



2012 Field Trial Results

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

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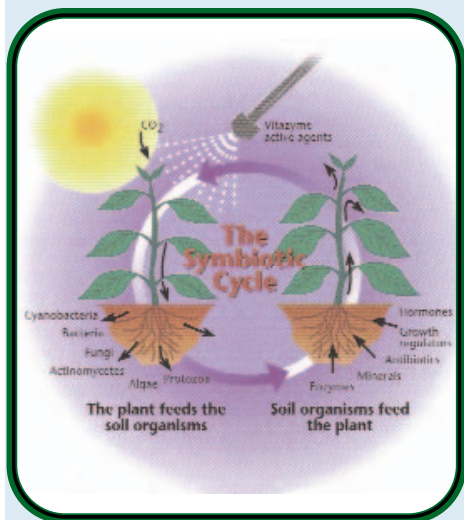
2012 Vitazyme Field Trial Results

This edition of Vitazyme crop reports represents the eighteenth year in which this biostimulant has been used successfully across many soil and climatic regimes in many nations.

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 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 dis-

solve 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

thus increasing productivity. Follow this easy-to-use five-point program.

Vitazyme is best used in the context of a comprehensive soil fertility program.

1 Test the soil, if possible, and discover any deficiencies or imbalances. Collect at least 10 subsamples from each uniform soil area, combine them, and send them to a reputable soil testing laboratory. Fertilize as required

Soil Organic Matter			Previous Crop		Compaction		Soil NO ₃ -N Test						
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:			← 60% →		← 70% →		← 80% →						

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,

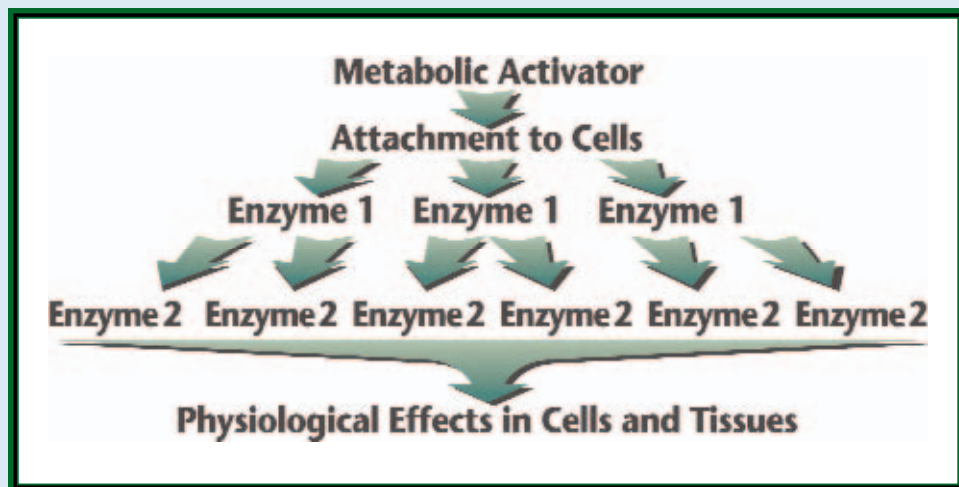
according to expert consultation, and note point 3 below for nitrogen applications.

2 Apply Vitazyme, if possible, to the seeds at or before planting by mixing the seeds and solution together in a seed treater, on a tarp, or in a seeding attachment, or by applying it directly in the seed row. Dry the seeds well before planting to avoid bridging in the planter.

3 Nitrogen fertilizer may be reduced each time it is applied if the current N application rate is high, especially if the soil test shows high available N, the soil has good structure, and the microbial activity is excellent. If fertilizer N applications are below optimum, do not reduce N applications.

4 Apply Vitazyme to the crop as indicated in the Vitazyme User's Guide. Usual applications are 13 to 20 oz/acre (1 to 1.5 liters/ha), applied two times per cropping cycle.

5 Integrate other sound, sustainable management practices into the total program such as soil conservation practices, minimum tillage, crop rotations with legumes, and the use of proper varieties.



Vitazyme Highlights for 2012

The year 2012 proved to be most excellent in terms of continued success of the Vitazyme program throughout the world. Once again, the consistency of the product in replicated studies and demonstration plots proved to be a highlight in many countries.

Some Highlights for 2012

1 Despite the serious drought throughout the Corn Belt of the United States, Vitazyme boosted corn yields in replicated tests in Cedar Falls, Iowa, by a highly significant 24 bushels/acre. Soybean responses in trials were generally between 4 and 5 bushels per acre under both dryland and irrigated conditions.

2 With chocolate being of much interest nowadays due to its antioxidant qualities, studies in Ghana proved that Vitazyme greatly improved cocoa nursery plants, increasing height by 24% at 240 days after planting, and root weight by 113%. In mature groves, the yield was increased by 22%. Yields of cocoa

in Viet Nam improved by 14%, and nursery stock was able to be field planted 33 days earlier than untreated plants.

3 Latin American studies provided a mountain of evidence for the effectiveness of the program. Bananas plants in Guatemala were 47% taller with 88% wider leaves, and watermelon yield increased by 11%. Cantaloupe increased by 1.56 brix, had much less cavity size, and yielded better, while tomatoes had larger fruit and yielded 33% more than untreated controls. Pea yields soared to 59% above the controls when Vitazyme was seed applied, and peppers were larger and yielded 59% more. Tobacco also responded very well.

4 University of Missouri studies on free amino acids of corn and soybean tissue revealed lower levels with Vitazyme treatment, meaning that pathogens are less attracted to treated plants. Corn plants were less apt to be broken by severe hail, with 20% fewer broken stalks.

5 Continuing grape trials in Chile by Syngenta showed excellent early coloration and enhanced maturity, and yields were improved by up to 68%.

6 Rice yields in Philippines were increased by 31%, with heavier test weight and excellent tillering of the plants. Continuing positive effects with this major food crop worldwide reveal the great potential for the program to help stem hunger in many countries that depend on this grain as a staple food.

7 Trials in Indonesia on sugar cane produced an amazing 49% increase in yield with Vitazyme applied three times. There were 83% more stems, and height increased 57%.

8 Studies at experiment stations and farms in Ukraine and Russia continued to reveal the great impact Vitazyme can have on cereal grains, oilseed crops, potatoes, and vegetables. In a winter wheat study, yields were improved by 15 to 20% while leaf diseases decreased and protein content increased.

Vitazyme Field Trials for 2012

Apples

Symbiosis of Vitazyme with Retain PGR

Researcher: agr.assistance personnel with Robert Hudak

Research organizations: agr.assistance and Ag Biotech, Livonia, New York

Variety: Jonagold

Rootstock: M7

Tree age: 4 years

Soil quality: pH = 6.3

Spray volume: 250 gal/acre (83 gal/acre three times)

Location: Wayne County, New York

Tree density: 300/acre

Sprayer: Aire Fan airblast

Sprayer speed: 3.5 mph

Experimental design: An apple orchard was divided into two areas, with Retain applied to both areas but Vitazyme, along with the Retain, applied to one area. The purpose of the trial was to evaluate effects of Vitazyme on the apple crop when applied along with Retain. Note that Vitazyme was applied earlier to all areas in a regular spray program as well.

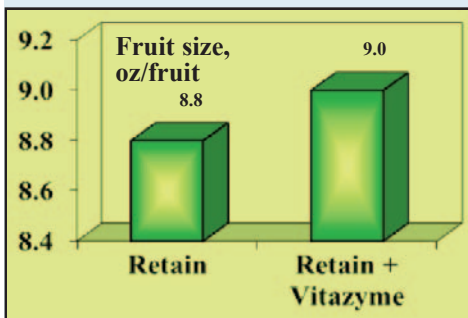
1. Retain

2. Retain + Vitazyme

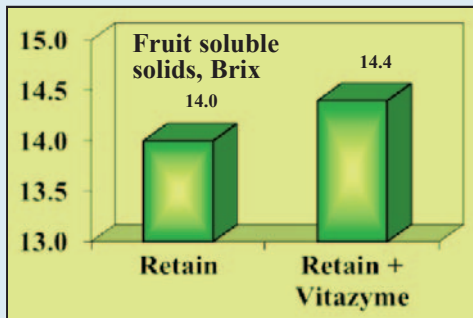
Fertilization: unknown

Vitazyme application: 16 oz/acre sprayed on the leaves at pink, petal fall, and first cover for all areas: 16 oz/acre mixed with Retain in 100 gallons of water, applied 4 weeks before harvest began

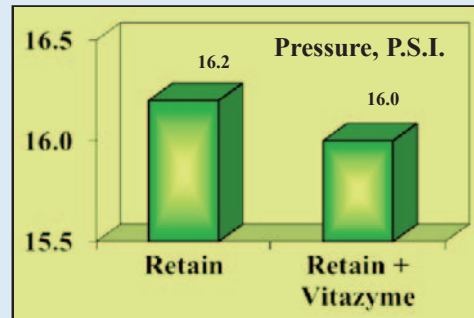
Mean Fruit Weight



Fruit Brix



Fruit Pressure



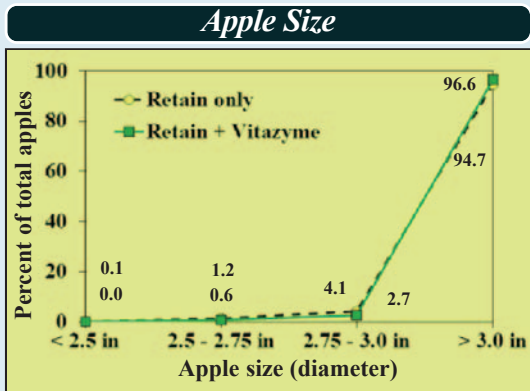
Retain application: 0.37 lb/acre (half the normal rate), sprayed on the leaves and fruit on September 8, 2012, with 100 gal of water along with 1 pint of Regulaid, to both areas, with Vitazyme for one area.

Continued on the next page

Retain contains aminoethoxyvinylglycine (AVG), a naturally occurring substance in certain fermentations. This material blocks ethylene production in plant tissues and affects fruit maturation, ripening, and abscission (fruit dropping).

Fruit evaluation: Harvesting was performed on seven replicates (trees) for each treatment. One hundred apples were harvested and graded per treatment. Vitazyme added to Retain increased the average size of the apples, reducing the 2.5 to 3.0 inch sizes but increasing the >3.0 inch size by nearly 2%.

Conclusions: This evaluation of Vitazyme with retain showed that this biostimulant increased mean fruit weight by 0.2 oz/fruit (+2%), a reflection of an increase in fruit size by 1.9% in the >3.0 inch diameter size; smaller fruit were correspondingly reduced. Vitazyme improved fruit Brix by 0.4 point (+3%), but slightly reduced fruit pressure. These results show a good synergism between the two products for the apple grower, and the value of Vitazyme to complement a Retain program.



- **Increase in fruit weight with Vitazyme: 0.2 oz/fruit (+2%)**
- **Increase in fruit Brix with Vitazyme: 0.4 point (+3%)**
- **Decrease in fruit pressure with Vitazyme: (-) 0.2 p.s.i. (-1%)**

Bananas

A Nursery Study



The control treatment for young bananas in this Guatemala greenhouse trial showed the typical growth expected for the plants. Growth is not nearly as vigorous as for the treated plants shown in the right-hand picture.

Researchers: Rodolfo Valenzuela and Cristhian Mazariegos, Foragro Development, Guatemala City, Guatemala, and Sergio Cordero, Supervisor, Producciones Agricolas del Sur, Guatemala
Location: La Blanca, Ocos Municipality, San Marcos Department, Guatemala
Variety: Cavendish

Experimental design: In a banana nursery greenhouse, rows of young plants 74 meters long x 1 meter wide, with plants in 1 kg bags, were selected to evaluate the effect of Vitazyme plus Silfact surfactant on banana plant growth. Several beds were used for each treatment.

1. Control
2. Vitazyme + Silfact on 4-week plants
3. Vitazyme + Silfact on 5-week plants

Vitazyme application: **Treatment 2** (4-week plants): (1) 50 ml of Vitazyme in 16 liters of water (0.31%) sprayed with a backpack sprayer on February 20, 2012; (2) 80 ml of Vitazyme in 16 liters of water (0.5%) sprayed with a backpack sprayer about three weeks later on March 13, 2012. **Treatment 3** (5-week plants): (1) 75 ml of Vitazyme in 16 liters of water (0.47%) sprayed with a backpack sprayer on February 20, 2012; (2) 80 ml of Vitazyme in 16 liters of water (0.5%) sprayed with a backpack sprayer about



The banana plants treated twice with Vitazyme (0.31% on February 20, and 0.5% on March 13) display a remarkably superior growth rate compared to the untreated controls (see in the left-hand photo).



Notice the superior root system of a typical Vitazyme treated plant on the right, compared to an untreated control plant on the left. The stem diameter is larger on the treated plant, with leaf chlorophyll development to the soil line.

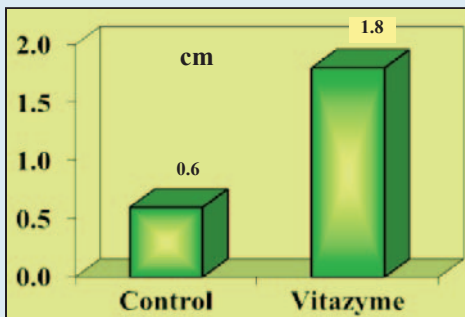
three weeks later on March 13, 2012.

Silfact application: This surfactant of Foragro was applied with all Vitazyme applications at 5 ml/16 liters of water (0.031%).

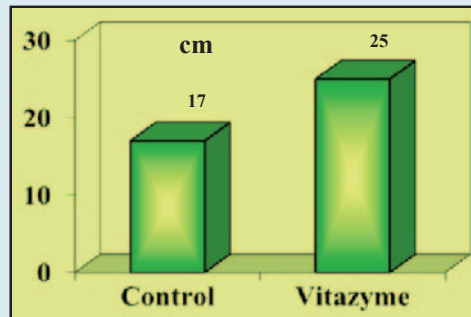
Growth results: Values for all parameters were collected on April 11, 2012, 51 days after the first treatment was made. Note that every parameter was increased with Vitazyme applications, especially trunk diameter (200% and 60% for Treatments 2 and 3, respectively). Plant height, leaf number, and leaf length and width were also markedly improved, by 20% to 88%.

