Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163 FAX: (903) 845-2262

2009 Crop Results

Vitazyme on Grass

A Testimonial

I expect to be using Vitazyme for many years to come. Two lawns next door to each other were seeded the same day with the same seed. My lawn was 50% bare after I had killed all undesirable grass and weeds and my neighbors lawn was about 20% bare after killing the undesirables. I applied Vitazyme to my lawn the day after the seedlings began to emerge. Both lawns are about 10% bare now, and my lawn is by far the greener of the two. So far I have gotten one renovation job as a result of the lawn's progress. I seeded a lawn several weeks ago, and it was making typical progress in regards to germination. I applied Vitazyme last week and the very next day saw improvement in color, and the seedlings seem to be kickstarted as well. On my third test site, I seeded and applied Vitazyme at half the recommended rate, plus ICT instant compost tea, kelp, and humic acid. It has been less than two weeks since the seeding, and the homeowner called me a couple of days ago to tell me that he has never been so pleased with money spent on his lawn. I am considering applying Vitazyme at the recommended rate once per month for the entire growing season.

Jerry Cobb, A Touch of Nature
Nicholasville, Kentucky

Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163 FAX: (903) 845-2262

2008 Crop Results

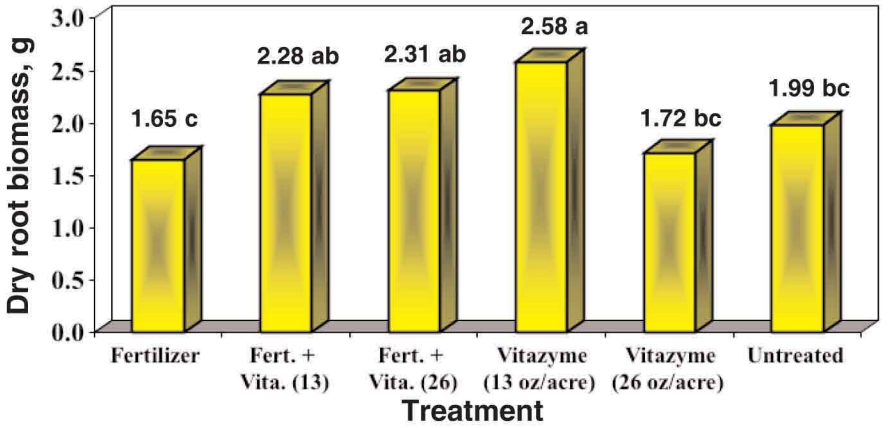
Vitazyme on Bermudagrass

A Thesis for the Degree of Master of Science: *Evaluation of Vitazyme As a Fertilizer Supplement in Establishing and Maintaining Bermudagrass*

Researcher: Jimmie Jackson Rose
Location: Tarleton State Turfgrass Field Laboratory, Tarleton State University, Stephenville, Texas
Varieties: Princess 77 bermudagrass, TifSport bermudagrass, common bermudagrass
Abstract: "Vitazyme has been demonstrated to increase yield in row crops. However, effects of Vitazyme in turfgrass have not been documented. Vitazyme was applied at 13 fl oz/acre and 26 fl oz/acre with and without complete fertilizer to seeded Princess 77 bermudagrass, established TifSport bermudagrass, established Princess bermudagrass at the Tarleton State Turfgrass Field Laboratory, and established common bermudagrass at a local golf course. In the seeded trial, Vitazyme in combination with fertilizer increased quality, percent cover, and density compared to the nontreated. Differences were noted between fertilized and non-fertilized treatments for quality in TifSport and established Princess 77 bermudagrass trials. Significant differences among most treatments were determined using a Field Scout 1000 Chlorophyll Meter."
Treatments: 1. Fertilizer (Lesco 18-24-12% N-P_2O_5-K_2O at seeding to apply 1 lb N/1,000 $ft.^2$; also applied at the same rate monthly from June to October)
2. Fertilizer + Vitazyme (13 oz/acre on June 14, July 25, August 2, September 18, and October 9)
3. Fertilizer + Vitazyme (26 oz/acre on the same dates as for 2)
4. Vitazyme only at 13 oz/acre (same dates as for 2)
5. Vitazyme only at 26 oz/acre (same dates as for 2)
6. No fertilizer or Vitazyme

Selected Data from the Thesis

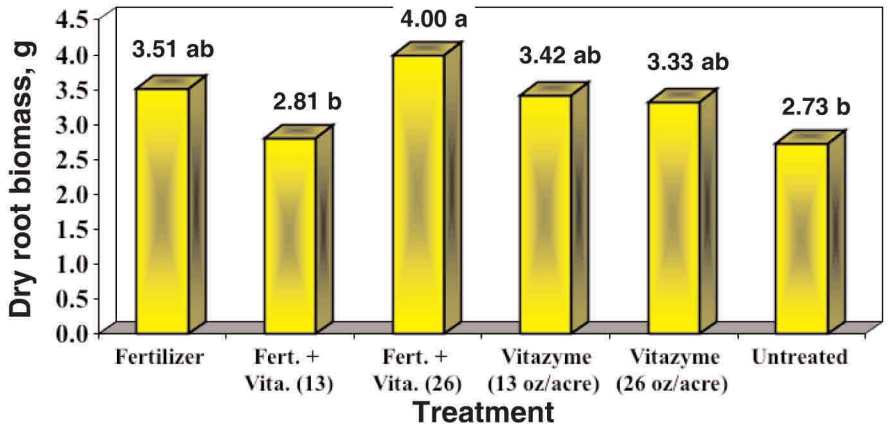
- **Root mass (dry) of seeded Princess 77 bermudagrass (2005)**
  When the Vitazyme treatments were compared to fertilizer alone, bermudagrass treated with only fertilizer had statistically significantly less root biomass than all Vitazyme treatments except for Vitazyme alone at 26 oz/acre. Bermudagrass treated only with Vitazyme at 13 oz/acre had significantly higher mean root biomass than bermudagrass treated with Vitazyme at 26 oz/acre, the untreated, and fertilizer alone. The mean root weight for the fertilizer alone treatment was the lowest recorded value. In addition, roots from the Vitazyme treated plots were observed to be surrounded by a "tube" of soil, which suggests a rhizospheric support system emanating from the root; this tube was not observed in other treatment samples.



Means followed by the same letter are not significantly different at P=0.10.

- **Root mass (dry) of seeded Princess 77 bermudagrass (2006)**

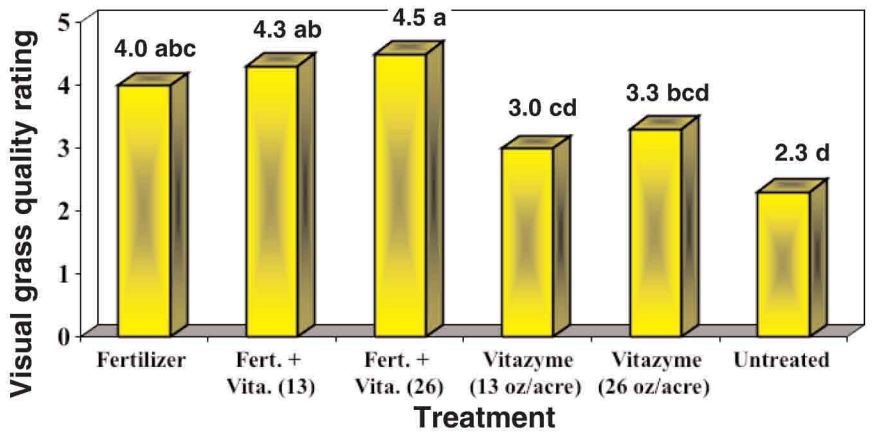
  In the seeded Princes 77 bermudagrass trial for 2006, dry root biomass for cores from plots treated with fertilizer in combination with Vitazyme at 6 oz/acre were statistically greater than fertilizer in combination with Vitazyme at 13 oz/acre and the control plots.



Means followed by the same letter are not significantly different at P=0.10.

- **Visual quality of seeded Princess 77 bermudagrass (11/16/2006)**

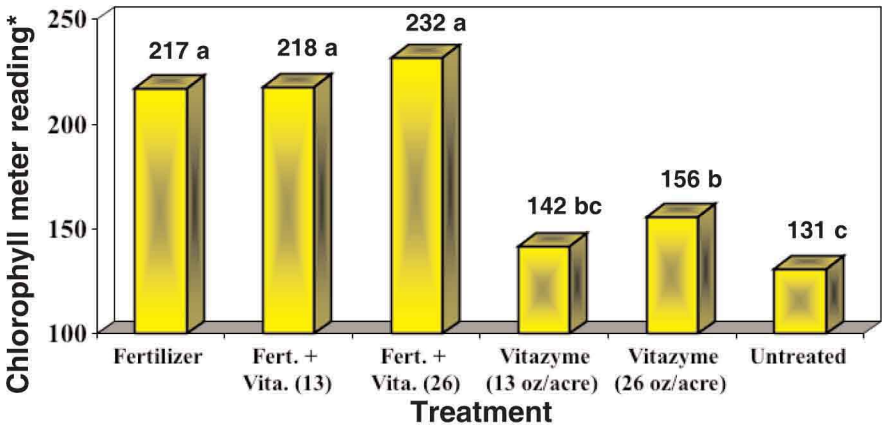
  Vitazyme at both 13 and 26 oz.acre increased the visual quality of the Princess 77 bermudagrass above the fertilizer alone or the untreated turf.



Means followed by the same letter are not significantly different at P=0.10.

- **Chlorophyll indices of Princess 77 bermudagrass treatments (11/17/2006)**

These data are for one day of evaluation in November of 2006. During all times of evaluation, from August 31 to December 1, significant differences occurred among the six treatments.

