Broccoli *with Vitazyme application*

Researcher: Rajnish Khanna, Ph.D.
Research organization: e-Cultiver, Manteca, California
Location: USDA/Plant Gene Expression Center, Albany, California
Variety: unknown
Planting date: September 1, 2024
Potting Soil: Sunshine Mix #1 (Sungro Horticulture)
Pot size: 3 gal tall
Experimental design: A small greenhouse trial, using pots for an untreated control and a Vitazyme treatment with six plants per treatment, was established to evaluate the effect of Vitazyme on the growth of broccoli.

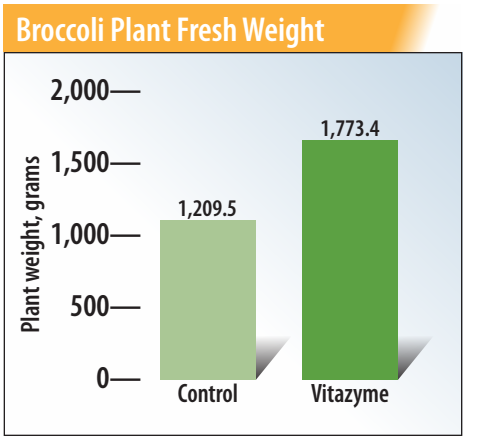
❶ ***Control*** ❷ ***Vitazyme***

Fertilization: Peters 20-20-20 water soluble fertilizer at 1:64 ppm, once per week
Vitazyme applications: 1:100 dilution sprayed on the leaves to the dripping point, and to the soil, every two weeks
Broccoli harvest results: The broccoli plants were harvested on December 23, and the leaves were weighed for the two treatments.

Treatment	Plant weight[1]	Weight change
	grams	grams
1. Control	1,209.5 b	—
2. Vitazyme	1,773.4 a	563.9 (+47%)

[1]Total of six plants, fresh weight. The Vitazyme treated leaves (a) exceeded the control leaves (b) at P = 0.004.

Increase in plant weight with Vitazyme: 47%



Conclusions: A small-pot broccoli greenhouse study in California, which compared an untreated control with Vitazyme treatment of a 1% spray every two weeks, revealed considerably greater leaf and stem growth with the Vitazyme treatment about 15 weeks after planting. The increase was 47%, showing the great efficacy of this biostimulant to increase broccoli growth. This improvement would very likely have carried over to total head yield.

Broccoli *with Vitazyme application.*

Researchers: Miguel Francisco Villalobos and Lucero Fernandez
Farm: Novasem
Research organization: Novasem and Quimica Lucava
Location: Sayula, Jalisco, Mexico
Variety: Avenger
Experimental design: Two hectares of a broccoli field were selected to apply Vitazyme three times, to compare the yield and profitability of this product with the adjoining untreated control.

Broccoli in this Mexican trial showed good growth, but produced considerably less yield and profit than the treated plants.

The Vitazyme treated broccoli, having received a transplant dip and two foliar applications, was more vigorous, contained more chlorophyll, and yielded 15% more than the control.

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

Fertilization: Unknown
Vitazyme application: (1) root dip of a 0.5% solution at planting of transplants (January 3, 2015); (2) foliar and soil spray 18 days after transplanting, on January 21; (3) foliar and soil spray 47 days after transplanting, on February 19, 2015.
Harvest date: March 24, 2015, after 80 days
Yield results:

Treatment	Plant weight[1]	Weight change	Yield	Yield change
	kg/plant	kg/plant	kg/ha	kg/ha
Control	0.629	—	35,224	—
Vitazyme	0.722	0.093	40,432	5,208 (+15%)

[1] Plant density = 56,000 plants/ha.

Increase in broccoli yield with Vitazyme : 15%

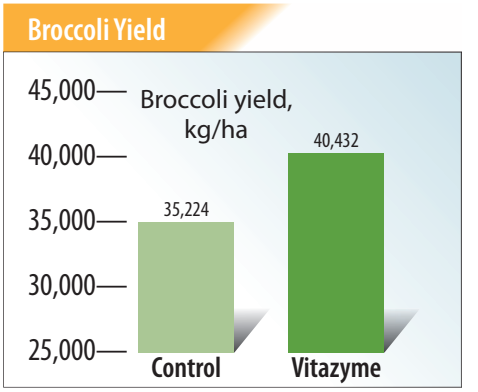
These typical treated and control broccoli plants show obvious differences in growth characteristics.

