



VITAZYME[®]

1997 Field Trial Results

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

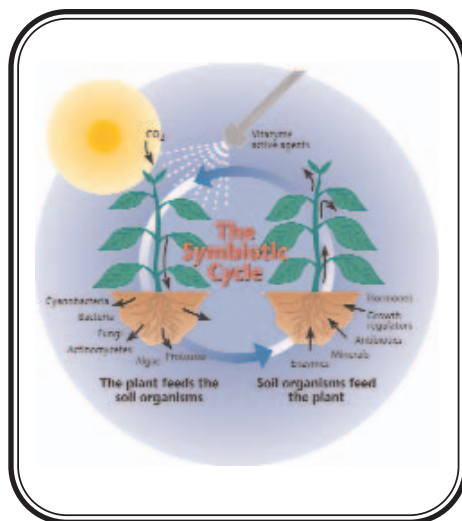
Compiled by Paul W. Syltie, Ph.D., Director of Research
Vital Earth Resources, 706 East Broadway
Gladewater, Texas 75647

The third major year of Vitazyme testing has now been completed. Results of many of these trials are summarized in this booklet. As shown in *Vitazyme 1996 Field Trial Results*, results were equally as good in 1997 as in 1996. Especially impressive were results on high value crops in California, where up to \$1,000/acre increased returns resulted from Vitazyme application.

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,



where — 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 ... 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 reg-

ulators, 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 better, fixing more sunlight energy in the form of carbon compounds to increase the transfer of car-

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% →						

bohydrates, 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. 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 yield a large physiological response from very little applied activator.

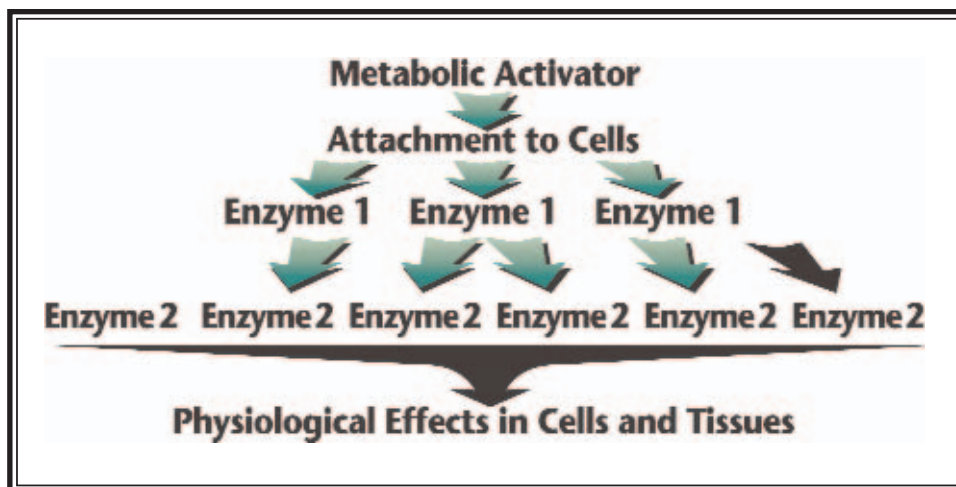
In short, Vitazyme enables the plant to better express its genetic potential by reducing the stresses that repress that expression.

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

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

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

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



Vitazyme Field Tests for 1997

Alfalfa Hay



This alfalfa field treated with Vitazyme produced excellent growth and high yields of high-protein forage.

Location: Oregon State University, Prineville, Oregon
Variety: WL-252HQ **Crop stage:** established
Experimental design: A small plot design was established on an irrigated alfalfa field at the Oregon State University Powell Butte research farm. There were four replications of two treatments, each plot being 24 x 20 ft. A section from the middle of each plot was harvested for yield and forage quality determinations for each cutting. These plots were the same ones as were treated in 1996.

1. Control
2. Vitazyme

Vitazyme applications: 13 oz/acre sprayed over the plants and soil at spring greenup (May 6), and after each cutting thereafter.

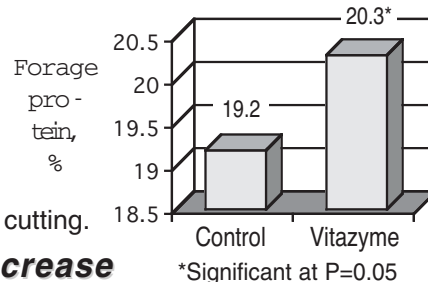
Harvest date: October 15, 1997

Yield results: Yields were not significantly affected by Vitazyme in 1997 at this location.

Comments: A protein increase was not apparent for the second cutting. In 1996, a small protein increase occurred on the first cutting (0.5 percentage point), while a stronger increase of 1.8 percentage points occurred for the second cutting.



Vitazyme improved crown regrowth for this alfalfa. Notice the additional roots as well.



- **Forage protein (first cutting): 1.1 percentage point increase**

Almonds

Location: Madera, California

Varieties: Non Pareil and Carmel

Soil type: sandy loam

Tree age: mature

Tree spacing: 22 ft x 22 ft

Experimental design: Ten acres of a 45-acre mature almond grove were treated with Vitazyme, with all areas of the grove otherwise being treated the same. This ten acres constituted 15 rows of trees.

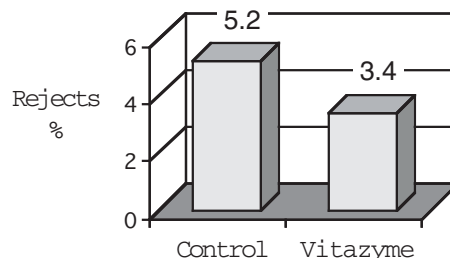
1. Control
2. Vitazyme, applied twice



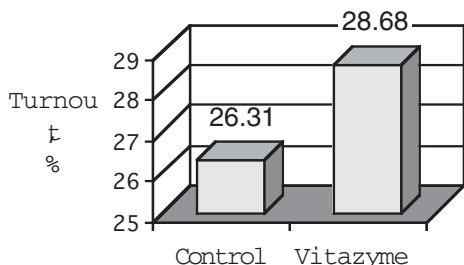
The productivity of this California almond grove was increased by 18% with two Vitazyme applications.



Note the improved size and earlier maturity of the Vitazyme treated almonds.



- **Reduction in rejects: 2.37 percentage points**



- **Turnout increase: 2.37 percentage points**

Two varieties of almonds were present in both treated and untreated areas, and were harvested separately.

Fertility treatments: All areas of the grove were sprinkler irrigated with "REF water". This water is pumped directly from a deep well and run through a pipe fitting to which is attached a programmed electronic device that imprints the water with electrons. All areas received 50 lb of N/acre as "un 32" in April, and 50 lb of N/acre as "can 17" in early October. The same applications had been made the previous year. "Rhizone", an organism cocktail, was applied foliar to all trees, as well as 10 lb/acre of K₂SO₄ using an electrostatic sprayer.

Vitazyme treatments: Vitazyme at 13 oz/acre was applied by injector through the sprinkler irrigation system for the treated area in mid-April, and again at 13 oz/acre

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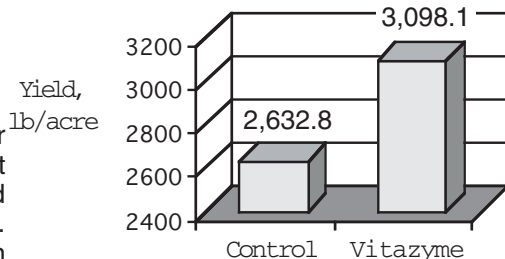
in mid-July. Bloom was from late January through early March, an unusually long period.

Harvest date and method: August 20, 1997.

Yield and quality results: Non Pareil almonds: See the graph on the right.

