

# **The Effect of Renew Plus (RP96) on Crop Yields in Replicated Studies**

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Renew Plus is an AgPro Systems proprietary formulation of trace minerals, humic acid, surfactants, and fermentation products. Applied to the soil with broadcast banded, or in-furrow methods, it has demonstrated enhanced yields in a variety of crops and turf.

## **1996 STUDIES**

The objective of these four field studies was to evaluate the effects of this product scientifically in replicated plots with two corn and two soybean hybrids grown on different soils using broadcast, banded and in-furrow application methods.

The studies were installed at the Center for International Research and Training in Agriculture (C.I.R.T.A.) at Parkersburg, Iowa.

### **Procedure**

All studies utilized a randomized complete block design with six replications. Plots consisted of six rows 15 feet wide and 40 feet long. Appropriate herbicides were applied as in normal practice (Roundup and Accent on corn, Roundup and Post Plus plus Concert on soybean plots).

Broadcast and banded treatments were applied with a bicycle sprayer and in-furrow treatments were applied at planting.

Plots were planted using a six-row John Deere Max Emerge planter.

The middle two rows of each corn plot and the middle four rows of each soybean plot were harvested with a Gleaner K combine equipped with electronic harvesting hardware.

Grain yield, moisture content, test weight and plant population (corn only) were measured.

Analysis of variance was performed on the raw data. Means separation was determined using an LSD test performed at the 0.05 level of probability.

### **Results and Discussion**

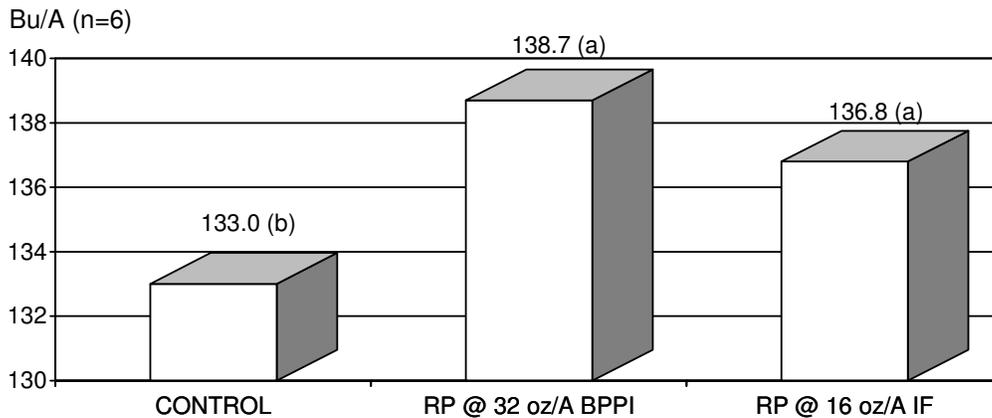
#### **Field Corn 1**

The first study utilized the Stine 061 hybrid and was planted on June 12, 1996 at 30,200 seeds per acre in a Bremer silt clay loam fertilized with 100 lbs. of nitrogen per acre.

Significant yield difference between treatments were detected at the 0.02 level of probability. Renew Plus in both broadcast and in-furrow treatments gave greater yields than the fertilized control (Figure 1).

### Figure 1. YIELD ENHANCEMENT IN FIELD CORN WITH RENEW PLUS™

STINE 1061 HYBRID. NITROGEN APPLIED TO ALL TREATMENTS @ 100 lbs/A.  
Center for International Research and Training in Agriculture. Parkersburg, Iowa. 1996.



Means followed by different letters are significantly different ( $P \leq 0.02$ )  
BPPI=Broadcast Pre-Plant Incorporated      IF=In-Furrow

