

Vital Earth Resources

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

2010 Crop Results

Vitazyme on Lettuce

Researcher: Adoracion Torres-Guy Institution: Soils and Agro-Ecosystem Division, Agricultural Systems Cluster, College of Agriculture, U.P. Los Banos Location: Los Banos, Lagune, The Philippines
Variety: Grand Rapids Planting rate: one seedling per hill Growth period: wet season
Seedling growth: seeds planted in seed boxes, and transplanted at 15 days Plot size: 5 m²
Spacing: 132 plants per plot, at 15 cm between hills and 20 cm between rows
Experimental design: A small plot replicated study (three reps) was set up to determine the effect of Vitazyme as a foliar treatment for lettuce, and to generate field data to register the product with the Fertilizer and Pesticide Authority in The Philippines. The plots were arranged in a randomized complete block design.

Treatment	Fertilizer	Vitazyme
1	0	0
2	100%	0
3	50%	0
4	0	Yes
5	50%	Yes
6	100%	Yes

Fertilization: 100% fertilizer: basal application per plot of 25 g of KCl (0-0-60% N-P₂O₅-K₂O), 50 g of 16-20-0, and 60.6 g of 46-0-0, plus 85 g of 46-0-0 side-dressed 10 days after transplanting. 50% fertilizer: half of the foregoing applications

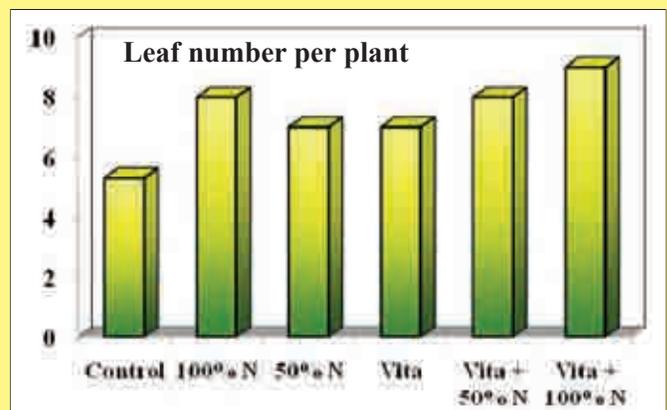
Vitazyme application: 1 liter/ha (13 oz/acre) sprayed on the leaves to the dripping point at 5, 10, and 15 days after transplanting

Yield and growth results: The lettuce was harvested 26 days after transplanting, at which time marketable yield, plant height, leaf number, and leaf width were determined. Ten representative plants from each plot were used for determining height, leaf number, and leaf width.

Leaf Number

Treatment	Leaves*	Change
	number	number
1. Control	5.3 d	---
2. 100% N	8.0 b	2.7 (+51%)
3. 50% N	7.0 c	1.7 (+32%)
4. Vitazyme only	7.0 c	1.7 (+32%)
5. Vitazyme + 50% N	8.0 b	2.7 (+51%)
6. Vitazyme at 100% N	9.0 a	3.7 (+70%)

*Means followed by the same letter are not significantly different at P=0.05. Fully expanded leaves were measured for 10 plants.



