



VITAZYME[®]

1999 Field Trial Results

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

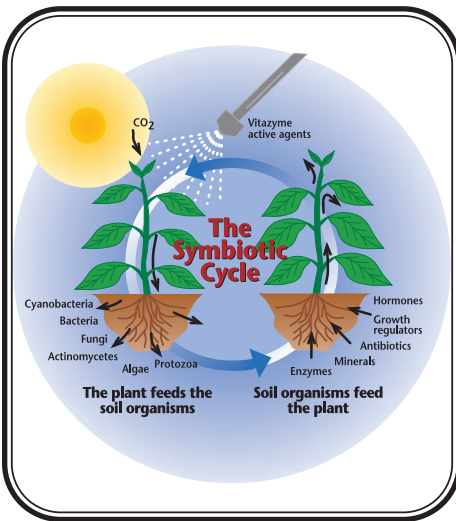
Compiled by Paul W. Syltie, Ph.D., Director of Research
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Gladewater, Texas 75647

The fifth major year of Vitazyme testing has now been completed. Results of many of these trials are summarized in this booklet. As shown in previous editions, results were very good in 1999 as in previous years. Note especially this year the results from germination trials with snap beans and cotton at various Southern and Midwestern universities. Green beans in particular responded well to Vitazyme.

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 ... 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 better,

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.

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% →				

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. 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.

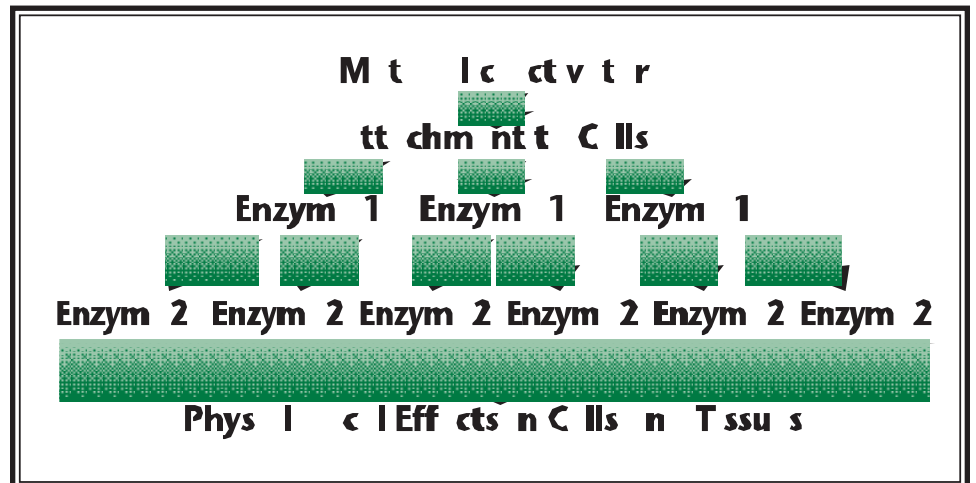
2 Reduce nitrogen fertilizer applications for non-legumes using this test:

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 breakthroughs in 1999

In tests with several Southern and Midwestern Land Grant universities during 1999, Vitazyme proved to be quite effective in stimulating the **germination of snap beans**, and somewhat less so with cotton. Seeds were treated in the Vital Earth laboratory with a dilute solution of regular or sterilized Vitazyme, and sent to various researchers via Dr. William Batson at Mississippi State University. In all cases both products enhanced the survival of plants, at Louisiana State University up to 65% more than the untreated control. The fact that both the regular and sterilized Vitazyme increased seedling survival about the same proves that it is the non-liv-

ing active agents in the product that are stimulating the growth increase.

A number of **cotton studies** were performed this year. Five conducted in west Texas proved that yields can consistently be enhanced by 4 to 32%. The greatest increase was with an organic grower north of Lubbock. A Missouri test proved that cotton lint quality can be improved with Vitazyme -- a stronger, finer fiber -- but such improvements do not always appear. More work needs to be done regarding the conditions necessary to produce a higher quality fiber. At Clemson University, Dr. Ahmad Khalilian proved that a cotton yield increase could be tied to

early-season soil nitrogen increases and enhanced N, P, and K uptake.

Efforts to **improve Vitazyme** are continuing. Plot studies at Iowa State University showed that one particular material has good potential since it significantly outyielded regular Vitazyme at both medium and high nitrogen levels. Results with this new material at other sites were also positive. Any changes in Vitazyme, however, will not be made until thorough studies have been conducted to insure that the new product is superior under all conditions to the original one. It is our commitment to the farmer to give him the very best possible response for his investment.

Alfalfa

Location: Tracy, California

Variety: Yolo

Cutting: fourth

Experimental design: An alfalfa field was divided into two portions, one part treated with Vitazyme and the other part untreated.

1. **Control** 2. **Vitazyme**

Fertilizer treatments: none

Vitazyme application: 13 oz/acre by air to the new growth, shortly after the third cutting had been harvested

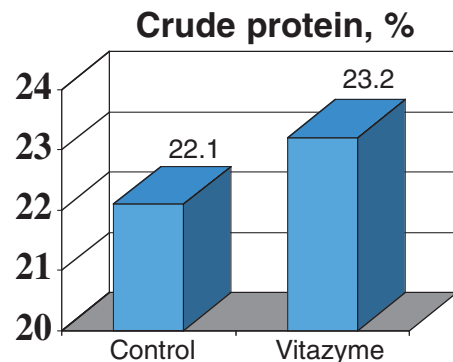


Note how the treated alfalfa is much more growthy than the control plants.

Yield results: None were collected on the fourth cutting.

Quality results: Samples of the two treatments were sent to J.L. Analytical Services, Inc., at Modesto, California, for various quality determinations. All determinations are expressed on a 100% dry basis.

Parameter	Control	Vitazyme
Acid detergent fiber, %	30.6	30.5
Crude protein, %	22.1	23.2
Total digestible nutrients, %	59.4	59.5
Net energy of lactation, Mcal/lb	0.605	0.606



• Crude protein increase: 1.1 percentage points

Barley -- Organic, Testimonial

Location: Olivia, Minnesota

Seeding rate: 3.5 bu/acre

Planting date: April 24 and 25, 1999

Fertilization: None, except a carryover of 2.6 tons/acre poultry litter applied in 1998.

This 79-acre field of barley suffered from serious nitrogen tie-up in the spring due to cool and wet conditions on heavy corn stalk residues. Vitazyme (13 oz/acre) plus molasses (3 gal/acre) had been sprayed over the soil after planting. An additional application of Vitazyme (6 oz/acre), molasses (1 gal/acre), and MgSO₄ (3 lb/acre) was made by air in June to try and alleviate the low chlorophyll and stunted condition of the barley.

During the aerial spraying with Vitazyme, molasses, and MgSO₄ in June, an area of the field along a power line at the edge of the field was not sprayed. This unsprayed area yielded much less than the remainder of the field, although the entire field yielded less than normal due to the nitrogen stress and dry summer conditions. **The sprayed portion of the field yielded about 40 bu/acre, while the unsprayed portion yielded only about 15 bu/acre.** Clearly, the Vitazyme and other nutrients combined to greatly stimulate a recovery of this highly stressed barley crop.

Variety: Logan spring barley

Previous crop: corn

Harvest date: July 25 to 27, 1999



The barley of this study began the season with cold and damp conditions, which tied up soil N. Vitazyme helped trigger N release to recover some of the lost yield.

Biostimulants on Snap Beans

Location: Gladewater, Texas (Vital Earth Resources Research Center)

Variety: bush type of snap beans

Soil type: sandy loam

Harvest date: March 25, 1999

Planting date: February 18, 1999

Pot size: one gallon

Experimental design: Six biostimulants or biostimulant combinations were compared with one another in a randomized complete block design using five replications.

Biostimulant applications: Six treatments were used, as listed below.



In this greenhouse study the Vitazyme treated beans grew taller and had more leaves and dry matter than the control.

Treatment	Rate*
1. Control	---
2. Vitazyme	13 oz/acre
3. Vitazyme + DLM4**	13 oz/acre
4. Vitazyme + AB-17	oz/acre + 32 oz/acre
5. AB-1	64 oz/acre
6. BG-1	13 oz/acre
7. BP-1	13 oz/acre

*13 oz/acre = 50 ml of a 0.02% solution;

64 oz/acre = 50 ml of a 0.1% solution.

** DLM4 was dissolved in Vitazyme before application.

After planting and thorough watering of the soil, the solutions were applied to the pots.

Yield results: The plants were washed thoroughly and dried in a drying oven. Dry weights are as follows.

Treatment	Dry weight, g/pot
4 (Vitazyme + AB-1)	6.5 a (+16%)
6 (BG-1)	5.93 ab (+6%)
2 (Vitazyme)	5.74 b (+3%)
7 (BP-1)	5.73 b (+3%)
5 (AB-1)	5.72 b (+2%)
1 (Control)	5.59 bc ---
3 (Vitazyme + DLM4)	5.04 c (-10%)

Biostimulants on Snap Beans

Southern Regional Project S-269: Regional Evaluation of Biological Seed Treatments

Coordinator: William Batson, Ph.D., Mississippi State University, Mississippi State, Mississippi

Researchers: Craig Rothrock, Ph.D., University of Arkansas, Fayetteville, Arkansas

Don Sumner, Ph.D., University of Georgia, Tifton, Georgia

Don Huber, Ph.D., Purdue University, West Lafayette, Indiana

Ray Schneider, Ph.D., Louisiana State University, Baton Rouge, Louisiana

William Batson, Ph.D., Mississippi State University, Mississippi State, Mississippi

Mike Benson, Ph.D., North Carolina State University, Raleigh, North Carolina

Anthony Keinath, Ph.D., Clemson University, Charleston, South Carolina

Bonney Ownley, Ph.D., and Melvin Newman, Ph.D., University of Tennessee, Knoxville, Tennessee

Phil Brannen, Ph.D., Gustafson, Plano, Texas

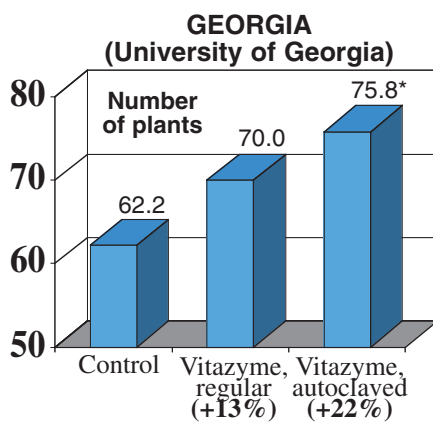
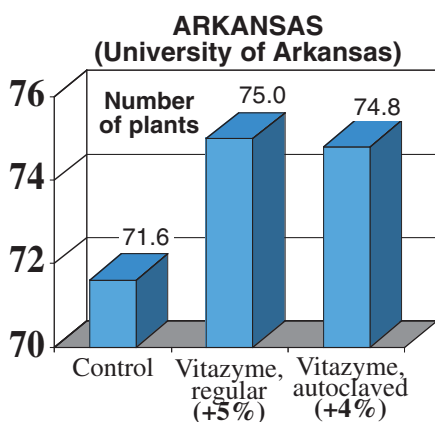
Experimental design: Two lots of a snap bean variety (2,500 grams in each) were sent to Vital Earth Resources from Dr. Batson, for treatment with Vitazyme. The two treatments were as follows:

(1) Lot 1. **Regular Vitazyme** (10%), with seeds soaked for five minutes and then air dried.

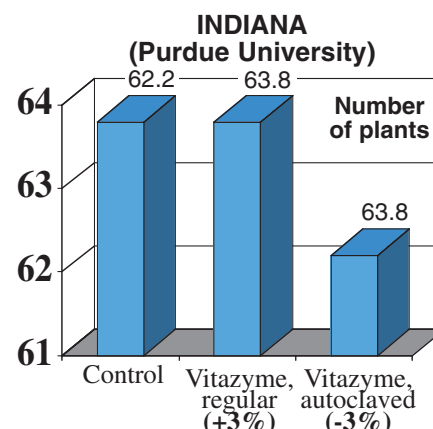
(2) Lot 2. **Autoclaved Vitazyme** (10%), with seeds soaked for five minutes and then air dried. [The Vitazyme was autoclaved at 15 lb/in² pressure for 15 minutes at 121°C, and autoclaved again one day later.] All beakers and items were sterilized with 3% H₂O₂ before using the autoclaved product. These seeds were returned to Dr. Batson in Mississippi and sent to the researchers for growth studies at the various stations. The seeds were planted in the field in 30 to 40-foot rows, and populations were determined after 28 days of growth. Final stand counts were used to determine the effectiveness of the product to enhance seed germination compared to other products and the control.

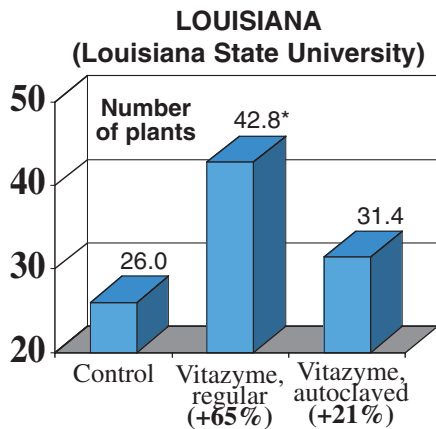
Results:

Final Stand

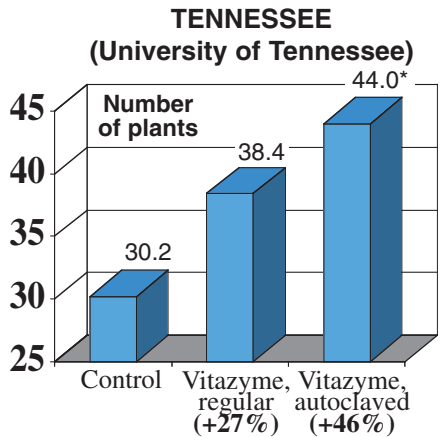
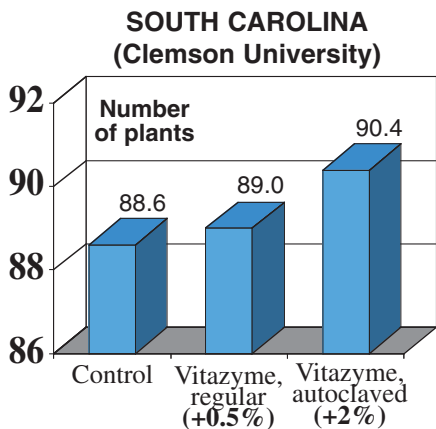
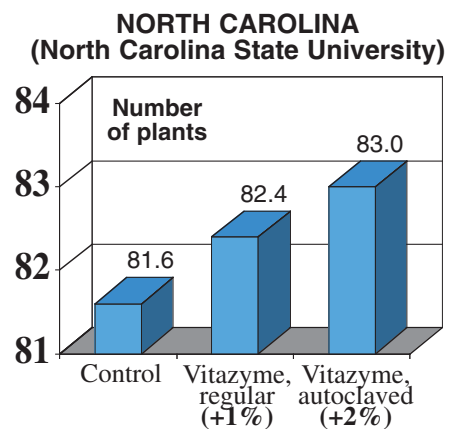
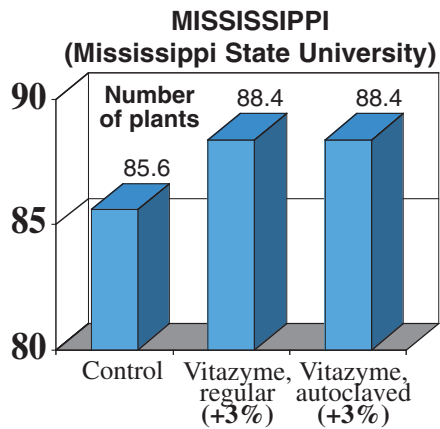


*Significantly greater than the control at P=0.06.