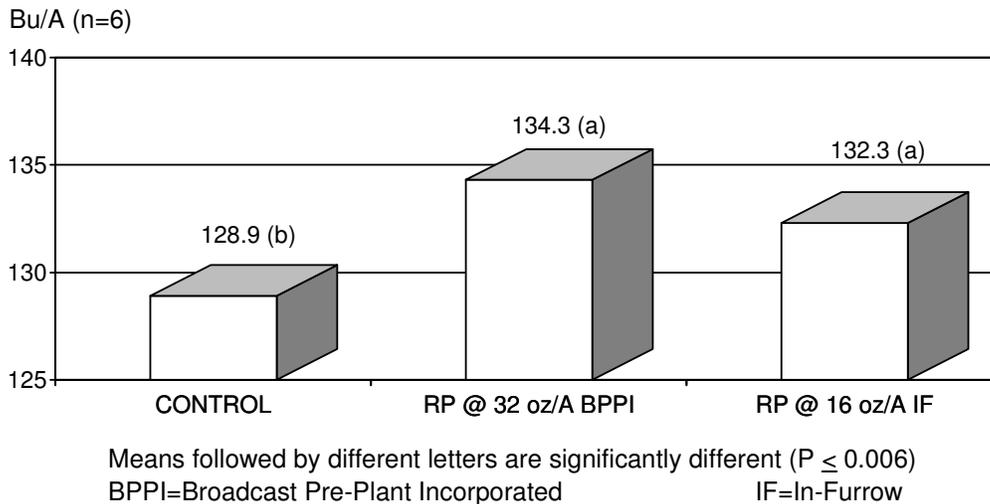
#### Field Corn 2

This study used the Ciba IMI 4306 hybrid. It was planted on June 24, 1996 at 30,200 seeds per acre in a Bremer silt clay loam fertilized with 100 lbs. of nitrogen per acre.

Treatment differences were significant the 0.006 level. Again both broadcast (32 oz. per acre) and banded (16 oz. per acre) applications of Renew Plus with 100 lbs. of nitrogen per acre out-yielded the control with 100 lbs. of nitrogen per acre without Renew Plus (Figure 2).

## Figure 2. YIELD ENHANCEMENT IN FIELD CORN WITH RENEW PLUS™

CIBA IMI 4306 HYBRID. NITROGEN APPLIED TO ALL TREATMENTS @ 100 lbs/A.  
Center for International Research and Training in Agriculture. Parkersburg, Iowa. 1996.



### Soybeans 1

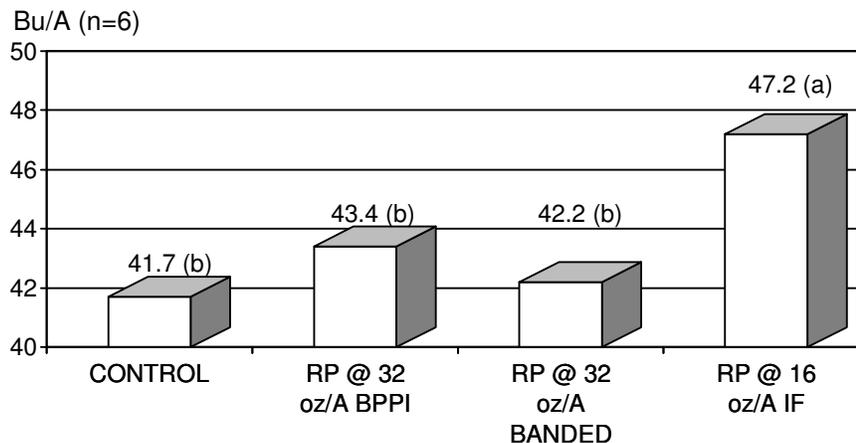
Kruger 2525 soybeans were planted in a Readlyn silt clay loam at 55 lbs. per acre on June 22. No fertility was used with any treatment or the control. Harvest was performed on October 19.

Yield differences were significant at the 0.02 level. Renew Plus applied in-furrow at 16 oz. per acre provided the highest grain yield (Figure 3).

## Figure 3. YIELD ENHANCEMENTS IN SOYBEANS WITH RENEW PLUS™

KRUGER 2525 HYBRID.

Center for International Research and Training in Agriculture. Parkersburg, Iowa. 1996.



Means followed by different letters are significantly different ( $P \leq 0.02$ )  
BPPI=Broadcast Pre-Plant Incorporated IF=In-Furrow

