

# Corn

## A Long-Term Crop and Soil Study: Year 3

Researcher: Bert Schou, Ph.D

Research Organization: Agricultural Custom Research and Education Services (ACRES)

Location: Cedar Falls, Iowa

Variety: Pioneer PO916XR (GMO)

Soil type: Kenyon loam (34% sand, 46% silt, 20% clay, 4.5% organic matter, pH = 7.3, C.E.C = 17.8 meq/100 g, fertility level = excellent, drainage = excellent)

Planting depth: 2 inches

Row spacing: 30 inches

Planting rate: 32,000 seeds/acre

Seedbed at planting: fine

Planting date: April 22, 2010

Tillage: conventional

Previous crop: soybeans (with glyphosate)

Experimental design: The third year of research on the long-term effects of Vitazyme on crop yield and quality, and on soil conditions, was conducted on the same plots as the previous two years. Two treatments were utilized, as during previous years, with plots 15 x 50 feet, and with five replicates.

### 1. Control

### 2. Vitazyme

Fertilization: Nitrogen was applied to all areas at 120 lb N/acre pre-plant.

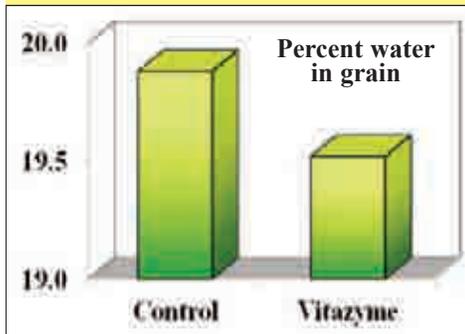
Weed control: glyphosate

Vitazyme application: (1) 13 oz/acre on the seeds at planting (April 22), and (2) 13 oz/acre sprayed on the leaves and soil at the V8 stage (20 inches tall) on June 16

### Grain Moisture

Treatment	Grain moisture <sup>1</sup>	Change
	%	%
1. Control	19.88 a	---
2. Vitazyme	19.52 a	(-) 0.36
LSD (P=0.05)	1.19%	
Standard deviation	0.68%	
CV	3.44%	
Replicate F	0.385	
Treatment F	0.719	

<sup>1</sup>Means followed by the same letter are not significantly different according to the Student-Newman-Keuls Test (P=0.05).



Weather during the growing season: The season was very wet, and temperatures were slightly above normal.

Harvest date: October 6, 2010. A Massey-Ferguson 8 plot combine harvested the middle two rows of each plot, and the corn was weighed with an electronic scale.

Grain moisture: There was a nonsignificant lower moisture content of the Vitazyme treated corn grain versus the control grain.

• **Reduced moisture in grain with Vitazyme: 0.36 percentage points**

Grain test weight: There was little difference between the treatments in grain test weight.

Plant population: The populations of both treatments were very close.

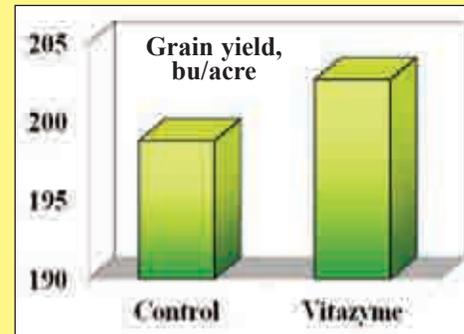
Yield results:

• **Increase in grain yield with Vitazyme: 2%**

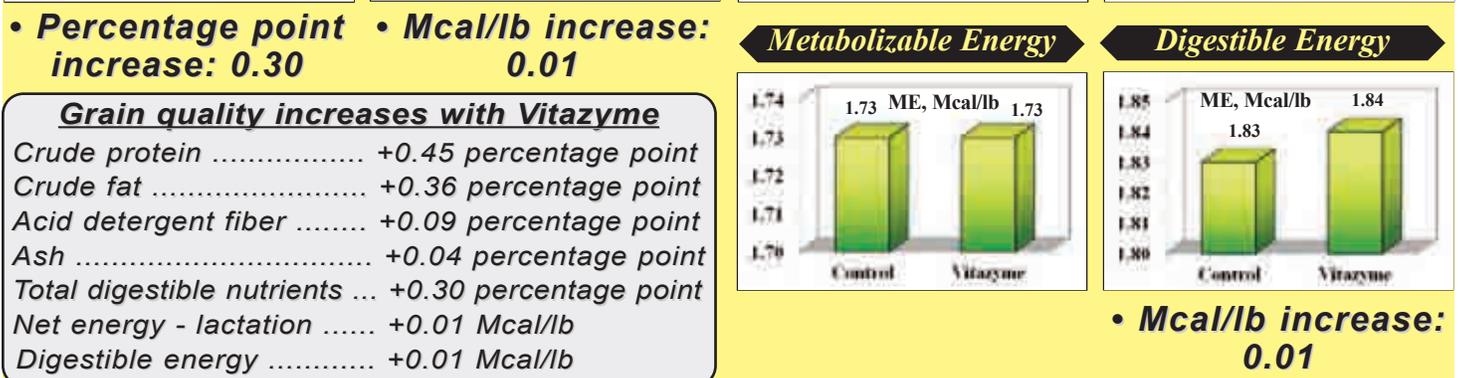
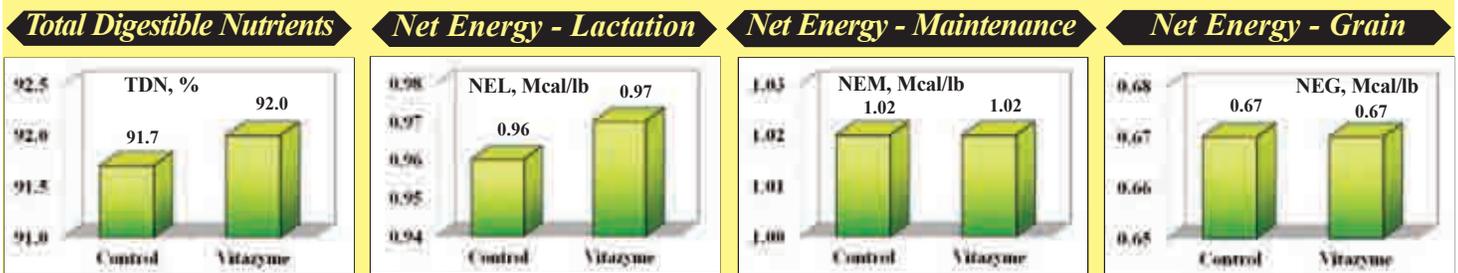
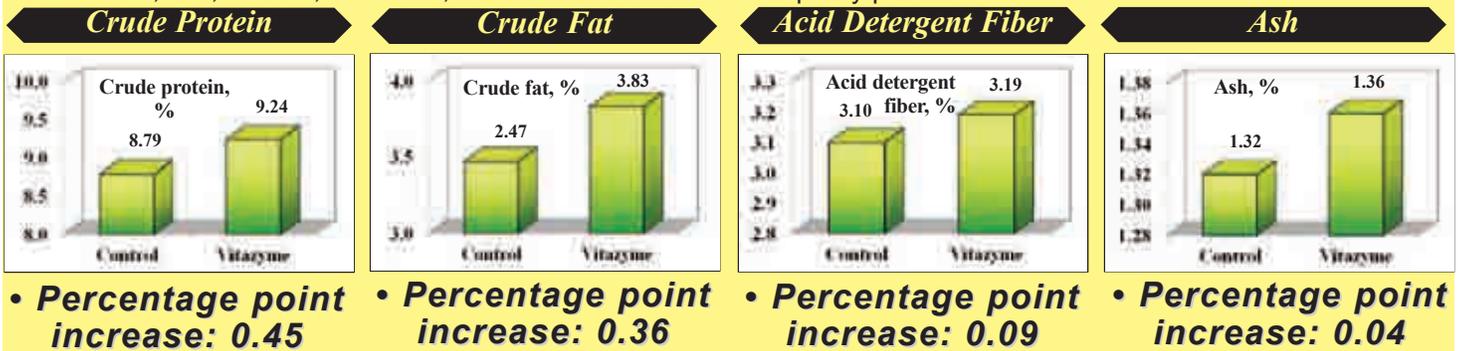
### Grain Yield

Treatment	Grain yield <sup>1</sup>	Change
	%	%
1. Control	198.8 a	---
2. Vitazyme	202.7 a	(-) 0.36
LSD (P=0.05)	11.3 bu/acre	
Standard deviation	6.4 bu/acre	
CV	3.2%	
Replicate F	0.066	
Treatment F	0.895	

<sup>1</sup>Means followed by the same letter are not significantly different according to the Student-Newman-Keuls Test (P=0.05).



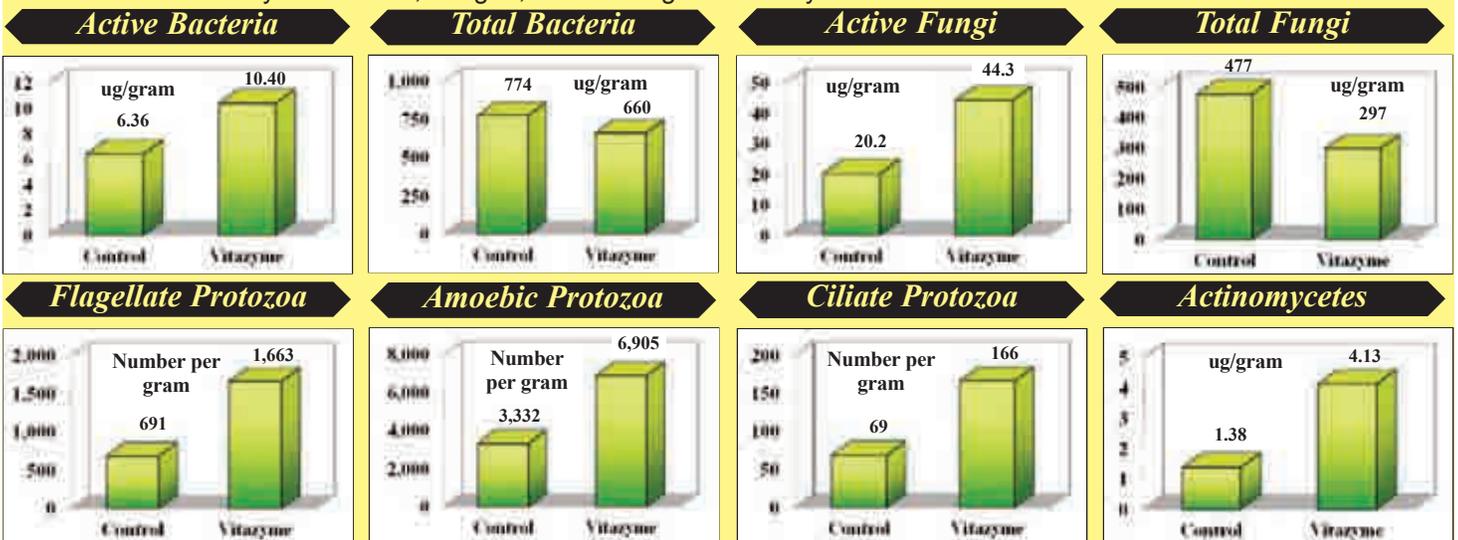
**Grain quality results:** Composite grain samples for each treatments (five treatments combined) were sent to Midwest Laboratories, Inc., Omaha, Nebraska, for an evaluation of several quality parameters.



**Grain quality increases with Vitazyme**

Crude protein ..... +0.45 percentage point  
 Crude fat ..... +0.36 percentage point  
 Acid detergent fiber ..... +0.09 percentage point  
 Ash ..... +0.04 percentage point  
 Total digestible nutrients ... +0.30 percentage point  
 Net energy - lactation ..... +0.01 Mcal/lb  
 Digestible energy ..... +0.01 Mcal/lb

**Soil microorganism results:** A composite soil sample from each rep of both treatments was collected and sent to the Soilfoodweb laboratory in Corvallis, Oregon, for microorganism analyses.



**Nematode Populations**

Treatment	Bacterial feeders*	Fungal feeders*	Root/Fungal feeders*	Predatory*	Root feeders*	Total
	number per gram					
Control	0.60 (5)	0.02 (1)	0.12 (3)	0	0.04 (1)	0.95
2. Vitazyme	0.39 (6)	0.04 (1)	1.99 (5)	0.06 (1)	0.12 (2)	3.14

\*The number in parenthesis after the population number indicates the number of species detected.

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**This ACRES long-term study for 2010 showed a clear advantage in growth for the Vitazyme treated plots.**



**Root mass was noticeably greater with Vitazyme at Cedar Falls, Iowa, a typical response with this powerful biostimulant.**

There were more active bacteria and fungi with Vitazyme, but a bit fewer total bacteria and fungi. Much higher levels of flagellate, amoebic, and ciliate protozoa were found, as well as considerably more actinomycetes in the Vitazyme treated soil. There were more nematodes with Vitazyme, especially fungal and root-feeding species, plus some beneficial predaceous ones, and a greater total variety than in the control.

Bacteria and fungal ratios were as follows:

Treatment	Total fungi Total bacteria	Active fungi Total fungi	Active bacteria Total bacteria	Active fungi Active bacteria
Control	0.62	0.04	0.008	3.18
Vitazyme	0.45	0.15	0.02	4.24

### **Improvements in microbial populations with Vitazyme**

Active bacteria .....	+64%
Active fungi .....	+119%
Flagellate protozoa .....	+141%
Amoebic protozoa .....	+107%
Ciliate protozoa .....	+141%
Actinomycetes .....	+199%

**Conclusions:** This Iowa long-term study revealed that Vitazyme, in the third year, increased the yield of corn by 3.9 bu/acre, while improving the quality of the corn considerably, especially the crude protein (0.45%-point), crude fat (0.36%-point), and ash (0.04%-point). Moreover, soil microbial populations were benefitted considerably with the product. These results continue to illustrate the positive effects of this product on both the yield and quality of corn grain, and on soil quality, in the U.S. Corn Belt.

## **Corn**

### **A Yield and Quality Study**



**A six treatment replicated study in Iowa gave highly significant yield increases for corn, for both Vitazyme formulations.**

**Researcher:** Bert Schou, Ph.D.

**Research Organization:** Agricultural Custom Research and Education Services (ACRES)

**Location:** Cedar Falls, Iowa

**Variety:** Pioneer 36W66 (non-GMO)

**Soil type:** Aredale loam (36% sand, 42% silt, 22% clay, 4.8% organic matter, pH = 6.4, C.E.C. = 1.7 meg/100 g, fertility level = fair, drainage = fair)

**Planting depth:** 1 inch

**Row spacing:** 30 inches

**Planting rate:** 34,000 seeds/acre

**Seedbed at planting:** fine

**Planting date:** April 29, 2010

**Tillage:** conventional

**Previous crop:** soybeans (with glyphosate)

**Experimental design:** A small plot study with corn, using plots 15 ft x 40 ft (six rows per plot), was set up with six treatments and six replicates in a Latin Square design. The purpose of the study was to evaluate two Vitazyme formulations and another seed treatment on the yield and quality of non-GMO corn.

Treatment	Nitrogen lb/acre	Vitazyme A <sup>1</sup> oz/acre	Vitazyme B <sup>2</sup> oz/acre	NERS <sup>3</sup> oz/acre
1	120	0	0	0
2	120	13 (2x)	0	0
3	120	0	13 (2x)	0
4	120	0	0	13 (1x)
5	120	13 (2x)	0	13 (1x)
6	60	13 (2x)	0	0

<sup>1,2,3</sup>2x = two applications; 1x = one application.

<sup>3</sup>NERS = New Era Soil Treatment, applied at planting.

**Fertilization:** Nitrogen was applied to the appropriate plots pre-plant at 60 or 120 lb/acre of N.

**Weed control:** Harness Xtra at 1.2 quarts/acre, giving good weed control

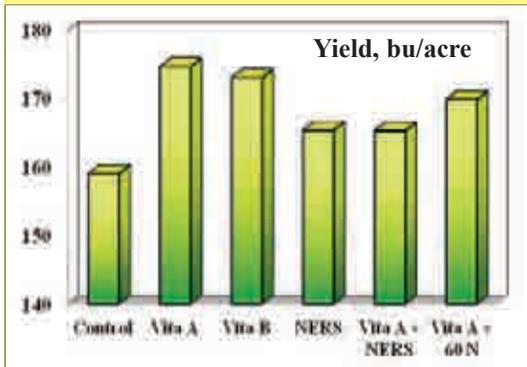
**Vitazyme application:** For Vitazyme A and B, 13 oz/acre on the seeds at planting on April 29, and as a foliar spray at 13 oz/acre on June 17, when the corn was at the V-8 stage (20 inches). The sprayer had a flat fan nozzle using 30 psi.

**New Era Root Stimulator application:** This liquid has a guaranteed analysis of 0.21% N, 0.01% P<sub>2</sub>O<sub>5</sub>, and other materials derived from compost, humic acids, seaweed extract, yucca, and bentonite. It is normally applied at 3 to 5 gallons/acre three to four times per growing season, but was applied at 13 oz/acre on the seeds at planting time for Treatments 4 and 5 of this experiment.

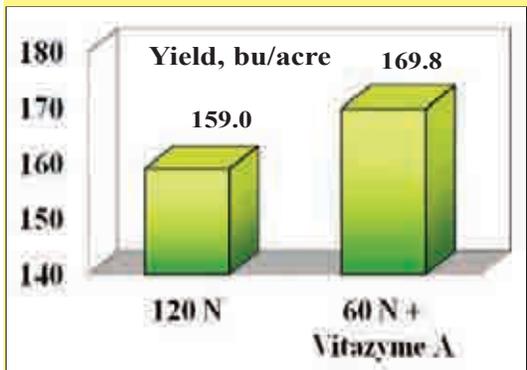
## Corn Yield

Treatment	Yield <sup>1</sup> bu/acre	Change bu/acre
1. Control	159.0 b	---
2. Vita A, 120 N	174.6 a	15.6 (+10%)
3. Vita B, 120 N	173.0 a	13.0 (+8%)
4. NERS, 120 N	165.4 b	6.4 (+4%)
5. Vita A + NERS, 120 N	165.3 b	6.3 (+4%)
6. Vita A, 60 N	169.8 b	10.8 (+7%)
LSD12.4 bu/acre		
Standard deviation	9.4 bu/acre	
Replicate F	13.11	
Treatment F	1.89	
CV	5.61%	

<sup>1</sup>Means followed by the same letter are not significantly different at P = 0.05 according to the Student-Newman-Keuls Test.



This non-GMO replicated corn trial from eastern Iowa proved that Vitazyme A and Vitazyme B formulations both substantially and statistically increased grain yield, by 15.6 bu/acre (10%) and 13.0 bu/acre (8%), respectively. Both of these treatments, applied at planting and at the V8 stage at 13 oz/acre, also increased the ash level of the grain. The increases were 0.56



## Weather during the growing season:

The season was very wet, and temperatures were slightly above normal.

**Harvest date:** October 7, 2010. A Massey-Ferguson 8 plot combine harvested the middle two rows of each plot, and the corn was weighed with an electronic scale.

**Grain moisture:** There were no significant differences among the six treatments in grain moisture at harvest. The range was 15.6 to 16.2%.

**Grain test weight:** No significant differences in grain test weight were found. They ranged from 54.7 to 55.0 lb/bu.

**Plant population:** All treatments had similar population, with no significant differences detected.

**Grain quality results:** Composite samples of corn from each treatment (all six replicates) were sent to Midwest Laboratories, Inc., in Omaha, Nebraska, for component analyses. The ash content was calculated on a dry weight basis.

**Conclusion:**

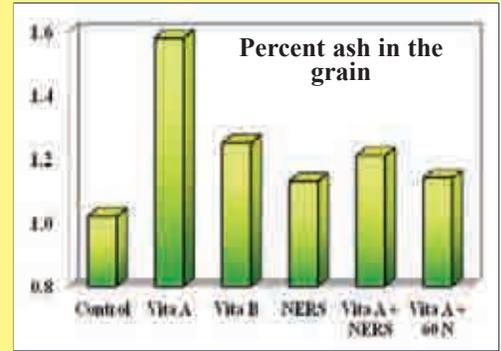
great increases in the minerals essential for plant growth. Thus, the growth and health-imparting values of these treatments should be apparent. All other treatments also increased crop yield by 4 to 7%, and grain ash in these treatments was raised by 0.11 to 0.19 percentage point.

Of special interest in the fact that a 50% nitrogen application, along with two Vitazyme A applications, improved yield by 10.8 bu/acre over the 100% nitrogen control without Vitazyme (see on the left). **This result shows the nitrogen utilization improvement usually noted with Vitazyme.**

## Ash

Treatment	Ash %	Change <sup>1</sup> %-pts
1. Control	1.02	---
2. Vita A, 120 N	1.58	+0.56
3. Vita B, 120 N	1.25	+0.23
4. NERS, 120 N	1.13	+0.11
5. Vita A + NERS, 120 N	1.21	+0.19
6. Vita A, 60 N	1.14	+0.12

<sup>1</sup>Only the actual percentage point increase is shown



### Increase in grain ash

Vitazyme A + 100% N	+0.56
Vitazyme B + 100% N	+0.23
Vitazyme A + 50% N	+0.19
New Era + 100% N	+0.12
Vitazyme A + New Era + 100% N	+0.11

### Increase in corn yield

Vitazyme A + 100% N	+10%
Vitazyme B + 100% N	+8%
Vitazyme A + 50% N	+7%
New Era + 100% N	+4%
Vitazyme A + New Era + 100% N	+4%

## Corn

**Researcher:** Bert Schou, Ph.D.

**Research Organization:** Agricultural Custom Research and Education Services (ACRES)

**Location:** Cedar Falls, Iowa

**Variety:** Pioneer PO916 (GMO)

**Soil type:** Aredale loam (36% sand, 42% silt, 22% clay, 4.8% organic matter, pH = 6.4, C.E.C. = 1.7 meq/100 g, fertility level = fair, drainage = fair)

**Planting depth:** 2 inches

**Row spacing:** 30 inches

**Planting rate:** 34,000 seeds/acre

**Seedbed at planting:** fine

**Planting date:** April 29, 2010

**Tillage:** conventional

**Previous crop:** soybeans (with glyphosate)

**Experimental design:** A small plot study with corn, using plots 15 ft x 40 ft (six rows per plot), was set up with six treatments and six replicates in a Latin Square design. The purpose of the study was to evaluate two Vitazyme formulations and another seed treatment on the yield and quality of GMO corn.

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Treatment	Nitrogen lb/acre	Vitazyme A <sup>1</sup> oz/acre	Vitazyme B <sup>2</sup> oz/acre	NERS <sup>3</sup> oz/acre
1	120	0	0	0
2	120	13 (2x)	0	0
3	120	0	13 (2x)	0
4	120	0	0	13 (1x)
5	120	13 (2x)	0	13 (1x)
6	60	13 (2x)	0	0

<sup>1,2,3</sup>2x = two applications; 1x = one application.  
<sup>3</sup>NERS = New Era Soil Treatment, applied at planting.

**Fertilization:** Nitrogen was applied to the appropriate plots pre-plant at 60 or 120 lb/acre of N.

**Weed control:** glyphosate

**Vitazyme application:** For Vitazyme A and B, 13 oz/acre on the seeds at planting on April 29, and as a foliar spray at 13 oz/acre on June 17, when the corn was at the V-8 stage (20 inches). The sprayer had a flat fan nozzle, and a 30 psi delivery rate.

**New Era Root Stimulator application:** This liquid has a guaranteed analysis of 0.21% N, 0.01% P<sub>2</sub>O<sub>5</sub>, and other materials derived from compost, humic acids, seaweed

### Corn Yield

Treatment	Yield <sup>1</sup> bu/acre	Change bu/acre
1. Control	203.5 a	---
2. Vita A, 120 N	211.7 a	8.2 (+4%)
3. Vita B, 120 N	200.0 a	(-) 3.5 (-2%)
4. NERS, 120 N	211.0 a	7.5 (+4%)
5. Vita A + NERS, 120 N	210.1 a	6.6 (+3%)
6. Vita A, 60 N	203.2 a	(-) 0.3 (0%)
LSD 12.4 bu/acre	11.4 bu/acre	
Standard deviation	9.6 bu/acre	
Replicate F	0.505	
Treatment F	1.590	
CV	4.65%	

<sup>1</sup>Means followed by the same letter are not significantly different at P = 0.05 according to the Student-Newman-Keuls Test.

extract, yucca, and bentonite. It is normally applied at 3 to 5 gallons/acre three to four times per growing season, but was applied at 13 oz/acre on the seeds at planting only for Treatments 4 and 5 of this experiment.

**Weather during the growing season:** The season was very wet, and temperatures were slightly above normal.

**Harvest date:** October 8, 2010. A Massey-Ferguson 8 plot combine harvested the middle two rows of each plot, and the corn was weighed with an electronic scale.

