with sterile florets and greatly reduced grain yield.

There is no straighthead resistance in commercial U.S. rice cultivars, but Yan has identified 26 indica and japonica rice lines that are resistant. Breeders at the University of Arkansas and Louisiana State University have incorporated some of these germplasm lines into their programs.

Straighthead yield losses can reach almost 100 percent if a highly susceptible variety is planted in the wrong conditions. The germplasm recently discovered to be resistant is diverse in origin, maturity and plant height. According to Yan, it can be used to improve straighthead resistance in rice breeding in the southern United States.

Stuttgart researchers are also addressing undesirable amylose content levels in indica rice. Amylose content is the characteristic used to describe the difference between dry, flaky rice (which indicates a high amylose content, typical for U.S. long grain rice) and moist, sticky rice (which indicates a low amylose content, typical for U.S. medium grain rice).

Germplasm of foreign indica rice, the principal type grown worldwide, usually has higher

yields when grown under conditions comparable to the U.S. However, it is considered to have poorer grain quality. Through hybridization and induced mutation breeding, J. Neil Rutger, a lead ARS scientist in Stuttgart, and Yan have developed numerous indica lines with ideal amylose content for the U.S. rice industry.

*From ARS News Service*

## **First Bi-Fuel Station in Texas**

The National Ethanol Vehicle Coalition and the Propane Education & Research Council applaud the efforts of the alternative fuels industry in the opening of the nation’s first public Propane(LPG)/E85 Fueling facility in Bexar County. The facility will provide E85 and LPG , as well as propane.

“This is a historic moment in terms of safeguarding our economic and energy security,” said Commissioner Tommy Adkisson. “By making this local effort, we are helping to change the national landscape,” he added.

National Ethanol Vehicle Coalition Chairman Curtis Donaldson stated, “Teaming propane with E85 at one site is a win-win. Propane is the most widely used alternative fuel in Texas, the USA, and the world. E85 is gaining ground fast given the wide base of OEM vehicle support in the light duty segment, while propane continues to be the “best” choice for medium duty applications.”

*Contact Michelle Kautz, National Ethanol Vehicle Coalition, 573-635-8445 or Brian Feehan, Propane Education & Research Council at 202-452-8975*

## Precision Ag continued...

both air and ground applications.

The question then becomes, is the cost of implementing this technology offset by the savings in reduced rates of chemicals and fertilizers?

According to research conducted in Texas by Tom Archer, Robert Lascano, and Ted Wilson, precision farming has the *potential* to revolutionize integrated crop management by improving the farmer's ability to manage field variability to enhance crop yield and profit. However, economic analysis does not, at this time, support investment in this technology for every farming situation.

The team conducted a literature review, which revealed that engineers and soil scientists have dominated the early research on SSA. Technology for soil and yield mapping is increasing rapidly, but research on agronomy and pest management is lagging. They concluded that implementation of SSA is expensive for farmers due to the high cost of site-specific technology, and that SSA limited to soil management shows a consistent profit only on high value crops. For SSA to be profitable on field crops, it must include inputs beyond soil variability, including nutrients, water, pests, weeds, and plant genotype in an interactive manner. They emphasized that science must focus on agricultural management as an integrated system to maximize farmers' production and return. \*

*The list of companies mentioned in this article is by no means comprehensive, and does not imply endorsement by the Texas A&M University System. For a complete list of contact information contact Jay Cockrell at 409-752-2741 ext. 2272, [j-cockrell@aesrg.tamu.edu](mailto:j-cockrell@aesrg.tamu.edu), or refer to **Web Resources** (right) for company websites.*

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