Income results: The estimated price for the almonds is \$1.50/lb.

Comments: (1) The percent turnout was improved for Vitazyme due to fuller nut meats. (2) The percent rejects was reduced for Vitazyme due to less insect (worm) damage, even though a neighboring almond grove was not well tended and in past seasons would increase worm damage on this side of the grove. (Thus, Vitazyme provided some insect protection). (3) In spite of a nitrogen application of only 100 lb of N/acre, versus the usual recommended 200 to 300 lb/acre, yields were maintained at high levels. (4) The Carmel variety, though not analyzed in this study, provided about the same yield increase as the Non Pareil variety.



• Yield increase: 17.7%

Corn

Seeding date: May 14, 1997

Location: Shortsville, New York

Row width: 30 inches

Seeding rate: 30,000 seeds/acre

Variety: Pioneer 3752 (97 day)

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

1. Control (no Vitazyme)

2. Vitazyme + 33% of fertilizer at planting

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

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

Soil: Ontario loam, 3 to 10% slope

Previous crop: wheat

Harvest date: November 26, 1997

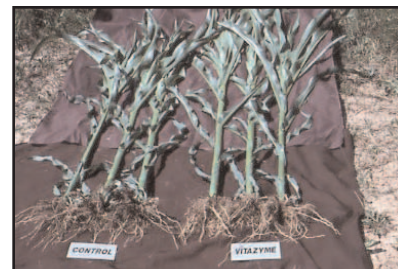
Yield results: Both treatments yielded about 22.7% grain moisture.

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

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



The Vitazyme treatment caused a noticeable improvement in leaf growth and color, seen here at the border of the plot.



On July 13, this corn in New York already showed a marked advantage where Vitazyme had been applied.

• Yield increase: 10% • Income increase: \$63.40/acre
• Test weight increase: 2 lb/bu

Corn

Location: Burkey Research Farm, Ames, Iowa (Iowa State University)

Seeding date: May 6, 1997

Seeding rate: 27,700 seeds/acre

Variety: Pioneer 3489

Row spacing and depth: 30 inches

Experimental design: A randomized complete block design, with six replications, was established in plots 4 rows wide by 40 feet long. At the same nitrogen rate for all plots, Vitazyme was applied at planting and/or at the V6 stage.

1. Control (no Vitazyme)

3. Vitazyme at V6

2. Vitazyme at planting

4. Vitazyme at planting and at V6

Fertility treatments: Nitrogen was applied before planting at 125 lb/acre.

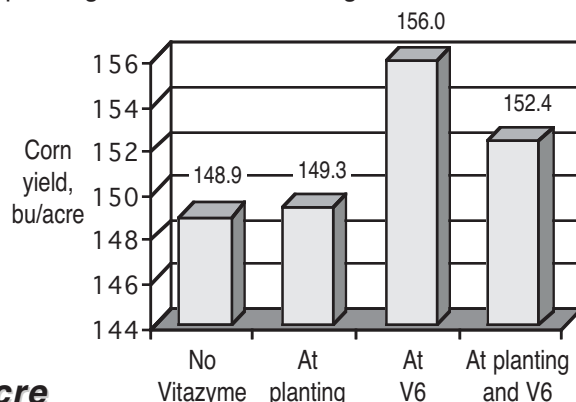
Vitazyme application: The planting treatment was applied directly on the seeds at 13 oz/acre, and the soil/foliar treatment at the V6 stage at 13 oz/acre.

Harvest date: October 15, 1997

Income results: The grain price has been calculated at \$3.00/bu.

Comments: A single application at the V6 stage of development was sufficient to produce the greatest yield increase in this study.

• Yield increase with V6 application: 5%
• Income increase with V6 application: \$21.30/acre



Corn

Location: Burkey Research Farm, Ames, Iowa (Iowa State University)

Seeding date: May 6, 1997

Seeding rate: 27,700 seeds/acre

Variety: Pioneer 3489

Row spacing and depth: 30 inches

Experimental design: A randomized complete block design, with four replications, was set up on plots which were 4 rows wide by 40 feet long. A nitrogen rate study was designed at three rates, with and without Vitazyme. Vitazyme was in the main plots, and nitrogen in the sub-plots.

1. No Nitrogen

2. Nitrogen (50 lb/acre)

3. Nitrogen (100 lb/acre)

4. No Nitrogen + Vitazyme (3 times)

5. Nitrogen (50 lb/acre) + Vitazyme (3 times)

6. Nitrogen (100 lb/acre) + Vitazyme (3 times)



This corn plot at Iowa State University shows excellent growth and color. Vitazyme caused small but consistent yield improvements in these studies.

Fertility treatments: Nitrogen was applied on appropriate plots before planting.

Vitazyme applications: Three applications were used, each at 13 oz/acre: immediately after planting, at one leaf, and at six leaves, for a total of 39 oz/acre.

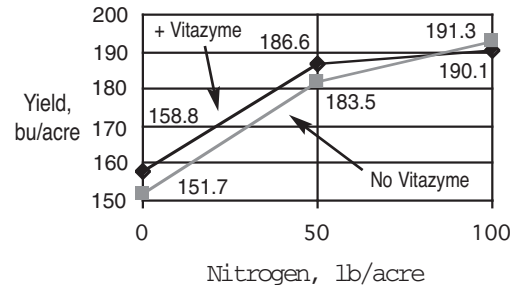
Harvest date: October 15, 1997

Income results: The grain price has been calculated at about \$3.00/bu.

Comments: While no significant increase in yield appeared with Vitazyme there were yield increases nonetheless at 0 and 50 lb N/acre. Nitrogen at 50 lb/acre gave a significant yield improvement.

• **Yield increase with no N: 5%**

• **Income increase at 50 lb N/acre: \$21.30/acre**



Corn

Location: Agronomy Farm, Ames Iowa (Iowa State University)

Row spacing and depth: 30 inches

Seeding date: May 6, 1997

Variety: Pioneer 3489

Seeding rate: 27,700 seeds/acre

Previous crop: Soybeans

Experimental design: A randomized complete block design was initiated using two treatments and 12 replications.

1. No Vitazyme

2. Vitazyme applied twice

Fertility treatments: Nitrogen was applied to all areas before planting at 100 lb/acre.

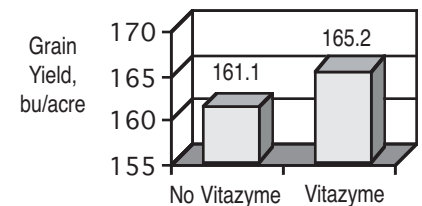
Vitazyme applications: Vitazyme was added directly to the seeds at planting at 13 oz/acre, and later to the soil and foliage at the V6 stage at 13 oz/acre.

Harvest date: October 15, 1997

Comments: Because 12 replications were used in this study, it was possible to demonstrate the yield increase statistically. The cropping year was quite good in spite of a late spring. It is likely that only one application of Vitazyme would have been sufficient to generate this 3% yield increase. Other studies in Iowa for 1997 showed that increases were higher for one application than for two.

• **Yield increase: 5%**

• **Income increase: \$12.30/acre**



Corn

Location: Bagley, Iowa

Variety: DeKalb SR corn

Seeding date: May 23, 1997 (adequate moisture)

Experimental design: A randomized complete block design, with four replications, was set up on a Clarion loam soil.

Seeding rate: 25,000 plants/acre

Row spacing and depth: 30 inches; 2 inches deep



This corn plot at Bagley, Iowa, showed some improvement in maturity with Vitazyme application.

Each plot was 10 feet wide and 40 feet long (0.009183 acre).

Four treatments were selected:

1. Low Nitrogen (80 lb/acre)

2. High Nitrogen (120 lb/acre)

3. Low Nitrogen (80 lb/acre) + Vitazyme twice

4. High Nitrogen (120 lb/acre) + Vitazyme twice

Fertility and tillage treatments: All nitrogen was applied before planting. The field was chisel plowed the previous fall and disked in the spring.

