A Final Report to the Texas Corn Board Concerning

The Control of Tropical Dayflower, *Comelina erecta*, in Non-RR Corn on the Texas Gulf Coast

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2005 Final Report to Texas Corn Producers Board

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Background.
The goal of this experiment and test location (Howard Book/Stephen Moreno Farm) was to evaluate various products for control of tropical dayflower in conventional (non-RR) corn. No herbicide combinations using glyphosate (Roundup) or its analogue (Touchdown) were to be used. This is important in that many corn growers have not elected to adopt RR technology due to cost.

In 2004 it was reported that during such a wet growing season, as much as 19.2 bu/A of corn were gained from herbicide treatments over and above the "untreated lay-by" or "cultivated" plots. In fact, every herbicide treatment to control dayflower had a positive yield response.

Tropical (Erect) Dayflower is an aggressive perennial weed that is of particular concern in wet growing seasons. When not controlled, dayflower produces an abundance of seed after corn is laid-by, especially in the weeks while corn is maturing and drying down. This test was an attempt to prevent dayflower from blooming and; if possible, to destroy any dayflower growing at layby and to prevent subsequent germination of dayflower seed.

Materials and Methods.
On April 22, 2005, a dayflower control test was established on the Book/Moreno Farm, Victoria County, Texas, using seven herbicide combinations. Evaluations were compared to untreated checks, and each treatment was replicated four times. Plots were 40 feet long and 6-rows wide, and were established at lay-by time using a Spider self-propelled field sprayer. The prevalence of dayflower was surveyed in the center row of each treatment (100 ft^2) and was recorded, in order to determine the efficacy of each treatment. The producer reserved 48 30-inch rows of field corn for the test. In the preliminary dayflower survey (table 2), substantially lower densities of Comminela erecta were found on the western 12 rows of the experiment site. This is relevant to the later decision to discard the "A" replication of the experiment. At the time of herbicide treatment, almost all dayflower was in the 2-3 leaf stages of growth. Densities of dayflower ranged from 0 to over 2.25 plants per square foot.

The producers planted Pioneer 31B13 on February 21st using a cat tractor and a White 6824 16-row planter. Conditions were marginal for planting (wet) as much rainfall had delayed field operations (3.6 inches in February). Herbicides used at planting included 1 qt/A atrazine on February 22 followed by 1 qt/A Honcho on the 24th. The producers also applied 14 oz/A of Basis Gold (labeled rate), which contains 82.44% atrazine and 1.34 oz/A of Accent (nicosulfuron) and an equivalent amount of Matrix (rimsulfuron). The last two ingredients are grass control herbicides. A 4 oz/A application was Clarity was also made on March 25th. This test was established on the Book/Moreno site on top of what was already an aggressive herbicide

program. The problem was, there was still as much as 2.5 DF/ft^2 coming through those treatments.

A total of 8.35 inches of rainfall was received at the Dacosta weather station during the growing season (March 1 -to- July 11. The crop was made by two rainfall events (1.28 and 1.09 inches) received on 5/29 and 6/1, respectively. In the fall the site received 22 lb/A N and was supplied with an additional 90 lbs/A N with a spoke-wheel applicator on March 14th (21 DAP).

Treatments used included:

1. 0.75 oz/A Steadfast + NIS
2. 1 qt/A atrazine + 2 pt/A Dual Magnum + NIS
3. 6.67 oz/A Celebrity + NIS
4. 8 oz/A Clarity + NIS
5. 4 oz/A Distinct + NIS + AMS
6. 0.33 oz/A Aim + NIS + AMS
7. 1 pt/A 2,4-D + NIS + 1 pt/A Dual Magnum
8. UTC

Results and Conclusions.
The presence of erect dayflower was not uniform and was totally absent from one plot. Table 1 is the plot layout and Table 2 lists dayflower counts made on 22 April (day of test establishment).

Table 1. Layout of herbicide treatments made on 22 April 2005, for control of Asiatic Dayflower, Texas Cooperative Extension, Book/Moreno Farm, Victoria County, Texas.