Increase in leaf number

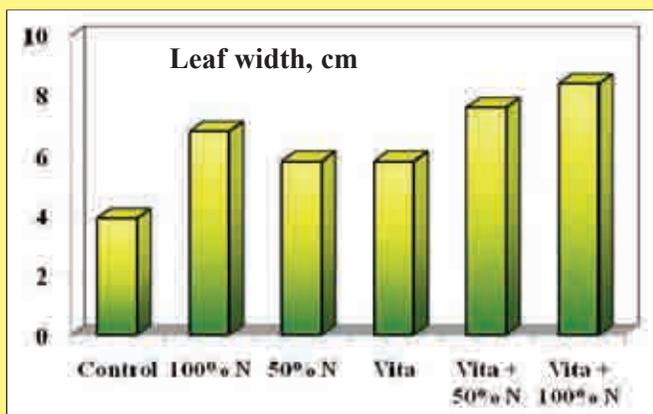
No Vitazyme

100% Nitrogen.....	51%
50% Nitrogen.....	32%

With Vitazyme

0% Nitrogen.....	32%
50% Nitrogen.....	51%
100% Nitrogen.....	70%

Leaf Width



Treatment	Leaf width*	Change
	cm	cm
1. Control	3.9 e	---
2. 100% N	6.8 c	2.9 (+74%)
3. 50% N	5.8 d	1.9 (+49%)
4. Vitazyme only	5.8 d	1.9 (+49%)
5. Vitazyme + 50% N	7.6 b	3.7 (+95%)
6. Vitazyme at 100% N	8.4 a	4.5 (+115%)

*Means followed by the same letter are not significantly different at P=0.05. The width of 10 fully expanded leaves per plot were measured.

Increase in leaf width

No Vitazyme

100% Nitrogen.....	74%
50% Nitrogen.....	49%

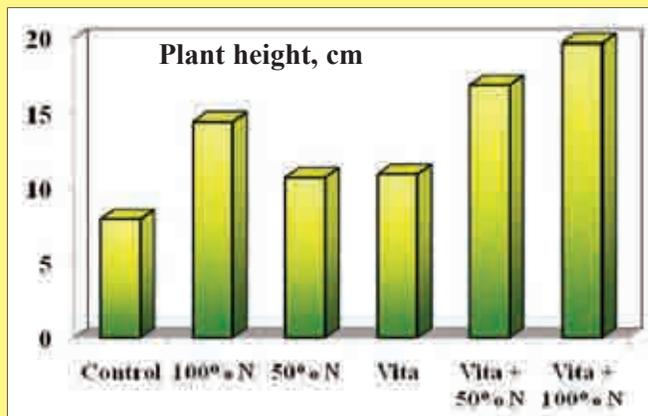
With Vitazyme

0% Nitrogen.....	49%
50% Nitrogen.....	95%
100% Nitrogen.....	115%

Plant Height

Treatment	Height*	Change
	cm	cm
1. Control	7.93 c	---
2. 100% N	14.43 c	6.50 (+82%)
3. 50% N	10.70 d	2.77 (+35%)
4. Vitazyme only	10.93 d	3.00 (+38%)
5. Vitazyme + 50% N	16.87 b	8.94 (+113%)
6. Vitazyme at 100% N	19.67 a	11.74 (+148%)

*Means followed by the same letter are not significantly different at P=0.05. The longest leaf was measured from the base to the leaf tip of 10 randomly selected plants of each plot.



Increase in plant height

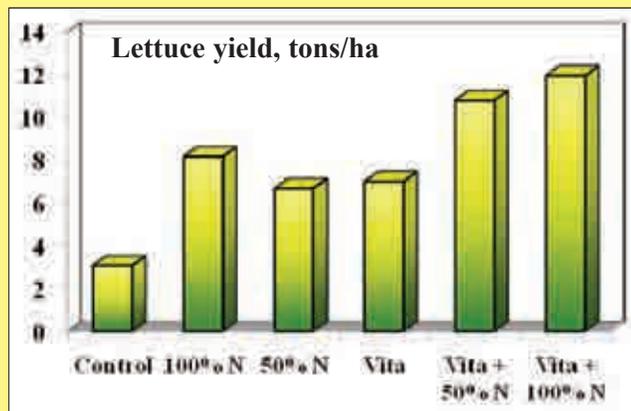
No Vitazyme

100% Nitrogen..... 82%
 50% Nitrogen..... 35%

With Vitazyme

0% Nitrogen..... 38%
 50% Nitrogen..... 113%
 100% Nitrogen..... 148%

Crop Yield



Treatment	Plot weight*	Yield*	Change
	grams/plot	tons/ha	tons/ha
1. Control	150.0 e	3.07 e	---
2. 100% N	369.3 c	8.16 c	5.09 (+166%)
3. 50% N	340.0 d	6.68 d	3.61 (+118%)
4. Vitazyme only	343.3 d	7.00 d	3.93 (+128%)
5. Vitazyme + 50% N	443.3 b	10.80 b	7.73 (+252%)
6. Vitazyme at 100% N	550.0 a	11.95 a	8.88 (+289%)