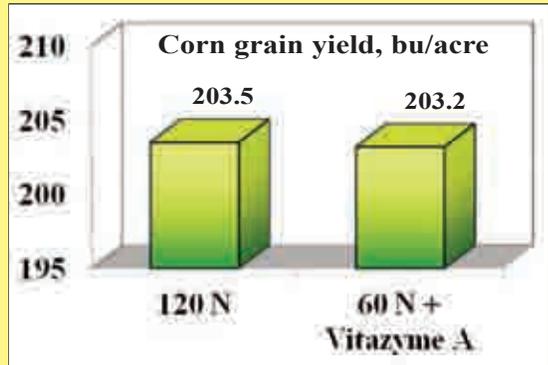
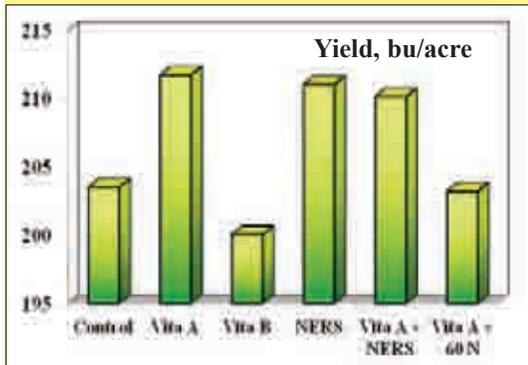
**Plant population:** All treatments had similar populations, with no significant differences detected.

**Yield results:**

#### Increase in corn yield

Vitazyme A + 100% N .....	+4%
New Era + 100% N .....	+4%
Vitazyme A + New Era + 100% N .....	+3%

**Conclusion:** This replicated corn study of a genetically modified variety in eastern Iowa revealed that Vitazyme A and New Era Root Stimulator increased grain yield by 4%. The two together increased yield by 3%. Vitazyme A alone, plus 50% of the optimum nitrogen (60 lb/acre), provided a yield equal to the control. However, it should be understood that none of these yield differences were significant at P=0.05.



## Corn

### A Nitrogen Rate Study

**Researcher:** Manjula V. Nathan, Ph.D., and Tim Reinbott  
 University of Missouri, Columbia, Missouri

**Plant population:** 32,000 seeds/acre

**Soil values:** pH = 6.0; cation exchange capacity = 13.4 meq/100 g; available N = 2 meq/100 g; Bray P1 = 24 lb/acre; Ca = 3,870 lb/acre; Mg = 350 lb/acre; K = 190 lb/acre

**Experimental design:** A small plot study was conducted using plots that were 35 feet long and four rows wide, using three nitrogen rates, to determine if the product Vitazyme would have an effect on corn yield, leaf chlorophyll, and lodging. Six replications were used. Treatments were as follows:

- 0% nitrogen
- 50% nitrogen
- 100% nitrogen
- 0% nitrogen + Vitazyme
- 50% nitrogen + Vitazyme
- 100% nitrogen + Vitazyme

**Fertilization:** Pre-plant incorporated, 18-46-62 lb/acre N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O; after planting, 0, 80 (50% N), or 160 (100% N) lb/acre nitrogen as SuperU Urea

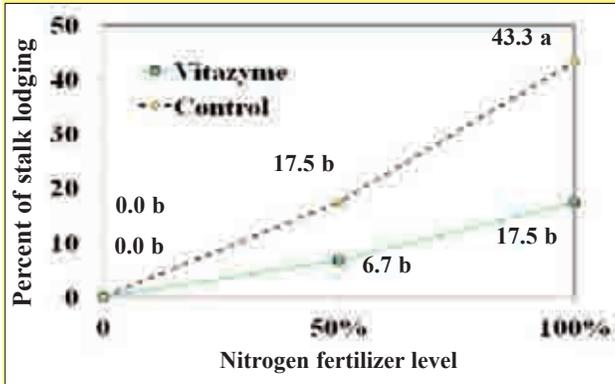
**Vitazyme application:** (1) Seeds were wetted with a 10% solution before planting, and dried; (2) 13 oz/acre (1 liter/ha) were sprayed on the plants and soil at the 10-leaf stage (June 25).

**Chlorophyll results:** A Minolta SPAD meter was used to measure leaf chlorophyll on July 21, but no significant differences were noted for the same nitrogen level among the six treatments. Ten plants from each

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plot were measured, using the ear leaf.

### Lodging



Means followed by the same letter are not significantly different at P=0.05. LSD<sub>0.05</sub>=21.4%; Prob > F=0.007.

#### Reduction in lodging with Vitazyme

At 50% N ..... -10.8%-points  
 At 100% N ..... -25.8%-points

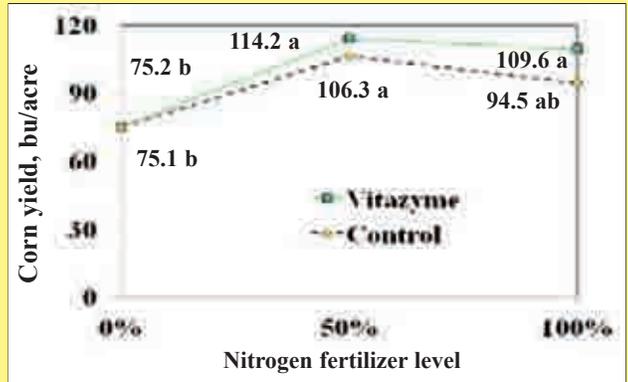
**Conclusion:** A replicated corn trial at the University of Missouri in 2010, using three nitrogen levels, revealed that Vitazyme significantly reduced plant lodging from high winds at the high (100%) nitrogen level; there was also a large reduction (about 26 percentage points) at the 50% nitrogen level, but the effect was not significant. Grain yield was increased by 7.9 bu/acre (7%) at the 50% nitrogen level, and by 15.1 bu/acre (16%) at the 100% nitrogen level, but these increases were not significant. It is likely that the late planting date, coupled with heavy rains that reduced nitrogen availability, reduced the ability of Vitazyme to improve yield response at all three nitrogen levels.

**Lodging results:** On July 20, at the tassel stage, a severe windstorm struck, which blew down many of the plants. Evaluations of lodging at harvest showed much greater susceptibility to stalk breakage with higher nitrogen levels and no Vitazyme. The corn treated with the lower nitrogen levels, as well as those receiving Vitazyme, had considerably less breakage from wind. This indicated stronger stalk structural tissues with these practices.

**Weather conditions:** Rainfall was very high during the growing season, leading to nitrogen loss from leaching and denitrification. The temperatures were somewhat above normal.

**Yield results:** The plots were harvested on October 21, 2010, using the two center rows of each plot. At every nitrogen level Vitazyme

### Corn Yield



Means followed by the same letter are not significantly different at P=0.05. LSD<sub>0.05</sub>=24.1 bu/acre; Prob > F=0.003.

#### Increase in yield with Vitazyme

At 50% N ..... +7.9 bu/acre (+7%)  
 At 100% N ..... +15.1 bu/acre (+16%)

## Corn

**Researcher:** Paul W. Syltie, Ph.D.      **Location:** Vital Earth Resources Research Greenhouse, Gladewater, Texas  
**Variety:** Pioneer 34R67 Liberty Link Triple-Stack  
**Soil type:** sandy loam      **Pot size:** 1 gallon  
**Planting rate:** 10 seeds per pot, thinned to three  
**Planting date:** March 19, 2010      **Growth temperature:** 65° to 85°  
**Harvest date:** April 22, 2010  
**Experimental design:** A greenhouse study was devised using four treatments and five replications to evaluate the effects of Vitazyme and Aquatron water on corn growth.

Treatment	Application
1	Control
2	Vitazyme at 100 ml/pot of a 0.02% solution
3	Aquatron water, applied at all waterings
4	Vitazyme (as in Treatment 2) + Aquatron water (as in Treatment 3)



**Aquatron treated water along with Vitazyme produced a dramatic growth response from corn in this greenhouse experiment. A 20% dry weight yield increase resulted.**

**Vitazyme application:** 100 ml/pot of a 0.02% solution for Treatments 2 and 4, to approximate a 13 oz/acre (1 liter/ha) rate  
**Aquatron water application:** An Aquatron device was obtained from Advanced AquaTronics International, Inc., Pompano Beach, Florida, and all water used to treat Treatments 3 and 4 was run through this device during watering. This water is imprinted with electrons and frequencies that are designed to aid in crop production. Days of application: March 22, 23, 24, 25, 26, 29, 30, 31; April 1, 2, 6, 7, 8, 9, 12, 14, 15, 16 (twice), 21  
**Growth results:** The crop was harvested by washing the soil from the corn roots. Leaf chlorophyll (eight measurements per pot) and leaf length were measured, and drying the plants in a dryer at 125° F was continued for 24 hours. Weights were taken to the nearest 0.01 gram.

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### Leaf Chlorophyll

Treatment	Chlorophyll*	Change
	SPAD units	SPAD units
3 (Aquatron)	27.1 a	0.3
2 (Vitazyme)	27.1 a	0.3
1 (Control)	26.8 a	---
4 (Vita + Aqua)	25.6 a	(-) 1.2
Main effects	0.589	
Model effects	0.589	
CV <sub>0.10</sub>	7.51%	
LSD <sub>0.10</sub>	2.2 units	

\*Means are not significantly different according to the Student-Newman-Kuels Test (P=0.10)

### Plant Height

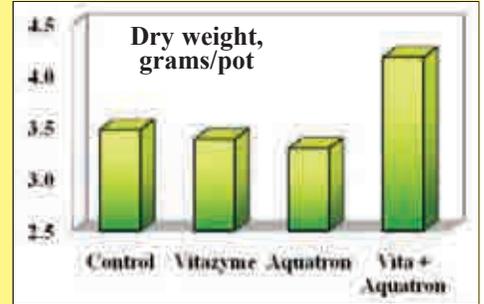
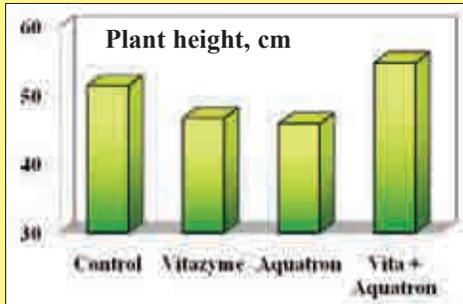
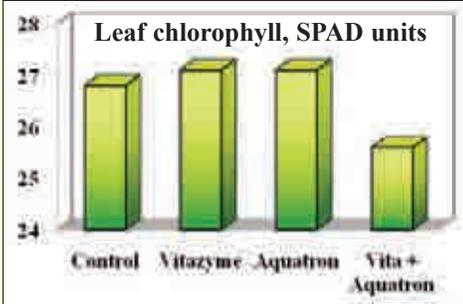
Treatment	Height*	Change
	cm	cm
4 (Vita + Aqua)	54.7 a	3.3 (+6%)
1 (Control)	51.4 a	---
2 (Vitazyme)	46.7 b	(-) 4.7 (9%)
3 (Aquatron)	45.9 b	(-) 5.5 (-11%)
Main effects	0.0009	
Model effects	0.0009	
CV <sub>0.10</sub>	6.14%	
LSD <sub>0.10</sub>	3.4 cm	

\*Means with different letters are significantly different at P=0.10 according to the Student-Newman-Kuels Test.

### Plant Dry Weight

Treatment	Dry weight*	Change
	grams	grams
4 (Vita + Aqua)	4.18 a	070 (+20%)
1 (Control)	3.48 b	---
2 (Vitazyme)	3.39 b	(-) 0.09 (-3%)
3 (Aquatron)	3.30 b	(-) 0.18 (-5%)
Main effects	0.0079	
Model effects	0.0079	
CV <sub>0.10</sub>	10.51%	
LSD <sub>0.10</sub>	0.42 gram	

\*Means with different letters are significantly different at P=0.10 according to the Student-Newman-Kuels Test.



• **Increase in height with Vitazyme + Aquatron water: +6%**

• **Increase in plant dry weight with Vitazyme + Aquatron water: +20%**

**Conclusion:** This greenhouse study, using corn with Vitazyme, Aquatron water, and their combination, revealed that leaf chlorophyll did not significantly vary with the four treatments. However, the combined Vitazyme and Aquatron water produced the tallest plants (+6% above the control), and by far the greatest plant dry weight (+20%). The control, Vitazyme, and Aquatron water treatments did not significantly vary from one another for plant height and dry weight. This study proves that the combination of Vitazyme and Aquatron treated water can greatly increase the growth of corn. The reason for neither Treatments 2 nor 3 not increasing yields by themselves in this study is not known.

## Corn

### A Greenhouse Trial

**Researcher:** Paul W. Sylie, Ph.D. **Location:** Vital Earth Resources Research Greenhouse, Gladewater, Texas

**Variety:** Pioneer 34R67 Liberty Link Triple-Stack

**Soil type:** Sandy loam **Pot size:** 1 gallon

**Planting rate:** 10 seeds per pot, thinned to three

**Planting date:** March 19, 2010 **Growth temperature:** 65° to 85° F

**Experimental design:** This greenhouse study utilized seven replicates and five treatments, to evaluate the effects of Vitazyme and another growth stimulant on corn growth.

Treatment	Vitazyme 1	Vitazyme 2	Root stimulator
1	O	O	O
2	X	O	O
3	O	X	O
4	O	O	X
5	X	O	X



**The Vitazyme plus growth stimulator produced significantly more dry matter than the control in this study, though poor soil conditions reduced growth in some treatments.**

**Vitazyme application:** Both Vitazyme 1 and Vitazyme 2 were applied at 100 ml per pot of a 0.02% solution for Treatments 2, 3, and 5. Vitazyme 1 was the regular product; Vitazyme 2 was produced without certain intermediate steps.

**Root stimulator application:** A 4 gallon/acre root stimulator treatment was applied in 100 ml of water for each pot of Treatments 4 and 5. The root stimulator dilution was 0.07 ml/100 ml of solution (for one pot).

**Harvest date:** April 22, 2010

**Growth results:** Roots were washed free of soil, heights were measured, and the plants were dried in a drying oven at 125° F for 24 hours.

**Conclusion:** This greenhouse study with corn revealed that Vitazyme 1 plus a root stimulator greatly increased both plant height (+11%) and dry weight (66%) above the control. The root stimulator alone increased height by 9%, and dry weight by 46%. Vitazyme 1 and Vitazyme 2 did not differ significantly in their effects on plant height and dry weight, but they exceeded the control dry weight by from 6 to 10%.

### Plant Height

Treatment	Height*	Change
	cm	cm
5 (Vita 1 + Growth Stim)	55.1 a	5.5 (+11%)
4 (Growth Stim)	54.2 a	4.6 (+9%)
1 (Control)	49.6 b	—
2 (Vita 1)	49.3 b	(-) 0.3 (-1%)
3 (Vita 2)	48.3 b	(-) 1.3 (-3%)
Main effects	0.0193*	
Model effects	0.0193*	
CV <sub>0.10</sub>	8.61%	
LSD <sub>0.10</sub>	4.0 cm	

\*Means followed by the same letter are not significantly different according to the Student-Newman-Keuls Test (P=0.10).

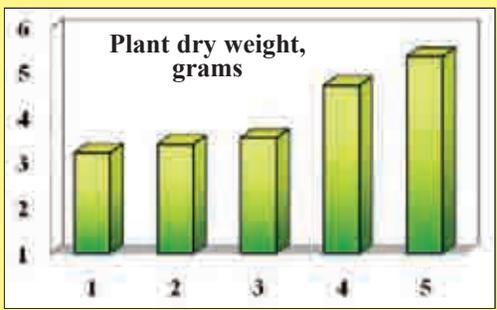
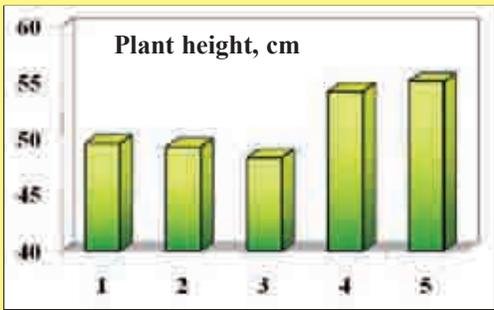
### Plant Dry Weight

Treatment	Dry weight <sup>1</sup>	Change
	grams	grams
5 (Vita 1 + Growth Stim)	5.36 a	2.13 (+66%)
4 (Growth Stim)	4.72 b	1.49 (+46%)
3 (Vita 2)	3.56 c	0.33 (+10%)
2 (Vita 1)	3.42 c	0.19 (+6%)
1 (Control)	3.23 c	—
Main effects	0.0000***	
Model effects	0.0000***	
CV <sub>0.10</sub>	26.47%	
LSD <sub>0.10</sub>	0.61 gram	

\*Means followed by the same letter are not significantly different according to the Student-Newman-Keuls Test (P=0.10).

**Increase in plant height**  
**Vitazyme + Growth stimulator** ..... +11%  
**Growth Stimulator** ... +9%

**Increase in dry weight**  
**Vitazyme 1 + Growth stimulator** ..... +66%  
**Growth Stimulator** ... +46%  
**Vitazyme 2** ..... +10%



## Corn

**Researcher:** V. V. Plotnikov  
**Location:** Vinnytsia State Agricultural Research Station, Vinnytsia, Ukraine (Central Forest and Steppe Region)  
**Variety:** Saari, FAO 280

**Research organization:** National Academy of Agrarian Sciences

**Soil type:** gray podzolic (organic matter = 2.2%, hydrolyzed N = 8.4 mg/100 g soil, P = 15.8 mg/100 g soil, exchangeable K = 12.4 mg/100 g soil, pH = 5.5)  
**Previous crop:** corn



**Planting date:** May 20, 2010  
**Planting rate:** 22 kg/ha  
**Soil preparation:** disking to 6 to 8 cm, tillage to 22 cm, cultivation to 5 to 6 cm

**Corn treated with Vitazyme on the right grew larger plants that yielded 12% more grain than the untreated control.**

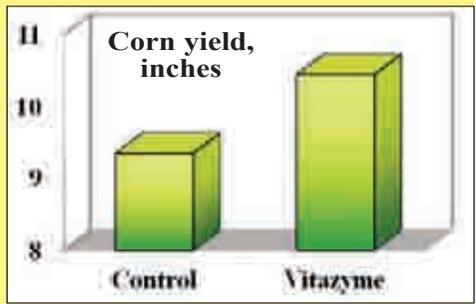
**Note the larger ears from the treated plots: the ears are not only longer, but they possess more rows of grains that are fuller.**

**Experimental design:** A corn plot area was divided into four replicates with a control and one Vitazyme treatment, with the objective of determining the effects of the product on corn yield.

### Corn Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	9.35	---
Vitazyme	10.44	1.09 (+12%)

- Control**
  - Vitazyme on the leaves and soil**
- Fertilization:** 100-60-60 kg/ha N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O, incorporated before planting  
**Vitazyme application:** 1 liter/ha to the leaves and soil at the 7 to 8-leaf stage on June 17



**Yield results:** See the table and graph on the right.  
**Income results:** A single Vitazyme application at the 7 to 8-leaf stage increased corn grain income by 1,489 hrn/ha.  
**Conclusion:** Corn raised with Vitazyme, applied at 1 liter/ha to the leaves and soil at the 7 to 8-leaf stage, increased yield by 1.09 tons/ha (12%), and income by 1,489 hrn/ha, in this Ukraine replicated research trial, showing the product's excellent effects upon this crop in Ukraine.

**• Increase in grain yield with Vitazyme: 12%**

# Corn

Researcher: unknown

Location: Krasnodar Region, Russia

Planting date: May 5, 2010

Soil type: Chernozem (2.6 to 3.2% organic matter, pH = 5.1, available P<sub>2</sub>O<sub>5</sub> = 45.0 to 48.4, available K<sub>2</sub>O = 341 to 385 mg/kg, exchangeable bases = 28.9 to 31.8 mg/100 g of soil, saturation with Ca and Mg = 85.0 to 88.6%, texture = 66% clay and 34% silt), highly fertile

Experimental design: A corn field was divided into untreated and Vitazyme treated plots, 40 m<sup>2</sup>, using four replicates, with the objective of evaluating its effects on corn growth and yield.

## 1. Control

Fertilization: a fall application of 16-60-40 kg/ha N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O as NH<sub>4</sub>H<sub>2</sub>PO<sub>4</sub> and KCl, plus 50 kg/ha of NH<sub>3</sub> in April; 50 kg/ha more NH<sub>3</sub> before planting

Weed control: Harness KE, 2 liters/ha in April, 2010

Vitazyme application: (1) 1 liter/ha on the leaves and soil sprayed at the 3 to 4-leaf stage on May 18, 2010, and (2) 1 liter/ha foliar sprayed at the 6 to 8-leaf stage on June 1, 2010

Weather conditions: The climate is moderate continental, warm temperature, and humid. Hot and dry weather during early growth in May prolonged the early grand period of growth, but rain (7.39 cm) in later June helped crop development. July was hot and dry, which reduced crop productivity.

Yield results:

Research organization: Krasnodar Lukyanenko NIICX

Variety: Krasnodar 385MB

Tillage: disking

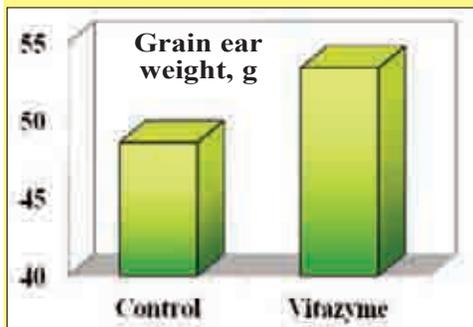
Seeding rate: 18 kg/ha

Previous crop: winter barley

## 2. Vitazyme

### Corn Yield

### Grain Per Ear\*\*



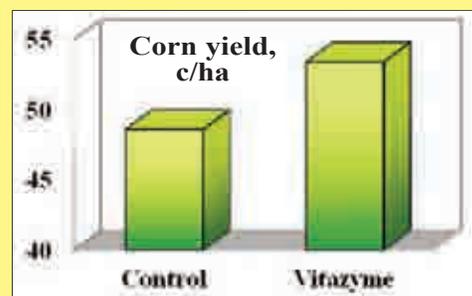
\*Means followed by the same letter are not significantly different at P = 0.05. LSD<sub>0.05</sub> = 11.8 g

- **Increase in grain per ear with Vitazyme: 13 g (+10%)**

Treatment	Yield* c/ha	Change c/ha
Control	48.6 b	---
Vitazyme	53.4 a	4.8 (+10%)

\*Means followed by the same letter are not significantly different at P = 0.05. LSD<sub>0.05</sub> = 3.8 c/ha.

- **Increase in grain yield with Vitazyme: 10%**



Grain quality results: The protein content of the two treatments was nearly identical, the control being 9.53% and the Vitazyme treatment being 9.56%.

Conclusion: This Russian corn trial from the Krasnodar Region revealed that Vitazyme improved ear size (10% more corn per ear), and increased the yield significantly (P = 0.05) over the control, also by 10% (4.8 c/ha). This increase was a result of using only two 1 liter/ha applications, at the 3 to 4-leaf stage. Even with the yield increase the protein content of the grain was not diminished, but was slightly improved. These results show the great utility of using Vitazyme as a yield and profit enhancer for corn in Russia.

# Corn

## A Greenhouse Trial

Researcher: Paul W. Syltie, Ph.D.

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas

Variety: Pioneer 34R67 Liberty Link

Soil type: Sandy loam, mixed with 10% compost

Pot size: 1 gallon

Planting rate: 10 seeds per pot, thinned to three

Planting date: December 16, 2009

Growth temperature: 50° to 80° F

Experimental design: Three treatments and seven replications were employed in a greenhouse study to evaluate the effect of two Vitazyme formulations on the growth of corn.

### 1. Control

### 2. Vitazyme 1

### 3. Vitazyme 2

Vitazyme application: Vitazyme 1 and Vitazyme 2 were applied at 100 ml per pot of a 0.01% solution.

Harvest date: February 1, 2010.

Growth results: Roots were washed free of soil, leaf lengths were measured, and the plants were dried in a drying oven at 125° F for 24 hours.

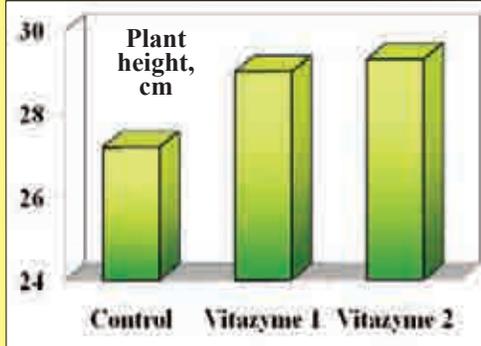


**Note the considerably greater growth of the Vitazyme treated corn plants, despite a soil very low in available nitrogen; dry weight increased by 18% in one formulation, and by 16% in the second.**

## Plant Height

Treatment	Height <sup>1</sup> cm	Change cm
3 (Vita 2)	29.3 a	2.1 (+8%)
2 (Vita 1)	29.0 a	1.9 (+7%)
1 (Control)	27.2 b	---
Blocks	0.1652 ns	
Main effects	0.0406*	
Model	0.0765 ns	
CV <sub>0.10</sub>	5.09%	
LSD <sub>0.10</sub>	1.4 cm	

<sup>1</sup>Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls Test.



### Increase in plant height

Vitazyme 1 ..... +8%  
Vitazyme 2 ..... +7%

### Increase in plant height

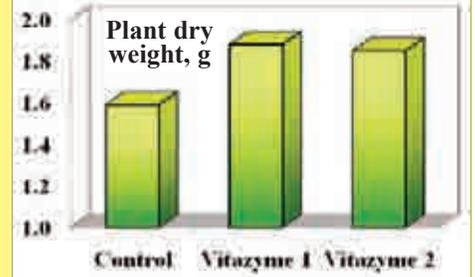
Vitazyme 1 ..... +18%  
Vitazyme 2 ..... +16%

**Conclusion:** This greenhouse study revealed that Vitazyme 1 and Vitazyme 2 did not differ significantly in their effect on corn height and dry weight, both producing significantly greater values than the untreated control: height increases were 7 to 8%, and dry weight increases were 16 to 18%.

