



**VITAZYME** <sup>®</sup>

# ***2005 Field Trial Results***

**A SUMMARY OF EXPERIMENTS USING  
VITAZYME SOIL AND PLANT BIOSTIMULANT  
ON FIELD, ORCHARD, AND GREENHOUSE CROPS**

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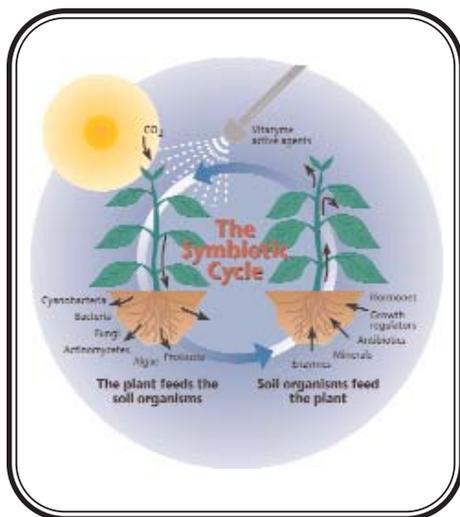
# 2005 Vitazyme Field Trial Results

For the tenth consecutive year a summary of Vitazyme field trials is presented to convey the great value of this crop biostimulant to enhance crop production. Over a wide variety of crops, soils, and climactic conditions various production programs involving Vitazyme have performed extremely well across the United States and in many foreign countries. The consistency of crop responses has been noteworthy.

For those unfamiliar with Vitazyme soil and plant biostimulant and its recommended program, please review the information given below to understand how the material works within the plant-soil system.

## Improved Symbiosis: The Secret of Vitazyme's Action

All plants that grow in soils develop an intimate relationship between the roots and the organisms that populate the root zone. The teeming billions of bacteria, fungi, algae, cyanobacteria, protozoa, and other organisms



that grow along the root surfaces — the rhizosphere — are much more plentiful than in the bulk of the soil. This is because roots feed the organisms with dead root epidermal cells as well as compounds exuded from the roots themselves. The plant may inject up to 25% or more of its energy, fixed in the leaves as carbohydrates, amino acids, and other compounds, into the root zone to feed these organisms' for a very good purpose.

The microorganisms which feed on these exuded carbon compounds along the root surfaces benefit the plant in many ways creating a beautiful symbiotic relationship. The plant feeds the bacteria, fungi, algae, and other microbial species in the rhizosphere, which in

turn secrete enzymes, organic acids, antibiotics, growth regulators, hormones, and other substances which are absorbed by the roots and transported to the leaves. The acids help dissolve essential minerals, and reduced iron releases anionic elements. Organism types include mycorrhizae, cyanobacteria and various other bacteria, fungi, and actinomycetes.

Vitazyme contains "metabolic triggers" that stimulate the plant to photosynthesize more efficiently, fixing more sunlight energy in the

Vitazyme should be used within the context of a complete crop management system, never by itself. Vitazyme will optimize your existing program by enabling the plant to grow better, thus increasing productivity. Follow this easy-to-use five-point program.

- 1 If possible, analyze the soil at a reputable laboratory and correct mineral deficiencies and imbalances with expert consultation.
- 2 Reduce nitrogen fertilizer applications for non-legumes using this test:

Soil Organic Matter			Previous Crop		Compaction		Soil NO <sub>3</sub> -N Test						
Low(<1.5%)	Medium(1.5-3%)	High(>3%)	Non-legume	Legume	Much	Little	Low	Medium	High				
1	2	3	1	3	1	3	2	4	6				
<b>Total additive score:</b>			15	14	13	12	11	10	9	8	7	6	5
<b>Apply this % of optimum N:</b>			← 50-60% →		← 60-70% →		← 70-80% →						

form of carbon compounds to increase the transfer of carbohydrates, proteins, and other growth substances into the root zone. These active agents may enter the plant through either the leaves or the roots. Root growth and exudation are both enhanced. This enhancement activates the metabolism of the teeming population of rhizosphere organisms to a higher level, triggering a greater synthesis of growth-benefiting compounds and a faster release of minerals for plant uptake. Thus the plant-microbial symbiosis is stimulated.

Very small amounts of these metabolic triggers in Vitazyme are needed to greatly improve plant and rhizosphere microbe response. This is because of the **enzyme cascade effect**. Successive tiers of enzymes are activated in plant and microbial tissues to give a large physiological response from very little activator.

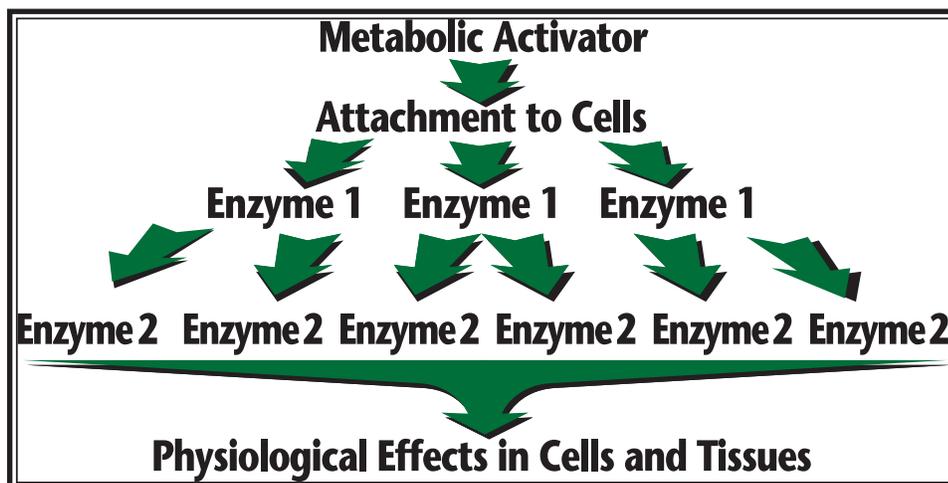
*In short, Vitazyme enables the plant to better express its genetic potential by reducing the stresses that repress that expression.*

Reduce the application each time the fertilizer normally is applied. Legumes normally need no added nitrogen. Vitazyme will accelerate legume nitrogen fixation.

- 3 Treat the seeds or transplant roots, if possible at planting. Treat seeds with a dilute Vitazyme solution, such as 1 liter of a 5% solution for every 50 kg of seed. Mix the seeds thoroughly in a seed or cement mixer or on a tarp. **For excellent results apply the solution directly on the seed row with a planting attachment. Dip or spray transplant roots with a 1% or 2% solution.**

- 4 Apply Vitazyme to the soil and/or foliage. Follow instructions for each crop. In most cases from 10 to 20 oz/acre can be applied per application at one to three times during the cropping cycle. A fall application on stubble is effective to accelerate residue breakdown.

- 5 Integrate other sound, sustainable management practices into a total program. Use crop rotations, minimum tillage, soil conservation practices, and adapted plant varieties.



# Vitazyme Highlights for 2005

Crops during 2005 in the United States had to endure severe drought in parts of the Midwest and South, and another cold, wet spring in the Northeast. Yet, Vitazyme performed very well under these stresses, and equally well in other parts of the country. The same consistency in response as seen in years past has continued this year, as evidenced in the pages of this booklet, and as pointed out below in this brief summary of results for the year.

## Some Highlights for 2005

**1** Two more corn studies in North Carolina, conducted through North Carolina State University, displayed once again the ability of the product to reduce leaf fungal infection and improve fertilizer efficiency. A journal publication is expected from these two years of study. Yield increases from Vitazyme alone were from 18 to 38 bu/acre.

**2** Cuban results continue to come in, with sugarcane yield increases of 17 to 34%, and rice yield enhancement of 14 to 35%.

Papaya and guava responses have been excellent to phenomenal, the yield of dwarf guava plants tripling with Vitazyme at the experimental site. Sales and research continue to prosper in this tropical nation.

**3** Raisin and wine grapes in California have performed very well with the Vitazyme program in 2005, carrying forward the results from previous years. The LDS Raisin Vineyard near Fresno, California, completed its third year of studies, and showed that the standard Ethrel treatment to enhance fruit sugar is not necessary if Vitazyme is used instead. Wine grapes near Paso Robles, California, responded extremely well to Vitazyme for the second year, with yields improving by 22% while wine quality may even have been enhanced.

**4** The third year of apple trials in western New York once again proved how the program can not only increase average apple size, but also improve brix and fruit pressure (tissue firmness), thus improving storability and crispness. Apple growers will now be able with confidence to utilize

this program in a much bigger way.

**5** In Africa and far western Asia, tests with Vitazyme have shown excellent results on pasture grasses and legumes. In Sub-Saharan Africa the improvement in pastures could have a very positive impact on domesticating the traditionally nomadic Fulani tribes.

**6** As the petroleum crisis has doubled fertilizer prices, in some cases, from a year earlier, farmers are faced with serious increases in production costs. To decrease fuel and fertilizer costs, Vitazyme has shown in 2005, as it has in previous years, its ability to improve fertilizer efficiency and decrease soil bulk density, thus helping the farmer become more efficient.

Continuing the consistent responses of Vitazyme on a number of crops, the results shown in this booklet reveal the great efficacy of this product to the farmer. Across all types of soils and climatic conditions, this product and its associated program have provided excellent results in North America as well as on other continents.

# Vitazyme Field Tests for 2005

## Alfalfa

### New Product Analysis

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas

Soil type: silt loam

Planting date: January 28, 2005

Experimental design: A replicated pot study (5 reps) was set up in the research greenhouse to evaluate the effect of Vitazyme and Rhizobium bacteria, alone or together, on alfalfa growth. Other products were also evaluated, including a "New" Vitazyme and a potential additive to upgrade Vitazyme.

Variety: common

Pot size: 1 gallon

Planting rate: thinned to 15 plants/pot

- |                         |                               |
|-------------------------|-------------------------------|
| 1. Control              | 4. "New" Vitazyme             |
| 2. Rhizobium only       | 5. "New" Vitazyme + Rhizobium |
| 3. Vitazyme only        | 6. Product B                  |
| 4. Vitazyme + Rhizobium | 8. Product B + Rhizobium      |

Fertilization: none

Vitazyme, "New Vitazyme, and Product B application: 100 ml/pot of a 0.01% solution for Vitazyme and "New Vitazyme; 100 ml/pot of a 0.001% solution for Product B

Harvest date: March 30, 2005, 61 days after planting

Growth results:

At harvest, ten average leaves of each pot were analyzed by a Minolta SPAD meter, and values were averaged.

#### Leaf Chlorophyll

Treatment	Leaf Chlorophyll*	
	SPAD units	Change
2 (Rhizobium)	44.26 a	9.18 (+26%)
8 (Prod B + Rhiz)	42.76 a	7.68 (+22%)
4 (Vita + Rhiz)	42.56 a	7.48 (+21%)
6 (New Vita + Rhiz)	42.40 a	7.32 (+21%)
3 (Vitazyme)	39.00 b	3.92 (+11%)
5 (New Vitazyme)	37.48 c	2.40 (+7%)
7 (Product B)	36.94 c	1.86 (+5%)
1 (Control)	35.08 d	—

\*Means followed by the same letter are not significantly different according to the Student-Newman-Keuls Test (P=0.10). LSD<sub>0.10</sub>=1.48 SPAD units.

#### Plant Height

Treatment	Plant height*	
	cm	Change
6 (New Vita + Rhiz)	22.8 a	4.8 (+27%)
8 (Prod B + Rhiz)	22.0 a	4.0 (+22%)
4 (Vita + Rhiz)	21.7 a	3.7 (+21%)
2 (Rhizobium)	21.0 a	3.0 (+17%)
7 (Product B)	20.2 ab	2.2 (+12%)
3 (Vitazyme)	20.2 ab	2.2 (+12%)
1 (Control)	18.0 b	—
5 (New Vitazyme)	17.8 b	(-) 0.2 (-1%)

\*Means followed by the same letter are not significantly different according to the Student-Newman-Keuls Test (P=0.10). LSD<sub>0.10</sub>=1.8 cm.

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Leaf chlorophyll was significantly increased in every treatment that received Rhizobium bacteria, showing its ability to fix nitrogen and supply it to leaf tissue. Vitazyme significantly increased leaf chlorophyll as well, but less than did Rhizobium, and the New Vitazyme and Product B also increased chlorophyll above the control.



**Vitazyme with rhizobium bacteria on alfalfa will greatly stimulate growth of the bacteria, and thus vegetative growth, beyond Vitazyme alone.**

The average height for all of the plants in a pot were averaged to the nearest cm.

All of the Rhizobium treated alfalfa had the tallest plants, with Product B and Vitazyme close behind.

All of the leaves and roots were dried after washing soil from the roots, in a drying oven at about 120°F for 24 hours.

Vitazyme + Rhizobium produced the highest dry matter yield, exceeding the control by 34%, followed by Product B + Rhizobium (+26%). Rhizobium bacteria alone also produced a 26% yield increase, while New Vitazyme + Rhizobium gave a 15% yield increase, only slightly more than the Vitazyme alone (+14%).

**Conclusions:** In this greenhouse alfalfa study using three products and Rhizobium bacteria, the Rhizobium, alone or combined with the other products, always exceeded the other four treatments in terms of leaf chlorophyll, plant height, and dry weight. With the all-important dry weight production, Vitazyme plus Rhizobium produced the highest increase, 34% more than the control, while Product B + Rhizobium produced the second highest yield increase at 26%. Vitazyme alone caused a 14% dry matter increase. Vitazyme is shown to be a very powerful alfalfa growth stimulator, especially in combination with Rhizobium bacteria which feed on photosynthate transferred into the roots to feed these nitrogen fixing bacteria.

**Dry Weight**

Treatment	Dry weight*	Change
	grams	grams
4 (Vita + Rhiz)	13.96 a	3.54 (+34%)
8 (Prod B + Rhiz)	13.14 ab	2.72 (+26%)
2 (Rhizobium)	13.10 ab	2.68 (+26%)
6 (New Vita + Rhiz)	11.95 abc	1.53 (+15%)
3 (Vitazyme)	11.85 abc	1.43 (+14%)
7 (Product B)	11.54 bc	1.12 (+11%)
5 (New Vitazyme)	11.42 bc	1.00 (+10%)
1 (Control)	10.42 c	—

\*Means followed by the same letter are not significantly different according to the Student-Newman-Keuls Test (P=0.10). LSD<sub>0.10</sub>=1.39 grams.

**Plant Height Changes**

- New Vitazyme + Rhizobium...+27%
- Product B + Rhizobium.....+22%
- Vitazyme + Rhizobium.....+21%

**Leaf Chlorophyll Changes**

- Rhizobium.....+26%
- Product B + Rhizobium.....+22%
- Vitazyme + Rhizobium.....+21%
- New Vitazyme + Rhizobium...+21%

**Dry Weight Changes**

- Vitazyme + Rhizobium.....+34%
- Product B + Rhizobium.....+26%
- Rhizobium.....+26%
- New Vitazyme + Rhizobium...+15%
- Vitazyme.....+14%

**Apples**



**These apples treated with Vitazyme at Sodus, New York, show excellent size and development.**

**Location:** Kast Farms, Albion, New York

**Variety:** Empire

**Experimental design:** The orchard was partially treated with Vitazyme, leaving an untreated control area for comparison of sugar content (brix) and fruit pressure.

**1. Control**

**2. Vitazyme**

**Fertilization:** unknown, but the same for both treatments.

**Vitazyme application:** 24 oz/acre on the leaves at pink (May 5), petal fall (June 1), first cover (June 20), and August 1, 2005

**Yield results:** No yields were compiled for the 2005 crop because of heavy frost that greatly reduced the apple numbers. The fruit load was about 50% of normal. Even so, **the Vitazyme treatment had a heavier fruit load at midsummer than the control.**

**Quality results:** On September 29, 2005, the fruit size was rather small for both treatments, but there were differences in fruit quality.

**Conclusions:** This study on an apple orchard with a reduced fruit load showed that Vitazyme improved fruit quality significantly by improving the firmness of the fruit, and slightly increasing the sugar content. The firmer fruit occurred despite enhanced maturity, which normally would decrease

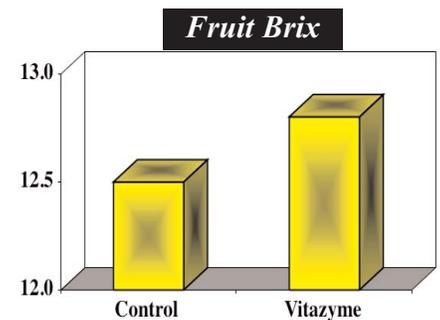
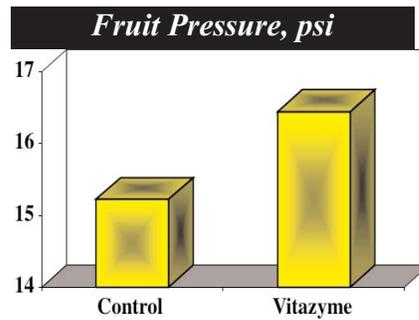
**Fruit Appearance, Maturity, Pressure, and Brix**

Treatment	Fruit appearance	Maturing	Pressure	Brix
			psi	
Control	Normal	Normal	15.22	12.5
Vitazyme	Darker and waxy	Advanced	16.44	12.8

Continued on the next page

flesh firmness. This result shows the ability of Vitazyme to increase the firmness of apple fruit by encouraging the deposition of stronger cell wall compounds such as cellulose and lignin, which should enhance storability of the fruit.

• **Increase in fruit brix: +0.3 percentage point**



• **Increase in fruit pressure: +1.22 percentage points**

## *Bermudagrass*

### *Tarleton State University*

Location: Tarleton State Turfgrass Field Laboratory, Stephenville, Texas

Variety: Princess 77 (new planting) and Tifsport (plugs)

Planting date: June 17, 2005, for the Princess 77; June 16 and 17 for the Tifsport plugs

Experimental design: A three-pronged approach to evaluating the efficacy of Vitazyme in improving the growth of bermudagrass turf was initiated using (1) a newly tilled area seeded to bermudagrass plugs, (2) a newly tilled area receiving evenly spaced bermudagrass plugs, and (3) a commercial golf course. Treatments applied to all three growing environments are given below. Four replicates were used.

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

Fertilization: Note the treatments for the three test areas

Vitazyme applications: Note the applications for the three test areas. Application was with a hand-pushed, two-wheeled, CO<sub>2</sub> pressured boom having four Teejet XR8003 nozzles calibrated to deliver 58 gal/acre at 39 psi.

Herbicide applications: In July, barnyard grass and yellow foxtail were controlled by Drive 75DF + N15. Yellow nutsedge was treated with Image 75DG + N15 + Target 66. In August, broadleaf weeds were controlled by WeedBGone, and Lesco 3Way, Pendulum AquaCap, and Drive 75DF + MES were applied later.

Irrigation: sprinkler to all plots



*Bermudagrass cores from Texas display the usual effect stimulation of roots and stolons for turf treated with this product.*

### **New Seeding Trial**

A 2,500 ft<sup>2</sup> area was cleared of weeds and grass using glyphosate sprayed on March 3 and April 26 at 2 quarts/acre. The area was tilled and raked smooth, and 5 x 5 foot plots were set up having 1-foot walkways between plots. The plots were seeded at 2 lb/1,000 ft<sup>2</sup> with Princess 77 bermudagrass. Vitazyme and fertilizer (Lesco 18-24-12% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O to give 1 lb P<sub>2</sub>O<sub>5</sub>/1,000 ft<sup>2</sup>) were applied immediately after seeding as a seed treatment. After 2 months,

on July 15, Lesco 28-3-10 was applied to give 1 lb N/1,000 ft<sup>2</sup>. This application was repeated August 12 and September 9. On October 7, the final fertilizer treatment of Lesco 5-10-31 was applied at a rate giving 1 lb K<sub>2</sub>O/1,000 ft<sup>2</sup>. The grass was mowed with a rotary mower to 1.5 inches twice weekly, but during the week of 10/7 the mowing height was lowered to 1.0 inches, which scalped the grass and lowered quality measurements.

Conclusions: This replicated bermudagrass turf study at Tarleton State University at Stephenville, Texas, proved how greatly Vitazyme can stimulate root growth, and thus early sod establishment, for a new seeding. The dry root biomass was greatly stimulated by Vitazyme, with or without fertilizer, except where Vitazyme was applied by itself at 26 oz/acre. Fertilizer alone reduced root development below the control, even though leaf development remained aggressive. **Vitazyme plus fertilizer at both the 13 and 26 oz/acre rates produced the highest root and shoot biomass,**

*Continued on the next page*

#### **Grass Color\***

Treatment	7/1	7/15	7/29	8/12	8/26	9/9	9/23	10/7	10/21
	----- color rating** -----								
1. Control	1.0	3.0	5.1 b	5.9	5.8	6.1 c	6.2 c	6.4	6.0 bc
2. Fertilizer	1.3	4.0	6.5 a	6.7	6.6	7.0 a	7.2 a	6.4	6.7 a
3. Vitazyme, 13	1.0	3.8	5.9 a	6.4	6.1	6.4 bc	6.2 c	6.0	5.9 c
4. Vitazyme, 26	1.0	3.3	5.1 b	6.4	4.6	6.2 c	6.6 b	6.3	6.1 b
5. Fert. + Vita, 13	1.3	4.5	6.4 a	6.8	6.9	6.9 a	7.4 a	6.5	6.8 a
6. Fert + Vita, 26	1.0	4.3	6.1 a	6.6	6.6	6.8 ab	7.1 a	6.4	6.7 a
LSD	NS	NS	0.7	NS	NS	0.4	0.3	NS	0.2

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

\*\*Rating system: 0=dead or no turf; 5=minimal acceptance for a golf course; 7=average turf; 10=ideal turf.