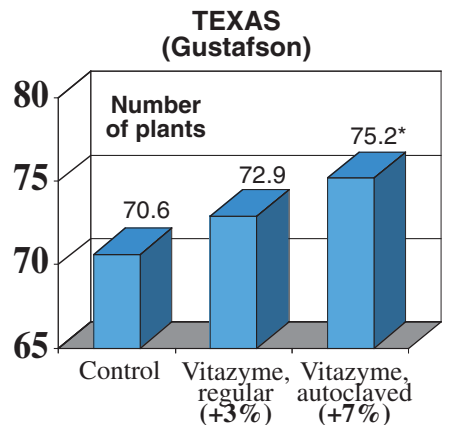




*Significantly greater than the control at P=0.05.



*Significantly greater than the control at P=0.07.



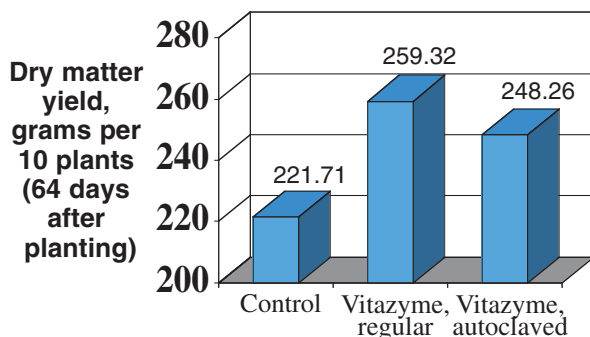
*Significantly greater than the control at P=0.1.

- Average snap bean stand increase with regular Vitazyme (9 sites): 13%
- Average snap bean stand increase with autoclaved Vitazyme (9 sites): 12%

Dry Matter Yield

MISSISSIPPI STATE UNIVERSITY

- Dry matter increase, regular Vitazyme: 17%
- Dry matter increase, autoclaved Vitazyme: 12%



Conclusions: Vitazyme responded similarly whether regular or autoclaved, proving that the active agents of the product are not living organisms but organic or inorganic activators within the solution.

Vitazyme increased the final stand of beans in nearly all of the nine locations in this study; some increases were significant. This shows that fungal and other soilborne diseases were being suppressed by Vitazyme so fewer seedlings fell prey to fungal and other diseases. The dry matter of the beans at 64 days after planting also was considerably higher (12 and 17%) with Vitazyme than with the control treatment.

Lima Beans

Location: Tracy, California

Soil type: sandy loam

Row spacing: 30 inches

Harvest date: October 15, 1999

Experimental design: A lima bean field was divided into a Vitazyme treated and untreated area.

Variety: baby limas, var. Luna

Previous crop: tomatoes

Planting date: June 20, 1999

1. Control

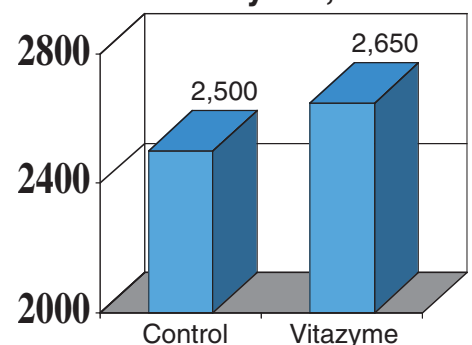
Fertilizer treatments: unknown

Vitazyme application: 13 oz/acre by air at early bloom, and again 21 days later.

Income increase: A bean price of \$0.40/lb is estimated.

2. Vitazyme

Bean yield, lb/acre



- Yield increase: 6%
- Income increase: \$60.00/acre

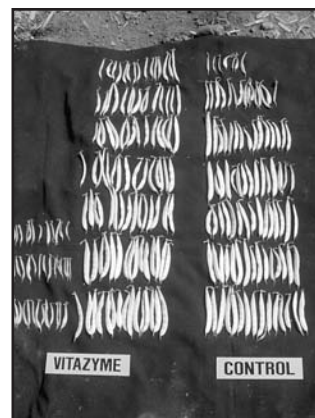
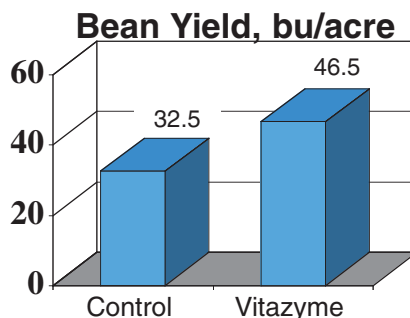
Black Turtle Beans



Vitazyme produced taller, leafier plants having more pods which contained larger beans in this Dansville, New York, study.

Location: Dansville, New York
Row spacing: 30 inches
Harvest date: October 23, 1999
Experimental design:
 A level, uniform field was divided into four strips (about 10 acres each) treated with different products, one of which was Vitazyme. An untreated control was also maintained.

Variety: black turtle soup beans
Planting date: June 5, 1999



Notice that the Vitazyme treated plants of this New York study produced considerably more pods versus the control.

1. Control (no Vitazyme)

2. Vitazyme

Fertilizer treatments: 200 lb/acre KCl broadcast preplant; 350 lb/acre 7-28-9 at planting
Vitazyme application: Vitazyme at 13 oz/acre was sprayed over the leaves and soil just before blossom on July 21, 1999.

Income increase: Bean value: \$9.00/bu (\$0.15/lb); see the figure below.

Comments: The Vitazyme treated beans were larger than those of the control. There was more white mold with the Vitazyme treatment.

• Yield increase: 43%

• Income increase: \$126.00/acre

Soybeans

Location: Humboldt County, Iowa
Planting date: May 25, 1999
Tillage: conventional

Variety: Pioneer 92B91
Harvest date: October 7, 1999
Seeding rate: 175,000 seeds/acre

Previous crop: soybeans
Row width: 30 inches



Vitazyme produced excellent chlorophyll levels and leaf size in this soybean study. The product nearly always improves the leaf chlorophyll content.

Experimental design: A soybean field was divided into two parts, one of which was treated with Vitazyme.

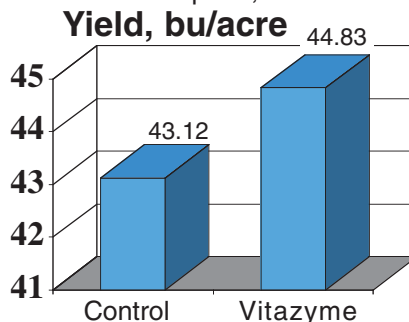
1. Control (no Vitazyme)

2. Vitazyme

Fertility treatments: none; chicken manure at three tons/acre in 1997

Vitazyme applications: 13 oz/acre preplant incorporated to 2 inches with Treflan herbicide
Yield results: Vitazyme area harvested = 1.229 acres; control area harvested = 1.471 acres.

Income results: Soybean price = \$5.50/bu
Comments: Although the increased income was only \$9.41/acre, this increase was significant. The cost of Vitazyme is less than \$5.00/acre.



• Income increase with Vitazyme: \$9.41/acre

Soybeans

Location: Leicester, New York
Planting date: May 17, 1999
Seeding rate: 190,000/acre (30-inch rows)

Variety: APK 190 (Roundup Ready)
Harvest date: November 5, 1999

Supervisor: Harold Upton, Agway Inc.
Soil type: gravelly loam

Experimental design: An 18-acre field was split into two equal parts, one half receiving Vitazyme and the other half receiving no treatment. At harvest, 0.7 acre was harvested from the treated side and 0.9 acre from the control side.

1. Control

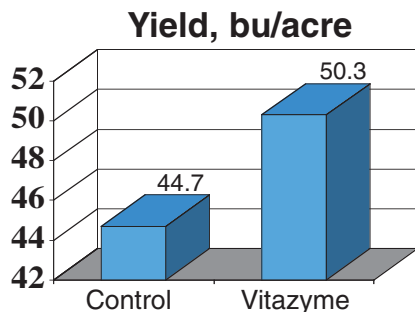
2. Vitazyme

Fertility treatments: 225 lb/acre 7-20-28 % N-P₂O₅-K₂O, 0.35 lb/acre Mn, and 0.35 lb/acre Zn applied preplant

Vitazyme treatment: 13 oz/acre sprayed on the leaves and soil at early bloom

Income increase: A price of \$5.50/bu is estimated.

Comments: In spite of a hot and dry summer the soybean yield increase with Vitazyme was substantial, amounting to \$30.80/acre at a price of \$5.50/bu for soybeans. Mr. Smucker commented, "I don't know what that stuff is, but next year I want to use a lot of it." Within a few days of applying Vitazyme the sprayed leaves turned darker green compared to the control soybean leaves.



• Yield increase: 13%

• Income increase: \$30.80/acre

Soybeans

Location: all tests at Wellman, Iowa
Fertility treatments: none for all tests

Tillage method: all tests no-till

Row width: 7 inches for all tests

Test 1

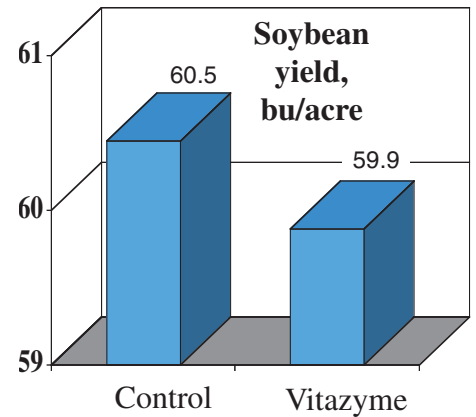
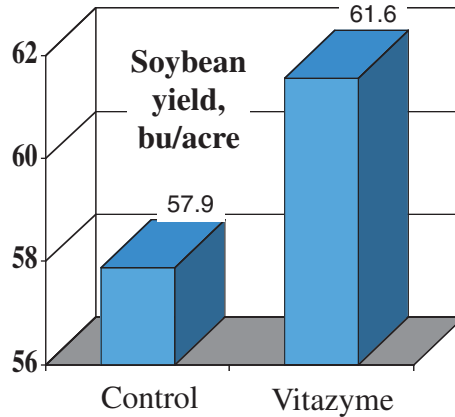
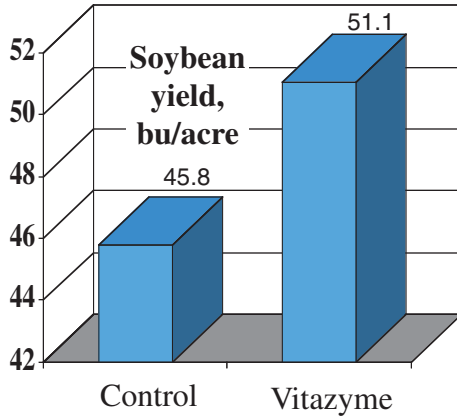
Farmer: Lynn Pope
Planting date: May 4
Planting rate: 240,000
Vitazyme trt.: 3 oz/acre on seeds, 13 oz at early bloom

Test 2

Farmer: Brent Yoder
Planting date: May 5
Planting rate: 230,000
Vitazyme trt.: 5 oz/acre on seeds, 13 oz at early bloom

Test 3

Farmer: Dennis Miller
Planting date: April 26
Planting rate: 230,000
Vitazyme trt.: 5 oz/acre on seeds, 13 oz at early bloom

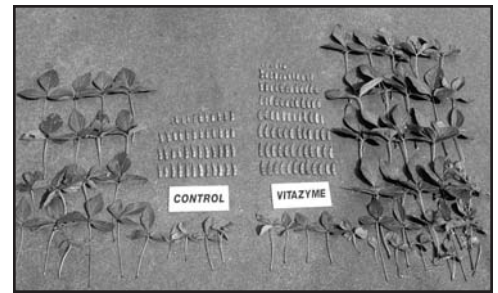


- **Average yield increase: 5%**
- **Average income increase: \$15.40/acre***

*Based on a 2.8 bu/acre increase, and \$5.50/bushel



More pods from larger more leafy stems resulted in this Wellman, Iowa, Vitazyme test.



In southeastern Iowa the leaf area, leaf size, pod number, and chlorophyll levels were all increased with Vitazyme.

Cabbage

Observations -- Caribbean Chemical International

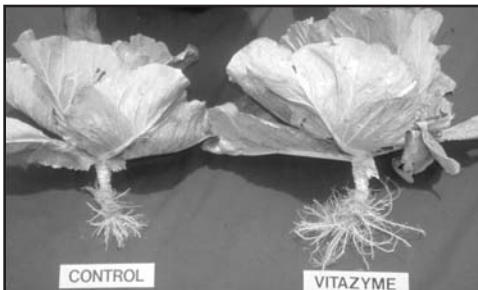
Location: Trinidad, West Indies
Planting date: Spring, 1999

Variety: Salvation
Harvest date: unknown

Experimental design: Two Vitazyme spray rates -- 15 and 30 ml/gal -- were used to treat cabbage in a field.

1. 15 ml/gal, foliar and soil sprayed
2. 30 ml/gal, foliar and soil sprayed

Fertility treatments: equal for all areas



Larger leaves, heads, and roots resulted from a 1% Vitazyme application in this Trinidad study.

