VITAZYME®

2003 Field Trial Results

A SUMMARY OF EXPERIMENTS USING VITAZYME SOIL AND PLANT BIOSTIMULANT ON FIELD, ORCHARD, AND GREENHOUSE CROPS

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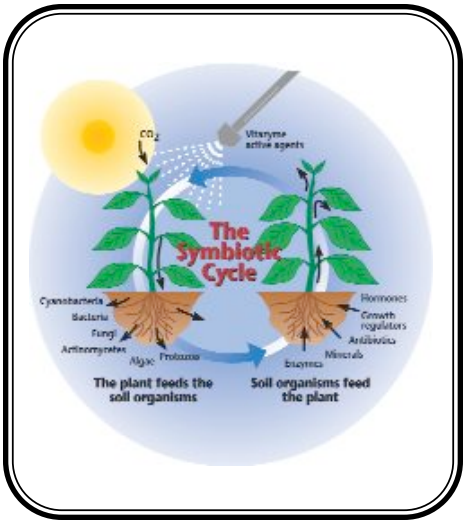
2003 Vitazyme Field Trial Results

For the ninth consecutive year a summary of Vitazyme field trials is presented to convey the great value of this crop biostimulant to enhance crop production. Over a wide variety of crops, soils, and climactic conditions various production programs involving Vitazyme have performed extremely well across the United States and in many foreign countries. The consistency of crop responses has been noteworthy.

For those unfamiliar with Vitazyme soil and plant biostimulant and its recommended program, please review the information given below to understand how the material works within the plant-soil system.

Improved Symbiosis: The Secret of Vitazyme's Action

All plants that grow in soils develop an intimate relationship between the roots and the organisms that populate the root zone. The teeming billions of bacteria, fungi, algae, cyanobacteria, protozoa, and other organisms



that grow along the root surfaces — the rhizosphere — are much more plentiful than in the bulk of the soil. This is because roots feed the organisms with dead root epidermal cells as well as compounds exuded from the roots themselves. The plant may inject up to 25% or more of its energy, fixed in the leaves as carbohydrates, amino acids, and other compounds, into the root zone to feed these organisms' for a very good purpose.

The microorganisms which feed on these exuded carbon compounds along the root surfaces benefit the plant in many ways creating a beautiful symbiotic relationship. The plant feeds the bacteria, fungi, algae, and other microbial species in the rhizosphere, which in turn secrete enzymes, organic acids, antibiotics, growth regulators, hormones, and other substances which are absorbed by the roots and transported to the leaves. The acids help dissolve essential minerals, and reduced iron releases anionic elements. Organism types include mycorrhizae, cyanobacteria and various other bacteria, fungi, and actinomycetes.

Vitazyme contains "metabolic triggers" that stimulate the plant to photosynthesize more efficiently, fixing more sunlight energy in the form of carbon compounds to increase the transfer of carbohydrates, proteins, and other growth substances into the root zone. These active agents may enter the plant through either the leaves or the roots. Root growth and exudation are both enhanced. This enhancement activates the metabolism of the teeming population of rhizosphere organisms to a higher level, triggering a greater synthesis of growth-benefiting compounds and a faster release of minerals for plant uptake. Thus the plant-microbial symbiosis is stimulated.

Very small amounts of these metabolic triggers in Vitazyme are needed to greatly improve plant and rhizosphere microbe response. This is because of the **enzyme cascade effect.** Successive tiers of enzymes are activated in plant and microbial tissues to give a large physiological response from very little activator.

In short, Vitazyme enables the plant to better express its genetic potential by reducing the stresses that repress that expression.

Vitazyme should be used within the context of a complete crop management system, never by itself. Vitazyme will optimize your existing program by enabling the plant to grow better, thus increasing productivity. Follow this easy-to-use five-point program.

1 If possible, analyze the soil at a reputable laboratory and correct mineral deficiencies and imbalances with expert consultation.

2 Reduce nitrogen fertilizer applications for non-legumes using this test:

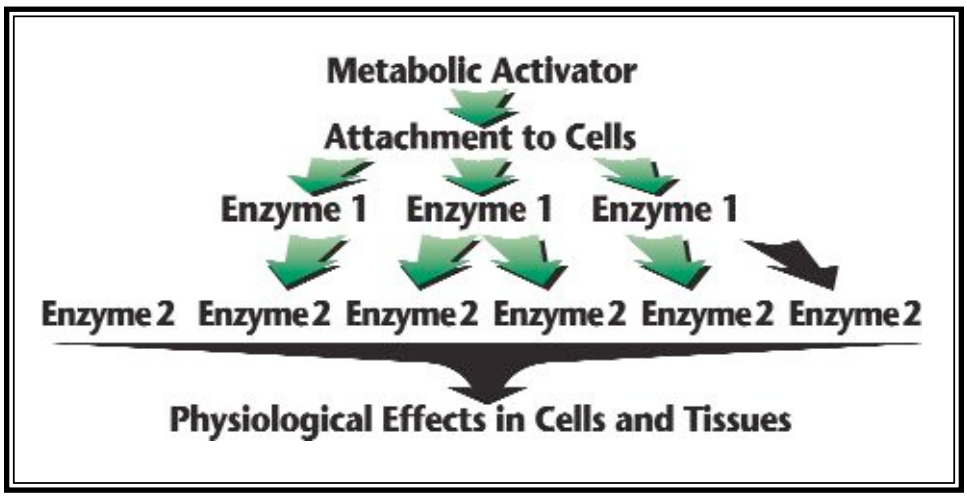
Soil Organic Matter			Previous Crop		Compaction		Soil NO_3-N		
Low(<1.5%)	Medium(1.5-3%)	High(>3%)	Non-legume	Legume	Much	Little	Low	Medium	High
1	2	3	1	3	1	3	2	4	6
Total additive score:	15 14	13 12	11	10	9	8	7	6	5
Apply this % of optimum N:	← 50-60% →		← 60-70% →				← 70-80% →		

Reduce the application each time the fertilizer normally is applied. Legumes normally need no added nitrogen. Vitazyme will accelerate legume nitrogen fixation.

3 Treat the seeds or transplant roots, if possible at planting. Treat seeds with a dilute Vitazyme solution, such as 1 liter of a 5% solution for every 50 kg of seed. Mix the seeds thoroughly in a seed or cement mixer or on a tarp. **For excellent results apply the solution directly on the seed row with a planting attachment. Dip or spray transplant roots with a 1% or 2% solution.**

4 Apply Vitazyme to the soil and/or foliage. Follow instructions for each crop. In most cases from 10 to 20 oz/acre can be applied per application at one to three times during the cropping cycle. A fall application on stubble is effective to accelerate residue breakdown.

5 Integrate other sound, sustainable management practices into a total program. Use crop rotations, minimum tillage, soil conservation practices, and adapted plant varieties.



Vitazyme Highlights for 2003

The year brought a variety of weather conditions across the country, with continued drought in the western states, and a very dry and hot August and September in much of the Corn Belt. Spring and early summer were quite cool and wet, however, especially in the East and Northeast. In spite of the extremes, Vitazyme performed very well with all crops across the nation in 2003. Usually the product displays its most profound growth responses when stresses of drought, pathogens, and fertility shortages are present. This year was no exception.

Some Highlights for 2003

1 Efforts began in Cuba to gain approval for use on a number of crops. Replicated trials on tomatoes produced a remarkable and significant 16% yield increase while fruit number and size were enhanced. Sweet potatoes responded excellently to the product, producing enhanced yields at reduced nitrogen levels, the 50% N level plus Vitazyme yielding as well as the 100% fertilizer treatment. Other crops such as sugar cane, rice, and potatoes are also being investigated.

2 The nitrogen sparing effects of the product have again been shown in the Cuba trials cited above, as well as in the corn studies in Iowa and Nigeria, and in a soybean study at the Vital Earth research greenhouse. This effect will become more important as fertilizer prices continue to climb.

3 Potatoes in Maine, Colorado, and Mexico continued to show excellent responses to Vitazyme application in terms of yield, tuber number, and uniformity. The standard program in Maine and Mexico now involves three applications.

4 Demonstrations on turf grasses of various types across Oklahoma, Arkansas, and Texas have shown how bermudagrass, zoysia grass, and centipede grass will produce much better roots and leaves, within only a few weeks after application in some cases. The effects of binding the sod mass together better enables the grass grower to market fields that ordinarily may have to be abandoned.

5 Silage corn in California continued the same excellent responses of this crop to Vitazyme noted over the past years, in terms of both yields and feeding quality. Of special note was an enhanced degree of ear filling.

6 A well-done replicated strawberry test in California showed the potential of Vitazyme to enhance berry yields, by 16% in this study. Such yield increases result in income enhancement of thousands of dollars per acre.

Continuing the consistent responses of Vitazyme on a number of crops, the results shown in this booklet speak for themselves. Across all types of soils and climate conditions, this product and its associated program have provided excellent results in North America as well as on other continents.

Vitazyme Field Tests for 2003

Amaranthus

Department of Agriculture, Ondo State, Nigeria

Location: Iju/itaogbolu, Akure North Local Government Area, Ondo State, Nigeria
Variety. *Amaranthus cruentus* *Planting date*: late season of 2000 *Soil type*: unknown
Experimental design: A field was set up with six treatments and three replicates in plots that were 3 meters x 5 meters, the treatments being as follows:

Treatment	Vitazyme*	NPK Fertilizer
1	yes	0
2	yes	100 kg/ha
3	yes	200 kg/ha
4	no	100 kg/ha
5	no	200 kg/ha
6	no	0

*Seed treatment only

Fertility treatments: The NPK fertilizer was applied to the appropriate plots two weeks after planting.
Vitazyme treatments: a seed treatment only with 5% Vitazyme, air dried before planting
Weeding: The plots were weeded at 2 and 4 weeks after planting.
Growth results: The plants were analyzed for growth parameters at six weeks after planting. No data was sent with the report received, so only verbal conclusions are given here.

Plant Height

- Treatments 2, 3, 4, and 5 were significantly taller than those of Treatments 1 and 6. Thus, Vitazyme alone, and no fertilizer or Vitazyme, produced plants that were significantly shorter than those receiving Vitazyme with either 100 or 200 kg/ha NPK, or 100 or 200 kg/ha NPK only.
- **Vitazyme plus 100 kg/ha NPK yielded plants about as tall as did 200 kg/ha NPK alone.**

Leaf Number Per Plant

- There were significantly more leaves on Treatments 2, 3, 4, and 5 than on treatments 1 and 6; Vitazyme alone and no treatment produced significantly fewer leaves than did any of the Vitazyme plus NPK or NPK treatments alone.

Leaf Area Per Plant

- Results were about the same as for leaf number per plant.

Fresh Shoot Weight

- Vitazyme plus 200 kg/ha NPK produced plants that had significantly greater fresh shoot weight than did the other treatments, including Vitazyme plus 100 kg/ha NPK, any NPK treatments, and Vitazyme alone or the control.

Continued on the next page

Total Biomass Production

- **Vitazyme plus 100 kg/ha NPK produced a biomass similar to 200 kg/ha NPK alone.**
- The two treatments above were significantly greater than the others in terms of total plant biomass.

Conclusions: Vitazyme applied to the amaranthus seeds only before planting produced significant growth stimulation effects throughout the 6-week growing period. **Especially noticeable was the effect of Vitazyme to initiate more efficient fertilizer utilization, making plant height, leaf number, leaf area, shoot weight, and plant biomass as great with the 100 kg/ha NPK level as with the 200 kg/ha NPK treatment with no Vitazyme. This effect of encouraging more efficient nutrient use is especially important for countries such as Nigeria where nutrient applications, because of high costs, may be suboptimal, but where Vitazyme can increase fertilizer effectiveness so the farmer can approach optimum yields in spite of this reduced application rate.**

Apples

Agr. Assistance, North Rose, New York

Vitazyme treated apples display the typical vigorous growth, leafiness, and branching as seen in this New York study.

Farmer: Jay DeBadts and Sons
Location: Sodus, New York
Variety: Empire (Royal Empire strain)
Tree age: 7-years of full bearing
Tree density: 600 trees/acre
Rootstalk: M9
Experimental design: A section of the orchard was treated with a Vitazyme spray four times during the growing season. Untreated apples alongside those rows served as controls. Scoring of the yield, fruit size, fruit number, and apple quality were determined for each treatment, using trees that were as identical as possible.

These Empire apples are hard to size, and although Vitazyme did not improve size, it helped the brix and flesh firmness.

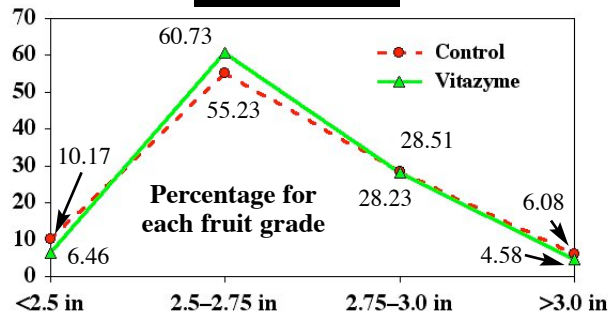
1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme applications: 24 oz/acre as a foliar spray at pink, petal fall, first cover, and 30 days pre-harvest in 100 gallon/acre sprays.
Weather: The season was unusually wet and cold, and apple yields on most varieties were heavy, with fruit size excellent on most varieties except Empire, which tended to give significantly smaller fruit this year.
Yield results: No significant differences were noted in yield between the two treatments.
Quality results: For brix and pressure ratings, 10 apples per tree were tested and averaged for each treatment.
Conclusions: This Vitazyme apple test in New York showed that, while not increasing yield, the product performed some valuable quality functions:

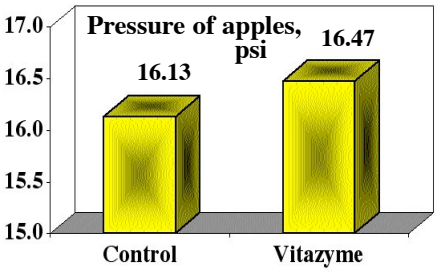
1. The fruit less than 2.5 inches in diameter were decreased.
2. Fruit firmness was increased by 0.34 psi.
3. Fruit brix was elevated by 0.31 point.

These results indicated that Vitazyme can improve the crispness and sweetness of apples, and also help reduce the number of small apples for a variety like Empire than has a problem with sizing.

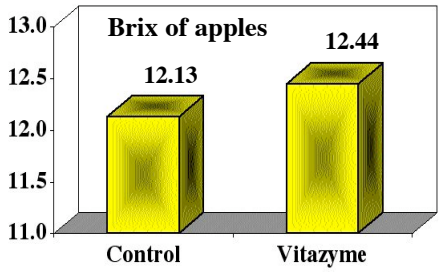
Fruit Grade



Fruit Pressure



Fruit Brix



· Increase in fruit pressure: 0.34 point ***· Increase in fruit brix: 0.31 point***

Bananas (Organic)

Researcher/Farmer: Grupo Agricola Prieto
Location: Los Angeles, Pasaje, El Oro, Ecuador
Variety: Cavendish *Soil type*: unknown (alluvial)
Tree spacing: standard
Cultivation system: certified organic (BCS)
Experimental design: An organically operated banana field was split into two parts, one conventionally treated and the other with Vitazyme added to the regime. The control treatmen,t for unknown reasons, did not receive the usual organic amendments during the duration of the trial, so the production data is quite low. Monthly and bimonthly Vitazyme treatments were used. Root counts, nematodes, soil nutrients, and leaf nutrients were gathered twice for the first part of the study.

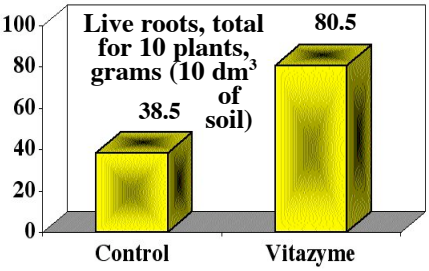
1. Vitazyme monthly **2. Vitazyme bimonthly** **3. Control**

Fertilization: Only certified organic fertilizer was applied to the treatments. For unknown reasons the control received no fertility amendments during the trial period.

Vitazyme application: Treatment 2 received 1 liter/ha each month, while Treatment 1 received 1 liter/ha every two months.

Irrigation: The control and Treatment 1 were watered as needed, but Treatment 2 was given less water than required due to irrigation system problems, which resulted in somewhat reduced yields.

Soil analysis: No major differences in soil nutrient levels were noted during the first part of the growing season, so this data is not included.



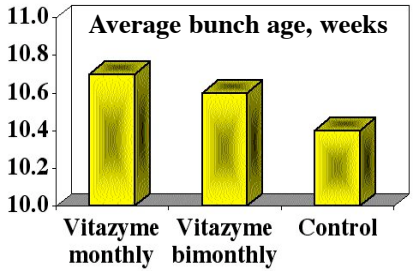
Plant growth: Root growth was evaluated on May 2, 2003, for the control and Vitazyme treatments (1). Analysis were made at Nemalab, S.A., in Machala, Ecuador.

Yield results: Yield totals were tallied for each treatment over a period of 8 weeks, and included the average age of the bunch at harvest, weight of the bunch, and the number of hands on the bunch. Totals of all bunches are given in the table, and averages are then calculated for bunch age, weight, and hands.

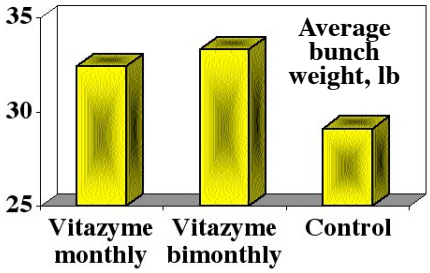
Organic bananas grown in Ecuador had a much higher yield, better rooting and greater bunch weights with Vitazyme either monthly or bimonthly.

Week	Treatment 1 (Vitazyme monthly)				Treatment 2 (Vitazyme bimonthly)				Treatment 3 (control)			
	No.	Age	Weight	Hands	No.	Age	Weight	Hands	No.	Age	Weight	Hands
		week	lb	number		week	lb	number		week	lb	number
36	15	165	497	66	21	231	714	95	6	66	188	27
37	4	41	138	20	9	88	315	46	5	51	139	21
38	11	114	360	51	15	158	472	64	7	70	209	30
39	11	118	350	48	12	130	384	51	6	62	166	23
40	3	30	90	13	5	50	165	23	2	20	54	9
41	4	41	129	20	5	52	165	24	3	31	86	13
42	7	80	232	32	9	99	307	41	3	33	89	12
43	4	40	115	16	4	40	138	16	3	30	88	12
Totals	59	629	1,911	266	80	848	2,660	360	35	363	1,019	147
Average		**10.7**	**32.4**	**4.51**		**10.6**	**33.3**	**4.50**		**10.4**	**29.1**	**4.20**

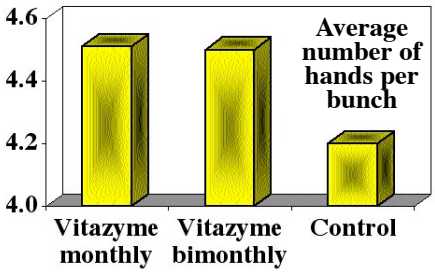
Bunch Age



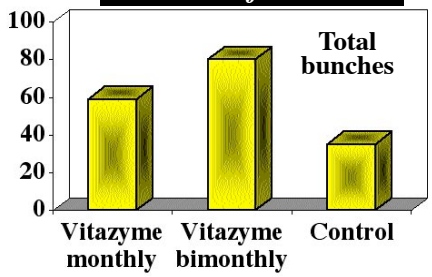
Bunch Weight



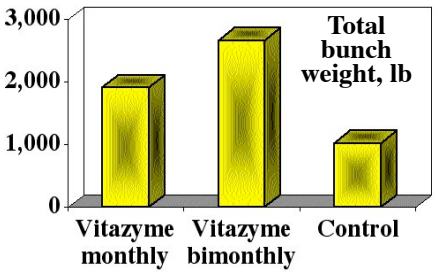
Number of Hands



Number of Bunches



Total Bunch Weight



Conclusions: This study on organic bananas in Ecuador revealed that the age of the bunches at harvested was slightly less for the control. The bunch weight was greatest for the Vitazyme applied every other month; this weight was 0.9 lb/bunch more than the monthly applied treatment and 4.2 lb/bunch more than the control. Hands/bunch was identical for both Vitazyme treatments but was 0.3 hands/bunch less for the control. Vitazyme greatly improved overall root growth increasing live root mass by 109% over the control. Vitazyme applied every other month produced the greatest number of bunches and the greatest total weight, exceeding the monthly applied Vitazyme and especially the control.

Caution must be taken in extrapolating these results too far, because the control treatment did not receive any organic fertilizers during this study, and the monthly applied treatment (Treatment 1) did not receive adequate irrigation water at times. These factors very likely contributed to the less than expected performance of the monthly applied treatments, and to lower production than expected for the control. The monthly treated bananas appeared stronger than those treated bimonthly

Of additional interest is the fact that the mother–son–grandson succession of tillers was noticeably improved with both Vitazyme treatments. If the trial had been monitored through another generation of bunches, the effect of Vitazyme reducing the time from flowering to harvest would have been quite dramatic.

- ***Increase in live roots (Vitazyme monthly): 109%***
- ***Increase in total bunch number (Vitazyme bimonthly): 129%***
- ***Increase in total bunch weight (Vitazyme bimonthly): 161%***

Bermudagrass (turf)

Sod Farm: Lloyd Brigance Grass Farm, Greenville, Texas
Variety: 419 bermudagrass *Soil type*: Houston black clay *Sod type*: mature

Bermuda grass treated with Vitazyme at the Brigance Grass Farm displayed considerably better rooting and top growth, as well as better color than the control areas.

Experimental design: A sod field was treated by sprayer in one part with Vitazyme, and the rest of the field was left untreated.

1. Control **2. Vitazyme**

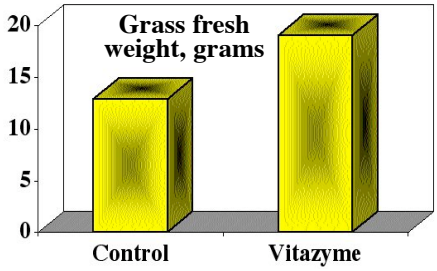
Fertilizer treatment: unknown

Vitazyme treatments: A 1% Vitazyme solution was sprayed on the treated area on April 2, 2003.

Growth results: On May 28, 2003, 56 days after Vitazyme application, four 3-inch cores were collected on each side of the dividing line of the treatments. The cores were thoroughly washed clean of all soil on roots blotted to relative dryness with paper towels, and weighed. The data were analyzed by Analysis of Variance using Cohort software.

Treatment	Fresh weight*	Change
	-------- grams --------	
Control	12.89 b	——
Vitazyme	19.02	6.13 (+48%)

*Means followed by the same letter are not significantly different at P=0.05. Significance level: P=0.017. $LSD_{0.10}$=3.00 grams.



Conclusions: Vitazyme applied to this bermuda grass field in north Texas caused a great increase in both root and leaf growth – 48% in this trial, significant at P=0.001. The leaves were also **deeper green** for the Vitazyme treated grass, indicating greater photosynthesis and carbon fixation resulting from this biostimulant.

