Peppers *with Vitazyme application—A Fertilizer Efficiency Study*

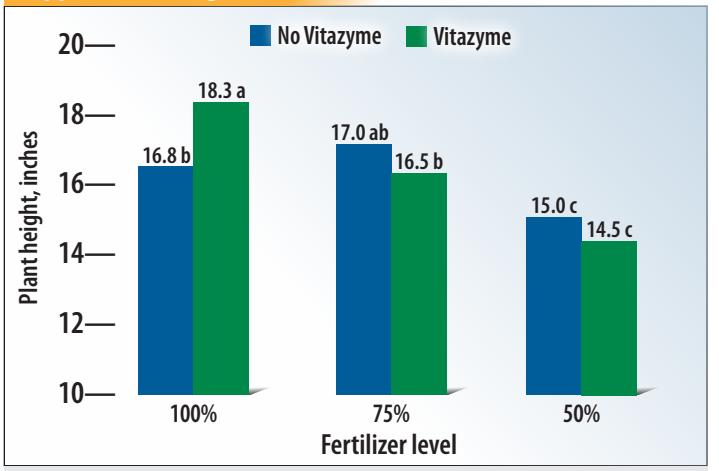
Researcher: Bruce Kirksey, Ph.D.
Research organization: Agricenter International, Memphis, Tennessee
Location: Memphis, Tennessee ***Variety:*** LaSalle ***Planting date:*** August 14, 2024
Planting rate: 5 plants/plot ***Row spacing:*** 38 inches ***Soil type:*** Fayette silt loam ***Tillage:*** conventional
Soil character: pH = 6.5, organic matter = 1.8%, cation exchange capacity = 7.8 meq/100g, excellent fertility, good drainage
Experimental design: A small-plot randomized complete block design with four replications, was established, using pepper transplants that were placed in the holes of a plastic mulch. Treatments of Vitazyme were made to three fertilizer levels to determine the effectiveness of this biostimulant to influence fertilizer efficiency of use, as determined by pepper height and weight.

Treatment	Fertilizer	Vitazyme	
		First	Second
		13 oz/acre	13 oz/acre
1. 100% fertilizer	100%	o	o
2. Vitazyme + 100% fertilizer	100%	x	x
3. 75% fertilizer	75%	o	o
4. Vitazyme + 75% fertilizer	75%	x	x
5. 50% fertilizer	50%	o	o
6. Vitazyme + 50% fertilizer	50%	x	x

The peppers in the Tennessee trial were laid out as shown, with plastic mulch to suppress weeds and conserve moisture. Pepper yield was improved with Vitazyme at all three fertilizer levels.

Fertilization: Pre-planting: 100% = 500 lb/acre of 12-24-24% N-P_2O_5-K_2O; 75% = 375 lb/acre of 12-24-24% N-P_2O_5-K_2O; 50% = 250 lb/acre of 12-24-24% N-P_2O_5-K_2O. In season through drip irrigation: 100% = 50 lb/acre of $CaNO_4$ and KNO_4 in a weekly rotation; 75% = 37 lb/acre of $CaNO_4$ and KNO_4 in a weekly rotation; 50% = 25 lb/acre of $CaNO_4$ and KNO_4 in a weekly rotation.
Vitazyme applications: 13 oz/acre (1 liter/ha) sprayed on the leaves at the 3-5 leaf stage; 13 oz/acre (1 liter/ha) sprayed on the leaves at first flower
Plant height results: The height of each plant was measured on November 6, 2024.

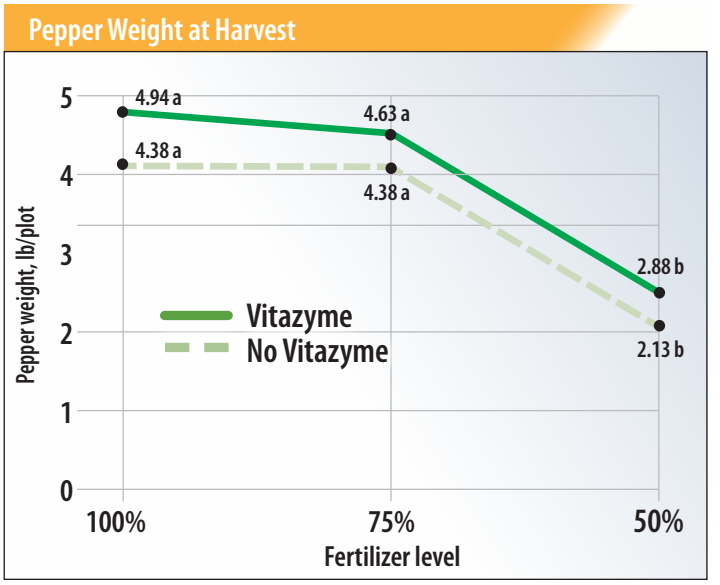
Pepper Plant Height[1]



[1]Means followed by the same letter are not significantly different at P = 0.05 according to ANOVA. LSD (0.05) = 1.5 inches; CV + 6.09; replicate F =0.4647; treatment prob (F) = 0.0009.

Vitazyme significantly increased plant height at the 100% fertilizer level, but the other fertilizer levels showed statistically equal heights for the treated and untreated treatments.

Pepper yield: Pepper fruit weights were measured at harvest on November 27, 2024. Comparisons are made at the same fertilizer level in the following discussions.



Statistical values

LSD (0.05)	1.07 lb/plot
CV	0.7109
Replicate F	0.9963
Treatment F	0.0002

Pepper weight increases with Vitazyme at each fertilizer level

100% fertilizer	0.56 lb/plot (+ 13%)
75% fertilizer	0.25 lb/plot (+ 6%)
50% fertilizer	0.75 lb/plot (+ 35%)

Fertilizer response, average of the two yield values at each fertilizer level

100%	4.66 lb/plot (+ 86% vs. the 50% level)
75%	4.51 lb/plot (+ 80% vs. the 50% level)
50%	2.51 lb/plot —

At every fertilizer level Vitazyme increased the pepper yield, from 6 to 35%. The greatest increase (35%) was at the 50% level, and the least at the 75% level (6%). All weights at the 75% and 100% fertilizer levels were statistically the same, but Vitazyme weights were higher in both cases.

