VITAZYME®

2006 Field Trial Results

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

Compiled by Paul W. Syltie, Ph.D., Director of Research
Vital Earth Resources, 706 East Broadway
Gladewater, Texas 75647, U.S.A.
(903)845-2163 www.vitalearth.com

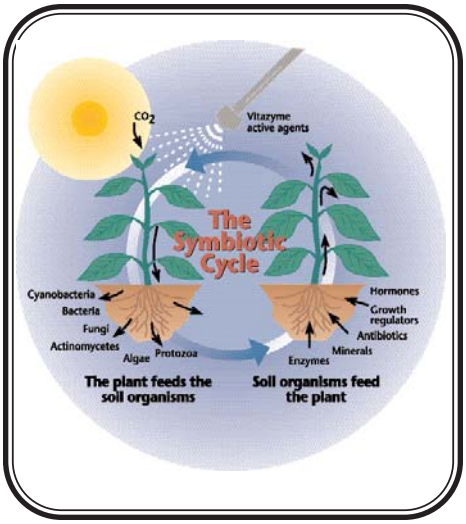
2006 Vitazyme Field Trial Results

For the eleventh 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 climatic 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 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.

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_3-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

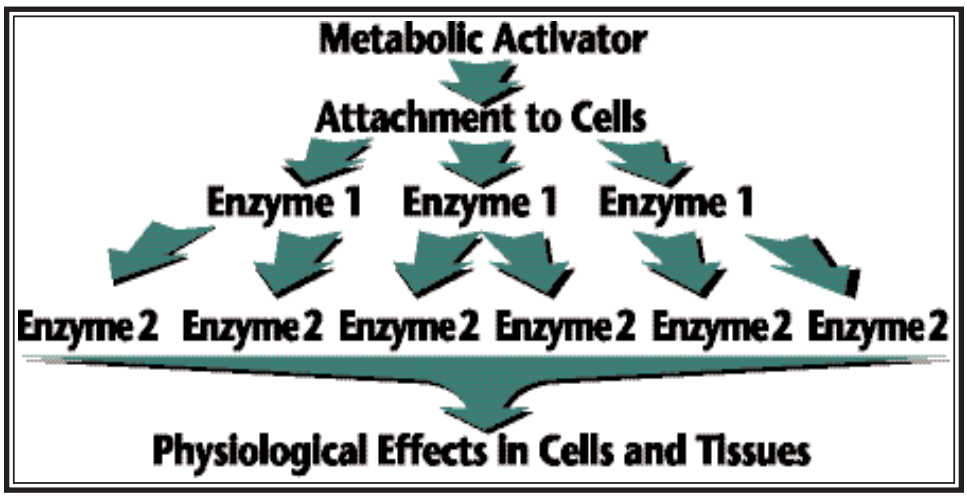
Total additive score:	15	14	13	12	11	10	9	8	7	6	5
Apply this % of optimum N:	←	50-60%		→	←	60-70%		→	←	70-80%	→

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 2006

The year 2006 produced the usual variations in growing conditions across the United States, but in all climates and soils Vitazyme continued to produce consistently excellent yields. A very dry late summer reduced yields in the northwest Corn Belt, but some areas, such as central Iowa, had excellent yields, as did most of the Midwest. Here are a few highlights for the year.

Some Highlights for 2006

1 A corn study at Cedar Falls, Iowa, in the heart of the Corn Belt, produced an impressive, highly significant 25.8 bu/acre yield increase, an 18% improvement above a high-yielding control. This yield enhancement continues excellent replicated corn responses in Iowa, North Carolina, and other states in previous years.

2 Sugar cane responses to Vitazyme in Cuba again have been exemplary. Large scale production trials gave sugar increases of from 30 to 50%, and two trials increased yield an amazing 98 and 100% above the untreated control fields.

3 Vegetable trials on former sugar cane land in Cuba proved how effective Vitazyme can be when fertility and water resources are limited. Sweet potatoes were enhanced by 46%, peanuts by 93%, corn by 93%, and black beans by 104%.

4 The three major vegetable, grain, and fiber crops in India were treated with Vitazyme in replicated trials, and each responded highly significantly: tomatoes by 17%, rice by 17%, and cotton by 16% at the University of Mysore.

5 Texas A&M University at College Station, Texas, evaluated the product at several nitrogen levels, and while no pronounced fertilizer nitrogen interaction was detected, a major yield indicator — "nodes above white flower" — was significantly increased.

6 Both raisin and wine grapes continued to perform remarkably well with Vitazyme treatment. In California, the third year of continuous treatment of coastal wine grapes in the same plots produced a 30% increase in grapes having more sugar than the untreated control grapes. The average yield increase for three years is 29%, and the wine from this higher yield is equal or superior to the control wine. Raisin grapes near Fresno also excelled in yield and quality.

6 Apples in New York increased by 16% of higher quality fruit in one trial, with the other trials also producing excellent results.

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 soil 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 2006

Apples

Location: Wayne County, New York
Variety: Gala
Maturity: second year (planted in 2005)
Rootstock: M9
Tree density: 650 trees/acre
Soil type: unknown

Experimental design: Vitazyme was applied to part of a new non-bearing apple orchard to determine its effects on tree growth and development; the other part of the grove was left untreated. Data were collected on matched groups of 10 trees each for each treatment in seven replicates. A statistical analysis was applied to the seven replicates using the Student-Newman Keuls Test.

1. Control **2. Vitazyme**

Fertilization: Pre-bloom: 200 lb/acre of $Ca(NO_3)_2$ (30 lb/acre of N); post-bloom: 200 lb/acre of $Ca(NO_3)_2$ (30 lb/acre of N)

Vitazyme application: 16 oz/acre in the initial weed spray, and again at the same rate at pre-bloom, petal fall, and first cover

Fire blight control: dormant copper followed by streptomycin sprays

Weather for 2006: unusually wet and warm, resulting in very good tree growth

Growth results: Four parameters were measured at the end of the 2006 growing season, on November 4 and 5. Seven sets of 10 consecutive trees under each treatment were measured, from 14 different rows across the orchard. Since there was hardly any fire blight detected, that data is not presented in the following.

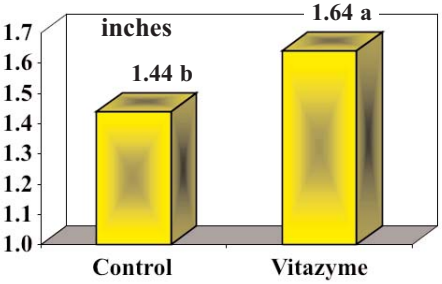
Final CSTD*

Treatment	Replicate 1	2	3	4	5	6	7	Mean[1]
	inches of diameter							
Control	1.4	1.5	1.6	1.4	1.2	1.4	1.6	1.44 b
Vitazyme	1.6	1.4	1.7	1.6	1.7	1.8	1.7	1.64 a

[1]Means followed by the same letter are not significantly different according to the Student-Newman-Keuls Test (P = 0.05).
Probabilities: Main effects, P = 0.0382*
Block effects, not significant
Coefficient of variation = 9.17%
$LSD_{0.05}$ = 0.18 inch

These apples in New York display the vigorous leafing, superior chlorophyll development, and fruiting that are characteristic of Vitazyme use.

Trunk Diameter



*Cross sectional trunk diameter, measured to the nearest 0.1 inch just above the rootstock grafting union.

Continued on the next page

Cumulative New Tree Growth*

Treatment	Replicate 1	2	3	4	5	6	7	Mean[1]
	inches of diameter							
Control	103.0	96.0	88.5	97.5	99.0	84.5	90.0	94.07 b
Vitazyme	114.0	101.5	122.0	98.0	106.5	111.5	110.0	109.07 a

[1]Means followed by the same letter are not significantly different according to the Student-Newman-Keuls Test (P = 0.05).
Probabilities: Main effects, P = 0.0178*
Block effects, not significant
Coefficient of variation = 8.46%
$LSD_{0.05}$ = 11.23 inches

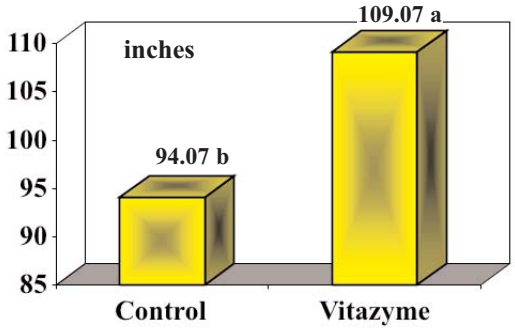
Tree Height*

Treatment	Replicate 1	2	3	4	5	6	7	Mean[1]
	inches of height							
Control	56.5	55.0	47.5	50.5	53.5	49.0	51.0	51.86 b
Vitazyme	61.5	54.0	57.5	52.5	55.0	59.5	56.5	56.64 a

[1]Means followed by the same letter are not significantly different according to the Student-Newman-Keuls Test (P = 0.05).
Probabilities: Main effects, P = 0.0265*
Block effects, not significant
Coefficient of variation = 5.64%
$LSD_{0.05}$ = 4.00 inches

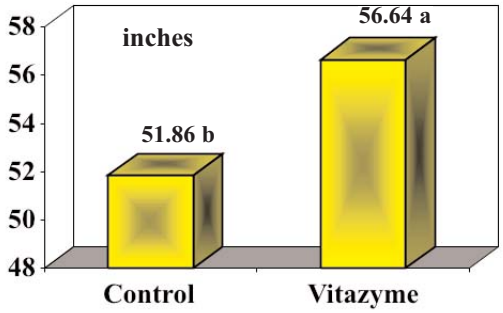
Conclusions: Vitazyme proved to be an excellent stimulator of growth for young apple trees in this replicated New York study. In this year of very good tree growth, the final cross-sectional trunk diameter was increased by 14%, the tree height by 9%, and the cumulative new branch growth by 16% above the untreated control trees. Fire blight incidence was negligible for both treatments. This study shows the great efficacy of Vitazyme to enhance the growth and future productivity of apple trees.

Cumulative New Branch Growth



*Cross sectional trunk diameter, measured to the nearest 0.1 inch just above the rootstock grafting union.

Tree Height



*Cross sectional trunk diameter, measured to the nearest 0.1 inch just above the rootstock grafting union.

According to the researcher, **"The Vitazyme program looks promising as a tool for helping to bring non-bearing apple blocks into production faster."**

- ***Increase in CSTD with Vitazyme: 14%***
- ***Increase in tree height with Vitazyme: 9%***
- ***Increase in cumulative new growth with Vitazyme: 16%***

Apples

Location: Albion, New York *Variety*: Ida Red *Soil type*: unknown *Tree age*: mature grove
Experimental design: A 5-acre orchard was divided, and one part was treated with Vitazyme while the other part was left untreated. The purpose of the study was to evaluate the product's effects on apple yield and quality.

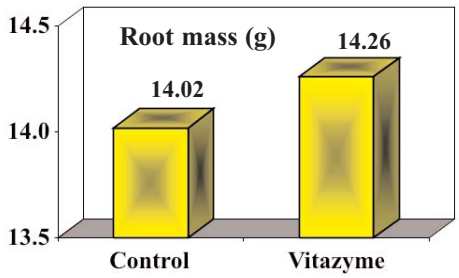
These Vitazyme treated apples (with three applications) had greater fruit pressure and significantly greater yield than the untreated controls.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: four foliar applications, each at 26 oz/acre; (1) pink bloom on May 13, (2) first cover on June 1, (3) third cover on June 28, and (4) August 30.
Harvest date: November 10, 2006
Quality results: Each value is the average of analyses performed on 30 fruit selected for each treatment on October 10, and 20 fruit selected on November 1.
Vitazyme increased the strength of apple tissue cell walls to increase fruit pressure, while reducing the starch content slightly. **Soluble solids were unchanged for the two treatments, quite remarkable since the greater fruit load did not reduce sugars in the tissue.** Thus, Vitazyme was apparently stimulating photosynthesis to fix more carbon from the air while enhancing root uptake of nutrients.

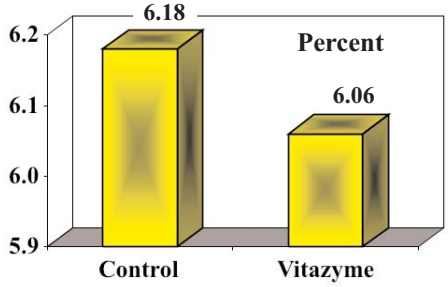
Continued on the next page

Fruit Pressure*



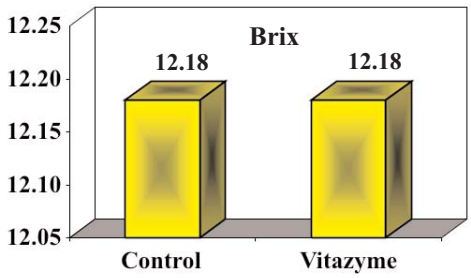
*Average of 50 fruit.

Fruit Starch*



*Average of 50 fruit.

Soluble Solids*



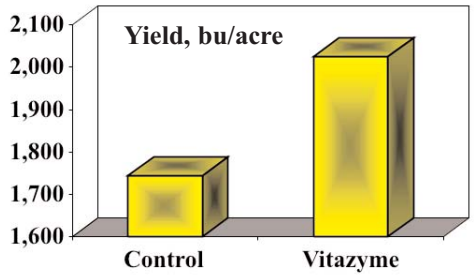
*Average of 50 fruit.

Yield results:

Treatment	Total yield	Trees	Yield	Trees	Yield	Increase	Income*
	bu	number	bu/acre	trees/acre	bu/acre	bu/acre	$/acre
Control	1,840	211	8.72	200	1,744.1	——	6,104.35
Vitazyme	1,680	166	10.12	200	2,024.1	280.0 (+16%)	7,084.35

*Based on a value of $3.50/bu

Apple Yield



Conclusions: This apple study in western New York proved that four applications of Vitazyme increased apple yield by 16%, producing $980/acre more income. At the same time there was no reduction in sugars with Vitazyme despite a heavier fruit load. The product also improved fruit pressure through the development of stronger cell walls.

- ***Increase in fruit pressure: 0.14 percentage point***
- ***Decrease in fruit starch: 0.12 percentage point***
- ***Increase in apple yield: 16%***
- ***Increase in income: $980.00/acre***

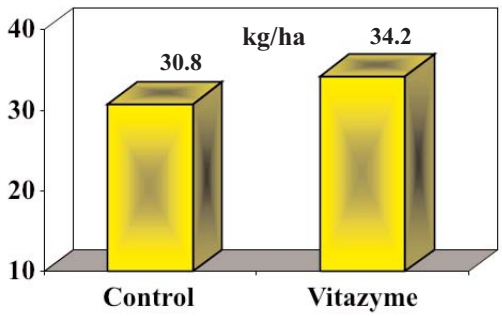
Beets

Location: Ukraine
Variety: unknown (a table variety)
Planting date: unknown
Planting rate: unknown
Experimental design: Two side-by-side 0.5 ha areas (in "Area 5") were selected, one area treated with Vitazyme and the other area left untreated to evaluate the effect of the product on beet yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1 liter/ha on the leaves and soil, at unknown dates
Harvest date: October 1, 2006
Yield results: (see graph)
Conclusions: This Ukraine table beet trial proved that Vitazyme increased beet yield by 11% when applied at the 1 liter/ha rate on these fertile Mollisol soils.

Beet Yield



- ***Increase in beet yield: 11%***

Bermudagrass

Tarleton State University

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

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

Fertilization: Note the treatments for the three tests later.

Continued on the next page

Vitazyme application: Note the applications for the individual test areas. Applications were made with a hand-pushed, two-wheeled CO_2 pressurized boom having four Teejet XR8003 nozzles calibrated to deliver 58 gal/acre at 39 psi.
Herbicide applications: **Trial 1:** On July 3, Drive75 DF + MES (a methylated seed oil) at 0.367 oz/1,000 ft.^{2} for barnyard grass and yellow foxtail; on July 31 and August 30, Lesco 3 Way at 0.9 oz/1,000 ft^2 for broadleafed weeds, especially pigweed; on September 9, Pendulum AquaCap at 0.6 oz/1,000 ft^2 for winter annuals and tall fescue.
Trials 2 and 3: Lesco 3 Way at 1.10 oz/1,000 ft^2 for broadleafed weeds, and Pendulum Aqua Cap at 1.6 oz/1,000 ft^2 for winter annuals.
Irrigation: sprinkler for all plots
Data evaluations: Evaluations of cover (visual), quality (visual), dry shoot weight (using grass clippings), root and shoot weight (from dried 875 cm^3 soil cores), turf cover (with a Canon Power Shot S50 digital camera mounted on a box, with SigmaScan pro software), and leaf chlorophyll (using a Spectrum Field Scout Chlorophyll Meter 1000).
Statistical analyses: Data were collected from a randomized complete block design plot layout (4 replicates), and were subjected to Analysis of Variance for replicated measures using SAS Version 9.1 (General Linear Model Procedure).

I. New Seeding Trial

A 1,200 ft^2 area was treated with glyphosate (2 qt/acre) on April 19 and May 9, 2006. Plots were seeded to Princess 77 bermudagrass. Vitazyme and Lesco 18-24-12 fertilizer were applied immediately after planting, at a rate of 1 lb/1,000 ft^2 of P_2O_5. After 30 days the fertilizer was changed to Lesco 28-3-10 at a rate to apply 1 lb/1,000 ft^2 of N. The final fertilizer treatment was with Lesco 5-10-31, on October 17, at a rate to give 1 lb/1,000 ft^2 of K_2O. Fertilizer treatment dates were June 14, July 25, August 8, September 9, and October 17. The grass was cut with a reel mower to 0.75 inch twice weekly during good growth.
While the fertilizer treatments gave significantly greater color responses by season's end, the Vitazyme only treatments also gave excellent color values earlier in the season.

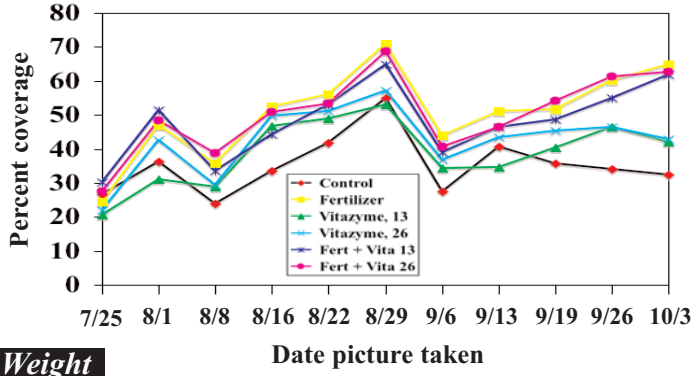
*Grass Color**

Treatment	Average color rating	Change color rating
1. Control	3.41	——
2. Fertilizer	4.79	1.38 (+40%)
3. Vitazyme, 13	3.72	0.31 (+9%)
4. Vitazyme, 26	4.06	0.65 (+19%)
5. Fert. + Vita, 13	4.85	1.44 (+42%)
6. Fert + Vita, 26	5.21	1.80 (+53%)

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

Three of the dates showed significant differences for grass coverage. By late September and early October the Fertilizer and Fertilizer + Vitazyme treatments had significantly greater coverage than did the Control and Vitazyme only treatments.

Percent Grass Cover by Digital Image Analysis



Dry Root Weight

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

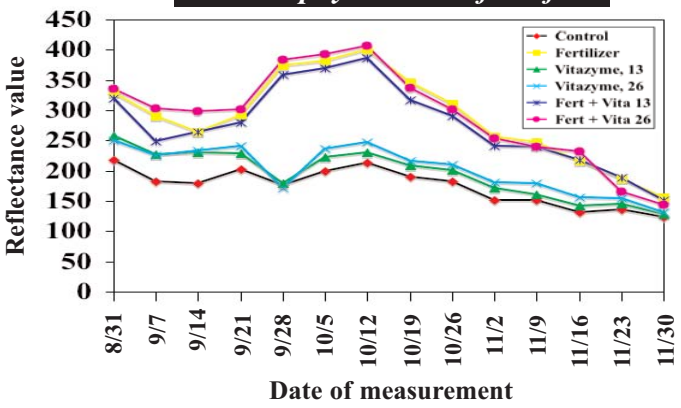
Root Weight Changes

Fertilizer alone.....+29%
Vitazyme, 13 oz/acre.....+26%
Vitazyme, 26 oz/acre.....+20%
Fert + Vita, 13 oz/acre....+3%
Fert + Vita, 13 oz/acre...+14%

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

Significant differences appeared on all dates. The consistently highest chlorophyll levels were for Fertilizer + Vitazyme (26 oz) for 8/13 through 11/17; after that the Fertilizer and Fertilizer + Vitazyme (13 oz) treatments showed the highest chlorophyll content. Vitazyme at both the 13 oz and 26 oz rates usually significantly increased chlorophyll above the untreated control.

*Chlorophyll Levels of Turf**



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

II. Established Tifsport Trial

Clipping Weights

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

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

A series of 5 x 5 foot plots was established on existing sod at the Field Laboratory, with four replications using the same treatments as for Trial I (six treatments and 24 plots).
All treatments improved the appearance of the turf compared to the con-

Continued on the next page

Grass Color*

Treatment	Average color rating	Change color rating
1. Control	5.48	——
2. Fertilizer	6.60	1.12 (+20%)
3. Vitazyme, 13	5.64	0.16 (+3%)
4. Vitazyme, 26	5.68	0.20 (+4%)
5. Fert. + Vita, 13	6.69	1.21 (+22%)
6. Fert + Vita, 26	6.77	1.29 (+24%)

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

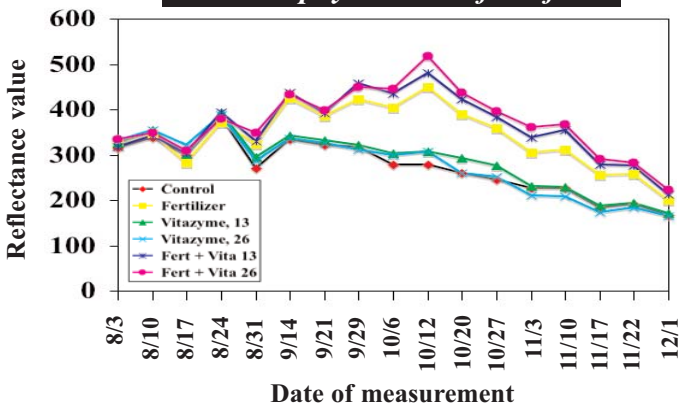
trol, especially the three treatments having fertilizer. Vitazyme at both rates marginally increased green color of the grass.

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

Chlorophyll Changes

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

Chlorophyll Levels of Turf*



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

Significant chlorophyll differences appeared on most dates, with the darkest green colors exhibited by the fertilized treatments, especially those receiving Vitazyme + Fertilizer. Vitazyme alone at both rates increased the green color slightly.

% Grass Cover by Digital Image Analysis

Percent Cover Changes

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

III. Established Princess 77 Trial

Dry Root Weight

Root Weight Changes

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

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

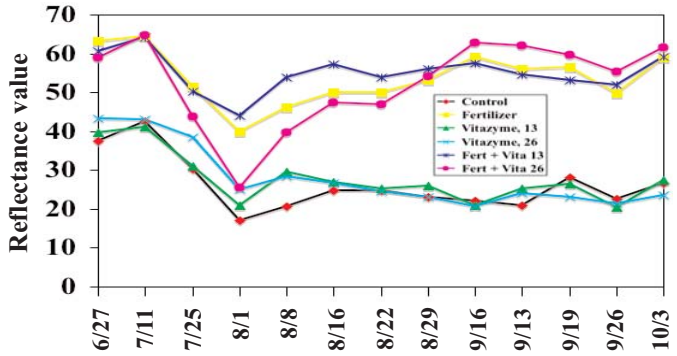
The treatments were identical to those of Trial II.

