TIMING OF APPLICATION OF GLYPHOSATE TO MAXIMIZE SUGAR PER ACRE AND POSSIBLE ALTERNATIVES TO THE USE OF GLYPHOSATE IN ENHANCING THE YIELD OF SUGAR OF LOUISIANA SUGARCANE IN 2004

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SUMMARY

This experiment shows that when applying glyphosate in August, the treatment-to-harvest interval should be shortened to 28 days after treatment (DAT) to insure maximizing the yield of sugar per acre (S/A). Although there is still a loss of yield of tons cane per acre (TC/A) associated with glyphosate treatments at 28 DAT, the increase in the yield of theoretical recoverable sugar per ton of cane (TRS/TC) more than compensates for the loss of TC/A. However, with the early application date, by delaying harvest beyond 42 DAT could possibly reduce overall S/A when compared to untreated cane even though the increase in TRS/TC might exceed 35-50 lb. The overall reduction in S/A is caused by the significant reduction in TC/A associated with the glyphosate treatment. However, it appears that by delaying glyphosate treatments by one month (September 14 vs. August 18), it is more likely that S/A will be significantly increased regardless of the post-harvest interval. This experiment supports the current recommendations that glyphosate be applied to LCP 85-384 at the equivalent rate of Polado-L at 6 oz/A or 0.1875 lb ae/A. Lower rates are not as effective while higher rates for LCP 85-384 appear excessive and may result in lowering of overall S/A.

In the 2004 experiment, both Test I and II had identical treatments with the only difference being that the second application of those treatments was deferred by one month (September 14 vs. August 18). Post-harvest sampling dates were the same for the two experiments at 28, 42 and 56 DAT. When averaging across all treatments and dates of sampling, there was a significant increase of 1,928 lb (8784 vs. 6856 lb) of S/A in favor of the later treatment date, September 14. This would indicate that the Louisiana sugarcane industry could significantly increase its overall yield of S/A by delaying harvest by one month in keeping with the historical startup date of October 15. Further, by delaying the harvest by one month and averaging across all treatments and dates of sampling, TC/A and TRS/TC would be increased by 4.2 tons and 29 lb, respectively. Mean stalk length (MSL) and mean stalk weight (MSW) would also be increased by 8.7 in and 0.27 lb, respectively by delaying the harvest by one month. There were similar trends when comparing each treatment independently for the two treatment dates and averaging over the three sampling dates.

This experiment also indicates that more studies should be conducted with Palisade, especially at the higher rates. Palisade apparently increases S/T without reducing TC/A as much as seen with most of the glyphosate treatments.

INTRODUCTION

In Louisiana, a sugarcane crop cycle usually consists of a fall-planted crop (plant-cane), which grows very little during winter and is harvested about one year after planting, and two or more stubble (ratoon) crops. The region has a 7- to 9-month growing season that extends from late February/early March to late November or until the first freeze of the winter season causes a cessation of growth. The harvest generally occurs from late September to early January. Consequently, sugarcane is relatively immature at the beginning of harvest and sucrose levels are usually low, generally increasing as the harvest season advances, depending upon the variety. Sucrose levels in juice and yield of sugar per ton of cane and per acre are affected greatly by variety and weather conditions during the growing season and harvest. A combination of high incident light, cool nights and drying soil prior to and during the harvest period retards vegetative growth and promotes sucrose accumulation (natural ripening) (Legendre 1975).

Artificial ripening of sugarcane has been made possible by the development of plant growth regulators such as chemical ripeners that hasten sugarcane maturation and increase sugar yield (Nickell 1984). Glyphosate [N-(phosphonomethyl)glycine], one of the most effective chemical ripeners used on a world-wide basis, apparently influences the way dry matter is partitioned, increasing the ratio of sucrose to fiber (Osgood et al. 1981). However, glyphosate treatment usually decreases cane yield in the crop by slowing cane growth after treatment, thus reducing stalk weight. In Louisiana, the effectiveness of glyphosate for ripening sugarcane is strongly dependent upon variety, treatment-harvest interval and growing season.

