

## ***Vital Earth Resources***

706 East Broadway, Gladewater, Texas 75647  
(903) 845-2163 FAX: (903) 845-2262

# **2014 Crop Results**

## **Vitazyme on Lettuce**

Researchers: Eng. Lucero Fernandez and Eng. Adrian Zapata  
owner of Agricola Amigo Packing Company

Farmer: Eng. Carlos Buen Rostro,  
Research organization: Quimica Lucava

Trial location: Rancho Jaramillo, Villagran, Guanajuato, Mexico

Variety: green leaf

Planting date: February 11, 2014

Experimental design: A lettuce field had 16 rows selected to treat twice with Vitazyme, once on the transplants and once foliar/soil, to evaluate the effect of the product on yield.

### **1. Control**

### **2. Vitazyme (2x)**

Fertilization: unknown

Vitazyme application: (1) Seedling treatment in flats, by dipping the plantlets and media into a 0.5% solution (500 ml in 100 liters of water), on February 10, one day before transplanting; (2) a 1 liter/ha foliar spray on the small plants and soil, on March 3, 21 days after transplanting.

Harvest date: April 7, 2014

Yield results: To assess the lettuce yield, 25 plants were harvested from each area and weighed.

Treatment	Plants harvested	Total weight	Weight/Plant	Plants/Ha	Weight/Ha	Weight change
		kg	kg	plants	kg/ha	kg/ha
Control	25	13.5	0.540	80,000	43,200	—
Vitazyme	25	14.1	0.564	80,000	46,120	1,920 (+5%)

## **Increase in lettuce yield with Vitazyme: 5%**

Pre-harvest evaluation: A few days before harvest, plants from both treatments were dug and photographed, showing superior root and leaf development with Vitazyme.

Shelf-life evaluation: The lettuce heads for the two treatments were stored under room conditions for 72 hours. The Vitazyme treated heads showed better strength, less wilting, and reduced waste compared with the untreated heads. As a side note, it was discovered that the untreated heads attracted many more white flies than did the Vitazyme treated heads.

Conclusions: A field-scale lettuce trial in Mexico revealed a small but significant increase in yield (5%), resulting from several noted improvements due to Vitazyme's active agents.

- Greater root and leaf growth
- More uniformity of growth across the field
- Improved resistance to pests, diseases, and stress

A shelf-life study revealed improved storability of Vitazyme treated lettuce, making it easier for store managers to utilize the crop.

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# 2011 Crop Results

## Vitazyme on Lettuce

Farmer: Glen Dobra  
Systems, Perth, Australia

Researcher: Steven David  
Soil type: sand

Research organization: Organic Farming  
Variety: Coral

Planting date: January, 2009

Experimental design: Adjacent beds of transplanted lettuce were selected to compare Vitazyme application with the conventional program on a production farm. The purpose of the trial was to determine the effect of the product on lettuce growth and yield.

### 1. Control

### 2. Vitazyme

Fertilization: farm standard

Vitazyme application: (1) tray drenching of transplants with a 1% Vitazyme solution; (2) 1 liter/ha sprayed on the leaves and soil 14 days after transplanting

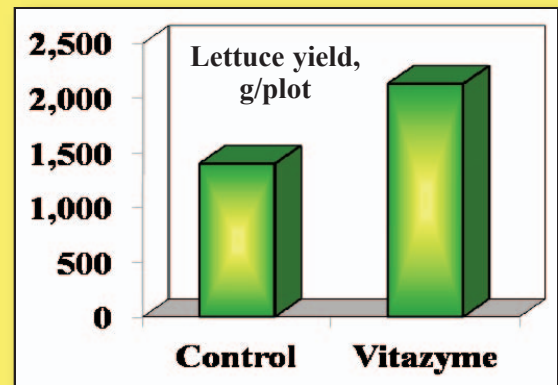
Growth results: Fresh and dry measurements were made 14 days after transplanting.