**Percent Grass Cover\***

Treatment	7/1	7/15	7/29	8/12	8/26
	----- % of plot cover** -----				
1. Control	5.8	38	56 bc	79	91 b
2. Fertilizer	7.0	48	76 c	86	95 ab
3. Vitazyme, 13	6.5	45	63 bc	77	94 ab
4. Vitazyme, 26	6.3	39	51 c	80	92 b
5. Fert. + Vita, 13	7.8	59	75 a	89	99 a
6. Fert + Vita, 26	6.3	52	66 ab	81	95 ab
LSD	NS	NS	12	NS	5

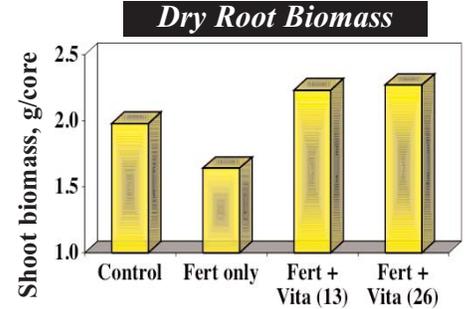
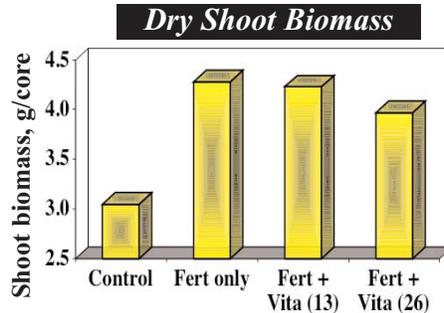
\*Treatments followed by the same letter are not significantly different at P=0.05. LSD=least significant difference. NS=non significant.  
 \*\*Rating system: 0=no green; 100=complete green turf canopy.

**Percent Grass Density\***

Treatment	7/1	7/15	7/29	8/12
	----- % density** -----			
1. Control	68 b	56 b	71	64 b
2. Fertilizer	84 a	80 a	71	77 a
3. Vitazyme, 13	68 b	58 b	67	60 b
4. Vitazyme, 26	69 b	64 b	69	63 b
5. Fert. + Vita, 13	84 a	86 a	72	77 a
6. Fert + Vita, 26	79 ab	79 a	70	75 a
LSD	14	8	NS	8

\*Treatments followed by the same letter are not significantly different at P=0.05. LSD=least significant difference. NS=non significant.  
 \*\*Rating system: 0=bare ground; 100=a canopy that resists compression from a golf ball.

exceeding the control by 28% and 24%, respectively; the fertilizer alone exceeded the control by 18%. This result demonstrates the frequently noted effect of Vitazyme improving nutrient utilization for plants. While shoot biomass was stimulated similarly (30 to 40%) by fertilizer and fertilizer + Vitazyme, the root biomass decreased by 17% with fertilizer alone but increased dramatically with Vitazyme added to the fertilizer.



Fertilizer and fertilizer + Vitazyme in some cases improved grass color, cover, and density above the control, but not on every test date. The 13 oz/acre rate of Vitazyme was generally superior to the 26 oz/acre rate in most circumstances.

The plug and golf course trials provided no significant effects of any treatments, although both trials showed positive effects of Vitazyme. The record dry growing season likely adversely affected the outcome of this experiment, and in spite of irrigation reduced the display of significant treatment differences.

Note on root development: Roots from Vitazyme treated plots were observed to be surrounded by a core of soil with intensive rhizosphere activity. This illustrates the usual observation of Vitazyme increasing mycorrhizal and exudation activity along root surfaces to enhance nutrient uptake.

- Increase in root biomass with Vitazyme (13 oz/acre): 30%
- Increase in root biomass with Vitazyme + fertilizer: 13 to 15%
- Increase in shoot biomass with Vitazyme + fertilizer: 30 to 38%

## *Bracheria Brizantha* (a perennial grass)

### *Studies in Six African Countries*

Location: Cameroon, Nigeria, Central African Republic, Niger, Tchad, and Burkina Fasso

Variety: *Bracheria brizantha*

Soil types: unknown

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

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

Fertilization: 100 kg/ha N (urea), 100 kg/ha P<sub>2</sub>O<sub>5</sub> (SSP), and 100 kg/ha dairy manure

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

Plant height and yield results:

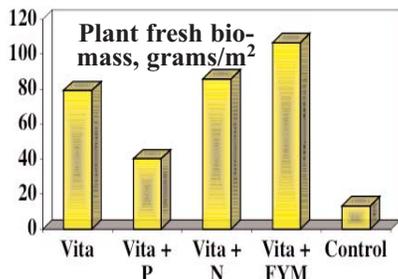
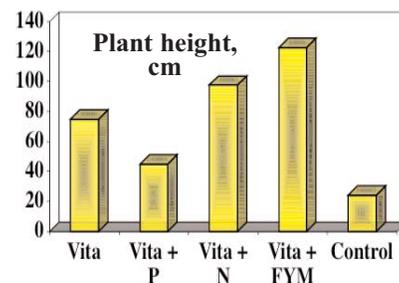
Vitazyme interacted positively with nitrogen and manure to bring excellent grass height responses. By itself Vitazyme exceeded the control by 210%, though phosphorus fertilizer reduced the response somewhat.

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

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### Plant Height, cm

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



### Plant Fresh Biomass, grams/m²

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

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

## Cabbage

**Research Organization:** CCE–Lake Plains Vegetable Program and the New York Crop Research Facility

**Location:** Batavia, New York

**Variety:** Amtrack (a storage cabbage)

**Planting date:** June 28, 2004

**In-row spacing:** 14.5 inches

**Previous crop:** turf (several years)

**Row spacing:** 30 inches

**Soil test results:** organic matter, 3.9%; pH, 7.0; CEC, 9.6 meq/100 g; K, 236 ppm; P (Mehlich), 123 ppm; P (Morgan), 40 ppm; Ca, 1,590 ppm; Mg, 121 ppm; Zn, 2.4 ppm; B, 0.9 ppm; Cu, 2.6 ppm; Al, 758 ppm; base saturation percentages, Ca = 83.1, Mg = 10.5, K = 6.3.

**Soil type:** clayey

**Experimental design:** Seven products produced by different companies were applied to cabbages at transplanting to evaluate the effects on yield and growth parameters. Plots contained 20 heads in a single row, with “guard rows” between treatments. Each treatment was replicated four times. Only one product application was made, at planting.

Treatment	Rate	Active ingredients
1. Control	0	—
2. RiseR	2.5 gal/acre	7-17-3 + Cu, Mn. and Fe + ZnNH <sub>4</sub> -acetate
3. Super Bio Ag Blend	1.5 gal/acre	3-0-0 + 1% humate + microbes
4. Alpine EXP + 6-24-6	1 qt/acre + 5 gal/acre	Humic coal product + 6-24-6
5. Vitazyme + Alpine EXP + 6-24-6	13 oz/acre + 1qt/acre + 5 gal/acre	Bio-stimulant + above products (see 3)
6. Fertiactyl GZ	4 pt/acre	13-0-5 + microbes, humates, and fulvic acid
7. Fertiactyl Starter	7 pt/acre	10-5-10 + humates, fulvic acid, zeatin, and glycine betaine
8. Hydra-Hume	2 gal/acre	0-0-2 + 12% humate + 4% fulvic acid



**This New York cabbage trial proved that Vitazyme improved growth better than any other product tested.**

**Fertilization:** 600 lb/acre Cabbage Blend M (14.7-13.1-2.9-0.7% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O-S-Zn) broadcast in the spring; two applications of 32% N Nitran (70 lb/acre N) side-dressed during the growing season

**Product application:** On June 28 at transplanting, furrows in the field were dug with a hoe and the transplants were placed-in-them. The products were poured evenly in 350 gal/acre equivalent of water over the transplants to simulate mechanical planter placement.

**Growing season:** unusually wet and cool all summer, giving high disease pressure (especially black rot), but low insect pressure

**Harvest and yield results:** On October 20, 2004, a final overall plant health rating was made. Then every other head, for a total of 10 heads per replicate, was harvested and weighed. Of these 10 heads, five were selected at random to measure individual weight, length, and width. These data were used to estimate head density. Head quality was also judged at harvest.

*Continued on the next page*

No treatment means were significantly different, but there were some notable differences among the treatments. The Hydra-Hume had the highest field (health) rating for barefoot transplants at harvest, while Hydra-Hume, Fertiactyl Starter, Vitazyme, Super Bio, and the control had virtually identical high ratings for plug transplants. Individual head weight was highest for RiseR and

Treatment	Field rating <sup>1</sup>		Head weight		Yield <sup>2</sup>		Head density	
	barefoot	Plugs	barefoot	Plugs	barefoot	Plugs	barefoot	Plugs
			----- lb -----		---- tons/acre----		grams/in <sup>2</sup>	
1. Control	4.3	4.2	4.0	3.1	28.8	22.7	0.53	0.48
2. RiseR	4.1	3.8	4.3	3.3	30.4	23.6	0.60	0.57
3. Super Bio	2.4	4.2	3.1	3.3	19.3	20.5	0.58	0.62
4. Alpine	3.7	3.1	3.6	3.4	25.7	19.1	0.57	0.56
5. Vitazyme	3.0	4.2	3.4	<b>4.2</b>	21.4	<b>31.2</b>	0.57	0.51
6. Fertiactyl GZ	3.9	3.4	3.4	3.0	25.0	21.1	0.62	0.51
7. Fertiactyl St.	3.9	4.3	3.2	3.2	23.3	21.1	0.49	0.61
8. Hydra-Hume	4.7	4.2	4.2	3.2	29.9	23.3	0.50	0.51

<sup>1</sup>Field rating: 1 = all dead, 5 = plants look very healthy.

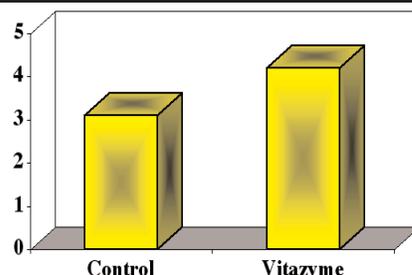
<sup>2</sup>Estimated yield adjusted for missing plants (i.e., dead), but including unmarketable heads; (average head weight)(14,400 plants/acre) + (2000 lb)(100% - % missing plants).

Hydra-Hume for barefoot transplants, but **by far the highest head weight for plugs was with Vitazyme (+35%)**. Estimated yields varied considerably for barefoot plants, being highest for RiseR, Hydra-Hume, and the control, while **Vitazyme produced by far the highest yield for the plug transplants (+37%)**. Head density was highest for Fertiactyl GZ with barefoot plants, and for Super Bio and Fertiactyl Starter for plugs.

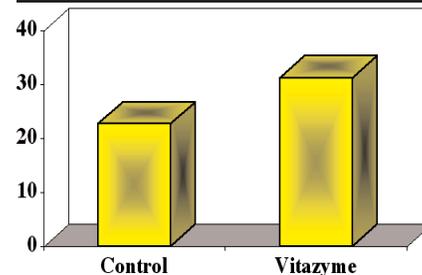
**Conclusions:** According to the researchers, "Although not significant, Vitazyme +

Alpine EXP 6-24-6 (Treatment 5) on plug transplants had the greatest effect on yield. Compared to the untreated check, this treatment increased yield by 8.5 tons/acre (37.4%) and improved head quality. RiseR and Hydra-Hume also increased yield by 5.6% and 3.8%, respectively, on bare roots, and by 4.0% and 2.6%, respectively, on plugs, although not significantly. Note, Hydra-Hume had a higher percentage of poor quality heads at harvest compared to the untreated check."

**Head Weight, lb/head - Plugs**



**Cab. Yield, tons/acre - Plugs**



### Cost Benefit Per Acre of Materials That Demonstrated Yield Enhancement Capabilities

Treatment	Transplants	Rate/Acre	Yield enhancement <sup>1</sup>				Cost of product			Cost benefit, \$/acre	
			Processing		Fresh market		\$/gal	\$/acre	Total, \$/acre	Processing	Fresh market
			tons/acre	\$/acre	tons/acre	\$/acre					
RiseR	bare roots	2.5 gal	1.6	77.92	1.6	403.20	8.25	20.63	20.63	57.29	382.57
	plugs	2.5 gal	0.9	43.83	0.9	226.80	8.25	20.63	20.63	23.20	206.17
Vitazyme	plugs	13 oz					45.00	4.57			
Alpine EXP		1 qt					10.00	2.50			
6-24-6		5 gal	8.5	413.95	8.5	2,142.00	2.70	13.50	20.57	393.38	2,121.43
Hydra-Hume	bare roots	2 gal	1.1	53.57	1.1	277.20	6.50	13.00	13.00	40.57	264.20
	plugs	2 gal	0.6	29.22	0.6	151.20	6.50	13.00	13.00	16.22	138.20

<sup>1</sup>USDA average commodity prices: processing = \$48.70/ton; fresh = \$252.00/ton.

▪ **Increase in head weight: + 35%**

▪ **Increase in head yield: +37%**

## Cabbage

Location: Monroe County, New York

Variety: Huron

Soil type: sandy loam

Previous crop: alfalfa

Planting date: June 12, 2005 (transplants)

Experimental design: A cabbage field was partly treated with Vitazyme (10 acres) to evaluate its effect on yield and quality when complementing the grower's typical program.

### 1. Control

### 2. Vitazyme

Fertilizer: 1,000 lb/acre of 10-20-20% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O, plowed in before planting; 25 gal/acre of a 30% N solution side-dressed in July. Total N: 175 lb/acre.

Vitazyme application: 13 oz/acre applied seven times during the growing season: in the transplant water (13 oz in 500 gal/acre water), and with fungicides and insecticides on June 30, July 16, July 30, August 15, September 7, and September 24

Harvest date: October 7 to 12

Yield results: No actual yield checks were made, but a close estimate based on one-ton boxes showed a modest 6 bu/acre yield increase with Vitazyme.

Income results: At \$10/bu of cabbage, the income increased by about \$60/acre.

Continued on the next page

Quality and storage results: The Vitazyme treated cabbage was more dense as determined by the weight of 1-ton (40 bushel) storage boxes.

**Vitazyme box weight: 1,920 lb (+120 lb)**

**Control box weight: 1,800 lb**

As of late December 2005, the Vitazyme treated cabbages were storing better than the control cabbages.

Conclusions: In this New York cabbage study, Vitazyme increased the yield, density, and storability of cabbage to a highly profitable degree. Results of the treatment in the field could be observed right to the row. Density increases were most likely due to greater soluble solids and tighter leaf development within the head. Improved storability is due to higher soluble solids in the cells and stronger cell walls that resist desiccation and physical damage.

▪ **Increase in yield: + 6 bu/acre**

▪ **Increase in cabbage density: + 7%**



*Note the uniformly vigorous growth of this Monroe County, New York, cabbage field. Vitazyme increased both yield and head density of the crop.*

## Coffee

A coffee study was conducted in Cuba on newly grafted plants. Little information is available on study details, but parameters measured are given below, showing a notable benefit of Vitazyme in the growth of the young coffee plants. The dosage rate was 15 ml per plant of an 8 ml/liter (0.8%) Vitazyme solution.



*A full crop of coffee beans results from Vitazyme application in all tropical countries.*

Treatment	Plant height	Stalk diameter	Pairs of leaves	Top dry weight	Root dry weight	Root length
	cm	cm	pairs	grams	grams	cm
1. Control	13.66	0.190	5.75	0.57	0.15	19.96
2. Graft soak (20 min.)	13.40	0.157	5.65	0.54	0.12	20.35
3. Foliar spray in the first leaf pair	14.66	0.176	5.95	0.61	0.14	22.73
4. Foliar spray in the second leaf pair	15.24	0.168	6.20	0.80	0.16	22.91
5. Foliar spray in the third leaf pair	15.34	0.190	6.15	0.68	0.14	21.55
6. Graft soak + foliar spray in the third leaf pair	17.78	0.229	6.35	1.00	0.22	22.43

Conclusions: Vitazyme improved young grafted coffee plant growth for all applications, except for the graft soak only (Treatment 2). **Plant height** was greatest for the graft soak and monthly foliar sprayer (third leaf pair; **+30%**), and **stalk diameter (21%)**, **leaf growth (+10%)**, and **top and root dry weights (+75% and +47%)** were also greatest for this treatment. Root length was similar for all foliar Vitazyme applications. It appears that Vitazyme application to the third leaf pair was most effective – especially when coupled with a graft soak — although the second leaf pair application did about as well. The first leaf pair application gave a slightly lower growth response for several parameters.

## Corn

### Agriculture Custom Research and Education Services

Location: Cedar Falls, Iowa

Variety: Pioneer 34N43 (non-GMO)

Previous crop: soybeans

Soil type: Floyd loam (pH 6.8, organic matter 4.2%, CEC 15.7, good fertility)

Planting depth: 1.5 inches

Planting rate: 29,900 seeds/acre

Row spacing: 30 inches

Planting date: May 8, 2005

Tillage: field cultivator

Experimental design: A Latin square design with eight replicates and eight treatments was set up in a uniform area having 6-row plots of 15 x 40 feet (0.0138 acre). The purpose of the trial was to discover the effect of Vitazyme, a new Vitazyme variant (Product X), a possible synergist with Vitazyme (Product Y), and another possible synergist (Product Z) on corn yield, grain/plant, and grain moisture content. The Student-Newman-Keuls test was used to separate treatment means.

Treatment	Product	Rate
1	None	0
2	Vitazyme	13 oz/acre x 2
3	Vitazyme + Product Y	13 oz/acre each x 2
4	Vitazyme + Product Y	6.5 oz/acre each x 2
5	Product Y	13 oz/acre x 2
6	Product X + Product Y	6.5 oz/acre each x 2
7	Product Z	16 oz/acre x 2
8	Vitazyme + Product Z	13 oz/acre (Vita.) + 16 oz/acre (Z) x 2

Fertilization: 100 lb/acre of N as 33 gallons/acre of 28-0-0% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O; P and K adequate

Vitazyme application: 13 oz/acre or 6.5 oz/acre on

*Continued on the next page*

## Grain Yield

Treatment	Grain yield*	Change	Moisture*	Change	Grain/Plant*	Change
	bu/acre	bu/acre	%	%	lb/plant	lb/plant
1. Control	145.4 b	—	18.4 a	—	0.633 a	—
2. Vitazyme	152.4 ab	7.0 (+5%)	19.0 a	+0.6	0.644 a	0.011 (+2%)
3. Vita + Prod Y	148.8 ab	3.4 (+2%)	19.3 a	+0.9	0.628 a	(-)0.005 (-1%)
4. Vita + Prod Y (1/2 rate)	153.2 ab	7.8 (+5%)	18.9 a	+0.5	0.636 a	0.003 (+0%)
5. Product Y	158.1 ab	12.7 (+9%)	18.5 a	+0.1	0.646 a	0.013 (+2%)
6. Prod X + Prod Y (1/2 rate)	161.9 a	16.5 (+11%)	18.9 a	+0.5	0.658 a	0.025 (+4%)
7. Product Z	163.0 a	17.6 (+12%)	18.7 a	+0.3	0.639 a	0.006 (+1%)
8. Vita + Prod Z	158.6 ab	13.2 (+9%)	18.7 a	+0.3	0.637 a	0.004 (+1%)
LSD (P=0.05)	10.6		0.74			
Standard deviation	10.5		0.73			
Coeff. of variation	6.79%		3.89%			

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



**Right to the row in this Iowa research plot the effect of Vitazyme can be seen: larger, darker green plants.**

A variant of Vitazyme increased yield by 11% when applied with Product Y, while Product Y alone increased yield by 9%. Product Z caused the greatest yield increase: 12%. Grain moisture was not significantly different among all eight treatments, and likewise for corn weight/plant, although Products X + Y (half rate) gave a 4% increase in grain/plant. Income increased with all seven treatments, the greatest being for Product Z (\$52.80/acre).

<b>Yield Changes</b>	
Vitazyme.....	+5%
Vitazyme + Product Y	
Full Rate.....	+2%
Half Rate.....	+5%
Product Y.....	+9%
Prod X + Prod Y	
Half Rate.....	+11%
Product Z .....	+10%
Vitazyme + Product Z...	+9%

**Conclusions:** In this Iowa replicated corn study using four different products, Vitazyme increased corn yields by 2 to 9% (up to 13.2 bu/acre) alone or in combination with another product.

the seeds at planting, and on the leaves and soil at knee height (six leaves)

**Product X application:** 6.5 oz/acre on the seeds at planting, and on the leaves and soil at knee height (six leaves)

**Product Y application:** 13 oz/acre or 6.5 oz/acre on the seeds at planting, and on the leaves and soil at knee height (six leaves)

**Product Z application:** 16 oz/acre on the seeds at planting, and on the leaves and soil at knee height (six leaves)

**Harvest date:** October 15, 2005

**Yield and population results:** The two center rows of each plot were harvested with a plot combine, and the grain was weighed with an electronic scale. Plants were counted for the harvested rows.

**Income results:** At \$3.00/bu for corn, the following income increases have been calculated.

Treatment	Grain increase	Extra income
	bu/acre	\$/acre
2. Vitazyme	7.0	21.00
3. Vita + Prod Y	3.4	10.20
4. Vita + Prod Y (1/2 rate)	7.8	23.40
5. Product Y	12.7	38.10
6. Prod X + Prod Y (1/2 rate)	16.5	49.50
7. Product Z	17.6	52.80
8. Vita + Prod Z	13.2	39.60

## Corn

### Evaluations of a New Cold Weather Product

**Location:** several in the Midwest and Northeast

**Experimental design:** A series of five studies was conducted in northern climates to determine the effectiveness of a new variation of Vitazyme to improve the growth and productivity of corn during cold and wet weather. Previous work had shown some limitations of standard Vitazyme to stimulate corn yield responses when soil temperatures were below 50°F, and the soil was wet, thus inhibiting microbial activity which is essential for Vitazyme's primary mode of action.

