Onions *with Vitazyme application*

A Paper Presented at the International Biostimulant Congress in Hollywood, California, November 29—December, 2021.
Differential Dehydrator Onion Yield Responses Due to Various Biostimulants and Growth Stage

This California trial with dehydrator onions, using several biostimulant materials applied usually at the 3, 5, and 7 leaf stages, proved that they can significantly improve yields. Vitazyme proved to be the best.

The dehydrator onions were carefully harvested plot-by-plot to collect the yield data from each of the several treatments during both the 2019-20 and 2020-21 seasons.

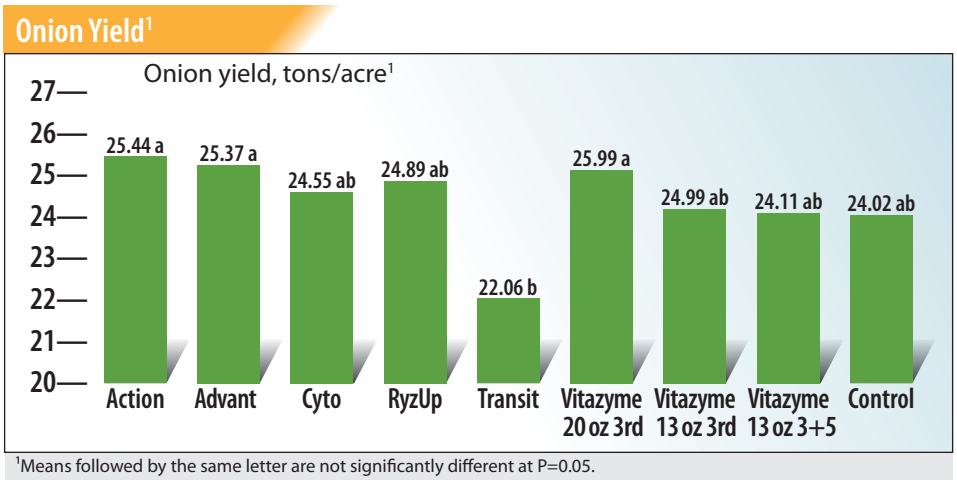
Researchers: Michael D. Rethwisch, Kassandra W. Allan, Lauren-Elizabeth Pope, and Nathan J. Tribby
Research organization: University of California Cooperative Extension, Riverside County, Palo Verde Valley Office, Blythe, California
Location: Blythe, California
Variety: Olam 41 (2019-2020) and Sensient (2020-2021)
Soil type: silty clay loam (2019-2020), and silty clay (2020-2021)
Experimental design: An onion field was prepared and planted in four replications (2019-2020) or six replications (2020-2021), with multiple rows per bed. For each year, plot sizes were 25 feet x 4 beds. Recommended rates for the various products were applied foliar at different leaf stages, in an effort to evaluate the effects of each product on dehydrator onion yields.

Treatment	Company	Rate	Leaf stage, 2019-20			Leaf stage, 2020-21		
			2	3	5	3	5	7
Vitazyme	Vital Earth Resources	20 oz/acre		x				
Vitazyme	Vital Earth Resources	13 oz/acre		x	x	x	x	
Vitazyme	Vital Earth Resources	20 oz/acre				x	x	x
Advantigro	Wilbur-Ellis	6 oz/acre		x		x	x	
Advantigro	Wilbur-Ellis	6 oz/acre				x	x	x
RyzUp Smartgrass	Valent	0.2 oz/acre	x					
Foliar Transit	FB Sciences	8-10 oz/acre		x				
Cyto power*	Mil Agro	1 lb/acre		x				
Cyto power*	Mil Agro	1 lb/acre				x	x	
Cyto power*	Mil Agro	1 lb/acre				x	x	x
GreenSol 48	FRIT Industries	8 oz/acre				x	x	
GreenSol 48	FRIT Industries	8 oz/acre				x	x	x

*Added to this was 1 qt/acre of MultiMin and 1 lb/acre of K-Amino.

Vitazyme applications: See the table.
Other product applications: See the table

Fertilization: unknown
Yield results, 2019-2020:



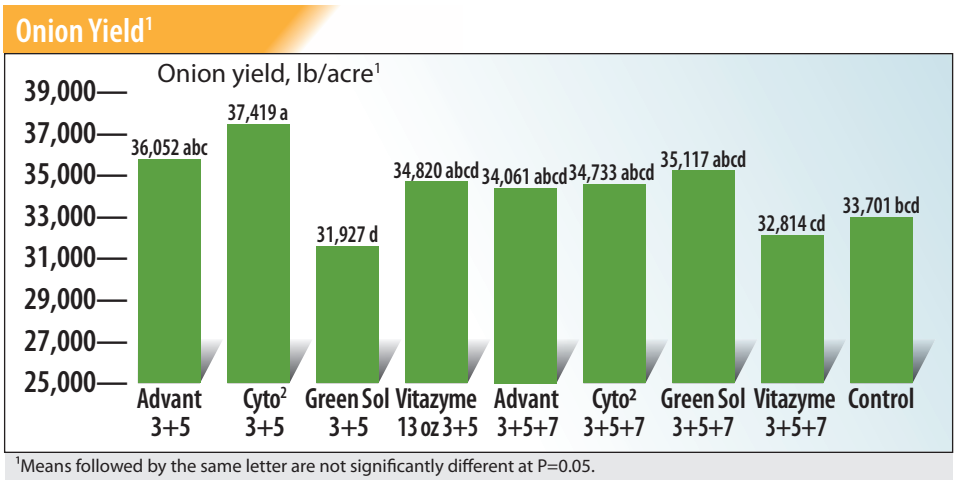
[1]Means followed by the same letter are not significantly different at P=0.05.

Yield increase with Vitazyme

20 oz/acre, 3rd leaf.....8%
13 oz/acre, 3rd leaf.....4%
13 oz/acre, 3rd + 5th leaf.....0%

While none of the treatments—except Transit—were significantly different in yield, Vitazyme at 20 oz/acre applied at the 3rd leaf stage produced the highest yield, which was 8% greater than the control.

Yield results, 2020-2021:

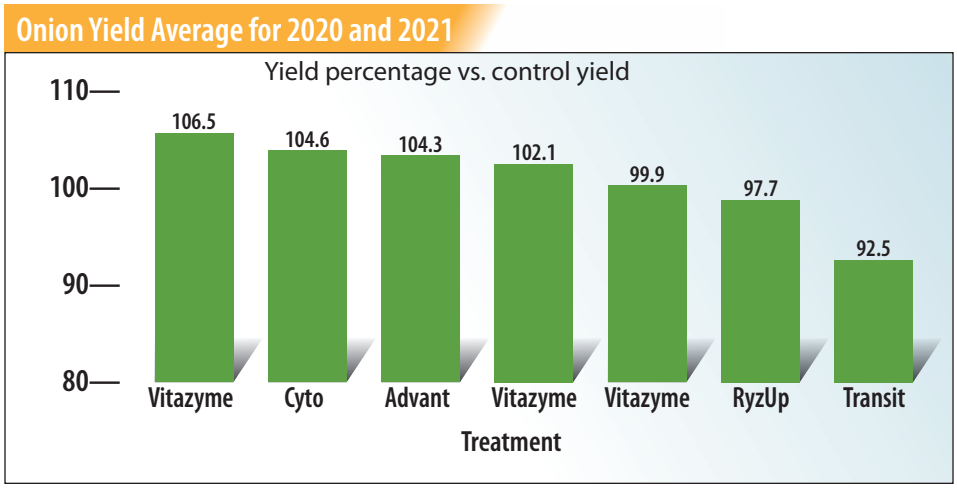


[1]Means followed by the same letter are not significantly different at P=0.05.
[2]In addition to 1 lb/acre of Cyto Power, 1 qt/acre of MultiMin + 1 lb/acre of K-Amino.

Most of the treatments were not significantly different in yield, although the Cyto Power with its added multi-mineral and K-Amino yielded the most.

Overall yield results, 2019-2021: An analysis was made of dehydrator onion yields of several treatments, expressed as a percentage of untreated onions.

Treatment	Rate	Leaf stage	Yield, % of control		
			2020	2021	Average
1. Vitazyme	20 oz/acre	3	104.8	108.2	106.5
2. Cyto Power	1 lb/acre	3+5	107.0	102.2	104.6
3. Advantigro	6 oz/acre	3+5	103.0	105.6	104.3
4. Vitazyme	13 oz/acre	3	100.2	104.0	102.1
5. Vitazyme	13 oz/acre	3+5	99.5	100.4	99.9
6. RyzUp Smartgrass	0.3 oz/acre	2	91.9	103.4	97.7
7. Transit Foliar	8-10 oz/acre	3 or 4	93.2	91.8	92.5



Conclusions:

- Vitazyme, applied foliar at the 3rd leaf stage, produced the highest yields of dehydrator onions.
- Yield responses were fairly consistent over the two years for most products.
- Yield differences exist between products.
- Interactions between onion development stage and product and rate exist.
- The consistency of yield results over years, while involving different dehydrator onion varieties, provides high confidence levels for respectable future results.