Conclusions: A small-plot, replicated pepper trial in Tennessee, using three fertilizer levels — 50, 75, and 100% of optimum — and two Vitazyme applications, each at 13 oz/acre (1 liter/ha), revealed that at all fertilizer levels Vitazyme increased the pepper fruit yield. The highest increase at the same fertilizer level was at 50% fertilizer, where Vitazyme gave a 35% yield increase. All of the yield values were the same at the 75 and 100% fertilizer levels, but when Vitazyme was applied the yields were higher than the corresponding control. The fertilizer response of pepper yield over the three levels was quite impressive, being 80% and 86% for the 75% and 100% fertilizer averages versus the 50% fertilizer level. If plot variability had not been so great there would likely have been significant differences detected. Plant height was significantly greater with Vitazyme at 100% fertilizer; the 50% and 75% fertilizer levels showed no significant differences in plant height for the two treatments. These results reveal a definite trend in the response to Vitazyme for peppers, making this a highly viable management option for growers.

Peppers *with Organic Vitazyme application*

Researcher: Bence Kiraly, Natalia Simon, and Jeno Simon
Research organization: Biotek Agriculture Hungary Kft., 6636 Martely, hrsz. : 013818, Hungary; Vital Earth Resources, Inc. Gladewater, Texas, USA
Location: Forraskut, Csongrad-Csanad State, Hungary
Farm cooperator: Imre Illes, Forraskut, Hungary
Variety: Magus F1 (*Capsicum annuum*)
Planting date: June 12, 2021
Planting depth: 8 cm
Row spacing: 30 cm
In-row spacing: 30 cm
Soil traits: sand, 0.5% organic matter, 7.62 pH, fair fertility
Tillage: conventional
Experimental design: A small-plot pepper trial was arrayed in a randomized complete block design, using six replications. Plots were 3 x 4.5 meters (13.5m^2). The purpose of the trial was to evaluate the effect of two biostimulants on the growth, yield, and quality of peppers.

Treatment	Product applications			
	June 16	July 7	July 28	September 9
1. Control	0	0	0	
2. Amalgerol	4 liters/ha	4 liters/ha	4 liters/ha	4 liters/ha
3. Organic Vitazyme	0.5 liter/ha	0.5 liter/ha	0.5 liter/ha	0.5 liter/ha
4. Organic Vitazyme	1 liter/ha	1 liter/ha	1 liter/ha	1 liter/ha
5. Organic Vitazyme	2 liters/ha	2 liters/ha	2 liters/ha	2 liters/ha
Crop stage, BBCH scale	18:80	51:60	65:50	89:60
Interval from previous appl.	0	21 days	21 days	43 days
Method of treatment	soil drench	foliar spray	foliar spray	foliar spray
Application amounts	10,000 liters/ha	300 liters/ha	300 liters/ha	300 liters/ha

Fertilization: unknown
Organic Vitazyme application: See the rates and timing in the table.
Amalgerol application: See the rates and timing in the table. Amalgerol is a mixture of seaweed extracts, mineral oil, essential oils, and herbal extracts, and is "Qualified Organic" according to EC regulation number 834/2007, for organic use. It is produced by Hechenbichler, Innsbruck Austria.
Pest control: July 22—Thiovit Jet fungicide at 5 kg/ha, Cuproxat FW fungicide at 4 liter/ha, and Karate Zeon 5 CS insecticide at 0.3 liter/ha; August 16—Thiovit Jet fungicide at 5 kg/ha, Cuproxat FW fungicide at 4 liters/ha, and Karate Zeon 5 CS insecticide at 0.3 liter/ha; August 28—Cuproxat FW fungicide at 4 liters/ha
Phytotoxicity results: No phytotoxicity was noted for any treatment.
Crop vigor results: No significant differences were detected among the five treatments for the first three times of analysis, but the fourth date (September 23) did reveal significantly greater vigor for Vitazmye at 2 liters than the control. Averages for all four dates are given here.

Average Crop Vigor Versus the Control, %-points

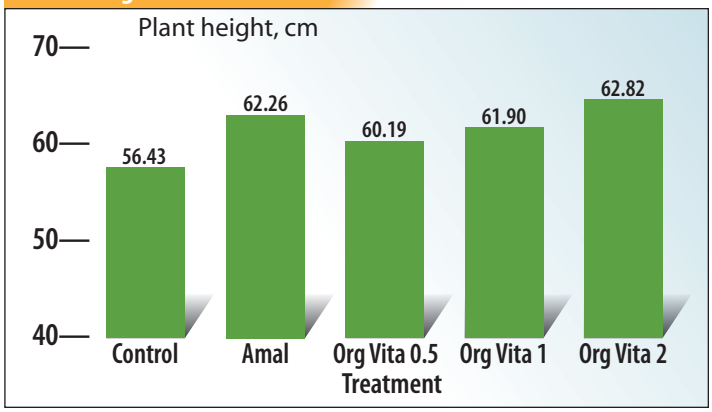
Amalgerol, 4 liters/ha ..... +2.6
Organic Vitazyme, 0.5 liter/ha ..... +1.7
Organic Vitazyme, 1 liter/ha ..... +2.9
Organic Vitazyme, 2 liters/ha ..... +3.9

Crop height results: Twenty-five plants were measured on August 11 for each plot and averaged.

Treatment	Rate	Height*	
	L/ha	cm	
1. Control	0	56.43 c	—
2. Amalgerol	4	62.26 ab	(+10%)
3. Organic Vita	0.5	60.19 b	(7%)
4. Organic Vita	1	61.90 ab	(+10%)
5. Organic Vita	2	62.82 a	(+11%)
LSD (P=0.10)		1.95	
CV		3.22	
Treatment F		0.0001	

*Means followed by the same letter are not significantly different at P=0.10, according to the Student-Newman-Keuls Test.

Plant Height



Organic Vitazyme at 1 and 2 liters/ha significantly increased pepper height above the control (+10% and +11%), as did the Amalgerol treatment (+10%).

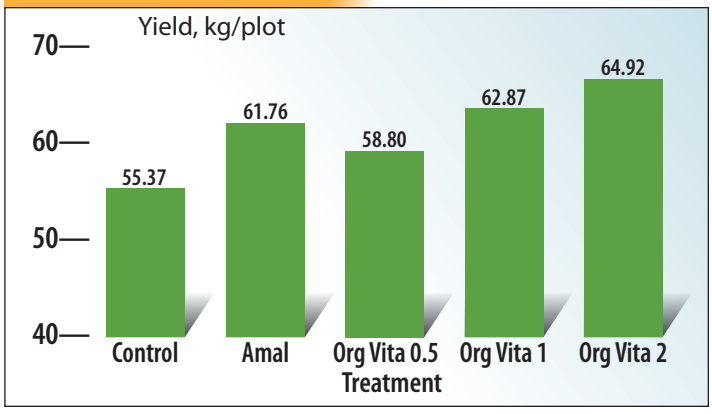
Crop yield results:

Treatment	Rate	Harvest Date*			
		September 9	September 16	September 23	Total
	L/ha	kg/plot	kg/plot	kg/plot	kg/plot
1. Control	0	41.14 c	51.47 c	55.37 c	
2. Amalgerol	4	43.85 ab	56.05 ab	61.76 ab	(+12%)
3. Organic Vita	0.5	42.24 bc	53.59 bc	58.80 bc	(+6%)
4. Organic Vita	1	44.05 ab	55.97 ab	62.87 ab	(+14%)
5. Organic Vita	2	44.71 a	56.55 a	64.92 a	(+17%)
LSD (P=0.10)		1.96	2.70	4.33	
CV		4.57	4.95	7.16	
Treatment F		0.0311	0.0190	0.0101	

*Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls Test.