Site number	Control	Regular Vitazyme	New Vitazyme	Grain moisture	Grain weight
	----- bu/acre, at 15.5% H <sub>2</sub> O -----			%	lb/bu
1	—	143.0	151.6	-1.3	—
2	—	155.0	156.5	-1.1	—
3	125.3	—	128.3	-0.1	+2.0
4	92.0	98.0	102.5	-0.1	+0.5
5	—	124.6	128.2	-0.6	+0.5
6	145.4	152.4	161.9	—	—

*Continued on the next page*

Yield results:

**Average increase in yield (vs. control) with regular Vitazyme: 6.50 bu/acre**

**Average increase in yield (vs. control) with new Vitazyme: 10.00 bu/acre**

**Average increase in yield (vs. regular Vitazyme) of new Vitazyme: 5.54 bu/acre\***

\*This value does not equal the difference of the above two values because of different comparisons amongst the five sites. The value of 5.54 bu/acre represents a significant increase in corn yield vs. the yields of regular Vitazyme at P=0.02 according to the Student-Newman-Keuls-Test (P=0.10), using individual sites as replicates. Means: 140.1 bu/acre (new Vitazyme), 134.6 (regular Vitazyme); LSD<sub>0.10</sub>=3.2 bu/acre.

Grain moisture: New Vitazyme reduced grain moisture from the control or regular Vitazyme treatment by an average of 0.64 percentage point over five sites.

Grain weight: New Vitazyme increased grain test weight versus the control or regular Vitazyme by an average of 1.0 lb/bu for three sites.

# Corn

## Cold Weather Soil Treatment

Location: Pritchett, Texas

Variety: Country Gentleman

Planting date: January 26, 2005

Row spacing: 24 inches

In-row spacing: 6 inches

Previous crop: vegetables

Soil type: Lilbert loamy fine sand, heavily amended (4.5 % organic matter)

Experimental design: An area of 25 x 15 feet was planted to 12 rows of corn, each row being one treatment of a four treatment design having three replicates. The corn was planted in cold weather with the purpose of discovering if any of the treatments would aid in the response of seedling growth during cold weather.

**1. Control      2. Vitazyme      3. New Vitazyme      4. Product B**

Fertilization: none

Vitazyme and product application: a spray of a 1 oz/gallon solution on the seeds, after planting and before covering; Product B was a 0.1% (w/v) solution of this material.

Weather during germination and early growth: Very cool and moist; two frosts killed a goodly number of plants.

Rainfall: January 27

(trace), 28 (0.14"), 29

(0.01"), 30 (trace), 31

(0.49"); February 1

(0.40"), 2 (0.08"), 6

(0.43"), 7 (1.86"), 9

(0.02"), 12 (0.03"), 13

(0.06"), 18 (trace), 19

(0.02"), 20 (0.02"), 23

(1.03"), 24 (0.31"), 27

(0.20"); March 2

(0.15"), 4 (trace), 9

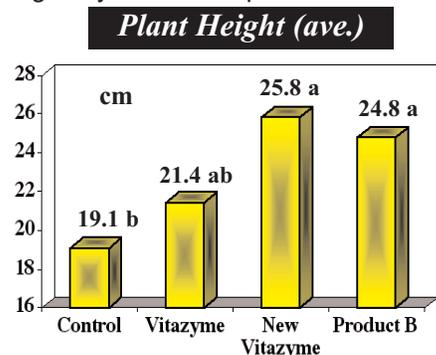
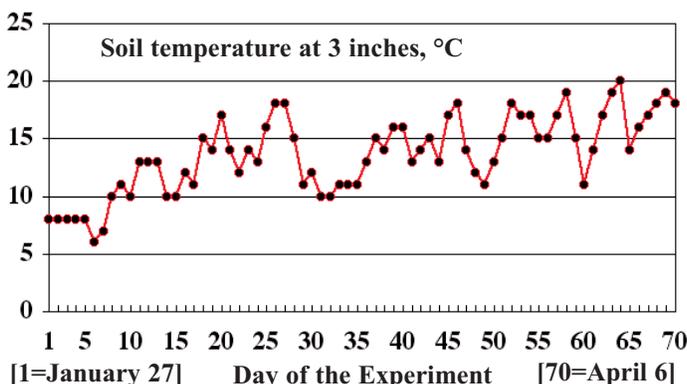
(0.06"), 15 (0.01"), 16

(trace), 20 (0.01"), 21

(0.69"), 26 (0.02"), 27

(0.74"), 31 (0.55"); April 1 (0.08"), 5 (trace). Total rainfall for the test period: 7.41

inches.



\*Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls Test. n=14. LSD<sub>0.10</sub> = 4.9 cm.

Growth results: On April 7, 2005, 70 days after trial initiation, the individual corn plants were measured. Because of severe frost damage on two days during the study, the plant stand was seriously reduced, and individual plot totals were quite variable. Therefore, the plants were considered as individual replicates throughout the test area and analyzed as a Completely Randomized Design, using CoHort software.

Conclusions: Both the New Vitazyme and Product B in this cold weather growth response study gave significant increases in plant height, of 35% and 30%, respectively. Vitazyme gave a 12% increase in height over the 70-day period of the test. New Vitazyme and Product B hold much promise in stimulating good seedling growth during cold and wet conditions, typical oftentimes of planting conditions in the U.S. and Canada during many planting seasons.

**Height Changes**

New Vitazyme...+35%

Product B.....+30%

Vitazyme.....+12%

**“Let the farmer forever be honored in his calling,  
for they who labor in the earth are the chosen people of God.”**

**Thomas Jefferson**

# Corn

## New Product Evaluation

Location: Gasport, New York

Soil type: Hilton silt loam

Experimental design: A uniform, 20 acre corn field was divided into two parts, one treated with regular Vitazyme and the other with a new cold-weather version of Vitazyme. The objective was to evaluate differences in corn yield and maturity for these two products.

Variety: 36B09 Pioneer

Previous crop: soybeans

Planting date: May 18, 2005

### 1. Regular Vitazyme

### 2. Cold weather Vitazyme



**Roots from corn treated with Vitazyme are bigger, with more root hairs for greater nutrient absorption. A new formulation has further enhanced this quality.**

Income results: The corn value is estimated at \$3.00/bu. Corn drydown cost is estimated at \$0.065/bu/point of moisture for a 150 bu/acre corn crop for commercial grain drying.

Conclusions: Cold weather Vitazyme in this New York on-farm field study performed better than the standard Vitazyme by raising corn yield by 6% (8.6 bu/acre) and reducing grain moisture by 1.3 percentage points more than the standard formulation. Such improvement led to \$36.21 more income per acre for the new cold formulation. This result shows considerable promise for the use of this product during cold spring conditions.

Fertilization: Preplant: 100 lb/acre high-calcium lime; 100 lb/acre (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> broadcast. At planting: 4.5 gal/acre of 9-18-9% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O. At 24 inches height: 19 gal/acre nitrogen solution; 1 gal/acre liquid calcium.

Vitazyme application: 13 oz/acre on the seeds at planting, with the 9-18-9

Herbicide application: At emergence: 0.5 pint/acre Dual + 1 pint/acre Atex + 1 gal/acre liquid calcium. At nitrogen solution application: 0.25 pint/acre Bucktil + 1 pint/acre Atex.

Harvest date: October 18, 2005

Yield and grain moisture results: Yields were calculated by using a combine monitor for both areas, reading a full harvested swath near the dividing boundary for each treatment. Grain moisture readings were taken for both treatments.

Treatment	Yield bu/acre	Change bu/acre	Grain moisture %	Change %
Regular Vitazyme	143.0	—	18.3	—
Cold-Weather Vitazyme	151.6	+8.6 (+5%)	17.0	-1.3 percentage points

Treatment	Crop income \$/acre	Drying cost* \$/acre	Net income** \$/acre	Change \$/acre
Regular Vitazyme	429.00	39.97	389.03	—
Cold-Weather Vitazyme	454.80	29.56	425.24	+36.21

\*Drying to 14.0% moisture.  
\*\*Crop income (-) Drying cost

▪ **Increase in grain yield: +6%**

▪ **Increase in income: \$36.21/acre**

▪ **Decrease in grain moisture: -1.3 percentage points**

# Corn

## New Product Evaluation

Location: Gasport, New York

Soil type: Hilton silt loam

Experimental design: A uniform, 25 acre corn field was divided into two parts, one treated with regular Vitazyme and the other with a new cold-weather version of Vitazyme. The objective was to evaluate differences in corn yield and maturity of these two products.

Variety: 34G82 Pioneer

Previous crop: soybeans

Planting date: May 9, 2005

### 1. Regular Vitazyme

### 2. Cold weather Vitazyme

Fertilization: Preplant: 100 lb/acre high-calcium lime; 100 lb/acre (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> broadcast. At planting: 4.5 gal/acre of 9-18-9% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O. At 24 inches height: 19 gal/acre nitrogen solution; 1 gal/acre liquid calcium.

Vitazyme application: 13 oz/acre on the seeds at planting, with the 9-18-9

Herbicide application: At emergence: 0.5 pint/acre Dual + 1 pint/acre Atex + 1 gal/acre liquid calcium. At nitrogen solution application: 0.25 pint/acre Bucktil + 1 pint/acre Atex.

Harvest date: October 18, 2005

Yield and grain moisture results: Yields were calculated by using a combine monitor for both areas, reading a full harvested swath near the dividing boundary for each treatment. Grain moisture readings

Treatment	Yield bu/acre	Change bu/acre	Grain moisture %	Change %
Regular Vitazyme	155.0	—	18.1	—
Cold-Weather Vitazyme	156.5	+1.5 (+1%)	17.0	-1.1 percentage points

*Continued on the next page*

were taken for both treatments.

**Income results:** The corn volume is estimated at \$3.00/bu. Corn drydown cost is estimated at \$0.065/bu/point of moisture for a 150 bu/acre corn crop for commercial grain drying.

Treatment	Crop income	Drying cost*	Net income**	Change
	\$/acre	\$/acre	\$/acre	\$/acre
Regular Vitazyme	465.00	41.31	423.69	—
Cold-Weather Vitazyme	469.50	30.52	435.98	+15.29

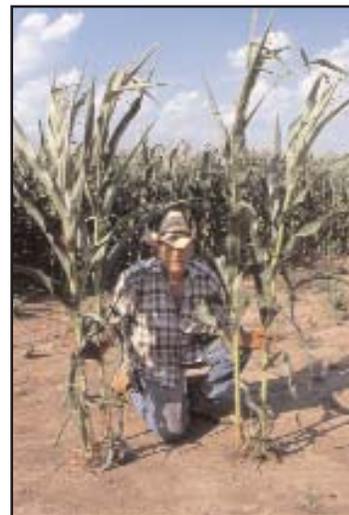
\*Drying to 14.0% moisture.  
\*\*Crop income (-) Drying cost

**Conclusions:** Cold weather Vitazyme in this New York in-farm corn study increased grain yield only slightly over regular Vitazyme, but the grain drydown was substantially enhanced. This drydown benefit was nearly the same as for another study with this product on the same farm, but in that study the yield was also enhanced by 6%. Potential for this new version of Vitazyme appears to be good.

▪ **Increase in grain yield: +1%**

▪ **Decrease in grain moisture:-1.1 percentage points**

▪ **Increase in income: \$15.29/acre**



A new cold weather Vitazyme formulation in this study increased plant size, root growth, and yield above regular Vitazyme.

## Corn

### North Carolina State University

**Location:** Hertford, North Carolina

**Soil type:** Roanoke silt loam

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

**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.

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

**Previous crop:** soybeans

**Planting date:** April 21, 2005

**Row width:** 30 inches

#### Main Plots

- 27,000 seeds/acre
- 38,000 seeds/acre

#### Subplots

- Control
- Vitazyme
- Starter
- Vitazyme + Starter

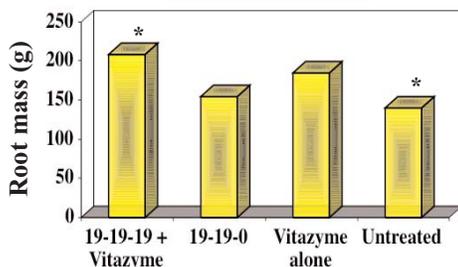
**Fertilization:** A 19-19-0% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O fertilizer was applied to the subplots 3 and 4 at a 10 gal/acre rate in a 2 x 2 inch band below and beside the seeds at planting. On June 7, 60 gal/acre of 30% UAN (urea ammonium nitrate) was applied.

**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

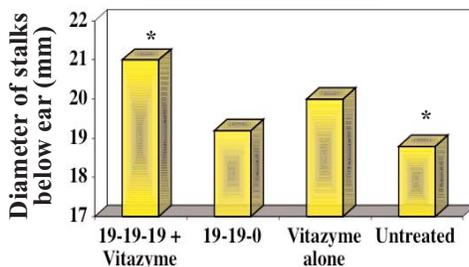
**Root and stalk results:** In early July five plants in consecutive order in rows of each treatment were dug, and the soil was washed from the root balls. Roots were pruned and dried, and the stalk diameter at the first internode below each ear was measured. Root ball depth and diameter were also measured.

#### Root Mass



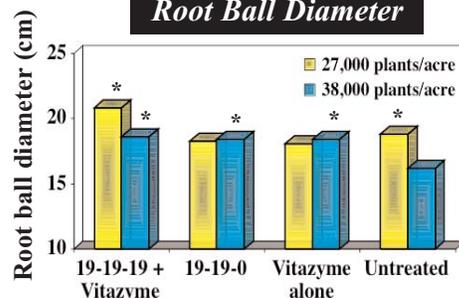
\*Significantly greater than the control. LSD<sub>0.05</sub> = 43.5

#### Stalk Diameter



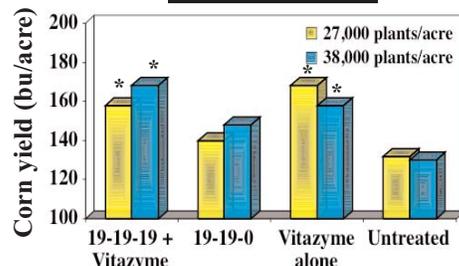
\*Significantly greater than the control. LSD<sub>0.05</sub> = 0.93 mm.

#### Root Ball Diameter



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

#### Grain Yield



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

Continued on the next page

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.

## Corn

### North Carolina State University

Location: Pantego, North Carolina

Soil type: Fork fine sandy loam

Population: 33,000 seeds/acre

Experimental design: A randomized complete block design with four replications was set up on a uniform soil area. Each plot was 10 x 40 feet. Three treatments were utilized to investigate the effects of Vitazyme and a starter fertilizer on corn leaf diseases and yield.

**1. Control**

**2. Vitazyme**

**3. Starter**

Fertilization: A 19-19-0% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O starter fertilizer at 10 gal/acre was applied 2 inches below and 2 inches beside the seed row of Treatment 3. On June 6, 30% UAN (urea ammonium nitrate) was applied at 60 gal/acre.

Vitazyme application: 13 oz/acre applied to the seeds at planting

Weed control: excellent control with Bicep, Roundup, Accent, and Banvel

Disease ratings: In mid-july, disease ratings were taken for Southern Corn Leaf Blight and Gray Leaf Spot.

Conclusions (by the researcher): Vitazyme significantly reduced the severity of Southern Corn Leaf Blight and Gray Leaf Spot infections in corn compared with an untreated check, while the use of a starter fertilizer (19-19-0) did not affect the severity of these two leaf diseases. Vitazyme also improved grain yield compared to the untreated check but there was no significant yield difference between the Vitazyme treatment and the starter treatment. In fact, the plots receiving the starter treatment tended to have higher yield compared to the Vitazyme treatment (226.7 vs 215.9 bu/acre). These results support the claim that Vitazyme helps stimulate the biochemical mechanisms that allow the corn plant to resist disease infection. While these diseases were not noted at this site until the late milk stage (R2-R3), it appears that the effects of the Vitazyme treatment resulted in an increase in grain yield. A yield increase was also observed when starter fertilizer was applied despite the fact that there were no improvements in disease resistance.

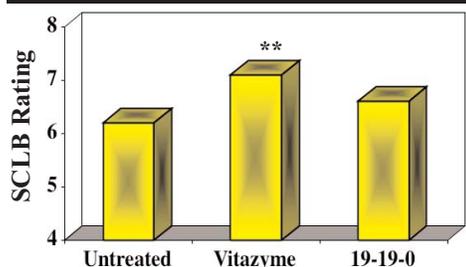
Planting date: April 20, 2005

Row width: 30 inches



**Research at North Carolina State University has shown that corn yield and disease resistance has been increased with Vitazyme application.**

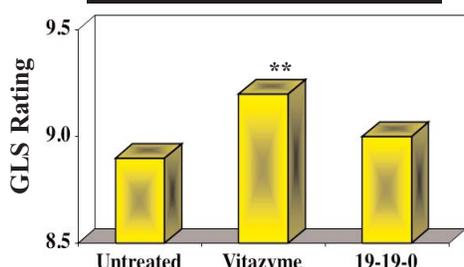
#### Southern Corn Leaf Blight Rating\*



\*Rating System: 1=leaves completely covered with lesions; 10=no disease.

\*\*Significantly greater than the control. LSD<sub>0.05</sub> = 0.4.

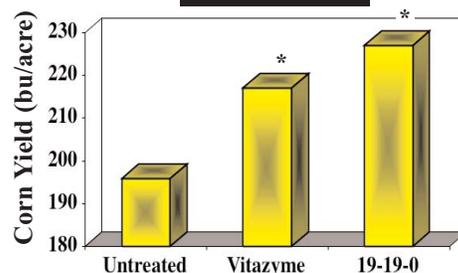
#### Gray Leaf Spot Rating\*



\*Rating System: 1=leaves completely covered with lesions; 10=no disease.

\*\*Significantly greater than the control. LSD<sub>0.05</sub> = 0.25.

#### Grain Yield



\*Significantly greater than the control. LSD<sub>0.05</sub> = 12.6 bu/acre



# Dry Beans

Research institution: Instituto de Ciencia Animal

Variety: black dry beans

Planting rate: unknown

Experimental design: A field of black dry beans was divided into four replicates in a completely randomized design with each plot comprising 80 meters of row. Evaluations were made on yield and yield parameters to determine the effects of Vitazyme.

Location: San Jose de las Lajas, Havana, Cuba

Soil type: red ferralitic (Eustrustox or Ferralsol)

Planting date: unknown

## 1. Control

## 2. Vitazyme

Fertilization: none

Insecticide applications: none

Harvest rate: unknown

Vitazyme application: 1.5 liters/ha before flowering

Irrigation: none

Yield results:

Treatment	Pod length <sup>1</sup>	Change	Beans/pod <sup>2</sup>	Change	Malformed beans <sup>3</sup>	Change	Bean yield <sup>4</sup>	Change
	cm	cm	number	number	%	%	kg/ha	kg/ha
Control	7.1 b	—	4.5	—	12.6	—	142.19	—
Vitazyme	7.4 a	0.3 (+4%)	5.2	0.7 (+16%)	6.1	(-) 52%	177.35	35.16 (+25%)

<sup>1</sup>Significant difference at P=0.01 (SE± 0.01 cm); <sup>2</sup>significant difference at P=0.01 (SE±0.05 beans); <sup>3</sup>significant difference at P=0.01 (SE±1.15%); <sup>4</sup>significant difference at P=0.01 (SE±9.03 kg/ha).

Conclusions: [Report of the Cuban researcher:] "This trial was carried out under adverse conditions, since after planting other field operations (irrigation, fertilization, pesticides, and cultivation) were not implemented. Under these conditions Vitazyme application showed positive effects on bean yield."

"In spite [of the fact] that the area did not receive cultural attention and Vitazyme was applied before flowering:

- There was greater pod length and number of beans, as well as [a] smaller number of malformed beans when Vitazyme was applied.
- Yield increased by 24.73% when Vitazyme was applied.
- Under adverse trial conditions (no irrigation, fertilization, and pesticides) Vitazyme showed positive effects."

### Changes with Vitazyme

Pod length .....	+4%
Beans/pod .....	+16%
Malformed beans .....	-52%
Bean yield .....	+25%

"It is recommended to carry out new trials under actual crop production conditions."

# Fruit — Apples

Researcher: agr.assistance

Location: Wayne County, New York

Variety: Empire

Population: 550 trees/acre

Rootstock: M9

Tree age: 12 years (full-bearing)

Experimental design: Vitazyme was tested on a commercial apple orchard which had some rows treated and other left untreated. At harvest, various fruit parameters were measured to evaluate effects on fruit yield and quality.