Vitazyme applications: For both treatments,



Ear size was somewhat increased with Vitazyme at this stage of development on August 15, 1997.

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Vitazyme was applied to the seed row at planting at 13 oz/acre, and also on the foliage and soil at the V-10 stage at 13 oz/acre. Twenty gallons of water per acre were used.

Yield results: Corn yields were not significantly affected by Vitazyme for each nitrogen level. The low nitrogen control (Treatment 1) was equal to both high nitrogen treatments.

Comments: The cropping year was very good. While no significant yield changes occurred with Vitazyme, grain for the low nitrogen Vitazyme treatment was significantly drier at harvest than for the control. Greater growing stress would likely have resulted in a significant yield response, at least at the lower nitrogen level.

• **Decrease in grain moisture (low nitrogen): 0.8%**

Cotton

Location: Tulia, Texas

Planting date: May 14, 1997

Row spacing: 40 inches

Experimental design: A 13.4-acre field was divided into two equal parts: 6.7 acres (32 rows) untreated, and 6.7 acres (32 rows) treated with Vitazyme. The field was row irrigated.

Variety: Paymaster HS-200

Seeding rate: 22 lb/acre



Notice a marked increase in the number of bolls and squares with Vitazyme. This improvement translated into a 25% yield increase two months later.

1. Control (No Vitazyme)
2. Vitazyme

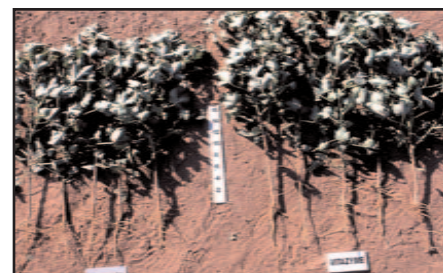
Fertility treatments: 2 tons/acre of steer compost in October, 1996

Vitazyme applications: Vitazyme on the seed at planting, and at early bloom, 13 oz/acre each time

Harvest date: November 5, 1997

Yield results: Ginned cotton and quality data were obtained from the Lakeview Gin near Tulia.

Income results: The cotton value, based on the loan price plus \$0.06/lb to give the likely sale price, was \$0.5860 for the Vitazyme-treated cotton, and \$0.5945 for the control cotton.



On September 2, 1997, the Vitazyme treatment is obviously having a great effect on overall cotton growth and maturity

Comments: Both sides of this test field were treated alike throughout the season except that the Vitazyme treated cotton received an irrigation near the end of July, which the control area did not receive.

• **Yield increase: 25%** • **Income increase: \$103.01/acre**

Cotton



The number of bolls for each treatment accurately reflect the 7% yield improvement recorded at harvest.



An obvious growth advantage exists for the Vitazyme treated cotton on September 3, 1997.

Location: Miles, Texas

Planting date: May 27, 1997

Previous crop: sorghum

Planting rate: about 45,000 plants/acre

Row spacing: 40 inches (2 planted, one skipped)

Soil type: heavy

Experimental design: A field was split into two parts, 25 acres treated with Vitazyme, and 17 areas untreated.

1. Control (no Vitazyme)
2. Vitazyme at planting and at early bloom

Fertility treatments: At planting, 120 lb/acre of a 15-15-0 liquid fertilizer were applied to the seeds.

Vitazyme application: 13 oz/acre on the seed with the fertilizer at planting, and 13 oz/acre on the leaves and soil at early bloom

Harvest date: October 10 and 17, 1997

Yield results: See the value below

Income results: A final price of about \$0.62/lb is anticipated. There was little difference in quality between the two treatments.

Comments: The 1997 cropping year began with good soil moisture, but late spring and summer were quite dry.

• **Yield increase with Vitazyme: 7%**
• **Income increase with Vitazyme: \$15.50/acre**

Cotton - a comparison with Temik for nematode control



The Vitazyme treated area of the experiment, shown here, looked every bit as good as the Temik treated area.



While the Vitazyme treated cotton plants showed even better rooting than those treated with Temik, there were no yield differences.

Location: Littlefield, Texas

Planting date: May 20, 1997

Planting rate: 18 lb/acre

Soil type: deep fine sandy loam

Experimental design: A center pivot irrigation circle of 132 acres was divided into two parts east and west. The south side of this circle was divided into two parts, one area of 40 acres receiving Vitazyme, and the other Temik to control pathogenic nematodes.

Variety: Alltex Atlas

Row spacing: 40 inches

Previous crop: cotton

1. Temik 2. Vitazyme

Fertility treatments: Some liquid starter was applied to the soil surface before planting, and 65 lb/acre of anhydrous ammonia was banded at the end of June.

Vitazyme treatment: At planting, 13 oz/acre was applied along with Direx herbicide in a 10-inch band over each seed row. At pinhead square (the first part of June), 13 oz/acre was applied to the leaves and soil.

Temik treatment: Temik was applied at the recommended rate at planting.

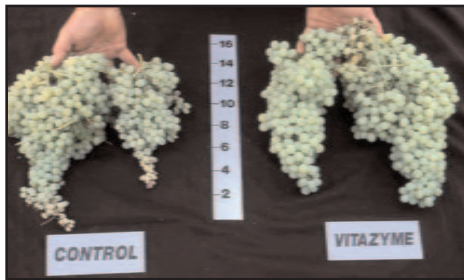
Yield results:

	<u>Temik</u>	<u>Vitazyme</u>
Cotton yield (lint)	642.2 lb/acre (+4.6%)	612.2 lb/acre

Comments: Although the Temik treatment yielded 4.6% more cotton than the Vitazyme treatment, this difference is very small. Essentially the yields were the same, showing that a non-toxic anti-nematode treatment could replace the highly toxic nematicide with little yield difference resulting.

When the plants were young, the Vitazyme treated cotton was noticeably darker green than the Temik-treated cotton. The Vitazyme treatment also produced leafier plants. Neither treatment had significant nematode (*Meloidogyne*) nodules in the root systems.

Grapes



Vitazyme treated grapes were more completely filled to the ends of the bunches, leading to a marked raisin yield increase.

Location: Kerman, California

Variety: Thompson seedless, for raisins

Maturity: mature vines

Soil type: sandy loam

Vine spacing: 12 ft x 7 ft

Experimental design: Three fields were selected for testing, and divided into treated and untreated portions: the Modoc Farm, the Church Farm, and the Floyd Farm.



The average size of treated grapes was larger with Vitazyme, and usually had a higher sugar content.

1. Control 2. Vitazyme

Fertility and Vitazyme treatments
(Vitazyme was applied to test areas only):

	<u>Modoc Farm</u>	<u>Church Farm</u>	<u>Floyd Farm</u>
First application	April 7 - Root zone Vitazyme (13 oz/acre) Nitrogen (75 lb/acre UN 32) Tracite (1 qt/acre 0-0-15)	April 6 - Root zone Vitazyme (13 oz/acre)	July 28 - Foliar Vitazyme (13 oz/acre)
Second application	May 14 - Foliar Vitazyme (13 oz/acre) Bayfolan (2 pt/acre) Wettable S (3 lb/acre)	May 14 - Foliar Vitazyme (13 oz/acre) Bayfolan (2 pt/acre) Wettable S (3 lb/acre)	None
Third application	July 28 - foliar Vitazyme (13 oz/acre) Tracite (1 qt/acre 6% Ca)	None	None

Harvest: All grapes were harvested by hand on trays between the rows for drying. Because of rains during harvest, it was possible to separate control raisins from treated raisins on the Modoc Farm only. Yield estimates were obtained for the Church and Floyd Farms.