Organic Vitazyme at 2 liters/ha produced the greatest yield increase (+17%), followed by Organic Vitazyme at 1 liter/ha (+14%) and Amalgerol (+12%). All treatments significantly exceeded the control.

Total Yield



Increase in yield above the control

Organic Vitazyme, 2 liters/ha .....+17%
Organic Vitazyme, 1 liter/ha.....+14%
Organic Vitazyme, 0.5 liter/ha.....+6%
Amalgerol, 4 liters/ha .....+12%

Unmarketable fruit results: An analysis of unusable fruit was made on September 9, 16, and 23. No differences were significant, but Vitazyme at 1 and 2 liters/ha produced the least unmarketable fruit. These average percentages for all three dates are shown here.

Unmarketable fruit	
Organic Vitazyme, 1 liter/ha	5.33%
Organic Vitazyme, 2 liters/ha	5.55%
Organic Vitazyme, 0.5 liter/ha	6.54%
Amalgerol, 4 liters/ha	6.18%
Control	7.48%

Fruit sugar content: There were no significant differences in fruit sugar content. All values were from 3.9 to 4.2% sugar.

Leaf chlorophyll results: All treatments were about equal, and significantly exceeded the control by about 1.0 SPAD unit, at P=0.10. Twenty leaves from each plot were measured for chlorophyll with a Minolta SPAD meter, and averaged.

Root mass results: No treatment was significantly different at P=0.10, from 20 plant roots weighed from each plot, and averaged. Treated roots varied from about 155 to 160 g/plot, which was nonsignificantly greater than the 149.3 g weight of the control.

Conclusions: A small plot replicated pepper trial in Hungary, which evaluated the effectiveness of Organic Vitazyme at 0.5, 1, and 2 liters/ha and Amalgerol at 4 liters/ha, revealed that Organic Vitazyme at 2 liters/ha was the superior treatment in terms of plant vigor, plant height, and yield. Organic Vitazyme at 2 liters/ha increased crop vigor by 3.9 percentage points above the control, and the yield of peppers was 17% greater than the control for this treatment. The 1 liter/ha Organic Vitazyme treatment produced 14% more yield, while Amalgerol increased the yield by 12%. The height of the plants was significantly greater than the control by 10 to 11% for Organic Vitazyme at both 1 and 2%, and for Amalgerol. No significant effects were noted for phytotoxicity, fruit sugar, leaf chlorophyll, root mass, and unmarketable fruit, although both 1 and 2 liters/ha of Organic Vitazyme reduced unsalable fruit to the lowest levels, from 5.33 to 5.55% of the total yield.

Peppers *with Vitazyme application*

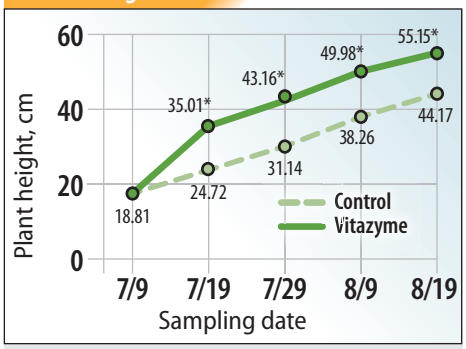
Researchers : V. V. Plotnikov and V. V. Rohach
Research Organization: Vinnytsia State Pedagogical University, Ministry of Education and Science of Ukraine, Vinnytsia, Ukraine
Location: "Berzhan P, G", Horbanovka Village, Vinnytsia District, Ukraine
Variety: Antei
Planting rate: 66,000/ha
Seed Planting date: March 9, 2015, in hot frames
Seedling planting date: May 15, 2015
Soil type: gray podzolic; humus = 2.2%, hydrolyzed N = 8.4 mg/100 g of soil, P = 15.8 mg/100 g of soil, exchangable K = 12.4 mg/100 g of soil, pH = 5.5
Replications: 5
Experimental design: An area of 33 m^2 per plot was selected from a uniform soil area to treat with Vitazyme one time, in order to evaluate the effect of this product on growth parameters and yield.

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

Fertilization: a mineral fertilizer giving 50, 40, and 30 kg/ha of N-P_2O_5-K_2O
Vitazyme application: 1 liter/ha with a backpack sprayer the morning of July 9, 2015; control plants were sprinkled with water only at the same time
Growth results:

Pepper fruit treated with Vitazyme tends to be larger and of higher quality that their untreated counterparts.

Plant Height

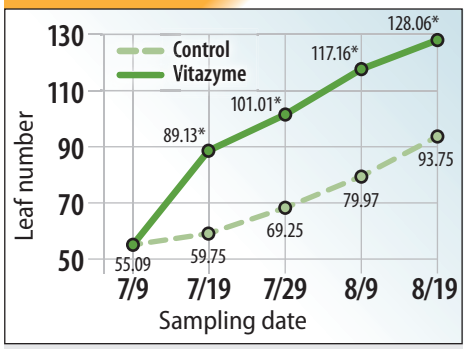


*Significantly greater than the control at P=0.05.

Increase in plant height with Vitazyme

7/19/15.....+42%
7/29/15.....+39%
8/9/15.....+31%
8/19/15.....+25%

Leaves Per Plant

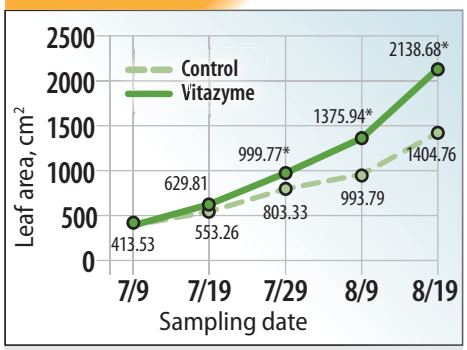


*Significantly greater than the control at P=0.05.

