Cabbage *with Vitazyme application (Brassica oleracea capitata alb)*

—A Synergism Trial with Bio Seed

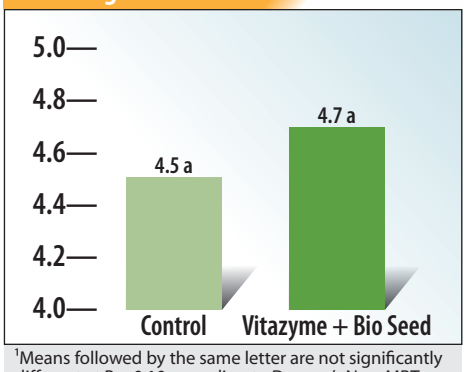
Researcher: David Holden ***Research organization:*** Holden Research and Consulting, Camarillo, California
Study directors: Tristan Hudak ***Location:*** Deardorff Family Farms, Ventura County, Somis, California ***Variety:*** unknown
Soil test values: pH = 7.5, organic matter = 2.8%, estimated N-release = 85 lb/acre, P1 = 50 ppm, K = 301 ppm, Mg = 621 ppm, Ca = 2,676 ppm, Na = 113 ppm, NO_3-N = 10 ppm, SO_4-S = 21 pm, Zn = 1.4 ppm, Mn = 2 ppm, Fe = 6 ppm, Cu = 1.1 ppm, B = 0.8 ppm, percent base saturations = 3.9% K, 25.9% Mg, 67.7% Ca, 2.5% Na, cation exchange capacity = 19.7 meq/100 g (all analyses performed at A&L Western Agricultural Laboratories, Modesto, California)
Planting date: October 11, 2018 ***Plot size:*** 10 x 25 ft (250 ft^2) ***Replications:*** 6
Design: randomized complete block design
Experimental design: A small-plot cabbage trial was initiated to evaluate the effect of Vitazyme and Bio Seed on cabbage growth, yield, and profitability.

1 ***Control (Grower Standard)*** **2** ***Vitazyme + Bio Seed***

Fertilization: grower standard
Pest program: grow standard as needed
Vitazyme application: (1) 16 oz/acre (1.3 liters/ha) pre-plant transplant drench; (2) 16 oz/acre (1.3 liters/ha) foliar/soil spray 18 days after planting; (3) 16 oz/acre (1.3 liters/ha) foliar/soil spray 47 days after planting
Bio Seed application: 50 grams/acre as a soil drench at planting. Bio Seed is an array of beneficial bacteria and fungi that populate the root zone of plants.
Plant population results: no significant difference
Root, shoot, and whole plant weights: no significant difference
Leaf chlorophyll values: as measured by a Minolta SPAD Meter, no significant difference
Plant vigor: 0 = least vigor, 5 = greatest rigor (see chart to the right)

Yield and income results: The harvest date was January 4, 2019.

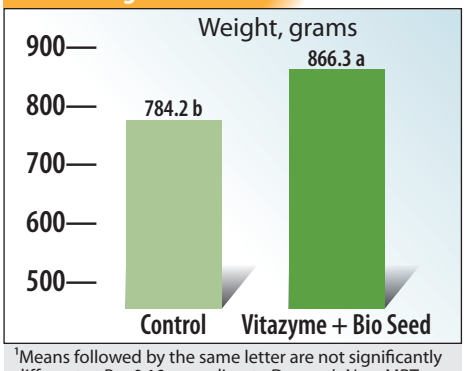
Plant Vigor[1]



[1]Means followed by the same letter are not significantly different at P = 0.10 according to Duncan's New MRT.

Increase in plant vigor with Vitazyme + Bio Seed: 0.2 point

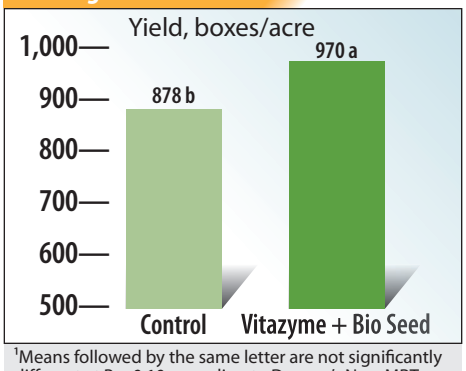
Head Weight[1]



[1]Means followed by the same letter are not significantly different at P = 0.10 according to Duncan's New MRT.

Increase in head weight with Vitazyme + Bio Seed: 10%

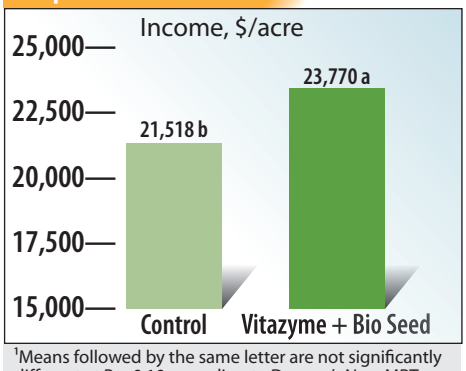
Cabbage Yield[1]



[1]Means followed by the same letter are not significantly different at P = 0.10 according to Duncan's New MRT.

Increase in cabbage yield with Vitazyme + Bio Seed: 10%

Crop Income[1]



[1]Means followed by the same letter are not significantly different at P = 0.10 according to Duncan's New MRT.

Increase in income with Vitazyme + Bio Seed: $2,252/acre

Conclusions: A small-plot cabbage trial in Ventura County, California, in 2018-19, using Vitazyme at planting and twice foliar, plus Bio Seed at planting, caused a significant head weight increase (10%) and yield increase (10%), which provided for an increased income of $2,252/acre. These results show the marked efficacy of these two complementary products for cabbage production in California.

Cabbage *with Vitazyme application*

Researcher: W.H. "Butch" Palmer
Research organization: Reality Research, Williamson, New York
Location: Williamson, New York
Variety: Bronco
Planting date: July 6, 2017
Planting spacing: 18 x 36 inches
Planting rate: 9,680 plants/acre
Plot size: 12 x 100 feet
Experimental design: A randomized complete block design, with four replicates, was established on a cabbage field to determine the effects of Vitazyme and WakeUp Summer, alone and in combination, on the yield and plant characteristics of cabbage grown in New York State.

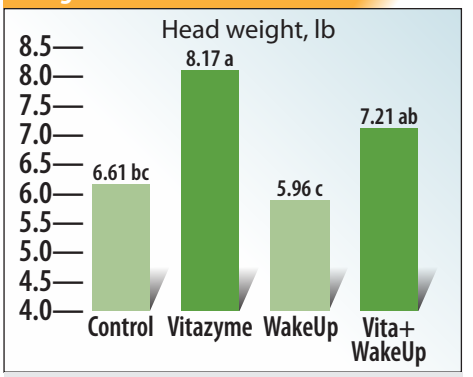
1. ***Control***
2. ***Vitazyme***
3. ***WakeUp Summer***
4. ***Vitazyme + WakeUp Summer***

Fertilization: unknown
Vitazyme application: 13 oz/acre (1 liter/ha) on the seedlings at transplanting on July 7, and 13 oz/acre (1 liter/ha) sprayed on the leaves and soil mid-season on August 14
WakeUp Summer application: 4 oz/acre (0.3 liter/acre) on the seedlings at transplanting on July 7, and 4 oz/acre (0.3 liter/ha) sprayed on the leaves and soil mid-season on August 14
Growing season conditions: favorable
Harvest date: October 5, 2017

Cabbage has always responded extremely well to Vitazyme in trials conducted over many years of research. Note the much growthier treated plants on the right.

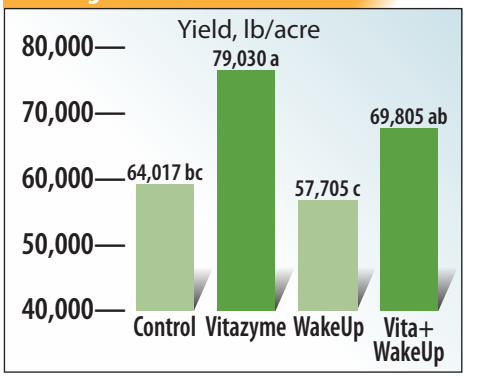
Growth and yield results: Several parameters for the cabbages were measured and are outlined below. For all parameters, means followed by the same letter are not significantly different at P=0.05, using ARM 2014.7 Analysis of Variance.

Weight of One Head*

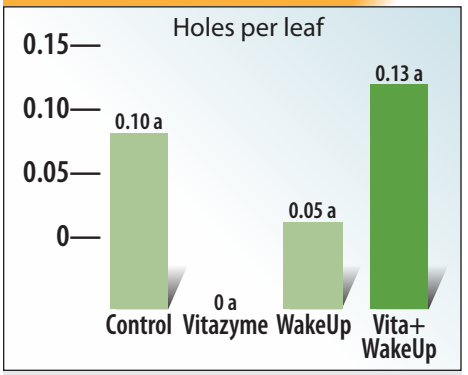


*Ten heads were evaluated per treatment

Cabbage Yield

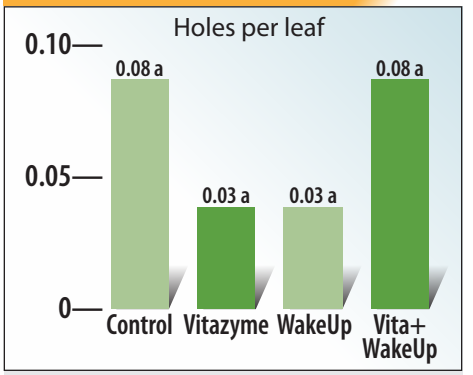


Holes on Leaf 1*



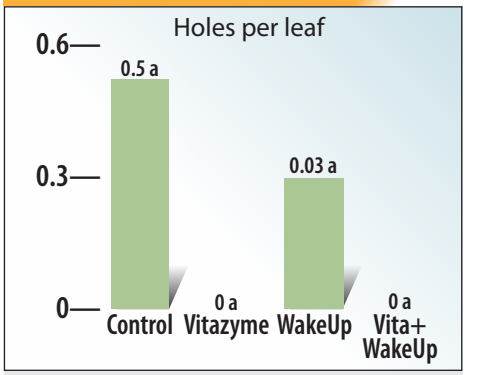
*Number of holes were evaluated on the first three leaves peeled back from the head. 0=clear, 1=1 to 2 holes, 2= 3 to 10 holes, and 3> 10 holes.

Holes on Leaf 2*



*Number of holes were evaluated on the first three leaves peeled back from the head. 0=clear, 1=1 to 2 holes, 2= 3 to 10 holes, and 3> 10 holes.