- Increase in leaf growth at 14 days: +44%
- Increase in root growth at 14 days: +86%

Yield results: Harvesting occurred in late March, 2009.

Treatment	Yield grams/plot	Yield change grams/plot
Control	1,400	—
Vitazyme	2,130	730 (+52%)

**Increase in yield with Vitazyme:  
52%**



Conclusion: Vitazyme in this Australian study, applied twice to transplants, greatly enhanced leaf (44%) and root (86%) growth at 14 days after transplanting. At harvest, the yield with Vitazyme exceeded the control by 52%, proving the great effectiveness of this product in lettuce production systems.

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# 2011 Crop Results

## Vitazyme on Lettuce

Farmer: Seedling Factory  
Systems, Perth, Australia

Researcher: Steven David  
Variety: Ribai

Research organization: Organic Farming  
Soil type: growing media

Planting date: May 24, 2010

Irrigation: overhead sprinkler

Tray size: 144 cells, or 25 ml per cell

Experimental design: A study on lettuce grown in multi-cell growing trays was initiated using Vitazyme and MicroPlus as drench treatments to treat trays, to evaluate the product's effects – alone and in combination – on the growth of roots and leaves.

### 1. Control

### 2. Vitazyme

### 3. MicroPlus

### 4. Vitazyme + MicroPlus

Fertilization: normal nursery fertility

Vitazyme application: 1% solution soil drench at 500 ml/tray, giving 5 ml of product per tray, 7 days after seeding on June 1. For the combined products, this rate was also used.

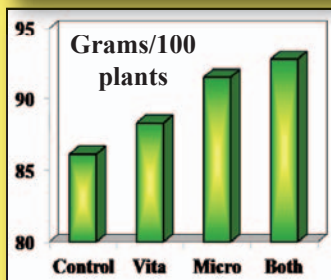
MicroPlus application: 50 grams/100 liters of water at 500 ml/tray, giving 0.25 gram of product per tray, 7 days after seeding on June 1. For the combined products, this rate was also used. MicroPlus is an inoculum of *Streptomyces lydicus* WYEC 108 (0.0371%).

Yield results: Harvesting of the lettuce plants was completed on June 29, 2010, by washing the roots clean of potting media, separating the roots and leaves, and weighing each. Then the roots and leaves were dried and weighed again.

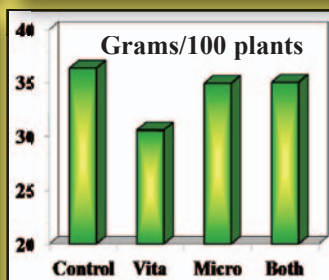
Treatment	Fresh weight			Dry weight		
	Shoots	Roots	Total	Shoots	Roots	Total
	-----g/100 plants-----			-----g/100 plants-----		
Control	86.13	26.37	112.50	6.32	1.51	7.84
Vitazyme	88.31 (+3%)	30.60 (+16%)	118.71 (+6%)	6.32 (+0%)	1.82 (+20%)	8.14 (+4%)
MicroPlus	91.50 (+6%)	34.96 (+33%)	126.46 (+12%)	6.83 (+8%)	1.89 (+24%)	8.72 (+11%)
Vita + Micro	92.78 (+8%)	35.06 (+33%)	127.84 (+14%)	6.99 (+11%)	1.92 (+26%)	8.91 (+14%)

### Fresh Weight

#### Shoots

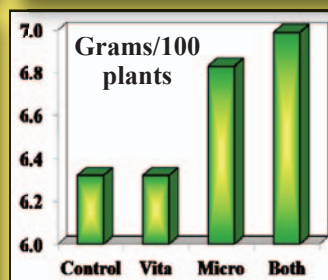


#### Roots

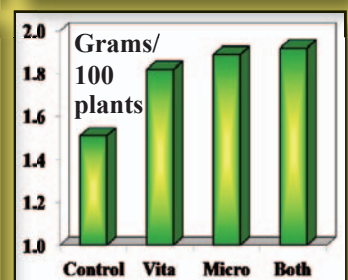


### Dry Weight

#### Shoots



#### Roots



### Fresh weight increases

	<u>Shoots</u>	<u>Roots</u>	<u>Total</u>
<b>Vitazyme</b>	<b>+3%</b>	<b>+16%</b>	<b>+6%</b>
<b>MicroPlus</b>	<b>+6%</b>	<b>+33%</b>	<b>+12%</b>
<b>Vita + Micro</b>	<b>+8%</b>	<b>+33%</b>	<b>+14%</b>