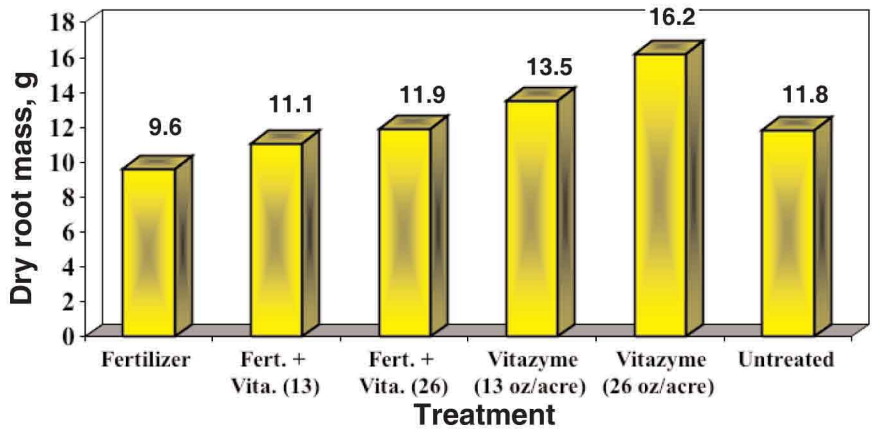


Means followed by the same letter are not significantly different at P=0.10.

*0 = no green light reflectance; 999 = complete green light reflectance

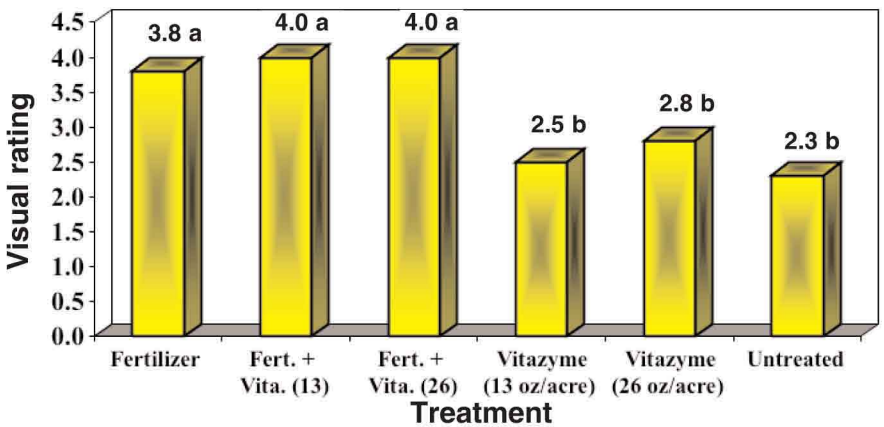
- **Root mass (dry) of established TifSport bermudagrass (2006)**

Although the dry root mass of the various TifSport bermudagrass treatments did not show significant differences, the differences were sizable, the Vitazyme treatments alone showing the greatest root masses.



- **Visual quality of TifSport bermudagrass (11/16/2006)**

In this trial, Vitazyme increased the visual quality of TifSport bermudagrass for both the fertilized and unfertilized plots. One date has been selected to show here.

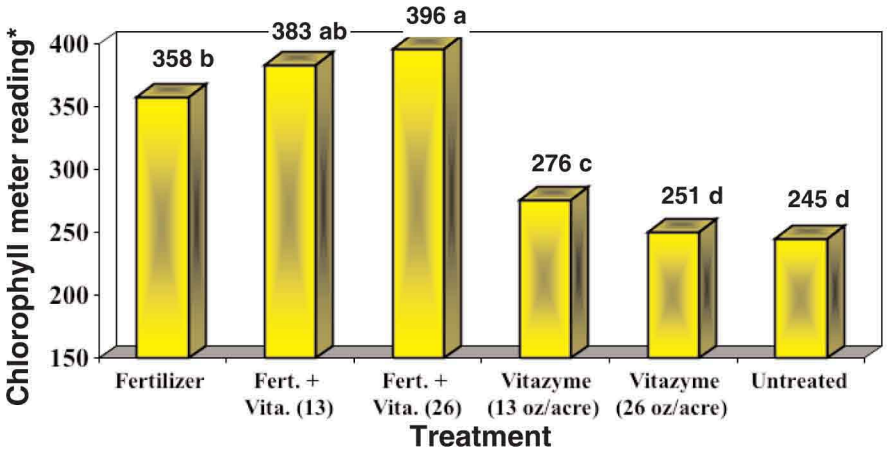


Means followed by the same letter are not significantly different at P=0.10.

*Rating of 1 for dead or absent turf; 10 for ideal turf.

- **Chlorophyll indices of TifSport bermudagrass (11/27/2006)**

  With or without fertilizer, Vitazyme at both levels increased — sometimes significantly — the chlorophyll content of the leaves compared to the controls.

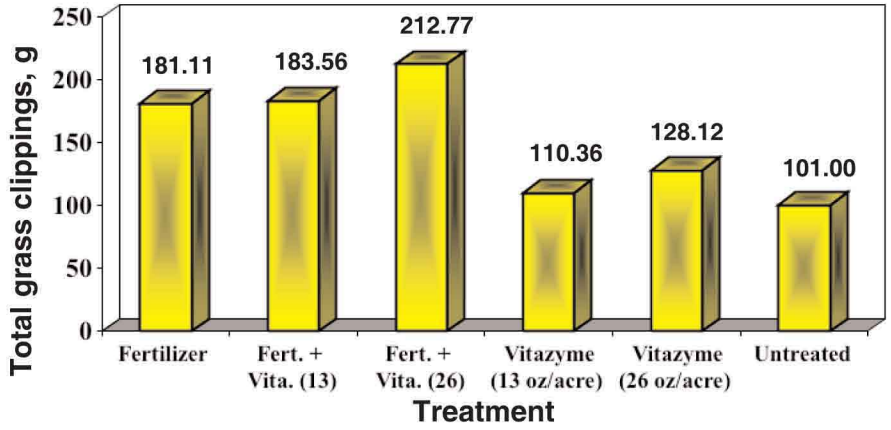


Means followed by the same letter are not significantly different at P=0.10.

*0 = no green light reflectance; 999 = complete green light reflectance

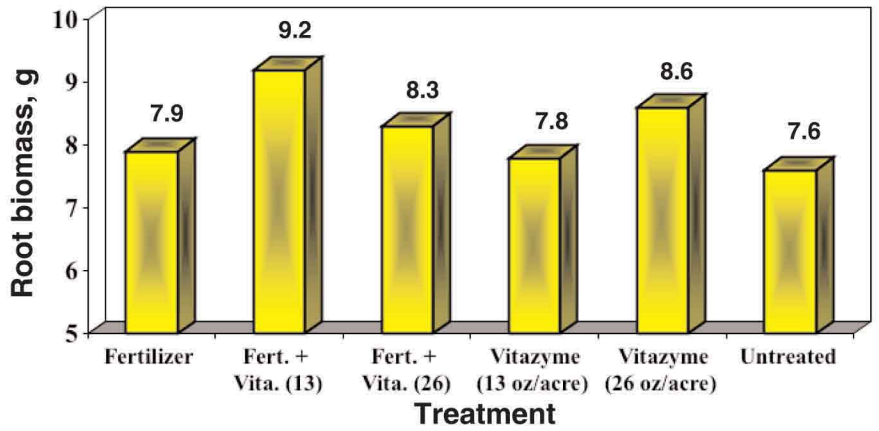
- **Clipping weights of established TifSport bermudagrass (2006)**

  The values given below are the totals of all 19 readings of grass clippings taken from June 19 to October 16, showing that Vitazyme increased the total grass growth versus the untreated controls.



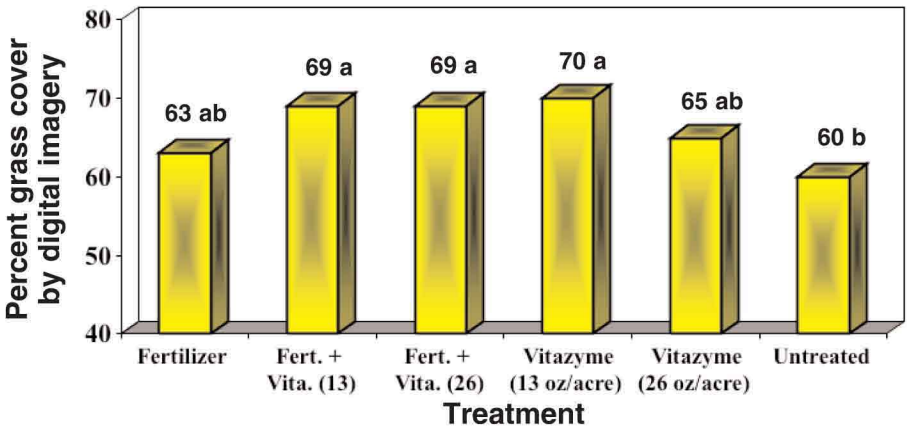
- **Root mass (dry) of established Princess 77 bermudagrass (2006)**

  The treatment with the greatest mean root mass was fertilizer plus Vitazyme at 13 oz/acre, and the lowest was with the untreated grass. Vitazyme always increased root mass above the controls.



- **Percent turf cover by digital image analysis of seeded Princess 77 bermudagrass (12/2/2006)**

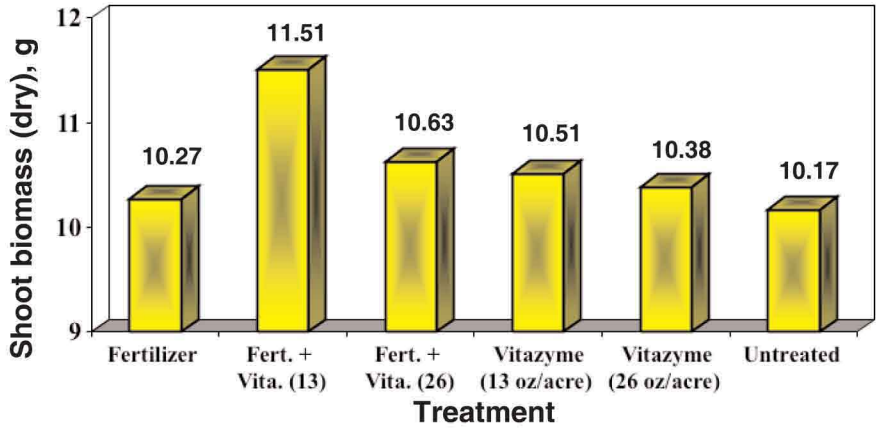
At the end of the growing season the percent leaf cover, as determined by digital image analysis, revealed that Vitazyme, both with and without fertilizer, increased the grass cover. This increase is grass cover with Vitazyme appeared to be accentuated as the season progressed.