Vitazyme treatments: Two rates of Vitazyme were used, at 15 and 30 ml/gallon (about 0.5 and 1 oz/gal, or 0.5 and 1%), with about 4 gallons of each sprayed on 500 to 600 plants at 11 days after transplanting. Enough product was applied to run off the leaves into the root zone soil. A second application was made about 30 days after transplanting.

Growth results: Although no yield checks were made, growth observations were made during the growing season. No differences in the treatments were noted until about 45 days after planting. After that time the Vitazyme treated plants at 30 ml/gal revealed the following advantages over the untreated control and the 15 ml/gal rate:

1. Much thicker and larger leaves
2. Much larger heads at harvest
3. A greater root system, especially more fine roots

The 15 ml/gal spray rate did not improve cabbage growth above the control treatment.

Cabbage and Broccoli -- a Greenhouse Study

Location: Gladewater, Texas (Vital Earth Resources Research Center)

Varieties: Mammoth Red Rock cabbage, Green Acre cabbage, Green Sprouting Calabrese broccoli

Seeding date: January 13, 1999 Pot size: four-inch

Potting media: Mini-Pot Mix potting soil from Vital Earth Resources (fine pine bark, compost, sand, and minerals).

Experimental design: Two flats of 20 pots each were seeded for each variety. Two seeds were planted per pot, and thinned to one plant after germination. One flat of each variety was treated with Vitazyme at planting, and the other flat was left untreated (control). Height measurements were made for each plant on February 15, 1999, 33 days after planting.

Vitazyme treatments: Just after seeding, 10 ml of a 0.01% Vitazyme solution were added to each four-inch pot for appropriate flats.

Growth results: Average plant height:



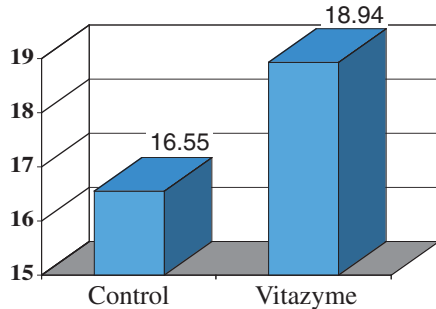
This greenhouse study produced a clear growth benefit for Vitazyme with cabbages.

	<u>Red Cabbage</u>
Control	16.55 cm
Vitazyme	18.94 cm
Increase	+ 14%

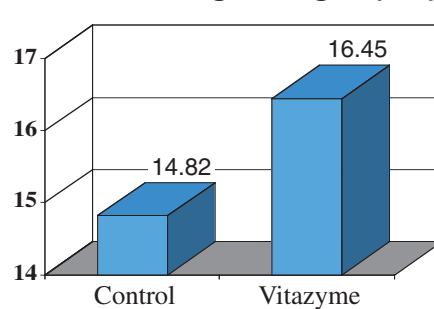
	<u>Green Cabbage</u>
Control	14.82 cm
Vitazyme	16.45 cm
Increase	+ 11%

	<u>Broccoli</u>
Control	21.76 cm
Vitazyme	23.76 cm
Increase	+ 9%

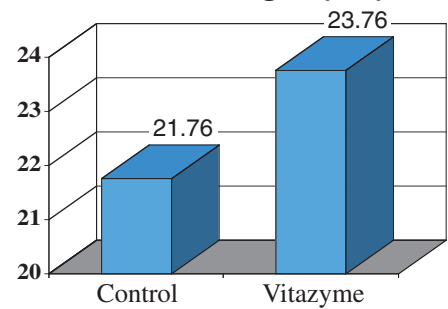
Red Cabbage, height (cm)



Green Cabbage, height (cm)



Broccoli, height (cm)



Comments: For all three varieties there was a significant aphid population on the controls, but no detectable aphids on the Vitazyme treated plants. Apparently the leaf composition of the treated plants provided some insect repellence, perhaps due to fewer free amino acids and/or higher sugar levels, either of which will suppress the activity of sucking insects.

Cabbage -- Caribbean Chemical International

Location: Trinidad, West Indies Variety: Tropicana Planting date: April 4 1999

Harvest date: June 5, 1999 (62 days after transplanting)

Experimental design: Three farmers' plots were divided to include a section that was treated with a particular concentration of Vitazyme. About 250 plants were in each treated area.

1. Vitazyme at 15 ml/gal with a foliar/soil spray
2. Vitazyme at 20 ml/gal with a foliar/soil spray
3. Vitazyme at 30 ml/gal with a foliar/soil spray

Fertility treatments: equal for all areas

Vitazyme treatments: The three rates of Vitazyme were prepared at 15, 20, and 30 ml/gal (about 0.5, 0.7, and 1.0 oz/gal, or 0.5, 0.75, and 1.0%) and sprayed on the plants and soil at transplanting (April 4, 1999), and again 2.5 weeks later (April 23, 1999). The spray was directed over the root zone.

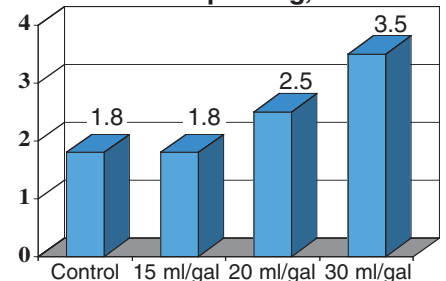
Fungicide treatments: Fungicides were applied heavily to suppress pepper leaf spot during active growth.

Growth and yield results: **28 days after the transplanting**

Parameter	Control	15 ml/gal	20 ml/gal	30 ml/gal
Leaves	Small	Small	Medium	Large
Color	Light green	Light green	Dark green	Dark green
Vigor	Poor	Poor	Medium	High
Stems	Medium	Medium	Thick	Thick
Roots	Poor roots	Medium roots	Good roots	Large tap roots, many fibrous roots
Heads	None	None	10% forming heads	50% forming heads
Pepper spot	50% infected	50% infected	20% infected	5% infected
Uniformity	50% uniform	50% uniform	80% uniform	90% uniform

heads of 0.25 to 0.5 lb in a short time, unlike the other treatments. The farmer wishes to use Vitazyme on his crops during the coming months.

Head weight 62 days after transplanting, lb



Comments:

- (1) Peppery leaf spot reduced the growth and head size of infected plants substantially.
- (2) A lack of water at critical times hurt yields.
- (3) The 30 ml/gal application rate was the best of the three in terms of marketable yield.
- (4) After harvest the 30 ml/gal treatment sprouted vigorous lateral buds that produced

• Increase in head weight with 30 ml/gal: 94%

Cabbage

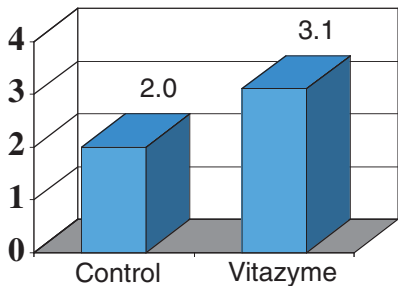
Caribbean Chemical International



This picture accurately captures the advantage Vitazyme gave to cabbages for increased leaf and head size in this Caribbean study.

weight on November 30. By November slightly more advanced with Vitazyme.

Nov. 30: Head weight, lb



Location: Paramin, Trinidad, West Indies
Transplanting date: September 21, 1999
Experimental design: A cabbage field was divided into two parts, one portion treated with Vitazyme and the other left untreated.

1. Control 2. Vitazyme

Fertilizer treatments: 8 and 35 days after transplanting toppedressed with 15 g/plant 20-10-10% N-P₂O₅-K₂O

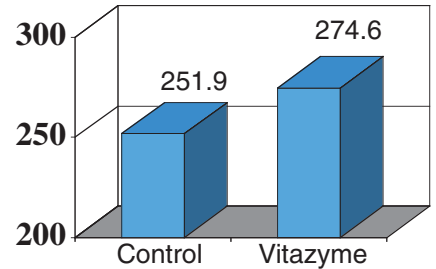
Vitazyme application: A 1% Vitazyme solution was sprayed on the leaves and soil on October 5 and 24, 1999.

Growth results: Ten representative heads were evaluated from each treatment on each date, and five representative heads were weighed from each treatment for head weight on November 30. By November 10 there was no major color difference between treatments. Head formation was slightly more advanced with Vitazyme. By harvest time (November 30) the Vitazyme treated cabbages were **much larger** than the control cabbages. There was also substantially **more root mass** with Vitazyme treatment, and the heads were **visibly "tighter."**

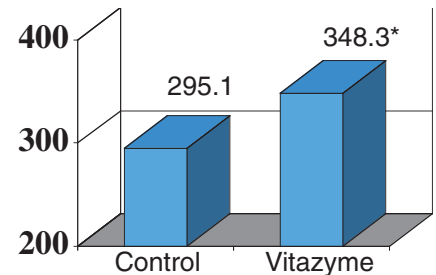
- **Head area increase: 9%**
- **Head size increase: 9%**
- **Head weight increase: 55%**

Variety: Salvation
Harvest date: November 30, 1999

Nov. 10: Head area, cm²



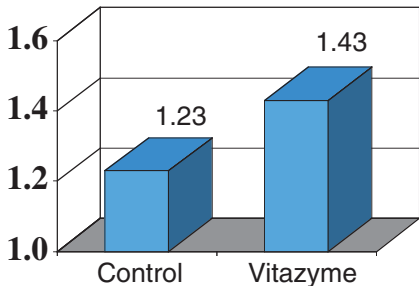
Nov. 30: Head area, cm²



*Significantly greater than the control at p=0.03.

Canola

Canola yield, tonnes/acre



- **Yield increase: 16%**
- **Income increase: \$50.88/acre**

Location: North Yorkshire, England
Variety: Martina (a high uric acid industrial oil variety)
Planting date: unknown Harvest date: unknown
Soil type: sandy clay loam
Experimental design: A canola field was divided into two parts, one treated with Vitazyme and the "Eco-Ag" System and the other left untreated.

1. Control 2. Vitazyme + Eco-Ag products

Fertility treatments: no P or K and reduced N fertilizer
Vitazyme applications: Vitazyme was applied at recommended rates with other Eco-Ag products.



Canola responds excellently and consistently to Vitazyme, often increasing yield more than the 16% achieved here.

Studies in England show excellent responses from Vitazyme

Several studies in England the last few years have proven how effective Vitazyme can work even in the cool, humid conditions of that country. Notice the test above on canola that produced a 16% yield increase using Vitazyme together with the Eco-Ag program of Eco-Ag Ltd, Norfolk, England. Also, on page 22, Vitazyme along with the Eco-Ag program helped to produce a 31% seed yield increase for seed potatoes in North Yorkshire.

Yet another test in Kent with Equinox soft winter wheat, on a sandy loam soil, compared Vitazyme, Eco-Ag products, and a 10% nitrogen reduction with the conventional program. The grain increase was 25% -- from 4.1 (control) to 5.1 tonnes/acre -- with Vitazyme and the Eco-Ag Program. This increase amounted to an increase in income of \$111.30/acre. As a result, the farmer will be using Vitazyme and the Eco-Ag System on all of his land in the year 2000. The farmer also noticed a benefit to soil structure and available plant nutrients with the program.



This winter wheat crop treated with Vitazyme performed very well.

Chinese Specialty Crops and Melons

A Testimonial

Farmer: Hiang Hwa "Steve" Lee

Location: Thermal, California, near the Salton Sea

Soil conditions: high salts (Electrical Conductivity[E.C.] of 3.0 to 5.0)

Area farmed: just under 100 acres

Steve Lee has used Vitazyme on specialty Chinese vegetables and melons for two years, with excellent results. Together with biological ViTech products, supplied by Kumen Meservy of Modesto, California, the soil salt levels have been maintained at an excellent 0.3 to 0.5 E.C. level. This low salt level has been a key factor to his high yields and quality.

Vitazyme was introduced into his program with some hesitation, since he already considered his program to be perfected. Results with his crops are as follows.

Melons

- The plants are greener.
- There is less fungal disease affecting the veins and leaves. The fungus normally infects the crop just before harvest, leading to soft melons having an off-flavor.

The yields and quality of the melon crop are enhanced,

Soil Program: ViBasic fertilizer + Vitazyme

Leaf Program: *Four to six leaves.* Vigorator 12-8-4 with biostimulant factors (1qt/acre) + Vitazyme (13 oz/acre)

Prebloom. ViBurst (1qt/acre)+ Fish (2 qt/acre) + Vitazyme (13 oz/acre)

Melon fill. ViFinisher with calcium (40 oz/acre) + Vitazyme (13 oz/acre)

with less nitrogen required.

With this program we get a more "balanced flavor" melon. They ship all over the United States and Canada to a "choosy" clientele, and Vitazyme has added a better quality dimension to an excellent melon program.

Root Crops

- The leaves are larger and greener.
 - The roots are of superior quality.
- Several varieties of radishes and dicons respond very well to Vitazyme.

Soil Program: *Thirty to 40 days before ground preparation.* ViClout (2 to 4 qt/acre) to prevent nematode damage. The entire root zone is treated, which in the case of the dicons is up to 30 inches deep.

At planting. ViClout (2 qt/acre) + fertilizer + Vitazyme (13 oz/acre)

Four to six leaves. Vigorator 12-8-4 (1 qt/acre) + Vitazyme (13 oz/acre). Sometimes the Vitazyme rate is cut in half and applied every two weeks, rather than 13 oz/acre every 30 days.

The root crop leaves are large, healthy, and "fresh green" looking, which is very important because the leaf helps sell the root to the Chinese people who use all of the plant in cooking. The roots are superior in flavor and quality! We are growing a crop that many others grow in the Thermal area, but ours stand out in the markets.

We can only sell our quality. **We believed that we had an excellent program that could not be improved, but Vitazyme has made it even better!** Vitazyme has also "evened out" rough conditions. People think that sunny California has few problems, but we have frost and temperatures down to the mid-teens that cause great "crop quality stress." **We believe Vitazyme makes a difference. We always use it. Always.**

Leaf Crops

We sell fresh, green, beautiful leaf produce. Vitazyme truly makes a difference. The soil and leaf programs are about the same as for the root crops.

Corn

Location: Geneseo, New York

Variety: unknown **Planting date:** unknown **Harvest date:** November 10, 1999

Experimental design: A large field was divided, with part treated with Vitazyme and part left untreated. Yields were determined by harvesting a 15-ft wide strip that was 254 to 768 feet long for each treatment.