Increase in leaves/plant with Vitazyme

7/19/15.....+49%
7/29/15.....+46%
8/9/15.....+47%
8/19/15.....+37%

Leaf Area Per Plant[1]

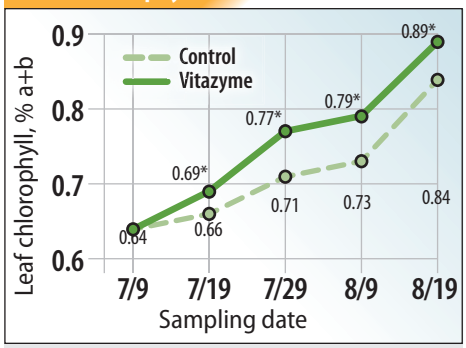


*Significantly greater than the control at P=0.05.
[1]Calculated as follows: $S=\frac{(n)(m_1)(S_v)}{m_2}$, and $S_v=\pi r^2$, where S= leaf area (cm^2), n= leaf number, m_1= leaf weight (g), m_2= cutting weight (g), S_v= cutting area (cm^2), π=3.14, and r= cutting radius (cm).

Increase in leaf area with Vitazyme

7/19/15.....+14%
7/29/15.....+24%
8/9/15.....+38%
8/19/15.....+52%

Leaf chlorophyll



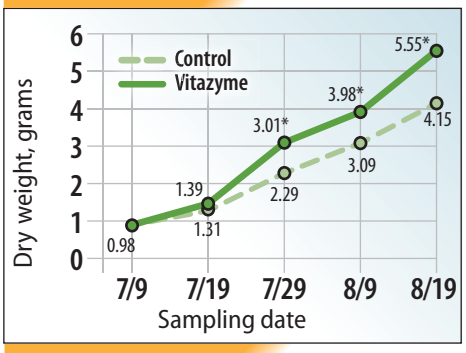
*Significantly greater than the control at P=0.05.
[1]Calculated as follows: $X=\frac{(C)(V)(100)}{(P)(1000)}$, where X=pigment content (% per leaf, net weight), C=pigment concentration (mg/liter), V=extract volume (ml), and P=weight of plant material (mg).

Increase in leaf chlorophyll with Vitazyme

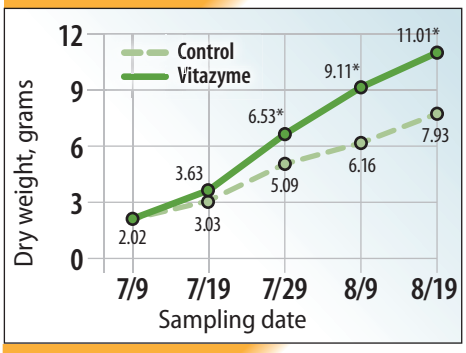
7/19/15.....+5%
7/29/15.....+8%
8/9/15.....+8%
8/19/15.....+6%

Plant Organ Dry Weights

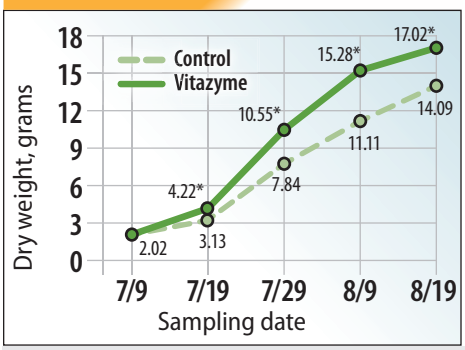
Roots



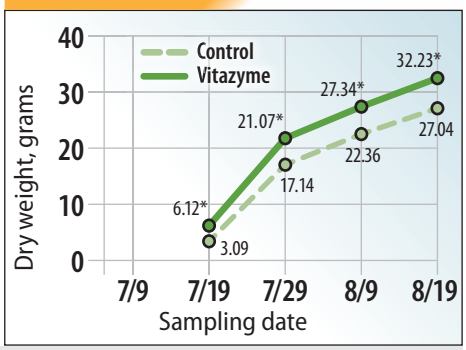
Stems



Leaves



Fruit



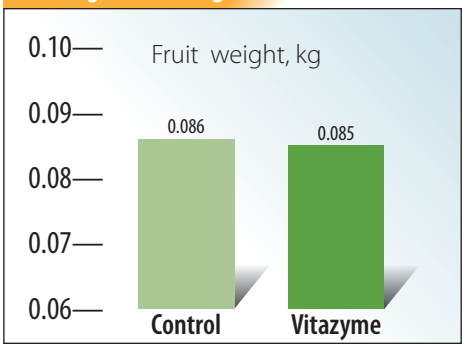
*Significantly greater than the control at P=0.05.

Economic results: An analysis of many factors was made to determine the profitability of the Vitazyme application. Costs included tillage, oil and fuel, harrowing, cultivation, fertilizers, planting, seedling, rent, watering, product applications, trucking, and harvesting.

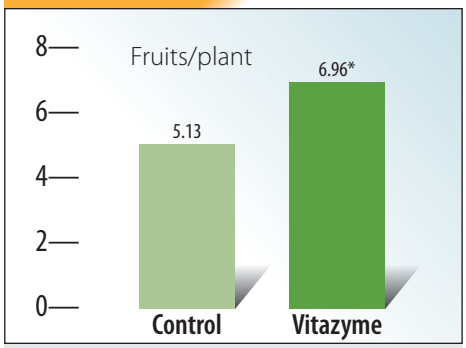
Conclusions: A bell pepper study in Ukraine, using one 1 liter/ha foliar application, revealed that the yield increased by 34%, with a net profit increase of 42%. This yield and profit improvement resulted from significant increases in plant height (up to 42%), leaves/plant (37 to 49%), leaf area/plant (14 to 52%), and leaf chlorophyll (5 to 8%). Improvements in root, stem, leaf, and fruit yields were significant in most cases for the four dates measurements were made. These results reveal the great effectiveness of Vitazyme for pepper production in Ukraine.

