Texas Rice Research Foundation

2005 Research Report

**Title**

Water Management and Weed Science

Research in Rice

**Project Leaders**

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and

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**Duration**

Year Two of Four Years
Executive Summary

Objective 1: Following a management system based on the prior two years research with Cocodrie and 6 years research with Lemont would have been disastrous in 2005. The TC economic loss would have been $234/ac due to yield loss and $34.62/ac due to lower whole milled grain. Two factors may have contributed to the 2005 results: 1) environmental stress was severe during the RC at Eagle Lake and 2) RC stubble height was adjusted with a flail mower in 2005 and a combine in prior years. The research should be continued to determine optimum water and N management when the MC stubble is flail mowed.

Objective 2: This study was conducted for the third year at Ganado. The dominate weed species was broadleaf signalgrass as in 2003 but there was secondary pressure from barnyardgrass as in 2004. Seventeen of the 30 treatments provide greater than 90 % control of the weeds present. The cost of these 17 treatments ranged from $33 to $88.

Objective 3: Alligatorweed control was achieved with Grasp alone and increases with the addition of Grandstand. Grandstand increased control in tankmixes, while Stam reduced control in tankmixes indicating possible antagonism with Grasp. Regiment provided control only when mixed with Grandstand but not alone or when mixed with Stam.

Objective 4: Working with County Extension Agents and Consultants no fields could be located with paspalum or perennial barnyardgrass. Numerous fields were surveyed across the rice belt. A cooperator and field site have been identified for 2006.

Objective 5: Command + Valor or Peak applied in October provided excellent fall weed control. Roundup + Valor applied in December also provided excellent winter weed control. In the spring single applications of Liberty or Roundup didn’t provide adequate winter weed control. Winter grass and broadleaf control was excellent with all single and sequential applications of Roundup + Valor.

Objective 6: Weed control and rice yields were acceptable across all herbicide input levels in the conventional and spring stale seed bed systems but were not acceptable in the fall stale seed bed system.

Objective 7: In the 2005 Rice Production Guidelines, the weed management, ratoon crop and water management sections were reviewed. Errors were corrected and revisions made where necessary. The hybrids out yielded all varieties at all locations but milling was less than in 2004. Data from this project helped obtain a 24C from TDA for the aerial application of Command, supported the request to EPA for a label change on Command that removes the limitation to use on the coarse textured soils, supported the registration of Beyond in both the main and ratoon crop, and was key in the registration of Clearpath. Numerous cooperative weed science research projects with commercial pesticide companies were conducted during the 2005 growing season.

Objective 8: No plot research was conducted related to this objective. All currently available land resources are allocated at Eagle Lake. Several visits were made to producer fields that are utilizing shorter rotations and reduced tillage. Continuous rice for more than two years will not work in some areas. At one site in west Wharton County, it was observed that stand establishment problems and yields were reduced after two years of rice-rice. This producer decided that the situation was alleviated by fallow or cultivation. Based on these visits it was determined that weed pressure and species shifts may be more effectively evaluated by surveying producers fields that have been using reduced tillage and reduced rotation for several years.

This year a 10 page report has been prepared to better comply with the TRRF guidelines. A full report on CD containing all data by objective is available from McCauley or Chandler on request.
Objective 1: Evaluate the impact of ratoon crop water and nitrogen management on main and ratoon crop yield and milling. (Continued)

The long growing season is a major strength and should be exploited in ratoon crop (RC) production. RC rice has a lower per unit cost as the only inputs are water and fertilizer. RC yields should be increase if possible but must be equalized between low and high yielding systems. These studies look at the impact of RC water and N management on RC production. RC N is defined as all N applied after main crop (MC) heading.

The research has been conducted for the past three years at the Texas Agricultural Experiment Station research site near Eagle Lake. The plot areas were located on a Nada fsl. The research area was rotated with 1 yr rice and 2 yr fallow. Cocodrie rice was drill seeded in 30-45 ft blocks on 7.5 inch centers at 70 lb/ac. In 2005, the plots were drill seeded on 24 March. Each plot consisted of 10 rows. The center 8 eight rows were harvested for MC yield and the center 4 rows were harvested for RC yields. The strips of rice were mechanically divided into 6-16 ft subplots. Subplots were separated by 6 to 12 ft alleys. Each of the 30 blocks was surrounded by levees for individual irrigation and draining. These areas received standard and uniform management except for the MC drain time, RC reflood time, and RC N management. Applications of P and K were made based on soil test. The MC received 200 lb N per acre in four applications (25% preplant incorporated, 35% prior to flood establishment, 20% at PD, and 20% at late boot). Karate was applied to all plots preflood for water weevil control. All plots received two MC fungicide applications at two inch panicle and 14 days later. Standard field plot management techniques were used.