Until the 2003 harvest season, the only glyphosate formulation labeled for use in Louisiana was Polado-L® (Monsanto Company) which was also labeled for sucrose enhancement in Florida, Hawaii, Texas and Puerto Rico. The label stipulates that it was to be used only in stubble crops, a rate range of 4 to 14 ounces per acre of the formulated product (contains 4 lb of glyphosate acid in each gallon in the isopropyl amine salt form) and a treatment-harvest interval of 35 to 49 days. For the 2003 harvest, a second formulation of glyphosate, Touchdown iQ® (Syngenta) was labeled for use in Louisiana. The Touchdown iQ label also stipulates use only in stubble crops at a rate of 8 to 10 ounces per acre of the formulated product (contains 3 lb of glyphosate acid in each gallon in the diammonium salt form) and a treatment harvest interval of 21 to 35 days. A third glyphosate formulation, Roundup WeatherMAX (Monsanto Company) was labeled for the 2004 crop year. In Louisiana, WeatherMAX is labeled at 3.5 to 12 ounces per acre of the formulated product (contains 4.5 lb of glyphosate acid in each gallon in the potassium salt form). None of the labeled products are labeled for plant-cane crops because of possible phytotoxicity to crown buds which could adversely affect regrowth (stubbling), thus having the potential to reduce plant stands and yields in the subsequent stubble crop.

Slow stand development in spring is commonly observed in glyphosate-treated sugarcane in Louisiana. Millhollon and Legendre (1996) found that annual glyphosate (Polado-L) ripener treatments will usually increase mean annual sugar yield, but the magnitude of the increase will depend on variety tolerance to the treatments. They found that CP 70-321 appeared to have adequate tolerance to annual treatments, whereas LCP 85-384 can show extreme

sensitivity. This prompted a reduction in the rate of Polado-L from 8 oz/A to 6 oz/A for LCP 85-384.

Currently, glyphosate is used on approximately 250-300,000 acres in Louisiana each crop year, netting the state's sugarcane growers, processors and landlords an estimated $22.1 million in increased gross revenues each year. However, all current glyphosate formulations are not labeled for plant-cane use and typically cause a loss of cane yield in the crop being treated. Further, there is potential for these products to cause yield reduction in the subsequent stubble crop. Therefore, additional research is needed to find alternative ripeners that can be used on the plant-cane crop and be harvested at a reduced treatment-harvest interval. Additionally, alternative ripeners should be developed that have little or no impact on cane yield and will not affect the subsequent stubble crop.

Polado-L is currently formulated without added surfactant. Although it is suggested that a quality non-ionic surfactant be added with Polado-L if weather conditions warrant, research has demonstrated that the use of a surfactant can improve the efficacy of the product. On the other hand, both Touchdown iQ and WeatherMAX are formulated with surfactants.

The first objective of this field experiment was to test the efficacy of the three labeled glyphosate formulations at several rates and post-treatment harvest dates when applied in mid August and mid September. A second objective of this experiment was to look at other potential ripeners. Because of the possibility of glyphosate-tolerant sugarcane varieties being developed in the future, the use of glyphosate as a ripener would be effectively eliminated. From 1983 to 1986, Legendre (unpublished data), showed that two products, Fusilade (fluazifop-P-butyl) (Syngenta) and Arsenal (imazapyr) (BASF), had the potential to ripen sugarcane under Louisiana conditions; however, the testing of both products was discontinued because the companies expressed no commercial interest. One potential new ripener, Palisade® (trinexapac-ethyl), a growth regulator from Syngenta, was included in the 2004 studies.