Yield results:

Average Fruit Weight

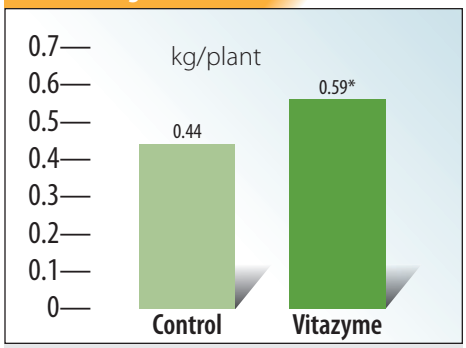


Fruits Per Plant



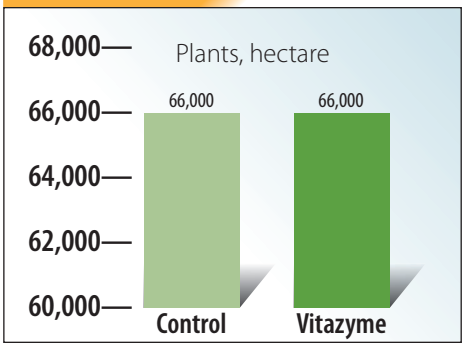
*Significantly greater than the control at P=0.05.

Fruit Weight Per Plant

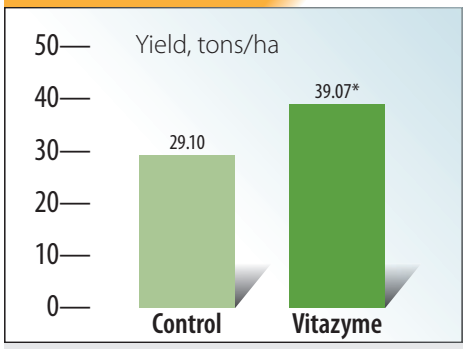


*Significantly greater than the control at P=0.05.

Plants Per Hectare



Fruit Yield



*Significantly greater than the control at P=0.05.

Treatment	Net profit	Profit increase
	UAH/ha	UAH/ha
Control	162,411.51	—
Vitazyme	230,375.23	67,963.72 (+42%)

Increase in net profit with Vitazyme: 42%

Increase with Vitazyme

Fruits/plant ..... +36%
Fruit weight/plant..... +34%
Fruit yield ..... +34%

Peppers *with Vitazyme application*

Researchers: Jonathan Pedroza, Lucero Fernandez, Agustin Peralta, and Ernesto Infante
Research organizations: Quimica Lucava, Mexico
Farmer Cooperator: Maurilio Lozano
Location: El Tabano Farm, San Francisco del Rincon, Guanajuato, Mexico
Variety: Jalapeño
Transplanting date: March 19, 2015
Experimental design: A half hectare of a pepper field was selected to apply three Vitazyme applications to jalapeño peppers, with the objective of evaluating the product's effects on plant growth, yield, and profitability.

Peppers grown with Vitazyme (left) in Mexico display a greater number of fruit, and better uniformity.

❶ *Control* ❷ *Vitazyme*

Vitazyme application: (1) transplant trays dipped in a 0.5% solution (1 liter/200liters of water) on March 16, three days before transplanting; (2) 1.0 liter/ha sprayed on the leaves and soil on April 26; (3) 1.0 liter/ha sprayed on the leaves and soil on May 15
Harvest date: June 24, 2015
Growth results:
April 23 observations (35 days after transplanting)
- Greater total root growth and health compared to the control plants
- More fine roots and root hairs

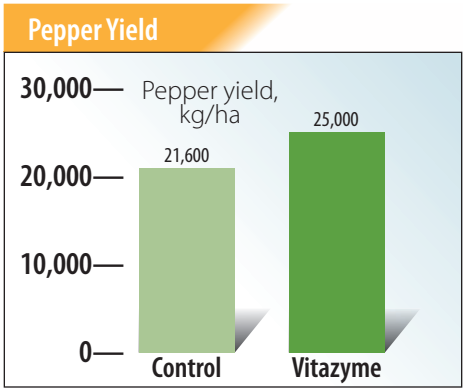
May 15 observations (57 days after transplanting)
- Greater overall plant growth and appearance than the control plants
- More leaves, flowers, and fruit
- Greater primary, secondary, and fine roots

Yield results:

Treatment	Yield	Yield change
	kg/ha	kg/ha
Control	21,600	—
Vitazyme	25,000	3,400 (+16%)

Increase in pepper yield with Vitazyme: 16%

Income results: The price of Jalapeño peppers was 0.4733 USD/kg, and the cost of three Vitazyme applications, including labor, was 113.33 USD/ha.



Conclusions: A field Jalapeño pepper study in Mexico, using a root dip before transplanting followed by two foliar applications at 35 and 57 days after transplanting, revealed that pepper yield increased by 16%, as evidenced by larger, leafier, and healthier plants having more extensive and fibrous root systems compared to the untreated control. Besides, income improved by nearly 1,500 USD/ha, with a cost : benefit of 13.2. These results show that pepper production in Mexico can greatly benefit from Vitazyme use.

Increased gross added income from 3,400 kg/ha = 1,609.22 USD/ha
Net added income after three applications = 1,495.89 USD/ha
Cost : Benefit with Vitazyme: 13.2

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

2014 Crop Results

Vitazyme on Peppers (Chili)

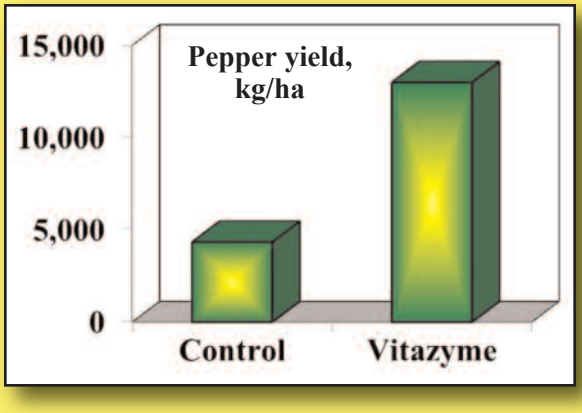
Researcher: Thiery Pelette *Research organization*: Acra Industries, Haiti
Location: Belladere, Haiti *Variety*: West Indies *Planting date*: unknown
Experimental design: This experiment was part of a multi-crop testing program that was established in December of 2011, to evaluate the efficacy of Vitazyme 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	4,329	—
Vitazyme	17,316	12,987 (+300%)

Increase in chili pepper yield with Vitazyme: 300%



Conclusions: A chili pepper study in Haiti revealed a great increase in yield with Vitazyme application, fully 300% greater than the control. It is not known why the control treatment yielded so poorly, possibly due to plant disease which Vitazyme suppresses. This program is shown to hold great promise in helping to alleviate food production problems in this developing country.

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

2013 Crop Results

Vitazyme on Pepper (Black)

Four Farm Trials — Cu Jut District

Trial 1

Researcher: unknown *Farmer*: Dam Van Huan *Location*: Dak Rong Hamlet, Cu Jut District, Viet Nam *Variety*: *Piper nigrum* *Plant population*: 1,600 pillars/ha

Experimental design: Pepper plants were treated with Vitazyme multiple times to evaluate its effect on pepper production, as compared to an untreated control.