A split plot design with three replications was utilized. Drain and reflood times were main plots and RC nitrogen rate and timing as subplots. Drain times were 15, 20, and 25 d after 5% MC heading. RC was flooded either 1 d after harvest, 10 d after harvest, or flushed and flooded 10 d after harvest. RC N applied pre-MC drain was applied 10 d after 5% heading in the MC which was 5 d before the first scheduled drain. N rates for this application was one third of the total RC nitrogen, but never more than 35 lb/ac. RC N treatments were 70 or 100 lb/ac applied in one application just prior to RC flood, split with one application prior to MC drain and the remainder applied prior to RC flood, or split with one application prior to flood and one application 20 days later. MC and RC yield and milling were monitored using standard techniques.

Main Crop – In contrast to prior year’s results, MC drain timing did not impact MC maturity, yield, or whole milled grain. MC yields were 600 to 800 lb/ac higher and milling was 2 to 3 % lower than in 2004. This was probably due the extreme temperatures during grain filling. The post MC heading of N did not affect maturity or yield but did increase the MC whole milled grain by about 2%. Applying a post MC heading N would increase the loan rate by $9.84 per acre. The cost of 35 lbs of Urea was $10.25 representing a net increase farm income of -$0.41.

Ratoon Crop – Some treatments produced no rice in 2005. These treatments included the early drain and delayed flood. The MC drain timing and post heading N application did not influence RC maturity or yield. In prior years, RC yields were increased by draining at 20 days after MC heading and making a post heading N application increase RC yield. RC yields were lower for all studies at Eagle Lake in 2005, but RC yields for this study were exceptionally low. They were at least 2000 lb/ac less than 2004. This was probably due to the extreme temperatures. The high temperature was over 95 for 14 of 16 days and over 100 for 6 of these days from late boot to early grain fill. The impact of between crop dry period was totally opposite from prior years. The highest RC yields were obtained with the longer dry periods with a flush irrigation after
harvest. The 20 day dry period resulted in one of the lowest yields. In 2005, flushing and delaying the flood by 10 days resulted in about 1200 lb/ac more rice or about $94 per acre greater return. The optimum dry period for milling had been less than 15 days in prior years and was 20 to 25 days this year. Milling quality for the 2005 ratoon crop was extremely low. The MC drain time and post heading N did not affect RC milling as it had in previous years. The highest milling was obtained when the dry period was at least 20 days long and was even higher when the dry period was interrupted by a flush irrigation. Treatments with a dry period of 30 days failed to produce enough rice to mill.

**Total Crop** – TC maturity was several days longer than in prior years. All drain times with delayed flood and a flush reduced maturity by 10 to 12 days. The lower N rate treatments matured earlier as would be expected. TC yield was at least 3000 lb/ac below prior year’s research. The N treatment with the highest yield and most economical would be a single application of 100 lb/ac. The best irrigation treatment was with latest MC drain and RC flood delayed with a flush resulting in 25 day dry period interrupted by a flush. This treatment resulted in the highest TC yield in 2005.

**Summary:** Following a management system based on the prior two years of the research with Cocodrie and 6 years research with Lemont would have been disastrous in 2005. The TC economic loss would have been $234 per acre due to yield loss and $34.62 due to lower whole milled grain. Two factors may have contributed to the 2005 problems: 1) the environmental stress was severe during the RC at Eagle Lake and 2) RC stubble height was adjusted with a flail mower in 2005 and a combine in prior years. The research should be continued to determine optimum water and N management when the MC stubble is flail mowed.