PROCEDURES

In two field experiments, the same chemical ripener treatments were applied to adjacent fields of LCP 85-384 in the plant-cane crop on August 28 (Test I) and September 14 (Test II), 2004, in water at a broadcast rate of 8 gal/A with a CO_2 sprayer and hand-held boom. The fields had been cultivated and fertilized according to recommended practices; insecticides were applied as required to control the sugarcane borer. A nonionic surfactant, Induce® (0.25% v/v)(Helena), was added to all spray solutions of Polado-L only. Each experiment consisted of 14 treatments: Polado-L at 4, 6 and 8 oz of the formulated product per acre (0.1250, 0.1875 and 0.2500 lb ae/A, respectively), Roundup WeaterMAX at 3.6, 5.3 and 7.1 oz of the formulated product per acre (0.1250, 0.1875 and 0.2500 lb ae/A, respectively), Touchdown iQ at 5.30, 6.65, 8.00 and 10.70 oz of the formulated product per acre (0.1250, 0.1562, 0.1875 and 0.2500 lb ae/A, respectively), Palisade at 0.223, 0.267 and 0.312 lb ai/A and an untreated check serving as a control. A 36-inch band was sprayed over sugarcane foliage so that most of the leaves were wet by the spray. Plots in each of the two experiments were one-row (6 ft) by 50 ft long with a 5-foot alley and with buffer rows on either side of treated row, arranged in a randomized complete block design with three replications. All plots of the two experiments were ultimately harvested green by

combine at 56 days after treatment for both experiments. The mulch residue remained on the fields after harvest.

From each plot of the two experiments, fifteen-stalk samples were taken at random along the row at 28, 42 and 56 days after treatment (DAT). Stalks were stripped of all leaves and topped approximately 4-6 in below the apical meristem (bud). Following hand sampling at 56 DAT, each plot was harvested by a cane combine (Cameco Model 2500) operating at approximately 3.5 mph and an extractor fan speed of 950 rpm. All cane from each plot was weighed in the wagon equipped with load cells and the weights recorded. Data collected and/or calculated from each plot included millable stalks per acre prior to sampling and for each date of sampling, mean stalk weight (MSW), mean stalk length (MSL), estimated tons of cane per acre (TC/A)(MSW multiplied by millable stalk count/A and divided by 2000), Brix by refractometer, sucrose by polarimetry, purity (the ratio of sucrose to Brix), the yield of theoretical recoverable sugar per ton of cane (TRS/TC) and yield of sugar per acre (S/A)(TC/A multiplied by TRS/TC) . From weighed plots, the yield of tons cane per acre (TC/A) was calculated adjusted to the plot size. All values for TC/A, whether estimated or weighed, were adjusted downward by applying a factor of 0.86 as a deduction for trash content. Plots were rated for regrowth through the residue on November 16, 2004 using a scale of 1-9 with 1 representing excellent stands and 9 representing very poor stands.

Data were analyzed using the Proc Mixed Procedure of the SAS (v 8.2) software package. Data were balanced and least square means were calculated. Mean separation was accomplished by the PDIFF option (P = 0.05).

RESULTS AND DISCUSSION

There were no significant differences from control plots in the number of millable stalks per acre for each treatment when averaged across the three replications of the two field studies conducted in 2004 - Test I (treated, August 18) and Test II (treated, September 14) (Table 1). These counts were used to calculate the estimated yield of tons cane per acre (TC/A) for each test by multiplying the average count for each treatment by the mean stalk weight (MSW) for each plot in the two tests (Tables 2-7). For comparison purposes, only estimated TC/A will be used since weighed TC/A could only occur after the last sampling date at 56 days after treatment (DAT).

