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Soil & Crop Sciences

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Texas Agricultural Extension Service
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TITLE:

Evaluation of Micro Flo MFX Plant Growth Regulators in LEPA Irrigated Cotton, AGCARES, Lamesa, TX, 1997.

AUTHORS:

Randy Boman, Danny Carmichael, P.J. Bessire, and John Farris; Extension Agronomist-Cotton, Extension Associate-Cotton, Student Worker, and CEA-Agriculture

MATERIALS AND METHODS:

Variety:	Paymaster HS26
Seeding rate:	15 lb seed/acre
Plot size:	4-40 inch rows x 50 ft, 2 center rows harvested for yield using a modified John Deere 482 plot stripper
Plot size:	4 - 40-inch rows by 50 ft
Experimental design:	randomized complete block with 4 replications
Planting date:	May 7
Irrigation and nitrogen management:	LEPA 0.75 ET replacement June 0” July 2.85” + 90 lb N/acre August 3.60” + 30 lb N/acre September 0.40” Seasonal total 9.18” + 140 lb N/acre
Stripper harvested:	October 17
Application timing:	4 sequential applications of 4 oz/acre (16 oz total): June 30 at 9 nodes July 9 - 9 days after first treatment (DAFT) July 17 - 17 DAFT July 25 - 25 DAFT

Treatments:

1. Untreated check
2. MFX 2294
3. MFX 2494
4. MFX 3294
5. MFX 4294 (now labeled Mep Plus)
6. Mepiquat chloride

RESULTS AND DISCUSSION:

Plant growth regulators (PGRs) have been used for many years in cotton production to modify growth and fruiting patterns. Inconsistencies of performance of PGR programs require testing in multiple locations and environments. This in turn increases knowledge and enables researchers and Extension workers to obtain better information on such materials. During the last two years, workers have been evaluating new formulations of mepiquat chloride (MC) with *Bacillus cereus* (BC) bacterial additives which have been observed to enhance uptake of MC. The BC additive is also reported to increase potential of positive yield responses in many locations across the cotton belt. The MFX 4294 material was recently labeled as MepPlus (4.2% MC + 2 g/gallon BC). The objectives of this work were to evaluate the effects of various MFX materials on growth, fruiting patterns and lint yield.

No statistically significant differences were observed for most response variables in 1997. Lint and seed yield, gin turnout and seed percentages, and the lint to seed ratio differences among treatments were not statistically significant (Table 1). Middle strata seedcotton weight (from a 50 boll/plot sample) tended to be numerically higher for most PGR treatment regimes than the untreated check (Table 1). Plant height, total mainstem nodes, height to node ratios, and open boll percentages over a 3-week period were not affected by any PGR treatment regime (Tables 2 and 3). No significant differences were noted for final plant mapping parameters with the exception of final plant height (Table 4). For reasons that are unclear, final plant height was significantly larger in the MC treatment (treatment 6) than other treatments, including the untreated check. This difference was observed across all 4 replications. Even though the crop produced in excess of 2 bales per acre, plant size was never excessive (the average across all treatments and replications was 21.8 inches) due to the high degree of control of irrigation and nitrogen fertilizer inputs via the low energy precision application irrigation (LEPA) system. No significant differences were noted for HVI fiber properties (Table 5).

Table 1. Response of lint and seed yields, gin turnout, seed percentage, lint to seed ratio, percent open bolls on September 1, and middle strata boll seedcotton weight to MicroFlo MFX and MC plant growth regulators, AGCARES, Lamesa, TX, 1997.

Treatment	Lint Yield (lb/acre)	Seed Yield (lb/acre)	Gin Turnout (%)	Seed (%)	Lint/Seed Ratio (ratio)	Middle Strata Boll Weight (g sc/boll)
1. Untreated check	1135	2090	24.8	45.6	0.54	5.8
2. MFX 2294	1085	2040	24.0	45.2	0.53	6.2
3. MFX 2494	990	1890	23.5	45.1	0.52	6.0
4. MFX 3294	1095	2040	23.9	44.7	0.53	6.0
5. MFX 4294	1075	2060	24.2	46.3	0.52	6.1
6. MC	1015	1950	23.6	45.3	0.52	6.4
CV, %	6.8	5.9	4.0	2.9	2.7	6.2
LSD 0.05	NS	NS	NS	NS	NS	NS

NS - nonsignificant.

Table 2. Response of plant height in inches, nodes, and height to node ratios to MicroFlo MFX and MC plant growth regulators, AGCARES, Lamesa, TX, 1997.

Treatment	Height 6-30	Nodes 6-30	Height to Node Ratio 6-30	Height 7-8	Nodes 7-8	Height to Node Ratio 7-8	Height 7-16	Nodes 7-16	Height to Node Ratio 7-16
1. Untreated check	9.2	9.0	1.02	11.8	10.5	1.12	16.7	13.7	1.21
2. MFX 2294	9.0	8.6	1.03	11.3	10.1	1.12	15.4	12.8	1.20
3. MFX 2494	9.5	8.6	1.10	12.3	10.4	1.18	16.8	13.6	1.23
4. MFX 3294	9.3	8.5	1.08	12.2	10.3	1.19	16.9	13.8	1.23
5. MFX 4294	9.0	8.2	1.08	11.6	10.0	1.15	16.7	13.4	1.24
6. MC	9.2	8.6	1.06	10.8	9.6	1.12	15.6	13.1	1.18
CV, %	7.1	5.9	3.00	6.3	6.9	5.1	6.4	5.5	3.5
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS

NS - nonsignificant.

Table 3. Response of plant height in inches, nodes, and height to node ratios, and open percent bolls to MicroFlo MFX and MC plant growth regulators, AGCARES, Lamesa, TX, 1997.

Treatment	Height 7-25	Nodes 7-25	Height to Node Ratio 7-25	Height 7-31	Nodes 7-31	Height to Node Ratio 7-16	% Open Bolls 10-1	% Open Bolls 10-8	% Open Bolls 10-15
1. Untreated check	19.7	15.5	1.26	19.5	15.7	1.24	6.9	18.7	55.6
2. MFX 2294	18.4	14.6	1.27	19.5	15.8	1.23	6.3	23.7	50.9
3. MFX 2494	18.7	14.8	1.26	19.2	15.3	1.25	3.1	11.8	63.8
4. MFX 3294	19.0	15.2	1.25	19.5	15.8	1.23	5.5	16.1	58.8
5. MFX 4294	18.9	14.8	1.27	19.4	15.4	1.25	4.8	22.8	54.3
6. MC	18.7	14.8	1.26	18.5	15.1	1.22	3.7	10.7	59.1
CV, %	4.7	4.7	3.6	5.9	4.4	3.0	75.1	46.0	12.4
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS

NS - nonsignificant.

Table 4. Response of total fruiting branches, final plant height, final height to node ratio, percent first, second and third position bolls, total bolls per plant, and percent boll retention of first five fruiting branches to MicroFlo MFX and MC plant growth regulators, AGCARES, Lamesa, TX, 1997.

Treatment	Total Fruiting Branches	Final Plant Height	Final Height to Node Ratio	% 1st Position Bolls	% 2nd Position Bolls	% 3rd Position Bolls	Total bolls per plant	% Boll Retention of bottom 5 fruiting branches
1. Untreated check	11.8	21.2	1.18	91.0	6.9	1.9	6.5	75.8
2. MFX 2294	12.1	20.6	1.28	80.1	15.2	4.5	6.4	74.2
3. MFX 2494	12.0	20.6	1.28	83.2	14.6	2.0	6.5	74.8
4. MFX 3294	12.3	21.6	1.32	85.1	12.0	1.2	6.3	75.6
5. MFX 4294	12.1	22.1	1.35	88.6	9.6	0.5	6.4	74.8
6. MC	12.4	24.5	1.21	85.5	12.4	1.1	6.1	74.3
CV, %	6.3	5.4	10.5	9.0	46.1	131.5	6.9	4.7
LSD 0.05	NS	1.8	NS	NS	NS	NS	NS	NS

NS - nonsignificant.

Table 5. Response of HVI fiber properties to MicroFlo MFX and MC plant growth regulators, AGCARES, Lamesa, TX, 1997.

Treatment	Micronaire units	Length inches	Uniformity Index %	Strength g/tex	Elongation %	HVI Leaf Grade units	Rd units	+b units
1. Untreated check	4.75	1.080	83.6	32.1	11.1	5.2	78.0	8.0
2. MFX 2294	4.81	1.075	83.2	31.7	11.2	5.5	77.9	7.8
3. MFX 2494	4.75	1.090	83.6	30.7	11.0	6.5	77.3	7.8
4. MFX 3294	4.75	1.077	83.3	33.1	10.9	6.0	77.7	7.8
5. MFX 4294	4.75	1.087	83.0	31.8	11.2	5.2	78.0	7.9
6. MC	4.75	1.072	82.7	32.8	11.0	5.7	77.9	8.1
CV, %	4.90	6.8	0.8	4.4	3.7	12.0	0.9	2.6
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS

NS - nonsignificant.

TITLE:

Evaluation of Micro Flo PGR IV Plant Growth Regulator in LEPA Irrigated Cotton, AGCARES, Lamesa, TX, 1997.

AUTHORS:

Randy Boman, Danny Carmichael, P.J. Bessire, and John Farris; Extension Agronomist-Cotton, Extension Associate-Cotton, Student Worker, and CEA-Agriculture

MATERIALS AND METHODS:

Variety:	Paymaster HS26
Seeding rate:	15 lb seed/acre
Plot size:	4-40 inch rows x 50 ft, 2 center rows harvested for yield using a modified John Deere 482 plot stripper
Plot size:	4 - 40-inch rows by 50 ft
Experimental design:	randomized complete block with 4 replications
Planting date:	May 7
Irrigation and nitrogen management:	LEPA 0.75 ET replacement June 0” July 2.85” + 90 lb N/acre August 3.60” + 30 lb N/acre September 0.40” Seasonal total 9.18” + 140 lb N/acre
Stripper harvested:	October 17
Treatment timing:	PHS (pinhead square), EB (early bloom), mid-bloom (MB)
First application:	June 30
Second application:	9 days after first treatment (DAFT), July 9
Third application:	17 DAFT, July 17
Fourth application:	25 DAFT, July 25
Treatments:	1. Untreated check 2. 2 oz/acre PGR IV PHS followed by (FB) 2 oz EB FB 2 oz mid-bloom 3. 4 oz/acre mepiquat chloride (MC) + 2 oz PGR IV PHS FB 4 oz/acre MC + 2 oz PGR IV EB FB 4 oz/acre MC + 2 oz PGR IV mid-bloom 4. 4 oz/acre MC at 9 nodes 5. 4 oz/acre MC at 9 nodes FB 4 oz 9 days after first treatment (DAFT) 6. 4 oz/acre MC at 9 nodes FB 4 oz 9 DAFT FB 4 oz 18 DAFT

RESULTS AND DISCUSSION:

Plant growth regulators (PGRs) have been used for many years in cotton production to modify growth and fruiting patterns. Inconsistencies of performance of PGR programs require testing in multiple locations and environments. This in turn increases knowledge and enables researchers and Extension workers to obtain better information on such materials. PGR IV is a product that contains a mix of low concentrations of plant hormones (gibberellic acid, indole butyric acid and other organics). Consistent yield benefits have not been observed in research plots in the High Plains region. The objectives of this work were to evaluate the effects of PGR IV and mepiquat chloride (MC) on growth, fruiting patterns lint yield, and HVI fiber properties.

No statistically significant differences were observed for most response variables in 1997. Lint and seed yield, gin turnout and seed percentages, and the lint to seed ratio differences among treatments were not statistically significant (Table 1). Middle strata seedcotton weight (from a 50 boll/plot sample) for some MC treatment regimes was significantly larger than the untreated check (Table 1). Plant height, mainstem nodes, and height to node ratios were not affected by any PGR treatment regime, with the exception of the July 16th height to node ratio (Table 2). A small reduction in height to node ratio (as compared to the check) was noted arising from PGR IV (treatment 2), PGR IV + MC (treatment 3) and some MC regimes (treatments 5 and 6). The reason for this is due to the fact that plants in the check had numerically more mainstem nodes and was larger in height than the other treatments. Total mainstem node number was less for one MC treatment (treatment 5) when compared to the check on July 31 (Table 3). Open boll percentage on October 8th was highest for one MC treatment (treatment 5), when compared to the check and PGR IV treatments (treatments 2 and 3). No significant differences were noted for final plant mapping parameters (Table 4) or HVI fiber properties (Table 5).

Table 1. Response of stand count, gin turnout, seed percentage, lint to seed ratio, lint yield, seed yield, percent open bolls on September 1, and middle strata boll seedcotton weight to MicroFlo MFX and MC plant growth regulators, AGCARES, Lamesa, TX, 1997.