1. Control

Fertility treatments: unknown

Vitazyme treatment: 13 oz/acre at planting

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

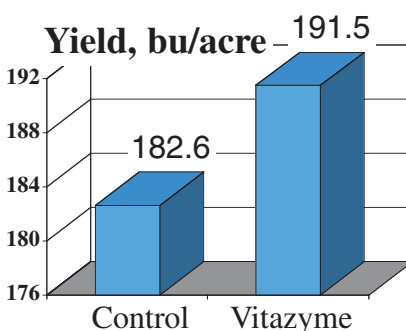
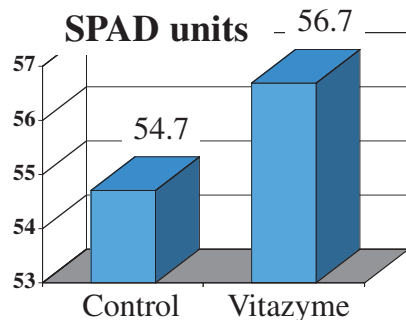
Income increase: Estimated price = \$2.50/bu

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

2. Vitazyme



Corn treated with Vitazyme (right) in this Geneseo, New York, test displays better overall root mass and root hairs.

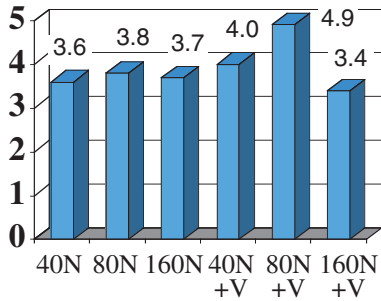


- **Yield increase: 5%**
- **Income increase: \$22.50/acre**

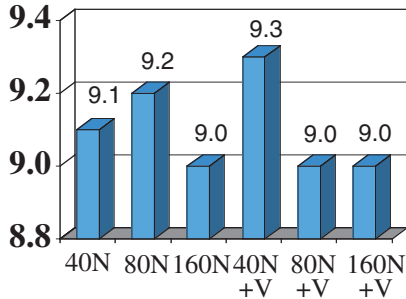
Sweet Corn

The University of Tennessee

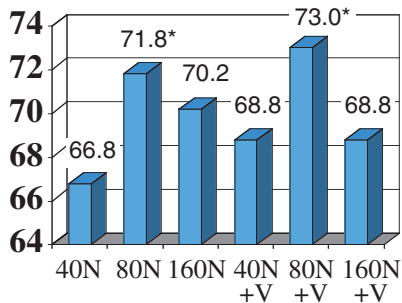
Marketable ears, ton/acre



Marketable ear wt, oz/ear



Plant height, in



*Significantly greater than the control at P=0.05.

Researchers: Charles A. Mullins and Allen Straw

Location: The University of Tennessee Plateau Experiment Station, Crossville, Tennessee

Variety: Silver King **Row spacing:** 30 inches

Planting date: May 25, 1999

Harvest date: August 16, 1999

Soil preparation: conventional tillage

Experimental design: A plot design with 20-foot plots, four rows wide (0.00459 acre), was used over four replications in a split-plot design. Three nitrogen rates were used, the nitrogen rates in the main plots and Vitazyme in the sub-plots. Six treatments were used:

1. Low nitrogen
2. Medium nitrogen
3. High nitrogen
4. Low nitrogen + Vitazyme
5. Medium nitrogen + Vitazyme
6. High nitrogen + Vitazyme

Fertilizer treatments: 100 lb/acre of P₂O₅ and K₂O broadcast over all plots before final disking; 40, 80, and 160 lb of N/acre broadcast on appropriate plots before disking

Vitazyme applications: Seeds for Vitazyme plots were soaked in a 5% Vitazyme solution for one hour, and air dried before planting. Vitazyme was foliar sprayed twice at 13 oz/acre, on July 6 and July 19.

Weed control: Bicep II (atrazine and metolachlor) at 2 qt/acre preemergent on May 28

Insect control: thiodicarb (Larvin), esfenvalerate (Asana), and lambda-cyhalothrin (Karate) at recommended rates on July 20, 23, and 26, and August 6, 11, and 14

Conclusions: Vitazyme caused several favorable effects in this sweet corn study:

Marketable and cull ears

1. The largest yield was produced by a moderate N level (80 lb/acre) plus Vitazyme, which was 1.1 tons/acre more than its control.

2. At the low N level (40 lb/acre), Vitazyme increased sweet corn yield by 0.4 ton per acre. [These results confirm the normal effect of Vitazyme to increase nitrogen availability to a crop when N is somewhat limiting (as 40 and 80 lb N/acre), while Vitazyme may cause nitrogen excess at high N levels (160 lb/acre), thus limiting the yield response somewhat.]

3. Ear weight was greatest with 80 lb N/acre, and especially with Vitazyme (9.3 oz/ear). The high N rate gave the smallest ear size.

4. The fewest cull ears were produced at the 80 lb/acre rate both with and without Vitazyme.

Growth parameters

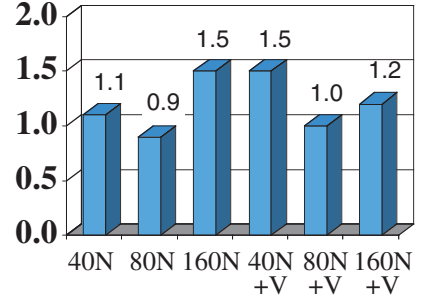
1. The tallest plants were raised by 80 lb N/acre plus Vitazyme.

2. The thickest stalks were produced by the 160 lb N/acre rate, with or without Vitazyme.

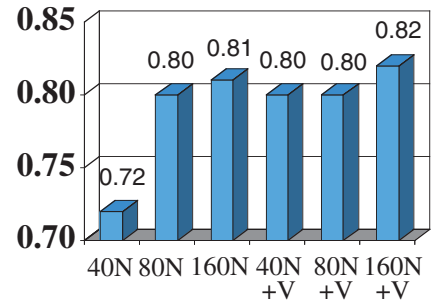
3. The most plants per plot were produced by the 80 lb N/acre rate plus Vitazyme.

This site was very fertile and did not reveal nitrogen and Vitazyme effects as well as would a less fertile site. Nonetheless, Vitazyme produced good responses in the study, especially at the 80 lb/acre rate.

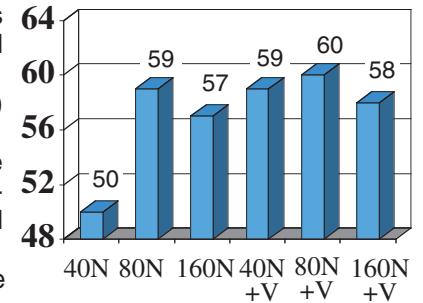
Cull ears, tons/acre



Stalk diameter, in



Plants per plot (40 ft)



• Increase in marketable ears: 29%

Did You Know ...

Vitazyme can increase the yields of any crop by up to 25% or more if nitrogen is somewhat limiting, essential nutrients such as phosphorus, calcium, and magnesium are present in adequate amounts and proportions, and there is no serious root barrier. At the same time, crop quality is enhanced. Over several months Vitazyme will help break up hardpan conditions as it also encourages the development of strong structural units (from microbial polysaccharides and glues) and helps build soil organic matter.

Sweet Corn -- Organic

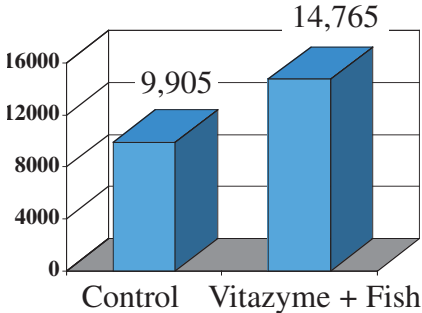
Grower: Klaas Martens
Variety: Ice Queen (SH2)
Previous crop: alfalfa

Location: Penn Yan, New York
Seeding rate: 20,000 seeds/acre
Soil fertility levels: low organic matter and cation exchange capacity

Seeding date: June 2, 1999
Soil type: Honeoye fine sandy loam

Experimental design: A sweet corn field that had been previously farmed intensively by conventional methods received five strip treatments of several rows each along one side of the field. They were as follows:

Sweet corn yield, lb/acre



Strip 1.....Control
 Strip 2.....Fish
 Strip 3.....Control

Strip 4.....Vitazyme + Fish
 Strip 5.....Vitazyme + Fish + Homeopathic treatment

Fertility treatments: A 1,000 lb/acre application of chicken manure (quite salty), with a 2-4-3 % N-P₂O₅-K₂O analysis, was made on the alfalfa field in August of 1998. The field was treated with 350 lb/acre of a custom blended Fertrell product having 4-4-4 % N-P₂O₅-K₂O, comprised of one-third gypsum and two-thirds compost and various minerals, especially zinc and boron. The alfalfa regrowth and fertilizers were then plowed down on May 3, 1999.

Vitazyme and fish applications: Vitazyme at 13 oz/acre was foliar applied to Treatments 4 and 5 on July 7, about 35 days after planting. Liquefied fish at 2 qt/acre was applied to Treatments 2, 4, and 5 at the same time and with Vitazyme in the foliar spray, while a homeopathic treatment at 2 oz/acre was added to the fish and Vitazyme

of Treatment 5 on the same date.

Harvest date: August 27, 1999

Income results: sweet corn price estimate: \$100.00/ton

• **Yield increase: 49%**

• **Income increase: \$487.87/acre**

Comments: Weather during the study was very dry and hot, with only 3 inches of rain for all of May, June, and July. Two crop-saving rains fell on August 8 and 20. Temperatures were oftentimes from 90 to 95 °F during July and August.

The Vitazyme plus fish treatment gave by far the heaviest yield of the five treatments. The harvester operator stopped while in this treatment and asked what had been done to that strip. The average of the entire field was 10,400 lb/acre of sweet corn delivered to the plant.

Treatment	Grain yield, lb/acre	Yield increase
1. Strip 1 (no Vitazyme)	10,307*	--
2. Strip 2 (fish)	10,438**	Unknown
3. Strip 3 (no Vitazyme)	9,503*	--
4. Strip 4 (Vitazyme + fish)	14,765	+49%
5. Strip 5 (4 + homeopathic)	10,471	+5%

* Average of the two controls: 9,905 lb/acre.
 ** This yield was seriously underestimated because of low air pressure in the wagon tires, which caused the tires to rest somewhat on the ground next to the scale. The estimated weight is 500 to 1,000 lb/acre higher than shown here.

Corn



Notice the dramatically greater size of the root system, leaves, and stalks of the Vitazyme treated corn. Note also the higher chlorophyll level of the leaves.

Location: Shortsville, New York Variety: Pioneer 3573 Planting date: May 4, 1999
Population: 30,000 seeds/acre planted, 28,000 plants/acre final

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

1. **Control:** 100% starter

2. **Vitazyme + 50% starter**

Fertility treatments: All areas of the field received a broadcast application of 100 lb/acre (NH₄)₂SO₄ (21%N) + Boron + Copper, 500 lb/acre EnviroSoil (composted sewage sludge mixed with high-calcium lime), 32 gal/acre 30% UAN, and 1 gal/acre liquid Canitrate. At planting the control received 10 gal/acre of 3-18-18 (\$3.25/gal = \$32.50/acre), while the Vitazyme treated area received 5 gal/acre of 3-18-18 (\$16.25/acre). Total N per acre for the broadcast fertilizer was 107 lb/acre, excluding the compost, for the control, and 106 lb/acre for the Vitazyme treatment.

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

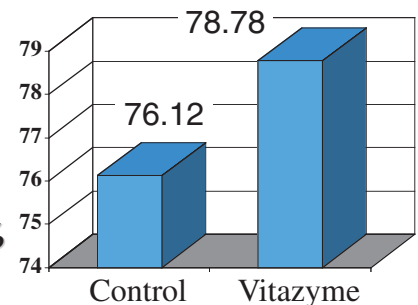
Weather conditions: very dry season-long
Income results: Corn is priced at \$2.00/bu.

• **Yield increase (50% fert.): 3.5%**

• **Income increase: \$17.67/acre**

• **Test weight increase: 0.5 lb/bu**

Yield, bu/acre



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

Corn -- Organic

Location: Olivia, Minnesota

Maturity: 102 days

Row spacing: 30 inch

Planting date: April 24, 1999

Experimental design: A 222 acre field was treated with Vitazyme and molasses on 217 acres at planting; about 5 acres served as a control.

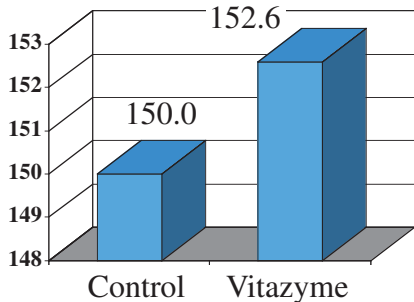
Variety: Enestvedts 670

Population: 31,700 at planting

Previous crop: soybeans

Harvest date: October 19, 1999

Corn grain, bu/acre



1. Control 2. Vitazyme

Fertility treatments: All areas received 3 tons/acre of poultry litter in March. At planting 2 gallons/acre of molasses were applied to the seed row.

Vitazyme application: 13 oz/acre mixed with molasses, on the seeds at planting.

Income results: Price = \$2.60/bu for organic corn

Comments: The weather was very cold and wet in May, and then progressively warmer and drier through the summer.



A more extensive rhizosphere resulted from Vitazyme application directly on corn seed in this Olivia, Minnesota, study.

• Income increase: \$6.76/acre

Cotton -- a Quality Evaluation

Location: Parma, Missouri

Seeding rate: 14 lb/acre

Experimental design: A field of 30 acres was divided into eight equal strips, four treated with Vitazyme and four untreated.

Variety: Stoneville 373

Row spacing: 38 inches

Planting date: May 13, 1999

Previous crop: corn

1. Control 2. Vitazyme

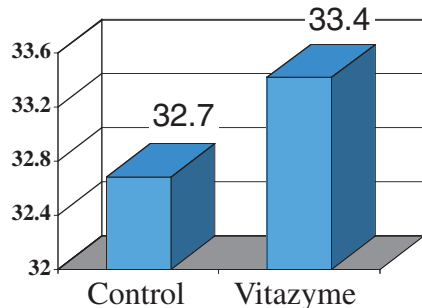
Fertility treatments: nitrogen, 100 lb/acre; phosphate, 40 lb/acre; potash, 60 lb/acre

Vitazyme treatment: (1) 13 oz/acre sprayed over the row in a 19-inch band with preemergent chemicals; (2) 13 oz/acre over the leaves at early bloom.