For Test I, there were no significant differences in the yield of sugar per acre (S/A) at either 28 or 56 DAT (Tables 2-4). At 42 DAT, there was a significant increase in S/A for all of the Palisade treatments and two of the Touchdown iQ treatments (5.30 and 8.00 oz/A). The S/A for all other treatments at 28 and 42 DAT, although not significantly different from control, were numerically higher; however, by 56 DAT there were several of the treatments, Palisade at 0.223 and 0.312 lb/A, Polado-L at 4 and 8 oz/A and all rates of Roundup WeatherMAX and Touchdown iQ, where S/A were numerically lower when compared to control. These data are very significant in that there was a perception by many producers that glyphosate actually reduced S/A, especially when applied in August for early harvest in mid to late September. These data do show that early glyphosate treatments do generally reduce TC/A by negatively impacting mean stalk length (MSL) and MSW, especially at the higher rates (Tables 2-4). In

general, the longer the treatment-to-harvest interval, the greater will be the measured reduction in MSW and possibly TC/A (Legendre and Finger 1987). The results of the current experiment are similar to those reported by Millhollon and Legendre (1996) where they indicated that repeated application of glyphosate reduced TC/A although S/A was not significantly reduced due to the increase in TRS/TC. However, in Test I, the increase in TRS/TC more than compensated for any loss of TC/A (Tables 2-4). Although glyphosate is classified as a herbicide, at the lower rates recommended for use as a ripener, it acts as a plant growth regulator significantly reducing MSL, regardless of the rate applied. Further, glyphosate also tended to reduce MSW although not as dramatic as the effect on MSL.

It appeared that Palisade which is classified as growth regulator, not a herbicide, had a less dramatic effect on TC/A and MSW although there was a significant reduction in MSL at the higher rates. There was a numerical increase in S/A at 28 DAT and a significant increase at 42 DAT for all three Palisade treatments. However, there was only limited response in S/A at 56 DAT. It appeared that the low rate of Palisade (0.223 lb/A) had less of an impact on increasing TRS/TC than any of the glyphosate treatments used in this experiment. However, at the higher rates, the increase in TRS/TC was comparable to that of any of the glyphosate treatments although there was a greater impact on reducing MSW at 56 DAT.

For Test II, all glyphosate treatments resulted in a numerical increase in S/A when compared to control at 24 DAT (Tables 5-7). Further, Polado-L at 8 oz/A, Roundup WeatherMAX at 3.6 oz/A and Touchdown iQ at 8.00 oz/A resulted in a significant increase in S/A at 28 DAT. Most all glyphosate treatments showed a significant increase in S/A at 42 DAT and 5 of the 10 treatments showed a significant increase in S/A at 56 DAT. TC/A, MSL or MSW were not generally affected by any of the glyphosate treatments on any of the sampling dates although MSL was negatively affected at 56 DAT (Tables 5-7). However, this decrease in MSL did not translate into a general reduction in TC/A. With no exceptions, TRS/TC was increased significantly by all glyphosate treatments, regardless of the rate or post-treatment interval (Tables 5-7).

In Test II, only the high rate of Palisade (0.312 lb/A) significantly increased S/A at both 42 and 56 DAT (Tables 5-7). No Palisade treatment increased (or decreased) S/A or had any significant affect on TC/A, TRS/TC, MSL or MSW at 28 DAT (Tables 5-7). At 42 DAT, the high rate of Palisade resulted in a significant increase in both TC/A and TRS/TC. TRS/TC was also significantly increased by Palisade at the two other rates tested at 42 DAT (Tables 5-7). At 56 DAT, the application of Palisade increased TRS/TC for the mid and high rates.

Both Test I and II had identical treatments with the only difference being that the second application of those treatments was deferred by one month (September 14 vs. August 18). Post-harvest sampling dates were the same for the two experiments at 28, 42 and 56 DAT. When averaging across all treatments and dates of sampling, there was a significant increase of 1,928 lb (8784 vs. 6856 lb) of S/A in favor of the later treatment date, September 14 (data not shown). This would indicate that the Louisiana sugarcane industry could significantly increase its overall yield of S/A by delaying harvest by one month in keeping with the historical startup date of October 15. Further, by delaying the harvest by one month and averaging across all treatments and dates of sampling, TC/A and TRS/TC would be increased by 4.2 tons and 29 lb, respectively

(data not shown). MSL and MSW would also be increased by 8.7 in and 0.27 lb, respectively by delaying the harvest by one month (data not shown). There were similar trends when comparing each treatment independently for the two treatment dates and averaging over the three sampling dates (data not shown).