Means followed by the same letter are not significantly different at P=0.10.

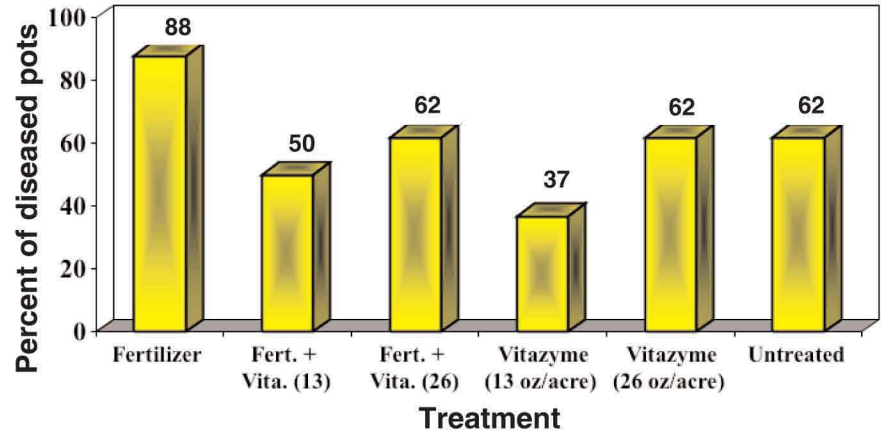
- **Shoot biomass (dry) for seeded Princess 77 bermudagrass, greenhouse trial (2006)**

While differences in means were not significant due to high experimental error, yet Vitazyme at both rates, and in both the fertilized and unfertilized Princess 77 treatments, increased dry shoot biomass.



- **Percent of diseased pots in a seeded Princess 77 greenhouse trial (2006)**

Of great interest in this trial was the fact that the 13 oz/acre rate of Vitazyme caused by far the lowest incidence of plant disease for both the fertilized and unfertilized Princess 77 bermudagrass.



Disease incidence decrease in percentage points with 13 oz/acre of Vitazyme

With fertilizer	38
Without fertilizer	25

Conclusions, quoted from the thesis: Fertilizer treatments significantly improved color and percentage cover visually, percentage cover by digital image analysis (DIA), shoot clipping biomass, and chlorophyll indices compared to treatments not containing fertilizer. Fertilized plots had higher quality ratings later into the growing season than non-fertilized plots. Vitazyme in combination with a complete fertilizer significantly improved color, percentage cover, and density of Princess 77 seeded bermudagrass. However, the effects of Vitazyme in combination with a complete fertilizer were not significantly different from fertilizer alone in many instances. Vitazyme at the label rate alone did not significantly increase root biomass compared to the nontreated and fertilizer alone; however, Vitazyme treatments had greater root biomass than the non-treated in the 2005 seeded Princess 77 bermudagrass and the 2006 established Princess 77 bermudagrass. Use of DIA did not show many significant differences between fertilizer in combination with Vitazyme and fertilizer alone when other methods could not.

Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163 FAX: (903) 845-2262

2007 Crop Results

Vitazyme on Zoysia Grass

Researcher: Eddie Pearson
Variety: Jamur
Planting date: April 1, 2007
Location: Tri-Tex grass, Tioga, Texas
Soil type: silty clay

Experimental design: A new zoysia grass field was planted to plugs in a 6 inch x 6 inch grid. One acre of this area received Vitazyme twice, while the rest of the field was left untreated. All areas were fertilized and treated the same. The purpose of the test was to evaluate the ability of Vitazyme to affect grass root and leaf growth.

1. Control **2. Vitazyme**

Fertilization: 85 lb/acre of 34-0-0% N-P_2O_5-K_2O every two weeks from May 1 to August; then 5 gal/acre of 32-0-0% N-P_2O_5-K_2O (+ Fe) on August 15, 2006

Vitazyme application: 13 oz/acre (1 liter/ha) at planting on April 1, 2006 (using a small sprayer), and the same rate in late May, 2006, using a field sprayer

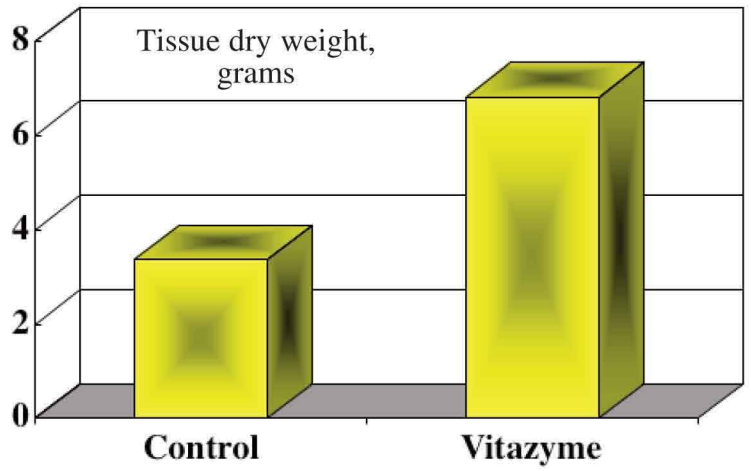
Growth results: On March 2, 2007, five plugs were collected from the treated area using a 3-inch diameter plug cutter. Likewise, five plugs were collected from the control area. The plugs were soaked in water for several hours and washed free of all soil, and then dried in a drying oven at about 130°F until totally dry. The plugs were then weighed, and the weights were statistically analyzed using a completely randomized design.

Tissue dry weight

Replicate	Control[a]	Vitazyme[a]
	-------- grams--------	
1.	4.04	6.16
2.	2.40	7.79
3.	4.32	6.88
4.	2.92	7.25
5.	3.23	6.00
Mean	3.38 b	6.82 a
Change	—	3.44 (+102%)

Main effects P = 0.0001***
Model P = 0.0001***
CV = 15.11%
$LSD_{0.05}$ = 1.12 grams

[a]Means followed by the same letter are not significantly different at P=0.05 according to the Student-Newman-Keuls Test.



Increase in plant dry weight with Vitazyme: 102%

Conclusions: The ability of Vitazyme to greatly improve zoysia grass yield is displayed by this study, where two applications caused a 102% increase in total dry matter accumulation over the test period. This program can greatly improve grass growth for turf farms or in turf applications of all sorts.

Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163 FAX: (903) 845-2262

2006 Crop Results

Vitazyme on Bermudagrass

Tarleton State University

Abstract by the researchers: In combination with a complete fertilizer, Vitazyme has been demonstrated to increase plant biomass and yield in row crops; however, the effects of Vitazyme in turfgrass have not been documented in the literature. Vitazyme was applied at 13 fl oz/acre and 26 fl oz/acre with and without a complete fertilizer to seeded Princess 77 bermudagrass, established TifSport bermudagrass, and established Princess 77 bermudagrass at the Tarleton State Turfgrass Field Laboratory and Greenhouse in Stephenville, TX. In the seeded trial, Vitazyme in combination with a fertilizer increased quality, percent cover, and density compared to the non-treated; however, the effects were not significantly different from fertilizer alone. There were also differences noted among treatments for quality in the TifSport and established Princess Bermudagrass trials. These differences were between the fertilized and non-fertilized treatments. Use of Digital Image Analysis did not show many significant results. When significance was noted, it was mostly between the fertilized and non-fertilized treatments. The Field Scout Chlorophyll meter was useful in determining differences using reflectance between fertilizer and fertilizer with Vitazyme treatments. The use of this equipment showed more significant results than did visual ratings.

Researchers: Josh Rose and Hennen Cummings, Ph.D.
Location: Tarleton State Turfgrass Field Laboratory, Stephenville, Texas
Variety: Princess 77 (new planting and established) and Tifsport (established)
Planting date for Princess 77 new planting: June 14, 2006 *Planting rate*: 2 lb/1,000 ft^2
Experimental design: This turf experiment was a continuation of a study initiated in 2005 to determine the effectiveness of Vitazyme on improving the growth of bermudagrass turf. Three major approaches were used in 2006: (1) a newly tilled area was seeded to Princess 77 bermudagrass; (2) an established Tifsport bermudagrass area was treated as in 2005; and (3) a Princess 77 bermudagrass area established in 2005 was treated like the other studies. Treatments applied to these situations are given below.

1. **Control**
2. **Fertilizer only**
3. **Vitazyme at 13 oz/acre**
4. **Vitazyme at 26 oz/acre**
5. **Fertilizer + Vitazyme at 13 oz/acre**
6. **Fertilizer + Vitazyme at 26 oz/acre**

Fertilization: Note the treatments for the three tests later.
Vitazyme application: Note the applications for the individual test areas. Applications were made with a hand-pushed, two-wheeled CO_2 pressurized boom having four Teejet XR8003 nozzles calibrated to deliver 58 gal/acre at 39 psi.
Herbicide applications: **Trial 1:** On July 3, Drive75 DF + MES (a methylated seed oil) at 0.367 oz/1,000 ft.^{2} for barnyard grass and yellow foxtail; on July 31 and August 30, Lesco 3 Way at 0.9 oz/1,000 ft^2 for broadleafed weeds, especially pigweed; on September 9, Pendulum AquaCap at 0.6 oz/1,000 ft^2 for winter annuals and tall fescue.

Trials 2 and 3: Lesco 3 Way at 1.10 oz/1,000 ft^2 for broadleafed weeds, and Pendulum Aqua Cap at 1.6 oz/1,000 ft^2 for winter annuals.
Irrigation: sprinkler for all plots
Data evaluations: Evaluations of cover (visual), quality (visual), dry shoot weight (using grass clippings), root and

shoot weight (from dried 875 cm^3 soil cores), turf cover (with a Canon Power Shot S50 digital camera mounted on a box, with SigmaScan pro software), and leaf chlorophyll (using a Spectrum Field Scout Chlorophyll Meter 1000). *Statistical analyses*: Data were collected from a randomized complete block design plot layout (4 replicates), and were subjected to Analysis of Variance for replicated measures using SAS Version 9.1 (General Linear Model Procedure).