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

Increase in crop yield

No Vitazyme

100% Nitrogen..... 166%
 50% Nitrogen..... 118%

With Vitazyme

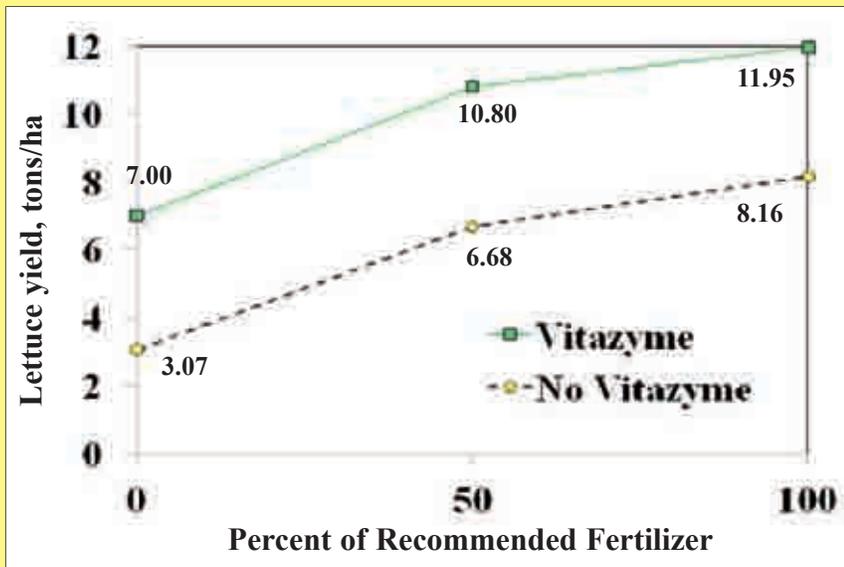
0% Nitrogen..... 128%
 50% Nitrogen..... 252%
 100% Nitrogen..... 289%

Conclusion: According to the official report on the Philippine lettuce study,

“The different treatments influenced significantly the plant height, number and width of leaves, weight of plant, and yield of lettuce at harvest. The recommended rate of Vitazyme increased significantly the number of leaves, but the increment was higher with the conventional fertilizer. All treatments increased all parameters significantly over the control. The performance of Vitazyme in combination with 50% of the recommended rate of conventional fertilizer was significantly better than the performance of either Vitazyme alone or 50% of the recommended rate of conventional fertilizer, indicating a positive interaction between Vitazyme and 50% of the recommended rate of conventional fertilizer.

A much better positive interaction was noted between Vitazyme alone and the recommended rate of conventional fertilizer. However, for economic reasons it would be better to recommend to the farmers a combination of the recommended rate of Vitazyme with 50% the recommended rate of conventional fertilizer. This approach will definitely result in much higher cost savings. The new product, Vitazyme, may qualify for provisional registration by the Fertilizer and Pesticide Authority as long as it is applied together with conventional fertilizer at 50% of the recommended rate.”

Note the improvement in nitrogen utilization with Vitazyme.



- *No added fertilizer* plus Vitazyme yielded 3.93 tons/ha (28%) more than no fertilizer alone.
- *With 50% added fertilizer*, Vitazyme increased the yield by 4.12 tons/ha (62%) more than 50% fertilizer alone.
- *With 100% added fertilizer*, Vitazyme increased lettuce yield by 3.79 tons/ha (46%) more than 100% fertilizer alone.