Treatment	Lint Yield (lb/acre)	Seed Yield (lb/acre)	Gin Turnout (%)	Seed (%)	Lint/Seed Ratio	Middle Strata Boll Weight (g sc/boll)
1. Untreated check	1050	1970	24.3	45.7	0.53	5.7
2. 2 oz/acre PGR IV PHS FB 2 oz EB FB 2 oz mid-bloom	1135	2115	24.3	45.1	0.53	6.0
3. 4 oz/acre MC + 2 oz PGR IV PHS FB 4 oz/acre MC + 2 oz PGR IV EB FB 4 oz/acre MC + 2 oz PGR IV mid-bloom	1060	1985	24.2	45.3	0.53	5.8
4. 4 oz/acre MC at 9 nodes	1105	2100	24.5	46.6	0.52	6.2
5. 4 oz/acre MC at 9 nodes FB 4 oz 9 DAFT	1020	1935	23.9	45.5	0.52	6.1
6. 4 oz/acre MC at 9 nodes FB 4 oz 9 DAFT FB 4 oz 18 DAFT	1045	1920	24.7	45.6	0.54	6.3
CV, %	7.7	6.9	3.1	1.9	2.6	4.8
LSD 0.05	NS	NS	NS	NS	NS	0.4

EB - early bloom, FB - followed by, MC - mepiquat chloride, PHS - pinhead square, DAFT - days after first treatment, NS - nonsignificant

Table 2. Response of plant height in inches, nodes, and height to node ratios to MicroFlo PGR IV and MC plant growth regulators, AGCARES, Lamesa, TX, 1997.

Treatment	Height 6-30	Nodes 6-30	Height to Node Ratio 6-30	Height 7-8	Nodes 7-8	Height to Node Ratio 7-8	Height 7-16	Nodes 7-16	Height to Node Ratio 7-16
1. Untreated check	9.4	8.9	1.05	12.2	10.5	1.16	17.3	13.7	1.26
2. oz/acre PGR IV PHS FB 2 oz mid-bloom	8.7	8.3	1.05	11.0	9.7	1.13	15.5	12.8	1.21
3. 4 oz/acre MC + 2 oz PGR IV PHS FB 4 oz/acre MC + 2 oz PGR IV EB FB 4 oz/acre MC + 2 oz PGR IV mid-bloom	9.4	8.7	1.09	11.6	10.0	1.16	16.4	13.5	1.21
4. 4 oz/acre MC at 9 nodes	9.6	8.6	1.11	11.5	9.9	1.16	16.9	13.5	1.25
5. 4 oz/acre MC at 9 nodes FB 4 oz 9 DAFT	8.6	7.9	1.09	10.8	9.3	1.16	15.9	13.3	1.19
6. 4 oz/acre MC at 9 nodes FB 4 oz 9 DAFT FB 4 oz 18 DAFT	9.3	8.7	1.08	10.8	9.6	1.13	16.0	13.5	1.19
CV, %	6.8	6.6	3.9	6.2	5.2	3.6	8.4	7.1	2.6
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS	0.05

EB - early bloom, FB - followed by, MC - mepiquat chloride, PHS - pinhead square, DAFT - days after first treatment, NS - nonsignificant

Table 3. Response of plant height in inches, nodes, height to node ratios, and percent open bolls to MicroFlo PGR IV and MC plant growth regulators, AGCARES, Lamesa, TX, 1997.

Treatment	Height 7-25	Nodes 7-25	Height to Node Ratio 7-25	Height 7-31	Nodes 7-31	Height to Node Ratio 7-16	% Open Bolls 10-1	% Open Bolls 10-8	% Open Bolls 10-15
1. Untreated check	19.7	15.3	1.29	20.0	15.7	1.28	5.2	12.8	48.6
2. oz/acre PGR IV PHS FB 2 oz mid-bloom	18.8	14.7	1.28	19.5	15.3	1.28	4.5	11.7	52.4
3. 4 oz/acre MC + 2 oz PGR IV PHS FB 4 oz/acre MC + 2 oz PGR IV EB FB 4 oz/acre MC + 2 oz PGR IV mid-bloom	18.4	14.9	1.23	19.0	15.7	1.21	4.1	11.5	59.2
4. 4 oz/acre MC at 9 nodes	19.3	14.9	1.29	20.0	16.0	1.24	6.5	15.5	54.4
5. 4 oz/acre MC at 9 nodes FB 4 oz 9 DAFT	18.4	14.7	1.25	18.5	14.8	1.25	6.4	20.5	47.8
6. 4 oz/acre MC at 9 nodes FB 4 oz 9 DAFT FB 4 oz 18 DAFT	18.3	15.2	1.20	18.8	15.1	1.25	5.6	15.5	56.6
CV, %	4.9	6.0	5.4	4.9	3.5	2.8	43.8	27.0	15.7
LSD 0.05	NS	NS	NS	NS	0.8	NS	NS	5.9	NS

EB - early bloom, FB - followed by, MC - mepiquat chloride, PHS - pinhead square, DAFT - days after first treatment, NS - nonsignificant

Table 4. Response of total fruiting branches, final plant height, final height to node ratio, percent first, second and third position bolls, total bolls per plant, and percent boll retention of first five fruiting branches to MicroFlo PGR IV and MC plant growth regulators, AGCARES, Lamesa, TX, 1997.

Treatment	Total Fruiting Branches	Final Plant Height	Final Height to Node Ratio	% 1st Position Bolls	% 2nd Position Bolls	% 3rd Position Bolls	Total Bolls Per Plant	% Boll Retention of Bottom 5 Fruiting Branches
1. Untreated check	11.9	23.4	1.14	85.8	11.5	0.9	6.3	76.4
2. 2 oz/acre PGR IV PHS FB 2 oz EB FB 2 oz mid-bloom	12.4	21.5	1.25	88.9	9.2	0.8	6.5	76.9
3. 4 oz/acre MC + 2 oz PGR IV PHS FB 4 ozacre MC + 2 oz PGR IV EB FB 4 oz/acre MC + 2 oz PGR IV mid-bloom	12.0	21.8	1.23	83.0	14.0	1.3	6.3	75.3
4. 4 oz/acre MC at 9 nodes	12.0	22.7	1.26	88.6	9.9	1.3	6.5	74.1
5. 4 oz/acre MC at 9 nodes FB 4 oz 9 DAFT	11.9	23.1	1.27	82.2	13.4	1.6	6.5	78.5
6. 4 oz/acre MC at 9 nodes FB 4 oz 9 DAFT FB 4 oz 18 DAFT	12.3	23.8	1.17	81.1	16.1	2.5	6.1	79.1
CV, %	4.6	10.9	9.6	6.5	35.6	86.5	5.9	5.9
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS

EB - early bloom, FB - followed by, MC - mepiquat chloride, PHS - pinhead square, DAFT - days after first treatment, NS - nonsignificant

Table 5. Response of HVI fiber properties to MicroFlo PGR IV and MC plant growth regulators, AGCARES, Lamesa, TX, 1997.

Treatment	Micronaire (units)	Length (inches)	Uniformity Index (%)	Strength (g/tex)	Elongation (%)	HVI Leaf Grade (units)	Rd (units)	+b (units)
1. Untreated check	4.75	1.062	83.0	31.8	11.1	5.8	77.3	8.1
2. 2 oz/acre PGR IV PHS FB 2 oz EB FB 2 oz mid-bloom	4.83	1.072	83.1	33.1	11.4	5.8	78.0	7.9
3. 4 oz/acre MC + 2 oz PGR IV PHS FB 4 oz/acre MC + 2 oz PGR IV EB FB 4 oz/acre MC + 2 oz PGR IV mid-bloom	4.88	1.087	83.4	31.8	11.1	5.5	78.0	8.0
4. 4 oz/acre MC at 9 nodes	4.68	1.090	83.4	32.1	11.0	5.0	78.0	8.0
5. 4 oz/acre MC at 9 nodes 9 nodes FB 4 oz 9 DAFT	4.60	1.085	83.2	31.8	11.0	5.8	78.3	8.0
6. 4 oz/acre MC at 9 nodes FB 4 oz 9 DAFT FB 4 oz 18 DAFT	4.79	1.055	83.3	31.5	11.4	5.5	77.7	7.9
CV, %	5.6	1.4	0.8	4.9	4.8	13.0	0.9	1.0
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS

EB - early bloom, FB - followed by, MC - mepiquat chloride, PHS - pinhead square, DAFT - days after first treatment, NS - nonsignificant

TITLE:

Evaluation of Griffin Early Harvest Plant Growth Regulator, Texas Agricultural Experiment Station, Lubbock, TX, 1997.

AUTHORS:

Randy Boman, Danny Carmichael, and P.J. Bessire; Extension Agronomist-Cotton, Extension Associate-Cotton, and Student Worker

MATERIALS AND METHODS:

Variety:	Paymaster HS26
Seeding rate:	15 lb seed/acre
Plot size:	4-40 inch rows x 50 ft, 2 center rows harvested for yield using a modified John Deere 482 plot stripper
Experimental design:	randomized complete block design with 4 replications
Planting date:	May 23
Harvested:	November 8
Furrow irrigated:	2 times
Treatment timing:	at plant (in-furrow, hopper box, seed treatment) foliar at 30 days after emergence (DAE), applied June 27 foliar at 60 DAE, applied July 30
Treatments:	1. Untreated check

Early Harvest PGR regimes:

2. 2 oz/acre in furrow
3. 4 oz/acre in furrow
4. 2 oz/cwt seed treatment
5. 2 oz/cwt planter box treatment
6. 2 oz/acre 30 DAE
7. 3 oz in furrow followed by (FB) 2 oz/acre 30 DAE
8. 2 oz seed treatment FB 4 oz 30 DAE
9. 2 oz seed treatment FB 3 oz 30 DAE FB 4 oz 60 DAE
10. Additional untreated check

RESULTS AND DISCUSSION:

Plant growth regulators (PGRs) have been used for many years in cotton production to modify growth and fruiting patterns. Inconsistencies of performance of PGRs require testing in multiple locations and environments. This in turn increases knowledge and enables researchers and Extension workers to obtain better information on such materials. The Griffin Early Harvest PGR is mixture of low concentrations of cytokinins, gibberellic acid, and indole butyric acid. The objective of this work was to determine the effects of various rates of Griffin Early Harvest PGR on lint yields and cotton quality using several methods of application (including seed treatment, in-furrow, planter box, foliar, and mixtures of methods and rates). Several response variables were evaluated in this experiment. No statistically significant differences were noted for any parameters with the exception of total mainstem nodes and height to node ratio 14 days after planting. The lower height to node ratio was a result of fewer mainstem nodes on plants that received in-furrow or seed treatment with Early Harvest PGR (Table 2). The cool, wet, May and June may have resulted in less vigor arising from those methods of application. Lint and seed yields, gin turnout and seed percentages, and lint to seed ratio (Table 1), and HVI fiber properties (Table 3) were not significantly affected by any of the treatments.

Table 1. Response of lint and seed yields, gin turnout, seed percentage, lint to seed ratio to Griffin Early Harvest plant growth regulators, Texas Agricultural Experiment Station, Lubbock, TX, 1997.

Treatment	Lint Yield (lb/acre)	Seed Yield (lb/acre)	Gin Turnout (%)	Seed (%)	Lint/Seed Ratio (ratio)
1. Untreated check	650	1135	24.2	42.2	0.57
2. 2 oz/acre in furrow	695	1175	24.9	42.1	0.59
3. 4 oz/acre in furrow	605	1055	24.5	43.0	0.57
4. 2 oz/cwt seed treatment	655	1120	25.1	42.9	0.58
5. 2 oz/cwt planter box treatment	620	1075	24.3	42.3	0.57
6. 2 oz/acre foliar 30 DAE	660	1150	24.1	42.0	0.57
7. 3 oz in furrow FB 2 oz/acre foliar 30 DAE	660	1135	24.5	42.2	0.58
8. 2 oz/cwt seed treatment FB 4 oz/acre foliar 30 DAE	645	1015	24.9	38.9	0.57
9. 2 oz/cwt seed treatment FB 3 oz/acre 30 DAE FB 4 oz/acre 60 DAE	660	1170	23.9	42.5	0.56
10. Untreated check	650	1125	24.4	42.2	0.57
CV, %	9.0	11.0	4.8	7.8	12.4
LSD 0.05	NS	NS	NS	NS	NS

FB - followed by, DAE - days after emergence, NS - nonsignificant.

Table 2. Response of stand count at 7 days after planting; plant height, nodes, and height to node ratio at 14 days after planting; and plant height, nodes, and height to node ratio at 28 days after planting to Griffin Early harvest plant growth regulator, Texas Agricultural Experiment Station, Lubbock, TX, 1997.