1. Control **2. Vitazyme**

Fertilization: unknown

Vitazyme application: 500 ml of Vitazyme in 200 liters of water (0.25%) applied to 150 pepper pillars four times per year

Treatment	Ear length	Flowering	Fruits/Ear	Ear falling	Yield/Pillar	Total yield
	cm		number		kg	kg/ha
Control	10	Long periods	22.5	Much	4.1	6,560
Vitazyme	11	Same time	27.0	None	5.8	9,200

Trial 2

Researcher: unknown *Farmer*: Lang Van Chanh *Location*: Bon U2-Dak Rong Hamlet, Cu Jut District, Viet Nam *Variety*: unknown *Plant population*: 1,700 pillars/ha

Experimental design: Pepper plants were treated with Vitazyme multiple times to evaluate its effect on pepper production, as compared to an untreated control.

1. Control **2. Vitazyme**

Fertilization: unknown

Vitazyme application: 500 ml of Vitazyme in 200 liters of water (0.25%) applied to 250 pepper pillars five times per year

Treatment	Ear length	Flowering	Ear falling	Yield/Pillar	Total yield
	cm			kg	kg/ha
Control	10.5	Long periods	Much	4.1	7,480
Vitazyme	11.0	Same time	None	6.0	10,200

Trial 3

Researcher: unknown *Farmer*: Trien Van Muu *Location*: Cu Knia Hamlet, Cu Jut District, Viet Nam *Variety*: unknown *Plant population*: 1,300 pillars/ha

Experimental design: Pepper plants were treated with Vitazyme multiple times to evaluate its effect on pepper production, as compared to an untreated control.

1. Control **2. Vitazyme**

Fertilization: unknown

Vitazyme application: 500 ml of Vitazyme in 200 liters of water (0.25%) applied to 200 pepper pillars three times a year

Treatment	Ear falling	Yield/Pillar	Total yield
		kg	kg/ha
Control	Falling 30-60 days before harvest	5.0	6,500
Vitazyme	None	5.3	6,890

Trial 4

Researcher: unknown *Farmer*: Nguyen Van Yan *Location*: Cu Knia Hamlet, Cu Jut District, Viet Nam *Variety*: unknown *Plant population*: 1,800 pillars/ha

Experimental design: Pepper plants were treated with Vitazyme multiple times to evaluate its effect on pepper production, as compared to an untreated control.

1. Control **2. Vitazyme**

Fertilization: unknown

Vitazyme application: 500 ml of Vitazyme in 200 liters of water (0.25%) applied to 100 pepper pillars five times a year

Treatment	Ear length	Flowering	Fruits/Ear	Ear falling	Yield/Pillar	Total yield
	cm		number		kg	kg/ha
Control	11.0	Long periods	26.5	A few	6.3	11,340
Vitazyme	10.5	Same time	29.0	None	6.8	12,240

Trial Summary

Increases in Parameter Values With Vitazyme

Trial	Ear length	Flowering[1]	Fruits/Ear	Ear falling[2]	Yield
Trial 1	+20%	Improved	+20%	Improved	+41%
Trial 2	+5%	Improved	—	Improved	+36%
Trial 3	—	—	—	Improved	+6%
Trial 4	-5%	Improved	+9%	Improved	+8%

[1]In all cases Vitazyme caused uniform flowering at the same time, while the control displayed flowering a number of times over a long period.
[2]Immature pepper ears fell 1 to 2 months before harvest to a lesser or greater degree for all trials, but few fell with Vitazyme.

Income results:

Trial	Applications	Estimated added income with Vitazyme	Vitazyme cost[1]	Return On Investment
		Vnd/ha	Vnd/ha	VND spent : VND returned
Trial 1	4	136,000,000	8,000,000	17 : 1
Trial 2	5	127,500,000	6,375,000	20 : 1
Trial 3	3	71,500,000	3,900,000	18.3 : 1
Trial 4	5	162,000,000	8,100,000	20 : 1

[1]Includes product plus labor to apply.

Conclusions: This Viet Nam pepper trial at four locations revealed that Vitazyme, applied as a 0.25% solution three to five times per year, improved ear length (except in one case) and fruits per ear, and greatly reduced premature ear dropping while causing flowering to occur at one time instead of over a one to two month period. Yield increased by 6 to 41%, and income by up to 162,000,000 VND/ha. **Return On Investment was boosted from 17 : 1 to 20 : 1, a very consistent response.** Based on these results, Vitazyme is highly recommended for pepper culture in Viet Nam.

Other observations: **Vitazyme treated plants had darker green leaves and more buds by only 5 to 7 days after spraying.**

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

2012 Crop Results

Vitazyme on Peppers

Researchers: Nelson Najarro and Cristhian Mazariegos, Foragro Development, Guatemala City, Guatemala.
Location: Jutiapa, Guatemala *Variety*: Natali (sweet pepper) *Transplanting date*: July 25, 2011
Planting rate: row spacing = 1.25 m; in-row spacing = 2.5 cm *Growth environment*: plastic tunnels
Experimental design: A pepper field was selected to evaluate the ability of Vitazyme to increase crop population. Two 120-meter rows containing 800 seedlings in a 300 m^2 area were treated with a single Vitazyme drench.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: Three days after transplanting, on July 28, 2011, a 1% Vitazyme solution was sprayed as a drench at the base of the transplants in the treated area. A total of 24 liters of solution was applied to the 800 seedlings, giving 30 ml/plant.
Growth results: At seven days after planting, the following results were noted with Vitazyme treatment as compared to the untreated control:

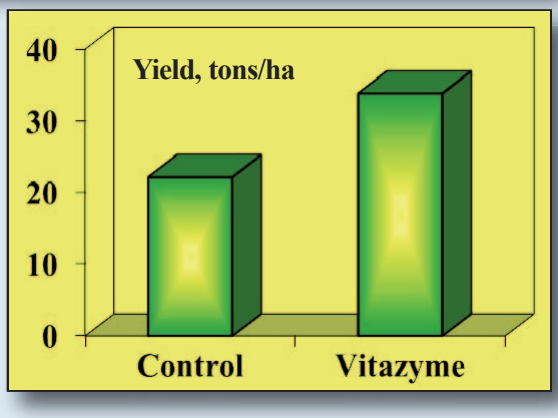
- ***More intense green color***
- ***Higher seedling survival rate***

Yield results:

Treatment	Diameter	Length	Weight	Fruits/ha	Yield
	cm	cm	grams		tons/ha
Control	15.00	13.20	56.0	395,833	22.16
Vitazyme	23.34 (+56%)	21.32 (+62%)	65.0 (+16%)	520,833 (+32%)	33.85 (+53%)

Increase with Vitazyme

Fruit diameter	56%
Fruit length	62%
Fruit weight	16%
Fruit/ha	32%



Note that all parameters of growth, especially yield, were dramatically increased with Vitazyme application.
Conclusions: In this Guatemala pepper trial, where only a single application to the root zone was made, the fruit size was dramatically increased (56% wider and 62% longer), as were the number per hectare (32%). Weight was boosted by 16% on average. These results were gained due to greater chlorophyll development and subsequent growth, and increased transplant survival. Also, contributing to a greater final yield was a ***greatly reduced infection from a viral disease*** that severely infected the control area after a storm, early in the trial, tore off the plastic covers of the growth tunnels.