## 1. Control

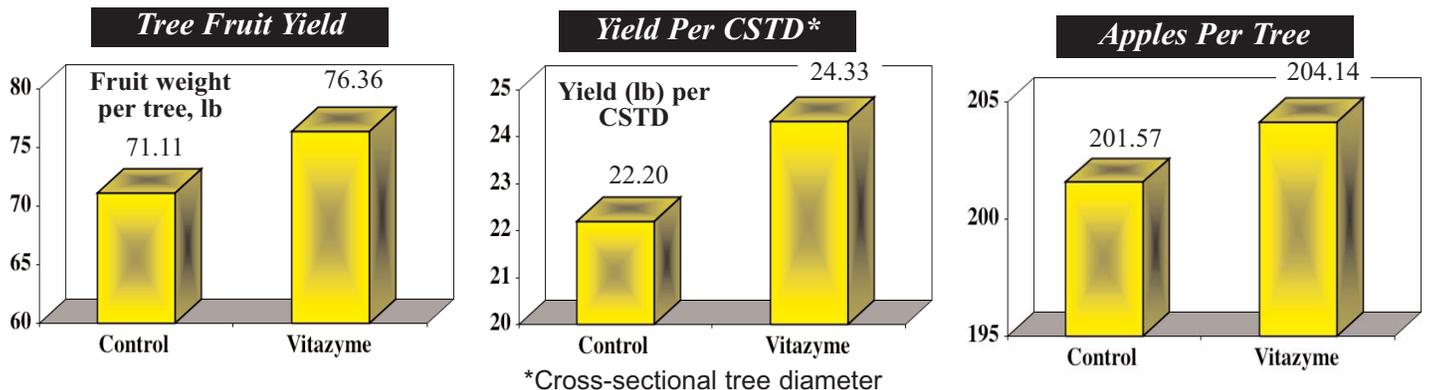
## 2. Vitazyme

Fertilization: unknown

Vitazyme application: 16 oz/acre at pink, petal fall, first cover, and 30 days pre-harvest in 100 gallons/acre sprays

Weather for 2005: unusually cool during bloom, and then unusually hot and dry until harvest.

Yield results: At harvest on October 3, 2005, seven trees of similar size and crop load were selected for evaluating the two treatments.



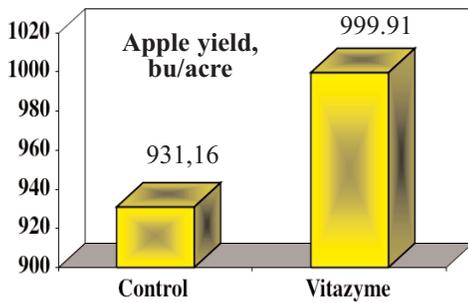
• Increase in fruit weight: +7%

• Increase in yield/CSTD: +10%

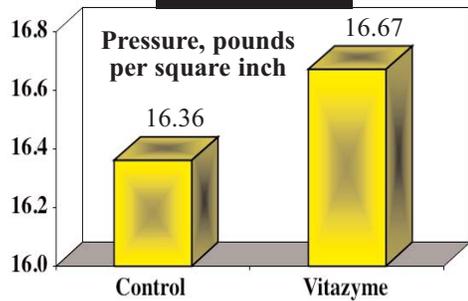
• Increase in apples per tree: +3%

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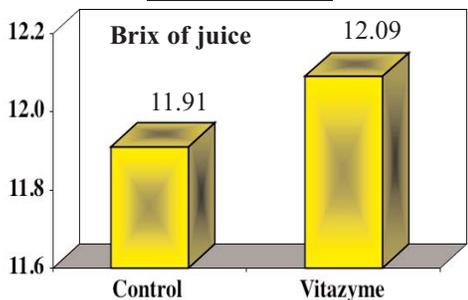
### Estimated Yield



### Fruit PSI



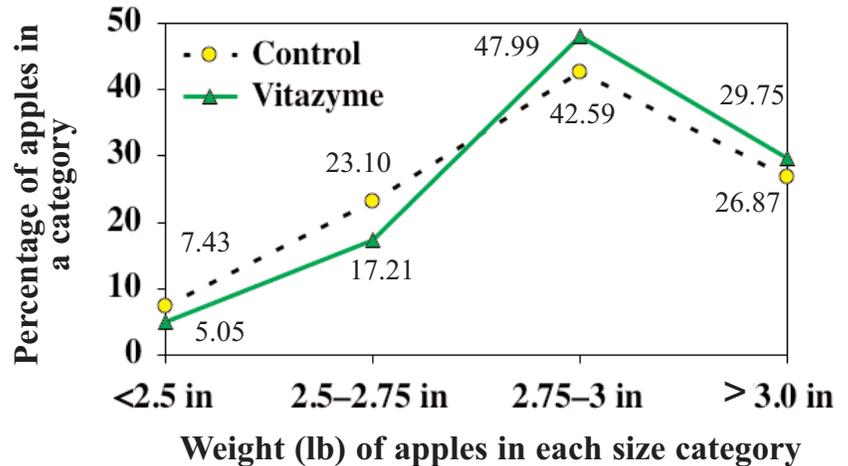
### Fruit Brix



### • Increase in apple yield: +7.4%

Vitazyme increased all parameters relating to fruit yield, which resulted in a 7% increase in apple yield.

**Fruit quality and size results:** All fruit was sized by categories, and the weights for each category were added and percentages for each category were determined. Vitazyme produced larger fruit, especially the fruit over 3.0 inches in diameter; smaller sizes were reduced proportionately. Fruit brix and pressure also increased with Vitazyme treatment



**Conclusions:** Vitazyme boosted the yield of Empire apples in this western New York trial. According to the investigator, "As in 2004 evaluation, in 2005 Vitazyme treated rows again produced somewhat larger fruit size (+5.5%), higher yield (7.4%), as well as an increase in percentage of 3"-plus diameter fruit. Vitazyme treated fruit were also somewhat firmer (by 0.31 psi) and had slightly higher brix levels (by 0.18 brix) than untreated trees. There were no apparent differences in fruit set, nor were any fruit color differences noted.

- Increase in mean fruit size: +5.5%
- Increase in fruit PSI: +1.9%
- Increase in fruit brix: +1.5%

## Gourds

### A Testimonial

**Location:** Blue Moon Gourd Farm, Liberty City, Texas

**Previous crop:** untilled

**Area planted:** 0.129 acre

**Fertilization:** dolomitic limestone, 195 lb/acre 10-10-10% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O

**Vitazyme application:** 13 oz/acre in June and July of 2005, on the leaves and soil

**Comments:** "After losing our early gourds due to a heavy rain, we replanted with just a few varieties over the area. It was

**Variety:** several

**Soil type:** very fine sandy loam



Before Vitazyme and balanced soil fertility (July of 2004), the gourds show poor growth.

n't long before we began to see growth averaging about a foot a day. At peak season (June) we had leaves that measured 16 to 18 inches wide. Our trellises were completely covered with growth. The miniature vines produced over 100 miniature gourds, and are still producing after Christmas . . . We believe that the Vitazyme we used was wonderful."



After Vitazyme application and better fertility in 2005, gourd growth greatly improved.

# Grapes

## Evaluation of Wine Produced in 2004

Vineyard: Mondello Vineyards

Location: San Miguel, California

Variety: Cabernet Sauvignon

Experimental design: Wine was produced from the control and Vitazyme treated areas of the vineyard by Donatoni Winery, Paso Robles, California, according to the state-of-the art methods. One stainless steel barrel and one oak barrel of each grape batch were produced, beginning September 25, 2004. Initial pH, acidity, brix, and quality data of both lots are recorded in the *2004 Vitazyme Crop Results*. Additional results from the two batches are given below.

According to these analyses of the wine as conducted by Baker Wine and Grape Analysis, Pasa Robles, California, there are no obvious differences between the two wine lots.

### February 17, 2005, analyses

Treatment	Ethanol	VA	pH	Total acidity	Malic acid	Lactic acid	RS	GF	Density
	%	g a a/100 ml		g tar/100 ml	g/liter	g/liter	g/100 ml	g/100 ml	mg/liter
Control	14.97	0.048	3.40	0.82	0.87	0	0.16	0.16	0.9937
Vitazyme	14.36	0.054	3.45	0.81	1.00	0	0.13	0.11	0.9947

### June 30, 2005, analyses

Treatment	Ethanol	VA	pH	Total acidity	Malic acid	Lactic acid	RS	GF	Density
	%	g a a/100 ml		g tar/100 ml	g/liter	g/liter	g/100 ml	g/100 ml	mg/liter
Control	14.77	0.056	3.42	0.83	0.94	0	0.17	0.13	0.9940
Vitazyme	14.74	0.059	3.46	0.82	1.04	0	0.17	0.12	0.9943

Taste tests: Two tasting sessions for the wine have been conducted as of mid-January, 2006.

### February 8, 2005, taste test

On February 8, 2005, an informal testing panel evaluated the wine from the four barrels of wine. All parties judged the wine from the stainless steel barrels as the least favorite of the the four, but **there was strong agreement that the wine produced from the Vitazyme treated wine was superior to the control wine, whether from oak barrels or stainless steel barrels.**

### January 6, 2006, taste test

On January 6, 2006, a tasting panel of seven professionals sampled the two batches of wine — from the control and Vitazyme treatments — and determined that there was very little difference between the two. The Vitazyme raised wine was actually a bit more mellow, mature, and palatable, more ready to market than the control wine, which tended towards a bit more acidity. **This means that (1) the Vitazyme treated grapes, which produced 46% more grapes than the control grapes, in no way produced an inferior wine to the lower yielding treatment; on the contrary, this higher yielding wine was superior, if anything, to the lower yielding control ... and, (2) the Vitazyme wine matured faster than the control wine, making it ready to market faster and enabling the wine producer to turn over his stock faster.** Considering both points, the higher yield of grapes per acre and the more rapid turnaround of the wine stocks, **the users of Vitazyme in their vineyards will reap considerably more income per acre than those who do not use it.**

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# Grapes (for raisins)

## Year three of a continuing raisin study

Cooperating party: Tulare Ag Products, Tulare, California

Location: LDS Fresno Raisin Vineyard, Madera, California

Soil type: Very sandy to light clay

Variety: Thompson seedless

Irrigation: drip

Experimental design: This test is the third year of a continuing study beginning in 2003 to evaluate the effects of Ethrel and Vitazyme (plus other Tulare Ag products), alone or in combination, on the yield and quality of raisin grapes. An 80-acre, 112 row raisin vineyard was divided into seven treatments on a replicated basis throughout the vineyard, each treatment applied to rows in all parts of the acreage to reduce treatment error and produce accurate results.

Fertilization: The whole vineyard received adequate N, P, and K in the irrigation well water. Liquid humate was applied to all areas through the irrigation water from May to August (1,000 gallons total). Zinc and boron were applied foliar at recommended rates to all areas on May 7 along with other materials. Copper and sulfur (for phomopsis) were sprayed with the fulvic acid on all areas on March 18.

Ethrel treatment: Ethrel [(2-chloroethyl) phosphonic acid], also known as Ethepon, is a syn-

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## Experimental Design

Treatment	Ethrel	Vitazyme	Finisher 21	Cal Ocho 8%	Fulvic acid	Dry Humates
1	O	O	O	O	O	O
2	X	O	O	O	O	O
3	O	X	X	X	X	X
4	X	O	X	X	O	O
5	X	X	X	X	O	O
6	X	O	X	X	X	X
7	X	X	X	X	X	X
<b>Dates applied</b>	6/30	5/7, 5/23, 6/28, 8/13	6/28	5/7, 6/28	3/18, 5/7, 5/23, 6/28, 8/13	10/2004

thetic plant growth regulator that releases ethylene into the plant system. Ethylene hastens sugar production so harvest can occur earlier and more sugars can accumulate. The product was sprayed once, on June 30, at veraison.

**Vitazyme application:** Vitazyme was applied foliar at 13 oz/acre along with other agents on May 7, May 23, June 28, and August 13 to appropriate treatments.

**Finisher 21 application:** Finisher 21 is a 21% potassium (K<sub>2</sub>O) formulation that was applied foliar at recommended rates, along with other agents, on June 28 only to the appropriate treatments.

**Cal Ocho 8% application:** Cal Ocho 8% is an 8% calcium formulation, with CaO and carbohydrates, which was applied foliar with other agents on May 7 and June 28 to the appropriate treatments.

**Fulvic acid application:** Fulvic acid was applied foliar at 1 quart/acre with other agents on March 18, May 7, May 23, June 28, and August 13 to the appropriate treatments.

**Dry humate application:** Dry humate acid was applied at 10 lb/acre to appropriate areas in October of 2004.

**Gibberellin application:** Gibberellic acid was sprayed foliar along with other agents at recommended rates on May 23 only, near full bloom.

**Weather conditions:** The spring was cool and wet, June was very hot (to 100°F), giving early veraison by one week, and the summer and fall were quite warm as well.

**Grape sugar and weight results:** One-hundred grapes from 16 selected rows of each of four treatments were analyzed with refractometers by University of California personnel on five dates: July 13, July 19, July 27, August 4, and August 10. These grapes were also weighed.

All four treatments produced sugar levels within 0.9 percentage point, the Ethrel treatment producing 18.9 brix with the Vitazyme + Ethrel treatment giving 18.7 brix. The control and Vitazyme + K produced slightly less brix; 18.5 and 18.0, respectively.

The largest grapes were produced by the Vitazyme + Ethrel treatment, followed closely by the Ethrel treatment. The control treatment produced the lightest grapes.

**Harvest date:** August 26 to September 3, 2005

**Yield results:** The grapes were harvested by volunteer labor and placed on paper trays between the rows. After 3 to 4 weeks of drying they were picked up and delivered to the Sunmaid raisin packing plant.

The raisins were graded at the



**Vitazyme has contributed to large bunches of well-filled fruit in the third year of this Madera trial.**

### Grape Sugar Content

Treatment	July 13	July 19	July 27	August 4	August 10
	----- brix -----				
<b>Control</b>	10.4	13.5	16.0	17.4	18.5
<b>Ethrel</b>	10.8	13.0	15.8	18.1	18.9
<b>Vitazyme + K</b>	11.2	13.4	15.8	17.3	18.0
<b>Vitazyme + Ethrel</b>	10.9	13.5	15.7	17.8	18.7

### Grape Weight

Treatment	July 13	July 19	July 27	August 4	August 10
	----- grams/100 berries -----				
<b>Control</b>	127.0	144.4	173.2	181.6	181.2
<b>Ethrel</b>	141.9	155.3	181.5	194.8	198.2
<b>Vitazyme + K</b>	144.2	146.4	168.4	178.2	184.2
<b>Vitazyme + Ethrel</b>	142.9	160.5	178.5	195.7	199.9

### Net Raisin Yield

Treatment	Raisins	Raisins <sup>1</sup>	Raisins <sup>2</sup>	Increase
	total lb.	lb/row	lb/acre	lb/acre
1. Control	53,293	1,665.4	4,663	—
2. Ethrel	52,752	1,701.6	4,764	101 (+2%)
3. Vitazyme + all others	64,977	2,030.5	5,685	1,022 (+22%)
4. Ethrel + Fin 21 + Cal 8%	51,772	1,670.0	4,676	13 (0%)
5. Ethrel + Vitazyme + Fin 21 + Cal 8%	54,154	1,805.1	5,054	391 (+8%)
6. Ethrel + all others	58,634	1,832.3	5,130	467 (+10%)
7. Ethrel + Vitazyme + all others	59,720	1,990.6	5,574	911 (+20%)

<sup>1</sup>One row contained about 180 vines.

<sup>2</sup>One acre contained 2.8 rows.

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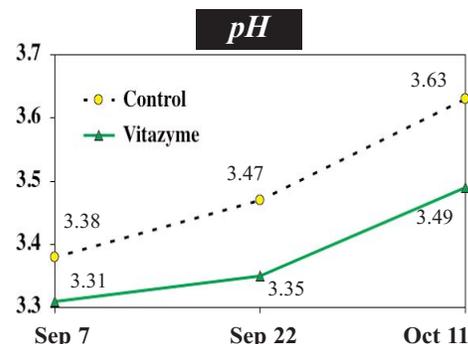
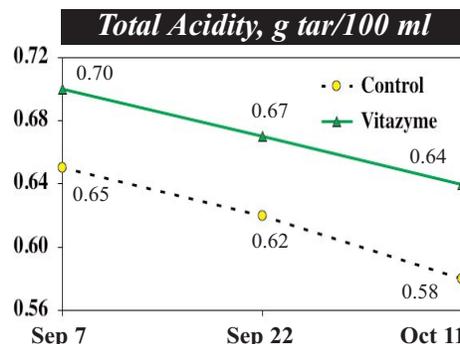
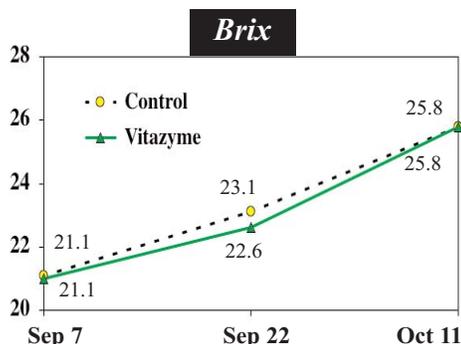


Tillage: none; mowing of weeds in the interrows

Vitazyme application: (1) 13 oz/acre with 9-18-9 fertilizer sprayed at bud break; (2) 13 oz/acre with 9-18-9 fertilizer and sulfur sprayed at BB-sized fruit; (3) 13 oz/acre with 9-18-9 fertilizer + sulfur sprayed at veraison; (4) 13 oz/acre 8 weeks before harvest (the end of August)

Harvest date: October 11, 2005

Preharvest to harvest grape and juice quality: Grapes from both treatments were collected randomly on September 7 and 22, and October 11, the grapes were crushed, and the juice was analyzed for brix (soluble solids, mostly sugars), total acidity, and pH at Baker Wine and Grape Analysis, Paso Robles, California.



Grape juice quality at harvest: The grapes were harvested on October 11, 2005, and the juice was evaluated for color and chemical factors. Quality parameters were similar for the two treatments.

Treatment	Color density	Color hue	Total phenolics	Antho-cyanins	Potential alcohol	Ammonia (NH <sub>3</sub> )	Amino acid	Yeast active nitrogen	Malic acid
	AU	ratio	AU	ppm	grams/liter	%	ppm	ppm	grams/liter
Control	13.93	0.52	39.00	453	1.292	14.2	102	148	0.52
Vitazyme	13.27	0.49	37.30	441	1.301	14.2	83	137	0.99

There were no major differences in the color or quality of these two lots of grapes. Vitazyme treatment did, however, produce a somewhat denser juice, likely because of a higher mineral content of the juice, such as potassium.

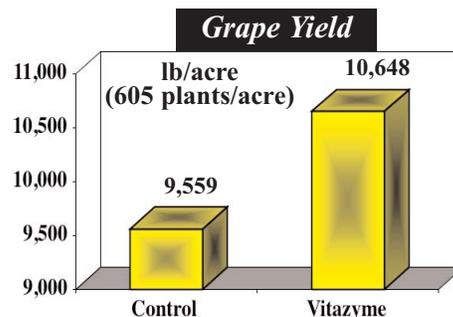
Yield results: Harvest results were collected during picking on October 11. Thinning had been performed uniformly over all areas, so product effects could be due only to changes in grape size and juice density.

Income results: Based on a \$1,000/ton grape value, the extra 1,089 lb (0.545 ton) of grapes produced \$545.00 more income per acre.

Wine making: Separate lots of wine were made from both the control and Vitazyme treated grapes and will be followed for quality and flavor during the coming months.

Conclusions: Vitazyme treatment of Cabernet Sauvignon grapes in this California study showed that Vitazyme is capable of increasing grape size, and thus total yield (11% in this test), while not sacrificing the sugar content of the juice. All areas of the vineyard were thinned to achieve a 4 ton/acre yield, so product effects were due to larger fruit. There was little difference in color or quality parameters of the two treatments. The separate wines made from these two treatments will be followed for quality and flavor during the coming months.

Treatment	Tartaric acid	Potassium
	grams/liter	ppm
Control	6.94	2,251
Vitazyme	7.21	2,105



• **Increase in grape yield: 11%**

• **Increase in income: \$545.00/acre**

## Grapes (for wine)

Location: San Miguel, California

Vineyard: Mondello Vineyards

Grafting: none (self-rooted)

Bunch thinning: yes

Soil type: loam, high-calcium subsoil, low organic matter

Experimental design: A vineyard of grapes of equal age was partially treated with Vitazyme during the growing season to evaluate effects on grape yield and winemaking quality; all other treatments were identical. Both treatments were to be evaluated for overall effects on grape and wine quality by following through the preharvest period, and on to the actual wine itself after fermentation and aging. Eventually a taste panel will evaluate the quality of the two wines after sufficient aging.

Irrigation: semi-dryland system: four times of deep irrigation (18 to 20 hours of drip irrigation) from mid-June to late August

Fungicides: applied as needed

Fertilization: 200 lb/acre (NH<sub>4</sub>)<sub>2</sub> SO<sub>4</sub> broadcast in March before bud break; 9-18-9 or 3-18-18 (+ micronutrients) applied

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**Cabernet Sauvignon grapes from San Miguel that were untreated were not well filled and had many green berries.**



**Vitazyme treated grapes, a few rows from the control grapes, show excellent filling and color, with few green berries.**

every two to three weeks at 2 to 3 gallons/acre during much of the growing season, usually with sulfur after veraison; a blue-green algae solution applied in the irrigation water periodically

**Tillage:** cover crop disked in

**Vitazyme application:** (1) 13 oz/acre with 9-18-9 fertilizer sprayed at bud break; (2) 13 oz/acre with 9-18-9 fertilizer + sulfur sprayed at BB-sized fruit; (3) 13 oz/acre with 9-18-9 fertilizer + sulfur sprayed at veraison; (4) 13 oz/acre 8 weeks before harvest (the end of August)

**Harvest date:** October 25, 2005

**Chlorophyll content:** On August 15, 30 random leaf samples from each treatment were analyzed with a Minolta SPAD chlorophyll meter to determine leaf chlorophyll levels. These levels relate directly to the ability of the plants to fix carbon and sunlight energy into plant structural and reproductive (grape) tissue.