### Dry weight increases

	<u>Shoots</u>	<u>Roots</u>	<u>Total</u>
<b>Vitazyme</b>	<b>+0%</b>	<b>+20%</b>	<b>+4%</b>
<b>MicroPlus</b>	<b>+8%</b>	<b>+24%</b>	<b>+11%</b>
<b>Vita + Micro</b>	<b>+11%</b>	<b>+11%</b>	<b>+14%</b>

**Conclusion:** A lettuce factory tray study in Australia, using Vitazyme and MicroPlus alone and together, revealed that both products improved both fresh and dry top and root weight. The increases were from 3 to 16% for Vitazyme, and from 6 to 33% for MicroPlus, while the combined products revealed an excellent synergism: increases of 8 and 11% in shoot fresh and dry weight, of 33 and 26% in root fresh and dry weight, and of 14 and 14% of total fresh and total dry weight were noted. Either product alone, but especially the combined products, have been shown in this study to increase lettuce yield, and thus are excellent adjuncts to lettuce production.

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# 2005 Crop Results

## Vitazyme on Lettuce

Research coordinator: Javier Gonzalez

Company: Agricola Nieto SPR deRL

Soil type: unknown

Planting date: November 30, 2004

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

### 1. Control, 100% N

### 2. Vitazyme, 60% N

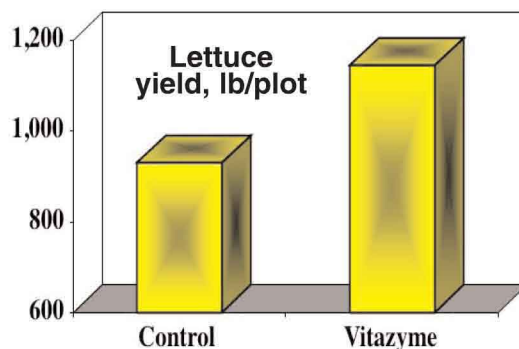
Fertilizer: The usual recommended N-P-K fertilizer was applied to the control treatment, but only 60% of that amount of N was applied to the Vitazyme treated parcel.

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

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

Treatment	Lettuce yield	Yield increase
	lb/plot	lb/plot
Control, 100% N	930	—
Vitazyme, 60% N	1,144	214 (+23%)

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



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

### Economic benefits per hectare

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

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

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

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# 2004 Crop Results

## Vitazyme on Lettuce

Researcher: Unknown

Location: Granja MININT Jaguey Grande, Cuba

Variety: unknown

Soil type: Leptic haphestert

Experimental design: An experimental area was divided into control and Vitazyme treated areas to determine the product's effects on lettuce yield. All other treatments on the test area were the same.

### 1. Control

### 2. Vitazyme

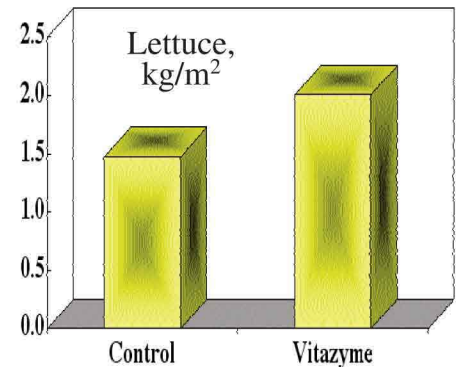
Fertilization: 20 tons/acre of organic fertilizer

Vitazyme application: 1 lb/ha on the seeds at planting, and again at 15 and 30 days after planting on the plants and soil

Yield and income results:

Treatment	Lettuce yield kg/m <sup>2</sup>	Change kg/m <sup>2</sup>	Value of production pesos	Change pesos
Control	1.475	—	31.86	—
Vitazyme	2.006	0.531 (+ 36%)	43.34	+ 11.48

**Increase in lettuce yield: + 36%**



Conclusions: Vitazyme applied three times to lettuce in this Cuban study increased yield by 36%, and improved income substantially.