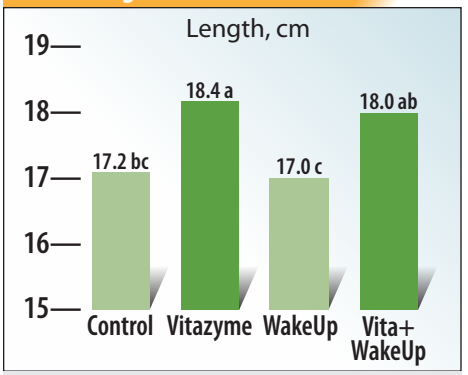
Holes on Leaf 3*



*Number of holes were evaluated on the first three leaves peeled back from the head. 0=clear, 1=1 to 2 holes, 2= 3 to 10 holes, and 3> 10 holes.

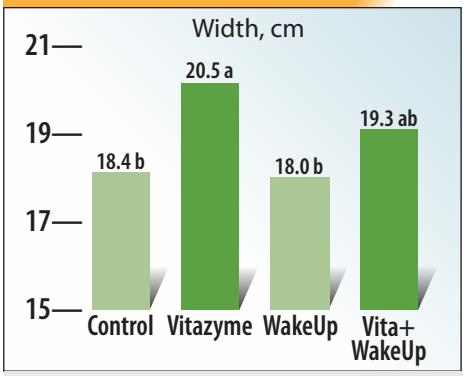
Leaf fungal infection: All three exterior leaves were evaluated for fungal infection, and there were no significant differences in the disease incidence for any treatment.

Head Length*



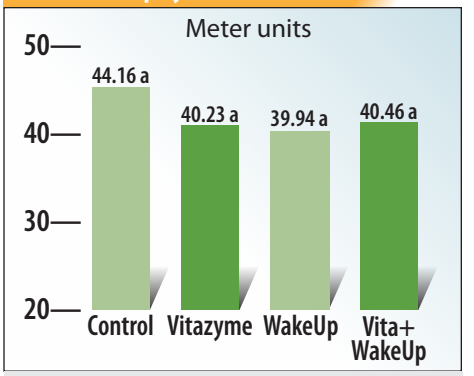
*Measurements made on cut halves of heads.

Head Width*



*Measurements made on cut halves of heads.

Leaf Chlorophyll*



*Measured with an A+Leaf Meter.

Parameter	Change from the control		
	Vitazyme	WakeUp	Vita + WakeUp
Head width	+24%	-10%	+9%
Yield	+24%	-10%	+9%
Holes on leaf 1	No significant differences		
Holes on leaf 2	No significant differences		
Holes on leaf 3	No significant differences		
Leaf fungal infection	No significant differences		
Head length	+7%	-1%	+5%
Head width	+11%	-2%	+5%
Leaf chloryphyll	-9%	-10%	-8%

Conclusions: This cabbage trial in western New York State revealed that two Vitazyme applications, at planting and mid-season, greatly increased cabbage weight and yield (24%). Both head length and width were increased by 7% and 11%, respectively, although leaf chlorophyll was slightly reduced, though not significantly. Worm holes in leaves were not different for any of the treatments, nor were fungal infections. WakeUp Summer, applied at 4 oz/acre (0.3 liter/ha), reduced the yield and head weight, length and width slightly, whereas the combined products provided modest yield weight and size gains, though these were statistically the same as the control. This trial shows no synergism between Vitazyme and WakeUp Summer at the timing and rates used.

Cabbage *with Vitazyme application*

Researcher: W.H. "Butch" Palmer
Research organization: Reality Research, Williamson, New York
Location: Willliamson, New York
Variety: unknown
Planting date: June 22, 2016
Planting rate: about 21,780
Soil test values: Soil samples were taken for each treatment on June 30, 2016.

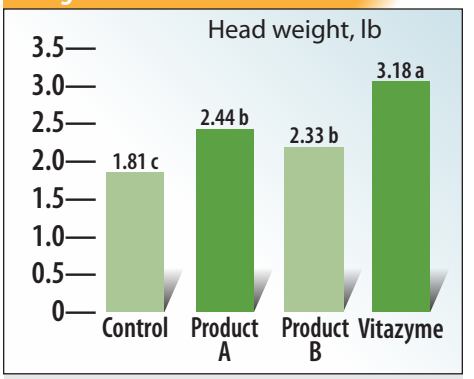
Treatment	pH	Potassium		Magnesium		Calcium	
		lb/acre	% B.S.	lb/acre	% B.S.	lb/acre	% B.S.
1	5.0	175	2.1	140	5.5	1591	37.5
2	5.2	179	2.6	106	5.0	1165	33.1
3	5.3	234	3.1	140	6.1	1403	36.5
4	6.8	224	2.6	303	11.4	3007	67.7

Experimental design: A randomized complete block design with four replications was established to determine the effect of Vitazyme and two other products on yield and growth parameters.

1 ***Control*** **2** ***Product A*** **3** ***Product B*** **4** ***Vitazyme***

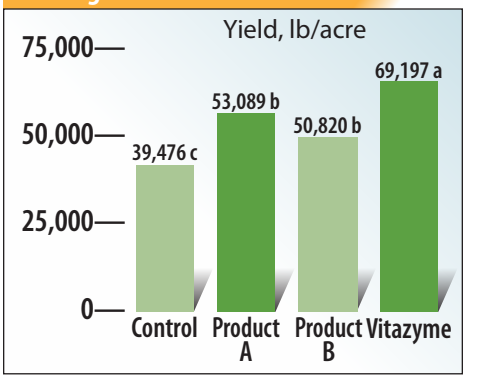
Fertilization: 400 lb/acre of a 15-15-15% N-P_2O_5-K_2O fertilizer preplant
Vitazyme application: four applications: 16 oz/acre (1.3 liters/ha) at planting (June 22), on July 15, on August 9, and on August 31
Product A and Product B applications: Both products were applied at 4 oz/acre (0.3 liter/ha) at planting (June 22), on July 15, on August 9, and on August 31.
Growing season conditions: favorable
Harvest date: October 13, 2016
Growth and yield results: Several parameters for the cabbages were measured and are given below. For all parameters, means followed by the same letter are not significantly different at P=0.05, using ARM 2014.7 Analysis of Variance.

Weight of One Head*

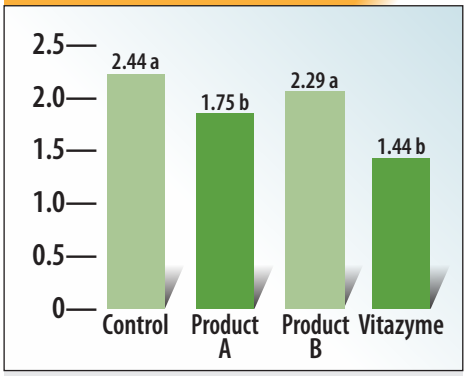


*Twelve heads were evaluated per treatment.

Cabbage Yield

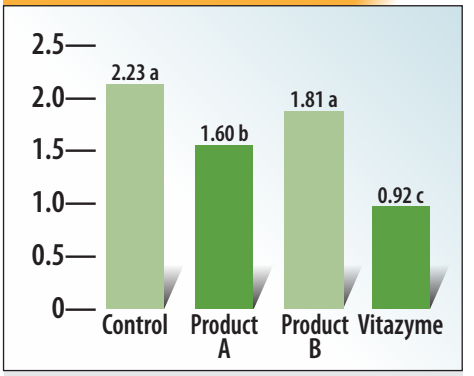


Holes On Leaf 1*



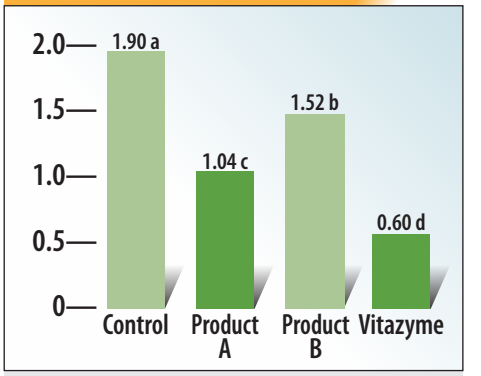
*Number of holes were evaluated on the first three leaves peeled back from the heads. 0 = clean, 1 = 1 to 2 holes, 2 = 3 to 10 holes, and 3 = > 10 holes.

Holes On Leaf 2*



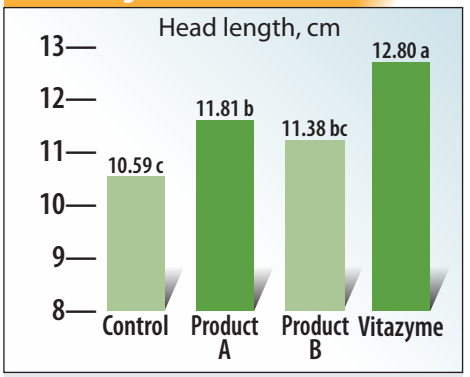
*Number of holes were evaluated on the first three leaves peeled back from the heads. 0 = clean, 1 = 1 to 2 holes, 2 = 3 to 10 holes, and 3 = > 10 holes.

Holes On Leaf 3*



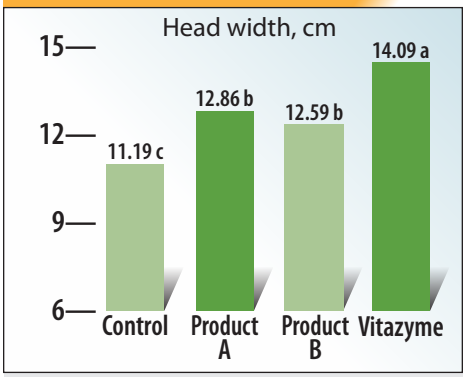
*Number of holes were evaluated on the first three leaves peeled back from the heads. 0 = clean, 1 = 1 to 2 holes, 2 = 3 to 10 holes, and 3 = > 10 holes.

Head Length*



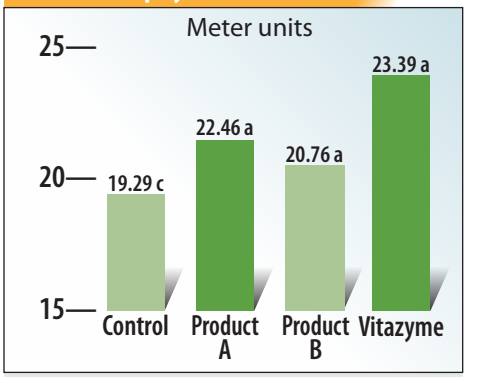
*Measurements made on cut halves of heads.