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2007 Crop Results

Vitazyme on Peppers

A Testimonial

Farmer: Michael Prochko
Location: Jefferson, Ohio
Varieties: sweet, hot, and other varieties
Soil type: silt loam, poorly drained, tiled at 20-foot centers
Spacing: double rows spaced 5 feet
In-row spacing: 15 inches
Mulching: plastic mulch over rows
Fertility level: good

Experimental design: The farmer applied a special fertility program plus Vitazyme over the entire 4.0-acre pepper area. He compared this program to previous years' results with the same cropping system.

Fertilization: added sulfur, high-calcium lime, boron, zinc, manganese, and copper

Vitazyme application: 13 oz/acre to the leaves and foliage at intervals

Weather: erratic, with a drought until late July, and then good moisture

Yield and quality results: All varieties yielded excellently, the Excursion variety producing many peppers of 1.25 lb! The hot and pablano peppers were exceptionally large and prolific, with a rapid turnover of the new fruit after picking. there were more peppers produced than he could market this year with the Vitazyme program.

Conclusions: Vitazyme in this pepper production system in Ohio produced large numbers of very sizable and tasty fruit. The product enabled the plants to make optimum use of the native and applied plant nutrients.

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2006 Crop Results

Vitazyme on Peppers

A Testimonial

Researcher: Ing. Agapo Castro *Location*: La Beatriz, Atuntaqui, Ecuador

Experimental design: No replicates were used in this study. The researcher observed the state of the crops as compared to untreated areas.

Comments by the researcher: "The plants reached a higher developmental stage and their strength was excellent, with an intense green color. We harvested bigger fruits and had a better yield. The entire crop had better sanitary [disease resistance] conditions and better drought resistance."

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2004 Crop Results

Vitazyme on Peppers

Researchers: Isel Creach Rodriguez, Ph.D.
Location: Santiago de Cuba Experiment Station, Dos Rios, Palma Soriana, Santiago de Cuba
Variety: Chay *Row spacing*: 1 meter *Soil type*: Leptic haplustert
Transplanting Date: December 5, 2003
Experimental design: An area of 73m^2 was used for each of the two treatments to determine the effects of the products on the growth and yield potential of the peppers. Each plot had an equal number of plants.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1 liter/ha on January 20, 2004, and 1 liter/ha on February 11, 2004
Growth results: Plants were evaluated on January 21 and February 2, 2004, for height and leaf number using random sampling of plants and leaves. The experimental design of this study was not conducive to a detailed statistical analysis, so only basic statistics were calculated.

Plant Height

January 21, 2004

Sample	Control	Vitazyme
	cm	cm
1	23	24
2	24	23
3	24	22
4	22	25
5	23	24
6	24	23
7	25	23
8	22	24
9	23	25
10	24	22
Mean	23.4	23.5

Increase in plant height: none

February 9, 2004

Sample	Control	Vitazyme
	cm	cm
1	30	32
2	31	32
3	21	33
4	28	31
5	27	33
6	22	30
7	26	33
8	24	32
9	22	31
10	23	33
Mean	25.4	32.0 (+26%)

Increase in plant height: 26%

Leaves Per Plant (February 6)

Sample	Control	Vitazyme
	----- number of leaves-----	
1	86	112
2	87	103
3	98	100
4	95	98
5	93	102
6	82	86
7	84	108
8	95	101
9	92	106
10	99	102
Mean	91.1	101.8 (+12%)

Increase in leaves per plant: 12%

Yield results (estimated): A formula was used to calculate estimated fruit weight and final yield of the pepper crop (after two pickings), based upon previous field studies.

Parameter	Control	Vitazyme
Fruit weight	16 g	24 g
Fruit yield/plot	4.8 kg	7.2 kg

Conclusions: This study in Santiago de Cuba showed that two applications of Vitazyme substantially increased plant height by 59 days after transplanting (+26%), while leaves per plant increased by 12% with Vitazyme by 63 days after transplanting. Estimated pepper yield with Vitazyme increased by 50% over the control.

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2000 Crop Results

Vitazyme on Peppers

Caribbean Chemical International

Agronomist: Fayaz Shah
Location: Aranguez, Trinidad, West Indies
Variety: King Henry Sweet Pepper
Transplanting date: August 12, 1999
Harvest date: January 25, February 7, 12, 16, and 24, and March 8 and 20, 2000
Experimental design: A plot of a pepper field was treated with Vitazyme, and an adjoining portion of the field served as a control. The treated plot had 245 pepper plants in an area 10x70 feet.

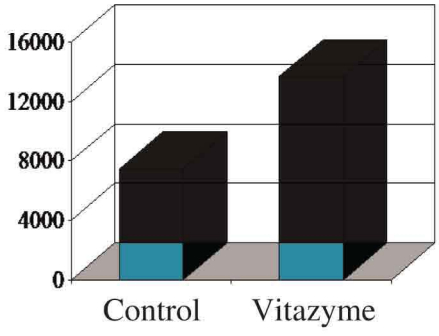
1. Control **2. Vitazyme**

Fertility treatments: unknown

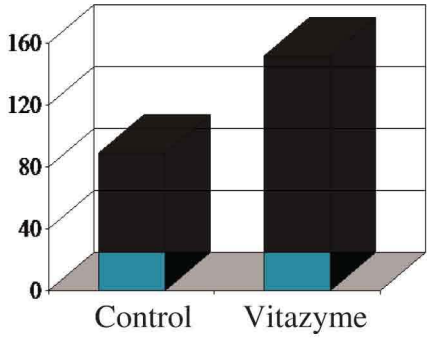
Vitazyme treatments: Vitazyme was applied three times at 30 ml/gallon (about 1%, or 3.29 liters/ha) each time on December 16 and December 29, 2000, and January 16, 2000.