Onions *with Vitazyme application*

Researcher: David Gray
Research organization: David Gray's AgroAdvantage, O'Connor, Western Australia
Location: Myalup, Western Australia
Variety: Rhinestone
Soil type: unknown
Plot size: 25 meters long X 1.5 meter wide (standard bed)
Planting method: direct seeded
Planting date: August 3, 2017
Experimental design: A series of eight beds (one replication per treatment) were prepared for an onion trial, the seeds treated with different biostimulant combinations and zinc, alone and in combination, to determine early growth and final yield and quality effects on the bulbs. Only the Vitazyme and zinc results are shown in this review.

1 ***Control*** **2** ***Vitazyme*** **3** ***Vitazyme + Zinc***

Note the greater leaf and root growth for these onion plants with Vitazyme application(right).

The standard farm practice in this trial produced onion bulbs that yielded 36.2 kg/plot. Compare these to the treated plot.

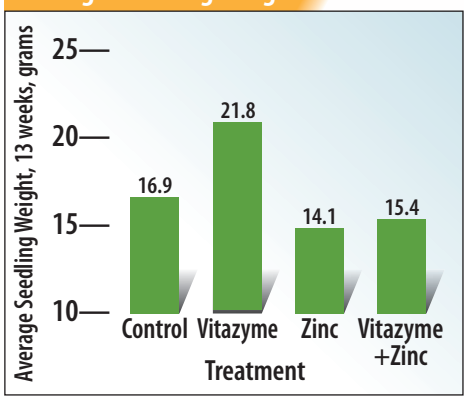
When Vitazyme and zinc were applied to the seeds before sowing, the plants responded greatly to produce bigger bulbs, especially in the 80+ mm range, and the yield was 23% higher than the control.

Fertilization: farm practice, equal for all plots
Vitazyme applications:

- **Vitazme only:** Vitazyme at 100 ml/kg of seed was sprayed on the seeds, and the seeds were dried before sowing.
- **Zinc chelate only:** Zinc at 100 ml/kg of seed was sprayed on the seeds and dried before sowing.
- **Vitazyme + Zinc:** Vitazyme at 50 ml/kg of seed and zinc chelate (14% actual Zn) at 50 ml/kg of seed were sprayed on the seeds and dried before sowing.

Growth results: On November 2, 2017, 13 weeks after planting, sample plants were dug from each treatment and weighed.

Average Seedling Weight



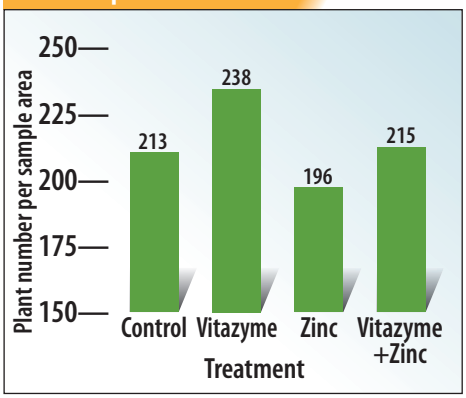
Change in seedling weight vs. control

Vitazyme	+29%
Zinc	-17%
Vitazyme + Zinc	-9%

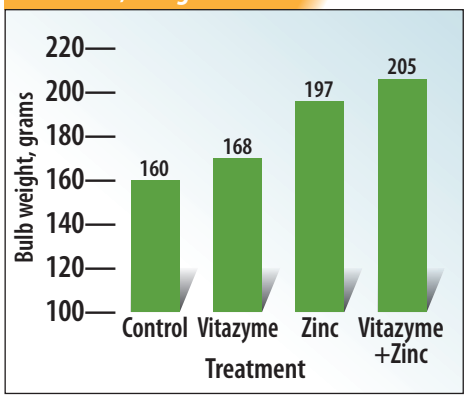
The only treatment that gave an increase in early growth was Vitazyme; only one other product combination gave an increase, and that was only 1%.

Yield and quality results:

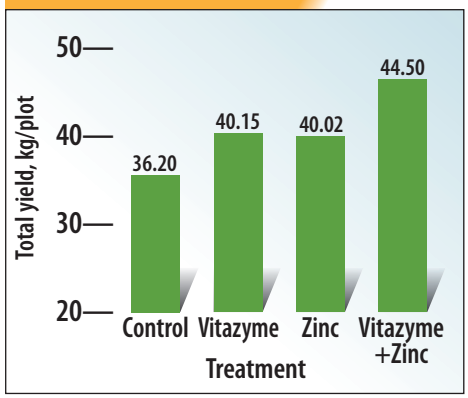
Plant Population



Bulb Size, Weight



Total Yield



Population change

Vitazyme .....+12%
Zinc ..... -8%
Vitazyme + Zinc .....+1%

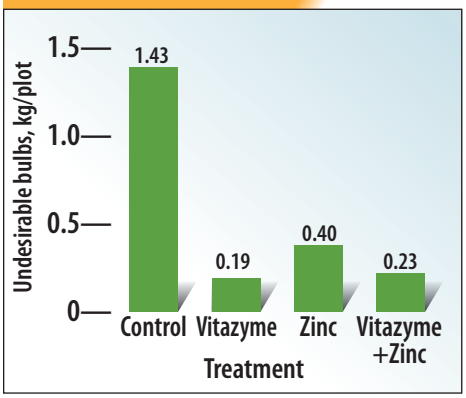
Bulb weight increase

Vitazyme .....+5%
Zinc .....+23%
Vitazyme + Zinc .....+28%

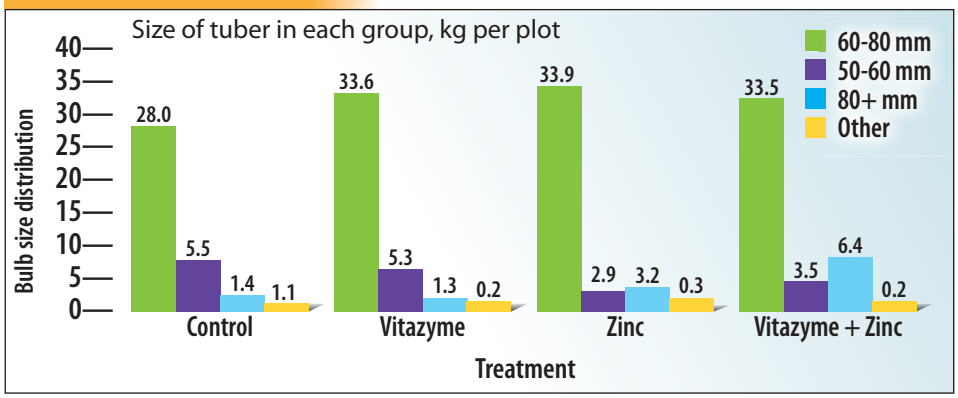
Total yield increase

Vitazyme .....+11%
Zinc .....+11%
Vitazyme + Zinc .....+23%

Undesirable Bulb Sizes



Bulb Size Distribution



Undesirable sizes change

Vitazyme ..... -87%
Zinc ..... -72%
Vitazyme + Zinc ..... -84%

The Vitazyme and zinc treatments each produced similar weights of 60-80 mm bulbs, but the Vitazyme + Zinc treatment produced considerably more large (80+ mm) bulbs than any of the others.

Income results: Money values are in Australian dollars.

Parameter	Control	Vitazyme	Zinc	Vita + Zinc
Yield, kg/plot	90.50	100.38	100.05	111.25
Yield increase	—	11%	11%	23%
Gross income, $/ha[1]	38,625	44,475	44,850	50,000
Treatment cost, $/ha[2]	0	401.34	391.59	396.47
Return on investment, $/ha	0	**5,448.66**	**5,833.41**	**11,278.53**

[1]Based on $500/tonne for large onions, and $400/tonne for small and medium onions. [2]Treatment costs: 100 ml of Vitazyme costs $9.48 and 100 ml of zinc chelate costs $1.59. Application costs are included in addition.

Conclusions: This Australian onion study, using single 1.5 meter wide beds, revealed that both Vitazyme and zinc chelate on the seeds were highly efficacious in increasing onion plant growth, and yield, quality, and income parameters. At 13 weeks after planting, Vitazyme increased plant weight by 29%—no other treatment responded positively— and also improved plant population by 12%, bulb weight by 5%, and yield by 11%; undesirable bulbs were reduced by 87%. Vitazyme also significantly improved the yield of 60-80 mm bulbs above the control. When combined with chelated zinc, Vitazyme revealed a strong syneryism in terms of bulb weight (+28%), total yield (+23%), and the number of extra large onions. Zinc chelate alone did well, but showed less response for all parameters than Vitazyme + Zinc. The return on investment (ROI) was greatly improved when Vitazyme was combined with zinc on the seeds, reaching $11,278.53 above the control; Vitazyme alone returned $5,448.66, about the same as the zinc chelate.