Treatment	Stand Count Plants/10 row-ft 7 DAP	Plant Height 14 DAP	Nodes 14 DAP	Height to Node Ratio 14 DAP	Plant Height 28 DAP	Nodes 28 DAP	Height to Node Ratio 28 DAP
1. Untreated check	53.5	1.5	2.1	0.73	2.4	4.3	0.55
2. 2 oz/acre in furrow	47.7	1.1	1.6	0.74	2.3	4.6	0.50
3. 4 oz/acre in furrow	49.2	1.4	1.6	0.87	2.2	4.1	0.54
4. 2 oz/cwt seed treatment	46.5	1.2	1.2	1.01	2.5	4.6	0.54
5. 2 oz/cwt planter box treatment	48.7	1.4	1.8	0.77	2.2	4.5	0.49
6. 2 oz/acre foliar 30 DAE	50.5	1.2	1.8	0.68	2.2	4.4	0.51
7. 3 oz in furrow FB 2 oz/acre foliar 30 DAE	47.0	1.4	1.5	0.93	2.4	4.3	0.55
8. 2 oz/cwt seed treatment FB 4 oz/acre foliar 30 DAE	51.0	1.3	1.8	0.70	2.6	4.5	0.57
9. 2 oz/cwt seed treatment FB 3 oz/acre 30 DAE FB 4 oz/acre 60 DAE	51.5	1.4	1.6	0.90	2.3	4.4	0.51
10. Untreated check	53.0	1.4	1.9	0.72	2.2	4.4	0.50
CV, %	7.9	14.0	19.4	17.6	13.5	9.9	11.1
LSD 0.05	NS	NS	0.5	0.21	NS	NS	NS

FB - followed by, DAE - days after emergence, NS - nonsignificant.

Table 3. Response of HVI fiber properties to Griffin Early Harvest plant growth regulator, Texas Agricultural Experiment Station, Lubbock, TX, 1997.

Treatment	Micronaire (units)	Length (inches)	Uniformity Index (%)	Strength (g/tex)	Elongation (%)	HVI Leaf Grade (units)	Rd (units)	+b (units)
1. Untreated check	4.55	1.047	81.9	31.6	10.7	4.5	77.6	7.6
2. 2 oz/acre in furrow	4.74	1.032	81.7	31.8	10.2	3.7	78.9	7.8
3. 4 oz/acre in furrow	4.64	1.047	81.7	32.5	10.1	3.5	79.2	7.6
4. 2 oz/cwt seed treatment	4.60	1.050	82.2	31.1	10.2	3.7	78.6	7.5
5. 2 oz/cwt planter box treatment	4.58	1.045	81.8	31.8	10.4	3.0	78.6	8.0
6. 2 oz/acre foliar 30 DAE	4.66	1.067	82.2	31.6	10.1	3.7	75.7	8.1
7. 3 oz in furrow FB 2 oz/acre foliar 30 DAE	4.69	1.047	81.5	32.3	10.2	5.0	77.3	7.8
8. 2 oz/cwt seed treatment FB 4 oz/acre foliar 30 DAE	4.76	1.045	82.0	30.5	10.3	4.0	78.9	7.4
9. 2 oz/cwt seed treatment FB 3 oz/acre 30 DAE FB 4 oz/acre 60 DAE	4.83	1.047	81.8	31.2	10.3	4.0	77.6	8.0
10. Untreated check	4.61	1.065	82.7	31.2	10.0	4.2	77.8	7.8
CV, %	5.1	2.2	0.7	5.2	3.3	19.7	2.3	5.6
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS

FB - followed by, DAE - days after emergence, NS - nonsignificant

TITLE:

Effect of RyzUp Plant Growth Regulator on Cotton Yield at AGCARES, Lamesa, TX, 1997.

AUTHORS:

Randy Boman, Danny Carmichael, P.J. Bessire, and John Farris; Extension Agronomist-Cotton, Extension Associate-Cotton, Student Worker, and CEA-Agriculture.

MATERIALS AND MAETHODS:

Variety:	Paymaster HS26, Paymaster 330, and Tejas
Seeding rate:	15 lb seed/acre
Plot size:	8-40 inch rows x 750 ft., 13 row-ft hand harvested for yield, randomized complete block design with 3 replications in strips, RyzUp treatment randomly applied to 4 rows in split-plot design with varieties as main plots
Planting date:	May 15
Wind/sand damage:	June 16
RyzUp applied at 2 oz/acre to 4 rows (split plot):	June 23
Hand harvested 13 row-ft.:	October 24
Treatments:	1. Untreated check 2. 2 oz/acre of RyzUp after wind/sand damage

RESULTS AND DISCUSSION:

RyzUp is a concentrated plant growth regulator product (4% gibberellic acid) that has been reported to increase leaf area and lint yield in some cases when applied to environmentally damaged cotton. Previous studies conducted at the AGCARES facility reported a lint yield response in one year when severe foliar and stem damage and stunting of cotton occurred due to a wind/sand storm. A dryland variety test at the AGCARES facility was wind/sand damaged on June 14 and 16. RyzUp was applied to 4 rows of the 8 row variety test at the rate of 2 oz/acre. Due to considerable stand variability in the experiment, it was decided to hand harvest the plots. Uniform stand density areas (about 30-40,000 plants/acre) were harvested and lint yields determined. In this experiment, no statistically significant effects on lint yield were observed (Table 1).

Table 1. Lint yield response of varieties to RzyUp treatments, AGCARES, 1997.

Variety	RyzUp Rate	Lint Yield (lb/acre)
Paymaster HS26	untreated	388
Paymaster HS26	2 oz/acre	372
Paymaster 330	untreated	446
Paymaster 330	2 oz/acre	354
Tejas	untreated	376
Tejas	2 oz/acre	375
CV, %	---	17.6
LSD 0.05	---	NS

TITLE:

Effect of RyzUp Plant Growth Regulator on Cotton Leaf Area and Yield in Crosby County, TX, 1997.

AUTHORS:

Randy Boman, Ron Graves, Jim Parkhill, Danny Carmichael, and P.J. Bessire; Extension Agronomist-Cotton, Extension Agent-IPM-Crosby County, Producer-Cooperator, Extension Associate-Cotton, and Student Worker

MATERIALS AND METHODS:

Variety:	Paymaster HS26
Seeding rate:	15 lb seed/acre
Planted:	May 29
Severe wind/sand damage:	June 24
RyzUp application:	July 1
Experimental design:	4 replication, with 8-row plots in a randomized complete block design in strips length of field
Leaf area analysis (9 plants/plot):	July 16, 24
Stripper harvested:	November 24
Furrow irrigated	

Treatments:
1. Untreated check
2. 2 oz/acre of RyzUp after wind/sand damage

RESULTS AND DISCUSSION:

RyzUp is a concentrated plant growth regulator product (4% gibberellic acid) that has been reported to increase leaf area and lint yield in some cases when applied to environmentally damaged cotton. Previous studies conducted at the AGCARES facility reported a lint yield response in one year when severe foliar and stem damage and stunting of cotton occurred due to a wind/sand storm. Significant wind/sand damage occurred across the High Plains region in 1997. Producer and Extension Agent interest was such that a trial was initiated in Crosby County. The producer applied the treatments and stripper harvested the plots which were weighed in a weigh wagon. In this experiment, no statistically significant effects on leaf area on either sampling date or on lint yield were observed (Table 1).

Table 1. Leaf area and lint yield response to RyzUp treatment, Crosby County, TX, 1997.

RyzUp rate	Leaf Area July 16 (cm^2)	Leaf Area July 24 (cm^2)	Lint Yield (lbs/acre)
Untreated	1340	2770	715
2 oz/acre	1260	3015	680
CV, %	9.3	13.4	20.6
LSD 0.05	NS	NS	NS

TITLE:

Evaluation of Miller/Plant Biotech Plant Growth Regulator and Foliar Fertilization Programs, Texas Agricultural Experiment Station, Lubbock, TX, 1997.

AUTHORS:

Randy Boman, Danny Carmichael, and P.J. Bessire; Extension Agronomist-Cotton, Extension Associate-Cotton, and Student Worker

MATERIALS AND METHODS:

Dryland location
Variety: Paymaster HS26
Seeding rate: 15 lb seed/acre
Plot size: 4-40 inch rows x 50 ft, 2 center rows harvested for yield using a modified John Deere 482 plot stripper
Experimental design: randomized complete block design with 4 replications
Planting date: May 21
Stand counts: n/a
3-leaf application: June 21
Matchead square application: June 30
Early bloom application: July 21
Mid-bloom application: August 13
Harvest
Composite October 16
Strata October 7

Treatments:
1. Untreated check
2. Miller/Plant Biotech PGR/foliar fertilizer program (MPB)
   Seed treatment: Arise 20 oz/cwt seed
   3-leaf stage: Cytoplex 2 oz/acre + Sol-u-gro 2 lb/acre (12-48-8)
   Matchead square (MHS): Cytoplex 4 oz + Sol-u-gro 4 lb + NuFilm (spreader-sticker) 4 oz
   Early bloom (EB): Cytokin 8 oz + Nutri-Leaf 5 lb (20-20-20) + 4 oz NuFilm
   Mid-bloom: Cytokin 6 oz + Cotton Finisher 5 lb (10-5-40) + 4 oz NuFilm
3. Mepiquat chloride (MC) 3 oz at matchead square (MHS)
4. MC 3 oz at early bloom (EB)
5. MC 6 oz at EB
6. Foliar fertilizer portion of Miller/Plant Biotech program (MPB Foliar)
   3-leaf stage: Sol-u-gro 2 lb/acre (12-48-8)
   MHS: Sol-u-gro 4 lb + NuFilm (spreader-sticker) 4 oz
   EB: Nutri-Leaf 5 lb (20-20-20) + 4 oz NuFilm
   Mid-bloom: Cotton Finisher 5 lb (10-5-40) + 4 oz NuFilm

RESULTS AND DISCUSSION:

Plant growth regulators (PGRs) have been used for many years in cotton production to modify growth and fruiting patterns. Foliar fertilization is also used to increase lint yields under some conditions. Inconsistencies of performance of PGRs and foliar fertilization programs require testing in multiple locations and environments. This in turn increases knowledge and enables researchers and Extension workers to obtain better information on such materials. The Miller Plant Biotech program is a combined PGR and foliar fertilization program that encompasses multiple applications of various materials during the growing season. The objective of this work was to determine the effects of such a program and various rates of MC on lint yields and cotton quality produced under dryland conditions. The PGR and/or foliar fertilization treatments resulted in no statistically significant effects on response variables measured, with the exception of lower strata boll size (as measured by the amount of seedcotton from 25 bolls per plot per strata - Table 1). Application of MC reduced lower strata boll size when compared to the untreated check. Differences in lint yield were not statistically significant for treatments. No significant effects were noted for any of the HVI fiber properties with the exception of the +b value (Table 2). This measure indicated the degree of yellowness of the fiber. The Miller PGR/foliar and Miller foliar programs resulted in significantly lower fiber yellowness than that obtained in the untreated check and 6 oz/acre MC applied at early bloom, the reasons for which are unclear.

Table 1. Response of gin turnout, seed percentage, lint to seed ratio, lint yield, seed yield, percent open bolls on September 1, and upper, middle and lower strata boll size to Miller/Plant Biotech plant growth regulator and foliar fertilization programs, Lubbock, 1997.

Treatment	Gin Turnout (%)	Seed (%)	Lint/Seed Ratio (ratio)	Lint Yield (lb/acre)	Seed Yield (lb/acre)	Open Bolls Sept. 1 (%)	Upper Strata Boll Size (g sc/boll)	Middle Strata Boll Size (g sc/boll)	Lower Strata Boll Size (g sc/boll)
1. Untreated check	24.2	41.5	0.58	620	1065	3.8	3.5	5.1	4.7
2. Miller PGR/foliar feed program	25.2	42.5	0.59	625	1055	2.0	3.5	4.8	4.7
3. MC 3 oz MHS	25.3	43.0	0.58	630	1075	3.8	3.7	4.9	4.4
4. MC 3 oz EB	25.0	43.1	0.58	600	1035	3.2	3.7	5.2	4.3
5. MC 6 oz EB	24.9	43.4	0.57	580	1010	3.5	3.7	4.9	4.4
6. Miller foliar feed	25.0	42.3	0.58	625	1055	2.0	3.6	5.0	4.8
CV, %	4.6	3.8	2.8	8.9	7.5	34.7	9.8	4.6	5.0
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS	0.3

PGR - plant growth regulator, MC - mepiquat chloride, MHS - matchead square, EB - early bloom, NS - nonsignificant.

Table 2. Response of HVI fiber properties to Miller/Plant Biotech plant growth regulator and foliar fertilization programs, Lubbock, 1997.