Yield results: Both pepper number and total weight were tabulated over the harvest period for 10 randomly selected plants for the treated and untreated plots.

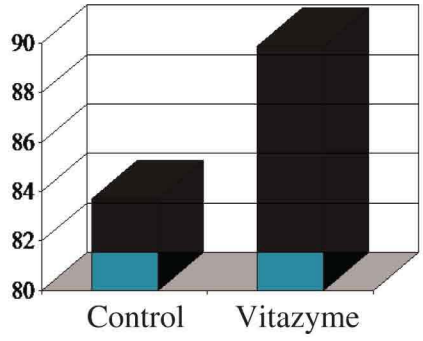
Treatment	Yield	Increase	Fruit number	Increase	Weight per fruit	Increase
	---------g----------				----------g/fruit----------	
Control	7,449	--	89	--	83.7	--
Vitazyme	13,668	6,219 (+83%)	152	63 (+71%)	89.9	6.2 (+7%)



Total yield, grams



Fruit number



Weight per fruit, grams

Conclusion: Vitazyme proved to be a great stimulator of pepper yield in this study, increasing total production by 83% above the control and increasing pepper size by 7%.

Yield increase: 83%

Fruit number increase: 83%

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1999 Crop Results

Vitazyme on Peppers

Caribbean Chemical International

Researcher: Chris Teixeira, agronomist *Location*: Trinidad, West Indies
Variety: King Henry *Transplanting date*: September 19, 1999 *Harvest date*: unknown
Experimental design: An area of a pepper field was treated with Vitazyme, while an adjacent area was left untreated. The determinations below are the analysis of five replications:

1. Control (no Vitazyme) 2. Vitazyme

Fertility treatments: 1 oz/plant of 12-24-12% N-P_2O_5-K_2O at planting; 1oz/plant of 12-12-17-2(Mg) 2 weeks after planting, and every 3 weeks thereafter

Vitazyme treatment: a 1% solution sprayed on the leaves and foliage on September 19, October 5, and October 24, 1999

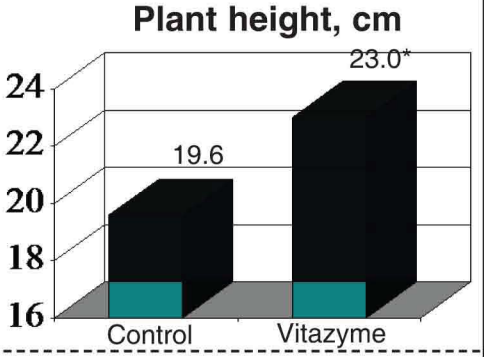
Yield and growth results: All values are from five replicates, collected on **November 10, 1999**.

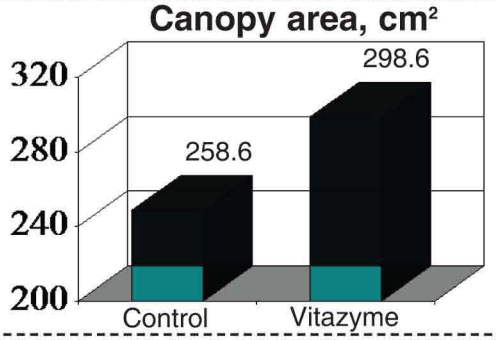
Plant Height

	Height, cm	Change, cm
Control	19.6	---
Vitazyme	23.0*	3.4 (+17%)

*Significantly greater than the control at P=0.12 (Duncan's Test)

Height increase: 17%





Leaf Canopy Area

	Canopy area, cm²	Change, cm
Control	248.6	---
Vitazyme	298.6	50.0 (+20%)

***Significantly greater than the control at P=0.001 (Duncan's test)

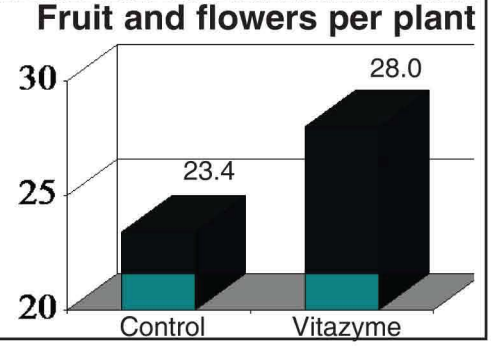
Canopy increase: 20%

Fruit and Flower Number

	Fruit and flower number	Increase
Control	23.4	---
Vitazyme	28.0*	4.6 (+20%)

*Significantly greater than the control at P=0.21 (Duncan's Test)

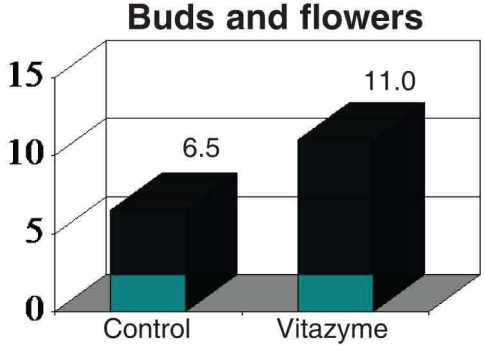
Fruit and flower increase: 20%



At this date the Vitazyme treatment was visibly superior to the control in the following respects:

- **A thicker, lusher leaf canopy**
- **Bigger and better developed roots**
- **A noticably better fruit set, and larger and more numerous pepper fruit**

Yield and growth results: Observations were made on **December 1, 1999**, using 10 plants per treatment.



Buds and Flowers

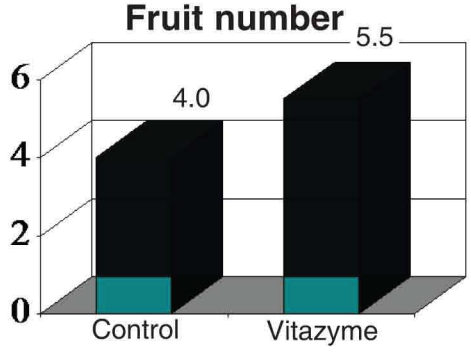
	Buds and flowers	Increase
Control	6.5	---
Vitazyme	11.0	4.5 (+69%)

Bud and flower increase: 69%

Pepper Fruit

	Fruit number	Increase
Control	4.0	---
Vitazyme	5.5	1.5 (+38%)

Pepper fruit increase: 38%



The Vitazyme treated plants also had **thicker stems**, were **darker green** in color throughout, and were **larger** in size than the control plants.