I. New Seeding Trial

A 1,200 ft^2 area was treated with glyphosate (2 qt/acre) on April 19 and May 9, 2006, and then the area was tilled and raked smooth. One-foot-wide walkways were established, and plots were seeded to Princess 77 bermudagrass. Vitazyme and Lesco 18-24-12 fertilizer were applied immediately after planting, at a rate of 1 lb/1,000 ft^2 of P_2O_5. After 30 days the fertilizer was changed to Lesco 28-3-10 at a rate to apply 1 lb/1,000 ft^2 of N. The final fertilizer treatment was with Lesco 5-10-31, on October 17, at a rate to give 1 lb/1,000 ft^2 of K_2O. Fertilizer treatment dates were June 14, July 25, August 8, September 9, and October 17. The grass was cut with a reel mower to 0.75 inch twice weekly during good growth.

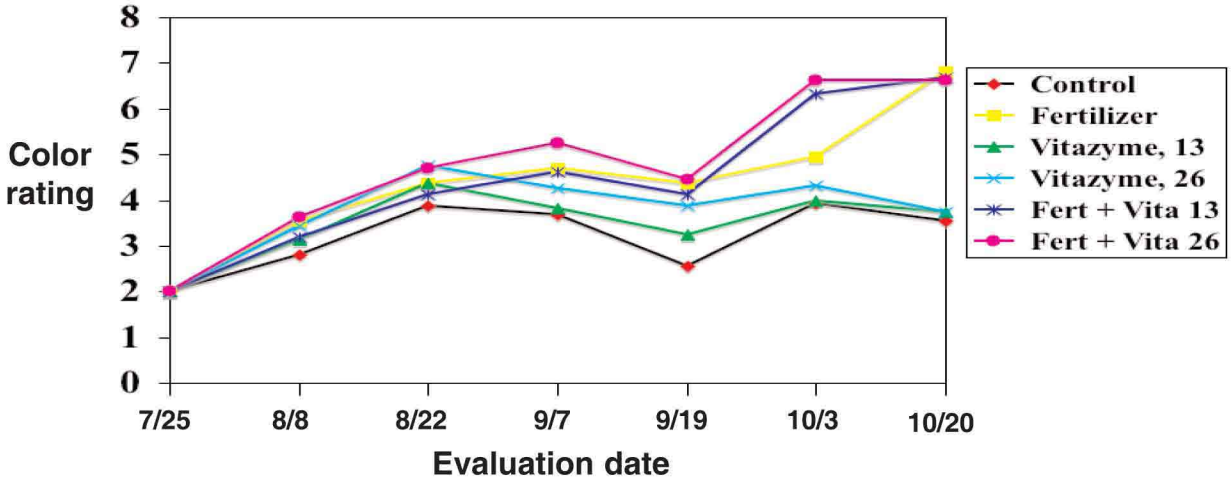
While the fertilizer treatments gave significantly greater color responses by season's end, the Vitazyme only treatments also gave excellent color values earlier in the season. Note the changes in the graph below.

Grass Color*

Treatment	7/25	8/8	8/22	9/7	9/19	10/3	10/20	Average	Change
	color rating**								
1. Control	2.00	2.81	3.88	3.69	2.56	3.94 c	3.56 b	3.41	—
2. Fertilizer	2.00	3.56	4.38	4.69	4.38	4.94 bc	6.81 a	4.79	1.38 (+40%)
3. Vitazyme, 13	2.00	3.13	4.38	3.81	3.25	4.00 c	3.75 b	3.72	0.31 (+9%)
4. Vitazyme, 26	2.00	3.44	4.75	4.25	3.88	4.31 c	3.75 b	4.06	0.65 (+19%)
5. Fert + Vita 13	2.00	3.19	4.13	4.63	4.13	6.31 ab	6.69 a	4.85	1.44 (+42%)
6. Fert + Vita 26	2.00	3.63	4.69	5.25	4.44	6.63 a	6.63 a	5.21	1.80 (+53%)
LSD	NS	NS	NS	NS	NS	1.66	0.53		

*Treatments followed by the same letter are not significantly different at P=0.05. LSD = least significant difference. NS = not significant.

**Rating system: 0 = dead or absent turf; 5 = minimal acceptance for a golf course; 7 = average turf; 10 = ideal turf.



All treat-

*Percent Grass Cover**

Treatment	7/25	8/8	8/22	9/7	9/19	10/3	10/20	Average	Change
	% of plot cover								
1. Control	26.00	38.75	54.50	60.00 c	57.75	76.75 b	82.50 c	56.6	—
2. Fertilizer	35.00	65.00	71.25	81.75 a	84.00	96.25 a	96.50 a	75.7	19.1 (+34%)
3. Vitazyme, 13	20.75	49.00	66.00	64.00 bc	72.50	77.50 b	83.75 bc	61.9	5.3 (+9%)
4. Vitazyme, 26	29.00	56.50	74.50	75.25 ab	79.25	82.25 b	87.00 abc	69.1	12.5 (+22%)
5. Fert + Vita 13	35.25	56.25	61.25	75.50 ab	79.50	93.75 a	94.25 ab	70.8	14.2 (+25%)
6. Fert + Vita 26	32.00	62.00	73.25	83.50 a	87.75	94.75 a	95.50 a	75.5	18.9 (+33%)
LSD	NS	NS	NS	15.22	NS	7.04	10.69		

*Treatments followed by the same letter are not significantly different at P=0.05. LSD = least significant difference. NS = not significant.

**Rating system: 0 = no green; 100 = complete green cover.

increased grass cover above the control, especially those having fertilizer. The average values for all seven reading dates are given below.

Fertilizer + Vitazyme at 26 oz/acre greatly increased root mass, though Vitazyme alone at both rates nearly equalled the increase in root dry weight from fertilizer alone.

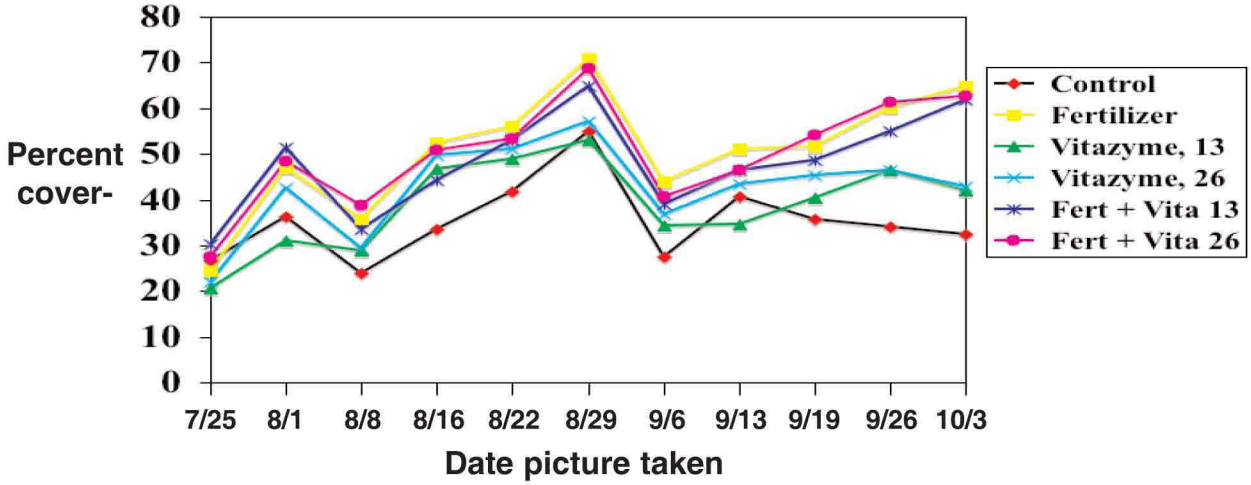
Dry Root Weight

Treatment	12/22	Increase
	grams	grams
1. Control	2.73	—
2. Fertilizer	3.51	0.78 (+29%)
3. Vitazyme, 13	3.36	0.63 (+23%)
4. Vitazyme, 26	3.28	0.55 (+20%)
5. Fert + Vita 13	2.80	0.07 (+3%)
6. Fert + Vita 26	4.01	1.28 (+47%)
LSD	NS	

Root weight increases

Fertilizer alone 29%
Vitazyme, 13 oz/acre 23%
Vitazyme, 26 oz/acre 20%
Fert + Vita, 13 oz/acre 3%
Fert + Vita, 26 oz/acre 47%

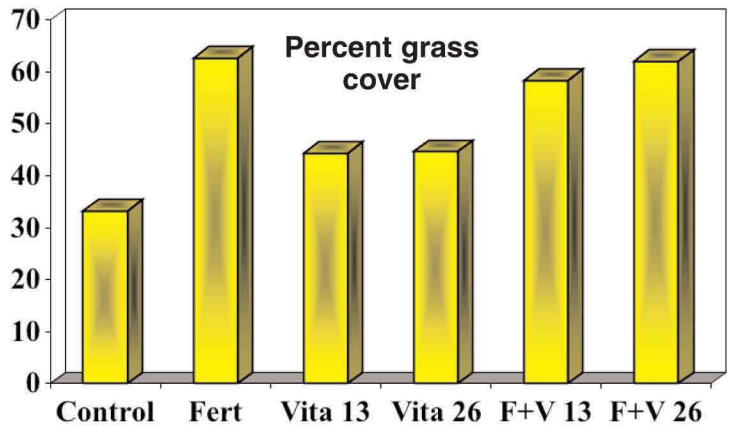
Percent Grass Cover by Digital Image Analysis