Treatment	Micronaire (units)	Length (inches)	Uniformity Index (%)	Strength (g/tex)	Elongation (%)	HVI Leaf Grade (units)	Rd (units)	+b (units)
1. Untreated check	4.43	1.052	81.8	31.8	9.9	4.5	83.9	8.2
2. Miller PGR/foliar feed program	4.43	1.037	81.6	31.2	10.2	4.2	84.3	7.7
3. MC 3 oz MHS	4.47	1.037	81.7	31.7	9.5	5.2	84.8	7.8
4. MC 3 oz EB	4.32	1.035	82.1	30.7	10.2	5.2	81.3	8.1
5. MC 6 oz EB	4.33	1.047	82.2	31.6	9.8	5.0	82.4	8.2
6. Miller foliar feed	4.47	1.035	81.9	31.1	10.1	4.5	84.8	7.8
CV, %	5.0	1.3	0.7	4.2	4.3	19.7	2.2	1.9
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	0.4

PGR - plant growth regulator, MC - mepiquat chloride, MHS - matchead square, EB - early bloom, NS - nonsignificant.

TITLE:

Evaluation of Miller/Plant Biotech Plant Growth Regulator and Foliar Fertilization Programs, AGCARES, Lamesa, TX, 1997.

AUTHORS:

Randy Boman, Danny Carmichael, P.J. Bessire, and John Farris; Extension Agronomist-Cotton, Extension Associate-Cotton, Student Worker, and CEA-Agriculture

MATERIALS AND METHODS:

Dryland corner location

Variety:	Paymaster HS26
Seeding rate:	15 lb seed/acre
Plot size:	4-40 inch rows x 50 ft, 2 center rows harvested for yield using a modified John Deere 482 plot stripper
Experimental design:	randomized complete block design with 4 replications
Planting date:	May 15
Stand counts:	June 13
3-leaf application:	June 17
Matchead square application:	June 23
Early bloom application:	July 9
Mid-bloom application:	July 22
Harvest	
Composite	October 17
Strata	October 17

Treatments:

1. Untreated check
2. Miller/Plant Biotech PGR/foliar fertilizer program (MPB)
   - Seed treatment: Arise 20 oz/cwt seed
   - 3-leaf stage: Cytoplex 2 oz/acre + Sol-u-gro 2 lb/acre (12-48-8)
   - Matchead square (MHS): Cytoplex 4 oz + Sol-u-gro 4 lb + NuFilm (spreader-sticker) 4 oz
   - Early bloom (EB): Cytokin 8 oz + Nutri-Leaf 5 lb (20-20-20) + 4 oz NuFilm
   - Mid-bloom: Cytokin 6 oz + Cotton Finisher 5 lb (10-5-40) + 4 oz NuFilm
3. Mepiquat chloride (MC) 3 oz at MHS
4. MC 3 oz at EB
5. MC 6 oz at EB
6. Foliar fertilizer portion of Miller/Plant Biotech program (MPB Foliar)
   - 3-leaf stage: Sol-u-gro 2 lb/acre (12-48-8)
   - MHS: Sol-u-gro 4 lb + NuFilm (spreader-sticker) 4 oz
   - EB: Nutri-Leaf 5 lb (20-20-20) + 4 oz NuFilm
   - Mid-bloom: Cotton Finisher 5 lb (10-5-40) + 4 oz NuFilm

RESULTS AND DISCUSSION:

Plant growth regulators (PGRs) have been used for many years in cotton production to modify growth and fruiting patterns. Foliar fertilization is also used to increase lint yields under some conditions. Inconsistencies of performance of PGRs and foliar fertilization programs require testing in multiple locations and environments. This in turn increases knowledge and enables researchers and Extension workers to obtain better information on such materials. The Miller Plant Biotech program is a combined PGR and foliar fertilization program that encompasses multiple applications of various materials during the growing season. The objective of this work was to determine the effects of such a program and various rates of MC on lint yields and cotton quality produced under dryland conditions. The PGR and/or foliar fertilization treatments resulted in few statistically significant effects on response variables measured (Table 1). Differences in lint yield were not statistically significant for treatments. Percentage seed was slightly increased above the check by 6 oz/acre of MC applied at early bloom. Seed yield was increased above the check by MC applied at early bloom at 3 and 6 oz/acre. The percentage of open bolls on September 1 was significantly greater in the untreated check than most other treatments. Upper, mid- and lower boll size (as measured by the amount of seedcotton from 25 bolls per plot per strata) was not significantly affected by any treatment regime. No significant effects were noted for any of the HVI fiber properties (Table 2).

Table 1. Response of stand count, gin turnout, seed percentage, lint to seed ratio, lint yield, seed yield, percent open bolls on September 1, and upper, middle and lower strata boll size to Miller/Plant Biotech plant growth regulator and foliar fertilization programs, AGCARES, 1997.

Treatment	Stand Plants/10 row-ft	Gin Turnout %	Seed (%)	Lint/Seed Ratio (ratio)	Lint Yield (lb/acre)	Seed Yield (lb/acre)	Open Bolls Sept. 1 (%)	Upper Strata Boll Size (g sc/boll)	Middle Strata Boll Size (g sc/boll)	Lower Strata Boll Size (g sc/boll)
1. Untreated check	30.3	24.3	44.5	0.54	480	875	19.5	3.8	4.6	3.8
2. Miller PGR/foliar feed program	31.9	24.9	45.3	0.55	515	935	9.3	3.9	4.9	4.2
3. MC 3 oz MHS	32.3	23.8	43.9	0.54	510	945	12.3	3.9	4.6	4.1
4. MC 3 oz EB	31.1	24.3	45.1	0.54	525	970	15.3	3.9	4.6	4.1
5. MC 6 oz EB	32.4	23.7	44.5	0.53	525	980	13.3	3.7	4.8	4.0
6. Miller foliar feed	24.8	24.3	44.6	0.54	485	890	9.8	3.9	4.9	4.0
CV, %	19.5	2.6	1.3	2.3	5.9	5.1	25.3	6.5	5.3	6.1
LSD 0.05	NS	NS	0.9	NS	NS	72	5.0	NS	NS	NS

PGR - plant growth regulator, MC - mepiquat chloride, MHS - matchead square, EB - early bloom, NS - nonsignificant.

Table 2. Response of HVI fiber properties to Miller/Plant Biotech plant growth regulator and foliar fertilization programs, AGCARES, 1997.

Treatment	Micronaire (units)	Length (inches)	Uniformity Index (%)	Strength (g/tex)	Elongation (%)	HVI Leaf Grade (units)	Rd (units)	+b (units)
1. Untreated check	4.46	1.060	82.6	31.7	9.5	4.7	82.5	8.1
2. Miller PGR/foliar feed program	4.51	1.022	81.7	31.8	9.5	5.5	81.9	7.9
3. MC 3 oz MHS	4.61	1.045	82.1	34.2	9.8	5.7	81.2	8.1
4. MC 3 oz EB	4.45	1.040	81.6	31.9	9.6	5.2	82.3	8.1
5. MC 6 oz EB	4.59	1.035	82.0	33.4	10.0	5.7	83.1	7.9
6. Miller foliar feed	4.57	1.037	82.2	31.5	9.7	5.0	82.5	8.0
CV, %	3.6	1.8	0.9	2.5	5.5	14.5	3.5	4.0
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS

PGR - plant growth regulator, MC - mepiquat chloride, MHS - matchead square, EB - early bloom, NS - nonsignificant.

TITLE:

Cotton Incorporated Root Health Project, AGCARES, Lamesa, TX, 1997.

AUTHORS:

Randy Boman, Danny Carmichael, P.J. Bessire, and John Farris; Extension Agronomist-Cotton, Extension Associate-Cotton, Student Worker, and CEA-Agriculture

MATERIALS AND METHODS:

Variety:	Paymaster HS26
Seeding rate:	15 lb seed/acre
Plot size:	4-40 inch rows x 100 ft, 2 center rows harvested for yield using a modified John Deere 482 plot stripper, randomized complete block design with 4 replications
Planting date:	May 6
Hypocotyl and root ratings:	May 20
Irrigation and nitrogen management:	LEPA 0.75 ET replacement June 0” July 2.85” + 90 lb N/acre August 3.60” + 30 lb N/acre September 0.40” Seasonal total 9.18” + 140 lb N/acre
Early plant map:	June 13
Final plant map:	October 21
Harvested:	October 22
Treatments:	1. Black seed + DiSyston (5 lb/acre in-furrow) 2. Commercial seed treatment (CST) (Baytan @ 1oz/cwt+Apron+Thiram) + DiSyston 3. CST + Temik (5 lb/acre in-furrow) 4. CST + Terraclor Super X (7 lb/acre in-furrow) + DiSyston 5. CST + Terraclor Super X + Temik

RESULTS AND DISCUSSION:

Seed treatment and in-furrow fungicides are commonly used by producers to enhance emergence potential and to reduce the possibility of stand losses. Cotton Incorporated has supported a Beltwide cotton root health research project for the last two seasons. One location in the Texas High Plains was at the Lamesa AGCARES facility. This research focused on early season plant health and several important measurements were made. A skip index was generated using a weighted scale to compute the severity and incidences of skips of various sizes (the higher the index the more pronounced and critical the amount of skips). Hypocotyl (the portion of the seedling below the cotyledons and above the root) and root ratings were made shortly after emergence. Plants were visually rated on a scale of one (healthy, no lesions) to five (necrotic lesions resulting in seedling death). Early season disease pressure was not extremely critical at this site in 1997. Other seasonal measurements were also taken, including plant height, total nodes, and height to node ratio. Although stand and skip count differences attributable to treatment were significant (Table 1), no differences in final yield were observed. Seed treatments increased seedling survival, but due to adequate stand (plants per foot of row) in the black seed treatment, no yield increases could be attributed to seed or in-furrow treatments. No statistically significant differences were observed in gin turnout or in HVI fiber properties that determine price per pound of lint (Table 2). Final plant mapping data indicated that under the LEPA 0.75 ET replacement irrigation regime, no significant differences were noted in final plant height, or height to node ratios (Table 3). Adequate control of irrigation and nitrogen via LEPA irrigation management resulted in compact, short-statured plants. First position bolls contributed to about 80 percent of the final total lint yield. Second position fruit produced about 12 percent, while third and greater positions contributed only 6 percent. Bolls produced on vegetative branches produced only about 2 percent of the final yield. This Cotton Incorporated supported project helped contribute to the Beltwide database in 1997. We hope to continue this important work in 1998.

Table 1. Early season stand count, skip index, hypocotyl rating, root rating, plant height, total nodes, height to node ratio, final lint, seed, and seedcotton yields of the Cotton Incorporated Root Health Experiment, AGCARES, 1997.

Treatment	Stand Count Plants/10 (row-ft)	Skip Index (index)	Hypocotyl 1 Rating (index)	Root Rating (index)	Plant Height (inches)	Total Nodes (nodes/plant)	Height to Node Ratio (inches/node)	Lint Yield (lb/acre)	Seed Yield (lb/acre)	Seedcotton Yield (lb/acre)
1. Black seed + DiSyston	2.8	15.8	1.33	1.25	2.3	4.1	0.58	1060	1960	3020
2. Commercial seed treatment[1] (CST)	4.4	2.5	1.15	1.40	2.4	3.9	0.63	1075	2030	3100
3. CST + Temik	4.9	1.3	1.40	1.23	2.8	4	0.72	1090	1970	3060
4. CST + TSX + DiSyston	4.2	2.3	1.60	1.30	2.4	3.8	0.65	1010	1880	2890
5. CST + TSX + Temik 3100		4.6	1.0	1.43	1.38	2.3	3.7	0.64	1100	2000
CV, %	6.9	35.2	24.2	7.8	9.5	9.3	9.6	9.2	7.8	8.2
LSD 0.05	0.4	2.5	NS	NS	0.4	NS	NS	NS	NS	NS

[1]*Commercial seed treatment consisted of Baytan (1 oz/cwt), Apron, and Thiram.*

Table 2. Gin turnout and selected HVI fiber properties of the Cotton Incorporated Root Health Experiment, AGCARES, 1997.

Treatment	Gin Turnout (%)	Mic (units)	UHM (inches)	Strength (g/tex)	Unif Index (%)	Elongation (%)	Rd (units)	+b (units)	Trash (%)	Short Fiber Content (%)
1. Black seed + DiSyston	24.3	4.50	1.067	29.7	83.3	11.4	77.5	8.3	0.58	7.3
2. Commercial seed treatment[1] (CST)	23.9	4.27	1.077	30.4	83.5	11.9	77.6	8.1	0.70	6.9
3. CST + Temik	25.0	4.42	1.067	29.8	83.4	11.6	77.4	8.3	0.52	7.3
4. CST + TSX + DiSyston	23.3	4.20	1.067	30.0	82.9	11.7	77.7	8.4	0.52	7.5
5. CST + TSX + Temik	24.7	4.55	1.062	29.6	83.9	11.9	77.4	8.3	0.70	7.1
CV, %	4.7	3.8	1.1	1.9	0.6	2.2	0.7	3.5	17.9	6.0
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

[1]*Commercial seed treatment consisted of Baytan (1 oz/cwt), Apron, and Thiram.*

Table 3. Final plant mapping data for the Cotton Incorporated Root Health Experiment, AGCARES, 1997.

