Lettuce *with Vitazyme application*

Researcher: Matthew O. Abiola
Research organization: Federal University Oye Ekiti, Nigeria
Field location: Kern Family Farm, North Fork, California
Varieties: Romaine, crisp head, and loose leaf
Planting date: April 16, 2025
Soil type: sandy loam
Transplanting date: May 3, 2025
Tillage: conventional
Soil analysis: pH = 7.1, organic matter = low, cation exchange capacity = 10 meq/100 g, SAR = 0.63, P, Zn, M, and Fe = adequate, NO_3-N = marginal, S, and Cu = deficient

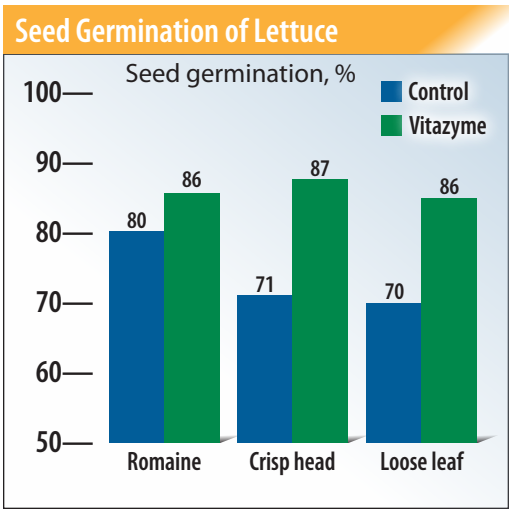
Lettuce. The lettuce plants were grown in plots that were 2x7 meters, and were drip irrigated during the dry summer months in California.

Experimental design: A small-plot lettuce study, using three lettuce varieties, was established in a completely randomized (CRD) arrangement, with 9 inches between rows and 9 inches within rows, with three replicates. A total of 36 plots were 2 x 7 meters, and seedlings were planted in 24 positions within each plot. The objective of the study was to determine the effect of Vitazyme on the growth, yield, and quality of lettuce besides stress tolerance and profitability.

❶ *Control* ❷ *Vitazyme*

Fertilization: none
Vitazyme applications: *Transplant treatments:* two nursery applications of a 0.1 % Vitazyme solution to approximate 13 oz/acre (1 liter/ha); *Field treatments:* two applications of a 0.1% Vitazyme solution at 13 oz/acre (1 liter/ha)

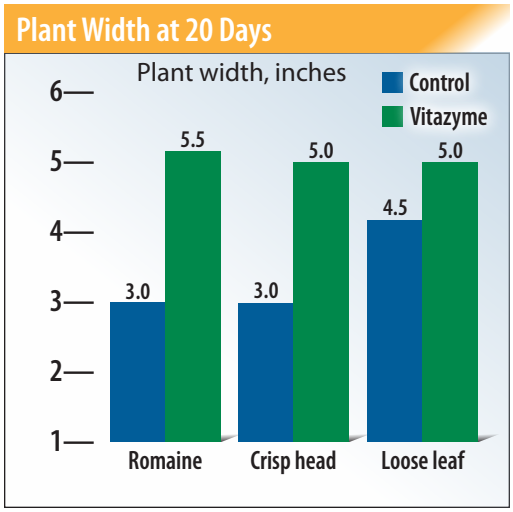
Plant emergence results:
Control emergence time (average) : 16 days
Vitazyme emergence time (average): 9 days
Seed germination results: Evaluations of the percent germination were made 14 days after planting.

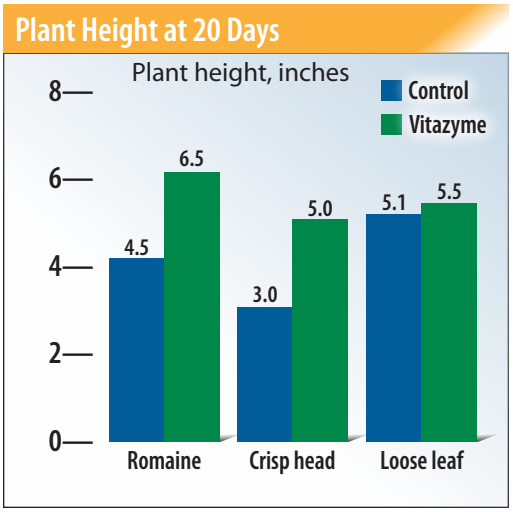


Improvement in seed germination with Vitazyme vs. the control

Romaine ..... 6 percentage points
Crisp head ..... 16 percentage points
Loose leaf ..... 16 percentage points

Plant width and height results: Measurements were made of plant width and height at 20 days after transplanting.





Plant width and height were consistently and greatly increased for all three lettuce varieties at 20 days after transplanting.

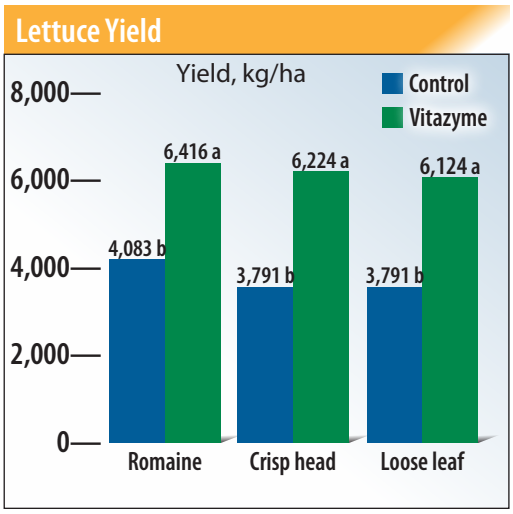
Lettuce yield results: The harvest was expressed in terms of kg/ha.

Treatment	Romaine[1]		Crisp head[1]		Loose leaf[1]	
	Total	Change	Total	Change	Total	Change
	kg/ha		kg/ha		kg/ha	
1. Control	4,083 b	—	3,791 b	—	3,791 b	—
2. Vitazyme	6,416 a	2,333 (+57%)	6,224 a	2,433 (+64%)	6,124 a	2,338 a (+62%)

[1]Means followed by the same letter are not significantly different at P = 0.05 (ANOVA).

Yield increase with Vitazyme

Romaine 57%
Crisp head 64%
Loose leaf 62%



Lettuce yield was greatly increased by Vitazyme for all three lettuce varieties.

Nutrient content results: Samples of Vitazyme treated and control lettuce were analyzed by a laboratory to determine the elemental content.

