ETTM: FINDING A PLACE AT HOME IN WEST CENTRAL TEXAS COTTON Billy E. Warrick Texas Cooperative Extension Texas A&M University San Angelo, TX

Abstract

ETTM (pyraflufen-ethyl), was tested as ET-751 prior to the 2003 growing season, is a herbicidal harvest aid being marketed by Nichino America, Inc. In cotton, ETTM has been tested as a harvest-aid product since 2001 in West Central Texas. The information summarized in this report is from plots established in 2001, 2002 and 2003. ETTM was applied with a self-propelled ground sprayer to small replicated test plots of furrow irrigated cotton. In these small plots ETTM was equal in its level of leaf defoliation to any currently labeled harvest aid (as of December, 2003). Leaf drop continued slowly even when night temperatures fell in the 50 to 60 degrees Fahrenheit range. The defoliation of the cotton plant was slowed when night temperatures dropped below 60 Fahrenheit. When ETTM is used at rates above the 1.4 ounces per acre rate, leaf desiccation is significantly higher for seven to fourteen days, however, the percent of desiccation falls within an acceptable range of less than 20 percent by fourteen days after treatment. When ETTM is applied at the 1.4 to 2.0 ounce per acre rate the level of leaf desiccation was no different by harvest time than other harvest aids tested. ETTM can provide some regrowth suppression if adequate coverage with the harvest aid is achieved.

Introduction

Cotton production in West Central Texas and Far West Texas comes from three production regions. They include: Concho Valley, Southern Rolling Plains and Trans-Pecos. In the Concho Valley and Southern Rolling Plains, cotton is usually planted starting in mid-May. Because of this planting date, cotton produced is generally ready for harvest 30 days before the first killing freeze in the Fall. Due to the extra time that the cotton lint is exposed to weather, both yield and quality are reduced. Normally, cool temperatures occur in late-September and October when harvest aids are usually applied in the area. Tests were initiated to determine the response of cotton conditioners, defoliants, and desiccants under cooler environmental conditions. The harvest aid ETTM was applied to small replicated plots of cotton in 2001, 2002 and 2003 with a self-propelled ground sprayer. The objectives of these tests were to compare the effectiveness of ETTM with other labeled cotton harvest aids in opening bolls, leaf defoliation, leaf desiccation, and regrowth control or suppression. ETTM is a PPO inhibitor that induces accumulation of protoporphyrins which leads to the damage to cell membranes and cell function. This activity on the foliage of cotton is very rapid and usually shows symptoms within 24 hours. ETTM is marketed as a 0.208 pound per gallon E.C. and used at a rate of 1.35 to 4.0 ounces per acre.

Methods and Materials

Tests plots in 2001 and 2002 were established in Tom Green County (San Angelo, Texas vicinity) on cotton that had been furrow irrigated. In 2003, five tests were established of which three (Glasscock and Tom Green County) were irrigated and two (Mitchell and Scurry County) were dryland production. The abbreviation DAT found in this report stands for days after treatments were applied. When regrowth is being reported it is based on a rating system that relates to the amount of new leaf development in the top (upper six inches) and bottom portion of the cotton plant. A copy of the regrowth rating system used can be obtained from http://sanangelo.tamu.edu/agronomy/harvest/regrowth.pdf.

2001 Test Site

Nine different combinations of cotton harvest-aids were applied with a self-propelled ground sprayer on September 28 to Deltapine 458 BG/RR cotton with and average height of 38 inches. The plot was established on Chris Bubenik's Farm, five miles northwest of Wall, Texas. The chemicals were applied to irrigated cotton that had 65 percent of its bolls open. Leaf shed was less than one percent and the cotton plant leaves were still green in color.

The sprayer was equipped with 11002 air induction flat fan nozzles on 20 inch center, applying 10.75 gallons of water per acre with 40 p.s.i. of pressure. Each treatment plus a check was replicated three times and each of the three plots were 13.33 feet wide by 70 feet long. Treatments were assigned at random within each replication. At the time of application, the relative humidity was 44 to 46 percent, the air temperature was 72 to 80 degrees Fahrenheit and wind was out of the Southeast at six to nine miles per hour.

Day time air temperature the first 14 days after chemicals were applied ranged from 67 to 88 degrees Fahrenheit. The the nighttime air temperature ranged from 46 to 70 degrees Fahrenheit was only above 60 degrees Fahrenheit twice and was below 55 degrees Fahrenheit eight nights. There was 0.25 inch of rain received on the plot 14 days after the treatments were applied. The test was terminated on October 19.

Prior to applying harvest aids, an area in each treatment was marked to make ratings on the percent open bolls, percent defoliation, percent desiccation, and regrowth in the top and bottom portion of the plants. The plots were evaluated on October 5 (7 DAT), October 12 (14 DAT), and October 19 (21 DAT). The information collected on October 5, October 12, and October 19 are reported in Tables 1, 2, and 3, respectively.

2002 Test Site

Eleven different combinations of cotton harvest-aids were applied with a self-propelled ground sprayer on September 30 to Deltapine 458 BG/RR cotton with and average height of 38 inches. The plot was established on Chris Bubenik's Farm, one mile north of Wall, Texas. The chemicals were applied to irrigated cotton that had 60 percent of its bolls open. Leaf shed was less than one percent and the cotton plant leaves were still green in color.

The sprayer was equipped with 11002 air induction flat fan nozzles on 20 inch center, applying 11.0 gallons of water per acre with 32 p.s.i. of pressure. Each treatment plus a check was replicated four times and each of the four plots were 13.33 feet wide by 70 feet long. Treatments were assigned at random within each replication. At the time of application, the relative humidity was 46 to 55 percent, the air temperature was 78 to 84 degrees Fahrenheit and wind was out of the South at seven to ten miles per hour.

Day time air temperature the first 14 days after chemicals were applied ranged from 61 to 92 degrees Fahrenheit. The the nighttime air temperature ranged from 50 to 69 degrees Fahrenheit; it was above 60 degrees Fahrenheit seven nights and was below 55 degrees Fahrenheit three nights. There was 2.84 inches of rain received on the plot during the 21 days it was being evaluated. Rain occurred on October 7 (1.64 inches), October 8 (0.42 inch), October 18 (0.65 inch) and October 21 (0.13 inch). The test was terminated on October 21.

Prior to applying harvest aids, an area in each treatment was marked to make ratings on the percent open bolls, percent defoliation, percent desiccation, and regrowth in the top and bottom portion of the plants. The plots were evaluated on October 7 (7 DAT), October 14 (14 DAT), and October 21 (21 DAT). The information collected on October 7, October 14 and October 21 are reported in Tables 4, 5, and 6, respectively.

2003 Test Sites

ET-751 was registered by EPA in May of this year and is being marketed as ET^{TM} . Five replicated tests and three strip plots were established this season. Only the replicated tests are being reported.

<u>Michael Fuchs Farm Glasscock County</u>. Fourteen different combinations of cotton harvest-aids were applied with a self-propelled ground sprayer on August 27 to Deltapine 5415 cotton with and average height of 29 inches. The plot was established on Michael Fuch's Farm one mile south of the intersection of farm road 2401 and farm road 137 in Glasscock County. The chemicals were applied to irrigated cotton (pre-water only) that had 15 percent of its bolls open. Leaf shed was less than two percent and the cotton plant leaves were still green in color.

The sprayer was equipped with 11002 air induction flat fan nozzles on 20 inch center, applying 10.0 gallons of water per acre with 30 p.s.i. of pressure. Each treatment plus a check was replicated three times and each of the three plots were 6.67 feet wide by 100 feet long. Treatments were assigned at random within each replication. At the time of application, the relative humidity was 50 to 65 percent, the air temperature was 88 to 92 degrees Fahrenheit and wind was out of the South at five to nine miles per hour.

Day time air temperature the first 13 days after chemicals were applied ranged from 78 to 99 degrees Fahrenheit. The nighttime air temperature ranged from 64 to 74 degrees Fahrenheit. There was no rain received on the plot during the 13 days it was being evaluated. The test was terminated on October 10.

Prior to applying harvest aids, an area in each treatment was marked to make ratings on the percent open bolls, percent defoliation, percent desiccation, and regrowth in the top and bottom portion of the plants. The plots were evaluated on September 3 (7 DAT) and September 9 (13 DAT). The information collected on September 3 and 9 are reported in Tables 7 and 8, respectively.

<u>Todd Shaw Farm Mitchell County.</u> Fifteen different combinations of cotton harvest-aids were applied with a self-propelled ground sprayer on September 23 to cotton with and average height of 23 inches. The plot was established on Todd Shaw's Farm, three

miles East of Buford in Mitchell County. The chemicals were applied to irrigated cotton that had 60 percent of its bolls open. Leaf shed was less than one percent and the cotton plant leaves were still green in color.

The sprayer was equipped with 11002 air induction flat fan nozzles on 20 inch center, applying 14.0 gallons of water per acre with 37 p.s.i. of pressure. Each treatment plus a check was replicated three times and each of the three plots were 6.67 feet wide by 50 feet long. Treatments were assigned at random within each replication. At the time of application, the relative humidity was 50 to 65 percent, the air temperature was 88 to 92 degrees Fahrenheit and wind was out of the Southeast at three to six miles per hour.

Day time air temperature the first 14 days after chemicals were applied ranged from 66 to 92 degrees Fahrenheit. The nighttime air temperature ranged from 48 to 67 degrees Fahrenheit; it was above 60 degrees Fahrenheit eight nights and was below 55 degrees Fahrenheit two nights. There was 1.29 inches of rain received on the plot during the 14 days it was being evaluated. Rain occurred on September 25 (0.42 inch), October 5 (0.11 inch), October 6 (0.66 inch) and October 8 (0.10 inch). The test was terminated on October 8.

Prior to applying harvest aids, an area in each treatment was marked to make ratings on the percent open bolls, percent defoliation, percent desiccation, and regrowth in the top and bottom portion of the plants. The plots were evaluated on September 30 (7 DAT) and October 8 (14 DAT). The information collected on September 30 and October 8 are reported in Tables 9 and 10, respectively.

<u>Morris Light Farm Scurry County</u>. Fifteen different combinations of cotton harvest-aids were applied with a self-propelled ground sprayer on September 24 to cotton with and average height of 29 inches. The plot was established on Morris Light's Farm one mile North of Inadale in Scurry County. The chemicals were applied to dryland cotton that had 60 percent of its bolls open. Leaf shed was less than one percent and the cotton plant leaves were still green in color.

The sprayer was equipped with 11002 air induction flat fan nozzles on 20 inch center, applying 16.0 gallons of water per acre with 37 p.s.i. of pressure. Each treatment plus a check was replicated three times and each of the three plots were 13.33 feet wide by 50 feet long. Treatments were assigned at random within each replication. At the time of application, the relative humidity was 50 to 65 percent, the air temperature was 88 to 92 degrees Fahrenheit and wind was out of the South at four to eight miles per hour.

Day time air temperature the first 14 days after chemicals were applied ranged from 66 to 92 degrees Fahrenheit. The nighttime air temperature ranged from 48° to 67° Fahrenheit; it was above 60 degrees Fahrenheit eight nights and was below 55 degrees Fahrenheit two nights. There was 1.29 inches of rain received on the plot during the 14 days it was being evaluated. Rain occurred on September 25 (0.42 inch), October 5 (0.11 inch), October 6 (0.66 inch) and October 8 (0.10 inch). The test was terminated on October 8.

Prior to applying harvest aids, an area in each treatment was marked to make ratings on the percent open bolls, percent defoliation, percent desiccation, and regrowth in the top and bottom portion of the plants. The plots were evaluated on September 30 (6 DAT) and October 8 (13 DAT). The information collected on September 30 and October 8 are reported in Tables 11 and 12, respectively.

<u>Chris Bubenik Farm Tom Green County (Test Number 1)</u>. Twenty-two different combinations of cotton harvest-aids were applied with a self-propelled ground sprayer on October 20 to Deltapine 424 BG/RR cotton with and average height of 36 inches. The plot was established on Chris Bubenik's Farm, seven miles north of Wall, Texas. The chemicals were applied to irrigated cotton that had 80 percent of its bolls open. Leaf shed was less than one percent and the cotton plant leaves were still green in color.

The sprayer was equipped with one 11002 air induction flat fan nozzle over the top of row and one 8002 flat fan nozzle on a 9 inch drop on each side of the row, applying 16.0 gallons of water per acre with 32 p.s.i. of pressure. Each treatment plus a check was replicated three times and each of the three plots were 13.33 feet wide by 60 feet long. Treatments were assigned at random within each replication. At the time of application, the relative humidity was 40 to 50 percent, the air temperature was 78 to 88 degrees Fahrenheit and wind was out of the South at two to five miles per hour.

Day time air temperature the first 14 days after chemicals were applied ranged from 54 to 89 degrees Fahrenheit. The nighttime air temperature ranged from 41 to 67 degrees Fahrenheit; it was above 60 degrees Fahrenheit two nights and was below 55 degrees Fahrenheit ten nights. There was 0.79 inch of rain received on the plot during the 21 days it was being evaluated. Rain occurred on October 26 (0.06 inch), November 2 (0.01 inch), November 5 (0.24 inch), November 6 (0.09 inch), November 7 (0.09 inch) and November 8 (0.30 inch). The test was terminated on November 10.

Prior to applying harvest aids, an area in each treatment was marked to make ratings on the percent open bolls, percent defoliation, percent desiccation, and regrowth in the top and bottom portion of the plants. The plots were evaluated on October 27 (7 DAT), November 3 (14 DAT), and November 10 (21 DAT). The information collected on October 27, November 3 and November 10 are reported in Tables 13, 14, and 15, respectively.

<u>Chris Bubenik Farm Tom Green County (Test Number 2)</u>. Twenty-four different combinations of cotton harvest-aids were applied with a self-propelled ground sprayer on October 21 to Deltapine 424 BG/RR cotton with and average height of 36 inches. The plot was established on Chris Bubenik's Farm, seven miles north of Wall, Texas. The chemicals were applied to irrigated cotton that had 80 percent of its bolls open. Leaf shed was less than one percent and the cotton plant leaves were still green in color.

The sprayer was equipped with one 11002 air induction flat fan nozzle over the top of row and one 8002 flat fan nozzle on a 9 inch drop on each side of the row, applying 16.0 gallons of water per acre with 32 p.s.i. of pressure. Each treatment plus a check was replicated three times and each of the three plots were 13.33 feet wide by 60 feet long. Treatments were assigned at random within each replication. At the time of application, the relative humidity was 23 to 50 percent, the air temperature was 75 to 86 degrees Fahrenheit and wind was out of the Southeast at two to five miles per hour.