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

Researchers: Diana Urrea Ramirez and Luis Acosta
Research organization: Agroglobal S.A., Bogota, Colombia
Location: Municipality of Une, Cundinamarca Department, Colombia
Variety: Okinawa ***Planting rate:*** unknown
Planting date: unknown
Experimental design: An onion field was divided into Vitazyme treated and untreated portions to evaluate the effect of the product on the yield and quality of the bulbs.

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

Fertilization: according to recommendations for soil building
Vitazyme application: three applications of a 0.25% Vitazyme dilution to the leaves and soil, beginning at 8 days after germination; mixed with humic and fulvic acids
Harvest date: unknown
Crop density results: At harvest, the number of bulbs per unit area were counted.

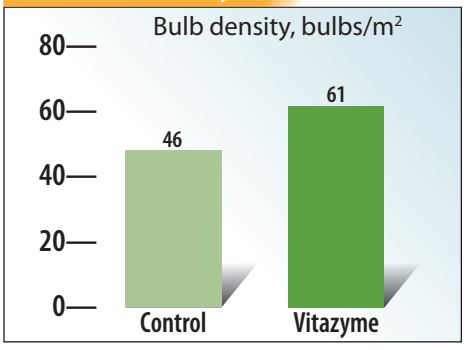
The size of the onions with Vitazyme (Globaplant) was greater, as can be noticed in the right-hand example from this Colombian study

Treatment	Bulb density	Density increase
	bulbs/m²	bulbs/m²
Control	46	—
Vitazyme	61	15 (+33%)

Yield results: An estimate of yield was made, using the weight of the three onion sizes per square meter, and extrapulating that to a full hectare.

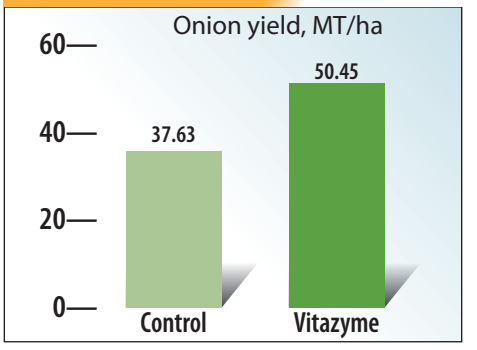
Conclusions: This onion trial in Colombia, comparing three Vitazyme applications to none on the Okinawa variety, revealed that Vitazyme (Globaplant) increased the total yield by 34%. These results reveal the great utility of Vitazyme as an onion crop input in Colombia.

Onion Bulb Density



Increase in bulb density with Vitazyme: 33%

Onion Yield



Yield increase with Vitazyme: 34%

Onions *with Vitazyme application—A Synergistic Study with Bioseed, Compared with Bactiva*

Researcher: Lucero Fernandez, Antonio Medina, and Juan Diaz
Research organization: Quimica Lucava S.A., de C.V., Celaya, Guanajuato, Mexico, and AgBiotech, Inc., Lakeville, New York
Location: Los Pinos, Leon, Guanajuato, Mexico
Farm Manager: Hugo Medina
Variety: Carta Blanca
Soil type: clayey loam
Planting arrangement: double row of seedlings, 10 cm between rows and 10 cm in rows, 80.5 cm between adjacent double rows
Transplanting date: September 13 2017
Experimental design: An onion trial was designed using two replications of plots containing four rows (3.22 m wide) that were 98 m long. The total treated area of each treatment was 630 m^2 for the two plots, and the two center rows of each plot (157.5 m^2 per plot, and 315^2 per treatment) were evaluated for data. The purpose of the trial was to determine the effect of these treatments on onion yield and profitability.

1 ***Control*** **2** ***Bio Seed + Vitazyme***
3 ***Bactiva*** **4** ***Bio Seed***

A. Bioseed alone increased the yield substantially, but not as much as it did when combined with Vitazyme.

B. Vitazyme plus Bioseed produced 25% more bulb yield, and larger bulbs, than did the control in this Mexican trial.

C. When Bactiva was used alone, the percentage of large bulbs were similar to the control.

Fertilization: October 3, 200 kg/ha of MAP (11-52-0% N-P_2O_5-K_2O) + 400 kg/ha of ammonium phosphate + 200 kg/ha of potassium sulfate; October 25, 50 kg/ha of Mg + 50 kg/ha of Ca; November 3, 50 kg/ha of Mg + 50 kg/ha of Ca; November 10, 100 kg/ha of potassium nitrate; November 17, 100 kg/ha of NKS; November 24, 100 kg/ha of NKS
Fungicide applications: Applications were made when the first symptoms of disease appeared.
Control plots: usual farm fungicides
Other plots: Quimica Lucava MM64-P which are rather compatible with fungi in Bio Seed and Bactiva
Bio Seed application: a drench at 125 g/ha after transplanting + three 1 liter/ha Vitazyme sprays for three consecutive months. Bio Seed is a biopesticide and biofertilizer product for seed treatments which contains **Paenibacillus azotofixans**, **Bacillus megaterium**, **Bacillus mucilaginosus**, **Bacillus subtilis**, and **Tricoderma harzianum**, each at 1 x 10^8 cfu/g, and mycorrhizae at 1 x 10^2 IP/g. The product is registered and developed in the USA by AgBioTech of Lakeville, New York.
Vitazyme application: 1 liter/ha sprays on consecutive months after Bio Seed treatment. Vitazyme is a proprietary fermentation product containing brassinosteroids, 1-triacontanol, B-vitamins, and other growth promoting agents, produced by Vital Earth Resources, Gladewater, Texas.
Bactiva applications: four drenches, totalling 1.25 kg/ha, beginning with 500 g/ha at transplanting + three monthly 250 g/ha drenches. Bactiva is a biopesticide and biofertilizer containing 1 x 10^8 CFU/g of **Trichoderma harzianum**, **Trichoderma reesei**, **Trichoderma viride**, **Gliocladium virens**, **Bacillus megaterium**. **Bacillus subtilis**, **Bacillus polymyxa**, and **Pseudomonas fluorescens**, gibberellins, cytokinins, seaweed and **Yucca schidigera** extracts, amino acids, fulvic acid, and several vitamins.

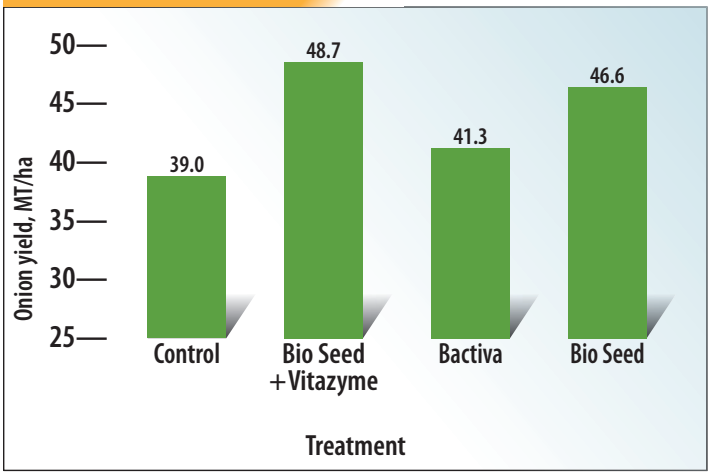
First application (September 14, 2017):

Product	Rate	Total application for 630m^2	Rate per plot (315m^2)	Rate per backpack fill
Bio Seed	125 g/ha	8 g	4g	1 g
Vitazyme	1 liter/ha	64 ml	32 ml	8 ml
Bactiva	500 g/ha	32 g	16 g	4 g

Yield results:

Treatment	Yield	Yield change	Sizes	
			Extras + Mediums	Small + Waste
	MT/ha	MT/ha	% of total	% of total
Control	39.0	—	91.6	8.4
Bio Seed + Vitazyme	48.7	9.7 (+25%)	92.2	7.8
Bactiva	41.3	2.3 (+6%)	91.1	8.9
Bio Seed	46.6	7.5 (+19%)	93.6	6.4

Onion Yield



Increase in yield

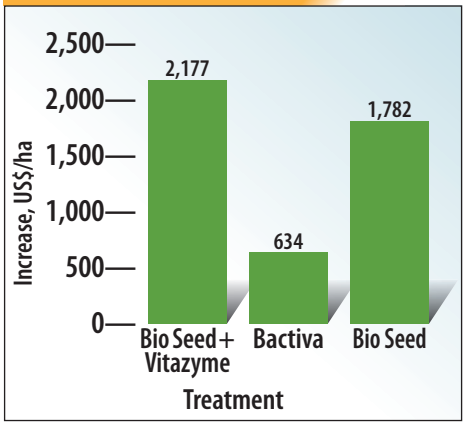
Bio Seed + Vitazyme..... 25%
Bactiva 6%
Bio Seed 19%

Income results:

Treatment	Crop value	Product cost*	Fungicide cost	Total cost	Value less costs	Extra return
	dollars/ha	dollars/ha	dollars/ha	dollars/ha	dollars/ha	dollars/ha
Control	8,210.67	0	235.68	235.68	7,974.99	—
Bio Seed + Vitazyme	10,300.61	110.95	37.84	148.78	10,151.82	2,176.83
Bactiva	8,738.97	130.41	0	130.41	8,608.56	633.57
Bio Seed	9,857.63	25.00	75.68	100.68	9,756.95	1,781.96

*Bio Seed $200.00/kg; Vitazyme $28.65/liter; Bactiva $104.32/kg.