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Yield and quality results:

Modoc Farm

	Plot size	Tray number	Total weight	Tons per acre	Grade* ("B&B")	Substandard	Moisture content	Brix
	acres	number	lb	tons/acre	grade	%	%	
Control	12.3	18,502	82,466	3.35	78.4	3.34	9.97	22.0
Vitazyme	5.0	7,262	44,346	4.43	79.6	3.10	9.90	23.5

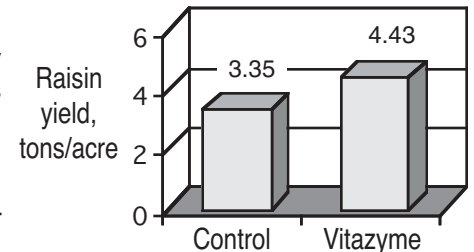
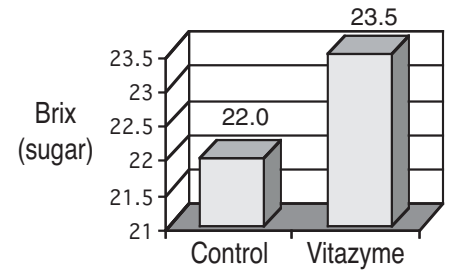
*Determined by a wind machine which blows lighter raisins over a barrier.

Income results: The estimated raisin price is \$0.45/lb.

- **Increase in Yield: 1.08 tons/acre (+32%)**
- **Increase in grade: 1.2 points: 1.2 points**
- **Income in Brix (sugar): 1.5 percentage points**
- **Income increase with Vitazyme: \$972.00/acre**

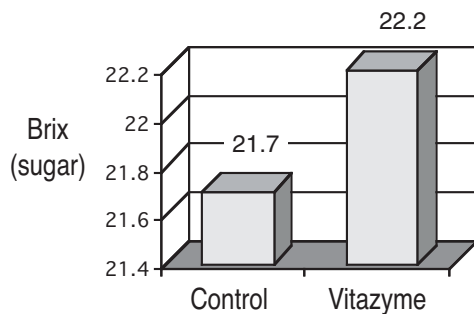
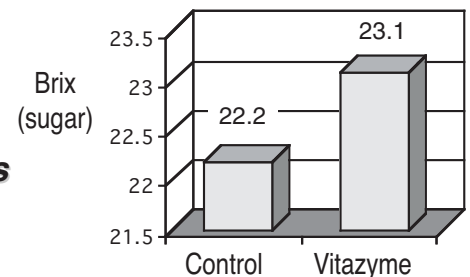
Comments: (1) The grower said the following: "The [added income] is absolutely unbelievable. Never have I seen such an increase. What is even more exciting is that the fruit canes for this coming year are mature."

(2) The fruit canes matured in spite of a large crop in 1997; normally they do not all mature after a heavy crop because the roots, while filling grapes for the current crop, are unable to support adequate growth for the canes. The prospects for a good or excellent crop in 1998 are thus much improved.



Church Farm

- **Estimated yield increase:* 1,500 lb/acre**
*Based on bin filling.
- **Income in Brix (sugar): 0.9 percentage points**
- **Reduction in substandard fruit:* 1.5 percentage points**
*Mostly from immature grapes. Control: 4.1% Vitazyme: 2.6%
- **Estimated income increase: \$675.00/acre**



Floyd Farm

- **Estimated yield increase:* 500 lb/acre**
*Based on bin filling.
- **Increase IN Brix (sugar): 0.5 percentage points**
- **Estimated income increase: \$225.00/acre**

Grapes



Grapes were filled more completely to the ends of the bunches with Vitazyme.

Location: Kerman, California
Variety: Thompson seedless, for raisins
Maturity: mature vines
Soil type: sandy loam
Vine spacing: 12 ft x 7 ft
Experimental design: Two fields were selected for testing. Each was divided into a treated and untreated portion.

- 1. Control 2. Vitazyme**

Fertility treatments: Both the Vitazyme and control treatments were fertilized the same for each field.

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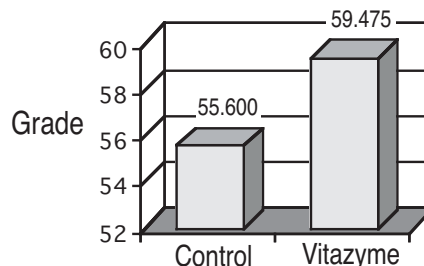
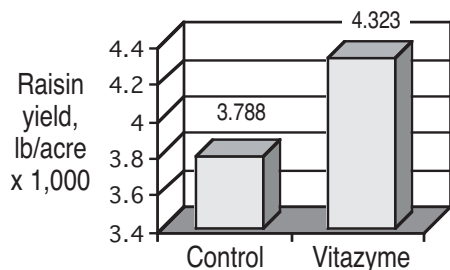


Areas of the vineyards which received Vitazyme were more growthy, and yielded more grapes with stronger, healthier canes.

Vitazyme treatments: (1) 13 oz/acre on March 28, 1997, with a 12-inch-wide band sprayed alongside the row berm. This application was before the first irrigation of the year, with 10 gal/acre sprayer output. (2) 13 oz/acre on May 24, 1997, to the foliage. This was about two weeks after bloom when the grapes were buckshot size. Fifty gallons/acre were foliar sprayed.

Harvest date: All grapes were harvested by hand and placed on trays between the rows for drying.

Test 1

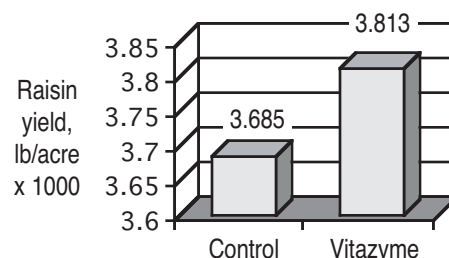


- **Increase in yield: 535 lb/acre (+14%)**
- **Increase in grade: 3.875 points**
- **Reduction in substandards: 1.4 points**
- **Income increase: \$284.74/acre**

Test 2

- **Increase in yield: 128 lb/acre (+3.4%)**
- **Reduction in substandards: 3.05 points**
- **Income increase: \$109.93/acre**

Comments: During the growing season the Vitazyme treated areas displayed superior growth, especially in sandy areas with weaker, nematode-infested vines. A better selection of canes was noted during pruning in the treated areas. The vines are becoming stronger as a result of Vitazyme use.



Onions

Location: Marion, New York

Planting arrangement: wide beds

Soil type: muck

Experimental design: Two field areas of an onion field were selected that were similar in soils and past treatment. One area received Vitazyme, and the other area nothing besides normal fertilizer.

1. Control 2. Vitazyme

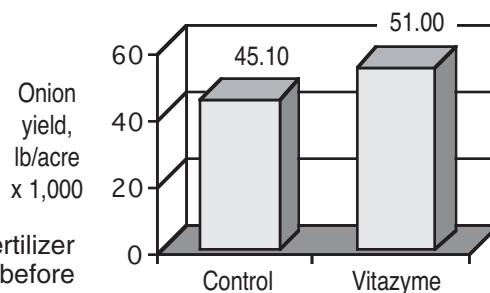
Fertility treatments: The control area received 1,300 lb/acre 10-10-15 dry fertilizer before planting. The Vitazyme area received 750 lb/acre 10-10-15 dry fertilizer before planting, plus 250 lb/acre high-calcium pelleted lime. One gallon/acre of liquid-Ca was applied with a herbicide near planting time, and then six foliar applications of liquid-Ca were applied with a fungicide spray. At planting, 5 gal/acre of 9-18-9 and Nutrapathic Soil Conditioner were applied.

Vitazyme treatments: (1) 13 oz/acre with the starter fertilizer; (2) 13 oz/acre with the second fungicide spray (about the third leaf); (3) 13 oz/acre at bulb initiation.