Nutrient	Control	Vitazyme	Change with Vitazyme
PO_4— P	3,487	5,060	+ 1,573
B, ppm	22	28	+ 6
NO_3—N, ppm	6,779	6,325	- 454
Cu, ppm	5	5	0
Cl, %	2.08	3.22	+ 1.14
P, %	0.59	0.66	+ 0.07
K, %	8.62	11.38	+ 2.76
Ca, %	1.25	1.21	- 0.04

In every case except for NO_3-N and Ca, the nutrient content of the Romain lettuce was increased with Vitazyme.

The reduction in NO_3-N with Vitazyme was a favorable nutritional effect, since free nitrate in foods is not favorable for health

Water stress results: A certain number of loose leaf and crisp head lettuce plants were subjected to water stress by withholding irrigation water for 25 days. The survival rate of the lettuce plants after this induced drought was then recorded.

Variety	Survival of plants	
	Control	Vitazyme
	number	number
Romaine	6	10
Crisp head	6	9
Loose leaf	5	8

Improvement of plant survival with Vitazyme vs. the control

Romaine ..... + 67%
Crisp head ..... + 50%
Loose leaf ..... + 60%

These improvements reveal that heat and drought stress are alleviated by Vitazyme.

Conclusions: A small-plot lettuce trial in California, using three common lettuce varieties and four Vitazyme applications at 10 oz/acre (1 liter/ha), revealed that all three varieties responded very well to Vitazyme.

- Seed germination was improved by 6 to 16 percentage-points.
- Plant emergence was 7 days earlier.
- Plant height and diameter were substantially increased by 20 days after planting.
- Lettuce yield was enhanced by 57 to 62%.
- Tissue nutrient content was improved.
- Resistance to water stress was enhanced by 6 to 11%.

There results support the use of Vitazyme as a supportive product to enhance lettuce production in California and other lettuce producing locations.

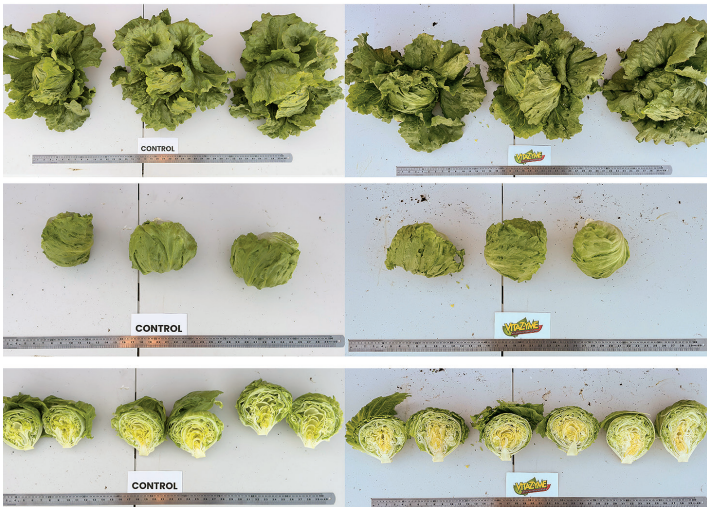
Lettuce *with Vitazyme application*

Researcher: Claudio Mondaca y Nicolas Miranda
Research organization: Syngenta, Santiago, Chile; Plant Designs, USA
Farm cooperator: Agricola Dallaserra ***Field location:*** La Serena, Chile ***Variety:*** Vanguardia (Iceberg type)
Planting date: June 19, 2024 ***Row spacing:*** 75 cm ***In-row spacing:*** 20 cm
Planting rate: 65,000 plants/ha ***Tillage:*** Conventional
Soil traits: clay loam soil
Experimental design: A homogeneous sector of a field was planted with lettuce, with the field divided into two subsectors of 1 hectare each. One subsector underwent five applications, one per week for five weeks, using 0.5 liter/ha of Vitazyme in 500 cc/ha per application. The other sub-sector continued with the regular field applications. Within each sub-sector four representative plots were selected for plant evaluation. Each plot was 9 m^2 and contained four rows. In each plot the percentage of large (grade 1), small (grade 2), and non-marketable lettuce were determined. A subsample from the plots was taken to measure the average weight of each category.

Samples of lettuce were harvested from several sub-sectors of the field to enable a statistical analysis of the head quality and grade.

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

Fertilization: unknown
Vitazyme applications: The treated plots received 0.5 liter/ha of Vitazyme on July 9, July 17, July 24, July 31, and August 7.
Field evaluation date: September 4, 2024

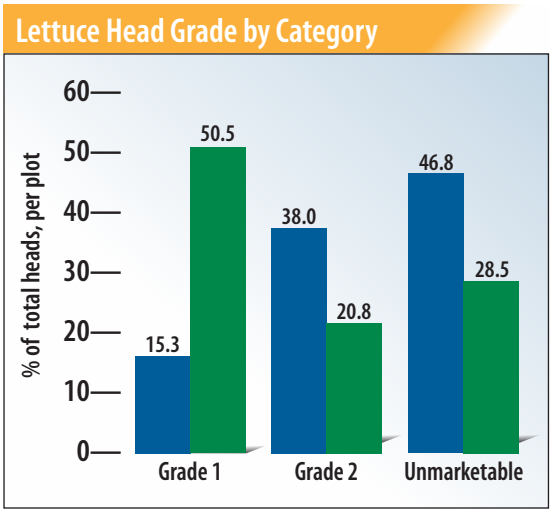


Notice the markedly superior quality of the Vitazyme treated lettuce heads, in terms of size, leafiness, and internal character.

Grade results:

Treatment	Grade of head		
	1*	2**	Unmarketable***
	---------- % of total ----------		
Control	15.3	38.0	46.8
Vitazyme	50.5 (+230%)	20.8 (-45%)	28.5 (-39%)

*Significant difference at P = 0.005; **Significant difference at P = 0.005; ***Significant difference at P = 0.041.



Change in lettuce head quality with Vitazyme

Grade 1 ..... +230%
Grade 2 ..... -45%
Unmarketable ..... -39%

Conclusions: This lettuce head quality study in Chile, using five 0.5 liter/ha applications at one-week intervals, greatly improved the percentage of Grade 1 heads above the untreated control, by a remarkable 230%, while reducing the number of Grade 2 heads by 45% and the number of unmarketable heads by 39%. In addition, the size and weight of the Vitazyme treated lettuce heads for all three grades were noticeably greater than for the untreated controls; notice the accompanying photos of the Grade 1 heads. These results show that Vitazyme is a major benefit for lettuce growers in Chile in terms of both yield and quality.

A portion of this lettuce field was treated with Vitazyme five times at 0.5 liter/ha, and showed excellent responses.