Trial With 4-Week Plants (Treatment 2)

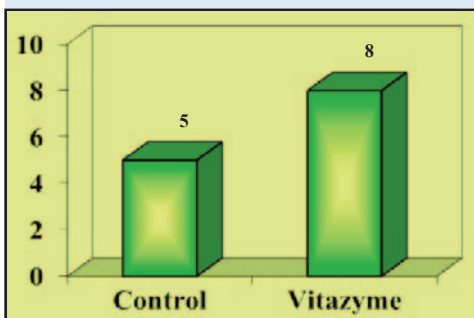
Trunk Diameter



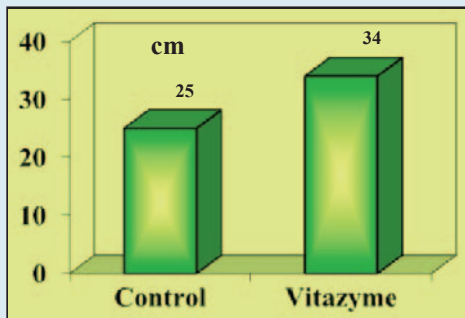
Plant Height



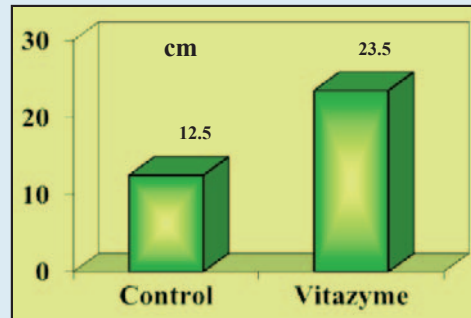
Leaf Number



Leaf Length

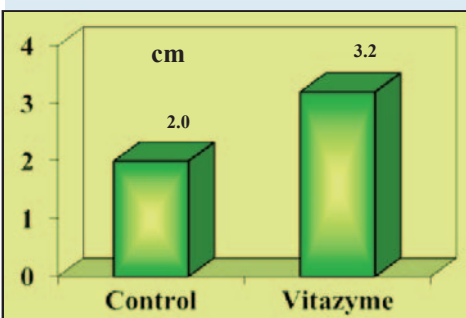


Leaf Width

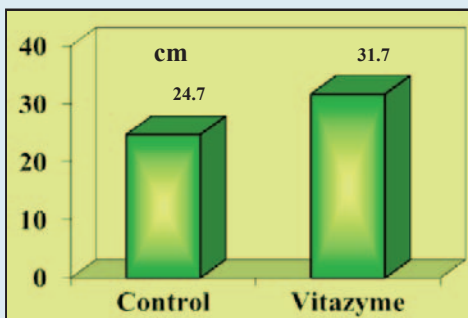


Trial With 5-Week Plants (Treatment 3)

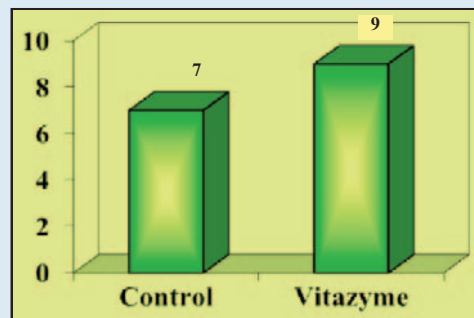
Trunk Diameter



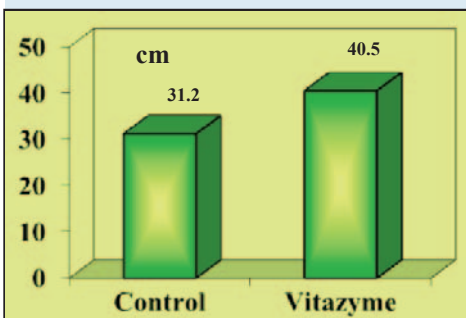
Plant Height



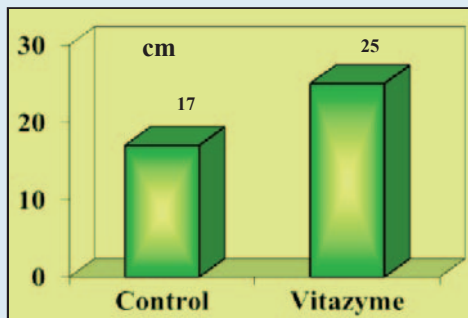
Leaf Number



Leaf Length



Leaf Width



Conclusions: The researchers stated the following:

1. Plants treated with Vitazyme in both treatments showed a better growth versus plants that did not receive treatment.
2. The plants that received the application of Vitazyme had a larger diameter [of stem] than the control.
3. Both treatments that received the application of Vitazyme had a larger diameter than the control.
4. In the variables leaf number, length, and width [of leaves] all treatments that received Vitazyme application gave better results than the untreated control.
5. The root system showed thicker roots in the Vitazyme treated plants.

The use of Vitazyme in nursery plantain banana by two foliar sprayings at 0.5% v/v (1 liter/200 liters of water), 5 and 8 weeks from planting, is recommended.”

Increases with Vitazyme

	<u>4-week plants</u>	<u>5-week plants</u>
Trunk diameter	1.2 cm (+200%)	1.2 cm (+60%)
Plant height	8 cm (+47%)	5 cm (+20%)
Leaf number	3 (+60%)	2 (+29%)
Leaf length	9 cm (+36%)	9.3 cm (+30%)
Leaf width	11 cm (+88%)	8 cm (+47%)

Bananas

A Nursery Study by Dole

Researcher: Ing. J. Vargas and Juan Jose Aycart M., Ph. D.

Research organization: Ubesa Dole, Ecuador Division, in cooperation with Summer Zone, Quito, Ecuador

Location: Babahoya, Ecuador

Variety: Cavendish

Soil type: greenhouse mix

Experimental design: A banana nursery was divided into three sections, with a conventional fungicide, a biological fungicide plus humic acid plus biological stimulators, and a biological fungicide plus Vitazyme treatment applied to the three areas. The purpose of the test was to evaluate the effects of the treatments in deterring infections of *Fusarium* and *Rhizoctonia* in the plant root systems.

1. Conventional fungicides (Citex and Phyton)

2. Companion 2-3-2 (biological fungicide) + Essential 1-0-1 (humic acid + biostimulants)

3. Companion 2-3-2 (biological fungicide) + Vitazyme

Fertilization: standard for the nursery

Vitazyme treatment: 5 ml in 20 liters of water to completely drench the plant roots and potting soil, along with Companion 2-3-2.

Companion 2-3-2 treatment: 5 ml in 20 liters of water, along with Vitazyme (Treatment 3) or Essential 1-0-1 (Treatment 2) as a root and potting soil drench. The product is a biological fungicide containing *Bacillus* GBO3 (>65 million cells/ml), which produces natural antibiotics.

Essential 1-0-1 treatment: 5 ml in 20 liters of water, along with Companion 2-3-2 in Treatment 2. The product is a "complete" biostimulant and nutritional supplement containing marine algae, humic acids, 20 amino acids, gibberellic acid, carbohydrates, vitamins, and hydrolyzed protein.

Growth, survival, and pathogen results: The plant source was Costa Rica.

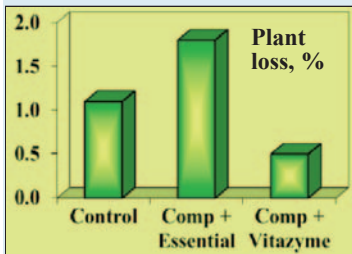


The bananas trial shown here—while not being a nursery study—reveals the improved vigor of Vitazyme treated plants. Transplanting was completed several weeks earlier.

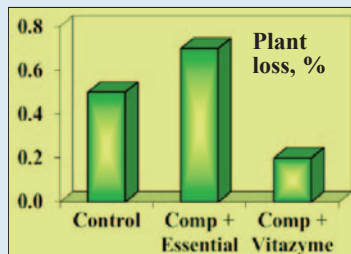
Treatment	Trial time weeks	Transplant date	Transplants number	Mortality of plants							
				Transplanting		Injury		Mutation		Fungi ¹	
				number	%	number	%	number	%	number	%
1. Conventional	43	Oct. 25, 2010	12,471	131	1.1	56	0.5	450	3.6	471	3.8
2. Companion + Essential	47	Nov. 27, 2010	11,845	207	1.8	80	0.7	47	0.4	38	0.3
3. Comparison + Vitazyme	46	Nov. 19, 2010	11,771	63	0.5	18	0.2	80	0.7	70	0.6

¹Fungi responsible for infection include *Fusarium* and *Rhizoctonia*.

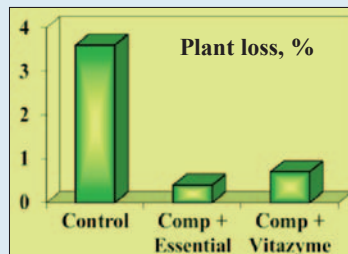
Transplant Loss



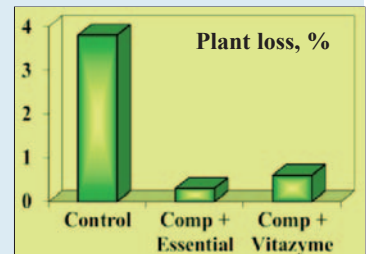
Injury Loss



Mutation Loss



Fungi Loss



Plant Growth Rate

1. Conventional Rapid
2. Companion + Essential Slow
3. Companion + Vitazyme Rapid

The conventional treatment (1) had a higher fungal infection rate (3.8%) than the other two (0.3% and 0.6%), but the growth rate was good. Companion + Essential (Treatment 2) had the lowest fungal loss (0.3%), but plants grew slower than for the other two treatments, while Companion + Vitazyme (Treatment 3) plants also had a low fungal loss (0.6%), but had high growth rates.

Conclusions: This greenhouse banana trial in Ecuador proved that losses of plants due to *Fusarium* and *Rhizoctonia* infection could be reduced dramatically with both Companion + Essential and Companion + Vitazyme; both treatments brought the infection rate down from 3.8% in the control to 0.3% and 0.6% for the other two. However the Companion + Essential treatment produced a slower plant growth rate than did the other two. According to the researcher, "The seedlings of the two treatments [1 and 3] achieved a more rapid development, and **could be transplanted at 6 weeks**, with development comparable to that of 8 weeks. The control plants normally take 8 weeks in the greenhouse before being ready to deliver to fields." **This study shows that Vitazyme plus a biological fungicide greatly reduce root fungal growth and speed plant development.**

Winter Barley

Researcher: V. Plotnikov

Location: Vinnytsia, Ukraine

Soil type: gray podzolic (2.2% organic matter, 8.4 mg/100 g of soil hydrolyzed N, 15.8 mg/100 g of soil P, 12.4 mg/100 g of soil exchangeable K, pH = 5.5)

Tillage: conventional (disking, plowing, and cultivation)

Experimental design: A replicated plot design was established using plots of 0.1 ha, and four replicates, to evaluate the effect of Vitazyme on the yield of winter barley.

Research organization: National Academy of Agricultural Sciences

Variety: Luran

Previous crop: corn

Planting date: October 13, 2011

Planting rate: 5 million seeds/ha

1. Control

2. Vitazyme

Fertilization: 50 kg/ha of dry nitrogen in the spring

Vitazyme application: 0.5 liter/ha on the leaves and soil at the boot stage (leaf tube formation)

Weather for 2012: favorable for crop development

Yield results: see right

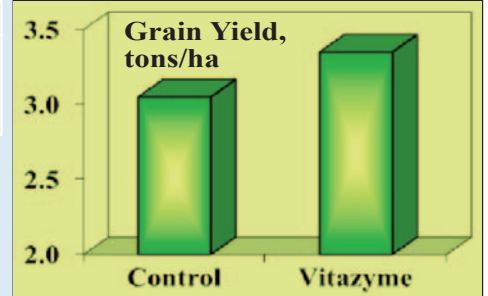
Conclusions: This replicated barley trial in Ukraine revealed that Vitazyme, applied at the boot stage at

0.5 liter/ha, increased grain yield by an excellent 10%, resulting in improved income of 475 hrn/ha. The utilization of a seed treatment at fall planting would likely have boosted the yield and income even more. These results prove the excellent value of this product in agricultural systems for barley production in Ukraine.

• **Increase in grain yield with Vitazyme: 10%**

Barley Yield

Treatment	Grain Yield tons/ha	Yield change tons/ha	Extra income hrn/ha
Control	3.05	—	—
Vitazyme	3.35	0.30 (+10%)	475



Spring Barley

A Fertilizer Rate Study

Researcher: V. Plotnikov

Location: Vinnytsia, Ukraine

Soil type: gray podzolic (2.2% organic matter, 8.4 mg/100 g of soil hydrolyzed N, 15.8 mg/100 g of soil P, 12.4 mg/100 g of soil exchangeable K, pH = 5.5)

Planting date: April 24, 2012

Planting rate: 4 million seeds/ha

Research organization: National Academy of Agricultural Sciences

Variety: Nabat super elite

Tillage: conventional (disking, plowing, and cultivating)

Previous crop: buckwheat

Experimental design: A replicated plot trial with spring barley, using four replicates, was conducted on 0.1 ha plots to determine the effectiveness of Vitazyme to improve the yield and quality of spring barley. Four fertility levels were used across the treated and control plots.

Fertilization: Phosphorus and potassium fertilizers were applied dry in the fall with fall tillage, and nitrogen was applied in the spring.

Vitazyme application: 1 liter/ton on seeds, and 0.5 liter/ha sprayed on the leaves and soil at tillering

Weather for 2012: favorable for crop development

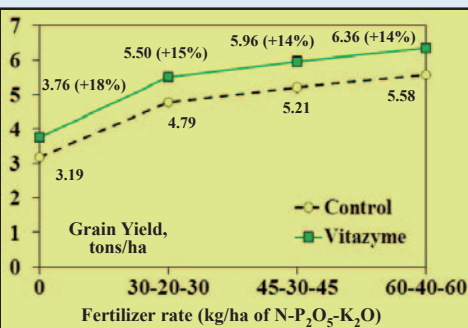
Yield results: Note the fine yield increases with Vitazyme at each fertility level, from 14 to 18%.

Crude protein results: All four fertilizer levels showed good protein increases with Vitazyme.