Day time air temperature the first 14 days after chemicals were applied ranged from 54 to 89 degrees Fahrenheit. The nighttime air temperature ranged from 41 to 67 degrees Fahrenheit; it was above 60 degrees Fahrenheit three nights and was below 55 degrees Fahrenheit nine nights. There was 0.79 inch of rain received on the plot during the 21 days it was being evaluated. Rain occurred on October 26 (0.06 inch), November 2 (0.01 inch), November 5 (0.24 inch), November 6 (0.09 inch), November 7 (0.09 inch) and November 8 (0.30 inch). The test was terminated on November 10.

Prior to applying harvest aids, an area in each treatment was marked to make ratings on the percent open bolls, percent defoliation, percent desiccation, and regrowth in the top and bottom portion of the plants. The plots were evaluated on October 27 (6 DAT), November 3 (13 DAT), and November 10 (20 DAT). The information collected on October 27, November 3 and November 10 are reported in Tables 16, 17, and 18, respectively.

Results and Discussion

2001

<u>The First Seven Days (September 28 to October 4, 2001).</u> From September 28 to October 4, daytime air temperatures ranged from 76 to 88 degrees Fahrenheit and the night temperatures ranged from 46 to 61 degrees Fahrenheit. The percent of open bolls increased by 10 percent in the first week. At the seven day evaluation, there was a significant difference in the percent of defoliation and the percent of desiccation. The information collected on October 5 is reported in Table 1., none of the treatments had significantly more bolls open than the check.

The most evident impact of the materials applied was the increased amount of leaf desiccation. All treatments had significantly more leaf desiccation than the check. The amount of desiccation ranged from 8 to 38 percent. The Ginstar treatments had the lowest levels of desiccation and the more Ginstar applied the higher the level of desiccation. The amount of defoliation was significantly higher in the treatments where 8 ounces or more of Ginstar was applied. The cool daytime and nighttime temperatures slowed the cottons response to all the treatments applied. No regrowth was found in the top and bottom portions of cotton plant in any of the treatments.

<u>The Second Week (October 5 - October 11, 2001).</u> Hourly daytime air temperature ranged from 67 to 85 degrees Fahrenheit. The nighttime temperatures ranged from 47 to 70 degrees Fahrenheit. These temperatures when compared to 2000 were 8 to 12 degrees cooler for the daytime air temperatures. The cooler temperatures slowed the plants response to harvest aids applied.

The amount of boll opening now ranged from 75 to 85 percent which is an increase of 0 to 10 percent from the seven day evaluation. At the 14 day evaluation (7 days after the followup treatments were applied), there was a significant difference in the percent of boll opening, percent of defoliation, percent of desiccation, and the amount of regrowth in the bottom portion of the plant. The information collected on October 12 is reported in Table 2.

In this test, all treatments had significantly more boll opening and leaf defoliation than the check. The amount of leaf defoliation was 17 to 38 percent higher than the check. Three of the five ETTM treatments was equal to the best defoliation treatments in the test. The protocol for the test was to apply the followup application seven days after the first treatment. Due to cool air temperatures, the plant response to harvest aids applied was slow. It would have been appropriate to wait for 10 days to allow the abscission layer to form to result in a higher level of leaf defoliation.

All treatments had significantly more desiccation than the check with the range being 52 to 79 percent (approximately one third of these leaves fell off by the time of the 21 day evaluation). Regrowth in the bottom portion of the plants was significantly higher in all treatments when compared to the check. The regrowth rating was 1, and at this level would not impact harvest efficiency but might impact leaf grade.

<u>The Third Week (October 12 - October 18, 2001).</u> Hourly daytime air temperature ranged from 66 to 83 degrees Fahrenheit. The nighttime temperatures ranged from 41 to 55 degrees Fahrenheit. These temperatures when compared to 2000 were 1 to 13 degrees cooler for the daytime and nighttime air temperatures. The cooler temperatures slowed the plants response to harvest aids applied.

The amount of boll opening now ranged from 80 to 95 percent which is an increase of 5 to 10 percent from the 14 day evaluation. At the 21 day evaluation (14 days after the followup treatments were applied) there was a significant difference in the percent of open bolls, the percent of defoliation, the percent of desiccation, and the amount of regrowth in the top and bottom portion of the plants. The information collected on October 19 is reported in Table 3.

In this test, all treatments had significantly more open bolls and defoliation than the check. The percent defoliation in the treated plots now ranged from 36 to 65 percent. The best treatments still had enough leaves remaining to cause concern due to potential leaf grade discounts that might result.

All treatments had more desiccation than the check and the percentage ranged from 26 to 61 percent. The cool temperatures followed by only a seven day waiting period before applying the Cyclone Max resulted in poor defoliation and high desiccation in this test. More flexibility before applying the followup treatment would have resulted in improved leaf defoliation and lower desiccation.

In this test, all treatments had significantly more regrowth in the top and bottom potions of the plant than the check plots. The regrowth rating was 1, and at this level would not impact harvest efficiency but might impact leaf grade. No regrowth was advanced enough to cause problems in ginning of the cotton.

<u>2002</u>

All applied treatments resulted in a significant level of leaf defoliation when compared to the untreated checks. New plant growth was minimal at 7 and 14 days after treatments were applied. Regrowth occurring at the 21 day evaluation was developing slowly and should not interfere with harvesting and ginning.

<u>The First Seven Days (September 30 to October 6, 2002)</u>. Daytime air temperatures ranged from 84 to 92 degrees Fahrenheit and the night temperatures ranged from 59 to 69 degrees Fahrenheit. On October 7 when the plots were evaluated, there was a significant difference in the percent open bolls, percent defoliation and percent desiccation. The data collected is summarized in Table 4.

The percent of open bolls increased by 10 to 20 percent in the first week. The ET^{TM} treatments were equal to or better than any treatment in the test at open bolls. Most of the treatments had more open bolls than the check plot. All treatments had significantly more leaf defoliation than the check. The ET^{TM} treatments were equal to or lower in the amount of desiccation.

<u>The Second Week (October 7 - October 13, 2002).</u> Hourly daytime air temperature ranged from 61 to 83 degrees Fahrenheit. The nighttime temperatures ranged from 50 to 61 degrees Fahrenheit. The cooler temperatures throughout the week slowed the plants response to harvest aids. Rainfall of more than two inches during the week will result in an increase in regrowth. The followup applications were scheduled to be applied on October 7, however the rain delayed application until October 12. On October 14 when the plots were evaluated, there was a significant difference in the percent open bolls, percent defoliation, percent desiccation and the amount of top regrowth. Top regrowth was burned by the followup applications and it was recorded as controlled and this rating was reflected at the rating made on October 21. The data collected is summarized in Table 5.

The amount of boll opening still remained at 70 to 80 percent, which is an increase of 0 to 1.25 percent from the seven day evaluation. ET^{TM} treatments were equal to all other harvest aids tested in the amount of boll opening. All treatments had significantly more leaf defoliation than the check.

All plots that had a followup treatment applied had significantly more leaf desiccation than plots that did not. Also, all plots that had a followup treatment applied had significantly less top regrowth than plots that did not.

<u>The Third Week (October 14 - October 20, 2002).</u> Hourly daytime air temperature ranged from 51 to 76 degrees Fahrenheit. The nighttime temperatures ranged from 40 to 58 degrees Fahrenheit. The cooler temperatures throughout the week slowed the plants response to harvest aids. During the week almost one inch of additional rain was received. The followup applications had been applied for nine days and leaf defoliation was higher than expected. On October 21 when the plots were evaluated, there was a significant difference in the percent open bolls, percent defoliation, percent desiccation, the amount of top regrowth, and the amount of bottom regrowth. The data collected is summarized in Table 6.

The amount of boll opening ranged from 80 to 93.75 percent, which is an increase of 8 to 20 percent from the 14 day evaluation. ETTM was better than or equal to all treatments in the amount of boll opening.

All treatments had significantly more leaf defoliation than the check. ET-751 at 1.35 ounces plus Prep at 16 ounces plus 1% Crop Oil Concentrate v/v followed by ET-751 at 1.35 ounces plus 1% Crop Oil Concentrate v/v treatment had significantly more leaf defoliation than five of the treatments in the test.

All plots that had a followup treatment applied had significantly more leaf desiccation than plots that did not. Also, all plots that had a followup treatment applied had significantly less top and bottom regrowth than plots that did not. None of the regrowth in the top and bottom portion of the plants was at a level that would impact harvest efficiency at the time of the 21 day evaluation. No regrowth was advanced enough to cause problems in ginning of the cotton.

For 2002, we had an open September and most of 75,000 acres of cotton could have been terminated and harvested prior to the first rain. Throughout October, rainfall kept producers from harvesting cotton in a timely manner. Most acreage had received 4 inches or more of rain during October and harvest was delayed until November. A loss of lint yield is obvious on most cotton acreage and lint quality has been effected. A loss of 4 to 7 cents per pound occurred because of the weather related delay. It is important to remember that a higher lint yield is not the only way of increasing profit from the use of a harvest aid. Other factors include: timely harvest, improved fiber quality, improved harvesting efficiency, and higher percent lint turnout at the gin.

2003

ET-751 was registered by EPA in May of this year and is being marketed as ET^{TM} . Five replicated tests and three strip plots were established this season. Only the replicated tests are being reported.

<u>Michael Fuchs Farm Glasscock County.</u> When these plots were evaluated on September 3, 2003 (7 days after the plot was established) most of the treatments applied had visually more desiccation than the check plot. Some defoliation was occurring and it ranged from 1 to 8 percent except in the Gramoxone Max plot which had 75 percent of its original leaves defoliated. The amount of regrowth in the top and bottom portion of the plants varied between treatments, however, no regrowth was high enough to impact harvesting or ginning. Data collected on September 3 is reported in Table 7.

When the plots were evaluated on September 9, 2003 (13 days after the plot was established) the amount of defoliation had increased significantly. The amount of desiccation in most treatments were lower than when evaluated September 3. In some treatments the amount of desiccated leaf remaining on the cotton plant was a concern. The amount of regrowth in the top and bottom portion of the plants varied between treatments, however, no regrowth was high enough to impact harvesting or ginning. Data collected on September 9 is reported in Table 8.

ETTM was equal to or better than any treatment applied in the amount of leaf defoliation except for Gramoxone Max applied at the 10 ounce rate. ETTM had a high percentage of desiccated leaves and was significantly higher than five of the treatments in the test. The amount of leaves is high enough that it is a concern because of the potential for discounts due to leaf trash.

A couple of new products were applied this year that work similar to Aim. Resource and ETTM were tank mixed with Gramoxone Max and they provided similar control. The cost of these harvest aids will impact their adoption by producers. ETTM is priced competitively and the price of Resource is high enough that producers will select between the other two products.

<u>Todd Shaw Farm Mitchell County.</u> When these plots were evaluated on September 30 and October 8, 2003 (7 and 14 days after the plot was established) most of the treatments applied had significantly more desiccation and defoliation than the check plot. The amount of defoliation ranged from 33 to 96 percent seven days after the treatments were applied. The amount of defoliation ranged from 60 to 99 percent 14 days after the treatments were applied. Desiccation was less than 12 percent for any treatment at both evaluations. The amount of regrowth in the top and bottom portion of the plants was high enough to be a concern in several of the treatments. Data collected on September 30 is reported in Table 9 and data collected October 8 is reported in Table 10.

When the plots were evaluated on October 8, 2003 (14 days after the plot was established) the amount of defoliation had increased in most plots. The amount of desiccation had decreased in most plots, when compared to data collected September 30. None of the plots had enough desiccation to be a concern. The amount of regrowth in the top and bottom portion of the plants was high enough to be a concern in most of the treatments. The data shown in Table 9 indicates how quickly the cotton responded to the treatments applied. The remaining discussion will focus on the data reported in Table 10.

ETTM when it was applied at 2.0 ounces per acre in combination with 16.0 ounces of C.O.C. provided the same level of defoliation and desiccation as ETTM at 1.0 ounce combined with Gramoxone Max at 10 ounces plus Induce at 3.52 ounces. In both ETTM plots, three percent of the green leaves remained on the plant, regrowth was becoming a problem, and another application of a harvest aid would be needed before this crop could be harvested. According to Nichino America, the company that sells ETTM , a crop oil concentrate should be used instead of a surfactant. ETTM was equal to or better than any treatment in the amount of leaf defoliation at the 7 and 14 DAT evaluations. The amount of desiccation was equal to or lower than any treatment in the test at both the 7 and 14 DAT evaluation.

The rainfall received in September and October has increased the difficulty of terminating this cotton crop. Producers will have to examine their cotton closely and if regrowth is already occurring they need to change nozzle configuration, increase the amount of water being applied and increase the application pressure. One of the better nozzle arrangements is one nozzle over the top of the row and drops in the furrows with one nozzle spraying each side of the plant. Coverage is critical! The volume of water and pressure should be high enough to get good coverage on the top and bottom portion of the leaf and penetrate the canopy enough to burn the axilary and terminal buds.

<u>Morris Light Farm Scurry County.</u> When these plots were evaluated on September 30 and October 8, 2003 (7 and 14 days after the plot was established) most of the treatments applied had significantly more desiccation and defoliation than the check plot. The amount of defoliation ranged from 23 to 92 percent seven days after the treatments were applied. The amount of defoliation ranged from 26 to 93 percent 14 days after the treatments were applied. At the September 30 evaluation, the desiccation ranged from 2 to 36 percent and at the October 8 evaluation, dessication ranged from 2 to 17 percent. The amount of regrowth in the top and bottom portion of the plants was high enough to be a concern in several of the treatments. Data collected on September 30 is reported in Table 11 and data collected October 8 is reported in Table 12.

When the plots were evaluated on October 8, 2003 (14 days after the plot was established) the amount of defoliation had increased in most plots. The amount of desiccation had decreased in most plots when compared to data collected September 30. None of the plots had enough desiccation to be a concern. The amount of regrowth in the top and bottom portion of the plants was high enough to be a concern in many of the treatments. The data shown in Table 11 indicates how quickly the cotton responded to the treatments applied. The remaining discussion will focus on the data reported in Table 12.

If 10 ounces or more of Gramoxone Max was applied alone or in a tank mix, the level of defoliation was over 81 percent. When 4 ounces or less of Gramoxone Max was applied per acre, the range of defoliation was 46 to 53 percent. Gramoxone Max preformed well whether it was combined with the surfactant Induce, the crop oil concentrate Herbimax, or a buffering surfactant L.I.-700. The amount of regrowth in the top and bottom portion of the plants was high enough to be a concern in these treatments.

In the treatment where Aim was applied at the 0.5 ounce rate some suppression occurred but it was short lived. Aim combined with Gramoxone Max was a good tank mix partner and will probably be used by producers as they terminate this cotton crop. The amount of Aim in the tank mix needed to be increased to at least 1 ounce per acre to provide additional suppression of regrowth.