Increase, US$/ha



Conclusions: The programs of Bio Seed in a 125 g/ha drench at transplanting, plus three monthly 1 L/ha Vitazyme sprays on leaves and soil, and Bio Seed alone, in one 125 g/ha drench show very marked (24.7% and 19.3%, respectively) yield increases, better quality in percent of larger sized bulbs, and a marked reduction of required fungicides for good plant health, resulting in marked increases (2,177 and 1,782 US$/ha, respectively) above the untreated control (with standard fungicide treatments), and also much larger (3-4 times) yield and net profit increases than with Bactiva in four monthly drenches: one at 500 g/ha, and three at 250 g/ha.

Increase

Bio Seed + Vitazyme ...$2,176.83/ha
Bactiva $633.57/ha
Bio Seed $1,781,96/ha

Onions *with Vitazyme application—A Study with Bio Seed Treatment*

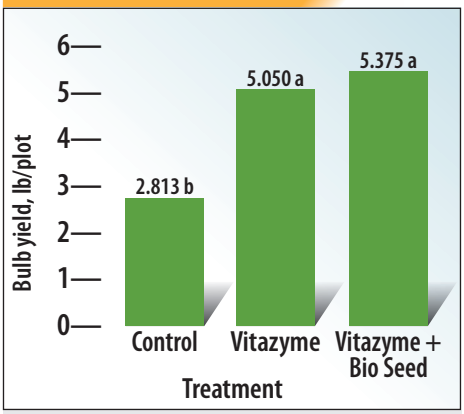
Researcher: K. Bruce Kirksey, Ph.D.
Research organization: AgriCenter International, Memphis, Tennessee
Location: Memphis, Tennessee
Variety: unknown
Soil type: Falaya silt loam; good fertility and drainage; pH = 6.3
Planting date: July 5, 2018 (transplants)
Row spacing: 48 inches
In-row spacing: 12 inches
Experimental design: A randomized complete block small-plot design was established with onions to evaluate the effect of Vitazyme and Bio Seed on the yield of these bulbs. The plot size was 10 x 30 ft., with one row per plot of transplants.

❶ ***Control*** ❷ ***Vitazyme***
❸ ***Bio Seed + Vitazyme***

Fertilization: unknown

Vitazyme application: (1) soil/root drench at transplanting at 13 oz/ha (1 liter/ha) on July 5; (2) soil/foliar spray at the 3-leaf stage at 13 oz/acre (1liter/ha) on July 28; (3) soil/foliar spray at the 6-leaf stage at 13 oz/acre (1 liter/ha) on August 23; (4) soil/foliar spray at E-M bulbing at 13 oz/acre (1 liter/ha) on September 7
Bio Seed application: 50 grams/acre (124 grams/ha) at transplanting in the drench water, with Vitazyme, on July 5. Bio Seed is a mixture of various bacteria and fungi for rhizosphere population.
Yield results: An area of 2.5 x 25 ft for each plot was hand harvested, and the bulbs were weighed.

Bulb Yield[1]



[1]Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.

Conclusions: A small-plot onion study in Tennessee, using Vitazyme alone or with Bio Seed, showed that Vitazyme increased bulb yield by 80%, and with Bio Seed in the soil drench by 91%. These results show that these products are highly effective to improve yields in onion growing programs.

Increase in yield with Vitazyme: 80%

Increase in yield with Vitazyme + Bio Seed: 91%

Onions *with Vitazyme application*

Fifteen days after the third application there is a pronounced advantage in size for the Vitazyme treated onions (left).

The leaves of the treated plants (right) have more chlorophyll than the control plants, and the bulbs are larger 15 days after the second application.

Researchers: Eng. Lucero Fernadez of Quimica Lucava, and Eng. Antonio Medina Hernandez (MEDFER)
Farm owner: Martin Perez Heredia
Location: San Francisco del Rincon, Guanajuato, Mexico
Variety: Carte Blanche
Treatment initiation: July 29, 2016
Experimental design: An onion field was divided into a Vitazyme treated (3 ha) and an untreated control area (3 ha) to determine the effect of this product on the growth and yield of white onions.

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

Fertilization: unknown
Vitazyme application: (1) 1 liter/ha by drip irrigation immediately after planting on July 29; (2) 1 liter/ha by spray on leaves and soil on August 29; (3) 1 liter/ha by spray on leaves and soil on September 29
Growth evaluations: Fifteen days after each application an evaluation was made of onion growth.

Evaluation 1: Vitazyme treated plants had larger root systems with thicker roots.

Evaluation 2: Treated plants had more roots that were thicker and healthier, and there were more small roots on the stem disc. They also had a much thicker phylodium, with more distinct veins and a darker green color.

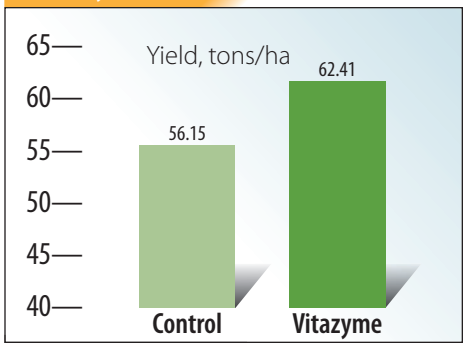
Evalution 3: Plants treated with Vitazyme had much more abundant roots, the phylodium was much thicker, the bulbs were larger and more uniform, and there was less Pink Root disease.

Harvest date: October 20 to 22, 2016 (83 to 85 days after transplanting)
Yield results:

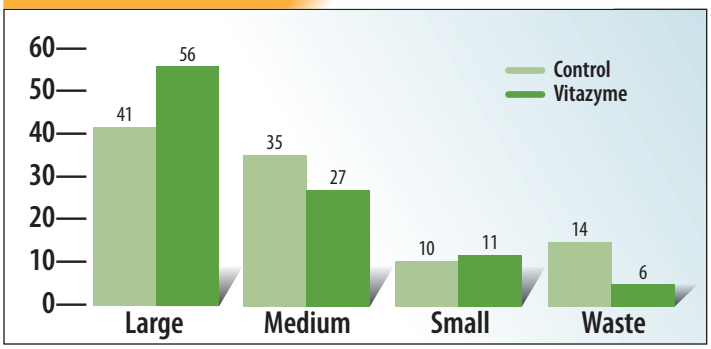
Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	56.15	—
Vitazyme	62.41	6.26 (+11%)

Yield increase with Vitazyme: 11%

Onion yield



Onion Size Distribution %



Income results:

Increased income with Vitazyme: 1,565 USD/ha
Increased profit with Vitazyme: 1,493.75 USD/ha
Cost : Benefit ratio: 21:1

Conclusions: An onion trial in Mexico, using three applications of Vitazyme at 1 liter/ha, revealed that this product produced superior root and leaf growth, chlorophyll development, and bulb size while reducing the incidence of Pink Root disease. The yield was increased by 11%, and the bulb size was moved towards the larger size category with considerably less waste. Profit was increased by 1,493.75 USD/ha, with a 21-times return for each dollar invested in the product. These data validate the great usefulness of of Vitazyme for onion growers in Mexico.

Onions *with Vitazyme application*

Researcher: Lucero Fernandez and Ivan Zazueta
Farmer: Gelasio Ramos
Research organization: Quimica Lucava, Mexico
Location: Canta Ranas Farm, Abasolo, Guanajuato, Mexico
Variety: Creole
Planting date: April 1, 2014
Experimental design: A 2 hectare area of an onion field was treated with Vitazyme three times, while the remainder of the field was left untreated, to evaluate the effect of the product on onion yield.

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

Fertilization: unknown
Vitazyme application: May 7, June 11, and July 24, 2014, at 1 liter/ha each time
Harvest date: December 29, 2014
Yield results: The crop was harvested after about 120 days.