· Increase in fresh weight: 48%

Broccoli (Transplants)

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Soil type: Vital Earth fine ultra blend potting mix
Variety: De Cisco
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**

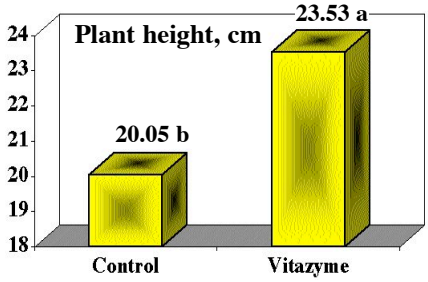
Broccoli transplants were bigger and sturdier, with broader leaves, when treated with Vitazyme at seeding.

Fertilization: Each pot received 0.5 gram of a pelleted 13-13-13 N-P_2O_5-K_2O (+ micronutrients), 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

Plant Height*



*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.

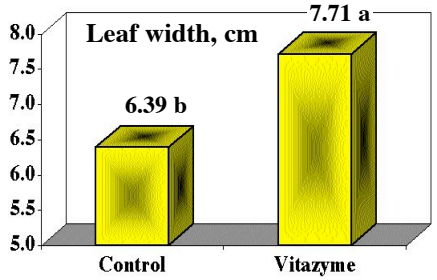
Growth results: Each plant was measured on March 16 for plant height and leaf width, and the results were analyzed as a completely randomized one-way design using CoHort software.

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

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

Plant Height : Leaf Width
Control: 20.05 cm/6.39 cm = 3.14
Vitazyme: 23.53 cm/7.71 cm = 3.05

Leaf Width*



*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.

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 resulting in a lower plant height to 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.**

· Plant height increase: 17% ***· Leaf width increase: 21%***

Corn (Fertility Levels)

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: yellow dent
Planting rate: 10 seeds/pot, thinned to 3 plants/pot
Pot size: 1 gallon
Replications: 7
Soil type: Bowie very fine sandy loam
Planting date: December 30, 2002
Experimental design: A replicated greenhouse study was initiated to evaluate the effect of different fertilizer levels and Vitazyme on corn growth. Levels chosen were 0, 33, 67, and 100% of 40 lb/acre Nitrogen with each fertilizer level Tested with and without Vitazyme.

Treatment	Fertilizer	Vitazyme
1	0	0
2	0	yes
3	33%	0
4	33%	yes
5	67%	0
6	67%	yes
7	100%	0
8	100%	yes

Fertilization: A 13-13-13% N-P_2O_5-K_2O fertilizer plus other nutrients (0.65% Mg, 6.0% S, 0.02% B, 0.0006% Co, 0.06% Cu, 1.40% Fe, 0.06% Mn, 0.0006% Mo, and 0.06 % Zn) was applied to Treatments 3 through 8 at rates of 33, 67, or 100% of the maximum rate of 40 lb/acre N. This rate was achieved by adding 1.75 g to the soil surface of the appropriate pots. The 67% rate was 1.17 g/pot, and the 33% rate was 0.58 g/pot, applied after planting.

With no nitrogen added the corn in this greenhouse study showed a moderate response to Vitazyme, but note the bigger response to the right.

When 67% of the nitrogen was added in this study, Vitazyme increased the response even more.

Harvest date: February 19, 2003, 52 days after planting
Growth results: The plant heights were measured, the roots were washed of soil, and the plants were dried at about 115°F for two days, after which the dried plants were measured to the nearest 0.01 gram. The data were analyzed with Analysis of Variance by CoHort software, using the Tukey-Kramer Test for a split-plot design.

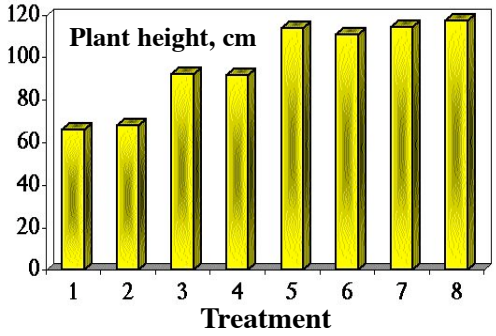
Plant Height

In this analysis, fertilizer was the main plot and Vitazyme the sub-plot in the split-plot design. Fertilizer added at four levels revealed a highly significant response of plant height, at least for the first three levels.

Main plots – Fertilizer effects

Fertilizer level	Plant height*	Change
order of height	cm	cm
4 (100%)	115.8 a	48.8 (+73%)
3 (67%)	112.2 a	45.2 (+67%)
2 (33%)	91.8 b	24.8 (+37%)
1 (none)	67.0 c	——

*Means followed by the same letter are not significantly different at P=0.1 according to the Tukey-Kramer Test. $LSD_{0.1}$=3.7 cm.



Sub plots – Vitazyme effects

Fertilizer level	Plant height*	Change
order of height	cm	cm
2 (added)	96.9 a	0.4 (+0)
1 (none)	96.5 a	——

*Means followed by the same letter are not significantly different at P=0.1 according to the Tukey-Kramer Test. $LSD_{0.1}$=2.5 cm.

Vitazyme did not produce any significant change in plant height, as seen in the table above.

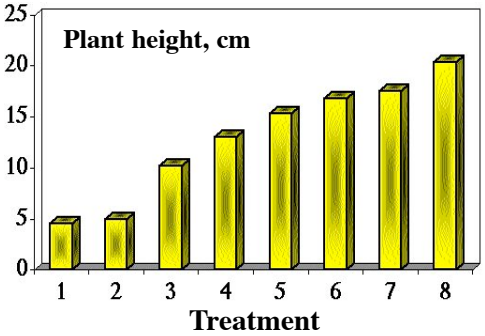
Dry Weight

The data were analyzed as a split-plot design, using the fertilizer as the main plots and the Vitazyme as the subplots.

Main plots – Fertilizer effects

Fertilizer level	Plant height*	Change
order of height	cm	cm
4 (100%)	18.92 a	14.16 (+297%)
3 (67%)	16.09 b	11.33 (+238%)
2 (33%)	11.64 c	6.88 (+145%)
1 (none)	4.76 d	——

*Means followed by the same letter are not significantly different at P=0.0001 according to the Tukey-Kramer Test. $LSD_{0.1}$=1.13 grams.



Sub plots – Vitazyme effects

Fertilizer level	Plant height*	Change
order of height	cm	cm
2 (added)	13.77 a	1.84 (+15%)
1 (none)	11.93 a	——

*Means followed by the same letter are not significantly different at P=0.002 according to the Tukey-Kramer Test. $LSD_{0.1}$=0.71 grams.

Fertilizer level	Dry weight increase with Vitazyme	
	grams	percent
0	0.37	8%
33%	2.79	27%
67%	1.45	11%
100%	2.77	16%

The fertilizer added at four levels revealed high and positive responses at each level, each addition giving a significantly greater yield response than the level below it for this low fertility, fine, sandy loam soil.

Vitazyme produced additional yield increases at each fertilizer level. The summation of these increases was significant at P=0.002, or a 15% yield increase. The increases in yield at each fertilizer level are shown in the table to the right.

Continued on the next page

The highest percentage yield increase from Vitazyme was at the 33% fertility level, which gave a 27% increase in yield. Such a response is normally expected, since higher fertility rates generally suppress the rhizosphere nutrient releasing actions of microorganisms. However, while the 67% fertility rate revealed a reduction in yield increase from Vitazyme, the 100% fertility level showed a resurgence of increase — 16% — though this percentage increase was much less than at the 33% fertilizer rate.

Conclusions: This greenhouse study with corn grown at four fertilizer rates, each rate having either Vitazyme or no Vitazyme, generally corroborates the usual observation that increasing fertility rates reduce the percentage response of the crop yield. This is thought to be due to the fact that as the crop approaches its maximum yield potential under a given set of environmental conditions, the extent to which Vitazyme can reduce growth stresses of fertility, diseases, water stress, and so forth, and increase yields decreases as the yield limit is approached. Even so, at high yield potentials of active and added fertility (Treatment 8), Vitazyme has been shown in this study to still stimulate the corn yield by 16% over its untreated control treatment (Treatment 7).

- ***Change in plant height with fertilizer: 37 to 73%***
- ***Change in dry weight with Vitazyme: 15%***
- ***Change in dry weight with fertilizer: 145 to 297%***

Corn (Foliar vs. Soil Application)

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: yellow dent *Planting rate*: 10 seeds/pot thinned to 3 plants/pot
Soil type: Bowie very fine sandy loam *Planting date*: December 30, 2002 *Pot size*: 1 gallon
Experimental design: A greenhouse study was established to discover the relative effect of soil versus foliar application of Vitazyme on corn growth. Seven replicates were set up for each treatment in a complete block design. Temperatures were maintained at 55° to 80°F during the study, with no artificial light.

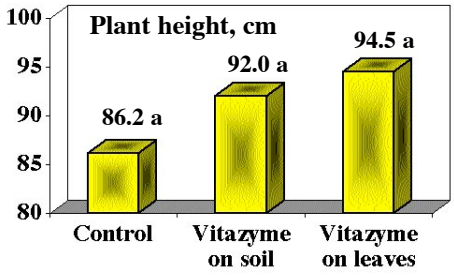
1. Control **2. Vitazyme on the soil** **3. Vitazyme on the leaves**

Fertilization: All plants were given 0.88 g/pot at planting of a pelleted 13-13-13% N-P_2O_5-K_2O, slow release fertilizer with 0.65% Mg, 6.0% S, 0.02% B, 0.0006% Co, 0.0006% Cu, 1.40% Fe, 0.06% Mn, 0.0006% Mo, and 0.06 % Zn. This fertilizer gave an effective rate of 50 lb/acre of N, applied to the soil surface.

Vitazyme application: Vitazyme was applied to the soil surface only of Treatment 2 on January 24 about at the six-leaf stage. It was also applied (a spray of a 1% solution) to the leaf whorl of the plants of Treatment 3 on January 24; care was taken to avoid applying any product to the soil surface.

Harvest date: February 13, 2003, 46 days after planting

Plant Height*



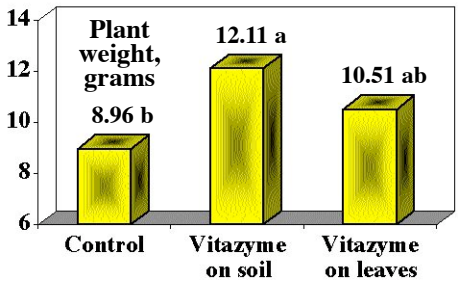
*Means followed by the same letter are not significantly different at P=0.10 according to the Tukey-Kramer Test. $LSD_{0.1}$=9.7 cm.

- ***Plant height increase (soil applied): 7%***
- ***Dry weight increase (soil applied): 35%***

Harvest results: The corn plants were washed free of soil, the leaves were measured, and then all plants were dried at about 115°F for two days and weighed to the nearest 0.01 gram.

Conclusions: Vitazyme applied to the soil of corn in this greenhouse study produced a nonsignificant increase in plant height of 7%. Applied to the leaves, the height was increased nonsignificantly by 10%. However, Vitazyme applied to either the soil or leaves increased dry weight accumulations of the corn plants. The soil application increased growth significantly (at P=0.10) by 35%, and almost significantly with a foliar application (17%). It is possible that too few active agents were applied by the foliar applications for a maximum growth response, since only enough product could be applied to fill the leaf whorl; the product would not stick to the slick corn leaves. **It is concluded that both soil and foliar applications of Vitazyme are highly effective in increasing the growth rate of corn.**

Plant Dry Weight*



*Means followed by the same letter are not significantly different at P=0.10 according to the Tukey-Kramer Test. $LSD_{0.1}$=1.89 grams.

Corn (Silage)

Researcher: Tulare Ag Products, Tulare, California
Farm: Bosma Dairy, Tipton, California
Variety: Pioneer 33 J56 silage corn
Experimental design: A silage corn field was selected that was divided into four 0.25 mile-long strips across the field that were 10 rows wide. Each strip received a different treatment, and the rest of the field served as a control. Vitazyme was used in combination with Tulare Ag products, so its effects are not isolated in this study.
Fertilization: All field areas received liberal applications of "manure water", containing an unknown fertil-

Farmer: Joel Callison
Soil type: clayey *Planting date*: June 25, 2003
Previous crop: wheat for silage

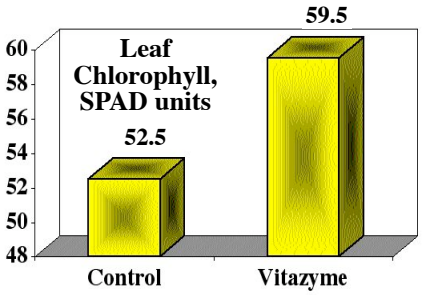
Treatment	Vitazyme + fertilizers, at planting	Vitazyme + fertilizers, foliar	Commercial fertilizer
1	O	O	O
2	X	X	O
3	X	O	O
4	O	O	X
5	O	X	X

izer composition. Treatments 4 and 5 received a commercial fertilizer applied by the farmer, whereas Treatments 1 and 2 received a Tulare Ag Products mix in a 2 x 2 inch band placement beside and beneath the seeds at planting (Vitazyme, 13 oz/acre; humates; organic acids; amino acids). Treatments 2 and 5 also were given a foliar spray of Vitazyme (13 oz/acre) at about 22 days after planting when the corn was 2 feet tall amino acids, and a 1-3-1 ratio N-P-K fertilizer.

Vitazyme application: See the text above. Treatment 2 received two Vitazyme applications with other Tulare Ag Products recommended materials, and Treatments 3 and 5 received just one Vitazyme treatment with the other materials.

Irrigation: Six flood irrigations were made of about 5 inches of water each time.

Chlorophyll results: On August 23, two plants were harvested at random from Treatments 2 and the control. Eight chlorophyll readings were made for each treatment using a Minolta SPAD meter, and the results were averaged.



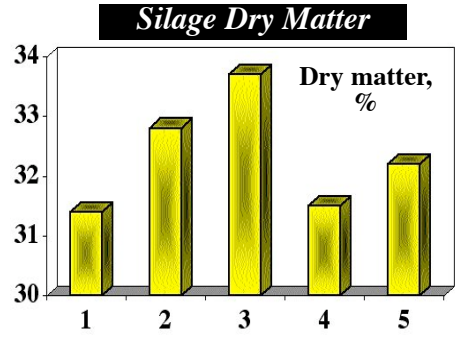
These corn plants and ears grown at Tipton, California, show the usual advantage in rooting and earing attributed to Vitazyme.

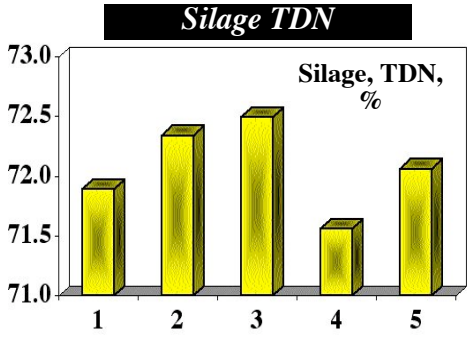
Rooting effects: On August 23, it was evident that the roots of Treatment 2 corn were larger and had more root hairs.

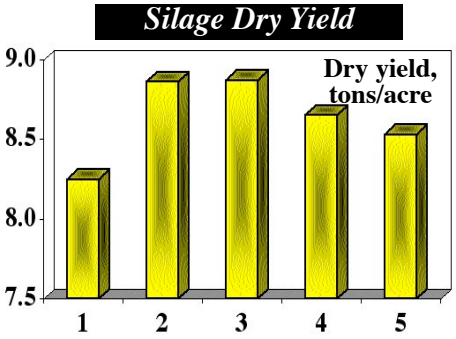
Ear filling: On August 23, the ears of corn from Treatment 2 were filled further to the end than ears from the control plants. At harvest on October 16, eight ears from each treatment were randomly selected, and the length of the filled corn for each ear was measured. **The control ears averaged 4.2 inches of filled corn, and Treatment 2 ears averaged 5.3 inches of filled corn.**

Harvest date: October 16, 2003

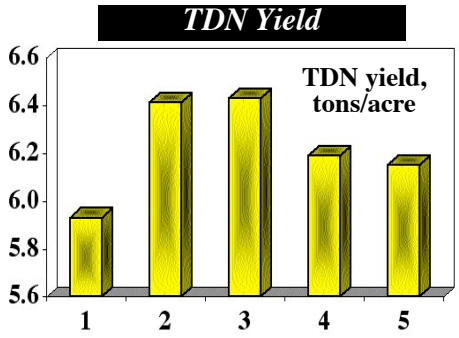
Silage quality and yield results: Samples of each treatment were collected and sent to a laboratory for analysis. Some of the results of their analysis are shown below.







Notice the better filling of kernels in this silage study when Vitazyme was used in the growing program.



Vitazyme plus other Tulare Ag Products components increased silage yield, dry matter, and TDN by up to 8% in these four treatments, the single 2 x 2 at planting application giving the best response. Silage quality was the highest for Treatment 3 even though the wet, as-harvested yield was not highest for this treatment. A double application of Vitazyme plus other components did not improve silage and quality above the single application at planting, and the commercial fertilizer treatments, with or without Vitazyme and other additives, did not do as well as either the single or double Tulare Ag applications.

Conclusions: Based on this corn silage study in the Central Valley of California, it is concluded that **Vitazyme, applied once near the seeds at planting along with other nutrient components including humates, organic acids, and amino acids, stimulates corn growth and yield significantly, in this case producing a yield increase of 8% dry matter and 8% TDN.** Thus it is seen that silage quality — and more milk per ton of feed — is also improved with this biostimulant combination of Tulare Ag Products.

- ***Increase in dry matter (Trt. 3): 7%***
- ***Increase in TDN (Trt. 3): 1%***
- ***Increase in dry yield: (Trt. 3): 8%***
- ***Increase in TDN yield (Trt. 3): 8%***

Corn (Surfactant vs. None)

Both Vitazyme applications on the foliage significantly increased corn dry matter yield; a surfactant did not benefit the response.

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: yellow dent *Soil type*: Bowie very fine sandy loam
Pot size: 1 gallon *Planting date*: December 30, 2002

Experimental design: A greenhouse study was established to discover the relative effectiveness of a foliar application on corn using either diluted product in the leaf whorl, or diluted product in the whorl and on leaf surfaces using a surfactant. Five replicates were used for each treatment in a complete block design. Temperatures were maintained at 55° to 80°F during the study, with no artificial light.

1. **Control**
2. **Vitazyme in the whorl, no surfactant**
3. **Vitazyme on the leaves, plus a surfactant**

Fertilization: All plants received 0.88 g/pot at planting of a 13-13-13% N-P_2O_5-K_2O pelleted fertilizer with 0.65% Mg, 6.0% S, 0.02% B, 0.0006% Co, 0.0006% Cu, 1.40% Fe, 0.06% Mn, 0.0006% Mo, and 0.06 % Zn. This fertilizer, giving 50 lb/acre of N, was applied to the soil surface.

Vitazyme application: On January 24, 2003, Vitazyme at 1% was sprayed from a small spray bottle into the leaf whorl of all plants in Treatment 2, being careful not to apply to the soil surface. Paper towels were used to prevent any spray from contacting the soil of the pots. Vitazyme was also sprayed the same day on the leaves and whorl of Treatment 3, with a 1% Vitazyme solution plus 5 tablespoons/gallon of Sunspray Ultra-Fine Oil, a fine agricultural oil containing 98.8% paraffinic oil.

Harvest date: February 14, 2003, 47 days after planting

Harvest results: The corn plants were washed free of soil, the leaves were measured, and then all plants were dried at about 115°F for two days. They were then weighed to the nearest 0.01 gram.

Conclusions: **This experiment showed that corn responded almost equally well with Vitazyme applied to the leaves only, with or without a surfactant, in terms of dry weight gain during the growth period.** Vitazyme in the leaf whorl only caused a highly significantly 48% weight gain versus the control, while the surfactant plus Vitazyme increased dry weight by 36%. Both treatments received the product in the leaf whorl, but Treatment 3 — with the surfactant — also had product clinging to other leaf surfaces. Both Treatments 2 and 3 had no Vitazyme applied to the soil surface.

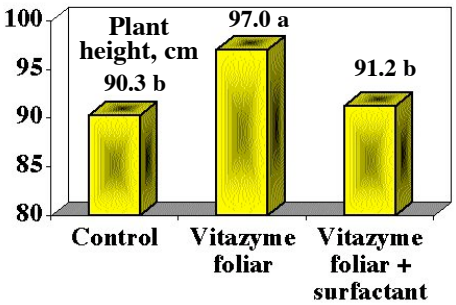
Plant height was significantly increased by Vitazyme applied to the leaves without a surfactant, but the failure of Treatment 3 (with the surfactant) to increase significantly in height did not prevent the plants of Treatment 3 from increasing dry matter accumulation nearly as much as Treatment 2.

It is concluded from this study that, **as long as sufficient active agents are present on the plant — such as in the leaf whorl for corn — the plant will react properly to the biostimulants.** Additional amounts of product clinging to leaf surfaces as produced by a surfactant may be important in encouraging plant growth if enough droplets cling to leaf surfaces during application. However, droplets falling to the soil surface will normally contribute to product activity through root stimulation by active agents, so there may be only certain instances in which the use of a surfactant with Vitazyme may be advantageous.

· Plant height increase (no surfactant): 7%

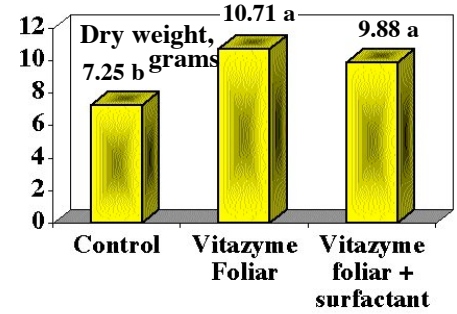
· Plant dry weight increase (no surfactant): 36%

Plant Height*



*Means followed by the same letter are not significantly different at P=0.10 according to the Tukey-Kramer Test. $LSD_{0.1}$=5.0 cm.

Plant Dry Weight*



*Means followed by the same letter are not significantly different at P=0.10 according to the Tukey-Kramer Test. $LSD_{0.1}$=1.58 grams.

Corn

Department of Agriculture, Ondo State, Nigeria

Location: Iju/itaogbolu, Akure North Local Government Area, Ondo State, Nigeria *Soil type*: unknown
Planting date: late season of 2000 *Variety*: unknown

Experimental design: A small plot replicated (3 reps), randomized complete block design was set up to evaluate the effects of Vitazyme on a number of growth parameters. Three levels of fertility and two applications of Vitazyme were used, with the treatments shown in the table to the left.

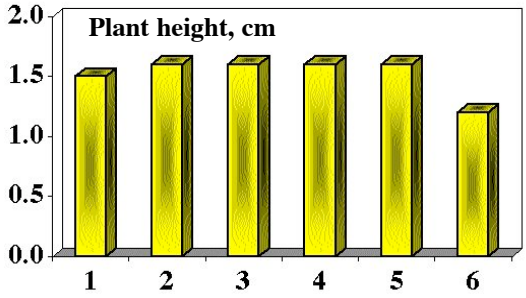
Fertility treatments: Treatments 2 and 4 received 100 kg/ha of an unknown fertilizer formulation two weeks after planting while Treatments 3 and 5 received 200 kg/ha of this same fertilizer two weeks after planting.