ETTM when it was applied at 2.0 ounces per acre in combination with 16.0 ounces of C.O.C. provided the same level of defoliation and desiccation as ETTM at 1.0 ounce combined with Gramoxone Max at 10 ounces plus Induce at 3.52 ounces. In both ETTM plots, green leaves remained on the plant, regrowth was becoming a problem, and another application of a harvest aid would be needed before this crop could be harvested. According to Nichino America, the company that sells ETTM, a crop oil concentrate should be used instead of a surfactant. ETTM was equal to or better than any treatment in the amount of leaf defoliation at the 14 DAT evaluations. The amount of desiccation was equal to or lower than any treatment in the test at the 14 DAT evaluation.

The rainfall received in September and October has increased the difficulty of terminating this cotton crop. Producers will have to examine their cotton closely and if regrowth is already occurring they need to change nozzle configuration, increase the amount of water being applied and increase the application pressure. One of the better nozzle arrangements is one nozzle over the top of the row and drops in the furrows with one nozzle spraying each side of the plant. Coverage is critical! The volume of water and pressure should be high enough to get good coverage on the top and bottom portion of the leaf and penetrate the canopy enough to burn the axilary and terminal buds.

<u>Chris Bubenik Farm Tom Green County (Test Number 1).</u> The First Seven Days (October 20 - 26, 2003). During the first two weeks of October, 3.32 inches of rain was received on the plot. No rain was received seven days prior to the establishment of the test plot. Daytime air temperatures ranged from 54 to 89 degrees Fahrenheit and the night temperatures ranged from 43 to 51 degrees Fahrenheit. On October 26, 0.06 inch of rain fell on the plot. When the plots were evaluated on October 27, there was a significant difference in the percent defoliation, percent desiccation and the amount of regrowth in the top and bottom portion of the cotton plants. The data collected is summarized in Table 13.

The percent of open bolls increased by 5 to 10 percent in the first week but no significant difference was determined between treatments. All treatments had significantly more leaf defoliation than the check. Most of the ETTM treatments had significantly less defoliation than the best Gramoxone Max treatments. The ETTM and Aim treatments had less regrowth in the top and bottom portion of the cotton plant than the Gramoxone Max plots.

The Second Week (October 27 - November 2, 2003). Hourly daytime air temperature ranged from 73 to 82 degrees Fahrenheit. The nighttime temperatures ranged from 41 to 67 degrees Fahrenheit. Only 0.01 inch of rain was recorded during the week and it fell on November 2. The followup applications were applied on September 28. On November 3 when the plots were evaluated, there was a significant difference in the percent defoliation, percent desiccation and the amount of regrowth in the top and bottom portion of the cotton plant. Regrowth in the top of the plant was desiccated by several of the followup applications and this delayed regrowth development for several days. The data collected is summarized in Table 14.

The amount of boll opening ranged from 85 to 91.67 percent, which is an increase of 0 to 5 percent from the seven day evaluation. The increase in leaf defoliation was noticeable across the entire test plot and the highest increase was seen in the ETTM treatments which had some increases as much as 40 percent. In the treated areas, defoliation ranged from 58 to 85 percent. At the time of this evaluation, enough leaves had been lost by the plant to keep the leaf rating of ginned cotton in the range of 1 to 3.

Most of the plots that had a followup treatment applied had significantly more leaf desiccation than plots that did not. Also, all plots that had a followup treatment applied had significantly less top regrowth than plots that did not. Regrowth was developing slowly even in the Gramoxone Max treated plots. None of the plots had enough regrowth develop to cause a problem with harvest or ginning.

The Third Week (November 3 - November 9, 2003). Hourly daytime air temperature ranged from 43 to 82 degrees Fahrenheit. The nighttime temperatures ranged from 38 to 66 degrees Fahrenheit. The cooler temperatures through most the week slowed the plants response to harvest aids. During the week, 0.72 inch of rain was received. Total cloud cover occurred for four of the seven days. The followup applications had been applied for 13 days. On November 10 when the plots were evaluated, there was a significant difference in the percent open bolls, percent defoliation, percent desiccation, and the amount of regrowth in the top and bottom portion of the cotton plant. The data collected is summarized in Table 15.

The amount of boll opening ranged from 85 to 95 percent, which is an increase of 0 to 5 percent from the 14 day evaluation. All treatments had significantly more boll opening than the check.

Leaf defoliation increased from 12 to 31 percent and all treatments had significantly more leaf defoliation than the check. ETTM treatments were equal to or better than any treatment in the amount of leaf defoliation. ETTM was equal to or lower than any treatment in the amount of leaf desiccation.

Even though there was significant differences between the treatments in the amount of regrowth developing in the top and bottom portion of the cotton plants, none of the regrowth was at a level that would impact harvest efficiency at the time of the 21 day evaluation. None of the treatments had enough regrowth to cause a problem during the ginning process.

<u>Chris Bubenik Farm Tom Green County (Test Number 2).</u> The First Seven Days (October 21 - 27, 2003). During the first two weeks of October, 3.32 inches of rain was received on the plot. No rain was received seven days prior to the establishment of the test plot. Daytime air temperatures ranged from 54 to 89 degrees Fahrenheit and the night temperatures ranged from 41 to 51 degrees Fahrenheit. On October 26, 0.06 inch of rain fell on the plot. When the plots were evaluated on October 27, there was a significant difference in the percent defoliation and percent desiccation. The data collected is summarized in Table 16. The percent of open bolls increased by 5 to 8 percent in the first week but no significant difference was determined between treatments. All treatments had significantly more leaf defoliation than the check.

 ET^{TM} was equal to or higher than any treatment in the amount of leaf defoliation. ET^{TM} was equal to or lower than any treatment in the amount of leaf desiccation.

The Second Week (October 28 - November 3, 2003). Hourly daytime air temperature ranged from 79 to 82 degrees Fahrenheit. The nighttime temperatures ranged from 44 to 67 degrees Fahrenheit. Only 0.01 inch of rain was recorded during the week and it fell on November 2. The followup applications were applied on September 28. On November 3 when the plots were evaluated, there was a significant difference in the percent defoliation and percent desiccation. The data collected is summarized in Table 17.

The amount of boll opening ranged from 85 to 88.33 percent, which is an increase of 0 to 1.67 percent from the seven day evaluation. In the treated areas, defoliation ranged from 51.67 to 83.33 percent which is an increase of 13 to 43 percent from the evaluation conducted on October 27. At the time of this evaluation, enough leaves had been lost by the plant to keep the leaf rating of ginned cotton in the range of 1 to 3.

The Third Week (November 4 - November 10, 2003). Hourly daytime air temperature ranged from 43 to 82 degrees Fahrenheit. The nighttime temperatures ranged from 38 to 65 degrees Fahrenheit. The cooler temperatures through most the week slowed the plants response to harvest aids. During the week, 0.72 inch of rain was received. Total cloud cover occurred for four of the seven days. The followup applications had been applied for 13 days. On November 10 when the plots were evaluated, there was a significant difference in the percent open bolls, percent defoliation, percent desiccation, and the amount of regrowth in the top and bottom portion of the cotton plant. The data collected is summarized in Table 18.

The amount of boll opening ranged from 85 to 93.33 percent which is an increase of 0 to 6 percent from the 14 day evaluation. All treatments had significantly more boll opening than the check. Leaf defoliation increased from 3.3 to 29 percent and all treatments had significantly more leaf defoliation than the check. Several of the treatments that had Gramoxone Max as a tank mix partner had less defoliation than the other treatments in this test.

ETTM was equal to or higher than any treatment in the amount of leaf defoliation except for Ginstar at 7 ounces. ETTM was equal to or lower than most of the treatments in the test in the amount of leaf desiccation.

Even though there was significant differences between the treatments in the amount of regrowth developing in the top and bottom portion of the cotton plants, none of the regrowth was at a level that would impact harvest efficiency at the time of the 21 day evaluation. None of the treatments had enough regrowth to cause a problem during the ginning process.

The Concho Valley had a wet September and most of 100,000 acres of cotton needed to have a harvest aid applied by mid-November. During October, most acreage received over 3 inches of rain and it has kept producers from harvesting cotton in a timely manner. A loss of lint yield is obvious on most cotton acreage that was planted in May and lint quality has been effected. A loss of 4 to 7 cents per pound could occur because of the weather related delay. It is important to remember that a higher lint yield is not the only way of increasing profit from the use of a harvest aid. Other factors include: timely harvest, improved fiber quality, improved harvesting efficiency, and higher percent lint turnout at the gin.

Summary

Each year more refinements have been made that has improved the performance of ETTM as a harvest aid. In 2001, rates were too high and desiccation was a concern, however, by the time it was harvested the percent of desiccation was the same for all treatments except for the Ginstar at 8 and 10 ounces. In 2002, at 14 days after the treatments were established, the level of defoliation was equal to all products tested. Desiccation was equal to or lower than all treatments tested. At 21 days after the treatments were applied the lower rate of ETTM used was equal to or better than the other treatments in the test. With each test established in 2003 more refinement was made and performance of ETTM enhanced. The first test established in 2003 was in Glasscock County and the level of defoliation was equal to or better than any treatment except for Gramoxone Max used at 10 ounces per acre rate. Desiccation was similar to most of the treatments in the test except for the defoliation rates of Gramoxone Max. Runnels County and Tom Green County strip tests were established next, inadequate coverage with the contact harvest aids resulted in minimal impact to axilary buds resulting in rapid development of new leaves. The Mitchell County and Scurry County tests were established in a similar time frame and each used more gallonage to address the coverage issue and the percent of defoliation increased and the percent of desiccation decreased, however, regrowth was still a concern. To address this issue new nozzle arrangements were used in the Howard County strip test. The entire plot was harvestable from a one-time application; the only problem was desiccation was too high. Regrowth in the top portion of the plant was minimal in most of the treatments. The last two tests were established in Tom Green County using a nozzle arrangement of three nozzles per row applying 16 gallons of water per acre. In these tests, at seven days after treatments were applied, ETTM had a trend of being slower in defoliating than Aim, Resource, or Appeal. By 14 days the defoliation performance was equal to or better than any of the treatments in the test and it remained that way at the 21 day evaluation. Regrowth in the top and bottom portion of the plant was minimal 21 days after the plot was established. ETTM strength is in defoliation. ETTM can provide some regrowth suppression if adequate coverage with the harvest aid is achieved. Desiccation concerns is generally related to the tank mix and the coverage of the harvest aid applied. ET^{TM} by itself has not shown to be a boll opener, however, when it was tank mixed with Prep it performed as well as most of the treatments tested.

Conclusions

ETTM (pyraflufen-ethyl), a herbicidal harvest aid being marketed by Nichino America, Inc., is a useful chemical tool in West Central Texas. In cotton, ETTM has been tested as a harvest-aid product since 2001. Refinements made each year has resulted in improved performance. In all tests included in this report, ETTM was applied to small plots using a self-propelled ground sprayer. In these small plot tests, ETTM was equal in its level of leaf defoliation to any currently labeled harvest aid (as of December, 2003). Leaf drop continued slowly even when night temperatures fell in the 50 to 60 degrees Fahrenheit range. The defoliation of the cotton plant was slowed when night temperatures dropped below 60 degrees Fahrenheit. When ETTM is used at rates above the 1.4 ounces per acre rate, leaf desiccation is significantly higher for seven to fourteen days, however, the percent of desiccation falls within an acceptable range of less than 20 percent by fourteen days after treatment. When ETTM is applied at the 1.4 to 2.0 ounce per acre rate, the level of leaf desiccation was no different by harvest time than other harvest aids tested. ETTM strength is in defoliation. ETTM can provide some regrowth suppression if adequate coverage with the harvest aid is achieved. Desiccation concerns is generally related to the tank mix and the coverage of the harvest aid applied. ETTM by itself has not shown to be a boll opener, however, when it was tank mixed with Prep it performed as well as most of the treatments tested.

Product Information and Disclaimer

Appeal® is a product marketed by K-I Chemical USA Inc. AimTM is a product marketed by FMC Corporation Cottonquik® is a product marketed by Griffin LLC Cyclone® is a product marketed by Syngenta Crop Protection, Inc., Cyclone® Max is a product marketed by Syngenta Crop Protection, Inc., Def® 6 is a product marketed by Bayer Corporation, Dropp® 50WP is a product marketed by Bayer CropScience, ETTM is a product marketed by Nichino America Incorporated, Finish® 6 is a product marketed by Bayer CropScience, Finish® 6 Pro is a product marketed by Bayer CropScience, Folex® 6 EC is a product marketed by Bayer CropScience, Ginstar® ECis a product marketed by Bayer CropScience, Gramoxone® Max is a product marketed by Syngenta Crop Protection, Inc., PrepTM is a product marketed by Bayer CropScience, Resource® is a product marketed by Valent U.S.A. Corporation Roundup Weather MAXTM is a product marketed by Monsanto Company Activator 90 is a product marketed by UAP - Loveland Industries, Inc. Herbimax® is a product marketed by UAP - Loveland Industries, Inc. LI-700® is a product marketed by UAP - Loveland Industries, Inc. Induce® is a product marketed by Helena Chemical Company

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Disclaimer

Trade names of commercial products used in this report are included only for better understanding and clarity. Reference to commercial products or trade names is made with the understanding that no discrimination is intended and no endorsement by the Texas A&M University System is implied. Readers should realize that results from one experiment do not represent conclusive evidence that the same response would occur where

| Harvest Aids Applied | Rate Applied Per Acre | % Open Bolls (7 DAT) | % Defoliation (7 DAT) | % Desiccation (7 DAT) | Regrowth Rating Top (7 DAT) | Regrowth Rating Bottom (7 DAT) |
|--|--|----------------------------|-----------------------------|-----------------------------|--------------------------------------|---|
| ET-751 + COC followed by Cyclone Max | 16 oz. + 0.5% followed by 21 oz. | 75 | 6.67 c | 31.67 a | 0 | 0 |
| ET-751 + COC + Ginstar followed by Cyclone Max | 14 oz. + 0.5% + 4 oz. followed by 21 oz. | 75 | 5.0 c | 38.33 a | 0 | 0 |
| ET-751 + COC + Prep followed by Cyclone Max | 14 oz. + 0.5% + 21 oz. followed by 21 oz. | 75 | 5.0 c | 36.67 a | 0 | 0 |
| ET-751 + COC + CottonQuik followed by Cyclone Max | 14 oz. + 0.5% + 55 oz. followed by 21 oz. | 75 | 5.0 c | 35.0 a | 0 | 0 |
| ET-751 + COC + Finish followed by Cyclone Max | 14 oz. + 0.5% + 21 oz. followed by 21 oz. | 75 | 5.0 c | 35.0 a | 0 | 0 |
| Ginstar followed by Cyclone Max | 6 oz. followed by 21 oz. | 75 | 8.33 c | 8.33 cd | 0 | 0 |
| Def/Folex + Prep followed by Cyclone Max | 16 oz. + 16 oz. followed by 21 oz. | 75 | 5.0 c | 20.0 b | 0 | 0 |
| Check | | 75 | 2.0 c | 0 d | 0 | 0 |
| Ginstar followed by Cyclone Max | 8 oz. followed by 21 oz. | 75 | 20.67 b | 14.67 bc | 0 | 0 |
| Ginstar followed by Cyclone Max | 10 oz. followed by 21 oz. | 75 | 29.33 a | 18.33 b | 0 | 0 |