Head Width*



*Measurements made on cut halves of heads.

Leaf Chlorophyll*



*Measured with an A+Leaf Meter.

Parameter	Change from the control		
	Product A	Product B	Vitazyme
Head weight	+35%	+29%	+76%
Yield	+34%	+29%	+75%
Holes on leaf 1	-28%	-6%	-41%
Holes on leaf 2	-28%	-19%	-59%
Holes on leaf 3	-45%	-20%	-68%
Head length	+12%	+7%	+21%
Head width	+15%	+13%	+26%
Leaf chlorophyll	+16%	+8%	+21%

Conclusions: This 2016 cabbage trial in New York, comparing Product A, Product B, and Vitazyme, revealed that Vitazyme increased the head weight (76%), yield (75%), head length (21%), and head width (26%) significantly above the control and both Products A and B in every case. Products A and B in most cases significantly increased these parameters above the control, but were less effective in such improvements than was Vitazyme. Insect damage to the three outer leaves of the cabbage heads was significantly less with Vitazyme compared to the control, and both Products A and B, showing that Vitazyme appeared to have some anti-insect effect on the insect larvae. Although leaf chlorophyll was greatest for Vitazyme, it was not significantly greater at P=0.05 than the other treatments. These results prove the great effectiveness of Vitazyme using four 16 oz/acre (1.3 liters/ha) applications, to increase cabbage yield and quality in New York State.

Chinese Cabbage *with Vitazyme application*

Researchers & organization: Personnel at the Research and Development Division, An Giang Plant Protection Joint Stock Company, Long Xuyen City, An Giang Province, Viet Nam.

Location: Hamlet 3, Tan Tay Village, Go Cong District, Tien Giang Province, Viet Nam

Variety: unknown

Planting date: April 21, 2015

Experimental design: Plot areas at 80 m^2 were prepared to evaluate the relative merits of several products on Chinese cabbage growth and yield. Products were applied two times.

Product	Dilute rate	Application rate
Control	0	0
Comcat 150 WP	0.3125 g/liter	0.125 kg/ha
Rachet	1.5 ml/liter	0.6 liter/ha
Rhizomyx 2.5 G	1 kg/1,000m^2	10 kg/ha
Vitazyme	3.125 ml/liter	1.25 liters/ha
*Vitazyme Blue	3.125 ml/liter	1.25 liters/ha

*Vitazyme Blue is a version of Vitazyme containing cobalt and certain other added components for greater responses in specialty crops.

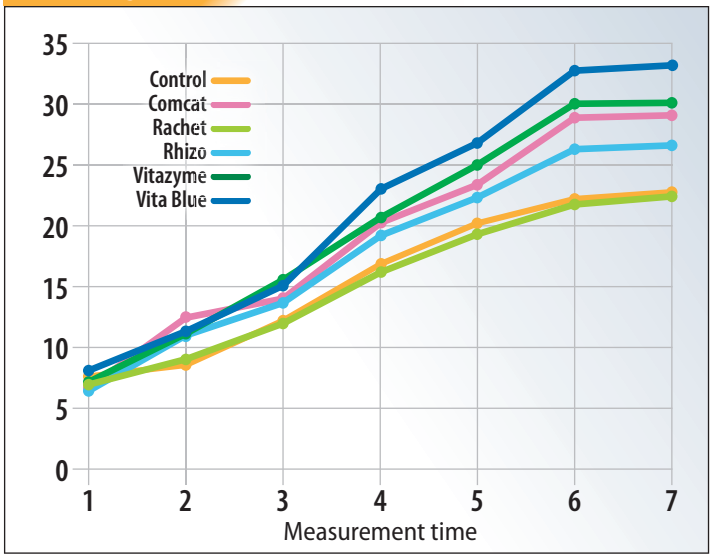
Fertilization: (1) Before planting 4 to 5 days, 100 kg/1,000 m^2 P_2O_5; (2) seven days after planting 10 kg/1,000 m^2 urea (46% N); (3) 15 days after planting, 10 kg/1,000 m^2 urea and 5 kg/1,000 m^2 DAP (di-ammonium phosphate); (4) 25 days after planting, 7 kg/1,000 m^2 urea and 5 kg/1,000 m^2 DAP; (5) 32 days after planting, 20 kg/1,000 m^2 urea and 30 kg/1,000 m^2 16-16-8 % N - P_2O_5- K_2O

Product application: at the times shown above on April 21 (10 days after planting) and April 29 (18 days after planting).

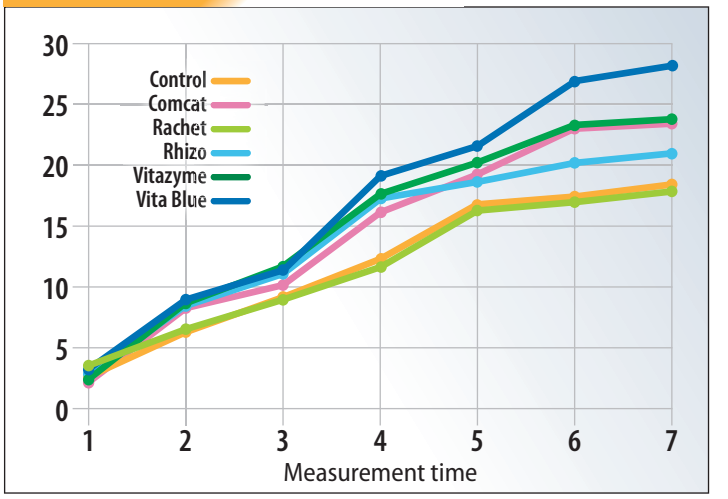
Plant growth results: Thirty selected average plants for each plot were measured just before the product applications, and then every 7 days until harvest.

Conclusion: This Vietnamese demonstration trial, using plots that were 80m^2, and with sampling of 30 selected plants at seven times during the growing period, revealed that Vitazyme Blue performed the best in terms of plant height, leaf width, leaf length, leaf numbers, head diameter, plant weight (+67.6%), and final yield (+56.6%). These values were followed by Vitazyme, which increased plant weight by 54.4%, and final yield by 48.9%. Comcat 150 WP was slightly below Vitazyme in terms of growth response and yield, while Rachet and Rhizomyx 25G produced much lower yield increases. These results show the great efficiency of Vitazyme Blue as a yield-promoting agent for Chinese cabbage growers in Viet Nam, and also Vitazyme, followed by Comcat 150 WP.

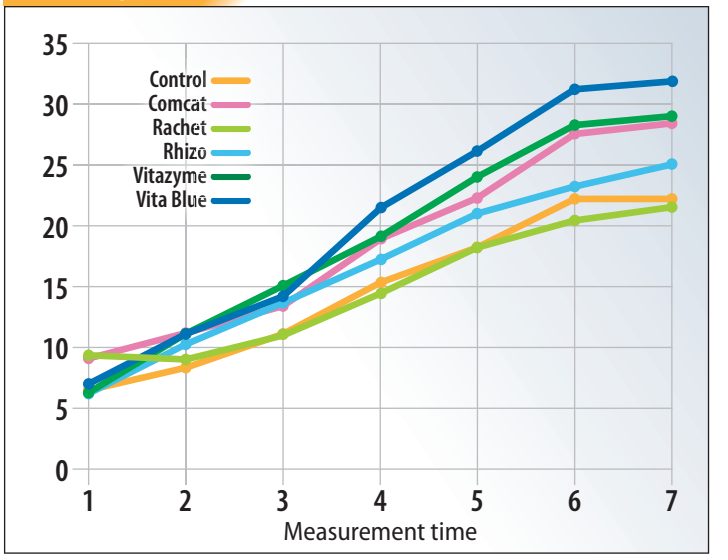
Plant Height, cm



Leaf Width, cm

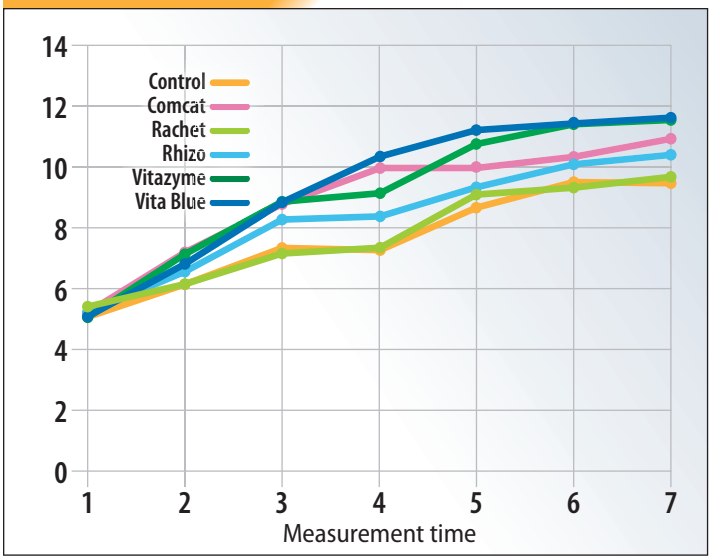


Leaf Length, cm

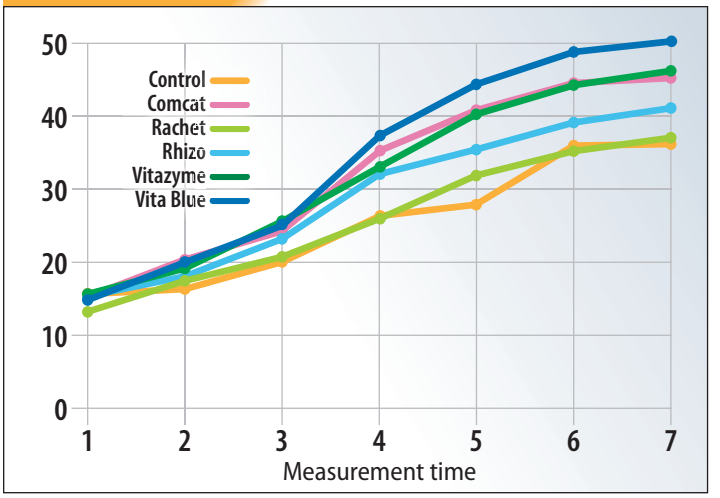


Chinese Cabbage *with Vitazyme application cont.*

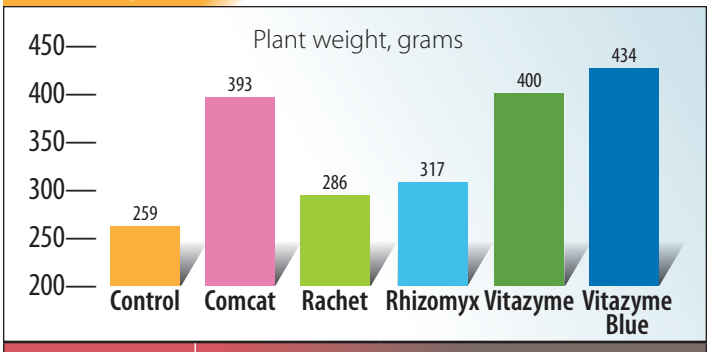
Leaf Number, Per Plant



Head Diameter, cm

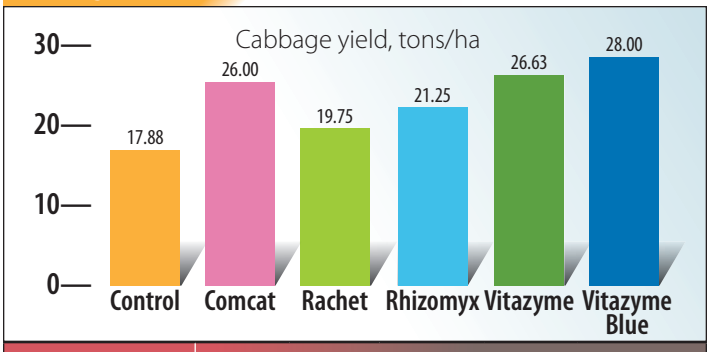


Plant Weight



Increase above the Control:	51.7%	10.4%	22.4%	54.4%	67.6%

Cabbage Yield



Increase above the Control:	45.4%	10.5%	18.8%	48.9%	56.6%

Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
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2014 Crop Results