Treatment	Yield	Yield change
	kg/ha	kg/ha
Control	41,233	—
Vitazyme	42,165	932 (+2.3%)

Yield increase with Vitazyme: 2.3%

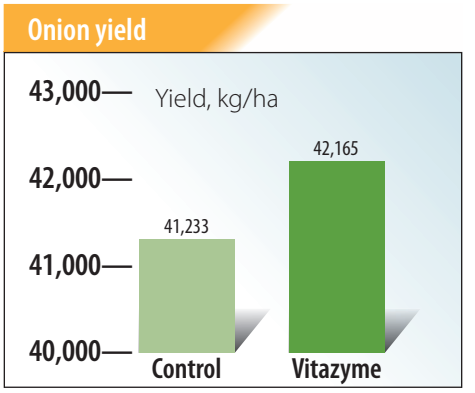
Income results:

Treatment	Yield	Gross Income[1]	Income change	Vitazyme cost	Profit	Cost : Benefit
	kg/ha	USD/ha	USD/ha	USD/ha	USD/ha	—
Control	41,233	23561,71	—	—	—	
Vitazyme	42,165	24094,29	532,57	101,79	430,79	4.2

*Price of onions = 0,5714 USD/kg.

Increased income with Vitazyme: 431 USD/ha
Greater Cost : Benefit with Vitazyme: 4.2

Conclusion: An onion trial in Mexico revealed that Vitazyme, applied three times, increased the yield by a modest 2.3%, but improved income by 431 USD/ha, giving a cost : benefit of applying the product of 4.2. These results show a good income increase from Vitazyme use on onions



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2014 Crop Results

Vitazyme on Onions

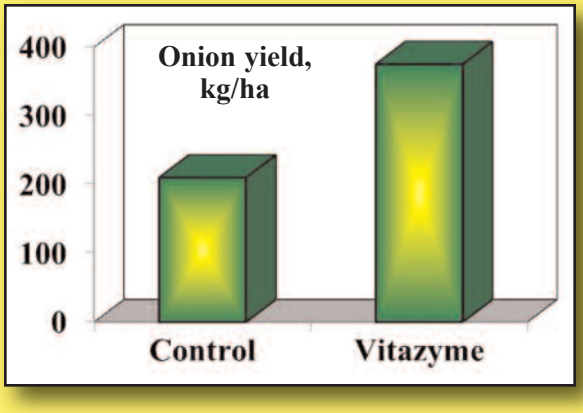
Researcher: Waking Novembre *Research organization*: Acra Industries, Haiti
Location: Mirebalais, Haiti *Variety*: unknown *Planting date*: unknown
Experimental design: This experiment was part of a multi-crop testing program that was established in December of 2011, to evaluate the efficacy of Vitazyme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

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	210	—
Vitazyme	375	165 (+79%)

Increase in onion yield with Vitazyme: 79%



Conclusions: An onion study in Haiti revealed a great increase in yield with Vitazyme application, up 79% from the untreated control. This program is shown to hold great promise in helping to alleviate food production problems in this developing country.

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2011 Crop Results

Vitazyme on Onions

Researcher: Steven David
Research organization: Organic Farming Systems, Perth, Australia
Farmer: LIM Produce
Location: Wyalup, Western Australia
Variety: unknown
Soil type: sand
Irrigation: fixed overhead
Plot size: 2 m x 8.7 m
Planting date: August 5, 2010
Experimental design: An onion planting was divided into two treatments with three replicates (six plots), one treatment being the farmer's program and the other being Vitazyme plus MicroPlus. The purpose of the study was to evaluate the effects of this program on onion number, disease, weight, and yield.
Fertilization: normal farm program
Vitazyme application: See the table below.
MicroPlus application: See the table below. MicroPlus is an inoculum of *Streptomyces lydicus* WYEC 108 (0.0371%).

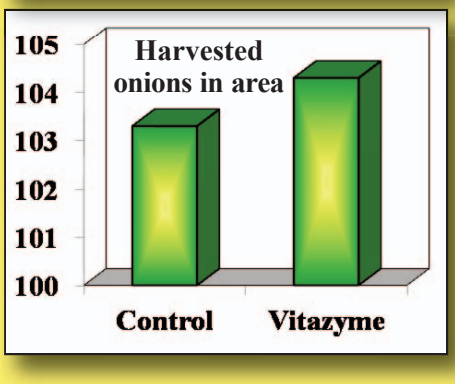
Treatment	Aug. 7	Aug. 26	Sep. 24	Nov. 4	Dec. 2
	---------- amount on the leaves and soil ----------				
Vitazyme	1.71 L/ha	—	1.0 L/ha	1.0 L/ha	1.0 L/ha
MicroPlus	854 g/ha	500 g/ha	500 g/ha	500 g/ha	500 g/ha

Note: MicroPlus was applied at 3.48 g in 6 L of water over the three beds; Vitazyme was applied at 5.25 ml in 6 L of water over the three beds.

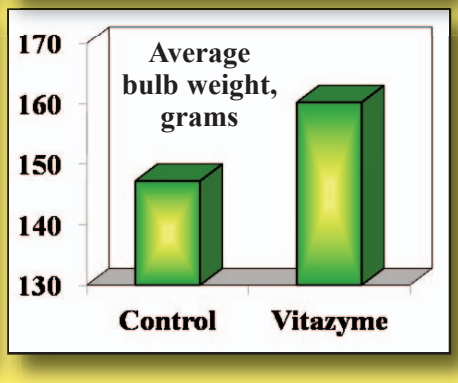
Disease incidence: Both treatments were equally infected with a low incidence of pink root.
Yield results: The onions were harvested on January 13, 2011, by digging bulbs from two square meters of each plot.

Treatment	Onion number	Average weight	Onion yield
	number	grams/bulb	tons/ha
Control	103.3 —	147.2 —	76.1 —
Vitazyme + MicroPlus	104.3 (+1%)	160.2 (+9%)	83.6 (+10%)

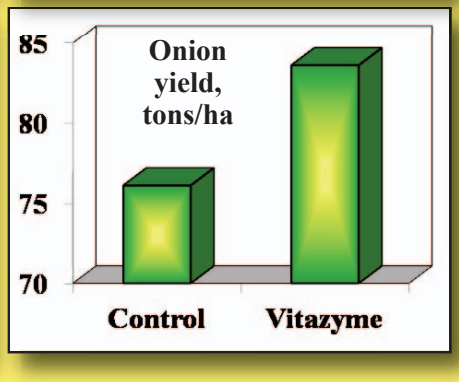
Onion Number



Onion Weight



Onion Yield



Increase in onion number: 1%

Increase in bulb weight: 9%

Increase in onion yield: 10%

Income results:

Onion price: $600/ton
Yield increase with Vitazyme and MicroPlus: 7.5 tons/ha
Increased gross income with Vitazyme and MicroPlus: $4.500.00/ha
Cost of Vitazyme and MicroPlus: $500.00/ha
Increased net income with Vitazyme and MicroPlus: $4.000.00/ha
Return on investment with Vitazyme and MicroPlus: $8.00 per $1.00 invested

Conclusion: This onion trial in Western Australia proved that Vitazyme and MicroPlus, an actinomycete inoculum, produced an excellent increases in onion yield (10%), mostly because of larger bulbs (9%). An increase of 7.5 tons/ha in yield, minus product cost, gave a net income increase of $4,000.00/ha, and a return on investment of $8.00 per $1.00 invested in product.

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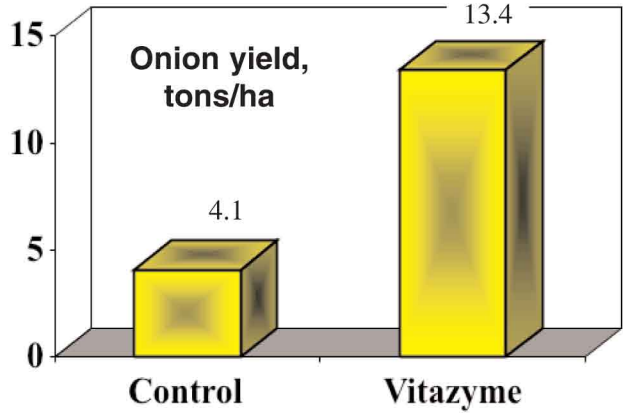
2006 Crop Results

Vitazyme on Onions

Researchers: Eng. Wilberto Gonzalez, and Eng. Jorge Gonzalez, Camilo Cienfuegos, Agricultural Enterprise
Location: Villena Farm of Camilo Cienfuegos Agricultural Enterprise, Havana Province, Cuba
Variety: unknown
Soil type: red ferralitic
Planting date: late 2005 to early 2006
Experimental design: A commercial production trial involved a split field area of 0.013 ha treated and 1.0 ha untreated with Vitazyme at Villena Farm.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme applications: 1.0 liter/ha on the leaves twice, separated by 30 days



Increase in onion yield: 227%

Conclusions: This commercial onion trial in Cuba revealed the remarkable ability of Vitazyme to increase onion production, with a 227% yield increase.