## Plant Dry Weight

Treatment	Dry weight <sup>1</sup> grams	Change grams
3 (Vita 1)	1.88 a	0.29 (+18%)
2 (Vita 2)	1.85 a	0.26 (+16%)
1 (Control)	1.59 b	---
Blocks	0.6091 ns	
Main effects	0.0997*	
Model	0.338 ns	
CV <sub>0.10</sub>	14.4%	
LSD <sub>0.10</sub>	0.24 g	

<sup>1</sup>Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls Test.



# Corn

## A Greenhouse Study

**Researcher:** Paul W. Syltie, Ph.D.

**Variety:** Pioneer 34R67 Liberty Link

**Pot size:** 1 gallon

**Planting rate:** 10 seeds per pot, thinned to three

**Planting date:** December 16, 2009

**Growth temperature:** 50° to 80° F

**Experimental design:** In this greenhouse corn study, using eight replicates, three treatments were used to evaluate the effect of Vitazyme, with or without formic acid, on corn growth.

**1. Control      2. Vitazyme      3. Vitazyme + Formic acid**

**Vitazyme application:** 100 ml/pot of a 0.02% solution

**Formic acid application:** Vitazyme at 100 ml/pot of a 0.02% solution having 0.5% formic acid

**Harvest date:** February 2, 2010

**Growth results:** The plants in each pot were washed free of soil, and the plant heights were measured. Then the plants were dried in a drying oven at 125° F for 24 hours.

**Conclusion:** This greenhouse study with corn revealed that both Vitazyme alone, and Vitazyme plus formic acid, significantly increased plant height (12 to 16%) and plant dry weight (17 to 19%) above the control. These data indicate that, in spite of sterilization of the product, Vitazyme alone or with formic acid equally stimulated plant growth in this corn study.

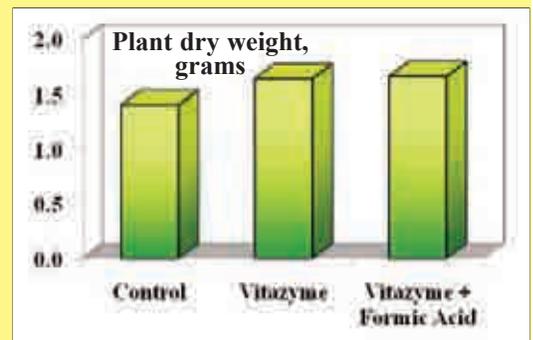
**Location:** Vital Earth Resources Research Greenhouse, Gladewater, Texas

**Soil type:** sandy loam

## Plant Dry Weight

Treatment	Dry weight <sup>1</sup> grams	Change grams
3 (Vita + Formic Acid)	1.66 a	0.26 (+19%)
2 (Vitazyme)	1.64 a	0.24 (+17%)
1 (Control)	1.40 b	---
Blocks	0.0590 ns	
Main effects	0.0021**	
Model	0.0081**	
CV <sub>0.10</sub>	8.37%	
LSD <sub>0.10</sub>	0.12 gram	

<sup>1</sup>Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls Test.



## Plant Height

Treatment	Height <sup>1</sup> cm	Change cm
3 (Vita + Formic acid)	30.7 a	4.2 (+16%)
2 (Vitazyme)	29.8 a	3.3 (+12%)
1 (Control)	26.5 b	---
Blocks	0.3505 ns	
Main effects	0.0054**	
Model	0.0480*	
CV <sub>0.10</sub>	7.76%	
LSD <sub>0.10</sub>	2.0 cm	

<sup>1</sup>Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls Test.

### Increase in plant height

Vitazyme ..... +16%  
Vitazyme + Formic Acid .... +12%

### Increase in plant dry weight

Vitazyme ..... +19%  
Vitazyme + Formic Acid .... +12%

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# 2009 Crop Results

## Vitazyme on Corn

Researcher: Nathan Temples

Farm cooperators: Parker Brothers

Location: Sikeston, Missouri

Variety: Pioneer 33N58

Soil type: sandy loam

Planting rate: 31,500 seeds /acre

Row-spacing: 38 inches

Irrigation: unknown

Planting date: April 23, 2009

Experimental design: A corn field received Vitazyme on the seeds of 24 rows within the field, to determine the effects of this product on corn yield.

### 1. Control

### 2. Vitazyme

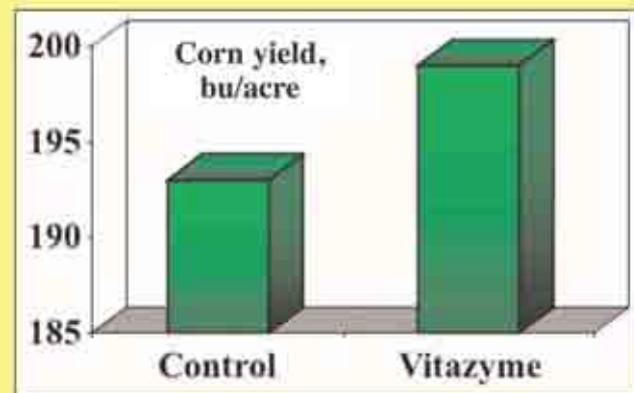
Fertilization: 200-60-90 lb/acre N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O

Vitazyme application: 8 oz/acre on the seeds at planting

Harvest date: September 23, 2009

Yield results:

Treatment	Yield	Yield change
	-----bu/acre-----	
Control	193	—
Vitazyme	199	6 (3%)



**Increase in corn yield with  
Vitazyme: 3%**

Conclusions: This high yielding corn study in Missouri revealed that Vitazyme, applied at 8 oz/acre to the seeds at planting, increased yield by 6 bu/acre (+3%). This is a highly profitable additional yield, to reveal the potential of Vitazyme to improve corn yields in the Corn Belt of Missouri.

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# 2009 Crop Results

## Vitazyme on Corn

Researcher: O.V. Kornijchuk, V.V. Plotnikov, and agronomic scientists

Organization: Vinnytsia State Agricultural Experiment Station, Ukraine Academy of Agrarian Sciences, Vinnytsia, Ukraine

Location: Ukraine central forest-steppe area near Vinnytsia

Planting date: May 22, 2009

Variety: Ronaldinio

Seeding rate: 22 kg/ha

Tillage: plowing, harrowing, and cultivation

Previous crop: winter wheat

Soil type: gray forest steppe soil; in the 0-30 cm layer, 2.2% organic matter, 8.4 mg/100 g of soil "hydrolyzed nitrogen", 15.8 mg/100g of soil phosphorous, 12.4 mg/100 g of soil exchangeable potassium, and pH=5.5.

Experimental design: A uniform field was divided into plots of 1.0 ha each with two treatments and four replications. The objective of the study was to evaluate the effect of Vitazyme as either a seed application, or a seed plus foliar application, on the yield of corn grain.

### 1. Control

### 2. Vitazyme, once foliar

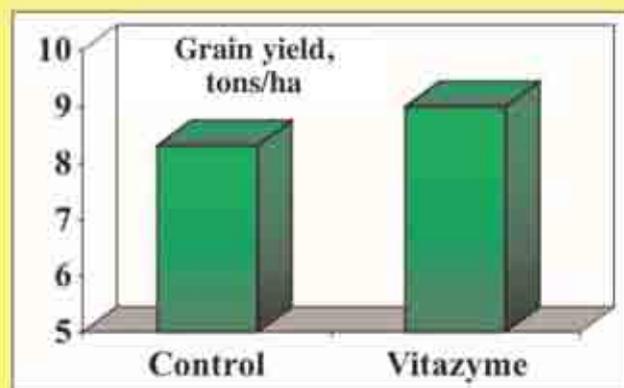
Fertilization: 60 kg/ha, 30 kg/ha P<sub>2</sub>O<sub>5</sub>, and 60 kg/ha K<sub>2</sub>O

Vitazyme application: Treatment 2 received 1.0 liter applied to the leaves and soil on June 25, 2009, at the 7 to 8 leaf stage

Yield results:

Treatment	Grain yield tons/ha	Change tons/ha
Control	8.3	—
Vitazyme	9.0	0.7 (+8%)

**Increase in corn yield with  
Vitazyme: 8%**



Income results:

**Income increase with Vitazyme foliar: 479 hrn/ha**

Conclusions: Corn grain with and without Vitazyme (1 liter/ha, foliar) in this Ukraine study showed an 8% yield increase. Moreover, the return to the farmer was improved substantially.

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# 2009 Crop Results

## Vitazyme on Corn

Researcher: Nathan Temples

Farm cooperator: Schlosser Farms

Location: Perkins, Missouri

Variety: Pioneer 33 N 58

Soil type: silt loam

Planting date: April 20, 2009

Planting rate: 25,000 seeds /acre

Irrigation: none

Experimental design: Five acres of a 90-acre corn field were treated with Vitazyme, applied with the herbicide, to determine the product's ability to improve crop yields.

### 1. Control

### 2. Vitazyme

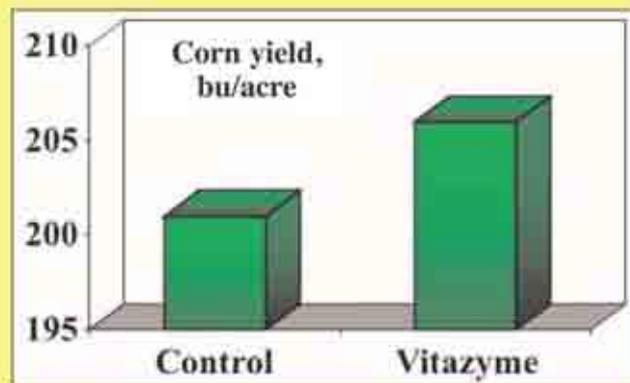
Fertilization: 160-50-90 lb/acre N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O preplant

Vitazyme application: 13 oz/acre with the herbicide, 42 days after planting

Harvest date: October 3, 2009

Yield results:

Treatment	Yield	Yield change
	-----bu/acre-----	
Control	201	—
Vitazyme	206	5 (2.5%)



**Increase in yield with Vitazyme:  
2.5%**

Conclusions: A Missouri corn study showed that Vitazyme, applied along with a herbicide at 13 oz/acre, increased yield by 5 bu/acre (+2.5%)

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# 2009 Crop Results

## Vitazyme on Corn

Researcher: Nathan Temples

Farm cooperater: Seyer Farms

Location: Oran, Missouri

Variety: Dekalb

Soil type: sandy

Planting rate: 29,000 seeds /acre

Row-spacing: 30 inches

Irrigation: furrow, six times

Planting date: April 22, 2009

Experimental design: An 80-acre irrigated corn field was divided into 60 acres treated with Vitazyme, and 20 acres left untreated, to determine the product's effect on crop yield.

### 1. Control

### 2. Vitazyme

Fertilization: unknown

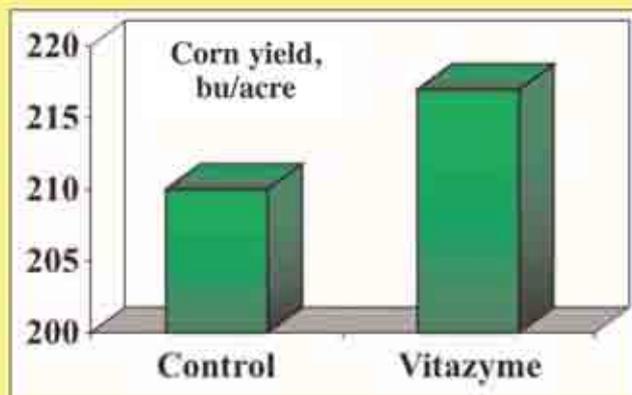
Vitazyme application: 13 oz/acre along with a herbicide

Harvest date: September 14, 2009

Yield results:

Treatment	Yield	Yield change
	----- bu/acre -----	
Control	210	—
Vitazyme	217	7 (3.3%)

**Increase in corn yield with  
Vitazyme: 3.3%**



Conclusions: In this high yielding Missouri irrigated corn trial, Vitazyme increased corn yield by 7 bu/acre (3.3%), showing the utility of this product to improve production even at high yield levels.

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# 2009 Crop Results

## Vitazyme on Corn

Researcher: Nathan Temples

Location: Arbor, Missouri

Planting rate: 29,000 seeds /acre

Planting date: May 7, 2009

Experimental design: A 55-acre field was treated with Vitazyme on 40 acres, using seed and foliar treatments, to determine if this product would increase the yield of grain.

Farm cooperator: Donnie and Chris Wondel, D and C Farms

Variety: 32 D 78

Row-spacing: 30 inches

Soil type: silt loam

Irrigation: furrow, six times

### 1. Control

Fertilization: unknown

Vitazyme application: (1) 8 oz/acre on the seeds at planting; (2) 13 oz/acre on the leaves and soil at 7 inches height, with a herbicide

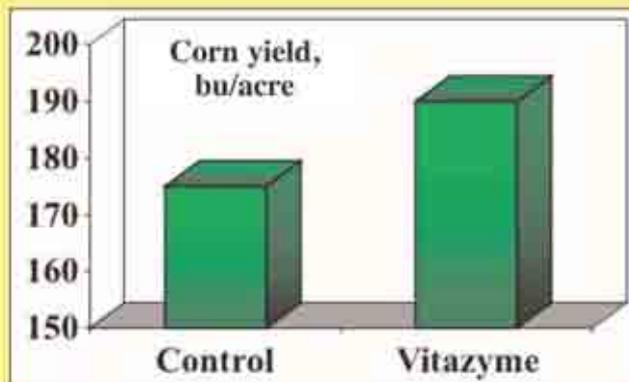
Harvest date: October 6, 2009

Yield results:

Treatment	Yield	Yield change
	-----bu/acre-----	
Control	175	—
Vitazyme	190	15 (9%)

**Increase in yield with Vitazyme: 9%**

### 2. Vitazyme



Conclusions: In this Missouri corn trial, using seed and foliar/soil applications, the Vitazyme treatments increased grain yield by 9% (15 bu/acre) in this high-yielding field, showing the program's great effectiveness in corn programs, even when yields are high.

## Vital Earth Resources

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# 2008 Crop Results

## Vitazyme on Corn A Long-Term study: Year 1

Researcher: Bertel Schou, Ph.D.      Research organization: ACRES (Agricultural Custom Research and Environmental Services), Cedar Falls, Iowa

Variety: Pioneer 34R67 (BBCH Scale:BCOR)

Tillage: conventional (cultivated and harrowed on May 21)

Planting depth: 2 inches

Previous crop: corn

Soil type: Kenyon loam (34% sand, 46% silt, 20% clay, 3.6% organic matter, 15.0 meq/100 grams cation exchange capacity, pH 7.2, good fertility)

Soil test results, initial for all plots (analyzed May 15, 2008): pH, 7.2; organic matter, 3.90%; N, 89 lb/acre; SO<sub>4</sub>-S, 6 lb/acre; P<sub>2</sub>O<sub>5</sub>, 1,076 lb/acre; Ca, 5,407 lb/acre; Mg, 916 lb/acre; K, 298 lb/acre; Na, 52 lb/acre; B, 1.76 lb/acre; Fe, 460 lb/acre; Mn, 176 lb/acre; Cu, 3.4 lb/acre; Zn, 12.6 lb/acre; base saturations: Ca, 72.6%, Mg, 20.5%, K, 2.1%, Na, 0.6%, others, 4.2%

Experimental design: A field was selected to place plots (15 x 40 feet) in a randomized complete block design (five replicates), using two treatments for a long-term field study. These plots are designed to assess the long-term effects of Vitazyme on the yield and growth of corn and soybeans in rotation, but moreover the effects on the physical, chemical, and microbial characteristics of the soil.

### 1. Control

### 2. Vitazyme

Fertilization: 120 lb/acre of N as 28% N applied postemergence in 20-inch spaced bands, using drop nozzles from a shielded sprayer

Vitazyme application: 13 oz/acre (1 liter/ha) in the seed furrow at planting (May 21), and 13 oz/acre sprayed over the leaves and soil on July 6, 2008, at the V6 stage

Weed control: Harness Extra preemergent, and Accent postemergent

Microorganism analyses: Soil biological activity was evaluated in the spring and fall to determine product effects on a number of parameters. Soil samples were collected from the root zones of plants from each of the five replicates, and then combined for each treatment and sent to the Soilfoodweb Laboratory in Corvallis, Oregon, for analysis.

### May 29 analysis (baseline values for future comparisons)

Treatment	Organism biomass	Active bacteria	Total bacteria	Active fungi	Total fungi	Protozoa			Total nematodes
						Flagellates	Amoebae	Ciliates	
Control	0.81	28.4	1,853	20.4	244	5,718	17,211	34	2.33
Vitazyme	0.80	24.7	2,324	13.3	282	3,454	5,738	72	1.84

Treatment	Total fungi to bacteria	Active fungi to total fungi	Active bacteria to total bacteria	Active fungi to active bacteria	Plant-available nitrogen
					lb/acre
Control	0.13	0.08	0.02	0.72	75 to 100
Vitazyme	0.12	0.05	0.01	0.54	50 to 75

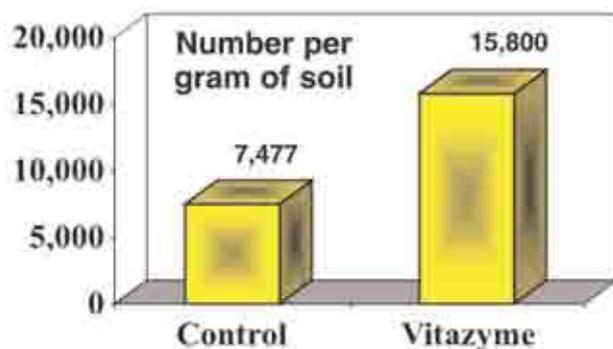
### September 10 analysis

Treatment	Organism biomass	Active bacteria	Total bacteria	Active fungi	Total fungi	Protozoa			Total nematodes
						Flagellates	Amoebae	Ciliates	
		ug/g	ug/g	ug/g	ug/g	no./g	no./g	no./g	no./g
Control	0.82	41.6	929	18.7	352	1,690	5,618	169	2.73
Vitazyme	0.81	3.4	1,033	13.4	240	8,594	7,103	103	0.57

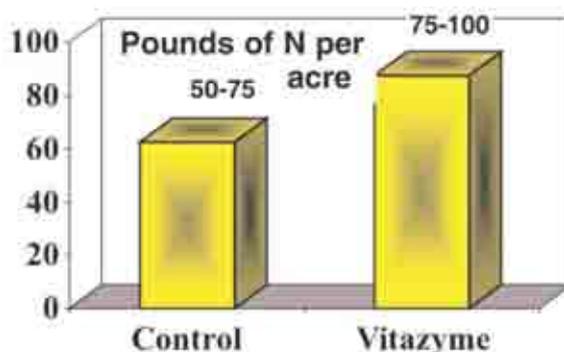
Treatment	VA mycorrhizae	Total fungi to bacteria	Active fungi to total fungi	Active bacteria to total bacteria	Active fungi to active bacteria	Plant-available nitrogen
	% infection					lb/acre
Control	0	0.38	0.05	0.04	0.45	50 to 75
Vitazyme	0	0.23	0.06	0.03	0.41	75 to 100

Differences in microbes between the two treatments are not pronounced, although there was a distinctly greater number of protozoa with the Vitazyme treatment, especially flagellates. There was no VAM mycorrhizal root infection for either treatment. Fungal and bacterial ratios were not very different, but plant-available nitrogen was decidedly greater with the Vitazyme treatment.

**Total Protozoa**



**Plant-Available Nitrogen**



**Increase in protozoa with Vitazyme: 111%**

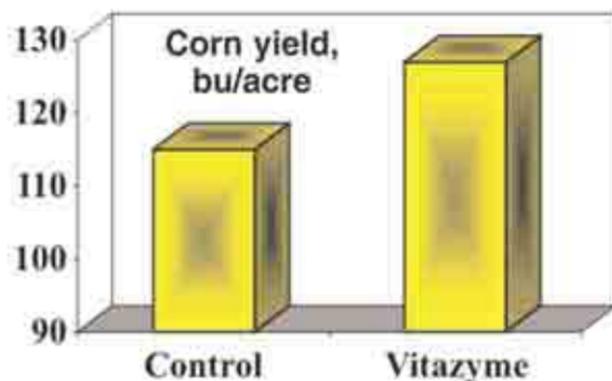
**Increase in N availability with Vitazyme: 25 lb/acre**

**Harvest date:** The crop was harvested on November 1, 2008, using a Massy-Ferguson 8 plot combine. Two rows 40 feet long were harvested from each plot.

**Plant populations:** The populations of the two treatments were very similar: 21,414 plants/acre for the control, and 21,235 plants/acre for the Vitazyme treatment. This difference was not significant (P=0.871).

### Yield results:

Treatment	Grain yield	Yield increase
	bu/acre	bu/acre
Control	114.96 b	—
Vitazyme	127.02 a	12.06 (+10%)
LSD (0.05)	8.53	
Standard deviation	4.86	
Coeff. of variation	4.02	
Replicate F	4.4	
Replicate probability	0.090	
Treatment F	15.4	
Treatment probability	0.017	



Vitazyme significantly increased the yield of corn, by 12.06 bu/acre, a full 10% above the control yield.

**Conclusions:** In this first year of a long-term trial to evaluate the effects of Vitazyme on the physical, chemical, and microbiological effects of the soil, and on crop response, Vitazyme greatly boosted grain yield (12.06 bu/acre, or 10%) above the control. Baseline soil chemical analyses were completed, as were baseline microbiological analyses. A September 10 microbial analysis revealed that, while both treatments showed minimal differences in most parameters measured, there was a marked 111% increase in total protozoa with Vitazyme. In addition, the supply of plant-available nitrogen was improved by about 25 lb/acre with Vitazyme, a significant factor in the current climate of high and volatile fertilizer prices. Work will continue during the coming years on monitoring the changes brought about by Vitazyme on an array of soil and plant characteristics.

## Vital Earth Resources

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# 2008 Crop Results

## Vitazyme on Corn

Researcher/Farmer: Rick Nichols

Variety: Pioneer 34Y88 (non-GMO)

Row spacing: 30 inches

Planting date: May 4, 2008

Experimental design: A field was divided into a control area receiving no sidedressed nitrogen or Vitazyme, and a treated area receiving both. The objective of the test was to evaluate the effect of combined sidedressed nitrogen plus Vitazyme on crop yield.

Location: Hebron, Indiana

Soil type: silty clay "gumbo"

Population: 34,000 seeds/acre

Previous crop: soybeans

### 1. Control

Fertilization: Before planting: 140 lb/acre nitrogen, as urea. At planting: 300 lb/acre 18-46-60% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O placed 4 inches to the side of the seeds. At sidedressing, in June (corn about 2 feet tall): 40 lb/acre nitrogen as a 28% solution

Vitazyme application: 13 oz/acre with sidedressed nitrogen on the treated area, applied in June at the 2-foot height

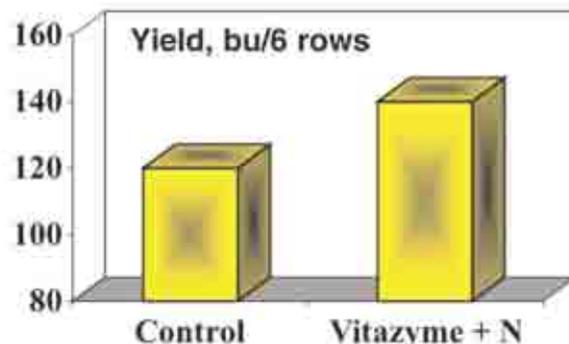
Harvest date: October 7, 2008

Yield results: Six rows of field length were harvested and weighed from each treatment in passes near one another. However, no row length was measured, so per acre yields were not obtained.

### 2. Vitazyme + sidedressed nitrogen

Treatment	Yield bu/6 rows	Increase bu/6 rows
1. Control	120	—
2. Vitazyme + Sidedressed N	140	20 (+17%)

**Increase in corn yield: 17%**



Conclusions: In this northern Indiana corn trial, Vitazyme side-dressed with 40 lb/acre of nitrogen as a 28% solution increased the yield by 17% above the control. It was not possible to separate the effects of the nitrogen and the Vitazyme, but it is well documented that Vitazyme enhances the utilization of soil and fertilizer applied nutrients, especially nitrogen.

## Vital Earth Resources

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# 2008 Crop Results

## Vitazyme on Corn

Researcher/Farmer: Gary Burkey

Variety: Flexseed 4918 non-GMO

Row spacing: 30 inches

Planting date: May 6, 2008

Soil test: pH, 6.6; cation exchange capacity, 24.6 meq/100g; organic matter, 3.6%; base saturations, Ca = 65.6%, Mg = 21.8%, K = 1.4%, Na = 0.3%, other bases = 4.8%, H = 6.0%; estimated N release, 86 lb/acre; S, 9 ppm; P<sub>2</sub>O<sub>5</sub>, 175 lb/acre; Ca, 6,468 lb/acre; Mg, 1,290 lb/acre; K, 274 lb/acre; Na, 38 lb/acre; B, 0.9 ppm; Fe, 1,842 ppm; Mn, 77 ppm; Cu, 1.1 ppm; Zn, 26.7 ppm

Experimental design: A corn field was treated entirely on the seeds with Vitazyme, and part of the field received a foliar Vitazyme treatment as well, along with two other products in the sprayer tank. The objective of the study was to evaluate the effect of an additional Vitazyme application and these other foliar products on corn yield.