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

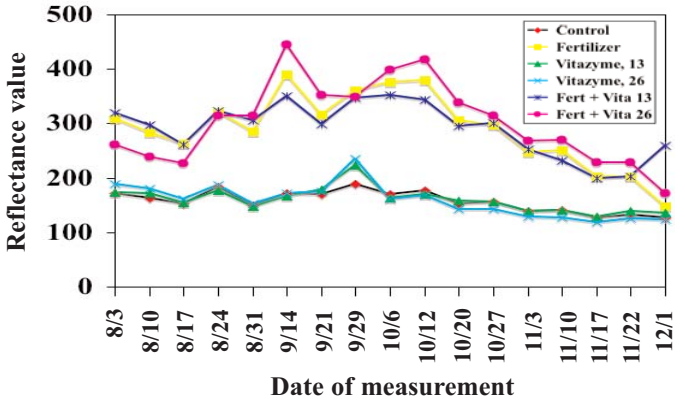
Vitazyme alone at 26 oz/acre increased the root mass greatly, whereas Vitazyme with fertilizer also increased root weight up to 21%, far above the 4% increase from Vitazyme alone.

All three fertilizer treatments raised leaf chlorophyll by 80 to 91%, the 26 oz Vitazyme rate increasing chlorophyll the most.

Percent Grass Cover by Digital Image Analysis



Chlorophyll Levels of Turf*



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

Grass Color*

Treatment	Average color rating	Change color rating
1. Control	3.59	——
2. Fertilizer	6.13	2.54 (+71%)
3. Vitazyme, 13	3.84	0.25 (+7%)
4. Vitazyme, 26	3.86	0.27 (+8%)
5. Fert. + Vita, 13	6.23	2.64 (+74%)
6. Fert + Vita, 26	6.02	2.43 (+68%)

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

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

Chlorophyll Changes

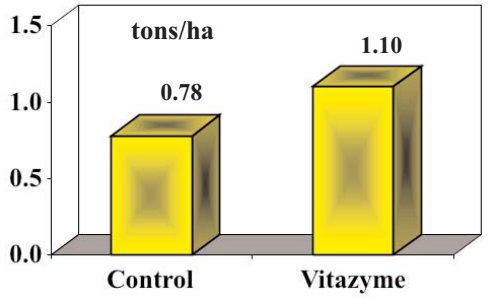
Fertilizer only.....+84%
Fert + Vitazyme (13 oz)....+80%
Fert + Vitazyme (26 oz)....+91%

Black Dry Beans

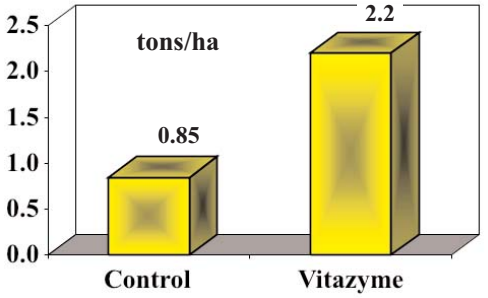
Note the taller, darker green, more vigorous field beans to the left in this field. Vitazyme applied on the seeds at planting and again at first bloom greatly improved yield potential.

Location: Camilo Farm and Victoria de Giron Farm of Camilo Cienfuegos Agricultural Enterprise, Havana Province, Cuba
Variety: black dry beans
Soil type: red ferralitic
Planting date: late 2005 to early 2006
Experimental design: A commercial production trial involved a split field of 2.0 ha treated and 1.0 ha not treated with Vitazyme at Victoria de Giron Farm, and 1.0 ha treated and 1.0 ha not treated at Camilo Farm.
1. Control **2. Vitazyme**

***Bean Yield* (Camilo Farm)**



***Bean Yield* (Victoria de Giron Farm)**



Fertilization: unknown
Vitazyme applications: 1.0 liter/ha sprayed over the soil and leaves two times, separated by 30 days
Yield results: (see graphs)
Conclusions: Vitazyme applied twice during the growing cycle in this commercial Cuban bean study revealed excellent yield increases, of 159 and 41%.

- ***Increase in bean yield (Camilo Farm): 41%***
- ***Increase in bean yield (Victoria de Giron Farm): 159%***

Black Beans

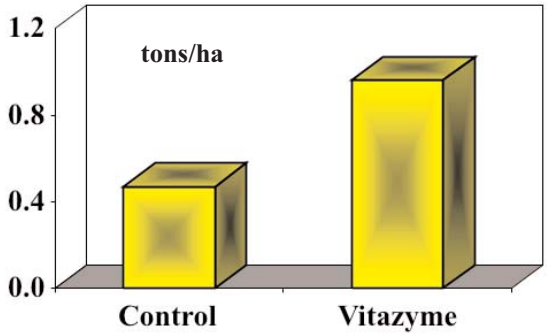
Cuban Ministry of Sugar

Location: Crucero Aurora Cooperative, Havana Province, Cuba
Soil type: sialitic over lime (Cambisol) *Variety*: unknown
Planting rate: unknown *Row spacing*: unknown
Planting date: November 10, 2005 *Watering*: rain-fed
Experimental design: A field of black beans was divided, part of it treated with Vitazyme and the other part left untreated. The objective was to determine the effectiveness of the product to increase bean yield.
1. Control **2. Vitazyme**
Vitazyme application: 1 liter/ha on the leaves and soil November 25, 2005, 15 days after planting, and also on December 12, 25 days later
Harvest date: February 28, 2006
Yield results:

Treatment	Yield	Increase
	tons/ha	tons/ha
Control	0.47	——
Vitazyme	0.96	0.49 (+104%)
Historical yield	0.69	

Field beans treated with Vitazyme at planting and once more — up to early pod fill— at 13 oz/acre will stimulate greater growth through improved rhizosphere activity and CO_2 uptake.

Bean Yield



Conclusions: This black bean split-field trial in Cuba revealed that Vitazyme, applied twice at 1 liter/ha each time, greatly boosted the bean yield, by 104% over the control and by 39% above the historical average yield for that area and management system. These increases occurred in spite of the year being very dry. According to the research report, "This Vitazyme treatment experienced conditions of extreme drought and results have been satisfactory, being able to produce the seeds for the next planting."

- ***Increase in bean yield: 104%***

Dry Beans

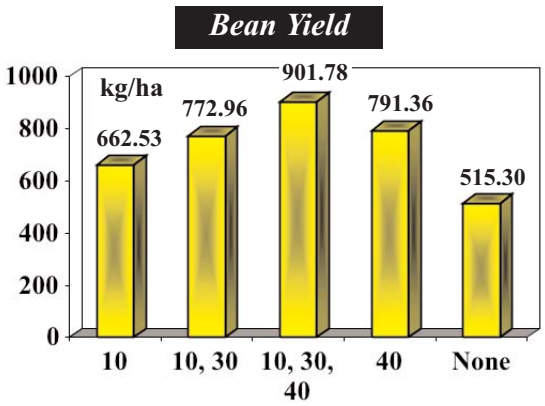
Research Organization: Villa Clara – Cienfuegos Territorial Sugarcane Research Station, Cuba *Location*: Cuba
Varieties: "red" and "black" dry beans *Soil type*: cambisol (non-calcic sialitic) *Seeding rate*: unknown
Planting date: November 21 and 30, 2004
Experimental design: A field area was divided into five parcels that received either red or black dry beans and different Vitazyme treatments to evaluate effects on bean yield and profitability.

Treatment	Bean type	Area	Vitazyme application
		ha	
1.	Red	0.25	1 liter/ha 10 days after planting
2.	Red	0.50	1 liter/ha 10 and 30 days after planting
3.	Black	0.25	1 liter/ha 10, 30, and 40 days after planting
4.	Black	0.50	1 liter/ha 30 days after planting
5.	Red	0.50	Control

Vitazyme application: 1 liter/ha at 10, 30, and/or 40 days (at flowering) after planting using backpack sprayers
Yield results: Harvesting was completed manually and the beans were weighed for each plot.

Bean yield increase

- *Vitazyme 10 days after planting: +29%*
- *Vitazyme 10 and 30 days after planting: +50%*
- *Vitazyme 10, 30, and 40 days after planting: +75%*
- *Vitazyme 40 days after planting: +54%*



All Vitazyme treatments increased bean yield, up to 75% above the control, although the only fair comparisons are Treatments 1 and 2 with the control (Treatment 5), which grew red beans. The two black bean treatments produced 25% more yield than did the two red bean treatments
Growth observations: Leaf and stem growth were the best with all Vitazyme treatments compared to the control, and Treatments 3 and 4 (three applications, and one application at flowering, respectively) produced the most pods out of the five treatments.
Income results: see table →
Conclusions: Vitazyme in all applications substantially increased the yield of dry beans in Cuba during this study, the best treatment being three applications at 10, 30, and 40 days after planting (a 75% yield increase). This yield gave rise to an additional 5,784.7 pesos/acre above the control. The single 1 liter/ha rate at blossom gave the greatest return per invested peso. According to the researchers,

Treatment	Yield	Value[1]	Vitazyme costs[2]	Net profit	Increased profit	Profit per invested peso
	kg/ha	pesos/ha	pesos/ha	pesos/ha	pesos/ha	pesos
1 (Vita day 10)	662.53	10,079.94	31.79	10,048.2	2,208.3	317.08
2 (Vita days 10 and 30)	772.96	11,760.06	63.58	11,696.5	3,856.6	184.96
3 (Vita days 10, 30, and 40)	901.78	13,719.97	95.37	13,624.6	5,784.7	143.86
4 (Vita day 40)	791.36	12,040.00	31.79	12,008.2	4,168.3	378.74
5 (Control)	515.30	7,839.94	——	7,839.9	——	——

[1]Based on a 15.214 pesos/kg price.
[2]Based on a cost of 11.72 pesos/liter of Vitazyme, and a 20.07 pesos/ha application cost.

"1. Vitazyme, applied at 1 liter/ha over the foliage and moist soil, increased dry bean yield as compared to the untreated control, regardless of the number of applications.
2. The profits, revenues, or returns per invested peso in product and application cost was greater when only one Vitazyme application was made at the beginning of the flowering stage."

- ***Increase in profit with Vitazyme: 2,208.3 to 5,784.7 pesos/ha***

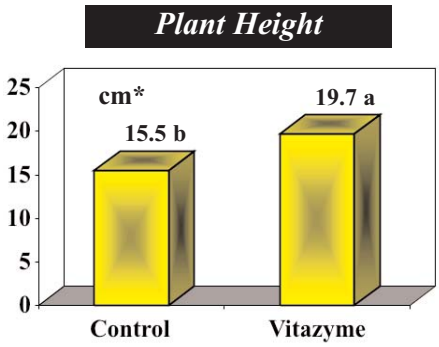
Broccoli

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: Umpqua (open-pollinated) *Planting date*: October 26, 2006
Media: Vital Earth Ultra-Blend (pH 6.0, 200+ ppm N, 75 ppm P, 450 ppm K, 650 ppm Ca, 250 ppm Mg, 200 ppm S, plus B, Cu, Fe, Mn, and Zn) *Pot size*: 8.5 cm x 8.5 cm x 8.0 cm deep
Experimental design: An evaluation of Vitazyme was made as it affects the germination and early development of broccoli. Seven replicates in a completely randomized design were grown in a greenhouse setting, with daytime temperatures of 60 to 75°F, and nighttime temperatures of 50 to 60°F. Watering was on an as-needed basis. Half of the 14 pots were treated and half left untreated as controls. Plant height and leaf area were measured to evaluate growth.

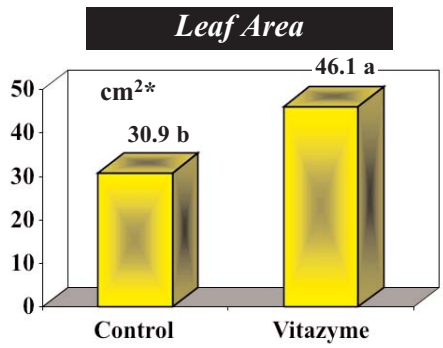
1. Control **2. Vitazyme**

Fertilization: An equal amount of 13-13-13% N-P_2O_5-K_2O granular fertilizer was sprinkled onto the top of each pot on November 10, once the plants were about one inch tall.
Vitazyme applications: 5 ml of a 0.1% solution applied to the seeds and soil after covering

Continued on the next page



$LSD_{0.05}$ = 2.7 cm
*Means followed by the same letter are not significantly different at P = 0.05.



$LSD_{0.05}$ = 10.0 cm^2
*Means followed by the same letter are not significantly different at P = 0.05.

The Vitazyme treated broccoli plants on the right display greater leaf area (49%) and development (27% taller) at the same age.

Growth results: On November 24, 29 days after planting, plant height was measured from soil level to the greatest extension of the longest leaf. Leaf area was determined by measuring the length and width of the largest leaf, and calculating the approximate area by length x width x 0.80.
Conclusions: This replicated study of broccoli seedlings shows that Vitazyme, applied at very low concentrations (only 5 ml of a 0.1% solution per plant) at seeding, produced substantial and highly significant plant growth responses. Plant height was increased by 27%, and leaf area by 49%, with this single Vitazyme application, showing that the product will produce larger and stronger broccoli transplants than untreated controls over the same time period.

- ***Increase in plant height: 27%***
- ***Increase in leaf area: 49%***

Cabbage

Location: Monroe County, New York
Variety: Artist
Planting date: April 25, 2006 (transplants)
Soil type: sandy loam
Previous crop: soybeans
Experimental design: This study is a comparison of early cabbage yield with previous crops on the same farm, using identical farming practices for the various years except Vitazyme was applied to the field in 2006. The field was treated entirely with Vitazyme.

1. Control (previous crops) **2. Vitazyme**

Fertilization: 1,000 lb/acre of 10-20-20% N-P_2O_5-K_2O; 10 gal./acre 32% liquid N sidedressed
Vitazyme application: 13 oz/acre at transplanting in the transplant water; 13 oz/acre twice more at 30-day intervals
Weather: Rainfall was ample to excessive throughout the cropping cycle.
Harvest date: July 11 to 18, 2006
Yield results:

Harvest date	Gross box weight	Net weight
	lb	lb
July 11	1,875	62,147
July 14	1,904	119.803
July 15	1,885	59,229
July 17	1,944	88,594
July 18	1,944	103,952
Total	9,552	433,725 (216.86 tons)
Average	1,915	[25.51 tons/acre]

Cabbage grown in New York displays the typical tight head having greater density than untreated cabbage, and greater per head weight due to greater overall plant size.

For 2006 (with Vitazyme)
Area harvested: 8.5 acres
Average yield: 25.51 tons/acre
Average box weight: 1,915 lb

For previous years (no Vitazyme)
Average early cabbage yield is 20 to 22 tons/acre (about 21 tons/acre).
The average box weight is about 1,750 lb.

Income results: Early cabbage averages about $100/ton. With 4.51 tons/acre above the average yield, the added return would be $451/acre.
Conclusions: This early cabbage evaluation in New York revealed that, compared to previous years, Vitazyme substantially improved the yield (21%) and specific gravity (9%) of the crop. These improvements amounted to a $451/acre estimated increased return on the crop. The results are estimates only, but give a reasonable evaluation of the efficacy of Vitazyme for cabbage production on this farm.

- ***Increase in cabbage yield: 21%***
- ***Increase in box weight: 9%***
- ***Increase in income: $451.00/acre***

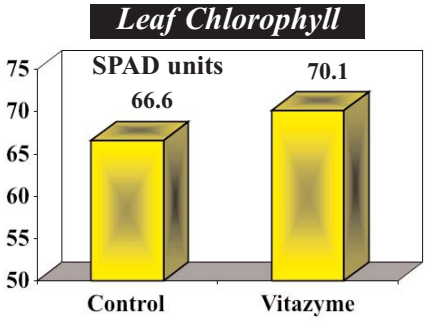
Cabbage

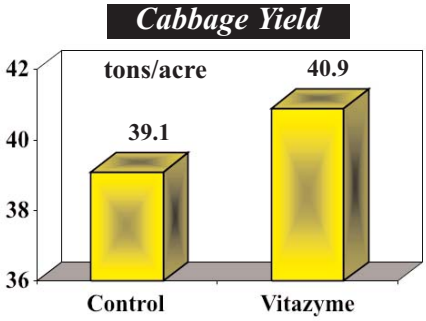
Research location: Ontario County, New York
Planting date: May 5 (transplants)
In-row spacing: 20 inches
Population: 10,454 plants/acre
Variety: Fresco (a kraut or fresh type)
Soil type: gravely loam
Row spacing: 30 inches
Harvest date: August 8
Experimental design: A cabbage field was divided into untreated and Vitazyme treated areas to determine effects of the product on cabbage yield.

A Vitazyme treated cabbage field in Ontario County, New York, produced more total weight than the untreated control. Greater carbon fixation resulted in greater yield.

1. Control **2. Vitazyme**

Fertilization: a standard N-P-K program
Vitazyme application: 13 oz/acre in the transplant water
Weather for the season: adequate moisture until August, then excessive
Chlorophyll results: On August 8, chlorophyll readings were made using a Minolta SPAD meter (30 leaf samples per average).
Yield results: Sections of equal length were measured and flagged in both treatments. The cabbage harvested from the two areas were 4,440 lb for the control and 4,620 lb for the treated row. This yield was superimposed on an average yield of 40.0 tons/acre to calculate treatment yield.





Income results: Cabbage sells for about $50/ton, so the gross income for the treatments would be $1,955/acre for the control and $2,045/acre for the Vitazyme treatment.

Conclusions: This New York study, which evaluated the effects of Vitazyme on cabbage yield, showed that a single 13 oz/acre rate in the transplant water increased the yield by a very profitable 5%. This increase translated into an additional $90/acre, or an increase of about $22.50/acre for every dollar invested.

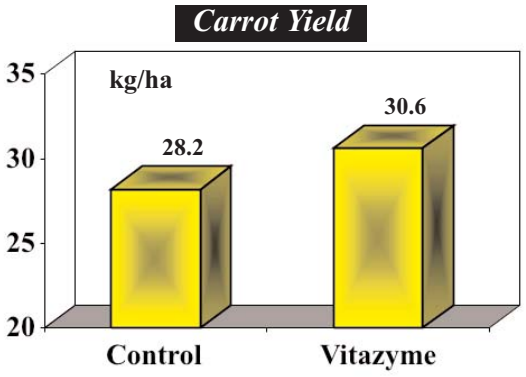
- ***Increase in chlorophyll: 3.5 SPAD units***
- ***Increase in cabbage yield: 5%***
- ***Increase in income: $90/acre***

Carrots

Location: Ukraine
Planting date: unknown
Variety: unknown
Planting rate: unknown
Experimental design: Two half-hectare carrot field areas of "Area 5" were selected, one parcel treated with Vitazyme and the other area left untreated. The objective of the trial was to evaluate Vitazyme's ability to influence carrot yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1 liter/ha on the leaves and soil, at unknown dates
Harvest date: October 1, 2006
Yield results: see the graph on the right
Conclusions: This carrot test in the Ukraine has shown that Vitazyme can substantially improve the yield of these roots under the temperate conditions of the fertile mollisols of that region of Eastern Europe.



- ***Increase in carrot yield: 9%***

Cherries

A Two-Year Study

Location: Appleton, New York (Singer Farms)
Variety: tart cherries
Soil type: gravely loam
Orchard age: 25 years
Experimental design: A tart cherry orchard was divided into a Vitazyme treated portion (10 acres) and a normally treated portion (balance of the area). The Vitazyme treated acres were from a portion of the field

Continued on the next page

that always yielded less than the other side. The first treatments were made in 2005, and this same area was treated in 2006. Average cherry size was calculated both years, as was harvested yield.

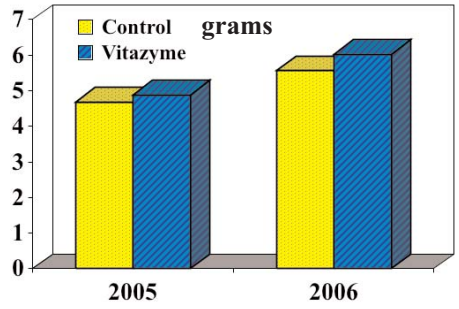
Fertilization: 2,000 lb/acre chicken compost in early spring (5-4-4% N-P_2O_5-K_2O)

Vitazyme application: 24 oz/acre on May 27 (petal fall), June 6 (shuck split), and June 23 (second cover)

Cherry size results: In 2005, two 300-cherry samples were collected from healthy, well-bearing trees from each treatment. In 2006, 25 average bearing trees were selected from each treatment, and 10 cherries were picked from each. The average cherry size was then calculated for both treatments. For both years, the researcher observed that the Vitazyme treated fruit was a bit larger than the control fruit, and was a bit redder in color in 2005. The untreated fruit was smaller but appeared to be greater in number.

Treatment	2005 Total wt.	2005 Average wt.	2006 Total wt.	2006 Average wt.
	grams/600	grams/cherry	grams/250	grams/cherry
Control	2,810	4.68	1,389	5.56
Vitazyme	2,924	4.87 (+4%)	1,503	6.01 (+8%)

Cherry Weight



Change in Cherry Weight

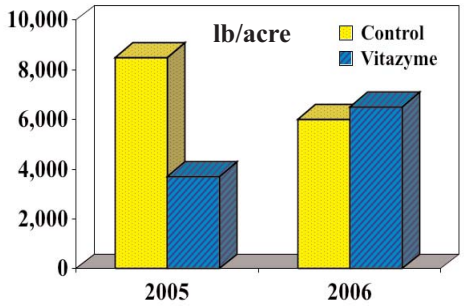
2005: +4%

2006: +8%

Yield results: Harvest weights were made for each treatment for both years. In year one of the Vitazyme program, the yield of the better portion of the field greatly exceeded the treated area. **However, once the product had stimulated the trees to produce more fruiting buds and enabled the leaves and roots to feed the fruit better, the poorer but treated portion of the field outyielded the control by 500 lb/acre.**

Treatment	2005	2006
	lb/acre	lb/acre
Control	8,500	6,000
Vitazyme	3,700 (-56%)	6,500 (+8%)

Cherry Yield



Change in Cherry Yield

2005: -56%

2006: +8%

Income results: The increased 500 lb/acre of cherries in 2006, at $0.15/lb., resulted in a greater return from Vitazyme of $75.00/acre.

Conclusions: This cherry study with Vitazyme near Lake Ontario in New York shows the potential of the product to improve tree fruiting over consecutive years. While the Vitazyme treatment was placed on the poorer portion of the orchard, and produced considerably less total fruit the first year (56% less) though the fruit weighed 4% more per cherry — yet **the second year the yield of cherries was 8% higher in the treated area than in the control. The Vitazyme treated cherries had increased in size even more than the control the second year, by 8%.** The product presumably stimulated the production of more fruiting buds, rhizosphere expansion, and branch and leaf growth so that by year two of the study the treated trees were able to more effectively utilize sunlight, CO_2, water, and plant nutrients than the untreated control.

The yield increase of the treated trees was actually considerably greater than the 8% benefit above the control trees in 2006 because these trees increased from a considerable yield deficit in 2005.

High yielding cherry trees result from two to four Vitazyme applications during blossoming and early to mid fruit development.

Corn

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

Variety: unknown

Soil type: red ferralitic

Planting date: late 2005 to early 2006

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

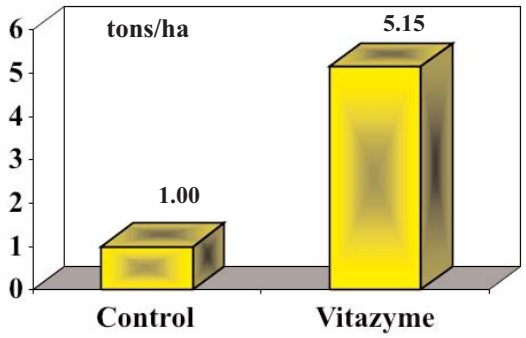
1. Control **2. Vitazyme**

Fertilization: unknown

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

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

Corn Yield



- ***Increase in corn yield: 415%***

Corn

University of Minnesota West Central Research Farm

Vitazyme helps improve nitrogen efficiency, as seen in this Morris, Minnesota, corn trial. Both had the same N; Vitazyme was applied on the right. Note the roots.