## Soybeans 2

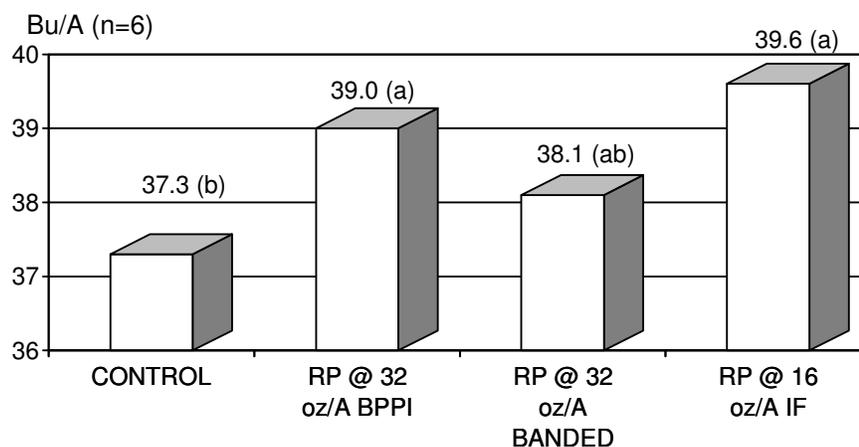
Stine 2250 soybeans were planted in a Bremer silt clay loam at 55 lbs. per acre. No fertility was used with any treatment or the control. Harvest was on October 19.

Yield differences were significant at the 0.03 level. Renew Plus applied in furrow at 16 oz. per acre and broadcast at 32 oz. per acre provided significant yield increases over the control (Figure 4).

### **Figure 4. YIELD ENHANCEMENTS IN SOYBEANS WITH RENEW PLUS™**

STINE 2250 HYBRID.

Center for International Research and Training in Agriculture. Parkersburg, Iowa. 1996.



Means followed by different letters are significantly different ( $P \leq 0.03$ )  
BPPI=Broadcast Pre-Plant Incorporated IF=In-Furrow

## **Summary and Conclusions**

Application of Renew Plus on two corn hybrids grown on two different soil types produced statistically significant yield increases when applied broadcast at 32 oz. per acre or in-furrow at 16 oz. per acre.

Application of Renew Plus on two soybean hybrids grown on two different soil types produced statistically significant yield increases when applied in-furrow at 16 oz. per acre.

Coefficients of variation were 1.70% and 2.06% on corn grain yield and 3.25% and 6.53% on soybean grain yield.

Based on the results from these studies, Renew Plus should provide substantial economic benefit when included in a corn or soybean production program.

## **1997 STUDIES**

In 1997 the emphasis was on verifying the 1996 results on corn and soybeans and on expanding the research to include other crops.

Studies were again installed at C.I.R.T.A. at Parkersburg, Iowa with similar studies in sandier soils at the University of Wisconsin's Hancock Research Station at Hancock, WI.

#### Field Corn (C.I.R.T.A.)

The experimental design of this project was a randomized complete block with six replications. Each plot consisted of 6 rows, 35 feet long and 30 inches apart.

The field was disked on May 12, 1997 and May 15, 1997. Dual II (2 pt/ac) and Attrex 4L (3 pt/ac) were applied on May 13.

AV 759 corn was planted in a Lawler silt loam at 30,200 seeds/A on May 21, 1997 using a 6-row John Deere Max Emerge planter. Kickoff (3 lb/a) and 8-19-3 (5 gal/a) were applied in-furrow over all treatments. In addition, 28% UAN (45 lb N/a on the control, 25% less on treatments 2, 3, and 4) was sidedressed at planting 2 inches deep and 6 inches from the row.

Treatments consisted of an untreated control, Renew Plus applied broadcast, preplant at 32 oz/A, Renew Plus applied in-furrow at planting at 16 oz/A and Renew Plus applied in furrow at planting at 16 oz/A plus 16 oz applied broadcast (foliar) 22 days after planting on June 12.

On July 10, the final 28% UAN (45 lbs N/a on the control, 25% less on treatments 2, 3, and 4) was sidedressed in the same manner as the first application.

The center two rows of each plot were harvested October 18, 1997 using a Gleaner K combine. Plant population was recorded before harvest. Grain yield, test weight, and moisture content were recorded using an Almaco Seed Spector 1.

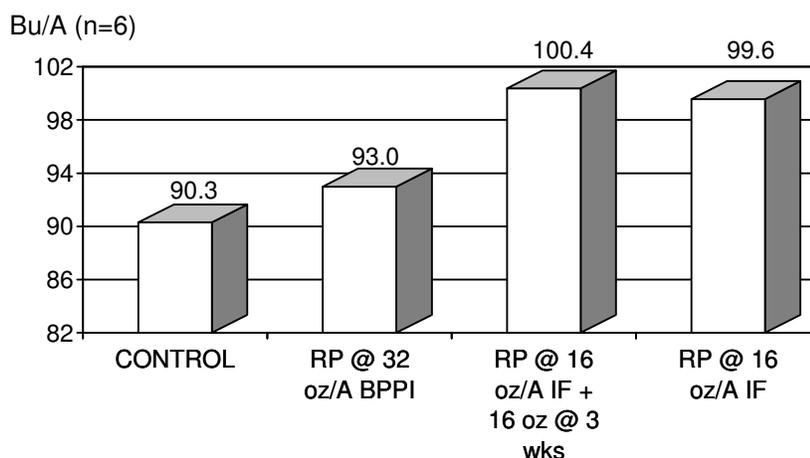
Although treatments of 16 oz/A applied in-furrow gave the highest yields (Figure 5), differences were not statistically significant. Differences in plant population, moisture content and test weight were likewise not significant.