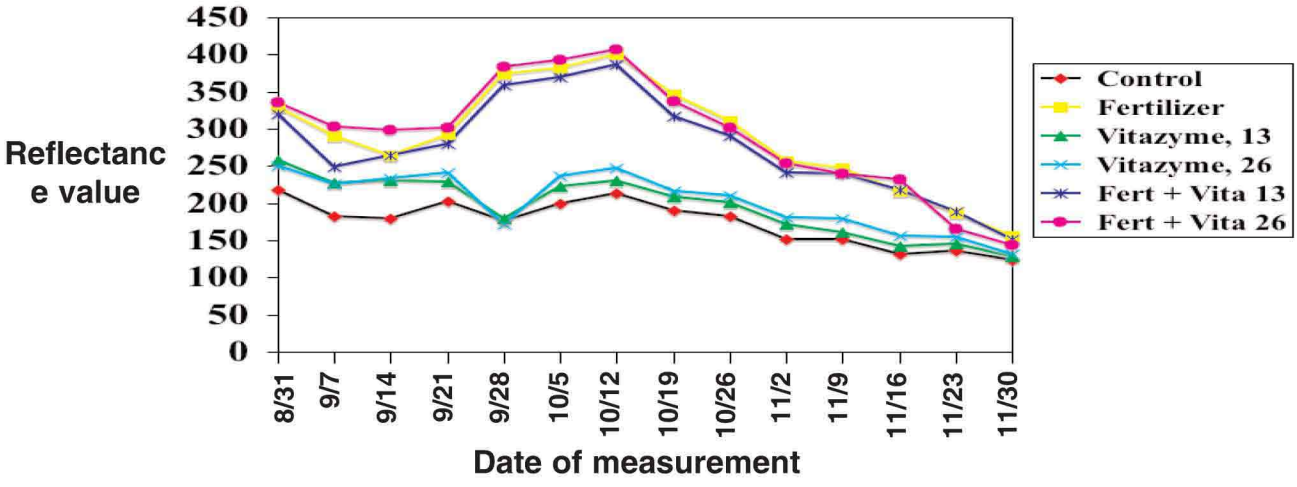
Three of the dates showed significant differences for grass coverage. By late September and early October the

Fertilizer and Fertilizer + Vitazyme treatments had significantly greater coverage than did the Control and Vitazyme only treatments. Average values for these late-season dates are given below.

Treatment	Cover (12/22)	Increase
	%	%
1. Control	33.2	——
2. Fertilizer	62.6	29.4 (+89%)
3. Vitazyme, 13	44.4	11.2 (+34%)
4. Vitazyme, 26	44.7	11.5 (+35%)
5. Fert + Vita 13	58.4	25.2 (+76%)
6. Fert + Vita 26	62.1	28.9 (+87%)



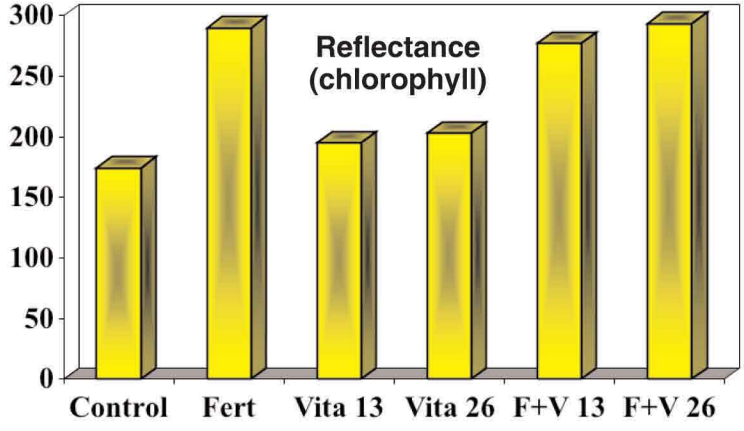
*Chlorophyll Levels of Turf**



*Mean chlorophyll meter readings. 0 = no green light reflectance; 999 = complete green light reflectance.

Significant differences appeared on all dates. In most cases the untreated control had significantly less chlorophyll than did the other treatments. The consistently highest chlorophyll levels were for Fertilizer + Vitazyme (26 oz) for 8/13 through 11/17; after that the Fertilizer and Fertilizer + Vitazyme (13 oz) treatments showed the highest chlorophyll content. Vitazyme at both the 13 oz and 26 oz rates usually significantly increased chlorophyll above the untreated control. Average chlorophyll values for the entire season are given below.

Treatment	Chlorophyll	Increase
	reflectance	reflectance
1. Control	174	——
2. Fertilizer	290	116 (+67%)
3. Vitazyme, 13	195	21 (+12%)
4. Vitazyme, 26	203	29 (+17%)
5. Fert + Vita 13	277	103 (+59%)
6. Fert + Vita 26	293	119 (+68%)



II. Established Tifsport Trial

A series of 5 x 5 foot plots was established on existing sod at the Field Laboratory, with four replications using the same treatments as for Trial I (six treatments and 24 plots). The same fertility and Vitazyme treatments were used as with Trial I. Measured parameters are given below.

Grass Color*

Treatment	6/13	6/27	7/25	8/8	8/22	9/7	9/18	10/3	10/20	Average	Change
	----------	----------	----------	----------	----------	color rating**	----------	----------	----------	----------	----------
1. Control	6.13	6.00	7.75	6.75 b	5.38	5.19	2.81 c	5.25 c	4.06 b	5.48	——
2. Fertilizer	6.38	6.81	7.75	7.56 a	5.81	6.38	6.06 ab	6.63 a	6.00 a	6.60	1.12 (+20%)
3. Vitazyme, 13	5.88	6.75	7.81	6.56 b	5.69	5.44	2.94 c	5.69 b	4.00 b	5.64	0.16 (+3%)
4. Vitazyme, 26	6.31	7.19	7.88	6.38 b	5.31	5.69	3.38 c	4.94 b	4.06 b	5.68	0.20 (+4%)
5. Fert + Vita 13	6.31	7.31	7.94	6.94 ab	5.63	6.50	5.75 b	7.13 a	6.69 a	6.69	1.21 (+22%)
6. Fert + Vita 26	6.13	7.00	8.06	7.00 ab	5.69	6.50	7.00 a	7.13 a	6.44 a	6.77	1.29 (+24%)
LSD	NS	NS	NS	0.66	NS	NS	0.97	1.19	0.95		

*Treatments followed by the same letter are not significantly different at P=0.05. LSD = least significant difference. NS = not significant.

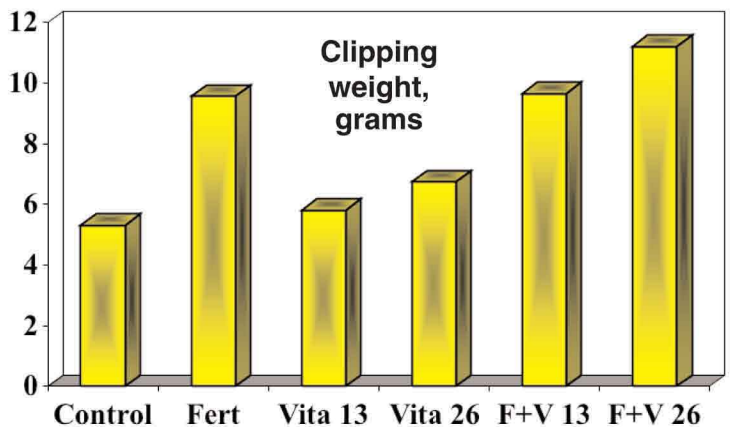
**Rating system: 0 = dead or absent turf; 5 = minimal acceptance for a golf course; 7 = average turf; 10 = ideal turf.

All treatments improved the appearance of the turf compared to the control, especially the three treatments having fertilizer. Vitazyme at both rates marginally increased green color of the grass.

Clipping Weights

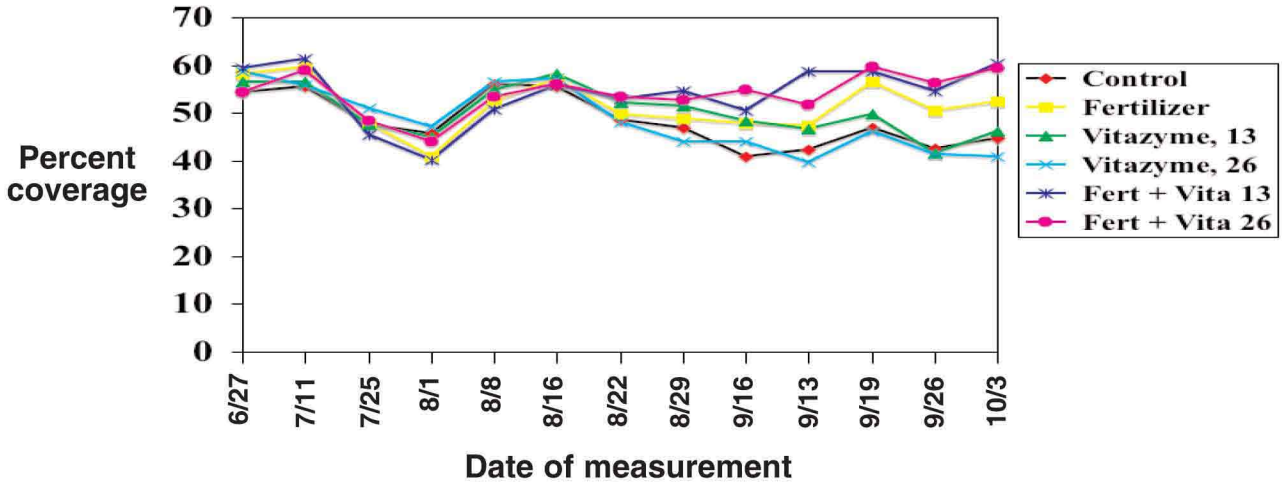
Treatment	Weight*	Increase
	grams	grams
1. Control	5.32	——
2. Fertilizer	9.56	4.24 (+80%)
3. Vitazyme, 13	5.81	0.49 (+9%)
4. Vitazyme, 26	6.74	1.42 (+27%)
5. Fert + Vita 13	9.66	4.34 (+82%)
6. Fert + Vita 26	11.20	5.88 (+111%)

*Average of 19 cuttings, from June 19 to October 26.