Treatment	NPK Fertilizer	Vitazyme
1	0	yes
2	100 kg/ha	yes
3	200 kg/ha	yes
4	100 kg/ha	no
5	200 kg/ha	no
6	0	no

Vitazyme treatments: Treatments 1, 2, and 3 received a 5% Vitazyme spray on the corn seeds before planting, and the newly emerged plants and soil received 1 liter/ha (13 oz/acre) two weeks after planting.
Harvest date: unknown
Growth and yield results: At harvest time several growth parameters were measured, and the data were statistically analyzed to determine significant differences at P=0.05.

Plant Height

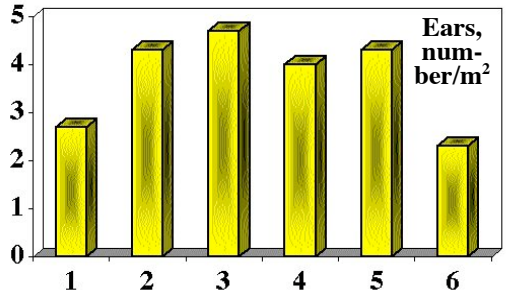
Treatment	Plant height	Change
	m	m
1. (Vitazyme only)	1.5	0.3 (+25%)
2. (100 NPK + Vit.)	1.6	0.4 (+33%)
3. (200 NPK + Vit.)	1.6	0.4 (+33%)
4. (100 NPK)	1.6	0.4 (+33%)
5. (200 NPK)	1.6	0.4 (+33%)
6. (Control)	1.2	—
$LSD_{0.05}$	0.1	



All of the fertilizer and Vitazyme treatments significantly (P=0.05) increased plant height, Vitazyme alone increasing height by 25% and all other treatments increasing it by 33%.

Ears per Square Meter

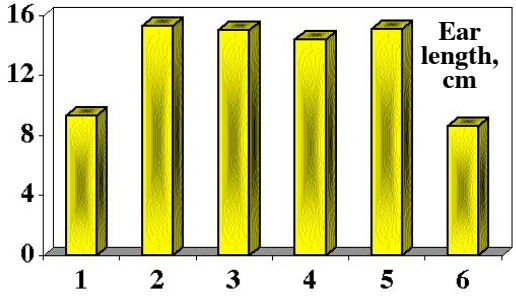
Vitazyme alone increased ears/m^2 by 17%, but not significantly. However, all other Vitazyme + fertilizer treatments and all fertilizer treatments significantly increased ears/m^2. The Vitazyme + 200 kg/ha NPK increased ears the most, while the Vitazyme + 100 kg/ha NPK increased ears as much as did 200 kg/ha NPK, showing the ability of Vitazyme to increase the efficiency of fertilizer use.



Treatment	Ears	Change
	number/m^2	number/m^2
1. (Vitazyme only)	2.7	0.4 (+17%)
2. (100 NPK + Vit.)	4.3	2.0 (+87%)
3. (200 NPK + Vit.)	4.7	2.4 (+104%)
4. (100 NPK)	4.0	1.7 (+74%)
5. (200 NPK)	4.3	2.0 (+87%)
6. (Control)	2.3	—
$LSD_{0.05}$	1.3	

Ear Length

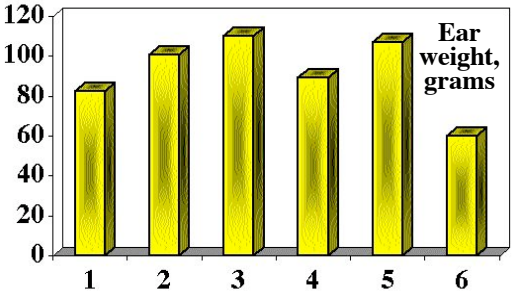
Treatment	Ear length	Change
	cm	cm
1. (Vitazyme only)	9.3	0.7 (+8%)
2. (100 NPK + Vit.)	15.3	6.7 (+78%)
3. (200 NPK + Vit.)	15.0	6.4 (+74%)
4. (100 NPK)	14.4	5.8 (+67%)
5. (200 NPK)	15.1	6.5 (+76%)
6. (Control)	8.6	—
$LSD_{0.05}$	1.0	



All but the Vitazyme only treatment significantly increased ear length. The Vitazyme and 100 kg/ha NPK increased ear length the most (78%), followed closely by the Vitazyme + 200 kg/ha NPK and 200 kg/ha NPK treatments.

Ear Weight

Ear weight was greatly affected by both Vitazyme alone (+37%) and by fertilizer alone (up to 78% with 200 kg/ha NPK) but most by Vitazyme + fertilizer (+68% for Vitazyme + 100 kg/ha NPK, and + 83% for Vitazyme + 200 kg/ha NPK). As with ears/m^2 Vitazyme is shown to increase the efficiency of fertilizer use at both the 100 and 200 kg/ha NPK rates but especially at the 100 kg/ha NPK fertilizer rate.

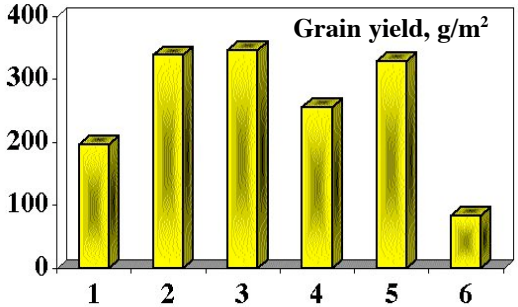


Treatment	Ear weight	Change
	g	g
1. (Vitazyme only)	82.3	22.3 (+37%)
2. (100 NPK + Vit.)	100.7	40.7 (+68%)
3. (200 NPK + Vit.)	110.0	50.0 (+83%)
4. (100 NPK)	89.3	29.3 (+49%)
5. (200 NPK)	107.0	47.0 (+78%)
6. (Control)	60.0	—
$LSD_{0.05}$	11.3	

Grain Yield

Treatment	Grain yield	Change*
	g/m^2	g/m^2
1. (Vitazyme only)	196.2	113.2 (+136%)
2. (100 NPK + Vit.)	338.3	255.3 (+308%)
3. (200 NPK + Vit.)	345.3	262.3 (+316%)
4. (100 NPK)	255.0	172.0 (+207%)
5. (200 NPK)	328.3	245.3 (+296%)
6. (Control)	83.0	—
$LSD_{0.05}$	110.3	

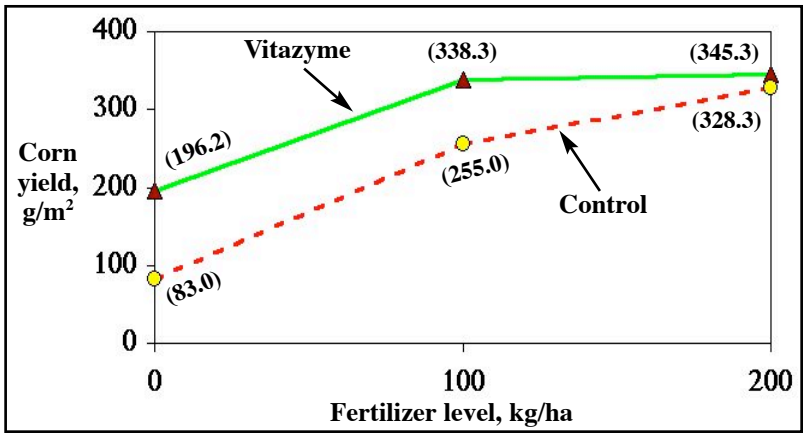
*All comparisons are made with the untreated control (6).



All treatments significantly increased grain yield above the control. Vitazyme produced a 126% yield improvement, while the highest yield was generated by Vitazyme + 200 kg/ka NPK (+316%). This was 17.0 grams/m^2 higher than the 200 kg/ha NPK value. The difference was

Continued on the next page

even greater for the 100 kg/ha NPK rate, where Vitazyme plus the fertilizer increased yield by 308%, but without Vitazyme the yield increased 207%. These data show a marked improvement of fertilizer efficiency with Vitazyme at the lower NPK rate, and also an improvement at the high NPK rate. These effects over the three rates are diagrammed below.



Note that the increase in grain yield above the untreated level is greatest at the lower fertilizer levels, with no fertilizer or with the 100 kg/ha NPK rate. The increase was not as dramatic at the highest NPK rate. These responses are similar to those noted in many other trials, and reflect the fact that microorganisms in the rhizosphere are stimulated to produce more available nutrients when soil nutrient levels are less than optimal. As fertility and environmental factors approach the optimum, the response from Vitazyme decreases somewhat.

Conclusions: In this replicated Nigerian corn study Vitazyme has been shown to increase plant growth and yield parameters (grain, ear number, ear length, and ear weight) significantly above the control. Vitazyme also increased yield parameters significantly, especially at the lower fertilizer levels (0 and 100 kg/ha NPK), where the Vitazyme +100 kg/ha NPK yield exceeded the 200 kg/ha NPK yield by 10.0 g/m^2. At 100 kg/ha NPK, Vitazyme significantly boosted yield by 83.3 g/m^2 above the same fertility level without Vitazyme.

In this highly weathered tropical soil of Ondo State of Nigeria, Vitazyme is seen as a powerful motivator of higher yield potential for corn.

- ***Increase in yield with Vitazyme only: 136%***
- ***Increase in yield with Vitazyme + 100 kg/ha NPK: 33%***
- ***Increase in yield with Vitazyme + 200 kg/ha NPK: 5%***

Corn – A Testimonial

Location: Arrow S Farms, Sharon Springs, Kansas
Variety: NC+ 5021RB
Planting rate: 26,000 seeds/acre
Soil type: Keith sandy clay loam
Previous crop: sunflowers
Planting date: May 3, 2003
Tillage system: no-till
Experimental design: A center pivot covering 120 acres was treated with Vitazyme over the entire area.
Fertilization: 180 lb/acre N, 35 lb/acre P_2O_5
Vitazyme and herbicide applications: (1) 13 oz/acre on May 7, with 0.5 lb/acre Atrazine 90df, 1.5 qt/acre Harness Extra, and 24 oz/acre Roundup herbicides; (2) 13 oz/acre on June 4, with 24 oz/acre Roundup herbicide when the corn was 10 inches tall
Irrigation: 16 inches total during the growing season
Weather: 8.5 inches during the growing period, with an 8-inch moisture deficit in 2002 and another 4.5 inch deficit to October of 2003; record heat throughout the summer, including several weeks of 100°F+ temperatures and 25 mph+ winds
Harvest date: October 10, 2003
Yield results: Harvested grain at 16.7% H_2O: 27,500 bushels
Conclusions: The corn received significant hail damage on June 10 when the leaves were stripped. In spite of severe heat and wind as well, the corn did exceptionally well with Vitazyme, exceeding in yield any other fields in the area. Most yields were 140 to 200 bu/acre, with a few in the 220 to 225 bu/acre range.

- ***Yield per acre for 120 acres: 229.2 bu/acre***

Corn

Agricultural Custom Research and Education Services

Location: Cedar Falls, Iowa
Variety: Pioneer 34H31 non-GMO
Previous crop: soybeans
Soil type: Floyd loam (pH 6.8, organic matter 4.2%, CEC 15.7, good fertility)
Planting depth: 1.5 inches
Planting rate: 29,900 seeds/acre
Row spacing: 30 inches
Planting date: May 22, 2003
Tillage: conventional

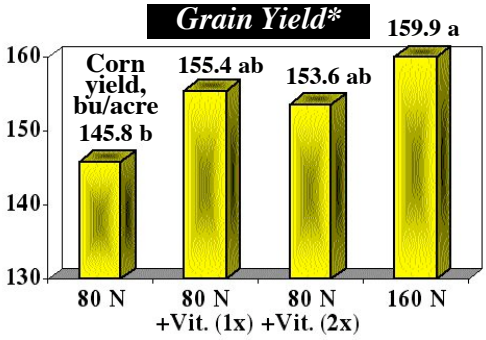
Treatment	Nitrogen rate	Vitazyme rate
1	80 lb/acre	0
2	80 lb/acre	13 oz/acre
3	80 lb/acre	26 oz/acre
4	160 lb/acre	0

Experimental design: A Latin-square design with four replicates was established with plots 15 x 40 feet (0.0138 acre), to discover if a reduced nitrogen rate would produce similar corn yields to a full nitrogen rate. Also, two Vitazyme rates were utilized. Four treatments were used, and an analysis of variance utilized the Student-Newman-Keuls method to separate treatment means.
Fertilization: 80 to 160 lb/acre of N as a 28-0-0 solution; all other nutrients were adequate
Vitazyme application: 13 oz/acre or 26 oz/acre, applied at planting on the seeds and at knee-height
Harvest date: October 18, 2003
Yield results: Although the high nitrogen rate (Treatment 4) yielded the most, the increase was not significantly greater than either Vitazyme treatment at P=0.10. Both the normal 13 oz/acre rate and the double rate of 26 oz/acre produced nearly the same yield, which were 5 to 7% higher than the control of 80 lb/acre N with no Vitazyme.

Income results: A $3.00/bu price for corn is used for calculation.

Treatment	Extra yield	Yield value	Vitazyme[1] or fertilizer[2] cost	Net increase	Return on investment
	bu/acre	$/acre	$/acre	$/acre	Return:Input cost
2. 80 lb/acre N + Vitazyme (1x) twice	9.6	28.80	8.00	20.80	2.6:1
3. 80 lb/acre N + Vitazyme (2x) twice	7.8	23.40	16.00	7.40	0.5:1
4. 160 lb/acre N	14.1	42.30	16.00	26.30	1.6:1

[1]Assuming a $4.00/acre cost. [2]Assuming a $0.20/lb cost for 80 lb/acre extra N.



*Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls Test. LSD (0.10)=8.0 bu/acre.

Conclusions: In this Iowa study, **Vitazyme produced statistically equal yield increases with 80 lb/acre of N compared to 160 lb/acre of N**, while both Vitazyme treatments boosted grain yield by 5 to 7% above the untreated control. There was no benefit to applying additional Vitazyme above the standard 13 oz/acre rate.

The highest return on investment was for the extra 80 lb/acre of N of Treatment 4, but this return was followed closely by two 13 oz/acre applications of Vitazyme (Treatment 2). **In terms of the return on investment ratio, Vitazyme applied at the standard rate did the best (2.6:1).**

These plants and exposed roots show the typical response noted with Vitazyme applied to corn at planting.

· Yield increase (Vitazyme 1x twice): 7%

Sweet Corn

New York Crop Research Facility – A.C.D.S. Research

Location: Batavia, New York
Variety: Sure Gold Super Sweet
Planting depth: 1.5 inches
Row spacing: 30 inches
Seeding rate: 19,900 seeds/acre
Tillage: conventional
Soil type: Cazenovia silt loam (pH 6.9 CEC 12.9, P 59 ppm, K 148 ppm, Mg 217 ppm, Ca 1,949 ppm)
Planting date: June 24, 2003

Experimental design: A randomized complete block design was established on a field with plots that were 10 feet x 40 feet (4 rows wide, 0.0092 acre). Data were collected from the inside two rows. Four replicates were used. A number of products and fertilizers were used in an effort to evaluate the value of these materials to boost sweet corn yield. Several parameters were measured during the crop cycle such as product toxicity, stand count, ear height, mature and immature ears at harvest, ear weight, and yield. Treatments were as shown in the table to the right.

Treatment	Placement
1. Untreated	——
2. Untreated with water	in-furrow
3. Untreated with water	2 x 2
4. Vitazyme	in-furrow
5. Vitazyme + 6-24-6*	in-furrow
6. 6-24-6*	in-furrow
7. Stimulate	2 x 2
8. Stimulate + 9-18-3	2 x 2
9. 9-18-3	2 x 2
10. Fertiactyl GZ	in-furrow
11. 10-34-0	2 x 2
12. 7-17-3**	in-furrow

* A Na-churs Alpine liquid fertilizer
**A starter fertilizer called RiseR

Fertilization and product applications: All starter fertilizers and biostimulant products were applied at the rates prescribed by the manufacturer and either on the seeds or in a 2 x 2 placement (inches beside and below the seeds).

Vitazyme application: A starter treatment of 13 oz/acre was applied on the seeds at planting for Treatment 4, and with Na-churs Alpine 6-24-6 starter fertilizer for Treatment 5.

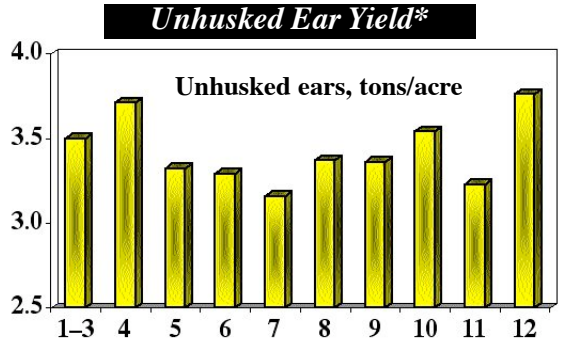
Weed control and pesticides: Guardsman, Permit, Banvel, and Warrior

Harvest date: September 20, 2003, 92 days after planting

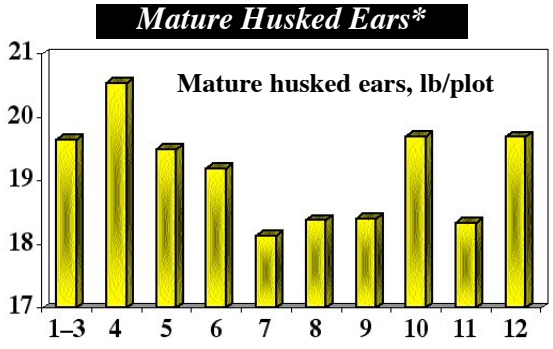
Growth results: Few significant differences in growth appeared, so these results are not included in this report.

Yield results: Although there were no significant differences among the treatments, Vitazyme alone produced the only real increase in weight of husked ears, a 5% increase above the control.

There were no significant differences among the several treatments in husked yield, but Vitazyme alone produced the greatest yield increase (6%) of any biostimulant. Only the 7-17-3 fertilizer caused a slightly higher increase (7%).



*Adjusted to 72% water. Means followed by the same letter are not significantly different (P=0.05) according to Bartlett's Test. LSD (0.05)=0.64 ton/acre.



*Forty feet of the inside two rows were harvested, and the ears were shucked by hand and weighed. Means followed by the same letter are not significantly different (P=0.05) according to Bartlett's Test. LSD (0.05)=3.28 lb.

Continued on the next page

Conclusions: This New York sweet corn study did not produce any significant yield differences in most parameters measured. However, a 6% yield increase resulted with Vitazyme alone, exceeded only slightly by a starter application of a 17-17-3 N-P_2O_5-K_2O liquid fertilizer at 2.5 gallons/acre. There was no benefit in this study to combining a starter fertilizer with Vitazyme, although normally a benefit of such a combination should appear. Possibly a second application of Vitazyme at knee-height would have enhanced the yield response for both Treatments 4 and 5.

· Increase in husked ears: 5% ***· Increase in unhusked ear yield: 6%***

Sweet Corn

New York Crop Research Facility – A.C.D.S. Research

Location: Byron, New York
Variety: Sure Gold Super Sweet
Planting depth: 1.5 inches
Soil type: Galen very fine sandy loam (pH 6.6, CEC 10.0, P 67 ppm, K 326 ppm, Mg 226 ppm, Ca 1,553 ppm)

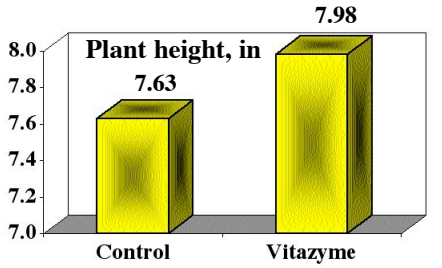
Vitazyme treated corn plants show superior root and top growth compared to the untreated control.

Row spacing: 30 inches
Seeding rate: 19,900 seeds/acre (drilled)
Tillage: conventional
Planting date: June 28, 2003
Experimental design: A non-replicated field test was established on a production field. Four rows (10 feet wide) were treated with Vitazyme, and adjoining untreated rows served as the control, the rows being 160 feet long. Various parameters were measured during the growing season including plant height, ear count, ear weight, ear length, filled length, and yield.

1. Control **2. Vitazyme**

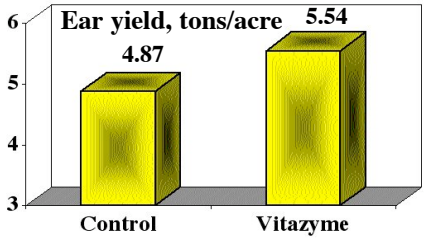
Fertilization: Both areas received 300 lb/acre of 15-15-15% N-P_2O_5-K_2O, side-dressed on July 21.
Vitazyme application: 13 oz/acre on the seeds at planting
Weed control and pesticides: Guardsman, Permit, Tilt, Quadris, Banvel, Warrior
Harvest date: September 29, 2003
Growth results: On July 26, measurements were made of plant height.

*Plant Height at 28 Days**



*15 plants from each plot, measured and averaged.

*Ear Yield**



*Yields are adjusted to 72% moisture.

Income results: The value of this variety was $56.64/ton, since all of the ears were 0 to 35 ear count range. Besides, the Sure Gold variety gets a $6.00/ton premium.

Harvest Parameters

Parameter	Treatment	Value	Change	Improvement with Vitazyme
Ears per 40 ft of row[1]	Control	68.0 ears	——	Ear per row: +1.5%
	Vitazyme	69.0 ears	+1.0 ear	
Ear weight per 40 ft row[1]	Control	51.90 lb	——	Ear weight per row: +7%
	Vitazyme	55.60 lb	+3.70 lb	
Bare ear weight per 40 ft of row[1]	Control	36.05 lb	——	Bare ear weight per row: +7%
	Vitazyme	38.45 lb	+2.40 lb	
Weight of husks per 40 ft of row[1]	Control	15.85 lb	——	Husk weight per row: +8%
	Vitazyme	17.15 lb	+1.30 lb	
Husk weight per ear[2]	Control	0.23 lb	——	Husk weight per ear: +9%
	Vitazyme	0.25 lb	+0.02 lb	
Ear weight[3]	Control	0.53 lb	——	Ear weight: +6%
	Vitazyme	0.56 lb	+0.03 lb	
Ear length[4]	Control	7.36 in	——	Ear length: +2%
	Vitazyme	7.51 in	+0.15 in	
Filled ear length[5]	Control	6.95 in	——	Filled ear length: +5%
	Vitazyme	7.28 in	+0.33 in	
Unfilled ear length[6]	Control	0.41 in	——	Unfilled ear length: –44%
	Vitazyme	0.23 in	–0.18 in	

[1]Measured from the two inside rows of the four plots.
[2]Husk weight/Ear number.
[3]Bare ear weight/Ear number.
[4]The average length of 11 randomly selected husked ears.
[5]The length of the ear containing filled kernels.
[6]The blank space of unfilled kernels of 4 above, determined by subtracting 5 from 4.