**Objective 2:** Evaluate the efficacy and economics of weed management systems using current commercial herbicides in early and late season treatments alone and in all combinations. (Continued at Ganado only)

Effective weed control and the associated cost is a primary issue with Texas rice producers. Weeds reduce rice yields and grain quality. The objective of this research was to determine the effective weed control and the associated cost using selected commercially available herbicide programs at Ganado only in 2005. Studies have already been conducted near Beaumont and Eagle Lake in 2003 and 2004. The dominate grass at Ganado had been broadleaf signalgrass from the early 70’s through 2003. The initial herbicide treatment had been Propanal, Ordram, and Facet in later years applied early postemergence. Several years ago the initial herbicide application was changed to Command applied pre plant. In 2004, the barnyardgrass became the dominate grass problem. This study was extended for one more year at Ganado and in 2005 there was a mix of broadleaf signalgrass and barnyardgrass. Ganado site is located in Jackson County on an Edna ssl. Cocodrie rice was planted on 12 April. The stand was not acceptable and replanting was attempted twice before a successful planting on 23 May. All cultural management was standard and uniform except for the weed management. Herbicide treatments included 1 preemerge, 4 early postemerge, and 6 late postemerge herbicides for a total of 30 treatments.

Broadleaf signalgrass, barnyardgrass, and nut sedge were present in levels sufficient for rating. Seventeen of the 30 treatments provided greater than 90% control of the broadleaf signalgrass and barnyardgrass. The cost of these 17 treatments ranged from about $33 to almost $88. Yields were not significantly different for these 17 treatments. No single application provided adequate
weed control. Single applications reduced yield from 800 to 1200 lb/ac. The most economical
and effective herbicide treatment was preemergence Command followed by Arrosolo applied
late postemerge. The grass pressure was rather severe as the untreated plots only yielded 270
lb/ac. These studies have pointed out 1) that there are a wide selection of effective herbicides
and a wide range in cost and 2) some early postemerge tankmixes (Propanil+Bolero+Facet) may
result in yield reductions on light soils with no visible seedling injury.

**Objective 3: Evaluate the influence of growth stage and soil moisture on alligatorweed
control with DE638 and Regiment applied alone and in combination with several
commercial herbicides. (Continued)**

Field studies were conducted in 2005 to evaluate herbicide programs for the control of
alligatorweed and its effect on yield in rice production. Studies were located in grower’s fields
near Eagle Lake, Garwood, and Ganado, TX where alligatorweed populations were adequate.
Grasp at 0.027 lb ai/A alone and in combination with Stam or Grandstand were applied early-
postemergence (EPOST) when rice was at the 3 leaf rice stage and alligatorweed at 4 to 7 inches
tall. Additional late-postemergence (LPOST) treatments included combinations of Regiment,
Stam, Grandstand, Londax, Facet, and Grasp. Treatments were applied with CO₂ pressurized
backpack sprayer and visual alligatorweed control ratings (0-100%) and yield were measured
and subjected to analysis of variance. Means were separated using Fisher’s protected LSD at the
10% level.

Grasp and Grasp + Grandstand at EPOST provided >82 and 86% control at 2 and 4 weeks after
treatment (WAT) respectively, and continued until the end of the season with Grasp +
Grandstand. By 7 WAT, control was reduced to <72% with Grasp alone. When treatments were
applied LPOST control was >82% except Grasp control declined to <73% by 4 WAT. Grasp +
Stam and Stam + Grandstand provided <68% season long. When these treatments were applied
LPOST results were similar, <62% with Stam + Grasp and <69% with Stam + Grandstand.
Regiment provided <76% control alone. The addition of Stam reduced control to <61% however;
the addition of Grandstand increased control to >87% for alligatorweed all season. Londax and
Facet + Stam LPOST provided <55% control at 2 WAT and <66% by 7WAT. Yield ranged
from 8493 to 6058 lb/A and Grasp + Grandstand yielded only significantly higher than Londax
treatment.

Overall alligatorweed control was achieved with Grasp alone and increases with the addition of
Grandstand. Grandstand increased control in tankmixes, while Stam reduced control in
tankmixes indicating possible antagonism with Grasp. Regiment also provided control only
when mixed with Grandstand but not alone or when mixed with Stam.

Data from this research project played a key role in the registration of Grasp (DE638) and
commercial availability in 2005.