Location: Morris, Minnesota
Variety: DK 47-10Bt/RR
Soil type: Tara silt loam/McIntosh silt loam complex (pH, 7.8; organic matter, 3.4%; Olsen P, 10 ppm; K, 151 ppm; NO_3-N (0-24 in), 68 lb/acre)
Previous crop: soybeans
Planting rate: 35,700 seeds/acre
Planting depth: unknown
Row spacing: 30 inches
Planting date: April 26, 2006
Fall tillage: disking
Harvest date: September 28, 2006
Spring tillage: field cultivation on April 26, and a second cultivation to incorporate N
Experimental design: A small plot randomized complete block design was set up on the West Central Research Farm to determine the efficacy of Vitazyme and Vitazyme Cold Start for increasing yield and improving nitrogen utilization with corn. Plots were 10x30 feet, with four rows per plot, the two center rows harvested for yield determinations.

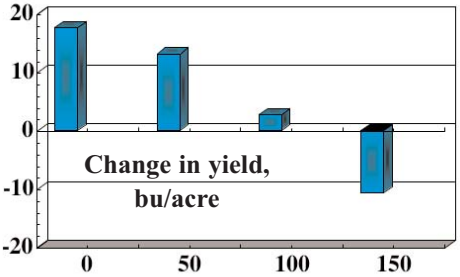
1. Control, no nitrogen
2. Control, 50 lb/acre nitrogen
3. Control, 100 lb/acre nitrogen
4. Control, 150 lb/acre nitrogen
5. Vitazyme + no nitrogen
6. Vitazyme + 50 lb/acre nitrogen
7. Vitazyme + 100 lb/acre nitrogen
8. Vitazyme + 150 lb/acre nitrogen
9. Vitazyme Cold Start + 100 lb/acre nitrogen

Fertilization: 50, 100, and 150 lb/acre of nitrogen, to appropriate plots as dry fertilizer applied the same day as planting (April 26)
Vitazyme application: 13 oz/acre over the row in a 10-inch band one day after planting, and 13 oz/acre on the leaves and soil at knee-height (10 inches) on June 12
Weather: Very hot and dry conditions during the summer limited the yield response for corn in 2006. Precipitation during the growing season: May, 2.94 in; June, July, and August, 3.96 in (versus a normal of 13.61 in). Growing degree days: May to August, 2,120 units (versus a normal of 1,996 units).
Weed control: Surpass applied pre-emergence (May 1) at 3 pints/acre; glyphosate applied post-emergence on June 2.
Yield results: All yield values are given on the basis of corn grain dried to 15% moisture.

Treatment	Grain yield[1]	Change
	bu/acre	bu/acre
1. No N	103.5c	——
5. Vitazyme + no N	121.2bc	17.7 (+17%)
2. 50 lb/acre N	140.5ab	——
6. Vitazyme + 50 lb/acre N	153.7a	13.2 (+9%)
3. 100 lb/acre N	154.4a	——
7. Vitazyme + 100 lb/acre N	157.1a	2.7 (+2%)
4. 150 lb/acre N	169.8a	——
8. Vitazyme + 150 lb/acre N	159.1a	(-) 10.7 (-6%)
9. Cold Start + 100 lb/acre N	142.7ab	——

[1]Means followed by the same letter are not significantly different at P = 0.10 according to the Student-Newman-Keuls Test. $LSD_{0.10}$ = 21.6 bu/acre. CV = 12.3%.

Changes in Corn Yield With Vitazyme at Four Nitrogen Levels



Although there are no significant differences between treatment means for all four nitrogen levels, due to a high variability in plot data, the trend is clearly for Vitazyme to increase grain yield at all but the highest nitrogen level. This reduction in yield at the high nitrogen level is likely due to an excessive amount of nitrogen being made available, an amount beyond the peak of the growth response curve. Such a conclusion is justified in light of the reduced increments of yield increase as total soil + fertilizer nitrogen increased from 68 lb/acre (Treatments 1 and 5), to 118 lb/acre (Treatments 2 and 6), to 168 lb/acre (Treatments 3 and 7). The 218 lb/acre level of nitrogen for Treatments 4 and 8 likely bordered on the toxic range. especially during a very hot and dry summer.
Conclusions: Vitazyme increased corn grain yields at all but the highest nitrogen level in this west central Minnesota study. Because of high variability among plot yield values, few significant differences emerged. The reason for this variability is likely due to differences in soil moisture variability across the test area during the very hot and dry summer, although it is possible that differences in the pattern of available nitrogen could also have played a part. As a result of the drought conditions, yields were substantially reduced from normal levels in average years.
It is apparent that Vitazyme produced yield increases, though not significant at P=0.10, at the 68, 118, and 168 lb/acre total nitrogen levels. The yield increases dropped as the nitrogen levels increased, reflecting the approach towards maximum yield potential during this drought year. The 218 lb/acre treatment showed a yield reduction with Vitazyme, most likely because Vitazyme increased available nitrogen to levels beyond the optimum portion of the response curve. Soil tests were not conducted during the growing season to confirm or deny this rationale.
There were no benefits gained from using Vitazyme Cold Start in this study, likely because the soil was not unduly cold (>50°F) at planting time.

- ***Increase in grain with no N: 17%***
- ***Increase in grain with 50 lb/acre N: 9%***
- ***Increase in grain with 100 lb/acre N: 2%***

Corn

Agricultural Custom Research Education Services

Location: Cedar Falls, Iowa *Variety*: Pioneer 34A15 (non-GMO) *Previous crop*: soybeans
Soil type: Maxfield silty clay loam (pH 7.2, organic matter 4.5%, CEC 17.9, excellent fertility)
Planting depth: 2.0 inches *Planting rate*: 29,900 seeds/acre *Row spacing*: 30 inches
Planting date: May 8, 2006 *Tillage*: conventional *Harvest date*: October 23, 2006
Experimental design: A randomized complete block design, with six replicates and six treatments, was established on a well-drained, uniform area. Plots had six rows and were 15 x 40 feet (0.0138 acre); the center rows were harvested for yield, population, and moisture analysis. The purpose of the trial was to discover the effect of Vitazyme, Actinovate (an actinomycete formulation), and glucose, alone and in combination, on corn yield, grain/plant, and grain moisture content. The Student-Newman-Keuls test was used to separate treatment means.

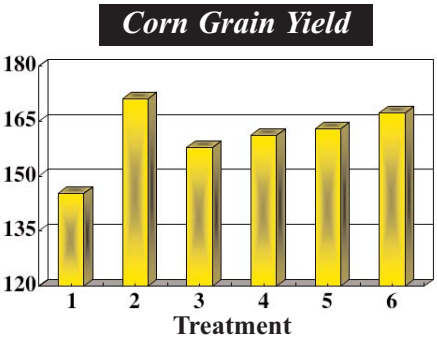
Treatment	Product	Rate
1	None	0
2	Vitazyme	13 oz/acre x 2
3	Actinovate	1 oz/acre x 2
4	Actinovate + Vitazyme	1 oz/acre + 13 oz/acre x 2
5	Actinovate + Vitazyme + Glucose	1 oz/acre + 13 oz/acre + 2.5 lb/acre x 2
6	Vitazyme + Glucose	13 oz/acre + 2.5 lb/acre x 2

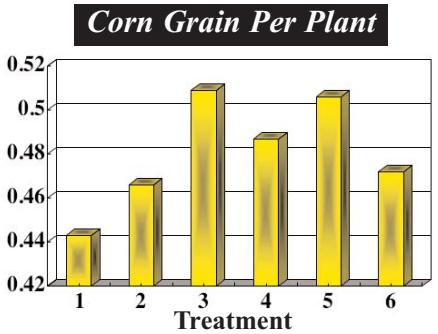
Fertilization: 90 lb/acre of N as a liquid 28-0-0% N-P_2O_5-K_2O solution; P and K adequate
Vitazyme application: (1) 13 oz/acre in-furrow on the seeds at planting on May 8, and (2) 13 oz/acre on the leaves and soil at knee height (six leaves) on June 28
Actinovate: Actinovate SP is a formulation of *Streptomyces lydicus* WYEC 108 that will populate the root zone to elicit soil pathogen control (Pythium, Rhizoctonia, Phytophthora, Veticillium, Fusarium, and other fungi); 1 lb/acre mixed with Vitazyme on May 8 at planting, and again on June 28 for a soil/foliar application.
Glucose: a microbial stimulant, applied with Vitazyme and Actinovate for both applications at 2.5 lb/acre
Yield, grain moisture, 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 and the moisture determined. Plants were counted for the harvested rows.

Treatment	Grain yield*	Change	Grain moisture*	Change	Grain/Plant**	Change
	bu/acre	bu/acre	%	%-points	lb/plant	lb/plant
1. Control	145.3 b	——	18.90 ab	——	0.443	——
2. Vitazyme	171.1 a	25.8 (+18%)	18.23 ab	-0.67	0.466	0.023 (+5%)
3. Actinovate	157.8 a	12.5 (+9%)	18.18 ab	-0.72	0.509	0.066 (15%)
4. Actinovate + Vitazyme	161.0 a	15.7 (+11%)	17.52 b	-1.38	0.487	0.044 (+10%)
5. Actinovate + Vita. + Glucose	162.9 a	17.6 (+12%)	17.88 b	-1.02	0.506	0.063 (+14%)
6. Vitazyme + Glucose	167.3 a	22.0 (+15%)	19.97 a	+1.07	0.472	0.029 (+7%)
LSD (P=0.05)	11.8		1.43			
Standard deviation	8.6		1.04			
Coeff. of variation	5.35%		5.67%			

*Means followed by the same letter are not significantly different according to the Student-Newman-Keuls-Test.
**There were no significant differences in plant population among the six treatments.

Corn grain was significantly enhanced above the control by all treatments, especially Vitazyme alone, which gave an 18% yield increase. Grain moisture at harvest was reduced by most applications, especially by Actinovate and Vitazyme combinations, and also when glucose was added to these two products; adding glucose to Vitazyme increased grain moisture by 1.07 percentage point. Grain per plant was boosted the most by Actinovate and Actinovate + Vitazyme + Glucose. All treatments gave increases in yield per plant, the range being 5 to 15%.





Grain Yield Changes

Vitazyme.....+18%
Actinovate.....+9%
Vitazyme + Actinovate.....+11%
Vitazyme + Actinovate + Glucose.....+12%
Vitazyme + Glucose.....+5%

Grain/Plant Changes

Vitazyme.....+5%
Actinovate.....+15%
Vitazyme + Actinovate.....+10%
Vitazyme + Actinovate + Glucose.....+14%
Vitazyme + Glucose.....+7%

Continued on the next page

Income results: At $3.00 per bushel for corn, the treatments produced the following gross income increases:

Treatment	Product	Income increase
2	Vitazyme	$77.40/acre
3	Actinovate	$37.50/acre
4	Actinovate + Vitazyme	$47.10/acre
5	Actinovate + Vitazyme + Glucose	$52.80/acre
6	Vitazyme + Glucose	$66.00/acre

Conclusions: This east central Iowa corn study showed that ***Vitazyme alone produced the greatest yield increase among the five treatments evaluated, a highly significant 18% increase (25.8 bu/acre); this yield increase produced $77.40/acre more gross income at $3.00/bu corn***. Actinovate and glucose, alone or in combination, produced significant yield increases of from 9 to 15%. Grain moisture at harvest was reduced by all treatments except Vitazyme + glucose; Vitazyme + Actinovate produced a major 1.38 percentage points grain moisture reduction. Grain per plant was increased by all treatments, the greatest increase being with Actinovate alone (15%) and Actinovate + Vitazyme + glucose (14%).

Corn

Evaluation of Mn-fortified Vitazyme

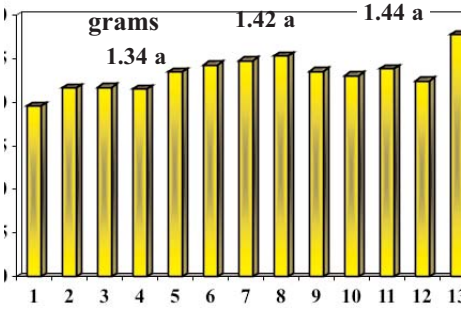
Corn treated with Vitazyme plus manganese in this greenhouse study produced a bit more dry matter than did regular Vitazyme.

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Soil type: "northern" soil, Mn-deficient *Variety*: yellow dent
Planting date: March 1, 2006 *Pot size*: 1 quart
Seeding rate: 5 seeds/pot, thinned to 2 plants/pot
Experimental design: Manganese-deficient soil was placed in small pots in which corn was planted to determine the effects of Vitazyme and a special Mn-fortified Vitazyme on seedling growth. Twelve reps were used for each treatment.

1. Control **2. Regular Vitazyme** **3. Mn-Vitazyme**

Fertilization: none
Vitazyme application: 100 ml of a 0.01% regular Vitazyme of Mn-Vitazyme solution per pot just after planting. The Mn-Vitazyme was identical to regular Vitazyme except the 0.2% Fe was replaced by 0.2% Mn.
Growth results: On March 17, 2006, after 16 days of growth, the small plants were harvested, the roots were washed free of soil, and the plants were dried in a drying oven at about 60°C for 24 hours.

Plant Dry Weight



Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.

Though all three treatments were not significantly different at P=0.05, the greatest growth response was with the Mn-Vitazyme, closely followed by regular Vitazyme.
Conclusions: Based on this corn greenhouse study of regular and Mn-fortified Vitazyme with a somewhat Mn-deficient soil, it appears that the Mn-Vitazyme produces a slightly better yield response for corn than does regular Vitazyme. The new product may have added value when used in Mn-deficient soils.

- ***Increase in dry matter (Regular Vitazyme): 6%***
- ***Increase in dry matter (Mn-Vitazyme): 7.5%***

Corn (Organic)

Research location: Ontario County, New York
Variety: Blue River 42A32 (96-day) *Soil type*: silty clay loam
Row spacing: 30 inches *Seeding rate*: 28,400/acre
Planting date: May 24, 2006 *Harvest date*: October 13
Experimental design: A field of organically grown corn was divided into Vitazyme treated and untreated areas in an effort to determine the product's effects on the yield of high-moisture corn. This corn was placed in an air-tight silo to be ground and used for cattle feed later.

1. Control **2. Vitazyme**

Fertilization: Liquid cow manure, 8,500 gal/acre in November of 2005, and 7,300 gal/acre on May 8, 2006; 300 lb/acre of a 5-5-5% N-P_2O_5-K_2O dry Fertrell organic mix, in a 2 x 2-inch placement
Vitazyme treatment: 13 oz/acre on the seed in-furrow at planting
Weather for 2006: adequate moisture until August, then excessive afterwards
Yield results: Each parcel was harvested for a certain area, and the grain was dumped into a bin where a measurement of volume was taken. From the difference of these values the value of each treatment was calculated

Ontario County, New York, organic corn responded dramatically to Vitazyme applied to the seed. Note the two ears per plant.

Continued on the next page

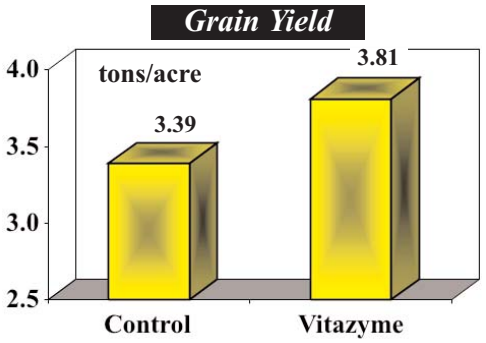
based upon the average field yield.

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

Value of control corn $593.25/acre
Value of Vitazyme corn $666.75/acre
Income increase with Vitazyme $73.50/acre

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

· *Increase in grain yield: 12%*



Corn

Cuban Ministry of Sugar

Location: Juan Abrahantes Farm, Madruga, Havana Province, Cuba
Variety: unknown
Soil type: red ferralitic of low fertility
Planting rate: unknown
Row spacing: unknown
Planting date: July 23, 2006
Watering: rain-fed

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

1. Control **2. Vitazyme**

Fertilization: unknown

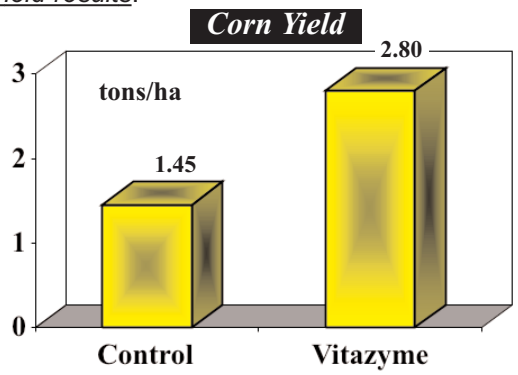
Vitazyme application: 1 liter/ha on the leaves and soil on August 7, 15 days after planting, and again 39 days later on September 15

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

Growth results:

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

Yield results:



· *Increase in corn yield: 93%*

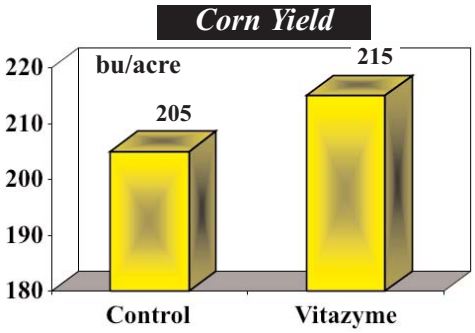
Conclusions: This Cuban corn study showed that Vitazyme greatly increased corn yield (by 93%) with two applications at 1 liter/ha each time, separated by 39 days. **This yield was four times the normal historical yield experienced in that area under the management system used.** The treated corn plants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

Corn

USDA/National Soil Tilth Laboratory

Location: Ames, Iowa
Variety: Pioneer 35P17
Planting rate: 36,000 seeds/acre in double rows
Planting date: April 18, 2006
Harvest date: October 19, 2006
Tillage: chisel plowing on November 26, 2005, and field cultivation on April 4 and April 18, 2006

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



1. Control **2. Vitazyme**

Fertilization: 50 lb/acre of N as 32% UAN on October 18, 2005; 30-80-120 lb/acre of N-P_2O_5-K_2O dry spread on November 23, 2005; 300 lb/acre of SuperCal 98 pelleted lime on February 8, 2006; 300 lb/acre of

A plot treated with Vitazyme at the National Soil Tilth Laboratory in Ames, Iowa, produced a good yield increase despite very high yields in double rows.

Continued on the next page

SuperCal SO_4 pelleted gypsum on February 9, 2006; sidedressed 180 lb/acre of N as 32% UAN on May 29, 2006
Vitazyme application: 13 oz/acre foliar, hand applied, on June 5, 2006; 13 oz/acre foliar, hand applied, on June 27, 2006
Herbicide application: 3 qt/acre of Lumax, pre-emergent, on April 24, 2006
Yield results: see the graph on the previous page
Conclusions: On this non-replicated corn-yield study in central Iowa, using a double row system, two foliar Vitazyme applications utilizing 13 oz/acre each time increased the grain yield by 10 bu/acre (5%). Had a seed application been made it is likely that the response would have been greater.

· *Increase in corn yield: 5%*

Corn

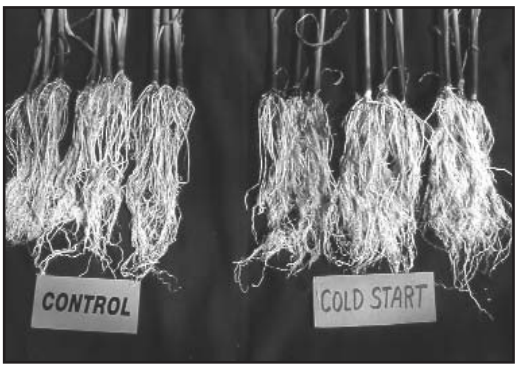
An Evaluation of Vitazyme Cold Start and Additive G

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: yellow dent
Pot size: 1 gallon
Soil type: silty loam
Planting date: January 24, 2006
Seeding rate: 9 seeds/pot, thinned to 3 plants/pot
Experimental design: A replicated greenhouse corn study was conducted to evaluate the effectiveness of three products, at several concentrations, to promote plant height and dry weight accumulation. Thirteen treatments were used.

Treatment	Regular Vitazyme	Vitazyme Cold	Additive G
	concentration, %		
1	0	0	0
2	0.0001	0	0
3	0.001	0	0
4	0.01	0	0
5	0.1	0	0
6	0	0.0001	0
7	0	0.001	0
8	0	0.01	0
9	0	0.1	0
10	0	0	0.00001
11	0	0	0.0001
12	0	0	0.001
13	0	0	0.01

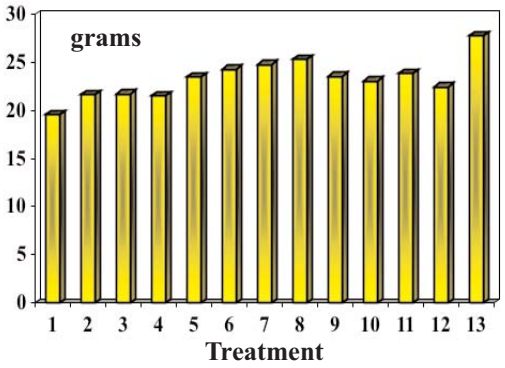
Fertilization: none
Biostimulant application: 100 ml/pot of the treatment concentrations
Plant height and dry weight results: On March 6, 2006, 41 days after planting, the plant roots were washed free of soil and dried in a drying oven at 60°C for 72 hours. The roots and tops were then weighed to the nearest 0.01 gram.
Conclusions: All treatments increased plant height above the control, and several treatments including Additive G, regular Vitazyme, and Cold Start concentrations increased height significantly above the control. The greatest height increase was 12%, with Additive G at 0.01%.

Dry matter accumulation was always increased by every treatment, with increases of from 10 to 42%. Especially effective were Additive G (0.01%) — a 42% increase — and all Cold Start concentrations (20 to 29% increases). All of these treatments were significantly greater than the control. All other Additive G concentrations increased dry matter increases significantly, as did the 0.1% regular Vitazyme treatment.



Vitazyme "Cold Start" in this greenhouse study outdid the regular Vitazyme in terms of root growth, height, and dry weight.

Corn Dry Weight



Plant Height

Treatment	Height[1]	Change
	cm	cm
13 (G, 0.01%)	138.0 a	14.7 (+12%)
6 (Cold Start, 0.0001%)	133.1 ab	9.8 (+8%)
3 (reg. Vita, 0.001%)	133.1 ab	9.8 (+8%)
12 (G, 0.001%)	133.1 ab	9.8 (+8%)
7 (Cold Start, 0.001%)	132.9 ab	9.6 (+8%)
2 (reg. Vita, 0.0001%)	132.3 ab	9.0 (+7%)
9 (Cold Start, 0.1%)	130.9 ab	7.6 (+6%)
8 (Cold Start, 0.01%)	129.9 bc	6.6 (+5%)
5 (reg. Vita, 0.1%)	129.0 bc	5.7 (+5%)
10 (G, 0.00001%)	128.7 bc	5.4 (+4%)
11 (G, 0.0001%)	128.3 bc	5.0 (+4%)
4 (reg. Vita, 0.01%)	126.7 bc	3.4 (+3%)
1 (control)	123.3 c	—

[1]Means followed by the same letter are not significantly different at P=0.1 according to the Student-Newman Kuels Test. $LSD_{0.1}$=7.4 cm.