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2004 Crop Results

Vitazyme on Onions

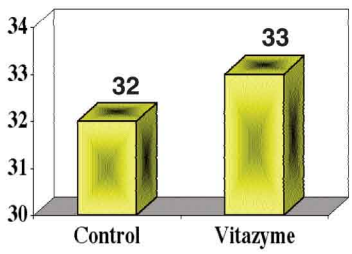
Researchers: Isel Creach Rodriguez, Ph.D.
Location: Santiago de Cuba Experiment Station, Dos Rios, Palma Soriana, Santiago de Cuba
Variety: red bulb multiplying onion *Soil type*: Leptic haplustert
Transplanting Date: January 13, 2004
Experimental design: Two areas of onions were used in two studies, one area in each study treated with Vitazyme and the other area left untreated. All other treatments were identical for both areas.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 13 oz/acre on the leaves and soil on January 1, and again on February 17, 2004

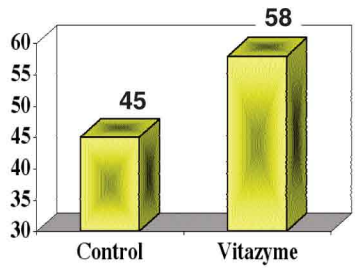
Trial 1

Height, cm



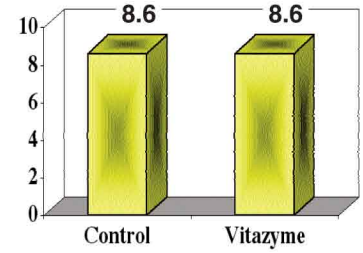
Height increase: 3%

Leaves Per Stool



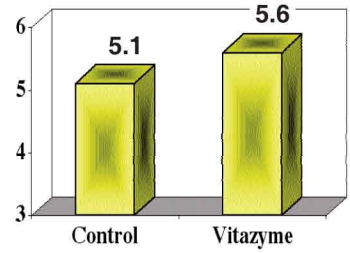
Leaves/stool increase: 29%

Plants Per Stool



Plants/stool increase: 0%

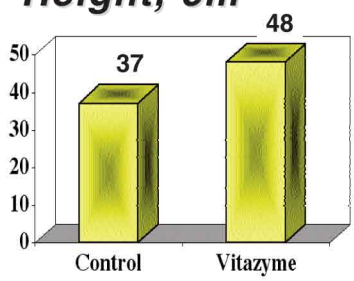
Leaves Per Plant



Leaves/plant increase: 10%

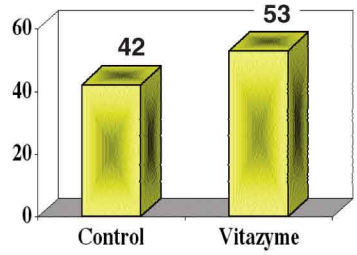
Trial 2

Height, cm



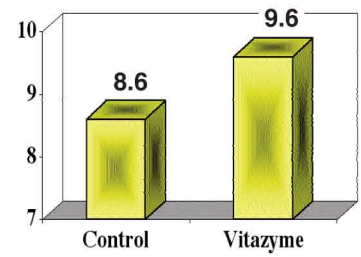
Height increase: 30%

Leaves Per Stool



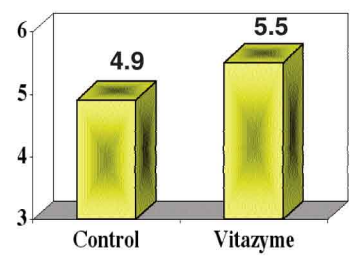
Leaves/stool increase: 26%

Plants Per Stool



Plants/stool increase: 12%

Leaves Per Plant



Leaves/plant increase: 12%

Conclusions: In this Cuban onion study, both trials showed a clear advantage for Vitazyme on growth and yield potential in terms of plant height, leaves per stool, and leaves per plant.

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2004 Crop Results

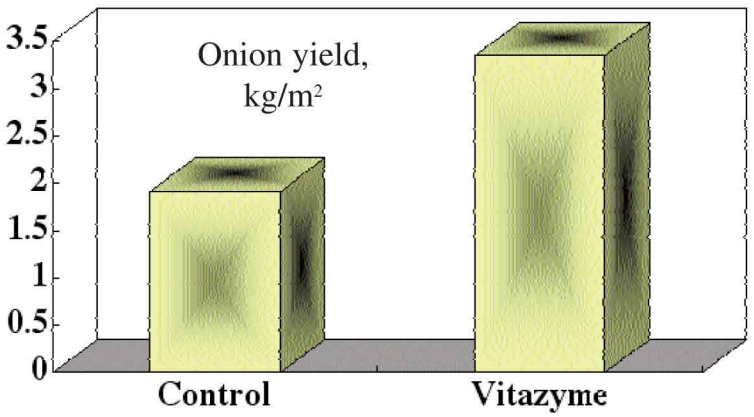
Vitazyme on Onions

Researcher: unknown *Location:* Granja MININT Jaguey Grande, Cuba
Variety: J-5 *Soil type*: Leptic haplustert *Planting date*: unknown
Experimental design: An experimental area was divided into a Vitazyme treated and an untreated area to determine the product's effects on onion yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1 liter/ha on the seedlings at transplanting, and 1 liter/ha on the plants and soil at 35 and at 79 days after transplanting (total application = 2.4 liters/ha, or 0.0068 cc/plant)
Yield results:

Treatment	Onion yield	Change	Weight/plant	Change	Value of production	Change
	kg/m^2	kg/m^2	g/plant	g/plant	pecos	pecos
Control	1.92	—	55.26	—	180.32	—
Vitazyme	3.35	1.43 (+74%)	94.70	39.44 (+71%)	315.56	+135.24



Increase in onion yield: +74%

Increase in weight per onion: +71%

Conclusions: Onions in this Cuban study responded very well to Vitazyme by increasing yield 74%, and average onion weight by 71%. The increase in value of this production was 135.24 pecos; the field area for this increase was not defined in the study report.

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2001 Crop Results

Vitazyme on Onions

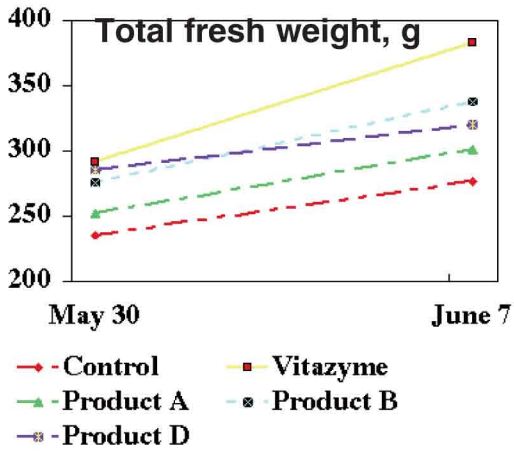
Research coordinator: H.W. Chung *Researcher*: unknown *Variety*: Manina
Location: Kunwe-Kun, Kyungbuk, Korea *Soil type*: clay loam *Transplanting date*: unknown
Experimental design: A field area for the onions was selected in an established plot to evaluate growth parameters. The areas were divided into treatments using the following:

1. Control 2. Vitazyme 3. Product A 4. Product B 5. Product D

Vitazyme application : A 1:1,000 dilution (0.1%) solution was sprayed on the leaves and soil on April 19, April 26, and May 3, 2001. *Fertilization*: unknown
Data collection: Results on growth and bulb weight were collected on May 30 and June 7, 2001.