### 1. Vitazyme on the seeds

### 2. Vitazyme on the seeds, plus Vitazyme and two other products on the leaves

Fertilization: *Before planting:* 150 lb/acre potassium chloride (0-0-60% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O); 100 lb/acre diammonium phosphate (18-46-0% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O); 70 lb/acre N from dry urea. *At planting:* 4 gallons/acre 3-18-18% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O on the seeds. *At knee-height:* 70 lb/acre N (28% N) side-dressed with a row-crop cultivator. *Foliar spray on July 6:* Tricert K (1 quart/acre of a 50-0-20 N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O material), manganese (1.5 lb/acre), with Vitazyme.

Vitazyme application: (1) 13 oz/acre on the seeds at planting, along with 3-18-18 fertilizer; (2) 13 oz/acre sprayed foliar with Tricert K and manganese on July 6

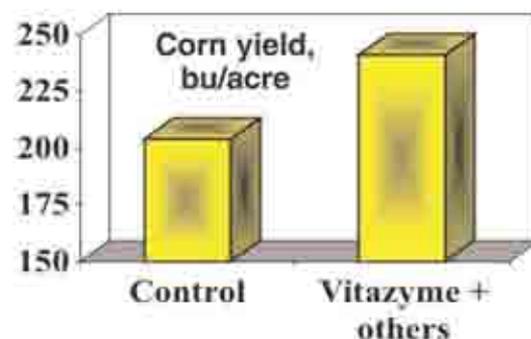
Weather results: a wet spring and late planting, few rains in July, and a very dry late July and August, followed by a 12-inch flooding rain in mid-October

Harvest date: November 10, 2008

Yield results: Eight -row swatches were combined and weighed for both treatments. Due to an extreme rain event in mid-October, water rose so high in the field that the ears were covered for two to three days. In spite of that problem the corn grade was not affected, although untreated corn from neighbors' fields suffered water damage to their grain.

Treatment	Yield bu/acre	Change bu/acre
1. Vitazyme on seeds	204	—
2. Vitazyme on seeds + foliar with Tricert K + Mn	241	37 (+18%)

**Increase in corn yield: 18%**



**Conclusions:** In this Indiana in-field corn trial, Vitazyme plus Tricert K and manganese boosted the yield by 18% (37 bu/acre), though it was not possible to separate the individual effects of these products. Vitazyme works in synergism with native soil and applied nutrients to boost utilization, so this great yield increase is not uncommon. **Of great interest is the fact that submersion of the ears before harvest for up to three days did not reduce the grain quality, indicating that cell wall integrity and anti-pathogen properties of the grain were likely enhanced by Vitazyme throughout the field.**

## Vital Earth Resources

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# 2008 Crop Results

## Vitazyme on Corn

Researcher/Farmer: Gary Burkey

Variety: Flexseed 303 Triple-Stack

Row spacing: 30 inches

Planting date: May 18, 2008

Soil test: pH, 7.2; cation exchange capacity, 22.53 meq/100g; organic matter, 6.0%; base saturations, Ca = 70.8%, Mg = 20.5%, K = 4.2%, Na = 0.3%, others = 4.2%, H = 0%; estimated N release, 105 lb/acre; S, 10 ppm; P<sub>2</sub>O<sub>5</sub>, 468 lb/acre; Ca, 6,376 lb/acre; Mg, 1,110 lb/acre; K, 739 lb/acre; Na, 31 lb/acre; B, 0.9 ppm; Fe, 277 ppm; Mn, 29 ppm; Cu, 0.4 ppm; Zn, 6.6 ppm

Experimental design: A field was treated entirely with Vitazyme on the seeds at planting, and a portion of the field was foliar treated to determine the effect of this later application on crop yield.

### 1. Vitazyme on the seeds

Location: Coats, Indiana

Soil type: mucky sand

Population: 31,000 seeds/acre

Soil test: pH, 7.2; cation exchange capacity, 22.53 meq/100g; organic matter, 6.0%; base saturations, Ca = 70.8%, Mg = 20.5%, K = 4.2%, Na = 0.3%, others = 4.2%, H = 0%; estimated N release, 105 lb/acre; S, 10 ppm; P<sub>2</sub>O<sub>5</sub>, 468 lb/acre; Ca, 6,376 lb/acre; Mg, 1,110 lb/acre; K, 739 lb/acre; Na, 31 lb/acre; B, 0.9 ppm; Fe, 277 ppm; Mn, 29 ppm; Cu, 0.4 ppm; Zn, 6.6 ppm

### 2. Vitazyme on the seeds + leaves

Fertilization: Before planting: 150 lb/acre potassium chloride (0-0-60% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O); 100 lb/acre diammonium phosphate (18-46-0% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O). At planting: 4 gallons/acre 3-18-18% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O on the seeds at planting. Sidedressed on June 18, at 5-foot plant height: 40 gallons/acre 28% N.

Vitazyme application: (1) 13 oz/acre on the seeds at planting, with 3-18-18% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O over all areas; (2) 13 oz/acre foliar over one portion of the field, on June 18

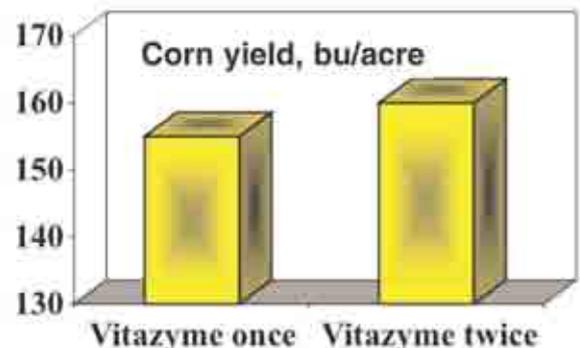
Weather results: a wet spring and late planting, few rains in July, and very dry in late July and August, with a flooding rain (12 inches) in mid-October

Harvest date: December 12, 2008

Yield results: Eight-row swaths were combined and weighed for both treatments.

Treatment	Yield bu/acre	Change bu/acre
1. Vitazyme on seeds	155	—
2. Vitazyme on seeds + leaves	160	5 (+3%)

Conclusions: Vitazyme applied foliar in this northern Indiana corn trial resulted in a substantial 5 bu/acre increase in yield above the treatment receiving only a seed treatment.



## Vital Earth Resources

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# 2008 Crop Results

## Vitazyme on Corn A Greenhouse Study

**Researcher:** Paul W. Syltie, Ph.D.  
Texas

**Location:** Vital Earth Resources Research Greenhouse, Gladewater,  
**Variety:** yellow dent

**Planting date:** January 31, 2008

**Soil type:** silt loam

**Pot size:** 1 gallon

**Planting rate:** 10 seeds/pot, thinned to three plants

**Watering:** on-demand

**Temperature:** 55 to 85°F

**Planting depth:** 0.5 inch

**Experimental design:** A replicated greenhouse pot study was designed to evaluate the effect of various rates of Vitazyme on the growth of corn. six replicates were included with six treatments, and the data were analyzed using Analysis of Variance with CoHort software.

1. Control

4. Vitazyme at 26.0 oz/acre

2. Vitazyme at 7.5 oz/acre

5. Vitazyme at 39.0 oz/acre

3. Vitazyme at 13.0 oz/acre

6. Vitazyme at 52.0 oz/acre

**Vitazyme applications:** The 13.0 oz/acre application was made immediately after planting to the soil surface of the pot, using 100 ml of a 0.0016% solution. Other treatments were multiples of this rate.

**Harvest date:** On March 5, 35 days after planting, the soil was washed from the roots of the plants, and measurements were made of the height of each plant. The plants were then placed in a drying oven at about 50°C for 48 hours.

**Plant height results:**

Treatment	Plant height	Height change*
	cm	cm
5 (Vitazyme, 3x)	85.3 a	5.5 (+7%)
3 (Vitazyme, 1x)	84.6 a	4.8 (+6%)
4 (Vitazyme, 2x)	83.8 a	4.0 (+5%)
2 (Vitazyme, 0.5x)	83.4 a	3.6 (+5%)
6 (Vitazyme, 4x)	80.0 b	0.2 (+0%)
1 (Control)	79.8 b	—
<b>Statistical analysis</b>		
Replicate P	0.0245	
Treatment P	0.0040	
Model P	0.0029	
Coefficient of variation	3.24%	
LSD <sub>0.10</sub>	2.6 cm	

\*Compared to the untreated control, Treatment 1.

The highest (4 times normal) rate, as well as the untreated control, gave significantly shorter plants than all of the other Vitazyme treatments. There was no statistical difference among the 0.5 to 3 times normal treatments, but the greatest heights were for the 3 times normal and normal treatments.

### Increase in plant height

3x Vitazyme ..... 7%

1x Vitazyme ..... 6%

2x Vitazyme ..... 5%

0.5x Vitazyme ..... 5%

Dry weight results:

Treatment	Dry weight	Dry weight change*
	cm	cm
2 (Vitazyme, 0.5x)	9.30 a	1.11 (+14%)
4 Vitazyme, 2x)	9.30 a	1.11 (+14%)
6 (Vitazyme, 4x)	9.22 a	1.03 (+13%)
5 (Vitazyme, 3x)	9.01 a	0.82 (+10%)
3 (Vitazyme, 1x)	9.00 a	0.81 (+10%)
1 (Control)	8.19 b	—

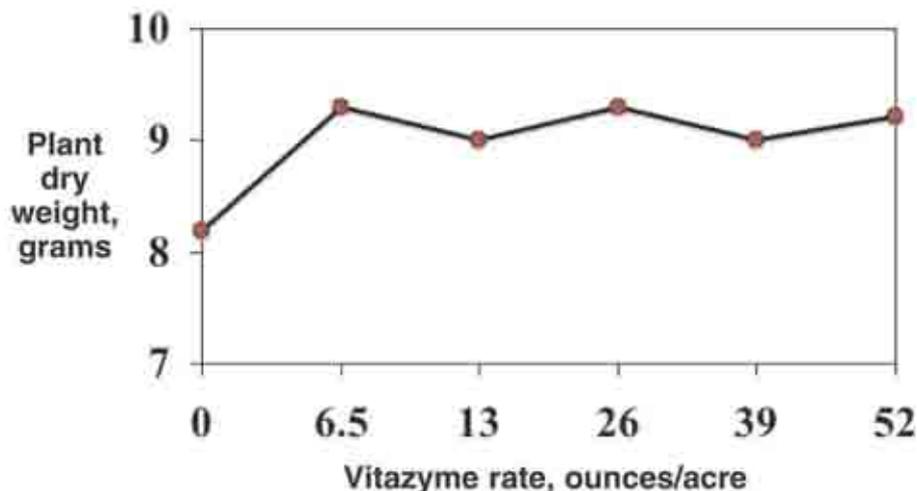
  

Statistical analysis	
Replicate P	0.0092
Treatment P	0.0192
Model P	0.0043
Coefficient of variation	6.23%
LSD <sub>0.10</sub>	0.55 gram

\*Compared to the untreated control, Treatment 1.

All of the Vitazyme applications gave increases in dry plant weight of from 10 to 14%, the highest increases being with the 0.5x, 2x, and 4x rates. None of these differences were statistically significant, and all exceeded the control.

Increase in plant dry weight	
0.5x Vitazyme .....	14%
2x Vitazyme .....	14%
4x Vitazyme .....	13%
3x Vitazyme .....	10%
1x Vitazyme .....	10%



Conclusions: In this greenhouse study to evaluate the effects of progressively higher rates of Vitazyme to stimulate corn height and dry weight accumulation, the product proved to significantly increase plant height by 5 to 7% at all but the 4x (52 oz/acre) rate, whereas dry weight significantly increased from 10 to 14% for all of the Vitazyme rates. These data prove that more than just the standard 13 oz/acre rate can be effective in stimulating crop growth, but higher rates do not produce a linear yield or growth increase.

## Vital Earth Resources

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# 2007 Crop Results

## Vitazyme on Corn

Researchers: Fred Vaughn and Greg Wilson

Organization: Vaughn Agricultural Research Services

Location: Branchton, Ontario, Canada

BBCH Scale: BCOR

Variety: Pioneer 38P03

Planting rate: 76,000 seeds/ha

Planting depth: 5cm

Row spacing: 76 cm

Planting Date: May 14, 2007

Seedbed conditions: dry, fine

Soil temperature at planting: 13.3C  
meq/100 g CEC, good fertility

Soil: silt loam (31.9% sand, 53.7% silt, 14.4% clay), 6.2 pH, 14.2

Field preparation: cultivation twice

Previous crop: 2004, winter wheat (with Cobutox); 2005, potatoes (with Dual + Sencor); 2006, corn (Dual + Marksman)

Experimental design: A uniform site was divided into plots that were 3x6 meters (six rows), using four treatments with six replications in a randomized complete block design. The objective of the study was to determine Vitazyme's ability to improve soybean yield with two applications. The treatments were as follows:

Treatment	At planting	At 8 leaves	Nitrogen
	----- liters/ha -----		Kg/ha
1. No Vitazyme	0	0	60
2. No Vitazyme	0	0	60
3. Vitazyme	1	1	120
4. Vitazyme	1	1	120

Fertilization: All areas received 200 kg/ha of dry 6-24-24% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O before planting. 100 liters/ha of liquid 6-24-6% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O was applied in the seed furrow at planting (May 14). A 28% nitrogen solution was applied to the plots on June 8 so that the appropriate plots would receive either 60 or 120 kg/ha of nitrogen.

Vitazyme application: To Treatments 3 and 4, 1 liter/ha was applied to the seeds at planting (May 14), as a spray on the seeds just behind the disc openers, and 1 liter/ha was applied to the leaves and soil at the eight-leaf stage (June 20).

Crop emergence date: May 18, four days after planting

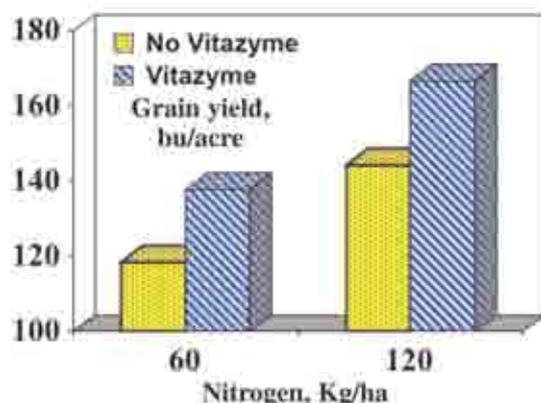
Weed control: unknown

Harvest date: October 12, 2007. An area of 1.52 x 6.00 meters (the two center rows) was harvested for each plot.

Yield results: There were no significant differences in grain moisture content and test weight, nor were any differences discovered in stalk lodging. Thus, those data are not included below.

## Grain Yield

Treatment	Grain yield bu/acre	Change* bu/acre
1. No Vitazyme, 60 N	118.6 c	—
2. No Vitazyme, 120 N	144.3 b	25.7 (+22%)
3. Vitazyme, 60 N	137.7 b	19.1 (+16%)
4. Vitazyme, 120 N	166.8 a	48.2 (+41%)
LSD	16.3	
CV	11.37	
Bartlett's X2	3	
P (Bartlett's X2)	0.392	
Replicate F	4.315	
Replicate Prob (F)	0.0124	
Treatment F	9.158	
Treatment Prob (F)	0.0011	



### Vitazyme Effect at 60 kg/ha N

Treatment	Yield bu/acre	Change bu/acre
No Vitazyme	118.6 b	—
Vitazyme	137.7 a	19.1 (+16%)

**Yield increase with Vitazyme at  
60 kg/ha N: 16%**

### Vitazyme Effect at 120 kg/ha N

Treatment	Yield bu/acre	Change bu/acre
No Vitazyme	144.3 b	—
Vitazyme	166.8 a	22.5 (+16%)

**Yield increase with Vitazyme at  
120 kg/ha N: 16%**

At both nitrogen levels, Vitazyme significantly increased grain yield at  $P=0.10$ . This increase was 16% above the control at both nitrogen levels. What is especially interesting to note is that the 60 kg/ha N yield (137.7 bu/acre) with Vitazyme was statistically equal to the 120 kg/ha N yield (144.3 bu/acre) without Vitazyme. This reveals a benefit of Vitazyme to improve the utilization of fertilizer nitrogen.

**Income results:** At \$4.00/bu, the increased incomes for the grain produced in this study are as follows:

At 60 kg/ha N. No Vitazyme: 118.6 bu/acre x \$4.00/bu = \$474.40  
 Vitazyme: 137.7 bu/acre x \$4.00/bu = \$550.80  
**Increase with Vitazyme: \$74.40/acre**

At 120 kg/ha N. No Vitazyme: 144.3 bu/acre x \$4.00/bu = \$577.20  
 Vitazyme: 166.8 bu/acre x \$4.00/bu = 667.20  
**Increase with Vitazyme: \$90.00/acre**

**Conclusions:** In this southern Ontario, Canada, study of Vitazyme on corn at two nitrogen levels, Vitazyme was shown to significantly increase grain yield, by 16% above the respective control (no Vitazyme) levels. Moreover, the yield of the Vitazyme + 60 kg/ha N rate was statistically equal to the 120 kg/ha N rate without Vitazyme, demonstrating the ability of the product to improve the utilization of nitrogen. Two applications of 1 l/ha, at planting and again at the eight-leaf stage, brought about this yield improvement. The yield increases gave significant income increases: \$74.40/acre at 60 kg/ha nitrogen, and \$90.00/acre at 120 kg/ha nitrogen.

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# 2006 Crop Results

## Vitazyme on Corn

### Ministry of Sugar, Cuban Ministry of Agriculture

Researchers: Wilberto G. Marrero and Jorge G. Acosta

Location: Juan Abrahantes Farm, Madruga, Havana Province, Cuba

Variety: unknown

Soil type: red ferralitic of low fertility

Planting rate: unknown

Row spacing: unknown

Planting date: July 23, 2006

Watering: rain-fed

Experimental design: An area of 1.5 acres in a production corn field was treated with Vitazyme twice, each time at 1 liter/ha, to determine the effect of the product on corn yield.

#### 1. Control

#### 2. Vitazyme

Fertilization: unknown

Vitazyme application: 1 liter/ha on the leaves and soil on August 7, 15 days after planting, and again 39 days later on September 15

Harvest date: October 14, 2006, 83 days after planting

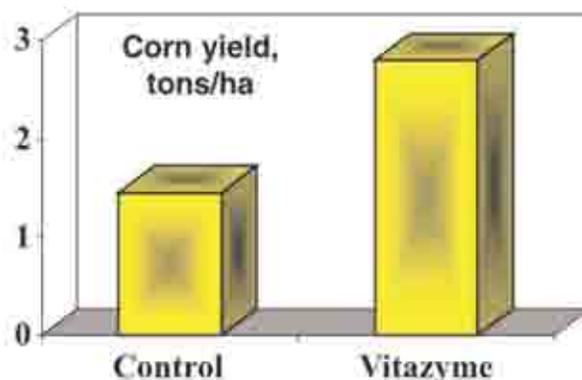
Growth results:

Parameter	Control	Vitazyme
Rows of kernels	Averaging <12 rows/ear	Averaging >12 rows/each
Ear size	Average size	Larger than average
Stalk diameter	Average diameter	Greater than average diameter
Plant vigor	Average vigor	More vigorous
Plant height	2.00 meters average	1.55 meters average
Root development	Moderate	Extensive

Yield results:

Treatment	Yield tons/ha	Increase tons/ha
Control	1.45	—
Vitazyme	2.80	1.35 (+93%)
Historical yield	0.70	

**Increase in corn yield: 93%**



Conclusions: This Cuban corn study showed that Vitazyme greatly increased corn yield (by 93%) with two applications at 1 liter/ha each time, separated by 39 days. **This yield was four times the normal historical yield experienced in that area under the management system used.** The treated corn plants expressed superior vigor and growth throughout the growth cycle.

## Vital Earth Resources

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# 2006 Crop Results

## Vitazyme on Corn

Researchers: Eng. Wilberto Gonzalez, and Eng. Jorge Gonzalez, Camilo Cienfuegos, Agricultural Enterprise

Location: Armistad Farm of Camilo Cienfuegos Agricultural Enterprise, Havana Province, Cuba

Variety: unknown

Soil type: red ferralitic

Planting date: late 2005 to early 2006

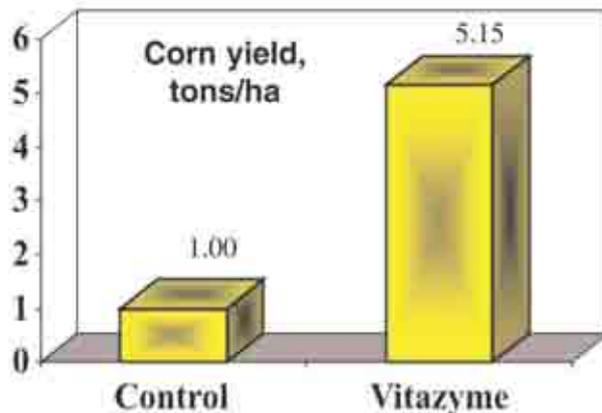
Experimental design: A commercial production trial involved a split field area of 1.0 ha treated and 1.0 ha untreated with Vitazyme at Armistad Farm.

### 1. Control

### 2. Vitazyme

Fertilization: unknown

Vitazyme applications: 1.0 liter/ha on the leaves twice, separated by 30 days



**Increase in corn yield: 415%**

Conclusions: This commercial corn trial in Cuba revealed the remarkable ability of Vitazyme to increase corn production, with a very large 415% yield increase.

## Vital Earth Resources

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# 2006 Crop Results

## Vitazyme on Corn

### USDA/National Soil Tilth Laboratory

Researcher: Jerry Hatfield, Ph.D.

Variety: Pioneer 35P17

Planting date: April 18, 2006

Tillage: chisel plowing on November 26, 2005, and field cultivation on April 4 and April 18, 2006

Experimental design: A field area was treated with Vitazyme to determine if corn planted in a double-row fashion would respond to the product under conventional tillage. The trial was non-replicated.

#### 1. Control

Fertilization: 50 lb/acre of N as 32% UAN on October 18, 2005; 30-80-120 lb/acre of N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O dry spread on November 23, 2005; 300 lb/acre of SuperCal 98 pelleted lime on February 8, 2006; 300 lb/acre of SuperCal SO<sub>4</sub> pelleted gypsum on February 9, 2006; sidedressed 180 lb/acre of N as 32% UAN on May 29, 2006

Vitazyme application: 13 oz/acre foliar, hand applied, on June 5, 2006; 13 oz/acre foliar, hand applied, on June 27, 2006

Herbicide application: 3 qt/acre of Lumax, pre-emergent, on April 24, 2006

Harvest date: October 19, 2006

Yield results:

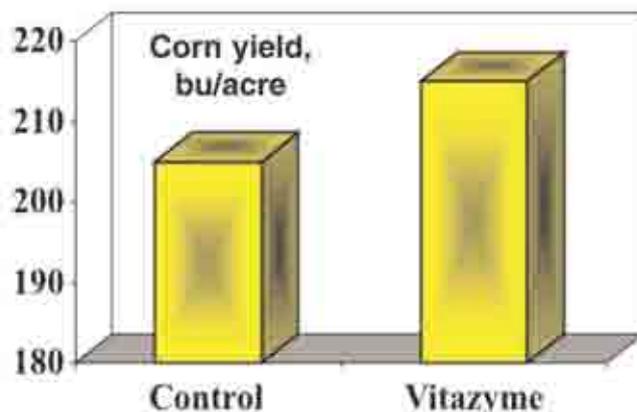
Treatment	Yield tons/ha	Increase tons/ha
Control	205	—
Vitazyme	215	10 (+5%)

**Yield increase with Vitazyme:  
5%**

Location: Ames, Iowa

Planting rate: 36,000 seeds/acre in double rows

#### 2. Vitazyme



Conclusions: On this non-replicated corn-yield study in central Iowa, using a double row system, two foliar Vitazyme applications utilizing 13 oz/acre each time increased the grain yield by 10 bu/acre (5%). Had a seed application been made it is likely that the response would have been greater.

## Vital Earth Resources

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# 2006 Crop Results

## Vitazyme on Corn (Organic)

Research location: Ontario County, New York

Planting date: May 24

Row spacing: 30 inches

Experimental design: A field of organically grown corn was divided into Vitazyme treated and untreated areas in an effort to determine the product's effects on the yield of high-moisture corn. This corn was placed in an air-tight silo to be ground and used for cattle feed later.