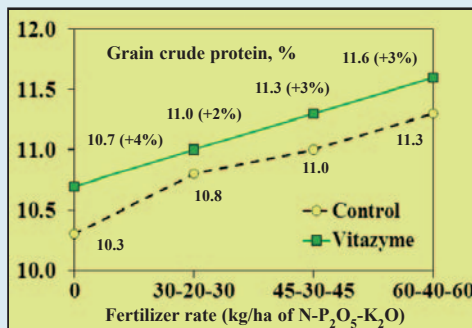
Leaf blight results: At all fertilizer levels the incidence of dark brown leaf blight was decreased by Vitazyme application.

Treatment	Vitazyme	Nitrogen	Phosphate	Potash
1	0	0	0	0
2	X	0	0	0
3	0	30	20	30
4	X	30	20	30
5	0	45	30	45
6	X	45	30	45
7	0	60	40	60
8	X	60	40	60

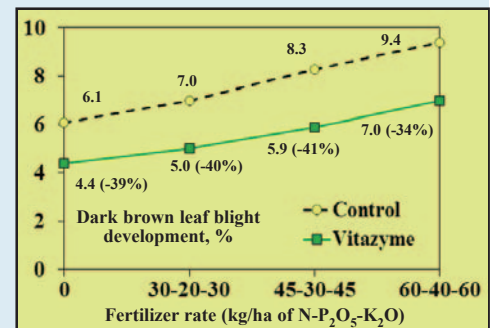
Barley Yield



Crude Protein



Leaf Blight



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Conclusions: A spring barley trial in Ukraine, using replicated plots with and without Vitazyme and four fertility levels, proved that Vitazyme increased the yield by 14 to 18% above the control, the highest percentage increase being for the lowest fertility level. Crude protein increased with Vitazyme by 0.2 to 0.3 percentage points at all fertility levels, and dark brown leaf blight development was reduced by from 34 to 41% for all four levels. These results prove that Vitazyme is a powerful tool to improve spring barley yields, protein, and plant health in Ukraine, and should be incorporated into farmers' production programs.

- **Increase in grain yield with Vitazyme at the same fertilizer level: 14 to 18%**
- **Increase in crude protein with Vitazyme at the same fertilizer level: 2 to 4%**
- **Reduction in leaf blight with Vitazyme at the same fertilizer level: 34 to 41%**

Bermudagrass

Researcher: James Rogers, Ph.D.
and Pasture Demonstration Farm, Ardmore, Oklahoma

Location: Noble Foundation, Headquarters Units I and III Farms,
Variety: common bermudagrass

Soil type: Windthorst fine sandy loam (Unit I and Unit III farms), and Wilson silt loam (Pasture Demonstration farm)



Bermudagrass at the Noble Foundation near Ardmore, Oklahoma, responded well to Vitazyme, as shown in this photo. Here, 100 lb/acre of nitrogen was applied with the product; yellow foxtail is shown competing with the grass.

At the Noble Foundation test farm, Vitazyme plus 100 lb/acre of nitrogen provided an average of 14% increase in yield, a good but nonsignificant improvement due to high variation among replicates. The control is on the right.

Treatment	Vitazyme oz/acre	Nitrogen
1	0	0
2	13	0
3	0	50
4	13	50
5	0	100
6	13	100

Experimental design: Areas of bermudagrass on three sites (the Pasture Demonstration farm was added in 2011) were selected to evaluate the effectiveness of Vitazyme, with and without nitrogen fertilizer, on the growth, productivity, and quality of bermudagrass pastures. Plot sizes were 10 x 30 feet, with three replications.

Fertilization: Nitrogen was applied at the rates shown in the table above in May, and again after each harvest. Soil tests were taken each year, and phosphorous and potassium were applied according to recommendations once a year.

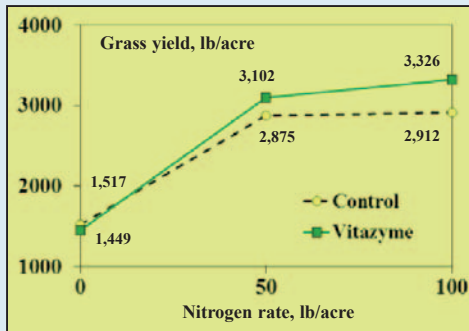
Vitazyme application: 13 oz/acre sprayed on the grass in May, and after each cutting

Yield results: A total of ten harvests were completed on the plots from 2010 to 2012.

Grass Yield

Treatment	Yield ¹ lb/acre	Yield change lb/acre
1. 0 N	1,517 b	—
2. 0 N + Vita	1,449 b	(-) 68 (-4%)
3. 50 N	2,875 a	—
4. 50 N + Vita	3,102 a	227 (+8%)
5. 100 N	2,912 a	—
6. 100 N + Vita	3,326 a	414 (+14%)

¹Means followed by the same letter are not significantly different at P = 0.05. Comparisons are made at the same N level.



This included two harvests from Units I and III in 2010, one harvest from Units I, III, and the Pasture Demonstration farm in 2011, and one harvest from each farm in 2012. Data were analyzed using the Proc Mixed procedure of the Statistical Analysis System (SAS); replication, year, and location were treated as random effects.

Increase in grass yield with Vitazyme
50 lb/acre N 8%
100 lb/acre N 14%

While there were no significant differences in grass yield at the same nitrogen level, even so there is a definite trend for yields to increase with Vitazyme at both 50 and 100 lb/acre of nitrogen.

Quality results: Samples of the hay were analyzed in a manner similar to the yield data.

Treatment	Crude protein ¹	Calcium	Phosphorus ¹	Potassium ¹	Magnesium	ADF ²	NDF ³	TDN ⁴
	%	%	%	%	%	%	%	%
1. 0 N	9.2 b	0.25	0.212 b	1.93 ab	0.23	34.0	65.9	62.4
2. 0 N + Vita	9.2 b	0.25	0.210 b	1.86 b	0.23	34.0	65.9	62.3
3. 50 N	9.4 b	0.20	0.218 ab	2.08 ab	0.22	34.4	67.2	62.1
4. 50 N + Vita	9.6 b	0.26	0.216 ab	2.13 a	0.24	34.7	66.7	61.8
5. 100 N	12.1 a	0.24	0.226 a	2.09 ab	0.26	32.6	64.3	63.5
6. 100 N + Vita	12.2 a	0.25	0.227 a	2.12 a	0.26	32.3	64.0	63.7

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

²ADF = acid detergent fiber; ³NDF = neutral detergent fiber; ⁴TDN = total digestible nutrients.

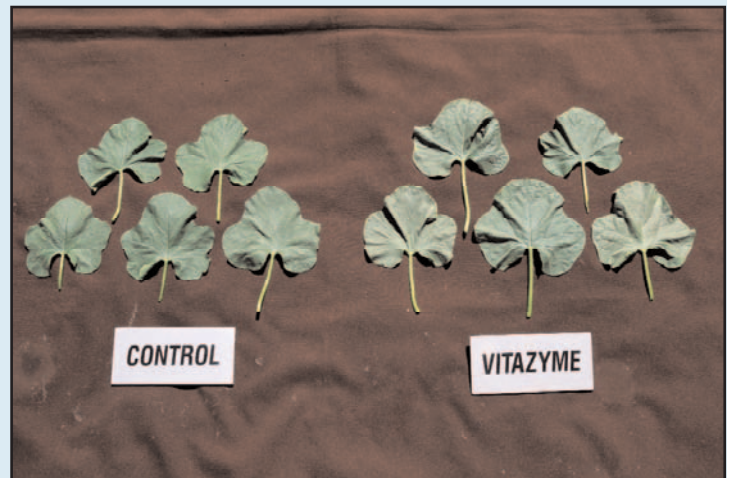
While there are no significant differences in nutrients between Vitazyme treated and untreated forage samples at each nitrogen level, there are increases in calcium and potassium at the 50 and 100 lb/acre nitrogen rates with Vitazyme.

Conclusions: In this replicated three-year study in Oklahoma of the effect of Vitazyme on the yield and nutritional value of bermudagrass at three locations, no significant increases in these parameters occurred with Vitazyme at any of the three nitrogen levels. However, Vitazyme boosted the yield by 8% at the 50 lb/acre N rate, and by 14% at the 100 lb/acre N rate. The product also appeared to improve calcium and potassium levels of the forage at these two nitrogen rates, but the other elements and nutritional parameters were not affected. Vitazyme holds promise as a potential enhancer of bermudagrass yield and quality in dryland range settings in Oklahoma.

Cantaloupe



Plants harvested from the two treatments show the greater leaf mass and chlorophyll content of the Vitazyme treated plant. The fruit are also more uniform with Vitazyme.



Leaf size and chlorophyll development are obviously greater with Vitazyme treatment, the result being greater carbon fixation for greater yield and fruit sugar content.

Researchers: Robert Garcia and Cristhian Mazariegos, Foragro Development, Guatemala City, Guatemala; Alex Diaz and William Sosa, Heads of Plant Protection, Proingasa Classic, Guatemala
Company: Proingasa Classic

Location: Site 21, Section 8, Valves 26 to 29, km 132, Senegal, Rio Hondo, Zacapa Department, Guatemala

Variety: Honey Dew HQ252 **Soil type:** silty clay

Planting date: October 22, 2011

Climate: temperature, 27 to 38°C; relative humidity, 63%

Altitude: 230 meters above sea level

Experimental design: A cantaloupe field was selected for a trial to determine the effectiveness of Vitazyme to enhance the yield and quality of the crop. A treated area of 2 manzanas (1.4 ha) was compared to an adjacent untreated area using three Vitazyme applications.

1. Control

2. Vitazyme

Fertilization: unknown

Vitazyme applications: (1) Roots of the seedlings were dipped into a drum containing a 1% Vitazyme solution (1 liter in 100 liters of water) for one manzana (0.7 ha), to give 1.4 liters/ha; (2) foliar and soil spray of 1.4 liters/ha at 23 days



The cavity closure with Vitazyme in this Guatemala trial is clearly superior to the untreated control. Notice also the greater chlorophyll content in the rind of the treated melon.

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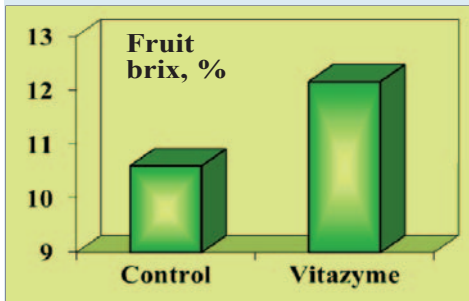
after planting; (3) foliar and soil spray of 1.4 liters/ha at 43 days after planting. The sprayer had a 1,100 liter capacity, with purple Albuz nozzles applying 0.49 liter/minute.

Growth results: *Vitazyme treatments gave a greater leaf area and root mass than the control plots.*

Yield and quality results: Harvesting was completed December 18, 2011.

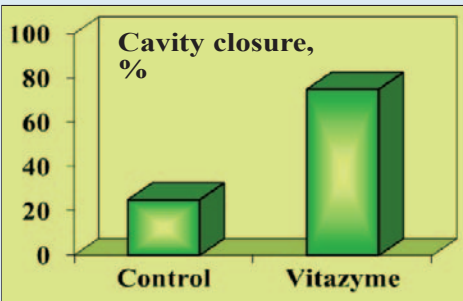
Melon Brix

Treatment	Brix	Change
	%	%
Control	10.60	—
Vitazyme	12.16	+1.56 (15%)



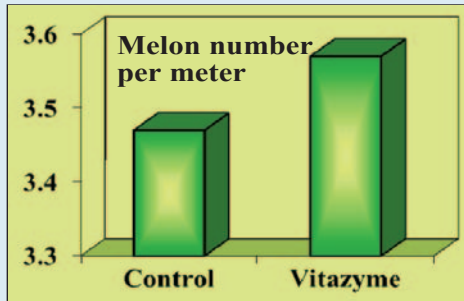
Cavity Closure

Treatment	Closure	Change
	%	%
Control	25	—
Vitazyme	75	+50 (200%)



Melon Yield

Treatment	Fruit number	Change
	number/meter	number/meter
Control	3.47	—
Vitazyme	3.57	+0.10 (+3%)



The increase in fruit soluble solids with Vitazyme was most excellent, 1.56 points, which would be very noticeable to the person eating the melons. The size of the fruit cavity was considerably smaller with Vitazyme compared to the control treatment, by 50%, meaning there was more edible fruit inside the melons. While not a large increase (3%), there were more melons in the Vitazyme treated area.

Conclusions: A cantaloupe trial in the Guatemala revealed that Vitazyme produced a small increase in melon number (3%); weights were not measured. However, melon quality was markedly improved in terms of sweetness (+1.56 Brix, a 15% sugar increase) and filling of the cavity (+200%) with Vitazyme. These data prove the great efficacy of this product for cantaloupe production in Guatemala.

- **Increase in fruit Brix with Vitazyme: 1.56 points**
- **Increase in fruit cavity closure with Vitazyme: 200%**
- **Increase in fruit number with Vitazyme: 3%**

Cantaloupe

Researchers: Robert Garcia and Cristhian Mazariegos, Foragro Development, Guatemala City, Guatemala; Alex Diaz and William Sosa, Heads of Plant Protection, Proingasa Classic, Guatemala

Company: El Castano Classic

Location: Field Espinal T1 Nogales, km 145, Estanzuela, Department of Zacapa, Guatemala

Variety: Harper Caribbean Gold

Soil type: silty clay

Altitude: 230 meters above sea level

Climate: temperature, 27 to 38°C; relative humidity, 63%

Planting date: October 15, 2011



Without Vitazyme the cantaloupe fruit was generally smaller, but without question was not as uniform as shown in this picture. Compare these results with the Vitazyme treated plants in the right-hand picture.



When Vitazyme was added to the production program, the yield was increased and the fruit were more uniform. Besides, the melons were more filled and had higher brix (sugars), meaning they were sweeter.

Experimental design: A cantaloupe field was divided into a Vitazyme treated area of 3 manzanas (2.1 ha), and an untreated control area, with three Vitazyme applications made for the treated area. The objective of the study was to determine the effects of this biostimulant on melon yield and quality.

1. Control

2. Vitazyme

Fertilization: unknown

Vitazyme applications: (1) Vitazyme at 1% (1 liter in 100 liters of water) was sprayed on the young plants in trays, one day before transplanting (October 14, 2011); (2) foliar and soil spray of 1.4 liters/ha at 23 days after planting; (3) foliar and soil spray of 1.4 liters/ha at 43 days after planting (sprayer had 1,100 liter capacity, with purple Albus nozzles applying 0.49 liter/minute).