Harvest date: early October

Income results: Onions are valued at about \$10.00/cwt (100 lb)

- **Yield increase: 22%**
- **Income increase: \$990.00/acre**



Peanuts

Location: Brownfield, Texas

Seeding rate: 57 lb/acre

Seeding date: May 6 (check) and May 8 and 12 (Vitazyme)

Experimental design: An irrigated production field was divided into two sections: an untreated control and a Vitazyme treated area. A live *Rhizobium* seed inoculant was added on the seed along with Vitazyme.

1. Control (no Vitazyme) 2. Vitazyme plus *Rhizobium*

Fertility treatments: manure at 10 tons/acre, applied in February of 1996

Continued on the next page



The Vitazyme treated peanuts on the left are clearly superior in size and color at this growth stage on September 2.

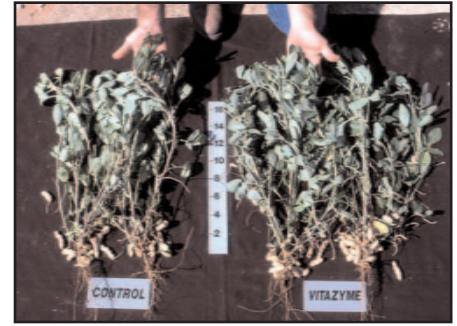
Vitazyme application: 13 oz/acre on the seed at planting, along with a live *Rhizobium* inoculant; 10 oz/acre sprayed on the foliage and soil at early bloom.

Soil: Brownfield sandy loam

Weed control: cultivation

Harvest date: Vitazyme treatment: dug on September 18 and 19, and threshed September 25. Control treatment: dug on September 30, and threshed October 5

Income results: The price paid for the Vitazyme-treated peanuts was \$0.225/lb, and \$0.219/lb for the control peanuts. The reduced price for the control was in part due to greater shelling caused by excessive drying of the peanuts before threshing.



Large plant size correlated with more chlorophyll and carbon fixation, and thus more peanuts, with Vitazyme use.

Comments: The Vitazyme treated peanuts had much better growth and a darker green color than the control throughout the season. The Vitazyme and *Rhizobium* effects are unable to be determined individually by this test.

• Yield increase: 6%* • Income increase: \$57.04/acre

*Note: This yield increase should have been higher due to a breakdown of the irrigation system, resulting in less water delivered to the Vitazyme rows later in the season.

Potatoes Testimonial

Location: Presque Isle, Maine (Nadeau Farm)

Variety: Andover

Experimental design: Vitazyme over all areas; no control

Vitazyme treatment: 13 oz/acre on the foliage at early bloom

Fertility treatment: base saturation balancing of nutrients

Comments: No accurate determination of yield differences could be made due to lack of a control, but the following items were noted:

- Greg said, **"I had to keep cleaning the digging fork when sampling because it was filling up with the roots!"**
- **Packable quality and appearance of the tubers were improved** compared to other fields.
- The treated field had **many fewer air cracks** in the treated tuber compared to other fields.



This field on a Smith potato farm shows excellent growth, and yielded very well.

Potatoes Testimonial

Location: Westfield, Maine

Variety: Katahdin

Experimental design: Vitazyme over the entire field

Vitazyme treatment: 13 oz/acre on the foliage about July 17

Fertility treatment: base saturation balancing of nutrients

Comments:

- **"I think Vitazyme is the best thing I put on my farm this year!"**
- At least a **20% yield increase** was achieved over other fields, and over what was expected on this field.
- Part of the field had a poor stand, but rather than yielding misshapen and uneven tubers the Vitazyme caused **very even sizing and few misshapen tubers**. The **yield** for this part of the field was as good as for the part having a good stand.
- Some hills had **up to 26 tubers per plant!**
- **Sizing** was equal in areas of a poor stand and a good stand.

Potatoes Testimonial

Location: Presque Isle, Maine

Variety: Atlantic

Experimental design: Much of the field received Vitazyme, with a control strip left untreated.

Vitazyme treatment: 13 oz/acre on the foliage applied July 15

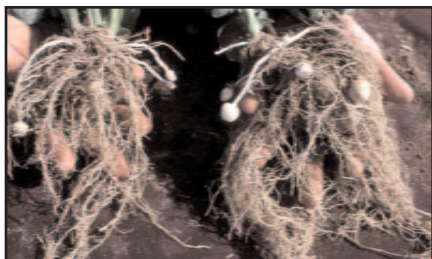
Fertility treatment: base saturation balancing of nutrients

Comments:

- The Maine State Inspection Service said that **the Vitazyme treated Atlantics were the best of that variety they had seen in 1997.**
- Merlon stated that this field produced the **best yield** on Atlantics he has ever seen. *Continued on the next page*

- Compared to the control strip, the Vitazyme treatment did the following:
 - a) **Substantially improved the yield**
 - b) **Produced very even sizing**
 - c) **Greatly increased the tuber set per plant**
- The control potatoes had much less set and therefore grew too large, having **poorer shape and size uniformity than did the Vitazyme treated plants.**
- **Chlorophyll** in leaves on July 17, using a SPAD meter (average of 20 leaves):
 - Control - 43.3
 - Vitazyme - 44.4

Potatoes Testimonial



This closeup shows markedly better rooting and advanced tuber formation with Vitazyme (right side).

Location: Littleton, Maine

Variety: Superior

Experimental design: A small field had Vitazyme applied to about half of the field, with an untreated control left for comparison on the other half.

Vitazyme treatment: 13 oz/acre applied to the soil soon after planting

Fertility treatment: base saturation balancing of nutrients

Comments:



Note the superior rooting and overall plant size with Vitazyme on July 17, 1997.

- The Vitazyme treated plants had **superior tuber set, appearance, and size (greater uniformity)** than the untreated control.
- In spite of droughty conditions, **the yield of these Superiors was greater** than similar fields for some of his neighbors.
- **Chlorophyll** in leaves on July 17, using a SPAD meter (average of 20 leaves): Control - 47.0 Vitazyme - 48.2

Soybeans

Location: Olivia, Minnesota

Seeding rate: 57 lb/acre

Row width: 30 inches

Seeding date: Field 2, April 28; Field 3, May 1; Field 6, May 5

Variety: Field 2, Great Lakes 1315; Field 3, Great Lakes 1315; Field 6, Agripro 1880

Experimental design: Large strips were treated in the field, alongside which were untreated controls. For all three fields the treatments were as follows.

1. Control (no Vitazyme)
2. Vitazyme, plus liquid fish and H₂O₂ at planting

Fertility treatments: The control treatments received no materials, but the Vitazyme treated areas received 13 oz/acre of Vitazyme, 1 pint/acre of H₂O₂, and 3.5 gal/acre of liquid fish at planting. These soybeans were all organically grown.

Vitazyme application: Vitazyme was applied on the seeds at planting at 13 oz/acre.

Harvest date: Field 2, September 27 and 28; Field 3, September 29 and 30; Field 6, October 1 to 3.

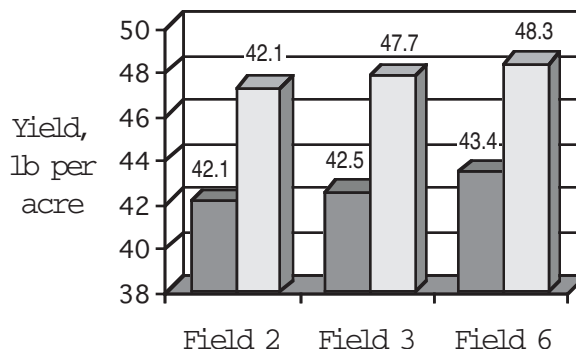
Yield results:

Yield increase	
Field 2:	12%
Field 3:	12%
Field 6:	11%

Income increase	
Field 2:	\$35.70/acre
Field 3:	\$36.40/acre
Field 6:	\$34.30/acre



Growth of these organic soybeans by July 30 is clearly superior with Vitazyme.