Variety: Blue River 42A32 (96-day)

Soil type: silty clay loam

Seeding rate: 28,400/acre

### 1. Control

### 2. Vitazyme

Fertilization: Liquid cow manure, 8,500 gal/acre in November of 2005, and 7,300 gal/acre on May 8, 2006; 300 lb/acre of a 5-5-5% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O dry Fertrell organic mix, in a 2 x 2-inch placement

Vitazyme treatment: 13 oz/acre on the seed in-furrow at planting

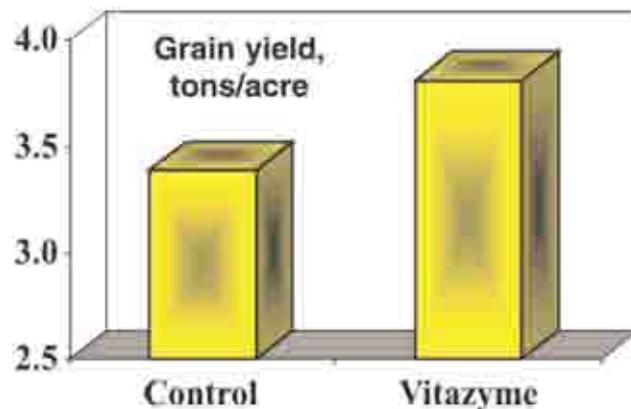
Weather for 2006: adequate moisture until August, then excessive afterwards

Harvest date: October 13

Yield results: Each parcel was harvested for a certain area, and the grain was dumped into a bin where a measurement of volume was taken. From the difference of these values the value of each treatment was calculated based upon the average field yield.

Treatment	Grain yield tons/acre	Yield increase tons/acre
Control	3.39	—
Vitazyme	3.81	0.42 (+12%)

**Grain increase with Vitazyme:  
12%**



Income results: The value of high moisture corn (25%) is about \$175/ton.

Value of control corn ..... \$593.25/acre

Value of Vitazyme corn ..... \$666.75/acre

Income increase with Vitazyme ..... \$73.50/acre

Conclusions: In this New York split-field study on organically grown corn, only one 13 oz/acre treatment of Vitazyme, on the seeds, produced a marked 12% increase in the yield of high moisture corn. This yield increase translated into an additional \$73.50/acre income, or about an \$18 return for each dollar invested in Vitazyme.

## Vital Earth Resources

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# 2005 Crop Results

## Vitazyme on Corn

### North Carolina State University

**Researcher:** Ron Heiniger, Ph.D.

**Variety:** De Kalb Dk 69-71 RR/YG

**Soil type:** Roanoke silt loam

**Row width:** 30 inches

**Experimental design:** A split-plot randomized complete block design (four replicates) was placed on a uniform soil area with the main plots containing the two seeding rates. Plots were 10 x 40 feet. Subplots contained starter fertilizer, starter fertilizer + Vitazyme, Vitazyme only, and a control. Evaluations were made on stalk diameter, root parameters, and yield to discover the effects of all variables on these parameters.

**Location:** Hertford, North Carolina

**Planting date:** April 21, 2005

**Previous crop:** soybeans

**Population:** 27,000 and 38,000 seeds/acre

#### Main Plots

1. 27,000 seeds/acre
2. 38,000 seeds/acre

#### Subplots

1. Control
2. Vitazyme
3. Starter
4. Vitazyme + Starter

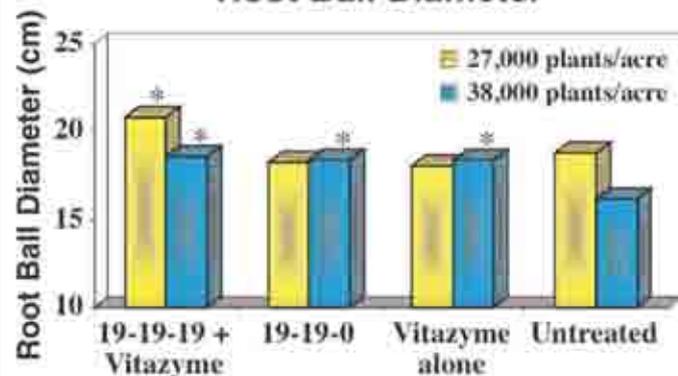
**Fertilization:** A 19-19-0% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O fertilizer was applied to the subplots 3 and 4 at a 10 gal/acre rate in a 2 x 2 inch band below and beside the seeds at planting. On June 7, 60 gal/acre of 30% UAN (urea ammonium nitrate) was applied.

**Vitazyme application:** 13 oz/acre on the seeds at planting for subplots 2 and 4

**Weed control:** excellent control with Bicep, Roundup, and atrazine herbicides

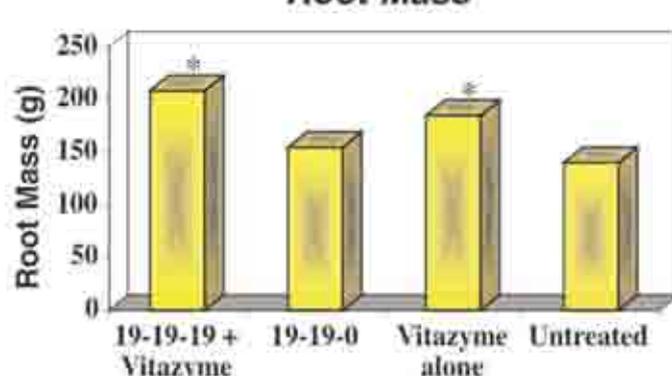
**Root and stalk results:** In early July five plants in consecutive order in rows of each treatment were dug, and the soil was washed from the root balls. Roots were pruned and dried, and the stalk diameter at the first internode below each ear was measured. Root ball depth and diameter were also measured.

#### Root Ball Diameter

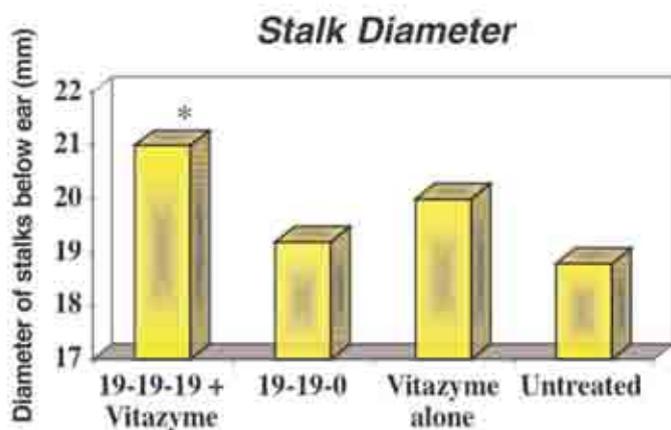


\*Significantly greater than the control. LSD<sub>0.05</sub> = 1.32 cm. (Comparisons are made within the same plant population.)

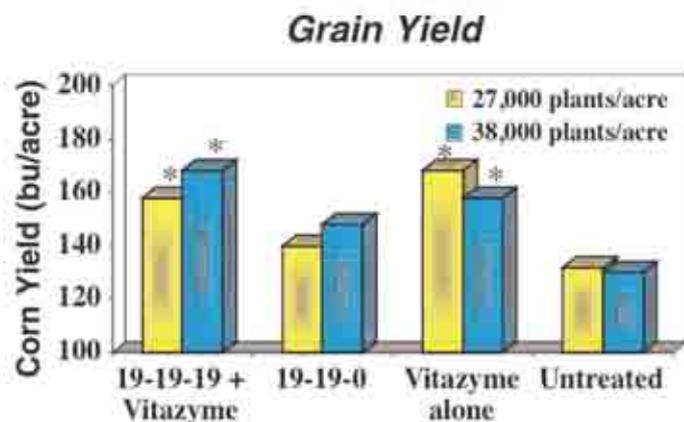
#### Root Mass



\*Significantly greater than the control. LSD<sub>0.05</sub> = 43.5 g



\*Significantly greater than the control.  $LSD_{0.05} = 0.93$  mm.



\*Significantly greater than the control.  $LSD_{0.05} = 22.9$  bu/acre (Comparisons are made within the same plant population.)

**Conclusions (by the researcher):** Significant treatment effects or interactions involving Vitazyme were found for the diameter of the root ball, root mass, stalk diameter and grain yield. In the case of the diameter of the root ball there was a significant plant population by treatment interaction. At the lower plant population of 28 000 plants/acre the combination of 19-19-0 and Vitazyme significantly increased the diameter of the root ball compared to either product used alone or when compared to the untreated check. Neither the 19-19-0 nor Vitazyme when used alone increased the diameter of the root ball compared to the untreated check. In contrast, at the higher plant population, Vitazyme, 19-19-0, or the combination of the two significantly increased the diameter of the root ball compared to the untreated check. Although none of these three treatments were significantly different from each other the combination of Vitazyme and 19-19-0 again tended to have the higher yield. There were no significant interactions for root mass. However, there was a significant treatment effect. Vitazyme when used alone or in combination with 19-19-0 resulted in greater root mass compared to the untreated check. Again, the combination of Vitazyme and 19-19-0 produced the greatest root mass when compared with either treatment used alone. There was also a treatment effect on stalk diameter. The combination of Vitazyme and 19-19-0 increased stalk diameter at the first internode below the ear when compared with the untreated check or with a treatment of only 19-19-0. There was not a significant difference in stalk diameter between a treatment with only Vitazyme and the combination of Vitazyme and 19-19-0. However, the combination did have the largest stalk diameter.

For grain yield there was a significant plant population and treatment interaction. At the lower plant population, Vitazyme alone significantly increased yield compared to either the starter fertilizer or the untreated check; while the combination of starter and Vitazyme resulted in a yield similar to that obtained by Vitazyme alone. In comparison, at the higher plant population, the starter treatment, Vitazyme, or the combination of the two resulted in statistically similar yields but only the Vitazyme or Vitazyme-starter combination had significantly higher yields than the untreated check.

In summary, Vitazyme or Vitazyme in combination with 19-19-0 increased root ball diameter, root mass, stalk diameter, and grain yield compared to an untreated check. While plant disease ratings were not taken in this study, it is unlikely that the Vitazyme effect was related to better disease resistance. It appears that Vitazyme applied to the seeds at planting improves early root development resulting in a larger root mass, greater stalk diameter, and increased yield.

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# 2004 Crop Results

## Vitazyme on Corn North Carolina State University

Researcher: Ron Heiniger, Ph.D

Location: Clarkton, North Carolina

Variety: DKC69-71 RRH62

Tillage: conventional

Population: 33,000 seeds/acre

Row width: 30 inches

Planting date: April 24, 2004

Previous crop: soybeans

Experimental design: A plot area of 18,000 ft<sup>2</sup> (180 x 100 ft) was divided into individual plots of 400 ft<sup>2</sup> (40 x 10 ft), with four replicates. The objective of the study was to evaluate the potential of Vitazyme bios-timulant to improve grain yield at five nitrogen rates.

### Control

1. No N
2. 56 lb/acre
3. 112 lb/acre N
4. 224 lb/acre N
5. 280 lb/acre N

### Vitazyme

6. No N
7. 56 lb/acre
8. 112 lb/acre N
9. 224 lb/acre N
10. 280 lb/acre N

Fertilization: 10 gal/acre of 19-19-0 %N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O in a 2x2 band on April 24 after broadcasting 30% UAN and a 10-34-0 fertilizer on April 19

Herbicide application: Lariat (3 qt/acre) on April 19, broadcast pre-plant

Insecticide application: Counter 20CR (7 lb/acre) on April 21, T-banded on April 21

Vitazyme application: 13 oz/acre on the seeds at planting, and 13 oz/acre broadcast at knee height

Harvest date: September 23, 2004

### Yield Results:

Treatment	N-level	Yield	Change <sup>1</sup>	NCLB rating <sup>2</sup>	Change <sup>1</sup>	GLS rating <sup>3</sup>	Change <sup>1</sup>
	lb/acre	bu/acre	bu/acre				
Control	0	153.9	—	9.25	—	8.88	—
	56	170.2	—	9.38	—	8.88	—
	112	145.9	—	9.63	—	9.00	—
	224	159.3	—	9.75	—	9.38	—
	280	139.7	—	10.00	—	9.50	—
	Average		153.8	—	9.60	—	9.13
Vitazyme	0	181.6	27.7* (+18%)	9.38	0.13 (+1%)	8.88	0 (0%)
	56	162.6	(-) 7.6 (-4%)	9.75	0.37* (+4%)	9.25	0.37* (+4%)
	112	166.8	20.9* (+14%)	9.88	0.25* (+3%)	9.50	0.50* (+6%)
	224	178.6	19.3* (+12%)	9.88	0.13 (+1%)	9.63	0.25* (+3%)
	280	151.2	11.5 (+8%)	10.00	0 (0%)	9.50	0 (0%)
	Average		168.2	14.4* (+9%)	9.78	0.18 (+2%)	9.35
LSD <sub>0.05</sub>		14.3		0.19		0.15	

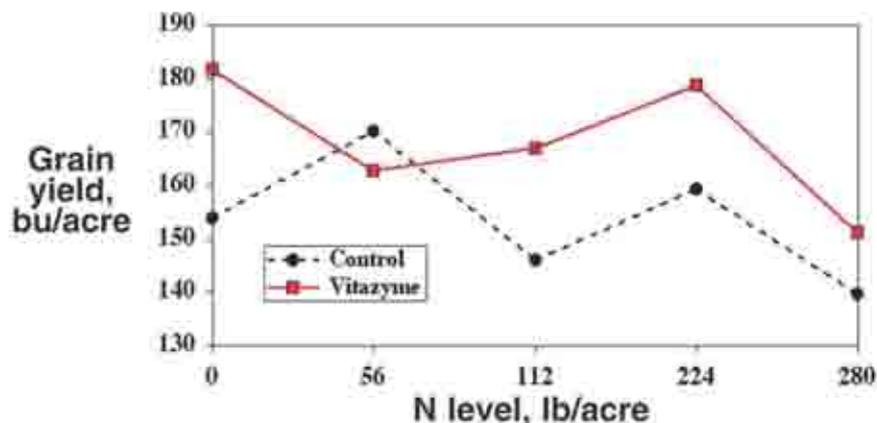
<sup>1</sup> Differences are compared with the same N level for control and Vitazyme

<sup>2</sup>NCLB = Northern Corn Leaf Blight: 1 = leaves covered with lesions, 10 = no disease.

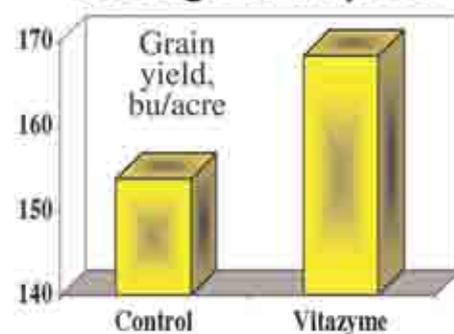
<sup>3</sup>GLS = Gray Leaf Spot: 1 = leaves covered with lesions, 10 = no disease.

\*Significant difference vs. the control at P=0.05.

## Corn Grain Yield



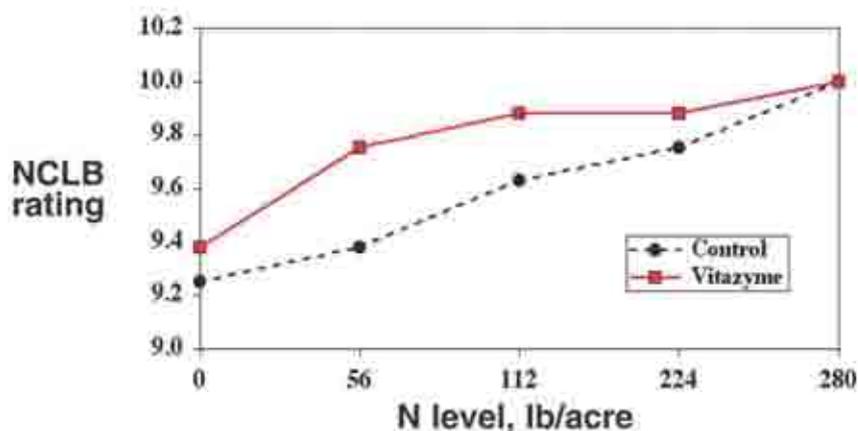
### Average of all plots



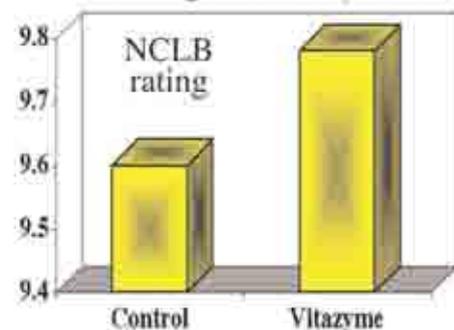
Vitazyme significantly boosted grain yield across all N levels, by 14.4 bu/acre (9%), and especially at the 0 N level (+18%), the 112 lb/acre N level (+14%), and the 224 lb/acre N level (+12%). Residual N levels and seasonal N release were apparently quite high, since the highest yield was with no added N plus Vitazyme (181.6 bu/acre), and yields in general tapered off as N levels increased, the lowest yields being at the 280 lb/acre N rate for both treatments. The yield response thus exhibited some N excess at the higher N rates.

### Leaf pathogen results:

## Northern Corn Leaf Blight Rating

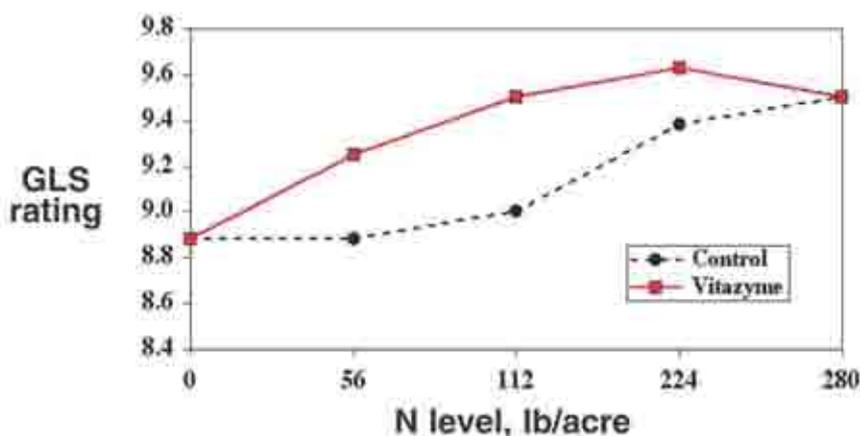


### Average of all plots

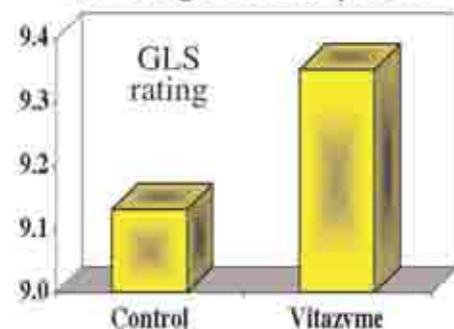


Vitazyme reduced the Northern Corn Leaf Blight rating significantly across nearly all plots, and did so at the 56 and 112 lb/acre N rates. At all N rates, Vitazyme treated corn reduced NCLB incidence compared to the control.

## Grey Leaf Spot Rating



### Average of all plots



At all levels of N except at 0 and 280 lb/acre, Vitazyme reduced the incidence of grey leaf spot. This reduction was significant at 56, 112, and 224 lb/acre of N, and also for the overall average of all plots.

*Conclusions:* In this North Carolina State University replicated corn study, Vitazyme increased corn grain yields at all N levels except at 56 lb/acre N. the average overall yield was increased by Vitazyme by 9%, which was significant at  $P=0.05$ . Resistance to both Northern Corn Leaf Blight and Grey leaf Spot were also significantly ( $P=0.05$ ) increased over several N levels, and was significantly greater for Vitazyme over all N levels for Grey Leaf Spot, and nearly so for NCLB. This product shows excellent promise in promoting higher yields with greater disease resistance under North Carolina conditions.

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# 2004 Crop Results

## Vitazyme on Corn

Farmer: James Glass

Location: Austin, Texas

Variety: Golden Acre 2850RR

Soil type: silty clay loam

Row spacing: 30 inches

Population: 24,000 plants/acre

Planting date: March 28, 2204

Experimental design: A 110-acre field was divided into two parts, 30 acres treated with Vitazyme and the rest of the field left untreated. All other treatments were the same across the entire field.

### 1. Control

### 2. Vitazyme

Fertilization: anhydrous ammonia and a mixed N-P-K fertilizer

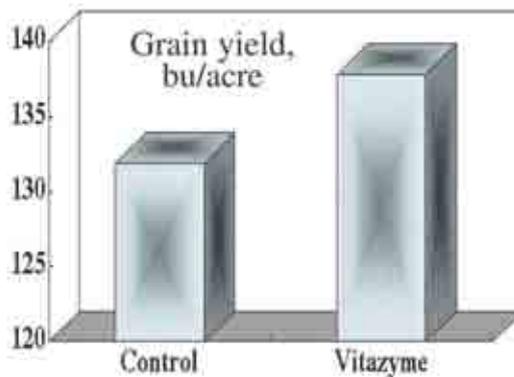
Vitazyme application: 13 oz/acre added to the seeds with a liquid starter fertilizer at planting

Growth observations: An examination of corn plants from each treatment at midseason revealed a noticeable size advantage for the treated plants.

Yield results: On August 27, 2004, one-acre areas of each treatment located close to each other were measured and blocked off. The one-acre areas were harvested and unloaded into a truck, and weighed individually.

Treatment	Grain weight		Change
	lb/acre	bu/acre	
Control	7,385	131.9	—
Vitazyme	7,715	137.8	5.9 (+4.5%)

**Increase in grain yield: 4.5%**



Conclusions: This south Texas corn study revealed that Vitazyme applied in the seed row at planting increased the yield by 4.5% (5.9 bu/acre). There was little change in grain quality due to Vitazyme application. If a \$3.00/bushel corn price is used, this yield increase is profitable \$17.70/acre.

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# 2004 Crop Results

## Vitazyme on Corn North Carolina State University

Researcher: Ron Heiniger, Ph.D

Location: Elizabeth City, North Carolina

Variety: DKC69-71 RRH62

Tillage: conventional

Population: 33,000 seeds/acre

Row width: 30 inches

Planting date: April 21, 2004

Previous crop: soybeans

Experimental design: A plot area of 15,400 ft<sup>2</sup> (220 x 70 ft) was divided into individual plots of 400 ft<sup>2</sup> (40 x 10 ft), with four replicates. The objective of the study was to evaluate the potential of Vitazyme bios-timulant to improve grain yield and reduce disease incidence at five nitrogen rates.

### Control

1. No N
2. 56 lb/acre
3. 112 lb/acre N
4. 224 lb/acre N
5. 280 lb/acre N

### Vitazyme

6. No N
7. 56 lb/acre
8. 112 lb/acre N
9. 224 lb/acre N
10. 280 lb/acre N

Fertilization: 10 gal/acre of 19-19-0 %N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O in a 2x2 band on April 21 after broadcasting 30% UAN and a 10-34-0 fertilizer before planting

Herbicide application: Atrazine (2 qt/acre) with Banvel (0.5 pt/acre) plus Accent on May 27

Insecticide application: Counter 20CR (15 lb/acre), T-banded on April 21

Vitazyme application: 13 oz/acre on the seeds at planting, and 13 oz/acre broadcast at knee height

Harvest date: unknown

### Yield Results:

Treatment	N-level	Yield	Change <sup>1</sup>	NCLB rating <sup>2</sup>	Change <sup>1</sup>	GLS rating <sup>3</sup>	Change <sup>1</sup>
	lb/acre	bu/acre	bu/acre				
Control	0	54.0	—	3.25	—	6.13	—
	56	118.3	—	3.75	—	6.13	—
	112	157.8	—	3.88	—	6.38	—
	224	150.0	—	4.25	—	6.63	—
	280	139.9	—	4.13	—	6.75	—
	Average		124.0	—	3.85	—	6.40
Vitazyme	0	98.5	44.5* (+82%)	4.88	1.63* (+50%)	6.50	0.37 (+6%)
	56	138.4	20.4* (+17%)	5.13	1.38* (+37%)	6.88	0.75* (+12%)
	112	155.6	(-)2.2 (-1%)	5.13	1.25* (+32%)	7.25	0.87* (+14%)
	224	159.4	9.4 (+6%)	5.88	1.63* (+38%)	7.38	0.75* (+11%)
	280	161.5	21.6* (+15%)	5.75	1.62* (+39%)	7.88	1.13* (+17%)
	Average		142.7	18.7* (+15%)	5.35	1.50* (+39%)	7.18
LSD <sub>0.05</sub>		15.0		0.40		0.38	

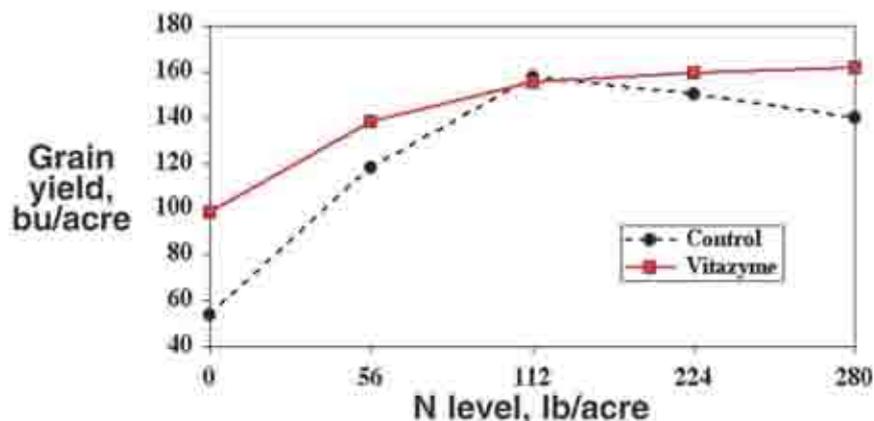
<sup>1</sup> Differences are compared with the same N level for control and Vitazyme

<sup>2</sup>NCLB = Northern Corn Leaf Blight: 1 = leaves covered with lesions, 10 = no disease.