Growth results: Vitazyme treatments provided greater leaf area and root mass compared to the untreated control area.

Yield and quality results: Harvesting was completed December 10, 2011.



Right to the row the growth difference can be noticed in this cantaloupe trial. Vitazyme treated plants are larger and darker green, fixing more carbon at a faster rate.

Melon Brix

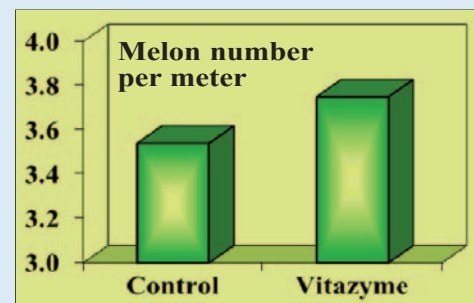
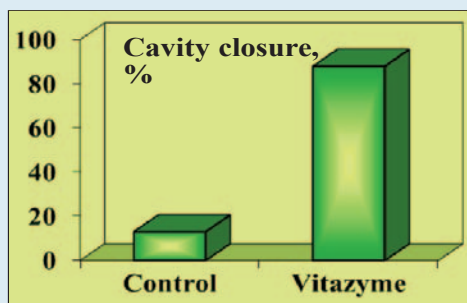
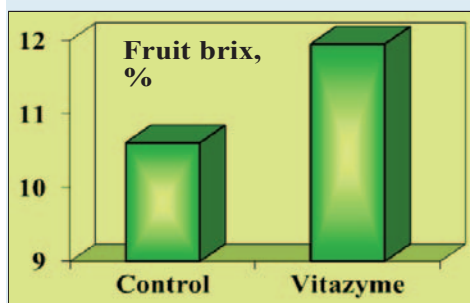
Treatment	Brix %	Change %
Control	10.61	—
Vitazyme	11.95	+1.34 (+13%)

Cavity Closure

Treatment	Closure %	Change %
Control	13	—
Vitazyme	88	+75 (+577%)

Melon Yield

Treatment	Fruit number number/meter	Change number/meter
Control	3.54	—
Vitazyme	3.75	+0.21 (+6%)



An excellent increase of 1.34 Brix was obtained with Vitazyme applications, a 13% increase in melon sugar compared to the untreated control. Vitazyme caused a marked increase in the amount of internal fruit of the melons, closing the cavity by 88%, versus 13% for the untreated control. A good increase in the melon number (+6%) was obtained with Vitazyme use, though the weight of the melons was not determined.

Conclusions: A study comparing Vitazyme (three applications) with an untreated control in Guatemala revealed that this product markedly improved cantaloupe yield (+6%), and quality: the cavity closure was improved by 577%, and the melon Brix by 1.34 points (13%). Melon weight was not determined, These results reveal how greatly Vitazyme boosts the growth of the plants, and the yield and quality of the fruit as well in Guatemala.

- **Increase in fruit Brix with Vitazyme: 1.34 points**
- **Increase in fruit cavity closure with Vitazyme: 577%**
- **Increase in fruit number with Vitazyme: 6%**

Cocoa

A Nursery and Field Study

Researcher: S. Acquaye, K. Ofori-Frimpong, A.A. Afrifa, and A. Arthur

Location: Ghana

Nursery Study

Treatment	Vitazyme
1	0%
2	1%
3	2%
4	3%

Experimental design: Cocoa beans were planted in 18 cm x 25 cm polyethylene bags filled with potting soil. Of these seedlings, 20 were selected for each replicate, each treatment having four replicates (80 plants per treatment). Three Vitazyme concentrations were sprayed on the soil of each treatment at 40-day intervals to compare with an untreated control, and determine several growth parameters.

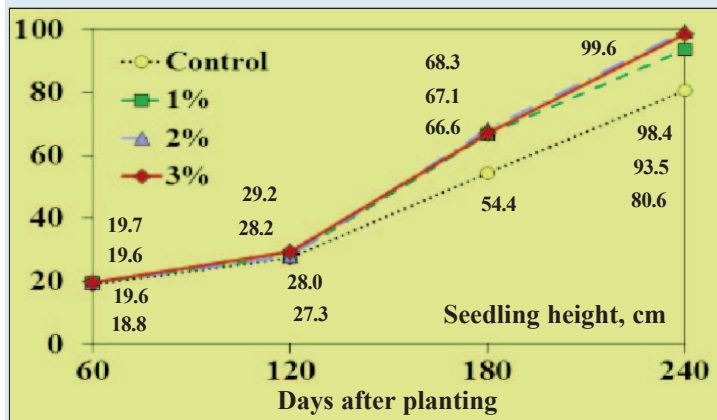
Fertilization: none

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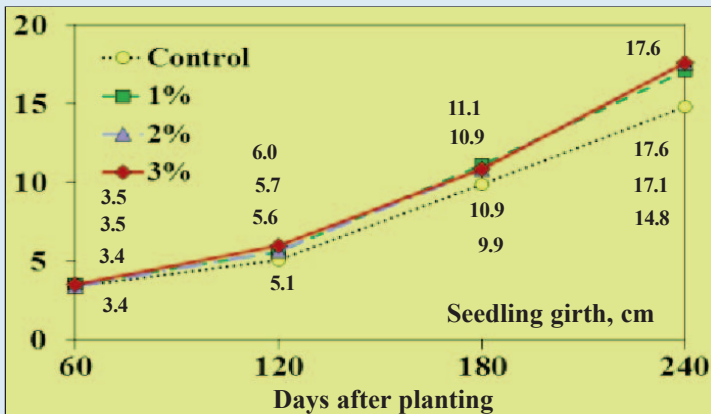
Vitazyme application: Treatment 2, 1% Vitazyme (150 ml in 15 liters of water) sprayed on the soil surface of each pot every 40 days using a hand sprayer; Treatment 3, 2% Vitazyme (300 ml in 15 liters of water) every 40 days; Treatment 4, 3% Vitazyme (450 ml in 15 liters of water) every 40 days

Growth results: Evaluations were made 60, 120, 180, and 240 days after planting.

Seedling Height



Seedling Girth



Treatment	Increase over the control			
	60 days	120 days	180 days	240 days
	cm	cm	cm	cm
1. Control	—	—	—	—
2. 1% spray	0.9 (5%)	0.7 (3%)	12.2* (22%)	12.9* (16%)
3. 2% spray	0.8 (4%)	0.9 (3%)	13.9* (26%)	19.0* (24%)
4. 3% spray	0.8 (4%)	1.9 (7%)	12.7* (23%)	17.8* (22%)
LSD _{0.05}	ns	ns	7.1	8.0

Treatment	Increase over the control			
	60 days	120 days	180 days	240 days
	cm	cm	cm	cm
1. Control	—	—	—	—
2. 1% spray	0.1 (3%)	0.5 (10%)	1.2* (12%)	2.3* (16%)
3. 2% spray	0	0.6* (12%)	1.0* (10%)	2.8* (19%)
4. 3% spray	0.1 (3%)	0.9* (18%)	1.0* (10%)	2.8* (19%)
LSD _{0.05}	ns	0.6	0.8	1.0

*Significantly greater than the control at P = 0.05.

*Significantly greater than the control at P = 0.05.

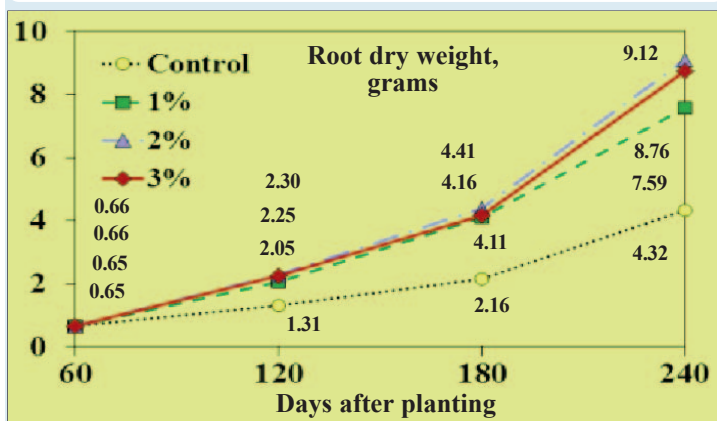
Increase in plant height at 240 days with Vitazyme

1% spray 16%
 2% spray 24%
 3% spray 22%

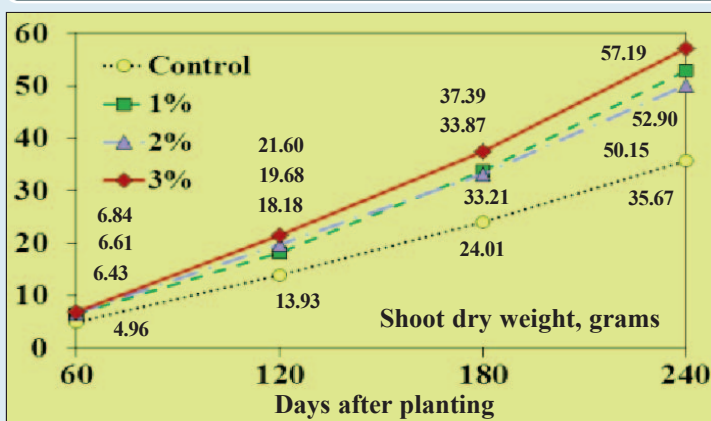
Increase in plant girth at 240 days with Vitazyme

1% spray 16%
 2% spray 19%
 3% spray 19%

Root Weight (dry)



Shoot Weight (dry)



Treatment	Increase over the control			
	60 days	120 days	180 days	240 days
	grams	grams	grams	grams
1. Control	—	—	—	—
2. 1% spray	(-) 0.01	0.74* (56%)	1.95* (90%)	3.27* (76%)
3. 2% spray	(-) 0.01	0.99* (76%)	2.25* (104%)	4.89* (113%)
4. 3% spray	0	0.94* (72%)	2.00* (93%)	4.44* (103%)
LSD _{0.05}	ns	0.43	0.56	0.63

Treatment	Increase over the control			
	60 days	120 days	180 days	240 days
	grams	grams	grams	grams
1. Control	—	—	—	—
2. 1% spray	1.47* (30%)	4.25* (31%)	9.86* (41%)	17.23* (48%)
3. 2% spray	1.65* (33%)	5.75* (41%)	9.20* (38%)	14.48* (41%)
4. 3% spray	1.88* (38%)	7.67* (55%)	13.38* (56%)	21.52* (60%)
LSD _{0.05}	0.63	3.57	3.99	6.08

*Significantly greater than the control at P = 0.05.

*Significantly greater than the control at P = 0.05.

Increase in root dry weight at 240 days with Vitazyme

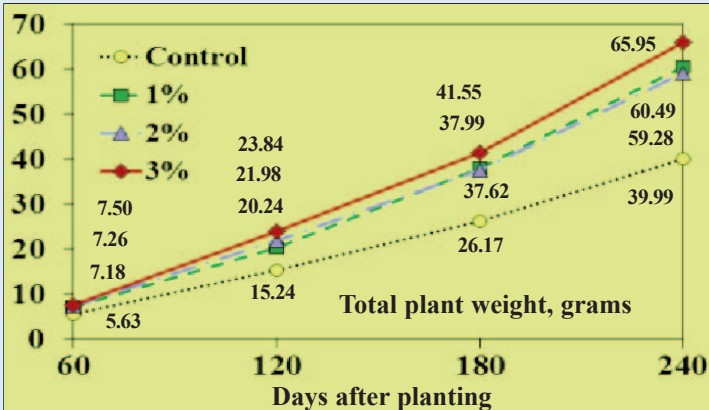
1% spray	76%
2% spray	113%
3% spray	103%

Increase in shoot weight at 240 days with Vitazyme

1% spray	48%
2% spray	41%
3% spray	60%

Vitazyme did not significantly increase plant height at 60 and 120 days after planting (3 to 7% increases), but did at 180 and 240 days after planting. At 60 days after planting there was no increase in plant girth with any rate of Vitazyme, but at 120, 180, and 240 days after planting there were significant increases in every case except one (1% spray at 120 days). All root dry weight values were significantly greater with Vitazyme at all concentrations for 120, 180, and 240 days after planting. The 2% spray gave the greatest increase. All increases were massive. In all cases, Vitazyme at all concentrations significantly increased the dry shoot weight above the control, especially the 3% spray that produced 60% more shoot weight at 240 days after planting. As with the root and shoot weight, total plant and dry weight were improved markedly above the control when Vitazyme at all levels was applied. Increases for all times and percentages were significant at P=0.05, especially at 240 days after planting.

Total Plant Weight (dry)



Increase in total plant weight at 240 days with Vitazyme

1% spray	51%
2% spray	48%
3% spray	65%

Treatment	Increase over the control			
	60 days	120 days	180 days	240 days
	grams	grams	grams	grams
1. Control	—	—	—	—
2. 1% spray	1.55 (28%)	5.00 (33%)	11.82 (45%)	20.50 (51%)
3. 2% spray	1.63 (29%)	6.74 (44%)	11.45 (44%)	19.29 (48%)
4. 3% spray	1.87 (33%)	8.60 (56%)	15.38 (59%)	25.96 (65%)
LSD _{0.05}	0.62	3.64	4.35	5.84

*Significantly greater than the control at P = 0.05.

Field Study

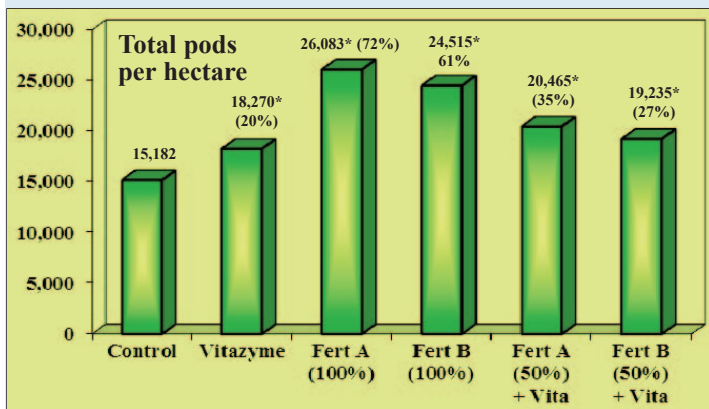
Tree age: 10 to 25 years

Variety: hybrid cocoa

Experimental design: Farms were selected for this study at 10 sites in four cocoa regions: Becham and Onwe Nkwanta (Brong Ahafo Region), Wassa Saamang and Wantram (Western Region), Assin Jakai, Awurabo, and Asikuma (Central Region), and Asamankese, Oda Nkwanta, and Kyenkyenku (Eastern Region). Vitazyme was applied with 50% of two major fertilizers used on the farms, and by itself, alongside 100% of the two fertilizers without Vitazyme plus a control, to determine effects on yield parameters. The locations served as replicates, and each plot was 0.2 ha.