Treatment	Number of Fruiting Branches (total/plant)	Final Plant Height (inches)	Final Height to Node Ratio (ratio)	1st Position Bolls (%)	2nd Position Bolls (%)	3rd and Greater Position Bolls (%)	Vegetative Bolls (%)	Average Bolls Per Plant (number)	Boll Retention on First 5 Fruiting Branches (%)
1. Black seed + DiSyston	12.5	24.1	1.36	82.9	10.8	4.1	2.1	7.3	77.0
2. Commercial seed treatment[1] (CST)	11.6	21.7	1.26	78.5	11.3	6.4	3.7	6.2	65.0
3. CST + Temik	12.2	21.8	1.18	78.1	11.5	8.2	2.1	6.9	61.0
4. CST + TSX + DiSyston	12.6	22.9	1.26	80.1	11.4	7.7	0.7	6.5	59.0
5. CST + TSX + Temik	12.4	22.8	1.25	78.9	14.9	6.1	0.0	6.5	63.0
CV, %	6.8	5.3	6.5	5.5	35.9	43.5	70.4	8.9	14.5
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS

[1]*Commercial seed treatment consisted of Baytan (1 oz/cwt), Apron, and Thiram.*

TITLE:

Cotton Incorporated Root Health Project, AGCARES, Lamesa, TX, 1997.

AUTHORS:

Randy Boman, Wayne Keeling, Danny Carmichael, and P.J. Bessire; Extension Agronomist-Cotton, Systems Agronomist-Texas Agricultural Experiment Station, Extension Associate-Cotton, and Student Worker

MATERIALS AND METHODS:

Variety:	Paymaster HS26
Seeding rate:	15 lb seed/acre
Plot size:	4-40 inch rows x 100 ft, 2 center rows harvested for yield using a modified John Deere 482 plot stripper
Experimental design:	randomized complete block with 4 replications
Planting date:	May 6
Stand counts:	May 20
Irrigation and nitrogen management:	LEPA 0.75 ET replacement June 0” July 2.85” + 90 lb N/acre August 3.60” + 30 lb N/acre September 0.40” Seasonal total 9.18” + 140 lb N/acre
Early plant map:	June 13
Harvested:	October 22
Treatments:	1. Black seed (untreated) + DiSyston (5 lb/acre in-furrow) 2. Commercial seed treatment (CST) (Baytan @ 1 oz/cwt+Apron+Thiram) + DiSyston 3. CST + Temik (5 lb/acre in-furrow) 4. CST + Terraclor Super X (7 lb/acre in-furrow) + DiSyston 5. CST + Terraclor Super X + Temik 6. Black seed 7. CST 8. CST + Agro polymer (5 lb/acre in-furrow) 9. CST + Temik + Agro polymer 10. CST + Terraclor Super X + Temik + Agro polymer

RESULTS AND DISCUSSION:

Seed treatment and in-furrow fungicides are commonly used by producers to enhance emergence potential and to reduce the possibility of stand losses. Cotton Incorporated has supported a Beltwide cotton root health research project for the last two seasons. One location in the Texas High Plains was at the Lamesa AGCARES facility. This research focused on early season plant health and several important early season measurements were made, including plant height, total nodes, and height to node ratio. Although stand differences attributable to treatment were significant (Table 1), no differences in final yield were observed. Seed treatments increased seedling survival, but due to adequate stand (plants per foot of row) in the black seed treatment, no yield increases could be attributed to seed or in-furrow treatments. No statistically significant differences were observed in gin turnout or in HVI fiber properties that determine price per pound of lint (Table 2).

Table 1. Response of stand count 14 days after planting; plant height, nodes, and height to node ratio on June 13; and lint yield, seed yield, gin turnout percentage, and seed turnout percentage to various commercial seed and in-furrow treatments AGCARES, 1997.

Treatment	Stand Count 14 DAP (plants/row-ft)	Plant Height June 13	Nodes June 13	Height to Node Ratio June 13	Lint Yield (lb/acre)	Seed Yield (lb/acre)	Gin Turnout (%)	Seed (%)
1. Black seed + DiSyston	2.8	2.4	4.1	0.58	1060	1955	24.2	44.8
2. Commercial seed treatment (CST)	4.4	2.4	3.9	0.63	1075	2030	23.9	45.2
3. CST + Temik	4.9	2.8	4.0	0.72	1090	1975	25.0	45.5
4. CST + Terraclor Super X	4.2	2.4	3.7	0.64	1010	1875	23.3	43.4
5. CST + Terraclor Super X + Temik	4.6	2.3	3.7	0.63	1105	2000	24.7	44.8
6. Black seed	2.6	2.7	4.0	0.69	1045	1930	24.2	44.8
7. CST	4.0	2.4	3.6	0.67	1045	1940	24.0	44.5
8. CST + Agro polymer	4.7	2.7	3.8	0.71	1050	1950	23.5	43.8
9. CST + Temik + Agro polymer	4.6	2.6	3.8	0.67	1020	1910	23.0	43.1
10. CST + Terraclor Super X + Temik + Agro polymer	4.2	2.3	3.6	0.67	1045	1955	24.1	45.1
CV, %	7.7	12.5	9.3	10.6	8.0	7.3	3.8	2.8
LSD 0.05	0.5	NS	NS	NS	NS	NS	NS	NS

NS - nonsignificant.

Table 2. Response of HVI fiber properties to various commercial seed and in-furrow treatments AGCARES, 1997.

Treatment	Micronaire (units)	Length (inches)	Uniformity Index (%)	Strength (g/tex)	Elongation (%)	HVI Leaf Grade (units)	Rd (units)	+b (units)
1. Black seed + DiSyston	4.7	1.067	82.8	32.5	11.1	5.5	77.1	8.2
2. Commercial seed treatment (CST)	4.5	1.082	83.0	32.5	11.2	6.2	77.7	7.9
3. CST + Temik	4.7	1.087	83.6	31.2	11.0	5.2	76.8	8.1
4. CST + Terraclor Super X	4.5	1.070	82.3	31.4	10.7	5.5	77.5	8.2
5. CST + Terraclor Super X + Temik	4.8	1.072	83.0	32.3	11.4	5.0	78.3	8.1
6. Black seed	4.7	1.065	82.8	31.1	11.2	5.7	77.8	8.0
7. CST	4.5	1.065	82.2	31.7	11.6	5.7	77.1	8.5
8. CST + Agro polymer	4.5	1.065	83.0	31.3	11.6	5.5	78.1	8.1
9. CST + Temik + Agro polymer	4.5	1.095	83.3	30.1	11.2	5.5	77.7	8.0
10. CST + Terraclor Super X + Temik + Agro polymer	4.7	1.077	83.6	32.1	11.4	5.2	78.2	8.1
CV, %	4.6	1.8	0.8	3.0	5.3	13.6	1.1	4.3
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS

NS - nonsignificant.

TITLE:

Evaluation of Methods of Placement of Stockhausen Agro Polymer in Dryland Cotton Production, AGCARES, Lamesa, TX, 1997.

AUTHORS:

Randy Boman, Wayne Keeling, Danny Carmichael, and P.J. Bessire; Extension Agronomist-Cotton, Systems Agronomist - Texas Agricultural Experiment Station, Extension Associate-Cotton, and Student Worker

MATERIALS AND METHODS:

Variety:	Paymaster HS26
Seeding rate:	15 lb seed/acre
Plot size:	4-40 inch rows x 40 ft, 2 center rows harvested for yield using a modified John Deere 482 plot stripper
Experimental design:	randomized complete block with 4 replications
Polymer applied:	May 1
Planting date:	May 15
Harvested:	October 17
Dryland corner	
Treatments:	1. Untreated check 2. 20 lb/acre Agro polymer broadcast and diskbed incorporated 3. 20 lb/acre Agro polymer banded with seed at planting

RESULTS AND DISCUSSION:

Interest in synthetic polymers has recently increased. Many types of polymers are currently manufactured by various companies, including linear polymers which have been reported to reduce soil erosion (both wind and water) potential when applied to the soil surface. Cross-linked polymers have been used to increase the moisture holding capacity of soil media for greenhouse crops. Stockhausen markets a cross-linked polymer (Stockosorb Agro) which has potential for reducing soil crusting and may thus affect seedling emergence. The objective of this work was to determine the effects of two methods of application of a cross-linked polymer on lint yields and cotton quality produced under dryland conditions. None of the Stockosorb treatments resulted in statistically significant effects on lint yield, gin turnout and HVI fiber properties (Tables 1 and 2). Numerically lower yields with the diskbed incorporation treatment may be due to considerable disturbance of soil by the treatment which resulted in lower early season soil moisture content.

Table 1. Response of gin turnout, lint yield, seed percentage, and seed yield to methods of placement of Stockhausen Stockosorb Agro cross-linked polymer, AGCARES, Lamesa, TX, 1997.

Treatment	Gin Turnout (%)	Lint Yield (lb/acre)	Seed (%)	Seed Yield (lb/acre)
1. Untreated check	25.8	525	47.6	965
2. 20 lb/acre Stockosorb Agro polymer broadcast and diskbed incorporated	23.2	455	42.6	835
3. 20 lb/acre Stockosorb Agro polymer banded with seed at planting	25.7	505	47.0	925
CV, %	7.9	12.1	8.7	12.3
LSD 0.05	NS	NS	NS	NS

NS = nonsignificant

Table 2. Response of HVI fiber properties to methods of placement of Stockhausen Stockosorb Agro cross-linked polymer, AGCARES, Lamesa, TX, 1997.

Treatment	Micronaire (units)	Length (inches)	Uniformity Index (%)	Strength (g/tex)	Elongation (%)	HVI Leaf Grade (units)	Rd (units)	+b (units)
1. Untreated check	4.5	1.050	82.3	33.0	9.7	5.0	81.7	8.3
2. 20 lb/acre Stockosorb Agro polymer broadcast and diskbed incorporated	4.7	1.025	82.3	32.1	9.4	5.0	81.1	8.2
3. 20 lb/acre Stockosorb Agro polymer banded with seed at planting	4.7	1.042	82.3	31.5	9.4	5.5	83.6	7.9
CV, %	4.5	0.7	0.6	7.4	3.7	11.2	2.3	4.0
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS

NS - nonsignificant.

TITLE:

Evaluation of Methods of Placement of Stockhausen Agro Polymer In Dryland Cotton Production, Texas Agricultural Experiment Station, Lubbock, TX, 1997.

AUTHORS:

Randy Boman, Wayne Keeling, Danny Carmichael, and P.J. Bessire; Extension Agronomist-Cotton, Systems Agronomist-Texas Agricultural Experiment Station, Extension Associate-Cotton, and Student Worker

MATERIALS AND METHODS:

Variety: Paymaster HS26
Seeding rate: 15 lb seed/acre
Plot size: 4-40 inch rows x 40 ft, 2 center rows harvested for yield using a modified John Deere 482 plot stripper
Experimental design: randomized complete block with 4 replications
Polymer applied: April 24
Planting date: May 21
Harvested: October 16
Dryland
Treatments:
1. Untreated check
2. 20 lb/acre Agro polymer broadcast and diskbed incorporated
3. 20 lb/acre Agro polymer banded with seed at planting
4. 20 lb/acre Agro polymer broadcast, incorporated, then diskbed

RESULTS AND DISCUSSION:

Interest in synthetic polymers has recently increased. Many types of polymers are currently manufactured by various companies, including linear polymers which have been reported to reduce soil erosion (both wind and water) potential when applied to the soil surface. Cross-linked polymers have been used to increase the moisture holding capacity of soil media for greenhouse crops. Stockhausen markets a cross-linked polymer (Stockosorb Agro) which has potential for reducing soil crusting and may thus affect seedling emergence. The objective of this work was to determine the effects of three methods of application of a cross-linked polymer on lint yields and cotton quality produced under dryland conditions. None of the Stockosorb treatments resulted in statistically significant effects on lint yield, gin turnout and HVI fiber properties (Tables 1 and 2).

Table 1. Response of gin turnout percentage, lint yield, seed percentage, and seed yield to methods of placement of Stockhausen Stockosorb Agro cross-linked polymer, Texas Agricultural Experiment Station, Lubbock, 1997.