**Objective 4: Assess control of perennial Paspalum species with commercial and
experimental herbicides. (New)**

Working with County Extension Agents and Consultants no fields could be located with
paspalum or perennial barnyardgrass in 2005. One field with moderate Paspalum species
pressure was reported in Wharton County. But, the field had been sprayed by the producer by
the time contact was established. Numerous fields were surveyed across the rice belt. A
cooperator and field site have been identified for 2006.
Objective 5: Evaluate fall and spring vegetation management prior to planting in a reduced tillage system. (Initiated)

Studies were established in the fall of 2004 at Eagle Lake and Beaumont to evaluate winter weed control for commercial rice (*O. sativa*) in Texas. The herbicides evaluated were clomazone (Command) at 1lb/a in Eagle Lake and 1.25 lb/a in Beaumont, flumioxazin (Valor) at 2.5 oz/a, glyphosate (Roundup Weathermax) at 1 lb/a, glufosinate (Liberty) at 0.5 lb/a, prosulfuron (Peak) at 0.5 oz/a, and 2,4-D (Weedar 64) at 1lb/a. Three application times used were fall (October), winter (December), and spring (February). Treatments were applied with a backpack CO\textsubscript{2} sprayer and a four-nozzle spray boom. Weed control was evaluated visually (0-100%) at two, four, and eight weeks after application. Monocot families included in the study were *Poaceae* and *Iridaceae*. Dicot weed families included were *Asteraceae*, *Fabaceae*, *Polygonaceae*, *Brassicaceae*, *Apiaceae*, *Oragraceae*, *Rubiaceae*, and *Campanulaceae*.

In the fall, clomazone + flumioxazin and clomazone + prosulfuron provided >95% control of all weed species at 8 weeks after application (WAA), but clomazone + prosulfuron didn’t provide adequate control of volunteer rice. The winter application of glyphosate + flumioxazin had a >95% control for all winter weed species 8 WAA. In the spring, single applications of glufosinate and glyphosate didn’t provide adequate control of rescuegrass (*Bromus catharticus* Vahl) in Eagle Lake and winter broadleaves in Beaumont, but all single and sequential applications of glyphosate + flumioxazin provided excellent weed control. Emerging broadleaf signalgrass (*Brachiaria platyphylla* Griseb. Nash) at Eagle Lake and barnyardgrass (*Echinochloa crus-galli* L. Beauv.) in Beaumont were not adequately controlled with any treatment prior to planting. Winter broadleaf control was >90% with all treatments that contained glyphosate + flumioxazin and clomazone + prosulfuron fb glyphosate. Clomazone + prosulfuron, clomazone + flumioxazin, and all treatments with glyphosate applied in February provided >90% control of emerging broadleaf signalgrass (*Brachiaria platyphylla* Griseb. Nash) in Beaumont.

Objective 6: Determine the impact of tillage intensity in rice production systems on the level of weed management inputs required to optimize control. (Initiated)

Studies were established in the fall of 2004 to evaluate the influence of these different tillage intensities on three levels of weed management at Eagle Lake and Beaumont. The three tillage intensities used were conventional, spring stale seed bed and fall stale seed bed. The herbicide programs used were Low-Command at 0.4 lb/A applied preemergence (PRE) and Stam at 3 lb/A + Permit at 0.031 lb/A applied early postemergence (EPOST), Medium-Command at 0.5 lb/A PRE and Stam at 4 lb/A + Facet at 0.5 lb/A EPOST and High-Command at 0.6 lb/A PRE and Stam at 0.4 + Permit at 0.047 + Facet at 0.5 lb/A EPSOT. The weeds included in this study were barnyardgrass (ECHCG), hemp sesbania (SEBEX) and sprangletop (LEFSS). Weed control rates were taken at 2, 4 and 8 weeks after rice emergence. Crop yield was obtained.

Winter weed control in January was 80 to 85% for all treatments but by mid March the control was 40 to 50%. Command PRE provided 90% control of ECHCG and 70 to 90% control of SEBEX. Eight weeks after rice emergence >80% control of ECHCG and SEBEX was observed. Late season control of ECHCG and LEFSS was >90%. The SEBEX control in the conventional and spring stale seed bed treatments were above 80% while in the fall stale seed bed the control ranged from 60 to 30%. Rice yield within the conventional and spring stale seed bed treatments were not different. In the fall stale seed bed treatments the yields were significantly reduced.
Objective 7:  Update the weed science information presented in the Texas Rice Production Guidelines. Establish cooperative research with commercial industry to identify new potential weed control technology and production management. (Continued)

Subobjective A:  Rice Production Guidelines
In the 2005 Rice Production Guidelines, the weed management, ratoon crop and water management sections were reviewed. Errors were corrected and revisions made where necessary.