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# 2004 Crop Results

## Vitazyme on Lettuce

Researcher: Isel Creach Rodriguez, Ph.D.

Location: Santiago de Cuba Experiment Station, Dos Rios, Palma Soriano, Santiago de Cuba

Variety: black-seeded Simpson

Soil type: Leptic haplustert

Transplanting date: February 10, 2004

Experimental design: Two beds were prepared, each 10 m<sup>2</sup> (1 x 10 m), which were planted to 1,440 lettuce transplants. One bed was treated with Vitazyme to evaluate growth effects of the product compared to the untreated control.

### 1. Control

### 2. Vitazyme

Fertilization: unknown

Vitazyme application: soil drenching of the transplant roots (rate unknown), and another soil application

Growth results: At a certain date after significant lettuce growth had occurred, 10 randomly selected plants from each treatment were evaluated for plant height, leaf number, and plant weight.

Parameter	Control	Vitazyme
Plant height (average of 10 plants)	30 cm	38 cm (+27%)
Leaf number (average of 10 plants)	8.1	9.4 (+16%)
Plant weight (total of 10 plants)	0.6 kg	1.1 kg (+83%)

**Increase in plant height: 27%**

**Increase in leaf number: 16%**

**Increase in plant weight: 83%**

Yield results: Based on the excellent responses of the plant parameters to Vitazyme, and previous studies with lettuce, the estimated probable yield of this lettuce variety was as follows.

	Control	Vitazyme
Estimated yield per plot	86.4 kg	158.4 kg (+83%)

**Estimated yield increase: 83%**

Conclusions: Vitazyme produced excellent growth and yield responses in this Santiago de Cuba lettuce trial. Plant height increased by 27%, leaf number by 16%, and plant weight by 83% in randomly selected plants. Most impressive was the projected lettuce yield, which was 83% greater with Vitazyme than with the untreated control. This product clearly produces an excellent benefit to lettuce production in Cuba.

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# 2003 Crop Results

## Vitazyme on Lettuce

Researcher/Grower: Wes Buckler

Location: Winnsboro, Texas

Variety: oak leaf lettuce

Growth medium: hydroponic, with foam cubes

Growth system: Nutrient water is cycled through pipes having cut-outs on 6 or 8-inch centers, in which the foam cubes with plants are placed.

Experimental design: A greenhouse with hydroponic tubes was situated with lettuce, and one portion was treated with Vitazyme.

### 1. Control

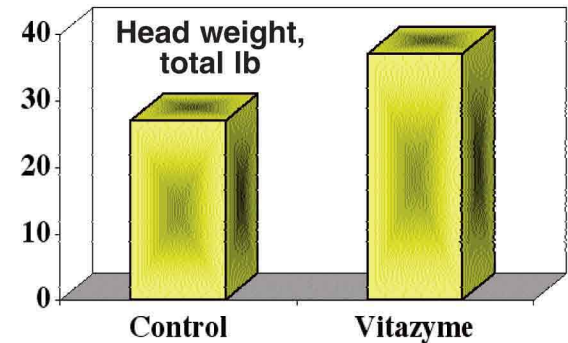
### 2. Vitazyme

Fertilization: a macro and micronutrient soluble formula in the circulating water

Vitazyme application: a 1% Vitazyme solution sprayed to the dripping point each week

Yield results: The same number of mature heads were harvested from an identical set of pipes for both treatments, and the heads were weighed.