Table 1. Chris Bubenik's 2001 Cotton Harvest Aid Test (Tom Green County). October 5, 2001 (Seven days after treatments were applied)

| deallients were appri- | ieu / / duys alter for | lowup treatment | | | Regrowth | Regrowth |
|--|--|-----------------------------|------------------------------|------------------------------|---------------------------|------------------------------|
| Harvest Aids Applied | Rate Applied Per Acre | % Open Bolls (14 DAT) | % Defoliation (14 DAT) | % Desiccation (14 DAT) | Rating Top (14 DAT) | Rating Bottom (14 DAT) |
| ET-751 + COC followed by Cyclone Max | 16 oz. + 0.5% followed by 21 oz. | 85 a | 30.00 abcd | 67.67 abc | 0 | 1 a |
| ET-751 + COC + Ginstar followed by Cyclone Max | 14 oz. + 0.5% + 4 oz. followed by 21 oz. | 85 a | 26.67 bcd | 69.67 abc | 0 | 1 a |
| ET-751 + COC + Prep followed by Cyclone Max | 14 oz. + 0.5% + 21 oz. followed by 21 oz. | 85 a | 26.67 bcd | 70.33 abc | 0 | 1 a |
| ET-751 + COC + CottonQuik followed by Cyclone Max | 14 oz. + 0.5% + 55 oz. followed by 21 oz. | 85 a | 35.00 ab | 64.00 bcd | 0 | 1 a |
| ET-751 + COC + Finish followed by Cyclone Max | 14 oz. + 0.5% + 21 oz. followed by 21 oz. | 85 a | 33.33 abc | 63.33 bcd | 0 | 1 a |
| Ginstar followed by Cyclone Max | 6 oz. followed by 21 oz. | 85 a | 20.00 d | 78.67 a | 0 | 1 a |
| Def/Folex + Prep followed by Cyclone Max | 16 oz. + 16 oz. followed by 21 oz. | 85 a | 21.67 cd | 75.67 ab | 0 | 1 a |
| Check | | 75 b | 3.0 e | 0 e | 0 | 0 b |
| Ginstar followed by Cyclone Max | 8 oz. followed by 21 oz. | 85 a | 37.33 ab | 56.33 cd | 0 | 1 a |
| Ginstar followed by Cyclone Max | 10 oz. followed by 21 oz. | 85 a | 40.67 a | 52.00 d | 0 | 1 a |

Table 2. Chris Bubenik's 2001 Cotton Harvest Aid Test (Tom Green County). October 12 (14 days after initial treatments were applied / 7 days after followup treatments)

| treatments were appre | a7 14 aays arter 10 | nowup treatmen | (13) | | Regrowth | Regrowth |
|--|--|-----------------------------|------------------------------|------------------------------|---------------------------|--|
| Harvest Aids Applied | Rate Applied Per Acre | % Open Bolls (21 DAT) | % Defoliation (21 DAT) | % Desiccation (21 DAT) | Rating Top (21 DAT) | Regrowth Rating Bottom (21 DAT) |
| ET-751 + COC followed by Cyclone Max | 16 oz. + 0.5% followed by 21 oz. | 95 a | 56.00 ab | 40.00 abcd | 1 a | 1 a |
| ET-751 + COC + Ginstar followed by Cyclone Max | 14 oz. + 0.5% + 4 oz. followed by 21 oz. | 95 a | 51.00 ab | 45.00 abcd | 1 a | 1 a |
| ET-751 + COC + Prep followed by Cyclone Max | 14 oz. + 0.5% + 21 oz. followed by 21 oz. | 95 a | 47.00 ab | 48.33 abc | 1 a | 1 a |
| ET-751 + COC + CottonQuik followed by Cyclone Max | 14 oz. + 0.5% + 55 oz. followed by 21 oz. | 95 a | 55.33 ab | 38.33 bcd | 1 a | 1 a |
| ET-751 + COC + Finish followed by Cyclone Max | 14 oz. + 0.5% + 21 oz. followed by 21 oz. | 95 a | 43.33 ab | 51.67 ab | 1 a | 1 a |
| Ginstar followed by Cyclone Max | 6 oz. followed by 21 oz. | 95 a | 36.00 b | 61.00 a | 1 a | 1 a |
| Def/Folex + Prep followed by Cyclone Max | 16 oz. + 16 oz. followed by 21 oz. | 95 a | 39.33 b | 56.67 ab | 1 a | 1 a |
| Check | | 80 b | 5.0 c | 0 e | 0 b | 0 b |
| Ginstar followed by Cyclone Max | 8 oz. followed by 21 oz. | 95 a | 64.33 a | 29.33 cd | 1 a | 1 a |
| Ginstar followed by Cyclone Max | 10 oz. followed by 21 oz. | 95 a | 64.67 a | 25.67 d | 1 a | 1 a |

Table 3. Chris Bubenik's 2001 Cotton Harvest Aid Test (Tom Green County). October 19, 2001 (21 days after initial treatments were applied / 14 days after followup treatments)

| Harvest Aids Applied | Rate Applied Per Acre | % Open Bolls (7 DAT) | % Defol. (7 DAT) | % Des. (7 DAT) | Regrowth Rating Top (7 DAT) | Regrowth Rating Bottom (7 DAT) |
|---|---|-------------------------------|------------------------|----------------------|--------------------------------------|---|
| ET-751 + Prep + COC followed by Cyclone Max + NIS | 2.2 oz. + 16 oz. + 14 oz. followed by 21 oz. + 3.5 oz. | 76.25 ab | 65.00 a | 5.00 bcd | 0 | 0 |
| ET-751 + Prep + COC followed by ET-751 + COC | 1.35 oz. + 16 oz. + 14 oz. followed by 1.35 oz. +14 oz. | 76.25 ab | 65.00 a | 4.25 bc | 0 | 0 |
| Aim + Prep + COC followed by Aim + COC | 1 oz. + 16 oz. + 14 oz. followed by 1 oz. + 14 oz. | 76.25 ab | 66.25 a | 4.75 bcd | 0 | 0 |
| Def + Prep followed by Cyclone Max + NIS | 8 oz. + 21 oz. followed by 21 oz. + 14 oz. | 73.75 bc | 61.25 a | 1.50 ab | 0 | 0 |
| Check | | 70.00 c | 20.00 b | 0.00 a | 0 | 0 |
| Inspire + NIS followed by Inspire + NIS | 10.7 oz. + 3.5 oz. followed by 10.7 oz. + 3.5 oz. | 73.75 bc | 58.75 a | 6.75 cd | 0 | 0 |
| Appeal + NIS followed by Appeal + NIS | 0.6 oz. + 3.5 oz. followed by 0.6 oz. +3.5 oz. | 72.50 bc | 61.25 a | 7.50 cd | 0 | 0 |
| Aim + COC | 1.6 oz. + 14 oz. | 75.00 abc | 58.75 a | 6.75 cd | 0 | 0 |
| Aim + COC followed by Aim + COC | 1 oz. + 14 oz. followed by 1 oz. + 14 oz. | 76.25 ab | 61.25 a | 6.25 cd | 0 | 0 |
| Aim + Cyclone Max + COC followed by Aim + COC | 1 oz. + 5.33 oz. + 14 oz. followed by 1 oz. + 14 oz. | 80.00 a | 61.25 a | 32.50 e | 0 | 0 |
| Aim + CottonQuik + COC followed by Aim + COC | 1 oz. + 64.0 oz. + 14 oz. followed by 1 oz. + 14 oz. | 77.5 ab | 66.25 a | 8.75 d | 0 | 0 |
| Def + Prep | 16 oz. + 21 oz. | 73.75 bc | 66.25 a | 1.75 ab | 0 | 0 |

Table 4. Chris Bubenik's 2002 Cotton Harvest Aid Test (Tom Green County). October 7, 2002 (7 days after initial treatments were applied)

| Harvest Aids | Rate Applied | % Open Bolls | % Defol. | % Des. | Regrowth Rating Top | Regrowth Rating Bottom |
|---|---|--------------------|-------------|-----------|---------------------------|------------------------------|
| Applied | Per Acre | (14 DAT) | (14 DAT) | (14 DAT) | (14 DAT) | (14 DAT) |
| ET-751 + Prep + COC followed by Cyclone Max + NIS | 2.2 oz. + 16 oz. + 14 oz. followed by 21 oz. + 3.5 oz. | 76.25 abc | 66.25 ab | 28.75 c | 0.00 a | 1.00 |
| ET-751 + Prep + COC followed by ET-751 + COC | 1.35 oz. + 16 oz. + 14 oz. followed by 1.35 oz. +14 oz. | 77.50 abc | 65.00 ab | 28.75 c | 0.00 a | 1.00 |
| Aim + Prep + COC followed by Aim + COC | 1 oz. + 16 oz. + 14 oz. followed by 1 oz. + 14 oz. | 77.50 abc | 67.50 ab | 26.00 c | 0.00 a | 1.00 |
| Def + Prep followed by Cyclone Max + NIS | 8 oz. + 21 oz. followed by 21 oz. + 14 oz. | 73.75 bcd | 62.50 b | 30.75 c | 0.00 a | 1.00 |
| Check | | 70.00 d | 25.00 c | 0.00 a | 1.00 c | 1.00 |
| Inspire + NIS followed by Inspire + NIS | 10.7 oz. + 3.5 oz. followed by 10.7 oz. + 3.5 oz. | 73.75 bcd | 65.00 ab | 25.00 c | 0.00 a | 1.00 |
| Appeal + NIS followed by Appeal + NIS | 0.6 oz. + 3.5 oz. followed by 0.6 oz. +3.5 oz. | 72.50 cd | 65.00 ab | 23.75 c | 0.25 ab | 1.00 |
| Aim + COC | 1.6 oz. + 14 oz. | 75.0 abcd | 65.00 ab | 6.75 b | 1.00 c | 1.00 |
| Aim + COC followed by Aim + COC | 1 oz. + 14 oz. followed by 1 oz. + 14 oz. | 76.25 abc | 65.00 ab | 26.25 c | 0.00 a | 1.00 |
| Aim + Cyclone Max + COC followed by Aim + COC | 1 oz. + 5.33 oz. + 14 oz. followed by 1 oz. + 14 oz. | 80.00 a | 70.00 a | 26.00 c | 0.50 b | 1.00 |
| Aim + CottonQuik + COC followed by Aim + COC | 1 oz. + 64.0 oz. + 14 oz. followed by 1 oz. + 14 oz. | 78.75 ab | 67.50 ab | 23.75 c | 0.00 a | 1.00 |
| Def + Prep | 16 oz. + 21 oz. | 73.75 bcd | 67.50 ab | 1.75 ab | 1.00 c | 1.00 |

 Table 5. Chris Bubenik's 2002 Cotton Harvest Aid Test (Tom Green County). October 14, 2002 (14 days after initial treatments were applied / 2 days after followup treatments)

| - | deatments were appried / | Judys alter followup | 07. | | | Dognowth | Dognowth | • |
|---|--------------------------|--------------------------|-----------------|-------------|-----------|----------------|-----------|---|
| | | | 70 Open | 0% | 0% | Regrowin | Regrowin | |
| | Harvest Aids | Rate Annlied | Bolls | 70 Defol | Des | Ton | Rating | |
| | Annlied | Per Acre | (21 DAT) | (21 DAT) | (21 DAT) | (21 DAT) | (21 DAT) | |
| • | ET-751 + Pren + | 2.2 oz + 16 oz + | 91 25 ab | 68 75 e | 31.25 e | 0.00 a | 1 00 a | • |
| | COC followed by | 14 oz. followed by |)1.25 ub | 00.75 0 | 51.25 0 | 0.00 u | 1.00 u | |
| | Cyclone Max + NIS | 21 oz. + 3.5 oz. | | | | | | |
| | ET-751 + Prep + | 1.35 oz. + 16 oz. + | 90.00 ab | 88.25 a | 10.25 bcd | 0.50 b | 1.00 a | |
| | COC followed by | 14 oz. followed by | | | | | | |
| | ET-751 + COC | 1.35 oz. +14 oz. | | | | | | |
| | | | | | | | | |
| | Aim + Prep + | 1 oz. + 16 oz. + | 85.50 cd | 84.50 abcd | 15.00 cd | 0.00a | 1.00 a | |
| | COC followed by | 14 oz. followed by | | | | | | |
| | $A_{1}m + COC$ | 1 oz. + 14 oz. | | | | | | |
| | Def + Prep | 8 oz. + 21 oz. | 93.75 a | 65.00 e | 35.00 e | 0.00 a | 1.00 a | |
| | followed by | followed by | | | | | | |
| | Cyclone Max + NIS | 21 oz. + 14 oz. | | | | | | |
| | Check | | 80.00 e | 30.00 f | 0.00.9 | 1.00 c | 1.00 a | |
| | Cheek | | 00.00 C | 50.001 | 0.00 a | 1.00 C | 1.00 a | |
| | Inspire + NIS | 10.7 oz. + 3.5 oz. | 85.00 cd | 87.00 ab | 12.00 bcd | 0.00 a | 1.00 a | |
| | followed by | followed by | | | | | | |
| | Inspire + NIS | 10.7 oz. + 3.5 oz. | | | | | | |
| | Appeal + NIS | 0.6 oz. + 3.5 oz. | 85.00 cd | 86.00 abc | 12.25 bcd | 0.50 b | 1.00 a | |
| | followed by | followed by | | | | | | |
| | Appeal + NIS | 0.6 oz. +3.5 oz. | | | | | | |
| | Aim + COC | 1.6 oz. + 14 oz. | 85.00 cd | 80.75 bcd | 1.75 a | 2.00 e | 2.00 c | |
| | Aim + COC | $1 \circ 7 + 14 \circ 7$ | 95 00 ad | 79 75 ad | 1775 d | 0.00 a | 1.00 a | |
| | followed by | $102. \pm 1402.$ | 85.00 cu | 78.75 cu | 17.75 u | 0.00 a | 1.00 a | |
| | Aim + COC | 1 or + 14 or | | | | | | |
| | Allii + COC | $1 02. \pm 14 02.$ | | | | | | |
| | Aim + Cyclone Max | 1 oz. + 5.33 oz. + | 88.75 bc | 87.00 ab | 8.00 b | 0.00 a | 1.00 a | |
| | + COC followed by | 14 oz. followed by | | | | | | |
| | Aim + COC | 1 oz. + 14 oz. | | | | | | |
| | Aim + CottonOuik + | 1 oz. + 64.0 oz. + | 87.5 bcd | 83.75 abcd | 16.25 d | 0.00 a | 1.00 a | |
| | COC followed by | 14 oz. followed by | | | | | | |
| | Aim + COC | 1 oz. + 14 oz. | | | | | | |
| | Def + Prep | 16 07 1 21 07 | 83 75 da | 78 50 A | 0.25 a | 1 5 0 d | 1 50 h | |
| | Der Tricp | $10.02. \pm 21.02.$ | 05.75 UE | 70.30 u | 0.25 a | 1.50 u | 1.50 0 | |