Subobjective B:  CLEARFIELD*, Hybrid and Conventional Variety Evaluation
Research was conducted to evaluate the performance and physiological characteristics of 4 CLEARFIELD* varieties with and without Newpath, 7 long grain hybrids, 1 medium grain hybrids, 4 long grain conventional varieties, and 2 medium grain varieties. The study was conducted at Beaumont, Eagle Lake, and Ganado. Management was optimized as much as possible for each entry considering that they were planted in the same block.

Beaumont – Yields were at least 500 lb/ac less than expected. Yields for several varieties were extremely low as 7 varieties did not yield 5,000 lb/ac. The highest yielding hybrid was XP 723 at 8526 lb/ac, CLXP 730 ranked second at 8430 lb/ac. The highest yielding conventional variety was Cybonnet at 6200 lb/ac. Eight of the 10 hybrid entries out yielded all conventional varieties. Milling was low also as the highest milling variety was Bengal at 61% whole grain and only 2 of the 18 entries milled over 60% whole grain. Three hybrids out milled Cybonnet the highest milling conventional variety while 5 hybrids out milled Cocodrie. The low milling should not have been due to harvest moisture. CL131 was comparable to CL161 in most parameters. Hurricane Rita eliminated the RC.

Eagle Lake – Yields were well below past years as the highest MC yield was 11,500 lb/ac and down about 2,000 lb/ac compared to 2004. All hybrids out yielded the conventional varieties. The highest yield hybrid was XP 723 and it out yielded Tranasse by 2,800 lb/ac and Cocodrie by 3,000 lb/ac. The lowest yielding variety was Bengal at 7,780 lb/ac. Milling was below expected at Eagle Lake also. Jupiter milled 64% whole grain and was the only variety over 60%. The whole milled grain of 4 hybrids was comparable to Cocodrie. RC yields were off at least 2,000 lb/ac from 2004. The highest yield hybrid was 3840 lb/ac which was 1,450 lb/ac above Jupiter and 2,200 lb/ac better than Cocodrie. All hybrids out yielded the conventional varieties in the RC crop. RC milling was slightly below the MC and followed the same patterns. CL131 was comparable to CL161 in most parameters.

Ganado – The MC yields were about 1,500 lb/ac less than in 2004. The highest MC yielding entries were XP732, XP723, and CLXP730 at about 9,350 lb/ac. This was 1,700 lb/ac better than Tranasse and 1,900 lb/ac better than Cocodrie. XP721 and XP728 yields were comparable to Cocodrie, while all other hybrids yields significantly exceeded the conventional varieties. Milling was below normal at Ganado also, though 6 conventional varieties did mill over 60% whole milled grain. Cocodrie milled 58% whole milled grain and three hybrids (CLXP730, XP723, and XP731) were only a couple of points below Cocodrie. All hybrids out yielded the conventional varieties in the RC crop. RC milling was slightly below the MC and followed the same patterns. CL131 was comparable to CL161 in most parameters.

All Locations – XP723 had the highest MC yield at 9,350 lb/ac and this was 2,300 lb/ac better than Cocodrie. All hybrids out yielded the Conventional varieties. Conventional medium grains
had the lowest yields of all entries. Only the medium grains milled greater than 60% whole when averaged across location. In general, the hybrids had lower whole milled grains, though XP723, XP732, and CLXP730 had milling comparable to Cocodrie. In the RC, most hybrids outyield the conventional crops with XP723 (at 2,900 lb/ac) out yielding Tranasse by 1,000 lb/ac and Cocodrie by 1,500 lb/ac. RC milling patterns were similar to the MC. The TC yield for XP732 was 12,170 lb/ac which was 2,600 lb/ac better than Tranasse and 3,250 lb/ac better than Cocodrie. CL131 was comparable to CL161 in most parameters.