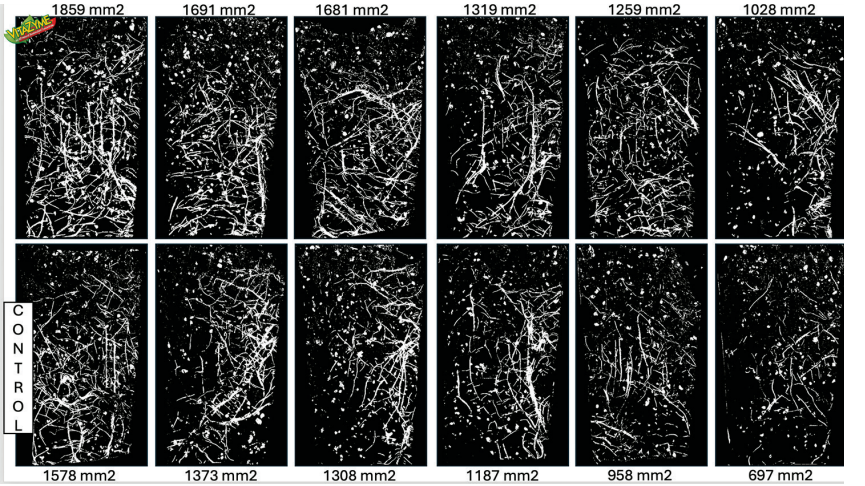
Lettuce *with Vitazyme application—A Root Growth Evaluation*

Researcher: Claudio Mondaca y Nicolas Miranda
Research organization: Syngenta, Santiago, Chile; Plant Designs, USA
Research location: Santiago, Chile ***Variety:*** Victoriosa ***Planting date:*** September 10, 2024
Planting media: 90% peat (Kekkila DSM 2W) + 10% Perlite
Experimental design: A series of small pots was arranged with six replications for two treatments: an untreated control and a Vitazyme treatment. Purchased lettuce plants were planted in each pot. Twenty days after transplanting, observations were made on the root development for each pot by opening the west and east sides of the pots. Total visible rooting was evaluated using an imaging technique to determine the effect of the two treatments on root development.

❶ *Control* ❷ *Vitazyme*

Fertilization: none
Vitazyme applications: Sprayed on the leaves to the dripping point, (1) at transplanting on September 10 using 1 ml/500ml of water (0.2%);)2) Six days later using 1 ml/1,000 ml of water (0.1%).
Root evaluation date: October 1, 2024
Root development results: Two sides of the pots, the east and the west, were removed to view the roots that were exposed along the soil-pot interface. To determine the volume of roots, an imaging technique was utilized to measure visible roots. Because of white Perlite in the soil mix that blended with the roots, and the presence of brown roots that blended with the peat, it was difficult to measure true root areas.

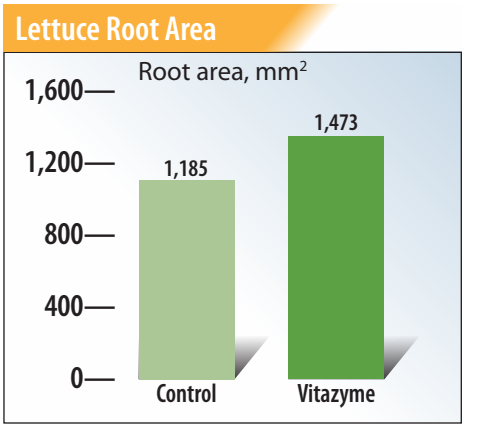
The pots for each treatment were arranged according to the amount of visible roots, from the greatest to the least. Then the roots on the west side of each pot were determined in terms of mm^2.



The roots of the Vitazyme treated lettuce plants (top row) had 24% greater root area than did the untreated control plants on the bottom row.

Treatment	Root area 1	2	3	4	5	6	Mean	Root area change
	---------- mm^2/pot ----------							
Control	1578	1373	1308	1187	958	697	1,185	—
Vitazyme	1859	1691	1681	1319	1259	1028	1,473	288 (+24%)

Increase in root area with Vitazyme: 24%



Conclusions: This study on lettuce root growth stimulation by Vitazyme in Chile, using two foliar applications during the first week of the study, proved that this biostimulant increased root area by 24% as compared to the untreated control. The brassinosteroids and other growth stimulators in Vitazyme are therefore shown to be very beneficial to plant growth, which leads to improved yields of not just lettuce but of any crop, since root growth is correlated closely with crop yield.

Lettuce *with Vitazyme application*

Researcher: Steven David
Research organization: Sustainable Farming Solutions, Perth, Western Australia
Location: Western Australia
Varieties: unknown
Planting date: March 20, 2018, for treatment in flats; unknown for field plantings
Experimental design: Three varieties of lettuce were selected for evaluation of the effects of Vitazyme on growth. One variety received a soil drench treatment at planting, and two varieties were treated at transplanting in the drench water.

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

Vitazyme applications:

- **Flat treatment:** A Vitazyme solution of unspecified concentration was applied to the seeds and soil media at planting on March 20, 2018.
- **Transplanting treatment:** A 2% Vitazyme solution was applied with the drench water at transplanting.

Growth results: Although no data were collected, it is obvious from the photographs which accompany this report, taken about one month after application, that Vitazyme greatly improved root and leaf development. The leaf area of the treated plants in every case is much greater for treated plants, likely by 30 to 50%

Conclusions: This lettuce trial in Western Australia, using three varieties which were treated with a Vitazyme soil drench, either at planting in flats or at transplanting, revealed a great increase in leaf and root growth one month after the trial began. The product is shown to be an excellent supplement for lettuce growers to improve leaf yields.

A red lettuce variety in Australia revealed an excellent leaf yield increase with Vitazyme applied as a 2% soil drench to the growth media.

This comparison between a Vitazyme treated lettuce plant (left) and the untreated control reveals a marked effect on leaf area and root development.

Another lettuce trial in Australia revealed similar results in terms of remarkably improved leaf and root growth from the natural growth regulators in the product.

Lettuce *with Vitazyme application [Vitazyme is called Globaplant in Colombia.]*

Researcher: Diana Urrea Ramirez
Research organization: Agroglobal S.A., Bogota, Colombia
Location: Andes Mountains
Variety: head lettuce
Planting density: unknown
Planting arrangement: four rows on raised beds
Experimental design: A lettuce field was treated with Vitazyme two times in a portion of the field, and the growth was compared to untreated plants nearby to evaluate the product's effects on plant weight and growth parameters.

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

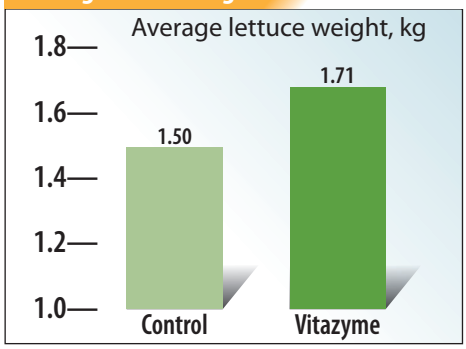
Fertilization: unknown
Vitazyme application: (1) transplants were immersed in a 10% Vitazyme solution before planting; (2) a 0.5% solution (5 ml/liter) was sprayed on the plants and soil during growth
Yield results: Several plants were analyzed for each parameter.