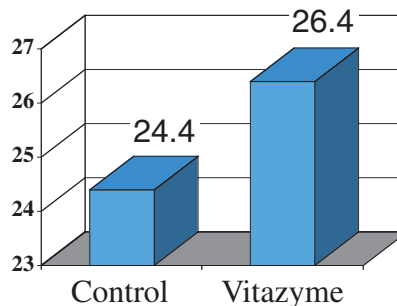
Yield results: No significant difference in yield was evident between the two treatments, even though the Vitazyme treatment yielded more than the control.

Cotton quality results: Samples of ginned cotton were compared. The Vitazyme treated cotton fibers were clearly higher in quality than the untreated control cotton for all three of the parameters shown below.

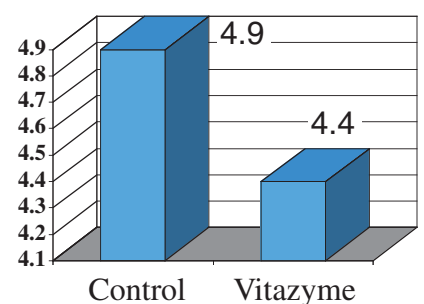
Lint yield, %



Fiber strength, g/tex



Micronaire



Cotton

Location: Littlefield, Texas

Previous crop: cotton

Row-spacing: 40 inches

Experimental design: Two side-by-side fields of 60 acres each, having the same soils and cropping history, were selected for a comparison. One was treated with Vitazyme and the other left untreated.

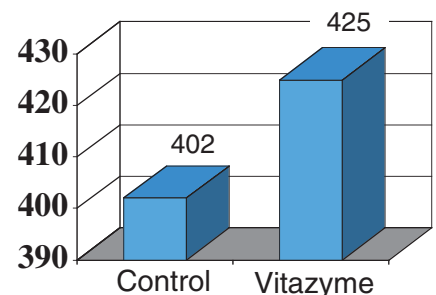
Variety: "Excess"

Irrigation: row-irrigated Seeding rate: 18 lb/acre

Harvest date: October 26, 1999

Soil type: sandy loam

Lint Yield, %



1. Control 2. Vitazyme

Fertility treatments: 60 lb N/acre knifed in between the rows on June 25

Vitazyme application: 13 oz/acre in a 10-inch band over the seed row at planting; 13 oz/acre sprayed on the leaves with Vydate (for boll weevils) on July 10

Income results: Cotton price (estimate): \$0.60/lb

Comments: Lint quality for the control and the treated areas was about the same.

• Yield increase : 6%

• Income increase: \$13.80/acre

Cotton

Edisto Research and Education Center, Clemson University, Blackville, SC

Researcher: Amad Khalilian, Ph.D.

Variety: Delta Pine 5415 Roundup Ready

Row spacing: 38 inches

Plant Population: 3 seeds/foot

Previous crop: cotton

Insecticide: 5 lb/acre of Temik at planting

Soil: Varina loamy sand

Planting date: May 14, 1999

Harvest date: October 15, 1999

Irrigation: 4 times by traveling gun (June 7, 0.5 in; July 26, 0.5 in; August 2, 0.25 in; August 12, 0.25 in)

Experimental design: A randomized split-plot design was arranged for a municipal solid waste (MSW) compost study, at four rates with and without Vitazyme applied twice. The main plots were eight rows wide, 25.3 x 80 ft (0.0465 acre), and were replicated four times. Subplots were four rows wide. The compost rates were located on the main plots and the Vitazyme rates were on the subplots. Treatments were as follows:

- | | |
|------------------------------------|------------------------------|
| 1. Broadcast compost, 4 tons/acre | 8. Same as 1, with Vitazyme |
| 2. Broadcast compost, 8 tons/acre | 9. Same as 2, with Vitazyme |
| 3. Broadcast compost, 12 tons/acre | 10. Same as 3, with Vitazyme |
| 4. Injected compost, 4 tons/acre | 11. Same as 4, with Vitazyme |
| 5. Injected compost, 8 tons/acre | 12. Same as 5, with Vitazyme |
| 6. Injected compost, 12 tons/acre | 13. Same as 6, with Vitazyme |
| 7. No compost | 14. Same as 7, with Vitazyme |

Effects of Vitazyme were separated from compost effects in the statistical analysis.

Fertility and tillage treatments: 100 lb K₂O/acre before planting; 90 lb N/acre in increments of 30 lb N/acre, three times during the season

Vitazyme applications: 13 oz/acre on the seeds at planting (May 14); 13 oz/acre on the leaves at first bloom (July 19)

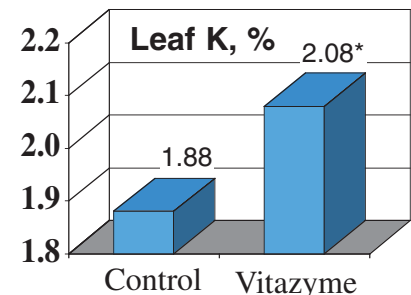
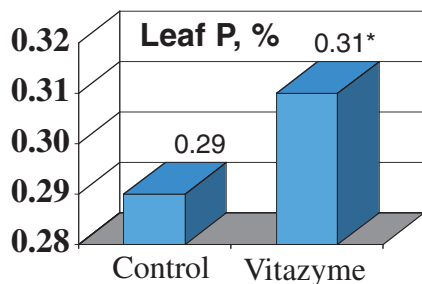
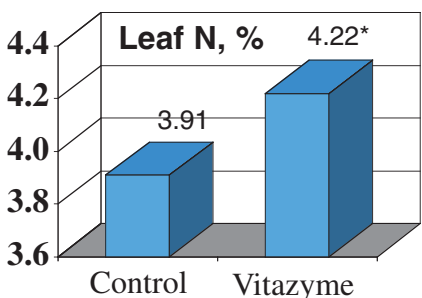
Plant composition effects: Leaf samples were collected and analyzed 12 weeks after planting.

	N*	P*	K*	Ca*	Mg*	S*
	-----leaf concentration, %-----					
Control	3.91b	0.29b	1.88b	2.60a	0.52a	0.74a
Vitazyme	4.22a	0.31a	2.08a	2.71a	0.54a	0.77a

Increase	+8%	+7%	+16%	+4%	+4%	+4%
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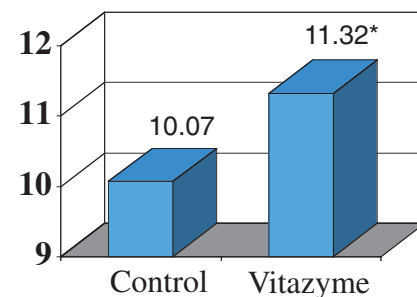
*Means followed by the same letter are not significantly different at P=0.05.

Note: All nutrients measured were increased, with N, P, and K registering significant increases.

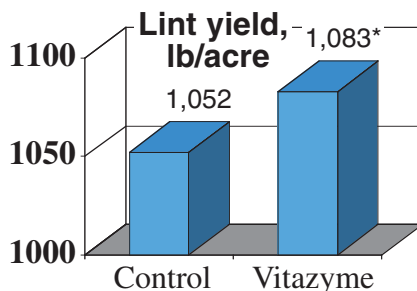
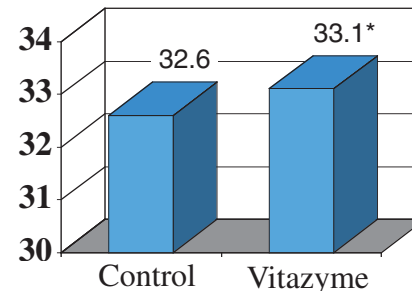


Conclusions: Vitazyme significantly increased leaf tissue nutrients at 12 weeks after planting, while also significantly increasing soil NO₃-N at 6 weeks after planting. Plant height and lint yield were also significantly increased. Soil organic matter percentage and plant population were not affected by Vitazyme. While some treatment means for growth parameters were not significantly greater with Vitazyme, they were all increased to some degree. This shows that the rhizosphere stimulating effects of the product are active in soils with and without added compost. The significant yield increase here produced an income increase of \$18.60/acre, assuming a price of \$0.60/lb.

Soil NO₃-N at 12 weeks, ppm



Plant height at 12 weeks, in



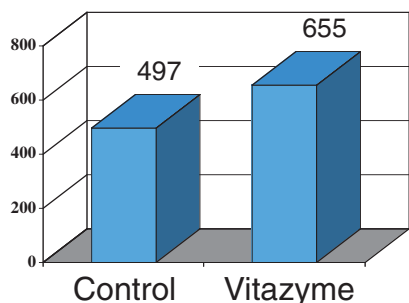
Vitazyme -- Organic Matter Synergism

Vitazyme displays a powerful synergism with organic materials of all types. Manure, compost, or crop residues along with Vitazyme will produce yield increases beyond either material alone.

Cotton

Location: Tulia, Texas Variety: Paymaster HS-200 Planting date: May 13, 1999 Row spacing: 40 inches
Seeding rate: 22 lb/acre Soil type: sandy loam Irrigation: all plots were furrow irrigated
Experimental design: A 32-acre field was divided into two equal parts, 16 acres (64 rows) treated with Vitazyme and 16 acres (64 rows) untreated.

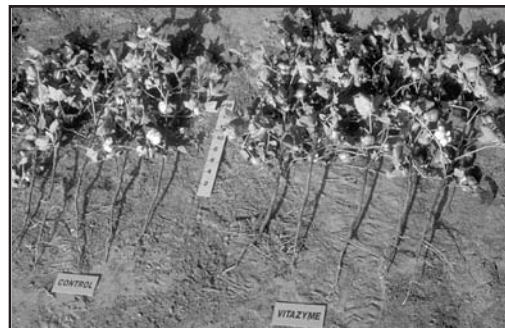
Lint yield, lb/acre



Control Vitazyme

decided advantage for the Vitazyme treatment in terms of boll numbers, plant top and root growth, and yield potential.

1. Control 2. Vitazyme
Fertility treatments: 2 tons/acre of steer compost in October, 1998
Vitazyme application: Vitazyme was sprayed on the soil at 13 oz/acre on May 5, two days after planting, and at early bloom.
Harvest date: November 6, 1999
Income results: The price of cotton is estimated at \$0.635/lb.
Comments: There was very little difference in the quality of the cotton for the two treatments. On September 9 the field showed a



Plants selected from the control and Vitazyme treatments at Tulia, Texas, portended a 32% yield difference at harvest.

• **Lint increase : 32%**

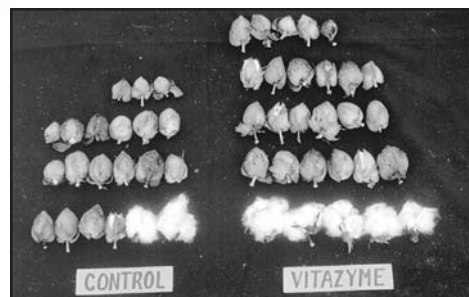
• **Income increase: \$110.30/acre**

Cotton



This Littlefield, Texas, cotton test reveals better root and top growth with Vitazyme.

Location: Littlefield, Texas Variety: Paymaster HS-26 Planting date: May 16
Harvest date: November 15, 1999
Previous crop: cotton Soil type: sandy loam Row spacing: 40 in
Seeding rate: 16 lb/acre
Irrigation: twice, 1.5 inches each time
Experimental design: A center pivot circle was divided in half, half treated with Vitazyme and half left untreated.



This same Texas test resulted in more bolls per plant. This photo shows bolls from three plants of each treatment.

1. Control 2. Vitazyme
Fertility treatments: Preplant: 11-52-11-11-5 lb/acre of N-P₂O₅-K₂O-S-Mn; a side-dress application of 150 lb/acre of 32-0-0
Vitazyme application: Vitazyme was mixed with Direx at 13 oz/acre and applied over the seed row in a 10-inch band at planting. A second application was made June 22 at 13 oz/acre, band sprayed (10 inches wide) over the rows.
Income increase: Cotton price after payments: about \$0.60/lb

• **Lint increase : 9%**

• **Income increase: \$28.20/acre**

Comments: The weather turned cool early in the fall and did not allow some bolls to mature. Had more warm weather continued there would have been a larger yield increase with Vitazyme, because that treatment produced more late-season bolls. This field had a serious boll weevil problem, and a bad worm infestation late in the season.

Cotton -- On Top of Temik

Location: Littlefield, Texas Variety: Paymaster HS 26 Soil type: medium sandy loam Row width: 40 inches
Previous crop: cotton Seeding rate: 20 lb/acre (46,000 plants/acre) Planting date: May 5, 1998
Harvest date: November 7, 1998

Experimental design: Two field-length strips of 1.5 acres each were selected from a large irrigated field to compare Temik application with and without Vitazyme.

1. Control: Temik only 2. Vitazyme and Temik

Fertilizer treatments: 30-40-0 lb/acre N-P₂O₅-K₂O preplant liquid, with Zn and B.
Vitazyme applications: (1) 13 oz/acre in a 10-inch band over the row at planting; (2) 13 oz/acre sprayed over the leaves and soil at early bloom
Temik application: 4 lb/acre on the seeds Income results: Price estimate: \$0.60/lb

Quality results: Both treatments had a 24% gin turnout, with little quality difference.

Comments: This small increase in yield on top of a Temik application gave a significant income increase of \$19.20/acre. It was cool and wet until mid-May, and then hot and dry.

• **Lint increase : 4%**

• **Income increase: \$19.20/acre**

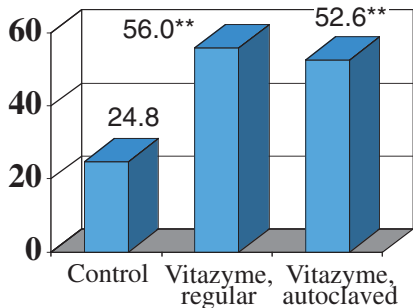


Note how the Vitazyme treated cotton plants have thicker stems, more roots, and more leaves and bolls.

Cotton

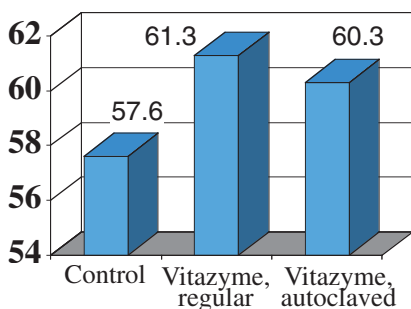
Southern Regional Project S-269: Evaluation of Biological Seed Treatments

TEXAS (Texas A&M University)



*Significantly greater than the control at P=0.01.