Treatment	Gin Turnout (%)	Lint Yield (lb/acre)	Seed (%)	Seed Yield (lb/acre)
1. Untreated check	23.9	450	41.4	770
2. 20 lb/acre Stockosorb Agro polymer broadcast and diskbed incorporated	24.0	480	42.4	840
3. 20 lb/acre Stockosorb Agro polymer banded with seed at planting	22.8	400	42.9	740
4. 20 lb/acre Stockosorb Agro polymer broadcast, incoirporated, then diskbed	23.5	450	42.7	810
CV, %	7.2	17.2	4.6	14.8
LSD 0.05	NS	NS	NS	NS

NS - nonsignificant

Table 2. Response of HVI fiber properties to methods of placement of Stockhausen Stockosorb Agro cross-linked polymer, Texas Agricultural Experiment Station, Lubbock, 1997

Treatment	Micronaire (units)	Length (inches)	Uniformity Index (%)	Strength (g/tex)	Elongation (%)	HVI Leaf Grade (units)	Rd (units)	+b (units)
1. Untreated check	4.08	1.012	81.3	31.4	10.0	4.7	83.8	8.1
2. 20 lb/acre Stockosorb Agro polymer broadcast and diskbed incorporated	4.25	1.005	81.1	31.1	9.8	5.2	83.8	7.9
3. 20 lb/acre Stockosorb Agro polymer banded with seed at planting	4.08	1.017	81.4	31.3	10.0	5.0	83.6	8.0
4. 20 lb/acre Stockosorb Agro polymer broadcast, incorporated, then diskbed	4.15	1.017	81.9	31.4	9.8	4.2	81.8	8.4
CV, %	4.2	2.0	0.7	4.6	5.1	14.8	2.7	4.0
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS

NS - nonsignificant.

TITLE:

Evaluation of Application Rates of Stockhausen Agro Polymer In Dryland Cotton Production, Texas Agricultural Experiment Station, Lubbock, TX, 1997.

AUTHORS:

Randy Boman, Wayne Keeling, Danny Carmichael, and P.J. Bessire; Extension Agronomist-Cotton, Systems Agronomist-Texas Agricultural Experiment Station, Extension Associate-Cotton, and Student Worker

MATERIALS AND METHODS:

Variety:	Paymaster HS26
Seeding rate:	15 lb seed/acre
Plot size:	4-40 inch rows x 40 ft, 2 center rows harvested for yield using a modified John Deere 482 plot stripper
Experimental design:	randomized complete block with 4 replications
Polymer applied:	April 24
Planting date:	May 21
Harvested:	October 16
Dryland	
Treatments:	1. Untreated check 2. 20 lb/acre Agro polymer broadcast and diskbed incorporated 3. 30 lb/acre Agro polymer broadcast and diskbed incorporated 4. 40 lb/acre Agro polymer broadcast and diskbed incorporated

RESULTS AND DISCUSSION:

Interest in synthetic polymers has recently increased. Many types of polymers are currently manufactured by various companies, including linear polymers which have been reported to reduce soil erosion (both wind and water) potential when applied to the soil surface. Cross-linked polymers have been used to increase the moisture holding capacity of soil media for greenhouse crops. Stockhausen markets a cross-linked polymer (Stockosorb Agro) which has potential for reducing soil crusting and may thus affect seedling emergence. The objective of this work was to determine the effects of several rates of application of a cross-linked polymer on lint yields and cotton quality produced under dryland conditions. None of the Stockosorb treatments resulted in statistically significant effects on lint yield, gin turnout and HVI fiber properties (Tables 1 and 2).

Table 1. Response of gin turnout percentage, lint yield, seed percentage, and seed yield to rates of Stockhausen Stockosorb Agro cross-linked polymer, Texas Agricultural Experiment Station, Lubbock, 1997.

Treatment	Gin Turnout (%)	Lint Yield (lb/acre)	Seed (%)	Seed Yield (lb/acre)
1. Untreated check	24.1	360	42.7	640
2. 20 lb/acre Stockosorb Agro polymer broadcast and diskbed incorporated	24.1	375	43.0	665
3. 30 lb/acre Stockosorb Agro polymer broadcast and diskbed incorporated	24.3	405	43.6	725
4. 40 lb/acre Stockosorb Agro polymer broadcast, incorporated, and diskbed incorporated	24.4	380	43.3	675
CV, %	3.0	18.2	2.7	17.4
LSD 0.05	NS	NS	NS	NS

NS - nonsignificant

Table 2. Response of HVI fiber properties to rates of Stockhausen Stockosorb Agro cross-linked polymer, Texas Agricultural Experiment Station, Lubbock, 1997

Treatment	Micronaire (units)	Length (inches)	Uniformity Index (%)	Strength (g/tex)	Elongation (%)	HVI Leaf Grade (units)	Rd (units)	+b (units)
1. Untreated check	4.06	0.992	80.7	31.0	9.8	5.0	79.6	8.5
2. 20 lb/acre Stockosorb Agro polymer broadcast and diskbed incorporated	4.22	1.000	80.9	33.0	10.2	4.7	82.6	8.3
3. 30 lb/acre Stockosorb Agro polymer banded broadcast and diskbed incorporated	4.19	1.023	81.8	31.9	9.9	4.6	85.2	7.9
4. 40 lb/acre Stockosorb Agro polymer broadcast, incorporated, and diskbed icnorporated	4.03	0.997	81.0	32.4	9.9	5.2	83.3	8.2
CV, %	8.2	1.4	0.8	2.3	4.6	19.2	3.3	4.2
LSD 0.05	NS	NS	NS	NS	NS	NS	NS	NS

NS - nonsignificant.

TITLE:

Evaluation of Amisorb Nutrient Enhancer For Use in LEPA Irrigated Cotton, AGCARES, Lamesa, TX, 1997.

AUTHORS:

Randy Boman, Danny Carmichael, and P.J. Bessire; Extension Agronomist-Cotton, Extension Associate-Cotton, and Student Worker

MATERIALS AND METHODS:

Variety:	Paymaster HS26
Seeding rate:	15 lb seed/acre
Plot size:	4-40 inch rows x 50 ft, 2 center rows harvested for yield using a modified John Deere 482 plot stripper, randomized complete block design with 4 replications
Planting date:	May 6
Irrigation and nitrogen management:	LEPA 0.75 ET replacement June 0” July 2.85” + 90 lb N/acre August 3.60” + 30 lb N/acre September 0.40” Seasonal total 9.18” + 140 lb N/acre
Leaf petiole nitrate samples:	August 6
Harvested:	October 22
Treatments:	1. Untreated check 2. 1 pt/acre prior to initial fertigation event (PIF - July 2) 3. 2 pt/acre PIF 4. 1 pt/acre PIF + 1 pt/acre second fertigation event (SF - July 16) 5. 2 pt/acre PIF + 2 pt/acre SF 6. 1 pt/acre PIF + 1 pt/acre SF + 1 pt/acre third fertigation event (TF - July 25) 7. 2 pt/acre PIF + 2 pt/acre SF + 2 pt/acre TF 8. 3 pt/acre PIF 9. 4 pt/acre PIF 10. 6 pt/acre PIF 11. 8 pt/acre PIF

Amisorb (40% carpramid concentration - 4.23 lb/gallon active ingredient) application was made to center wet LEPA furrow prior to respective fertigation events

RESULTS AND DISCUSSION:

Amisorb is a polyaspartate compound that is reported to increase density of root hairs in hydroponic laboratory culture and is marketed as a “nutrient enhancer.” Little data exists to support or refute claims of increased cotton lint yields or effects on other response variables important in cotton production. The objective of this work was to determine the effects of various rates and timings of application of Amisorb in LEPA irrigated cotton. Mid-bloom leaf petiole samples were taken to determine if increased plant nitrogen concentrations would occur as a result of Amisorb applications prior to LEPA fertigation events. None of the Amisorb treatments resulted in statistically significant effects on gin turnout, lint and seed yields, petiole nitrate concentration at mid-bloom, and selected HVI fiber properties (Table 1).

Table 1. Gin turnout, lint and seed yields, petiole nitrate concentration, and selected HVI fiber properties in the Amisorb/LEPA irrigated cotton trial, AGCARES, 1997.

Treatment	Gin Turnout (%)	Lint Yield (lb/acre)	Seed Yield (lb/acre)	Petiole Nitrate (ppm)	Mic (units)	Length (inches)	Strength (g/tex)
1. Untreated check	24.6	1076	1948	3400	4.62	1.072	32.5
2. 1 pt/acre prior to initial fertigation event (PIF - July 2)	24.4	1055	1951	4200	5.05	1.062	32.1
3. 2 pt/acre PIF	24.9	1193	2144	3730	4.82	1.077	30.8
4. 1 pt/acre PIF + 1 pt/acre second fertigation event (SF - July 16)	23.7	960	1846	3380	4.72	1.075	32.1
5. 2 pt/acre PIF + 2 pt/acre SF	24.3	995	1820	3410	4.77	1.067	31.2
6. 1 pt/acre PIF + 1 pt/acre SF + 1 pt/acre third fertigation event (TF - July 25)	24.6	1024	1898	4010	4.89	1.075	33.0
7. 2 pt/acre PIF + 2 pt/acre SF + 2 pt/acre TF	24.7	1149	2109	3080	4.67	1.072	32.0
8. 3 pt/acre PIF	25.5	1135	2048	3280	4.76	1.095	31.3
9. 4 pt/acre PIF	24.5	1118	2063	3420	4.86	1.077	33.4
10. 6 pt/acre PIF	24.7	1095	2003	3640	4.59	1.092	32.7
11. 8 pt/acre PIF	25.5	1158	2033	3720	4.71	1.080	31.6
CV, %	3.6	9.8	10.0	18.1	4.70	1.700	4.5
LSD 0.05	NS	NS	NS	NS	NS	NS	NS

1997 AGRIPARTNERS CRP SOIL SAMPLING PROJECT

CONDUCTED BY THE COUNTY EXTENSION-AGRICULTURE AGENTS AND THEIR AGRIPARTNERS TECHNICIANS

Dr. Randy Boman and Dr. Brent Auvermann
Extension Agronomist-Cotton and Extension Agricultural Engineer-Environmental Systems
Texas Agricultural Extension Service, Lubbock and Amarillo, TX, respectively.

During the summer of 1997, a total of 60 High Plains fields were soil sampled by the Texas Agricultural Extension Service Agriculture Agents and their AgriPartner technicians, generating observations of the soil fertility status of CRP fields across the 20-county area. The AgriPartners program in District 2 furnishes trained personnel to obtain data for various projects. This program incorporates support from various segments of the cotton industry including producer organizations, agrichemical companies, etc., all in cooperation with researchers and Extension staff from Texas A&M University and Texas Tech University.

This project included a comprehensive soil sampling (in two increments - 0-6 inches and 6-12 inches) of 31 Conservation Reserve Program (CRP) fields located in playa lake watersheds, along with 29 adjacent fields that had been in continuous production for the duration of the CRP program. Concerns about potential air and water quality degradation after extensive breakout of CRP lands have been expressed by many people in the High Plains region. The CRP has resulted in considerable improvement in air quality by reducing wind erosion and scouring on highly erodible lands in the Southern High Plains region.

Many questions arise as CRP contracts begin to expire. Governmental rules concerning eligibility for re-enrollment result in many producers considering options for returning land to agricultural production. Fertility management of CRP break-out land is expected to be an important challenge as many of these fields return to production. It is recognized that many CRP fields were inherently lower production fields, perhaps with low soil fertility status prior to enrollment. Two CRP research sites were recently converted to crop production in western Oklahoma. Results from several studies conducted at those sites indicated that higher than normal nitrogen (N) fertilization rates were required to obtain optimum crop yields. Large amounts of grass residues (biomass) have been returned to the soil during the 10-year period of CRP participation. This addition of high carbon-to-nitrogen ratio organic biomass (both above-ground and root mass) to the soils is expected to immobilize some fertilizer N initially. Over time, as tillage, rainfall, and fertilization enhance residue degradation, the fields are expected to return to “normal” in terms of fertilizer requirements. Generally speaking, the N fertility status of CRP land is low, and this will increase the need for additional fertilizer until the organic residues become stabilized via degradation. Phosphorus (P) fertility is also expected to be lower now than 10 years ago due to numerous wetting and drying cycles resulting in insoluble (and thus plant unavailable) P reaction products in the soil. Some of the benefits expected from CRP organic residues include better soil structure, higher water infiltration rates, and increased water holding capacity until the residues become decomposed and stabilize.

This sampling project was initiated to address the lack of information concerning the soil fertility status of CRP fields and the potential impact of increased fertilization in playa basin watersheds.

The objectives of the soil sampling program were as follows:

1) To compare present nutrient status of CRP land with adjacent lands that have been under continuous cropping over the previous 10 years to help determine future N, P, and potassium (K) fertilizer requirements of CRP land converted to crop production.

2) Survey producers to determine potential management methodology of future CRP breakout fields.

County Agents and AgriPartners demonstration technicians located 2 CRP sites in each county that were likely to be converted to crop land during 1998, and 2 adjacent continuous production fields in close proximity to the CRP site. A total of 20 soil cores were taken from 40 acres using Oakfield soil probes, and mixed thoroughly to obtain a uniform sample. This was performed for both the 0-6 inch and 6-12 inch increments. About 1 pint of mixed soil per sample was collected. Soil samples were then submitted for routine analysis at the Texas Agricultural Extension Service Soil, Plant, and Water Testing Laboratory at College Station. Agents also asked producers to answer questions concerning their intentions concerning CRP break-out management practices.