This experiment shows that when applying glyphosate in August, the treatment-to-harvest interval should be shortened to 28 DAT to insure maximizing S/A. Although there is still a loss of TC/A associated with glyphosate treatments at 28 DAT, the increase in TRS/TC more than compensates for the loss of TC/A. However, with the early application date, by delaying harvest beyond 42 DAT could possibly reduce overall S/A when compared to untreated cane even though the increase in TRS/TC might exceed 35-50 lb. The overall reduction in S/A is caused by the significant reduction in TC/A associated with the glyphosate treatment. However, it appears that by delaying glyphosate treatments by one month (September 14 vs. August 18), it is more likely that S/A will be significantly increased regardless of the post-harvest interval. Overall, this experiment supports the current recommendations that glyphosate be applied to LCP 85-384 at the equivalent rate of Polado-L at 6 oz/A or 0.1875 lb ae/A (Legendre 2001).

This experiment also indicates that more studies should be conducted with Palisade, especially at the higher rates. Palisade apparently increases S/T without reducing TC/A as much as seen with most of the glyphosate treatments.

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Table 1. Number of millable stalks per acre for each treatment averaged across the three replications for each of the two tests, Test I and Test II, in the 2004 field experiment 1/.

Treatment	**Stalk Number Test I (counts)**	**Stalk Number Test II (counts)**
Control	44,189	42,302
Palisade @ 0.223 lb/A	41,576	41,769
Palisade @ 0.267 lb/A	44,480	40,753
Palisade @ 0.312 lb/A	44,189	42,495
Polado @ 4 oz/A	41,140	39,204
Polado @ 6 oz/A	42,495	41,672
Polado @ 8 oz/A	42,350	42,011
RdUp Weather Max @ 3.6 oz/A	40,124	41,576
RdUp Weather Max @ 5.3 oz/A	42,060	40,511
RdUp Weather Max @ 7.1 oz/A	41,285	43,705
Touchdown iQ @ 5.30 oz/A	44,964	43,754
Touchdown iQ @ 6.65 oz/A	45,109	41,818
Touchdown iQ @ 8.00 oz/A	41,092	40,172
Touchdown iQ @ 10.70 oz/A	42,253	42,834

1/ Millable stalk counts were conducted on August 11, 2004.

Table 2. Effect of 13 chemical ripener treatments when applied in mid August on yield of sugar per acre (Sugar/A), tons cane per acre (TC/A) and theoretical recoverable sugar per ton of cane (TRS/TC), mean stalk length (MSL) and mean stalk weight (MSW) when harvested at 28 days after treatment 1/.

Treatment	Sugar/A (lbs)	TC/A (tons)	TRS/TC (lbs)	MSL (in)	MSW (lb)
Control	5572	31.2	178	86.6	1.64
Palisade @ 0.223 lb/A	6282	30.4	206 +	83.5	1.70
Palisade @ 0.267 lb/A	6438	29.2	219 +	78.0 -	1.52
Palisade @ 0.312 lb/A	6314	29.3	216 +	79.8 -	1.54
Polado @ 4 oz/A	6073	27.3	222 +	77.4 -	1.54
Polado @ 6 oz/A	6557	29.2	224 +	77.2 -	1.60
Polado @ 8 oz/A	5961	26.9	221 +	78.5 -	1.48 -
RdUp Weather Max @ 3.6 oz/A	5657	25.9 -	219 +	77.3 -	1.50 -
RdUp Weather Max @ 5.3 oz/A	6063	26.8	226 +	78.7 -	1.48 -
RdUp Weather Max @ 7.1 oz/A	5779	26.0 -	222 +	75.3 -	1.47 -
Touchdown iQ @ 5.30 oz/A	6156	28.3	218 +	77.7 -	1.46 -
Touchdown iQ @ 6.65 oz/A	6287	29.3	215 +	78.7 -	1.50 -
Touchdown iQ @ 8.00 oz/A	5939	26.0 -	229 +	76.5 -	1.47 -
Touchdown iQ @ 10.70 oz/A	5783	26.5	219 +	77.7 -	1.46 -