Note also that Vitazyme with no fertilizer added exceeded the 50% fertilizer rate without Vitazyme by 0.32 tons/ha (5%), while the 50% fertilizer rate plus Vitazyme exceeded the 100% fertilizer rate without Vitazyme by 2.64 tons/ha (32%), showing a great nitrogen efficiency improvement with this product.



Lettuce Crop Report Directory

Recommended Application Rates For Lettuce

- | | |
|-------------|---|
| 2005 | Cleopatra
Mexico |
| 2004 | Unknown variety
Granja MININT Jaguey Grande, Cuba
Black-seeded Simpson
Santiago de Cuba |
| 2003 | Oak leaf lettuce
Winnsboro, Texas
Iceberg and Romaine
San Jose Iturbide, Mexico
Iceberg and Romaine
Iceberg and Romaine |
| 2001 | Kohyang
Kyungbuk, Korea |
| 2000 | Unknown variety
Ventura County, California |
| 1999 | Unknown variety
Trinidad, West Indies |



Crop Recommendations for Lettuce, Chinese Cabbage, Celery, Radishes, Spinach, and Herbs

Apply Vitazyme with herbicide or irrigation either before or after seeding at the rate of 1 liter/hectare (13-16 oz/acre).

One application is enough for short cycle crops of 45 days. For crops up to 60 days a second application at the rate of 1 liter/hectare (13-16 oz/acre) approximately 30 days from planting will give maximum effect.

Vitazyme can be tank mixed with all farm chemicals, including herbicides, insecticides, fungicides, and fertilizers.

Added benefit: when mixed with herbicide, Vitazyme will stimulate weed growth, thereby enhancing herbicide efficacy.

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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

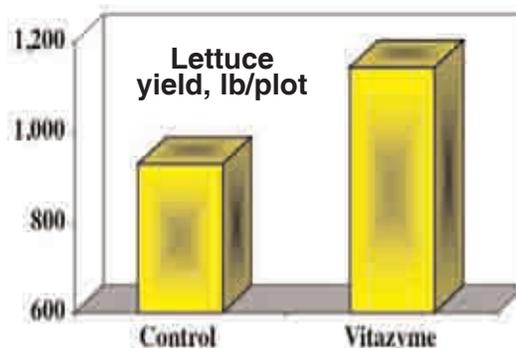
Fertilizer: The usual recommended N-P-K fertilizer was applied to the control treatment, but only 60% of that amount of N was applied to the Vitazyme treated parcel.

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 lb/plot	Yield increase 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

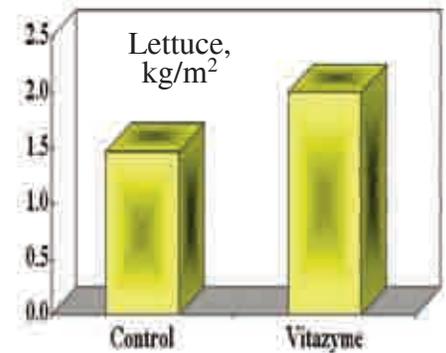
2. Vitazyme

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 ²	Change kg/m ²	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 m² (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

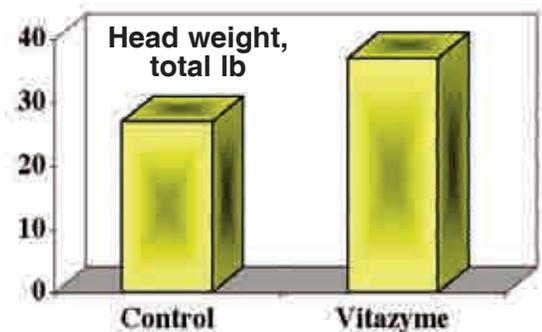
Fertilization: a macro and micronutrient soluble formula in the circulating water