Treatment	Head weight	Change
	total lb	lb
Control	27	—
Vitazyme	37	+10 (+37%)



**Increase with Vitazyme: 37%**

Conclusions: Vitazyme proved to be a remarkably effective stimulator of growth in this greenhouse hydroponic study when the product was regularly applied to the leaves.



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# 2003 Crop Results

## Vitazyme on Lettuce

**Researchers:** Juan Carlos Usabiaga and Jorge Gonzalez Duran

**Location:** Ranch Florencia, San Jose Iturbide, Mexico

**Variety:** Iceberg and Romaine

**Experimental design:** A production lettuce field was divided into sections having either control (standard) or Vitazyme treatments. Treatments were not replicated.

**Ranch Manager:** Juan Pablo Nieto

**Soil type:** unknown

**Planting date:** summer, 2003

### 1. Control

### 2. Vitazyme

**Fertilization:** All areas were treated with the same fertility program.

**Vitazyme application:** 1 liter/ha (13 oz/acre) on the plants and soil at transplanting, and again 30 days later

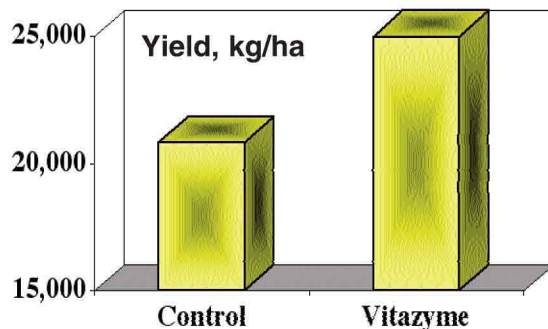
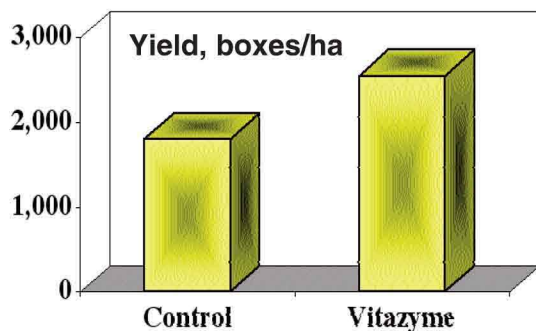
**Harvest date:** summer, 2003

**Yield results:**

### Iceberg Lettuce

Treatment	Area	Yield	Per area yield	Change
	hectares	kg	kg/ha	kg/ha
Control	2.5	51,995	20,798	—
Vitazyme	1.0	24,960	24,960	4,162 (+20%)

**Increase in yield: 20%**



### Romaine Lettuce

Treatment	Area	Yield	Per area yield	Change
	hectares	boxes	boxes/ha	boxes/ha
Control	1	1,800	1,800	—
Vitazyme	1.0	508	2,540	740 (+41%)

**Increase in yield: 41%**

**Income results:**

Variety	Treatment	Yield	Yield <sup>1</sup>	Price <sup>2</sup>	Total value	Increase with Vitazyme
		kg/ha	boxes/ha	pesos/box or lb	pesos/ha	pesos/ha
Iceberg lettuce	Control	20,798	1,300	0.7/lb	14,766.58	—
	Vitazyme	24,960	1,678	84.00/box	140,952.00	126,185.42
Romaine lettuce	Control	—	1,800	84.00	151,200.00	—
	Vitazyme	—	2,540	84.00	213,360.00	62,160

<sup>1</sup>Each box had 24 heads, and averaged 14.87 lb/box

<sup>2</sup>For Iceberg lettuce, the price was much less for the control crop which was damaged by hail and did not recover well, while the Vitazyme treated crop recovered very well. The control lettuce was sold for processed lettuce, and the Vitazyme treated lettuce for fresh packed lettuce.