Treating lettuce and other crops with Vitazyme (Globaplant) is very simple, and the results are most excellent with only very small amounts of active agents.

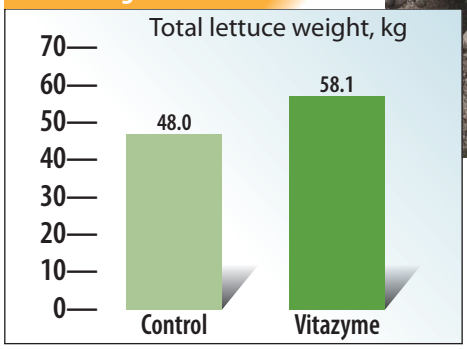
Treatment	Average weight	Total plants	Viable plants	Burst plants	Missing plants	Total weight*
	kg					kg
1. Control	1.50	35	32	2	2	48.0
2. Vitazyme	1.71	35	34	0	0	58.1 (+21%)

*Viable plants only.

Average Head Weight

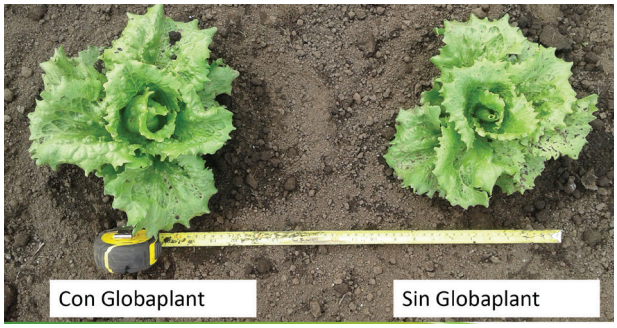


Total Weight



Increase in lettuce average head weight with Vitazyme: 14%

Increase in lettuce total weight with Vitazyme: 21%



The leaf size and development of Vitazyme (Globaplant) treated lettuce is easily noted in this photo. Enhanced root growth is commensurate with improved leaves.

Conclusions: A lettuce study in Colombia, using transplant and foliar applications, revealed several Vitazyme (Globaplant) effects. Head weight increased by 14%, as did total lettuce weight (21%). The Vitazyme treatment produced slightly more plants, and no burst heads, compared to the control which had fewer viable plants and two burst heads. These results show the considerable value of the Vitazyme (Globaplant) program for lettuce in Colombia.

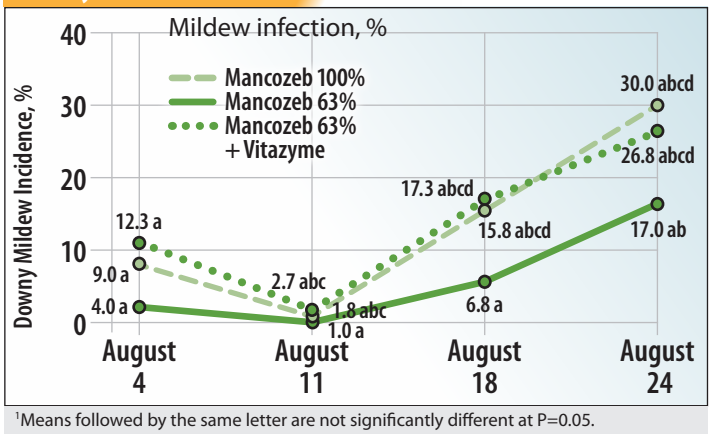
Lettuce *with Vitazyme application*

Researcher: Jan Ties Malda
Research institution: Wageningen University, Holland
Location: Lelystad, Holland
Variety: unknown ***Planting date:*** May 12, 2017
Experimental design: A small plot replicated trial was established using four replications, and several different products, to determine the relative value of these products in inhibiting downy mildew and botrytis infection and promoting lettuce yield. A reduced fungicide rate with Vitazyme was evaluated as well to determine if this product could replace some of the fungicide during the cropping cycle.

1 *Mancozeb, 100%* 2 *Mancozeb, 63%*
3 *Mancozeb, 63% + Vitazyme*

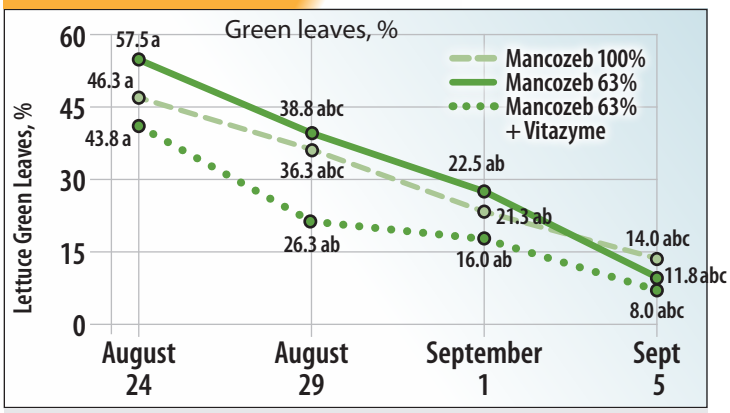
Fertilization: on July 4, 130 kg/ha of CAN
Vitazyme application: (1) 1 liter/ha (13 oz/acre) shortly after seeding on May 12; (2) 1 liter/ha (13 oz/acre) at the 3 to 4-leaf stage ; (3) 1 liter/ha (13 oz/acre) seven days after T1
Fungicide applications: Various fungicides, including CHD, Fandago, Movento, Mancozeb, and others were applied frequently during the growth period. Mancozeb is a popular fungicide from Dow Chemical, sold as Dithane.
Irrigation: The plots were irrigated on July 7 and July 10.
Harvest date: September 25, 2017
Yield and growth results: Only the results with Vitazyme and Mancozeb are shown here, while other products were also evaluated.

Downy Mildew Incidence[1]



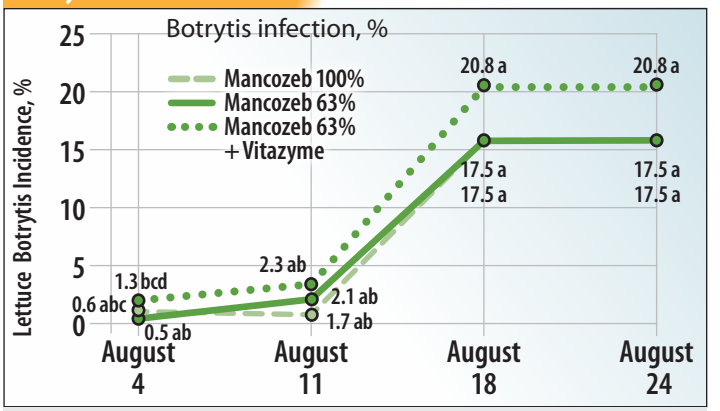
[1]Means followed by the same letter are not significantly different at P=0.05.