Income results: The price of soybeans in southern Minnesota is about \$7.00/bu.

Other comments and observations: Because both liquid fish and H₂O₂ were used along with Vitazyme at planting, one cannot necessarily attribute all of the yield improvement to Vitazyme. The year was quite favorable to high crop yields.

Soybeans

Location: Bagley, Iowa

Variety: Pioneer RR soybeans

Seeding rate: 80,000 plants/acre

Seeding date: June 4, 1997 (adequate moisture)

Row spacing and depth: 30 inches, 1.5 inches deep

Experimental design: A randomized complete block design with six replications was set up on a Clarion loam, with plots 10 feet wide and 40 feet long (0.009183 acre). Four treatments were used:

1. Control (no Vitazyme)
2. Vitazyme on the seed at planting, and at early bloom
3. Vitazyme on the seed at planting
4. Vitazyme at early bloom

Fertility and tillage treatments: Soils were sampled before planting and after harvest for analysis of basic soil parameters. No fertilizers were applied. The field was chisel plowed in the fall and disked in the spring.

Vitazyme applications: Vitazyme was applied to the seed row at planting at 13 oz/acre, and on the leaves and soil at early bloom (July 21) at 13 oz/acre, to appropriate plots.

Harvest date: October 20, 1997

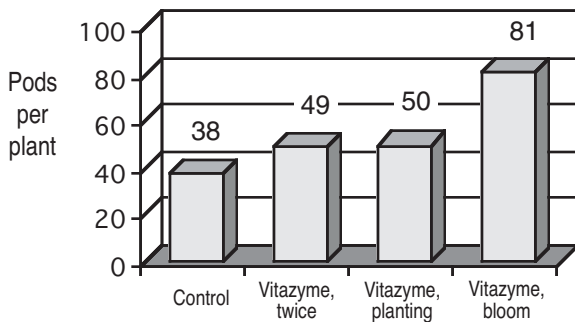
Bean pod count results: Bean pods on representative plants from each treatment were counted on September 25.



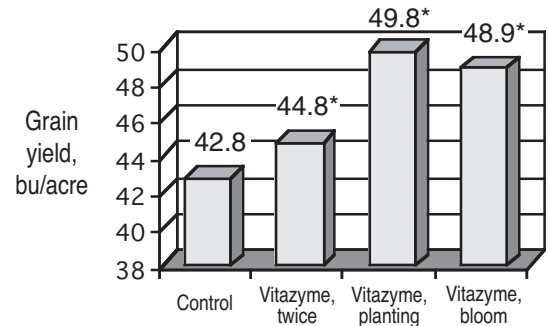
By August 15 the soybean plots at Bagley, Iowa, had shown a sizable advantage for Vitazyme.



Differences in plant size were especially evident with field samples.



Yield results:

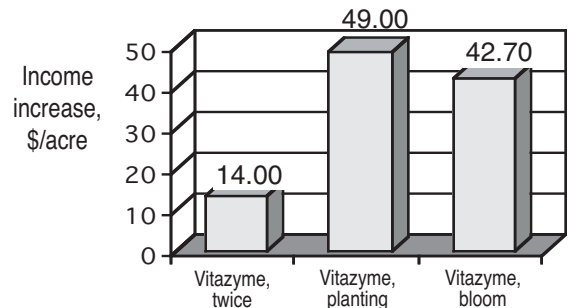


Significantly greater than the control at P=0.05.

• **Pod increase (bloom application): 113%** • **Yield increase (planting application): 16%**

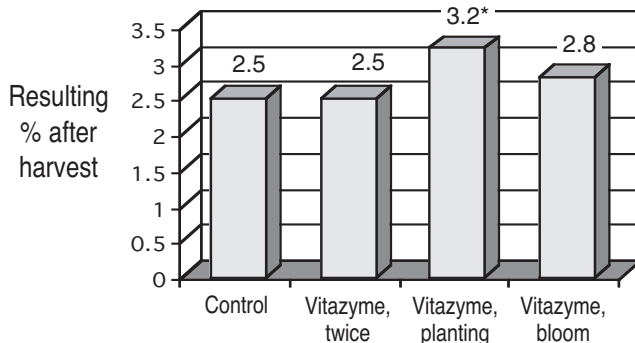
Income results: Average soybean value in Iowa: about \$7.00/bu

• **Income increase (planting application): \$49.00/acre**



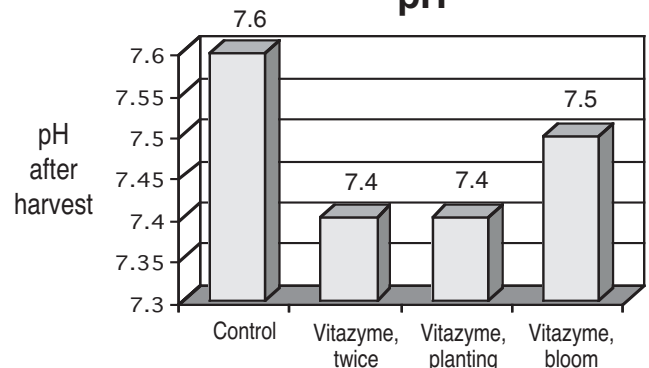
Soil test results: Changes in soil parameters from before planting to after harvest were similar for all treatments for P, K, Mg, Ca, and cation exchange capacity. Nitrate-N ended up slightly higher for all three Vitazyme treatments, but organic matter and pH levels showed greater differences.

Organic Matter



Significantly greater than the control at P=0.05.

pH



Comments: The cropping year was excellent in central Iowa during 1997 despite a cool and wet spring.

Soybeans

Location: Shortsville, New York

Seeding rate: 57 lb/acre

Seeding date: May 20, 1997

Experimental design: A field was split, half treated with Vitazyme and half left untreated.

Row width: 7 inches

Variety: Terra 200



Despite some herbicide damage, the Vitazyme treated soybeans were much better developed with more leave, roots, and Rhizobium nodules.

1. Control (no Vitazyme)
2. Vitazyme at planting

Fertility treatments: All of the field received 5.4 gal/acre 9-18-9 plus 2.6 gal/acre 0-0-30 on the seeds at planting.

Vitazyme application: 12 oz/acre along with the fertilizer at planting.

Soil: Ontario loam, 3 to 10% slope; 7.8 mg/100 g cation exchange capacity

Tillage: conservation tillage (chisel plow)

Previous crop: corn

Harvest date: October 8, 1997

Yield results:

- **Yield increase: 10%**

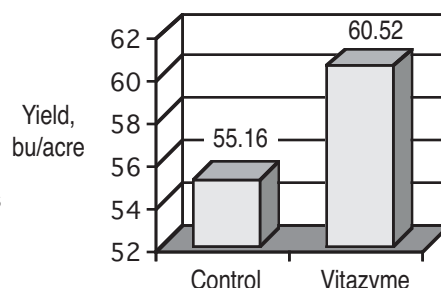
Income results: The price of corn in New York is about \$7.00/bu.

- **Income increase: \$37.52/acre**

Leaf chlorophyll increase: An average chlorophyll value for 20 leaves was obtained for each treatment on July 13, 1997, using a Minolta SPAD meter.

- **Chlorophyll increase: 2.1 SPAD units**

Comments: The cropping year was very favorable. Vitazyme treated plants were noticeably bigger on July 13 than the control plants.



Soybeans



The soybean plots at Danville, Iowa, were showing responses to Vitazyme by August 17 when this picture was taken.



Note the marked improvement in leafing and pod performance with Vitazyme application. Yield increases of up to 8% were documented.