1/ Treated, August 18, 2004; Sampled, September 14, 2004. TC/A based on estimated yield (mean stalk weight multiplied by the stalk count for each plot). (+) or (-) denotes values in a column are statistically higher or lower than control, respectively.

Table 3. Effect of 13 chemical ripener treatments when applied in mid August on yield of sugar per acre (Sugar/A), tons cane per acre (TC/A) and theoretical recoverable sugar per ton of cane (TRS/TC), mean stalk length (MSL) and mean stalk weight (MSW) when harvested at 42 days after treatment 1/.

Treatment	Sugar/A (lbs)	TC/A (tons)	TRS/TC (lbs)	MSL (in)	MSW (lb)
Control	5851	30.0	196	86.6	1.58
Palisade @ 0.223 lb/A	7751 +	32.4	239 +	85.3	1.81
Palisade @ 0.267 lb/A	7471 +	30.1	248 +	81.9	1.58
Palisade @ 0.312 lb/A	7629 +	31.5	241 +	83.5	1.66
Polado @ 4 oz/A	7285	28.3	258 +	79.5 -	1.61
Polado @ 6 oz/A	7207	29.0	248 +	78.7 -	1.59
Polado @ 8 oz/A	6948	27.5	253 +	78.0 -	1.51 -
RdUp Weather Max @ 3.6 oz/A	6466	27.3	236 +	80.1 -	1.58
RdUp Weather Max @ 5.3 oz/A	6695	27.7	241 +	80.3 -	1.53 -
RdUp Weather Max @ 7.1 oz/A	6950	28.7	242 +	82.2	1.62
Touchdown iQ @ 5.30 oz/A	7523 +	29.2	256 +	79.5 -	1.51 -
Touchdown iQ @ 6.65 oz/A	6587	29.1	226 +	81.4	1.50 -
Touchdown iQ @ 8.00 oz/A	7391 +	28.7	257 +	79.8 -	1.62
Touchdown iQ @ 10.70 oz/A	6614	27.2	244 +	80.1 -	1.49 -

1/ Treated, August 18, 2004; Sampled, September 29, 2004. TC/A based on estimated yield (mean stalk weight multiplied by the stalk count for each plot). (+) or (-) denotes values in a column are statistically higher or lower than control, respectively.

Table 4. Effect of 13 chemical ripener treatments when applied in mid August on yield of sugar per acre (Sugar/A), tons cane per acre (TC/A) and theoretical recoverable sugar per ton of cane (TRS/TC), mean stalk length (MSL) and mean stalk weight (MSW) when harvested at 56 days after treatment 1/.

Treatment	Sugar/A (lbs)	TC/A (tons)	TRS/TC (lbs)	MSL (in)	MSW (lb)
Control	7644	31.4	243	87.1	1.68
Palisade @ 0.223 lb/A	7279	30.0	243	80.8 -	1.65
Palisade @ 0.267 lb/A	8080	30.0	269 +	80.3 -	1.46
Palisade @ 0.312 lb/A	7403	27.8	266 +	76.1 -	1.41
Polado @ 4 oz/A	6565	25.0 -	264 +	76.9 -	1.65
Polado @ 6 oz/A	8163	29.9	273 +	76.6 -	1.54
Polado @ 8 oz/A	7584	28.1	270 +	75.1 -	1.57
RdUp Weather Max @ 3.6 oz/A	7479	27.1	276 +	76.6 -	1.58
RdUp Weather Max @ 5.3 oz/A	7623	28.5	267 +	78.0 -	1.63
RdUp Weather Max @ 7.1 oz/A	7587	29.0	261 +	76.1 -	1.45
Touchdown iQ @ 5.30 oz/A	7535	27.1	278 +	76.1 -	1.49
Touchdown iQ @ 6.65 oz/A	7477	28.9	259	78.2 -	1.48
Touchdown iQ @ 8.00 oz/A	7199	26.2	275 +	73.8 -	1.68
Touchdown iQ @ 10.70 oz/A	7093	26.6	268 +	73.5 -	1.41