Treatment	Crop income	Product cost	Net income increase
	$/acre	$/acre	$/acre
Vitazyme	37.95	4.57	33.38

Conclusions: This in-field sweet corn study in New York revealed that Vitazyme, applied at planting, significantly improved the early growth of the plants which resulted in a 14% yield increase, as well as an improvement in several growth characteristics: heavier ears (+6%), larger ears (+2%), and better filled ears (+5%). The unfilled ear length was only about half as long (0.18 inch less) for the Vitazyme treated ears than for the control ears.

The income increase with a single Vitazyme application was $33.38/acre, showing the product's economic viability for sweet corn growers. Another product tested along with Vitazyme in this study produced a higher yield, but the net income increase was less.

· Yield increase: 14%

· Increase in plant height: 5%

· Income increase: $33.38/acre

Cotton

Texas A&M Research and Education Center

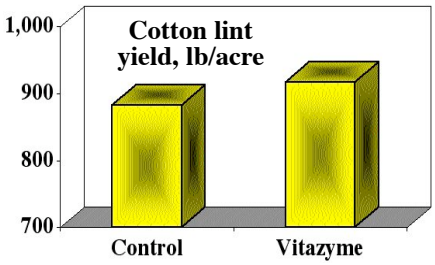
Location: J. Melcher farm, south of Lorenzo, Texas
Variety: Paymaster 2326 BT/RR *Row spacing*: 40 inches
Soil type: Amarillo fine sandy loam *Planting rate*: unknown
First planting date: May 27, 2003 *Second planting date*: June 12, 2003
Experimental design: An experimental site was set up on a production field using 4 rows that were 95 feet long, for 13 side-by-side plots per rep; 4 reps were used. The total plot area was 173.3 feet wide. Three products were compared — Vitazyme, Temik 15G, Na 2101, and Na 2101a. The treatments used are shown below. Both nematode counts and lint yields were determined, but due to great variability in nematode counts, only the lint yields are shown in this report.

Treatment	Seed trt.[1]	In-furrow at planting	In-furrow or spray after planting
1. Control	BAA or GBAA	0	0
2. Vitazyme	BAA	13 oz/acre	13 oz/acre
3. Na 2101	BAA	2 or 4 qt/acre	0 or 2 qt/acre
4. Na 2101a	BAA	2 or 4 qt/acre	0 or 2 qt/acre
5. Temik 15G	BAA or GBAA	0 or 5 lb/acre	0 or 5 lb/acre

[1]BAA = Baytan 30 + Allegiance FL + Argent (0.5 + 0.75 + 1.5oz/acre); GBAA = Gaucho + Baytan 30 + Allegiance + Argent (4 + 0.5 + 0.75 + 1.5 oz/acre).

The typical Vitazyme response to cotton is displayed here for this west Texas trial. Notice the greater leaf area, and bigger stems and root systems on the right.

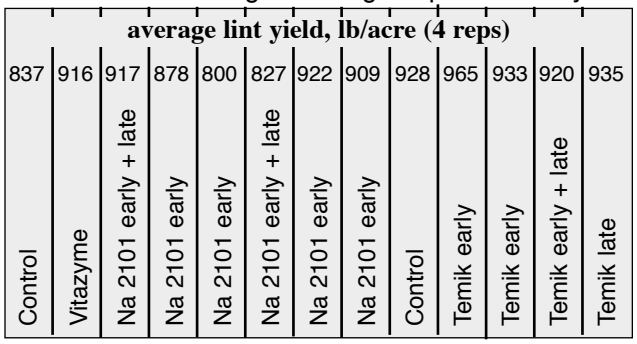
Fertilization: the same across all areas
Vitazyme Application: 13 oz/acre, in-furrow at planting and again after planting on July 22
Harvest date: December 10, 2003
Yield results: The first planting was hailed out, so a second planting was made on June 12. After the second planting heavy rains caused washing in the lower area of the field, which reduced yields in that area versus the rest of the plots. Experimental error was thus high due to great plot variability.



Treatment	Increase of all variations	
	lb/acre	%
Control	0	—
Vitazyme	33.5	(+4%)
Na 2101	12.5	(+1%)
Na 2101a	3.5	(0%)
Temik	55.8	(+6%)

Income results: The cotton price is estimated at $0.60/lb, Temik at $3.32/lb, and Vitazyme at $4.00/13 oz. The prices of Na 2101 and Na 2101a are not known.

Treatment	Yield increase	Cotton value	Tr. cost	Net increase
	lb of lint/acre	$/acre	$/acre	$/acre
2. Vitazyme	33.5	20.10	8.00	12.10
5. Temik 15G	55.8	33.48	16.60	16.88



Rep 1 plot layout

Conclusions: In this west Texas cotton study which compared four nematode control formulations, the nematode counts and yields were severely affected by a second planting (after hail damage of the first planting), and excessive washing and water damage for the lower end of the field. Because of this variability there were no significant differences in nematode counts or yield among the five treatments, but Vitazyme increased yields by 4% over the control. This amounted to a $12.10/acre income increase. Na 2101 and Na 2101a slightly increased yields above the control, and Temik 15G increased yield the most, by 6% over the control. Temik increased net return by $16.88/acre, which is slightly more than the return for Vitazyme but with the problem of Temik toxicity remaining.

· Increase with Vitazyme: 4% (33.5 lb)

Grapes (for Raisins)

Cooperating party: Tulare Ag Products, Tulare California *Location*: LDS Fresno Raisin Vineyard, Madera, California
Variety: Thompson seedless *Soil type*: very sandy to light clay
Experimental design: An 80-acre raisin vineyard was divided into 8-row blocks for half of the vineyard to evaluate grape (raisin) yield of two treatments. Each row was 1/4 mile long. Alternate 8-row blocks were treated with either Ethrel, the standard raisin grape treatment of the area, or Vitazyme three times (one time also receiving potassium, boron, and calcium supplements). Each of the two treatments was thus 40 acres in alternating strips. The data were analyzed with CoHort software using analysis of variance.

1. Ethrel **2. Vitazyme**

Fertilization: nothing in addition to adequate N, P, and K from well water
Vitazyme application: Vitazyme was applied to the leaves of the grapes by an air-blast sprayer four times at 2 weeks before bloom, at bloom with gibberellins, at BB-sized fruit, and at verasion. The third spray also received a Tulare Ag Products combination of potassium, calcium, and boron.

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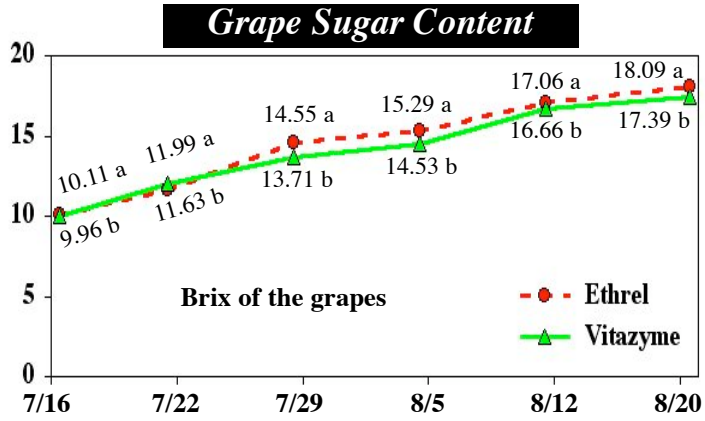
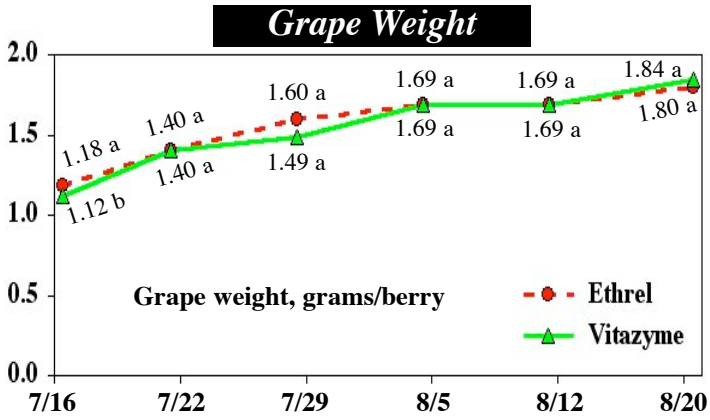
Ethrel application: Ethrel [(2-Chloroethyl) phosphonic acid], also known as Ethephon, is a synthetic plant growth regulator that releases ethylene into the plant system. The effect of ethylene is to hasten sugar production so one can harvest earlier, or get more total sugar into the grapes. The product was sprayed on four times, the same times that the Vitazyme was applied.

Grape sugar results: Grapes from selected rows and locations of both treatments were analyzed by University of California personnel with a refractometer to determine Brix, and grapes were also weighed from those locations. A statistical analysis was performed on those values to determine significant differences.



[Means followed by different letters are significantly different at P=0.05.]



[Means followed by different letters are significantly different at P=0.05.]

The grape yield with Vitazyme in this California study was 16% higher than with the standard Ethrel treatment. Raisin yield was increased by 6%

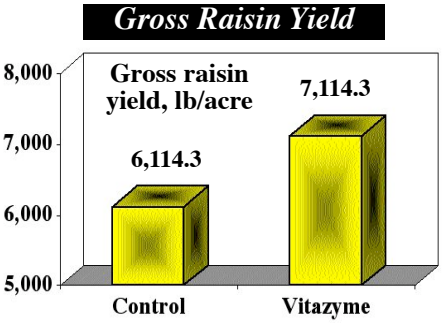
It will be noted that the sugar content of the Ethrel treated grapes was consistently a bit higher than the Vitazyme treated grapes. In addition, it was discovered that sandier soils tended to increase the sugar content more for Vitazyme than for Ethrel treatment.

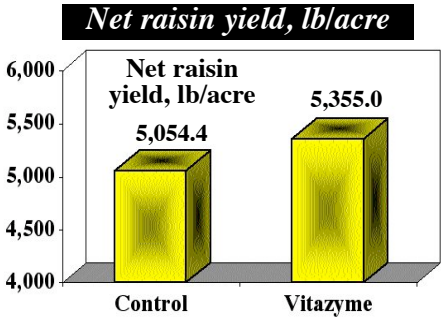
There was little difference in grape size as affected by treatment, although towards the end of the season the Vitazyme treatment produced slightly (though not significantly) larger berries. As for sugar content, the sandier soils produced larger berries, on average, with Vitazyme than for Ethrel treatment.

Harvest date: September 4, 2003

Yield results: All grapes were harvested by volunteer labor and placed on paper trays between the rows. They were left to dry for 3 to 4 weeks before being picked up and delivered to the raisin packing facility.

The raisins were graded through a machine that used an air current to remove the fruit that was too light, i.e. mostly skins with little sugar deposition.





Conclusions: In this San Joaquin Valley raisin grape test, Vitazyme (with one of the four sprays also containing some potassium, calcium, and boron) increased total raisin production by 16% above the standard Ethrel treatments. However, the net raisin production was increased less by Vitazyme – by 6% – and while this is still a substantial increase in yield, it is believed that the net yield increase would have been considerably higher, perhaps approaching 16%, if the growing season had been more normal. Due to cool conditions during parts of the summer, the progress of the vines and grapes was retarded, so that towards the end of the season the grapes were not reaching their usual high sugar content as soon as normal. Thus, at harvest the Vitazyme treated grapes had a lower sugar content because the heavier load of grapes had too little time to develop a 21 to 22% sugar content, whereas the lighter load of grapes with the Ethrel treatment achieved a higher sugar content due to less grapes to fill.

Ethrel treated grapes had a slightly higher sugar content than the Vitazyme treated grapes throughout the growing season except for the July 22 determination. Grape size varied little between the two treatments during the July 17 to August 20 testing period.

This study proved that Vitazyme, together with some foliar minerals at one stage of development, performed better in terms of gross and net yield than the "standard of the industry" Ethrel treatments. Further studies will be performed during 2004 to confirm and expand upon these conclusions.

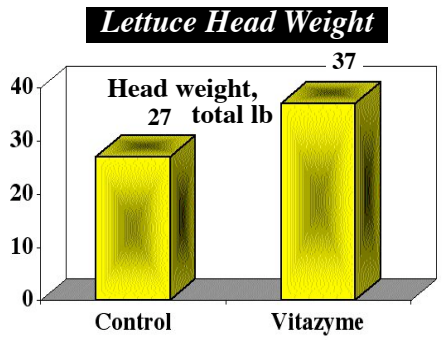
- ***Gross yield increase with Vitazyme: 16%***
- ***Net yield increase with Vitazyme: 16%***

Lettuce

Location: Winnsboro, Texas
Variety: oak leaf lettuce
Growth medium: hydroponic, with foam cubes
Growth system: Nutrient water is cycled through pipes having cut-outs on 6 or 8-inch centers, in which the foam cubes with plants are placed.
Experimental design: A greenhouse with hydroponic tubes was situated with lettuce, and one portion was treated with Vitazyme.

1. Control **2. Vitazyme**

Fertilization: a macro and micronutrient soluble formula in the circulating water



Vitazyme application: a 1% Vitazyme solution sprayed to the dripping point each week

Yield results: The same number of mature heads were harvested from an identical set of pipes for both treatments, and the heads were weighed.

Greenhouse-grown, hydroponic lettuce with Vitazyme produced much tighter and heavier, leafier heads as shown in this side-by-side comparison.

Conclusions: Vitazyme proved to be a remarkably effective stimulator of growth in this greenhouse hydroponic study when the product was regularly applied to the leaves.

- **Head weight increase with Vitazyme: 37%**

Lettuce

Romaine lettuce in Mexico received two applications of Vitazyme, and produced these beautiful heads in spite of a hailstorm.

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

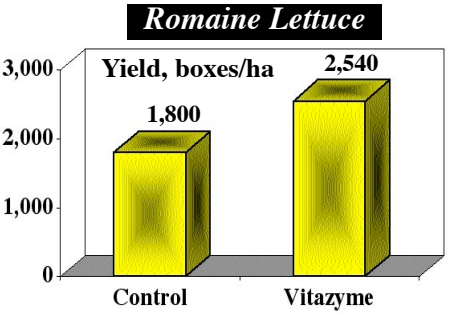
1. Control **2. Vitazyme**

Fertilization: All areas were were treated with the same fertility program.

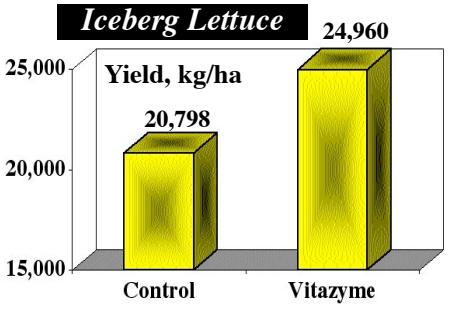
Vitazyme application: 1 liter/ha (13 oz/acre) on the plants and soil at transplanting, and again 30 days later

The lettuce heads from Mexico were compact, well-filled, and of high quality as can be seen from this split head.

Harvest date: summer, 2003



- **Increase in yield: 20%**



- **Increase in yield: 41%**

Income Results

Variety	Treatment	Yield	Yield[1]	Price[2]	Total value	Increase with Vitazyme
		kg/ha	boxes/ha	pesos/box or lb	pesos/ha	pesos/ha
Iceberg lettuce	Control	20,798	1,300	0.7/lb	14,766.58	—
	Vitazyme	24,960	1,678	84.00/box	140,952.00	126,185.42
Romaine lettuce	Control	—	1,800	84.00	151,200.00	—
	Vitazyme	—	2,540	84.00	213,360.00	62,160

[1]Each box had 24 heads, and averaged 14.87 lb/box.
[2]For Iceberg lettuce, the price was much less for the control crop which was damaged by hail and did not recover well, while the Vitazyme treated crop recovered very well. The control lettuce was sold for processed lettuce, and the Vitazyme treated lettuce for fresh packed lettuce.

Conclusions: In this lettuce field trial in central Mexico, Vitazyme produced excellent yield and income responses for both Iceberg and Romaine lettuce. Yield increases were 20 and 41%, respectively for the two varieties using two applications (at planting, and 30 days later), but most impressive was the substantial increase in net income with Vitazyme. This increase was over 126,000 pesos/ha for Iceberg lettuce, in part due to a higher grade head from rapid plant recovery after a hail storm. The Romaine lettuce income increase was over 62,000 pesos/ha due to Vitazyme use.

Iceberg lettuce treated with Vitazyme in Mexico has recovered nicely despite hail and produced high quality heads, qualifying for fresh market.

Oil Palm (Nursery Stock)

Nigerian Institute for Oil Palm Research

Research Organization: NIFOR, Benin City, Nigeria *Variety*: oil palm (unknown)
Planting date: April, 2002 *Soil type*: Kulfo sand (2.5% clay, 3.0% silt, 94.5% sand) *Pot size*: 30 x 35 cm poly bags
Experimental design: Poly bags were spaced in a 45 x 45 cm pattern in the NIFOR palm nursery, laid out in a 3 x 2 factorial, randomized complete block design having four replicates. Twelve sprouted palm seeds were used for each plot in a 30 plot area. Two fertilizers were used, and shredded bunch refuse was placed on the pot surfaces a day after planting. The treatments were as follows:

Treatment	Nutripak[1]	Rustica[2]	Vitazyme[3]
1	O	O	O
2	O	O	X
3	X	O	O
4	X	O	X
5	O	X	O
6	O	X	X

[1]A 3-year time-release packet of 57 g of a 12-4-12 N-P_2O_5-K_2O formulation, applied at pot filling 5 cm below the surface.
[2]A 12-12-17-2 formulation of N-P_2O_5-K_2O-Mg at 42 g per seedling, split equally at 2, 5, and 8 months after planting.
[3]A 0.5 liter per seedling dosage of a dilute solution applied at 0.91 liter/ha at 2 months after planting, and at 1.40 liters at 5 and 8 months after planting. These were made 1 to 2 days after the fertilizer applications.

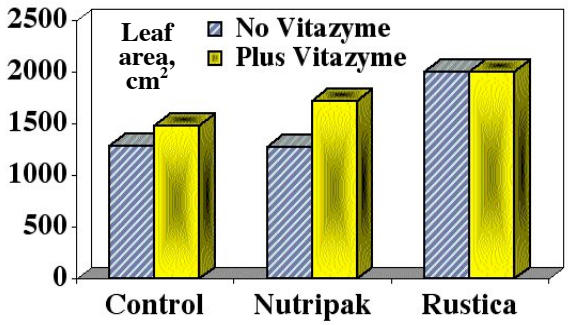
Fertilizer treatment: see table at left
Vitazyme application: see table at left
Growth results: At 2, 6, 9, and 12 months after planting, measurements were made of plant height, leaf number, stem girth, and leaf area. At the termination of the experiment in April of 2003, fresh plant weight and the number of transplantable and surviving seedlings were determined. However, only a portion of the data collected was obtained for this report, so only the data received is reported here.
Vitazyme increased the growth of the leaves considerably compared to the control (+15%) and with Nutripak (+35%). It is likely that these increases are significant. However, Vitazyme did not improve the leaf area of the Rustica (highly soluble) fertilizer for some reason, perhaps because the nutrient levels were already very high and pushing optimum levels.
Vitazyme likely significantly increased plant fresh weight with Nutripak, though not with no fertilizer or with Rustica highly soluble nutrients.

Conclusions: In this replicated study on oil palm seedlings in Nigeria using two different fertilizers — one slow release (Nutripak) and one rapid release (Rustica) — **Vitazyme interacted very favorably with the slow release Nutripak to increase leaf area by 35% after one year and to increase plant fresh weight by 43%. Vitazyme alone increased leaf area by 15% and fresh weight by 6%.** The reasons for not increasing growth parameters with the rapid release Rustica may be due to the sufficiency of nutrients, so that Vitazyme could do little in this small pot environment to make more nutrients available.

Leaf Area

Treatment	Leaf area*	Change**
	cm^2	cm^2
1. Control	1291	——
2. Vitazyme only	1486	195 (+15%)
3. Nutripak only	1280	——
4. Nutripak + Vita	1725	445 (+35%)
5. Rustica only	2003	——
6. Rustica + Vita	2008	5(0%)

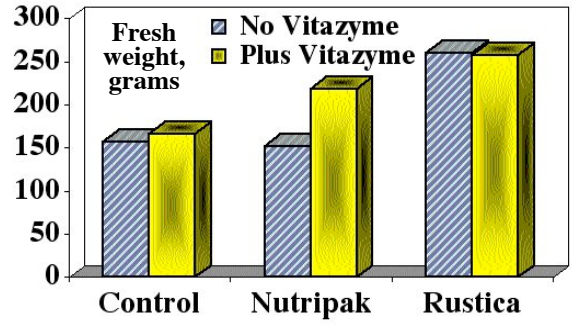
*Levels of significance are not known.
**The changes compare a treatment to its appropriate control: Treatment 1 vs 2, 3 vs 4, and 5 vs 6.



Plant Fresh Weight

Treatment	Fresh weight*	Change**
	grams	grams
1. Control	157	——
2. Vitazyme only	166	9 (+6%)
3. Nutripak only	152	——
4. Nutripak + Vita	218	66 (+43%)
5. Rustica only	260	——
6. Rustica + Vita	257	-3 (0%)

*Levels of significance are not known.
**The changes compare a treatment to its appropriate control: Treatment 1 vs 2, 3 vs 4, and 5 vs 6.



According to the researchers, Dr. Utulu and Dr. Ugbah,

"1. Vitazyme boosted the activity of Nutripak and also stimulated the leaf area and fresh weight of seedlings that did not receive Rustica and Nutripak."

"2. Visual scoring for phytotoxicity did not implicate Nutripak or Vitazyme as phytotoxic to the oil palm seedlings."

Vitazyme has been shown in this study to be a highly effective booster of a slow release fertilizer for oil palm seedling growth. It is also very effective to be used by itself as a soil fertility and plant growth booster for the highly weathered tropical soils used in this study.

· Increase in leaf area with Vitazyme alone: +15%

· Increase in leaf area with Vitazyme and Nutripak: +35%

· Increase in fresh weight with Vitazyme and Nutripak: +43%

Ornamentals

Location: Cactus Ranch, Canton, Texas
Varieties: Candle tree *(Cassia alata)*, banana "basjoo", "banana double" *(Musa nana)*, and Madagascar (Sago) palm *(Cycas thouarsii)*
Potting soil: pine bark + Carl Pool growers mix + other components *Planting date*: about June 15, 2003 for all plants
Experimental design: For the candle tree, banana basjoo, and banana double, a number of plants were treated with Vitazyme while only one average plant served as an untreated control. For the Sago palm, no untreated controls were included in the study, but knowledge of their germination characteristics revealed that germination requires one year.

1. Control **2. Vitazyme**

Fertility treatments: All potting soils received a 20-6-11% N-P_2O_5-K_2O (5 to 6-month release) fertilizer mixed in before planting. In addition, a 19-13-6% N-P_2O_5-K_2O topdress fertilizer was in some cases applied, but various fertilizers, amounts, and timing depended on the specific plant and growth conditions.
Vitazyme applications: A soil drench of a 1 tsp/gallon (0.2%) solution at planting on June 15, and again 30 days later on July 15, for the candle tree, banana "basjoo", and banana "double". The Sago palms were soaked in a 0.5 tsp/gal (0.1%) solution for a few days before planting.
Watering schedule: on-demand, adjusted to the individual plant species
Fungicide applications: to all plants every few weeks
Growth results: All data were collected on September 26, 2003, 3.5 months after the first application.