Income results:

Treatment	Yield	Yield change	Gross Income[1]	Added income	Added cost[2]	Net Profit	Cost : Benefit
	kg/ha	kg/ha	USD/ha	USD/ha	USD/ha	USD/ha	—
Control	35,224	—	9,862.72	—	—	—	
Vitazyme	40,432	5,208	11,320.96	1,458.24	117.24	1,341.00	11.4

[1]Broccoli price = 0.28 USD/kg ; [2]Vitazyme (three applications) and relevant labor.

Increase in income with Vitazyme: 1,341.00 USD/ha
Cost : Benefit: 11.4



Conclusion: Vitazyme in this Mexican broccoli study, using three applications, resulted in an excellent 15% yield increase, with income improved by 1,341 USD/ha and cost : benefit by 11.4. This program is well adapted to broccoli production in Mexico.

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2006 Crop Results

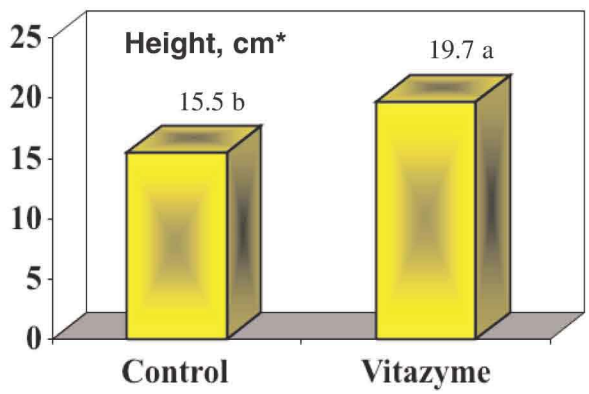
Vitazyme on Broccoli

Researcher: Paul W. Syltie, Ph.D.
Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: Umpqua (open-pollinated) *Planting date*: October 26, 2006
Media: Vital Earth Ultra-Blend (pH 6.0, 200+ ppm N, 75 ppm P, 450 ppm K, 650 ppm Ca, 250 ppm Mg, 200 ppm S, plus B, Cu, Fe, Mn, and Zn) *Pot size*: 8.5 cm x 8.5 cm x 8.0 cm deep
Experimental design: An evaluation of Vitazyme was made as it affects the germination and early development of broccoli. Seven replicates in a completely randomized design were grown in a greenhouse setting, with daytime temperatures of 60 to 75°F, and nighttime temperatures of 50 to 60°F. Watering was on an as-needed basis. Half of the 14 pots were treated and half left untreated as controls. Plant height and leaf area were measured to evaluate growth.

1. Control **2. Vitazyme**

Fertilization: An equal amount of 13-13-13% N-P_2O_5-K_2O granular fertilizer was sprinkled onto the top of each pot on November 10, once the plants were about one inch tall.
Vitazyme applications: 5 ml of a 0.1% solution applied to the seeds and soil after covering
Growth results: On November 24, 29 days after planting, plant height was measured from soil level to the greatest extension of the longest leaf. Leaf area was determined by measuring the length and width of the largest leaf, and calculating the approximate area by length x width x 0.80.

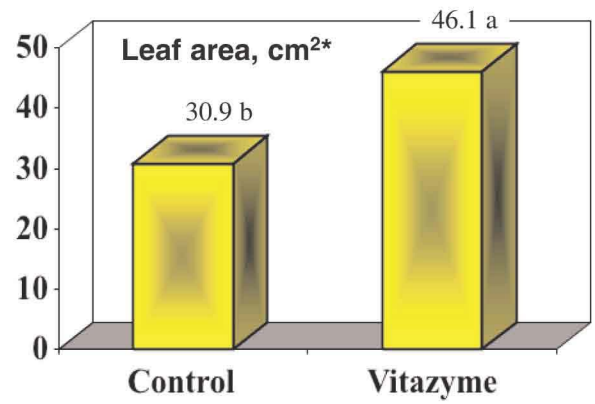
Plant Height



Increase in plant height: 27%

Main effects P = 0.0056***
CV = 13.0%
$LSD_{0.05}$ - 2.7 cm
*Means followed by the same letter are not significantly different at P = 0.05.

Leaf Area



Increase in leaf area: 49%

Main effects P = 0.0062***
CV = 22.2%
$LSD_{0.05}$ = 10.0 cm^2
*Means followed by the same letter are not significantly different at P = 0.05.