Clipping weights at individual dates were usually significantly different, the Fertilizer + Vitazyme (26 oz) giving by far the greatest weights. This was followed by Fertilizer + Vitazyme (13 oz) and Fertilizer alone. While the Vitazyme 13 oz rate increased clippings by 9%, the Vitazyme 26 oz rate tripled the total to 27%.

Percent Grass Cover by Digital Image Analysis



Only the last analysis, on October 3, showed significant differences in percent coverage values. These values are given in the table below. Fertilization treatments gave the highest coverage, especially when combined with Vitazyme.

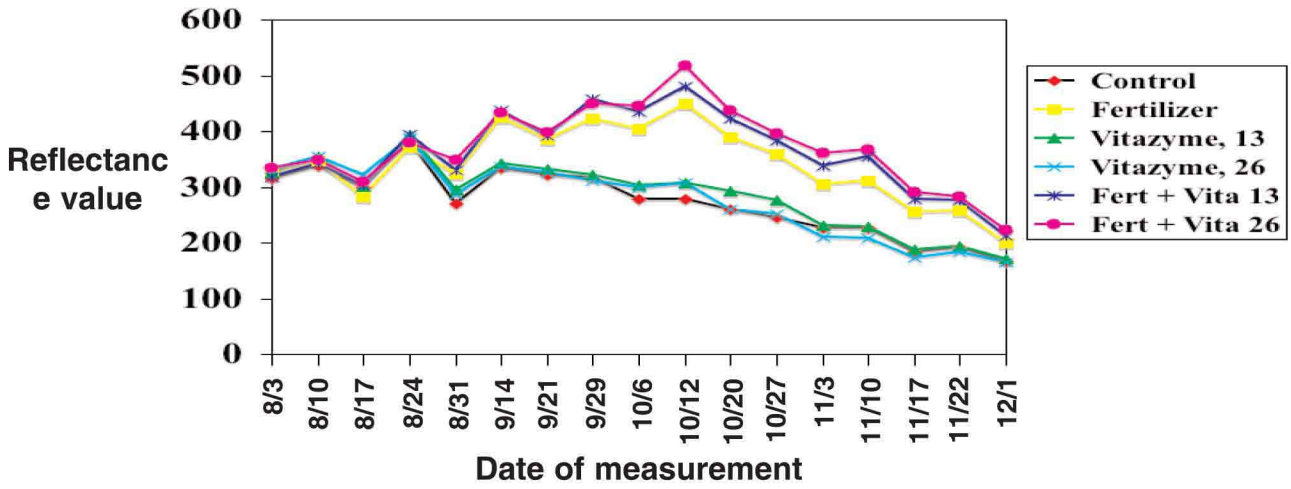
Treatment	Cover (10/3)*	Increase
	%	%
1. Control	44.8 c	—
2. Fertilizer	52.5 abc	7.7 (+17%)
3. Vitazyme, 13	46.1 bc	1.3 (+3%)
4. Vitazyme, 26	40.9 c	(-) 3.9 (-9%)
5. Fert + Vita 13	60.3 a	15.5 (+35%)
6. Fert + Vita 26	59.4 ab	14.6 (+33%)
LSD	13.7	

*Means followed by the same letter are not significantly different at P = 0.05.

Percent Cover Increase

Fertilizer only 17%
Fertilizer + Vitazyme (13 oz) 35%
Fertilizer + Vitazyme (26 oz) 33%

*Chlorophyll Levels of Turf**



*Mean chlorophyll meter readings. 0 = no green light reflectance; 999 = complete green light reflectance.

Significant difference appeared on most dates, with the darkest green colors exhibited by the fertilized treatments, especially those receiving Vitazyme + Fertilizer. Vitazyme alone at both rates increased the green color slightly. Average chlorophyll levels for the entire season are given below.

Treatment	Chlorophyll	Increase
	reflectance	reflectance
1. Control	273	—
2. Fertilizer	342	69 (+25%)
3. Vitazyme, 13	286	13 (+5%)
4. Vitazyme, 26	277	4 (+1%)
5. Fert + Vita 13	362	89 9 (+33%)
6. Fert + Vita 26	372	99 (+36%)

Chlorophyll Increase

Fertilizer only 25%
Fertilizer + Vitazyme (13 oz) 33%
Fertilizer + Vitazyme (26 oz) 36%

III. Established Princess 77 Trial

The treatments were identical for Trial III as they were for Trial II.

*Grass Color**

Treatment	6/13	6/27	7/25	8/8	8/22	9/7	9/18	10/3	10/20	Average	Change
	---------- color rating** ----------										
1. Control	3.13 c	3.81 b	4.00 b	3.13 b	3.25 b	2.94 b	5.13 c	3.63 b	3.25 bc	3.59	—
2. Fertilizer	5.38 a	5.88 a	6.69 a	6.38 a	5.19 a	5.69 a	6.38 abc	7.31 a	6.25 a	6.13	2.54 (+71%)
3. Vitazyme, 13	3.50 bc	3.69 b	4.00 b	3.44 b	3.44 b	2.75 b	5.75 abc	3.63 b	4.38 b	3.84	0.25 (+7%)
4. Vitazyme, 26	3.88 bc	4.38 b	4.31 b	3.50 b	3.63 b	2.81 b	5.38 bc	3.81 b	3.06 c	3.86	0.27 (+8%)
5. Fert + Vita 13	4.88 ab	6.06 a	6.94 a	6.88 a	5.19 a	5.56 a	7.00 a	7.31 a	6.25 a	6.23	2.64 (+74%)
6. Fert + Vita 26	3.88 bc	6.19 a	6.38 a	6.13 a	5.13 a	5.94 a	6.44 ab	7.44 a	6.69 a	6.02	2.43 (+68%)
LSD	1.39	1.25	0.97	1.08	0.61	0.49	1.26	0.53	1.20		

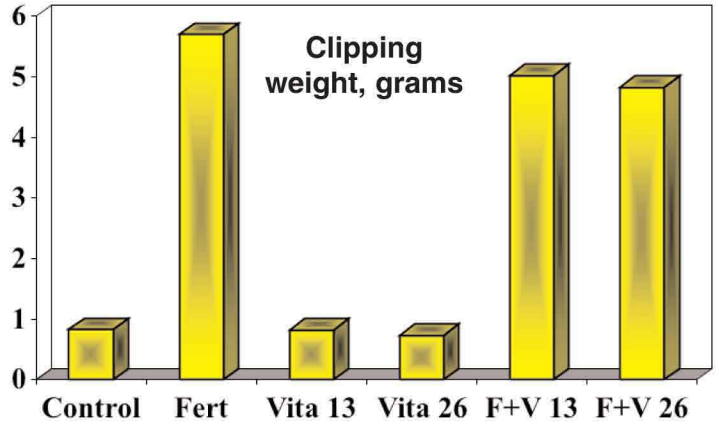
*Treatments followed by the same letter are not significantly different at P=0.05. LSD = least significant difference. NS = not significant.
**Rating system: 0 = dead or absent turf; 5 = minimal acceptance for a golf course; 7 = average turf; 10 = ideal turf.

Every date gave significant differences, with all of the fertilizer treatments giving large increases in grass color above the control. Vitazyme alone gave small increases in grass color (7 to 8%).

Clipping Weights

Treatment	Weight*	Increase
	grams	grams
1. Control	0.83	—
2. Fertilizer	5.70	4.87 (+587%)
3. Vitazyme, 13	0.82	(-) 0.01 (-1%)
4. Vitazyme, 26	0.74	(-) 0.09 (-11%)
5. Fert + Vita 13	5.02	4.19 (+505%)
6. Fert + Vita 26	4.82	3.99 (+481%)

*Average of 19 cuttings, from June 19 to October 26.



Clipping weights were not increased by Vitazyme, but were increased dramatically by all fertilizer treatments for Princess 77 bermudagrass.

Dry Root Weight

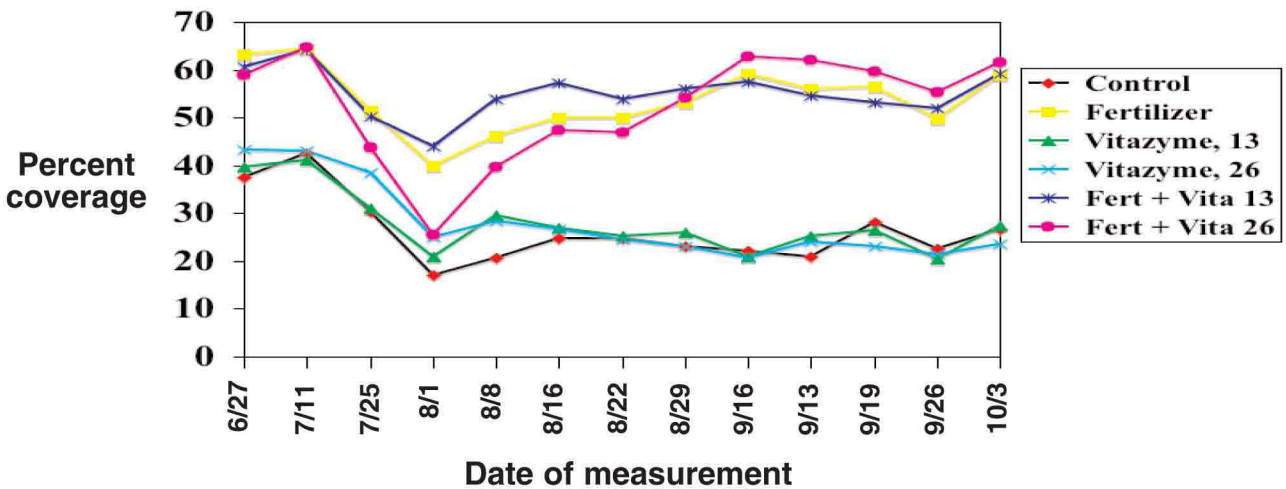
Treatment	12/22	Increase
	grams	grams
1. Control	7.60	—
2. Fertilizer	7.93	0.33 (+4%)
3. Vitazyme, 13	7.78	0.18 (+2%)
4. Vitazyme, 26	8.59	0.99 (+13%)
5. Fert + Vita 13	9.17	1.57 (+21%)
6. Fert + Vita 26	8.33	0.73 (+10%)

Root weight increases

Fertilizer alone 4%
Vitazyme, 26 oz/acre 13%
Fert + Vita, 13 oz/acre 21%
Fert + Vita, 26 oz/acre 10%

Vitazyme alone at 26 oz/acre increased the root mass greatly, whereas Vitazyme with fertilizer also increased root weight up to 21%, far above the 4% increase from Vitazyme alone.