Vitazyme on Cabbage

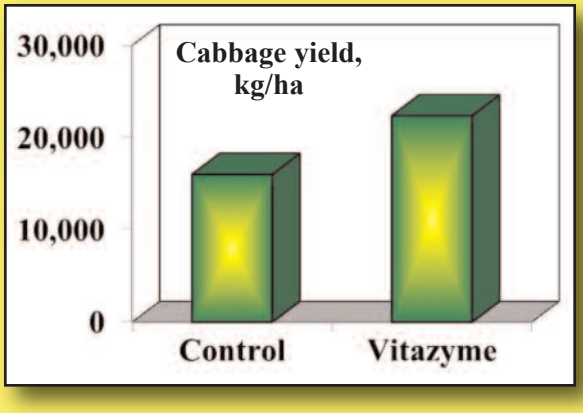
Researcher: Thiery Pelette *Research organization*: Acra Industries, Haiti
Location: Belladere, Haiti *Variety*: Tropicana *Planting date*: unknown
Experimental design: This experiment was part of a multi-crop testing program that was established in December of 2011, to evaluate the efficacy of Vitazyme for increasing crop yields in Haiti. The test area was 1 hectare (10,000 m^2) for the treated and control plants.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1 liter/ha (13 oz/acre)
Harvest date: unknown
Yield results:

Treatment	Yield	Yield change
	kg/ha	kg/ha
Control	15,999	—
Vitazyme	22,353	6,354 (+40%)

Increase in cabbage yield with Vitazyme: 40%



Conclusions: A cabbage study in Haiti revealed a great increase in yield with Vitazyme application, the treated plants producing 40% more than the untreated control cabbage. This program is shown to hold great promise in helping to alleviate food production problems in this developing country.

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2009 Crop Results

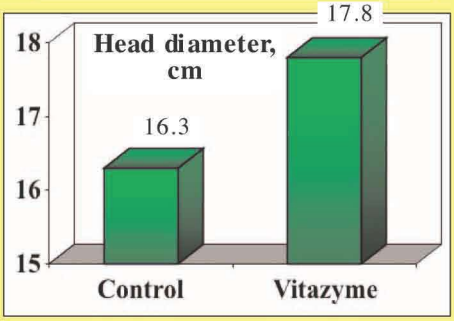
Vitazyme on Cabbage

Researchers: Wang Zhongyan, Peng Juncal, Cai Jinshu, Yi Chun, Xino Wenzhong, Peng Fengxiang, Li Qunfeng, and Shen Ying, Hunan Horticultural Research Institute
Location: Xinzhou, Jinshi, Hunan, China *Variety*: Jingfeng 1 *Planting date*: July 25, 2009
Experimental design: A two treatment design with three replications was placed with a cabbage field, each plot being 0.4 heaters. The purpose of the study was to evaluate the efficacy of this product to promote yield and crop income.

1. Control **2. Vitazyme**

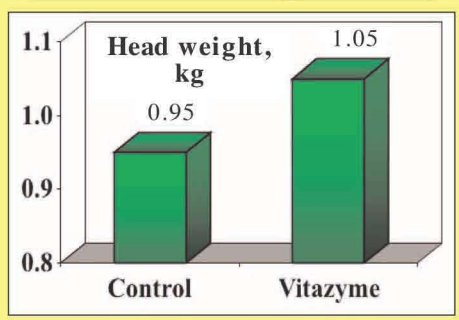
Fertilization: unknown
Vitazyme application: (1) seeds soaked in a 5% Vitazyme solution for 5 minutes (July 25); (2) transplant roots dipped in a 1% solution for 5 minutes (August 30); (3) 1.0 liter/ha sprayed on the leaves and soil 30 days after transplanting (September 30); (4) 1.0 liter/ha sprayed 60 days after transplanting (November 2)
Harvest date: unknown
Yield results:

Head Diameter



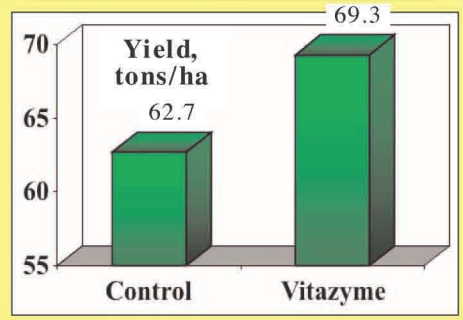
Increase in head diameter with Vitazyme: 9%

Head Weight



Increase in head weight with Vitazyme: 11%

Cabbage Yield



Increase in cabbage yield with Vitazyme: 11%

Income results:

Treatment	Income	Change
	-------- RMB/ha ----------	
Control	50,160	—
Vitazyme	55,440	5,280 (+11%)

Increase in income with Vitazyme: 11%

Conclusions: This cabbage study in China, where Vitazyme was applied on the seeds, transplants, and twice on the leaves and soil, revealed increases in head diameter (9%) and head weight (11%), plus an 11% increase in yield. Moreover, the income was increased by 11% with Vitazyme compared to the untreated control. These results show that this product can excellently improve cabbage yield and income in China.

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2008 Crop Results

Vitazyme on Cabbage

Researcher: unknown
Variety: KK cross
Planting date: spring, 2008
Location: Hoai Duc, Ha Tay, Viet Nam
Soil Type: alluvial soils of the Red River
Planting density: unknown

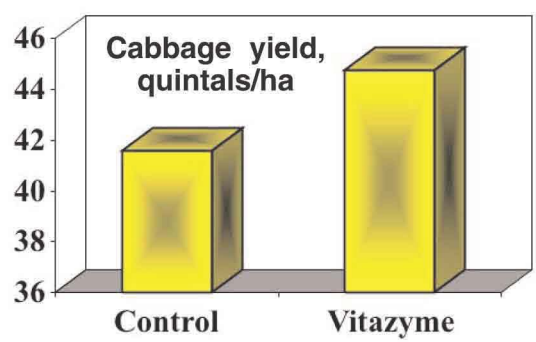
Experimental design: A field of cabbage was divided into Vitazyme treated and untreated areas for the purpose of evaluating the effect of the product on cabbage yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: two applications of 1 liter/ha each time (times unknown)
Harvest date: unknown, in 2008
Yield results:

Treatment	Yield	Change
	quintals/ha	quintals/ha
Control	41.58	—
Vitazyme	44.75	3.17 (+8%)

Increase in cabbage yield: 8%



Income results: an income increase of 4,140,000 Vnd/ha

Conclusions: Vitazyme in this Viet Nam trial increased cabbage yield by 8%, a very profitable increase on this alluvial river bottom soil. Note also the good increase in income from just two Vitazyme applications.

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2008 Crop Results

Vitazyme on Cabbage

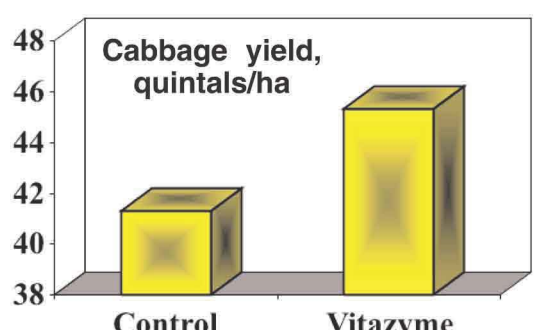
Researcher: unknown
Variety: Dong Du
Planting date: spring, 2008
Location: Minh Khai and Tu Liem, Viet Nam
Soil Type: alluvial soils of the Red River
Planting density: unknown
Experimental design: A field of cabbage was divided into Vitazyme treated and untreated areas for the purpose of evaluating the effect of the product on cabbage yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: two applications of 1 liter/ha each time (times unknown)
Harvest date: unknown, in 2008
Yield results:

Treatment	Yield	Change
	quintals/ha	quintals/ha
Control	41.30	—
Vitazyme	45.34	4.04 (+10%)

increase in cabbage yield: 10%



Income results: an income increase of 5,445,000 Vnd/ha
Conclusions: Vitazyme in this Viet Nam trial increased cabbage yield by 10%, a very profitable increase on this alluvial river bottom soil.

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2008 Crop Results

Vitazyme on Cabbage

Researcher: unknown
Variety: KK cross
Planting date: spring, 2008
Location: Thanh Xuan, Soc, Viet Nam
Soil Type: gray, "exhausted" soil
Planting density: unknown

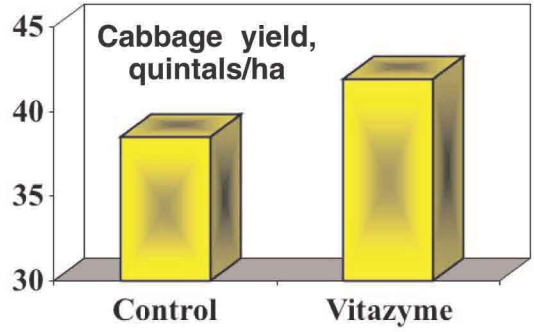
Experimental design: A field of cabbage was divided into Vitazyme treated and untreated areas for the purpose of evaluating the effect of the product on cabbage yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: two applications of 1 liter/ha each time (times unknown)
Harvest date: unknown, in 2008
Yield results:

Treatment	Yield	Change
	quintals/ha	quintals/ha
Control	38.50	—
Vitazyme	41.93	3.43 (+9%)

Increase in cabbage yield: 9%



Income results: an income increase of 4,530,000 Vnd/ha
Conclusions: Vitazyme in this Viet Nam trial increased cabbage yield by 9%, a very good increase on this highly farmed, exhausted soil. Besides, income was increased substantially.