Conclusions: This replicated study of broccoli seedlings shows that Vitazyme, applied at very low concentrations (only 5 ml of a 0.1% solution per plant) at seeding, produced substantial and highly significant plant growth responses. Plant height was increased by 27%, and leaf area by 49%, with this single Vitazyme application, showing that the product will produce larger and stronger broccoli transplants than untreated controls over the same time period.

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2003 Crop Results

Vitazyme on Broccoli *(Transplants)*

Researcher: Paul W. Syltie, Ph.D.
Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: De Cisco *Soil type*: Vital Earth fine ultra blend potting mix
Planting date: February 3, 2003
Experimental design: Two flats of 20 pots each (3.5 x 3.5 x 3.5 inches) were planted with three broccoli seeds per pot — thinned to one plant — and grown in a greenhouse at about 55° to 80°F. One flat was treated with Vitazyme and the other flat was left untreated.

1. Control **2. Vitazyme**

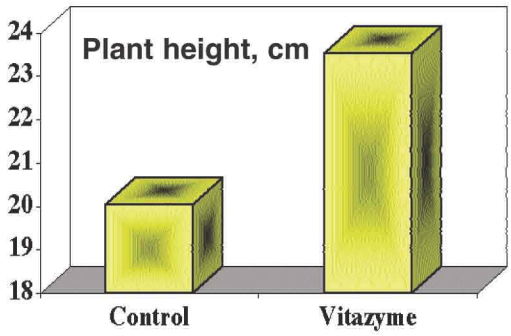
Fertilization: Each pot received 0.5 gram of 13-13-13 N-P_2O_5-K_2O (+ micronutrients) pelleted, timed release fertilizer, equal to about 30 lb/acre of nitrogen, at planting to the pot surface.
Vitazyme treatment: For Treatment 2, each pot received 25 ml of a 0.1% Vitazyme solution after planting.
Measurement date: March 16, 2003, 41 days after planting
Growth results: Each plant was measured on March 16 for plant height and leaf width, and the results were analyzed as a completely randomized one-way design using CoHort software.

Plant Height

The leaves were extended, and the distance from the soil level to the tip of the longest leaf was measured.

Treatment	Plant height*	Height change
	cm	cm
1. Control	20.05 b	—
2. Vitazyme	23.53 a	3.48 (+17%)

*Means followed by the same letter are not significantly different at P=0.01 according to the Tukey-Kramer Test. $LSD_{0.1}$=2.18 cm.



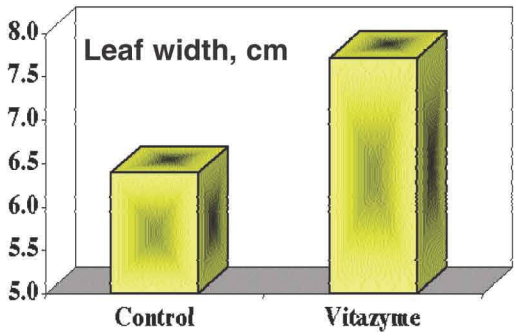
Plant height increase: 17%

Leaf Width

The width of the widest leaf was measured for each plant.

Treatment	Leaf width*	Width change
	cm	cm
1. Control	6.39	—
2. Vitazyme	7.71	1.32 (+21%)

*Means followed by the same letter are not significantly different at P=0.0001 according to the Tukey-Kramer Test. $LSD_{0.1}$=0.51 cm.



Leaf width increase: 21%

Plant Height : Leaf Width

Control: 20.05 cm/6.39 cm = 3.14
Vitazyme: 23.53 cm/7.71 cm = 3.05

Conclusions: In this greenhouse experiment evaluating the effect of Vitazyme on broccoli transplants, **Vitazyme significantly increased plant height (by 17%) and especially leaf width (by 21%), giving a more leaf-dense plant canopy as evidenced by a lower plant height : leaf width ratio than the control: 3.05 versus 3.14.** This improved ratio is favorable for transplants and represents a stronger plant; this occurred in spite a taller plant with Vitazyme. Also noted at measurement time was **a greater leaf chlorophyll development for the Vitazyme treated plants.**