Candle Tree *(Cassia alata)*

Treatment[a]	Height	Leaf size[b]	Stem caliper	Leaf number
	inches	inches	inches	number
1. Control	15	1.5 x 2.0	0.25	9
2. Vitazyme	20	2.5 x 4.0	0.50	12

[a]One plant for the control, and the average of 15 plants for the Vitazyme treatment
[b]Dimensions of the largest fully developed crown leaf.

Vitazyme produced substantial improvements in growth for these candle tree plants. The largest treated plant was 23 inches tall and had a crown leaf of 4 x 6 inches.

Banana "Double" *(Musa nana)*

Treatment[a]	Height	Leaf size[b]	Stem caliper	Leaf number
	inches	inches	inches	number
1. Control	18.5	5 x 9	0.5	7
2. Vitazyme	25.0	6 x 11	0.9	9

[a]One plant for the control, and the average of 15 plants for the Vitazyme treatment
[b]Dimensions of the largest fully developed crown leaf.

The growth of these banana plants was greatly improved by Vitazyme applications as evidenced by height, leaf size, stem caliper, and leaf number.

Banana "Basjoo" *(Musa nana)*

Treatment[a]	Height	Leaf size[b]	Stem caliper
	inches	inches	inches
1. Control	21	4.5 x 11.0	0.5
2. Vitazyme	32	5 x 15.5	1.5

[a]One plant for the control, and the average of 15 plants for the Vitazyme treatment
[b]Dimensions of the largest fully developed crown leaf.

Vitazyme greatly improved the growth of all aspects of this banana variety: height, leaf size, and stem caliper.

Madagascar (Sago) Palm *(Cycas thouarsii)*

Number of seeds treated: 38
Number of seeds germinated by September 26 (3.5 months after a Vitazyme soak): 7
Normal time of germination: 12 months
Size of largest germinated palm: 9 inches tall, upper leaf with 16 leaflets and 10 spikes, lower leaf with 13 leaflets and 8 spikes
Time to germination of the first palm: 2 months

Vitazyme as a seed soak greatly reduced the time to germination of these Sago palms, with 7 of the 38 already germinated by 3.5 months, though usually a full year is required. A seed soak with a higher concentration of Vitazyme may have improved early germination even more.

Peanuts

Location: Whitheral, Texas *Variety*: TamSpan 90 *Soil type*: medium sandy loam
Row spacing: 40 inches to middles, 8 inches on berm
Population: 100 lb/acre *Previous crop*: cotton *Planting date*: May 15, 2003
Experimental design: A center pivot field was divided into two 33.5-acre areas, one receiving Vitazyme and the other none. All other treatments were the same for both parcels.

1. Control **2. Vitazyme**

Fertilizers: 11-52-0 fertilizer applied preplant
Vitazyme application: 13 oz/acre at planting, 13 oz/acre about July 20 on the leaves and soil
Irrigation: as needed, but one period of about 2 weeks received none due to the loss of the irrigation rig from a tornado.
Weather: a hot , extremely dry summer; 8.5 inches of rain for the year, with no rain for August and September
Harvest date: November 18, 2003 (dug several weeks earlier)
Income results: The sale price of the peanuts was $370/ton, or $0.185/lb.
67 lb/acre x $0.185/lb = $12.40/acre more income from Vitazyme
Conclusions: This peanut trial in west Texas produced a small but profitable yield increase with Vitazyme application. The peanut grade was similar for both treatments (about 77). The yield difference would have been greater if the treated areas had not included low areas that produced less yield due to more weed competition and poorer water relations. In 2002, a similar test on this same farm with peanuts produced a 30% yield increase with Vitazyme.

Yield Results

Treatment	Yield	Change
	lb/acre	lb/acre
Control	3,515	——
Vitazyme	3,582	67 (+2%)

• Yield increase: 2%

Pears

Agr. Assistance, North Rose, New York

Pears grown in New York performed remarkably well when treated with Vitazyme in terms of both fruit weight and quality factors.

Farmer: Jay DeBadts and Sons
Location: Sodus, New York
Crop load: full
Variety: Bartlett (for processing)
Soil type: unknown
Tree age: mature

Experimental design: A pear orchard was divided into two portions, one treated with Vitazyme and the other an untreated control. All other treatments were the same on both sides.

1. Control **2. Vitazyme**

Fertilizer treatment: unknown

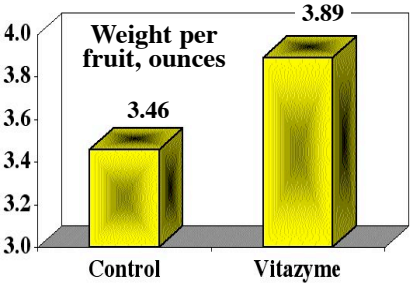
Vitazyme treatments : Three applications were made at 24 oz/acre on the leaves: (1) at "pink", (2), at petal fall, and (3) at first cover.

Harvest date: unknown

Weather: The weather was very cool and wet during much of the growing season.

Quality results: This test was primarily to determine the effect of Vitazyme on various quality parameters of pears, including fruit size, fruit grade, fruit uniformity, fruit pressure, and fruit soluble solids.

Fruit Size

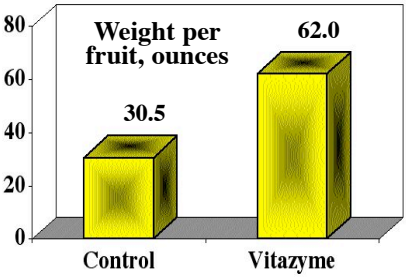


*100 fruit were sampled per bin, for 8 bins, or 800 fruit were averaged for each figure.

Eight bins of pears were compared from both treatments to determine the average weight of the pears. One hundred pears from each bin were weighed and averaged.

Vitazyme treated fruit were considerably larger, by 12%, than the untreated controls.

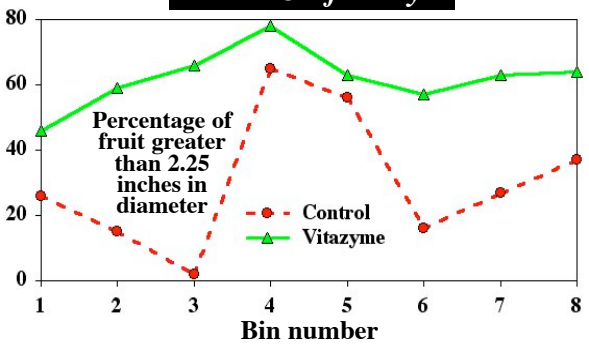
Fruit Grade



*100 fruit were sampled per bin, for 8 bins, or 800 fruit were averaged for each figure.

The same pears that were weighed in the above determination were also graded. A measurement was made of fruit diameter, either less than or greater than 2.25 inches.

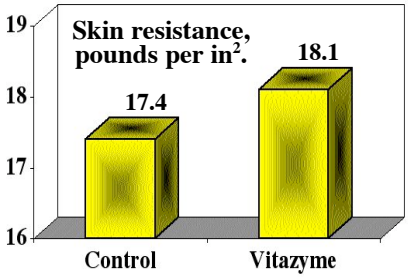
Fruit Uniformity



Using the same figures as for fruit grade, the following graph illustrates the degree of uniformity for the two treatments. The Vitazyme treated fruit had about twice the number of pears that were 2.25 inches or greater in diameter than did the untreated control.

The untreated control shows a great variability in pear size, whereas the Vitazyme treatment displays considerable uniformity in size; the pears vary only from 46 to 78% for fruit equal to or greater than 2.25 inches in diameter.

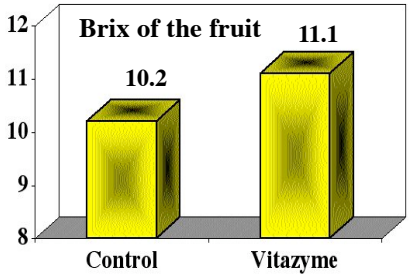
Fruit Pressure



An analysis was made of 25 pears from each treatment using a small device that measures the resistance of the flesh to pressure. These values were averaged for each treatment.

The Vitazyme caused the shine and flesh to be somewhat firmer to applied pressure of the test instrument.

Fruit Soluble Solids



For each treatment, 10 fruit were selected and analyzed with a refractometer, using the juice expressed from the fruit.

Since Brix approximates the sugar content of the juice, the Vitazyme treatment produced sweeter pears than the untreated control.

Conclusions: In this test in New York with Vitazyme on pears, the product caused a number of worthwhile, positive effects on the fruit:

(1) An increase in fruit weight and size (+12%), meaning better prices for the fruit
(2) A marked increase in fruit uniformity for larger fruit (≥ 2.25 in diameter)
(3) An increase in flesh firmness and resistance to pressure (+4%), meaning less bruising potential and better shipping and storage qualities
(4) An improvement in soluble solids, or sugars and minerals (+9%), meaning sweeter and tastier fruit

The grower and the pickers all felt that the Vitazyme treated fruit was larger. This product can produce a number of benefits for pear growers that make it an obvious choice to use for better yields, quality and profits.

· Increase in fruit weight: 12%

· Increase in fruit grade: 103% more were ≥ 2.25 inches

· Increase in fruit resistance to pressure: +4%

Potatoes

Research organization: Agritec del Centro, S. de P.R. de RL., Leon, Guanajuato, Mexico
Test location: Zamora de Hidalgo, Michoacan, Mexico
Variety: Alpha *Soil type*: unknown
Previous crop: unknown *Row spacing*: unknown
Planting date: August 10, 2002
Experimental design: A 10-acre field of potatoes was split into two equal parts, one half treated with Vitazyme and the other half left untreated. All input parameters except for Vitazyme for both sides were equal.

1. Control **2. Vitazyme**

Fertilization: At planting, 100 kg/ha 18-46-0 (%N-P_2O_5-K_2O), 100 kg/ha 16-16-16, 150 kg/ha 0-50-18, 100 kg/ha 22-22-4, and 100 kg/ha sulfur.
Vitazyme treatments: Two applications at 1 liter/ha, sprayed on each time, a few weeks after planting and at the hook stage
Harvest date: December 20, 2002
Yield results: At harvest time, two samples of 1 meter^2 each were collected from each of the two treatments. These two values for each treatments have been arranged for all of the yield figures below. The tubers were sorted according to size into five categories.
Yield and size distribution results:

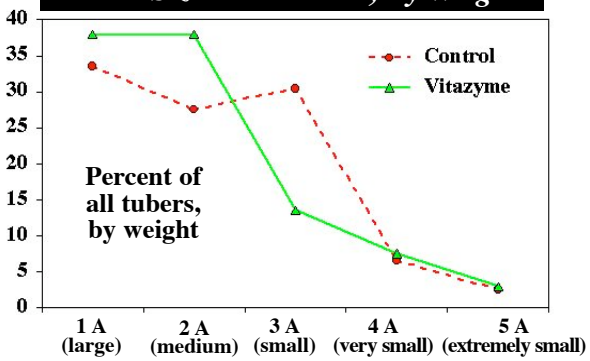
The Control treatment of this study revealed a normal potato yield for this field. Compare this with the next picture.

Note how the number of tubers has increased greatly with Vitazyme application, but with no sacrifice of size or quality. Uniformity is excellent as well.

Yield and Tuber Size Data

Treatment	Tuber size														
	1 A (large)			2 A (medium)			3 A (small)			4 A (very small)			5 A (extremely small)		
	number	kg/m^2		number	kg/m^2		number	kg/m^2		number	kg/m^2		number	kg/m^2	
Control	6.5	0.91	—	7.5	0.75	—	16.5	0.83	—	8.5	0.17	—	2.5	0.07	—
Vitazyme	10.5	1.48	(+63%)	14.0	1.43	(+91%)	10.5	0.53	(–36%)	14.5	0.30	(+0.76)	11.5	0.12	(+71%)

Tuber Size Distribution, By Weight



Treatment	Total Tubers		Total weight		Total yield	
	number		kg/m^2		tons/ha	
Control	41.5	—	2.72	—	28.016	—
Vitazyme	61.0	(+47%)	3.84	(+41%)	39.552	(+41%)

The Vitazyme treatment produced tubers that were considerably larger than for the untreated plants. The weights for the large and medium sizes were 63 and 91% greater, respectively, with Vitazyme than without it. The Vitazyme treatment produced 2.91 kg/m^2 out of a total of 3.84 kg/m^2, or 76% of the total tuber weight, whereas the control produced 1.66 kg/m^2 out of a total of 2.72 kg/m^2, which was 61% of the total tuber weight. Total tuber production was 71% higher with Vitazyme.
Income results: Prices used in calculating these values are according to tuber size, using the following schedule. 9 pesos = 1 dollar.

Treatment	Size 1 A			Size 2 A		
	Yield	Value		Yield	Value	
	kg/ha	Pesos/ha	$/ha	kg/ha	Pesos/ha	$/ha
Control	9,385.4 (33.5%)	75,083.2	8,342.58	7,704.4 (27.5%)	53,930.8	5,992.31
Vitazyme	15,029.8 (38.0%)	120,238.4	13.359.82	15,029.8 (38.0%)	105,208.3	11,689.81

Size 1 A — 8.0 pesos/kg
Size 2 A — 7.0 pesos/kg
Size 3 A — 6.5 pesos/kg
Size 4 A — 5.0 pesos/kg
Size 5 A — 5.0 pesos/kg

Treatment	Size 3 A			Size 4 A			Size 5 A		
	Yield	Value		Yield	Value		Yield	Value	
	kg/ha	Pesos/ha	$/ha	kg/ha	Pesos/ha	$/ha	kg/ha	Pesos/ha	$/ha
Control	8,544.9 (30.5%)	55,541.7	6,171.30	1,821.0 (6.5%)	9,105.2	1,011.69	700.4 (2.5%)	3,502.0	389.11
Vitazyme	5,339.5 (13.5%)	34,706.9	3,856.32	2,966.4 (7.5%)	14,832.0	1,648.00	1,186 (3.0%)	5,933.0	659.22

Conclusions: Vitazyme greatly improved the performance of this potato crop in Mexico, as determined by a split-field design. The tubers were larger on average with Vitazyme, the 1 A and 2A classes being increased by 15% above the controls in terms of percentage of the total weight. The total yield of tubers with Vitazyme was 41% greater than for the control, and total income was increased by 83,755.7 pesos/ha ($9,306.19/ha) using this highly effective crop biostimulant.

Total Value				
	Pesos/ha	$/ha	change, Pesos/ha	change, $/ha
Control	197,162.9	21,906.99	—	—
Vitazyme	280,918.6	31,213.17	+83,755.7	+9,306.19

- ***Tuber yield increase: 41%***
- ***Increase in tuber size (large and medium): 15%***
- ***Income increase: 83,755.7 pesos/ha = 9,306.19 $/ha***

Potatoes

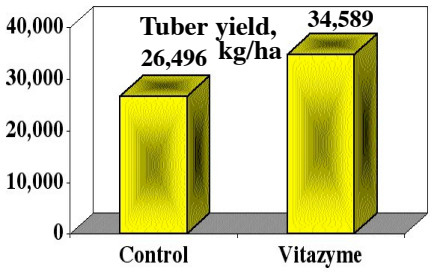
Location: El Ranch "Cerro de agua", Saltillo, Coahuila, Mexico
Soil type: high-calcium stony clay (desert soil); very compact
Variety: Frito Lay variety
Previous crop: unknown
Experimental design: Two potato fields under separate center pivot irrigation were divided into sections having Vitazyme treatments and controls. Each field had a separate treatment regime. Vitazyme applications were made with a field sprayer.

1. Control **2. Vitazyme**

Field 9

This section of the Mexican potato center pivot area had Vitazyme applied three times, starting at 45 days, and shows good growth.

Notice how much larger and more numerous are the tubers from the Vitazyme treated portion of Field 9 compared to the untreated control.



· Increase in yield: 31%

Fertilization: N-P-K plus certain micronutrients
Vitazyme applications: Field 9: three soil/foliar sprays at 1 l/ha, beginning 45 days after planting
Field 8: three soil/foliar sprays at 1 l/ha, beginning 30 days after planting
Harvest date: unknown
Income results: The price of potatoes is 3.4 pesos/kg, and the cost of Vitazyme is 231 pesos/liter.
Field 9: 8,093 kg/ha increase x 3.4 pesos/kg =

27,516.2 pesos/ha increase

Field 8: 14,977 kg/ha increase x 3.4 pesos/kg =

50,921.8 pesos/ha increase

Vitazyme cost: 3 applications x 231 pesos = 693 pesos/ha

Income – Cost ratio:
Field 9: 27,516.2 pesos/693 pesos = 39.7:1

Field 8: 50,921.8 pesos/693 pesos = 73.5:1

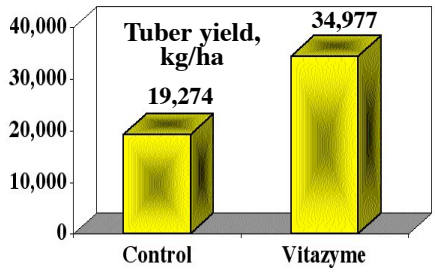
Conclusions: In this potato study near Saltillo, Mexico, Vitazyme applied three times produced remarkable increases in yield of 31% when applied fairly late in the growth cycle, and 78% when applied earlier. Increases may have been even greater if the product had been applied at or near planting as well. These very high yield increases translated into income increases of over 27,000 to nearly 57,000 pesos per hectare, with remarkable income:cost ratios of 39.7 to 73.5:1.

These two studies show the potential of Vitazyme to substantially increase the yields of potatoes grown in northern Mexico under the typically stressful conditions of high heat, compaction, low organic matter, and high calcium and mineral imbalances. This product enables plants to overcome many environmental stresses, as evidenced well in these tests.

Field 8

Potatoes on the left, which are much bigger than the ones on the right, have been treated with Vitazyme beginning 30 days after planting.

Potatoes from the two sides of the border of Field 8 reveal great differences in plant size, and tuber number and size.



· Increase in yield: 78%

Potatoes

Agro-Engineering, Alamosa, Colorado

Farm: Ford Farm, Field 8
Location: Saguache, Colorado
Variety: Norkotah TX 112
Soil type: sandy loam
Planting date: unknown
Population: 10-inch spacing
Row spacing: 34 inches
Experimental design: A portion of a center pivot irrigation circle was selected to apply Vitazyme, while the nearby areas of the circle served as the controls.

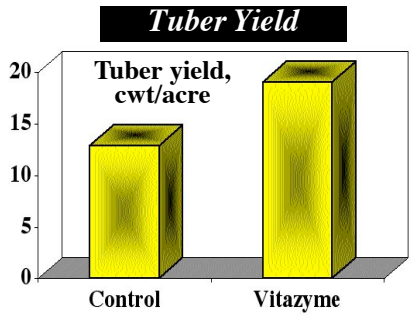
1. Control **2. Vitazyme**

Fertilization: 130 lb/acre N, 100 lb/acre P_2O_5
Vitazyme application : (1) 13 oz/acre soon after planting, through the irrigation system (2) 13 oz/acre at the early hook stage
Harvest date: unknown
Yield results: A 2 acre area of the treated potatoes was dug, weighed on a truck scale, and compared to a nearby untreated area.

Income results: A price of $10.00/cwt is used in these calculations.

Treatment	Tuber yield	Income	Increase
	cwt/acre	$/acre	$/acre
Control	542	5,420	——
Vitazyme	560	5,600	180

Conclusions: **Vitazyme applied to potatoes in this southern Colorado test produced a modest 3% yield increase, that gave the grower $180/acre more income.** Not evaluated in this study was tuber size distribution, which very likely would have shown a higher percentage of medium-sized tubers. Such a size improvement, seen in several earlier potato trials in the same area, would further enhance this income figure.



Treatment	Tuber yield	Change
	cwt/acre	
Control	542	——
Vitazyme	560	18

While the increase in yield was not large in this study, Vitazyme boosted yield significantly and very profitably on Ford Farm, Field 8 in Colorado.

· Yield increase: 3% · Income increase: $180/acre

Potatoes

Bedrock Soil Balancing Services, Presque Isle, Maine

Location: Ft. Fairfield, Aroostook County, Maine
Soil type: gravely loam
Population: unknown
Row width: 36 inches
Previous crop: cereal rye
Variety: Frito Lay 1879
In-row spacing: 8 inches
Planting date: unknown
Experimental design: A potato field was divided into two parts, one receiving Vitazyme three times and the other receiving only the normal program.

Potatoes treated with Vitazyme three times at Ft. Fairfield, Maine, produced a large increase in tubers, as evidenced by this sample dug on August 8.

1. Control **2. Vitazyme**

Fertilization: standard for the farm
Vitazyme applications: three applications of 13 oz/acre each time: in the furrow at planting, at blossom, and a few weeks later
Yield results: While no yield figures are available for the control and treated areas, the yield improvement was easily noticed and was estimated by the farmer to be 3,000 lb/acre, possibly more.
Tuber size: There were **fewer "B-sized" tubers** (2 inches or less in diameter) with Vitazyme and **more uniformity in tuber size.**
Conclusions: Vitazyme, in this northern Maine trial produced a higher yield of more uniform sized tubers, with fewer in the small "B" range. With FL1879 potatoes it is difficult to get a yield increase, but this program proved that an increase is certainly possible.

· Yield increase: 3,000 lb/acre

Roses

Location: Florecal, Cayambe, Pichincha, Ecuador
Variety: "Latin Lady"
Soil type: unknown
Treatment initiation: February 26, 2003, during active production
Experimental design: Vitazyme was applied to beds of roses in a production greenhouse to evaluate the product's ability to decrease the number of "blind" (nonflowering) stems on the plants. The total test area was 8 beds of 30 m^2 each, or a total of 240 m^2. The treated and control areas were each half of this total, or 4 beds of 30 m^2 each.

1. Control **2. Vitazyme**

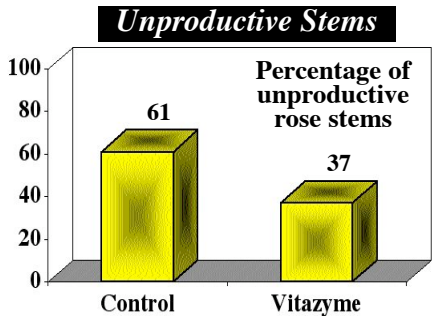
Fertilizer treatment: unknown
Vitazyme application: 1.55 ml per bed of 30 m^2 each week
Growth results: The numbers of productive and "blind", nonflowering stems were counted after 8 weeks of Vitazyme application. Four areas of beds for each treatment were counted, and the results were tallied to give the percentage of "blind" stems.
Observations on root mass: Examination of the roots of the respective treatments revealed a decided advantage for the Vitazyme treated rose plants. **Roots were heavier with more root hairs** for treated plants.
Observations on growth: Visual examination of the various blocks of treated and untreated roses showed that Vitazyme caused an **increase in the number of**

Treatment	Area	Total stems	Productive stems	"Blind" stems	Proportion of "Blind" stems
		number			%
Control	1	54	22	32	59
	2	55	20	35	64
	3	59	24	35	59
	4	48	18	30	63
	Average				61
Vitazyme	1	84	68	16	19
	2	89	62	27	30
	3	66	44	22	33
	4	61	21	40	66
	Average				37

Continued on the next page

This rose treated with Vitazyme at Florecal, Cayambe, Ecuador, is typical of the production from this program that results in fewer unproductive stems.

productive stems, and these stems were **more vigorous and uniform** than the untreated controls.