Soil Testing Survey Results

Analytical results for the region are reported in Tables 1-4, with the mean (average) values and the ranges in values observed at the bottom of each table. These results generally indicate that the nutrient status of CRP fields is considerably lower than adjacent fields for both N and P. Potassium levels in the region are generally inherently adequate for most high-yield agriculture due to the mineralogy of High Plains soils.

Nitrate-N levels in the 0-6 inch depth in the CRP fields averaged 4 ppm (ppm x 2 = lb/acre, so 4 x 2 = 8 lb N/ acre) whereas the continuous production fields averaged 11 ppm or 22 lb/acre. This translates into an average difference of almost 12-15 lb/acre more fertilizer N for cotton and sorghum production at similar yield goals on CRP land when compared to the continuous production fields. This increased fertilizer N requirement difference is based on average nitrate-N value differences between CRP and continuous production fields as reported from this survey.

Nitrate-N is the most readily available form for plants. However, N exists in the soil in many species including ammonium-N, nitrite-N, and numerous organic-N forms. The soil testing procedure that is used cannot estimate how much N could be immobilized by soil micro-organisms to break down the grass residues in the CRP fields, nor does it tell us how much N could possibly be mineralized from crop residues in the continuous production fields. In actuality, it is very likely that net N requirement differences in terms of the “total soil system requirement” for CRP land compared to land continuously cropped will be much greater than that estimated by nitrate-N testing. Put another way, these highly carbonaceous soils may represent a large N sink that must be satisfied before N fertility increases in real terms.

Soil test P levels were lower in the 0-6 inch depth in CRP fields than in adjacent continuous production fields. The average soil test P value for CRP land in this survey was 23 ppm, while the continuous production fields averaged 41 ppm. The CRP fields ranged from 4 to 91 ppm extractable phosphorus, which indicated that there is considerable variability in the distribution of this nutrient among sampled fields. It is suggested that a soil testing below 41 ppm should be fertilized, the degree to which varies by actual soil test P level. A total of 27 fields tested below 41 ppm, which indicated that about 87% of CRP fields in this survey would require some phosphate fertilization. The continuous production fields ranged from 6 to 147 ppm in the surface layer. A total of 20 fields sampled had soil test levels at 41 ppm or below which resulted in a total of about 69% requiring phosphate fertilization. Nine continuous production fields tested high or very high (greater than 41 ppm). The probability of obtaining economic yield responses to added phosphate fertilizer begins to diminish as soil test P levels rise above the 41 ppm level. Identification of high P status fields via soil testing could potentially save on fertilizer inputs and allow reallocation of those dollars to more responsive crop management options.

Soil test K levels in the soil surface of fields sampled in this survey indicate that all fields were above the value at which potash fertilization is suggested (126 ppm). The range for CRP fields was 185 to 802 ppm, with an average of 427 ppm. The continuous production fields ranged from 135 to 848 ppm, and averaged 408 ppm. Based on these soil test levels, no K fertilization would generally be required to obtain optimum crop yields.

Producer CRP Questionnaire Results

A total of 17 surveys were returned by agents, with varying levels of responses by producers. Most producers answered most of the questions, however, many questions did not receive a full response. Many of the producers surveyed indicated that they intended to return the CRP land to production through the use of conventional primary tillage (Question #1). Most indicated that they would employ offset disking and moldboarding in conjunction with burning to reduce cropping problems with the heavy grass residues. The clean-tillage methods will immediately result in increased erosion (both wind and water) potential in converted fields. Over 60 percent indicated that a transgenic, herbicide-resistant crop would likely be produced to help reduce problems with troublesome weed species (Question #5). Weed species ranking high in terms of producer worry include pigweed, silverleaf nightshade, cocklebur, Johnsongrass, Texas blueweed, and field bindweed (Question #2). Herbicide resistant crops such as Roundup Ready cotton should significantly help reduce problems associated with tough annual and perennial weeds listed. Many managers noted that the fields they intend to break out were irrigated prior to enrollment in the CRP, and more than half indicated that the fields would be irrigated once returned to crop production (Questions #3 and 4). Irrigation capability increases the probability of achieving success, and also aids in the potential for better erosion control. Practices such as cover cropping with small grains and termination with herbicides such as Roundup will significantly decrease erosion potential.

Many producers recognize that the CRP grass has not contributed significantly to soil fertility prospects over the 10-year period (Questions #6). However, few recognize that fertilizer requirements will likely be greater initially than for conventional fields (Question #8). Soil structure improvement is cited by producers as a major benefit of CRP enrollment (Question #7). A vast majority of those responding said that they would utilize soil testing to help make decisions on how to fertilize the fields, with most reporting that private soil testing laboratories will be used (Questions #9, 10, 14, and 15). Over 80 percent indicted that they currently use soil testing as a soil fertility management tool (Question #13), and routinely use the recommendations to modify fertilizer programs (Question #14). Most recognize that obtaining multiple cores per soil sample is important (Question #15). All respondents indicated that they limit the number of acres represented by a single sample to less than 120 (Question #15), with several reporting less than 100 acres. Only 3 producers indicated that they would use manure or other organic sources of fertilizer, and of those, 2 stated that they submit samples for laboratory analysis to determine nutrient content (Questions #11 and 12).

About 75 percent of responding producers stated that runoff water entering playa lakes would be affected by breaking out CRP lands. Just over 50 percent indicated that they did not attempt to re-bid the land back into the new CRP signups. The results of the questionnaire survey of a small population of producers indicate that many are aware of potential management problems associated with returning CRP to production. Most recognize that soil fertility management will be important when returning CRP land back to production, and most plan to use soil testing as a management tool.

Summary

The results from this project suggest that when returning CRP lands back to agronomic production, N and P fertilization will be critical. The resultant increased nutrient loading potential in playa lake watersheds also increases concerns for good soil stewardship. This includes the use of conservation tillage practices to reduce sediment loss via water erosion. Soil testing is an important management tool that will pay dividends if utilized. Producers should be selective if possible with respect to soil fertility status when planning to break out CRP sites. Use of soil testing to determine which fields are higher in inherent fertility could possibly save fertilizer dollars. Rates of respective fertilizer nutrients will depend upon several factors. The crop selected and the amount of biomass will influence N rate, as will yield goal. Fields with heavy biomass residue levels will very likely require higher N rates than those suggested by NO_3-N testing due to immobilization of N by soil micro-organisms. Higher N requirements will diminish over time as tillage reduces grass residue levels. Phosphate fertilization will depend upon the soil test P level in the field, and recommendations will likely range from 30 to 60 lb of P_2O_5/acre. Generally speaking, due to the high soil test K levels in High Plains soils, they will not likely require extensive additions of potash fertilizers.

Acknowledgment: *The County Agents and AgriPartners technicians are very appreciative of the producers who participated in this important survey of CRP fields in the Texas High Plains region.*

Table 1. CRP - 0-6 INCH DEPTH SOIL TEST RESULTS

County #	County	Field #	Depth	Inches	Type	pH	Nitrogen NO^3-N, ppm	Phosphorus P, ppm	Potassium K, ppm	Calcium Ca, ppm	Magnesium Mg, ppm	Zinc Zn, ppm	Iron Fe, ppm	Manganese Mn, ppm	Copper Cu, ppm	Sodium Na, ppm	Sulfur S, ppm
17	Bailey	1	a	0-6	crp	8.2	25	17	478	18192	543	0.21	4.10	4.00	0.66	52	17
17	Bailey	2	a	0-6	crp	8.2	3	87	483	30000	2024	0.29	3.82	5.05	0.45	66	42
33	Borden	1	a	0-6	crp	8.4	1	48	286	29968	360	0.14	2.56	3.57	0.44	53	26
33	Borden	2	a	0-6	crp	8.3	2	30	576	8668	367	0.29	3.22	4.58	0.56	53	18
79	Cochran	1	a	0-6	crp	7.6	5	8	317	1510	301	0.43	6.73	7.99	0.58	60	12
79	Cochran	2	a	0-6	crp	7.8	5	5	350	1624	226	0.29	5.93	5.54	0.47	46	10
107	Crosby	1	a	0-6	crp	7.7	10	12	506	2887	579	0.28	11.45	8.30	1.08	61	13
107	Crosby	2	a	0-6	crp	7.7	1	4	455	2671	543	0.15	6.48	7.74	0.88	51	9
115	Dawson	1	a	0-6	crp	7.9	1	9	246	1760	184	0.15	5.35	3.77	0.40	48	12
115	Dawson	2	a	0-6	crp	8.3	1	7	186	1556	137	0.10	5.20	2.59	0.36	42	10
153	Floyd	1	a	0-6	crp	7.7	6	28	660	3841	677	0.25	14.13	9.94	1.51	61	13
153	Floyd	2	a	0-6	crp	7.8	15	40	802	3288	1178	0.38	7.13	12.66	1.18	77	13
165	Gaines	1	a	0-6	crp	8.2	1	10	190	2221	142	0.14	3.15	5.52	0.31	51	13
165	Gaines	2	a	0-6	crp	8.4	1	17	185	2353	192	0.11	2.42	4.28	0.18	49	8
169	Garza	1	a	0-6	crp	7.7	1	10	452	2647	325	0.25	5.71	13.09	0.89	56	10
169	Garza	2	a	0-6	crp	7.2	1	10	475	2118	286	0.29	7.15	13.47	0.83	58	11
189	Hale	2	a	0-6	crp	7.8	1	76	719	2780	726	2.68	11.54	16.79	1.43	57	14
219	Hockley	1	a	0-6	crp	7.8	16	16	609	1858	647	0.21	3.23	10.10	0.59	44	14
219	Hockley	2	a	0-6	crp	8.1	1	9	530	2517	416	0.13	3.14	4.60	0.55	43	13
303	Lubbock	1	a	0-6	crp	7.7	1	8	226	1415	294	0.13	1.83	2.29	0.29	56	7
303	Lubbock	2	a	0-6	crp	7.7	1	10	387	2221	237	0.16	2.37	4.20	0.43	56	9
305	Lynn	1	a	0-6	crp	7.9	1	15	495	2894	233	1.41	9.23	8.98	0.95	46	10
305	Lynn	2	a	0-6	crp	7.7	1	8	237	1448	160	0.16	5.68	4.16	0.32	43	8
369	Parmer	1	a	0-6	crp	7.6	13	29	654	1730	441	0.94	6.83	10.43	1.07	44	15
369	Parmer	2	a	0-6	crp	8.2	5	91	503	30002	2035	0.35	3.94	4.87	0.48	59	43
437	Swisher	1	a	0-6	crp	8.0	2	21	649	3380	581	0.23	5.38	9.41	0.90	53	14
437	Swisher	2	a	0-6	crp	8.0	1	29	608	4655	708	0.26	8.47	7.66	1.10	53	12
445	Terry	1	a	0-6	crp	8.3	1	27	274	2205	275	0.27	5.27	3.56	0.28	44	11
445	Terry	2	a	0-6	crp	8.3	1	28	218	2032	232	0.27	5.40	2.74	0.27	48	9
501	Yoakum	1	a	0-6	crp	8.0	1	6	250	1664	157	0.09	4.20	3.74	0.24	47	8
501	Yoakum	2	a	0-6	crp	7.9	1	7	238	1405	147	0.10	2.32	3.74	0.21	47	8
Average						7.9	4	23	427	5726	495	0.35	5.50	7.00	0.70	52	14
Std. Dev.						0.3	6	23	179	8652	471	0.50	2.90	4.00	0.40	8	8
Minimum						7.2	1	4	185	1405	137	0.09	1.80	2.00	0.20	42	7
Maximum						8.4	25	91	802	30002	2035	2.68	14.10	17.00	1.50	77	43