Green Leaves[1]



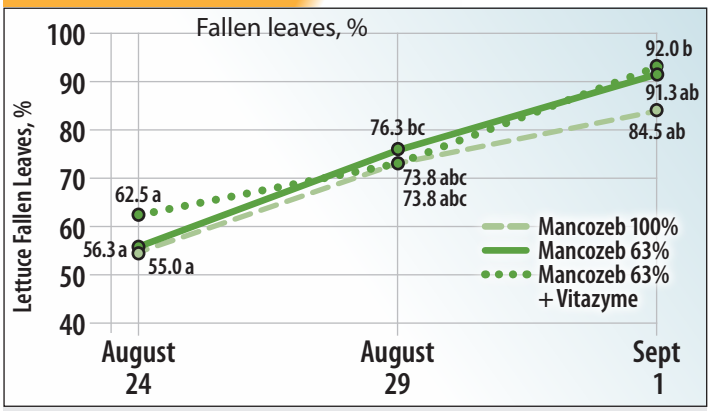
[1]Means followed by the same letter are not significantly different at P=0.05.

Botrytis Incidence[1]



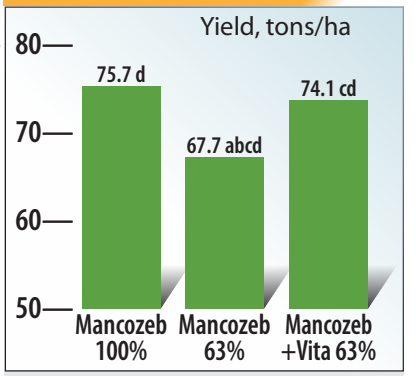
[1]Means followed by the same letter are not significantly different at P=0.05.

Fallen Leaves[1]



[1]Means followed by the same letter are not significantly different at P=0.05.

Yield[1]



[1]Means followed by the same letter are not significantly different at P=0.05.

Conclusions: A lettuce trial at Lelystad, The Netherlands, comparing the effects of Mancozeb fungicide at 63% of the normal rate with that same rate plus Vitazyme (three applications at 1 liter/ha), revealed that the yield was increased by 9% when Vitazyme was added to this reduced fungicide rate. All three treatments were not significantly different in yield. This yield improvement with Vitazyme occurred in spite of the fact that leaf diseases were not fully controlled, as noted in the graphs for downy mildew and botrytis. Apparently photosynthetic activity occurred at a higher rate with Vitazyme treatment on the leaves to overcome the leaf death caused by fungi. This trial gives compelling evidence that Vitazyme can allow a reduction in fungicide use for lettuce production without hindering optimum yields.

Increase in lettuce yield with Vitazyme at 63% Mancozeb: 9.5%

Lettuce *with Vitazyme application*

Researcher: Augustin Peralta
Research organization: Quimica Lucava, Mexico
Farmer: Venancio Olayo
Location: La Aventura Farm, Palmarito, Puebla, Mexico
Variety: unknown
Transplanting date: April 28, 2015
Experimental design: A lettuce field was treated with two Vitazyme applications on 0.5 ha, in an effort to evaluate the effect of the product on lettuce growth, yield, and profitability.

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

Fertilization: unknown
Vitazyme application: (1) 1 liter/ha sprayed on the leaves and soil on May 13 and June 13(15 and 46 days) after transplanting.
Growth results: Compared to the untreated control, Vitazyme treated plants displayed the following:
- Bigger root systems
- Greater leaf area and larger plants
- More leaf chlorophyll (deeper green color) and brighter color
- Less damage from Fusarium and other plant diseases
- Reduced sunspot damage

Yield results:

Treatment	Yield	Yield change
	bags/ha	bags/ha
Control	1,840	—
Vitazyme	2,160	320 (+17%)

Increase in lettuce yield with Vitazyme: 17%

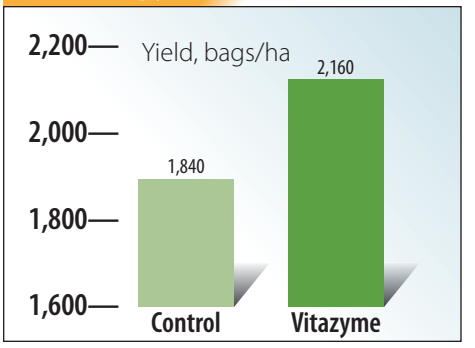
Two Vitazyme applications on lettuce in Mexico produced much improved root and leaf growth, plus a 17% yield increase.

Income results: Each bag was worth 2.258 USD. The extra 320 bags were valued at 723 USD/ha, and the Vitazyme cost 64.52 USD/ha, giving an added profit of 658.48 USD/ha. The cost benefit was 10.2 : 1.

Added income with Vitazmye: 658.48 USD/ha

Cost : Benefit increase: 10.2 : 1

Lettuce bag yield



Conclusion: A lettuce trial in Puebla, Mexico, using two Vitazyme applications of 1 liter/ha, revealed an excellent yield response of 17%, 658 USD/ha more income, and a cost : benefit of 10.2 : 1. The treated plants were healthier with larger, deeper green leaves and larger root systems, having few disease and sunspot incidence, proving that Vitazyme is an excellent supplement for lettuce production in Mexico.

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
Farmer: Eng. Carlos Buen Rostro, owner of Agricola Amigo Packing Company
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
Research organization: Organic Farming
Soil type: sand
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

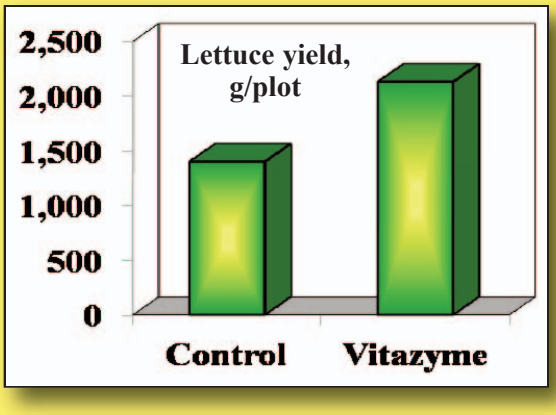
Growth results: Fresh and dry measurements were made 14 days after transplanting.

- **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	Yield change
	grams/plot	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.