Conclusions: In this study of rose production (variety Latin Lady) in Ecuador, the objective of reducing the number of "blind", unproductive flower stems was achieved using Vitazyme biostimulant. Using weekly applications of 1.55 ml per 30 m^2 of bed, **the treated plants were more growthy, developed more root mass, and had 24 percentage points fewer unproductive stems than the untreated controls.** The results show that Vitazyme is a powerful tool for increasing the flowering potential of roses, especially for the varieties that have difficulty producing blossoms on some stems.

· Reduction in unproductive rose stems: 24 percentage points

Shrimp

Ing. Patricio C. Velasquez, Universidad Tecnica de Machala, Centro de Investigaciones Agropecuarias, Programa de Acuacultura, Machala, Ecuador

Shrimp culture is a big business in Ecuador, and it has been discovered that Vitazyme can work effectively to improve the pond microbial conditions, thus favoring their development.

Location: Camaronera Mariluna, Machala, Province El Oro, Ecuador
Nutripak composition: 12% humic acids, seaweed extract, microbes including *Azotobacter*, *Bacillus subtilius*, actinomycetes, *Clostridium*, *Lactobacillus liquifaciens*, mycorrhizae, *Pseudomonas*, *Rhizobium*, and *Thiobacilleus*.
Nutripak application: 0.5 l/ha
Vitazyme application: 1 l/ha, with Nutripak, to the mud or shallow seawater on the pond bottom a week before flooding
Treatment dates: unknown

Quotes from Ing. Velasquez. July 18, 2003: "In regard to the preliminary outcome of the trial using the products Vitazyme and Nutripak, I must state that the results are acceptable as growth promoters of natural productivity. We have observed an increase in the bentonic growth of a diverse microalgae population such as diatoma, navicula, amphiphora, nitzchia, oscilatoria, and anabaena, as well as the presence of nematodes, poliquetos, and other phytoplankton genera and bentonic organisms . . . . Nutrition is a key factor for better [shrimp] production. A biological inoculation in well treated pond soils will always be an excellent mechanism."

October 8, 2003: "Camaronera Mariluna, situated in Machala, Province El Oro in Ecuador, is performing some trials using a few products to assure the system's natural productivity. Enzymes, specific proteins, used to accelerate chemical reactions, are good complements in cell metabolism. With this rationale, we are using Vitazyme for soils in shrimp farming. In addition, we are using Nutripak in order to inoculate microorganisms (in particular bacteria) and to supplement micronutrients. We suspect that the combined use of both products would generate biological reactions with the subsequent contribution to increased productivity of the environment. Preliminary observations have allowed to determine that when these biological reactions take place with the use of these sorts of natural products, whether enzymatic or micronutrient or microorganism or organic compounds, soil productivity is substantially increased. It has been observed in shrimp ponds an increased presence in quantity and variety of diverse microorganisms with the use of such propagation methods."

Snap Beans

New York Crop Research Facility – A.C.D.S. Research

Location: New York Crop Research Facility, Batavia, New York
Variety: Histyle *Planting depth*: 1.5 inches *Row spacing*: 30 inches
Soil type: Cazenovia silt loam (pH 6.6, CEC 10.0, P 67 ppm, K 126 ppm, Mg 226 ppm, Ca 1,553 ppm)
Previous crop: sweet corn *Planting date*: June 28, 2003 *Planting conditions*: excellent
Experimental design: A randomized complete block design was set up, with four replicates to evaluate several fertilizers and biostimulants as starter applications for snap beans. Each plot was 40 x 10 feet (0.0092 acre), containing four rows, with data collected from the two inside rows of each plot. Data were collected on emergence 7 days after planting, toxicity of the product 2 days after emergence and again at 28 days, stand count at 14 and 28 days after planting, plant height at 28 days after planting, bean yield, and bean size. Of a total of 12 treatments used in the study, those that involve Vitazyme

Treatment	Placement
1. Untreated	——
2. Untreated with water	in-furrow
3. Untreated with water	2 x 2
4. Vitazyme	in-furrow
5. Vitazyme + 6-24-6*	in-furrow
6. 6-24-6*	in-furrow

* A Na-churs Alpine liquid fertilizer

and the assorted starter fertilizer, plus the controls, are included in this report.

Fertilization and product applications: All starter fertilizers and biostimulant products were applied at the rates prescribed by the manufacturer and either on the seeds or in a 2 x 2 placement (inches beside and below the seeds).

Vitazyme application: A starter treatment of 13 oz/acre was applied on the bean seeds at planting for Treatment 4, and with Na-churs Alpine 6-24-6 starter fertilizer for Treatment 5.

Weed and fungus control: Warrior, Basagran, Reflex, Poast

Snap beans treated with Vitazyme display more vigorous root and top growth, both clearly evident in this photo from New York.

Growth results:

Days to Emergence

No difference between treatments were noted, so this data is not included here.

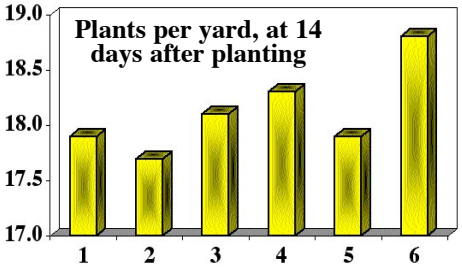
Phytoxicity of Products At 9 and 28 Days

No significant phytotoxicity differences were noted between treatments at 9 or 28 days after planting, so that data is not listed here. Of note is the fact that, next to the untreated control (Treatment 1), Vitazyme alone (Treatment 4) had the least phytotoxicity of all treatments (0.13 on a 10-point scale) at 28 days after planting.

Stand Count At 14 Days

Treatment	Plant Count*	Change
	--- plants per yard ---	
1. Untreated	17.9 ab	——
2. Untreated+H_2O(i-f)	17.7 ab	–0.2
3. Untreated+H_2O(2x2)	18.1 ab	+0.2
4. Vitazyme	18.3 ab	+0.4
5. Vitazyme + 6-24-6	17.9 ab	0
6. 6-24-6	18.8 a	+0.9

*The number of plants per yard was counted at 14 days after planting, giving a measure of germination percentage. Means followed by the same letter are not significantly different at P=0.05 (Bartlett's Test). LSD (0.05)=1.6.

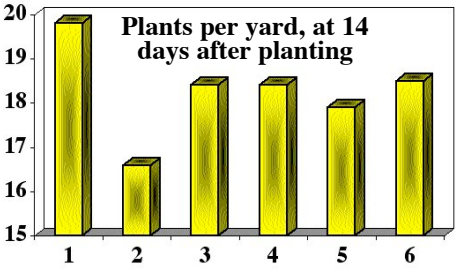


There were no significant differences among the six treatments, but the Na-churs Alpine 6-24-6 had the highest stand count.

Stand Count At 28 Days

Treatment	Plant Count*	Change
	--- plants per yard---	
1. Untreated	19.8 a	——
2. Untreated+H_2O(i-f)	16.6 bc	–3.2
3. Untreated+H_2O(2x2)	18.4 abc	–1.4
4. Vitazyme	18.4 abc	–1.4
5. Vitazyme + 6-24-6	17.9 abc	–1.9
6. 6-24-6	18.5 ab	–1.3

*The number of plants per yard was counted at 14 days after planting, giving a measure of germination percentage. Means followed by the same letter are not significantly different at P=0.05 (Bartlett's Test). LSD (0.05)=2.5 plants per yard.

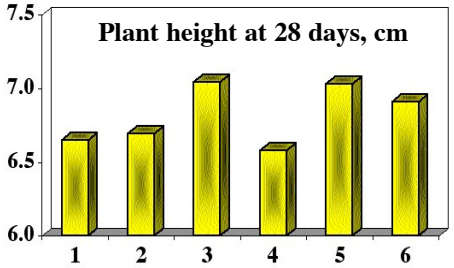


Treatment 2, a water control applied in-furrow, had a significantly lower number of plants at 28 days in this analysis.

Plant Height At 28 Days

Treatment	Plant Height*	Change
	cm	cm vs. Trt. 1
1. Untreated	6.65 ab	——
2. Untreated+H_2O(i-f)	6.69 ab	+0.04
3. Untreated+H_2O(2x2)	7.04 a	+0.39
4. Vitazyme	6.58 ab	–0.07
5. Vitazyme + 6-24-6	7.03 a	+0.38
6. 6-24-6	6.91 ab	+0.26

*A measurement of plant height by pulling the youngest trifoliate straight up and measuring the full height. Means followed by the same letter are not significantly different at P=0.05 (Bartlett's Test). LSD (0.05)=0.58 cm.



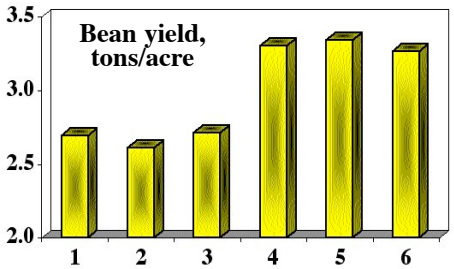
There were no significant differences among the six treatments for plant height at 28 days.

Yield results: The beans were harvested on August 27, 2003.

Bean yield At 60 Days

Treatment	Bean yield*	Change
	tons/acre	tons/acre
1. Untreated	2.69 c	——
2. Untreated+H_2O(i-f)	2.61 c	–0.08
3. Untreated+H_2O(2x2)	2.71 c	+0.02
4. Vitazyme	2.30 a	+0.61 (+23%)
5. Vitazyme + 6-24-6	3.34 ab	+0.65 (+24%)
6. 6-24-6	3.26 a	+0.57 (+21%)

*30 feet of the inside two rows of each plot were harvested with a single-row harvester. Means followed by the same letter are not significantly different at P=0.05 (Bartlett's Test). LSD (0.05)=0.19 ton/acre.



Vitazyme and 6-24-6, alone or together, applied on the seeds at planting significantly boosted bean yield above the controls. Though statistically equal, the combination of the two did the best, boosting the yield by 24%.

Conclusions on growth and yield analysis: While there were few true differences in growth parameters among the six treatments, Vitazyme and Na-churs Alpine 6-24-6, and a combination of the two, significantly boosted bean yield above the control treatments. Of interest is the fact that a combination of the fertilizer and Vitazyme further boosted yield, a phenomenon typically noted with Vitazyme since it helps rhizosphere organisms make native and applied nutrients more available to plants.

Income analysis: The price per ton of snap beans was determined by making a size analysis of the beans (67.5% of sieve size 1 to 4, and 32.5% of sieve size 5), and weighting the value of those bean sizes. The value of the beans was $136.94/ton.

Continued on the next page

The beans harvested from Vitazyme and control plants in this New York study show a significant yield advantage for the treated beans.

Treatment	Yield	Product cost	Yield increase	Increase in value	Net increase
	tons/acre	$/acre	tons/acre	$/acre	$/acre
1. Untreated 2. Untreated + H_2O (i-f) 3. Untreated + H_2O (2x2)	2.67	0	—	—	—
4. Vitazyme	3.30	4.57	0.63	86.27	81.70
5. Vitazyme + 6-24-6	3.34	10.66	0.67	91.75	81.09
6. 6-24-6	3.26	7.20	0.59	80.79	73.59

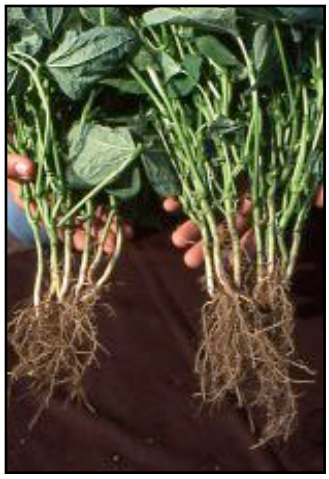
The increase in income was highest with Vitazyme alone, though Vitazyme + Na-churs Alpine 6-24-6 was a close second, followed next by the fertilizer alone. Vitazyme is thus shown to be a highly effective booster of snap bean income in New York.

· Bean yield increase with Vitazyme: 23%

· Income increase with Vitazyme: $81.70 acre

Snap Beans

New York Crop Research Facility – A.C.D.S. Research



Vitazyme treatment in this New York study has produced sturdier plants with thicker stems and a greater root and leaf mass . . . able to produce higher yields.

Location: New York Crop Research Facility, Batavia, New York
Variety: Histyle *Planting depth*: 1.5 inches *Row spacing*: 30 inches
Soil type: Cazenovia silt loam (pH 6.9 CEC 11.9, P 55 ppm, K 148 ppm, Mg 227 ppm, Ca 1,549 ppm)
Previous crop: sweet corn *Planting date*: June 20, 2003 *Planting conditions*: excellent

Experimental design: A randomized complete block design was set up, with four replicates to evaluate several fertilizers and biostimulants as starter applications for snap beans. Each plot was 40 x 10 feet (0.0092 acre), containing four rows, with data collected from the two inside rows of each plot. Data were collected on emergence 7 days after planting, toxicity of the product 2 days after emergence and again at 28 days, stand count at 14 and 28 days after planting, plant height at 28 days after planting, bean yield, and bean size. An analysis of variance was performed using Bartlett's Test. Treatments were as shown in the table at right.

Treatment	Placement
1. Untreated	—
2. Untreated with water	in-furrow
3. Untreated with water	2 x 2
4. Vitazyme	in-furrow
5. Vitazyme + 6-24-6*	in-furrow
6. 6-24-6*	in-furrow
7. Stimulate	2 x 2
8. Stimulate + 9-18-3	2 x 2
9. 9-18-3	2 x 2
10. Fertiactyl GZ	in-furrow
11. 10-34-0	2 x 2
12. 7-17-3**	in-furrow

* A Na-churs Alpine liquid fertilizer
**A starter fertilizer called RiseR

Fertilization and product applications: All starter fertilizers and biostimulant products were applied at the rates prescribed by the manufacturer, and either on the seeds or in a 2 x 2 placement (inches beside and below the seeds).

Vitazyme application: A starter treatment of 13 oz/acre was applied on the bean seeds at planting for Treatment 4, and with Na-churs Alpine 6-24-6 starter fertilizer for Treatment 5.

Weed control and pesticides: Warrior, Basagran, Reflex, and Ronilan

Growth results:

A close-up of the roots from the other photo dramatizes how greatly Vitazyme can enhance rhizosphere activity, manifested by a much greater root mass.

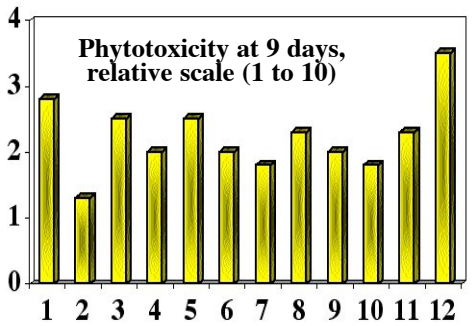
Only the 7-17-3 starter fertilizer, applied on the seeds at planting, caused a significantly higher degree of seedling toxicity at 9 days than some of the other treatments.

There were no significant differences amongst the 12 treatments in the phytotoxicity ratings at 28 days after planting.

Days to Emergence

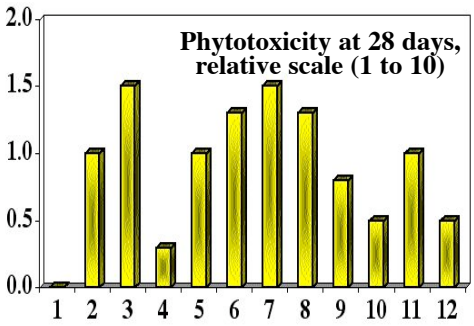
All treatments emerged 7 days after planting, so there was no visible effect of any product on germination and emergence time. The data therefore is not included here.

Phytotoxicity of Products at 9 Days



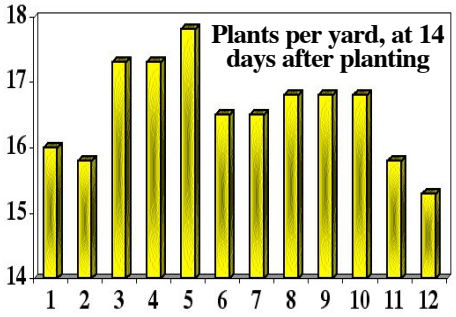
*The rating scale is 1 = a plant in full health, and 10 = a dead plant. Plant traits noted were leaf discoloration and mottling, and plant vigor and mortality. Means followed by the same letter are not significantly different at P=0.05 (Bartlett's Test). LSD (0.05)=1.52.

Phytotoxicity of Products at 28 Days



*The rating scale is 1 = a plant in full health, and 10 = a dead plant. Plant traits noted were leaf discoloration and mottling, and plant vigor and mortality. Means followed by the same letter are not significantly different at P=0.05 (Bartlett's Test). LSD (0.05)=1.54.

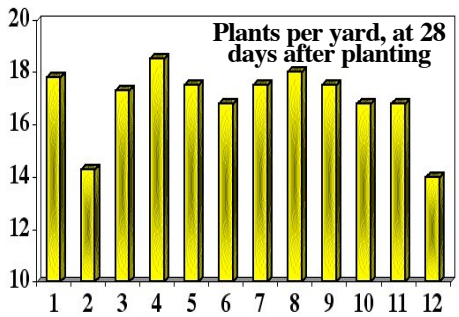
Stand Count At 14 Days



*The number of plants per yard was counted at 14 days after planting, giving a measure of germination percentage. Means followed by the same letter are not significantly different at P=0.05 (Bartlett's Test). LSD (0.05)=2.16.

Vitazyme + Na-churs Alpine 6-24-6 starter fertilizer (Treatment 5) significantly increased seed germination and plant stand at 14 days after planting, whereas the 7-17-3 fertilizer applied to the row significantly reduced the germination rate and plant stand.

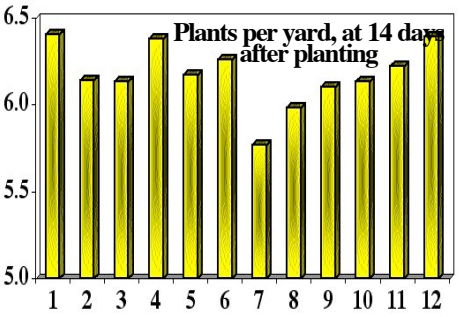
Stand Count At 28 Days



*The number of plants per yard was counted at 14 days after planting, giving a measure of germination percentage. Means followed by the same letter are not significantly different at P=0.05 (Bartlett's Test). LSD (0.05)=3.76.

The Vitazyme treatment (Treatment 4) gave the highest plant count at 28 days after planting; this value was significantly greater than the control (water only in-furrow) and the 7-17-3 (RiseR, Treatment 12). Thus, Vitazyme helped save plants while the 7-17-3 in-furrow reduced their numbers.

Plant Height At 28 Days



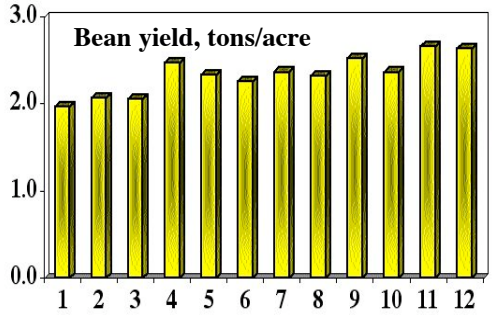
*A measurement of plant height by pulling the youngest trifoliate straight up and measuring the full height. Means followed by the same letter are not significantly different at P=0.05 (Bartlett's Test). LSD (0.05)=0.88 cm.

The untreated control produced plants as tall as any other treatment, but there was no significant difference among all 12 treatments. The Stimulate treatment (Treatment 7) produced the shortest plants.

Bean yield At 60 Days

Treatment	Bean yield*	Change
	tons/acre	tons/acre
1. Untreated	1.96 e	——
2. Untreated+H_2O(i-f)	2.07 de	+0.11 (+6%)
3. Untreated+H_2O(2x2)	2.05 de	+0.09 (+5%)
4. Vitazyme	2.47 abc	+0.51 (+26%)
5. Vitazyme + 6-24-6	2.33 bc	+0.37 (+19%)
6. 6-24-6	2.25 cd	+0.29 (+15%)
7. Stimulate	2.36 bc	+0.40 (+20%)
8. Stimulate + 9-18-3	2.32 bc	+0.36 (+18%)
9. 9-18-3	2.52 ab	+0.56 (+29%)
10. Fertiactyl GZ	2.36 bc	+0.40 (+20%)
11. 10-34-0	2.65 a	+0.69 (+35%)
12. 7-17-3	2.63 a	+0.67 (+34%)

*30 feet of the inside two rows of each plot were harvested with a single-row harvester. Means followed by the same letter are not significantly different at P=0.05 (Bartlett's Test). LSD (0.05)=0.23 ton/acre.



The two highest yielding treatments were commercial fertilizers (Treatments 9, 11, and 12), but these yields were not significantly greater than the yield with Vitazyme alone (Treatment 4).

Yield results: The beans were harvested on August 12, 2003

Conclusions of growth and yield analysis: Snap bean growth, stand count, and phytotoxicity were not closely related with final bean yield, though in some cases there were significant differences noted for various treatments. Yield responses were significantly highest and the same for three fertilizer treatments and for Vitazyme alone (26 to 35%). Vitazyme plus Na-churs Alpine 6-24-6 did not outyield Vitazyme alone. The lowest yield increase was for Na-churs Alpine 6-24-6 alone in-furrow. It is apparent from this study that Vitazyme, applied once to the seeds at planting, was able to make nutrients more available through enhanced rhizosphere activity in spite of no added fertilizers in this moderately fertile soil.

Income analysis: The price per ton of snap beans was determined by making a size analysis of the beans (67.5% of sieve size 1 to 4, and 32.5% of sieve size 5), and weighting the value of those bean sizes. The value of the beans was $136.94/ton. This income analysis reveals that Vitazyme alone produced an income increase higher than any treatment except the nutrient applications of Treatments 11 and 12 (10-34-0 and 7-17-3). The low cost and high yield response of Vitazyme contributed to this excellent result.

Treatment	Yield	Product cost	Yield increase	Increase in value	Net increase
	tons/acre	$/acre	tons/acre	$/acre	$/acre
1. Untreated 2. Untreated + H_2O (i-f) 3. Untreated + H_2O (2x2)	2.03	0	——	——	——
4. Vitazyme	2.47	4.57	0.44	60.25	55.68
5. Vitazyme + 6-24-6	2.33	10.66	0.30	41.08	30.42
6. 6-24-6	2.25	7.20	0.22	30.13	22.93
7. Stimulate	2.36	5.00	0.33	45.19	42.83
8. Stimulate + 9-18-3	2.32	18.75	0.29	39.71	37.39
9. 9-18-3	2.52	12.50	0.49	67.10	54.60
10. Fertactyl GZ	2.36	10.61	0.33	45.19	34.58
11. 10-34-0	2.65	4.71	0.62	84.90	80.19
12. 7-17-3	2.63	20.63	0.60	82.16	61.53

· Bean yield increase with Vitazyme: 26%

· Income increase with Vitazyme: $55.68/acre

Snap Beans

New York Crop Research Facility – A.C.D.S. Research

Location: Byron, New York *Variety*: Histyle *Row spacing*: 30 inches
Soil type: Galen very fine sandy loam (pH 6.6, CEC 10.0, P 67 ppm, K 126 ppm, Mg 226 ppm, Ca 1,553 ppm)
Seeding rate: unknown (drilled) *Tillage*: conventional *Planting date*: June 28, 2003
Experimental design: A snap bean field was used to evaluate the effect of Vitazyme on top of standard fertilization to increase bean yield. A strip 10 feet x 160 feet (four rows wide) was treated with Vitazyme, with an adjoining strip used as the untreated control. Plant height was measured at 28 days after planting, and bean yield and size were determined at harvest.