*Conclusions:* In this lettuce field trial in central Mexico, Vitazyme produced excellent yield and income responses for both Iceberg and Romaine lettuce. Yield increases were 20 and 41%, respectively, for the two varieties, using two applications (at planting, and 30 days later), but most impressive was the substantial increase in net income with Vitazyme. This increase was over 126,000 pesos/ha for Iceberg lettuce, in part due to a higher grade head from rapid plant recovery after a hail storm. The Romaine lettuce income increase was over 62,000 pesos/ha due to Vitazyme use.

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# 2003 Crop Results

## Vitazyme on Lettuce

**Researchers:** Juan Carlos Usabiaga and Jorge Gonzalez Duran

**Location:** Ranch Florencia, San Jose Iturbide, Mexico

**Variety:** Iceberg and Romaine

**Experimental design:** A production lettuce field was divided into sections having either control (standard) or Vitazyme treatments. Treatments were not replicated.

**Ranch Manager:** Juan Pablo Nieto

**Soil type:** unknown

**Planting date:** summer, 2003

### 1. Control

### 2. Vitazyme

**Fertilization:** All areas were treated with the same fertility program.

**Vitazyme application:** 1 liter/ha (13 oz/acre) on the plants and soil at transplanting, and again 30 days later

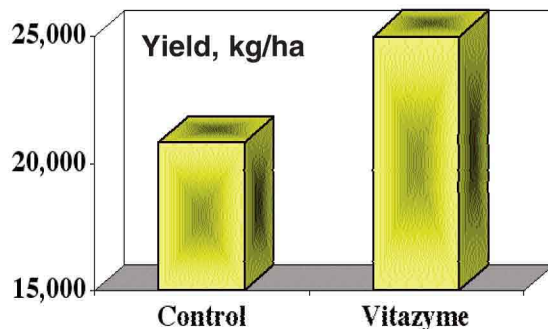
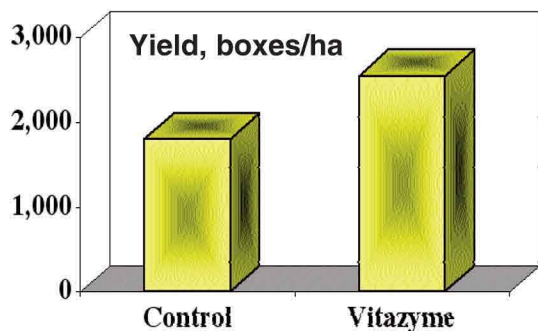
**Harvest date:** summer, 2003

**Yield results:**

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**Increase in yield: 20%**



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	hectares	boxes	boxes/ha	boxes/ha
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**Increase in yield: 41%**

**Income results:**

Variety	Treatment	Yield	Yield <sup>1</sup>	Price <sup>2</sup>	Total value	Increase with Vitazyme
		kg/ha	boxes/ha	pesos/box or lb	pesos/ha	pesos/ha
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Romaine lettuce	Control	—	1,800	84.00	151,200.00	—
	Vitazyme	—	2,540	84.00	213,360.00	62,160

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# 2001 Crop Results

## Vitazyme on Lettuce

Research coordinator: H.W. Chung

Researcher: unknown

Location: greenhouse at Daegu University, Hayang Eup, Kyungan City, Kyungbuk, Korea

Soil type: "market bed" soil

Pot number: 48

Variety: Kohyang

Transplanting date: January 6, 2001

Seeding date: December 22, 2000

Experimental design: The pots were arranged in a randomized design, with three treatments and four replicates (4 plants per pot). The treatments were as follows:

**1. Control**

**2. Vitazyme**

**3. Product A**

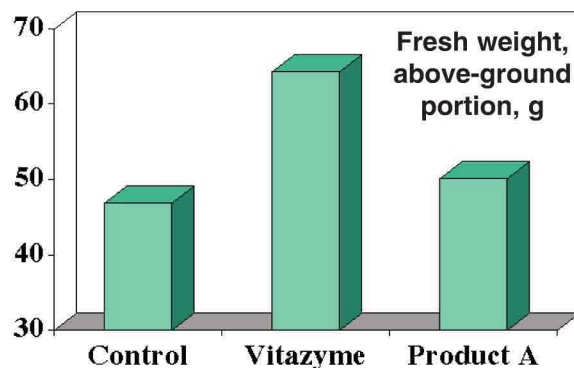
Fertilization: unknown

Vitazyme application: A 1:2,000 solution (0.05%) was used for a foliar spray on February 16 and 26, and March 6.