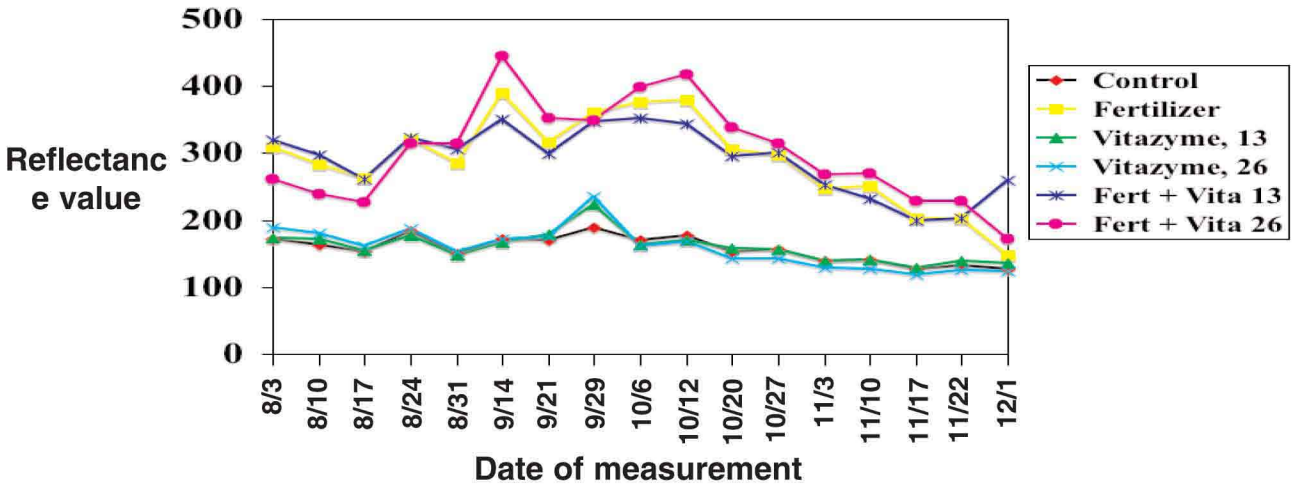
Percent Grass Cover by Digital Image Analysis



All but one date showed significant differences in the treatment means. All of the fertilizer treatments had much greater grass coverage than did the other three. The averages for the entire growing season are given below.

Treatment	Cover	Increase
	%	%
1. Control	26.3	—
2. Fertilizer	53.8	27.5 (+105%)
3. Vitazyme, 13	27.8	1.5 (+6%)
4. Vitazyme, 26	28.1	1.8 (+7%)
5. Fert + Vita 13	55.1	28.8 (+110%)
6. Fert + Vita 26	52.5	26.2 (+100%)

*Chlorophyll Levels of Turf**



*Mean chlorophyll meter readings. 0 = no green light reflectance; 999 = complete green light reflectance.

Significant differences occurred at every reading date. All three fertilizer treatments raised leaf chlorophyll by 80 to 91%, the 26 oz Vitazyme rate increasing chlorophyll the most. Vitazyme alone did not increase leaf chlorophyll. Average values for the entire season are given below.

Treatment	Chlorophyll	Increase
	reflectance	reflectance
1. Control	158	—
2. Fertilizer	291	133 (+84%)
3. Vitazyme, 13	160	2 (+1%)
4. Vitazyme, 26	158	0
5. Fert + Vita 13	285	127 (+80%)
6. Fert + Vita 26	302	144 (+91%)

Chlorophyll Increase

Fertilizer only 84%
Fertilizer + Vitazyme (13 oz) 80%
Fertilizer + Vitazyme (26 oz) 91%

Conclusions: This extensive study of Princess 77 and Tifsport bermudagrass with fertilizer and Vitazyme at Tarleton State University has revealed that, with few exceptions, fertilizer consistently increased leaf growth and leaf chlorophyll content while enhancing leaf coverage of the soil. Vitazyme in several cases, with or without fertilizer, produced more roots than did fertilizer, and usually the combination of Vitazyme and fertilizer produced superior grass growth and appearance. Many of the effects noted were significant at P = 0.05. The 26 oz/acre rate of Vitazyme did not usually produce superior results compared to the 13 oz/acre rate. These effects were noted in both the new seeding and the established sod trials.

Please note the abstract at the beginning of this report for conclusions of the researchers.

Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163 FAX: (903) 845-2262

2005 Crop Results

Vitazyme on *Bracheria Brizantha* (a perennial grass)

Studies in Six African Countries

Researcher: Soudan A. Musa *Location*: Cameroon, Nigeria, Central African Republic, Niger, Tchad, and Burkina Fasso
Variety: *Bracheria brizantha* *Soil types*: unknown

Experimental design: Four fertility regimes with six replications were applied to experimental plots (4 m^2) in six African countries, all with Vitazyme with the exception of an untreated control. Effects on plant growth and biomass were used to evaluate the product.

1. **Vitazyme alone**
2. **Vitazyme + phosphorus fertilizer (P)**
3. **Vitazyme + nitrogen fertilizer (N)**
4. **Vitazyme + farmyard manure (FYM)**
5. **Control**

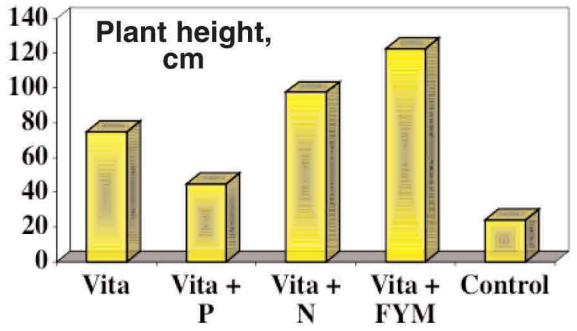
Fertilization: 100 kg/ha N (urea), 100 kg/ha P_2O_5 (SSP), and 100 kg/ha dairy manure

Vitazyme applications: 20 ml of Vitazyme was added to 250 g of seed for each 4 m^2 plot of Treatments 1, 2, 3, and 4.

Plant height and yield results:

Plant Height, cm

Treatment	Cameroon	Nigeria	Central African Rep.	Niger	Tchad	Burkina Fasso	Mean
1. Vitazyme	80	96	54	70	80	70	75.0
2. Vita + P	60	60	30	40	40	40	45.0
3. Vita + N	120	100	46	100	120	100	97.7
4 Vita + FYM	150	120	55	140	150	120	122.5
5. Control	30	30	10	20	25	30	24.2

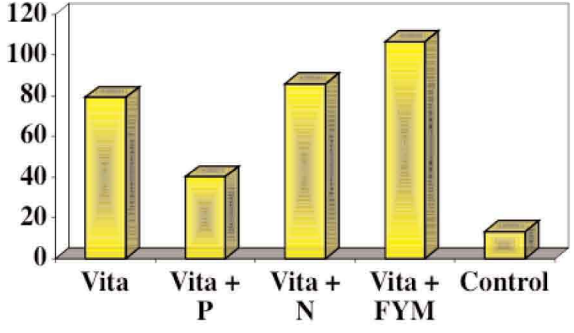


Vitazyme interacted positively with nitrogen and manure to bring excellent grass height responses. By itself Vitazyme exceeded the control by 210%, though phosphorus fertilizer reduced the response somewhat.

Plant Fresh Biomass, grams/m²

Treatment	Cameroon	Nigeria	Central African Rep.	Niger	Tchad	Burkina Fasso	Mean
1. Vitazyme	75	140	100	50	50	60	79.2
2. Vita + P	30	75	45	30	32	30	40.3
3. Vita + N	100	100	50	90	90	85	85.8
4 Vita + FYM	140	45	135	120	100	100	106.7
5. Control	20	15	10	10	15	10	13.3

Plant fresh biomass values closely reflected the plant height measurements. Vitazyme interacted positively with urea fertilizer and manure, but phosphorus fertilizer reduced the yield somewhat compared to Vitazyme alone. Vitazyme produced a 495% increase in moist harvested weight above the control.



Conclusions: In this grass study conducted in six African countries, Vitazyme alone substantially improved grass production and height, and with nitrogen fertilizer and manure the product produced a marked synergism. However, this synergism did not occur with phosphorus fertilizer.

Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163 FAX: (903) 845-2262

2003 Crop Results

Vitazyme on Zoysia Grass

Researcher: Eddie Pearson, Vital Earth Resources
Research Farm: Fulton Grass Farm, Hope, Arkansas
Variety: Zoysia
Soil type: heavy clay
Experimental design: A portion of a zoysia grass sod field was treated with Vitazyme to give an approximate standard application. The remainder of the field was left untreated.

1. Control **2. Vitazyme**

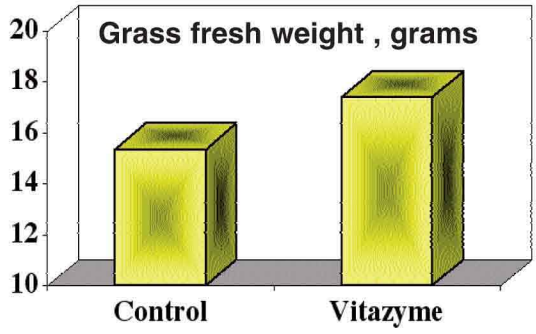
Fertilizer treatment: unknown
Vitazyme treatments: 13 oz/acre on July 23, 2003 (3.5 gal of Vitazyme in 250 gal of water)
Growth results: The sod was sampled on August 25, 2003, 33 days after treatment. A 3-inch diameter coring device was used to obtain four cores from each side of the boundary. These cores were carefully washed free of soil and weighed after blotted dry with paper towels to get fresh weight, then dried in a drying oven for 24 hours at 130°F to obtain dry weight. Statistical analyses were performed using Cohort software.
General Observations: The Vitazyme treated sod 33 days after treatment was **better knit together by vigorous roots** so that the samples, after washing, remained tied together in their original form. The untreated control samples were very loose and became disorganized on washing. Also, the treated plants were **darker green** indicating **more chlorophyll** in the leaves, and thus more carbon and sunlight-fixing capacity.