Table 6. Chris Bubenik's 2002 Cotton Harvest Aid Test (Tom Green County). October 21, 2002 (21 days after initial treatments were applied / 9 days after followup treatments)

| Harvest Aid | Rate Applied | % Open Bolls | % Defol. | % Desiccation | Regrowth Rating Top, |
|--|----------------------------------|-----------------|--------------|------------------|----------------------------|
| Chemicals Applied | <u>Per Acre</u> | (7 DAT) 65 | (7 DAT) 5 | (7 DAT) 70 | Bottom Ton- 0 |
| Gramoxone® Max + Induce | 4.0 02. + 5.52 02. | 03 | 5 | 70 | Bottom= 0 |
| Gramoxone® Max + Induce | 10 oz. + 3.52 oz. | 65 | 75 | 8 | Top= 1 Bottom= 1 |
| Gramoxone® Max + L.I.700 | 16.0 oz. + 6.4 oz. | 70 | 8 | 90 | Top= 0 Bottom= 0 |
| Gramoxone® Max + Induce | 16.0 oz. + 3.52 oz. | 75 | 6 | 90 | Top= 0 Bottom= 0 |
| Gramoxone® Max @ + Miller Plex | 16 oz. + 2 oz. | 75 | 5 | 95 | Top= 0 Bottom= 0 |
| Gramoxone® Max @ + Miller Plex + Induce | 16 oz. + 2 oz. + 3.52 oz. | 80 | 5 | 95 | Top= 0 Bottom= 0 |
| Gramoxone® Max + C.O.C. | 16.0 oz. + 16.0 oz. | 75 | 6 | 90 | Top= 0 Bottom= 1 |
| Check | | 25 | 3 | 0 | Top= 0 Bottom= 0 |
| Aim [™] + Gramoxone® Max + Induce | 0.5 oz. + 10.0 oz. + 3.52 oz. | 70 | 7 | 85 | Top= 1 Bottom= 1 |
| Resource + Gramoxone® Max + Induce | 4.6 oz. + 10.0 oz. + 3.52 oz. | 70 | 5 | 75 | Top= 0 Bottom= 0 |
| Aim^{TM} + Gramoxone® Max +C.O.C. | 0.5 oz. + 10 oz. + 16.0 oz. | 65 | 5 | 70 | Top= 1 Bottom= 1 |
| Ginstar | 4.0 oz. | 30 | 1 | 25 | Top= 0 Bottom= 0 |
| Finish 6 Pro | 21 oz. | 25 | 2 | 5 | Top= 0 Bottom= 0 |
| Gramoxone® Max + Prep + Induce | 3.5 oz. + 16.0 oz. + 3.52 oz. | 45 | 4 | 35 | Top= 0 Bottom= 0 |
| ET [™] + Gramoxone® Max + Induce | 1.0 oz. + 10.0 oz. + 3.52 oz. | 80 | 6 | 87 | Top= 1 Bottom= 0 |

Table 7. Michael Fuchs' 2003 Cotton Harvest Aid Test (Glasscock County). September 3, 2003 (7 days after treatments were applied)

| Harvest Aid | Rate Applied | % Open Bolls | % Defol. | % Desiccation | Regrowth Rating Top, |
|--|----------------------------------|-----------------|-----------------|------------------|----------------------------|
| Chemicals Applied | Per Acre | (14 DAT) | (14 DAT) | (14 DAT) | Bottom |
| Gramoxone® Max + Induce | 4.0 oz. + 3.52 oz. | 88.33 ab | 50 abcdef | 7 efg | Top= 1 Bottom= 1 |
| Gramoxone® Max + Induce | 10 oz. + 3.52 oz. | 93.33 a | 80 a | 7.33 efg | Top= 1 Bottom= 1 |
| Gramoxone® Max + L.I.700 | 16.0 oz. + 6.4 oz. | 95 a | 35 defgh | 60 abc | Top= 1 Bottom= 1 |
| Gramoxone® Max + Induce | 16.0 oz. + 3.52 oz. | 91.66 ab | 25 efgh | 70 ab | Top= 1 Bottom= 1 |
| Gramoxone® Max @ + Miller Plex | 16 oz. + 2 oz. | 93.33 a | 16 gh | 83.33 a | Top= 1 Bottom= 1 |
| Gramoxone® Max @ + Miller Plex + Induce | 16 oz. + 2 oz. + 3.52 oz. | 93.33 a | 28.33 efgh | 70 ab | Top= 1 Bottom= 1 |
| Gramoxone® Max + C.O.C. | 16.0 oz. + 16.0 oz. | 93.33 a | 46.66 bcdefg | 48.33 bcd | Top= 1 Bottom= 1 |
| Check | | 75 c | 6 h | 0 g | Top= 0 Bottom= 0 |
| Aim^{TM} + Gramoxone® Max + Induce | 0.5 oz. + 10.0 oz. + 3.52 oz. | 93.33 a | 55 abcde | 36.66 cde | Top= 1 Bottom=1 |
| Resource + Gramoxone® Max + Induce | 4.6 oz. + 10.0 oz. + 3.52 oz. | 93.33 a | 63.33 abcd | 31.66 cdef | Top= 1 Bottom= 1 |
| Aim^{TM} + Gramoxone® Max + C.O.C. | 0.5 oz. + 10 oz. + 16.0 oz. | 93.33 a | 68.33 abc | 25 defg | Top= 1 Bottom= 1 |
| Ginstar | 4.0 oz. | 83.33 b | 76.66 ab | 2 fg | Top= 1 Bottom= 0 |
| Finish 6 Pro | 21 oz. | 91.66 ab | 20 fgh | 0 g | Top= 0 Bottom= 0 |
| Gramoxone® Max + Prep + Induce | 3.5 oz. + 16.0 oz. + 3.52 oz. | 86.66 ab | 36.66 cdefgh | 5.66 fg | Top= 1 Bottom= 1 |
| ET [™] + Gramoxone® Max + Induce | 1.0 oz. + 10.0 oz. + 3.52 oz. | 88.33 ab | 45.33 bcdefg | 45.66 bcd | Top= 1 Bottom= 1 |

 Table 8. Michael Fuchs' 2003 Cotton Harvest Aid Test (Glasscock County).
 September 9, 2003 (13 days after treatments were applied)

| | | % | | | |
|--|----------------------------------|---------|----------|----------|----------|
| | | Open | % | % | Regrowth |
| Harvest Aid | Rate Applied | Bolls | Defol. | Des. | Rating |
| Chemicals Applied | Per Acre | (7 DAT) | (7 DAT) | (7 DAT) | (7 DAT) |
| Check | | 70 | 1.0 d | 0.0 d | 3.0 ab |
| Gramoxone® Max + Induce | 4.0 oz. +3.52 oz. | 75 | 33.3 bc | 13.3 ab | 3.3 a |
| Gramoxone® Max + Induce | 10 oz. +3.52 oz. | 75 | 93.3 a | 4.0 cd | 3.0 ab |
| Gramoxone® Max + L.I.700 | 10.0 oz. +3.52 oz. | 75 | 91.7 a | 5.0 cd | 3.0 ab |
| Gramoxone® Max + C.O.C. | 10.0 oz. +16.0 oz. | 75 | 90.0 a | 6.7 bcd | 3.3 a |
| Gramoxone® Max + Induce | 16.0 oz. +3.52 oz. | 75 | 96.3 a | 3.7 cd | 2.7 ab |
| Gramoxone® Max + L.I.700 | 16.0 oz. +3.52 oz. | 75 | 69.3 abc | 4.0 cd | 2.7 ab |
| Gramoxone® Max + C.O.C. | 16.0 oz. +16.0 oz. | 75 | 93.3 a | 6.7 bcd | 2.3 abc |
| Ginstar | 4.0 oz. | 75 | 75.0 ab | 10.0 abc | 2.0 bc |
| Ginstar | 6.0 oz. | 75 | 73.3 abc | 16.7 a | 1.3 cd |
| Aim TM +Gramoxone® Max + Induce | 0.5 oz. + 10.0 oz. + 3.52 oz. | 75 | 81.7 a | 11.7 abc | 2.3 abc |
| Aim^{TM} +Gramoxone® Max + C.O.C. | 0.5 oz. + 10 oz. + 16.0 oz. | 75 | 87.7 a | 7.3 bcd | 1.0 d |
| $\operatorname{Aim}^{\mathrm{TM}}$ +C.O.C. | 1.0 oz. +16.0 oz. | 75 | 71.7 abc | 8.3 bc | 1.3 cd |
| ET^{TM} +Gramoxone® Max + Induce | 1.0 oz. + 10.0 oz. + 3.52 oz. | 75 | 80.0 a | 5.0 cd | 2.3 abc |
| $ET^{TM} + C.O.C.$ | 2.0 oz. + 16.0 oz. | 75 | 85.0 a | 7.3 bcd | 2.3 abc |
| Gramoxone® Max + Prep + Induce | 3.5 oz. + 16.0 oz. + 3.52 oz. | 75 | 55.0 abc | 11.7 abc | 2.7 ab |

 Table 9. Todd Shaw's 2003 Cotton Harvest Aid Test (Mitchell County). September 30, 2003 (7 days after treatments were applied)

| | | % | | | |
|--|----------------------------------|----------|----------|----------|----------|
| | | Open | % | % | Regrowth |
| Harvest Aid | Rate Applied | Bolls | Defol. | Des. | Rating |
| Chemicals Applied | Per Acre | (14 DAT) | (14 DAT) | (14 DAT) | (14 DAT) |
| Check | | 75 | 1.0 d | 3.3 abc | 2.0 ab |
| Gramoxone® Max + Induce | 4.0 oz. + 3.52 oz. | 85 | 60.0 c | 8.3 ab | 2.7 a |
| Gramoxone® Max + Induce | 10 oz. + 3.52 oz. | 85 | 95.0 a | 2.3 bc | 2.3 ab |
| Gramoxone® Max + L.I.700 | 10.0 oz. + 3.52 oz. | 85 | 92.7 ab | 2.7 bc | 2.3 ab |
| Gramoxone® Max + C.O.C. | 10.0 oz. + 16.0 oz. | 85 | 96.7 a | 1.3 bc | 2.7 a |
| Gramoxone® Max + Induce | 16.0 oz. + 3.52 oz. | 85 | 98.0 a | 0.7 c | 2.0 ab |
| Gramoxone® Max + L.I.700 | 16.0 oz. + 3.52 oz. | 85 | 92.7 ab | 1.7 bc | 2.0 ab |
| Gramoxone® Max + C.O.C. | 16.0 oz. + 16.0 oz. | 85 | 99.3 a | 0.3 c | 1.3 b |
| Ginstar | 4.0 oz. | 85 | 86.7 ab | 3.7 abc | 1.3 b |
| Ginstar | 6.0 oz. | 85 | 91.7 ab | 3.0 abc | 1.3 b |
| Aim TM +Gramoxone® Max + Induce | 0.5 oz. + 10.0 oz. + 3.52 oz. | 85 | 91.7 ab | 3.7 abc | 2.0 ab |
| Aim^{TM} +Gramoxone® Max + C.O.C. | 0.5 oz. + 10 oz. + 16.0 oz. | 85 | 97.7 a | 1.0 bc | 1.3 b |
| $\operatorname{Aim}^{\mathrm{TM}}$ + C.O.C. | 1.0 oz. + 16.0 oz. | 85 | 81.7 ab | 6.7 abc | 1.3 b |
| ET^{TM} +Gramoxone® Max + Induce | 1.0 oz. + 10.0 oz. + 3.52 oz. | 85 | 96.0 a | 1.0 bc | 2.0 ab |
| ET^{TM} +C.O.C. | 2.0 oz. + 16.0 oz. | 85 | 94.3 a | 2.7 bc | 1.7 ab |
| Gramoxone® Max + Prep + Induce | 3.5 oz. + 16.0 oz. + 3.52 oz. | 85 | 73.3 bc | 10.0 a | 2.0 ab |

 Table 10. Todd Shaw's 2003 Cotton Harvest Aid Test (Mitchell County). October 8, 2003 (14 days after treatments were applied)

| | | % | | | |
|---|----------------------------------|---------|--------------|--------------|----------|
| | | Open | % | % | Regrowth |
| Harvest Aid | Rate Applied | Bolls | Defol. | Des. | Rating |
| Chemicals Applied | Per Acre | (7 DAT) | (7 DAT) | (7 DAT) | (7 DAT) |
| Check | | 70 | 0.0 h | 0.0 g | 1.0 c |
| Gramoxone® Max + Induce | 4.0 oz. + 3.52 oz. | 75 | 23.3 g | 36.7 a | 1.0 c |
| Gramoxone® Max + Induce | 10 oz. + 3.52 oz. | 75 | 75.0 bcd | 16.7 bcde | 2.0 ab |
| Gramoxone® Max + L.I.700 | 10.0 oz. + 3.52 oz. | 75 | 70.0 cde | 20.0 bcd | 2.0 ab |
| Gramoxone® Max + C.O.C. | 10.0 oz. + 16.0 oz. | 75 | 63.3 def | 26.7 abc | 2.3 a |
| Gramoxone® Max + Induce | 16.0 oz. + 3.52 oz. | 75 | 88.3 a | 8.3 defg | 2.0 ab |
| Gramoxone® Max + L.I.700 | 16.0 oz. + 3.52 oz. | 75 | 92.3 a | 7.5 efg | 1.5 bc |
| Gramoxone® Max + C.O.C. | 16.0 oz. + 16.0 oz. | 75 | 81.7 abc | 13.3 def | 1.7 b |
| Ginstar | 4.0 oz. | 75 | 50.2 f | 1.7 fg | 1.0 c |
| Ginstar | 6.0 oz. | 75 | 60.0 def | 6.7 efg | 1.0 c |
| Aim [™] + Gramoxone® Max + Induce | 0.5 oz. + 10.0 oz. + 3.52 oz. | 75 | 76.7 abcd | 17.7 bcde | 1.0 c |
| Aim^{TM} + Gramoxone® Max + C.O.C. | 0.5 oz. + 10 oz. + 16.0 oz. | 75 | 76.7 abcd | 20.0 bcd | 1.0 c |
| $\operatorname{Aim}^{\mathrm{TM}}$ + C.O.C. | 1.0 oz. + 16.0 oz. | 75 | 56.7 ef | 33.3 a | 1.0 c |
| ET^{TM} + Gramoxone® Max + Induce | 1.0 oz. + 10.0 oz. + 3.52 oz. | 75 | 85.0 abc | 15.0 cde | 1.0 c |
| $\mathrm{ET}^{\mathrm{TM}}$ + C.O.C. | 2.0 oz. + 16.0 oz. | 75 | 60.0 def | 28.3 ab | 1.0 ce |
| Gramoxone® Max + Prep + Induce | 3.5 oz. + 16.0 oz. + 3.52 oz. | 75 | 60.0 def | 16.7 bcde | 1.7 b |