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

Ranch Manager: Juan Pablo Nieto

Location: Ranch Florencia, San Jose Iturbide, Mexico

Soil type: unknown

Variety: Iceberg and Romaine

Planting date: summer, 2003

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

1. Control

2. Vitazyme

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

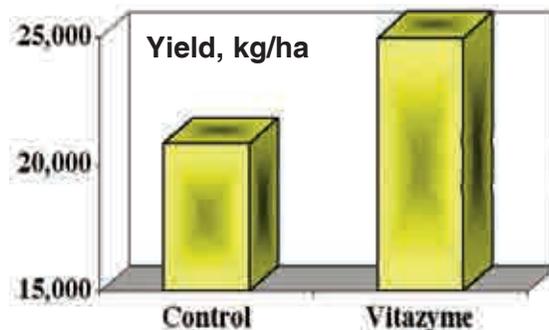
Vitazyme application: 1 liter/ha (13 oz/acre) on the plants and soil at transplanting, and again 30 days later

Harvest date: summer, 2003

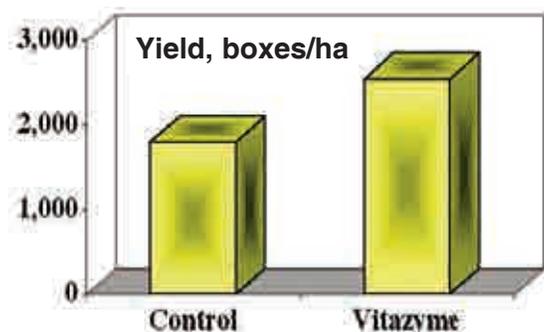
Yield results:

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 ¹	Price ²	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

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

²For 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

Ranch Manager: Juan Pablo Nieto

Location: Ranch Florencia, San Jose Iturbide, Mexico

Soil type: unknown

Variety: Iceberg and Romaine

Planting date: summer, 2003

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

1. Control

2. Vitazyme

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

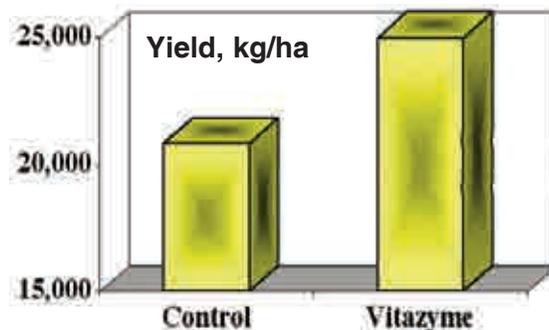
Vitazyme application: 1 liter/ha (13 oz/acre) on the plants and soil at transplanting, and again 30 days later

Harvest date: summer, 2003

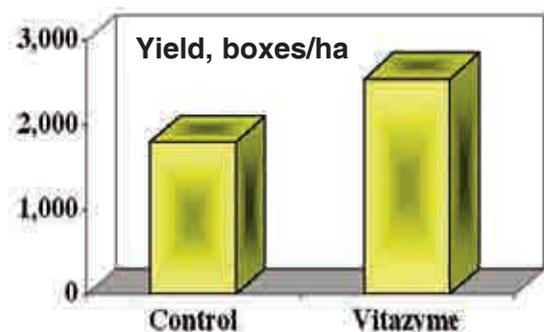
Yield results:

Iceberg Lettuce

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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 ¹	Price ²	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

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

²For 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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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

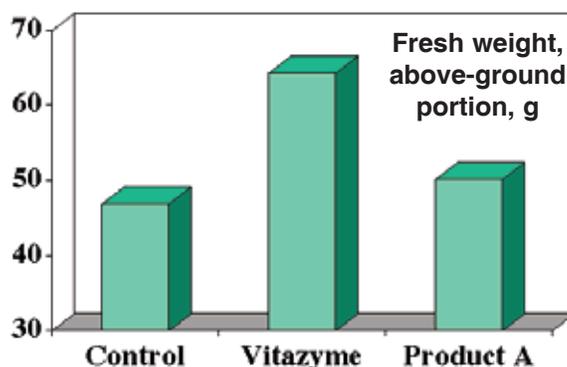
Fertilization: unknown

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.