Tier 4	7	8	1	2	3	4	5	6
Tier 3	5	6	7	8	1	2	3	4
Tier 2	3	4	5	6	7	8	1	2
Tier 1	1	2	3	4	5	6	7	8

Table 2. Counts of Asiatic Dayflower made in center row of 32 plots (40'x30") on the day of herbicide application, Texas Cooperative Extension, Book/Moreno Farm, Victoria County, Texas.

Tier 4	0	1	11	200+	9	24	50	18
Tier 3	3	3	4	74	20	47	150	50
Tier 2	2	6	10	225+	110	200	190	95
Tier 1	9	12	27	125+	50	170	200	105

Note. Dayflower densities/ft^2 may be calculated by dividing counts by 100.

Table 3. Final count of Asiatic Dayflower made in center row of 32 plots (40'x30"), Texas Cooperative Extension, Book/Moreno Farm, Victoria County, Texas.

Tier 4	0	0	1	11	2	11	29	8
Tier 3	0	0	0	73	12	21	16	63
Tier 2	0	1	2	91	0	198	72	7
Tier 1	5	2	1	43	11	56	9	98

[1] Counted 5 July 2005

A mid-course evaluation was made 15 June 2005, where dayflower counts were made from the center row-middle of each plot. Shading and a fairly uniform stand of Texas panicum were useful in reducing dayflower growth. Most dayflower was kept in the 2-4 leaf stage (stunted) except for where noted. The untreated check produced some plants 7-8 inches in height. Some larger plants were also observed in treatments 4 (Clarity + NIS), treatment 3 (Celebrity + NIS) and treatment 7 (2,4-D + Dual Magnum). The cleanest plots appeared to be treatments 1 and 2, which contained Steadfast, Celebrity or atrazine + Dual Magnum. Evaluations were made on the reduction in the overall number of dayflower plants since treatment with herbicide, whether the dayflower bloomed during the corn's growth cycle, and the final number and size of dayflower. It was determined that all treatments provided valuable reductions in dayflower populations, but the greatest suppression was with residual materials rather than burn-down products (Distinct, Aim, AMS). If the corn planted had been Roundup Ready, "Sequence" would have been evaluated (touchdown + Dual Magnum).

Weed counts before and after layby treatments were converted to "percent control" to avoid weighting due to the number of dayflower in each replication. Replication 1 was dropped due to the low number of dayflower plants present at the time of treatment, and the remaining 3 replications were evaluated statistically using ARM (see figure 1) and the ARM evaluation sheets.

The impact and affect of mid-to-late season drought on the die-back and death of erect dayflower can only be estimated. Because of the difficulty in distinguishing dry, shriveled dayflower plants from Texas panicum dry, shriveled seedlings, only the dayflower plants with green stems or one or more green leaves were counted as "live plants". These living plants were used to calculate percent control. The high coefficient of variability is probably a result of differences in soil moisture regime, the presence and incidence of dayflower plants, the size of the dayflower plants at the time of treatment, and the injury caused by the herbicide treatments.

Because of the reduced weed pressure due to lack of rainfall, grain yields were only thought to be different where major differences in grass control were found (treatments 1,2,3 and 7. By far, the best observed control of dayflower was with the 1 pt/A 2,4-D + 1 pt/A DualMAG. Economically, the cost of this treatment go far in reducing the number of dayflower plants surviving after corn harvest is completed. Control ranged from 96 to 100% using the 1 pt/A 2,4-D + 1 pt/A DualMagnum. Most impressive was the large number of dayflower present in some of these test plots where nearly full control was obtained.

The primary purpose in taking a hand harvest on these plots was suspicion that the poor grass

control in some plots would influence yields for those treatments. Also, it was assumed that the untreated check plots would have the lowest yields of any of the layby herbicide treatments. Having observed some yield drag with dayflower populations of 12-15 plts/ft^2, it was not certain that a low population like 2 plts/ft^2 would have any impact in a dry year. Because the bottoms of corn plants had "fired" early, and appeared to have lost their green leaves earlier than normal, it was assumed that yields would be lower than 2004.