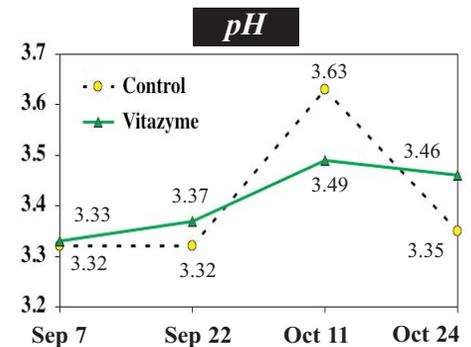
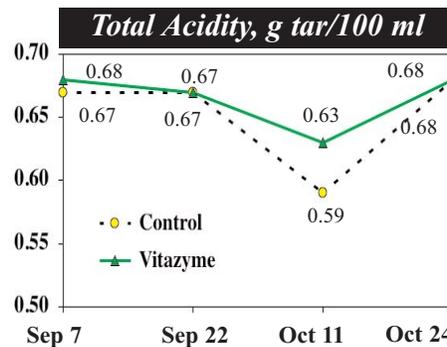
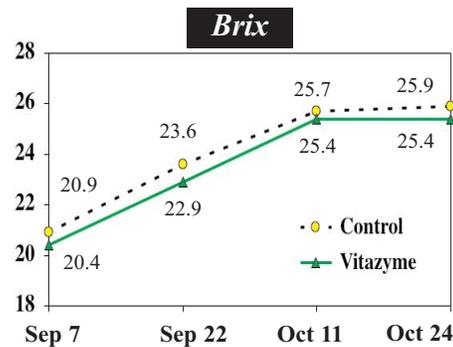
**Vine growth:** The researcher noted that there was considerably more leaf and vine growth for the Vitazyme treated grapes, perhaps 30% more total leaf mass than for the control plants. An analysis of canes for the plants of the two treatments revealed the following differences (per plant):

**Control plants:** 64 feet of canes, evenly distributed in 1, 2, and 3-foot lengths

**Vitazyme plants:** 92 feet of canes, nearly half of them being about 2 feet long

**Preharvest to harvest grape and grape juice quality:** Grapes from each treatment were randomly collected at four dates before and at harvest: September 7 and 22, and October 11 and 24. These samples were crushed, and the juice was analyzed for brix (soluble solids, mostly sugars), total acidity, and pH at Baker Wine and Grape Analysis, Paso Robles, California.

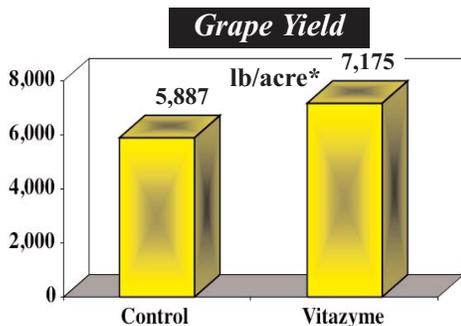
Treatment	Leaf chlorophyll	Change
	SPAD units	SPAD units
Control	43.6	—
Vitazyme	45.1	+1.5



**Remarkably, the higher yielding Vitazyme treatment did not produce grapes that were significantly lower in sugar content, showing the ability of the product to stimulate photosynthesis, carbon fixation, and mineral uptake to provide for the heavier grape load.**

**Grape juice quality at harvest:** The grapes were harvested on October 24, 2005, and the juice was evaluated for color and chemical factors. Quality parameters were similar for both treatments.

Treatment	Color density	Color hue	Total phenolics	Antho-cyanins	GF	Density	Potential alcohol	Ammonia (NH <sub>3</sub> )	Amino acid	Yeast active nitrogen
	AU	ratio	AU	ppm	grams/liter	grams/liter	%	ppm	ppm	ppm
Control	15.49	0.48	43.40	518	200	1.234	14.2	46	80	126
Vitazyme	10.60	0.53	32.20	377	172	1.252	14.0	76	97	173



\*Based on 605 plants/acre

**Yield results:** Grape yields were recorded for both treatments on the eastern end of the vineyard where soil characteristics were uniform. A border area between the treatments was avoided to remove possible product drift effects. Thinning had been performed equally on all areas, so Vitazyme effects were expressed entirely on grape and branch size.

**Income results:** Based on a \$1,000/ton value of the grapes, the extra 1,288 lb (0.644 ton) of grapes produced \$644.00 more income per acre.

**Wine making:** On October 24, 2005, a ton of grapes from both treatments was picked and

Treatment	Malic acid	Tartaric acid	Potassium
	grams/liter	grams/liter	ppm
Control	0.70	7.09	1,530
Vitazyme	1.13	6.87	1,839

*Continued on the next page*

crushed, and on October 25 the winemaking process began. See the schedule below for details.

**October 25.** The grapes were destemmed and cold soaked for 48 hours. During this time tartaric acid was added to raise the acidity to 0.7.

**October 27.** Yeast was added to the destemmed grapes, as well as yeast nutrient (diammonium phosphate, yeast cell walls, and other items), and Color Pro (an enzyme material to extract more color from the skins, and stabilize the color).

**November 4.** After 8 days of fermentation, the juice was pressed from the mash. At this point there was 3% sugar left. Malic acid bacteria were added at this point to convert the malic acid to lactic acid. The fermenting wine was then placed in stainless steel barrels. Each barrel yielded 148 gallons of juice per ton of grapes.

**November 8.** After 4 more days, half of the wine from each treatment was put in an identical oak barrel; the remaining wine was retained in a stainless steel barrel.

Conclusions for the second year: This was the second year that Vitazyme was applied to the same grape plants in this vineyard near San Miguel, California. The Cabernet Sauvignon grapes responded very well to the product, increasing in yield by 22%, the vines also significantly increasing in length and girth. The yield increase was solely due to larger grapes in the treated area, since the bunches of both treatments were thinned the same early in the season. In spite of the higher yield, the juice brix and quality were equivalent for the two batches. These two lots of wine from the Vitazyme and control treatments will be evaluated periodically throughout the coming year for quality and taste differences.

▪ **Increase in leaf chlorophyll: 1.5 SPAD units**

▪ **Increase in grape yield: 22%**

▪ **Increase in income: \$644.00/acre**

## *Grapes (for raisins)*

### *Three-Year Grape Trial Averages*

The following data is a summary of the three-year trial conducted by Jamie Hansen and Tulare Ag Products at the L.D.S. Fresno Raisin Vineyard. These mature Thompson seedless grapes, raised on sandy to light clayey soils, received drip irrigation as well as certain foliar and soil treatments during this three-year period. Results were obtained from rows highly randomized throughout the 80-acre vineyard to give a very accurate, unbiased result across all soil types and vineyard conditions. Treatments became more varied for year 2 (four total), and even more varied for year 3 (seven total). Not all treatments are shown below for year 3.

Year	Fertilization (soil)	Vitazyme (foliar)	Tulare Ag Products (foliar)	Ethrel (foliar)
2003	Adequate with N, P, and K in well water	13 oz/acre at ... (1) 2 weeks pre-bloom (2) At bloom (with GA) (3) BB-sized fruit (4) Verasion	The third Vitazyme application received K (Finisher 21), Ca (Cal Ocho 8%), and boron.	At recommended rates at verasion
2004	Adequate N, P, and K in well water	13 oz/acre at ... (1) Pre-bloom cluster stretch (2) Post-bloom berry set (3) Verasion (4) 14-21 days before harvest	K (Finisher 21) applied with each Vitazyme application	At recommended rates at verasion
2004	Adequate N, P, and K in well water Liquid humates for all areas, 1,000 gallons May to August Zinc and boron on May 7 Copper and sulfur on March 18	13 oz/acre at ... (1) Pre-bloom cluster stretch (2) Post-bloom berry set (3) Verasion (4) 14-21 days before harvest	K (Finisher 21) applied at verasion to Vitazyme and Ethrel treatments Ca (Cal Ocho 8%) applied at pre-bloom and verasion to Vitazyme and Ethrel treatments Fulvic acid applied five times to Vitazyme and Ethrel treatments	At recommended rates at verasion

Based on the information given on the next page, several conclusions can be drawn:

- (1) Vitazyme alone outyielded Ethrel alone by 6% (2003 only).
- (2) Ethrel alone outyielded the control by 10% (2004 and 2005 averaged).
- (3) Ethrel + K + Ca + fulvic acid outyielded the control by 10% (2005 only).
- (4) Vitazyme + K + Ca + fulvic acid outyielded the control by 33% (2004 and 2005 averaged), and outyielded Ethrel only by 21% (2004 and 2005 averaged).

*Continued on the next page*

### Net Raisin Yield Results Summary (1lb/acre) \*

Year	Control	Ethrel only	Vitazyme only**	Ethrel + all others	Vitazyme + all others	Ethrel + Vitazyme + all others
2003	na	5,054	5,355	na	na	na
2004	4,007	4,757	na	na	5,854	5,220
2005	4,663	4,764	na	5,130	5,685	5,574

\*na = not available  
\*\*The last Vitazyme application received K (Finisher 21) as well.

- (5) Vitazyme + K + Ca + fulvic acid outyielded Ethrel + K + Ca + fulvic acid by 11% (2005 only).
- (6) Ethrel + Vitazyme + K + Ca + fulvic acid reduced yield compared to Vitazyme + K + Ca + fulvic acid only by 7% (2004 and 1005 averaged), though they increased yield above Ethrel only by 13% (2004 and 2005 averaged).

(7) Ethrel + Vitazyme + K + Ca + fulvic acid outyielded Ethrel + K + Ca + fulvic acid by 9% (2005 only).

Partitioning of cause of the yield increases:

**Vitazyme vs. Ethrel with K, Ca, and fulvic acid: +11%**

**Vitazyme vs. Ethrel with no other additives: +6%**

**Average increase due to Vitazyme: +8.5%**

This study reveals that Vitazyme is a highly viable substitute for Ethrel in raisin grape culture. Its addition as a foliar treatment for grapes substantially increases raisin yields, with or without additional K, Ca, and fulvic acid sprayed foliar ... but especially with these additional materials. **By far the greatest yield increase was produced by Vitazyme plus K, Ca, and fulvic acid; Ethrel in the foliar mix with Vitazyme comparatively reduced yields by 7%.**

**In addition, observations on the vines showed significant vine and leaf damage due to the senescence effects of Ethrel, whereas Vitazyme encouraged healthy leaf and vine development.**

Ethrel tended to cause slightly higher sugar values than did Vitazyme in 2003 and 2005, but the reverse was true in 2004. **Because of significantly improved yields and quality with Vitazyme during all three years, however, the sugar differences had little effect on the treatment differences in overall net raisin yield.**

Only one year, 2005, has reported Sunmaid raisin quality information.

**Raisin quality results:** These results show that while the substandard raisin percentage varied little for all of the treatments, the "B and B" raisins were by far the highest with Vitazyme + K + Ca + fulvic acid, being 20% above the control and 5% higher than the next highest treatment, which was Vitazyme + Ethrel + K + Ca + fulvic acid. Fulvic acid tended to boost raisin quality, for in the treatments in which it was left out the "B and B" raisins were lowest. Ethrel was not positively correlated with high "B and B" percentages.

### Grape Sugar Results Summary (%) \*

Year	Control	Ethrel only	Vitazyme only	Vitazyme + all others	Ethrel + Vitazyme + all others
2003	na	18.09	17.39	na	na
2004	21.52	21.62	na	22.30	21.12
2005	18.50	18.90	na	18.00	18.70

\*Final grape sugar values before harvest; na = not available

## Guava

**Location:** "Carlos Balino" Organic Estate, Santo Domingo, Villa Clara Province, Cuba

**Soil type:** Cambisol (Eutropept)

**Cultivar:** dwarf variety

**Transplanting date:** September 2, 2004

**Experimental design:** A 6-month-old guava plantation was divided into treated and untreated areas to evaluate the effect of Vitazyme on tree growth, fruit number, and yield at 9 months after transplanting. Three application regimes were used.

1. Control (no Vitazyme)
2. Vitazyme at 30 days after transplanting
3. Vitazyme at 30 and 60 days after transplanting
4. Vitazyme at 30, 60, and 90 days after transplanting

**Fertilization:** unknown

**Vitazyme application:** A 0.5% solution was applied by backpack sprayer on the tree leaves and the soil over the root zone at 30, 30 and 60, and 30, 60, and 90 days after transplanting for the three treatments.

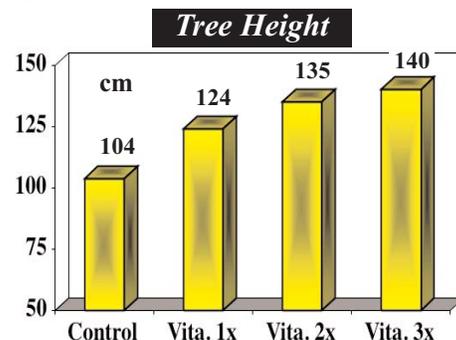
**Tree growth:** At 9 months after transplanting the height of the trees was measured to give means for each treatment.

It was also noticed that there were more leaves and larger leaves per tree for the Vitazyme treatment versus the untreated control trees.

**Yield results:** Mean, fruit number and yield were determined for each treatment.

Treatment	Fruit per tree	Change in fruit number	Fruit yield total kg	Fruit per tree kg/tree	Change fruit yield kg/tree
1. Control	10	—	153	0.77	—
2. Vitazyme once	28	18 (+180%)	625	1.56	0.79 (+103%)
3. Vitazyme twice	24	14 (+140%)	882	2.21	1.44 (+187%)
4. Vitazyme three times	36	26 (+260%)	620	2.07	1.30 (+169%)

• **Increase in tree height: +19 to 35%**



Continued on the next page

Conclusions: In the words of the Cuban researchers,

“1. Vitazyme in 1, 2 and 3 applications of a 0.5% concentration benefited a dwarf variety guava plant growth as compared to the untreated control.

2. Guava ripe fruit yield was greater with two Vitazyme applications (at 30, 60, and 90 days from transplanting), followed by three and one Vitazyme applications at 30, 60, and 90 days and only at 30 days . . . with 1.44, 1.30, and 0.79 kg/plant increases, respectively.”

### Fruit Number Increase

**Vitazyme once.....180%**

**Vitazyme twice.....140%**

**Vitazyme three times...260%**

### Fruit Yield Increase

**Vitazyme once.....103%**

**Vitazyme twice.....187%**

**Vitazyme three times...169%**

## Lettuce

Ranch: Labradores parcel 48, Mexico deRL

Soil type: unknown

Planting date: November 30, 2004

Experimental design: A one-hectare area of lettuce was treated three times with Vitazyme, and had a 40% nitrogen fertilizer reduction, to compare the effects on yield with an adjoining parcel of land that received no Vitazyme and 100% fertilizer, but was otherwise treated the same.

**1. Control, 100% N      2. Vitazyme, 60% N**

Fertilizer: The usual recommended N-P-K fertilizer was applied to the control treatment, but only 60% of that amount of N was applied to the Vitazyme treated parcel.

Vitazyme application: (1) 1 liter/ha at planting; (2) 1 liter/ha to the leaves and soil early in the production cycle; (3) 1 liter/ha to the leaves and soil later in the production cycle

Yield results: At harvest the lettuce was packed in boxes containing 24 heads each, and these boxes were counted for both treatments.

Vitazyme increased lettuce yield considerably despite a greatly reduced rate of nitrogen application.

Income results: Based on calculations of the lettuce price (\$0.05 per 950 lb), the cost of packing (2.30 pza per 24-head box), and the cost of fertilizer and Vitazyme, the following economic results were determined.

### **Economic benefits per hectare**

Increased income per bin with Vitazyme	1,571.83 pesos
Increased income in packing with Vitazyme	6,474.96 pesos
Reduced cost of fertilizer with Vitazyme	874.49 pesos
Total economic benefit with using Vitazyme	8,921.28 pesos

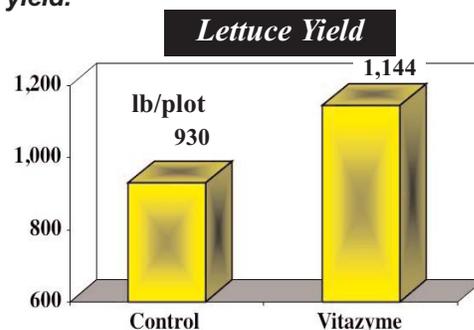
Conclusions: Vitazyme greatly increased income with lettuce for this production field in Mexico, by increasing yield by 23% despite a 40% nitrogen fertilizer reduction. This yield increase led to an income increase of 8,921.28 pesos per hectare.

This study reveals how Vitazyme's active agents are able to improve the efficiency of nitrogen use through reducing losses from denitrification, leaching, and other means, while enabling a more vigorous rhizosphere microflora to generate more of its own fixed nitrogen, and make better use of applied and native nitrogen.

**• Increase in yield with reduced N: +23%**



**This Vitazyme treated Mexican lettuce shows excellent head density and a high yield.**



## Papaya (young plants)

Research organization: Tropical Fruit Culture Research Institute, Havana, Cuba

Location: Jaguey Grande Citrus Experiment Station, Cuba

Soil substitute: soil, citricompost, and zeolite (30-20 v/v)

Experimental design: Vitazyme, mycorrhizae, and trichoderma were applied to pre-germinated papaya seedlings that were transplanted in 14x20 cm bags. The four treatments were applied to six replicates, with 10 plants per treatment, to determine effects of the treatments on various growth parameters.

Varieties: red Maradol and Solo Sunrise

Planting date: November, 2004

**1. Control      2. Mycorrhizae      3. Vitazyme      4. Mycorrhizae + Vitazyme + Trichoderma**

Fertilization: unknown

Vitazyme application: 10 ml/liter of water, sprayed on the trees and soil at planting

Mycorrhizal application: A pool of strains from INCA; 20 grams/bag in the soil at planting

Trichoderma application: from IIFT labs; 20 grams of the full mixture per pot with a backpack sprayer

Watering: "Pyramidal water" was applied on alternate days.

Growth results: Every 10 days, measurements of plant height, stalk diameter, and leaf number were made. The values given below are at 30 days after treatment.

Conclusions: According to the Cuban researchers,

*Continued on the next page*

- Under semi-controlled conditions, best results in the Maradol variety were found in mycorrhizae and Vitazyme treatments, with more than 10 cm in 30 days. The combined mycorrhizae + Vitazyme + trichoderma treatment was also higher than the control.
- In the Solo variety inoculation with mycorrhizae, Vitazyme application, and the combined mycorrhizae + Vitazyme + trichoderma treatments favored most seedling growth, showing values above 10 cm, and were also higher than those of the Maradol variety.
- In both the Maradol and Solo Sunrise varieties, treatments of mycorrhizae and mycorrhizae + Vitazyme + trichoderma showed best results in stalk diameter, with values close to 4 mm, followed by Vitazyme that reached a diameter above 3.5 mm. Similar results were found in number of leaves in both varieties.

### Plant Height

Treatment	Plant height	Change	Plant height	Change
	cm	cm	cm	cm
	cv. Maradol		cv. Solo	
1. (Control)	6.0	—	7.1	—
2. (Mycorr.)	10.3	4.3 (+72%)	11.4	4.3 (+61%)
3. (Vitazyme)	10.3	4.3 (+72%)	11.6	4.5 (+63%)
4. (Mycorr. + Vita. + Trico.)	8.1	2.1 (+35%)	11.5	4.4 (+62%)

### Stalk Diameter

Treatment	Stalk diameter	Change	Stalk diameter	Change
	mm	mm	mm	mm
	cv. Maradol		cv. Solo	
1. (Control)	3.40	—	3.43	—
2. (Mycorr.)	3.75	0.35 (+10%)	3.81	0.38 (+11%)
3. (Vitazyme)	3.71	0.31 (+9%)	3.52	0.09 (+3%)
4. (Mycorr. + Vita. + Trico.)	3.73	0.33 (+10%)	4.00	0.57 (+17%)

### Leaf Number

Treatment	Leaf number	Change	Leaf number	Change
	cv. Maradol		cv. Solo	
1. (Control)	7.00	—	5.01	—
2. (Mycorr.)	7.52	0.52 (+7%)	8.00	2.99 (+60%)
3. (Vitazyme)	7.15	0.15 (+2%)	6.48	1.47 (+29%)
4. (Mycorr. + Vita. + Trico.)	7.18	0.18 (+3%)	8.02	3.01 (+60%)

▪ **Increase in plant height (cv. Maradol): 72%**

▪ **Increase in plant height (cv. Solo): 63%**

▪ **Increase in stalk diameter (cv. Maradol): 9%**

▪ **Increase in stalk diameter (cv. Solo): 17%**

▪ **Increase in leaf number (cv. Maradol): 2%**

▪ **Increase in leaf number (cv. Solo): 29%**

## Papaya

Location: Cuba, Fruit Research Station

Variety: unknown

Age of trees: first production

Experimental design: Papaya trees were planted in a plantation setting at the research station to evaluate the effects of Vitazyme on growth and production. The trees had been started from seedlings, and treated periodically with Vitazyme from the beginning. One portion of the plantation was treated with Vitazyme and another portion was left untreated.

1. Control

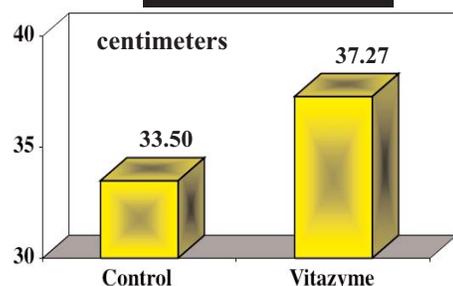
4. Vitazyme

Fertilization: unknown

Vitazyme treatments: periodically at 1 liter/ha to the leaves and soil

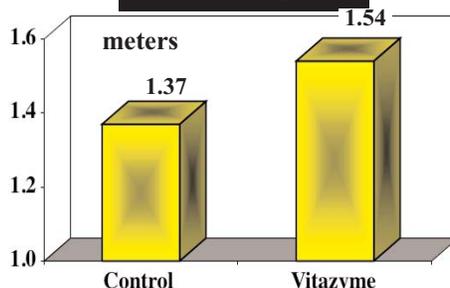
Growth and production results: At an unknown date, evaluations were made for tree growth and fruit production based on the average of 15 trees per treatment.