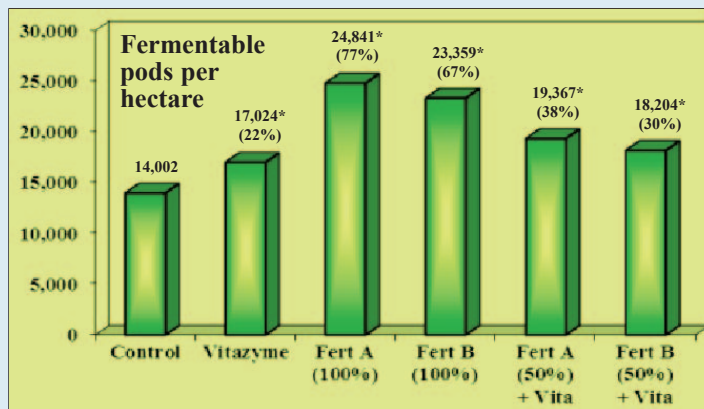
Treatment	Fertilizer		Vitazyme
	Type	Rate	
1	0	0	0
2	0	0	1.5 L/ha
3	A	375 kg/ha (100%)	0
4	B	375 kg/ha (100%)	0
5	A	187.5 kg/ha (50%)	1.5 L/ha
6	B	187.5 kg/ha (50%)	1.5 L/ha

Total Pods



*Significantly greater than the control at P = 0.05. LSD_{0.05} = 2,287.

Fermentable Pods



*Significantly greater than the control at P = 0.05. LSD_{0.05} = 2,159.

Continued on the next page

Fertilization: Treatments 3 and 4, 375 kg/ha of type A and B broadcast in May of 2010; Treatments 5 and 6, 50% of fertilizers A and B (187.5 kg/ha) applied in May of 2010

Vitazyme application: 1.5 liters/ha sprayed on the leaves and trunks of the trees in May, July, and September

Weed control: standard

Black pod disease control: Ridomil Gold (Mefonoxam + copper) applied five times monthly from June to October, 2010

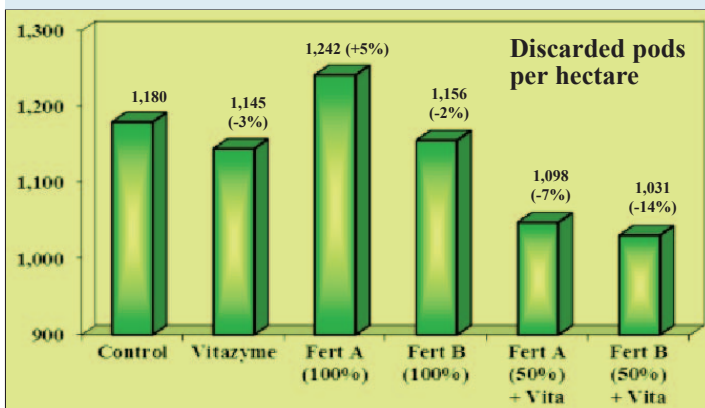
Mirid control: Confidos (Imidacloprid) applied four times from August to December, 2010

Harvest results: See the previous page for Total Pods and Fermentable Pods graphs, as well as the following.

• **Increase in total pods with Vitazyme: 20%**

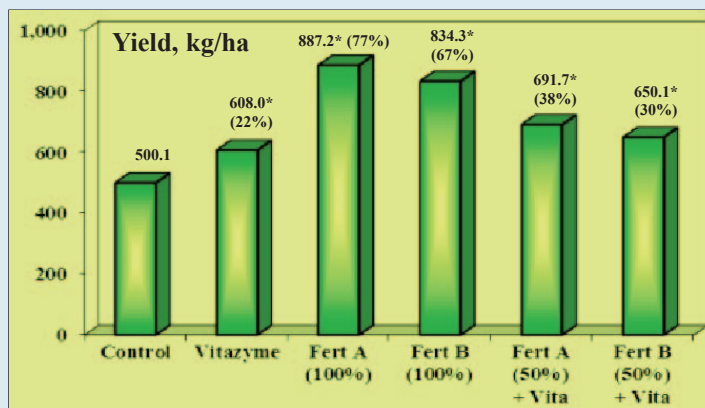
• **Increase in fermentable pods with Vitazyme: 22%**

Discarded Pods



Values are not significantly different at P = 0.05.

Cocoa Yield



*Significantly greater than the control at P = 0.05. LSD_{0.05} = 77.1 kg/ha.

• **Reduction in discarded pods with Vitazyme: -3%**

• **Increase in cocoa yield with Vitazyme: 22%**

All yield parameters displayed a highly positive response to Vitazyme, the total increasing by 20%, fermentable pods by 22%, and discarded pods by -3%. Yield was increased by a full 22%. Fertilizers A and B at 100% both increased pods and yield substantially, and yield was boosted by 77% and 67%, respectively, above the control. However, there was no Fertilizer A or B without Vitazyme to evaluate the effects of this fertilizer level without Vitazyme.

Conclusions: A replicated nursery and field evaluation of cocoa in Ghana revealed that Vitazyme greatly improved the growth of cocoa seedlings when applied to the soil of polyethylene liners as a 1, 2, or 3% spray. Seedling height and girth were significantly increased with all three percentage sprays, especially at 180 and 240 days after planting. The 2% spray did as well as, or better than, the 1% and 3% sprays. Increases were from 16 to 24% at 240 days. Roots were greatly expanded with Vitazyme at 120, 180, and 240 days after planting, up to 113% over the control at 240 days. Shoot weight was significantly improved at all times from 60 to 240 days (41 to 60%), and total plant weight was boosted by 65% with the 3% spray at 240 days, though all Vitazyme percentages did well. These results show how remarkably well Vitazyme improves the growth of young cocoa plants.

The field study likewise proved the efficacy of Vitazyme to increase total and fermentable pods (20 to 22%), reduce discarded pods (by 3%), and increase cocoa yield (22%). Both fertilizers A and B at 100% usage increased pods and yield, by up to 77% for yield; 50% levels of these fertilizers plus Vitazyme improved pod growth (27 to 35%) and fermentable pods (30 to 38%), while reducing discarded pods (-7 to -14%) and increasing yield (30 to 38%). However, interpretations of the study were limited by the absence of a 100% fertilizer plus Vitazyme treatment, as well as a 50% fertilizer treatment without Vitazyme. With such an excellent response from Vitazyme alone, it would be expected – based on previous results with the products – that a synergism would appear at both the 50% and 100% fertilizer levels with Vitazyme application. No such determination could be made by the design of this study.

Cocoa

Researcher: Nguyen Kim Dinh

Location: Village 8, Eapo District, Dak Nong Province, Viet Nam

Variety: TD3 (purple), TD5 (light purple), and TD9 (green)

Soil type: greenhouse mix

Experimental design: A cocoa plantation having three varieties was divided into Vitazyme treated and untreated areas for each variety. Five applications were made on a 500 m² area for each type. Observations on plant growth and yield were made over approximately a six month period.

1. Control

2. Vitazyme

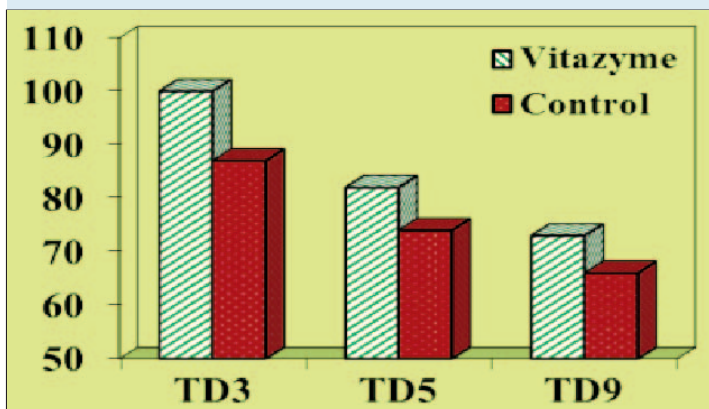
Fertilization: unknown

Vitazyme application: 500 ml of Vitazyme in 200 liters of water for each 500 m² block (1 liter/ha), applied to the leaves on July 24 (flowering), September 24 (small fruit), October 24 of 2011, and January 26 (beginning of harvest) and March 23 of 2012

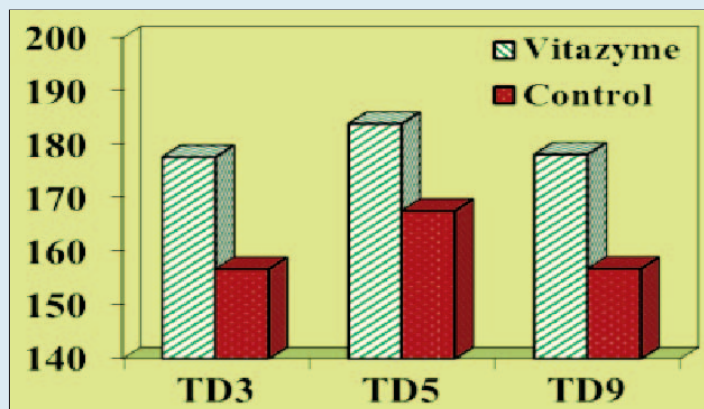
Yield results: Harvests were conducted in January, March, and April of 2012, and totaled for each variety.

Parameter	Vitazyme			Control			Change with Vitazyme		
	TD3	TD5	TD9	TD3	TD5	TD9	TD3	TD5	TD9
Fruit per plant	100	82	73	87	74	66	13 (+15%)	8 (+11%)	7 (+11%)
Dry weight, 1,000 fermented seeds, g	830	105	111	819	103	108	11 (+1%)	2 (+2%)	3 (+3%)
Yield, dry weight of fermented seeds, kg/500 m ²	177.70	183.92	178.20	156.75	167.64	156.81			
Yield increase	20.95 (+13%)	16.28 (+10%)	21.39 (+14%)	—	—	—			

Fruit Per Plant



Yield Per 500 m², kg



Increase in fruit per plant with Vitazyme

TD3	15%
TD5	11%
TD9	11%

Increase in cocoa yield with Vitazyme

TD3	13%
TD5	10%
TD9	14%

Conclusions: This Vietnamese study on cocoa response to five Vitazyme applications over a six-month period revealed a consistent yield increase for all three varieties, a reflection of more fruit per plant. Fruit number increases ranged from 11 to 15%, and yield increases from 10 to 14%, fine responses for this high-value crop.

Cocoa

Researcher: unknown

Location: Viet Nam

Variety: unknown

Experimental design: In a cocoa preparation facility, cocoa seeds were planted to produce “mother plants”, a number of which were treated with Vitazyme to compare with untreated plants. Then these plants were grafted to the other rootstock to comprise the field-ready plants. Applications of Vitazyme were made to the grafted plants as well to evaluate effects on growth and budding.

1. Control

2. Vitazyme

Fertilization: unknown

Vitazyme application: “Mother” plants, a 5% seed treatment, and a 1% Vitazyme spray at 10, 30, 60, and 90 days after planting; grafted plants, a 1% spray over the root zone 3 days after planting, and a 1% spray over the entire plants 14 days after planting.

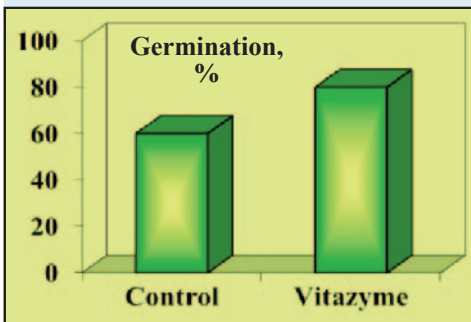
Growth results:

Mother Cocoa Plants

Parameter	Control	Vitazyme	Change with Vitazyme
Germination 7 days after planting	60%	80%	+20 %-points
Live plants 15 days after planting	90%	95%	+5 %-points
Plant height 30 days after planting	10.0 cm	12.5 cm	+2.5 cm (+25%)
Leaf number 30 days after planting	2	4	+2 (+100%)
Plant height 60 days after planting	21.5 cm	24.0 cm	+3.5 cm (+16%)
Plant height 90 days after planting	32.5 cm	42.5 cm	+10.0 cm (+31%)
Grafting date	May 1	March 28 to 30	33 days earlier

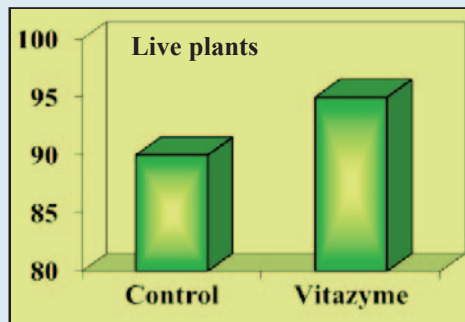
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Germination at 7 Days



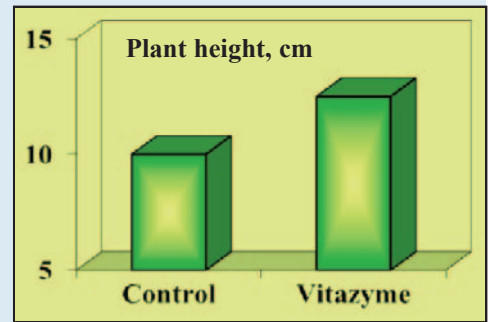
• Increase in germination with Vitazyme: 20 %-points

Live Plants at 15 Days



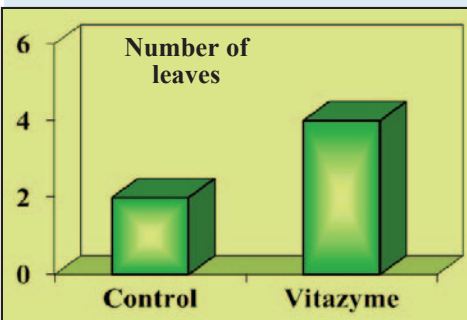
• Increase in live plants with Vitazyme: 5 %-points

Plant Height at 30 Days



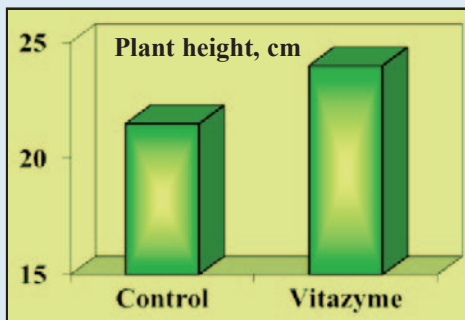
• Increase in plant height with Vitazyme: 25%

Leaf Number at 30 Days



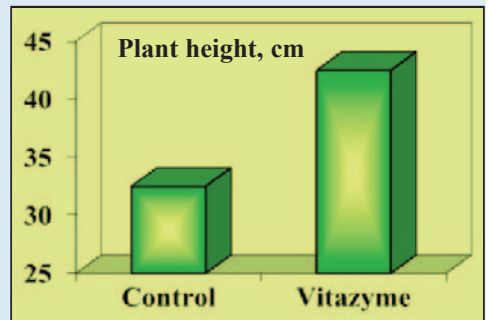
• Increase in leaf number with Vitazyme: 100%

Plant Height at 60 Days



• Increase in plant height with Vitazyme: 16%

Plant Height at 90 Days



• Increase in plant height with Vitazyme: 31%

• Days reduced to grafting: 33 days

It is clear that a Vitazyme seed treatment, and 1% spray at 10, 30, 60, and 90 days after planting greatly stimulated plant development in all cases, including with germination, rate of growth, and time to grafting size.