**Subobjective C: Aerial Application of Command in Texas.**
During the past three years this project has worked with FMC Corporation to obtain a 24C that would allow aerial application of Command 3ME in rice production systems in Texas. In January 2005 we were successful in obtaining the 24C from the Texas Department of Agriculture. The state allocated 5,000 acres under 24C and 4,616 acres were treated. It was reported that no incident of off-target movement occurred in association with the above acreage in the 24C. It is currently assumed that an expanded acreage for aerial application of Command under a new 24C will be available to the producers in 2006.

Research using a logarithmic sprayer in studies at Beaumont showed that rates up to 1.5 lb ai/A applied to rice in the 1 to 2 leaf resulted in no visible injury. Similar results were observed at Eagle Lake and Ganado with rates up to 0.7 lb ai/A. Additional research at all three locations addressed tank mixtures of Command plus residual or burndown herbicides. Complete sets of these data are available upon request.

**Subobjective D: Federal Label Change for Command.**
Clomazone is an effective herbicide widely used for preemergence grass control in rice. However, use of clomazone on sandy textured soils of the western Texas rice belt was excluded from the federal label. Field experiments at three locations have been conducted to determine the optimum rate range that maximizes weed control and minimizes crop injury across a wide variety of soil textures and planting dates. At Beaumont, Eagle Lake, and Ganado, TX, preemergence application of 0.36 to 0.50, 0.34 to 0.38, and 0.32 to 0.38 lb ai/A clomazone, respectively, provided optimum weed control with minimal rice injury. Data suggests that clomazone is safe to use on rice on sandy textured soils. Injury may occur; however, rates suggested from the research will minimize injury and achieve excellent weed control. As a result, application for amendments to the herbicide label will allow clomazone use on sandy textured soils giving rice producers more flexibility and access to another effective herbicide.

On January 4, 2005 EPA received the Command 3ME herbicide amendment to rice use proposing to remove the existing limitation to use on the coarse textured soils. EPA has until June 2006 to rule on the requested amendment. Numerous contacts have been made to encourage EPA to make a ruling prior to the 2006 rice planting season.

**Subobjective E: Beyond as a rescue treatment for red rice control in CLEARFIELD* rice.**
Field studies were conducted at the Texas A&M Research and Extension center near Beaumont to evaluate the timing and rate of Beyond on late season red rice control and crop tolerance. Red rice variety CL161 was drill-seeded at 80 lbs/A with red rice drill-seeded perpendicular at 30 lbs/A to ensure uniform and adequate red rice density. Command (clomazone) was applied at .5 lbs ai/A preemergence over the entire study to eliminate all grass weeds except red rice. Blazer (acifluorfen) was applied at 0.175 lbs ai/A at the rice four leaf stage to eliminate broadleaf weeds. Application of New path for red rice control was not made prior to rescue grass
treatments as required by the Beyond label, ensuring intense red rice pressure. In 2003, Beyond (imazamox) was applied at 0.031, 0.039, and 0.047 lbs ai/A at the rice 1-2 and 3-4 tiller ranged between 85 and 93%. Delaying Beyond application to booting stage provided less than 80% red rice control. Application at flowering stage provided less than 10% control. Red rice control results within each timing were similar regardless of the Beyond rate. However, there were significant differences with red rice heading. The application of Beyond at the booting stage prevented red rice seed head formation. No visual crop injury was noted, however, rice yield significantly decreased when the Beyond application was delayed to the booting or flowering stage. This could be due to a longer period of red rice competition and lack of control at these timings and/or potential crop injury to the commercial rice in its reproductive phase. In 2004, application timings were modified. Beyond was applied at 0.031, and 0.039 and 0.047 lbs ai/A at the rice 2-4 tiller, panicle initiation, panicle initiation + 10 days, and panicle initiation +17 days. Red rice control up to 60% was achieved at the 204 tiller application stage. As Beyond application was delayed percent control was reduced to 23%. All timings except panicle initiation +10 days resulted in red rice seed head formation at all rates of Beyond. No visible rice injury or significant differences in yield were observed. Lower red rice control in 2004 might be due to later planting date of April 14, 2003 vs. May 6, 2004 and nearly three times as much rainfall during the 2004 growing season.

Data from this research project played a leading role in the registration of Beyond in both the main crop and the ratoon crop.