1/ Treated, August 18, 2004; Sampled and harvested by cane combine, October 12, 2004. TC/A based on estimated yield (mean stalk weight multiplied by the stalk count for each plot). (+) or (-) denotes values in a column are statistically higher or lower than control, respectively.

Table 5. Effect of 13 chemical ripener treatments when applied in mid September on yield of sugar per acre (Sugar/A), tons cane per acre (TC/A) and theoretical recoverable sugar per ton of cane (TRS/TC), mean stalk length (MSL) and mean stalk weight (MSW) when harvested at 28 days after treatment 1/.

Treatment	**Sugar/A (lbs)**	**TC/A (tons)**	**TRS/TC (lbs)**	**MSL (in)**	**MSW (lb)**
Control	7366	31.9	231	88,4	1.76
Palisade @ 0.223 lb/A	7714	31.5	245	86.1	1.76
Palisade @ 0.267 lb/A	7344	30.1	245	85.6	1.72
Palisade @ 0.312 lb/A	8188	33.2	247	88.2	1.82
Polado @ 4 oz/A	8055	31.5	256 +	86.9	1.87
Polado @ 6 oz/A	6840	27.2 -	253 +	84.0	1.52
Polado @ 8 oz/A	8852 +	35.0	253 +	88.2	1.94
RdUp Weather Max @ 3.6 oz/A	8918 +	33.9	263 +	85.0	1.90
RdUp Weather Max @ 5.3 oz/A	8471	33.1	256 +	86.9	1.90
RdUp Weather Max @ 7.1 oz/A	7799	30.9	253 +	85.8	1.65
Touchdown iQ @ 5.30 oz/A	8439	32.8	257 +	83,7	1.74
Touchdown iQ @ 6.65 oz/A	8137	31.4	259 +	85.0	1.76
Touchdown iQ @ 8.00 oz/A	8517 +	33.2	257 +	88.2	1.92
Touchdown iQ @ 10.70 oz/A	8368	33.1	254 +	85.6	1.80

1/ Treated, September 14, 2004; Harvested, October 12, 2004. TC/A based on estimated yield (mean stalk weight multiplied by the stalk count for each plot). (+) or (-) denotes values in a column are statistically higher or lower than control, respectively.

Table 6. Effect of 13 chemical ripener treatments when applied in mid September on yield of sugar per acre (Sugar/A), tons cane per acre (TC/A) and theoretical recoverable sugar per ton of cane (TRS/TC), mean stalk length (MSL) and mean stalk weight (MSW) when harvested at 42 days after treatment 1/.

Treatment	**Sugar/A (lbs)**	**TC/A (tons)**	**TRS/TC (lbs)**	**MSL (in)**	**MSW (lb)**
Control	7248	31.7	229	92.9	1.75
Palisade @ 0.223 lb/A	7567	30.4	249 +	86.1 -	1.69
Palisade @ 0.267 lb/A	8431	32.9	256 +	92.1	1.88
Palisade @ 0.312 lb/A	9188 +	36.2 +	254 +	93.7	1.98
Polado @ 4 oz/A	9611 +	33.3	289 +	91.1	1.98
Polado @ 6 oz/A	8482	30.8	276 +	88.2	1.72
Polado @ 8 oz/A	8880 +	32.9	270 +	90.3	1.83
RdUp Weather Max @ 3.6 oz/A	10184 +	35.4	288 +	88.2	1.98
RdUp Weather Max @ 5.3 oz/A	9213 +	33.2	278 +	90.3	1.91
RdUp Weather Max @ 7.1 oz/A	8997 +	32.7	276 +	87.9	1.74
Touchdown iQ @ 5.30 oz/A	8970 +	33.0	271 +	90.3	1.76
Touchdown iQ @ 6.65 oz/A	9101 +	32.5	280 +	89.0	1.81
Touchdown iQ @ 8.00 oz/A	8381	29.6	284 +	85.3 -	1.71
Touchdown iQ @ 10.70 oz/A	9240 +	33.1	279 +	90.3	1.80