TEXAS (Gustafson)



Vitazyme are non-microbial in nature. Rather, they are stimulators of microorganisms and cells in the soil and roots.

Coordinator: William Batson, Ph.D., Mississippi State University, Mississippi State, Mississippi
Researchers: Ray Schneider, Ph.D., Louisiana State University, Baton Rouge, Louisiana; Phil Brannen, Ph.D., Gustafson, Plano, Texas; Peggy Thaxton, Ph.D., Texas A&M University, College Station, Texas

Experimental design: Two seedlots of a cotton variety (2,500 grams in each) were sent to Vital Earth Resources from Dr. Batson, for treatment with Vitazyme. The two treatments were as follows:

(1) Lot 1. **Regular Vitazyme** (10%), with seeds soaked for five minutes and then air dried.

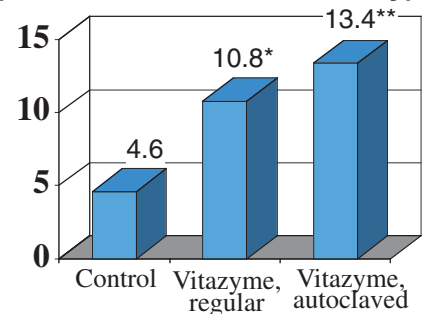
(2) Lot 2. **Autoclaved Vitazyme** (10%), with seeds soaked for five minutes and then air dried.

[The Vitazyme was autoclaved at 15 lb/in² pressure for 15 minutes at 121°C, and autoclaved again one day later.] All beakers and items were sterilized with 3% H₂O₂ before using the autoclaved product. These seeds were returned to Dr. Batson in Mississippi and sent to the researchers for growth studies at the various stations. The seeds were planted in the field. Final stand counts were used to determine the effectiveness of the product to enhance seed germination compared to other products and a control.

Results: Final stand measurements, as **number of plants**, are shown in the graphs.

Conclusions: This study shows that Vitazyme can enhance the germination and survival of cotton when the seeds are treated before planting. Such an effect was not apparent at all testing sites, however. It is also noted that the autoclaved Vitazyme performed as well as the non-autoclaved product, proving that the active ingredients inducing the benefits of

LOUISIANA (Louisiana State University)



*Significantly greater than the control at P=0.06.

**Significantly greater than the control at P=0.04.

Flax

Location: Olivia, Minnesota

Planting date: April 29 and 30, 1999

Previous crop: corn

Fertilization: molasses only, after planting on the soil surface

Variety: A C Emerson (brown)

Seeding rate: 1.5 bu/acre

Harvest date: August 15, 1999

The entire 112-acre field was treated with Vitazyme (13 oz/acre) plus molasses (3 gal/acre), sprayed on the soil after planting. Growth of the crop was excellent, although a minimal nitrogen deficiency was apparent during the growing season, most likely due to cool temperatures and slow residue breakdown early in the season, which resulted in a nitrogen tie-up.

In spite of this marginal nitrogen deficiency, the crop yielded 27.0 bu/acre, an excellent flax crop. At \$12.00/bu, this crop produced an excellent return.

This Vitazyme treated flax grown at Olivia, Minnesota, yielded very well despite a cool, wet spring which tied up soil nitrogen. Vitazyme helped release this nitrogen in time for an excellent yield response.



Grapes -- a Testimonial

Wine Grapes

Grower: Paul Anderson

Location: Snelling, California

"I have over 100 acres of grapes along a waterway. The land slopes in two directions, and the fruit block (block 1) on the highest ground is always the last to sugar. I applied Vitazyme through the drip system at

13 oz/acre three times. This year block one was ready to go first.

Grapes grown at Snelling, California, using Vitazyme sugared much faster before harvest, enabling the grower to harvest his crop a full 30 days earlier than normal despite the fact that the treated grapes were slowest to sugar.

The crowning point is this: Vitazyme built Brix [sugar content] 30 days sooner! Unfortunately, I kept no yield data".



Grapes -- for Raisins

Location: Kerman, California

Soil type: sandy loam

Experimental design: A 40-acre field of good uniformity was divided into two portions, a treated area having 18.5 acres and a control area having 18.5 acres:

1. Control (conventional program)
2. Vitazyme (on top of the conventional program)



An excellent, productive grape yield resulted from Vitazyme application in this Kerman, California, test.

Variety: Thompson seedless

Vine spacing: 12 ft x 7 ft

Fertility treatments: All areas received 20 gal/acre of CAN-17 (calcium ammonium nitrate with 17% N, giving about 37 lb/acre N) and "liquid potassium" (amount unknown) injected into the root zone in early June. No other fertilizers were applied.

Vitazyme applications: (1) 13 oz/acre were sprayed on the vines at match-head size, about two weeks after bloom the first part of June. (2) 13 oz/acre were sprayed on the vines at softening, in early July.

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

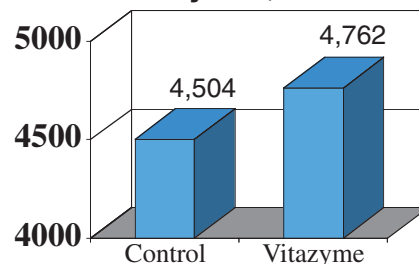
Yield and quality results: Quality parameters were slightly better for the control treatment. Substandard: control, 2.25%; Vitazyme, 4.00%. B&B: control, 84.1%; Vitazyme, 80.0%. Moisture: control, 11.4%; Vitazyme, 11.5%.

Income results: The price of raisins is estimated at \$1,220.00/ton, or \$0.61/lb.

Maturity: mature vines (about ten years old)

Irrigation: all rows were irrigated

Raisin yield, lb/acre



- Raisin increase: 6%
- Income increase: \$157.38/acre

Grapes -- for Raisins

Location: Kerman, California

Soil type: sandy loam

Experimental design: A 20-acre field of good uniformity was divided into two portions, a treated area having 9.5 acres and a control area having 9.5 acres (0.3279 acre/row). This is the second year in the Vitazyme study.

1. Control (conventional program)
2. Vitazyme (on top of the conventional program)

Fertility treatments: All areas received 20 gal/acre of CAN-17 (calcium ammonium nitrate with 17% N, giving about 37 lb/acre N) and "liquid potassium" (amount unknown) injected into the root zone in early June. No other fertilizers were applied.

Vitazyme applications: (1) 13 oz/acre were sprayed on the vines at match-head size, about two weeks after bloom the first part of June. (2) 13 oz/acre were sprayed on the vines at berry softening, in early July.

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

Yield and quality results: Quality parameters were similar for both treatments.

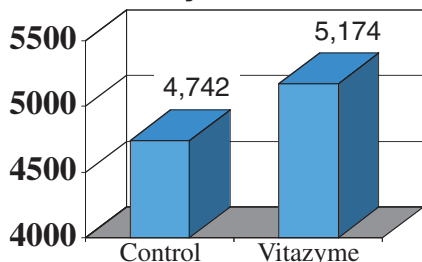
Substandard: control, 5.0%; Vitazyme, 5.0%. B&B: control, 74.8%; Vitazyme, 77.8%. Moisture: control, 10.8%; Vitazyme, 11.9%.

Income results: The price of raisins is estimated at \$1,220.00/ton, or \$0.61/lb actual net value.

Maturity: mature vines (about ten years old)

Irrigation: all rows were irrigated

Raisin yield, lb/acre



A 9% yield increase brought a highly profitable return for these raisin grapes near Kerman, California. Note the excellent bunch size and filling to the ends.

- Raisin increase: 9%

- Income increase: \$263.52/acre

Grapes -- for Raisins, 1998 study

Location: Kerman, California

Soil type: sandy loam

Experimental design: A 20-acre field of good uniformity was divided into two portions, a treated area having 31 rows and a control area having 30 rows (0.3279 acre/row):

1. Control (conventional program)
2. Vitazyme (on top of the conventional program)

Fertility treatments: All areas received 20 gal/acre of CAN-17 (calcium ammonium nitrate with 17% N, giving about 37 lb/acre N) and "liquid potassium" (amount unknown) injected into the root zone about June 8, 1998. No other fertilizers were applied.

Vitazyme applications: (1) 13 oz/acre were sprayed on the vines at match-head size, about a week after bloom the first part of June. (2) 13 oz/acre were sprayed on the vines at berry softening, in early July.

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

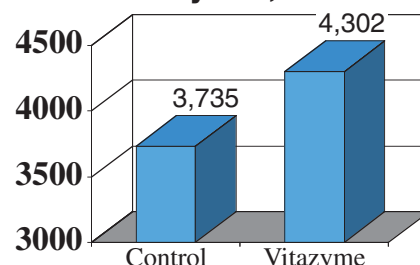
Yield and quality results: Quality parameters were slightly better for the control treatment. Substandard: control, 3.4%; Vitazyme, 4.9%. B&B: control, 83.1%; Vitazyme, 80.0%. Failed due to mold: control, 5.9%; Vitazyme, 6.3%.

Income results: The price of raisins is estimated at \$1,284.00/ton, or \$0.642/lb.

Maturity: mature vines

Irrigation: all rows were irrigated

Raisin yield, lb/acre



- Raisin increase: 15%

- Income increase: \$364.01/acre

Grass (Turf) -- a Testimonial



Vitazyme applied to this Minnesota golf course produced greens that were very thick and without usual fungal diseases.

Farmer: Al Simons
Location: Newberry Springs, California

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



Notice this excellent sod covering on a football field in Texas which had been treated with Vitazyme and compost.

Lettuce

Caribbean Chemical International

Location: Trinidad, West Indies

Variety: unknown

Planting date: Spring, 1999

Experimental design: Two grow boxes were planted with lettuce transplants. One box was sprayed with Vitazyme four days after transplanting, and again 14 days after the first spray.

1. Control
2. Vitazyme sprayed on the leaves and soil

Vitazyme treatments: Vitazyme at 30 ml/gal (about 1 oz/gal, or 1%) was sprayed over the plants and soil of the appropriate grow box at four and 18 days after transplanting.

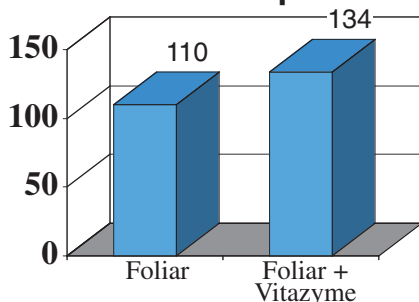
Growth results: No yield data were collected, but observations of lettuce growth were made weekly. The Vitazyme treated lettuce showed the following improvements over the control:

1. Many more root hairs
2. Thicker leaves

Conclusion: The farmer on whose land the test was done was very pleased with the results, and desires to purchase product for future use.

Millet (for Bird Seed) -- a Testimonial

Boxes of millet per acre



Farmer: William "Chip" Struckmeyer

Location: Colusa, California

We have followed Kumen Meservy's recommendation on this crop for five years and it always makes us money. The program is as follows:

1. Preplant: two gallons of liquid chicken manure compost with aqua ammonia (the liquid to prevent ammonia escape)
2. Plants 3 to 6 inches tall: a foliar spray of 1 qt/acre Vigorator + 1 pt/acre PHOS
3. Head in the boot stage: a foliar spray of balanced nutrients, including S and Ca

Vitazyme is applied in the second and third foliar sprays at 13 oz/acre.

Results of a bird seed millet crop at the Tarke

Ranch:

Untreated

80 boxes/acre

Foliar nutrients

110 boxes/acre

Foliar + Vitazyme

134 boxes/acre (+22%)

There were an extra 14 boxes/acre of millet heads "over budget" of 120 boxes projected. This increased production is as follows:

14 boxes x \$26.00/box=

11.4 : 1

Costs: Aerial application (\$8/acre) x 2 = \$16/acre

Material cost (\$8/acre) x 2 = \$16/acre

Total = \$32/acre

Return on investment: \$364 : \$32 = \$11.38 return per dollar invested

Will he use Vitazyme again? "Yeah, I'll do it again... in a heartbeat!"



Notice the large, uniform, full millet heads which are essential for market quality bird seed. Vitazyme helped achieve this result.

Onions

Location: Fulton, New York

Variety: Prince (yellow)

Planting date: May 5, 1999

Harvest date: October 15, 1999

Soil type: organic (muck)

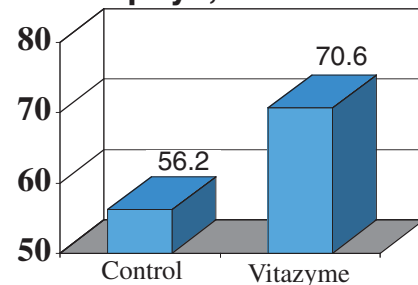
Previous crop: onions

Row spacing: two rows 6 inches apart, spaced every 15 inches

Experimental design: An onion field was treated with Vitazyme on several rows the length of the field.

Seeding rate: 8 plants/foot (seed)

Chlorophyll, SPAD units



1. Control

2. Vitazyme

Fertilizer treatments: Preplant: 100-60-250 lb/acre of actual N-P-K, plus 75 lb/acre Ca-Mg-micronutrients; sidedressed in July: 70 lb/acre of 34-0-0 (NH₄NO₃)

Vitazyme applications: 13 oz/acre at planting on the seeds

Chlorophyll results: On August 16, 1999, evaluations were made with a Minolta SPAD meter of several Vitazyme treated and untreated onion leaves from adjoining rows at the treatment boundary.

Yield results: Although evaluations of the field on August 16 revealed a decided advantage for the Vitazyme treatment (see the chlorophyll data above), the final harvest weights did not reveal a significant yield difference. There was a decided difference in onion quality, however, which is shown below.

The yield was 72,500 lb/acre for this field. Samples of onions for the two treatments were sized, and the various sizes were multiplied by the price for those sizes to give a total value for the crop. As size increases, so does the price.

Control

Vitazyme

Onion size	Onion value	Proportion of crop	Amount of crop	Onion value
inches	\$/lb	%	lb/acre	\$/acre
2.0	0.06	8.83	6,401.8	384.11
2.5	0.14	31.39	22,757.8	3,186.09
2.75	0.16	31.25	22,656.3	3,625.01
3.0	0.18	28.53	20,684.3	3,723.17
		100.00	72,500.0	10,918.38

Onion size	Onion value	Proportion of crop	Amount of crop	Onion value
inches	\$/lb	%	lb/acre	\$/acre
2.0	0.06	7.16	5,191.0	311.46
2.5	0.14	24.26	17,588.5	2,462.39
2.75	0.16	33.36	24,186.0	3,869.76
3.0	0.18	35.22	25,534.5	4,596.12
		100.00	72,500.0	11,239.73

Vitazyme clearly increases onion size, resulting in greater income per acre.