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

2011 Crop Results

Vitazyme on Lettuce

Farmer: Seedling Factory Systems, Perth, Australia
Researcher: Steven David
Research organization: Organic Farming
Variety: Ribai
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.

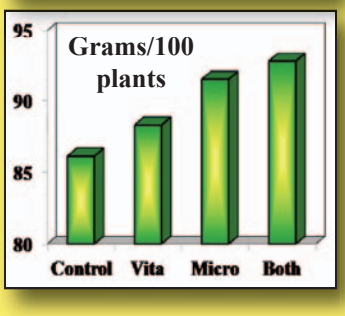
MicroPlus application: 50 grams/100 liters of water at 500 ml/tray, giving 0.25 gram of product per tray, 7 days after seeding on June 1. For the combined products, this rate was also used. MicroPlus is an inoculum of *Streptomyces lydicus* WYEC 108 (0.0371%).

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.

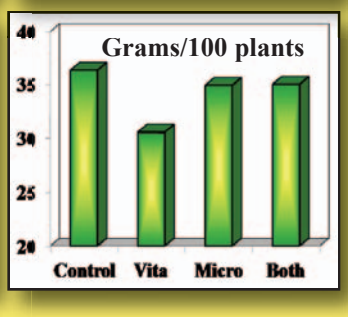
Treatment	Fresh weight			Dry weight		
	Shoots	Roots	Total	Shoots	Roots	Total
	----------g/100 plants----------			----------g/100 plants----------		
Control	86.13	26.37	112.50	6.32	1.51	7.84
Vitazyme	88.31 (+3%)	30.60 (+16%)	118.71 (+6%)	6.32 (+0%)	1.82 (+20%)	8.14 (+4%)
MicroPlus	91.50 (+6%)	34.96 (+33%)	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

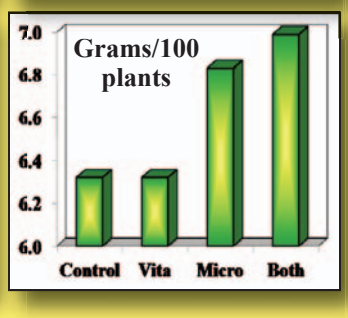


Roots

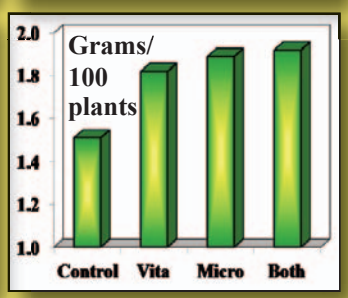


Dry Weight

Shoots



Roots



Fresh weight increases

	Shoots	Roots	Total
Vitazyme	+3%	+16%	+6%
MicroPlus	+6%	+33%	+12%
Vita + Micro	+8%	+33%	+14%

Dry weight increases

	Shoots	Roots	Total
Vitazyme	+0%	+20%	+4%
MicroPlus	+8%	+24%	+11%
Vita + Micro	+11%	+11%	+14%

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 expecially 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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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 m^2
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.

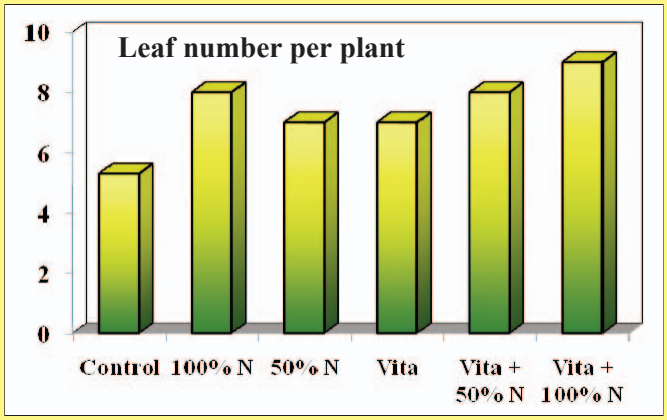
Treatment	Fertilizer	Vitazyme
1	0	0
2	100%	0
3	50%	0
4	0	Yes
5	50%	Yes
6	100%	Yes

Fertilization: *100% fertilizer*: basal application per plot of 25 g of KCl (0-0-60% N-P_2O_5-K_2O), 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

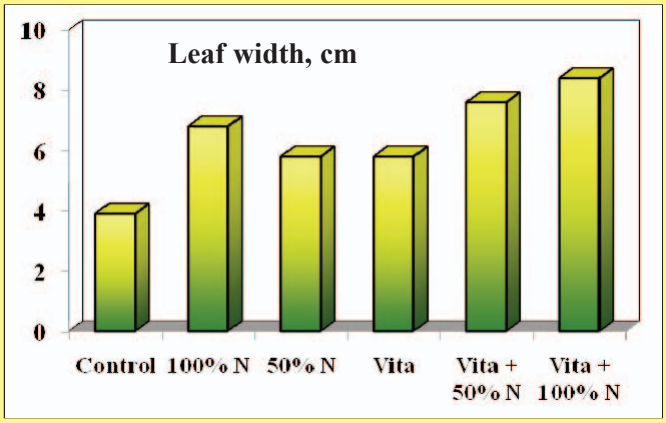
No Vitazyme

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%

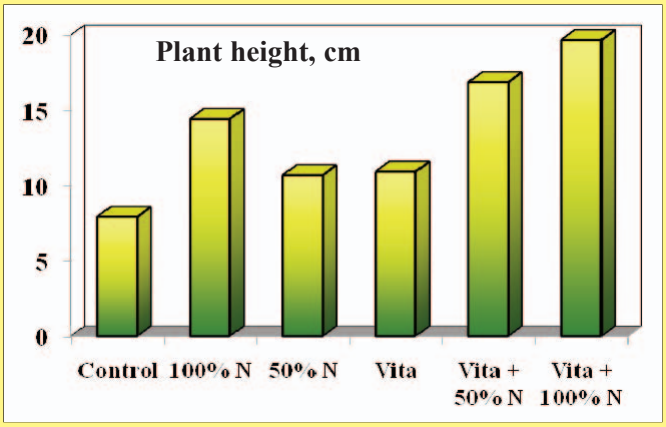
With Vitazyme

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%

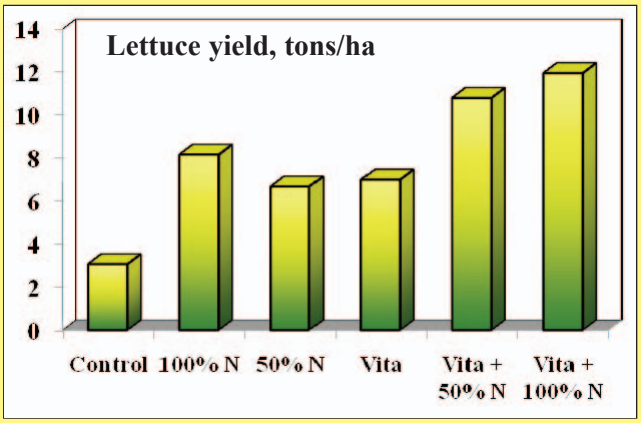
With Vitazyme

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 ame 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%