Table 11. Morris Light's 2003 Cotton Harvest Aid Test (Scurry County). September 30, 2003 (7 days after treatments were applied)

| | | % | | | |
|--|----------------------------------|----------|----------|----------|----------|
| | | Open | % | % | Regrowth |
| Harvest Aid | Rate Applied | Bolls | Defol. | Des. | Rating |
| Chemicals Applied | Per Acre | (14 DAT) | (14 DAT) | (14 DAT) | (14 DAT) |
| Check | | 75 | 1.7 d | 0.0 d | 1.3 cde |
| Gramoxone® Max + Induce | 4.0 oz. + 3.52 oz. | 85 | 53.3 bc | 13.3 ab | 1.7 bcd |
| Gramoxone® Max + Induce | 10 oz. + 3.52 oz. | 85 | 84.7 a | 2.7 cd | 2.7 a |
| Gramoxone® Max + L.I.700 | 10.0 oz. + 3.52 oz. | 85 | 81.7 a | 5.0 cd | 2.3 ab |
| Gramoxone® Max + C.O.C. | 10.0 oz. + 16.0 oz. | 85 | 83.3 a | 6.7 bcd | 2.3 ab |
| Gramoxone® Max + Induce | 16.0 oz. + 3.52 oz. | 85 | 88.3 a | 4.0 cd | 2.3 ab |
| Gramoxone® Max + L.I.700 | 16.0 oz. + 3.52 oz. | 85 | 93.3 a | 1.9 cd | 2.0 abc |
| Gramoxone® Max + C.O.C. | 16.0 oz. + 16.0 oz. | 85 | 92.7 a | 3.3 cd | 2.3 ab |
| Ginstar | 4.0 oz. | 85 | 58.3 bc | 6.2 bcd | 0.8 de |
| Ginstar | 6.0 oz. | 85 | 71.7 ab | 5.0 cd | 0.7 e |
| Aim TM +Gramoxone® Max + Induce | 0.5 oz. + 10.0 oz. + 3.52 oz. | 85 | 88.3 a | 4.7 cd | 1.7 bcd |
| Aim^{TM} +Gramoxone® Max + C.O.C. | 0.5 oz. + 10 oz. + 16.0 oz. | 85 | 88.7 a | 3.0 cd | 1.7 bcd |
| $\operatorname{Aim}^{\mathrm{TM}}$ +C.O.C. | 1.0 oz. + 16.0 oz. | 85 | 58.3 bc | 16.7 a | 1.7 bcd |
| ET^{TM} +Gramoxone® Max + Induce | 1.0 oz. + 10.0 oz. + 3.52 oz. | 85 | 89.7 a | 3.7 cd | 1.7 bcd |
| ET^{TM} +C.O.C. | 2.0 oz. +16.0 oz. | 85 | 70.0 ab | 10.0 abc | 1.3 cde |
| Gramoxone® Max + Prep + Induce | 3.5 oz. + 16.0 oz. + 3.52 oz. | 85 | 46.7 c | 8.3 bc | 2.0 abc |

Table 12. Morris Light's 2003 Cotton Harvest Aid Test (Scurry County). October 8, 2003 (14 days after treatments were applied)

| Harvest Aids | Rate Applied | % Open Bolls | % Defol. | % Des. | Regrowth Rating Top | Regrowth Rating Bottom |
|---|--|--------------------|----------------|------------|---------------------------|------------------------------|
| Applied | Per Acre | (7 DAT) | (7 DAT) | (7 DAT) | (7 DAT) | (7 DAT) |
| Aim + C.O.C followed by Aim + C.O.C. | 1.0 oz. + 1% v/v followed by 1.0 oz. + 1% v/v | 88.25 | 45.00 abcde | 5.00 bc | 0 c | 0 c |
| Aim + Prep + C.O.C. followed by Gramoxone Max + C.O.C. | 1.0 oz. + 16 oz. + 1% v/v followed by 10.67 oz. + 1% v/v | 88.25 | 47.50 abcde | 1.50 bc | 0 c | 0 c |
| Aim + Gramoxone Max + C.O.C. | 1 oz. + 5.33 oz. + 1% v/v | 87.50 | 58.33 abc | 7.00 bc | 0 c | 0 c |
| Check | | 85.00 | 5.00 f | 0.00 c | 0 c | 0 c |
| Aim + C.O.C. followed by Gramoxone Max + C.O.C. | 1.0 oz. + 1% v/v followed by 10.67 oz. + 1% v/v | 86.25 | 45.00 abcde | 4.50 bc | 0 c | 0 c |
| Gramoxone Max + C.O.C. followed by Gramoxone Max + C.O.C. | 10.67 oz. + 1% v/v followed by 10.67 oz. + 1% v/v | 85.0 | 48.75 abcde | 3.25 bc | 0 c | 0 c |
| Appeal + Gramoxone Max + C.O.C. | 0.6 oz. + 10.67 oz. + 1% v/v | 86.25 | 47.50 abcde | 5.00 bc | 0 c | 0 c |
| ET TM + C.O.C. followed by ET TM + C.O.C. | 1.4 oz. + 1% v/v followed by 1.4 oz. + 1% v/v | 86.67 | 23.33 ef | 1.67 bc | 0.33 b | 0.33 b |
| ET TM + C.O.C. followed by ET TM + C.O.C. | 2.0 oz. + 1% v/v followed by 1.4 oz. + 1% v/v | 85.00 | 28.33 def | 0.67 c | 0 c | 0 c |
| ET^{TM} + C.O.C. followed by Gramoxone Max + N.I.S. | 2.0 oz. + 1% v/v followed by 16.0 oz. + 0.25% v/v | 86.67 | 33.33 cde | 1.67 bc | 0 c | 0 c |
| ET TM + Prep + C.O.C. followed by ET TM + C.O.C. | 1.4 oz. + 21.0 oz. + 1% v/v followed by 1.4 oz. + 1% v/v | 86.67 | 50.00 abcde | 0.67 c | 0 c | 0 c |
| ET^{TM} + Prep + C.O.C. followed by Gramoxone Max + N.I.S. | 1.4 oz. + 21.0 oz. + 1% v/v followed by 16.0 oz. + 0.25% v/v | 85.00 | 43.33 abcde | 1.67 bc | 0 c | 0 c |

Table 13. Chris Bubenik's 2003 Cotton Harvest Aid Test #1 (Tom Green County). October 27, 2003 (7 days after initial treatments were applied)

| Harvest Aids Applied | Rate Applied Per Acre | % Open Bolls (7 DAT) | % Defol. (7 DAT) | % Des. (7 DAT) | Regrowth Rating Top (7 DAT) | Regrowth Rating Bottom (7 DAT) |
|---|---|-------------------------------|------------------------|----------------------|--------------------------------------|---|
| ET TM + Prep + | 1.4 oz. + 16.0 oz. + | 85.00 | 33.33 | 0.33 | 0 | 0 |
| C.O.C. followed by ET^{TM} + Gramoxone Max + C.O.C. | 1% v/v followed by 1.0 oz. + 10 oz. + 1% v/v | | cde | с | С | С |
| ET TM + Prep + | 1.4 oz. + 16.0 oz. + | 86.67 | 36.67 | 0.00 | 0.33 | 0.33 |
| C.O.C. followed by ET^{TM} + Gramoxone Max + C.O.C. | 1% v/v followed by 1.0 oz. + 8 oz. + 1% v/v | | bcde | с | b | b |
| ET TM + Prep + C.O.C. followed by ET TM + Gramoxone Max + C.O.C. | 1.4 oz. + 16.0 oz. + 1% v/v followed by 1.0 oz. + 6 oz. + 1% v/v | 85.00 | 36.67 bcde | 1.67 bc | 0 c | 0 c |
| $ET^{TM} + C.O.C.$ followed by $ET^{TM} +$ Gramoxone Max + C.O.C. | 1.4 oz. + 1% v/v followed by 1.0 oz. + 10 oz. + 1% v/v | 85.00 | 25.00 ef | 0.00 c | 0 c | 0 c |
| ET^{TM} + Prep + Roundup WeatherMAX + C.O.C. followed by ET^{TM} + C.O.C. | 1.4 oz. + 16.0 oz. + 12 oz. + 1% v/v followed by 1.4 oz. + 1% v/v | 85.00 | 33.33 cde | 0.67 c | 0 c | 0.33 b |
| Resource + | 4 oz. + | 90.00 | 58.33 | 7.33 | 0 | 0 |
| Gramoxone Max + C.O.C. | 10.67 oz. + 1% v/v | | abc | bc | с | с |
| Aim + Gramoxone Max + C.O.C. | 1.0 oz. + 10.67 oz. + 1% v/v | 88.33 | 58.33 abc | 6.33 bc | 0 c | 0 c |
| Check | | 85.00 | 5.00 f | 0.00 c | 0 c | 0 c |
| Gramoxone Max + N.I.S. | 8.0 oz. + 0.25% v/v | 86.67 | 53.33 abcd | 6.33 bc | 1 a | 1 a |
| Gramoxone Max + N.I.S. | 10.67 oz. + 0.25% v/v | 86.67 | 66.67 a | 4.67 bc | 1 a | 1 a |
| Gramoxone Max + N.I.S. | 16.0 oz. + 0.25% v/v | 85.00 | 61.67 ab | 10.67 ab | 1 a | 1 a |
| Check | | 85.00 | 5.00 f | 0.00 c | 0 c | 0 c |

| | | % | | | Regrowth | Regrowth |
|-----------------|------------------|---------|---------|---------|----------|----------|
| | | Open | % | % | Rating | Rating |
| Harvest Aids | Rate Applied | Bolls | Defol. | Des. | Тор | Bottom |
| Applied | Per Acre | (7 DAT) | (7 DAT) | (7 DAT) | (7 DAT) | (7 DAT) |
| Gramoxone Max + | 4.0 oz. + | 86.67 | 45.00 | 5.33 | 1 | 1 |
| N.I.S. | 0.25% v/v | | abcde | bc | а | а |
| followed by | followed by | | | | | |
| Gramoxone Max + | 16.0 oz. + | | | | | |
| N.I.S. | 0.25% v/v | | | | | |
| Gramoxone Max + | 21.0 oz. + 0.25% | 90.00 | 63.33 | 16.67 | 1 | 1 |
| N.I.S. | v/v | | ab | а | а | а |

| initial treatments were appl | ned 7 6 days after fon | Onen | <i>o</i> | 0/o | Regrowth Rating | Regrowth Rating |
|--|---|-------------------|--------------------|------------------|--------------------|--------------------|
| Harvest Aids Applied | Rate Applied Per Acre | Bolls (14 DAT) | Defol. (14 DAT) | Des. (14 DAT) | Top (14 DAT) | Bottom (14 DAT) |
| Aim + C.O.C followed by Aim + C.O.C. | 1.0 oz. + 1% v/v followed by 1.0 oz. + 1% v/v | 88.25 | 70.00 abcd | 16.25 abc | 0.25 bc | 0.50 b |
| Aim + Prep + C.O.C. followed by Gramoxone Max + C.O.C. | 1.0 oz. + 16 oz. +1% v/v followed by 10.67 oz. + 1% v/v | 88.25 | 78.75 ab | 10.00 bcd | 0.25 bc | 0.50 b |
| Aim + Gramoxone Max + C.O.C. | 1 oz. + 5.33 oz. + 1% v/v | 87.50 | 75.00 abcd | 5.75 cd | 0.25 bc | 0.50 b |
| Check | | 85.00 | 20.00 e | 0.00 d | 0 c | 0 c |
| Aim + C.O.C. followed by Gramoxone Max + C.O.C. | 1.0 oz. + 1% v/v followed by 10.67 oz. + 1% v/v | 86.25 | 78.75 ab | 12.50 abcd | 1 a | 1 a |
| Gramoxone Max + C.O.C. followed by Gramoxone Max + C.O.C. | 10.67 oz. + 1% v/v followed by 10.67 oz. + 1% v/v | 87.50 | 70.00 abcd | 10.25 bcd | 0.75 ab | 1 a |
| Appeal + Gramoxone Max + C.O.C. | 0.6 oz. + 10.67 oz. + 1% v/v | 88.75 | 85.00 a | 8.75 bcd | 1 a | 1 a |
| ET^{TM} + C.O.C. followed by ET^{TM} + C.O.C. | 1.4 oz. + 1% v/v followed by 1.4 oz. + 1% v/v | 86.67 | 60.00 cd | 13.67 abcd | 1 a | 1 a |
| ET^{TM} + C.O.C. followed by ET^{TM} + C.O.C. | 2.0 oz. + 1% v/v followed by 1.4 oz. + 1% v/v | 86.67 | 76.67 abc | 4.00 cd | 0.33 abc | 1 a |
| ET^{TM} + C.O.C. followed by Gramoxone Max + N.I.S. | 2.0 oz. + 1% v/v followed by 16.0 oz. + 0.25% v/v | 90.00 | 71.67 abcd | 10.00 bcd | 1 a | 1 a |
| ET TM + Prep + C.O.C. followed by ET TM + C.O.C. | 1.4 oz. + 21.0 oz. + 1% v/v followed by 1.4 oz. + 1% v/v | 86.67 | 75.00 abcd | 9.33 bcd | 0 c | 1 a |
| ET^{TM} + Prep + C.O.C. followed by Gramoxone Max + N.I.S. | 1.4 oz. + 21.0 oz. + 1% v/v followed by 16.0 oz. + 0.25% y/v | 90.00 | 83.33 a | 8.33 bcd | 0.67 abc | 1 a |