### Trunk Diameter



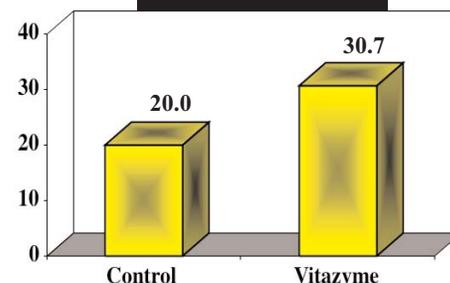
▪ **Increase in trunk diameter: 11%**

### Tree Height



▪ **Increase in tree height: 12%**

### Fruit Per Tree



▪ **Increase in fruit per tree: 54%**

Conclusions: This papaya study in Cuba at a fruit research station revealed that Vitazyme greatly increased the number of fruit produced per tree, by 54% over the control. This increase resulted from trees that were larger and more vigorous, and which had more blossoms and bore more fruit than the controls. The treated trees fixed more sunlight energy and atmospheric CO<sub>2</sub> to produce greater tree growth and fruit.

# Papaya (seedlings)

Research organization: Tropical Fruit Culture Research Institute, Havana, Cuba

Location: Jaguey Grande Citrus Experiment Station, Cuba

Soil substitute: 35% cattle manure, 15% rice husk, and 50% topsoil

Experimental design: Vitazyme and mycorrhizae were applied to newly planted papaya seeds in trays containing the substrate mix. The seeds had been soaked for 48 hours in "pyramidal water" before planting. Also, seeds for all but the control treatment came from "energetically treated" fruits. The study was completely randomized with five replications.

Variety: red Maradol

Planting date: November, 2004

## 1. Mycorrhizae

## 2. Mycorrhizae + Vitazyme

## 3. Control

## 4. Vitazyme

Fertilization: Leaf yellowing was corrected by application of earthworm castings during vigorous tree growth.

Vitazyme application: Method, time, and amount of treatment are unknown.

Mycorrhizae application: a pool of strains from INCA; method, rate, and timing of applications are unknown

Watering: Irrigation water was applied every other day initially, and daily after the trees had gained some size.

Growth results:

All treatments had germinating seeds by eight days after planting, and all viable seeds had germinated by 12 days after planting.

The mycorrhizal inoculation provided the greatest germination percentage, followed by Vitazyme, and then mycorrhizae + Vitazyme. The control provided the lowest germination rate.

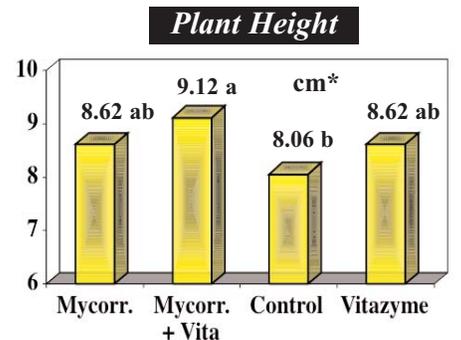
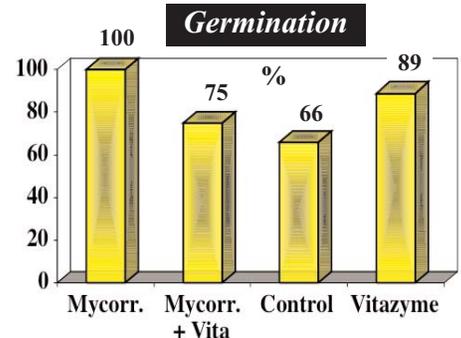
The height of the trees was measured seven times from December 8, 2004, to January 29, 2005. Only the final measurement values for January 29 are shown on the graph to the right.

Conclusions: According to the Cuban researchers,

1. The inoculation of Maradol papaya seeds with a mycorrhizal pool was the most effective treatment on germination, followed by Vitazyme application. The control showed the lowest germination percentage.
2. Under controlled conditions, the combination mycorrhizae + Vitazyme favored seedling growth. The inoculation with mycorrhizae and Vitazyme application, independently, showed similar values, while the control showed the shortest plants.

▪ **Increase in plant height (Vitazyme): 7%**

▪ **Increase in plant height (Vitazyme + mycorrhizae): 13%**



\*Means followed by the same letter are not significantly different (P=0.05).

# Peanuts

Location: Whitheral, Texas

Variety: TamSpan 90

Population: 100 lb/acre

Previous crop: cotton

Soil type: medium sandy loam

Planting date: May 15, 2004

Row spacing: 40 inches to middles, 8 inches on berm

Experimental design: A center-pivot field was divided into two 33.5-acre areas, with one part receiving Vitazyme and the other no product. All other treatments were the same for both areas.

## 1. Control

## 2. Vitazyme

Fertilizer: 11-52-0% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O applied pre-plant, with some liquid calcium and nitrogen applied through the irrigation system

Vitazyme application: 13 oz/acre at planting, sprayed on the soil in a 10-inch band behind the planter; 13 oz/acre sprayed on the leaves and soil at early bloom

Irrigation: about one inch per week during the primary growing period

Weather: a fairly cool summer with good rainfall all year

Harvest date: dug in early October, and picked up November 1 to 6

Yield results: Results were affected by excessive weed growth from considerable rainfall, the Vitazyme area more so because it was on the outside of the circle. The Vitazyme area was also lower, on part of an old lake bottom.



**In west Texas this split field under irrigation produced more leaves and roots with Vitazyme.**



**This same trial also produced more peanuts with Vitazyme, and they were larger and better filled.**

Treatment	Peanut yield lb/acre	Change lb/acre
Control	3,329	—
Vitazyme	3,521	192 (+6%)

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**Quality and income results:** Based on payment reports, the average prices for the peanuts were as follows:

Control: \$0.1861/lb, or \$372.20/ton  
 Vitazyme: \$0.1869/lb, or \$373.80/ton

▪ **Increase in yield: 6%**

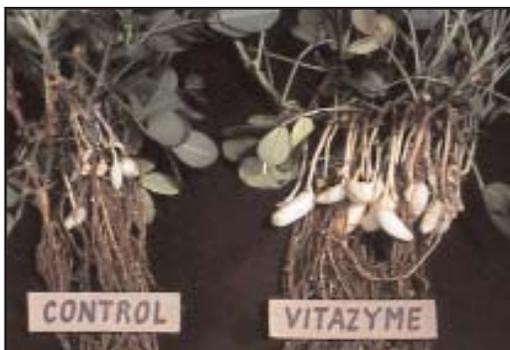
Treatment	Peanut yield	Peanut value*	Value change
	lb/acre	\$/acre	\$/acre
Control	3,329	619.53	—
Vitazyme*	3,521	658.07	38.54

\*See the prices above.

**Conclusions:** This west Texas field-scale peanut study revealed that Vitazyme produced a small (6%) but highly profitable yield increase, which was of slightly higher quality and produced \$38.54/acre more income. This increase came despite the Vitazyme treatment having a more serious weed problem than the control, and being located on an old lake bed which, during this wet year, hindered maximum yields.

## Peanuts

### A Greenhouse Growth and Nodulation Study



**Note the effect of Vitazyme on plant maturity and peanut development in this greenhouse study.**

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

**Variety:** Texas red

**Planting date:** February 17, 2005

**Pot size:** 1 gallon

**Seeding rate:** 10 seeds/pot, thinned to 3 plants

**Soil type:** silt loam

**Experimental design:** A greenhouse study was set up to evaluate the effect of Vitazyme, New Vitazyme, and Product B on peanut growth. Six replicates were utilized in a randomized complete block design. The treatments were as follows:

1. Control
2. Vitazyme only
3. Product B only
4. Vitazyme + Product B (100%)
5. Vitazyme + Product B (50%)
6. New Vitazyme

**Fertilization:** none

**Vitazyme and New Vitazyme application:** 100 ml of a 0.01% solution per pot

**Product B application:** 100 ml of a 0.001% solution per pot

**Combined product applications:** Treatment 4: 100 ml of both Vitazyme and Product B per pot; Treatment 5: 50ml of both Vitazyme and Product B per pot

**Harvest date:** On April 26, 68 days after planting, the soil was washed from the roots of the plants, and growth determinations were made. The plants were then placed in a drying oven at about 140°F for 36 hours to dry the tissue and developing peanuts thoroughly.

**Growth results:**

#### Plant Height

Treatment	Plant height*	Change
	cm	cm
2 (Vitazyme)	27.0 a	6.5 (+32%)
3 (Product B)	25.3 ab	4.8 (+23%)
5 (Vit. + B, 50%)	24.0 bc	3.5 (+17%)
6 (New Vitazyme)	22.2 cd	1.7 (+8%)
4 (Vit. + B, 100%)	21.3 d	0.8 (+4%)
1 (Control)	20.5 d	—

\*Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls Test. LSD<sub>0.10</sub>=2.6 cm

#### Peanut Number

Treatment	Nut number*	Change
5 (Vit. + B, 50%)	12.2 a	9.4 (+336%)
6 (New Vitazyme)	11.7 a	8.9 (+318%)
3 (Product B)	11.2 a	8.4 (+300%)
2 (Vitazyme)	10.7 a	7.9 (+282%)
4 (Vit. + B, 100%)	8.5 ab	5.7 (+204%)
1 (Control)	2.8 b	—

\*Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls Test. LSD<sub>0.10</sub>=5.9. Nuts greater than 0.5cm in diameter were recorded.

#### Root Nodules

Treatment	Nodules*	Change
	rating	rating
2 (Vitazyme)	3.3 a	2.3 (+230%)
3 (Product B)	3.0 a	2.0 (+200%)
5 (Vit. + B, 50%)	2.8 a	1.8 (+180%)
4 (Vit. + B, 100%)	2.7 a	1.7 (+170%)
6 (New Vitazyme)	2.3 a	1.3 (+130%)
1 (Control)	1.0 b	—

\*Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls Test. LSD<sub>0.10</sub>=1.1. Nodule number.

Vitazyme had the tallest plants (+32%) of all six treatments, significantly greater than all but Product B. The New Vitazyme and 100% Vitazyme + Product B were not significantly taller than the control; apparently the products gave an excess of active agents.

All Treatments produced many greater peanuts of >0.5 cm diameter than did the control, and all values were significantly greater than the control except Vitazyme + Product B at 100%.

Vitazyme alone produced the greatest number of Rhizobium fixing nodules on the peanut roots. All treatments significantly exceeded the control, from 130% to 230%. Vitazyme gave the greatest dry weight increase of all treatments, which was statistically equal to Product B and Product B + Vitazyme. Eventual peanut yield should be proportional to early dry matter accumulation, as determined here.

**Conclusions:** In this greenhouse peanut study in Texas, Vitazyme produced the greatest plant height, Rhizobium nodulation, and dry matter accumulation of all six treatments. Vitazyme + Product B (at 50% levels) produced the most young peanuts, but

*Continued on the next page*

#### Plant Dry Weight

Treatment	Dry weight*	Change
	grams	grams
2 (Vitazyme)	20.40 a	8.73 (+75%)
5 (Vit. + B, 50%)	20.34 ab	8.67 (+74%)
3 (Product B)	19.57 ab	7.90 (+68%)
6 (New Vitazyme)	17.60 bc	5.93 (+51%)
4 (Vit. + B, 100%)	16.27 c	4.60 (+39%)
1 (Control)	11.67 d	—

\*Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls Test. LSD<sub>0.10</sub>=2.79 grams.

there was no statistical difference between that treatment and all others except the control. Since total peanut production is directly related to early dry matter accumulation, these results with Vitazyme predict that it would produce the greatest final peanut yield in the field. The active agents in Vitazyme stimulated chlorophyll production, plant metabolism, and energy transfer to the roots to feed a high population of Rhizobium bacteria which fixed high amounts of nitrogen for the greatest growth.

- **Increase in root nodules: 230%**
- **Increase in peanut number (Vitazyme + Product B): 336%**
- **Increase in plant height: 32%**
- **Increase in dry weight: 75%**

## *Pennisetum Purpureum*

Location: Cuba

Planting date: September, 2004

Growth stage: new planting

Variety: *Pennisetum purpureum* cv. Cuba CT-115

Tillage: unknown

Experimental design: A uniform test area was marked off in 27m<sup>2</sup> plots, upon which two treatments were established in a completely randomized design (four replicates). Evaluations were made of plant growth characteristics as well as leaf pigment content.

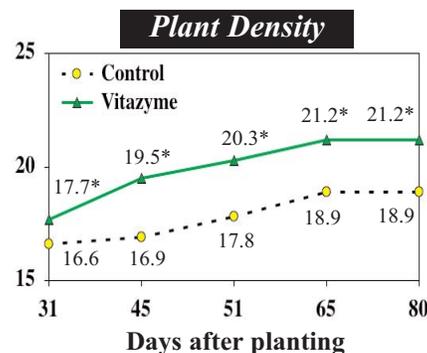
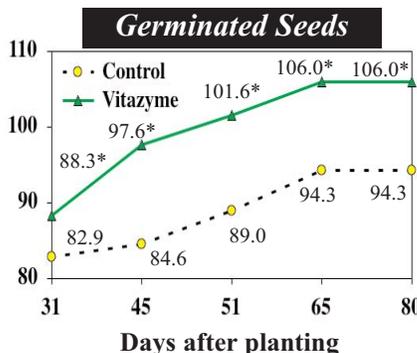
1. Control                      2. Vitazyme

Fertilization: none

Vitazyme applications: 13 oz/acre (1 liter/ha) at planting

Conclusions: In this Cuban trial with the forage grass *Pennisetum purpureum* cv. Cuba CT-115, Vitazyme produced several significant improvements in grass growth and quality.

1. Germination was increased throughout the 80-day test period.



### Stool and Stalk Density

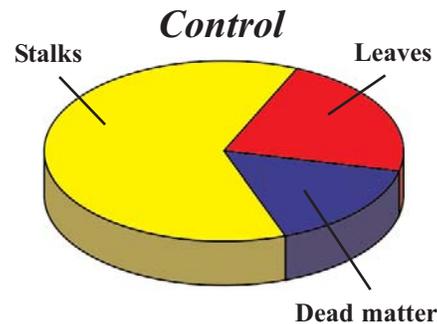
Treatment	Stools	Change	Stalks*	Change
	stools/5 m	stools/5 m	stalks/5 m	stalks/5 m
Control	12.75	—	71.87 b	—
Vitazyme	13.75	1.00 (+8%)	77.88 a	6.01 (+8%)

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

### Leaves, Stalks, and Dead Tissue Composition of Total Tissue

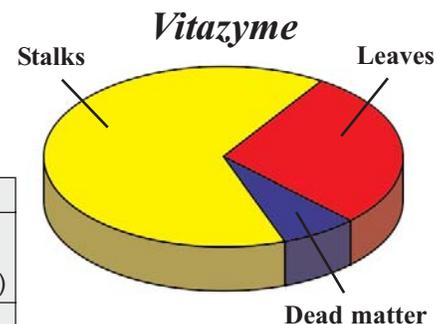
Treatment	Leaves*	Change	Stalks	Change	Dead matter*	Change
	percent of total tissue					
Control	22.12 b	—	62.14	—	15.74 a	—
Vitazyme	28.32 a	+6.20	64.75	+2.61	6.93 b	-8.81

\*Means followed by the same letter are not significantly different at P=0.01 (for leaves), and P=0.001 (for dead matter).



### Dry Matter Content of Leaves, Stalks, and Whole Plants

Treatment	Leaves*	Change	Stalks	Change	Whole plant	Change
	% of dry matter					
Control	31.45	—	28.00	—	28.19	—
Vitazyme	32.94	+1.49	28.95	+0.95	29.35	+1.16



### Leaf Photosynthetic Pigment Content

Treatment	Chlorophyll a	Change	Chlorophyll b	Change	Carotenoids*	Change
	mg/dm <sup>2</sup>					
Control	1.73	—	0.71	—	0.44 b	—
Vitazyme	1.93	0.20 (+12%)	0.71	0	0.55 a	0.11 (+25%)

\*Means followed by the same letter are not significantly different at P=0.01.

### Yield Results

Treatment	Fresh matter*	Change	Dry matter*	Change	Leaves**	Change	Dead tissue**	Change
	tons/ha							
Control	9.53 b	—	2.69 b	—	0.59 b	—	0.42 a	—
Vitazyme	10.41 a	0.88 (+16%)	3.10 a	0.41 (+15%)	0.86 a	0.27 (+46%)	0.21 b	0.21 (-100%)

\*Means followed by the same letter are not significantly different at P=0.05.  
\*\*Means followed by the same letter are not significantly different at P=0.01.

Continued on the next page

- Plant density was improved at every stage during the 80-day growth period, with 2.3 more plants per square meter with Vitazyme at 80 days.
- Stool and stalk density at the end of the test period were both increased with Vitazyme, by 8% in each case.
- The relative composition of leaves, stalks, and dead tissue was much more favorable for the Vitazyme treated grass, with a greater percentage of leaves and stalks and a reduction of dead tissue.
- The dry matter content of the entire plant was higher with Vitazyme.
- Vitazyme produced a 16% higher fresh yield, a 15% higher dry matter yield, a 46% greater leaf yield, and only half the dead tissue as the control.
- Both the chlorophyll and carotenoid photosynthetic pigments were increased by the Vitazyme versus the control grass. Vitazyme has been shown in this study to a powerful adjunct to typical management practices for the production of *Pennisetum purpureum* in Cuba.

- **Increase in stools: +8%**
- **Increase in stalks: +8%**
- **Increase in fresh matter yield: +16%**
- **Increase in dry matter yield: +15%**
- **Increase in leaf yield: +46%**
- **Decrease in dead tissue yield: -100%**
- **Increase in chlorophyll a: +12%**
- **Increase in carotenoids: +25%**

## Potatoes



Two potato plants from each treatment gave the tubers, leaves, and roots as shown in this Colorado study. Note the superiority of the Vitazyme treatment.

Location: Hooper, Colorado  
Soil type: sandy loam  
Planting date: May 3, 2005  
In-row spacing: 11 inches

Variety: Norkotah 296  
Previous crop: barley  
Row spacing: 34 inches

Experimental design: A center-pivot irrigated, uniform potato field was partially treated with Vitazyme (30 acres), and an adjoining area of 30 acres was left untreated. The object of the study was to compare the effects of Vitazyme on tuber yield.

### 1. Control

Fertilization: preplant, 286 lb/acre (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> and 167 lb/acre KCl; at planting, 42 lb/acre 10-34-0 N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O, 3.5 lb/acre Thiosol 12-0-0-29 (S), and 2 lb/acre ammoniated Zn; in-season, 25 lb/acre 28-0-0-5 (S)

### 2. Vitazyme

Vitazyme application: 13 oz/acre shortly after plant emergence, through the irrigation system of the first irrigation; 13 oz/acre at tuber initiation through the irrigation system

Harvest date: September 20, 2005

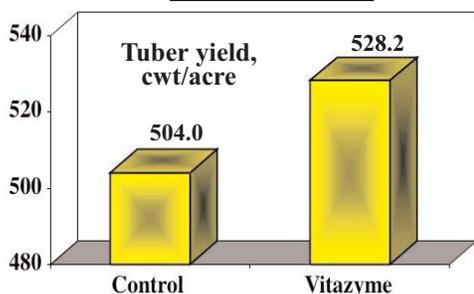
Yield results: All weights were gathered by weighing trucks on a scale from both treatments.

Income results: At \$7.50/cwt bulk price, then 24.2 cwt/acre would gross the farmer \$181.50/acre more income.

Conclusions: This potato study in the San Luis Valley of southern Colorado provided a 5% yield increase with Vitazyme, which meant \$181.50/acre more income for the farmer. This result is consistent with tests conducted in the same locale for several years that have shown increases in yield with Vitazyme of up to 10%, along with a more uniform tuber size with more tubers in the most valuable size classes.

- **Increase in tuber yield: +5%**
- **Increase in income: \$181.50/acre**

### Tuber Yield



## Potatoes

Research organization: Batabano VCE, Havana Province, Cuba

Farm: Farm 14

Soil type: red ferralitic

Planting date: unknown

Experimental design: Two potato fields received Vitazyme on one portion (8.05 ha), with a small fertilizer reduction on the treated portion, to evaluate the productive effects on potato tuber yield and quality.

### 1. Control (100% fertilizer)

### 2. Vitazyme (90% fertilizer)

Fertilization: Field 1, Control: 1,490 kg/ha of a 9-13-17% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O fertilizer; Vitazyme: 1,341 kg/ha of the same fertilizer. Field 2, Control: 1,341 kg/ha; Vitazyme: 1,207 kg/ha.

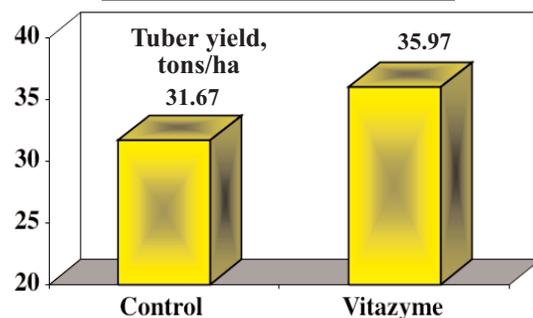
Vitazyme application: 3 liters/ha, although application times were not specified.