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2007 Crop Results

Vitazyme on Cabbage, Organic

Researchers: Jorge Gonzalez Acosta and Wilberto Gonzalez Marrero
Organization: Ministry of Sugar, Camilo Cienfuegos Agricultural Enterprise
Location: Villena Farm, Havana Province, Cuba
Variety: Hercules
Soil type: red ferralitic, organic beds
Watering: rainfed
Planting date: September 1, 2006
Experimental design: A 0.02 ha area was selected to evaluate the effectiveness of Vitazyme in promoting cabbage yields. The crop was treated twice, and observed carefully throughout the growing cycle.

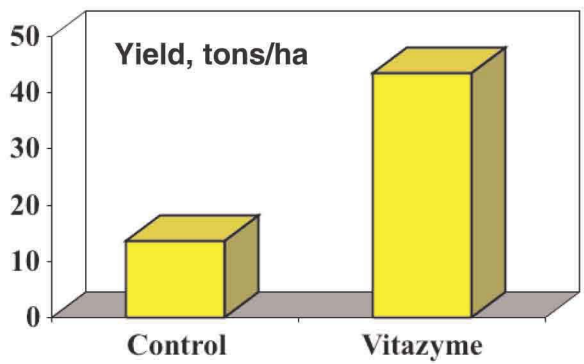
1. Control **2. Vitazyme**

Fertilization: according to recommendations
Vitazyme application: 1 liter/ha sprayed on September 20, 2006, 19 days after transplanting, and again on October 23, 33 days later
Harvest date: December 30, 2006

Treatment	Yield	Change
	tons/ha	tons/ha
Control	13.6	—
Vitazyme	43.5	29.9 (+220%)
Historic yield	6.5	—

Increase in cabbage yield: 220%

Cabbage Yield



Conclusions: This Cuban cabbage trial revealed how effective Vitazyme can be in enhancing cabbage yield under organic growing conditions. This dramatic response has been rather typical with various vegetable crops receiving Vitazyme across Cuba.

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2007 Crop Results

Vitazyme on Cabbage

Researcher/Farmer: Kludt Brothers, Inc.
Variety: Morton (a kraut variety)
Planting rate: 11,600 plants/acre
In-row spacing: 18 inches
Planting date: May 7, 2007
Location: Kendall, New York
Soil type: sandy loam
Row spacing: 30 inches
Irrigation: none

Experimental design: A cabbage field was divided into a portion treated with Vitazyme at planting, and an area alongside treated with Black Label (a United Agri-Products material) to compare final yield.

1. Black Label **2. Vitazyme**

Fertilization: 350 lb/acre of 0-0-60% N-P_2O_5-K_2O applied pre-plant; 13 gal/acre 7-21-7% N-P_2O_5-K_2O starter at planting; 34 gal/acre of 30% N sidedressed
Vitazyme application: 13 oz/acre in the starter fertilizer at planting
Black Label application: the correct amount according to label directions
Chlorophyll levels: On August 15, a Minolta SPAD meter was used to evaluate the leaf chlorophyll level. Results are given below.

Treatment	SPAD values*	Change
	SPAD units	
Control	69.6	—
Vitazyme	72.2	+2.6

*Average of 30 leaves per treatment.

Increase in leaf chlorophyll with Vitazyme: 2.6 SPAD units

Harvest date: September 5
Yield results: One complete row of each treatment was harvested, which were side-by-side at the treatment border. The per-acre difference in yield was calculated at that time, but the per acre values were not saved; only the increase was recorded. Yields below are based on the field average for 2007.

Treatment	Yield		Yield change
	lb/acre	tons/acre	tons/acre
Control	80,600	40.30	—
Vitazyme	82,150	41.08	0.78 (+2%)

Yield increase with Vitazyme: 2%

Income results: Based on a kraut cabbage value of $65.00/ton, the extra 0.78 ton/acre yield increase brought **an additional $50.70/acre** to the grower.
Conclusions: In this New York cabbage trial, Vitazyme, a natural growth regulator biostimulant, increased the yield by 2% above a starter fertilizer + humate product called Black Label. Ordinarily Vitazyme would be applied along with such a material to improve its efficacy, since it works by improving nutrient availability. This 2% yield enhancement resulted in a $50.70/acre increase in income.

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2006 Crop Results

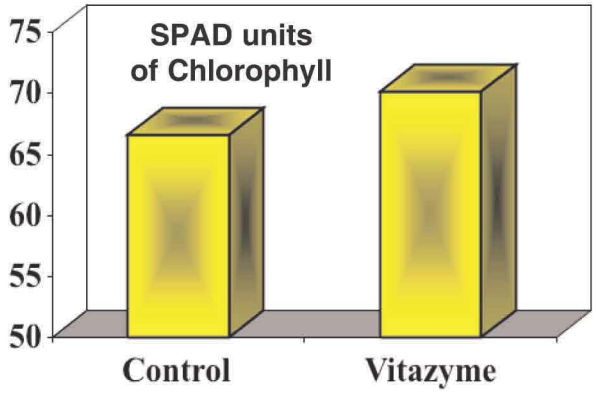
Vitazyme on Cabbage

Research location: Ontario County, New York
Planting date: May 5 (transplants)
In-row spacing: 20 inches
Population: 10,454 plants/acre
Variety: Fresco (a kraut or fresh type)
Soil type: gravely loam
Row spacing: 30 inches
Harvest date: August 8

Experimental design: A cabbage field was divided into untreated and Vitazyme treated areas to determine effects of the product on cabbage yield.

1. Control **2. Vitazyme**

Fertilization: a standard N-P-K program
Vitazyme application: 13 oz/acre in the transplant water
Weather for the season: adequate moisture until August, then excessive
Chlorophyll results: On August 8, chlorophyll readings were made using a Minolta SPAD meter (30 leaf samples per average).

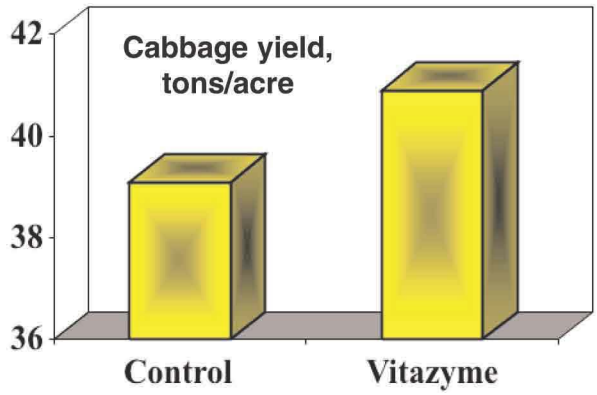


Increase in chlorophyll with Vitazyme: 3.5 SPAD units

Yield results: Sections of equal length were measured and flagged in both treatments. The cabbage harvested from the two areas were 4,440 lb for the control and 4,620 lb for the treated row. This yield was superimposed on an average yield of 40.0 tons/acre to calculate treatment yield.

Treatment	Cabbage yield	Yield increase
	tons/ha	tons/ha
Control	39.1	—
Vitazyme	40.9	1.8 (+5%)

Cabbage yield increase: 5%



Income results: Cabbage sells for about $50/ton, so the gross income for the treatments would be $1,955/acre for the control and $2,045/acre for the Vitazyme treatment.

Increase in income with Vitazyme: $90/acre

Conclusions: This New York study, which evaluated the effects of Vitazyme on cabbage yield, showed that a single 13 oz/acre rate in the transplant water increased the yield by a very profitable 5%. This increase translated into an additional $90/acre, or an increase of about $22.50/acre for every dollar invested.

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2006 Crop Results

Vitazyme on Cabbage

Location: Monroe County, New York
Variety: Artist
Planting date: April 25, 2006 (transplants)
Soil type: sandy loam
Previous crop: soybeans

Experimental design: This study is a comparison of early cabbage yield with previous crops on the same farm, using identical farming practices for the various years except Vitazyme was applied to the field in 2006. The field was treated entirely with Vitazyme.

1. Control (previous crops) **2. Vitazyme**

Fertilization: 1,000 lb/acre of 10-20-20% N-P_2O_5-K_2O; 10 gal./acre 32% liquid N sidedressed

Vitazyme application: 13 oz/acre at transplanting in the transplant water; 13 oz/acre twice more at 30-day intervals

Weather: Rainfall was ample to excessive throughout the cropping cycle.

Harvest date: July 11 to 18, 2006

Harvest date	Gross box weight	Net weight
	lb	lb
July 11	1,875	62,147
July 14	1,904	119.803
July 15	1,885	59,229
July 17	1,944	88,594
July 18	1,944	103,952
Total	9,552	433,725 (216.86 tons)
Average	1,915	[25.51 tons/acre]

Yield results:

For 2006 (with Vitazyme)
Area harvested: 8.5 acres
Average yield: 25.51 tons/acre
Average box weight: 1,915 lb

For previous years (no Vitazyme)
Average early cabbage yield is 20 to 22 tons/acre (about 21 tons/acre).
The average box weight is about 1,750 lb.

Increase in cabbage yield: 4.51 tons/acre (+21%)

Increase in box weight: 165 lb/box (+9%)

Income results: Early cabbage averages about $100/ton. With 4.51 tons/acre above the average yield, the added return would be $451/acre.

Income increase: $451/acre

Conclusions: This early cabbage evaluation in New York revealed that, compared to previous years, Vitazyme substantially improved the yield (21%) and specific gravity (9%) of the crop. These improvements amounted to a $451/acre estimated increased return on the crop. The results are estimates only, but give a reasonable evaluation of the efficacy of Vitazyme for cabbage production on this farm.

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2006 Crop Results

Vitazyme on Cabbage

Researchers: Christy Hoepting and Jeremiah Smith
Research Organization: CCE–Lake Plains Vegetable Program and the New York Crop Research Facility
Location: Batavia, New York
Variety: Amtrack (a storage cabbage)
Planting date: June 28, 2004
Soil type: clayey
Soil test results: organic matter, 3.9%; pH, 7.0; CEC, 9.6 meq/100 g; K, 236 ppm; P (Mehlich), 123 ppm; P (Morgan), 40 ppm; Ca, 1,590 ppm; Mg, 121 ppm; Zn, 2.4 ppm; B, 0.9 ppm; Cu, 2.6 ppm; Al, 758 ppm; base saturation percentages, Ca = 83.1, Mg = 10.5, K = 6.3.
Previous crop: turf (several years)
Row spacing: 30 inches
In-row spacing: 14.5 inches
Experimental design: Seven products produced by different companies were applied to cabbages at transplanting to evaluate the effects on yield and growth parameters. Plots contained 20 heads in a single row, with "guard rows" between treatments. Each treatment was replicated four times. Only one product application was made, at planting.