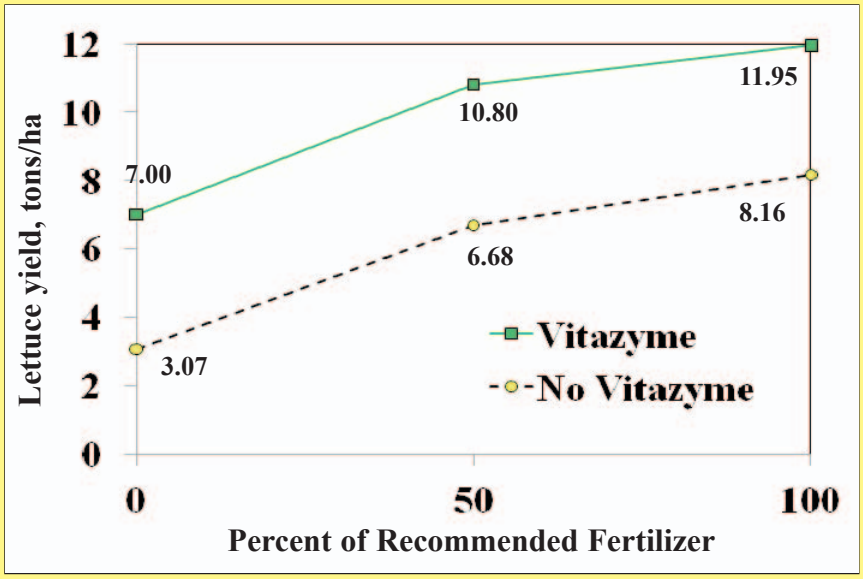
100% Nitrogen..... 289%

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.

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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
Ranch: Labradores parcel 48, Mexico
Variety: Cleopatra
Previous crop: unknown

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**

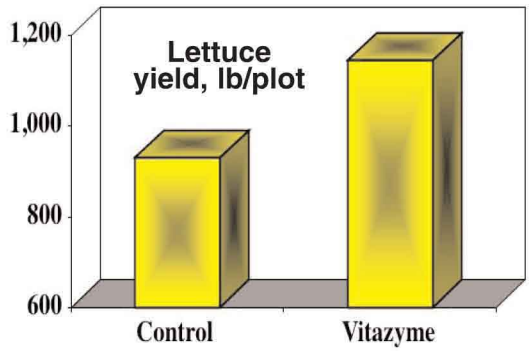
Fertilizer: The usual recommended N-P-K fertilizer was applied to the control treatment, but only 60% of that amount of N was applied to the Vitazyme treated parcel.

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.

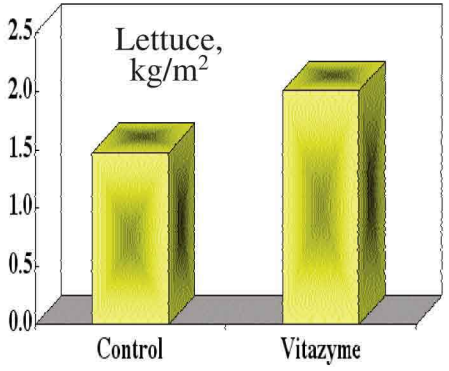
1. Control **2. Vitazyme**

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	Change	Value of production	Change
	kg/m^2	kg/m^2	pesos	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^2 (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

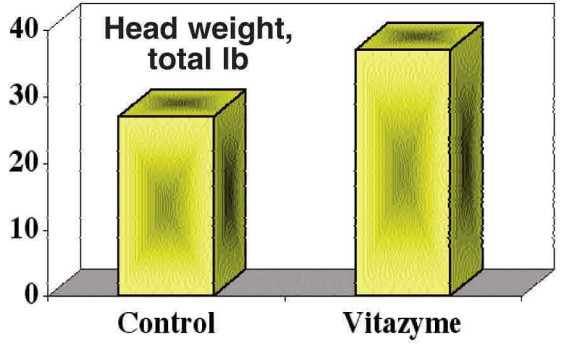
Researcher/Grower: Wes Buckler *Location*: Winnsboro, Texas
Variety: oak leaf lettuce *Growth medium*: hydroponic, with foam cubes
Growth system: Nutrient water is cycled through pipes having cut-outs on 6 or 8-inch centers, in which the foam cubes with plants are placed.
Experimental design: A greenhouse 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

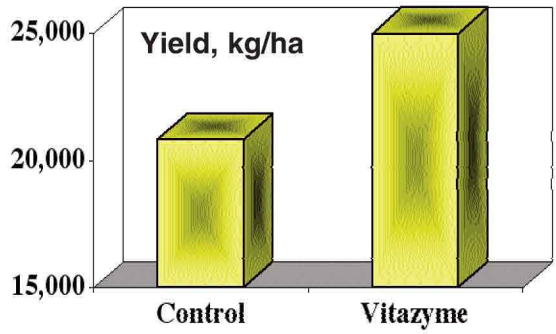
Researchers: Juan Carlos Usabiaga and Jorge Gonzalez Duran
Ranch Manager: Juan Pablo Nieto
Location: Ranch Florencia, San Jose Iturbide, Mexico
Soil type: unknown
Variety: Iceberg and Romaine
Planting date: summer, 2003
Experimental design: A production lettuce field was divided into sections having either control (standard) or Vitazyme treatments. Treatments were not replicated.