1/ Treated, September 14, 2004; Harvested, October 26, 2004. TC/A based on estimated yield (mean stalk weight multiplied by the stalk count for each plot). (+) or (-) denotes values in a column are statistically higher or lower than control, respectively.

Table 7. Effect of 13 chemical ripener treatments when applied in mid September on yield of sugar per acre (Sugar/A), tons cane per acre (TC/A) and theoretical recoverable sugar per ton of cane (TRS/TC), mean stalk length (MSL) and mean stalk weight (MSW) when harvested at 56 days after treatment 1/.

Treatment	Sugar/A (lbs)	TC/A (tons)	TRS/TC (lbs)	MSL (in)	MSW (lb)
Control	8618	34.1	253	92.4	1.89
Palisade @ 0.223 lb/A	8653	32.9	263	87.9	1.83
Palisade @ 0.267 lb/A	8215	30.1	273 +	85.3 -	1.72
Palisade @ 0.312 lb/A	9863 +	36.9	267 +	90.3	2.02
Polado @ 4 oz/A	9316	31.3	298 +	85.6 -	1.86
Polado @ 6 oz/A	9336	30.9	302 +	83.7 -	1.73
Polado @ 8 oz/A	10107 +	34.2	296 +	89.5	1.89
RdUp Weather Max @ 3.6 oz/A	9249	30.9	299 +	85.0 -	1.73
RdUp Weather Max @ 5.3 oz/A	9980 +	33.7	297 +	86.4 -	1.93
RdUp Weather Max @ 7.1 oz/A	8663	29.6 -	293 +	85.8 -	1.58 -
Touchdown iQ @ 5.30 oz/A	10322 +	36.0	287 +	93.2	1.91
Touchdown iQ @ 6.65 oz/A	10661 +	35.3	302 +	86.6 -	1.97
Touchdown iQ @ 8.00 oz/A	9600	32.4	296 +	85.8 -	1.88
Touchdown iQ @ 10.70 oz/A	9849 +	34.0	291 +	88.5	1.84

1/ Treated, September 14, 2004; Harvested, November 10, 2004. TC/A based on estimated yield (mean stalk weight multiplied by the stalk count for each plot). (+) or (-) denotes values in a column are statistically higher or lower than control, respectively.

Table 8. Regrowth ratings for Test I in the fall following harvest 1/.

Treatment	Regrowth
Control	3
Palisade @ 0.223 lb/A	3
Palisade @ 0.267 lb/A	4
Palisade @ 0.312 lb/A	3
Polado @ 4 oz/A	6
Polado @ 6 oz/A	8
Polado @ 8 oz/A	8
RdUp Weather Max @ 3.6 oz/A	6
RdUp Weather Max @ 5.3 oz/A	7
RdUp Weather Max @ 7.1 oz/A	9
Touchdown iQ @ 5.30 oz/A	7
Touchdown iQ @ 6.65 oz/A	7
Touchdown iQ @ 8.00 oz/A	7
Touchdown iQ @ 10.70 oz/A	9

1/ Test I treated August 18, 2004; Harvested by cane combine October 12, 2004; Rated November 16, 2004; Plots were rated for regrowth (shoot number and uniformity of shoots on the row) using a rating scale of 1-9 with 1 representing excellent and uniform stands and 9 representing very poor and irregular stands.