Treatment	Rate	Active ingredients
1. Control	0	—
2. RiseR	2.5 gal/acre	7-17-3 + Cu, Mn. and Fe + $ZnNH_4$-acetate
3. Super Bio Ag Blend	1.5 gal/acre	3-0-0 + 1% humate + microbes
4. Alpine EXP + 6-24-6	1 qt/acre + 5 gal/acre	Humic coal product + 6-24-6
5. Vitazyme + Alpine EXP + 6-24-6	13 oz/acre + 1qt/acre + 5 gal/acre	Biostimulant + above products (see 3)
6. Fertiactyl GZ	4 pt/acre	13-0-5 + microbes, humates, and fulvic acid
7. Fertiactyl Starter	7 pt/acre	10-5-10 + humates, fulvic acid, zeaton, and glycin bataine
8. Hydra-Hume	2 gal/acre	0-0-2 + 12% humate + 4% fulvic acid

Fertilization: 600 lb/acre Cabbage Blend M (14.7-13.1-2.9-0.7% N-P_2O_5-K_2O-S-Zn) broadcast in the spring; two applications of 32% N Nitan (70 lb/acre N) sidedressed during the growing season
Product application: On June 28 at transplanting, furrows in the field were dug with a hoe and the transplants were placed in them. The products were poured evenly in 350 gal/acre equivalent of water over the transplants to simulate mechanical planter placement.
Growing season: unusually wet and cool all summer, giving high disease pressure (especially black rot), but low insect pressure
Growth results: Field evaluations were made about 2 and 6 weeks (June 16 and August 7, respectively) after planting on 10 randomly selected plants per row. Measurements were made on height, width, leaf number, and overall health. Final yield harvest was made on October 20, at which time overall plant health, head weight, head size and density, and head quality were evaluated.

Plant Size[1]

Treatment	Bareroot[2]		Plugs[2]	
	Two weeks	Six weeks	Two weeks	Six weeks
	cm^2	cm^2	cm^2	cm^2
1. Control	944 a	2450 a	453 b	2172 a
2. RiseR	597 cd	2383 a	290 c	2084 a
3. Super Bio	439 d	1152 c	251 c	1256 c
4. Alpine	602 c	1772 b	408 b	1741 b
5. Vitazyme	752 b	1548 b	460 ab	2132 a
6. Fertiactyl GZ	827 ab	2515 a	474 b	2034 a
7. Fertiactyl St.	937 a	2215 a	527 a	1916 ab
8. Hydra-Hume	742 bc	2370 a	444 b	2034 ab

[1]Plant size = (Plant width)(Plant height), in cm.
[2]Means followed by the same letter are not significantly different at P=0.05 according to Fisher's Protected LSD Test.

Health Rating[1], Pre-Harvest

Treatment	Bareroot[2]		Plugs[2]	
	Two weeks	Six weeks	Two weeks	Six weeks
1. Control	4.4	4.6	4.3	4.8
2. RiseR	4.3	4.1	2.9	4.0
3. Super Bio	2.1	2.4	2.7	2.8
4. Alpine	3.2	3.7	3.7	3.6
5. Vitazyme	3.6	3.0	4.4	4.2
6. Fertiactyl GZ	4.4	4.3	4.5	4.2
7. Fertiactyl St.	4.5	4.1	4.7	4.4
8. Hydra-Hume	4.2	4.6	4.3	4.6

[1]Health rating: 1 = all dead, 5 = plants look very healthy.
[2]No means differed significantly according to Fisher's Protected LSD Test (P=0.05).

There were no significant differences between the eight treatments, in large part due to some very poorly performing plots. The reason for these failures was not known.

Number of Leaves

Treatment	Leaf number at two weeks[1]	
	Bareroot	Plugs
1. Control	10.6 ab	8.8 b
2. RiseR	9.4 bc	7.8 c
3. Super Bio	6.5 e	7.1 c
4. Alpine	7.9 de	7.2 c
5. Vitazyme	9.1 cd	9.1 ab
6. Fertiactyl GZ	10.1 abc	8.9 ab
7. Fertiactyl St.	11.3 a	9.8 a
8. Hydra-Hume	10.1 abc	9.0 ab

[1]Means followed by the same letter are not significantly different at P=0.05 according to Fisher's Protected LSD Test.

The control had the highest leaf number of all treatments for bareroot transplants, and the Fertiactyl Starter did best for the plugs. Vitazyme was only slightly behind behind the control in leaf number for bareroot transplants, and statistically equal to the highest value for plugs.

The control performed the best for total plant size of bareroot transplants at 2 weeks after transplanting, but at 6 weeks the Fertiactyl GZ had surpassed the control slightly, though not significantly. For plugs, Fertiactyl Starter had the biggest plant size, but this size was statistically equal to Vitazyme. At 6 weeks after transplanting all but the Super Bio and Alpine treatments were statistically equal in plant size, the control having the largest plants.

Harvest and yield results: On October 20, 2004, a final overall plant health rating was made. Then every other head, for a total of 10 heads per replicate, was harvested and weighed. Of these 10 heads, five were selected at

random to measure individual weight, length, and width. These data were used to estimate head density. Head quality was also judged at harvest.

No treatment means were significantly different, but there were some notable differences among the treatments. The Hydra-Hume had the highest field (health) rating for bareroot transplants at harvest, while Hydra-Hume,

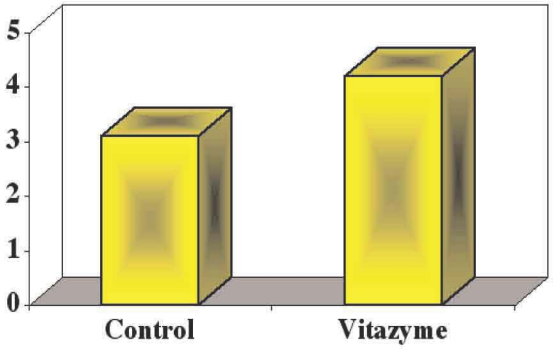
Treatment Head density	Field rating[1]		Head weight		Yield[2]		Head density	
	Bareroot	Plugs	Bareroot	Plugs	Bareroot	Plugs	Bareroot	Plugs
			lb		tons/acre		grams/in^2	
1. Control	4.3	4.2	4.0	3.1	28.8	22.7	0.53	0.48
2. RiseR	4.1	3.8	4.3	3.3	30.4	23.6	0.60	0.57
3. Super Bio	2.4	4.2	3.1	3.3	19.3	20.5	0.58	0.62
4. Alpine	3.7	3.1	3.6	3.4	25.7	19.1	0.57	0.56
5. Vitazyme	3.0	4.2	3.4	**4.2**	21.4	**31.2**	0.57	0.51
6. Fertiactyl GZ	3.9	3.4	3.4	3.0	25.0	21.1	0.62	0.51
7. Fertiactyl St.	3.9	4.3	3.2	3.2	23.3	21.1	0.49	0.61
8. Hydra-Hume	4.7	4.2	4.2	3.2	29.9	23.3	0.50	0.51

[1]Field rating: 1 = all dead, 5 = plants look very healthy.

[2]Estimated yield adjusted for missing plants (i.e., dead), but including unmarketable heads; (average head weight)(14,400 plants/acre) + (2000 lb)(100% – % missing plants).

Fertiactyl Starter, Vitazyme, Super Bio, and the control had virtually identical high ratings for plug transplants. Individual head weight was highest for RiseR and Hydra-Hume for bareroot transplants, but **by far the highest head weight for plugs was with Vitazyme (+35%)**. Estimated yields varied considerably for bareroot plants, being highest for RiseR, Hydra-Hume, and the control, while **Vitazyme produced by far the highest yield for the plug transplants (+37%)**. Head density was highest for Fertiactyl GZ with bareroot plants, and for Super Bio and Fertiactyl Starter for plugs.

Head Weight, lb/head – Plugs

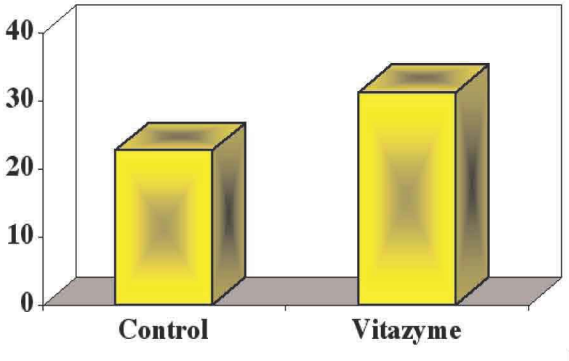


Income results:

Increase in head weight: + 35%

Increase in head yield: + 37%

Cabbage Yield, tons/acre – Plugs



Cost Benefit Per Acre of Materials That Demonstrated Yield Enhancement Capabilities

Treatment	Transplants	Rate/Acre	Yield enhancement[1] Processing		Yield enhancement[1] Fresh market		Cost of product			Cost benefit, $/acre	
			tons/acre	$/acre	tons/acre	$/acre	$/gal	$/acre	Total, $/acre	Processing	Fresh market
RiseR	bareroots	2.5 gal	1.6	77.92	1.6	403.20	8.25	20.63	20.63	57.29	382.57
	plugs	2.5 gal	0.9	43.83	0.9	226.80	8.25	20.63	20.63	23.20	206.17
Vitazyme	plugs	13 oz					45.00	4.57			
Alpine EXP		1 qt					10.00	2.50			
6-24-6		5 gal	8.5	413.95	8.5	2,142.00	2.70	13.50	20.57	393.38	2,121.43
Hydra-Hume	bareroots	2 gal	1.1	53.57	1.1	277.20	6.50	13.00	13.00	40.57	264.20
	plugs	2 gal	0.6	29.22	0.6	151.20	6.50	13.00	13.00	16.22	138.20

(From the table on the previous page) [1]USDA average commodity prices: processing = $48.70/ton; fresh = $252.00/ton.