1. Control **2. Vitazyme**

Fertilization: Both the Vitazyme and control treatments received 300 lb/acre of a 15-15-15 N-P_2O_5-K_2O fertilizer sidedressed.
Vitazyme application: (1) 13 oz/acre on the seeds at planting (2) 13 oz/acre on the leaves and soil shortly before bloom
Weed/fungus control: Warrior, Basagran, Reflex, and Poast
Growth results: At 28 days after planting, the height of 15 plants was measured for both treatments to give a measure of early plant vigor.
Yield results: The plots were harvested at about 60 days with a one-row bean harvester. One-hundred sixty feet of the two inside rows were harvested and evaluated.
Bean size results: The beans were sized at a local vegetable processing plant into larger beans (5 sieve size) and smaller beans (1 to 4 sieve size), and the percentages of each were calculated.
Income results: An average value of the beans was determined using the sizes and was calculated as $136.94/ton.

Increased crop value with Vitazyme: 0.17 ton/acre x $136.94/ton = $23.28/acre
Vitazyme cost: $4.57/13 oz x 2= $9.14/acre

Net increase: $23.28 – $9.14 = $14.14/acre

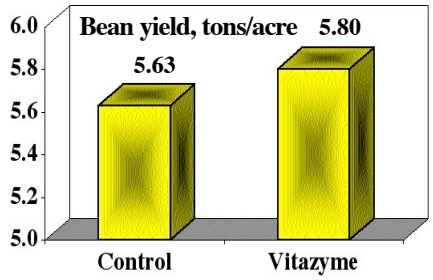
Conclusions: In this non-replicated snap bean field study, Vitazyme applied at planting and again at pre-bloom boosted yield by 3% resulted in a $14.14/acre income increase. The plants were a bit taller and the beans a bit larger as well with Vitazyme use. Using a starter fertilizer along with Vitazyme would likely have led to an improved response in this moderately fertile soil.

Plant Height At 28 Days

Treatment	Plant height	Change
	in	in
1. Control	7.53	——
2. Vitazyme	7.60	+0.07

Vitazyme caused a slight increase in plant height versus the control treatment.

Snap Bean Yield



A 3% yield increase resulted from Vitazyme application.

Bean Size

Treatment	5 sieve size	1 to 4 sieve size
	%	%
1. Control	31	69
2. Vitazyme	33	67

The beans receiving the Vitazyme treatments were a bit larger, on average, than those of the control.

· Yield increase with Vitazyme: 3%

Soybeans (Fertility Levels)

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Planting rate: 10 seeds/pot, thinned to 3 plants/pot
Soil type: Bowie very fine sandy loam
Experimental design: A greenhouse pot study was established with soybeans using three fertilizer levels and Vitazyme to evaluate effects of both variables and possible interactions. Greenhouse conditions were about 55° to 80° F throughout the study, and watering was on-demand. Five replicates were used, and the arrangement was a complete block design. Each pot represented $5x10^{-6}$ acre, and treatments were as shown in the table on the right.
Fertilization: The 100% rate was 1.17 gram/pot of a 13-13-13% N-P_2O_5-K_2O granular fertilizer, which also contained other elements (0.65% Mg, 6.0% S, 0.02% B, 0.0006% Co, 0.06% Cu, 1.40% Fe, 0.06% Mn, 0.0006% Mo, and 0.06 % Zn). This rate was equivalent to 50 lb/acre of actual N and was incorporated into the soil surface. The 50% rate of fertilizer was 0.58 grams/pot, giving 25 lb/acre of N, a common rate of starter for soybeans.
Vitazyme application: Treatments 2, 4, and 6 received a soil application of 100 ml of a 0.01% Vitazyme solution after planting to the soil of the pot surfaces. This was equivalent to 2 liters/hectare, or about 25 oz/acre.
Harvest date: On February 19, 2003, 52 days after planting, the plants were measured for height, the pods per pot were counted, and the soil was washed from the roots. Each set of three plants per pot was dried in a drying oven at about 115°F and weighed to the nearest 0.01 gram.
Growth results: In all of these analysis, performed using CoHort software, the fertilizer levels were the main plots and the Vitazyme levels were the sub-plots.

Variety: unknown
Pot size: 1 gallon
Planting date: December 30, 2002

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

Plant Height

Treatment	Plant height*	Change
order of response	cm	cm
5	53.2 a	18.6 (+54%)
6	51.6 ab	17.0 (+49%)
4	48.7 bc	14.1 (+41%)
3	45.2 c	10.6 (+31%)
2	36.1 d	1.5 (+4%)
1	34.6 d	——

*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test. $LSD_{0.1}$=2.4 cm.

Fertilizer effects

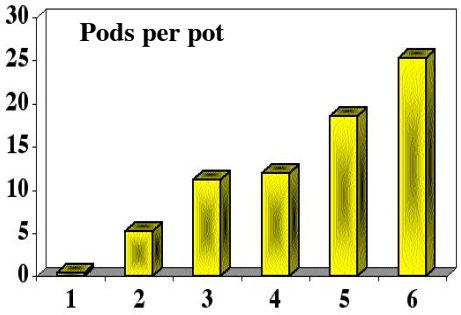
Fertilizer level	Plant height*	Change
	cm	cm
100%	52.4 a	17.1 (+48%)
50%	47.0 b	11.7 (+33%)
0%	35.3 c	—

*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test. $LSD_{0.1}$=1.5 cm.

Vitazyme effects were small but not significant for plant height changes. Fertilizer increased plant height significantly at both levels, the biggest increment being at the 50% level which caused a 33% increase above the control.

With no N, soybeans responded by producing 10% more dry weight with Vitazyme, but many more pods.

Pod Number



Treatment	Plant height*	Change
order of response	cm	cm
6	25.2 a	24.8 (+6,200%)
5	18.6 b	18.2 (+4,550%)
4	12.0 c	11.6 (+2,900%)
3	11.2 c	10.8 (+2,700%)
2	5.2 d	4.8 (+1,200 %)
1	0.4 e	—

*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test. $LSD_{0.1}$=3.6.

Dry weight responses to Vitazyme at 33% N were about the same as the control, but more pods were produced.

Fertilizer effects

Fertilizer level	Pods*	Change
	number	number
100%	21.9 a	19.1 (+682%)
50%	11.6 b	8.8 (+314%)
0%	2.8 c	—

*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test. $LSD_{0.1}$=2.2.

Vitazyme effects

Vitazyme level	Pods*	Change
	number	number
Added	14.1 a	4.0 (+40%)
None	10.2 b	—

*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test. $LSD_{0.1}$=3.7.

Again, as for the other N levels, the 67% N rate caused more pods to be produced, showing Vitazyme's capability to enhance bean yield.

Fertilizer levels increased the number of pods developed in a fairly straight-line fashion, the 50% level increasing pods by 314% 52 days after planting and the 100% level increasing pods by 682%. Vitazyme increased pods by 40% – from 10.1 for the control to 14.1 pods per pot for the Vitazyme treatment. **The interaction between fertilizer and Vitazyme was significant at P=0.09, showing that Vitazyme assisted plants in the utilization of fertilizer nutrients.** Even with no added fertilizer, Vitazyme noticeably improved pod formation, but the improvement was especially notable at the 100% fertilizer level, where pods per pot jumped significantly (P=0.10) from 18.2 to 24.8 pods per plant.

Conclusions: This greenhouse study with soybeans proves that fertilizer addition to an infertile soil will increase the growth rate and dry matter accumulation, thus enhancing the degree of pod function earlier in the life cycle of the plant. Vitazyme has been shown in this study to interact favorably with fertilizer. While plant height and dry matter accumulation were not significantly enhanced by Vitazyme, the degree of pod formation was accelerated by 40% compared to the untreated plants across all three fertility levels. These results illustrate the effect of Vitazyme to enhance chlorophyll, photosynthesis, and rhizosphere microorganism development which make more nutrients available while stimulating the physiological development of the plants as shown by earlier and more prolific pod formation. Presumably, this fruiting enhancement would lead to greater bean yields if the plants were carried to maturity.

Also noticed during this study was the fact that the pods of the Vitazyme treated plants were larger than those of the untreated control plants at each fertilizer level. This effect on seed development could affect ultimate bean yield by producing more beans per pod and larger beans.

Dry Weight

Treatment	Plant weight*	Change
order of response	grams	grams
5	10.80 a	5.74 (+113%)
6	10.55 a	5.49 (+108%)
3	9.01 a	3.95 (+78%)
4	8.92 a	3.86 (+76%)
2	5.58 b	0.52 (+10%)
1	5.06 b	—

*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test. $LSD_{0.1}$=1.17 grams.

Fertilizer effects

Fertilizer level	Dry weight*	Change
	grams	grams
100%	10.68	5.35 (101%)
50%	8.96	3.64 (+68%)
0%	5.32	—

*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test. $LSD_{0.1}$=0.85 grams.

Vitazyme dry weight effects were small and not significant, so that data is not presented here. Fertilizer effects on dry weight of the soybean plants was essentially in a straight-line relationship.

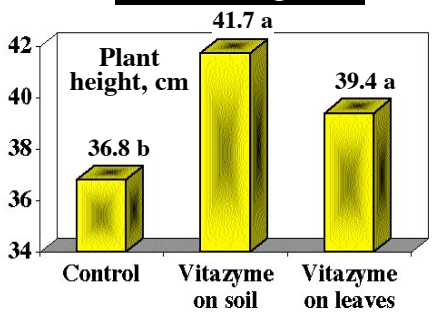
Soybeans (Foliar vs. Soil Application)

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: unknown *Planting rate*: 10 seeds/pot thinned to 3 plants/pot
Soil type: Bowie very fine sandy loam *Planting date*: March 13, 2003 *Pot size*: 1 gallon
Experimental design: A greenhouse study was established to discover the relative effect of soil versus foliar application of Vitazyme on soybean growth. Ten replicates were established for each treatment in a complete block design. Temperatures were maintained at 55° to 80°F during the study with no artificial light.

1. Control 2. Vitazyme on the soil 3. Vitazyme on the leaves

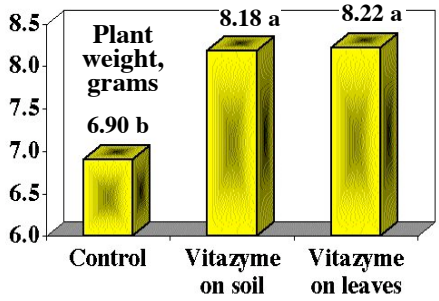
Fertilization: All plants were given 0.5 g/pot at planting of a pelleted 21-7-12% N-P_2O_5-K_2O, slow release fertilizer. This fertilizer gave an effective rate of 46 lb/acre of N, applied to the soil surface as a starter.
Vitazyme application: Vitazyme was applied to the soil surface only of Treatment 2 on March 27 when the first true leaves were fully expanded. It was also applied (a spray of a 1% solution) to the leaves of the plants of Treatment 3 on March 27; most of the spray beaded on the cotyledons and in the midrib of the undersides of the leaves. Care was taken to avoid applying any product to the soil surface.
Harvest date: April 23, 2003, 41 days after planting
Harvest results: The soybean roots were washed free of soil, and the heights were measured. Then all plants were dried at about 115°F for one day, and weighed to the nearest 0.01 gram.

Plant Height*



*Means followed by the same letter are not significantly different at P=0.10 according to the Tukey-Kramer Test. $LSD_{0.1}$=1.8 cm.

Plant Dry Weight*



*Means followed by the same letter are not significantly different at P=0.1 according to the Tukey-Kramer Test. $LSD_{0.1}$=0.69 grams.

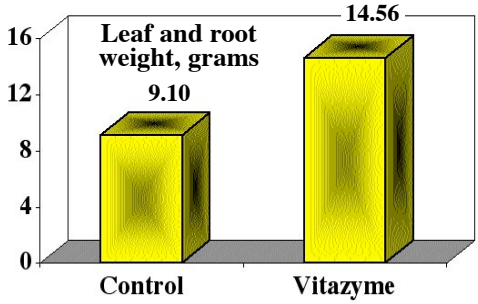
Conclusions: Vitazyme applied to soybeans on either the foliage or soil in this greenhouse study showed a remarkably similar response for both methods. Both increases in dry matter accumulation were 19% above the control and were highly significant. The increase in plant height was also highly significant for both soil and foliar applications of Vitazyme. It is concluded from this study that **either soil or foliar applied Vitazyme are equally effective in stimulating carbon fixation and plant growth of soybeans.** This study has given results similar to a parallel study on corn using soil or foliar applied product.

· Plant height increase (soil applied): 13% · Dry weight increase (soil applied): 19%

St. Augustine Grass

The Vitazyme treated St. Augustine cores are more growthy, and have better root penetration, shown by more soil clinging to the roots.

Leaf And Root Weight



Location: L.D.S. Church, Longview, Texas *Variety*: St. Augustine (sod)
Soil type: laid on the previous sod *Sodding date*: October 10, 2002
Experimental design: While sod was being laid on a 15-foot-wide grass island between a street and a parking lot, the new sod for a 30-foot section was treated with Vitazyme on both the roots and tops.

1. Control 2. Vitazyme

Fertilization: none during the test period
Vitazyme treatments : A 1% Vitazyme solution was sprayed on the roots before the sod was laid on a 15x30 foot section, and then the same solution was sprayed on the new sod surface of the same area. No further applications were made.
Irrigation: erratic and insufficient for good growth
Growth results: On October 1, 2003, nearly a year after the initial sod applications, three 3-inch square plugs (9 square inches total area for each plug) were cut from the grass randomly on each side of the treatment boundary. The plugs were then washed free of all soil, the grass and roots were combined for the three plugs of each treatment and dried at 125° F in a drying oven for 24 hours. The grass was then weighed to the nearest hundredth of a gram.
Conclusions: This trial with St. Augustine sod laid in a grass island in Longview, Texas, proved that Vitazyme increased the grass growth considerably in spite of difficult growing conditions. The sod was laid on the previous grass with no tillage of the bed, erratic water scheduling, and no application of fertilizers. In spite of these obstacles, Vitazyme increased the growth of the grass by 60% above the control, showing that the activity of its active agents is powerful even under stressful conditions.

· Increase in leaf and root growth: 60%

Strawberries

Research organization: Hulst Research Farm Services, Inc., Hughson, California *Variety*: Seascape *Soil type*: unknown
Experimental design: A field area divided into eight plots 5 by 25 feet, in a randomized complete block design, was established to investigate the effects of Vitazyme and an untreated control on the yield and quality of strawberries. Four replicates were used.

1. Control **2. Vitazyme**

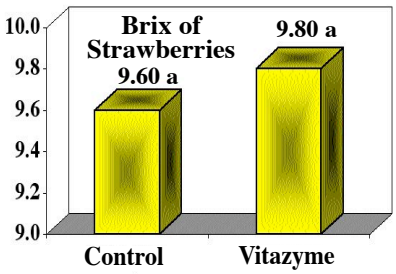
Fertilization: unknown
Vitazyme treatments: Vitazyme was applied at 13 oz/acre over the leaves and soil of the appropriate plots on April 29, May 13, and May 27, 2003. A CO_2-charged backpack sprayer was used with a 5-foot boom and three TeeJet 8003 flat fan nozzles, at 30 psi and 50 gallons/acre.
Weather: Weather during this study turned exceptionally hot, effectively stopping fruit set by late May. Four days in the mid-90s during the third week of May slowed fruit set, and three days in the high 90s during the last week of May ended fruit set. Then a 100°F temperature on June 3 was followed by lower temperatures in the mid-80s for two weeks. This cooler weather initiated flowering and fruit set again so a final berry weight was taken on June 11. According to the researchers, **"Since all six berry weight events favored Vitazyme, a late spring with 'regular' temperatures could have resulted in lower variability across the trial, and samples taken on a weekly basis in such a case should result in greater measurable differences."**
Yield and quality, and plant results: Berry weights were taken on May 13, 16, 20, 23, 27, and June 13, 2003. All marketable fruit was included in the totals, defined as berries having at least 50% red color, less all culls (those that were rotted, bird damaged, or insect damaged). At the final harvest on June 13 the degree of brix was determined on ten berries from each plot, using a Bausch and Lomb refractometer. On June 17, plants (with roots) from each plot were harvested and divided into tops and roots. Analysis of Variance was calculated for all data using P = 0.10 as the level of significance.

Harvested Berry Weights*

Treatment	May 13	May 16	May 20	May 23	May 27	June 11	Total**
	grams						
Control	900.0 a	305.0 b	185.0 b	66.8 a	33.0 a	1,340.0 a	2,829.8 a
Vitazyme	1,005.0 a	380.0 a	262.0 a	91.0 a	65.2 a	1,480.0 a	3,283.2 a
Change	105.0 (+12%)	75.0 (+25%)	77.0 (+42%)	24.2 (+36%)	32.2 (+98%)	140.0 (+10%)	453.4 (+16%)
$LSD_{0.10}$	325.3	67.4	64.1	27.3	69.3	644.4	499.7

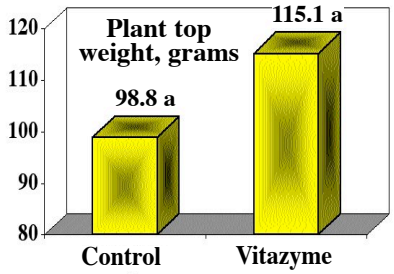
*Treatment means are not significantly different at P=0.10 if letters are the same, according to the Tukey-Kramer Test.
**This difference is significant at P=0.11, a level at which considerable confidence may be placed.

Fruit Brix Value*

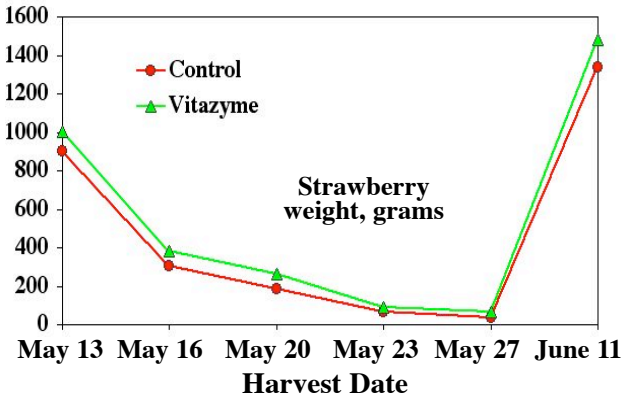


*Means followed by the same letter are not significantly different according to the LSD. $LSD_{0.10}$=0.75.

Plant Top Weight*



*Means followed by the same letter are not significantly different according to the LSD. $LSD_{0.10}$=24.1 grams.

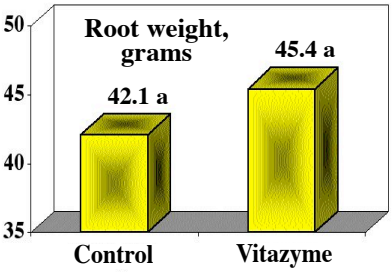


Conclusions: This replicated strawberry trial in California proved that Vitazyme, applied to the leaves and soil, is capable of increasing the growth, yield, and quality of strawberries. In particular, the following points are emphasized:

- **Harvested berry weight was increased 16%. The report said, "While this difference is not significant at the 0.10 level of significance, it would be significant at approximately the 0.11 level."**
- **Fruit brix was elevated by 0.2 unit, meaning the fruit was somewhat sweeter.**
- **Top growth of the plants was increased by 16%.**
- **Root growth of the plants was increased by 8%.**

Vitazyme can assist strawberry growers to increase yields and quality to a substantial degree, and to increase income as well. According to the researcher, **"Even though the combined sample weights of the Vitazyme plots weren't statistically superior to those of the untreated control [though the trial was significant at P=0.11], farmers would use any product resulting in a 16% increase in yield."**

Plant Root Weight*



*Means followed by the same letter are not significantly different according to the LSD. $LSD_{0.10}$=9.3 grams.

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Income projections:

Typical returns in California coastal areas, assuming a 12 ton/acre crop, with the harvest spread evenly throughout the growing season

No Vitazyme

Season and market	Production*	Price**	Total income
	lb/acre	$/lb	$/acre
Early-season fresh	8,000	1.25	10,000
Mid-season fresh	8,000	0.84	6,720
Late-season fresh	8,000	0.28	2,240
		Total	18,960

*Assuming the production is relatively uniform throughout the year.
**Early-season fresh: $10.00/8 lb flat; mid-season fresh: $6.75/8 lb flat; Late-season fresh: $0.28/lb.

Plus Vitazyme

Season and market	Production*	Price**	Total income
	lb/acre	$/lb	$/acre
Early-season fresh	9,280	1.25	11,600.00
Mid-season fresh	9,280	0.84	7,795.20
Late-season fresh	9,280	0.28	2,598.40
		Total	21,993.60

*Assuming the production is relatively uniform throughout the year. Production is based on yields obtained by Hulst Research in 2003, which showed a 16% yield increase.
**Early-season fresh: $10.00/8 lb flat; mid-season fresh: $6.75/8 lb flat; Late-season fresh: $0.28/lb.

· Increase with Vitazyme: $3,033.60/acre

Typical returns in the northern San Joaquin Valley, assuming a 4.5 ton/acre crop, with the harvest spread evenly over the growing season

No Vitazyme

Season and market	Production*	Price**	Total income
	lb/acre	$/lb	$/acre
Early-season fresh	3,000	1.25	3,750
Mid-season fresh	3,000	0.84	2,520
Late-season fresh	3,000	0.28	840
		Total	7,110

*Assuming the production is relatively uniform throughout the year.
**Early-season fresh: $10.00/8 lb flat; mid-season fresh: $6.75/8 lb flat; Late-season fresh: $0.28/lb.

Plus Vitazyme

Season and market	Production*	Price**	Total income
	lb/acre	$/lb	$/acre
Early-season fresh	3,480	1.25	4,350.00
Mid-season fresh	3,480	0.84	2,923.20
Late-season fresh	3,480	0.28	974.40
		Total	8,247.60

*Assuming the production is relatively uniform throughout the year. Production is based on yields obtained by Hulst Research in 2003, which showed a 16% yield increase.
**Early-season fresh: $10.00/8 lb flat; mid-season fresh: $6.75/8 lb flat; Late-season fresh: $0.28/lb.