Income results: The price of soybeans in Iowa is about \$7.00/bu.

Comments: The year was very favorable for soybean yields.

Location: Danville, Iowa

Variety: Pioneer 9281

Seeding rate: 150,000 seeds/acre

Seeding date: May 30, 1997

Row width: 30 inches

Experimental design: Four treatments were evaluated, in a completely randomized design having six replications. Plots were 10 x 40 feet (0.0091827 acre).

1. Control (no Vitazyme)
2. Vitazyme at 13 oz/acre at planting
3. Vitazyme at 13 oz/acre at early bloom
4. Vitazyme at 13 oz/acre at planting and at early bloom

Fertility treatments: none

Fertility level: high

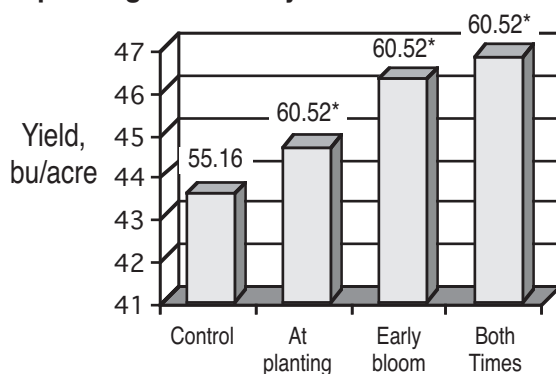
Tillage: conventional

Soil type: Mahaska silty clay loam (pH = 6.8; cation exchange capacity = 20.8 meq/100 g.)

Vitazyme application: Vitazyme was applied at 13 oz/acre at planting (directly on the seeds), at early bloom, or at both times.

Harvest date: October 1, 1997

Yield results: A plot combine was used to harvest the plots.

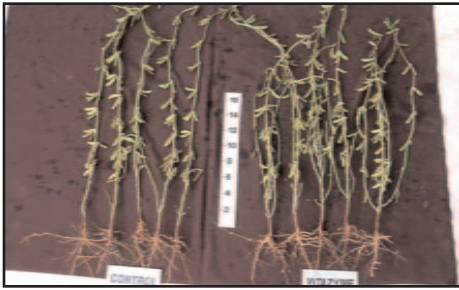


Significantly greater than the control at P=0.05.

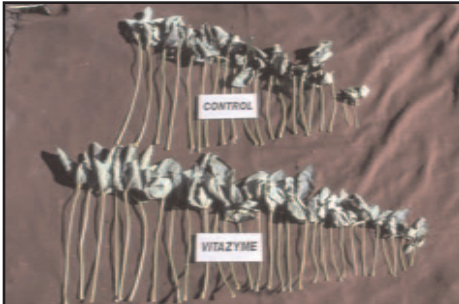
Yield increase
At planting: 3%
At early bloom: 6%
At both times: 8%

Income increase,
two applications:
\$22.89/acre

Soybeans



Considerably better pod formation was noted in the Vitazyme treated portions of the field near Wellman, Iowa.



Note the leaf number per plant, which is greater with a Vitazyme treatment (Cedar Falls, Iowa).

Location: Wellman, Iowa
Seeding date: May 1, 1997
Seeding rate: 230,000 seeds/acre
Previous crop: corn
Variety: Pioneer 9306
Row width: 7.5 inches
Tillage method: no-till
Experimental design: Two treatments were evaluated:

1. Control (no Vitazyme)
2. Vitazyme sprayed once on the foliage and soil

Vitazyme application: Vitazyme was applied to the foliage and soil at 13 oz/acre along with a herbicide spray when the soybeans were about one foot high.

Harvest date: October 2, 1997

Yield results: A weigh wagon was used to determine bean weights for strips harvested on both sides of the the applied Vitazyme strip. The weights were averaged.

- **Soybean yield increase: 4%**

Income results: Value of soybeans, mid-Iowa: \$7.00/bu

- **Income increase: \$14.84/acre**

Moisture at harvest:

- **Moisture decrease: 0.7 percentage point**

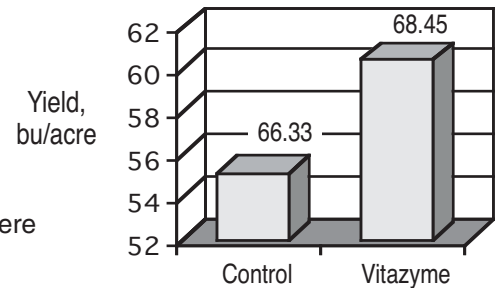
Leaf chlorophyll on August 17: An SPAD meter was used with 20 plants averaged for each treatment.

- **Chlorophyll increase: 1.7 units**

Pods: Five random plants from each treatment were selected, and pods were counted.

- **Pod number increase: 51%**

Other observations and comments: Because the Vitazyme treated soybeans were drier at harvest, it may be presumed that they matured faster than the control beans. During August it was possible to view the field and pick out the treated strip due to a darker green color. The cropping year was excellent.



Sudangrass Testimonial

The Vitazyme made a substantial difference in the quality and quantity of our sudangrass. We were not able to plant as early as we wanted, but we still got a very "leafy stand".

Our initial application of Vitazyme at 13 oz/acre was at planting in July of 1997. We planted Piper Sudan, a non-hybrid, with which we had better results in the past. We broadcast the seed at a rate of 50 lb/acre and sprayed the Vitazyme on the seed. We then used a spring tooth harrow to cover it with approximately 3/4 to 1 inch of soil and applied water.

Sudan seed germinates quickly, usually in about 3 to 5 days, but with the Vitazyme it gained at least one day. The temperature during this period was about 92 degrees. It appeared that we had a higher percentage of germination than we have had in the past.

Keep in mind we used no commercial fertilizer at all. Very little manure was used and we irrigated every 14 days.

When we baled the sudangrass it was difficult to keep from making the bales too tight. The reason for this was the extremely fine stems and the large amount of leaves.

The end result was **a very high quality feed at an affordable price.** This hay was grown to be fed to our registered Saanen dairy goats. Goats are notorious for being picky eaters, but they eat every bit of this hay.

We feel that the Vitazyme greatly enhanced the quality of this hay, and we would recommend it to anyone who is looking for crop improvement.

Ken Robbins
Madera, CA

Sugar Cane



Location: New Iberia, Louisiana
Variety: LCP 85-384
Soils: variable, from sandy to clayey
Seeding date: mid-December, 1996
Experimental design: A sugar cane field was divided into six strips, representing three alternate replications of two treatments. Each strip was comprised of 12 rows, of which the eight center rows were harvested for the test.



More tillers developed with Vitazyme treatment.

1. Control 2. Vitazyme

Fertility treatments: Starter mix at planting: 18-36-50-18 lb/acre N-P₂O₅-K₂O-S. In April, 120-36-62-20 lb/acre N-P₂O₅-K₂O-S.

Vitazyme treatments: (1) 13 oz/acre on the seed pieces at planting; (2) 13 oz/acre on the soil and leaves at emergence; (3) 13 oz/acre on the leaves and soil at layby (18 to 24-inches height).

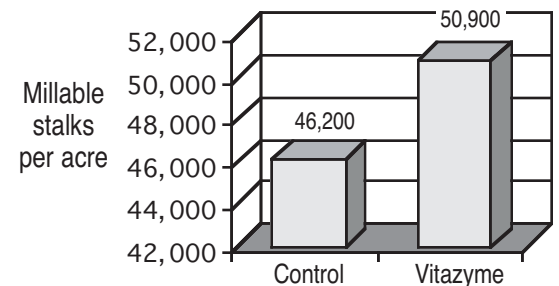
Harvest date: December 9 and 10, 1997

Yield results:

Vitazyme treated sugar cane generally produced more tillers than the control, although treatment differences were less than expected due to the fertile soil of a new planting.