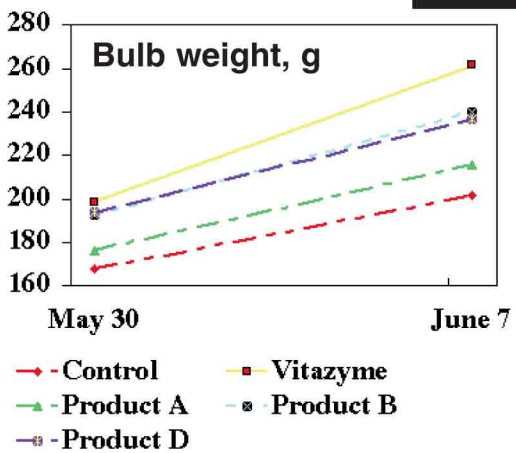
Total plant weight

Treatment	Fresh weight, May 30	Change	Fresh weight, June 7	Change
	g			
1. (Control)	236.0	—	276.7	—
2. (Vitazyme)	291.8	+55.8 (+24%)	383.3	+106 (+39%)
3. (Product A)	252.5	+16.5 (+7%)	301.6	+24.9 (+9%)
4. (Product B)	276.1	+40.1 (+17%)	338.0	+61.3 (+22%)
5. (Product D)	286.1	+50.1 (+21%)	320.7	+44.0 (+16%)



Increase in plant weight with Vitazyme:
First evaluation: 24% Second evaluation: 39%

Bulb weight



Treatment	Bulb weight, May 30	Change	Bulb weight, June 7	Change
	g			
1. (Control)	167.7	—	201.6	—
2. (Vitazyme)	198.6	+30.9 (+18%)	261.5	+59.9 (+30%)
3. (Product A)	176.1	+8.4 (+5%)	215.7	+14.1 (+7%)
4. (Product B)	192.3	+24.6 (+15%)	240.2	+38.6 (+19%)
5. (ProductD)	193.9	+26.2 (+16%)	236.9	+35.3 (+18%)

Increase in bulb weight with Vitazyme:
First evaluation: 18% Second evaluation: 39%

Conclusions: Vitazyme gave excellent growth stimulation to these onions, increasing total plant weight by 24% on May 30, and by 39% on June 7. The increase in growth was accelerating above the control as time passed. The same was true with bulb weight, where an 18% yield increase on May 30 gave way to a 30% bulb increase on June 7. Vitazyme outperformed the other three products in all situations.

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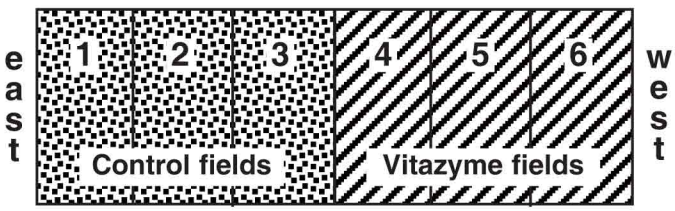
2001 Crop Results

Vitazyme on Onions

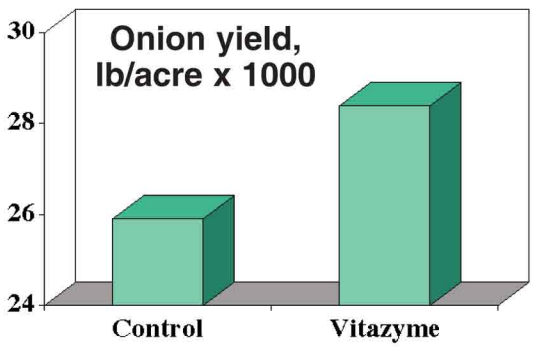
Farmer: Larry Karas, Wm. Karas and Sons
Location: Elba, New York
Variety: Benchmark
Soil type: muck (organic)
Planting date: April 30 and May 1, 2001
Watering: sprinkler irrigated
Experimental design: Six side-by-side fields of 3.33 acres each, with very uniform muck soils across all fields, were divided into two parts: three fields treated with Vitazyme and three fields left untreated.

1. Control **2. Vitazyme**



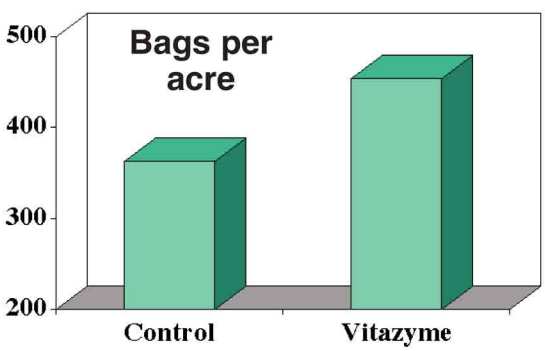
Fertilization : the same for all six fields: 1,000 lb/acre 10-8-28 at planting, and 100 lb/acre of urea (46-0-0) midseason.
Vitazyme treatment: 13 oz/acre on the seeds at planting; 13 oz/acre on the leaves and soil at the 6 to 7 leaf stage.
Growing season observations: On August 14, 2001, shortly before harvest, the Vitazyme treated onions were noticeably larger on average, and the leaves were much greener compared to the senescing control leaves. Thus, the treated plants were continuing to photosynthesize later and add more bulk to the bulbs.
Harvest date: late August, 2001
Yield results: All six fields were harvested at the same time, and the onions were placed in 1,000 lb boxes in the field. These boxes were counted for the different fields and totaled for each treatment.

	Control	Vitazyme	Change
Onion yield	259	284	25 (+10%)
Total weight, lb	259,000	284,000	25,000 (+10%)
Per acre weight, lb/acre	25,900	28,400	2,500 (+10%)



Onion yield increase: 10%

Onion packout results: The onions were graded and packed into 50-lb bags. Only the bulbs that were 2 inches in diameter and larger were packed, and are included in these figures.



	Control	Vitazyme	Increase
		onions >2" in diameter	
Bags per acre	362.6 bags/acre	454.4 bags/acre	91.8 (+25%)
Total weight	18,130 lb/acre	22,720 lb/acre	4,590 (+25%)

Marketable onion yield increase: 25%

Percent marketable yield of total harvest:

	Total yield	Marketable yield	Percent of total
	lb/acre		
Control	25,900	18,130	70%
Vitazyme	28,400	22,720	80%

Control % of marketable: 70%
Vitazyme % of marketable: 80%

Income results: Average market price of onions: $0.10/lb.

	Control	Vitazyme	Change
	$/acre		
Onion income	1,813	2,272	+459

Income increase: $459/acre

Return per dollar invested with Vitazyme: $51.00

Conclusions: Vitazyme substantially improved the yield and size of onions in this New York muck soil field trial. While Vitazyme improved the overall yield by 10%, it increased the packout (onions > 2" in diameter) by an additional amount over the control so that the overall marketable weight was 25% greater than for the control. This extra weight amounted to $459/acre more income, as Vitazyme returned $51 for every dollar invested in the product.

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2000 Crop Results

Vitazyme on Onions

A testimonial

Farmer: Troy Shuknecht, Lee Shuknecht and Sons *Location*: Elba, New York

Fertility program: a balanced program with regular use of cover sprays and foliar sprays

Vitazyme application: (1) 13 oz/acre in the furrow at planting, with starter fertilizer and fungicide; (2) 13 oz/acre over the leaves and soil at the 3 to 4-leaf stage; (3) 13 oz/acre over the leaves and soil at bulb initiation.

Time of Vitazyme use: 5 years

Troy: **"We're very satisfied with Vitazyme. We farm mostly mineral soils, and they are easier to work and have better drainage than when we first started the program. We have had good crops in two difficult years when others didn't. We grow mostly jumbo-sized onions and Vitazyme really helps them obtain that size. It's a big benefit."**

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2000 Crop Results

Vitazyme on Onions

Farmer: John Dunsmoor _Location_: Fulton, New York _Variety_: New York Early
Soil type: muck _In-row spacing_: 9 plants/foot (seeded) _Planting date_: May 5, 2000
Row spacing: 15.5 inches between double rows
Experimental design: Four small onion fields in muck were selected for this study. Three of the fields received Vitazyme and one (the control) was left untreated.

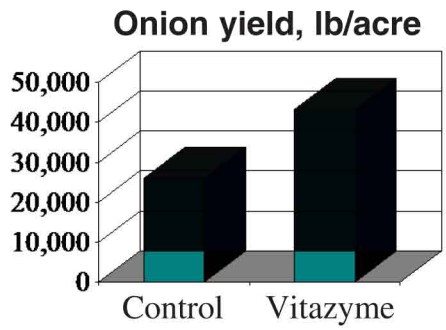
Field 1	Field 2	Field 3	Field 4
1.06 acres	1.40 acres	1.15 acres	1.27 acres
Vitazyme	Vitazyme	Vitazyme	Control

1. Control 2. Vitazyme

Fertility treatments: 100 lb/acre N, 80 lb/acre P_2O_5, 120 lb/acre K_2O, plus micronutrients pre-plant; 34 lb/acre N topdressed during growth
Vitazyme treatment: 13 oz/acre in the furrow at planting, along with a fungicide and insecticide
Harvest date: September 8, 2000
Yield results:

Treatment	Field 1	Field 2	Field 3	Average	Control
Yield, bags*/acre	905.70	714.29	973.91	864.63	519.67
Yield, lb/acre	45,285	35,715	48,696	43,232	25,984(+66%)

* One bag = 50 lb.



Onion yield increase: 66%

Income results: The onion value is about $4.00/50lb bag, or $0.08/lb.