Conclusions: According to the researchers, **"Although not significant, Vitazyme + Alpine EXP 6-24-6 (Treatment 5) on plug transplants had the greatest effect on yield. Compared to the untreated check, this treatment increased yield by 8.5 tons/acre (37.4%) and improved head quality.** RiseR and Hydra-Hume also increased yield by 5.6% and 3.8%, respectively, on bareroots, and by 4.0% and 2.6%, respectively, on plugs, although not significantly. Note, Hydra-Hume did have a higher percentage of poor quality heads at harvest compared to the untreated check."

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2004 Crop Results

Vitazyme on Cabbage

Researcher: Isel Creach Rodriguez, Ph.D. and others *Farm*: Alfride Vazquez *Variety*: unknown
Location: Santiago de Cuba Experiment Station, Dos Rios, Palma Soriano, Santiago de Cuba, Cuba
Soil type: Leptic haplustert *Transplanting date*: unknown *Row spacing*: unknown
Experimental design: Two treatments were set up in a cabbage field to evaluate the effects of Vitazyme on growth and yield. Several growth parameters were measured in addition to final yield.

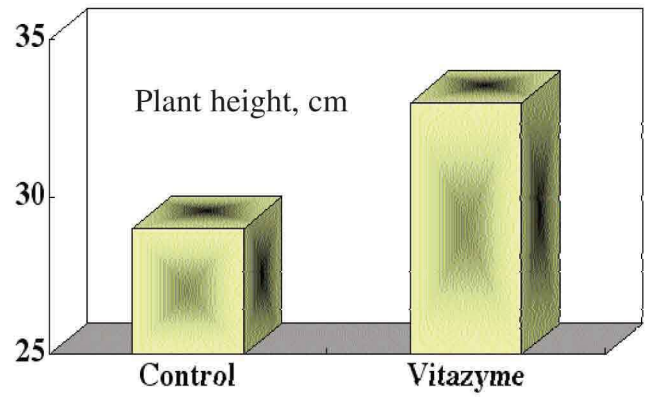
1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme treatment: unknown
Growth and yield results: The parameters shown here were measured at harvest.

Plant Height

Treatment	Height	Change
	cm	cm
Control	29	—
Vitazyme	33	4 (+14%)

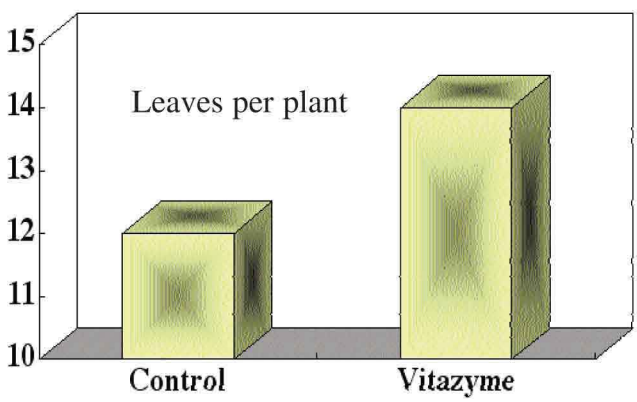
Increase in plant height: +14%



Leaf Width

There was no difference in leaf width for the two treatments. Each averaged 21 cm in width.

Leaves Per Plant



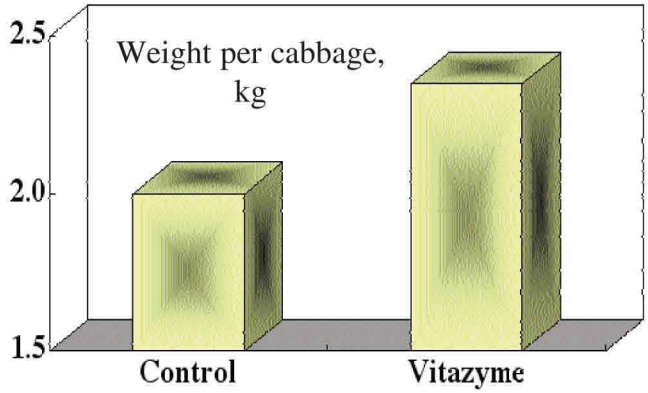
Treatment	Leaves/plant	Change
	number	number
Control	12	—
Vitazyme	14	2 (+17%)

Increase in leaves per plant: +17%

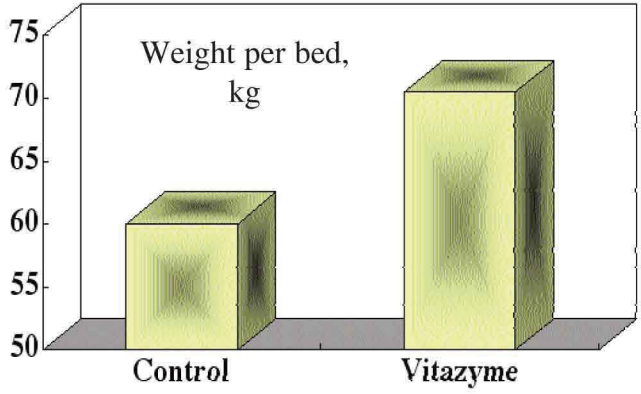
Weight Per Cabbage

Treatment	Weight/Cabbage	Change
	kg	kg
Control	2.00	—
Vitazyme	2.35	0.35 (+18%)

Increase in weight per cabbage: +18%



Cabbage Yield



Treatment	Yield per bed	Change
	kg	kg
Control	60.0	—
Vitazyme	70.5	10.5 (+18%)

Increase in cabbage yield: +18%

Conclusions: Vitazyme applied to cabbages in this Cuban study caused excellent responses in growth parameters (height, +14%; leaves per plant, +17%), as well as yield values. The average cabbage size was increased by 18%, and yield increased by 18% as well. Vitazyme is shown to be a highly effective adjunct to cabbage cultivation in Cuba.

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2001 Crop Results

Vitazyme on Cabbage

University of Costa Rica

Researcher: Oscar Acuna N., M.S. *Location*: Agronomic Research Center, San Jose, Costa Rica, in conjunction with Organic Planet International Corporation

Variety: a standard green heading type

Soil type: unknown *Transplanting date*: unknown

Experimental design: A small plot study involving two treatments of cabbages was established. The two treatments are as follows:

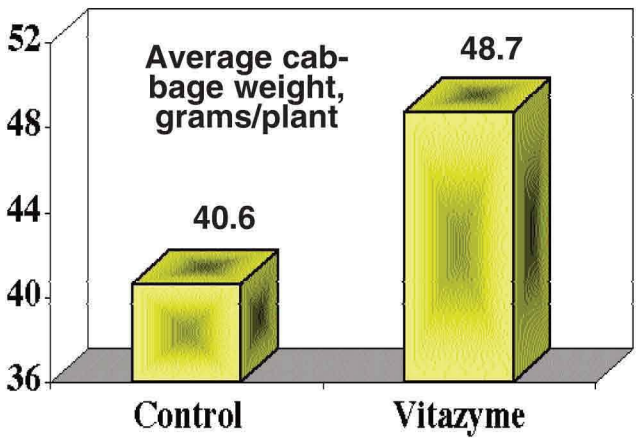
1. Control **2. Vitazyme**

Fertilization: unknown

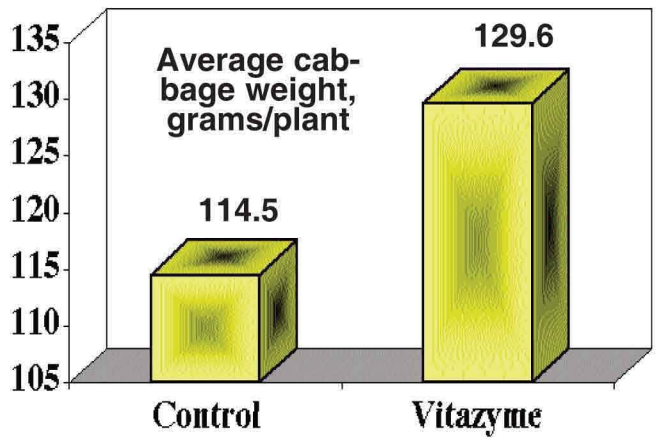
Vitazyme application : A dilute application of Vitazyme was applied to the cabbages of the treated plots 15 days after transplanting, and again 30 days after transplanting.

Growth and harvest results: At 30 days after transplanting (15 days after the first Vitazyme application) a sampling of the weights of plants was made. This sampling was repeated at 60 days after transplanting (30 days after the second application).

Plant weight at 30 days



Plant weight at 60 days



Conclusions: This cabbage study in Costa Rica has shown that Vitazyme can significantly increase the growth of cabbages, beginning at two weeks after the first application and up to at least 45 days later. The following conclusions are offered:

1. Vitazyme stimulates crop development from the early stages of growth.
2. Vitazyme emerges as a good alternative for improving production of vegetable crops.
3. The weight increase generated by Vitazyme is important for producing greater income.

Yield increase at 30 days: 20%
Yield increase at 60 days: 13%

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2000 Crop Results

Vitazyme on Cabbage (Transplants)

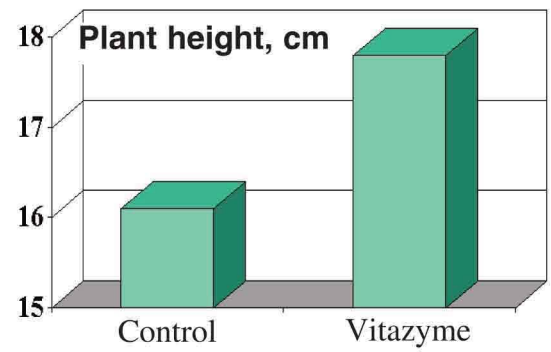
Researcher: Paul W. Syltie
Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Soil medium: Vital Earth Ultra-Blend Potting Soil
Variety: Copenhagen Market *Planting date*: January 19, 2001 *Pot size*: 3.25 in. x 3.25 in.
Experimental design: Forty pots were planted and placed on a greenhouse bench. Half of the pots were treated with Vitazyme and the other half was left untreated.

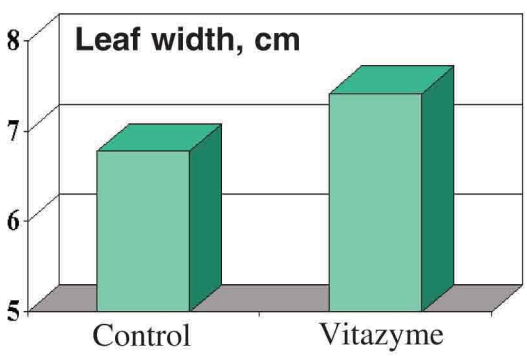
1. Control **2. Vitazyme**

Vitazyme treatment : 50 ml of a 0.1% Vitazyme solution applied to each pot immediately after planting
Growth results: On February 25, 2001, 37 days after planting, the forty plants were measured for height and leaf width, and the data were statistically analyzed as a completely randomized design.