Table 4. Corn yields obtained with seven herbicide treatments applied to conventional (non-RR) corn, Texas Cooperative Extension, Book/Moreno Farm, Victoria County, TX.

Treatment	Rep 1	Rep 2	Rep 3	Rep 4	Average
0.75 oz/A Steadfast	159	148	153	158	155
2 pt/A Atrazine + 2 pt DualMag	146	156	156	152	152
6.67 oz/A Celebrity + AMS	153	149	149	153	156
8 oz/A Clarity	133	157	164	161	153
4 oz/A Distinct + AMS	161	168	167	161	164
0.33 oz/A AIM + AMS	156	161	166	167	162
1 pt/A 2,4-D + 1 pt/A DualMag	156	148	153	149	152
UTC	175	153	155	169	163

On the day of hand-harvest, kernel moisture was 19.2%, and the ears were bright and glossy although small in size. The kernels were deep and, the 30-inch row production was very clean grain and had very little corn earworm damage due to full shuck coverage. There was no visible sign of ear diseases. The cobs were still quite wet and rubbery. The average number of plants per acre was 24,000 and the average bushel weight was 57 lbs/bu. These evidences demonstrate that the corn was not deficient for moisture from dent to black layer (20 days).

The post-flowering drought limited the germination of new weed seedlings, and restricted the growth of established weeks. Panicum, dayflower and larger weeds were all in some stage of moderate wilting and die-back. Some of the dayflower appeared to be 2-3 leaf dayflower that failed to grow beyond those leaf stages. The number of dayflower in two of the check plots decreased without any herbicide treatment, indicating that some of the seedlings did not become established due to lack of adequate rainfall.

ARM analyses revealed no significant yield differences between herbicide treatments. A very low CV of 4.82 was obtained. It is interesting that the dayflower populations and herbicide treatments did not seem to have any effect whatsoever on the yields of grain. Likewise, the layout of the test did not suggest that any particular patterns of yield occurred within the test. Strangely, some of the highest yields were obtained where there was poor grass control and/or

untreated check. Had this been a wet year like it was in 2004, the effects of dayflower on grain yields would have been substantial.

Conclusions.

1. The most effective control of erect dayflower was provided by 1.0 pt/A 2,4-D + 1 pt/A Dual Magnum + NIS (98.5% control). The next best product combinations were 2 pt/A atrazine + 2 pt/A Dual Magnum + NIS (80.8%) and 6.67 oz/A Celebrity + AMS + NIS (72.4%).

2. Unfortunately, the products providing the best dayflower control were also the <u>most expensive</u>: $17.31, $29.56 and $34.28, respectively. The most economical treatments were also the <u>lowest</u> in dayflower control.

3. In 2005 dayflower and grass pressure did not seem to affect grain yields. Grain yields in the untreated checks were on-par with all of the herbicide treatments. Because the late season drought and plant shading was suppressing dayflower growth, the herbicide treatments provided no economic advantage.

4. Every herbicide combination was effective in suppressing bloom and seed production during the course of the experiment. Only the untreated check plot produced dayflower bloom.

5. Based on 2004 and 2005 results, erect dayflower may only be a problem during wet growing seasons; subsequently, herbicide control at lay-by may not be necessary or economical when conditions are dry in May through July (harvest).

Unfortunately, the grower is unable to predict if rainfall will be light or missing after the corn is laid-by. After the final cultivation or at lay-by, an economical herbicide treatment is needed to provide both broadleaf and grass control during the time that corn ears develop and kernels fill. The cost of the pint of Dual Magnum drives the cost of the best herbicide treatment to $17.31/A. At today's corn prices, this would require an additional 7-10 bushels of corn to justify the herbicide product and application.

The presence of 24 DF/ft^2 encountered in 2004 was sufficient to justify application. The presence of 2.4 DF/ft^2 in 2005, was not. If the producer can be assured of clean row-middles at lay-by through cultivation or previous herbicide control, this may be preclude having to make any special lay-herbicide application for dayflower.