Plants After Grafting

Parameter	Control	Vitazyme
Emerging shoots	none	April 8 to 10
Live shoots	none	97%
Shoot length	none	11 cm

All plants were grafted on the dates at which grafting size was reached, which was March 28 to 30 for the Vitazyme treatment, and May 1 for the untreated control. Each treatment utilized 2,000 plants.

Because of a 33-day later time to grafting, the control plants had no shoots yet at the time these data were collected.

Conclusions: In a Viet Nam cocoa nursery study, Vitazyme produced a remarkably good result by improving early seed germination (+20%), plant height (+31% at 90 days after planting), and rate of maturity of the developing plants. Treated plants were ready for grafting 33 days before the untreated control "mother" plants. After grafting, the treated plants were growing very well on the measurement date, but no values could be determined for the control plants because they were far behind the Vitazyme treated plants. These results prove the great value of this product to improve the growth, maturity, and early development of cocoa plants in the nursery environment.

Corn

Researcher: Bert Schou, Ph.D.

Location: Cedar Falls, Iowa

Soil type: Aredale Loam (36% sand, 42% silt, 22% clay), 3.6% organic matter, pH = 6.1, C.E.C. = 15.2 meq/100 g, fertility level = excellent, soil drainage = excellent

Seedbed at planting: fine

Planting date: May 9, 2012

Plot size: 15 x 40 feet (600 ft²)

Irrigation: 2 inches total in late July and early August

Experimental design: A small plot, replicated corn trial (four replicates) was established in eastern Iowa to evaluate the ability of two Vitazyme variations, plus an amino acid formulation, alone or in combination, to influence corn yield and quality.

Research organization: Agricultural Custom Research and Education Services (ACRES)

Variety: Pioneer PO 448 (non-GMO)

Previous crop: soybeans

Planting depth: 1.5 inches

Row spacing: 30 inches

Tillage: conventional

Planting rate: 38,000 seeds/acre

Treatment	Vitazyme 1*	Vitazyme 2*	Amino acids*
1	0	0	0
2	13 oz/acre (2x)	0	0
3	0	13 oz/acre (2x)	0
4	0	0	2 oz/acre (2x)
5	13 oz/acre (2x)	0	2 oz/acre (2x)

*All applications were on the seeds at planting, and on the leaves and soil later.



The corn study at ACRES Research, Cedar Falls, Iowa, was affected by severe drought, but some irrigation water helped the crop attain yields of over 200 bu/acre.

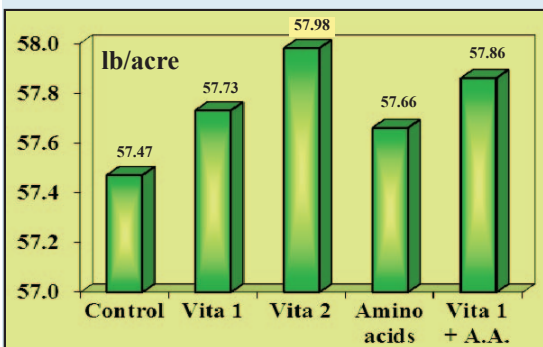
Vitazyme significantly boosted grain yield above the control, by about 24 bu/acre for one version of the product, in this replicated Iowa study. Note improved ear filling.

Fertilization: Fall of 2011, 60 lb/acre of 18-46-0% N-P₂O₅-K₂O; June 5, 2012, 110 lb/acre of N as urea ammonium nitrate, with a sprayer and drop nozzles

Vitazyme application: For Treatments 2, 3, and 5, 13 oz/acre on the seeds at planting (May 9), and again at 13 oz/acre on the leaves and soil at the V6 stage (June 16). Treatments 2 and 5 received Vitazyme 1, and Treatment 3 received a slight modification of the product called Vitazyme 2.

Amino acid application: A proprietary amino acid blend was applied to Treatments 4 and 5, to the seeds at 2 oz/acre on May 9, and to the leaves and soil at the V6 stage at 2 oz/acre on June 16. For Treatment 5, the amino acids were mixed with the Vitazyme before application.

Corn Test Weight



Sprayer settings: seed treatment, 10 gallons/acre of 115 ml of Vitazyme in 3 gallons of water, or 18 ml of amino acids in 3 gallons of water; foliar and soil treatment, 15 gallons/acre of 77 ml of Vitazyme in 3 gallons of water, or 12 ml of amino acids in 3 gallons of water

Weed control: preplant: Harness Xtra at 1.2 quarts/acre; additional post-emergence applications

Weather during the growing season: The season was hot and dry, with the July average high temperature being 92.3° F, and the August average high being 85.5° F. Rainfall for April through October 12 was 12 inches, whereas the normal is 26 inches.

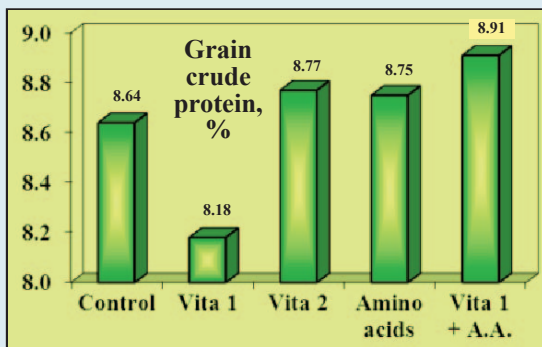
Harvest date: October 20, 2012. A Massey-Ferguson 9 plot combine harvested the middle two rows of each plot, and the corn was weighed on an electronic scale.

Plant population results: No significant differences were detected.

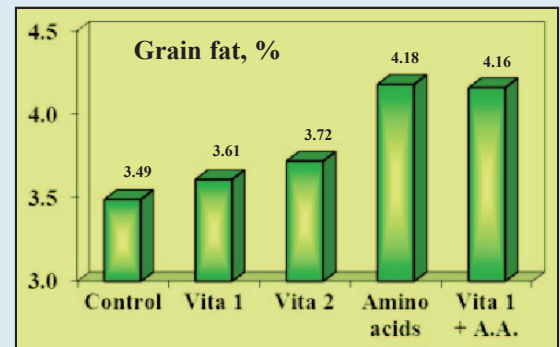
Corn test weight: Although differences among treatments were not significant, all four Vitazyme and amino acid treatments exceeded the control.

Corn protein and fat: Composite corn samples from the four replicates of each treatment were sent to Midwest Laboratories, Inc., Omaha, Nebraska, to evaluate the levels of protein and fat in the samples. Fat of the treated corn always exceeded the untreated control, and in all but one case the protein was also elevated by the treatments. Changes in grain composition are usually quit resistant to treatment, but there were small increases in grain protein with Vitazyme and amino acids. Fat composition was improved by all four treatments, and dramatically by the

Protein (dry basis)



Fat (dry basis)



Increase in grain protein with Vitazyme and amino acids

Vitazyme 2	2%
Amino acids	1%
Vitazyme 1 + Amino acids	3%

Increase in grain fat with Vitazyme and amino acids

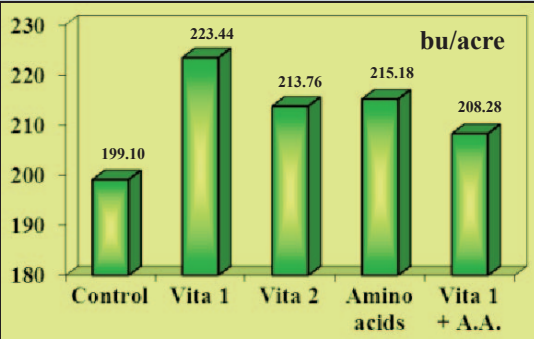
Vitazyme 1	3%
Vitazyme 2	7%
Amino acids	20%
Vitazyme 1 + Amino acids	3%

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Corn Yield

Treatment	Yield ¹ bu/acre	Yield change bu/acre
1. Control	199.10 b	—
2. Vitazyme 1	223.44 a	24.34 (+12%)
3. Vitazyme 2	213.76 ab	14.66 (+7%)
4. Amino acids	215.18 ab	16.08 (+8%)
5. Vita 1 + A.A.	208.28 ab	9.18 (+5%)
LSD _{0.05}	15.21 bu/acre	
Standard deviation	11.35 bu/acre	
Replicate F	10.947	
Treatment F	3.150	
C.V.	5.35%	

¹Means followed by the same letter are not significantly different at P = 0.05, according to the Student-Newman-Keuls Test.



Increase in yield with Vitazyme and amino acids

Vitazyme 1	12%
Vitazyme 2	7%
Amino acids	8%
Vitazyme 1 + Amino acids ...	5%

amino acid and Vitazyme 1 plus amino acid treatments (19 to 20%).

Yield results:

The two inner rows of each plot were harvested. Notice that Vitazyme 1 increased the corn yield by 12% (24.34 bu/acre), while the other treatments boosted the yield by from 5 to 8% above the control.

While these lower increases were not significant at P = 0.05, yet the 7 and 8% increases were very close to being significant.

Conclusions: A replicated corn study in east-central Iowa, during a very hot and dry year, revealed that two variations of Vitazyme both increased corn yield, one by 12% (24.34 bu/acre), and another by 7% (14.66 bu/acre). An amino acid product increased yield by 8% (16.08 bu/acre). With a corn price of \$7.50/bu during the fall of 2012, these yield increases translate to \$182.55, \$109.95, and \$120.60/acre, respectively. The combined Vitazyme plus amino acid treatment increased yield a very respectable 5% (9.18 bu/acre), but did not display a synergism. Grain quality was also improved by both Vitazyme and amino acids. Per bushel weight was increased by up to 0.51 lb/bu (Vitazyme 2), and grain protein was improved by 1 to 3%. Grain fat was especially enhanced by both products, increasing by 3 to 7% with Vitazyme alone, by 20% with amino acids alone, and by 19% with the two products combined. These results show the great value of utilizing Vitazyme, and to a lesser extent the amino acids, to improve corn grain yield and quality in the central Corn Belt. There appears to be no synergism between Vitazyme and the amino acid formulation used in this study.



The ears and roots of corn in this east-central Iowa study show a typical response to two Vitazyme applications, 13 oz/acre on the seeds and at the V6 stage.

Corn

Seed Treatment Results in the Greenhouse

Researcher: Paul W. Syltie, Ph.D.

Variety: yellow dent

Planting date: March 14, 2012

Seeding rate: 8 seeds/pot, thinned to 3 plants/pot

Experimental design: A four replicated greenhouse trial, using corn seeds pre-treated with Vitazyme on January 17, 2012, was planted on March 14, 2012, 57 days after treatment, to determine residual effects of the seed treatment on plant growth. A randomized complete block design was used.

1. Control

2. Vitazyme seed treatment

Fertilization: none

Vitazyme treatment: On January 17, corn seeds were soaked in a 10% Vitazyme solution for 6 minutes, then dried on paper towels with a fan blowing across them for rapid drying. The seeds were stored in closed jars at room temperature along with untreated seeds, which served as the control.

Harvest date: April 5, 2012, 21 days after planting

Dry weight results: Roots of the corn plants were washed free of soil, and the plants were placed in a drying oven at 115 °F for 24 hours. Weights of the dried plants for each pot

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas

Pot size: 1 gallon

Soil type: silt loam



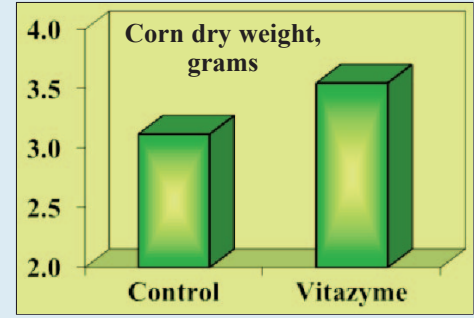
As a result of this greenhouse study, wherein corn seeds had been treated with a 10% solution of Vitazyme 57 days before planting, the long-term efficacy has been shown.

were recorded to the nearest 0.01 gram. A seed treatment on these corn seeds 57 days before planting caused a significant 14% increase in dry weight at harvest.

Conclusions: A greenhouse pot study, using corn seeds treated with a 10% Vitazyme solution and dried 57 days earlier, produced a 14% increase in dry weight after 21 days of growth. This significant increase at $P = 0.10$ shows the effectiveness of a seed treatment to improve corn growth, and the long-term efficacy of the product.

Corn Dry Weight

Treatment	Dry Weight	Weight change
	g	g
Control	3.12	—
Vitazyme seed trt.	3.55	0.43 (+14%)
Block P	0.339*	
Treatment P	0.0978*	
Model P	0.0403*	
CV _{0.10}	7.581%	
LSD _{0.10}	0.42 gram	



Corn

A Greenhouse Study

Researcher: Paul W. Syltie, Ph.D.