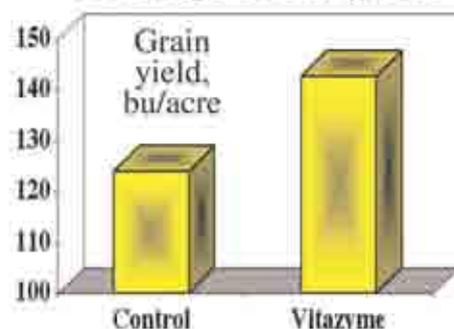
<sup>3</sup>GLS = Gray Leaf Spot: 1 = leaves covered with lesions, 10 = no disease.

\*Significant difference vs. the control at P=0.05.

## Corn Grain Yield

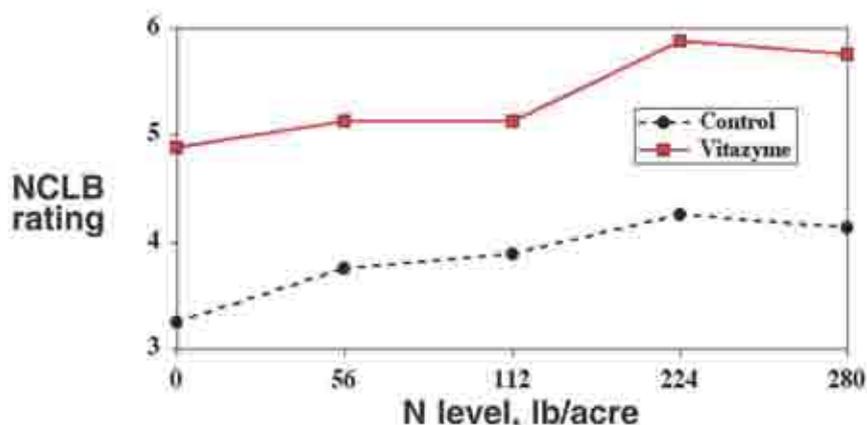


## Average of all plots

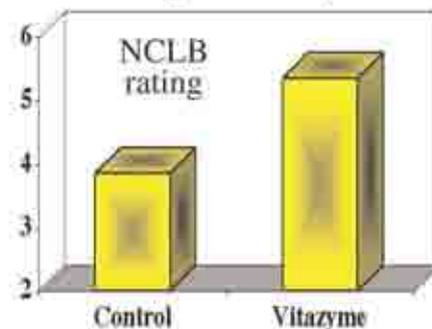


Vitazyme caused a substantial increase in yield over the untreated control at all N levels except at 112 lb/acre N; most of these yield differences were significant. The average yield difference was 18.7 bu/acre in favor of Vitazyme, a significant increase over the control of 15%.

## Northern Corn Leaf Blight Rating

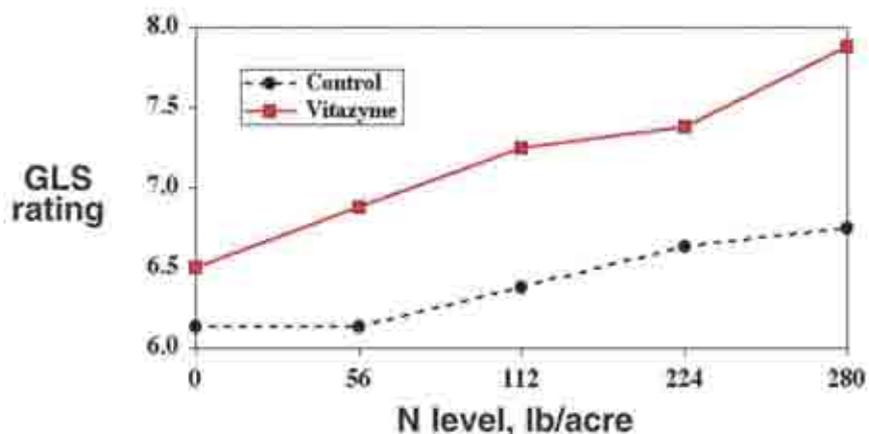


## Average of all plots

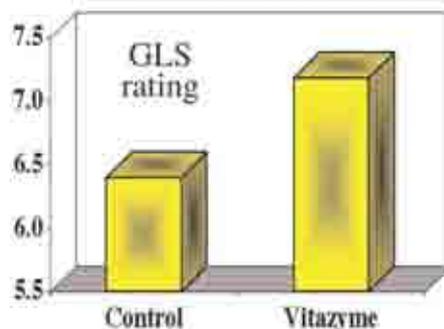


At all N levels the Vitazyme treatment produced significantly reduced NCLB infection than did the control. This led to an average 39% reduction in NCLB lesions over all treatments.

## Grey Leaf Spot Rating



## Average of all plots



As for Northern Corn Leaf Blight ratings, Grey Leaf Spot ratings were significantly better for Vitazyme at all N levels than for the control. This differences led to a significant average difference of 12% over all plots for each treatment.

*Conclusions:* This corn study in North Carolina revealed that Vitazyme increased grain yield significantly, by an average of 18.7 bu/acre (+15%) over all plots ... and especially at the 0 N level, where yield was improved by 44.5 bu/acre (+82%) above the control. Both Northern Corn leaf Blight and Grey Leaf Spot were also significantly reduced by Vitazyme at all N levels, the average reduction being 39% for NCLB and 12% for GLS. These data show that Vitazyme apparently improves plant immunity to common corn pathogens, and concurrently boosts the yield potential of the crop, especially when N is limiting. The optimum N application in this study was 112 lb/acre; corn yields increased only slightly with Vitazyme with higher N rates, although without Vitazyme the yields fell somewhat.

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# 2003 Crop Results

## Vitazyme on Corn (*Surfactant vs. None*)

**Researcher:** Paul W. Syltie, Ph.D.

**Location:** Vital Earth Resources Research Greenhouse, Gladewater, Texas

**Variety:** yellow dent

**Soil type:** Bowie very fine sandy loam

**Pot size:** 1 gallon

**Planting date:** December 30, 2002

**Experimental design:** A greenhouse study was established to discover the relative effectiveness of a foliar application on corn using either diluted product in the leaf whorl or diluted product in the whorl and on leaf surfaces using a surfactant. Five replicates were used for each treatment in a complete block design. Temperatures were maintained at 55° to 80°F during the study, with no artificial light.

1. Control
2. Vitazyme in the whorl, no surfactant
3. Vitazyme on the leaves, plus a surfactant

**Fertilization:** All plants received 0.88 g/pot at planting of a 13-13-13% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O pelleted fertilizer with 0.65% Mg, 6.0% S, 0.02% B, 0.0006% Co, 0.0006% Cu, 1.40% Fe, 0.06% Mn, 0.0006% Mo, and 0.06 % Zn. This fertilizer, giving 50 lb/acre of N, was applied to the soil surface.

**Vitazyme application:** On January 24, 2003, Vitazyme at 1% was sprayed from a small spray bottle into the leaf whorl of all plants in Treatment 2, being careful not to apply to the soil surface. Paper towels were used to prevent any spray from contacting the soil of the pots. Vitazyme was also sprayed the same day on the leaves and whorl of Treatment 3, with a 1% Vitazyme solution plus 5 tablespoons/gallon of Sunspray Ultra-Fine Oil, a fine agricultural oil containing 98.8% paraffinic oil.

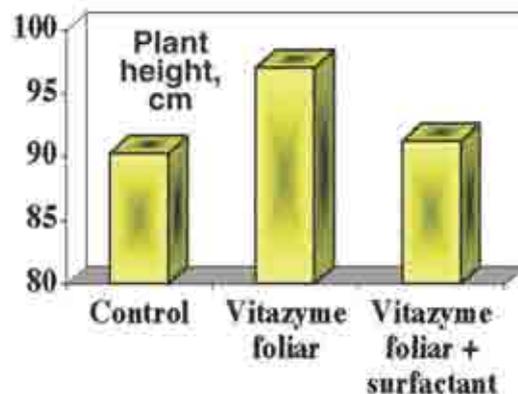
**Harvest date:** February 14, 2003, 47 days after planting

**Harvest results:** The corn plants were washed free of soil, the leaves were measured, and then all plants were dried at about 115°F for two days. They were then weighed to the nearest 0.01 gram.

### Plant Height

Treatment	Plant height*	Height change
	cm	cm
1. Control	90.3 b	—
2. Vitazyme on leaves, no surfactant	97.0 a	6.7 (+7%)
3. Vitazyme on leaves, with a surfactant	91.2 b	0.9 (+1%)

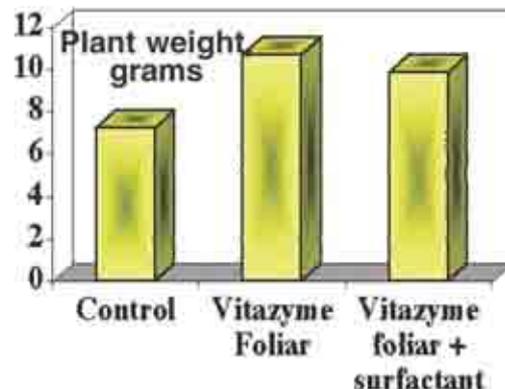
\*Means followed by the same letter are not significantly different at P=0.10 according to the Tukey-Kramer Test. LSD<sub>0.1</sub>=5.0 cm.



## Plant Dry Weight

Treatment	Dry weight*	Weight change
	grams	grams
1. Control	7.25 b	—
2. Vitazyme on leaves, no surfactant	10.71 a	3.46 (+48%)
3. Vitazyme on leaves, with a surfactant	9.88 a	2.63 (+36%)

\*Means followed by the same letter are not significantly different at  $P=0.10$  according to the Tukey-Kramer Test.  $LSD_{0.1}=1.58$  grams.



**Conclusions:** This experiment showed that corn responded almost equally well with Vitazyme applied to the leaves only, with or without a surfactant, in terms of dry weight gain during the growth period. Vitazyme in the leaf whorl only caused a highly significantly 48% weight gain versus the control, while the surfactant plus Vitazyme increased dry weight by 36%. Both treatments received the product in the leaf whorl, but Treatment 3 — with the surfactant — also had product clinging to other leaf surfaces. Both Treatments 2 and 3 had no Vitazyme applied to the soil surface.

Plant height was significantly increased by Vitazyme applied to the leaves without a surfactant, but the failure of Treatment 3 (with the surfactant) to increase significantly in height did not prevent the plants of Treatment 3 from increasing dry matter accumulation nearly as much as Treatment 2.

It is concluded from this study that, **as long as sufficient active agents are present on the plant — such as in the leaf whorl for corn — the plant will react properly to the biostimulants.** Additional amounts of product clinging to leaf surfaces as produced by a surfactant may be important in encouraging plant growth if enough droplets cling to leaf surfaces during application. However, droplets falling to the soil surface will normally contribute to product activity through root stimulation by active agents, so there may be only certain instances in which the use of a surfactant with Vitazyme may be advantageous.

## Vital Earth Resources

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# 2003 Crop Results

## Vitazyme on Corn (Foliar vs. Soil Application)

**Researcher:** Paul W. Syltje, Ph.D.

**Location:** Vital Earth Resources Research Greenhouse, Gladewater, Texas

**Variety:** yellow dent

**Planting rate:** 10 seeds/pot thinned to 3 plants/pot

**Soil type:** Bowie very fine sandy loam

**Planting date:** December 30, 2002

**Pot size:** 1 gallon

**Experimental design:** A greenhouse study was established to discover the relative effect of soil versus foliar application of Vitazyme on corn growth. Seven replicates were set up for each treatment in a complete block design. Temperatures were maintained at 55° to 80°F during the study, with no artificial light.

### 1. Control

### 2. Vitazyme on the soil

### 3. Vitazyme on the leaves

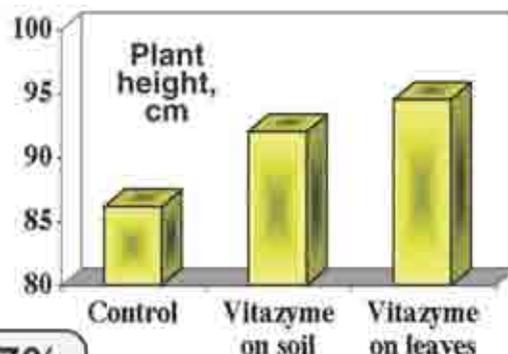
**Fertilization:** All plants were given 0.88 g/pot at planting of a 13-13-13% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O pelleted, slow release fertilizer with 0.65% Mg, 6.0% S, 0.02% B, 0.0006% Co, 0.0006% Cu, 1.40% Fe, 0.06% Mn, 0.0006% Mo, and 0.06% Zn. This fertilizer gave an effective rate of 50 lb/acre of N, applied to the soil surface.

**Vitazyme application:** Vitazyme was applied to the soil surface only of Treatment 2 on January 24 about at the six-leaf stage. It was also applied (a spray of a 1% solution) to the leaf whorl of the plants of Treatment 3 on January 24; care was taken to avoid applying any product to the soil surface.

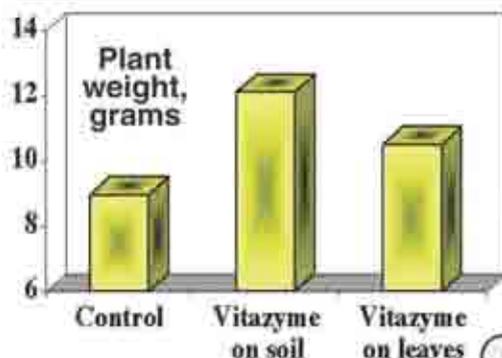
### Plant Height

Treatment	Plant height*	Height change
	cm	cm
1. Control	86.2 a	—
2. Vitazyme on soil	92.0 a	5.8 (+7%)
3. Vitazyme on leaves	94.5 a	8.3 (+10%)

\*Means followed by the same letter are not significantly different at P=0.10 according to the Tukey-Kramer Test. LSD<sub>0.1</sub>=9.7 cm.



**Plant height increase (soil applied): 7%**



### Plant Dry Weight

Treatment	Dry weight*	Weight change
	grams	grams
1. Control	8.96 b	—
2. Vitazyme on soil	12.11 a	3.15 (+35%)
3. Vitazyme on leaves	10.51 ab	1.55 (+17%)

\*Means followed by the same letter are not significantly different at P=0.1 according to the Tukey-Kramer Test. LSD<sub>0.1</sub>=1.89 grams.

**Dry weight increase (soil applied): 35%**

Harvest date: February 13, 2003, 46 days after planting

Harvest results: The corn plants were washed free of soil, the leaves were measured, and then all plants were dried at about 115°F for two days, and weighed to the nearest 0.01 gram.

Conclusions: Vitazyme applied to the soil of corn in this greenhouse study produced a nonsignificant increase in plant height of 7%. Applied to the leaves, the height was increased nonsignificantly by 10%. However, Vitazyme applied to either the soil or leaves increased dry weight accumulations of the corn plants. The soil application increased growth significantly (at  $P=0.10$ ) by 35%, and almost significantly with a foliar application (17%). It is possible that too few active agents were applied by the foliar applications for a maximum growth response, since only enough product could be applied to fill the leaf whorl; the product would not stick to the slick corn leaves. **It is concluded that both soil and foliar applications of Vitazyme are highly effective in increasing the growth rate of corn.**

## Vital Earth Resources

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# 2003 Crop Results

## Vitazyme on Corn

Researcher: unknown

Research organization: Department of Agriculture, Ondo State, Nigeria

Location: Iju/itaogbolu, Akure North Local Government Area, Ondo State, Nigeria

Soil type: unknown

Planting date: late season of 2000

Variety: unknown

Experimental design: A small plot replicated (3 reps), randomized complete block design was set up to evaluate the effects of Vitazyme on a number of growth parameters. Three levels of fertility were used and two applications of Vitazyme, with the following treatments:

Treatment	NPK Fertilizer	Vitazyme
1	0	yes
2	100 kg/ha	yes
3	200 kg/ha	yes
4	100 kg/ha	no
5	200 kg/ha	no
6	0	no

Fertility treatments: Treatments 2 and 4 received 100 kg/ha of an unknown fertilizer formulation two weeks after planting; Treatments 3 and 5 received 200 kg/ha of this same fertilizer also two weeks after planting.

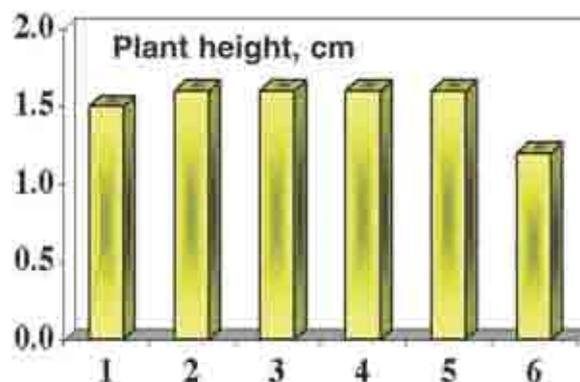
Vitazyme treatments: Treatments 1, 2, and 3 received a 5% Vitazyme spray on the corn seeds before planting, and the newly emerged plants and soil received 1 liter/ha (13 oz/acre) two weeks after planting.

Harvest date: unknown

Growth and yield results: At harvest time several growth parameters were measured, and the data were statistically analyzed to determine significant differences at  $P=0.05$ .

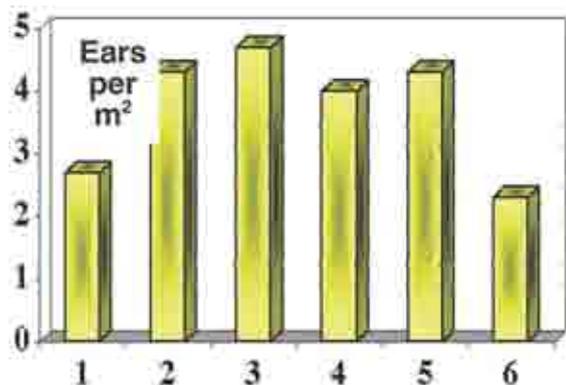
### Plant Height

Treatment	Plant height	Change
	m	m
1. (Vitazyme only)	1.5	0.3 (+25%)
2. (100 NPK + Vit.)	1.6	0.4 (+33%)
3. (200 NPK + Vit.)	1.6	0.4 (+33%)
4. (100 NPK)	1.6	0.4 (+33%)
5. (200 NPK)	1.6	0.4 (+33%)
6. (Control)	1.2	—
LSD <sub>0.05</sub>	0.1	



All of the fertilizer and Vitazyme treatments significantly ( $P=0.05$ ) increased plant height, Vitazyme alone increasing height by 25% and all other treatments increasing it by 33%.

## Ears per Square Meter

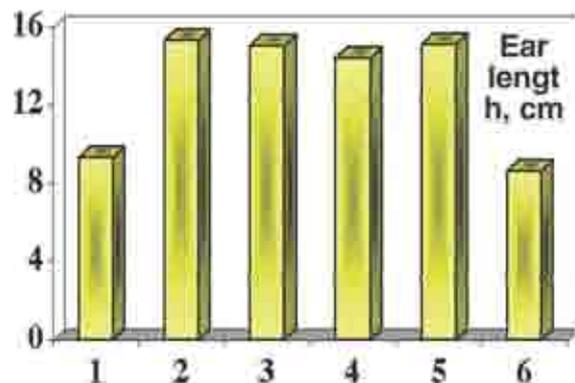


Treatment	Ears number/m <sup>2</sup>	Change number/m <sup>2</sup>
1. (Vitazyme only)	2.7	0.4 (+17%)
2. (100 NPK + Vit.)	4.3	2.0 (+87%)
3. (200 NPK + Vit.)	4.7	2.4 (+104%)
4. (100 NPK)	4.0	1.7 (+74%)
5. (200 NPK)	4.3	2.0 (+87%)
6. (Control)	2.3	—
LSD <sub>0.05</sub>	1.3	

Vitazyme alone increased ears/m<sup>2</sup> by 17%, but not significantly. However, all other Vitazyme + fertilizer treatments and all fertilizer treatments significantly increased ears/m<sup>2</sup>. The Vitazyme + 200 kg/ha NPK increased ears the most, and the Vitazyme + 100 kg/ha NPK increased ears as much as did 200 kg/ha NPK, showing the ability of Vitazyme to increase the efficiency of fertilizer use.

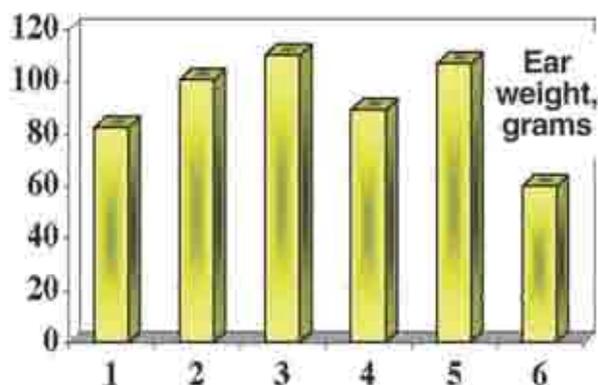
## Ear Length

Treatment	Ear length cm	Change cm
1. (Vitazyme only)	9.3	0.7 (+8%)
2. (100 NPK + Vit.)	15.3	6.7 (+78%)
3. (200 NPK + Vit.)	15.0	6.4 (+74%)
4. (100 NPK)	14.4	5.8 (+67%)
5. (200 NPK)	15.1	6.5 (+76%)
6. (Control)	8.6	—
LSD <sub>0.05</sub>	1.0	



All but the Vitazyme only treatment significantly increased ear length. The Vitazyme and 100 kg/ha NPK increased ear length the most (78%), followed closely by the Vitazyme + 200 kg/ha NPK and 200 kg/ha NPK treatments.

## Ear Weight

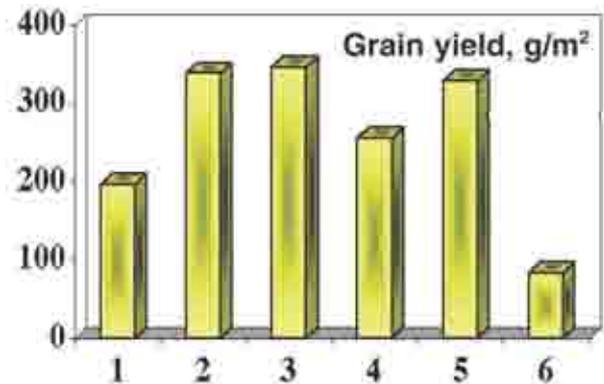


Treatment	Ear weight g	Change g
1. (Vitazyme only)	82.3	22.3 (+37%)
2. (100 NPK + Vit.)	100.7	40.7 (+68%)
3. (200 NPK + Vit.)	110.0	50.0 (+83%)
4. (100 NPK)	89.3	29.3 (+49%)
5. (200 NPK)	107.0	47.0 (+78%)
6. (Control)	60.0	—
LSD <sub>0.05</sub>	11.3	

Ear weight was greatly affected by both Vitazyme alone (+37%) and by fertilizer alone (up to 78% with 200 kg/ha NPK), but most by Vitazyme + fertilizer (+68% for Vitazyme + 100 kg/ha NPK, and +83% for Vitazyme + 200 kg/ha NPK). As with ears/m<sup>2</sup> Vitazyme is shown to increase the efficiency of fertilizer use at both the 100 and 200 kg/ha NPK rates, but especially at the 100 kg/ha NPK fertilizer rate.

## Grain Yield

Treatment	Grain yield g/m <sup>2</sup>	Change* g/m <sup>2</sup>
1. (Vitazyme only)	196.2	113.2 (+136%)
2. (100 NPK + Vit.)	338.3	255.3 (+308%)
3. (200 NPK + Vit.)	345.3	262.3 (+316%)
4. (100 NPK)	255.0	172.0 (+207%)
5. (200 NPK)	328.3	245.3 (+296%)
6. (Control)	83.0	—
LSD <sub>0.05</sub>	110.3	



\*All comparisons are made with the untreated control (6).