Plant Dry Weight

Treatment	Dry weight[1]	Change
	grams	grams
13 (G, 0.01%)	27.83 a	8.23 (+42%)
8 (Cold Start, 0.01%)	25.38 ab	5.78 (+29%)
7 (Cold Start, 0.001%)	24.82 bc	5.22 (+27%)
6 (Cold Start, 0.0001%)	24.32 bcd	4.72 (+24%)
11 (G, 0.0001%)	23.87 bcde	4.27 (+22%)
9 (Cold Start, 0.1%)	23.60 bcde	4.00 (+20%)
5 (reg. Vita, 0.1%)	23.52 bcde	3.92 (+20%)
10 (G, 0.00001%)	23.08 bcde	3.48 (+18%)
12 (G, 0.001%)	22.46 cde	2.86 (+15%)
3 (reg. Vita, 0.001%)	21.76 def	2.10 (+11%)
2 (reg. Vita, 0.0001%)	21.65 ef	2.05 (+10%)
4 (reg. Vita, 0.01%)	21.54 ef	1.94 (+10%)
1 (control)	19.60 f	—

[1]Means followed by the same letter are not significantly different at P=0.1 according to the Student-Newman Kuels Test. $LSD_{0.1}$=2.62 grams.

· *Increase in height with Additive G (0.01%): 12%*

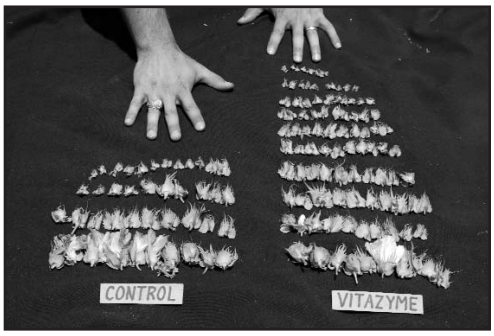
· *Increase in dry weight with Additive G (0.01%): 42%*

Cotton

Texas A&M University

Location: Texas A&M University, Department of Soil and Crop Sciences, College Station, Texas
Variety: Delta and Pine 164 Bollgard II/RR Flex
Soil type: Weswood silt loam (pH, 8.1)
Previous crop: cotton
Planting depth: unknown
Planting rate: 52,000 seeds/acre
Row spacing: 40 inches
Planting date: April 17, 2006
Tillage: conventional
Experimental design: A site at the university's research field was selected for the study, and plots 13.3 (four rows) x 32 feet were established with a split-plot design, placing Vitazyme treatments in the whole plots, and nitrogen rates in the subplots. The two center rows of the four rows in each plot were harvested for lint yield determinations. Because there were 30 lb/acre of residual nitrogen in the soils at planting and there could be no zero nitrogen rate, the four nitrogen rates ranged from 30 to 120 lb/acre. The purpose of the study was to evaluate the effects of Vitazyme on lint yield and quality, as well as various growth parameters, at four nitrogen levels.

Cotton at Texas A&M grown with 60 lb/acre of N produced bigger tops, stems, and roots with Vitazyme.



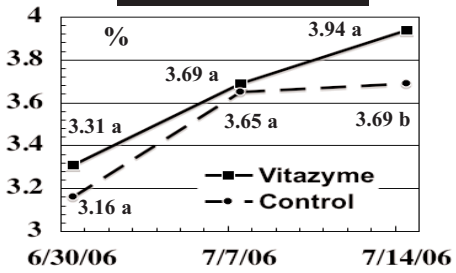
Notice the number of bolls and flowers at the same 60 lb/acre N rate. Vitazyme greatly increased the number.

1. **Control + 30 lb/acre nitrogen**
2. **Vitazyme + 30 lb/acre nitrogen**
3. **Control + 60 lb/acre nitrogen**
4. **Vitazyme + 60 lb/acre nitrogen**
5. **Control + 90 lb/acre nitrogen**
6. **Vitazyme + 90 lb/acre nitrogen**
7. **Control + 120 lb/acre nitrogen**
8. **Vitazyme + 120 lb/acre nitrogen**

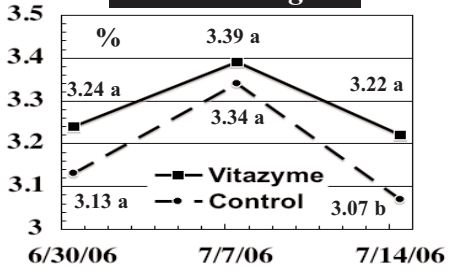
Fertilization: 30, 60, and 90 lb/acre of nitrogen applied before planting to appropriate plots to provide totals of 30, 60, 90, and 120 lb/acre nitrogen
Vitazyme application: 13 oz/acre on the seeds at planting, 13 oz/acre on the leaves and soil at early bloom (June 26), and 13 oz/acre to the leaves at the cracked boll stage (July 25)
Weather: Rainfall was adequate and temperatures were somewhat above average during the growing season.
Harvest date: the last part of August to September 11, 2006
Foliar analyses: Leaf samples were collected from each plot on June 30, July 7, and July 14 to determine chlorophyll, nitrogen, and elemental levels. Not all results are included below, in particular those that produced no significant increase or interaction.

[For all graphs, means followed by the same letter are not significantly different at P=0.05 for the same date.]

Tissue Calcium

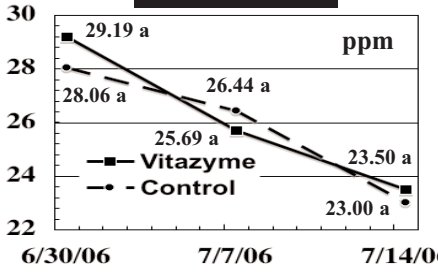


Tissue Nitrogen



Positive interaction of Vitazyme with fertilizer N (P = 0.0001).

Tissue Zinc

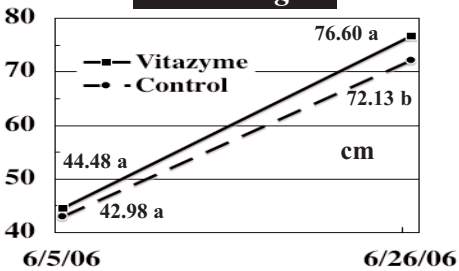


Positive interaction of Vitazyme with fertilizer N (P = 0.0001).

Some of the leaf analysis parameters showed increases and positive interactions with Vitazyme. Nitrogen additions caused many significant increases in leaf elements including chlorophyll, N, K, Ca, Zn, Fe, Cu, and Mn.

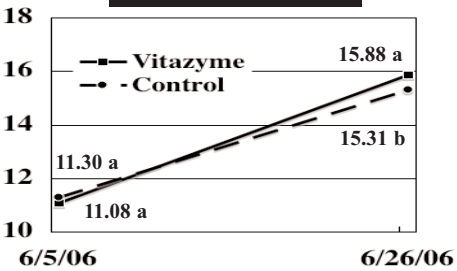
Growth parameters:

Plant Height



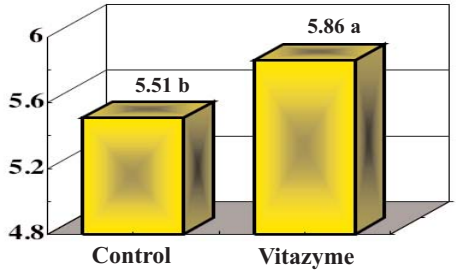
Positive interaction of Vitazyme with fertilizer N on June 26 (P = 0.0061).

Nodes Per Plant



Positive interaction of Vitazyme with fertilizer N on June 26 (P = 0.0006).

Nodes Above White Flower On June 26



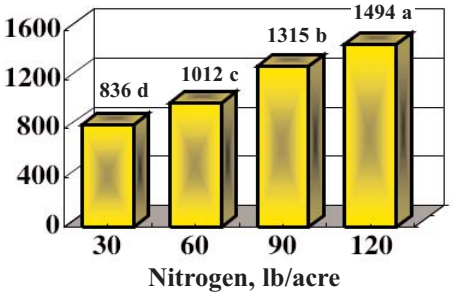
Positive interaction of Vitazyme with fertilizer N on June 26 (P = 0.0143).

Continued on the next page

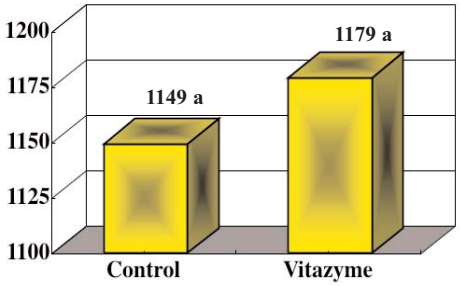
Vitazyme significantly increased plant height and node number over the period of June 5 to 26. Also, on June 26 the number of nodes above white flower were significantly greater for Vitazyme than for the control. ***"Nodes above white flower" is an indicator of ultimate yield potential for the cotton plant.***

Vitazyme increased lint yield in a linear fashion with nitrogen fertilizer additions. With Vitazyme, over all nitrogen levels, the lint yield increased by 30 lb/acre, a 3% increase.

Lint Yield Increase With Nitrogen



Lint Yield Increase With Vitazyme



<u>Conclusions</u>: The replicated cotton trial in southern Texas, using four nitrogen levels and Vitazyme or no Vitazyme at each level, revealed that nitrogen uniformly increased the yield of lint, while ***Vitazyme also increased the lint yield (3%)***. While this yield increase was not significant at P=0.05, ***the yield indicator of "nodes above white flower" was significantly greater than the control with Vitazyme, showing the product's potential to significantly improve yields in most situations***. Nitrogen also significantly increased several leaf nutrient elements at three sampling dates, while Vitazyme also significantly increased leaf nitrogen, calcium, and zinc; ***there were positive interactions with nitrogen and Vitazyme for leaf nitrogen and leaf zinc***.

Nodes per plant, plant height, and nodes above white flower — a figure denoting yield potential — were all significantly increased with Vitazyme, and for all three of these growth parameters there were significant positive interactions.

Fiber analyses will be completed in November of 2006 and included with future editions of this report.

· *Increase in lint yield with Vitazyme: 3%*

Cotton – a Seed Germination and Seedling Study

<u>Researchers</u>: S. Umesha[1], P. Hariprasad[2], S.A. Deepak[3], S.T. Girish[4], and Paul Syltie[5]

[1, 2] Department of Applied Botany, Seed Pathology, and Biotechnology, University of Mysore, Manasagangotri, Mysore, India

[3]National Institute for Agro-Environmental Sciences, Tsukuba, Japan

[4]Department of Botany and Microbiology, Yuvaraja's College, University of Mysore, India

[5]Vital Earth Resources, Gladewater, Texas, U.S.A.

<u>Location</u>: University of Mysore, Mysore, India

<u>Variety</u>: LRA-5166 from the seed storage division of the University of Mysore

<u>Experimental design</u>: Various Vitazyme dilutions were prepared for seed soaking, and after drying were used to test seed germination, seedling vigor, seed mycoflora, field emergence, and dry seedling weight. Standard statistical methods were used for analysis of variance, and Duncan's Multiple Range Test at P=0.05 was used to compare treatment means.

<u>Vitazyme treatment</u>: Dilutions were used as follows: o (control), 0.001, 0.01, 0.1, 1, 2, 4, 6, 8, 10. 12. 14, 16, 18, 20, 25, and 30%, prepared with sterile distilled water. Seeds were soaked at 26°C for 6 hours on a rotary shaker at 100 rpm, and then blot dried.

Vitazyme Concentration	Germination (%)	MRL (CMS)	MSL (CMS)	Vigor index
Control	63^{ab}	8.9±0.3^{abcd}	10.9±1.2^{abd}	1249^{def}
0.001	68^{ab}	9.7±0.5^{ab}	11.8±0.5^{a}	1453^{a}
0.01	68^{ab}	9.5±0.4^{abc}	11.5±0.2^{ab}	1444^{a}
0.1	60^{ab}	9.5±0.4^{abc}	11.1±0.4^{a}	1236^{efg}
1	60^{ab}	9.1±0.4^{abcd}	10.3±0.3^{abdef}	1172^{g}
2	66^{ab}	10.1±0.3^{a}	10.3±0.5^{abdef}	1353^{bc}
4	68^{ab}	9.1±0.3^{abcd}	10.9±0.5^{abc}	1359^{b}
6	67^{ab}	9.4±0.4^{abc}	10.8±0.1^{abcd}	1350^{bc}
8	68^{ab}	8.7±0.2^{bcd}	10.1±0.3^{bcdef}	1280^{cde}
10	65^{ab}	8.0±0.5^{d}	10.3±0.3^{abcdef}	1182^{fg}
12	70^{ab}	8.3±0.2^{cd}	10.4±0.2^{abcde}	1319^{bcd}
14	57^{ab}	6.8±0.4^{e}	10.0±0.3^{bcdef}	963^{ij}
16	65^{ab}	5.8±0.2^{ef}	9.3±0.4^{def}	990^{i}
18	68^{ab}	6.2±0.3^{ef}	9.4±0.3^{cdef}	1070^{h}
20	69^{ab}	6.1±0.1^{ef}	9.4±0.2^{cdef}	1075^{h}
25	63^{ab}	5.5±0.5^{f}	8.8±0.2^{f}	906^{j}
30	63^{ab}	5.3±0.5^{f}	9.2±0.3^{ef}	919^{ij}

Values are the means of four replicates of 100 seeds each and repeated thrice.
MRL – Mean root length; MSL - Mean shoot length

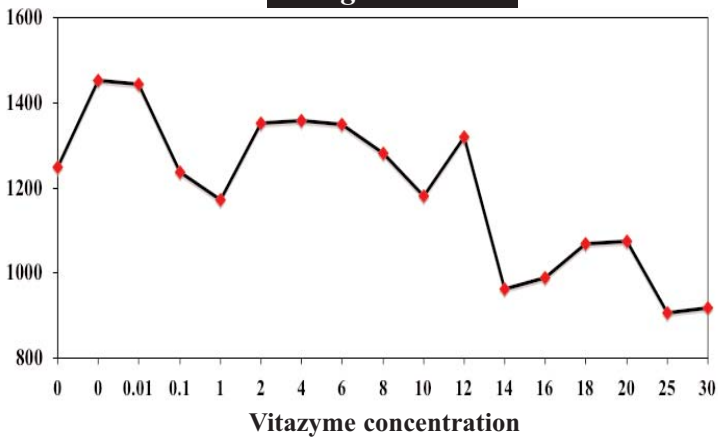
Seed Germination and Seedling Vigor

Methods recommended by the International Seed Testing Association were used. Seeds were rolled up on wet germination sheets and incubated in a seed germinator at 27±2°C. Germination was determined as the percent of seeds sprouted and the vigor index was calculated as (mean root length + mean shoot length)(% germination). There were 4 replicates of 100 seeds each, repeated three times.

Several Vitazyme treatments increased seed germination and vigor versus the control. The 0.001, 0.01, 4, 8, 18, and 20% dilutions gave 68 to 69% responses, compared to only 63% for the control, with vigor indices of up to 1453 (at 0.0001%) versus 1249 for the control. Concentrations of 14% or higher gave a reduced vigor index compared to the control.

Continued on the next page

Vigor Index



Dry Seedling Weight

Twelve-day-old seedlings were carefully removed from the soil and washed to remove soil particles, oven dried at 60°C for 48 hours, and weighed. Four replicates of 100 seedlings each were repeated three times. Vitazyme at 0.001, 0.01, and 0.1% gave significant increases in dry seedling weight, but a non-significant increase at 1%.

Vitazyme concentration	Dry weight*
%	grams
Control	115±80.4^{c}
0.001	126±108.1^{ab}
0.01	133±113.2^{a}
0.1	133±115.6^{a}
1	118±96.5^{bc}

Vitazyme seed treatment on cotton leads to greater boll numbers and higher yields, oftentimes with less nitrogen being required to produce optimum yields.

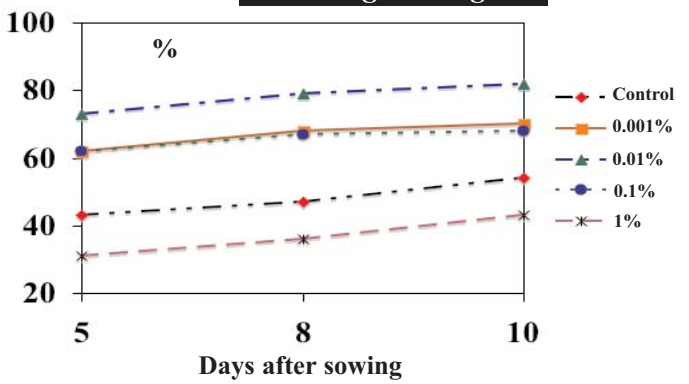
Seedling Emergence

The same treatments used for the fungi tests were used in this evaluation. Seeds were sown in 20 x 30 meter plots using normal agronomic practices. Each treatment had four rows (each row a replicate) of 100 seeds each in a randomized block design for two seasons. Seedling emergence was recorded from day 3 to day 16.

Days after sowing	Vitazyme concentration				
	Control	0.001%	0.01%	0.1%	1%
	seedlings emerged (%)				
5	47±1.0^{g}	62±2.0^{d}	73±1.5^{b}	62±1.0^{d}	31±1.0^{1}
8	47±1.1^{f}	68±1.5^{c}	79±0.5^{a}	67±0.5^{c}	36±1.5^{h}
10	54±1.0^{e}	70±0.5^{bc}	82±1.1^{a}	68±0.5^{c}	43±0.5^{g}

Values are the means of four replicates of 100 seeds each and repeated twice

Seedlings Emerged



Only the three lowest concentrations of Vitazyme increased seedling emergence above the control, the best being the 0.01% seed soak. The 1% soak actually reduced emergence.

Conclusions: For all parameters measured, Vitazyme significantly improved cotton germination and seedling performance above the untreated control, which received only distilled water. Especially effective were the 0.001 and 0.01% concentrations for germination and seedling vigor. These two concentrations, plus the 0.1 and 1% soaks, were used for the rest of the analyses, and displayed significant improvements in many cases in field seedling emergence and dry seedling weight, especially the 0.001, 0.01, and 0.1% dilutions. These results prove Vitazyme's great effectiveness as a seed treatment for cotton in India and other tropical countries.

- ***Increase in vigor index at 0.001% Vitazyme: 16%***
- ***Increase in seedling emergence at 10 days after planting with 0.01% Vitazyme: 22 percentage points***
- ***Increase in dry seedling weight (0.01 and 0.1% Vitazyme): 16%***

Cowpeas (Vigna unguiculata)

Research organization: Animal Science Institute, Havana, Cuba
Variety: cowpea (*Vigna unguiculata*)
Planting date: September 2005
Irrigation: none
Location: Havana, Cuba
Soil type: red ferralitic (estrustox)
Planting rate: unknown
Experimental design: A uniform field area of cowpeas was selected to evaluate the effect of Vitazyme on pea yield. Four randomly placed replicates were arranged with ten treatments. (See table on next page)

Continued on the next page

Treatment	Rhizobium[1]	Fertilizer[2]	Seed soak[3]	Vitazyme In-furrow[4]	Vitazyme Early flowering[5]
1	O	O	O	O	O
2	X	X	O	O	O
3	O	O	H_2O		
4	O	O	Vita		
5	O	O		X	
6	O	O	Vita		X
7	O	O		X	X
8	X	X	Vita		
9	X	X		X	
10	X	X	Vita		X

[1]An inoculum of Rhizobium ssp. was added to the seed before planting.
[2]0.25 ton/ha was applied of a "complete" N-P-K fertilizer
[3]H_2O = distilled water; Vita = a 10 minute soak of a 5% Vitazyme solution at 1 liter/50 kg of seed.
[4]1.5 liters/ha in-furrow before covering.
[5]1.5 liters/ha on the leaves at flower initiation.

Conclusions: In this Cuban cowpea study, the two Vitazyme applications at 1.5 liters/ha to the seed furrow at planting and on the foliage at early bloom provided by far the best yield increase of all treatments (+105%). This yield increase was achieved without fertilizer and Rhizobium bacteria. The next best yield increase was with the soil furrow application only (+22%). The seed soak treatment negatively affected yield and plant growth, with or without Rhizobium and fertilizer, suggesting the oversaturation of enzyme systems had been achieved with excess active agents. Crop residue levels paralleled yields, the highest being with the in-furrow treatment (+104%) and the in-furrow plus early bloom treatment (+88%). These results show that the two treatments of Vitazyme, in-furrow and early bloom, are especially effective in Cuba for promoting pea yields and crop residues for human and animal use.

Fertilization: 0.25 ton/ha to Treatments 2,8,9, and 10 before planting
Vitazyme application: 1.5 liters/ha on either the seeds in the furrow, or on the leaves at early bloom (see the table); 1 liter of a 5% solution on 50 kg of seed for selected treatments
Harvest date: unknown
Yield results:

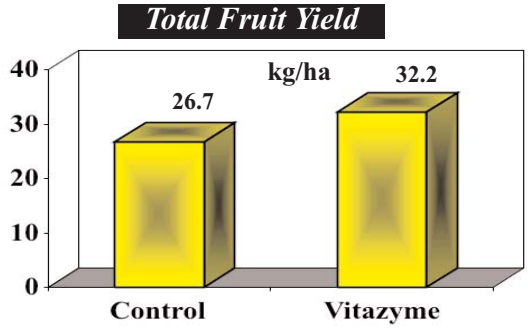
Treatment	Yield[a]	Crop residues[a]
	kg/ha	tons/ha
1	168.5 bc —	0.26 bc —
2	91.0 c —	0.22 bc —
3	110.7 bc (-34%)	0.16 c (-38%)
4	103.5 bc (-39%)	0.24 bc (-8%)
5	205.2 b (+22%)	0.53 a (+104%)
6	110.5 bc (-34%)	0.25 bc (-4%)
7	344.7 a (+105%)	0.49 ab (+88%)
8	117.7 bc (-29%)	0.19 c (-14%)
9	112.0 bc (-23%)	0.19 c (-14%)
10	105.2 bc (-16%)	0.34 abc (+31%)
	32.8***	0.08*

[1]Means followed by the same letter do not differ significantly at P=0.05 according to Duncan's Multiple Range Test. Percentage increases are calculated using the appropriate control.
***P<0.001.
*P<0.05

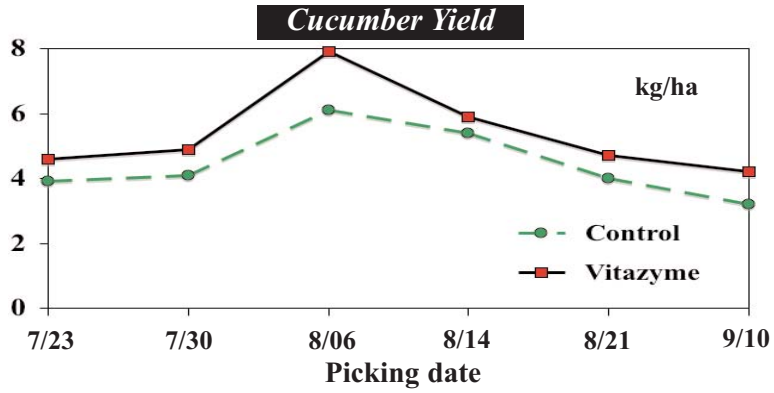
- ***Increase in yield with in-furrow and foliar Vitazyme: 105%***
- ***Increase in residues with in-furrow and foliar Vitazyme: 88%***

Cucumbers

In the Ukraine, cucumbers treated with Vitazyme clearly performed better than the untreated control plants on the right.



Location: Ukraine
Planting date: unknown
Variety: unknown
Planting rate: unknown
Experimental design: A cucumber area ("Area 10") was divided into two parts, each 1 hectare, one treated with Vitazyme and the other left untreated. The objective was to evaluate the effects of the product on cucumber yield.
1. Control **2. Vitazyme**
Fertilization: unknown
Vitazyme application: 1 liter/ha on the leaves and soil, at unknown dates
Yield results: see the graphs below



Conclusions: In this Vitazyme test in the Ukraine, cucumber yield was improved uniformly throughout the 48-day harvest period, to give a total yield enhancement of 21%.