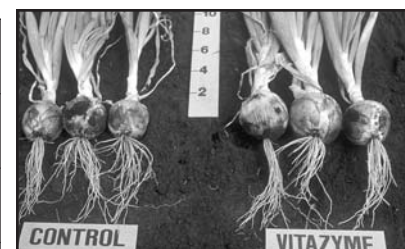
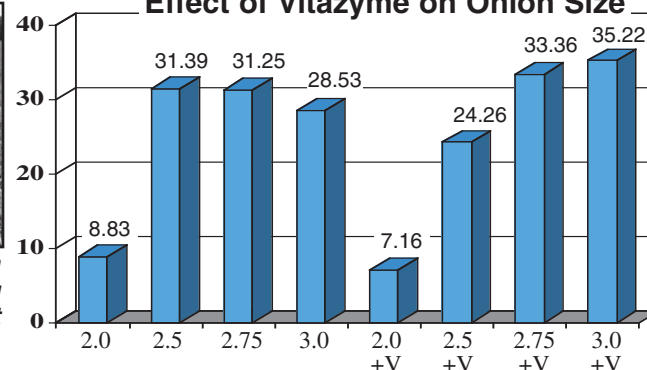
• **Chlorophyll increase: 26%**

• **Income increase: \$321.35/acre (from quality improvement only)**



The treated onions on the right in this New York study were standing more upright and still growing at this date.

Effect of Vitazyme on Onion Size



Note the larger onion size and greater chlorophyll development of the treated onions from this New York field.

Peppers

Caribbean Chemicals International

Location: Trinidad, West Indies

Variety: King Henry

Transplanting date: September 19, 1999

Harvest date: unknown

Experimental design: An area of a pepper field was treated with Vitazyme, while an adjacent area was left untreated. The parameters shown on the next page were determined from five replications of the treatments.

1. Control (no Vitazyme)

2. Vitazyme

Fertility treatments: 1 oz/plant of 12-24-12% N-P₂O₅-K₂O at planting; 1 oz/plant of 12-12-17-2(Mg) 2 weeks after planting, and every 3 weeks thereafter

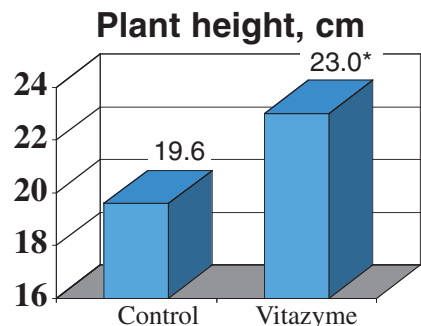
Vitazyme treatment: a 1% solution sprayed on the leaves and foliage on September 19, October 5, and October 24, 1999

Yield and growth results: All values are from five replicates, collected on November 10, 1999.



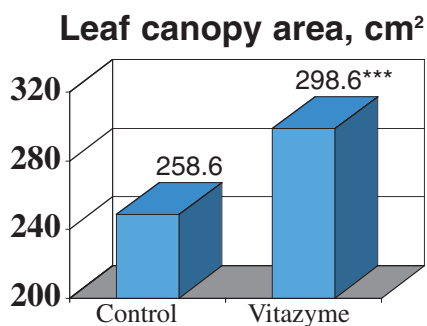
It is clear that size, fruiting, and chlorophyll development were superior with the Vitazyme treatment in the right row.

(continued on page 20)



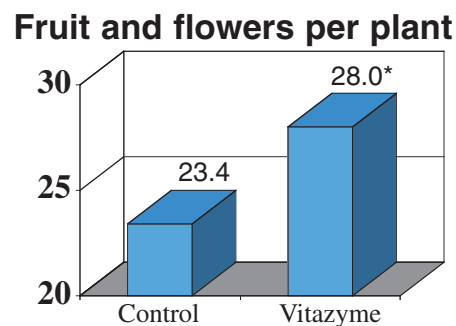
*Significantly greater than the control at P=0.12 (Duncan's Test).

• **Height increase: 17%**



***Significantly greater than the control at P=0.001 (Duncan's Test).

• **Canopy increase: 20%**



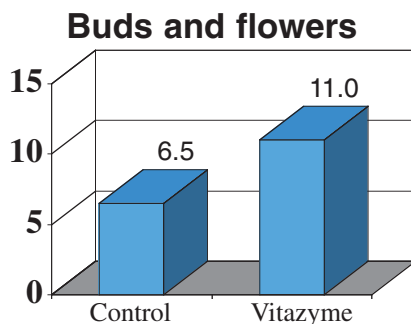
*Significantly greater than the control at P=0.21 (Duncan's Test).

• **Fruit and flower increase: 20%**

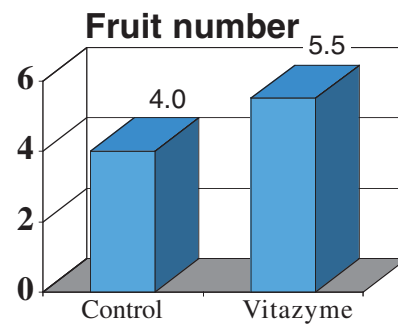
At this date the Vitazyme treatment was visibly superior to the control in the following respects:

- A thicker, lush leaf canopy
- Bigger and better developed roots
- A noticeably better fruit set, and larger and more numerous pepper fruit

Yield and growth results: Observations were made on **December 1, 1999**, using 10 plants per treatment. The Vitazyme treated plants also had **thicker stems**, were **darker green** in color throughout, and were **larger** in size than the control plants.



• **Bud and flower increase: 69%**



• **Pepper fruit increase: 38%**

Plums (for Prunes) -- a Testimonial

Grower: Jagmail Dulai Location: Yuba City, Dingville, Los Banos, and El Nido, California

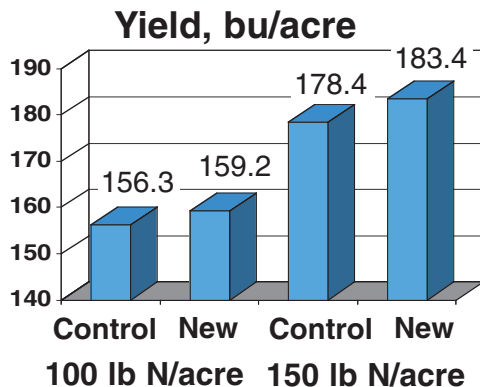
- Applying Vitazyme causes the trees to develop "a new greener leaf" within the first week after foliar application.
- The field reported in the *1998 Vitazyme Field Trial Results* continues to grow ahead of the other trees with just one application of Vitazyme in 1998.
- 1999 was a hard year, with an early frost and a shorter than usual harvest window. Even so, the fruit harvested were generally larger by 10 to 15% over last year. We apply Vitazyme one or more times each year or as the budget permits.
- We applied Vitazyme, ViBasic, and 5 gal/acre of liquid chicken manure as a residue breakdown treatment on the Dingville (55 acres) and Yuba City (35 acres) soils this fall.



Plums at Yuba City, California, were plump and sweet from Vitazyme treatment.

Encouraging Results With "Improved" Vitazyme

Dr. Ivan Anderson at Iowa State University conducted a detailed comparison of two new formulations of Vitazyme to see if either held promise as an improvement over the regular material. One formula proved to be especially promising, as shown by the data in the graph. Work will continue to confirm whether this new material is effective under many different conditions before it will be released.



Control treatment at the Berkey Research Farm: corn plant height is only chest-high.



New Vitazyme formulation treatment alongside the left-hand picture: plants are shoulder-high.

Potatoes

Location: Naples, Florida
Soil Type: gravelly (limestone)

Variety: Red Lasota Planting date: December 29, 1999
Harvest date: April 17, 1999



More leaves and tubers resulted from Vitazyme's rhizosphere stimulation in this Florida test.

Experimental design: A field contained 16-row strips of potatoes divided by drainage ditches. Three strips were treated with Vitazyme and eight strips were left untreated.

1. Control (no Vitazyme) 2. Vitazyme
Fertility treatments: 1,300 lb/acre of 7-10-10% N-P₂O₅-K₂O, broadcast preplant and incorporated; 1,200 lb/acre of 12-4-18 dropped in the rows four inches apart and scratched into the shoulders of the hills, at the four-inch stage

Fungicide treatments: 14 during the growing season, on January 20, 26, February 1, 3, 8, 11, 15, 19, 23, 26, and March 9, 15, 20, 25

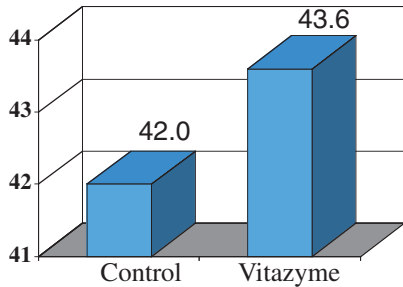
Vitazyme application: 13 oz/acre sprayed over the foliage and soil at tuber initiation, and 13 oz/acre about 12 days later
Chlorophyll content: On March 5, 1999, evaluations on chlorophyll were taken with a Minolta SPAD meter, using 20 leaves randomly selected across each plot, and averaged. The control areas had 160 values, and the treated areas 100 values.
Leaf canopy temperature: On March 5, 1999, canopy temperatures were taken of each plot using a Raytek infrared thermometer. Plot values were averaged.

Income increase: Potato price = \$0.16/lb x 2,400 lb/acre = \$384.00/acre

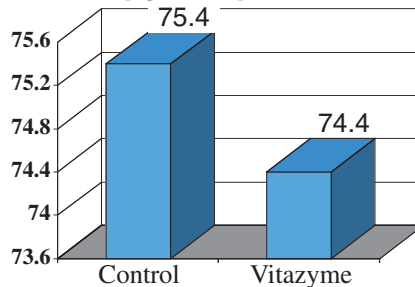


Vitazyme treated potatoes in this Florida test were darker green, transpired more, and yielded \$384 more per acre than the control.

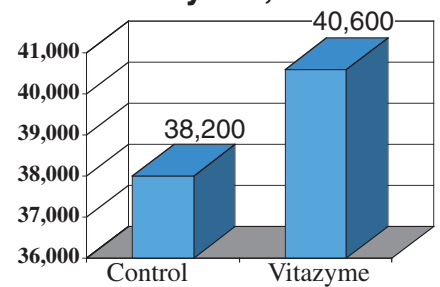
SPAD units



Canopy temperature, °F



Potato yield, lb/acre



• **Chlorophyll increase: 20%**

• **Leaf canopy temperature reduction: 1.0 °F**

• **Income increase: \$384.00/acre**

Potatoes

Location: Arkport, New York
Row spacing: 34 inches

Variety: Reba Planting date: May 5, 1999

Soil type: muck (organic)
Harvest date: October 5, 1999

Experimental design: A field of 5 acres was split in half, one half receiving Vitazyme and the other half another foliar treatment called "ACA" (an anhydrous ammonia + zinc formulation).

1. Control (ACA) 2. Vitazyme

Fertility treatments: 1000 lb/acre of 8-8-8 preplant, and 250 lb/acre of urea sidedressed (193 lb/acre of N total)

Vitazyme and ACA treatments: 13 oz/acre of Vitazyme with Admire insecticide on the seed pieces at planting; 1pt/acre of ACA in the fertilizer band at planting

Chlorophyll determinations: On August 11, chlorophyll readings were made using a Minolta SPAD meter, and 20 leaves per treatment to achieve an average.

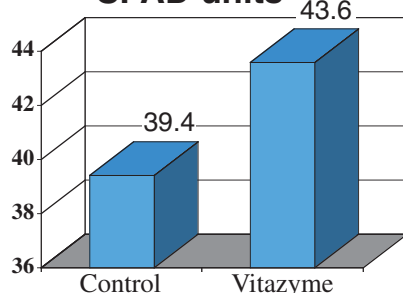
Yield results: Four field-length rows of each treatment were harvested and weighed.

Income results: At \$0.16/lb, the increased yield produced \$300.80/acre more income.

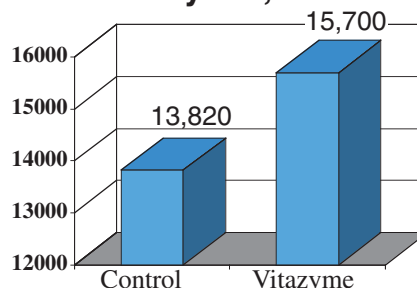


These potatoes grown at Arkport, New York responded to Vitazyme by producing a 14% yield increase.

SPAD units



Potato yield, lb/acre

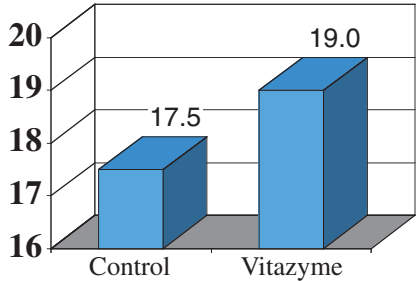


• **Chlorophyll increase: 4.2 SPAD units**

• **Tuber weight increase: +14%**

Potatoes

Total tuber yield, tonnes/acre



Location: North Yorkshire, England
Soil type: sandy clay loam
Harvest date: September 1, 1999
Experimental design: A potato field was divided into two parts: two-thirds with standard fertilizer practices and one-third with the "Eco-Ag" System, using Vitazyme, humic acids, and beneficial rhizosphere bacteria.

Variety: Cara (seed potatoes)

Planting date: first weekend of May, 1999

1. Control

2. Vitazyme + Eco-Ag products

Fertility treatments: recommended applications of mono-ammonium phosphate, K_2SO_4 , $(NH_4)_2SO_4$, and other minerals

Vitazyme applications: 0.5 liter/ha (6 oz/acre) + humic acids + rhizosphere bacteria at planting; 0.5 liter/ha and humic acids at tuber initiation and again at tuber bulking; total Vitazyme application = 1 liter/ha

Income results: Seed potato price = \$286.20/tonne

Food potato price = \$95.40/tonne

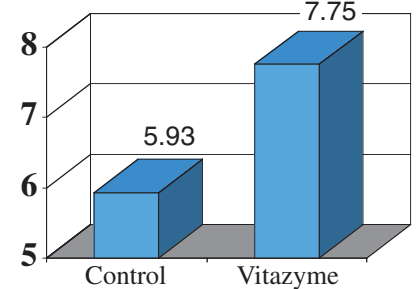
Comments: The extra profit achieved by the Eco-Ag System in this potato study was \$491.31, after accounting for the extra costs of this system compared to the conventional program. "Mr. Harrison was delighted by the result which he monitored throughout the year. He intends to use Vitazyme on all crops in 2000."