**Subobjective F: Clearpath for weed control in rice.**

Clearpath, a premix of Newpath and Facet, is a new herbicide developed by BASF for control of red rice, grasses and broadleaf weeds in CLEARFIELD* rice. Field studies were conducted at the Texas Agricultural Experiment Station near Beaumont, Texas to evaluate treatment application timings and combinations using Clearpath and Newpath.

Rice variety CL161 was drill-seeded at 80 lbs/A with red rice drilled perpendicular at 30 lbs/A to ensure uniform and adequate red rice levels. Clearpath was applied to rice preemergence (PRE), at the rice1 leaf, 4 leaf, or 1 tiller stage at 0.363 lb ai/A fb Newpath at 4oz/A at the same application timings. A non-treated check, command plus Newpath fb Newpath, and Newpath fb Newpath treatments were applied at the labeled rates for comparison. Red rice (*Oryza sativa*), hemp sesbania (*Sesbania exaltata*), and barnyardgrass (*Echinochloa crus-galli*) control and crop injury was evaluated.

Red rice and barnyardgrass control was >90% with all treatments of Newpath and Clearpath independent of which herbicide was applied PRE or at the 4 leaf stage. Clearpath applied at rice 1 leaf fb Newpath at rice 4 leaf obtained 90% control of red rice compared to Newpath applied at 1 leaf fb Clearpath at 4 leaf, receiving 85% control. Later applications of Newpath or Clearpath at the rice 1 tiller stage following a one-leaf application resulted in control greater than 93%. Hemp sesbania control was achieved greater than 82% for all treatments that included Clearpath. In 2003, early applications (PRE and 1 leaf) of Clearpath provided less control ranging between 82 and 85% when compared to the later applications at 4 leaf and 1 tiller. In 2004, there were no significant differences providing greater than 90% control. No visual crop injury was noted, however, rice yield significantly decreased when single treatments of Newpath and Command were applied. This was due to the lack of control of hemp sesbania whereas treatments using the premix Clearpath obtained the highest yields.
Data from this research project was extremely important in the registration of Clearpath and commercial availability in 2005.

**Subobjective G: Additional Herbicide Research with Commercial Companies.**
To better serve the rice producers of Texas this weed science project conducts numerous cooperative research projects with commercial pesticide companies. This research is where future useful weed control technology is identified and developed. The studies listed below were conducted during the 2005 growing season. Full reports are available upon request.

**Beaumont**

F05-82 Evaluation of Clearpath for improved weed control in CLEARFIELD* rice.
F05-83 Red rice control with Newpath and Beyond at various red rice growth stages.
F05-84 Conventional and hybrid rice variety tolerance to Newpath and Beyond.
F05-86 Evaluation of Grasp tank mixes on rice tolerance and weed control.
F05-87 Weed control and rice tolerance with two formulations of Stam.
F05-88 Evaluation of Clincher tank mixes as early postemergence grass control.
F05-89 Red rice control with Newpath when used in tank mixes with Regiment.
F05-92 Evaluation of Command, Aim, Newpath, or Clearpath tank mixes for weed control.
F05-93 Evaluation of Aim tank mixes with conventional herbicides for weed control.
F05-95 Evaluation of Permit tank mixes for weed control.
F05-96 Evaluation of Permit, Beyond, and Newpath tank mixes for weed control.
F05-97 Evaluation of CL XL-8 tolerance to Clearpath.
F05-98 Evaluation of CL XL-730 tolerance to Clearpath.

**Eagle Lake**

F05-102 Evaluation of Clearpath for improved weed control in CLEARFIELD* rice.
F05-103 Conventional and hybrid rice variety tolerance to Newpath and Beyond.
F05-104 Rice injury and yield as affected by Grasp.
F05-108 Evaluation of CL XL-8 tolerance to Clearpath.

**Objective 8: Document weed intensities and shifts in intensified rice production with varying levels of herbicide input.** (Possible)

No plot research was conducted related to this objective. All currently available land resources are allocated at Eagle Lake. Several visits were made to producer fields that are utilizing shorter rotations and reduced tillage. Continuous rice for more than two years will not work in some areas. At one site in west Wharton County, it was observed that stand establishment problems and yields were reduced after two years of rice-rice. This producer decided that the situation was alleviated by fallow or cultivation. Based on these visits it was determined that weed pressure and species shifts may be more effectively evaluated by surveying producers fields that have been using reduced tillage and reduced rotation for several years.