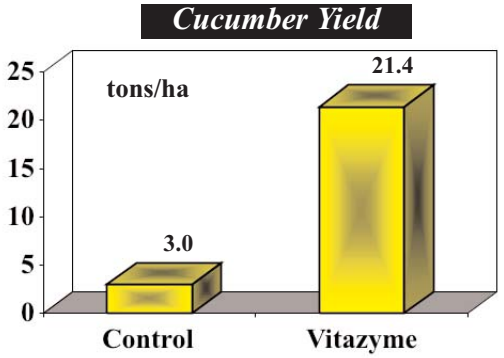
- ***Increase in cucumber yield: 21%***

Cucumbers

Location: Villena Farm of Camilo Cienfuegos Agricultural Enterprise, Havana Province, Cuba
Variety: unknown
Planting date: late 2005 to early 2006
Soil type: red ferralitic
Experimental design: A commercial production trial involved a split field area of 0.013 ha treated and 1.0 ha untreated with Vitazyme at Villena Farm.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme applications: 1.0 liter/ha on the leaves and soil twice, separated by 30 days
Conclusions: This commercial cucumber trial in Cuba revealed the great ability of Vitazyme to increase cucumber production, with a more than six-fold yield increase.



- ***Increase in cucumber yield: 613%***

Flowers

A Testimonial

Location: Coteg, Cayambe, Ecuador
Variety: unknown ("summer flowers")
Experimental design: A field of summer flowers was treated with Vitazyme and compared with other flowers that were untreated.
Comments by the researcher: **"The effect of the biostimulant upon the height and stem diameter is evident.** Our trial has better and higher values than the control (untreated area) where Vitazyme was not used. **The same increase situation was observed with the number of flower buds and the flower size."**

Grapes (for raisins)

Year four of a continuing raisin study

Cooperating party: David Morgan, Tulare Ag Products, Tulare, California
Location: LDS Fresno Raisin Vineyard, Madera, California
Variety: Thompson seedless
Soil type: Very sandy to light clay
Irrigation: drip
Experimental design: This test is in its fourth year of a continuing raisin study that began in 2003. The study was designed initially 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. In 2006, however, the study was modified to evaluate the best possible combinations of Ethrel and seaweed treatments on top of a background application of Vitazyme, potassium (Finisher 21), calcium (Cal Ocho 8%), and fulvic acid. An 80-acre, 112-row raisin vineyard was divided into eight treatments on a replicated basis throughout the vineyard, with each treatment applied to rows in different areas of the vineyard to produce accurate results. All treatments had vines pruned to five or six canes , except for Treatment 8, which was pruned to three canes per vine to provide earlier sugaring and harvest; these were "dried-on-the-vine" (DOV) grapes.

Treatment	Ethrel	Vitazyme	Finisher 21	Cal Ocho 8%	Fulvic acid	Seaweed
1	25% rate	X	X	X	X	1x
2	O	X	X	X	X	1x
3	O	X	X	X	X	2x
4	50% rate	X	X	X	X	O
5	O	X	X	X	X	O
6	100% rate	X	X	X	X	O
7	25% rate	X	X	X	X	O
8	100% rate	X	X	X	X	2x
Dates applied	7/6	5/12, 5/26, 6/28, 8/2	6/28	6/28	5/12, 5/26, 6/28, 8/2	5/3, 5/19, 6/14, 6/28, 8/2

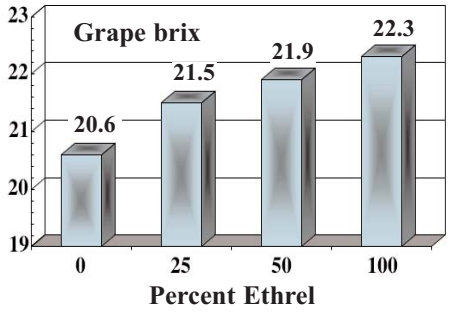
Fertilization: The whole vineyard received adequate N, P, and K in the irrigation well water. Some micronutrients were applied at specific times.
Ethrel treatment: Ethrel [(2-chloroethyl) phosphonic acid], also known as Ethephon, is a synthetic plant growth regulator that releases ethylene into the plant system. Ethylene hastens sugar production so harvest can occur earlier and more sugars can accumulate.

The product was sprayed once, on July 6, at verasion.
Vitazyme application: Vitazyme was applied foliar at 16 oz/acre, along with fulvic acid, on May 12 and 26, June 28, and August 2, and with Finisher 21 and Cal Ocho as well on June 28, plus seaweed on August 2. All treatments received Vitazyme.
Finisher 21 application: Finisher 21 is a 21% potassium (K_2O) formulation that was applied foliar at the recommended rate, along with other materials to all treatments on June 28.
Cal Ocho 8% application: Cal Ocho 8% is an 8% calcium formulation, with CaO

Continued on the next page

and carbohydrates. It was applied foliar at the recommended rate with other agents to all treatments on June 28.
Fulvic acid application: Fulvic acid was applied foliar at 1 quart/acre, along with other materials, to all treatments on May 12.
Seaweed application: A soluble seaweed product was sprayed foliar with other products at 1 lb/acre for Treatments 1 and 2 on May 3 and 19, June 14 and 28, and August 2, sometimes with other products. A 2 lb/acre rate was used for Treatments 3 and 8 on the same dates.
Gibberellin application: A single gibberellic acid application was made to the leaves at the recommended rate near full bloom.
Weather conditions: July was very hot, reaching over 100° F for over 20 days during July.
Grape sugar results: Sugar evaluations were made July 24, July 31, August 7, August 21, and also on August 28 for half of the treatments.

Ethrel Effects on Grape Sugar

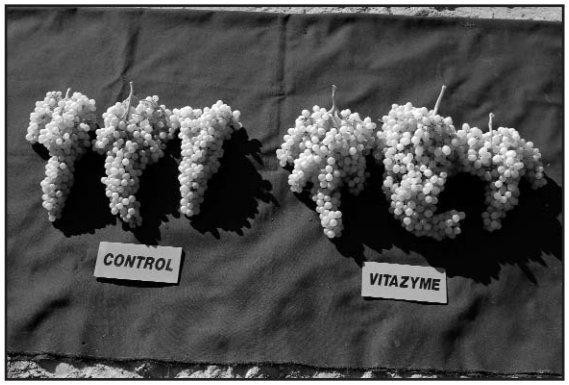


Treatment 8 (DOV), which had grape plants with only three canes per plant and therefore a higher sugar production capability than the others having five or six canes per vine, had the highest brix level throughout the season. Even though the 100% Ethrel treatment (6) had on average the highest sugar accumulation throughout the season, by August 21 it was equalled by Treatment 3: no Ethrel + seaweed (2x). The seaweed treatments did not in general, however, give the highest sugar levels at season's end, Treatments 1 and 2 averaging 20.9 brix on August 21; the analogous treatments, 5 and 7, without seaweed, averaged 21.1 brix. Ethrel without seaweed did tend to boost grape sugar with increasing application rates (see the table), but this added sugar did not translate into significantly higher raisin yield, as will be shown later.
Harvest date: August 26 to September 2, 2006
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 Sunmaid raisin plant, and all light and inferior raisins were removed. Those retained for yield results were grade B or better.

Raisin Yield

Treatment	Raisin yield[1]	Raisin yield[2]	Yield change[3]	
	lb/row	lb/acre	lb/acre	%
1. Ethrel (25%)+Sea (1x)	1,520	4,256	+ 556 (vs. 7)	+ 15%
2. No Ethrel+Sea (1x)	1,373	3,844	+ 123 (vs. 3)	+ 3%
3. No Ethrel+Sea (2x)	1,329	3,721	——	——
4. Ethrel (50%)	1,408	3,942	- 168 (vs. 5)	- 4%
5. No Ethrel	1,468	4,110	——	——
6. Ethrel (100%)	1,478	4,138	+ 28 (vs. 5)	+ 1%
7. Ethrel (25%)	1,318	3,690	- 420 (vs. 5)	- 10%
8. Ethrel (100%)+Sea (2x)	1,044	2,923	——	——

[1]One row contained about 180 vines.
[2]One acre contained 2.8 rows.
[3]Compared to a control that is treated the same except for one variable.



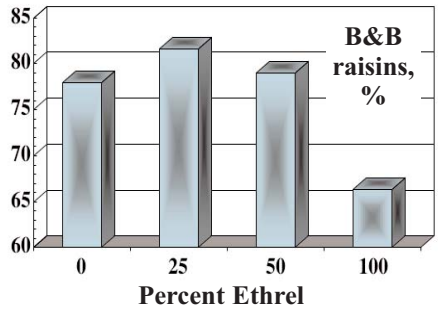
Thompson seedless raisin grapes have responded excellently to Vitazyme for four consecutive years in the San Joaquin Valley.

All treatments had a background application of Vitazyme, Finisher 21, Cal Ocho 8%, and fulvic acid; only Ethrel and seaweed were varied across these eight treatments. Treatment 8 (DOV) had the lowest overall yield due to thinning of canes to only three per plant; the extra sugar content of the grapes did not make up for the loss of yield.
Ethrel did not increase raisin yields: on the contrary, it decreased yields from 4 to 10% for the 50% and 25% Ethrel applications, respectively. On the other hand, the highest overall yield was with a 25% Ethrel+1 lb/acre seaweed rate. This yield was 15% greater than with 25% Ethrel alone, and 3% higher than the next highest yield. The 1 lb/acre rate of seaweed was slightly superior to the 2 lb/acre rate.
Raisin quality results: Raisin quality results were determined at the Sunmaid raisin processing facility.

Raisin Quality

Treatment	Substandards	Substand. change	B and B	B and B change
	% of total	percentage points	% of total	percentage points
1. Ethrel (25%)+Sea (1x)	3.8	+ 0.1 (vs, 7)	74.0	+ 2.1 (vs. 7)
2. No Ethrel+Sea (1x)	3.6	- 1.0 (vs. 3)	78.7	+ 6.8 (vs. 3)
3. No Ethrel+Sea (2x)	4.6	——	71.9	——
4. Ethrel (50%)	4.7	+ 1.1 (vs. 5)	79.0	+ 1.1 (vs. 5)
5. No Ethrel	3.6	——	77.9	——
6. Ethrel (100%)	5.6	+ 2.0 (vs. 5)	66.3	- 11.6 (vs. 5)
7. Ethrel (25%)	3.9	+ 0.3 (vs. 5)	81.6	+ 3.7 (vs. 5)
8. Ethrel (100%)+Sea (2x)	3.0	——	82.6	——

Ethrel Effects on B&B Raisins



The level of Ethrel was negatively correlated with raisin quality in this study. Total B and B raisins decreased when Ethrel levels increased from 25% to 100% (see the graph), while substandards increased in a similar fashion as Ethrel levels increased.
Conclusions: This 2006 raisin study at Madera, California, compared Ethrel concentrations plus two levels of seaweed against a background application of

Continued on the next page

Vitazyme, Finisher 21, Cal Ocho 8%, and fulvic acid. Although the study lacked a control containing no products, it is possible to deduce from the results that low doses of Ethrel (25% of the recommended rate) may be beneficial along with Vitazyme and other amendments such as 1 lb/acre seaweed to produce high raisin yields. In general, however, the study showed that ***increasing Ethrel rates, from 25% to 100% of the recommended rate, reduced raisin quality and yield even though these same rates tended to raise grape brix***. ***The 2 lb/acre seaweed application rate was shown to produce slightly fewer raisins and somewhat lower quality than the 1 lb/acre rate, but further study is needed to evaluate if this difference is real or simply an anomaly of this experiment***. Seaweed is known for its comprehensive benefits to plant growth. ***Vitazyme along with Finisher 21, Cal Ocho 8%, and fulvic acid produced very good yields and quality of raisins during 2006. These yields were apparently enhanced somewhat by 1 lb/acre of seaweed and a 25% Ethrel application, although data from the previous three years fail to corroborate that Ethrel in any way enhances raisin yields when combined with the Tulare Ag Products raisin grape program.***

- ***Increase in raisin yield with Ethrel (25%) + Seaweed (1x): 15%***

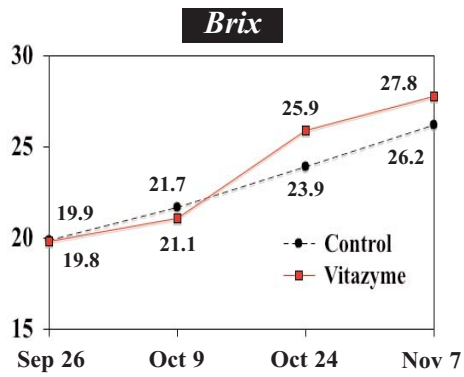
Grapes (for wine)

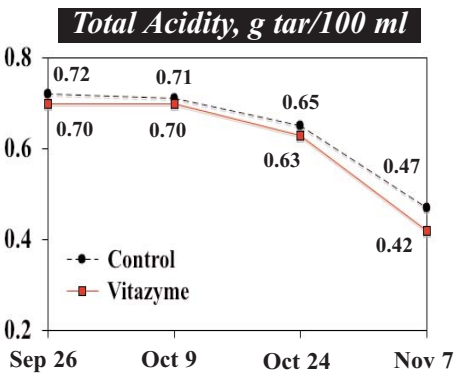
Year Three of a Continuing Study

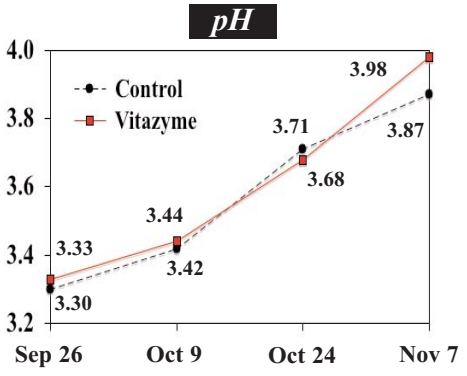
Location: San Miguel, California
Variety: Cabernet Sauvignon
Yield goal: 3.5 tons/acre
Grape plant age: 6 years (third harvest)
Bunch thinning: yes
Shoot trimming: yes
Vineyard: Mondello Vineyards
Plants/acre: 605
Grafting: none (self-rooted)
Irrigation: drip
Row spacing: 12 x 6 feet
Pruning: spur
Soil 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.

These beautiful Cabernet Sauvignon wine grapes grown with Vitazyme near San Miguel, California, display full, high sugar fruit.

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 $(NH_4)_2$ SO_4 broadcast in March before bud break; 9-18-9 or 3-18-18 (+ micronutrients) applied every two to three weeks at 2 to 3 gallons/acre during much of the growing season, usually with sulfur after verasion; 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 verasion; (4) 13 oz/acre 8 weeks before harvest (the end of August)
Harvest date: November 7, 2006
Vine growth: The researcher noted that there was considerably more leaf and vine growth for the Vitazyme treated grapes, perhaps 40% more total leaf mass than for the control plants. An analysis of canes for the plants of the two treatments revealed considerably more cane growth with Vitazyme application as well.
Leaf character at harvest: On November 7, at harvest, about 70% of the control leaves had already fallen from the vines, whereas leaves from the Vitazyme treated plants were nearly all intact, green, and actively photosynthesizing.
Preharvest to harvest grape and grape juice quality: Grapes from each treatment were randomly collected at harvest. 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.







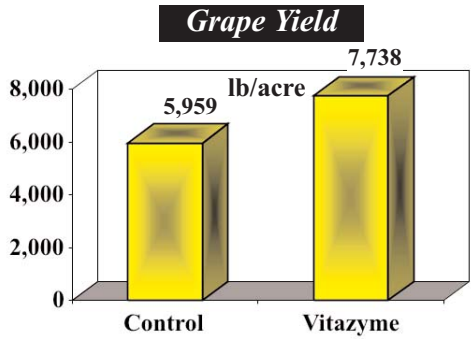
Continued on the next page

Differences in brix, total acidity, and pH throughout the season were minor. ***Remarkably, the higher yielding Vitazyme treatment did not produce grapes that were significantly lower in sugar content, but rather were higher in sugar by 1.6 points, showing the ability of the product to stimulate photosynthesis, carbon fixation, and mineral uptake to provide for the heavier grape load.*** During the testing period it was obvious which grape sample was treated: the grapes were larger and the bunches fuller. Despite minimal watering, Vitazyme enhanced water utilization and maintained grape fruit turgor pressure.

Grape juice quality at harvest: The grapes were harvested on November 7, 2006, 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_3)	Amino acid	Yeast active nitrogen	Malic acid	Tartaric acid	Potassium
	AU	ratio	AU	ppm	grams/liter	grams/liter	%	ppm	ppm	ppm	grams/liter	grams/liter	ppm
Control	9.70	0.47	32.60	335	226	1.071	14.4	72	130	202	2.17	2.91	1502
Vitazyme	11.65	0.46	37.40	385	246	0.973	15.3	89	162	251	3.17	2.88	1664

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 $1,200/ton value of the grapes, the extra 1,779 lb (0.889 ton) of grapes produced $1,066.80 more income per acre.

Wine making: On November 7, 2005, a half ton of grapes from both treatments was picked and crushed, and that day the winemaking process began.

Conclusions for the third year: This was the third 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 30%, 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.

The yields for the three years of the study are as follows:

Treatment	2004 (Yr 1) Yield	2004 (Yr 1) Change	2005 (Yr 2) Yield	2005 (Yr 2) Change	2006 (Yr 3) Yield	2006 (Yr 3) Change	Average Yield	Average Change
	tons/acre							
Control	1.565	——	2.994	——	2.980	——	2.513	——
Vitazyme	2.287	0.722 (+46%)	3.588	0.644 (+22%)	3.869	0.889 (+30%)	3.248	0.735 (+29%)

The first three years of this Cabernet Sauvignon vineyard produced an average of 29% more grapes with Vitazyme applied three times during the growing season. With the wine from these two treatments being equivalent each year — by some opinions even favoring Vitazyme — there is every reason for the grape grower to utilize Vitazyme in his production system to greatly increase yield without decreasing wine quality.

- ***Increase in grape yield: 30%***
- ***Increase in grape income: $1,066.80/acre***

Onions

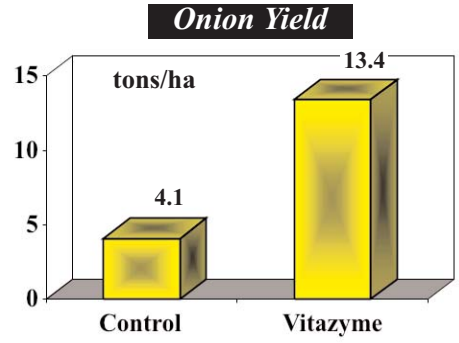
Location: Villena Farm of Camilo Cienfuegos Agricultural Enterprise, Havana Province, Cuba

Variety: unknown

Soil type: red ferralitic

Planting date: late 2005 to early 2006

Experimental design: A commercial production trial involved a split field area of 0.013 ha treated and 1.0 ha untreated with Vitazyme at Villena Farm.

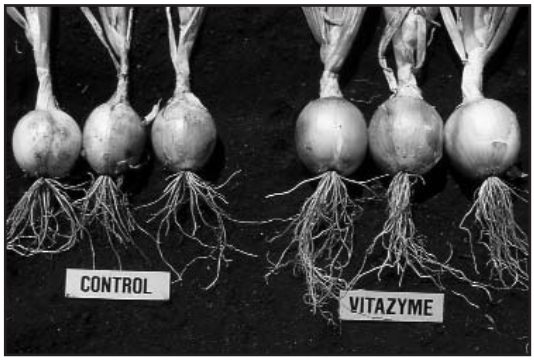


1. Control 2. Vitazyme

Fertilization: unknown

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

Conclusions: This commercial onion trial in Cuba revealed the remarkable ability of Vitazyme to increase onion production, with a 227% yield increase.



Vitazyme applied to onions increases both leaf and root growth, enhancing photosynthesis for more carbon fixation and yield.

- ***Increase in onion yield: 227%***

Oranges

These Vitazyme treated oranges near Lindsay, California, show excellent development early in the season.

Location: Monte Vista Ranches, McCord Ranch, Lindsay, California
Variety: Early Fukumoto Navel grafted on Carrizo rootstock
Soil type: unknown
Tree age: mature
Experimental design: A 10-acre orange orchard was divided into two parts, one treated with Vitazyme and the other left untreated to determine effects of the product on fruit yield and quality. The treated area was 4.688 acres, and the control area was 5.313 acres.

1. Control 2. Vitazyme

Note the size and uniformity of this fine fruit set near Lindsay, California. Also, Vitazyme is aiding fruit quality.

Fertilization: No nitrogen was soil-applied during the year. Potassium and phosphorous were applied through drip irrigation water on May 4 (5 gal/acre of 0-15-15% N-P_2O_5-K_2), and on July 10 (5 gal/acre of 0-10-20% N-P_2O_5-K_2O), for a total of about 12 lb/acre of P_2O_5 and 16 lb/acre of K_2O.

Vitazyme application: Four applications were made:

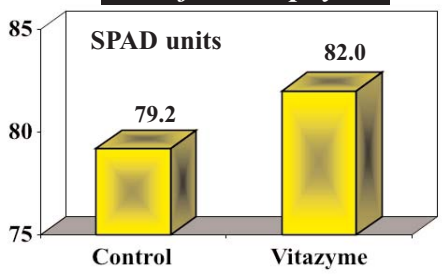
1. Foliar at 16 oz/acre on April 19
2. Foliar at 16 oz/acre on July 11 (after 12 weeks)
3. Drip system at 16 oz/acre on September 8 (after 8.5 weeks)
4. Drip system at 16 oz/acre on October 26 (after 7 weeks)

Chlorophyll content: On August 23 an evaluation of leaf chlorophyll was made using a Minolta SPAD Meter. Thirty leaf samples were sued for each treatment, taken on the north sides of the trees.

Harvest date: December 11 (treated) and December 11 (control), 2006

Yield results:

Leaf Chlorophyll



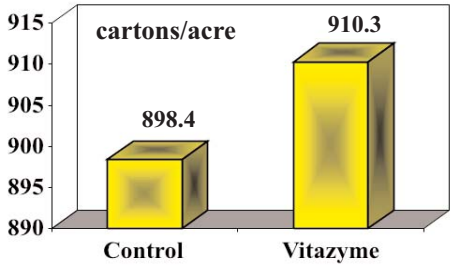
Packout Results

Treatment	Fancy	Export	Choice	Total	Others	All
	----------	----------	kg/ha	----------	----------	----------
Control	643 (13.5%)	3,682 (77.1%)	207 (4.3%)	4,532 (95.0%)	241 (5.1%)	4,773 (100%)
Vitazyme	129 (3%)	3,708 (86.9%)	164 (3.8%)	4,001 (93.8%)	266 (6.3%)	4,267 (100%)

Yield Results

Treatment	Cartons	Trees	Yield	Acres	Yield
		number	cartons/tree		cartons/acre
Control	4,773	1,054	4.528	5.3125	898.4
Vitazyme	4,267	830	4.588	4.6875	910.3 (+1.3%)

Orange Yield

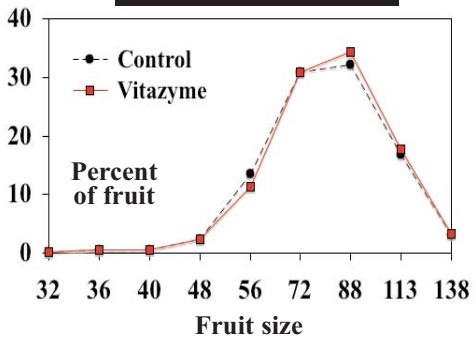


Fruit size results: The Vitazyme treated fruit was slightly smaller (84 vs. 83 and 82).