Figure 1. Percent control of tropical dayflower in non-RR corn using seven herbicide combinations, Texas Cooperative Extension, Howard Book/Stephen Moreno Farm, Victoria County, 2005.

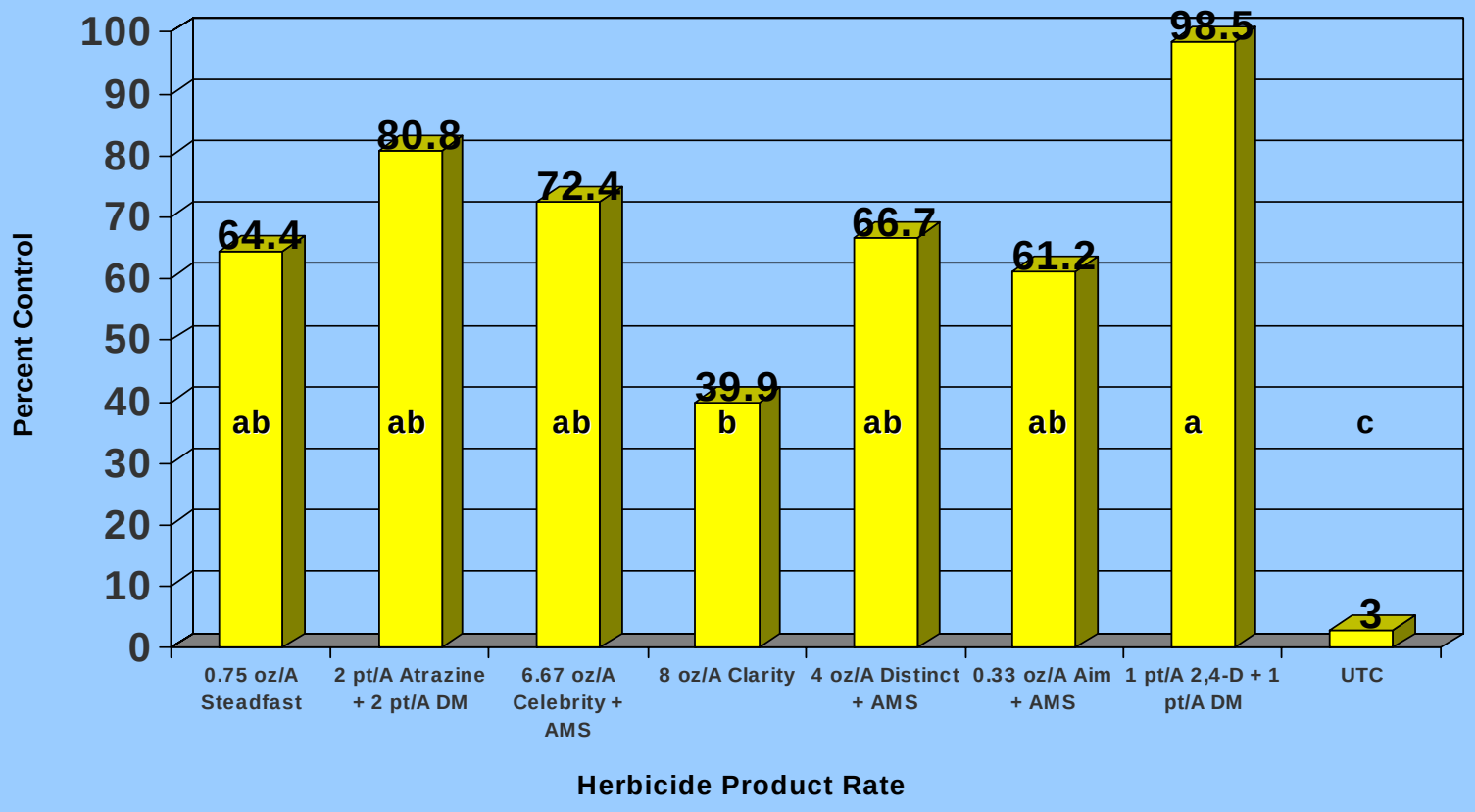


Figure 2. Percent control and product cost using seven herbicide combinations to control tropical dayflower in conventional (non-RR) corn, Texas Cooperative Extension, Book/Moreno Farm, Victoria County, 2005