Table 14. Chris Bubenik's 2003 Cotton Harvest Aid Test #1 (Tom Green County). November 3, 2003 (14 days after initial treatments were applied / 6 days after followup treatments)

| Harvest Aids Applied | Rate Applied Per Acre | % Open Bolls (14 DAT) | % Defol. (14 DAT) | % Des. (14 DAT) | Regrowth Rating Top (14 DAT) | Regrowth Rating Bottom (14 DAT) |
|---|--|--------------------------------|-------------------------|-----------------------|---------------------------------------|--|
| ET TM + Prep + C.O.C. followed by ET TM + Gramoxone Max + C.O.C. | 1.4 oz. + 16.0 oz. + 1% v/v followed by 1.0 oz. + 10 oz. + 1% v/v | 88.33 | 65.00 bcd | 3.33 cd | 0 c | 0.67 ab |
| ET TM + Prep + C.O.C. followed by ET TM + Gramoxone Max + C.O.C. | 1.4 oz. + 16.0 oz. + 1% v/v followed by 1.0 oz. + 8 oz. + 1% v/v | 88.33 | 81.67 ab | 9.00 bcd | 0.33 abc | 1 a |
| ET TM + Prep + C.O.C. followed by ET TM + Gramoxone Max + C.O.C. | 1.4 oz. + 16.0 oz. + 1% v/v followed by 1.0 oz. + 6 oz. + 1% v/v | 86.67 | 78.33 ab | 6.33 cd | 0.67 abc | 1 a |
| ET^{TM} + C.O.C. followed by ET^{TM} + Gramoxone Max + C.O.C. | 1.4 oz. + 1% v/v followed by 1.0 oz. + 10 oz. +1% v/v | 88.33 | 76.67 abc | 5.00 cd | 0.33 abc | 1 a |
| ET^{TM} + Prep + Roundup WeatherMAX + C.O.C. followed by ET^{TM} + C.O.C. | 1.4 oz. + 16.0 oz. + 12 oz. + 1% v/v followed by 1.4 oz. + 1% v/v | 85.00 | 68.33 abcd | 3.33 cd | 0.33 abc | 1 a |
| Resource + Gramoxone Max + C.O.C. | 4 oz. + 10.67 oz. + 1% v/v | 91.67 | 78.33 ab | 10.67 bcd | 0.33 abc | 1 a |
| Aim + Gramoxone Max + C.O.C. | 1.0 oz. + 10.67 oz. + 1% v/v | 90.00 | 76.67 abc | 10.00 bcd | 0.67 abc | 1 a |
| Check | | 85.00 | 21.67 e | 0.00 d | 0 c | 0 c |
| Gramoxone Max + N.I.S. | 10.67 oz. + 0.25% v/v | 88.33 | 70.00 abcd | 4.00 cd | 1 a | 1 a |
| Gramoxone Max + N.I.S. | 8.0 oz. + 0.25% v/v | 88.33 | 58.33 d | 4.33 cd | 1 a | 1 a |
| Gramoxone Max + N.I.S. | 16.0 oz. + 0.25% v/v | 90.00 | 75.00 abcd | 21.33 ab | 1 a | 1 a |
| Check | | 85.00 | 21.67 e | 0.00 d | 0 c | 0 c |

Table 14. continued

| | | % | | | Regrowth | Regrowth |
|-----------------|------------------|----------|----------|----------|----------|----------|
| | | Open | % | % | Rating | Rating |
| Harvest Aids | Rate Applied | Bolls | Defol. | Des. | Тор | Bottom |
| Applied | Per Acre | (14 DAT) |
| Gramoxone Max + | 4.0 oz. + | 90.00 | 81.67 | 10.00 | 1 | 1 |
| N.I.S. | 0.25% v/v | | ab | bcd | а | а |
| followed by | followed by | | | | | |
| Gramoxone Max + | 16.0 oz. + 0.25% | | | | | |
| N.I.S. | v/v | | | | | |
| Gramoxone Max + | 21.0 oz. + 0.25% | 91.67 | 72.67 | 24.67 | 1 | 1 |
| N.I.S. | v/v | | abcd | а | а | а |

| treatments were applied / 1 | 5 days after followup | % | | | Regrowth | Regrowth |
|------------------------------|---------------------------------|-------------|--------------|------------|----------|----------|
| | | Open | % | % | Rating | Rating |
| Harvest Aids | Rate Applied | Bolls | Defol. | Des. | Тор | Bottom |
| Applied | Per Acre | (21 DAT) | (21 DAT) | (21 DAT) | (21 DAT) | (21 DAT) |
| Aim + C.O.C | 1.0 oz. + 1% v/v | 91.25 | 90.00 | 3.00 | 0.25 | 1 |
| followed by | followed by | ab | abc | cd | ab | а |
| $A_{1}m + C.O.C.$ | 1.0 oz. + 1% v/v | | | | | |
| Aim + Prep | 1.0 oz. + 16 oz. | 92.00 | 89.75 | 4.00 | 0.75 | 1 |
| + C.O.C. | +1% v/v | ab | abc | cd | а | а |
| followed by | followed by | | | | | |
| Gramoxone Max + | 10.67 oz. + | | | | | |
| C.O.C. | 1% v/v | | | | | |
| Aim + Gramoxone Max | 1 oz. + 5.33 oz. | 91.25 | 86.50 | 3.50 | 0.75 | 1 |
| + C.O.C. | + 1% v/v | ab | bcd | cd | а | а |
| Check | | 85.00 | 40.00 | 0.00 | 0 | 0 |
| Chiefen | | d | e | d | b | c |
| | 1.0 . 1.07 / | 02.50 | 02 75 | 2.25 | 1 | 1 |
| $A_{1}m + C_{.}O_{.}C_{.}$ | 1.0 oz. + 1% V/V | 92.50 | 92.75 | 3.25 | 1 | l |
| Gramoxone Max + | 10.67 oz + | aU | aU | cu | a | a |
| C.O.C. | 1% v/v | | | | | |
| C | 10 (7 | 00.00 | 00.00 | 2.25 | 0.75 | 1 |
| $C \cap C$ | 10.6 / 0Z. + 1% v/v | 90.00 bc | 90.00 abc | 2.25 cd | 0.75 | l |
| followed by | followed by | be | abe | eu | a | a |
| Gramoxone Max + | 10.67 oz. + | | | | | |
| C.O.C. | 1% v/v | | | | | |
| Appeal + Gramoxone | 0.6 oz + 10.67 | 92 50 | 92 50 | 4 75 | 1 | 1 |
| Max $+$ C.O.C. | oz. + 1% v/v | ab | ab | 75 cd | a | a |
| | 1 4 + 107/ | 00.00 | 01.00 | 4.0 | 1 | 1 |
| $E1^{1M} + C.O.C.$ | 1.4 0Z. + 1% V/V followed by | 90.00 | 91.00 | 4.0 cd | 1 | 1 |
| $ET^{TM} + C.O.C.$ | 1.4 oz. + 1% v/v | be | abe | eu | a | a |
| | | 00.00 | 01 (7 | 2.22 | 0.22 | |
| $ET^{TM} + C.O.C.$ | 2.0 oz. + 1% v/v | 90.00 | 91.67 | 2.33 | 0.33 | 1 |
| $ET^{TM} + C \cap C$ | 14 oz + 1% v/v | be | abe | cu | au | a |
| Li + c.o.c. | 1.4 02. 1 170 070 | | | | | |
| $ET^{TM} + C.O.C.$ | 2.0 oz. + 1% v/v | 91.67 | 93.33 | 2.33 | 1 | 1 |
| followed by Gramovona Max | 16 $0.07 \pm 0.25\%$ | ab | ab | ca | a | a |
| N.L.S. | 10.0 02. + 0.23% v/v | | | | | |
| | 1.4 | 01 (7 | 00 (7 | 2.22 | 0 | 1 |
| EI ^{IM} + | 1.4 oz. + | 91.67 | 90.67 | 3.33 ad | 0 b | l |
| COC | 21.002. + 1% v/v | aD | abe | Cu | U | a |
| followed by | followed by | | | | | |
| ET™ + C.O.C. | 1.4 oz. + 1% v/v | | | | | |
| $ET^{TM} +$ | 1407 + | 93 33 | 95 33 | 1.67 | 0.67 | 1 |
| Prep + | 21.0 oz. + | ab | a | d | ab | a |
| C.O.C. | 1% v/v | | | | | |
| followed by | followed by | | | | | |
| Gramoxone Max + | 16.0 oz. + 0.25% | | | | | |
| N.I.S. | v/v | | | | | |

Table 15. Chris Bubenik's 2003 Harvest Aid Test #1 (Tom Green County). November 10, 2003 (21 days after initial treatments were applied / 13 days after followup treatments)

| Harvest Aids Applied | Rate Applied Per Acre | % Open Bolls (21 DAT) | % Defol. (21 DAT) | % Des. (21 DAT) | Regrowth Rating Top (21 DAT) | Regrowth Rating Bottom (21 DAT) |
|---|--|--------------------------------|-------------------------|-----------------------|---------------------------------------|--|
| $ET^{TM} +$ Prep + C.O.C. followed by $ET^{TM} + Gramoxone Max$ | 1.4 oz. + 16.0 oz. + 1% v/v followed by 1.0 oz. + 10 oz. + 1% v/v | 93.33 ab | 90.00 abc | 1.33 d | 0.33 ab | l a |
| ET TM + Prep + C.O.C. followed by ET TM + Gramoxone Max + C.O.C. | 1.4 oz. + 16.0 oz. + 1% v/v followed by 1.0 oz. + 8 oz. + 1% v/v | 91.67 ab | 93.00 ab | 3.30 cd | 0.67 ab | 1 a |
| ET^{TM} + Prep + C.O.C. followed by ET^{TM} + Gramoxone Max + C.O.C. | 1.4 oz. + 16.0 oz. + 1% v/v followed by 1.0 oz. + 6 oz. + 1% v/v | 90.00 bc | 92.00 ab | 2.00 d | 1 a | 1 a |
| ET^{TM} + C.O.C. followed by ET^{TM} + Gramoxone Max + C.O.C. | 1.4 oz. + 1% v/v followed by 1.0 oz. + 10 oz. +1% v/v | 91.67 ab | 90.33 abc | 3.00 cd | 0.33 ab | 1 a |
| ET^{TM} + Prep + Roundup WeatherMAX + C.O.C. followed by ET^{TM} + C.O.C. | 1.4 oz. + 16.0 oz. + 12 oz. + 1% v/v followed by 1.4 oz. + 1% v/v | 90.00 bc | 92.67 ab | 1.33 d | 0.67 ab | 1 a |
| Resource + Gramoxone Max + C.O.C. | 4 oz. + 10.67 oz. + 1% v/v | 91.67 ab | 92.33 ab | 2.67 cd | 0.33 ab | 1 a |
| Aim + Gramoxone Max + C.O.C. | 1.0 oz. + 10.67 oz. + 1% v/v | 93.33 ab | 94.33 a | 2.00 d | 0.67 ab | 1 a |
| Check | | 85.00 d | 40.00 e | 0.00 d | 0 b | 0 c |
| Gramoxone Max + N.I.S. | 8.0 oz. + 0.25% v/v | 91.67 ab | 84.67 cd | 3.33 cd | 1 a | 1 a |
| Gramoxone Max + N.I.S. | 10.67 oz. + 0.25% v/v | 90.00 bc | 82.67 d | 2.00 d | 1 a | 1 a |
| Gramoxone Max + N.I.S. | 16.0 oz. + 0.25% v/v | 93.33 ab | 88.33 abcd | 11.33 a | 1 a | 1 a |
| Check | | 86.67 cd | 40.00 e | 0.00 d | 0 b | 0.33 b |

Table 15. continued

| | | % | | | Regrowth | Regrowth |
|-----------------|------------------|----------|----------|----------|----------|----------|
| | | Open | % | % | Rating | Rating |
| Harvest Aids | Rate Applied | Bolls | Defol. | Des. | Тор | Bottom |
| Applied | Per Acre | (21 DAT) |
| Gramoxone Max + | 4.0 oz. + | 91.67 | 89.33 | 7.67 | 1 | 1 |
| N.I.S. | 0.25% v/v | ab | abc | bc | а | а |
| followed by | followed by | | | | | |
| Gramoxone Max + | 16.0 oz. + 0.25% | | | | | |
| N.I.S. | v/v | | | | | |
| Gramoxone Max + | 21.0 oz. + 0.25% | 95.00 | 87.00 | 13.00 | 0.67 | 1 |
| N.I.S. | v/v | а | bcd | а | ab | а |

| Harvest Aids | Rate Applied Per Acre | % Open Bolls (6 DAT) | % Defol. (6 DA T) | % Des. (6 DAT) | Regrowth Rating Top (6 DAT) | Regrowth Rating Bottom (6 DAT) |
|---|---|-------------------------------|-------------------------|----------------------|--------------------------------------|---|
| Ginstar + Aim | 12.8 oz. + 1.0 oz | 88.33 | 50.00 ab | 23.33 bcd | 0 | 0 |
| Finish 6 Pro | 21.3 oz. | 86.67 | 58.33 a | 6.67 d | 0 | 0 |
| Finish 6 Pro + Ginstar | 21.3 oz. + 4.0 oz. | 86.67 | 61.67 a | 10.00 cd | 0 | 0 |
| Finish 6 Pro + Aim | 21.3 oz. + 1.6 oz. | 86.67 | 48.33 ab | 11.67 cd | 0 | 0 |
| Finish 6 Pro + Aim | 21.3 oz. + 1.0 oz. | 85.00 | 50.00 ab | 15.00 cd | 0 | 0 |
| Finish 6 Pro + Aim | 21.3 oz. + 0.8 oz. | 88.33 | 58.33 a | 13.33 cd | 0 | 0 |
| Check | | 85.00 | 13.33 cd | 0.00 d | 0 | 0 |
| Ginstar + Aim | 8.8 oz. + 1.6 oz. | 85.00 | 33.33 abcd | 41.67 ab | 0 | 0 |
| Prep + Aim followed by Aim + C.O.C. | 32.0 oz. + 1.6 oz. followed by 1.6 oz. + 1% v/v | 86.67 | 56.67 a | 18.33 cd | 0 | 0 |
| Ginstar | 6.0 oz. | 86.67 | 38.33 abc | 10.00 cd | 0 | 0 |
| Ginstar + Aim | 6.4 oz. + 1.0 oz. | 86.67 | 40.00 abc | 33.33 abc | 0 | 0 |
| Ginstar + Aim | 3.0 oz. + 0.8 oz. | 85.00 | 41.67 abc | 16.67 cd | 0 | 0 |
| Prep + Aim | 32.0 oz. + 1.6 oz. | 85.00 | 40.00 abc | 31.67 abc | 0 | 0 |
| Prep + Ginstar | 21.3 oz. + 4.0 oz. | 86.67 | 55.00 a | 10.00 cd | 0 | 0 |
| ET TM + Gramoxone Max + C.O.C. | 2.0 oz. + 10.67 oz. + 1% v/v | 86.67 | 33.33 abcd | 41.67 ab | 0 | 0 |
| Ginstar | 5.0 oz. | 86.67 | 45.00 abc | 10.00 cd | 0 | 0 |
| Ginstar | 7.0 oz. | 85.00 | 31.67 abcd | 11.67 cd | 0 | 0 |
| Check | | 85.00 | 5.00 d | 0.00 d | 0 | 0 |