Variety: Ajiba

Previous crop: unknown

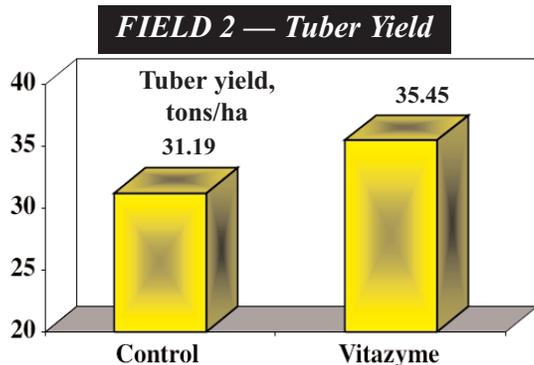
Irrigation: center pivot

### FIELD 1 — Tuber Yield



Continued on the next page

Harvest date: unknown



• **Tuber yield increase (FIELD 1): +14%**

• **Tuber yield increase (FIELD 2): +14%**



The russet potatoes on the right were Vitazyme treated. They produced longer root attachments and were more uniform than the controls on the left.

## Potatoes

Location: Matanzas Province, Cuba

Variety: Romano

Soil type: red ferralitic

Previous crop: unknown

Planting date: unknown

Irrigation: row irrigation

Experimental design: A potato field was treated with Vitazyme once over 5.4 hectares, while the rest of the field was left untreated, to evaluate the product's effect on tuber yield.

### 1. Control

### 2. Vitazyme

Fertilizer: the same for both treatments: 1,341 kg/ha of a 9-13-17% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O fertilizer

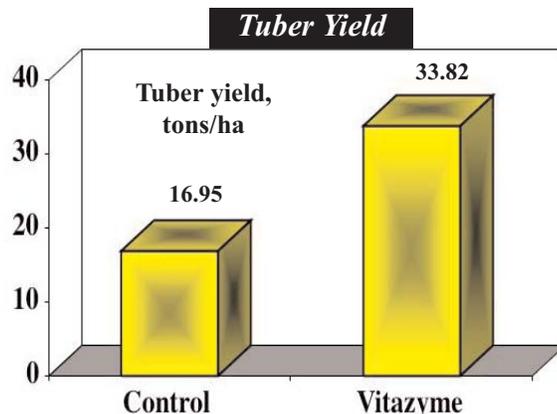
Vitazyme application: 3.44 liters/ha to the leaves and soil at 60 days after planting

Harvest date: unknown

Yield results: See the graph on the right.

Conclusions: Vitazyme applied only one time, but at a high rate (3.49 liters/ha), doubled the tuber yield in this Cuban on-farm potato trial. Both treatments were treated equally in all other ways. These results illustrate the potential of Vitazyme to benefit potato yields in Cuba.

• **Tuber yield increase: +100%**



## Potatoes

Research organization: Guira de Melena VCE, Havana Province, Cuba

Farms: Fregat 1, Fregat 2, and Mamey

Variety: Chieftan

Soil type: red ferralitic

Planting date: unknown

Previous crop: unknown

Irrigation: center pivot

Experimental design: Three potato fields received Vitazyme on one portion of the test field (Fregat 1, 26.84 ha; Fregat 2, 29.52 ha; Mamey, 40.26 ha), to evaluate the product's effectiveness to improve tuber yield under equal fertilization.

### 1. Control

### 2. Vitazyme

Fertilizer: All fields received 1,490 kg/ha of 9-13-17% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O.

Vitazyme application: 3 liters/ha, although application times were not specified.

Harvest date: unknown



Note the greater number of tubers on the right, these plants having darker green leaves for greater carbon fixation.

Treatment	Tuber yield tons/ha	Change tons/ha
<b>Fregat 1</b>		
Control	25.49	—
Vitazyme	26.97	1.48 (+6%)
<b>Fregat 2</b>		
Control	26.04	—
Vitazyme	26.25	0.21 (+1%)
<b>Mamey</b>		
Control	18.10	—
Vitazyme	22.83	4.73 (+26%)

• **Tuber yield increases: +1%, +6%, and +26%**

Yield results: See the table above.

Income results: Based on a potato price of 209.84 Ps/ton, the Vitazyme treatment for Fregat 1 produced an economic benefit of 402.53 Ps/ha. [Economic effect = (Value – Cost of Vitazyme treatment) – (Value – Cost of Control treatment)]

Conclusions: Despite several problems in the conduct of this study including delayed planting times, severe *Phytophthora* infestations, and inadequate irrigation water, Vitazyme increased tuber yields by up to 26% in this Cuban potato trial. Fertilizer reductions of 10 to 25% would likely have shown benefits in cost savings, but even so the economic benefit of Vitazyme was 402.53 Ps/ha.

# Potatoes

Researchers: unknown  
Planting date: February 10, 2004  
Previous crop: tomatoes

Location: Los Mochis, Sinaloa, Mexico  
Planting density: 70,000 pieces/ha  
Row spacing: 90 cm

Variety: Mondial  
Irrigation: trickle  
Soil type: Barriol

Experimental design: A potato field was selected to evaluate the effectiveness of Vitazyme to improve tuber yield and quality. A portion of the field was divided into nine plots, each two rows wide (1.8 meters) x 30 meters long. Three treatments were replicated three times in a randomized complete block design.

## 1. Control

## 2. Vitazyme two times

## 3. Vitazyme four times

Fertilization: 194-206-238-7-47 lb/acre of N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O, Mg, and Ca, distributed during the growing season as 72-150-91 pre-plant, 19-38-19-1 (Mg) at emergence, 52-11-58 5(Mg)-19(Ca) at tuber initiation, 41-7-54-1(Mg)-19(Ca) at tuber filling, and 10-0-16-9(Ca) at ripening

Vitazyme application: Treatment 2: 1 liter/ha on the seed pieces at planting, and 1 liter/ha 2 weeks later on the leaves and soil; Treatment 3: the same first two applications as for Treatment 2, plus 1 liter/ha on the leaves and soil 3 weeks after the second application, and 800 ml/ha 3 weeks after the third application

Fungicide and insecticides: Syngenta products

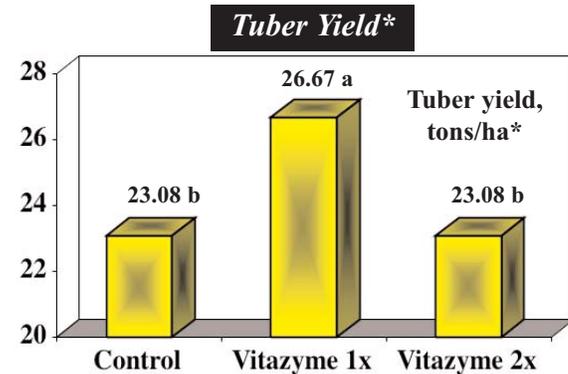
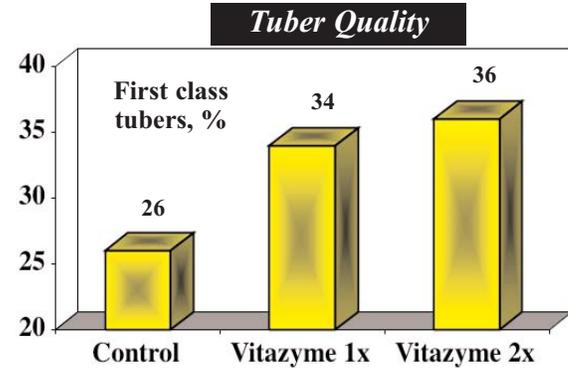
Growth results: The tubers were harvested, weighed, and classified on June 7, 2004.

Income results: Treatment 2 produced 3.59 tons/ha more potatoes, and at 3,000 pesos/ton the extra income generated was 10,770 pesos/ha. With a product cost of 470 pesos/ha, the net increase in income was 10,300 pesos/ha.

Conclusions: In this Mexican potato study, Vitazyme applied at 1 liter/ha at planting and again two weeks later produced an excellent, significant (at P=0.05), 16% yield increase. This increase translated into 10,300 pesos/ha more net income, while increasing the percentage of first class tubers from 26% in the control to 34% with Vitazyme. Four Vitazyme applications did not increase yield but improved the tuber quality even further, by producing 36% first class tubers. Vitazyme at two applications per cropping cycle is an excellent potato treatment in Mexico.



**This difference in yield of tubers is typical of what to expect with Vitazyme treatment.**



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

• **Tuber yield increases: +16%**

• **Tuber quality improvement: +8 to +10 percentage points more first class tubers**

# Rice

## Preliminary Results On Large-Scale Field Trials

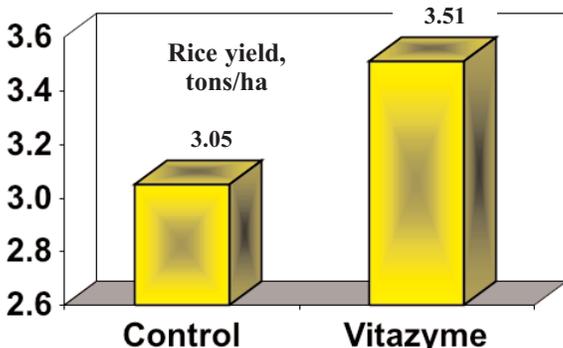
Researcher: unknown

Location: Los Palacios, Cuba

Variety: unknown

Preliminary conclusions: Although few details of these Cuban large-scale field trials are presently available, Vitazyme is shown to have a great effect on rice yield, increasing the average yield by a consistent 14 to 15% over the controls.

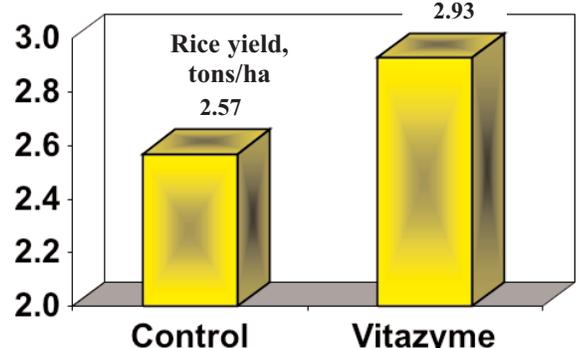
### Farm: Agricola



• **Increase in grain yield (Agricola): +15%**

• **Increase in grain yield (Cubanacan): +14%**

### Farm: Cubanacan



# Rice



**Note how Vitazyme has produced more roots and stronger shoots in this field comparison.**

Location: CAI rice growers, Ruta Invasora, Province Camaguey  
Research organization: Ministry of Agriculture, Rice Agroindustrial Production Group, Havana, Cuba  
Variety: unknown Soil type: unknown

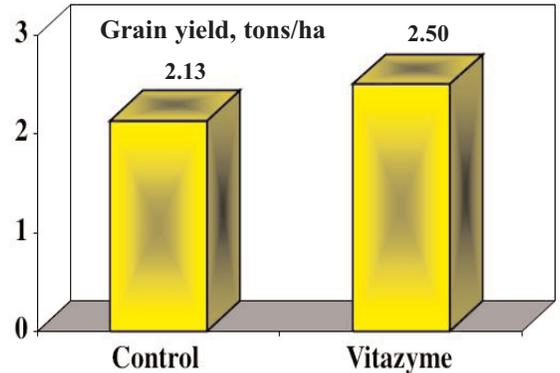
Planting date: spring, 2004  
Experimental design: A large rise field was divided into two parts, one treated with Vitazyme and the other left untreated, in an effort to evaluate the product's effectiveness in large-scale trials.

**1. Control      2. Vitazyme**

Fertilizer: standard protocol  
Vitazyme application: 1.5 liters/ha, most likely at planting  
Weather: There was a very limited supply of water at the final stages of rice development.

Yield results: Note the results on the right

Conclusions: This large-scale field trial in Cuba proved that Vitazyme, applied only once at 1.5 liters/ha, greatly increase grain yield (+17%), despite a serious water shortage late in the growing season.



**· Increase in grain yield: +17%**

# Rice

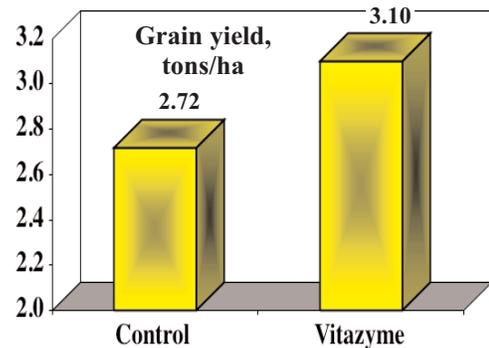
Location: CAI rice growers, Los Palacios, Province P. del Rio  
 Agriculture, Rice Agroindustrial Production Group, Havana, Cuba  
Soil type: unknown

Research organization: Ministry of Agriculture, Rice Agroindustrial Production Group, Havana, Cuba  
Variety: unknown  
Planting date: spring, 2004

Experimental design: Full scale production trials with Vitazyme were initiated on large blocks of land, using two different application regimes. Yields for field areas were determined by actual harvest data.

## Trial 1

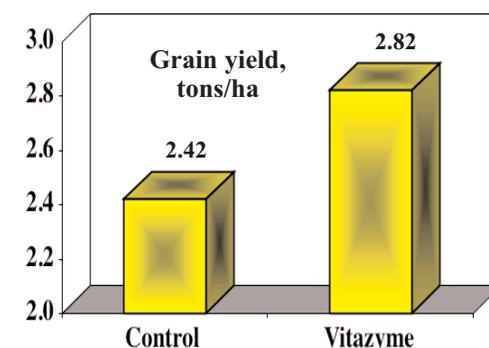
**1. Control    2. Vitazyme once, 1 liter/ha**



**· Increase in grain yield (Trial 1): +14%**

## Trial 2

**1. Control    2. Vitazyme twice, 1.5 liters/ha**



**· Increase in grain yield (Trial 2): +17%**

Fertilization: standard protocol  
Vitazyme application: Trial 1, 1 liter/ha; Trial 2, 1.5 liters/ha twice.  
Yield results: See on the left.

Conclusions: This two-part large scale rice trial in Cuba revealed that Vitazyme, applied once at 1 liter, or twice at 1.5 liters/ha, increased grain yield significantly, by 14% (1 liter/ha), and 17% (1.5 liters/ha twice). This product can greatly increase rice production in Cuba compared to untreated areas.

# Rice

Research organization: Ministry of Agriculture, Rice Agroindustrial Production Group, Havana, Cuba

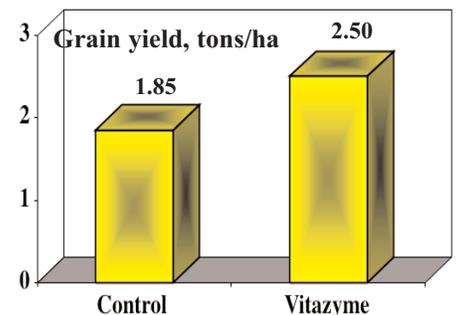
Location: CAI rice growers, sur del Jibaro, Province Sancti Spiritus  
Variety: unknown Soil type: unknown Planting date: spring, 2004

Experimental design: Large rice fields were used to compare the effectiveness of Vitazyme on the yield of rice grain. One field area was left untreated while the other field was treated with Vitazyme; all other treatments were identical for the two parcels.  
**1. Control      2. Vitazyme**

Fertilization: standard protocol  
Vitazyme application: 1.5 liters/ha, most likely at planting

Weather: Water was limited, delayed the harvest, and affected yield.

Conclusions: In this Sancti Spiritus, Cuba, large-scale rice study, Vitazyme increased grain yield by 35% despite considerable moisture stress.



**· Increase in grain yield: +35%**

# Soybeans

Location: Coatesville, Indiana  
Soil type: Fincastle silty clay loam  
Row spacing: 15 inches  
Experimental design: A soybean field was treated on one part, across the rows, with Vitazyme, and the other part was left untreated.

Variety: Pioneer 93 B68  
Previous crop: corn  
Tillage: no-till

Planting date: May 10, 2005  
Population: 179,000 seeds/acre

## 1. Control

## 2. Vitazyme

Fertilization: none (residual fertility from corn last year)

Vitazyme application: 13 oz/acre on the soil surface about one week before planting

Weather: cooler than normal

Results: About August 26 the data shown below was collected. Forty plants from each field area, closely separated, were dug with a potato fork — four plants per dig with 10 digs — and trifoliolate leaves and pods were counted for the 40 plants.

Treatment	Trifoliates	Change	Pods	Change	Roots	Biological activity
	----- number/40 plants -----					
Control	420	—	1,100	—	Standard roots structure	No fungi seen; few sowbugs*
Vitazyme	520	100 (+24%)	1,330	230 (+21%)	Long, stronger main roots More fine roots	More fungal threads on corn residue; many sowbugs*

\*Fungi are the first organisms to begin crop residue breakdown. Sowbugs consume the organic material that is breaking down.

Conclusions: This Indiana soybean study revealed that only one Vitazyme application at planting increased the number of trifoliolate leaves by 24%, while pods were increased by 21%. In addition, root growth and soil biological activity were enhanced. Unfortunately a yield check could not be made because the product was applied across the rows, making it impossible to keep treatments separate while combining down the field.

▪ **Increase in trifoliolate leaves: +24%**

▪ **Increase in pods: +21%**

# Soybeans

## Agricultural Custom Research and Education Services



**Note how the treated soybean plants are taller, have more leaf area, and have more extensive roots.**

Location: Cedar Falls, Iowa  
Soil type: Floyd loam (pH 6.8, organic matter 4.2%, CEC 15.7, good fertility)  
Previous crop: corn  
Planting rate: 49 lb/acre  
Planting date: May 10, 2005  
Tillage: conventional

Variety: Pioneer 92M72 (non-GMO)  
Planting depth: 1.5 inches  
Row spacing: 30 inches

Experimental design: A Latin square design with eight replicates and eight treatments was set up in a uniform area having 6-row plots of 15 x 40 feet (0.0138 acre). The purpose of the trial was to discover the effect of Vitazyme, a new Vitazyme variant (Product X), a possible synergist with Vitazyme (Product Y), and another possible synergist (Product Z) on soybean yield and bean moisture content. The Student-Newman-Keuls test was used to separate treatment means.

Fertilization: none

Vitazyme application: 13 oz/acre pr 6.5 oz/acre on the seeds at planting, and on the leaves and soil at 3.5 trifoliates

Product X application: 6.5 oz/acre on the seeds at planting, and on the leaves and soil at 3.5 trifoliates



**The Vitazyme treated soybeans have a large number of nodules at the stem base, a very positive feature for achieving high yields.**

Treatment	Product	Rate
1	None	0
2	Vitazyme	13 oz/acre x 2
3	Vitazyme + Product Y	13 oz/acre each x 2
4	Vitazyme + Product Y	6.5 oz/acre each x 2
5	Product Y	13 oz/acre x 2
6	Product X + Product Y	6.5 oz/acre each x 2
7	Product Z	16 oz/acre x 2
8	Vitazyme + Product Z	13 oz/acre (Vita.) + 16 oz/acre (Z) x 2

Product Y application: 13 oz/acre or 6.5 oz/acre on the seeds at planting, and on the leaves and soil at 3.5 trifoliates

Product Z application: 16 oz/acre on the seeds at planting, and on the leaves and soil at 3.5 trifoliates

Harvest date: October 4, 2005

Yield results: The two center rows of each plot were harvested with a plot com-

*Continued on the next page*

Treatment	Bean yield*	Change	Moisture*	Change
	bu/acre	bu/acre	%	%
1. Control	39.3 b	—	15.45 a	—
2. Vitazyme	45.0 a	5.7 (+15%)	15.67 a	+0.22
3. Vita + Prod Y	45.4 a	6.1 (+16%)	15.41 a	-0.04
4. Vita + Prod Y (1/2 rate)	45.0 a	5.7 (+15%)	16.15 a	+0.70
5. Product Y	43.4 a	4.1 (+10%)	15.51 a	+0.06
6. Prod X + Prod Y (1/2 rate)	44.7 a	5.4 (+14%)	15.51 a	+0.06
7. Product Z	44.1 a	4.8 (+12%)	15.95 a	+ 0.50
8. Vita + Prod Z	45.0 a	5.7 (+15%)	16.04 a	+0.59
LSD (P=0.05)	2.37		1.158	
Standard deviation	2.34		1.146	
Coeff. of variation	5.32%		7.3%	

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

bine, and the grain was weighed with an electronic scale

All treatments significantly increased soybean yield at P=0.05, with the increases ranging from 10 to 16% above the control. Vitazyme plus Product Y at the full rates gave the greatest increases (+16%) while Product Y alone gave the smallest increase (+10%). Grain moisture drydown was not significantly affected by the treatments, likely because all of the beans were dry at harvest.

**Income results:** At \$4.50/bu for soybeans, the following income increases have been calculated.

**Conclusions:** In this replicated soybean

study in Iowa, all treatments produced significant yield increases (P=0.05) of from 4.1 to 6.1 bu/acre (10 to 16%). The greatest increase was with Vitazyme + Product Y, although Vitazyme alone produced a 15% yield increase. These yield increases produced income increases of from \$18.45 to \$27.45/acre. Grain moisture did not vary significantly among the eight treatments because all of the grain was harvested when completely dry.

This study shows that Vitazyme alone produced nearly the greatest yield improvement, and other treatments or combinations did not significantly exceed this result.

Treatment	Bean increase	Extra income
	bu/acre	\$/acre
2. Vitazyme	5.7	25.65
3. Vita + Prod Y	6.1	27.45
4. Vita + Prod Y (1/2 rate)	5.7	25.65
5. Product Y	4.1	18.45
6. Prod X + Prod Y (1/2 rate)	5.4	24.30
7. Product Z	4.8	21.60
8. Vita + Prod Z	5.7	25.65

### Yield Changes

<b>Vitazyme</b> .....	<b>+15%</b>
<b>Vitazyme + Product Y</b>	
<b>Full Rate</b> .....	<b>+16%</b>
<b>Half Rate</b> .....	<b>+ 15%</b>
<b>Product Y</b> .....	<b>+10%</b>
<b>Product X + Product Y</b>	
<b>Half rate</b> .....	<b>+14%</b>
<b>Product Z</b> .....	<b>+12%</b>
<b>Vitazyme + Product Z</b> .....	<b>+15%</b>

## Squash

**Location:** Monroe County, New York

**Previous crop:** soybeans

**Experimental design:** A squash field was treated partially with Vitazyme to evaluate effects on crop yield and storability, when applied to the grower's standard program.