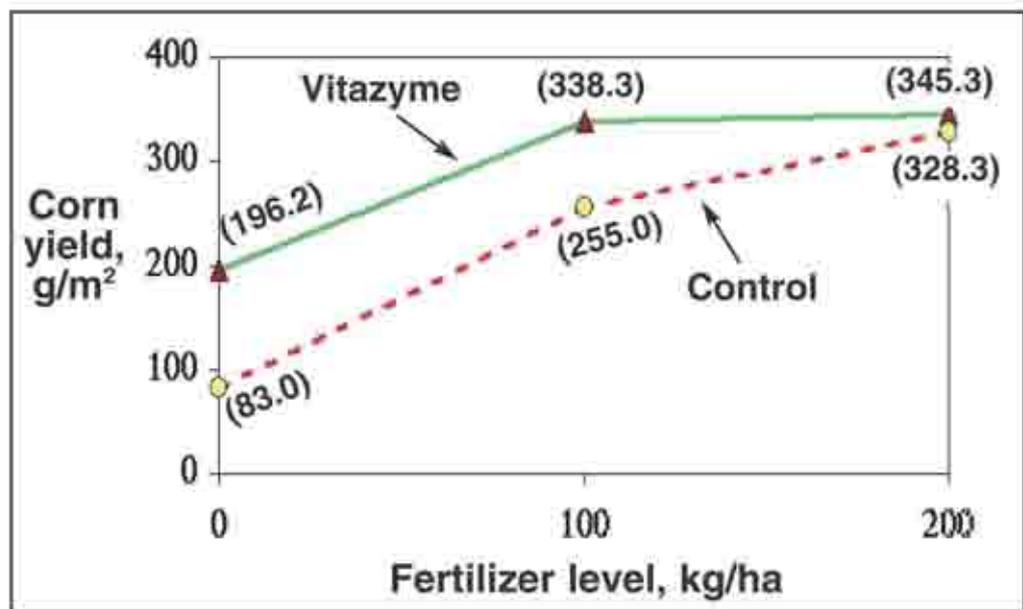
**Increase in yield with Vitazyme only: 136%**

**Increase in yield with Vitazyme + 100 kg/ha NPK: 33%**

**Increase in yield with Vitazyme + 200 kg/ha NPK: 5%**

All treatments significantly increased grain yield above the control. Vitazyme produced a 126% yield improvement, while the highest yield was generated by Vitazyme + 200 kg/ha NPK (+316%). This was 17.0 grams/m<sup>2</sup> higher than the 200 kg/ha NPK value. The difference was even greater for the 100 kg/ha NPK rate, where Vitazyme plus the fertilizer increased yield by 308%, but without Vitazyme the yield increased 207%. These data show a marked improvement of fertilizer efficiency with Vitazyme at the lower NPK rate, and also an improvement at the high NPK rate. These effects over the three rates are diagrammed below.

**Note that the increase in grain yield above the untreated level is greatest at the lower fertilizer levels, with no fertilizer or with the 100 kg/ha NPK rate. The increase was not as dramatic at the highest NPK rate. These responses are similar to those noted in many other trials, and reflect the fact that microorganisms in the rhizosphere are stimulated to produce more available nutrients when soil nutrient levels are less than optimal. As fertility and environmental factors approach the optimum, the response from Vitazyme decreases somewhat.**



**Conclusions:** In this replicated Nigerian corn study Vitazyme has been shown to increase plant growth and yield parameters (grain, ear number, ear length, and ear weight) significantly above the control. Vitazyme also increased yield parameters significantly, especially at the lower fertilizer levels (0 and 100 kg/ha NPK), where the Vitazyme +100 kg/ha NPK yield exceeded the 200 kg/ha NPK yield by 10.0 g/m<sup>2</sup>. At 100 kg/ha NPK, Vitazyme significantly boosted yield by 83.3 g/m<sup>2</sup> above the same fertility level without Vitazyme.

**In this highly weathered tropical soil of Ondo State of Nigeria, Vitazyme is seen as a powerful motivator of higher yield potential for corn.**

## **Vital Earth Resources**

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# **2003 Crop Results**

## **Vitazyme on Corn – testimonial**

Farmer/Researcher: David Schemm

Location: Arrow S Farms, Sharon Springs, Kansas

Variety: NC+ 5021RB

Planting rate: 26,000 seeds/acre

Soil type: Keith sandy clay loam

Previous crop: sunflowers

Planting date: May 3, 2003

Tillage system: no-till

Experimental design: A center pivot covering 120 acres was treated with Vitazyme over the entire area.

Fertilization: 180 lb/acre N, 35 lb/acre P<sub>2</sub>O<sub>5</sub>

Vitazyme and herbicide applications: (1) 13 oz/acre on May 7, with 0.5 lb/acre Atrazine 90df, 1.5 qt/acre Harness Extra, and 24 oz/acre Roundup herbicides; (2) 13 oz/acre on June 4, with 24 oz/acre Roundup herbicide when the corn was 10 inches tall

Irrigation: 16 inches total during the growing season

Weather: 8.5 inches during the growing period, with an 8-inch moisture deficit in 2002 and another 4.5 inch deficit to October of 2003; record heat throughout the summer, including several weeks of 100°F+ temperatures and 25 mph+ winds

Harvest date: October 10, 2003

Yield results: Harvested grain at 16.7% H<sub>2</sub>O: 27,500 bushels

**Yield per acre for 120 acres: 229.2 bu/acre**

Conclusions: The corn received significant hail damage on June 10 when the leaves were stripped. In spite of severe heat and wind as well, the corn did exceptionally well with Vitazyme, exceeding in yield any other fields in the area. Most yields were 140 to 200 bu/acre, with a few in the 220 to 225 bu/acre range.

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# 2002 Crop Results

## Vitazyme and Awaken on Corn

**Researcher:** Paul W. Syltie, Ph.D.

**Location:** Vital Earth Resources Research Greenhouse, Gladewater, Texas

**Variety:** yellow dent

**Soil type:** Bowie very fine sandy loam

**Planting date:** November 21, 2001

**Pot type:** 1 gallon

**Population:** 7 seeds/pot, thinned to 3/pot

**Experimental design:** A complete block design was set up using eight replicates for each of four treatments. The soil was carefully packed into each pot, watered evenly, and then treated with the materials. Plants were watered on demand, and grown in the greenhouse at about 70°F for a high and 55°F for a low temperature.

1. Control

3. Awaken only

2. Vitazyme only

4. Vitazyme + Awaken

**Vitazyme application:** After planting on November 21, 100 ml of a 0.01% Vitazyme solution was applied to the soil surface of each pot for Treatment 2. This rate is higher than recommended, but used so as to obtain a 50-50 mixture of the two products.

**Awaken application:** Awaken was applied to the soil surface of the pots of Treatment 3 as 100 ml of 0.01% solution; this is equivalent to 71 oz/acre, the recommended rate for this experiment. The Awaken for Treatment 4 was mixed at the same percentage with 0.01% Vitazyme, which was also applied at 100 ml/pot.

**Product specifications: Vitazyme:** a liquid fermentation product of various plant materials, organisms, simple and complex carbohydrates, and other materials to yield a multiple mode of action - multiple active agent metabolic stimulator containing natural growth regulators (triacontanol, etc.), vitamins (B-complex, etc.), enzymes, and other phytoactive substances that are biologically active at very low application rates. Producer: Vital Earth Resources, Gladewater, Texas.

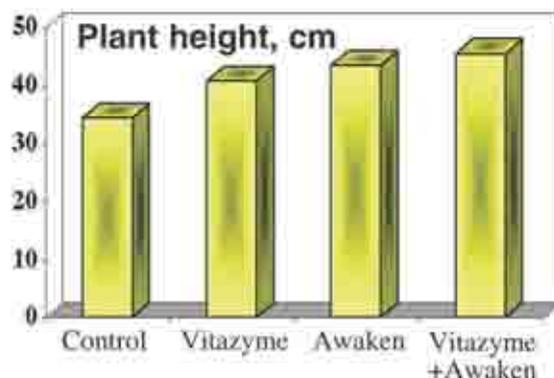
**Awaken:** a macro/micronutrient solution for plant growth stimulation having 16% N, 2% K<sub>2</sub>O, 0.02% B, 0.15% Cu (chelated), 0.15% Fe (chelated), 0.15% Mn (chelated), 0.0006% Mo, and 2.7% Zn of which 0.15% is chelated. Awaken also contains as a major component the material called ACA (Agricultural Crop Additive). ACA's active component is zinc ammonium phosphate, the mechanism of action of which has not been fully characterized. Producer: United AgriProducts (UAP).

**Harvest date:** January 8, 2002, 48 days after planting.

**Height results:** On January 8, all of the plant roots were washed clean of soil, and the plants were measured for height. The plants were then dried in a drying oven at 115°F for 48 hours.

Treatment	Plant height*	Change vs. the control
	----- cm	
4. Vitazyme + Awaken	45.4 a	+11.1 (+32%)
3. Awaken	43.4 ab	+9.1 (+27%)
2. Vitazyme	40.7 b	+6.4 (+19%)
1. Control	34.3 c	—

\* Means followed by the same letter are not significantly different at P=0.10, according to the Tukey-Kramer Test. LSD<sub>0.10</sub>=2.0 cm.

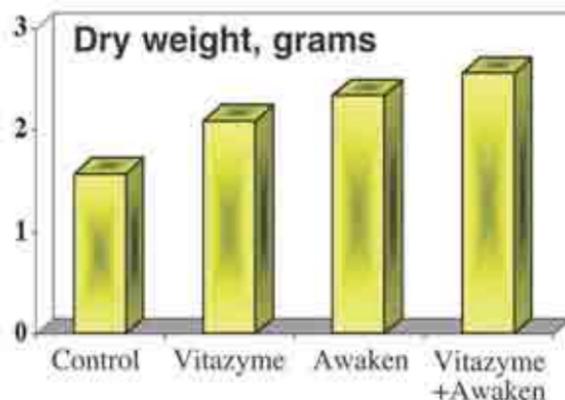


There were some differences in plant height among the four treatments. The control treatment was significantly shorter than the other three treatments, and the Vitazyme treatment was significantly shorter than the combined Vitazyme-Awaken treatment.

Dry weight results: These results showed highly significant differences among treatment means.

Treatment	Dry weight*	Change vs. the control
	----- grams -----	
4. Vitazyme + Awaken	2.56 a	+1.20 (+30%)
3. Awaken	2.34 ab	+0.93 (+23%)
2. Vitazyme	2.09 b	+0.46 (+11%)
1. Control	1.57 c	—

\* Means followed by the same letter are not significantly different at  $P=0.10$ , according to the Tukey-Kramer Test.  $LSD_{010}=0.27$  g.



The dry weight of corn plants treated with Vitazyme plus Awaken was significantly greater than Vitazyme alone or the control, and also exceeded the Awaken treatment by 7%. There appears to be a synergism between Vitazyme and Awaken in this greenhouse study.

Conclusions: It appears that Vitazyme enhances the activity of Awaken for corn in terms of both plant height and dry tissue weight. Awaken, with its nutrients, stimulated corn growth somewhat more than did Vitazyme in this study, though not significantly. **Vitazyme and Awaken together appear to work well together, displaying a noticeable synergism.**

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# 2001 Crop Results

## Vitazyme on Corn and Soybeans A Testimonial

Farmer: Tom Jones

Location: Delavan, Minnesota

Soil type: Clarion-Nicollet-Webster series

Experimental design: Several split-field experiments were set up on the Jones farm for both corn and soybeans, with variably sized treated and control areas.

Weather: Weather conditions during the year were very unfavorable for high yields, starting out very wet to delay planting, and then turning very dry for much of the summer. Yields throughout the region were down this year.

Vitazyme application: 13 oz/acre on the seeds at planting for both corn and soybeans

Data collection: Because of considerable variability in field conditions due to the wet spring and dry summer, the farmer decided not to collect yield data but closely observed effects during the season and at harvest, and during post-harvest tillage.

Chlorophyll content: Both the corn and soybeans showed more leaf chlorophyll on July 30, as detected by a Minolta SPAD chlorophyll meter. For example, one soybean trial showed the following results:

Treatment	Leaf chlorophyll*	Change
	SPAD units	
Control	35.8	—
Vitazyme	38.0	+2.2

\* Twenty leaves per treatment were examined

### Other crop responses noted on July 30, 2001:

Corn: taller plants, larger stalks, darker green color (more chlorophyll), larger roots with more hair roots

Soybeans: larger plants, more leaves, thicker stems, darker green color (more chlorophyll) larger roots

Observations by Tom Jones:

**“Where I used Vitazyme on my beans they had more fine root hairs, and they were a little bushier in appearance. Because of the poor growing season and erratic field conditions, I didn’t get a yield check. However, they were some of my best beans.**

**The corn that had Vitazyme on also had a lot more fine root hairs. I couldn’t believe the difference when I disced my stalks. I could see all these bushy looking root balls, unlike in the untreated fields. Again, no yield check was taken, but I know I could see a difference in the combine hopper. I plan to use more Vitazyme next year – perhaps on all my acres.”**

Thanks,

Tom Jones

Faribault County

Southern Minnesota

# Effects of Solution pH During Storage On Vitazyme Efficacy With Corn (*Zea Mays L.*)

By Paul W. Syltie, Ph.D., Soil Fertility  
Director of Research, Vital Earth Resources  
706 East Broadway Avenue, Gladewater, Texas 75647, U.S.A.  
June, 2001

## Introduction

Vitazyme is a naturally fermented biostimulant that contains a multiple array of active agents — vitamins, enzymes, growth regulators, and other substances — which trigger various growth responses in plants. Typical effects include enhanced root growth, greater leaf chlorophyll, increased carbon fixation, and concomitant increases in overall growth, life-cycle stimulation, root exudation, rhizosphere microbial growth, and crop yields.

Little information is available regarding the effects of the pH of the solution during storage on the resultant effectiveness of Vitazyme's active agents for plant growth. Therefore, this study, using corn as the test crop, was initiated to answer the questions of efficacy with pH over time.

## Materials and Methods

Two Vitazyme concentrations were used in this study — 1% and 100% — to simulate conditions during use in the field when mixed either undiluted or diluted with agricultural chemicals. These solutions were placed in beakers which were sealed with Parafilm to prevent evaporation. For each concentration, the pH of the solution was adjusted to pH 7.0, 8.0, 9.0, or 10.0. These dilutions, prepared on April 4, 2001, are summarized in Table 1. The pH of each solution was determined again on May 7, 2001, 34 days after initial preparation.

Table 1. Dilutions of Vitazyme at various pH levels for a corn efficacy study.

Solution pH*	Parts of Vitazyme : Parts of Water (distilled)	
	100% solution	1% solution
7.0	100:0	1:99
8.0	100:0	1:99
9.0	100:0	1:99
10.0	100:0	1:99

\* Solution pH was adjusted using a NaOH solution having a pH of 12.90

On May 8, 2001, the corn study was initiated in the Vital Earth Resources research greenhouse. One gallon pots were filled with Bowie fine sandy loam and placed in a complete block arrangement (eight replications), with five treatments for each concentration. See Table 2 for a summary of these treatments.

Table 2. Treatments for corn in a Vitazyme study using two concentrations of product stored at various pH's.

Treatment	Vitazyme, 100%	Vitazyme, 1%
1. Control (no Vitazyme)	none	none
2. pH 7.0	x	x
3. pH 8.0	x	x
4. pH 9.0	x	x
5. pH 10.0	x	x

Seven corn seeds (yellow dent, treated with Captan fungicide) were planted in each pot at a depth of 0.75 inch, and each pot received 100 ml of solution carefully distributed to the soil surface of the pots. The 100% Vitazyme pots received 100 ml of a 0.1% (1 ml/liter) solution of actual Vitazyme, while the 1% Vitazyme pots received 100 ml of a 0.05% (50 ml/liter) solution of actual Vitazyme. The 1% solution was applied half as concentrated as the 100% solution because there was not enough prepared solution of the 1% concentration.

On May 5, 2001, the emerged corn plants were thinned to three aggressive plants per pot, and on May 30, 2001, 22 days after planting, the plants were harvested. All soil was washed from the roots, the height of each plant was measured, and the plants were dried in a drying oven at about 115° F for two days. Each set of three plants from each pot was weighed to the nearest 0.01 gram, and a statistical analysis (ANOVA) was run on each concentration (100% and 1%) using Cohort software.

## Results and Discussion

### *Solution pH changes over 34 days*

The pH of the stored solutions tended to move towards neutrality over the 34-day storage period. Interestingly, the 1% concentration moved more towards neutrality than did the 100% concentration (see Figure 1).

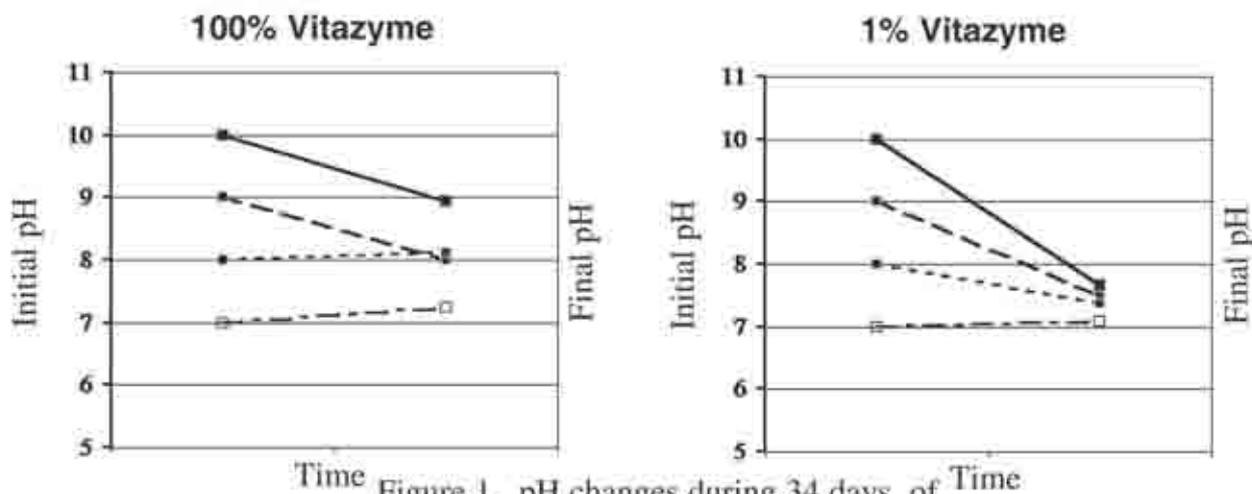


Figure 1. pH changes during 34 days of storage of Vitazyme solutions.

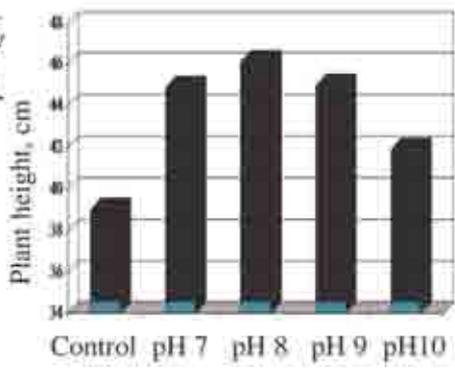
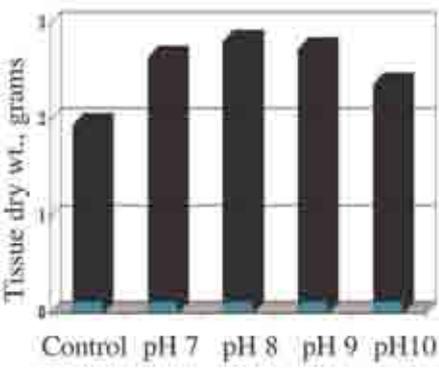
Vitazyme tended to move towards neutrality (pH 7.0) at both the 1% and 100% concentrations when stored at room temperature for 34 days. This was equally true for the dilute (1%) solution, where all four solution pH's ended up between pH 7.08 and 7.66 at the end of the storage period.

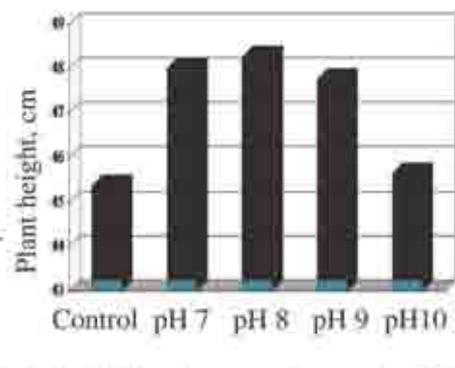
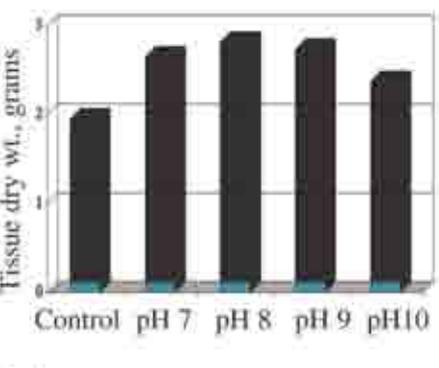
# Corn Growth Effects

The average height and weight of the corn plants for the treatments are shown in Table 3.

Table 3. Corn heights and weights treated with different Vitazyme solutions stored at various pH's.

Treatment	Corn height (cm)	Tissue dry weight (g)
<b>1% Vitazyme</b>		
1. Control	39.00	1.95
2. pH 7.0	44.88	2.64
3. pH 8.0	46.13	2.81
4. pH 9.0	45.00	2.73
5. pH 10.0	41.88	2.37
<b>100% Vitazyme</b>		
1. Control	45.38	2.59
2. pH 7.0	48.00	2.79
3. pH 8.0	48.25	2.97
4. pH 9.0	47.75	2.71
5. pH 10.0	45.63	2.70

A statistical analysis of the data revealed the following, as shown in Table 4.

Table 4. A statistical analysis of a corn study, using Vitazyme stored at different pH's.

Treatment	Corn height (cm)	Tissue dry weight (g)
<b>1% Vitazyme*</b>		
3. pH 8.0	46.13 a (+18%)	2.81 a (+44%)
4. pH 9.0	45.00 a (+15%)	2.73 a (+40%)
2. pH 7.0	44.88 ab (+15%)	2.64 ab (+35%)
5. pH 10.0	41.88 bc (+7%)	2.37 b (+22%)
1. Control	39.00 c	1.95 c
CV	5.48%	10.70%
LSD <sub>0.10</sub>	2.02	0.23
<b>100% Vitazyme*</b>		
3. pH 8.0	48.25 a (+6%)	2.97 a (+15%)
2. pH 7.0	48.00 a (+6%)	2.79 ab (+8%)
4. pH 9.0	47.75 a (+5%)	2.71 ab (+5%)
5. pH 10.0	45.63 a (+1%)	2.70 ab (+4%)
1. Control	45.38 a	2.59 b
CV	4.78%	9.51%
LSD <sub>0.10</sub>	1.91	0.22

\*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test (P=0.10).

It is clear that Vitazyme in every case, at both the 1% and 100% concentrations, and at all pH's, provided height and dry weight increases in this corn study. Several of these increases were significant at  $P=0.01$ , especially when Vitazyme was stored at pH 8.0 for both the 1% and 100% concentrations. At 1%, the pH 8.0 solution provided a 44% dry weight increase for Vitazyme, and at 100% a 15% increase. Plant height increases were in all cases less than half of the dry weight increases, but followed the same order as with dry tissue weight.

Vitazyme stored at pH 7.0, 8.0, and 9.0 always provided good dry weight increases for corn, especially for the 1% solution. At pH 10.0, however, the increases were less — indicating some deactivation of active agents — though with the 1% solution the increase was still significant; for the 100% solution the increase was not significantly greater than with the untreated control.

## Summary and Conclusions

Vitazyme at 1% dilution, when adjusted to pH 7.0, 8.0, or 9.0, and stored for 34 days at room temperature, always caused significant height and weight increases for corn in this study. Increases in dry weight were up to 44% above the control. At pH 10.0 the increases were smaller but, in the case of dry weight, still significantly greater than the control. At the 100% dilution the increase in dry weight with Vitazyme at pH 8.0 was significant, and all other pH's also produced increases.

**This study reveals that Vitazyme significantly improved corn height and dry weight at any product pH when stored for 34 days, but especially at pH 8.0. Thus, the use of Vitazyme in fertilizer or pesticide solutions of pH 7.0 to 9.0 is recommended, and such use can boost product efficacy. Product effectiveness when stored at pH 10.0 appears to be somewhat diminished.**

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# 2001 Crop Results

## Vitazyme on Corn

**Researcher:** Dennis Parrett, Cecilia Farm Service, Inc.

**Location:** Cecelia, Kentucky

**Farm cooperater:** Richard Preston

**Variety:** Novartis 6367

**Row spacing:** 30 in

**Population:** 26,600 seeds/acre

**Planting date:** April 10, 2001

**Soil type:** unknown

**Experimental design:** A test field was divided into five portions, each with a treatment as shown below.

Treatment	Foliar N	Sidedress N	Vitazyme
1. Control	0	0	0
2. Foliar N	5 gal/acre of 28% N	0	0
3. Sidedress N, low	0	80 lb/acre of 28% N	0
4. Sidedress N, high	0	105 lb/acre of 28% N	0
5. Sidedress N, high + Vitazyme	0	105 lb/acre of 28% N	13 oz/acre

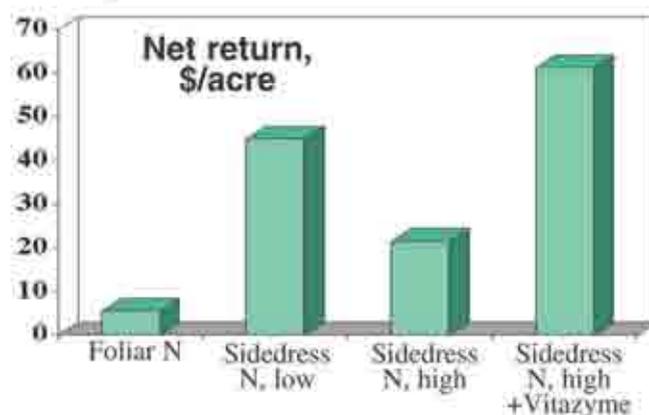
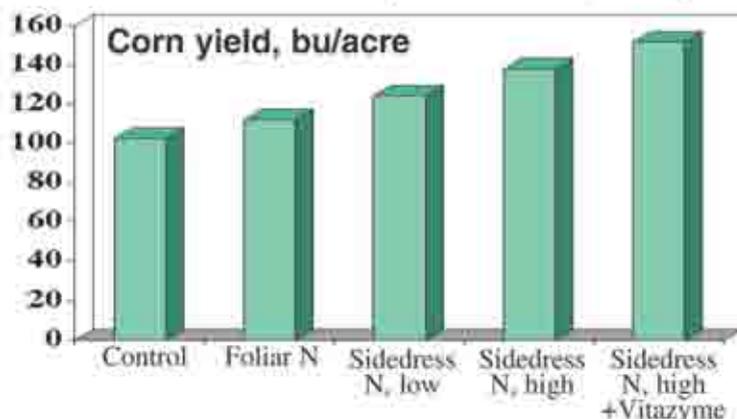
**Fertilization:** 50-60-60 lb/acre N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O preplant incorporated; sidedress fertilizer as shown above

**Vitazyme treatments:** 13 oz/acre along with the 28% nitrogen solution, applied June 9

**Yield and income results:** Harvest was on October 11, 2001.

Treatment	Grain yield	Increase over the control	Product cost*	Net return
	bu/acre	bu/acre	\$/acre	\$/acre
1. Control	102.6	—	0	—
2. Foliar N	112.3	9.7 (+9%)	15.88	5.46
3. Sidedress N, low	124.4	21.8 (+21%)	33.25	44.85
4. Sidedress N, high	138.1	35.5 (+35%)	26.52	21.48
5. Sidedress N, high + Vitazyme	151.9	49.3 (+48%)	37.25	61.27

\* Product costs were determined by Cecilia Farm Service, including \$4.00/acre for Vitazyme and \$2.00/bu for corn.