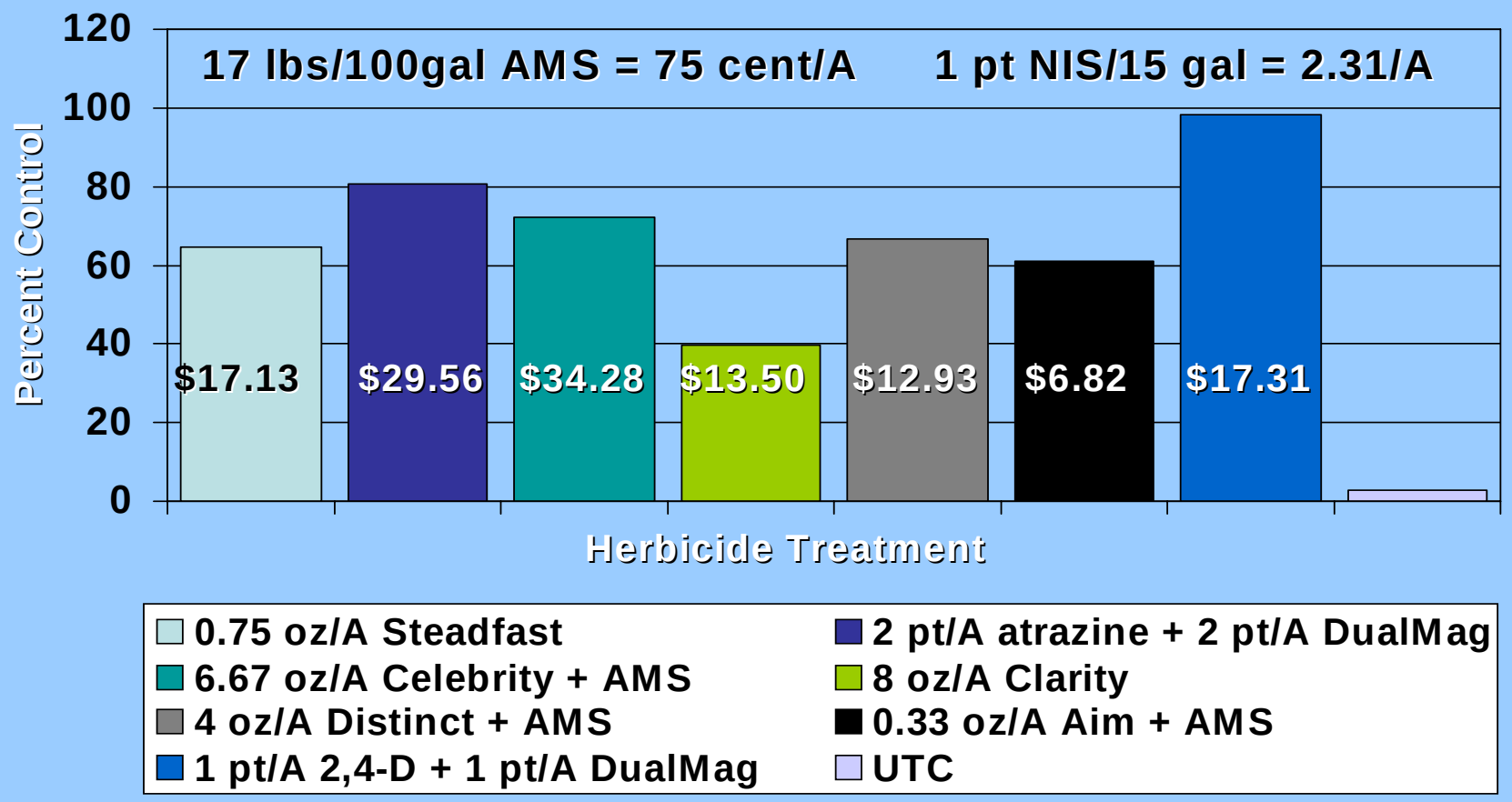