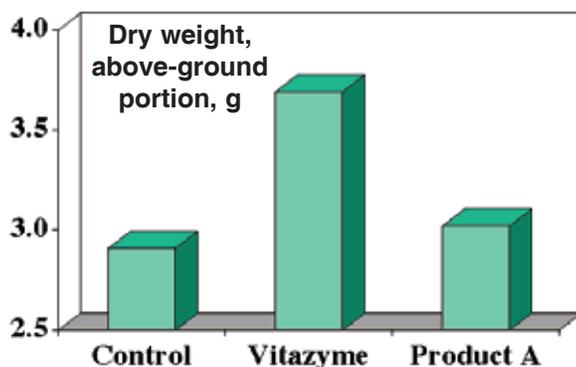
Fresh weight, above ground portion

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

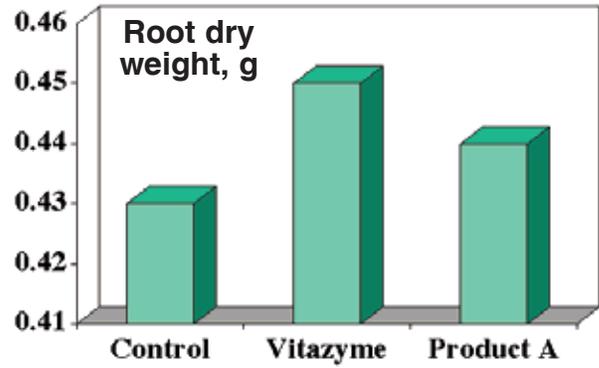


Treatment	Dry weight, above-ground portion	Change
	----- g	
1. (Control)	2.91	—
2. (Vitazyme)	3.69	+0.78 (+27%)
3. (Product A)	3.02	+0.11 (+4%)

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

Dry weight, roots

Treatment	Fresh weight, above-ground	Change
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).

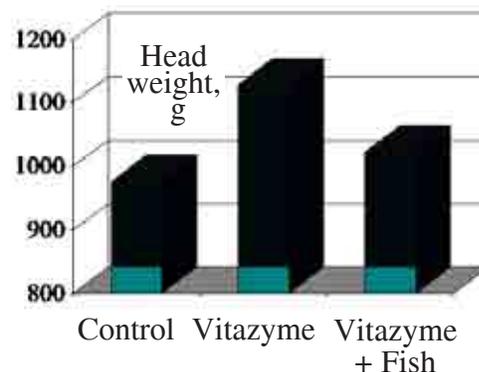
Pesticide treatments: proprietary

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

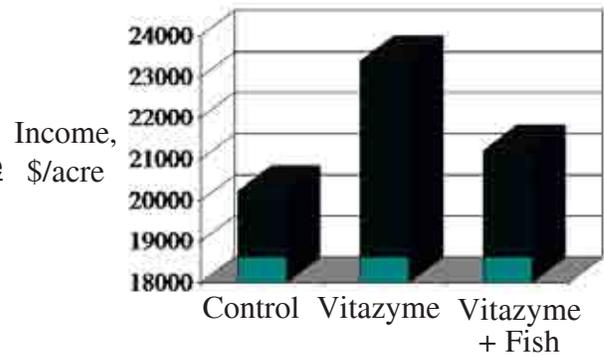
<u>Treatment</u>	<u>Yield, lb/acre*</u>	<u>Change</u>
Control	67,405	-
Vitazyme	77,907	10,502
Vitazyme + Fish	70,653	3,248

**Total yield
increase:
16%**

* Harvested area per treatment: 0.00015942 acre.

Income

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

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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.

Fruit per cluster graph

Average fruit weight, g
graph

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