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2000 Crop Results

Vitazyme on Broccoli

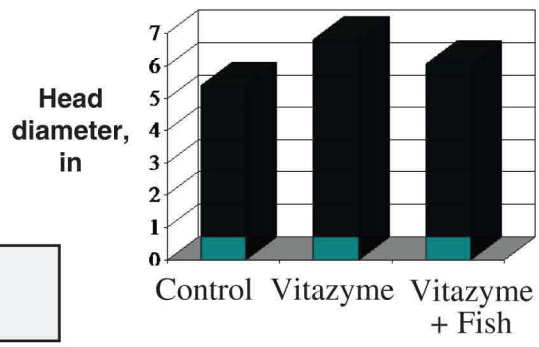
Grower: Gene Jackson Farms (Duda Farms), Jerry Benson, agronomist
Location: Maxwell Ranch, Ventura County, CA *Variety*: unknown
Planting date: January 10, 2000 (seeds) *Plot location*: Block 40, Row 9
Planting rate: one seed every 5 inches on 40-inch beds
Experimental design: A 20-foot section of row of a broccoli field was treated with Vitazyme three times during the growing season. Near that was a 20-foot section of Vitazyme plus liquid fish. Untreated plants alongside the treated rows served as controls.

1. Control 2. Vitazyme 3. Vitazyme + fish

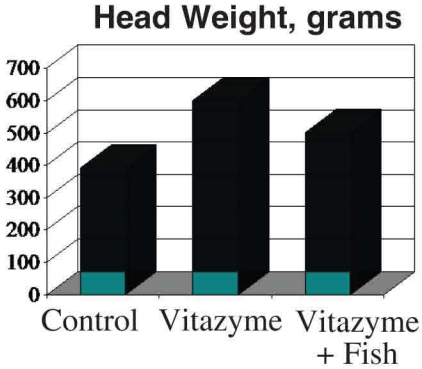
Fertilizer treatments: proprietary
Fish treatment: 10 gal/acre of actual fish, diluted 10:1, applied three times with Vitazyme (see below)
Vitazyme application: Vitazyme was applied three times to the leaves and soil at 13 oz/acre: January 12 (2 days after planting), February 29 (48 days after planting), and March 23 (71 days after planting).
Pesticide treatments: proprietary
Harvest date: April 13 (92 days after planting). The projected harvest date had been April 3.
Results: Ten representative heads were cut for weighing in each treated and control row with the guidance of the agronomist. Head diameter was also measured.

Head Diameter

Treatment	Diameter, inches	Change
Control	5.40	--
Vitazyme	6.80	1.40 (+26%)
Vitazyme + Fish	6.05	0.65 (+12%)



Head diameter increase: 26%



Head Weight

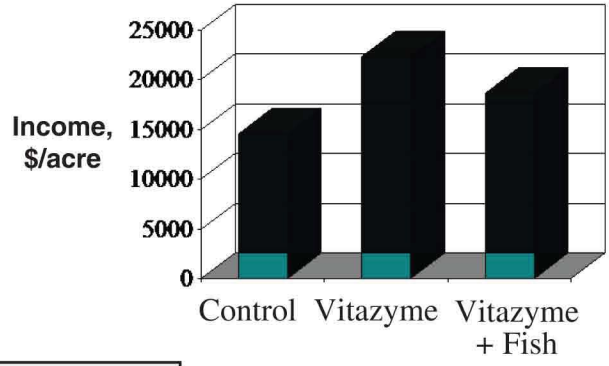
Treatment	Weight, grams	Change
Control	391.9	--
Vitazyme	600.6	208.7 (+53%)
Vitazyme + Fish	501.6	109.7 (+28%)

Head weight increase: 53%

Income

Treatment	Income, $/acre*	Change
Control	14,547.98	--
Vitazyme	22,303.03	(+) 7,755.05
Vitazyme + Fish	18,627.60	(+) 4,079.62

* Based on the value of broccoli as purchased by major stores in early May, 2000, for resale in eastern Texas: $0.5375/lb.



Income increase: $7,755.05/acre

Conclusions: Vitazyme alone increased yield over the control by 53%, and gave a considerably greater increase than the fish plus Vitazyme. Heads were biggest with Vitazyme alone, one head being 1,123 grams (2.47 lb) and 8.0 inches in diameter. The fish caused some leaf spotting, but the spotting did not influence the yield of the affected plants. The increased income from the three Vitazyme applications was $7,755.05/acre, an incredibly good return from a very small investment. Since larger heads are produced with Seaweed, it is possible for the grower to cut the growing cycle shorter to get the desired head size.