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas

Variety: yellow dent

Planting date: January 19, 2012

Pot size: 1 gallon

Planting rate: 8 seeds/pot, thinned to 3 plants/pot

Soil type: silt loam

Experimental design: A greenhouse pot trial using 12 replicates was set up to evaluate the effect of Vitazyme, applied once at a standard field rate, on corn growth.

1. Control

2. Vitazyme

Fertilization: none

Vitazyme application: 100 ml of a 0.1% solution for each pot, immediately after planting

Harvest date: March 5, 2012, 46 days after planting

Plant height results: All plants were measured to the nearest cm, and the three plants for each pot were averaged. Vitazyme increased corn height by 4% at 46 days after planting, but this increase was not significant at $P = 0.10$.



The roots of the Vitazyme treated corn plants are obviously denser, enabling them to absorb more nutrients and promote growth of the leaves as seen on the right.

Plant Height

Treatment	Plant height	Height change
	cm	cm
Control	95.7 a	—
Vitazyme	99.3 a	3.6 (+4%)
Block P	0.382	
Treatment P	0.153	
Model P	0.336	
CV _{0.10}	5.85%	
LSD _{0.10}	4.2 cm	

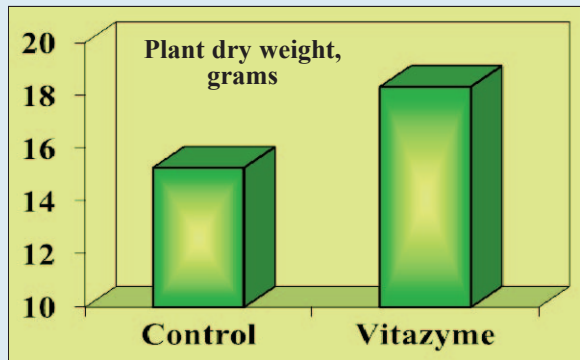
Plant Dry Weight

Treatment	Dry weight	Weight change
	grams	grams
Control	15.27	—
Vitazyme seed trt.	18.33	3.06 (+20%)
Block P	0.7148	
Treatment P	0.0029**	
Model P	0.1589	
CV _{0.10}	11.74%	
LSD _{0.10}	1.45 grams	

Dry weight results: The plants were placed in a drying oven for 24 hours at 115°F, and then weighed to the nearest 0.01 gram. Vitazyme dramatically and significantly increased the dry matter accumulation of the corn (20%) with only one application.

Conclusions: In this greenhouse trial, Vitazyme greatly increased the fixation of dry matter in the plants with 100 ml/pot of a 0.1% solution applied at planting. The increase was highly significant, and 20% greater than the control. Plant height was increased by 4% with Vitazyme, but this increase was not significant. These results verify the utility of this product, with its natural vitamins and growth regulators, to improve plant growth and yield.

• Increase in dry weight with Vitazyme: 20%



Corn

Yield, Quality, and Hail Damage - University of Missouri



Despite a severe hailstorm in early July, the corn of this Vitazyme trial recovered to some extent. The treated plants had greater standability—20% more unbroken stalks—due to more lignin and other supportive tissues in the stalks.

Note the greater degree of ear filling with Vitazyme in spite of the severe hail damage. This difference resulted in a 17% greater grain yield with Vitazyme because of less stalk damage as greater nutrient uptake.

Researcher: Manjula Nathan, Ph. D., and Timothy Reinbott, research station supervisor

Location: University of Missouri Division of Plant Sciences, Columbia, Missouri, research farm

Variety: unknown hybrid

Planting date: May 3, 2011

Row spacing: 30 inches

Seeding rate: 32,000 seeds/acre

Soil type: unknown

Experimental design: A plot area of 12 rows – six rows for a control and six rows for the Vitazyme treatment, or 0.33 acre for each area – was selected; each row was 200 feet long. Corn was grown to determine the effects of Vitazyme on the yield and growth characteristics of corn.

1. Control

2. Vitazyme

Fertilization: station standard for corn

Vitazyme application: The corn seeds of Treatment 2 were seed treated with straight Vitazyme to give a coating of 13 oz on 32,000 seeds, or an equivalent of 13 oz/acre. The control received water only on the seeds. On June 28 (V10 stage), a soil/foliar application of 13 oz/acre was made to Treatment 2.

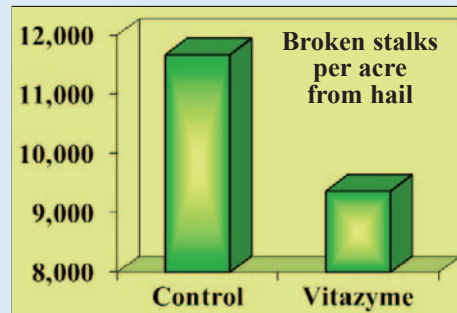
Hail damage event: On July 2, a severe hail storm (stones of golf ball size) struck the plot area, resulting in considerable damage to the crop, with many partially or completely broken stalks. Since there appeared to be a difference in stalk damage between the two treatments, a count was made of broken stalks. It is clear that the Vitazyme treated corn had substantially stronger stalks due to greater deposition of lignin, cellulose, and hemicellulose in the stalk structures.

Plant analysis results: On July 14, at silking, some of the hail-damaged ear-leaf tissue was collected and analyzed at the University of Missouri Soil and Crop Testing Laboratory. Results are shown below. d.m. = dry matter. All nutrients and protein were increased in leaf tissue harvested at silking.

Broken Stalks

Treatment	Broken stalks stalks/acre	Difference stalks/acre
Control	11,671	—
Vitazyme	9,365	(-) 2,306 (-20%)

• Decrease in broken stalks with Vitazyme: -20%



Plant Analysis

Treatment	Nitrogen % d.m.	N change % d.m.	Phosphorus % d.m.	P change % d.m.	Potassium % d.m.	K change % d.m.	Crude protein %	Protein change %
Control	2.126	—	0.290	—	1.323	—	13.3	—
Vitazyme	2.188	0.062 (+3%)	0.338	0.048 (+17%)	1.550	0.227 (+17%)	13.7	0.4 (+3%)

Grain analysis results: At harvest, grain samples of the two treatments were analyzed at the University of Missouri Soil and Crop Testing Laboratory, with the following results.

Increase in leaf N with Vitazyme: 3%
Increase in leaf P with Vitazyme: 17%
Increase in leaf K with Vitazyme: 17%
Increase in leaf crude protein with Vitazyme: 3% (0.4%-point)

Grain Analysis

Treatment	N	P	K	Ca	Mg	Zn	Fe	Mn	Cu	B	Mo	S	N:S
	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	%	
Control	1.20	0.35	0.36	0.01	0.06	16.8	13.2	3.9	2.6	28.2	1.0	0.007	171
Vitazyme	1.20	0.55	0.40	0.01	0.09	20.4	14.6	5.1	2.9	27.5	0.3	0.005	240

Increases with Vitazyme

P	0.20 %-point	Fe	1.4 ppm
K	0.04 %-point	Mn	1.2 ppm
Mg	0.03 %-point	Cu	0.3 ppm
Zn	3.6 ppm	N:S	171 to 240

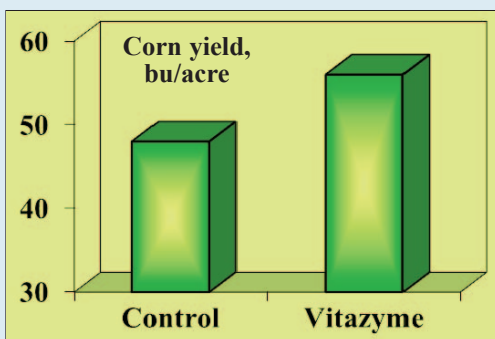
In most cases, nutrient uptake into the grain was increased with Vitazyme application.

Yield results: Due to the July 3 hail storm, yields were greatly reduced, and are given to the right.

Conclusions: In this side-by-side experimental farm demonstration at Columbia, Missouri, a seed plus foliar treatment of Vitazyme resulted in a substantial 8 bu/acre (17%) yield increase despite a severe hailstorm on July 3. Of considerable interest is the fact that the hail storm broke off 20% fewer stalks that had been treated with this product due to stronger connective tissues – cellulose, hemicellulose, and lignin – in the treated plants. Tissue levels of N, P, K, and protein were all increased, especially P, and K, and grain elemental levels at harvest were in most cases increased, especially for P. These results reveal the ability of Vitazyme's active agents to activate rhizosphere activity and the availability of nutrients, especially P, presumably because of a more active mycorrhizae population. An analysis of free amino acids in the plant tissues is discussed in a separate report.

Corn Yield

Treatment	Grain yield bu/acre	Yield change bu/acre
Control	48	—
Vitazyme	56	8 (+17%)



• Increase in grain yield with Vitazyme: 17%



Plants treated with two applications of Vitazyme (right) show greater height and more vigorous, healthy root systems. As a result, the yield was increased by 17%.

Corn



Corn to be harvested as "baby corn" is shown here in the untreated portion of the field. The plants show nutrient deficiencies, especially compared to the photo on the right.

Baby corn in Kenya treated with Vitazyme and Rizobacter is growing very well compared to the untreated control (left-hand photo). The combination increased yield by 127%.

Continued on the next page

Researcher: Richard Stonewigg

Research organization: Lachlan Kenya Limited.

Location: Mboga Tuu, Isinya, Kenya

Soil type: unknown

Variety: "Baby" corn

Planting date: November, 2011

Irrigation: drip

Experimental design: A field of baby corn was divided into five treatments of 1,800 m² each to evaluate the effect of Vitazyme (two formulations) and Rizobacter, alone and in combination, on the health, growth parameters, and yield of the crop.

- 1. Control
- 2. Vitazyme, regular
- 3. Rizobacter
- 4. Vitazyme, regular + Rizobacter
- 5. Vitazyme, from concentrate + Rizobacter

Fertilization: unknown

Vitazyme treatment: The Vitazyme from concentrate was diluted with water (1 part concentrate to 9 parts water). Treatments for either product alone, or combined with Rizobacter, are shown on the right.

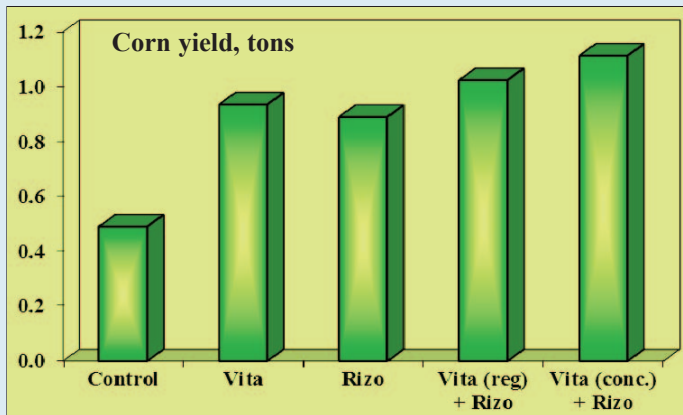
Rizobacter application: The Rizobacter products are bacterial preparations from Argentina.

Yield results: The crop was harvested in January of 2012.

Time	Rate
Seeding	5 ml/kg of seed
Drench, pre-plant	200 ml/20 liters of water
Two weeks post-plant	foliar 50 ml/20 liters of water
Before tasseling	foliar 50 ml/20 liters of water
At tasseling	foliar 50 ml/20 liters of water
At ear filling	foliar 50 ml/20 liters of water

Corn Yield

Treatment	Yield tons	Yield increase tons
1. Control	0.490	—
2. Vitazyme, regular	0.935	0.445 (+91%)
3. Rizobacter	0.890	0.400 (+82%)
4. Vita (regular) + Rizobacter	1.024	0.534 (+109%)
5. Vita (from conc.) + Rizobacter	1.113	0.623 (+127%)



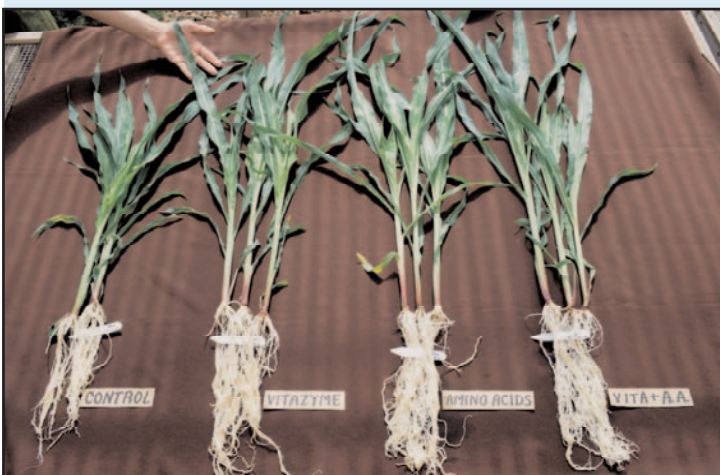
Yield increase with Vitazyme

- Vitazyme regular 91%**
- Vitazyme regular + Rizobacter 109%**
- Vitazyme concentrate + Rizobacter 127%**

Conclusions: This baby corn study in Kenya proved that both Vitazyme and Rizobacter inoculant gave excellent yield increases, especially when the two products were combined. Regular Vitazyme gave a 91% yield increase, while Rizobacter alone provided an 82% increase. When regular Vitazyme was combined with Rizobacter, a 109% yield increase resulted, showing the synergism between the bacterial product and Vitazyme. Both the regular and the diluted concentrate (10:1) provided excellent yield increases (109% and 127%, respectively), proving that the diluted concentrate is as viable a product as is the regular product.

Corn

A Greenhouse Trial - Synergism With Amino Acids



All treatments—Vitazyme, amino acids, and their combination—significantly increased plant height and dry weight. There was a small synergism of the two products. Notice especially the stimulation of roots by the three treatments.

Researcher: Paul W. Syltie, Ph.D.

Variety: yellow dent

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas

Pot size: 1 gallon

Planting date: January 19, 2012

Soil type: silt loam

Planting rate: 8 seeds/pot, thinned to 3 plants/pot

Experimental design: A replicated greenhouse pot study (four reps) was set up to evaluate the effects of Vitazyme and certain amino acids — alone and together — on corn growth.

- 1. Control
- 2. Vitazyme
- 3. Amino acids
- 4. Vitazyme + Amino acids

Fertilization: none

Vitazyme application: Pots of Treatments 2 and 4 received 100 ml/pot of a 0.1% Vitazyme solution just after seeding.