Vitazyme and the Eco-Ag System produced a sizeable (31%) increase in high quality seed potatoes versus the conventional system.

• **Seed yield increase: 31%**

• **Income increase: \$1,529.90/acre**

Seed quality yield, tonnes/acre



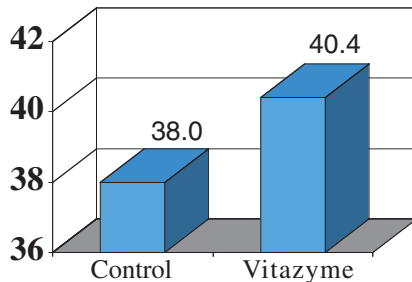
Potatoes -- Testimonials

Several potato growers used Vitazyme on all of their acreage in the Presque Isle, Maine, area so no test comparison with untreated controls could be made. Those having control areas without a Vitazyme application had many positive remarks to give about the product.

Jay and David McCrum. On August 8, 1999, the chlorophyll levels of leaves for treated and untreated areas of test fields revealed significant differences. Values were determined by averaging 20 leaves for each treatment, using a Minolta SPAD meter.

Snowden

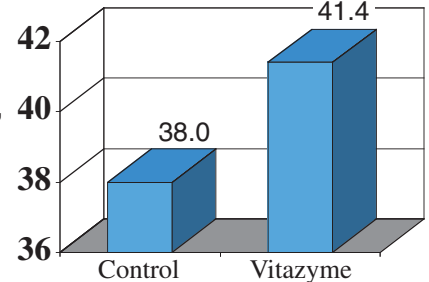
Leaf chlorophyll, SPAD units



Two Vitazyme applications were put on 1,700 acres of their potatoes, at 13 oz/acre each time: (1) at planting on the seed pieces, and (2) one week before flowering. Samples of plants from treated and nearby untreated areas revealed significant yield improvements with Vitazyme, up to a 33% increase.

Leaf chlorophyll, SPAD units

Russet Burbank

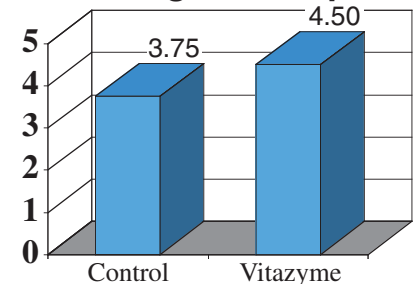


The treated Russet Burbanks from the McPherson farm were more numerous and uniform.

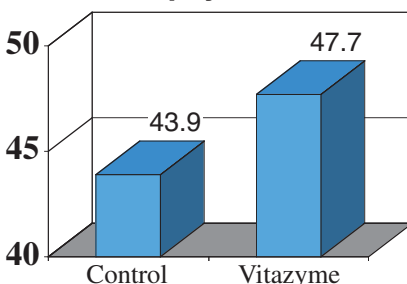
Alan Irving. Treated potatoes in the test area had greater uniformity of size and better color. No yields were determined for treated and untreated areas.

Terry McPherson. On August 9, 1999, a significant difference in yield was detected between Vitazyme treated and untreated areas of a Russet Burbank field. Samples of two plants from each treatment gave the weights shown on the right. It was impossible to separate yields for the two areas due to wet conditions at harvest. Terry estimated that the treated area yielded at least 20 cwt/area more than the adjacent control area.

Potato weight, lb/two plants



Leaf chlorophyll, SPAD units



Jay Boyd. On August 10, 1999, the Vitazyme treated areas of a field revealed higher leaf chlorophyll levels than nearby untreated areas. Note the graph on the left.

The yields of treated field areas, while not documented, were higher than for untreated field areas.

Mike Adams. "[Vitazyme treated] plants looked fuller with more leaves all summer. Tubers had more even size and a very nice type."



This potato field at Mars Hill, Maine, showed a Vitazyme response even two years after an application had been made to the right half.

Pumpkins

Location: Redlands, California

Harvest date: October 10 to 20, 1999

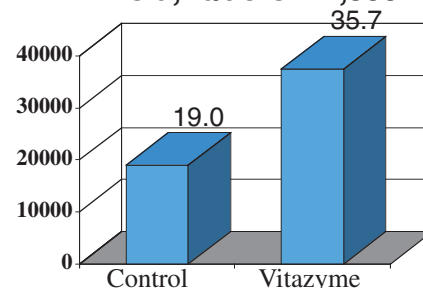
Experimental design: Two adjoining fields of four and six acres were planted to the same pumpkin varieties. One field was treated with Vitazyme and the other left untreated.

Variety: Goldstrike and Jackpot

Soil type: clay loam (treated) and sandy loam (control)

Planting date: June, 1999

Yield, lb/acre x 1,000



1. Control (four acres)

2. Vitazyme (six acres)

Fertility treatments: Both fields received 80 lb N/acre in 1999. The Vitazyme treated field received some compost in 1996 and 1997, but none in 1998; thus, some carry-over effect of the compost was evident.

Vitazyme application: An airblast sprayer applied 12 oz/acre to the test field at the 5 to 6 leaf stage, and again at first bloom.

Yield results: Four small areas of each field were picked, and the pumpkins weighed, to give a yield estimate.

• Yield increase: 97%

Note: This yield increase was directly related to a reduced incidence of mildew for the Vitazyme treated field. While Vitazyme played a big role in that reduced disease incidence, the different soil types and residual fertility effects from compost must have played a partial role in the yield difference.

Income results: Wholesale pumpkin value: \$0.05/lb

Increased pumpkin income from 18,500 lb/acre: \$925/acre

• Income increase: \$925/acre

Comments: The year was very hot, which affected many crops grown in the area this year. The pumpkins were irrigated all season.

Tomatoes

Location: Trinidad, West Indies

Variety: Kada

Planting date: April 6, 1999

Harvest date: unknown

Experimental design: One portion of a field was selected to place three beds (reps) of tomatoes on which 15, 20, and 30 ml/gal (about 0.5, 0.7, and 1 oz/gal, or about 0.5, 0.7, and 1%) Vitazyme rates were placed. Controls were also interspersed in these beds. The treated beds had about 90 plants each, and the control had about 30 plants.

1. Control

2. Vitazyme at 15 ml/gal on the leaves and soil

3. Vitazyme at 20 ml/gal on the leaves and soil

4. Vitazyme at 30 ml/gal on the leaves and soil

Fertility treatments: equal for all plots

Vitazyme application: The 15, 20, and 30 ml/gal rates were applied at three times: (1) at transplanting to the soil and foliage; (2) two weeks after transplanting to the foliage; (3) five weeks after transplanting to the foliage. Each plant received about 2 tbsp of the Vitazyme solution each time it was applied.

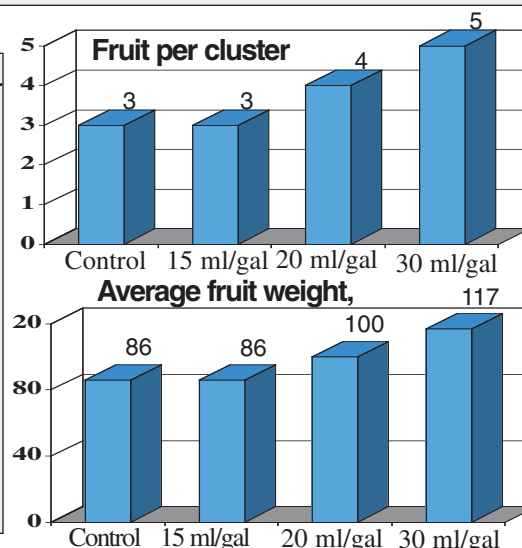
Yield results at harvest

Two weeks after the transplant application

Parameter	15 ml/gal	20 ml/gal	30 ml/gal	Average fruit weight (10 fruit)			Fruit per clusters	Fruit character	
				Pickings	First picking	Last picking			Average
Roots	Similar to control	Good growth	Many fibrous roots, twice the next best plot	9	108	63	86	3	Light
Leaves	About 1 cm longer than controls	About 2 cm longer than the 15 ml rate	About 2 to 3 cm longer than others	9	108	63	86	3	Light
Vigor	Average, like the controls	Good	Excellent	9	124	76	100	4	Solid, juicy
				10	138	95	117	5	Blocky, juicy

Six weeks after the transplant application

Parameter	Control	15 ml/gal	20 ml/gal	30 ml/gal
Roots	Least roots; longest roots about 12 cm long	A few more fibrous roots than controls; long roots 0.5 cm longer than controls	Good; many fibrous roots, and longest roots 2 to 3 cm longer than control	Excellent; large areas of fibrous roots, and longest roots 3 to 5 cm longer than others
Leaves	Smallest; lightest green	A bit bigger and darker than controls	Good leafing	About 3 to 5 cm longer than others
Stems	Smallest	Good	Good	Twice as thick as others
Side shoots	Fewest	3 per plant	2 to 3 per plant	4 per plant
Vigor	Least	Good	75% excellent	83% excellent
Flowering	6 weeks after transplanting; 3 flowers to bear fruit	Same time as controls (about 6 wks); fruit set 66% better than controls; 3 to 4 flowers per cluster; 2 to 3 fruit bearing	68% with flower buds 2 to 3 days before controls; 5 to 6 per cluster, and 4 to 5 fruit bearing	95% with flower buds one weeks earlier than others; 5 to 6 per cluster, and 5 fruit bearing



Conclusion: The 30 ml/gal rate of Vitazyme produced the best growth and yield response in this West Indies study. Besides producing more fruit per cluster and larger fruit, the treated tomatoes flowered longer and bore fruit two weeks longer than any other treatment.

• Increase in fruit weight (30 ml/gal): 36%

Tomatoes

Caribbean Chemical International

Location: Trinidad, West Indies Variety: Heatmaster Transplanting date: September 19, 1999

Experimental design: A tomato field was divided into two treatments on equivalent soil types:

1. Control (no Vitazyme)
2. Vitazyme

Fertility treatments: At transplanting, 15 g/plant in the planting hole of 12-24-12; 7 to 10 days later, same as above topdressed; 3 and 5 weeks after transplanting, 15 g/plant of a 12-12-17-2(Mg); 7 and 10 weeks after transplanting, 15 g/plant of a 9-6-24.

Vitazyme treatments: A 1% Vitazyme solution was sprayed over the leaves and soil on 9/21, 10/6, and 10/24.

Growth and yield determinations, first time: On **November 10**, ten randomly selected plants from each treatment were selected and analyzed for the following parameters.

Observations on November 10: The Vitazyme treated tomato plants began to flower as much as 7 days earlier than the control. The fruit size was clearly larger with the Vitazyme treatment.

Growth and yield determinations, second time: A second visit to this experiment on **December 6, 1999**, revealed the following results (averages of three representative plants from each treatment).

Fruit per Cluster: Control.....3/cluster (4 maximum) Vitazyme....4/cluster (6 maximum)

Observations on December 6, 1999: The farmer and agronomist noted that the Vitazyme treated tomato plants began to flower one week earlier, and produced noticeably larger fruit.

Determinations on November 10, 1999 (10 randomly selected plants from each treatment)

	Plant height cm	Stem circumference cm	Fruit in first set	Side shoots
Control	43.1	1.7	3.3	4.0
Vitazyme	45.3*	2.2***	3.9*	4.1
Increase	+ 6%	+ 29%	+ 18%	+ 3%
Significance	P=0.16	P=0.001	P=0.017	

By November 10 the Vitazyme treated tomato plants had begun to flower as much as seven days earlier than the control. Fruit size was clearly larger for the Vitazyme treatment.

Determinations on December 6, 1999 (three randomly selected plants from each treatment)

	Plant height cm	Root length cm	Shoot number	Stem diameter cm	Fruit weight lb	Fruit number	Fruit per cluster
Control	101	16	5	1.25	5.56	18	3
Vitazyme	125	32	8	2.00	11.50	34	4
Increase	+ 24%	+ 100%	+ 60%	+ 60%	+ 107%	+ 89%	+ 33%

The farmer and agronomist both noted that the Vitazyme treated tomato plants began to flower one week earlier, and produced noticeably larger fruit than the control.



The Vitazyme treated tomato plant in Trinidad on the right is obviously larger than the untreated one on the left. Note differences in root and top masses.

Tomatoes

Caribbean Agricultural Research and Development Institute (Trinidad)

Planting date: November 10, 1998

Variety: Kada hybrid

Planting rate: 14 plants/6-meter row

In-row spacing: 2.3 plants/meter

Experimental design: Five replicates of a randomized complete block design were placed on a uniform soil area of the Ramdial Ramtahal Farm. Each plot was 6x6 m (0.0036 ha), with six rows per plot and 14 plants per row (84 plants per plot). The rows were spaced 1.5 meters apart. Treatments were as follows:

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

Fertility treatments: Planting to early bloom: 28 g/plant each week of a 12-12-17-2% N-P₂O₅-K₂O fertilizer. Flowering to the end of the trial: 28 g/plant each week of a 13-13-21 N-P₂O₅-K₂O fertilizer.

Vitazyme applications: (1) Root dip at planting, using 0.5% Vitazyme; (2) Vitazyme at 1 liter/ha sprayed on the leaves and soil at early bloom

Harvest date: February 2, 1999

Yield results: One replicate was discarded due to bacterial wilt.

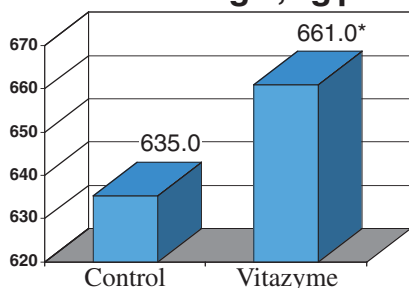
Income results: Based on an average tomato price of \$0.30/lb

Comments: Tomato plants throughout the study had more prolific root and shoot growth with Vitazyme treatment. Weekly flowering data showed that Vitazyme treated plants flowered at least two or three days before the control plants. Earlier fruit development with Vitazyme confirmed these flowering observations.



The Vitazyme treated tomatoes on the left side are obviously larger than the controls on the right. Yield differences are proportional to plant size differences.

Tomato weight, kg/plot



- **Yield increase: 6,433 lb/acre**
- **Income increase: \$1,929.90/acre**