This result in itself is interesting, since it indicates that nitrogen application can be reduced 25% where Renew Plus is applied with no significant effect on yield or the other parameters. Furthermore, this may be successful even under unfavorable conditions such as excess moisture and the cold spring conditions that prevailed in 1997.

Last season, application of Renew Plus at 32 oz per acre (broadcast) and at 16 oz/A (in-furrow) produced significant increases. However, 1997 started with a cold spring, which reduced emergence, and followed with wet conditions in late spring and early summer, which hampered crop development and weed control. The result was large plot variability and below-normal yields. The coefficient of variation for this study was 19.71% on corn grain yield.

### Figure 5. YIELD ENHANCEMENTS IN FIELD CORN WITH RENEW PLUS™

AV 759 HYBRID. NITROGEN REDUCED 25% IN ALL RENEW PLUS TREATMENTS  
Center for International Research and Training in Agriculture. Parkersburg, Iowa. 1997.



Note: The control received 90 lb/A of N as 28% UAN. Renew Plus treatments received only 68 lb/A of N as 28% UAN

#### Field Corn (U. of Wisconsin)

Dr. Edward Oplinger was the research cooperater in this study. The experimental design was a randomized complete block with four replications. Plots were 10' x 25' on a 30-inch row spacing.

Aatrex 4L (0.75 qt/A) and Lasso (2 qt/A) were applied premerge. The plots were disked and planted on May 19, 1997 into a Plainfield sand.

DeKalb 471 was planted at 32,000 seeds/A using a John Deere 7000 planter. Kickoff (3 lb/A) was applied in-furrow over all treatments and 100# of N as 300# of 33-0-0 as applied twice on June 23 and July 1.

Treatments consisted of a control, Renew Plus at 16 oz applied in-furrow, and Renew Plus at 16 oz/A in-furrow + 16 oz/A broadcast @ 21 days after emergence. The central 5' x 20.5' of each plot was harvested on October 29, 1997 using an Almaco plot combine #2.

The 16 oz in-furrow rate + 16 oz. applied broadcast (foliar) gave a significant increase in yield (Figure 6). Dr. Oplinger indicated since there were no

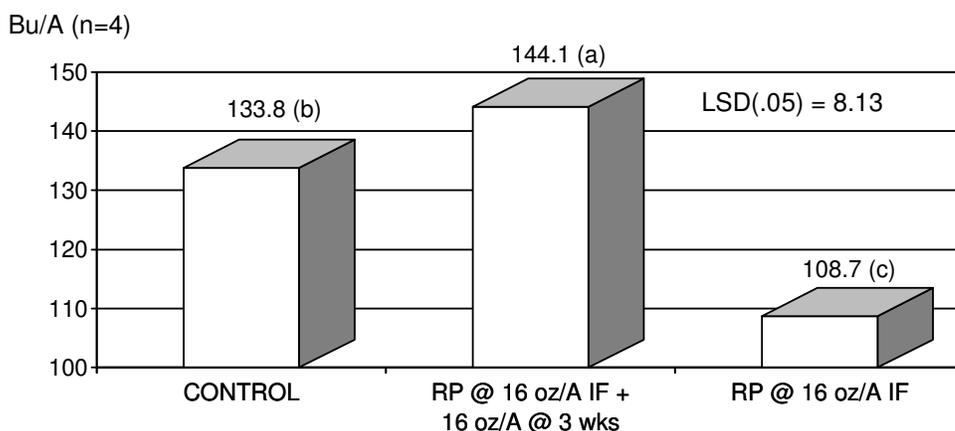
differences in test weight, the increase in yield resulted from more kernels per ear rather than larger kernels.