Fruit quality results: Fruit were collected from each treatment on four dates and sampled for brix and acidity. **Vitazyme appears to produce sweeter, better tasting fruit.**

	Brix (Sugar)[a]				Acidity[a]				Acidity :
Treatment	Oct 30	Nov 6	Nov 20	Dec 11	Oct 30	Nov 6	Nov 20	Dec 11	Brix[a]
Control	9.3	9.8	10.3	10.6	31.7	28.7	27.0	28.5	9.7
Vitazyme	9.1	8.9	10.0	10.7	31.8	28.7	30.3	25.0	11.1

Fruit Size Results



Income results: Exportable fruit, which received a $2.00/carton premium, was improved by nearly 10% for Vitazyme: 86.9% versus 77.1%. This packout resulted in 791 versus 692.7 cartons/acre, or an income advantage of $196.80/acre on the basis of this improvement in fruit quality alone.

Conclusions: For this central California orange trial (cv. Fukumoto), Vitazyme proved to be a good improver of orange yield and quality. While the yield increase was only 1.3%, the number of high-value export quality oranges, shipped to Korea and Japan, was increased by nearly 10%, which translated into a sizable income increase. Total cartons of export grade fruit were 692.7 cartons/acre for the control, and 791.1 cartons/acre for the Vitazyme treatment. This improvement resulted in an income increase of $196.80/acre. Fruit size for the Vitazyme treatment was slightly smaller, reflecting a somewhat higher fruit load.

- ***Increase in export quality fruit: 10%***
- ***Increase in orange yield: 1.3%***

Peanuts

Cuban Ministry of Sugar

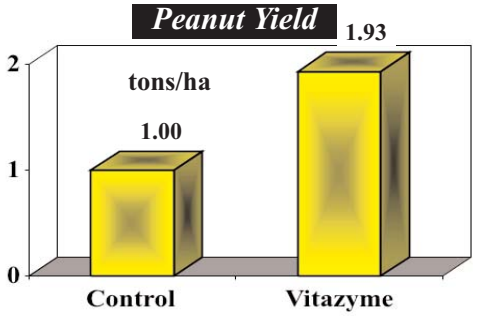
Location: Pedro Gonzalez Credit and Service Cooperative, Havana Province, Cuba
Soil type: red ferralitic (Eutrustox) of low fertility
Planting date: June 6, 2006
Variety: unknown
Planting rate: unknown
Watering: rain-fed
Row spacing: unknown
Experimental design: A field was split with one part treated with Vitazyme and the other portion left untreated. The objective of the study was to discover the effect of Vitazyme on peanut yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1 liter/ha on June 21, 15 days after planting; 1 liter/ha on July 17, 31 days after planting
Growth observations:

Parameter	Control	Vitazyme
Pod number	Fewer: 15 to 18/plant	Many more: 30 to 33/plant
Foliage development	Smaller leaves, slower growth	Larger leaves, faster growth
Flower development	Less	Greater
Canopy closure	Slower	Faster
Root growth	Smaller	Greater

Harvest date: September 20, 2006, after 104 days of growth
Yield results:



Conclusions: In this Cuban peanut study conducted on red ferralitic soils, two applications of Vitazyme at 1 liter/ha each time greatly increased the yield of peanuts (+93%) above the control and also over the historical yield average.

- ***Increase in peanut yield: 93%***

Pennisetum purpureum, cv. Cuba CT-115

Research organization: Animal Science Institute (ICA), Havana, Cuba
Location: near Havana, Cuba
Variety: *Pennisetum purpureum*, cv. Cuba CT-115
Planting date: unknown
Soil type: red ferralitic (Eutrustox)
Planting rate: unknown
Experimental design: Various Vitazyme regimes were used to evaluate effects of this forage legume on crop yield and growth at different times; these regimes will be outlined with each section below. No irrigation or fertilization were used except for fertilizer in the last trial mentioned. The tests were conducted during Cuba's dry season, except for one established pasture test that was carried out all year, and the fertilizer trial that was completed during the rainy season. The plot setups were of a completely randomized design with four replications.

Crop Establishment Application

The yield was measured at 135 days after planting (full establishment), with a sizable yield increase (15%) from only one Vitazyme application at planting. Also, there were more leaves in the total yield (6.2% more percentage points), and less dead tissue (8.81% less percentage points).

Treatment	Dry matter[a]	Change	Leaves[a]	Change	Dead matter[a]	Change
	tons/ha	tons/ha	%	%	%	%
Control	2.69 b	——	22.12 b	——	15.74 a	——
1.5 liters/ha at planting	3.10 a	0.41 (+15%)	28.32 a	6.20	6.93 b	(-) 8.81

[a]Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.

- ***Increase in yield with Vitazyme: 15%***

Different Applications at Planting and Shortly After

Treatment	Dry matter[a]	Change	Height[a]	Change	Leaves[a]	Change
	g/m^2	g/m^2	cm	cm	%	%
1. Control	245.0 ab	——	73.6	——	23.2 a	——
2. 1.5 l/ha in-furrow	303.2 a	58.2 (+24%)	86.2	12.6 (+17%)	26.9 a	3.7
3. 1.5 l/ha after planting	193.2 bc	(-) 51.8 (-21%)	55.2	(-) 18.4 (-25%)	31.6 a	8.4
4. 1.5 l/ha at 7 days	189.2 bc	(-) 55.8 (-23%)	80.0	6.4 (+9%)	28.6 a	5.4
5. 1.5 l/ha at 14 days	134.4 c	(-) 110.6 (-45%)	75.0	1.4 (+2%)	22.1 a	(-) 1.1
6. 1.5 l/ha at 21 days	183.9 bc	(-)61.1 (-25%)	74.6	1.0 (+1%)	24.5 a	1.3
Standard error	21.2***		2.5***		2.2^{ns}	

[a]Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.
***P=0.001

Only Vitazyme applied at 1.5 liter/ha in-furrow at planting caused a yield increase in this study, but the increase was 24%. Height effects on the plants of the various treatments were variable, and there was no significant effect on leaves as a percentage of the biomass.

- ***Increase in yield with Vitazyme (in furrow): 24%***

Continued on the next page

Treatment	Dry matter[a]	Change	Height[a]	Change
	g/m^2	g/m^2	cm	cm
1. Control	259.8 a	——	126.7 a	——
2. 0.75 liter/ha	338.8 a	79.0 (+30%)	136.6 a	9.9 (+8%)
3. 1.5 liters/ha	284.6 a	24.8 (+10%)	133.3 a	6.6 (+5%)
4. 2.25 liters/ha	143.9 a	(-) 115.9 (-45%)	98.8 b	(-) 27.9 (-22%)
Standard error	46.4^{ns}		7.5*	

[a]Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.
***P=0.05.

Dosage Levels At Planting

Though not significant, the 0.75 and 1.5 liters/ha rates at planting increased grain yield by 30% and 10%, respectively. The high rate of 2.25 liters/ha decreased yield and growth below the control.

- ***Increase in yield with 0.75 liter/ha Vitazyme: 30%***

Established Pasture Treatments

Vitazyme at every cutting increased grass yield, in all cases but one significantly. The total of all cuttings was 25% greater with Vitazyme than for the untreated control.

- ***Increase in yield with Vitazyme: 25%***

Treatment	Yield[a], per cutting dry matter						
	1	2	3	4	5	Total	Change
	----------	----------	----------	tons/ha	----------	----------	----------
1. Control	2.96 b	3.40	2.05 b	2.53 b	1.05 b	11.99	——
2. Vitazyme[b]	3.29 a	3.70	2.60 a	3.00 a	2.42 a	15.01	3.02 (+25%)
Standard error	0.03*	0.23^{ns}	0.12*	0.10**	0.07***		

[a]Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.
[b]1.5 liters/ha sprayed over the soil after each cutting, every 90 days during the dry season and every 60 days during the rainy season.
***P=0.05; **P=0.05; ***P=0.001.

Application Timing After Cutting

Treatment	Dry matter*	Change	Leaves*	Change
	tons/ha	tons/ha	%	%
1. Control	3.17 b	——	32.96 bc	——
2. Immediate	3.50 ab	0.33 (+10%)	34.91 ab	1.95 (+6%)
3. At 7 days	3.37 b	0.20 (+6%)	36.95 a	3.99 (+12%)
4. At 14 days	3.75 ab	0.58 (+18%)	36.73 a	3.77 (+11%)
5. At 21 days	3.59 ab	0.42 (+13%)	37.27 a	4.31 (+13%)
6. At 28 days	4.25 a	1.08 (+25%)	33.69 bc	0.73 (+2%)
7. At 35 days	3.79 ab	0.62 (+20%)	32.34 c	(-)0.62 (-2%)
Standard error	0.75		2.10	

[a]Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.
*P=0.05.

Vitazyme applied at any time after cutting caused an increase in yield, up to 25% at 28 days which was a significant increase. Leaf percentages were even more significant, with all but the immediate, 28, and 35 day applications producing a significant leaf increase. This indicates a likely improvement in palatability of the grass with Vitazyme, since a higher percentage of leaves usually indicates greater digestibility.

- ***Increase in yield with Vitazyme at 1 to 35 days after cutting: 10 to 25%***

Effects With Nitrogen Fertilizer

Vitazyme with no fertilizer boosted grass yield greatly — by 43% — but with all levels of fertilizer Vitazyme did not boost the yield above the 150 kg/ha N application. This boost in yield with fertilizer over the untreated control at the same N level is usually observed, but not in this study. It is theorized that excessive N was made available with Vitazyme, suppressing growth and yield.

- ***Increase in yield with Vitazyme: 43%***

Treatment	Dry matter, per cutting				
	1	2	3	Total	Change
	----------	----------	tons/ha	----------	----------
1. Control	2.05 d	2.50 b	1.05 d	5.60 d	——
2. Vitazyme	2.60 c	3.00 b	2.42 c	8.02 c	2.42 (+43%)
3. N (150 kg/ha)	3.76 b	6.10 a	4.64 a	14.50 a	8.90 (+159%)
4. N (150 kg/ha) + Vita	4.34 a	5.80 a	3.68 b	13.82 a	8.22 (+147%)
5. N (100 kg/ha) + Vita	3.48 b	5.40 a	3.81 b	12.69 b	7.09 (+127%)
6. N (75 kg/ha) + Vita	3.95 ab	5.90 a	3.75 b	13.60 a	8.00 (+143%)
7. N (50 kg/ha) + Vita	3.97 ab	5.20 a	3.26 b	12.43 b	6.83 (+122%)
Standard error	0.14***	0.31***	0.18***	0.21***	

[a]All Vitazyme applications were at 1.5 liters/ha over the soil and leaves when the fertilizer was applied.
[b]Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.
***P=0.001.

<u>*Conclusions from the authors*</u>:
For the establishment period:

- The application of 1.5 L/ha of Vitazyme increased yield and reduced the proportion of dead material.
- The best moment to apply the product was immediately before planting: the product is applied in the furrow bottom immediately after furrow opening, and right away planting and covering is carried out.
- The dosage of Vitazyme did not influence establishment.

For the production period:

- When no fertilizer or irrigation was applied, Vitazyme increased yields.
- The best yield was reached when Vitazyme was applied 28 days after cutting, but did not differ with the application immediately after cutting.
- When 75 kg/ha N/ha + split Vitazyme is applied after each cutting during the rainy season, similar yields are reached as when 150 kg/ha N fertilizer is applied.

Peppers

A Testimonial

Location: La Beatriz, Atuntaqui, Ecuador
Experimental design: No replicates were used in this study. The researcher observed the state of the crops as compared to untreated areas.
Comments by the researcher: **"The plants reached a higher developmental stage and their strength was excellent, with an intense green color. We harvested bigger fruits and had a better yield. The entire crop had better sanitary [disease resistance] conditions and better drought resistance."**

Petunias

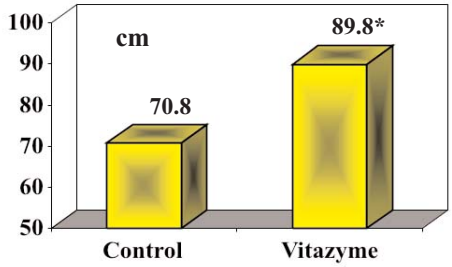
Location: Vital Earth Resources Research Center, Gladewater, Texas
Variety: pink *Transplanting date*: November 14, 2006
Media: Vital Earth Ultra-Blend (pH 6.0, 200+ ppm N, 75 ppm P, 450 ppm K, 650 ppm Ca, 250 ppm Mg, 200 ppm S, plus B, Cu, Fe, Mn, and Zn)
Pot size: 8.5 cm x 8.5 cm x 8.0 cm deep
Experimental design: An experiment to evaluate the efficacy of Vitazyme to stimulate early petunia growth with initiated in the greenhouse, using plants of equal size and vitality for each of six replicates. Daytime temperatures were 60 to 80°F, and nighttime temperatures were 50 to 60°F. Watering was on an as-needed basis.

1. Control **2. Vitazyme**

Fertilization: none (potting soil residual fertility only)
Vitazyme treatment: 5 ml of a 0.1% solution applied to the transplants at planting, and again on December 8
Growth results: On December 22, each plant was measured for total shoot length (by adding the length of each shoot), shoot number, and chlorophyll content (using a Minolta SPAD meter, with seven leaves measured and averaged per plant).

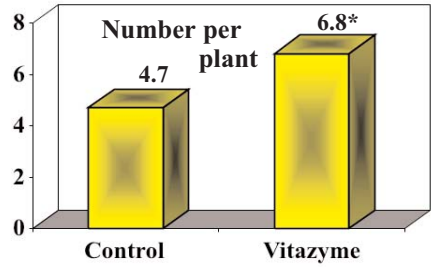
Note how the Vitazyme treated petunia has larger, more fully developed leaves, and more side shoots than the control.

Shoot Length



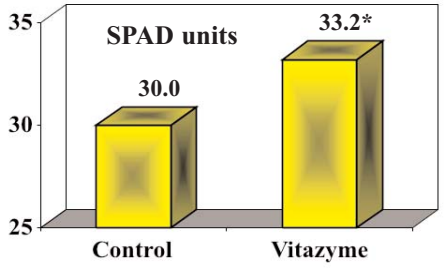
*Significantly greater than the control at P = 0.05 according to the Student-Newmans-Keuls Test. $LSD_{0.05}$ = 16.9 cm.

Branches



*Significantly greater than the control at P = 1.10 according to the Student-Newmans-Keuls Test. $LSD_{0.10}$ = 1.8 branches..

Leaf Chlorophyll



*Significantly greater than the control at P = 0.11 according to the Student-Newmans-Keuls Test. $LSD_{0.11}$= 3.2 SPAD units.

- ***Increase in shoot length: 27%***
- ***Increase in branches: 45%***
- ***Increase in leaf chlorophyll: 3.2 SPAD units***

Conclusions: Vitazyme applied to the potting media in this greenhouse transplant study, at only 5 ml of a 0.1% solution per plant, provided excellent increases in shoot length, branch number, and leaf chlorophyll. This treatment is then shown to be highly effective in increasing the plant size and blossoming potential for petunias.

Potatoes

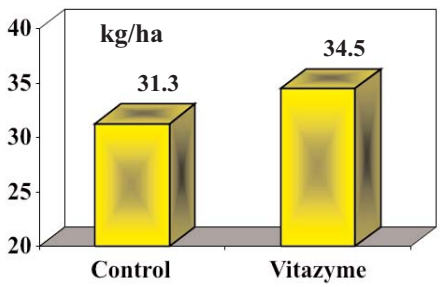
Location: Ukraine *Variety*: unknown *Planting date*: unknown
Planting rate: unknown *Harvest date*: August 21, 2006
Experimental design: A potato plot ("Area 6") was divided into a Vitazyme treated and an untreated area (0.6 ha each) to evaluate the product's effects on yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1 liter/ha on the leaves and soil, at unknown dates
Yield results: see the graph to the right
Conclusions: In this Ukraine Vitazyme study, potatoes were improved in yield by 10% with the treatments given, a significant increase on these fertile Eastern European soils.

- ***Increase in potato yield: 10%***

Potato Yield



Rice

A Seed Germination and Seedling Study

Researchers: S. Umesha[1], P. Hariprasad[2], S.A. Deepak[3], S.T. Girish[4], and Paul Syltie[5]
[1, 2] Department of Applied Botany, Seed Pathology, and Biotechnology, University of Mysore, Manasagangotri, Mysore, India
[3]National Institute for Agro-Environmental Sciences, Tsukuba, Japan
[4]Department of Botany and Microbiology, Yuvaraja's College, University of Mysore, India
[5]Vital Earth Resources, Gladewater, Texas, U.S.A.
Location: University of Mysore, Mysore, India
Variety: IRG4, from the seed storage division of the University of Mysore
Experimental design: Various Vitazyme dilutions were prepared for seed soaking, and after drying were used to test seed germination, seedling vigor, seed mycoflora, field emergence, and dry seedling weight. Standard statistical methods were used for analysis of variance, and Duncan's Multiple Range Test at P=0.05 was used to compare treatment means.
Vitazyme treatment: Dilutions were used as follows: 0 (control), 0.001, 0.01, 0.1, 1, 2, 4, 6, 8, 10. 12. 14, 16, 18, 20, 25, and 30%, prepared with sterile distilled water. Seeds were soaked at 26°C for 6 hours on a rotary shaker at 100 rpm, and then blot dried.

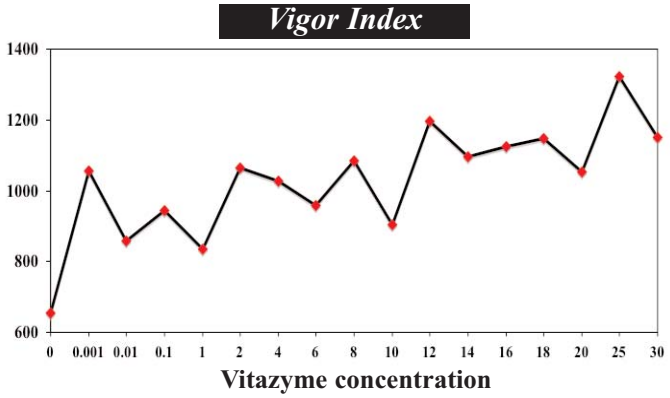
Seed Germination and Seedling Vigor

Methods recommended by the International Seed Testing Association were used. Seeds were rolled up on wet germination sheets and incubated in a seed germinator at 27±2°C. Germination was determined as the percent of seeds sprouted, and the vigor index was calculated as (mean root length + mean shoot length)(% germination). There were 4 replicates of 100 seeds each, repeated three times.

Vitazyme Concentration	Germination (%)	MRL (CMS)	MSL (CMS)	Vigor index
Control	48^{fg}	9.5 ± 0.3^{e}	4.5 ± 0.2^{e}	655^{i}
0.001	54^{cdefg}	13.6 ± 0.3^{ab}	5.9 ± 0.5^{abcde}	1055^{ef}
0.01	47^{g}	12.9 ± 0.6^{abcd}	5.2 ± 0.2^{cde}	857^{h}
0.1	52^{defg}	13.2 ± 0.4^{abc}	4.9 ± 0.3^{de}	945^{g}
1	54^{cdefg}	10.7 ± 0.4^{de}	4.7 ± 0.2^{de}	835^{h}
2	55^{bcdef}	13.6 ± 0.8^{ab}	5.7 ± 0.3^{bcde}	1065^{ef}
4	49^{fg}	14.9 ± 1.0^{a}	6.0 ± 0.3^{abcde}	1028^{f}
6	57^{abcde}	10.7 ± 0.4^{de}	6.0 ± 0.3^{abcde}	958^{g}
8	60^{abc}	12.6 ± 0.8^{bcd}	5.4 ± 0.5^{bcdec}	1085^{def}
10	50^{efg}	11.8 ± 0.5^{bcd}	6.3 ± 0.4^{abcd}	905^{g}
12	60^{abc}	12.9 ± 0.6^{abcd}	7.0 ± 0.6^{ab}	1196^{b}
14	62^{ab}	10.8 ± 0.1^{de}	6.8 ± 0.4^{ab}	1095^{cde}
16	60^{abc}	12.4 ± 0.3^{bcd}	6.2 ± 0.4^{abcd}	1124^{cd}
18	63^{a}	11.5 ± 0.7^{bcde}	6.6 ± 0.8^{abc}	1149^{bc}
20	59^{abcd}	10.9 ± 1.2^{cde}	6.9 ± 0.7^{ab}	1054^{ef}
25	62^{ab}	13.8 ± 0.8^{ab}	7.4 ± 0.2^{a}	1322^{a}
30	60^{abc}	13.0 ± 0.5^{abcd}	6.1 ± 0.2^{abcd}	1151^{bc}

Values are the means of four replicates of 100 seeds each and repeated thrice.
MRL – Mean root length; MSL - Mean shoot length

Nearly all Vitazyme treatments increased seed germination and vigor versus the control. The 14, 18, and 25% dilution gave 62 and 63% responses, compared to only 48% for the control, with vigor indices of 1149 to 1322 versus 655 for the control.



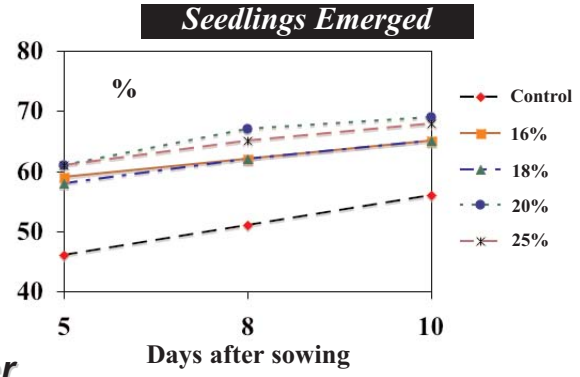
- ***Increase in vigor index at 25% Vitazyme: 102%***

Seedling Emergence

The same treatments used for the fungi tests were used in this evaluation. Seeds were sown in 20 x 30 meter plots using normal agronomic practices. Each treatment had four rows (each row a replicate) of 100 seeds each in a randomized block design for two seasons. Seedling emergence was recorded from day 3 to day 10.

Days after sowing	Vitazyme concentration				
	Control	16%	18%	20%	25%
	seedlings emerged (%)				
5	46 ± 0.5^{g}	59 ± 0.5^{de}	58 ± 4.1^{e}	61 ± 2.0^{cde}	61 ± 2.3^{cde}
8	$51\pm1.5fg^{f}$	62 ± 1.0^{bcde}	62 ± 3.3^{bcde}	67 ± 1.1^{abc}	65 ± 0.5^{abcd}
10	56 ± 1.5^{ef}	65 ± 0.5^{abcd}	65 ± 2.0^{abcd}	69 ± 1.0^{a}	68 ± 0.5^{ab}

Values are the means of four replicates of 100 seeds each and repeated twice.



All concentrations of Vitazyme increased rice seedling field emergence, especially the 20% soak.

- ***Increase in seedling emergence at 10 days after planting with 20% Vitazyme: 13 percentage points***

Continued on the next page

Dry Seedling Weight

Twelve-day-old seedlings were carefully removed from the soil and washed to remove soil particles, oven dried at 60°C for 48 hours, and weighed. Four replicates of 100 seedlings each were repeated three times.

Vitazyme at 25% seed soaking gave a 3.3% significant increase in seedling dry weight above the untreated control and the 16% soak.

Vitazyme concentration	Dry weight*
%	grams
Control	19.6±1.0^{de}
16	19.6±1.7^{de}
18	19.9±1.2^{de}
20	20.5±0.6^{de}
25	22.9±0.4^{d}

*The mean of four replicates of 100 seeds each.