Table 2. CRP - 6-12 INCH DEPTH SOIL TEST RESULTS

County #	County	Field #	Depth	Inches	Type	pH	Nitrogen NO^3-N, ppm	Phosphorus P, ppm	Potassium K, ppm	Calcium Ca, ppm	Magnesium Mg, ppm	Zinc Zn, ppm	Iron Fe, ppm	Manganese Mn, ppm	Copper Cu, ppm	Sodium Na, ppm	Sulfur S, ppm
17	Bailey	1	b	6-12	crp	8.3	1	22	317	29984	667	0.14	4.28	3.39	0.87	54	24
17	Bailey	2	b	6-12	crp	8.4	1	70	392	30003	2330	0.19	3.63	5.07	0.59	72	46
33	Borden	1	b	6-12	crp	8.6	1	48	242	29986	487	0.09	2.46	3.90	0.44	56	34
33	Borden	2	b	6-12	crp	8.2	1	20	428	26407	361	0.20	3.54	5.25	0.67	57	19
79	Cochran	1	b	6-12	crp	7.6	2	2	268	1581	208	0.11	6.56	5.50	0.48	46	10
79	Cochran	2	b	6-12	crp	7.5	2	3	247	1491	255	0.13	6.20	6.11	0.52	47	10
107	Crosby	1	b	6-12	crp	8.1	2	7	385	11814	627	2.22	7.40	5.81	1.06	74	15
107	Crosby	2	b	6-12	crp	7.9	1	3	381	2718	529	0.12	5.51	6.20	0.95	55	9
115	Dawson	1	b	6-12	crp	8.1	1	4	237	1720	212	0.11	5.35	2.91	0.39	44	12
115	Dawson	2	b	6-12	crp	8.3	1	5	209	1722	175	0.08	5.32	2.45	0.38	42	10
153	Floyd	1	b	6-12	crp	7.9	5	16	554	29928	723	0.14	9.39	5.29	1.25	62	14
153	Floyd	2	b	6-12	crp	8.0	11	45	747	3548	1141	0.52	7.28	12.39	1.22	84	17
165	Gaines	1	b	6-12	crp	7.9	1	5	147	1438	110	0.10	2.97	6.46	0.38	46	11
165	Gaines	2	b	6-12	crp	8.4	1	20	189	2505	190	0.22	2.53	4.39	0.19	49	12
169	Garza	1	b	6-12	crp	7.6	1	5	381	2961	375	0.15	6.60	14.01	1.08	61	10
169	Garza	2	b	6-12	crp	7.4	1	9	456	2243	295	0.40	7.16	14.96	0.84	60	10
189	Hale	2	b	6-12	crp	7.8	1	80	664	3883	734	1.22	8.37	12.04	1.27	111	34
219	Hockley	1	b	6-12	crp	8.0	5	9	425	1818	716	0.09	1.98	5.84	0.55	50	11
219	Hockley	2	b	6-12	crp	8.5	1	7	305	2944	407	0.06	1.14	4.86	0.47	45	11
303	Lubbock	1	b	6-12	crp	7.7	1	7	239	1436	313	0.25	5.21	6.37	0.52	65	8
303	Lubbock	2	b	6-12	crp	7.6	1	7	336	2139	228	0.30	10.48	9.09	1.01	58	9
305	Lynn	1	b	6-12	crp	7.9	1	6	417	3762	311	1.14	11.49	15.06	1.67	53	17
305	Lynn	2	b	6-12	crp	7.5	1	6	219	1497	169	0.13	5.60	4.15	0.37	54	9
369	Parmer	1	b	6-12	crp	7.3	2	9	406	1909	563	0.19	6.73	8.72	1.19	60	15
369	Parmer	2	b	6-12	crp	8.3	3	70	389	30003	2338	0.20	3.47	4.66	0.58	64	48
437	Swisher	1	b	6-12	crp	8.1	1	9	467	7571	710	0.11	6.35	6.35	1.02	109	15
437	Swisher	2	b	6-12	crp	8.0	1	25	660	5082	901	0.21	8.52	7.12	1.24	75	14
445	Terry	1	b	6-12	crp	8.4	1	18	242	2174	248	0.28	5.11	2.78	0.31	53	9
445	Terry	2	b	6-12	crp	8.5	1	14	270	2272	265	0.15	4.57	2.26	0.26	57	9
501	Yoakum	1	b	6-12	crp	7.9	1	5	220	1679	165	0.11	2.70	3.94	0.23	49	10
501	Yoakum	2	b	6-12	crp	8.2	1	5	279	1661	195	0.10	3.94	3.34	0.26	47	9
Average						8.0	2	18	358	8060	546	0.31	5.50	6.00	0.70	60	15
Std. Dev.						0.3	2	21	146	10835	539	0.44	2.50	4.00	0.40	17	10
Minimum						7.3	1	2	147	1436	110	0.06	1.10	2.00	0.20	42	8
Maximum						8.6	11	80	747	30003	2338	2.22	11.50	15.00	1.70	111	48

Table 3. Continuous - 0-6 INCH DEPTH SOIL TEST RESULTS

County #	County	Field #	Depth	Inches	Type	pH	Nitrogen NO^3-N, ppm	Phosphorus P, ppm	Potassium K, ppm	Calcium Ca, ppm	Magnesium Mg, ppm	Zinc Zn, ppm	Iron Fe, ppm	Manganese Mn, ppm	Copper Cu, ppm	Sodium Na, ppm	Sulfur S, ppm
17	Bailey	3	a	0-6	cont	8.2	6	93	497	5826	947	1.77	7.35	5.69	1.17	88	22
17	Bailey	4	a	0-6	cont	8.1	6	147	509	3010	1007	1.18	6.37	6.35	0.99	89	58
33	Borden	3	a	0-6	cont	8.4	13	41	232	30000	650	0.15	2.75	3.20	0.53	64	52
33	Borden	4	a	0-6	cont	8.4	19	22	432	11520	390	0.16	3.87	4.20	0.63	97	20
107	Crosby	3	a	0-6	cont	8.1	25	13	498	2810	622	0.30	4.98	7.79	0.95	92	19
107	Crosby	4	a	0-6	cont	8.1	1	19	470	2812	624	0.31	4.23	5.15	0.84	59	10
115	Dawson	3	a	0-6	cont	8.3	4	16	245	2041	124	0.19	5.74	2.86	0.30	43	12
115	Dawson	4	a	0-6	cont	8.2	2	12	231	1626	142	0.10	6.92	3.88	0.30	42	11
153	Floyd	3	a	0-6	cont	7.8	32	16	608	2521	909	0.20	5.16	7.12	1.04	99	16
153	Floyd	4	a	0-6	cont	8.0	3	18	596	3020	1090	0.21	8.54	11.32	1.15	104	18
165	Gaines	3	a	0-6	cont	7.6	5	6	135	1321	215	0.11	2.37	4.43	0.71	115	88
165	Gaines	4	a	0-6	cont	7.9	13	21	220	1046	500	0.24	2.40	3.38	0.42	105	35
169	Garza	3	a	0-6	cont	7.6	8	12	363	2114	335	0.25	4.95	9.59	0.73	53	11
169	Garza	4	a	0-6	cont	7.2	7	17	408	2016	231	0.31	6.07	9.53	0.80	47	10
189	Hale	4	a	0-6	cont	7.8	10	74	512	2711	612	1.27	9.24	15.25	1.31	90	19
219	Hockley	3	a	0-6	cont	8.2	13	35	491	1870	713	0.24	2.13	16.01	0.46	91	15
219	Hockley	4	a	0-6	cont	8.3	13	62	567	2215	718	0.90	2.34	7.11	0.52	104	33
303	Lubbock	3	a	0-6	cont	7.5	23	26	281	1343	422	0.39	3.67	5.51	0.41	95	29
303	Lubbock	4	a	0-6	cont	7.6	38	26	329	1962	296	0.42	8.50	8.49	0.80	74	13
305	Lynn	3	a	0-6	cont	8.0	7	24	503	3429	194	1.05	9.55	8.76	0.91	50	12
305	Lynn	4	a	0-6	cont	7.0	8	12	246	1266	451	0.30	7.76	8.33	0.45	286	167
369	Parmer	3	a	0-6	cont	7.5	8	67	441	2423	452	1.93	8.05	8.49	0.71	82	19
369	Parmer	4	a	0-6	cont	7.8	9	143	527	3123	1076	1.07	6.78	5.83	1.12	88	64
437	Swisher	3	a	0-6	cont	7.5	10	9	575	2950	517	0.27	6.24	21.33	1.11	58	13
437	Swisher	4	a	0-6	cont	7.9	9	93	848	3365	935	0.47	9.31	9.71	1.36	113	18
445	Terry	3	a	0-6	cont	8.3	22	61	348	4934	641	0.29	7.00	8.80	0.48	101	52
445	Terry	4	a	0-6	cont	8.3	1	20	221	1927	260	0.15	6.64	2.59	0.39	53	8
501	Yoakum	3	a	0-6	cont	8.1	1	55	282	1378	407	0.15	3.33	4.50	0.24	89	14
501	Yoakum	4	a	0-6	cont	7.8	2	34	219	1146	378	0.68	2.93	3.77	0.31	74	9
Average						7.9	11	41	408	3708	546	0.52	5.70	8.00	0.70	88	30
Std. Dev.						0.4	9	38	162	5431	286	0.50	2.40	4.00	0.30	44	33
Minimum						7.0	1	6	135	1046	124	0.10	2.10	3.00	0.20	42	8
Maximum						8.4	38	147	848	30000	1090	1.93	9.60	21.00	1.40	286	167

Table 4. Continuous - 06-12 INCH DEPTH SOIL TEST RESULTS

County #	County	Field #	Depth	Inches	Type	pH	Nitrogen NO^3-N, ppm	Phosphorus P, ppm	Potassium K, ppm	Calcium Ca, ppm	Magnesium Mg, ppm	Zinc Zn, ppm	Iron Fe, ppm	Manganese Mn, ppm	Copper Cu, ppm	Sodium Na, ppm	Sulfur S, ppm
17	Bailey	3	b	6-12	cont	8.1	3	35	380	2562	726	0.51	5.51	5.36	0.91	89	18
17	Bailey	4	b	6-12	cont	7.9	10	61	458	3548	1129	0.48	6.48	5.88	0.99	118	123
33	Borden	3	b	6-12	cont	8.4	9	39	219	30000	644	0.16	3.15	3.46	0.59	63	52
33	Borden	4	b	6-12	cont	8.3	34	16	335	29883	394	0.15	3.76	4.34	0.67	113	22
107	Crosby	3	b	6-12	cont	8.1	42	9	444	3930	660	0.23	4.90	5.26	0.81	134	33
107	Crosby	4	b	6-12	cont	7.8	2	9	469	3447	731	0.25	5.83	6.78	0.99	73	11
115	Dawson	3	b	6-12	cont	8.3	5	16	272	2138	127	0.18	5.17	3.46	0.33	43	12
115	Dawson	4	b	6-12	cont	8.0	3	5	243	1909	173	0.07	5.50	3.45	0.42	42	10
153	Floyd	3	b	6-12	cont	8.1	12	9	550	3445	1070	0.11	5.55	6.35	1.14	140	19
153	Floyd	4	b	6-12	cont	7.8	8	30	611	2699	1043	0.53	18.45	17.65	1.70	103	24
165	Gaines	3	b	6-12	cont	7.8	3	49	169	1379	266	0.14	2.46	3.95	0.28	139	103
165	Gaines	4	b	6-12	cont	8.1	13	14	170	1016	458	0.23	2.56	2.99	0.41	111	21
169	Garza	3	b	6-12	cont	7.6	5	8	357	2210	344	0.18	6.04	10.97	0.85	60	11
169	Garza	4	b	6-12	cont	7.3	4	10	394	2136	246	0.20	7.48	11.99	0.93	67	11
189	Hale	4	b	6-12	cont	7.8	8	27	435	2811	759	0.72	10.96	12.35	1.55	114	22
219	Hockley	3	b	6-12	cont	8.2	7	26	393	1866	693	0.17	1.91	6.01	0.52	123	11
219	Hockley	4	b	6-12	cont	8.3	7	29	459	2115	645	0.53	2.40	5.46	0.56	110	33
303	Lubbock	3	b	6-12	cont	7.4	40	22	232	1232	385	0.65	4.45	8.94	0.52	66	18
303	Lubbock	4	b	6-12	cont	7.5	30	15	321	2104	255	0.37	8.59	13.46	0.87	71	14
305	Lynn	3	b	6-12	cont	7.9	2	13	440	3352	180	0.32	9.45	9.61	1.01	55	10
305	Lynn	4	b	6-12	cont	7.0	6	8	233	1416	331	0.21	7.08	7.42	0.47	246	162
369	Parmer	3	b	6-12	cont	7.6	3	16	384	2740	491	0.29	6.33	6.96	0.96	102	25
369	Parmer	4	b	6-12	cont	7.9	16	58	478	7233	1230	0.44	6.90	5.40	1.06	113	121
437	Swisher	3	b	6-12	cont	8.0	9	8	508	13433	728	0.13	6.61	8.23	1.02	105	19
437	Swisher	4	b	6-12	cont	7.9	9	37	622	2882	855	0.25	9.23	7.14	1.22	105	17
445	Terry	3	b	6-12	cont	8.3	27	65	335	5118	664	0.29	5.78	6.69	0.48	98	42
445	Terry	4	b	6-12	cont	8.3	1	8	178	1787	227	0.12	5.60	2.07	0.33	43	6
501	Yoakum	3	b	6-12	cont	7.7	1	30	260	1382	387	0.16	4.39	3.94	0.25	92	24
501	Yoakum	4	b	6-12	cont	7.9	1	27	213	1161	365	0.25	2.75	3.32	0.30	81	13
Average						7.9	11	24	364	4860	558	0.29	6.10	7.00	0.80	97	35
Std. Dev.						0.3	12	17	130	7345	307	0.17	3.30	4.00	0.40	41	40
Minimum						7.0	1	5	169	1016	127	0.07	1.90	2.00	0.20	42	6
Maximum						8.4	42	65	622	30000	1230	0.72	18.50	18.00	1.70	246	162