The wet season apparently had less of a deleterious effect further to the east in Wisconsin, especially in these well-drained sandy soils. It is not clear why 16 oz/A of Renew applied without the additional 16 oz/A broadcast post-emerge treatment caused a yield decline. It is speculated that the single application caused a temporary mineralization of soil nutrients which were quickly leached away with the excess soil moisture permeating these lighter soils. This resulted in less available fertility for plants receiving this treatment.

### Figure 6. YIELD ENHANCEMENTS IN FIELD CORN WITH RENEW PLUS™

DEKALB 471 HYBRID

Dr. E. S. Oplinger. University of Wisconsin. Hancock Research Station. Hancock, Wisconsin. 1997.



Means followed by the same letter do not differ significantly ( $P < 0.01$ )

#### Soybeans (C.I.R.T.A.)

A randomized complete block design with six replications consisting of 6 rows 40 feet long on a 30 inch spacing was used in this study.

The field was disked on May 12 and on May 19, 1997. Stine 2254 RR soybeans were planted in a Marshan silty clay loam at 140,000 seeds/A on May 22 using a 6-row John Deere Max Emerge planter. Three treatments including one control were used in this study. A standard program of 1 gal/A 8-19-3 and 3 lb/A Kickoff was applied in-furrow across all treatments.

Treatments consisted of an untreated control, Renew Plus at 32 oz/A at planting, Renew Plus at 16 oz/A at planting plus 16 oz. applied after emergence.

The foliar treatment was applied 3 weeks after planting on June 12, 1997 with a JD 322 mounted sprayer.

Roundup Ultra was applied at 48 oz/A on July 5. The plots were then cultivated on July 16. A final treatment of 16 oz/A of Roundup Ultra was applied August 21, 1997.

The center four rows of each plot were harvested October 6, 1997 using a Gleaner K combine. Grain yield, test weight, and moisture content were recorded using an Almaco Seed Spector 1.

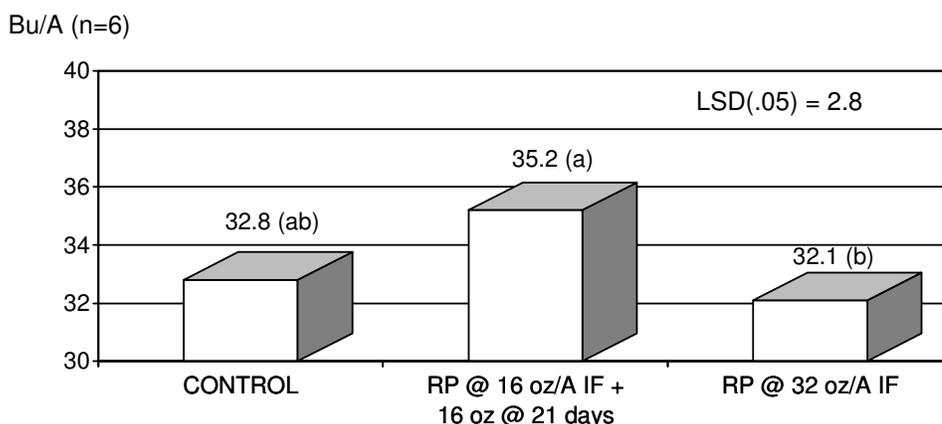
There were no significant differences in test weight, moisture content or plant population. However, the 16 oz/A in-furrow + 16 oz applied post-emergent gave the highest yield (Figure 7).

Even with this season's wet spring conditions which tended to reduce yields, these findings seem to confirm the efficacy of the 16 oz/A in-furrow rate on soybeans.

### Figure 7. YIELD ENHANCEMENT IN SOYBEANS WITH RENEW PLUS™

STINE 2254 RR SOYBEANS

Center for International Research and Training in Agriculture. Parkersburg, Iowa. 1997.



#### Soybeans (U. of Wisconsin)

Dr. Oplinger also cooperated in this study which utilized a randomized complete block design with four replications.

Plot size was 10' x 25' with a 30" row spacing.

Lasso (2 qt/A) and Lorox (0.5 lb/A) were applied preemerge. Plots were disked and then planted on May 19. Midwest 2100 soybeans were planted in a Plainfield sand at 9 seeds per foot of row using a John Deere 7000 planter.

Kickoff starter (3 lb/A) and 100 lb/A of 0-0-60 (applied April 4) were applied to all plots.

Treatments consisted of a control, Renew Plus at 16 oz/A applied in furrow + 16 oz/A broadcast at 21 days after emergence, and Renew Plus at 32 oz/A in furrow.