· Increase with Vitazyme: $1,137.60/acre

· Increase in total berry weight: 16%

· Increase in Brix units: 0.2 units

· Increase in plant top weight: 16%

· Increase in plant root weight: 8%

Sweet Potatoes

Ministry of Agriculture, Soils Institute — Republic of Cuba

Research organization: Republic of Cuba, Ministry of Agriculture, Soils Institute, Central Registry of Fertilizers *Variety*: CEMSA 78-354

Location: Experimental Station "La Renee", Quivican, Havana Province, Cuba

Soil analysis: near neutral pH, 2.5% organic matter, 32 mg/100 g P_2O_5, 35 mg/100g K_2O *Soil type*: rhodic ferralsol

Row spacing: 1.6 meters *Planting date*: April 3, 2003

Experimental design: The objective of this study was to evaluate the effect of Vitazyme on the yield and quality of sweet potatoes in Cuba. Four treatments were utilized in this study that evaluated Vitazyme's ability to make fertilizers more available. Several replicates were made using plots that were 50 meters long, having five rows per plot. Statistical analysis were made using Duncan's Multiple Range Test.

1. **100% fertilizer only**
2. **100% fertilizer plus Vitazyme**
3. **75% fertilizer plus Vitazyme**
4. **50% fertilizer plus Vitazyme**

Fertilization: The 100% fertilizer rate received 100 kg/ha N, 45 kg/ha P_2O_5, and 75 kg/ha K_2O as a "complete formula" and urea. This is the "optimum economic dosage" for chemical fertilization according to the Cultivation Technical Institute.

Vitazyme application: (1) Sweet potato plants were submerged in a 1% solution at planting; (2) Vitazyme was sprayed on the leaves and soil at 1 l/ha at 25 days; (3) Vitazyme was sprayed on the leaves and soil at 50 days.

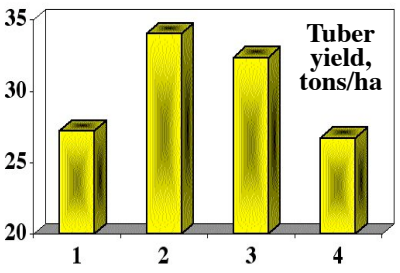
Irrigation: according to the Technical Instructive for Cultivation

Harvest date: September 8, 2003, just over 5 months after planting

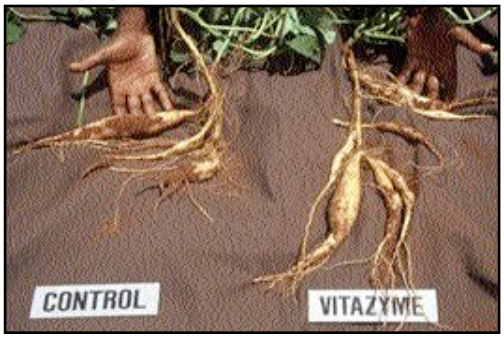
Sweet Potato Yield

Treatment	Tuber yield*	Change
	------- tons/ha -------	
1 (100% fertilizer)	27.20 b	——
2 100% fert. + Vita.)	34.00 a	+6.80 (+25%)
3 (75% fert. + Vita.)	32.33 a	+5.13 (+19%)
4 (50% fert. + Vita.)	26.73 b	–0.47 (–2%)

*Means followed by the same letter are not significantly different according to Duncan's Multiple Range Test (P=0.10). Standard error=1.11 tons/ha.



Yield results: Vitazyme significantly increased tuber yield above the 100% fertilizer control at both 100% fertilizer (+25%) and 75% fertilizer levels (+19%). It is also highly interesting to note that only 50% of the recommended fertilizer plus Vitazyme produced a statistically equal yield to the 100% fertilizer control.

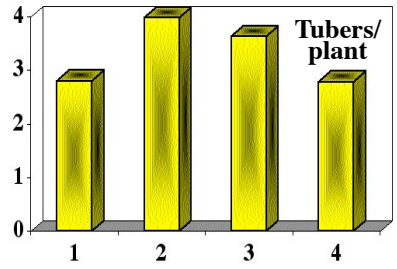


These Cuban sweet potato samples show the marked advantage for rooting and tuber development that Vitazyme provides.

Sweet Potato Number

Treatment	Tubers per plant	Change
	number of tubers	
1 (100% fertilizer)	2.80 b	——
2 100% fert. + Vita.)	3.98 a	+1.18 (+42%)
3 (75% fert. + Vita.)	3.63 a	+0.83 (+30%)
4 (50% fert. + Vita.)	2.78 b	–0.02 (–1%)

*Means followed by the same letter are not significantly different according to Duncan's Multiple Range Test (P=0.10). Standard error=0.21 tubers/plant.



Tuber number values closely parallel the yield values but are even more dramatic. Vitazyme plus 100% fertilizer greatly increased tuber set (+42%), as it did at 75% fertilizer (+30%). At 50% fertilizer the tuber number was nearly identical with the 100% fertilizer untreated control.

Quality results: Although Vitazyme increased the dry matter and starch contents slightly in all three treatments, the increase was not significant.

Economic results: The following formula was used in computing the economic value of using Vitazyme in Treatment 3 (with 75% fertilizer):

Economic effect = (Value, Trt. 3 – Cost, Trt. 3) – (Value, Trt. 1 – Cost, Trt. 1)

Value of sweet potatoes: ..... 264 Ps/ton
Costs: Fertilizer (mixed) ..... 250 Ps/ton
Urea ..... 273 Ps/ton
Vitazyme ..... 30 Ps/gallon
Vitazyme application ..... 148 Ps/Cab

Tuber Dry Matter and Starch Content

Treatment	Dry matter*	Change	Starch**	Change
	% of tubers		% of tubers	
1 (100% fertilizer)	29.25 a	——	22.33 a	——
2 100% fert. + Vita.)	30.30 a	+1.05 (+4%)	22.21 a	–0.12 (–1%)
3 (75% fert. + Vita.)	30.35 a	+1.10 (+4%)	23.42 a	+1.09 (+5%)
4 (50% fert. + Vita.)	30.40 a	+1.15 (+4%)	23.55 a	+1.22 (+5%)

*Means followed by the same letter are not significantly different according to Duncan's Multiple Range Test (P=0.10). Standard error=0.95% dry matter in the tubers.
*Means followed by the same letter are not significantly different according to Duncan's Multiple Range Test (P=0.10). Standard error=0.87% starch in the tubers.

Economic effect = 8,535–1,490–234–148) – (7,181–1,986) = 1,468 Ps/cab = 109 Ps/ha

Conclusions: According to the researchers, **"It is proposed that Vitazyme, which is a biostimulant synthesized from vegetable matter, intensifies the activity of the soil-plant system, which makes possible an increase in photosynthesis so that more carbon becomes affixed to the texture of the plant."**

"Besides the noted Vitazyme economic residual effect, the beneficial residual effect of Vitazyme upon the physical and biological properties of the soil must be included, even though it was not evaluated in this trial."

1. "The application of the biostimulant Vitazyme plus 75% dosage of the recommended chemical fertilizer for this type of soil and cultivation allows for a significant and economical increase of the agriculture yield of sweet potatoes in comparison with the application of a 100% dosage. Nevertheless, with the application of Vitazyme similar yield results are achieved as the control treatment with only 50% chemical fertilizing."
2. "The combined use of the biostimulant Vitazyme, plus a dosage of 50 to 100% of the recommended chemical fertilizer, did not affect the quality (percentage of dry matter and starch) of the sweet potato."

· Yield increase, 100% fertilizer: 25% · Tuber number increase, 100% fertilizer: 42%

· Yield increase, 75% fertilizer: 19% · Tuber number increase, 75% fertilizer: 30%

· Income increase with Vitazyme: 109 Pesos/ha

Tomatoes

Research Institute of Tropical Agriculture Fundamentals

Research organization: Research Institute of Tropical Agriculture Fundamentals [INIFAT]
Location: Santiago de las Vegas, City of Havana Province, Cuba *Variety*: INIFAT-28, a salad tomato
Soil type: red ferralitic *Transplanting date*: February 25, 2003 *Previous crop*: unknown
Experimental design: This study was designed to evaluate the effectiveness of Vitazyme to enhance tomato growth and yield. Six parcels of land on the INIFAT research station, each 50 m^2, were marked out in a pattern as shown here. Two treatments were applied, Vitazyme and an untreated control, with three replicates. Each plot received 100 tomato transplants. The data were analyzed using Analysis of Variance and Duncan's Multiple Range Test.

Control	Vitazyme	Control
Buffer	Buffer plot	Buffer plot
Vitazyme	Control	Vitazyme

1. Control 2. Vitazyme

Continued on the next page

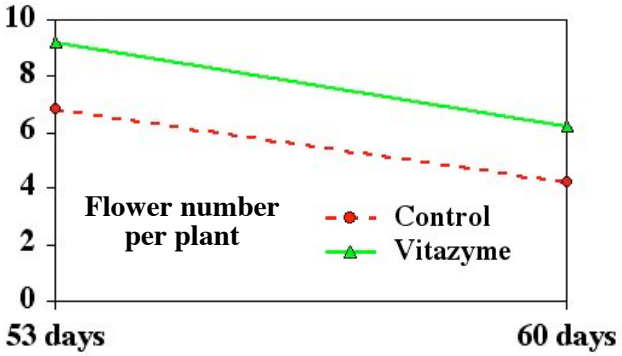
Fertilizer treatments: standard for the institute
Vitazyme treatments: **Seedlings:** For the Vitazyme plots the seedlings were inserted for 10 minutes in a jar containing 60 ml in 10 l of water (a 0.6% solution) before planting.
Field: A hand sprayer containing 50 ml of Vitazyme in 500 ml of water (a 1% solution) was used to apply to the leaves of the plants on March 12 (15 days after planting). A second application was made by sprayer on April 1, 34 days after planting.
Flower and fruit results: Flowers and fruits were counted on 50 plants from each plot on April 19 (53 days after planting) and April 26 (60 days after planting). These 150 plants for each treatment were then averaged to a per plant basis.

Flower Number Per Plant

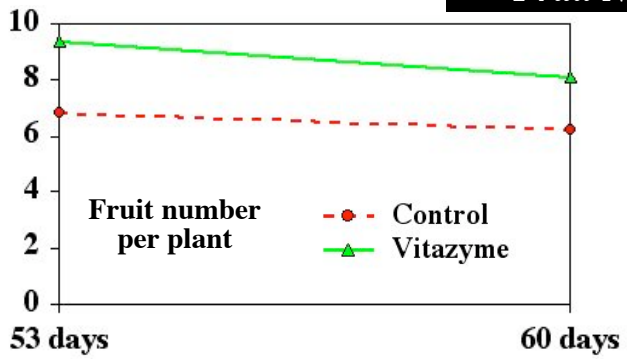
Treatment	At 53 days		At 60 days	
	Flowers*	Change	Flowers*	Change
	number			
Control	6.8 b	—	4.2 b	—
Vitazyme	9.2 a	2.4 (+35%)	6.2 a	2.0 (+ 48%)

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

Vitazyme greatly enhanced the degree of flowering of treated plants versus untreated controls.



Fruit Number Per Plant



Treatment	At 53 days		At 60 days	
	Fruit*	Change	Fruit*	Change
	number			
Control	6.8 b	—	6.2 b	—
Vitazyme	9.4 a	2.6 (+38%)	8.1 a	1.9 (+31%)

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

Vitazyme caused the treated tomato plants set about a third more fruit than the untreated controls.

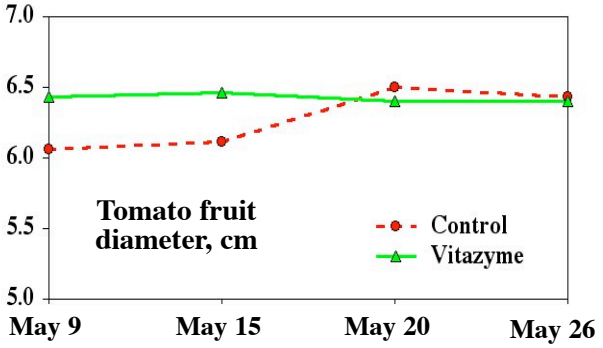
Yield and fruit results: Tomato fruit were harvested on May 9, May 15, May 20, and May 26, which were 73, 79, 84, and 90 days after planting, respectively. Each value represents an average from 100 plants for each plot.

Fruit Diameter

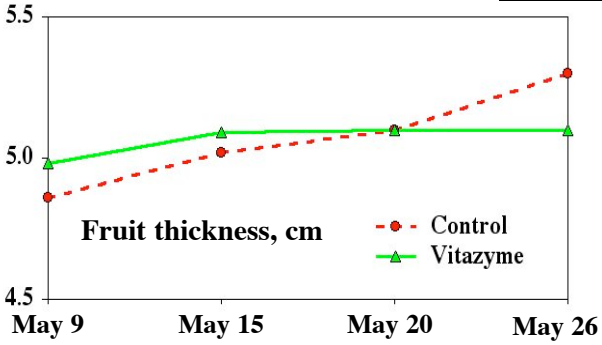
Treatment	May 9*	May 15*	May 20*	May 26*	Total
	fruit diameter, cm				
Control	6.06 b	6.11 b	6.50 a	6.43 a	6.27
Vitazyme	6.43 a	6.46 a	6.40 a	6.40 a	6.42 (+2%)

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

The tomato fruit were significantly larger for the May 9 and 15 harvests, but not for the May 20 and 26 harvests. The overall size of the fruit was, on average, larger with Vitazyme.



Fruit Height (Thickness)



Treatment	May 9*	May 15*	May 20*	May 26*	Total
	fruit height, cm				
Control	4.86 a	5.02 a	5.10 a	5.30 a	5.06
Vitazyme	4.98 a	5.09 a	5.10 a	5.10 a	5.06

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

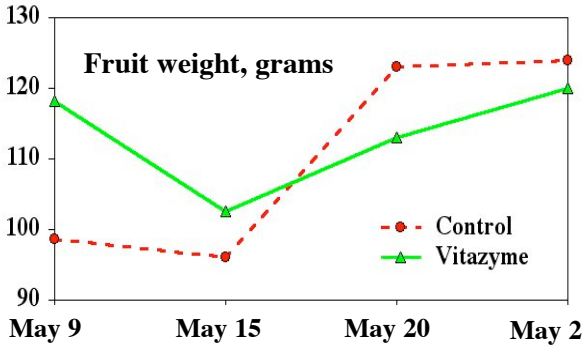
The height or thickness of the fruit did not differ greatly throughout the trial, being somewhat greater for Vitazyme at the beginning and a bit greater for the control at the end ... in line with the diameter changes.

Fruit Weight

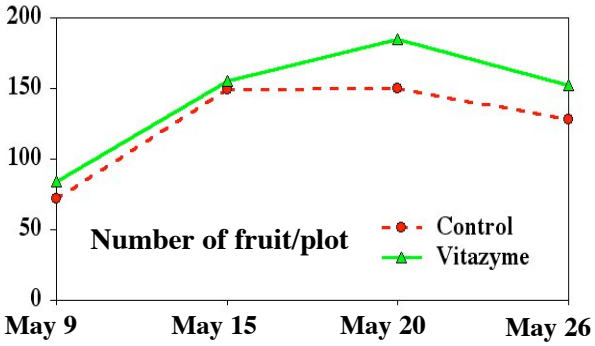
Treatment	May 9*	May 15*	May 20*	May 26*	Total
			fruit weight, grams		
Control	98.6 b	96.1 b	123.0 a	124.0 a	110.4
Vitazyme	118.2 a	102.6 a	113.0 b	120.0 a	113.4 (+3%)

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

The Vitazyme treated fruit were significantly heavier for the first two harvests, but the control significantly outweighed the Vitazyme treatment on May 20. On May 26, fruit from the two treatments were statistically equal, but overall weight favored Vitazyme by 3%.



Fruit Per Plot



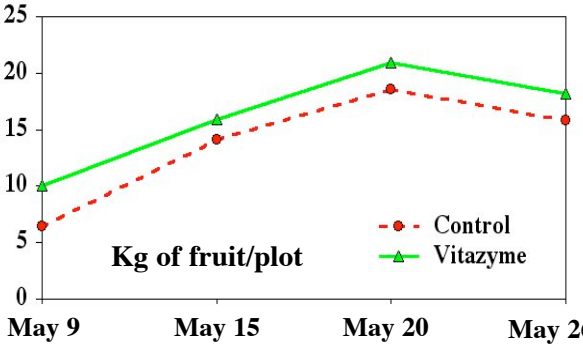
Treatment	May 9*	May 15*	May 20*	May 26*	Total
			number of fruit/plot		
Control	72	149	150	128	448
Vitazyme	84	155	185	152	576 (+29%)

The total fruit from all plots shows a decided advantage from Vitazyme for all four harvest periods, giving an increase in total fruit of 29%.

Yield Per Plot

Treatment	May 9*	May 15*	May 20*	May 26*	Total
			kg of fruit/plot		
Control	6.4	14.1	18.6	15.8	56.0
Vitazyme	10.0	15.9	20.9	18.2	65.0 (+16%)

The average yields of the various plots showed an increase with Vitazyme over the control at every picking, giving an overall yield increase of 16%.



Conclusions: A replicated research study using the tomato variety INIFAT-28 near Havana, Cuba, produced results that were highly favorable for Vitazyme. Using 100 plants per plot, the degree of statistical significance with fruit diameter and thickness, as well as fruit weight, was in most cases favorable to the Vitazyme treatment, while fruit numbers and harvested weights always favored Vitazyme. These data are summarized below.

Changes in Tomatoes with Vitazyme

Change in flowers at 53 days: ..... + 35%
Change in flowers at 60 days: ..... + 48%
Change in fruit number at 53 days: ..... + 38%
Change in fruit number at 60 days: ..... + 31%
Change in fruit diameter: ..... + 2% (0,15 cm)
Change in fruit thickness: ..... no change
Change in fruit weight: ..... + 3%
Change in fruit number per plot: ..... + 29%

The conclusions of the INIFAT study in terms of fruit number and yield are summarized in the table below.

Treatment	Number of fruit	Yield
	number	tons
Control	89,600	11.0
Vitazyme	115,200	13.0
Increase (%)	28	18

According to INIFAT researchers, **"The effectiveness of the growth and yield enhancing product 'Vitazyme' was manifested in the tests conducted. The application stimulates the number of fruits per plot, with a slight increase in the weight of each fruit. As a consequence, agricultural yields are 18% greater than when the product is not applied."**

Winter Wheat

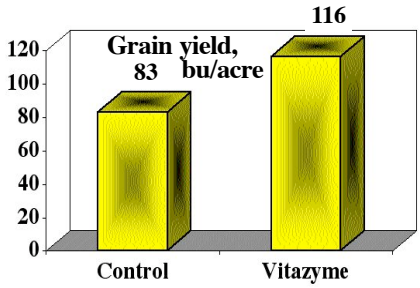
The benefit of Vitazyme for wheat can be viewed in this photo of wheat roots and stems. More soil clinging to the treated roots means more fine root hairs.

Location: Arrow S Farms, Sharon Springs, Kansas *Variety*: Jagger
Planting rate: 120 lb/acre *Soil type*: Keith sandy clay loam
Previous crop: corn *Planting date*: September 20, 2002
Experimental design: A center pivot covering 120 acres was divided into halves, the north side treated with Vitazyme and the south half left untreated. All other treatments were the same across the pivot area.

1. Control 2. Vitazyme

Fertilization: 18 lb/acre of N as a 28% ammonia solution on about January 20, 2003, when the wheat was all germinated. Total available N: about 60 to 70 lb/acre due to residual N from a failed corn crop in 2002.
Vitazyme application: 13 oz/acre applied with the 28% N solution on January 20
Irrigation: 550 gal/minute well, and 8 inches applied to the crop
Weather: An 8-inch moisture deficit existed for 2002, and by October of 2003 another 4.5-inch deficit had accumulated.
Harvest date: July 20 to 25, 2003

Grain Yield



Yield results: The yield of the two 60-acre parcels was estimated closely by bin volume during combining.
Income results: The average price for winter wheat in western Kansas in October of 2003 was $3.10/bu. At that price, the extra income per acre resulting from Vitazyme applications was 33 bu/acre X $3.10/bu =$102.30/acre. Using a cost of $4.00/13 oz of product, the return from Vitazyme was $25.58 for every dollar invested.
Conclusions: The average of this wheat yield was **100 bu/acre** across all 120 acres of the center pivot test area, which was **the highest yield of wheat for the entire county during 2003.** An *average* yield of irrigated wheat is 60 bu/acre for western Kansas. Vitazyme not only increased the yield of the wheat by 40% but also **improved the standability of the wheat** due to greater stem strength. **The grower estimated that the treated wheat had 20 to 30% more plants standing at harvest than did the untreated control. This benefit resulted in an income increase of $102.30/acre, with a cost:benefit ratio of 25:1.**

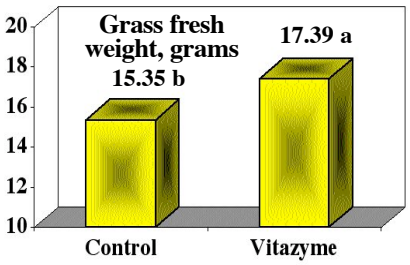
· Increase in grain yield: 40%

· Increased return: $102.30/acre

· Cost:benefit ratio: 25.6:1

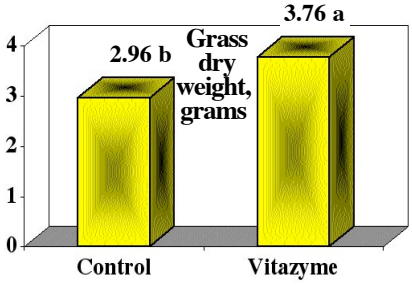
Zoysia Grass

Fresh Weight*



*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test. Level of significance=0.015. $LSD_{0.10}$=0.96 gram.

Dry Weight*



*Means followed by the same letter are not significantly different according to the Tukey-Kramer Test. Level of significance=0.0007. $LSD_{0.10}$=0.13 gram.

Research Farm: Fulton Grass Farm, Hope, Arkansas
Variety: Zoysia *Soil type*: heavy clay
Experimental design: A portion of a zoysia grass sod field was treated with Vitazyme to give an approximate standard application. The remainder of the field was left untreated.

1. Control 2. Vitazyme

Fertilizer treatment: unknown
Vitazyme treatments: 13 oz/acre on July 23, 2003 (3.5 gal of Vitazyme in 250 gal of water)
Growth results: The sod was sampled on August 25, 2003, 33 days after treatment. A 3-inch diameter coring device was used to obtain four cores from each side of the boundary. These cores were carefully washed free of soil and weighed after blotted dry with paper towels to get fresh weight. They were then dried in a drying oven for 24 hours at 130°F to obtain dry weight.

Notice how the zoysia grass treated with Vitazyme is knit together much better from a more extensive root system.

General Observations: The Vitazyme treated sod, 33 days after treatment, was **better knit together by vigorous roots** so that the samples, after washing, remained tied together in their original form. The untreated control samples were very loose and became disorganized on washing. Also, the treated plants were **darker green** indicating **more chlorophyll** in the leaves, and thus more carbon and sunlight-fixing capacity.
Conclusions: After only 33 days of Vitazyme influencing the growth of this zoysia grass,

- Vitazyme at 13 oz/acre increased the fresh weight of the grass by 7%.
- Vitazyme increased the dry weight of the grass by 27%.
- The zoysia grass contained a considerably higher level of dry matter in the leaf and root tissue after only 33 days of Vitazyme effects, shown by the 27% greater dry weight but only 7% greater fresh weight.

· Increase in fresh weight: 7%

· Increase in dry weight: 27%