	Control[1]	Vitazyme[1]	Change
		cm	
Plant height	16.1 b	17.8 a	1.7 (+11%)

[1]Means followed by the same letter are not significantly different at P=0.05 according to Tukey's Honestly Significant Difference Test. $LSD_{0.05}$=1.6 cm.





	Control[1]	Vitazyme[1]	Change
		cm	
Plant height	6.78 b	7.42 a	0.64 (+9%)

[1]Means followed by the same letter are not significantly different at P=0.05 according to Tukey's Honestly Significant Difference Test. $LSD_{0.05}$=0.63 cm.

Conclusions:: Vitazyme significantly stimulated the early growth of cabbage transplants, by 11% for height and 9% for leaf width. This early aggressiveness for the plants should translate into more vigorous and profitable growth of mature plants when the product is applied on a commercial scale.

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1999 Crop Results

Vitazyme on Cabbage

Caribbean Chemical International

Researcher: Chris Teixeira, agronomist *Location*: Paramin, Trinidad, West Indies
Variety: Salvation *Transplanting date*: September 21, 1999 *Harvest date*: November 30,1999
Experimental design: A cabbage field was divided into two parts, one portion treated with Vitazyme and the other left untreated.

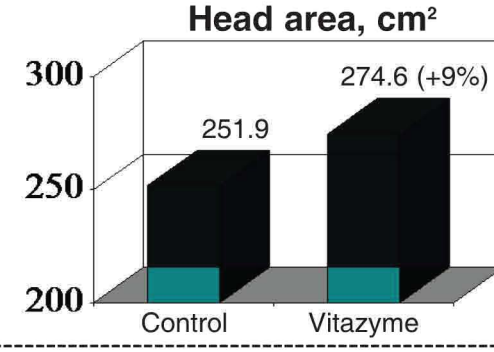
1. Control **2. Vitazyme**

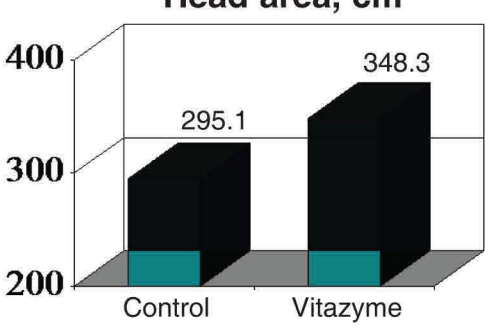
Fertilizer treatments: 8 and 35 days after transplanting, topdress with 15 g/plant 20-10-10% N-P_2O_5-K_2O
Vitazyme application: A 1% Vitazyme solution was sprayed on the leaves and soil on October 5 and 24, 1999.
Growth results: Ten representative heads were evaluated from each treatment on each date, and five representative heads were weighed from each treatment for head weight on November 30.

November 10, 1999

	Head area, cm²	Increase, cm²
Control	251.9	---
Vitazyme	274.6	22.7 (+9%)

At this date there was no major **color** difference.
Head formation was slightly more advanced with Vitazyme.





November 30, 1999

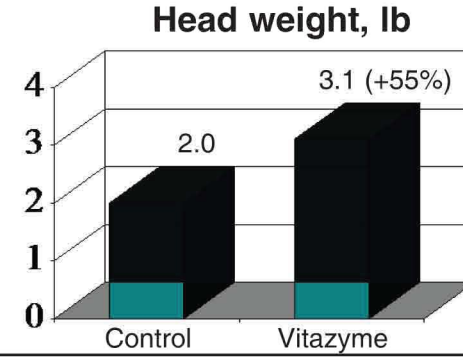
	Head area, cm²	Increase, cm²
Control	295.1	---
Vitazyme	348.3*	53.2 (+18%)

*Significantly greater than the control at p=0.03 (Duncan's test.)

Head size increase: 9%

	Head weight, lb	Increase, lb
Control	2.0	---
Vitazyme	3.1	1.1 **(+55%)**

By harvest time the Vitazyme treated cabbages were **much larger** than the control cabbages. There was also substantially **more root mass** with Vitazyme, and the heads were **visibly "tighter."**



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1999 Crop Results

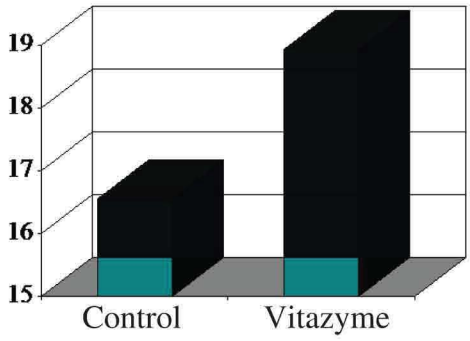
Vitazyme on Transplants

A Greenhouse Study with Red Cabbage, Green Cabbage, and Broccoli

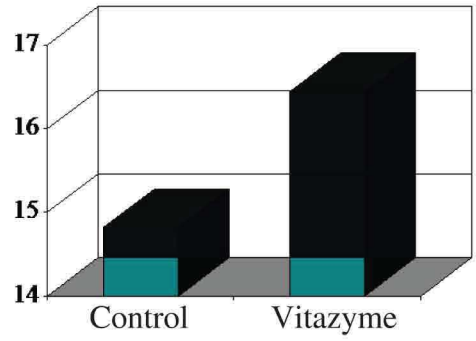
Researcher: Paul W. Syltie, Ph.D. *Location*: Vital Earth Resources Green house, Gladewater, Texas
Varieties: Mammoth Red Rock cabbage, Green Acre cabbage, and Green Sprouting Calabrese broccoli
Seeding date: January 13, 1999 *Pot size*: four-inch
Potting media: Mini-Pot Mix potting soil from Vital Earth Resources (fine pine bark, compost, sand, and minerals)
Experimental design: Two flats of 20 pots each were seeded for each variety. Two seeds were planted per pot, and thinned to one plant after germination. One flat of each variety was treated with Vitazyme at planting, and the other flat was left untreated (control). Height measurements were made for each plant on February 15, 1999, 33 days after planting.
Vitazyme treatments: Just after seeding, 10 ml of a 0.01% Vitazyme solution were added to each four-inch pot for appropriate flats.
Growth results: Average plant height:

	Red Cabbage	Green Cabbage	Broccoli
Control	16.55 cm	14.82 cm	21.76 cm
Vitazyme	18.94 cm	16.45 cm	23.76 cm
Increase	**+ 14%**	**+ 11%**	**+ 9%**

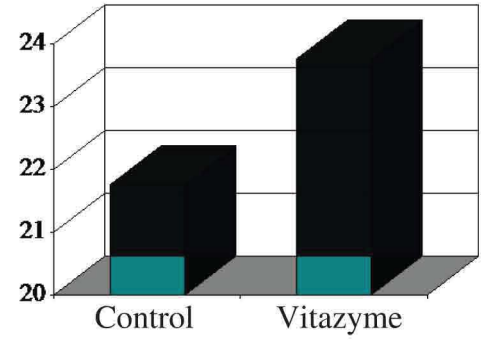
Red Cabbage, height (cm)



Green Cabbage, height (cm)



Broccoli, height (cm)



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

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1999 Crop Results

Vitazyme on Cabbage

Caribbean Chemical International

Researcher: Richard Ramdin, agronomist *Location*: Trinidad, West Indies *Variety*: Tropicana
Planting date: April 4 1999 *Harvest date*: June 5, 1999 (62 days after transplanting)
Experimental design: Three farmers' plots were divided to include a section that was treated with a particular concentration of Vitazyme. About 250 plants were in each treated area.

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

Fertility treatments: equal for all areas
Vitazyme treatments: The three rates of Vitazyme were prepared at 15, 20, and 30 ml/gal. (about 0.5, 0.7, and 1.0 oz/gal, or 0.5, 0.75, and 1.0%) and sprayed on the plants and soil at transplanting (April 4, 1999), and again 2.5 weeks later (April 23, 1999). The spray was directed over the root zone.
Fungicide treatments: Fungicides were applied heavily to suppress pepper leaf spot during active growth.
Growth and yield results:

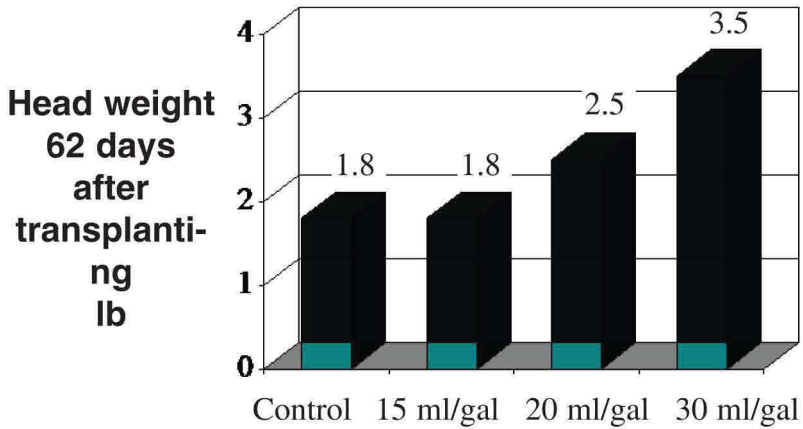
28 days after the transplanting

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

At harvest (62 days after transplanting)

Parameter	Control	15 ml/gal	20 ml/gal	30 ml/gal
Cabbage weight	1.75lb	1.75lb	2.5lb	3.5lb
Cracking	None	None	None	Some
Harvestable	?	?	75%	80%

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



Comments:

(1) Peppery leaf spot reduced the growth and head size of infected plants substantially.

(2) A lack of water at critical times hurt yields.

(3) The 30 ml/gal application rate was the best of the three, in terms of marketable yield.

(4) After harvest, the 30 ml/gal treatment sprouted vigorous lateral buds, that produced heads of 0.25 to 0.5 lb in a short time, unlike the other treatments.

The farmer wishes to use Vitazyme on his crops during the coming months.

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1999 Crop Results

Vitazyme on Cabbage

Observations -- Caribbean Chemical International

Researcher: Saleem Shah, agronomist *Farmer*: Motee *Location*: Tortuga, Trinidad, West Indies
Variety: Salvation *Planting date*: Spring, 1999 *Harvest date*: unknown
Experimental design: Two Vitazyme spray rates -- 15 and 30 ml/gal -- were used to treat cabbage in a field.

1. **Control**
2. **15 ml/gal, foliar and soil sprayed**
3. **30 ml/gal, foliar and soil sprayed**

Fertility treatments: equal for all areas

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

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

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

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