Increase in millable stalks: 10%

Counts were taken on June 27, 1997, by Dr. Jeff Hoy of Louisiana State University, from eight 25-foot sections of row per treatment. Though there was no significant difference at P=0.05 for these differences, the percentage of increase is substantial.



	Control	Vitazyme	Change
Pounds of sugar/acre	7,406	7,430	little

Comments: Usually this sugar cane grower expects little effect from fertilizers the first year of a new planting. The second year more effects should be noted for Vitazyme as well. An apparent increase in the number of millable stalks with Vitazyme did not translate to greater yield in 1997.

Sweet Potatoes



Overall yield was substantially improved (by 65%) with Vitazyme.

Location: St. Kitts, West Indies (Caribbean Agricultural Research and Development Institute)

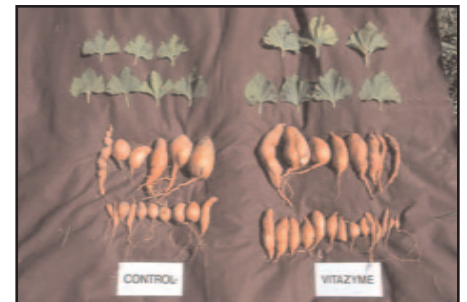
Variety: "Carib" sweet potato

Planting rate: 17,400 plants/acre

Planting date: early November, 1996

Row spacing: 30 in. row spacing, 12 in. in-row

Experimental design: Ten rows of sweet potatoes were planted side-by-side. Half were control rows, and half were treated with Vitazyme. Cuttings (plants) were planted each foot along the rows.



Note the larger plants and excellent tubers for the Vitazyme treatment.

1. Control 2. Vitazyme

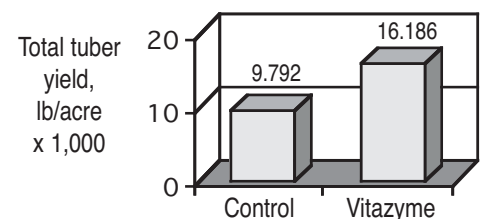
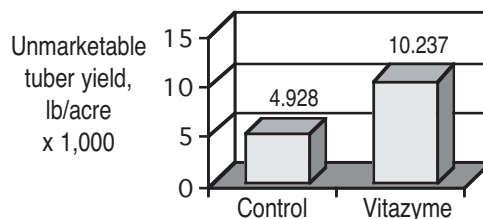
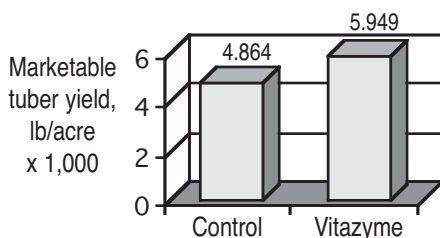
Vitazyme treatments: About 7 days after planting, a solution of Vitazyme (15 cc/gal) was applied over the plants and soil.

Harvest date: February 7, 1997 (about 12 weeks of growth)

Yield results: The figures below show the averages per acre of the several rows grown.

Income results: The value for sweet potatoes in St. Kitts is \$0.56/lb (U.S.) for marketable tubers (human food), and \$0.24/lb (U.S.) unmarketable tubers (animal food).

Comments: Besides improving yield and income, Vitazyme application resulted in considerably less worm borer damage to the tubers in the treated rows. These damage data were not quantified thoroughly enough to present in this report.



• Income increase: \$1,881.64/acre (+48%)

Tomatoes Testimonial

La Jolla Ranch
Firebaugh, California

We applied Vitazyme to an eight-acre section (30 rows) of a 75-acre tomato field. A 40 gallon/acre 10-34-0 preplant fertilizer application was made, and then 12 oz/acre of Vitazyme was added directly to the seeds at planting with a starter, on April 16, 1997. We sidedressed 40 gallons/acre of UN-32, and sprayed Vitazyme over the top in April at 5 oz/acre. These were Heinz 8892 paste tomatoes.

At harvest about September 15 we were unfortunately unable to separate the yield of the Vitazyme section of the field from an adjoining 30-row section that had Kwik-Start (7-21-0), or from any untreated areas of the field. These early tomatoes were used to mix with other tomatoes that had more rot, to improve the overall grade. I would estimate the yield improvement of Vitazyme and Kwik-Start compared to the regular planting as follows:

Vitazyme: 2 to 4 tons/acre (\$100 to \$200/acre)
Kwik-Start: 1 to 2 tons/acre (\$50 to \$100/acre)

Besides the improved yield, the Vitazyme treated tomatoes were **firmer**, had **fewer green fruit**, and were **more uniform in size** than the other parts of the field. We will try more tests with Vitazyme in 1998.

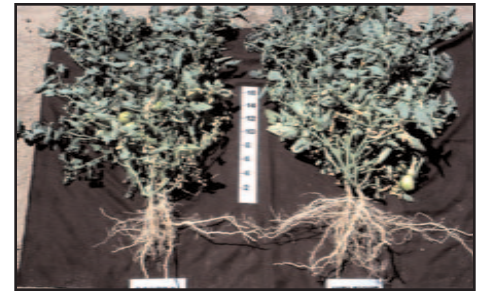
Sincerely,
Ramon Chavez, Jr.

Chlorophyll content of tomato leaves on July 23, 1997 (average of 20 leaves using the SPAD meter):

	North end of field	South end of field
Control	53.2	55.6
Vitazyme	55.5	56.5



The Vitazyme treated tomatoes on the right show more chlorophyll development, greater leafing, and a better stand than the control.

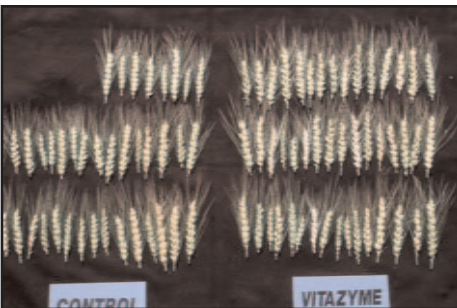


A greater plant size, with better rooting led to greater overall tomato yield with Vitazyme.

Wheat



An advantage for Vitazyme in plant and head size is noticed in this July 15 photo.



This head sample from an equal number of average plants shows the yield difference that was later verified at harvest.

Location: Rushville, New York
Seeding date: October 6, 1996
Variety: Pioneer 2548 winter wheat
Previous crop: native sod
Seeding rate: 2.9 bu/acre
Experimental design: A wheat field was split into two portions, one part of 32 acres receiving Vitazyme and the other part of 43 acres receiving additional nitrogen but no Vitazyme.

1. Control (no Vitazyme)
2. Vitazyme

Fertility treatments: The **control** received 5.4 gal/acre of Nature's 9-18-9 plus 2.6 gal/acre of 0-0-30 (liquid) in the fall at planting, applied directly to the seeds. The **Vitazyme treatment** received only 2.7 gal/acre (50%) of 9-18-9 plus 1.3 gal/acre of 0-0-30 and 0.5 gal/acre of sugar at planting. In the spring, **both treatments** received 60 lb N/acre as a 32% liquid plus 1 lb/acre Solubor.

Vitazyme treatment: The Vitazyme treated portion of the field received 13 oz/acre injected with the fertilizer directly on the seed at planting.

Interseeded crop: Red clover was seeded to all areas, so no herbicides were used.

Harvest date: July 20, 1997

Yield results: Both plots had 13% moisture and 60 lb/bu grain at harvest

• Yield increase: 6%

Income results: The price of wheat was estimated at \$3.50/bu. The 9-18-9 and 0-0-30 fertilizer mix was worth about \$2.50/gal.

• Income increase: \$24.00/acre