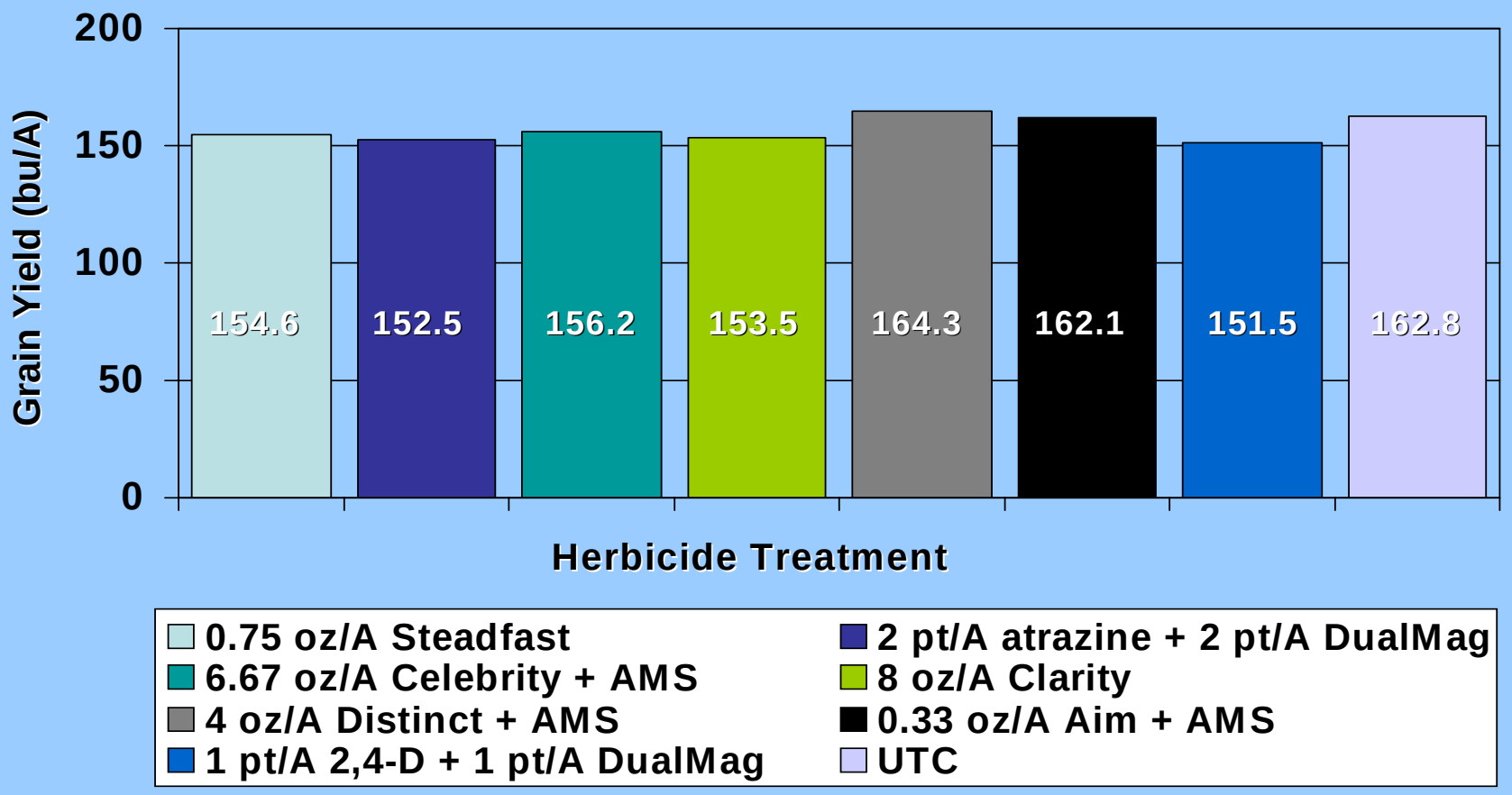