- ***Increase in dry seedling weight at 25% Vitazyme: 17%***

Conclusions: For all parameters measured, Vitazyme significantly improved rice germination and seedling performance above the untreated control, which received only distilled water. Especially effective were the 16, 18, 20 and 25% concentrations for germination and seedling vigor. These four concentrations, used for the rest of the analyses, then displayed significant improvements in many cases in field seedling emergence and dry seedling weight, especially the 20% and 25% dilutions. These results prove Vitazyme's great effectiveness as a seed treatment for rice in India and other tropical countries.

Rice

Soaked rice seeds were air-dropped in this Ecuador trial. Vitazyme produced excellent yield increases, even with reduced nitrogen applications.

Location: Arroz de Riego, near Guayaquil, Ecuador

Experimental design: Few details are available on this study, although two levels of fertilizer nitrogen, 100% and 75%, were applied with Vitazyme to investigate the effect on yield and crop profitability.

1. **100% nitrogen only**
2. **75% nitrogen + Vitazyme**
3. **100% nitrogen + Vitazyme**

Fertilization: 75% and 100% of the usual nitrogen rate applied to different portions of the test field

Vitazyme application: 1 liter/ha at planting on the seedbed; 1 liter/ha on the leaves at emergence of the heads

Yield and income results: Yield was increased substantially above the 100% nitrogen control for both the 75% and 100% nitrogen treatments with Vitazyme. However, actual yield numbers were not available. Income increases above the control were substantial.

- **Income increase with Vitazyme + 100% nitrogen: $128.62/ha**
- **Income increase with Vitazyme + 75% nitrogen: $94.38/ha**

Conclusions: Despite a reduction in nitrogen fertilizer by 25%, Vitazyme boosted income above the control nearly as much as did the 100% nitrogen treatment. Both treatments proved that Vitazyme, applied at planting and at head initiation, is a highly effective yield and income enhancer in Ecuador.

Roses

Testimonials

1. Location: Flores de Napoles, near Quito, Ecuador
   Production regime: greenhouse for export flowers
   Observations, compared to untreated areas:
   Leaf area: 20% larger than usual
   Flower color: more intense for all three rose varieties
   New basal stems: 5 to 10% increase
   Disease incidence: reduced

2. Location: Agriflora, near Quito, Ecuador
   Varieties: several
   Production regime: greenhouse-raised roses for export
   Observations, compared to untreated areas:
   Yield: a 12% increase in exportable roses
   Rhizosphere development: improved growth of the root section
   Drought resistance: the plants are kept active during times of water stress
   Nutrient utilization: better
   Resistance to pathogens and disease: improved

Varieties: Versilia, Confeti, Rafaela

Roses in a greenhouse bed treated with Vitazyme reveal excellent root mass, which in turn leads to high flower yields and increased profits.

3. Location: Pilones la Victoria Pilvicsa, near Quito, Ecuador
   Varieties: unknown
   Production regime: greenhouse for producing new plants
   Observations, compared to untreated areas:
   Root mass: a 30 to 38% increase, with increased root dry matter
   Utilization of fertilizers (especially phosphorus): improved
   Drought resistance: better
   General plant quality: increased

Soybeans

Agricultural Custom Research Education Services

Location: Cedar Falls, Iowa
Variety: Pioneer 92M72 (non-GMO)
Planting depth: 1.5 inches
Row spacing: 30 inches
Soil type: Floyd loam (pH 6.8, organic matter 4.2%, CEC 15.7, good fertility)
Planting date: May 8, 2006
Planting rate: 47 lb/acre
Previous crop: corn
Tillage: conventional
Harvest date: October 8, 2006
Experimental design: A randomized complete block design with six replicates and six 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, Actinovate, glucose, and combinations of these products on soy bean yield and bean 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	Actinovate	1 oz/acre x 2
4	Actinovate + Vitazyme	1 oz/acre + 13 oz/acre x 2
5	Actinovate + Vitazyme + Glucose	1 oz/acre + 13 oz/acre + 2.5 lb/acre x 2
6	Vitazyme + Glucose	13 oz/acre + 2.5 lb/acre x 2

The young soybean growth in this Cedar Falls, Iowa, replicated study reveals superior growth with Vitazyme treatment. The yield increase was 9% above the control.

Fertilization: none
Vitazyme application: 13 oz/acre on the seeds at planting, and on the leaves and soil at 3.5 trifoliates on June 28

Actinovate: Actinovate SP is a formulation of *Streptomyces lydicus* WYEC 108 that will populate the root zone to elicit soil pathogen control (Pythium, Rhizoctonia, Phytophthora, Veticillium, Fusarium, and other fungi); 1 lb/acre mixed with Vitazyme on May 8 at planting, and again on June 28 for a soil/foliar application.
Glucose: a microbial stimulant, applied with Vitazyme and Actinovate for both applications at 2.5 lb/acre
Yield and bean moisture results: The two center rows of each plot were harvested with a plot combine, and the beans were weighed with an electronic scale. Bean moisture was also determined at harvest for each plot.

Treatment	Bean yield*	Change	Bean moisture*	Change
	bu/acre	bu/acre	%	%-points
1. Control	53.15 b	——	10.43 a	——
2. Vitazyme	57.70 a	4.55 (+9%)	10.35 a	-0.08
3. Actinovate	57.10 a	3.95 (+7%)	9.82 a	-0.61
4. Actinovate + Vitazyme	58.33 a	5.18 (+10%)	9.82 a	-0.61
5. Actinovate + Vita. + Glucose	56.10 ab	2.95 (+6%)	10.07 a	-0.36
6. Vitazyme + Glucose	57.83 a	4.68 (+9%)	9.80 a	-0.63
LSD (P=0.05)	3.28		1.04	
Standard deviation	2.76		0.87	
Coeff. of variation	4.86%		8.68%	

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

Bean Yield Changes

Vitazyme.....+9%
Actinovate.....+7%
Vitazyme + Actinovate .....+10%
Vitazyme + Glucose.....+9%

All treatments but Treatment 5 significantly increased soybean yield at P=0.05, with the increases ranging from 6 to 10% above the control. Vitazyme plus Actinovate gave the greatest increase (+10%), but this increase was only slightly more than Vitazyme alone, Bean moisture drydown was not significantly affected by the treatments because all of the beans were dry at harvest, although all of the treatments produced slightly dryer beans, from 0.08 to 0.63 percentage point..
Income results: At $6.00/bu for soybeans, the following income increases have been calculated.

Treatment	Product	Income increase
2	Vitazyme	$27.30/acre
3	Actinovate	$23.70/acre
4	Actinovate + Vitazyme	$31.08/acre
5	Actinovate + Vitazyme + Glucose	$17.70/acre
6	Vitazyme + Glucose	$28.08/acre

Conclusions: In this replicated soybean study in Iowa, all but one treatment produced significant yield increases (P=0.05) of from 2.95 to 4.68 bu/acre (6 to 10%). The greatest increase was with Vitazyme + Actinovate, although Vitazyme alone produced a 9% yield increase. These yield increases produced income increases of from $17.70 to $28.08/acre. Grain moisture did not vary significantly among the eight treatments because all of the grain was harvested when almost completely dry, although all treatments produced somewhat dryer beans at harvest than did the untreated control..

This study shows that Vitazyme alone produced nearly the greatest yield improvement, and other treatments or combinations did not significantly exceed this result. The use of Vitazyme is a highly profitable practice in Iowa, and has been proven to consistently increase soybean yields and profits since 1995.

Sugar Cane

Sugar cane treatment with Vitazyme in this new planting has produced remarkably good results in terms of cane height and total leaves and stems.

Location: Laura Farm (Block 112), Cristino Naranjo Sugar Enterprise, Holguin Province, Cuba
Variety: C89-176
Crop cycle: first ratoon
Soil type: vertisol (typic calciustert)
Experimental design: A study was conducted on a large-scale planting of 45.49 ha to determine the effects of Vitazyme application on sugar yield on a commercial scale. The field was split to leave a Vitazyme treated and control area.
1. Control **2. Vitazyme**
Fertilization: according to the Fertilizer and Amendment Recommendation Service, applied evenly to all areas
Vitazyme application: 1 liter/ha applied three times over the rows; first application in May of 2005
Harvest date: May of 2006
Yield results:

Treatment	Cane yield	Yield change	Juice purity	Sugar yield*	Yield change
	tons/ha	tons/ha	%	tons/ha	tons/ha
Control	32.55	——	82.25	3.58	——
Vitazyme (3x)	47.99	15.44 (+47%)	89.25	5.28	1.70 (+47%)

*Estimated using an 11% recoverable sugar from total cane yield.

Vitazyme produced a large 47% increase in both cane yield and sugar yield, increasing sugar by 1.70 tons/ha. Juice purity was slightly higher (1.00 percentage point) with Vitazyme.
Income results:

Added sugar with Vitazyme	Added costs			Added revenue[3]	Added profit	Cost : benefit	Cost per added dollar
	Additional cane[1]	Vitazyme[2]	Total				
tons/ha				$/ha	$/ha		$
1.70	54.04	39.60	93.64	561.00	467.36	4.99	0.17

[1]Cost of cane harvesting and milling: $3.50 (U.S.)/ton x 15.44 tons/ha additional yield.
[2]Cost of Vitazyme applications: $9.00 (U.S.)/ha (Vitazyme) + $4.20 (U.S.)/ha (spraying) x 3 applications.
[3]Price of sugar: $0.15 (U.S.)/lb, or $330 (U.S.)/ton.

Conclusions: This large-scale field trial with Vitazyme on sugar cane in Holguin Province, Cuba, proved that the program can greatly increase cane and sugar yield, in this case by 47% above the control. This increase produced a cost:benefit of about $5.00 return per dollar invested, which is an excellent return on investment, with added profit totaling $467.36/ha.

- ***Increase in sugar cane yield: 47%***
- ***Increase in sugar yield: 47%***

Sugar Cane

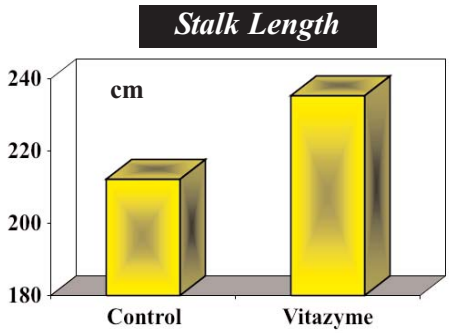
Research organization: Extension Service, Matanzas Province
Location: Espana Republicana, Reglita Farm, Perico, Matanzas Province, Cuba
Varieties: C439-72 and C323-68
Cane type: first ratoon
Soil type: red ferralitic (Eutrustox)
Trial initiation: May 14, 2005
Experimental design: Two uniform blocks of sugar cane were selected to run comparison studies on Vitazyme for evaluating growth and yield results. Fields 4 and 5 from each block were used, one treated three times with Vitazyme, and the other left untreated. Replicates (four for each treatment) were obtained by treating strips for Trial 1 using a tractor-mounted Matabi sprayer. Trial 2 was not replicated: the control was 10.74 ha and the treated area was 16.10 ha.
1. Control **2. Vitazyme**
Fertilization: 100% of the recommended rate
Vitazyme application: 1 liter/ha at 60, 90, and 120 days after application (May 14, June 14, and July 15, 2005), for a 3 liters/ha total application
Weather during the trials: 16.1 cm for February to November, 2005, the majority falling from June through October

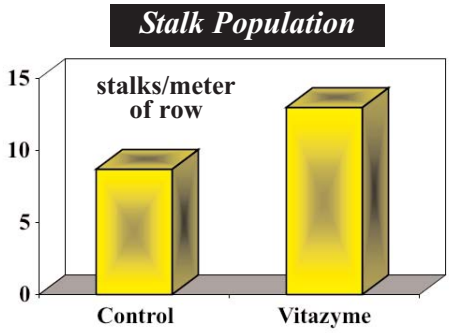
Trial 1 (cv. C439-72)

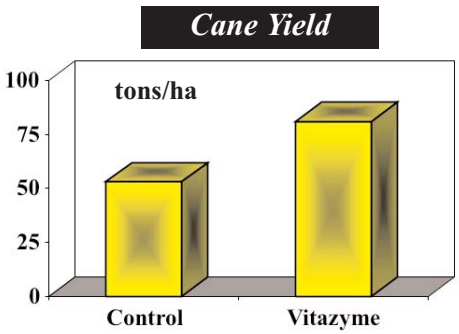
Treatment	Stalk diameter	Change	Stalk length	Change	Stalk population	Change	Sugar content	Change	Cane yield	Change
	cm	cm	cm	cm	stalks/m	stalks/m	%	%	+/ha	+/ha
Control	2.40	——	212.3 b	——	8.7 b	——	15.73	——	53.03 b	——
Vitazyme	2.40	0	235.3 a	23.0 (+11%)	13.0 a	4.3 (+49%)	15.62	(-)0.11 (-1%)	80.81 a	27.78 (+52%)
Standard error	0.05		9.77		1.17		0.24		5.61	

While cane diameter was not influenced in this study, cane height and population density were greatly improved, by 11% and 49%, respectively. Sugar being about the same for both treatments, the yield was 52% higher for the Vitazyme treatment.

Continued on the next page







- ***Increase in cane yield: 52%***

Trial 2 (cv. C439-72)

Treatment	Cane yield	Change
	tons/ha	tons/ha
Control	61.3	——
Vitazyme	63.8	2.5 (+4%)

Vitazyme in this trial provided a respectable 4% cane yield increase.
Conclusions of the researcher: "Vitazyme applied at 60, 90, and 120 days after harvest in the ratoon crop cycle, at 1 liter/ha each application on moist red ferralitic (ferralsol or eutrustox) soil, increased sugarcane yields, was associated with similar increases in stalk population and length. Cultivar C439-72 showed a greater yield response to the Vitazyme treatment than C323-68. It is recommended to continue studying this technology during several continuous crop cycles."

Sugar Cane

Research organization: Hector Molinas Sugar Enterprise, Capitan Alberto Torres Agricultural Production Cooperative, Cuba
Location: Cuba
Varieties: C323-68, C86-12
Cane type: ratoon
Fertilization: unknown
Soil type: red ferralitic (eutrustox) and alluvial (vert-haptic phaeozen)
Experimental design: Large-scale field trials were conducted on several fields of sugar cane to evaluate the effects of Vitazyme on sugar production. Treatments were not replicated, but comparisons were made with paired fields.

1. Control **2. Vitazyme**

Root development from Vitazyme treatment of sugar cane seed pieces was markedly improved in this study.

Tests on Red Ferralitic Soils

NOTE: The control treatment was in its fourth growth cycle, whereas the Vitazyme treatment was in its 13th. In spite of the usual yield reduction with long-term ratoon growth, Vitazyme boosted the yield far above the four-cycle field.

Treatment	Location	Cultivar	Yield	Change
	block/field		tons/ha	tons/ha
Control	5202/15	C323-68	34.6	——
Vitazyme[1]	5202/16	C323-68	43.3	8.7 (+25%)

[1]Three applications at 1 liter/ha each time.

- ***Increase in cane yield: 25%***

Treatment	Location	Cultivar	Yield	Change	Ratoon Cycle
	block/field		tons/ha	tons/ha	
Control	5301/21	C323-68	22.4	——	4
Vitazyme[1]	5301/19	C323-68	44.7	22.3 (+100%)	13

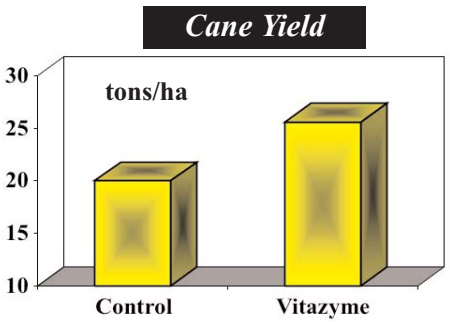
[1]Three applications at 1.5 liters/ha each time.

- ***Increase in cane yield: 100%***

Tests on Alluvial Soils

Treatment	Location	Cultivar	Yield	Change
	block/field		tons/ha	tons/ha
Control	5304/17	C86-12	20.6	
	5304/21	C86-12	13.4	
	5304/22	C86-12	26.0	
		Average	20.0	——
Vitazyme[1]	5304/15	C86-12	24.2	
	5304/19	C86-12	25.1	
	5304/20	C86-12	27.4	
		Average	25.6	5.6 (+28%)

[1]Three applications at 1 liter/ha each time.



- ***Increase in cane yield: 28%***

Conclusions: In this Cuban sugar cane study, Vitazyme initiated excellent cane yield responses in both the red ferralitic and the alluvial soils, but especially in the red ferralitic soils. Of note is the fact that Vitazyme, at two applications of 1.5 liters/ha, prompted a doubling of cane yield with a very mature 13-cycle ratoon cane stand when compared to a nearby cane stand in only its fourth cycle. This response was greater than for any other comparison in this study. Responses to Vitazyme ranged from 25 to 100% in increased cane yield with 3 liters/ha total application, showing that the product is highly effective for improving sugar cane production in Cuba.

Sugar Cane

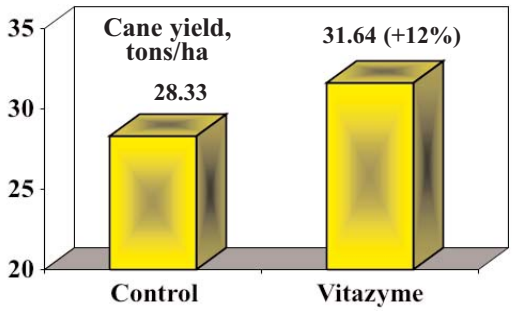
Research organization: Hector Molina Sugar Enterprise and Antonino Rojas Agricultural Production Cooperative
Location: Cuba *Variety*: unknown *Cane type*: ratoon
Fertilization: according to the Fertilizer Recommendation Service *Soil type*: unknown
Vitazyme applications: 1 liter/ha three times
Experimental design: Large-scale field trials were performed on sugar cane fields to verify effects of Vitazyme on sugar cane production. Each field was divided into two portions, one treated and one not, to obtain eight replications that enabled a statistical analysis.

1. Control **2. Vitazyme**

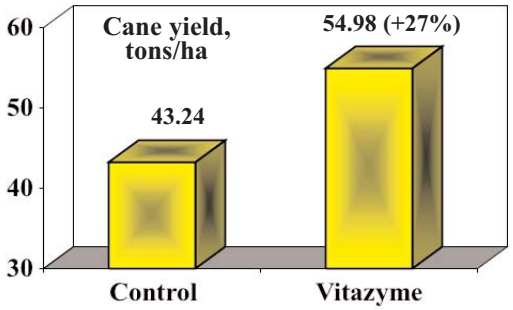
Treatment	Location	Watering	Yield[1]	Change
	block/field		tons/ha	tons/ha
Control	1. 214/16	rain	30.63	——
	2. 214/15	rain	26.64	——
	3. 205/16	rain	25.33	——
	4. 201/17	rain	33.11	——
	5. 102/15	rain	26.70	——
	6. 102/18	rain	27.56	——
	7. 208/15	irrigation	48.72	——
	8. 208/18	irrigation	37.76	——
		Average	32.06 b	
Vitazyme	1. 214/16	rain	34.28	3.65 (+12%)
	2. 214/15	rain	28.32	1.68 (+6%)
	3. 205/16	rain	29.40	4.07 (+16%)
	4. 201/17	rain	35.00	1.89 (+6%)
	5. 102/15	rain	30.20	3.50 (+13%)
	6. 102/18	rain	32.62	5.06 (+18%)
	7. 208/15	irrigation	58.06	9.34 (+19%)
	8. 208/18	irrigation	51.90	14.14 (+37%)
		Average	37.47 a	

[1]Means followed by the same letter are not significantly different according to the Student-Newman-Keuls Test. Significant at P=0.0087. $LSD_{0.1}$=2.85 tons/ha

Rainfed Tests



Irrigated Tests



- ***Increase in cane yield, rainfed: 12%***
- ***Increase in cane yield, irrigation: 27%***

Conclusions: Vitazyme applied to sugar cane in Cuba greatly improved cane yield in this series of eight comparisons, by 12% with no irrigation and by 27% with irrigation. The differences were significant at a high level of significance. This study shows that Vitazyme is a very effective sugar cane yield booster in Cuba.

Sugar Cane

Location: Calderon Farm, Dos Rios Sugar Enterprise, Palma Soriano Municipality, Santiago de Cuba Province, Cuba
Varieties: C87-51, Ja64-19, C86-12, and C1051-73 *Soil type*: Cambisol
Crop cycle: third, fourth, sixth, and eighth ratoon *Harvest date*: unknown
Experimental design: A series of sugar cane tests was established on a large scale with the objective of evaluating Vitazyme's ability to enhance sugar cane yield and profitability during commercial production. A total of 125.7 ha were treated on the various fields, with control areas left untreated to permit comparisons.

1. Control **2. Vitazyme**

Fertilization: according to recommendations of the Fertilizer and Amendment Recommendation Service for ratoon cane on Cambisol soils; 60 to 80 kg of nitrogen per hectare
Vitazyme application: one, two, or three 1 liter/ha sprays directed over the rows, the frequency dependent on the trial. The first applications were made between May 23 and June 13, the second applications between June 30 and July 7, and the third applications between August 5 and 9, 2005. These applications were made during the "full" rainy season.
Yield results:

Block 5 – Fourth Ratoon – C87-51

Treatment	Area	Yield	Change
	ha	tons/ha	tons/ha
Control	3.11	15.4	——
Vitazyme (3x)[1]	11.94	30.5	15.1 (+98%)

[1]Applications on May 23, June 30, and August 5.

- ***Increase in cane yield: 98%***

Block 13 – Third ratoon – C86-12

Treatment	Area	Yield	Change
	ha	tons/ha	tons/ha
Control	4.03	27.3	——
Vitazyme (2x)[1]	5.37	56.3	29.0 (+106%)

[1]Applications on June 3 and July 1.

- ***Increase in cane yield: 106%***

Continued on the next page

Block 10 – Sixth Ratoon – Ja64-19

Treatment	Area	Yield	Change
	ha	tons/ha	tons/ha
Control	1.42	45.0	—
Vitazyme (3x)[1]-1	9.61	50.8	
Vitazyme (3x)[1]-2	10.39	51.3	
Vitazyme (3x)[1]-3	10.79	53.7	
Vitazyme (average)		51.9	6.9 (+15%)

[1]Applications on May 27, July 4, and August 9.

· ***Increase in cane yield: 15%***

Overall Sugar Cane Yield Increases

With Vitazyme

All applications: 65%
One application: 131%
Two applications: 84%
Three applications: 36%

Income results:

	Vitazyme Applications			
Parameter	**3**	**2**	**1**	**All**
Additional cane, tons/ha	11.02	18.66	17.25	15.32
Additional sugar, tons/ha[1]	1.21	2.05	1.90	1.69
Cost of harvest and milling[2]	38.56	65.30	60.36	53.62
Cost of Vitazyme treatment[3]	39.60	26.40	13.20	26.40
Total additional cost, $/ha	78.16	91.70	73.56	80.02
Additional revenues, $/ha[4]	399.97	677.24	626.00	556.12
Additional profits, $/ha	321.81	585.54	552.44	476.10
Cost : Benefit	4.21	6.39	7.51	5.95
Cost per increased dollar	0.20	0.14	0.12	0.14

[1]Sugar yield: 11% estimated recoverable sugar cane (recovered sugar % cane) x cane yield.
[2]Cost of cane harvesting and milling: 3.5 U.S. $/ton x additional cane yield.
[3]Cost of each Vitazyme application: 9.0 U.S. $ of Vitazyme + 4.2 U.S. $/ha per each spraying.
[4]Price of sugar: 0.15 U.S. $/lb (330 U.S. $/ton).

Block 75 – Third Ratoon – Ja6419

Treatment	Area	Yield	Change
	ha	tons/ha	tons/ha
Control	7.85	17.0	—
Vitazyme (2x)[1]-1	15.11	26.2	
Vitazyme (2x)[2]-2	33.44	24.5	
Vitazyme (average)		25.4	8.4 (+49%)

[1]Applications on June 11 and July 5.
[2]Applications on June 13 and July 7.