Table 16. Chris Bubenik's 2003 Cotton Harvest Aid Test #2 (Tom Green County). October 27, 2003 (6 days after initial treatments were applied)

| Table 16. continued | | | | | | |
|---------------------------------------|--------------------------------------|-------------------------------|------------------------|----------------------|--------------------------------------|---|
| Harvest Aids Applied | Rate Applied Per Acre | % Open Bolls (6 DAT) | % Defol. (6 DAT) | % Des. (6 DAT) | Regrowth Rating Top (6 DAT) | Regrowth Rating Bottom (6 DAT) |
| Aim + Gramoxone Max + C.O.C. | 1.0 oz. + 10.67 oz. + 1% v/v | 86.67 | 50.00 ab | 33.33 abc | 0 | 0 |
| ET™ + Prep + C.O.C. | 1.4 oz. + 21.0 oz. + 1% v/v | 86.67 | 51.67 a | 10.00 cd | 0 | 0 |
| Ginstar + Prep + N.I.S. | 7.0 oz. + 16.0 oz. + 0.25% v/v | 85.00 | 41.67 abc | 18.33 cd | 0 | 0 |
| Def + Prep + N.I.S. | 16.0 oz. + 21.3 oz. + 0.25% v/v | 85.00 | 40.00 abc | 5.67 d | 0 | 0 |
| Ginstar + C.O.C. | 5.0 oz. + 16.0 oz. | 85.00 | 18.33 bcd | 16.67 cd | 0 | 0 |
| Ginstar + Finish 6 Pro + N.I.S. | 7.0 oz. + 16.0 oz. + 0.25% v/v | 85.00 | 51.67 a | 18.33 cd | 0 | 0 |
| Ginstar + Gramoxone Max | 3.0 oz. + 20.0 oz. | 86.67 | 31.67 abcd | 51.67 a | 0 | 0 |
| Def + Finish 6 Pro + N.I.S. | 8.0 oz. + 21.0 oz. + 0.25% v/v | 86.67 | 43.33 abc | 10.00 cd | 0 | 0 |

| Harvest Aids | Rate Applied | % Open Bolls | % Defol. | % Des. | Regrowth Rating Top | Regrowth Rating Bottom |
|---|---|-------------------|---------------|----------------|---------------------------|------------------------------|
| Applied | Per Acre | (13 DAT) | (13 DAT) | (13 DAT) | (13 DAT) | (13 DAT) |
| Ginstar + Aim | 12.8 oz. + 1.0 oz | 88.33 | 65.00 abcd | 20.00 bcdef | 0 | 0 |
| Finish 6 Pro | 21.3 oz. | 86.67 | 81.67 a | 5.67 fg | 0 | 0 |
| Finish 6 Pro + Ginstar | 21.3 oz. + 4.0 oz. | 88.33 | 78.33 a | 10.00 defg | 0 | 0 |
| Finish 6 Pro + Aim | 21.3 oz. + 1.6 oz. | 86.67 | 80.00 a | 11.67 defg | 0 | 0 |
| Finish 6 Pro + Aim | 21.3 oz. + 1.0 oz. | 85.00 | 73.33 abc | 13.33 cdefg | 0 | 0 |
| Finish 6 Pro + Aim | 21.3 oz. + 0.8 oz. | 88.33 | 76.67 ab | 13.33 cdefg | 0 | 0 |
| Check | | 85.00 | 26.67 e | 0.00 g | 0 | 0 |
| Ginstar + Aim | 8.8 oz. + 1.6 oz. | 85.00 | 51.67 d | 41.67 a | 0 | 0 |
| Prep + Aim followed by Aim + C.O.C. | 32.0 oz. + 1.6 oz. followed by 1.6 oz. + 1% v/v | 86.67 | 80.00 a | 13.33 cdefg | 0 | 0 |
| Ginstar | 6.0 oz. | 86.67 | 81.67 a | 10.00 defg | 0 | 0 |
| Ginstar + Aim | 6.4 oz. + 1.0 oz. | 86.67 | 66.67 abcd | 25.00 abcde | 0 | 0 |
| Ginstar + Aim | 3.0 oz. + 0.8 oz. | 85.00 | 70.00 abcd | 16.67 cdefg | 0 | 0 |
| Prep + Aim | 32.0 oz. + 1.6 oz. | 85.00 | 56.67 bcd | 30.00 abc | 0 | 0 |
| Prep + Ginstar | 21.3 oz. + 4.0 oz. | 86.67 | 83.33 a | 8.33 efg | 0 | 0 |
| $ET^{TM} +$ Gramoxone Max + C.O.C. | 2.0 oz. + 10.67 oz. + 1% v/v | 86.67 | 55.00 cd | 35.00 ab | 0 | 0 |
| Ginstar | 5.0 oz. | 86.67 | 81.67 a | 10.00 defg | 0 | 0 |
| Ginstar | 7.0 oz. | 85.00 | 78.33 a | 11.67 defg | 0 | 0 |
| Check | | 85.00 | 20.00 e | 0.00 g | 0 | 0 |

Table 17. Chris Bubenik's 2003 Cotton Harvest Aid Test #2 (Tom Green County). November 3, 2003 (13 days after initial treatments were applied / 6 days after followup treatments)

| | | | | | Regrowth | Regrowth |
|------------------|--------------------|-------------------|----------|----------|----------|----------|
| | | % | % | % | Rating | Rating |
| Harvest Aids | Rate Applied | Open Bolls | Defol. | Des. | Тор | Bottom |
| Applied | Per Acre | (13 DAT) | (13 DAT) | (13 DAT) | (13 DAT) | (13 DAT) |
| Aim + | 1.0 oz. + | 86.67 | 65.00 | 28.33 | 0 | 0 |
| Gramoxone Max + | 10.67 oz. + | | abcd | abcd | | |
| C.O.C. | 1% v/v | | | | | |
| ET^{TM} + | 1.4 oz. + | 86.67 | 78.33 | 10.00 | 0 | 0 |
| Prep + | 21.0 oz. + | | а | defg | | |
| C.O.C. | 1% v/v | | | | | |
| Ginstar + | 7.0 oz. + | 85.00 | 73.33 | 18.33 | 0 | 0 |
| Prep + | 16.0 oz. + | | abc | bcdefg | | |
| N.I.S. | 0.25% v/v | | | | | |
| Def + | 16.0 oz. + | 85.00 | 73.33 | 5.67 | 0 | 0 |
| Prep + | 21.3 oz. + | | abc | fg | | |
| N.I.S. | 0.25% v/v | | | | | |
| Ginstar + C.O.C. | 5.0 oz. + 16.0 oz. | 85.00 | 73.33 | 16.67 | 0 | 0 |
| | | | abc | cdefg | | |
| Ginstar + | 7.0 oz. + | 85.00 | 66.67 | 18.33 | 0 | 0 |
| Finish 6 Pro + | 16.0 oz. + | | abcd | bcdefg | | |
| N.I.S. | 0.25% v/v | | | | | |
| Ginstar + | 3.0 oz. + | 86.67 | 53.33 | 40.0 | 0 | 0 |
| Gramoxone Max | 20.0 oz. | | cd | а | | |
| Def + | 8.0 oz. + | 86.67 | 76.67 | 10.00 | 0 | 0 |
| Finish 6 Pro + | 21.0 oz. + | | ab | defg | | |
| N.I.S. | 0.25% v/v | | | | | |

| initial treatments were a | applied / 15 days alter 1 | onowup treatm | ients) | | Regrowth | Regrowth |
|---------------------------|---------------------------|-------------------|----------|----------|----------|----------|
| | | % | % | % | Rating | Rating |
| Harvest Aids | Rate Applied | Open Bolls | Defol. | Des. | Тор | Bottom |
| Applied | Per Acre | (13 DAT) | (13 DAT) | (13 DAT) | (13 DAT) | (13 DAT) |
| Ginstar + Aim | 12.8 oz. + 1.0 oz | 91.67 | 77.33 | 10.67 | 0.33 | 1 |
| | | а | abc | cde | ab | а |
| Finish 6 Pro | 21.3 oz. | 93.33 | 87.67 | 3.67 | 0.33 | 1 |
| | | а | ab | de | ab | а |
| Finish 6 Pro + | 21.3 oz. + | 93.33 | 89.67 | 4.33 | 0.33 | 1 |
| Ginstar | 4.0 oz. | а | а | de | ab | а |
| Finish 6 Pro + Aim | 21.3 oz. + 1.6 oz. | 90.00 | 88.00 | 7.67 | 0.33 | 1 |
| | | а | ab | cde | ab | а |
| Finish 6 Pro + Aim | 21.3 oz. + 1.0 oz. | 91.67 | 87.33 | 6.67 | 0.33 | 1 |
| | | а | ab | cde | ab | а |
| Finish 6 Pro + Aim | 21.3 oz. + 0.8 oz. | 91.67 | 86.67 | 5.00 | 0.33 | 1 |
| | | а | ab | cde | ab | а |
| Check | | 85.00 | 40.00 | 0.00 | 0 | 0 |
| | | b | e | e | b | b |
| Ginstar + Aim | 8.8 oz. + 1.6 oz. | 90.00 | 81.33 | 12.67 | 0.33 | 1 |
| | | а | ab | cd | ab | а |
| Prep + Aim | 32.0 oz. + 1.6 oz. | 93.33 | 87.33 | 8.33 | 0 | 1 |
| followed by | followed by | a | ab | cde | b | а |
| Aim + C.O.C. | 1.6 oz. + 1% v/v | | | | | |
| Ginstar | 6.0 oz. | 93.33 | 85.00 | 6.67 | 0.67 | 1 |
| | | а | ab | cde | ab | а |
| Ginstar + Aim | 6.4 oz. + 1.0 oz. | 91.67 | 85.00 | 8.33 | 0.67 | 1 |
| | | а | ab | cde | ab | а |
| Ginstar + Aim | 3.0 oz. + 0.8 oz. | 91.67 | 84.00 | 8.33 | 0.67 | 1 |
| | | а | ab | cde | ab | а |
| Prep + Aim | 32.0 oz. + 1.6 oz. | 91.67 | 64.67 | 28.33 | 0.33 | 1 |
| | | a | d | а | ab | а |
| Prep + Ginstar | 21.3 oz. + 4.0 oz. | 90.00 | 88.67 | 4.67 | 0 | 1 |
| | | а | ab | de | b | а |
| $ET^{TM} +$ | 2.0 oz. + | 90.00 | 75.00 | 16.67 | 0.33 | 1 |
| Gramoxone Max + | 10.67 oz. + | а | bcd | bc | ab | а |
| C.O.C. | 1% v/v | | | | | |
| C : (| 5.0 | 00.00 | 06.67 | 6.00 | 0 | 1 |
| Ginstar | 5.0 oz. | 90.00 | 86.67 | 6.00 | 0 | 1 |
| | | а | ab | cde | D | а |
| Ginstar | 7.0 oz. | 90.00 | 89.00 | 6.67 | 0 | 1 |
| Children | 110 021 | a | a | cde | b | a |
| | | | u | | U | |
| Check | | 85.00 | 40.00 | 0.00 | 0 | 0 |
| | | b | e | e | b | b |
| A | 10 | 01 (7 | 77.22 | 16.67 | 0.22 | 1 |
| Aim + | 1.0 oz. + | 91.67 | //.33 | 10.07 | 0.33 | 1 |
| Gramoxone Max + | 10.67 oz. + 1% v/v | a | abc | bc | ab | а |
| U.U.U. | | | | | | |
| $ET^{TM} +$ | 1.4 oz. + | 90.00 | 84.33 | 8.67 | 0.67 | 1 |
| Prep + | 21.0 oz. + | a | ab | cde | ab | a |
| C.O.C. | 1% v/v | | | | | |
| 2.0.0. | 2,0 111 | | | | | |
| Ginstar + | 7.0 oz. + | 90.00 | 80.67 | 9.33 | 0 | 1 |
| Prep + | 16.0 oz. + | а | ab | cde | b | а |
| N.I.S. | 0.25% v/v | | | | | |

Table 18. Chris Bubenik's 2003 Cotton Harvest Aid Test #2 (Tom Green County). November 10, 2003 (20 days after initial treatments were applied / 13 days after followup treatments)

| | | ~ | ~ | ~ | Regrowth | Regrowth |
|---------------------|--------------------|-------------------|----------|----------|----------|----------|
| | | % | % | % | Rating | Rating |
| Harvest Aids | Rate Applied | Open Bolls | Defol. | Des. | Тор | Bottom |
| Applied | Per Acre | (13 DAT) | (13 DAT) | (13 DAT) | (13 DAT) | (13 DAT) |
| Def + | 16.0 oz. + | 91.67 | 84.33 | 3.67 | 1 | 1 |
| Prep + | 21.3 oz. + | а | ab | de | | а |
| N.I.S. | 0.25% v/v | | | | | |
| Ginstar + C.O.C. | 5.0 oz. + 16.0 oz. | 90.00 | 83.67 | 10.00 | 0 | 1 |
| | | а | ab | cde | b | а |
| Ginstar + | 7.0 oz. + | 90.00 | 83.33 | 9.33 | 0.33 | 1 |
| Finish 6 Pro + | 16.0 oz. + | а | ab | cde | ab | а |
| N.I.S. | 0.25% v/v | | | | | |
| Ginstar + Gramoxone | 3.0 oz. + | 93.33 | 66.67 | 26.67 | 0.33 | 1 |
| Max | 20.0 oz. | а | cd | ab | ab | а |
| Def + | 8.0 oz. + | 91.67 | 87.33 | 6.67 | 0.67 | 1 |
| Finish 6 Pro + | 21.0 oz. + | а | ab | cde | ab | а |
| N.I.S. | 0.25% v/v | | | | | |

NOTE: In Tables 1 thru 18 the individual or combination of letter a, b, c, d, e, f, g or h shown beside the number are to indicate statistical significance. The statistical difference between treatments using Duncan's mean separation procedure at alpha=0.05. There is no statistical difference between numbers that have the same letter to the side (even when there appears to be a large difference in results between the chemicals applied).