### True increase from Vitazyme

**Yield:** Treatment 5 vs. Treatment 4: 151.9 bu/acre - 138/bu/acre = **13.8 bu/acre**

**Net income:** Treatment 5 vs Treatment 4: \$61.27/acre - \$21.48/acre = **\$39.79/acre**

**Conclusions:** In this corn study in Kentucky, Vitazyme proved to be highly beneficial to corn production in terms of yield increase and income increase. The 13.8 bu/acre increase in yield provided an extra \$39.79/acre income, showing its high profitability in farming programs.

**Return per dollar invested in Vitazyme: \$9.95**

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# 2001 Crop Results

## Vitazyme on Sweet Corn

### New York Crop Research Facility, Cornell University

Researchers: Arlie McFaul, Alan Erb, Lee Stivers, and Christy Hoeping

Location: near Batavia, New York

Variety: Bonus

Row spacing: 30 inches

Spacing-in-row: 9 inches

Planting date: June 4, 2001

Experimental design: A small field experiment was designed in a randomized complete block fashion, with four replications. Individual plots were 6 rows wide and 20 feet long. Foliar treatments were made to the center two rows only for all eight treatments.

- |                                  |             |
|----------------------------------|-------------|
| 1. Vitazyme                      | 5. Asset RS |
| 2. Harpin protein seed treatment | 6. Auxigrow |
| 3. Messenger                     | 7. K-Mag    |
| 4. ACA                           | 8. Control  |

Fertilization: All areas received 250 lb/acre of a 15-15-15% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O dry formulation banded along the seed row at planting. On July 10, 100 lb/acre of N was applied.

Vitazyme application: (1) 13 oz/acre sprayed over the soil after emergence on July 6; and (2) again before tasseling on July 30; other products were added according to supplier recommendations.

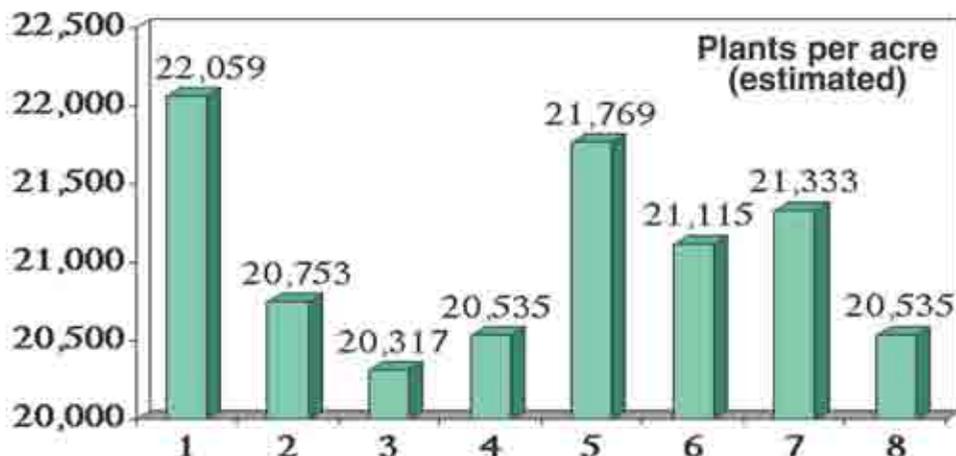
Herbicides: Atrazine (3 pints/acre) and Basagran (1.5 pints/acre) post-emergent on June 21

Harvest date: August 31, 2001

Weather: It was very hot and dry during the summer, with growth and yields curtailed due to the drought. Monthly totals: May, 3.84 in; June, 1.47 in; July, 1.02 in; August 2.21 in; September, 2.82 in.

Yield and harvest results: Total yield and cob characteristics were evaluated before or at harvest

### Plant population

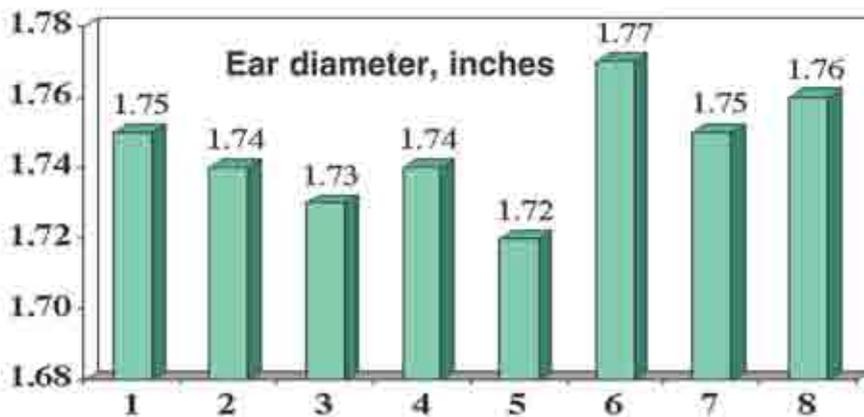
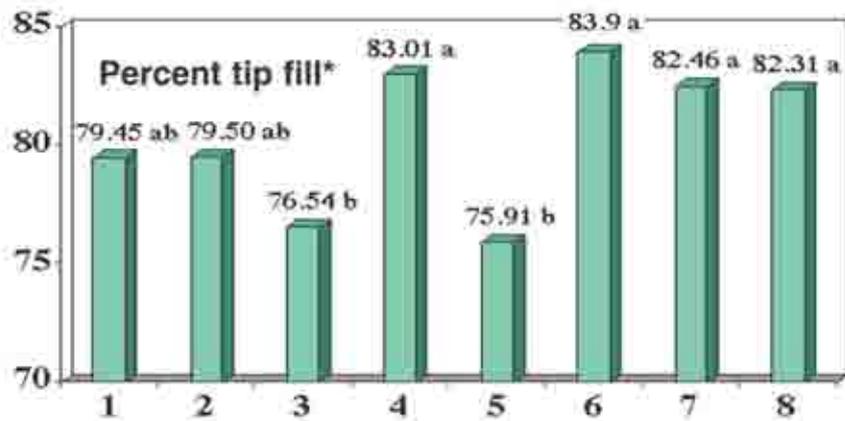


## Percent Tip Fill

All values were not significantly different, but the population with Vitazyme was the highest, being 7% higher than the control.

Some significant differences in percent tip fill appeared, with Messenger and Asset RS being the lowest in value of all treatments. Vitazyme was statistically equal to the highest tip fill value.

\*Means followed by the same letter are not significantly different according to Fisher's Protected LSD;  $P_{0.05} = 0.04$ .

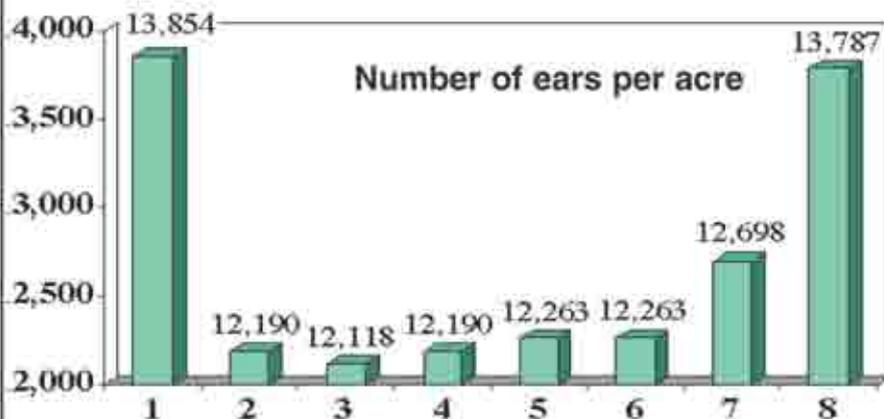
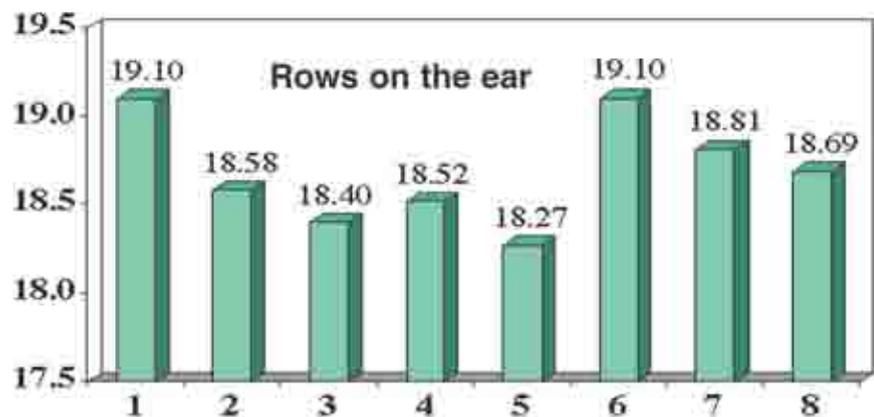


## Ear Diameter

There was relatively little difference amongst the various treatments for ear diameter. None were significantly different.

## Number of Rows

Vitazyme and K-Mag had the highest numbers of rows of kernels per ear, being 2% higher than the control. There were no significant differences amongst these values.

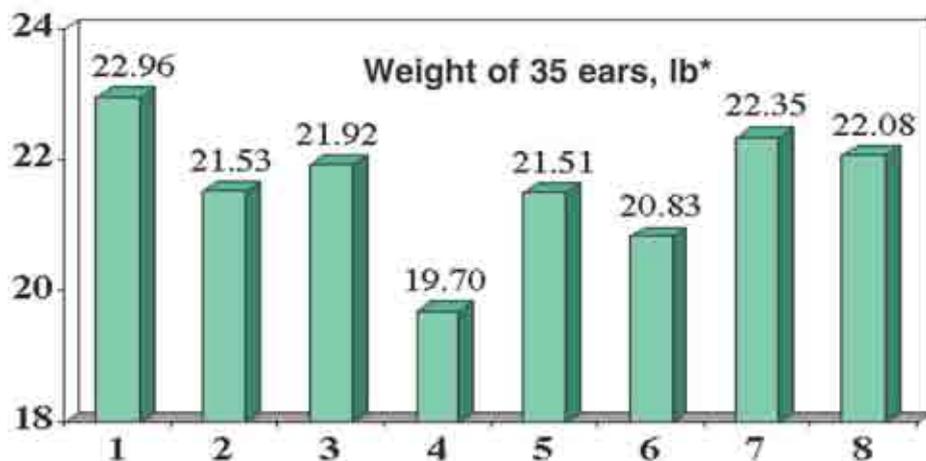
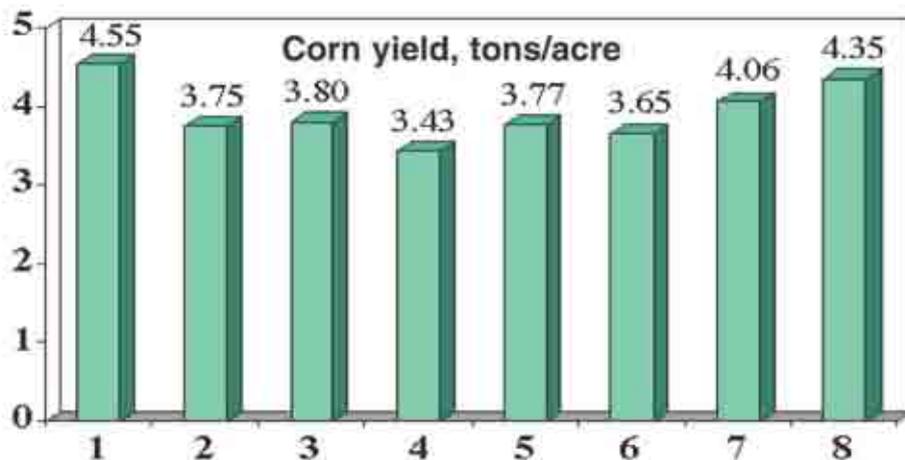


## Ears per Acre

Vitazyme produced the greatest number of ears per acre, being slightly greater than the control but considerably greater than the other treatments by about 13%. This increase was a reflection of higher estimated plant population as noted earlier. No treatment means were significantly different.

## Corn Yield

Vitazyme yielded the most corn of any treatment, exceeding the control by 5% but exceeding the lowest other treatment (ACA) by 33%. The difference was equivalent to \$54.88/acre based on a \$49/ton sweet corn price. None of these differences were significant, however.



## Cob Weight, 35 Ears

\* Growers are urged to grow large ears, so the weight of 35 ears should equal or exceed 25 lb; lower prices result from underweight ears. In 2001 the weights were low because of the severe drought. Nonetheless, the 25-ear weight for Vitazyme was the highest of all the treatments, exceeding the control by 4%. Vitazyme exceeded ACA ear weight by 17%.

**Conclusions:** Results with sweet corn in this study were greatly affected by a severe summer drought. In spite of this fact, **Vitazyme performed the best of all seven treatments used in this study, being highest in plant population, rows per ear, ears per acre, yields per acre, and total weight per 35 ears. Vitazyme treatment produced 33% more yield than the lowest yielding other treatment.** Though significance in the mean differences was lacking, the consistent trend of this study was for Vitazyme to provide excellent plant responses that would substantially benefit sweet corn growers.

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# 2000 Crop Results

## Vitazyme on Corn

Grower: Jim Clise

Location: Waterloo, New York

Variety: Agway 501

Researcher: Jake Gephart, Agway, Inc.

Planting date: May 31, 2000

Seeding rate: unknown

Row spacing: 30 inches

Experimental design: A 100-acre field was divided into halves (50 acres each), with half treated with Vitazyme and half left untreated.

### 1. Control

### 2. Vitazyme

Fertilization: 380 lb/acre of a urea and potash mixture, broadcast before planting and incorporated; 250 lb/acre of 11-37-0% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O as a starter

Weed control: Bicep and Prowl tank-mixed

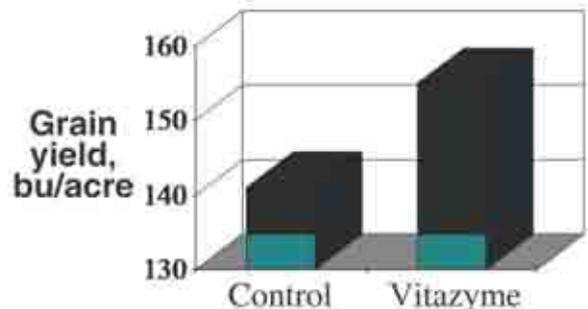
Vitazyme application: 13 oz/acre with the herbicide, at 18-inches corn height

Harvest date: December 3, 2000

Yield results:

	Control	Vitazyme	Change
		bu/acre	
Corn yield	141	155	(+) 14 (+10%)

**Yield increase: 10%**



Income results:

	Control	Vitazyme	Change
		\$/acre	
Income	246.75	271.25	(+) 24.50

**Income increase:  
\$24.50/acre**

Conclusions: Only 13 oz/acre of Vitazyme, applied with the herbicide, resulted in a 10% grain yield increase and a \$24.50/acre income increase. This increase resulted in a return on investment of about 5:1 for this low-value crop. In spite of a very wet and cool year, Vitazyme still produced a very good crop response.

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# 1999 Crop Results

## Vitazyme on Corn

Farmer: Craig Rice, Rice Farms

Supervisor: Don Jones, Agway Inc.

Planting date: unknown

Experimental design: A large field was divided in two, with part treated with Vitazyme and part left untreated.

Yields were determined by harvesting a 15- ft wide strip that was 254 to 768 feet long for each treatment.

### 1. Control

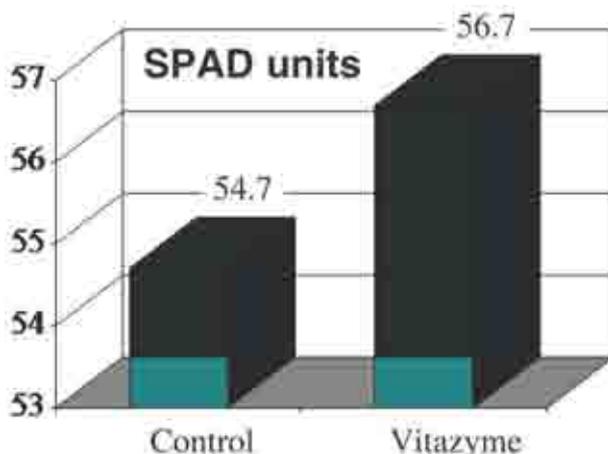
Fertility treatments: unknown

Vitazyme treatment: 13 oz/acre at planting

Chlorophyll determinations: On August 12 readings were taken of leaves from the corn treatments with a Minolta SPAD chlorophyll meter. Each value represents an average of 10 individual leaf determinations.

Treatment	SPAD units	Increase
Control	54.7	--
Vitazyme	56.7	2.0

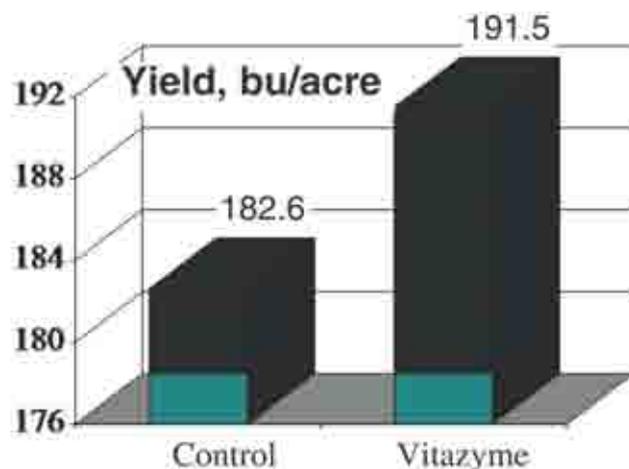
**Chlorophyll increase:  
2.0 SPAD units**



Yield results:

Treatment	Yield lb/plot	Plot area acre	Yield bu/plot
Control	2,700	0.264	182.6
Vitazyme, area 1	2,865	0.259	197.5
Vitazyme, area 2	2,690	0.259	185.4
Vitazyme, average	--	--	191.5

**Yield increase: 5%**



Income increase: Estimated corn price = \$2.50/bu.

8.9 bu/acre increase x \$2.50/bu = \$22.25/acre

**Income increase: \$22.50/acre**

Comments: In spite of a very dry and hot summer, the Vitazyme treatment boosted the corn yield significantly (8.9 bu/acre). Leaf chlorophyll increases during the growing season would explain most of this increase, since this would promote greater root growth and exudation to feed a more vigorous rhizosphere organism population.

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# 1999 Crop Results

## Vitazyme on Corn

Farmer: Bill Goodell

Location: Shortsville, New York

Variety: Pioneer 3573

Planting date: May 4, 1999

Population: 30,000 seeds/acre planted, 28,000 plants/acre final

Experimental design: A 5-acre field was split in half, one half receiving Vitazyme with 50% of the usual starter fertilizer at planting, and the other half receiving the regular starter rate but no Vitazyme.

**1. Control:** 100% starter

**2. Vitazyme + 50% starter**

Fertility treatments: All areas of the field received a broadcast application of 100 lb/acre  $(\text{NH}_4)_2\text{SO}_4$  (21%N) + Boron + Copper, 500 lb/acre EnviroSoil (composted sewage sludge mixed with high-calcium lime), 32 gal/acre 30% UAN, and 1 gal/acre liquid Ca-nitrate. At planting the control received 10 gal/acre of 3-18-18 (\$3.25/gal = \$32.50/acre), while the Vitazyme treated area received 5 gal/acre of 3-18-18 (\$16.25/acre). Total N per acre for the broadcast fertilizer was 107 lb/acre, excluding the compost, for the control, and 106 lb/acre for the Vitazyme treatment.

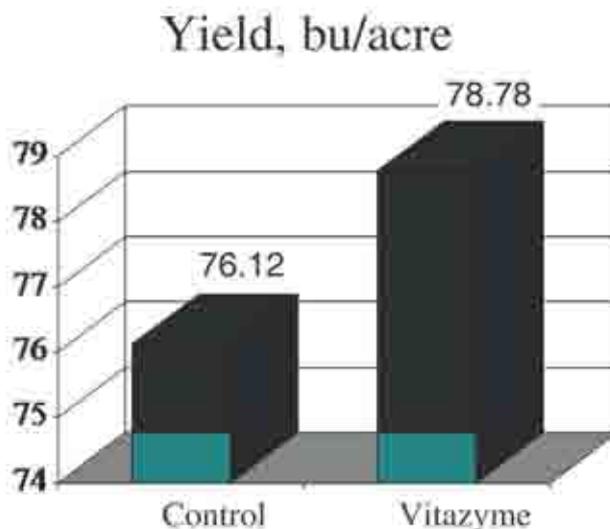
Vitazyme treatment: 13 oz/acre mixed with the 3-18-18, on the seeds at planting

Weather conditions: very dry season-long

Yield results:

<u>Treatment</u>	<u>Yield</u> bu/acre	<u>Test weight</u> lb/bu
Control	76.12	57.0
Vitazyme	78.78 (+3.5%)	57.5

**Test weight increase: 0.5 lb/bu**



**Yield increase with 50% starter: 3.5 %**

Income results: Corn is priced at \$2.00/bu.

<u>Treatment</u>	<u>Corn value</u>	<u>Fertilizer savings*</u>	<u>Total Increase</u>
Control	\$152.24/acre	---	---
Vitazyme	\$157.56/acre	\$12.35/acre	<b>\$17.67/acre</b>

Comments: Yields were reduced by about 50%, due to very dry conditions throughout the summer. In spite of this, Vitazyme stimulated a yield increase with a reduced starter fertilizer input, illustrating its ability to activate rhizosphere nutrient uptake.

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## 1997 Crop Results

# Vitazyme on Corn

Researcher: William (Bill) Goodell

Seeding date: May 14, 1997

Location: Shortsville, New York

Row width: 30 inches

Seeding rate: 30,000 seeds/acre

Variety: Pioneer 3752 (97 day)

Experimental design: A field of reasonable uniformity was divided into two parts: an untreated control part and a Vitazyme treated part.

### 1. Control (no Vitazyme)

### 2. Vitazyme + 33% of fertilizer at planting

Fertility treatments: The entire field received 10 tons/acre of manure, plus 26 gal/acre of 30% nitrogen and 4 gal/acre of ammonium thiosulfate. The control area received an additional 8 gal/acre of 9-18-9 plus 4 gal/acre of 0-0-30 at planting on the seed. The Vitazyme treatment received 2.7 gal/acre of 9-18-9 plus 1.3 gal/acre of 0-0-30 at planting, or 33% of the control treatment.

Vitazyme application: 12 oz/acre with the liquid fertilizer, on the seeds at planting

Soil: Ontario loam, 3 to 10% slope

Previous crop: wheat

Harvest date: November 26, 1997

Yield results: Both treatments yielded about 22.7% grain moisture.

**Yield Increase:  
10%**

	<u>Control</u>	<u>Vitazyme</u>	<u>Increase with Vitazyme</u>
Corn yield	129.6 bu/acre	142.2 bu/acre	12.6 bu/acre

Income results: The grain price has been calculated at about \$3.00/bu. Natures 9-18-9 + 0-0-30, mixed at a 2:1 ratio retails for about \$3.20/gal.

	<u>Control</u>	<u>Vitazyme</u>	<u>Income Increase</u>
Corn income	\$386.12/acre	\$423.64/acre	\$37.80/acre
Fertilizer savings, less Vitazyme	—	\$25.60/acre	\$25.60/acre
Net income increase			\$63.40/acre

**Income Increase: \$63.40/acre**

Test weight results:

	<u>Control</u>	<u>Vitazyme</u>
Test weight	53 lb/bu	55 lb/bu

**Test weight  
increase: 2 lb/bu**

Comments: The cropping year was quite good. Only July 13, leaf chlorophyll measured on 20 average leaves of each treatment gave 50.7 SPAD units for the Vitazyme treatment and 49.1 SPAD units for the control.

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