	Control	Vitazyme	Change
		$/acre	
Gross income	2,078.72	3,458.56	(+)1,379.84

Income increase: $1,379.84/acre

Conclusions and observations: During the growing season in other fields it was noted that Vitazyme, when applied with other fertility products at planting in the seed row, improved emergence and the resulting plant population. These fields, however, averaged 746.56 cwt/acre, somewhat less than when Vitazyme was used alone.

Vitazyme in the onion test, used one time at planting on the seeds, produced an average yield increase that was 66% above the control fields. This increase translated into a very large income increase of nearly $1,380/acre.

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1999 Crop Results

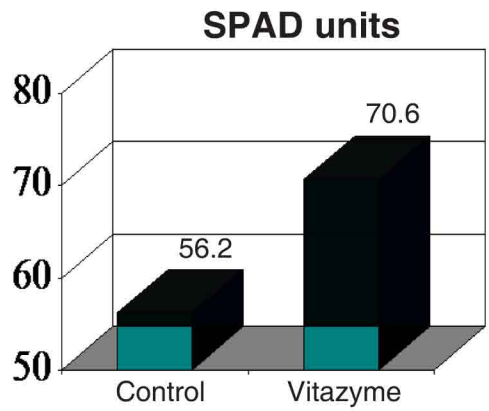
Vitazyme on Onions

Farmer: Fred Strano
Location: Fulton, New York
Variety: Prince (yellow)
Seeding rate: 8 plants/foot (seed)
Planting date: May 5, 1999
Harvest date: October 15, 1999
Soil type: organic (muck)
Previous crop: onions
Row spacing: two rows 6 inches apart, spaced every 15 inches
Experimental design: An onion field was treated with Vitazyme on several rows the length of the field.

1. Control **2. Vitazyme**

Fertilizer treatments: Preplant: 100-60-250 lb/acre actual N-P-K, plus 75 lb/acre Ca-Mg-micronutrients
Sidedressed in July: 70 lb/acre 34-0-0 (NH_4NO_3)
Vitazyme applications: 13 oz/acre at planting on the seeds
Chlorophyll results: On August 16, 1999, evaluations were made with a Minolta SPAD meter of several Vitazyme treated and untreated onion leaves from adjoining rows at the treatment boundary.

	Control	Vitazyme	Increase
Chlorophyll, SPAD values	56.2	70.6	14.4 (+26%)



Chlorophyll increase: 26%

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

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

Control

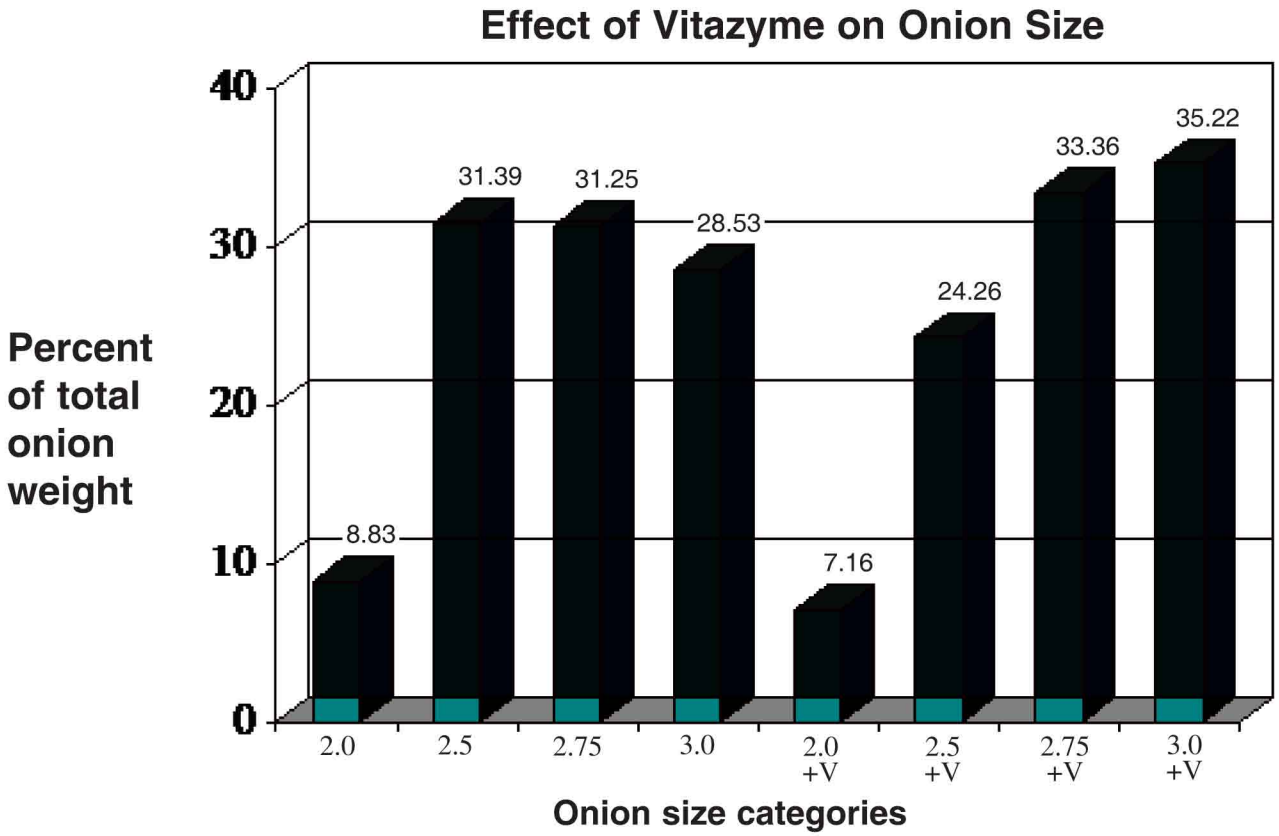
Onion size	Onion value	Proportion of crop	Amount of crop	Onion value
inches	$/lb	%	lb/acre	$/acre
2.0	0.06	8.83	6,401.8	384.11
2.5	0.14	31.39	22,757.8	3,186.09
2.75	0.16	31.25	22,656.3	3,625.01
3.0	0.18	28.53	20,684.3	3,723.17
		100.00	72,500.0	10,918.38

Vitazyme

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

	Control	Vitazyme	Increase
Onion value	$ 10,918.38/acre	$11,239.73	$321.35/acre

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



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

Vital Earth Resources
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1997 Crop Results

Vitazyme on Onions

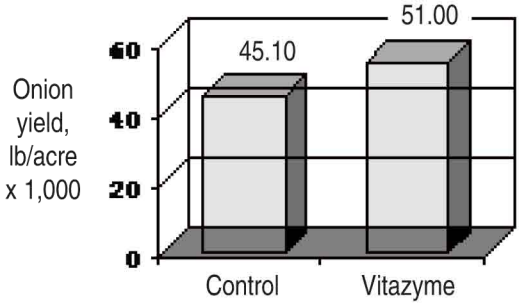
Researchers: Williams Farms (Douglas, Steve, and John Williams)
Location: Marion, New York *Variety*: Hamlet (a white onion)
Planting arrangement: wide beds *Planting date*: May 2, 1997 *Soil type*: muck
Experimental design: Two field areas of an onion field were selected that were similar in soils and past treatment. One area received Vitazyme, and the other area nothing besides normal fertilizer.

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

Fertility treatments: The control area received 1,300 lb/acre 10-10-15 dry fertilizer before planting. The Vitazyme area received 750 lb/acre 10-10-15 dry fertilizer before planting, plus 250 lb/acre high-calcium pelleted lime. One gallon/acre of liquid-Ca was applied with a herbicide near planting time, and then six foliar applications of liquid-Ca were applied with a fungicide spray. At planting, 5 gal/acre of 9-18-9 and Nutrapathic Soil Conditioner were applied.
Vitazyme treatments: (1) 13 oz/acre with the starter fertilizer; (2) 13 oz/acre with the second fungicide spray (about the third leaf); (3) 13 oz/acre at bulb initiation.
Harvest date: early October
Yield results:

	Boxes/acre*	Weight (lb)/acre
Control	41	45,100
Vitazyme	50	**55,000 (+22%)**

*Each box weighed about 1,100 lb.



Yield increase: 22%

Income results: Onions are valued at about $10.00/cut (100 lb)

	Income	Increase
Control	$4,510/acre	—
Vitazyme	$5,500/acre	**$990/acre**

Income increase: $990/acre

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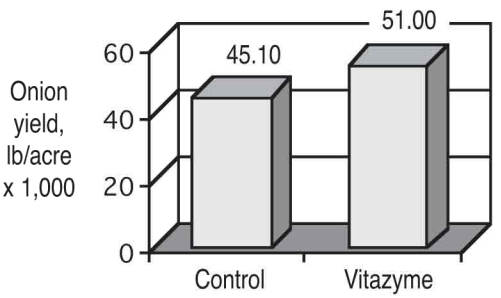

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