Figure 3. Grain yields from plots treated with seven herbicide combinations to control tropical dayflower in conventional (non-RR) corn, Texas Cooperative Extension, Book/Moreno Farm, Victoria County, 2005



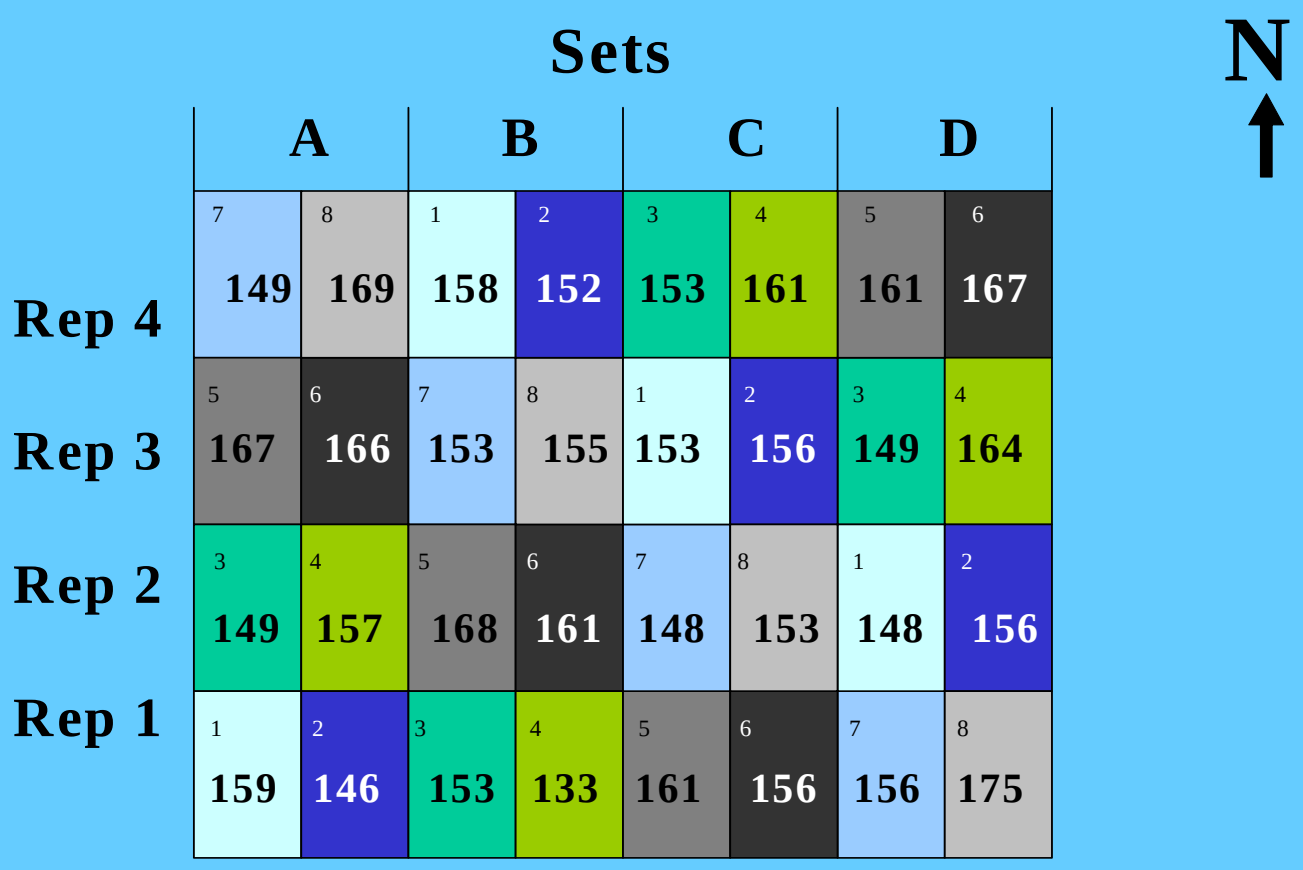


Figure 4. Plot diagram of corn yields (bu/A) by replication of herbicide treatments, Texas Cooperative Extension, Steve Moreno Farm, Victoria County, Texas, 2005.