Fresh Weight

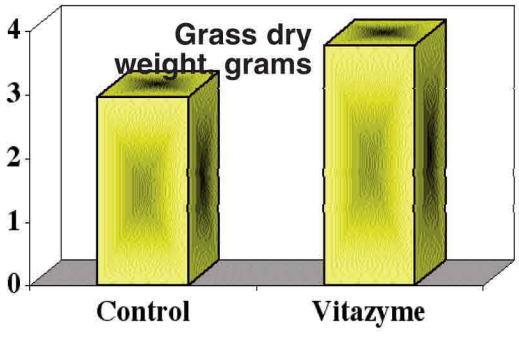
Treatment	Fresh weight*	Weight change
	grams	
Control	15.35 b	—
Vitazyme	17.39 a	1.04 (+7%)

*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test. Level of significance=0.015. $LSD_{0.10}$=0.96 gram.

Increase in fresh weight: 7%



Dry Weight



Treatment	Dry weight*	Weight change
	grams	
Control	2.96 b	—
Vitazyme	3.76 a	0.80 (+27%)

*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test. Level of significance=0.0007. $LSD_{0.10}$=0.13 gram.

Increase in dry weight: 27%

Conclusions: After only 33 days of Vitazyme influencing the growth of this zoysia grass, the following conclusions can be made:

- Vitazyme at 13 oz/acre increased the fresh weight of the grass by 7%.
- Vitazyme increased the dry weight of the grass by 27%.
- The zoysia grass contained a considerably higher level of dry matter in the leaf and root tissue after only 33 days of Vitazyme effects, shown by the 27% greater dry weight but only 7% greater fresh weight. More carbon compounds and minerals were being fixed in the plants after the active agents of Vitazyme began stimulating plant metabolism.

Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163 FAX: (903) 845-2262

2003 Crop Results

Vitazyme on St. Augustine Grass

Researcher: Dwayne Canup, Vital Earth Resources *Location*: L.D.S. Church, Longview, Texas
Variety: St. Augustine (sod) *Soil type*: laid on the previous sod *Sodding date*: October 10, 2002
Experimental design: While sod was being laid on a 15-foot-wide grass island between a street and a parking lot, the new sod for a 30-foot section was treated with Vitazyme on both the roots and tops.

1. Control **2. Vitazyme**

Fertilization: none during the test period

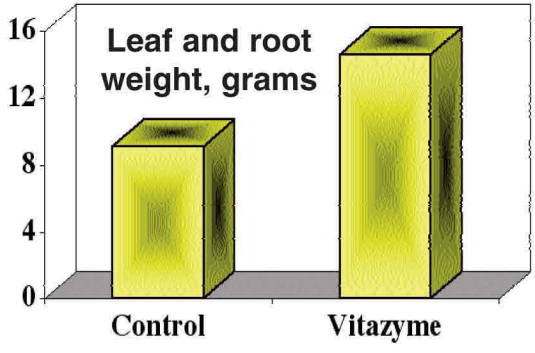
Vitazyme treatments : A 1% Vitazyme solution was sprayed on the roots before the sod was laid on a 15x30 foot section, and then the same solution was sprayed on the new sod surface of the same area. No further applications were made.

Irrigation: erratic and insufficient for good growth

Growth results: On October 1, 2003, nearly a year after the initial sod applications, three 3-inch square plugs (9 square inches total area for each plug) were cut from the grass randomly on each side of the treatment boundary. The plugs were then washed free of all soil, and the grass and roots were combined for the three plugs of each treatment and dried at 125°F in a drying oven for 24 hours. The grass was then weighed to the nearest hundredth of a gram.

Treatment	Leaf and root weight	Change
	grams	
Control	9.10	—
Vitazyme	14.56	5.46 (+60%)

Increase in leaf and root growth: 60%



Conclusions: This trial with St. Augustine sod laid in a grass island in Longview, Texas, proved that Vitazyme increased the grass growth considerably in spite of difficult growing conditions. The sod was laid on the previous grass with no tillage of the bed, erratic water scheduling, and no application of fertilizers. In spite of these obstacles, Vitazyme increased the growth of the grass by 60% above the control, showing that the activity of its active agents is powerful even under stressful conditions.

Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163 FAX: (903) 845-2262

2003 Crop Results

Vitazyme on Bermudagrass (turf)

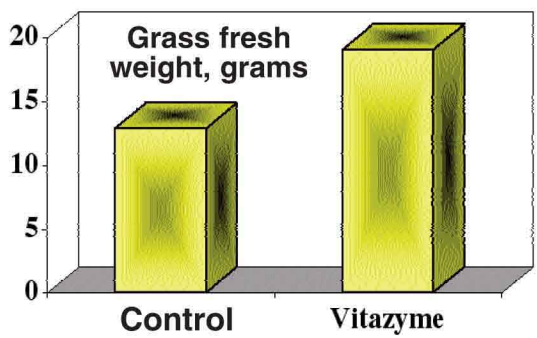
Researcher: Eddie Pearson *Sod Farm*: Lloyd Brigance Grass Farm, Greenville, Texas
Variety: 419 bermudagrass *Soil type*: Houston black clay *Sod type*: mature
Experimental design: A sod field was treated by sprayer in one part with Vitazyme and the rest of the field was left untreated.

1. Control **2. Vitazyme**

Fertilizer treatment: unknown
Vitazyme treatments: A 1% Vitazyme solution was sprayed on the treated area on April 2, 2003.
Growth results: On May 28, 2003, 56 days after Vitazyme application, four 3-inch cores were collected on each side of the dividing line of the treatments. The cores were thoroughly washed clean of all soil on roots blotted to relative dryness with paper towels and weighed. The data were analyzed by Analysis of Variance using Cohort software.

Treatment	Fresh weight*	Change
	---------- grams ----------	
Control	12.89 b	——
Vitazyme	19.02	6.13 (+48%)

*Means followed by the same letter are not significantly different at P=0.05. Significance level: P=0.017. $LSD_{0.10}$=3.00 grams.



Increase in fresh weight: 48%

Conclusions: Vitazyme applied to this bermuda grass field in north Texas caused a great increase in both root and leaf growth . . . 48% in this trial, significant at P=0.001. The leaves were also **deeper green** for the Vitazyme treated grass, indicating greater photosynthesis and carbon fixation resulting from this biostimulant.

Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163 FAX: (903) 845-2262

2002 Crop Results

Vitazyme on Grass

Researcher: Eddie Pearson *Location*: Fulton Grass Farm, Hope, Arkansas
Grass type: centipede grass *Soil type*: heavy clay

Experimental design: An area of centipede grass several acres in extent was treated one time with Vitazyme, and compared to an adjoining field treated the same in every way but without Vitazyme.

1. Control **2. Vitazyme**

Fertilizer treatments: unknown

Vitazyme application : 13 oz/acre sprayed over the surface about August 1, 2002

Growth results: Sections of sod were cut from both areas on October 25, using a sod cutter, three months after the Vitazyme treatment. These sod sections were compared and photographed.

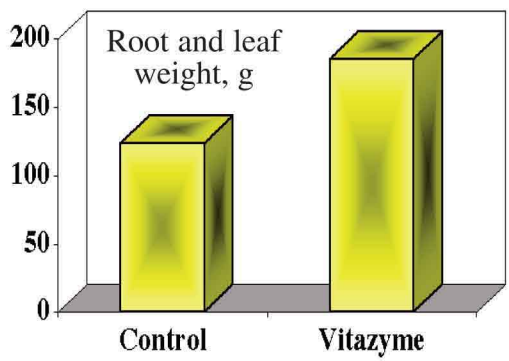
	Control sod	Vitazyme treated sod
Root density	Poor rooting	Much thicker; roots intertwined extensively
Stability of the sod	Poor	Well-knit and strong
Leaf and shoot density	Average	Much denser

Because of the poor integrity of the control sod, this field could not be cut and sold. The Vitazyme treated sod was able to be cut and sold.

Root and leaf density: A six-inch square of control and Vitazyme treated sod pieces were cut and washed clear of soil. The pieces were then weighed while moist.

	Control	Vitazyme	Change
	---------- grams ----------		
Fresh root and leaf weight	123	185	62 (+50%)

Increase in biomass: 50%



Conclusions: Vitazyme treatment for a sod farm is an excellent way to increase the root and leaf density for the production of high quality, strong sod sections.

Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163 FAX: (903) 845-2262

2002 Crop Results

Vitazyme on Grass
a Testimonial

Researcher: Eddie Pearson
Location: Riverby Turf Farms, Telephone, Texas
Grass type: Tifgreen 419 bermuda grass
Soil type: sandy loam
Fertilizer applications: unknown
Vitazyme application: 13 oz/acre sprayed over all 1,200 acres of the turf farm on August 26, 2002
Results: Samples of newly-cut sod were examined on November 8, 2002, and the soil was washed away from areas to reveal **a well-knit sod having many aggressive rhizomes. The harvesting crew found the sod to be of excellent quality with good integrity.**

Because no untreated control areas existed (all 1,200 acres were treated), no direct comparisons could be made beside the treated turf. However, the manager, Rusty Goforth, commented that he was very pleased with the performance of Vitazyme in enhancing the development and quality of the turf.

Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163 FAX: (903) 845-2262

1999 Crop Results

Vitazyme on Grass (Turf)

A Testimonial

Farmer: Al Simons *Location*: Newberry Springs, California

We applied Vitazyme, at the 13 oz/acre rate, to sod-type grass that had just started to root. Within the first six days we saw a color change, a deeper green. Also, at harvest we had one of the best root masses ever seen. We are experimenting further on our southern ranch this winter.