· ***Increase in cane yield: 49%***

Block 74 – Eighth Ratoon – C1051-73

Treatment	Area	Yield	Change
	ha	tons/ha	tons/ha
Control-1	10.55	12.9	
Control-2	11.26	13.3	
Control (average)		13.1	—
Vitazyme (1x)[1]-1	10.32	26.1	
Vitazyme (1x)[2]-2	5.68	31.1	
Vitazyme (1x)[2]-3	7.53	30.6	
Vitazyme (1x)[3]-4	5.61	33.5	
Vitazyme (average)		30.3	17.2 (+131%)

[1]Application on June 4.
[2]Application on June 5.
[3]Application on June 6.

· ***Increase in cane yield: 131%***

Conclusions: Vitazyme in this commercial-scale Cuban sugar cane study provided very large increases in cane yield: 36% for three applications, 84% for two applications, and 131% for one application. These applications were made over the row during the rainy season from late May to early August. The average cane yield increase for all tests was 65%. The economic increase for these treatments varied from $4.21 per dollar invested (three applications) to $6.39 per dollar invested (two applications) and $7.51 per dollar invested (one application). The average return for all tests was $5.95 increased income for each dollar invested. This study proves that Vitazyme is a remarkably powerful means of improving sugar cane yield and profitably in Cuba.

Sugar Cane

Location: Calderon Farm, Dos Rios Sugar Enterprise, Palma Soriano Municipality, Santiago de Cuba Province, Cuba
Varieties: C87-51 and C1051-73 *Soil type*: Cambisol *Crop cycle*: first, second, and third ratoon
Experimental design: Preliminary results of this study are reported in the 2005 edition of *Vitazyme Field Trial Results*. This experiment on large-scale fields was designed to further ascertain the efficacy of Vitazyme to enhance sugar yields on Cuban soils. Three different blocks were utilized to test effects on first, second, and third ratoon cane. The fields were divided, and part was treated with Vitazyme and part left for a control.

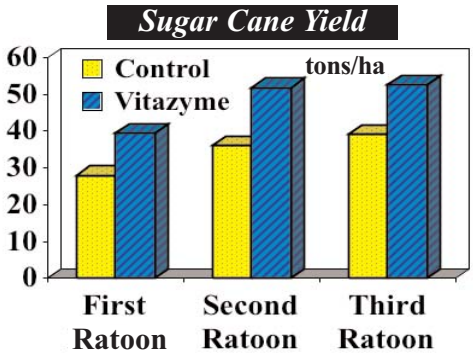
1. Control **2. Vitazyme**

Fertilization: according to recommendations of the Fertilizer and Amendment Recommendation Service for ratoon cane on Cambisol soils; 60 to 80 kg of nitrogen per hectare
Vitazyme application: one 1 liter/ha application for C87-51 on the first and second ratoon cane, and two 1 liter/ha applications for C1051-73 on third ratoon cane, banded over the cane rows. The first applications were made July 5 to 12, 2004, and the second application on August 6, 2004.

					Cane yield		
Block	**Field**	**Area**	**Variety**	**Ratoon**	**Control**	**Vitazyme**	**Change**
					---------- tons/ha ----------		
12	4, 5	12.06	C87-51	first	28.05	39.41	11.36 (+40%)
75	1, 2	15.78	C87-51	second	36.10	51.78	15.68 (+43%)
8	1, 2	7.52	C1051-73	third	39.22	52.58	13.36 (+34%)

Harvest date: unknown
Yield results: see the table to the left and the graph on the next page
Conclusions: For all three varieties of sugar cane at different ratoon stages in

Continued on the next page



this Cuban trial, Vitazyme at either one or two applications produced excellent yield increases of from 34 to 43% above the control. These large sugar cane increases reveal the marked ability of this product to stimulate additional carbon fixation above usual levels in Cuban sugar cane management programs, and also illustrate how Vitazyme can improve nitrogen use efficiency, plus the more efficient use of other soil nutrients.

- ***Increase in first ratoon cane (1 liter/ha Vitazyme): 40%***
- ***Increase in second ratoon cane (1 liter/ha Vitazyme): 43%***
- ***Increase in third ratoon cane (2 liters/ha Vitazyme): 34%***

Sugar Cane

Research institution: "Carlos Balino" Sugar Enterprise, "Richard Gonzalez" Farm, Cuba *Variety*: C1051-73
Soil type: Cambisol (Eutropept) *Application date (first)*: April 28, 2005 *Crop type*: ratoon
Experimental design: A study was made on a uniform divided field (Block 119) to discover the effects of Vitazyme on sugar cane growth and yield. The treated area was 20.46 ha; the control was 11.27 ha.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1 liter/ha three times, the first application made 50 to 60 days after harvest on April 28, 2005
Harvest date: March 11, 2006
Growth results: Data were collected on February 11, a month before harvest. Vitazyme caused an increase in stalk diameter and weight but a reduction in stalk height, besides an increase in total stalks per linear row of 11%.
Yield results: An estimate of sugar yield was made using the total harvested weight of the cane, as measured on truck loads coming from the field.

Treatment	Control	Vitazyme	Change
Stalk length, m	2.10	1.95	(-)0.15 (-7%)
Stalk diameter, cm	2.0	2.3	0.3 (+15%)
Active leaves, number	8.8	8.5	(-)0.3 (-3%)
Stalks, number/meter	11.9	13.2	1.3 (+11%)
Stalk weight, kg	0.83	0.85	0.02 (+2%)

Treatment	Yield	Change	Estimated sugar yield[1]	Change
	tons/ha	tons/ha	tons/ha	tons/ha
Control	31.05	——	3.57	——
Vitazyme	32.35	1.3 (+4%)	3.72	0.15 (+4%)

[1]Based upon an 11.5% sugar recovery from the cane.

Conclusions from the researcher: "Vitazyme, at three applications of 1 liter/ha each on the crop foliage of ratoon C1051-73 sugarcane cultivar, and on the Sialitic (Cambisol or Eutropept) soil present, increased slightly cane and sugar per hectare yields, which agrees with previous results of a small plot replicated trial and an extension trial conducted under similar soil and crop cycle conditions of this province."

- ***Increase in stalk diameter: 15%***
- ***Increase in stalk number: 11%***

Sweet Potatoes

Cuban Ministry of Sugar

Location: Juan Abrahantes Farm, Havana Province, Cuba *Variety*: INIVIT 98-2 *Planting date*: June 1, 2006
Soil type: red ferralitic of low fertility *Watering*: rain-fed *Fertilization*: unknown

Sweet potatoes have done remarkably well across Cuba in Vitazyme trials conducted for over three years.

Experimental design: A split field study was designed to evaluate the effects of Vitazyme on the yield of sweet potatoes. A 1.0 hectare area was treated with the product, while the rest of the field was left untreated.

1. Control **2. Vitazyme**

Vitazyme application: 1 liter/ha on the leaves and soil on June 20, 19 days after planting, and again on leaves and soil on July 22, 32 days after application one
Harvest date: October 10, 2006, after 101 days of growth
Yield results: see the table at right
Conclusions: This sweet potato study in Cuba revealed that two 1 liter/ha Vitazyme applications produced a remarkable 46% yield increase above the untreated control. This yield exceeded the historical yield average by 73%.

Treatment	Yield	Increase
	tons/ha	tons/ha
Control	5.0	——
Vitazyme	7.3	2.3 (+46%)
Historical yield	4.2	

- ***Increase in sweet potato yield; 46%***

Sweet Potatoes

Cuban Ministry of Sugar

Location: Juan Abrahantes Farm, Madruga, Havana Province, Cuba
Soil type: yellow ferralitic of low fertility
Variety: INIVIT 98-2
Planting date: June 1, 2006
Watering: rain-fed
Experimental design: A split field study was designed to evaluate the effects of Vitazyme on the yield of sweet potatoes. A 1.0 hectare area was treated with the product, while the rest of the field was left untreated.

1. Control **2. Vitazyme**

Vitazyme application: 1 liter/ha on the leaves and soil on June 21, 20 days after planting, and 1 liter/ha on the leaves and soil on July 1, 10 days after the first application
Harvest date: October 10, 2006, after 101 days of growth
Growth observations: Vitazyme applications produced the effects versus the control:

1. Greater vegetative and foliar growth
2. Increased resistance to water stress
3. More uniform tubers

· Increase in sweet potato yield: 123%

Yield results: see table below

Treatment	Yield	Increase
	tons/ha	tons/ha
Control	4.7	——
Vitazyme	10.5	5.8 (+123%)
Historical yield	4.2	

Conclusions: This Cuban sweet potato test proved that two 1 liter/ha applications of Vitazyme, separated by only 10 days, increased the yield by a massive 123%. This increase also exceeded the historical average by 150%. One of the reasons for such a large yield improvement was due to improved drought tolerance due to better water and fertility utilization from Vitazyme application. According to the researchers, "In spite of the great drought, yields were significant for this type of yellowish ferralitic soil with concretions, of low fertility."

Tobacco

Research Organization: Tobacco Research Institute (TABACUBA), Cuba
Location: near Havana, Cuba
Experimental design: A tobacco study was designed to test the ability of Vitazyme to improve tobacco production, fertilizer utilization, seed germination, seedling production, and tobacco quality under Cuban technology and growing conditions. The phases of the study are discussed below.

Tobacco treated with Vitazyme in Cuba grew about as well with 50% fertilizer as with the 100% rate. Quality was excellent.

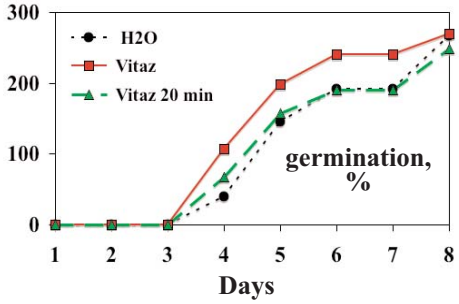
Stimulation of Germination

Seeds of Criollo 98, Habana 2000, GAA-955 cultivars were placed in Petri dishes (100 per dish), with three reps per cultivar. The temperature was maintained at 28°C, and germination was measured at 7 and 14 days.

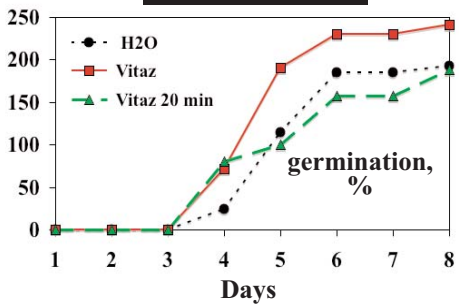
Treatments

1 — seeds were soaked in distilled water in the Petri dish
2 — seeds were soaked in a 5% Vitazyme solution in the Petri dish
3 — seeds were pre-soaked for 20 minutes in a 5% Vitazyme solution, then placed in distilled water in the Petri dish

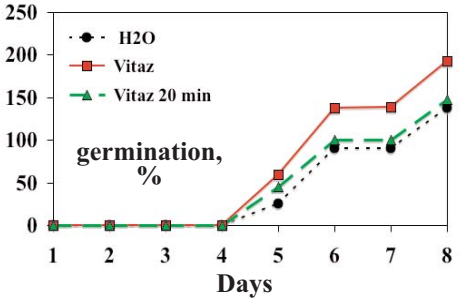
Habana 2000



Criollo 98



GAA-955



In all three varieties, 5% Vitazyme added to the Petri dishes increased seed germination, though not significantly. The pre-soaked seeds increased final germination percentage for only the GAA-955 cultivar. The great increase in germination with the poorly germinating GAA-955 cultivar was especially noteworthy.

Germination increase with Vitazyme at 8 days

Habana 2000.....2%
Criollo 98.....19%
GAA-955.....38%

Continued on the next page

Seedling Production Floating Trays

A floating tray seedbed area was devised with the Criollo 98 cultivar, using four replications. The substrate was composed of 70% black peat, 25% rice hulls, and 5% zeolite plus a 20-8-20% N-P_2O_5-K_2O fertilizer. Vitazyme was sprayed on the seedlings and mats as a 2% solution at planting.

Treatments

1 – 100% fertilizer **2** – 100% fertilizer + Vitazyme **3** – 50% fertilizer **4** – 50% fertilizer + Vitazyme

Treatment	Leaf length[1]	Change	Leaf width[2]	Change	Height	Change	Chlorophyll[3]	Change	Transplant quality
		cm	cm	cm	cm	cm	cm	SPAD units	SPAD units
1 (100% fert)	5.7 b	——	3.79 b	——	14.28 a	——	26.81 b	——	4.5 a
2 (100% fert + Vita)	7.1 a	1.4 (+25%)	4.18 a	0.39 (+10%)	14.56 a	0.28 (+2%)	28.04 a	(+) 1.23	4.4 a
3 (50% fert)	5.9 b	——	3.85 b	——	14.22 a	——	25.96 b	——	3.8 b
4 (50% fert + Vita)	7.3 a	1.4 (+24%)	4.28 a	0.43 (+11%)	13.89 a	0.33 (-2%)	27.12 a	(+) 1.16	4.1 a

[1]Measurement from the largest leaf.
[2]Measurement of width from the longest leaf.
[3]A Minolta SPAD chlorophyll meter was used.

- ***Increase in leaf length with Vitazyme (100% fertilizer): 25%***
- ***Increase in leaf length with Vitazyme (50% fertilizer): 24%***
- ***Increase in leaf chlorophyll with Vitazyme: 1.16 to 1.23 SPAD units***

Vitazyme increased overall leaf growth and photosynthesis in the floating trays at both the 100% and 50% fertilizer levels. These changes were especially helpful to produce higher quality transplants at the 50% fertilizer rate.

Covered Tobacco Production

Two large plots under greenhouse plastic cover, one with 100% fertilizer and the other with 50% fertilizer, were divided into four treatments and three replications in a randomized complete block design. Vitazyme was applied by dipping seedling roots (variety Criollo 98) in a 2% solution at transplanting, and by spraying the plants 25 days late

Treatments

100% fertilizer
1 – Control
2 – Vitazyme at transplant and 25 days
3 – Vitazyme at transplant
4 – Vitazyme at 25 days

50% fertilizer
1 – Control
2 – Vitazyme at transplant and 25 days
3 – Vitazyme at transplant
4 – Vitazyme at 25 days

Leaf Length and Width

Many significant differences occurred among the four treatments at both 50% and 100% fertilizer, for all five leaf grades. The greatest leaf lengths and widths occurred with Vitazyme applied at 25 days and twice for the 50% fertilizer. For 100% fertilizer, the differences among the treatments were less pronounced.

For plant height and stalk diameter only one significant difference appeared, so that data is not included in this report. However, heights were slightly greater for the 50% fertilizer treatments than for the 100% treatments. Stalk diameters were about the same for both fertilizer levels and for all treatments within each level.

Conclusions from the Cuban researcher:

- The product Vitazyme can be used as a germination booster in seeds of low germination percentage.
- With the use of Vitazyme, fertilization can be reduced up to 50%, in tobacco seedling production, without affecting seedling quality. The 50% fertilization reduction represents a saving of $548.00 USD for each 1.9 ha, using 1 liter of Vitazyme.
- The performance of the variables after a 50% reduction in fertilization was quite close to that of 100% fertilization, and consequently we consider that a reduction to 75% of normal fertilization plus Vitazyme application could yield the best results.
- The results of the leaf quality analyses were excellent for the 50% fertilization combined with Vitazyme application at 25 days after transplant treatment, in covered tobacco production.

Fresh Leaf Weight, grams

Treatment	Leaf grade					Total weight
	CG	CF	CL	UM	LP	
50% fertilizer:						
1 (Control)	17.3 c	21.15 e	25.8 c	30.9 b	32.2 ab	127.35
2 (Vita 2x)	20.9 bc	23.2 cde	25.8 c	32.2 ab	32.4 a	134.5
3 (Vita planting)	22.95 b	21.45 de	29.3 bc	31.4 b	32.4 a	137.5
4 (Vita 25 days)	21.25 b	25.85 bcd	31.35 abc	38.7 a	31.25 ab	148.4
100% fertilizer:						
1 (Control)	27.05 ab	28.55 ab	33.25 ab	34.45 ab	30.45 ab	153.75
2 (Vita 2x)	21.05 ab	25.9 bcde	29.85 abc	35.55 ab	28.6 b	140.95
3 (Vita planting)	28.10 a	32.25 a	33.90 a	35.45 ab	33.35 a	163.05
4 (Vita 25 days)	22.65 b	26.5 bc	28.05 bc	37.55 ab	29.4 ab	144.15

*Tobacco Smoking Qualities**

Parameter	Effect of the three Vitazyme treatments
Leaf elasticity	Maintained between good and acceptable for all treatments
Color	Acceptable for all treatments
Ash quality	Acceptable for all treatments
Combustion quality	Normal for all treatments

*In general, the best tobacco quality was noted with the 50% fertilizer level plus Vitazyme, and in particular with Vitazyme applied 25 days after transplanting.

- ***Increase in leaf weight (25 days): 17%***
- ***Increase in leaf weight (planting): 8%***

Tomatoes — A Seed Germination and Seedling Study

Researchers: S. Umesha[1], P. Hariprasad[2], S.A. Deepak[3], S.T. Girish[4], and Paul Syltie[5]
[1, 2] Department of Applied Botany, Seed Pathology, and Biotechnology, University of Mysore, Manasagangotri, Mysore, India
[3]National Institute for Agro-Environmental Sciences, Tsukuba, Japan
[4]Department of Botany and Microbiology, Yuvaraja's College, University of Mysore, India
[5]Vital Earth Resources, Gladewater, Texas, U.S.A.

Location: University of Mysore, Mysore, India *Variety*: PKM-1, from the seed storage division of the University of Mysore

Experimental design: Various Vitazyme dilutions were prepared for seed soaking, and after drying were used to test seed germination, seedling vigor, seed mycoflora, field emergence, and dry seedling weight. Standard statistical methods were used for analysis of variance, and Duncan's Multiple Range Test at P=0.05 was used to compare treatment means.

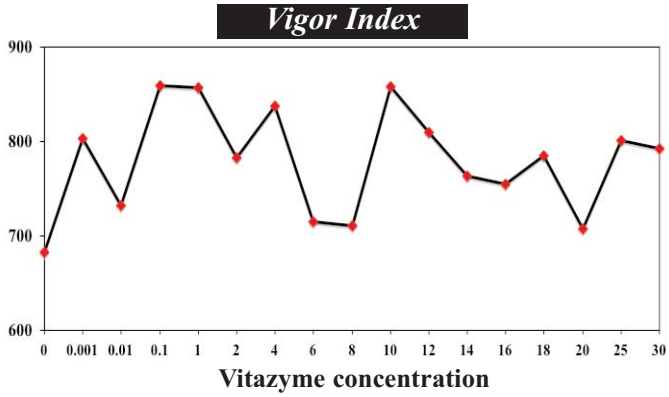
Vitazyme treatment: Dilutions were used as follows: 0 (control), 0.001, 0.01, 0.1, 1, 2, 4, 6, 8, 10. 12. 14, 16, 18, 20, 25, and 30%, prepared with sterile distilled water. Seeds were soaked at 26°C for 6 hours on a rotary shaker at 100 rpm, and then blot dried.

Seed Germination and Seedling Vigor

Methods recommended by the International Seed Testing Association were used. Seeds were rolled up on wet germination sheets and incubated in a seed germinator at 27±2°C. Germination was determined as the percent of seeds sprouted and the vigor index was calculated as (mean root length + mean shoot length)(% germination). There were 4 replicates of 100 seeds each, repeated three times. Several Vitazyme treatments increased seed germination, and all Vitazyme treatments increased the vigor index versus the control. The 0.1, 1, 4, and 25% dilutions gave 66 to 70% responses, compared to 63% for the control, with vigor indices of up to 859, versus 683 for the control.

Vitazyme Concentration	Germination (%)	MRL (CMS)	MSL (CMS)	Vigor index
Control	63^{ab}	5.1±0.3^{ab}	5.6±0.8^{b}	683^{f}
0.001	63^{ab}	5.6±0.2^{ab}	7.1±0.4^{ab}	803^{abc}
0.01	60^{b}	5.2±0.2^{ab}	7±0.2^{ab}	732^{def}
0.1	67^{ab}	5.9±0.5^{ab}	6.8±0.8^{ab}	859^{a}
1	66^{ab}	5.8±0.5^{ab}	7.1±0.9^{ab}	857^{a}
2	61^{ab}	5.6±0.9^{ab}	7.2±0.3^{ab}	783^{bcd}
4	68^{ab}	6.1±0.2^{a}	6.1±0.2^{ab}	838^{ab}
6	62^{ab}	4.9±0.4^{ab}	6.6±0.3^{ab}	715^{ef}
8	60^{b}	5.3±0.6^{ab}	6.4±0.8^{ab}	711^{ef}
10	65^{ab}	5.6±0.3^{ab}	7.6±0.4^{a}	858^{a}
12	64^{ab}	5.5±0.4^{ab}	7.2±0.9^{a}	810^{abc}
14	61^{ab}	5.0±0.3^{ab}	7.4±0.2^{a}	763^{cde}
16	61^{ab}	5.0±0.3^{ab}	7.3±0.8^{a}	755^{cde}
18	64^{ab}	4.8±0.2^{b}	7.4±0.2^{a}	785^{bcd}
20	61^{ab}	4.8±0.4^{b}	6.7±0.7^{ab}	707^{ef}
25	70^{a}	4.7±0.9^{b}	6.7±0.8^{ab}	801^{abc}
30	64^{ab}	5.8±0.2^{ab}	6.5±0.3^{ab}	792^{abcd}

Values are the means of four replicates of 100 seeds each and repeated thrice.
MRL – Mean root length; MSL - Mean shoot length



Seedling Emergence

The same treatments used for the fungi tests were used in this evaluation. Seeds were sown in 20 x 30 meter plots using normal agronomic practices. Each treatment had four rows (each row a replicate) of 100 seeds each in a randomized block design for two seasons. Seedling emergence was recorded from day 3 to day 16. All concentrations of Vitazyme increased rice seedling field emergence, especially the 4% soak.

Days after sowing	Vitazyme concentration			
	Control	0.001%	1%	4%
	seedlings emerged (%)			
5	36 ±1.1^{f}	39 ± 0.5^{de}	41 ± 0.5^{d}	53 ± 0.5^{b}
8	38 ± 0.3^{ef}	41 ± 0.5^{d}	44 ±1.0^{c}	56 ±1.0

Values are the means of four replicates of 100 seeds each and repeated twice.

Dry Seedling Weight

Twelve-day-old seedlings were carefully removed from the soil and washed to remove soil particles, oven dried at 60°C for 48 hours, and weighed. Four replicates of 100 seedlings each were repeated three times. Vitazyme at 25% seed soaking gave a 3.3% significant increase in seedling dry weight above the untreated control and the 16% soak.

Vitazyme concentration	Dry weight*
%	grams
Control	10.0 ±1.0^{e}
0.1%	11.7 ± 0.5^{e}
1%	11.7 ± 0.2^{e}
4%	11.6 ± 0.3^{e}

*The mean of four replicates of 100 seeds each.

Conclusions: For all parameters measured, Vitazyme significantly improved tomato germination and seedling performance above the untreated control, which received only distilled water. Especially effective were the 0.1, 1, and 4% concentrations for germination and seedling vigor. These three concentrations, used for the rest of the analyses, then displayed significant improvement in many cases in field seedling emergence and dry seedling weight. These results prove Vitazyme's great effectiveness as a seed treatment for tomatoes in India and other tropical countries.

- ***Increase in seedling emergence at 8 days after planting with 4% Vitazyme: 47 percentage points***
- ***Increase in vigor index at 10% Vitazyme: 26%***
- ***Increase in dry seedling weight at 1 and 4% Vitazyme; 17%***