1. Control **2. Vitazyme**

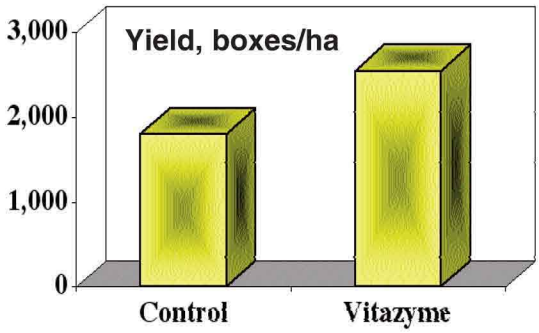
Fertilization: All areas were were treated with the same fertility program.
Vitazyme application: 1 liter/ha (13 oz/acre) on the plants and soil at transplanting, and again 30 days later
Harvest date: summer, 2003
Yield results:

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

[1]Each box had 24 heads, and averaged 14.87 lb/box
[2]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
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 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
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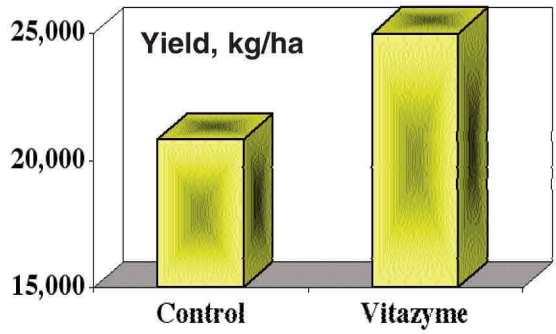
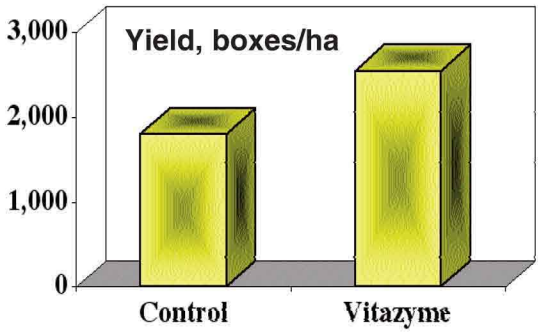


Increase in yield: 20%



Romaine Lettuce

Treatment	Area	Yield	Per area yield	Change
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Increase in yield: 41%

Income results:

Variety	Treatment	Yield	Yield[1]	Price[2]	Total value	Increase with Vitazyme
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[2]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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2001 Crop Results

Vitazyme on Lettuce

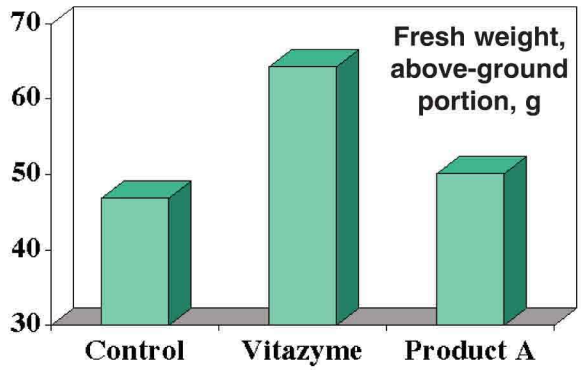
Research coordinator: H.W. Chung *Researcher*: unknown
Location: greenhouse at Daegu University, Hayang Eup, Kyungan City, Kyungbuk, Korea
Soil type: "market bed" soil *Pot number*: 48 *Variety*: Kohyang
Transplanting date: January 6, 2001 *Seeding date*: December 22, 2000
Experimental design: The pots 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.

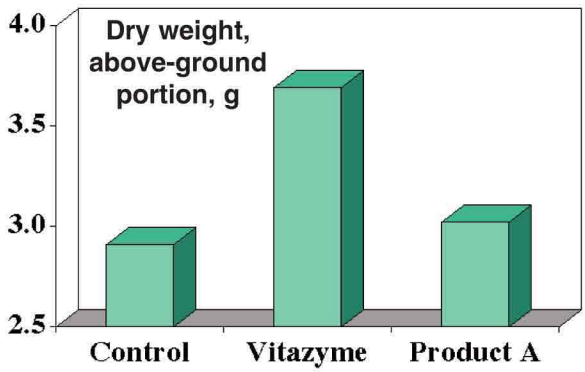
Fresh weight, above ground portion

Treatment	Fresh weight, above-groundportion	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

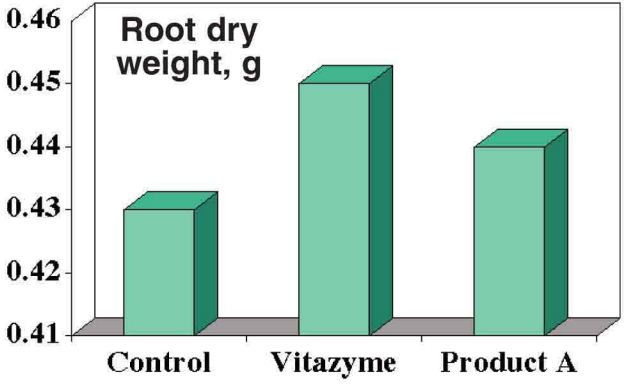


Treatment	Dry weight, above-ground portion	Change
	g	
1. (Control)	2.91	—
2. (Vitazyme)	3.69	+0.78 (+27%)
3. (Product A)	3.02	+0.11 (+4%)

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)

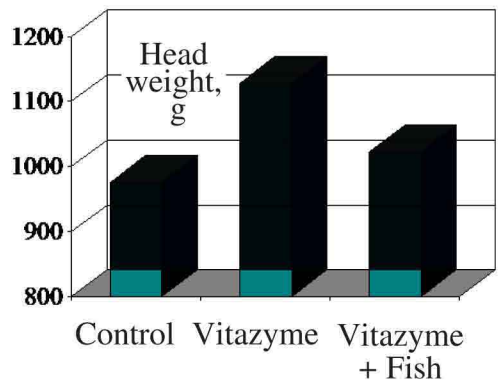
Grower: Gene Jackson Farms (Duda Farms), Jerry Benson, agronomist
Location: Maxwell Ranch, Ventura County, CA *Variety*: unknown
Planting date: January 12, 2000 (seeds) *Planting rate*: one seed every 10 inches with two rows per bed, on 40-inch spaced beds
Experimental design: A 20-foot section of row 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

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



Head weight increase: 16%

Total Yield

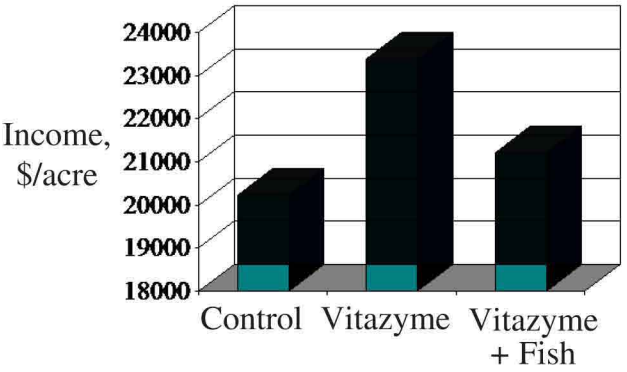
Treatment	Yield, lb/acre*	Change
Control	67,405	-
Vitazyme	77,907	10,502
Vitazyme + Fish	70,653	3,248

* Harvested area per treatment: 0.00015942 acre.

Total yield increase: 16%

Income

Treatment	Income, $/acre*	Change
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.

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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%