Data collection: Evaluations were made on March 8, 2001.

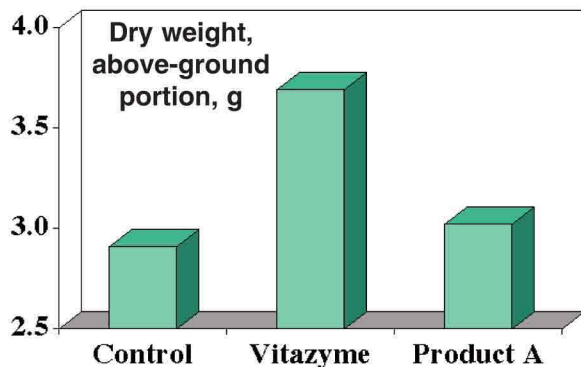
### Fresh weight, above ground portion

Treatment	Fresh weight, above-ground portion	Change
	----- g -----	
1. (Control)	46.9	—
2. (Vitazyme)	64.3	+17.4 (+37%)
3. (Product A)	50.1	+3.2 (+7%)



**Fresh weight increase  
with Vitazyme: 37%**

### Dry weight, above ground portion



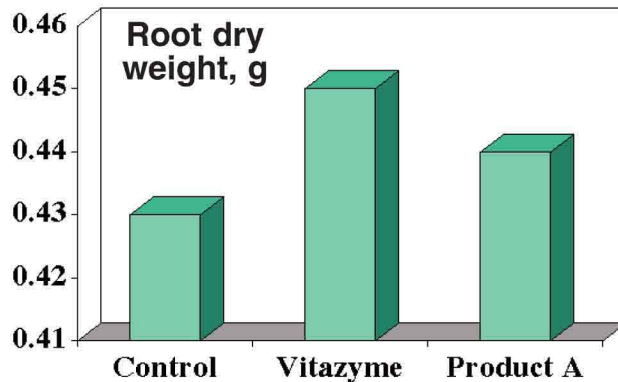
Treatment	Dry weight, above-ground portion	Change
	----- g -----	
1. (Control)	2.91	—
2. (Vitazyme)	3.69	+0.78 (+27%)
3. (Product A)	3.02	+0.11 (+4%)

**Dry weight increase  
with Vitazyme: 27%**



### Dry weight, roots

Treatment	Fresh weight, above-ground	Change
	----- g -----	-----
1. (Control)	0.43	
2. (Vitazyme)	0.45	+0.02 (+5%)
3. (Product A)	0.44	+0.01 (+2%)



**Conclusions:** In this replicated study at a South Korean University, Vitazyme greatly stimulated fresh lettuce leaf growth — by 37% over the control — and leaf dry weight by 27% above the control. Root weight increases were not similarly stimulated, but are not necessary for the production of lettuce, whose value is in the leaves. A mere 0.05% solution of Vitazyme sprayed three times during the growth period evoked this response.

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# 2000 Crop Results

## Vitazyme on Lettuce (Romaine)

Grower: Gene Jackson Farms (Duda Farms), Jerry Benson, agronomist

Location: Maxwell Ranch, Ventura County, CA

Variety: unknown

Planting date: January 12, 2000 (seeds)

Planting rate: one seed every 10 inches with

two rows per bed, on 40-inch spaced beds

Experimental design: A 20-foot section of row of a broccoli field was treated with Vitazyme three times during the growing season. Near that was a 20-foot section of Vitazyme plus liquid fish. Untreated plants alongside the treated rows served as controls.