### 1. Control

**Fertilizer:** 600 lb/acre 6-25-27% N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O, plowed in before planting; 25 gal/acre of a 30% N solution in July, side-dressed. Total N: 110 lb/acre.

**Vitazyme application:** 13 oz/acre applied three times during the growing season: July 22 (newly forming fruit), August 8 (very green fruit), and August 24 (some dark green fruit)

**Harvest date:** September 12, 2005

**Variety:** buttercup

**Soil type:** clay loam

**Planting date:** May 31, 2005

### 2. Vitazyme

Treatment	Yield	Yield change
Control	320 bu/acre	—
Vitazyme	330 bu/acre	+10 bu/acre

**Yield results:** One-acre areas, near each other, were flagged for the treated and control portions of the field near harvest time. Three areas were picked separately and the yields were determined.

Forty bushel boxes from each treatment were identified for storage to determine quality later.

**Income results:** At a price of \$10/bu, the additional yield from Vitazyme provided \$100/acre more income.

**Storage results:** On December 15, about 3 months after harvest, the treated squash removed from storage boxes and washed were noticeably better than the untreated squash, having fewer bruised and rotten spots and fewer rejections. This improvement with Vitazyme was likely due to stronger cell walls and higher soluble solids in the cell walls of the fruit, a normal response to Vitazyme application.

**Conclusions:** In this New York squash study, Vitazyme produced a highly profitable yield increase as well as better storability of the fruit, meaning more of the stored squash made it to market to further increase the marketable yield.



**The Vitazyme treated squash in this trial displays the typical aggressive growth expected from the product for all crops. Plant maturity is enhanced as well.**

# *Stylosanthes Guinensis Cook* (a forage legume)

## *Studies in Six African Countries*

Location: Cameroon, Nigeria, Central African Republic, Niger, Tchad, and Burkina Fasso

Variety: *Stylosanthes guinensis* Cook

Soil types: unknown

Experimental design: Four fertility regimes were applied to experimental plots (4 m<sup>2</sup>) in six African countries, all with Vitazyme with the exception of an untreated control. Effects on nodulation were used to evaluate the product.

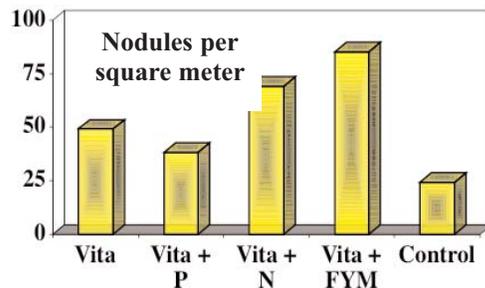
1. Vitazyme alone
2. Vitazyme + phosphorus fertilizer (P)
3. Vitazyme + nitrogen fertilizer (N)
4. Vitazyme + farmyard manure (FYM)
5. Control

Fertilization: 100 kg/ha N (urea), 100 kg/ha P<sub>2</sub>O<sub>5</sub> (SSP), and 100 kg/ha dairy manure

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

Nodulation results: Nodules were counted in one square meter of plants for each determination.

Vitazyme alone increased legume nodulation by 103% over the control. All other treatments exceeded the control as well, especially the nitrogen and farmyard manure treatments with Vitazyme. Phosphorus plus Vitazyme did not produce as great an increase as did the other treatments.



### **Nodules per Square Meter**

Treatment	Cameroon	Nigeria	Central African Rep.	Niger	Tchad	Burkina Fasso	Mean
1. Vitazyme	40	40	75	40	60	40	49.2
2. Vita + P	35	35	60	25	40	35	38.3
3. Vita + N	75	55	70	50	100	65	69.2
4 Vita + FYM	90	65	80	65	130	80	85.0
5. Control	15	20	50	20	30	10	24.2

Conclusions: In this six country African trial, Vitazyme performed admirably by inducing a 103% increase in forage legume nodulation. In combination with nitrogen and farmyard manure the increases were even

greater, from 186 to 253% above the control, showing an excellent synergism between these materials. Vitazyme has been proven by this study to be an excellent stimulator of forage legume nodulation, and thus of legume growth potential in tropical countries.

# *Stylosanthes Hamata Cook* (a forage legume)

## *Studies in Six African Countries*

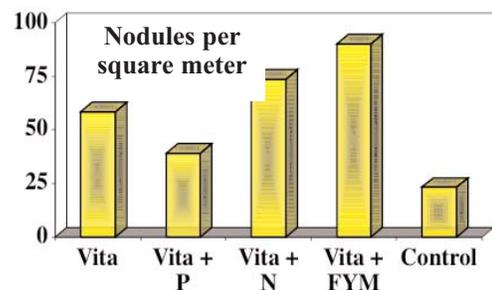
Location: Cameroon, Nigeria, Central African Republic, Niger, Tchad, and Burkina Fasso

Variety: *Stylosanthes hamata* Verano

Soil types: unknown

Experimental design: Four fertility regimes with six replications were applied to experimental plots (4 m<sup>2</sup>) in six African countries, all with Vitazyme with the exception of an untreated control. Effects on nodulation were used to evaluate the product.

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



Fertilization: 100 kg/ha N (urea), 100 kg/ha P<sub>2</sub>O<sub>5</sub> (SSP), and 100 kg/ha dairy manure

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

Nodulation results: Nodules were counted in one square meter of plants for each determination.

Vitazyme alone increased root nodulation by 150% over the control. In combination with nitrogen and farmyard manure, Vitazyme greatly boosted nodulation, though with phosphorus the nodulation was slightly depressed.

Conclusions: Vitazyme applied with farmyard manure and nitrogen in this six-

country African trial greatly boosted the nodulation of this tropical forage legume, by up to 286% above the control. Vitazyme alone more than doubled nodulation. The product shows great promise in increasing tropical legume production.

### **Nodules per Square Meter**

Treatment	Cameroon	Nigeria	Central African Rep.	Niger	Tchad	Burkina Fasso	Mean
1. Vitazyme	40	60	70	60	60	60	58.3
2. Vita + P	35	35	55	35	30	45	39.2
3. Vita + N	60	76	60	85	80	80	73.5
4 Vita + FYM	75	95	90	100	90	90	90.0
5. Control	20	20	40	20	20	20	23.3

# Sugar Cane

## Preliminary Results On Large-Scale Field Trials

Location: Calderon Cooperation Farm, Blocks 14, 12, 75, and 8

Soil type: Cambisol (Eutropept)

Farm: Dos Rios, Palma Soriano, Santiago de Cuba, Cuba

Row spacing: 1.6 meters

Variety: C8612, C87-51, C87-51, and C1051

Previous crop: sugar cane, all harvested between February and April of 2003

Experimental design: Four sugar cane fields — a new planting (Block 14, Field 1), first ratoon (Block 12, Fields 4 and 5), second ratoon (Block 75, Fields 1 and 2), and third ratoon (Block 8, Fields 1 and 2) — were divided into Vitazyme treated and control areas to evaluate the product's effects in large scale field situations.

### 1. Control

### 2. Vitazyme

Fertilization: according to SERFE (Fertilizer Service) recommendations, or 60 to 80 kg/ha N in ratoon cane; no fertilizer for newly planted cane

Vitazyme application: a Shogun backpack sprayer with a 16 liter capacity and a 300 l/ha spray volume (hollow cone nozzles), having 50% of the area treated in 80 cm bands over the rows. Rate: 1 liter/ha.

Harvest yield estimates: Stalk diameter and length were determined for 10 samples in four plots per treatment. Stalk population counts were made in 10 meters of row in four plots per treatment as well to determine stalks per meter of row. Then all of the stalks in one meter of row were cut, counted, and weighed to determine mean stalk weight. Finally, using stalks per meter and mean stalk weight, with a row spacing of 1.6 meters, the cane yield was determined in metric tons/ha.

## New Planting

Variety C8612, planted in June of 2003; age 6 months at measurement; area treated, 8.03 ha

Treatment	Stalk length	Change	Stalk diameter	Change	Stalk population	Population change
	cm	cm	cm	cm	stalks/m	stalks/m
Control	121.9	—	2.54	—	8.8	—
Vitazyme	125.9	4.0 (+3%)	2.82	0.28 (+11%)	12.3	3.5 (+40%)

▪ Increase in stalk length: +3%

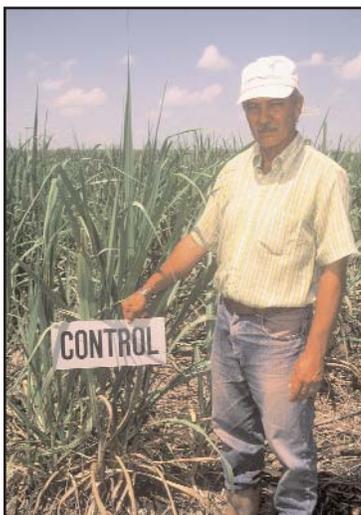
▪ Increase in stalk diameter: +11%

▪ Increase in stalks/meter: +40%

## First Ratoon

Variety C87-51; area treated, 12.06 ha; one application

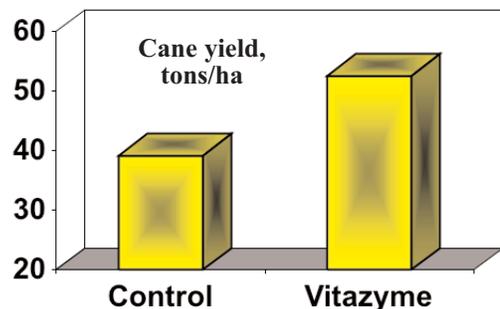
Treatment	Stalk length	Length change	Stalk diameter	Diameter change	Stalk population	Population change	Stalk weight	Weight change	Yield	Yield change
	cm	cm	cm	cm	stalks/m	stalks/m	kg	kg	tons/ha	tons/ha
Control	189.2	—	2.23	—	9.03	—	0.69	—	38.94	—
Vitazyme	201.4	12.2 (+6%)	2.33	0.10 (+4%)	9.00	-0.03 (0%)	0.81	0.11 (+16%)	45.56	6.62 (+17%)



Without Vitazyme the sugar cane growth in this trial is typical for Cuba.



With Vitazyme, note how aggressive the sugar cane growth has become.



▪ Increase in stalk length: +6%

▪ Increase in stalk diameter: +4%

▪ Increase in stalk weight: +16%

▪ Increase in cane yield: +17%

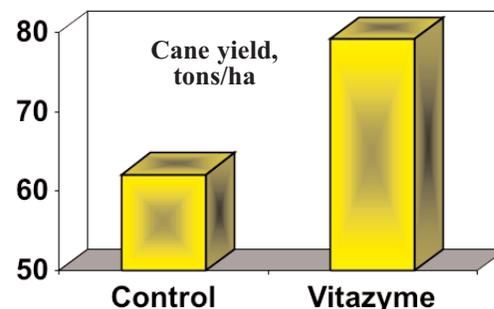
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## Second Ratoon

Variety C87-51; area treated, 10.0 ha; one application

Treatment	Stalk length	Length change	Stalk diameter	Diameter change	Stalk population	Population change	Stalk weight	Weight change	Yield	Yield change
	cm	cm	cm	cm	stalks/m	stalks/m	kg	kg	tons/ha	tons/ha
Control	216.2	—	2.33	—	11.83	—	0.84	—	62.11	—
Vitazyme	212.0	-3.8 (-2%)	2.34	0.01 (0%)	12.80	0.97 (+8%)	0.99	0.15 (+18%)	79.22	17.11 (+28%)

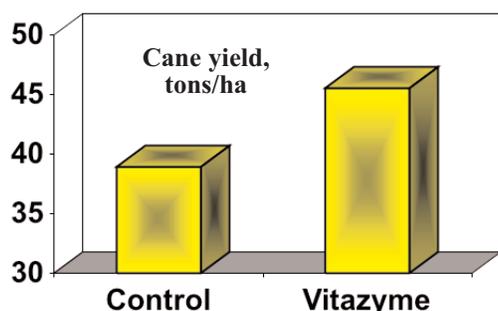
- **Increase in stalk population: +8%**
- **Increase in stalk weight: +18%**
- **Increase in cane yield: +28%**



## Third Ratoon

Variety C1051; area treated, 7.52 ha; two applications

Treatment	Stalk length	Length change	Stalk diameter	Diameter change	Stalk population	Population change	Stalk weight	Weight change	Yield	Yield change
	cm	cm	cm	cm	stalks/m	stalks/m	kg	kg	tons/ha	tons/ha
Control	170	—	2.51	—	8.15	—	0.77	—	39.22	—
Vitazyme	175	5 (+3%)	2.67	0.16 (+6%)	10.65	2.50 (+31%)	0.79	0.02 (+3%)	52.58	+13.36 (+34%)



- **Increase in stalk length: +3%**
- **Increase in stalk diameter: +6%**
- **Increase in stalk population: +31%**
- **Increase in stalk weight: +3%**
- **Increase in cane yield: +34%**

*Preliminary results:* Vitazyme, at 1 to 2 liters/ha total application, showed great promise in markedly increasing sugar production in these Cuban cane trials. As of the end of 2004, total cane growth and estimated cane yields increased substantially with Vitazyme, the all-important cane yield increasing by 17%, 28%, and 34% for first, second, and third year ratoon cane, respectively. Growth of newly planted cane also revealed excellent responses in stalk diameter and stalk population 6 months after planting and treating with Vitazyme.

## Sugar Cane

*Location:* Marcelino Matidueña, Province of Guayas, Ecuador

*Variety:* *Sachrum officinarum*

*Soil type:* clayey

*Experimental design:* A uniform soil area was selected alongside a water channel, where six rows were treated with Vitazyme and Stimplex seaweed to determine effects on sugarcane seed piece germination and growth.

### 1. Control

### 2. Vitazyme + Stimplex treatment of seed pieces

*Fertilization:* none

*Vitazyme and Stimplex application:* Seed pieces were immersed before planting in a solution of 1 liter of Vitazyme and 1 liter of Stimplex in 100 liters of water.

*Tiller numbers and height:* See the next page.

*Shoot structure:* Vitazyme + Stimplex produced many more secondary tillers per seed piece than did the control, and the leaves were of a stronger, more vital nature.

*Conclusions:* Vitazyme + Stimplex applied to the sugar cane seed pieces before planting resulted in a marked increase in tiller germination and vigor. The number of shoots per seed piece increased by 46% above the control at 45 days after planting, and shoots per meter of row by 30%. Treated shoot height also was 12% greater than the control, and the shoots were stronger with wider leaves.

*Continued on the next page*

Treatment	Total seed pieces	Meters of row <sup>1</sup>	Shoots, Oct. 1 <sup>2</sup>	Shoots per seed	Shoots, Oct. 18 <sup>3</sup>	Shoots per seed	Shoots per meter of row	Average height, cm
Control	1,239	m	505	0.41	845	0.69	7.67	23.2
Vitazyme	938	96	580	0.62	949	1.01	9.97	26.0

<sup>1</sup>Four rows for each treatment were measured and totalled.

<sup>2</sup>Thirty days after planting.

<sup>3</sup>Forty-five days after planting.

**Changes with Vitazyme + Stimplex**  
**Increase in shoots/seed at 30 days: +51%**  
**Increase in shoots/seed at 45 days: +46%**  
**Increase in shoots/meter of row: +30%**  
**Increase in shoot height: +12%**

## Sweet Corn

Organization: Aguijares SPRL

Location: Santa Teresa, Tabla 1, Mexico

Variety: unknown

Soil type: unknown

Planting date: April, 2004

Experimental design: A sweet corn field was divided into two portions, one hectare treated with the usual fertilizer and the other treated with 30% less nitrogen and Vitazyme three times. Growth and yield parameters were evaluated to determine Vitazyme effects.

### 1. Control

### 2. Vitazyme (3 applications)

Fertilization: Control, the "usual" N-P-K application; Vitazyme, 30% less nitrogen

Vitazyme application: 1 liter/ha on the soil at planting; 1 liter/ha on the leaves and soil twice during growth

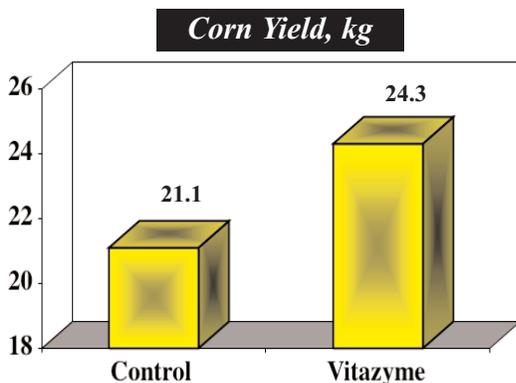
Growth, quality, and yield results: Ten meter samples of the corn were harvested from each treatment for evaluations.

Income results: The yield increase was 3,200 kg/ha, at 1,300 pesos/ton.

Parameter	Control	Vitazyme
"Tender" corn	10.0	9.8
"Useful tender" corn	88	85
"Monlonco tender" corn	12	13
Length, cm	16.5	18.5
Diameter, cm	4.4	4.7

Parameter	Control	Vitazyme
Stalk diameter, cm	1.81	2.03
Plant height, m	1.80	2.27

Parameter	Control	Vitazyme
Gross weight, kg	21.1	24.3
"Trashed" weight, kg	15.95	18.40



### Income Summary

Increased income from the extra yield.....3,439 pesos/ha  
Savings in nitrogen fertilizer.....1,000 pesos/ha  
Total benefit of Vitazyme.....4,438 pesos/ha  
Product cost.....722 pesos/ha  
Net increase in income.....3,716 pesos/ha

Conclusions: Vitazyme applied to sweet corn in this Mexican study produced a 12% increase of higher quality corn. The ears were longer and thicker, on taller and stronger stalks despite a 30% reduction in nitrogen fertilizer application. The economic benefit to the farmer was 3,716 pesos/ha, even without any consideration of the improved corn quality.



**Vitazyme treated sweet corn shown here has considerably more root mass than the control, with much more soil clinging to the roots ... indicating a more vigorous rhizosphere. The ears are more mature as well with the Vitazyme treatment.**

# Improvement in Fertilizer Efficiency with Vitazyme

## Evidence from Replicated Field Trials — 1995 to 2004

The following studies demonstrate the effectiveness of Vitazyme for improving fertilizer nitrogen efficiency. Compare the improvement of yield with Vitazyme at each nitrogen level, and also the enhancement of yield with Vitazyme at a lower nitrogen level compared to the untreated yield at a higher nitrogen level (see the dotted lines). **All of these studies have been conducted by universities, government testing stations, or contract researchers and have been statistically analyzed.** For the full reports, go to [www.vitalearth.com](http://www.vitalearth.com).

Location	Year	Nitrogen lb/acre	Yield no Vitazyme	Yield with Vitazyme
Ames, Iowa (field corn)	1995	80	79.5 bu/acre	87.2 bu/acre
		120	80.4 bu/acre	89.1 bu/acre
Burlington, Iowa (field corn)	1996	80	127.6 bu/acre	155.2 bu/acre
		120	155.2 bu/acre	165.6 bu/acre
Ames, Iowa (field corn)	1997	0	151.7 bu/acre	158.8 bu/acre
		50	183.5 bu/acre	186.6 bu/acre
		100	191.3 bu/acre	190.1 bu/acre
Crossville, Tennessee (sweet corn)	1999	40	3.6 tons/acre	4.0 tons/acre
		80	3.8 tons/acre	4.9 tons/acre
Cedar Falls, Iowa (field corn)	2003	80	145.8 bu/acre	155.4 bu/acre
		160	159.9 bu/acre	—
Elizabeth City, NC (field corn)	2004	0	54.0 bu/acre	98.5 bu/acre
		56	118.3 bu/acre	138.4 bu/acre
		112	157.8 bu/acre	155.6 bu/acre
		224	150.0 bu/acre	159.4 bu/acre
		280	139.9 bu/acre	161.5 bu/acre
Clarkton, North Carolina (field corn)	2004	0	153.9 bu/acre	181.6 bu/acre
		56	170.2 bu/acre	162.6 bu/acre
		112	145.9 bu/acre	166.8 bu/acre
		224	159.3 bu/acre	178.6 bu/acre
		280	139.7 bu/acre	151.2 bu/acre
Havana Province, Cuba (sweet potatoes)	2003	56	—	26.73 tons/ha
		84	—	32.33 tons/ha
		112	27.20 tons/ha	34.00 tons/ha
Mantanzas Province, Cuba (sugar cane)	2004	109	—	10.81 tons/ha
		146	9.87 tons/ha	10.89 tons/ha
Holguin, Cuba (sugar cane)	2004	0	7.46 tons/ha	—
		73	—	8.14 tons/ha
		109	—	8.94 tons/ha
		146	9.73 tons/ha	12.06 tons/ha
Santiago de Cuba, Cuba (sugar cane)	2004	0	11.95 tons/ha	—
		42	—	15.05 tons/ha
		84	12.21 tons/ha	16.50 tons/ha
Sancti Spiritus, Cuba (rice)	2004	0	3.17 tons/ha	—
		66	3.83 tons/ha	5.81 tons/ha
		88	4.65 tons/ha	6.34 tons/ha
Havana Province, Cuba (rice)	2004	0	2.41 tons/ha	—
		66	2.96 tons/ha	3.10 tons/ha
		88	2.88 tons/ha	3.19 tons/ha