The central 5' x 20.5' of each plot was harvested on October 8 using an Almaco plot combine #1.

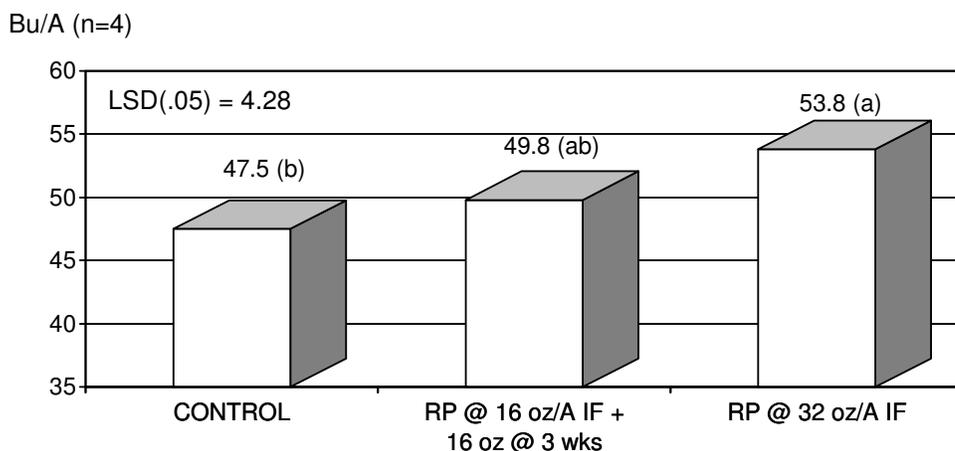
A significant yield increase was observed with the 32 oz/A in-furrow rate (Figure 8). Since seed size studies indicated no increase in bean size, the yield increase was likely due to more beans per acre rather than larger beans.

While the 16 oz + 16 oz treatment provided some yield enhancement, it was not significant. This seems contrary to the C.I.R.T.A. findings. This may be an indication that higher rates are necessary on lighter soils. On heavier soils, such as those at C.I.R.T.A., the higher 32 oz/A rate may be excessive even under conditions of above-average rainfall.

### Figure 8. YIELD ENHANCEMENT IN SOYBEANS WITH RENEW PLUS™

MIDWEST 2100 SOYBEANS

Dr. E. S. Oplinger. University of Wisconsin. Hancock Research Station. Hancock, Wisconsin. 1997.



Means followed by the same letter do not differ significantly ( $P < 0.01$ )

### Grain Sorghum (Texas A&M University at Commerce, Texas)

A randomized complete block design with six replications consisting of 30-foot rows was used in this study which was planted at the Texas A&M University (Commerce, TX) Research Farm on May 3, 1997. The hybrid used was Honcho sorghum. Seeds were treated with Gaucho. Following soil preparation, plots were planted with a two-row cone planter on a John Deere Max Emerge frame. Plots were seeded at 7 seeds per foot in 38-inch rows. One hundred pounds of 18-46-0 was applied in the row at planting and Counter 15G was applied at the rate of 8 oz/1000 feet of row .

Renew Plus was applied at two rates (8 and 16 oz/A) in the furrow through a Delavan 80-2R flat fan nozzle on May 4 with a CO<sub>2</sub> powered backpack sprayer after mixing with 10 gallons of water per acre.

Ammonium nitrate (34-0-0) was sidedressed on June 2 and cultivated into the soil. Stand counts were made on June 2 and vigor ratings were performed on June 10. The best 8 feet of each plot was harvested on August 19 and 20.

Differences were numerically different but not statistically significant largely due to plot variation. However, Renew Plus treatments showed greater stand and vigor than the control and the 16 oz/A treatment produced a 10% yield increase (Figure 9).

### **Figure 9. EFFECT OF RENEW PLUS™ ON STAND, VIGOR AND YIELD IN GRAIN SORGHUM**

MEANS OF 6 REPLICATIONS

Department of Ag Sciences. Texas A&M University. Commerce, TX. 1997.

	<b>CONTROL</b>	<b>RENEW PLUS @ 8 oz/A IF</b>	<b>RENEW PLUS @ 16 oz/A IF</b>
<b>Plants/25'</b>	123	128	128
<b>Vigor (1-5 scale)</b>	3.0	4.2 (+40%)	4.0 (+33%)
<b>Yield (Lbs/A)</b>	2586	2481 (-4%)	2844 (+10%)

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