### 1. Control

### 2. Vitazyme

### 3. Vitazyme + fish

Fertilizer treatments: proprietary

Fish treatment: 10 gal/acre of actual fish, diluted 10:1, applied three times with Vitazyme (see below)

Vitazyme application: Vitazyme was applied three times to the leaves and soil at 13 oz/acre: January 12 (the same day as planting), February 29 (46 days after planting), and March 23 (69 days after planting).

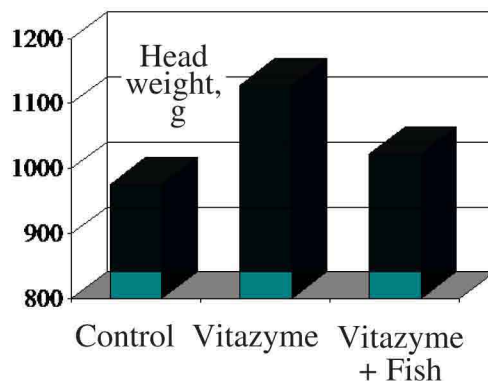
Pesticide treatments: proprietary

Harvest date: April 19 (92 days after planting).

Results: Five representative heads were cut for weighing in each treated and control row. The heads were not trimmed as usually done during harvest.

## Head Weight

<u>Treatment</u>	<u>Weight, grams</u>	<u>Change</u>
Control	975.6	--
Vitazyme	1,127.6	152.0 (+16%)
Vitazyme + Fish	1,022.6	47.0 (+5%)



**Head weight increase: 16%**

## Total Yield

<u>Treatment</u>	<u>Yield, lb/acre*</u>	<u>Change</u>
Control	67,405	-
Vitazyme	77,907	10,502
Vitazyme + Fish	70,653	3,248

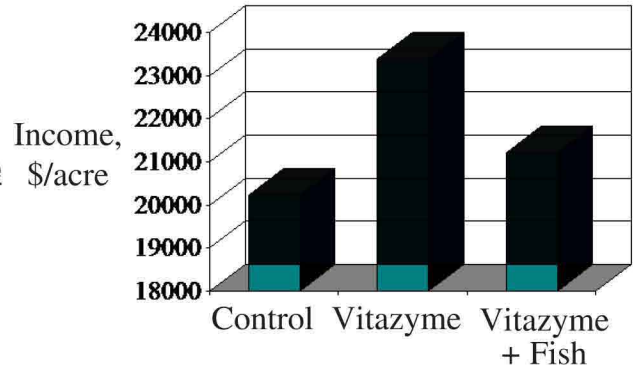
\* Harvested area per treatment: 0.00015942 acre.

**Total yield  
increase:  
16%**

## ***Income***

<u>Treatment</u>	<u>Income, \$/acre*</u>	<u>Change</u>
<b>Control</b>	20,221.50	--
<b>Vitazyme</b>	23,372.10	(+) 3,150.60
<b>Vitazyme + Fish</b>	21,195.90	(+) 974.40

\* Based on the average value of Romaine lettuce as received by the farmer in early May, 2000: about \$0.30/lb.



**Income increase: \$3,150.60/acre**

**Conclusions:** Vitazyme alone increased yield over the control by 16%, which was a bigger increase than the fish plus Vitazyme. The increased income from the three Vitazyme applications was \$3,150.60/acre, a very high return from a very small investment.

## ***Vital Earth Resources***

706 East Broadway, Gladewater, Texas 75647  
(903) 845-2163 FAX: (903) 845-2262

# **1999 Crop Results**

## **Vitazyme on Lettuce**

### ***Observations -- Caribbean Chemical International***

*Researcher:* Saleem Shah, agronomist      *Farmer:* Rishi Pretran      *Location:* Trinidad, West Indies  
*Variety:* unknown      *Planting date:* Spring, 1999      *Planting date:* unknown  
*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.

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Fruit per cluster graph

Average fruit weight, g  
graph

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