Amino acid application: A special liquid proprietary amino acid blend was applied at 100 ml of a 0.04% solution to Treatments 3 and 4. For Treatment 4, the product was mixed with Vitazyme in 100 ml of water.

Harvest date: March 1, 2012, 41 days after planting

Height results: The three plants from each pot were measured to the nearest cm, and averaged. A statistical analysis was then performed on these averages.

Plant Height

Treatment	Plant height cm	Height change cm
Control	82.6 b	—
Vitazyme	91.9 a	9.3 (+11%)
Amino acids	92.7 a	10.1 (+12%)
Vita + A.A.	88.4 a	5.8 (+7%)
Block F	0.0096*	
Main effects F	0.0262*	
Model F	0.0088*	
LSD _{0.10}	5.3 cm	
CV _{0.10}	4.63%	

Plant Dry Weight

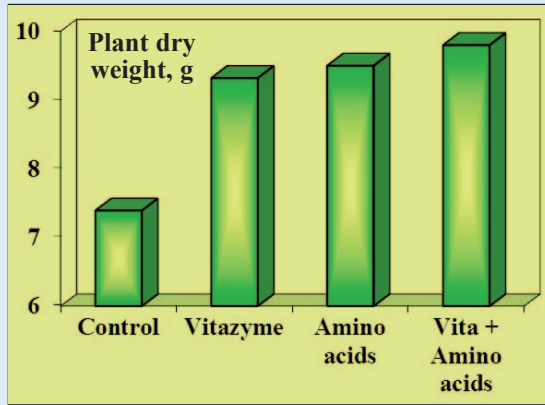
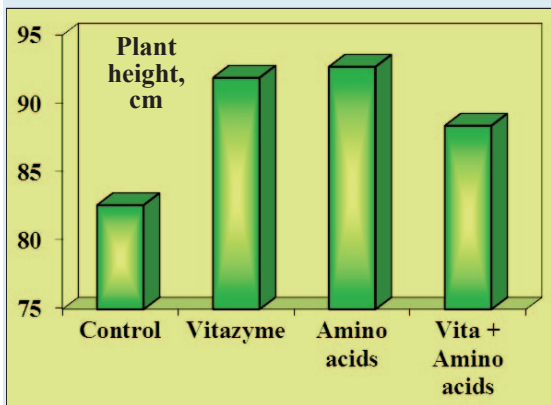
Treatment	Dry weight g	Weight change g
Control	7.39 b	—
Vitazyme	9.32 a	1.93 (+26%)
Amino acids	9.50 a	2.11 (+29%)
Vita + A.A.	9.80 a	2.41 (+33%)
Block F	0.184	
Main effects F	0.068*	
Model F	0.088*	
LSD _{0.10}	1.54 gram	
CV _{0.10}	13.2%	

All three treatments significantly increased plant height at P = 0.10.

Dry weight results: The harvested plants were dried in a drying oven for 24 hours at 115°F, before weighing to the nearest 0.01 gram.

All three treatments increased plant dry weight at P = 0.10, especially the combined Vitazyme + Amino Acid treatment.

Conclusions: In this greenhouse study with corn, Vitazyme, Amino Acids, and the combined products all significantly increased both plant height and dry weight. Dry weight was especially improved (+33%) by the combined products, showing a possible synergism between them.



Increase in height with Vitazyme: 11%
Increase in height with Amino Acids: 12%

Increase in dry weight with Vitazyme
Vitazyme 26%
Amino acids 29%
Vitazyme + Amino Acids 33%

Corn

Researcher: James Anderson

Varieties: Pioneer 38A56, Garst 88B37

Planting rate: 32,000 seeds/acre

Experimental design: A field was divided into plots of field length to determine the effects of Vitazyme on corn yield and test weight for various varieties.

Farmer: David Bergeson

Planting date: April 25, 2012

Previous crop: soybeans

Location: Dawson, Minnesota

Row width: 30 inches

Tillage: conservation

1. Control

2. Vitazyme



The Vitazyme treated corn on the right had very long leaves, and stayed greener longer through the severe drought of 2012. The left-hand row is an untreated control.



Plant samples dug from the two treatments displayed the typical response to Vitazyme of more extensive roots, thicker stalks, and larger and more uniform ears.

Continued on the next page

Fertilization: (1) starter in-furrow at 8 gal/acre (a 20-14-12% N-P₂O₅-K₂O formulation with sulfur and zinc, dry mixed at 1.5 lb/gal of water); (2) 120 lb/acre of anhydrous NH₃ (82% N)

Vitazyme application: 13 oz/acre in the starter, in the seed row at planting

Weather: very dry all season

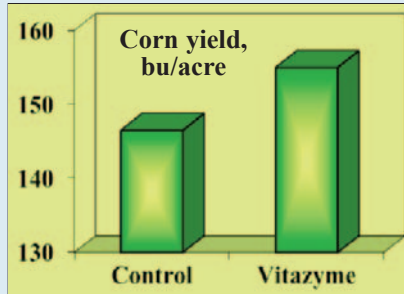
Yield and test weight results: A weigh wagon was used to weigh the corn for a measured area, from which yield calculations were made. Harvest date was September 29, 2012.

Variety: Pioneer 37A56

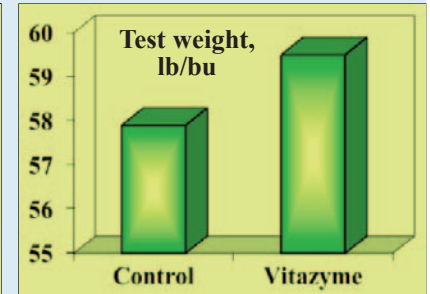
Treatment	Yield	Yield change	Test weight	Test weight change
	bu/acre	bu/acre	lb/bu	lb/bu
Control	146.5	—	57.9	—
Vitazyme	155.0	8.5 (+6%)	59.5	+1.6

- Increase in yield with Vitazyme: 6%
- Increase in test weight with Vitazyme: 1.6 lb/bu

Corn Yield



Test Weight



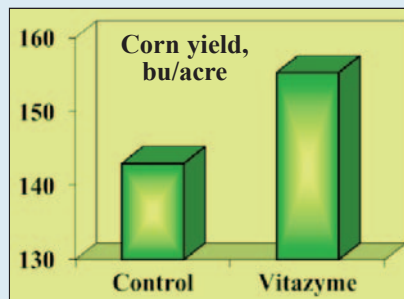
Pioneer 38A56 responded with a yield increase of 6% (8.5 bu/acre), and with heavier grain that weighed 1.6 lb/bu more with Vitazyme.

Variety: Garst 88B37

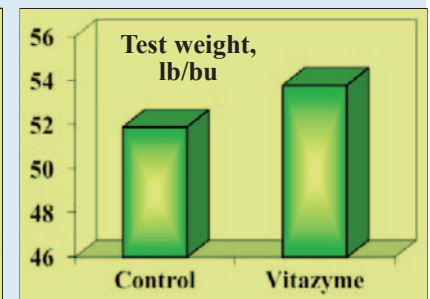
Treatment	Yield	Yield change	Test weight	Test weight change
	bu/acre	bu/acre	lb/bu	lb/bu
Control	143.0	—	51.9	—
Vitazyme	155.3	12.3 (+9%)	53.8	+1.9

- Increase in yield with Vitazyme: 9%
- Increase in test weight with Vitazyme: 1.9 lb/bu

Corn Yield



Test Weight



Garst 88B37 produced excellent responses with Vitazyme, the yield increasing by 9% (12.3 bu/acre), and the test weight by 1.9 lb/bu.

The great increase in Federal 5100 yield with Vitazyme was due in part to the fact that the harvest was postponed because of equipment problems. As a result, high winds blew down some of the corn, preferentially downing the untreated control corn because the stalks and ear shanks were weaker

Conclusions: Four comparisons of Vitazyme treated and untreated corn varieties in this west central Minnesota study produced excellent yield increases for Vitazyme: 6% for Pioneer 38A56, 9% for Garst 88B37, 4% for Pioneer 36152, and 24% for Federal 5100.

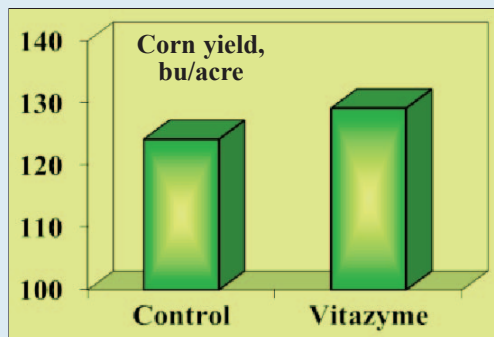
The 24% increase for the Federal variety was due in part to better standability and stronger stalks and shanks. These results show

the great value in using Vitazyme to increase corn yields, grain weight, and profits in western Minnesota. Since only 13 oz/acre was used at planting, at a cost of about \$5.00/acre, then the smallest increase (5.0 bu/acre) netted an added \$32.50/acre — using \$7.50/bu of corn — while the highest increase (20.6 bu/acre) netted \$149.50/acre more with a single Vitazyme application. The recommended two applications would likely have given addition returns on investment.

Variety: Pioneer 36152

Corn Yield

Treatment	Yield	Yield change
	bu/acre	bu/acre
Control	124.2	—
Vitazyme	129.2	5.0 (+4%)

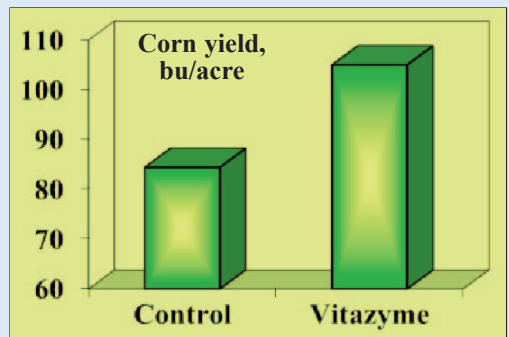


- Increase in yield with Vitazyme: 4%

Variety: Federal 5100

Corn Yield

Treatment	Yield	Yield change
	bu/acre	bu/acre
Control	84.4	—
Vitazyme	105.0	20.6 (+24%)



- Increase in yield with Vitazyme: 24%

Corn

Free Amino Acid Levels - University of Missouri

Researcher: Manjula Nathan, Ph. D.

Variety: unknown

Seeding rate: 32,000 seeds/acre

Experimental design: A plot area of 12 rows — six rows for the control and six rows for the Vitazyme treatment (0.33 acre per treatment) — was selected; each row was 200 feet long. Corn was grown to determine yield responses (reported elsewhere), and also to evaluate the free amino acid levels in plant tissues.

Location: University of Missouri, Columbia, Missouri

Planting date: May 3, 2011

Soil type: unknown

Row spacing: 30 inches

1. Control

Fertilization: station standard for corn

Vitazyme application: The seeds for Treatment 2 were treated with 100% Vitazyme to give a coating of 13 oz on 32,000 seeds, or an equivalent of 13 oz/acre. The control received only water on the seeds. On June 28 (V10 stage), an additional 13 oz/acre was applied to the leaves and soil of Treatment 2.

Free amino acid analysis: Samples of leaves below and opposite the ear were collected on July 14, during silking. These leaves were quite ragged due to the hail damage of a severe storm that struck on July 3, 11 days before. These composite samples from each treatment were frozen and later analyzed at a university laboratory to determine levels of free amino acids.

Note that the net effect of Vitazyme is to decrease the free amino acid level of the leaf tissue slightly (1.90 µg/100mg). This occurred in spite of the fact that large increases occurred for isoleucine, ornithine, and arginine. Most amino acids decreased with Vitazyme treatment, which should help explain the observation that treated plants resist fungal, bacterial, nematode, and other infections.

Conclusions: This University of Missouri corn trial revealed that **Vitazyme reduced the level of most free amino acids in leaf tissue** when sampled at silking, but fairly large increases in isoleucine, ornithine, and arginine offset much of the reduction. Even so, **the theory of trophobiosis -- where high levels of free amino acids in tissues encourage the growth of pathogenic fungi, bacteria, nematodes, and other pests -- is somewhat substantiated by these results.** Vitazyme stimulates the metabolic activity of various cycles in leaves, so proteosynthesis is encouraged to reduce the free amino acid backlog in tissues, thus reducing pest feeding potential.

2. Vitazyme

Amino acid*	Control µg/100 mg	Vitazyme µg/100 mg	Change µg/100 mg
Aspartic acid	23.32	20.04	-3.28
Threonine	21.72	20.33	-1.39
Serine	16.13	15.52	-0.61
Glutamic acid	29.55	28.15	-1.40
α-amino adipic acid	0.78	1.45	+0.67
Proline	9.49	9.73	+0.24
Glycine	6.88	5.84	-1.04
Alanine	35.26	32.81	-2.45
Valine	14.06	13.40	-0.66
Methionine	0.61	0.46	-0.15
Cystine	11.07	11.43	+0.36
Isoleucine	10.21	15.39	+5.18
Leucine	15.28	16.64	+1.36
Tyrosine	11.14	11.83	-0.69
Phenylalanine	12.37	10.11	-2.26
β-amino isobutyric acid	5.80	4.66	-1.14
alpha-amino butyric acid	6.63	6.12	-0.51
Ornithine	3.29	7.93	+4.64
Lysine	14.89	13.80	-1.09
Histidine	3.26	3.10	-0.16
Arginine	0.72	3.20	+2.48
Net change			-1.90

*Only those free amino acids that were discovered in the analysis are listed here.

Corn

Researcher: V. Plotnikov

Location: Vinnytsia, Ukraine

Seedbed preparation: plowing, harrowing, and cultivation

Soil type: gray podzolic (2.2% organic matter, 8.4 mg/100 g of soil hydrolyzed N, 15.8 mg/100 g of soil P, 12.4 mg/100 g of soil exchangeable K, pH = 5.5)

Planting date: May 14, 2012

Experimental design: A small plot corn study was laid out on land previously grown to corn, using 1.1 ha plots and four replications. The purpose of the study was to determine the effect of Vitazyme biostimulant on corn growth and yield, with one treatment using soil on which a Vitazyme treated corn crop had been grown in 2011. Thus, any carryover effect would be detected.

1. Control

2. Vitazyme

3. Vitazyme in 2011

Fertilization: 100 kg/ha N, 60 kg/ha P₂O₅, and 60 kg/ha K₂O applied before cultivation

Research organization: National Academy of Agricultural Sciences

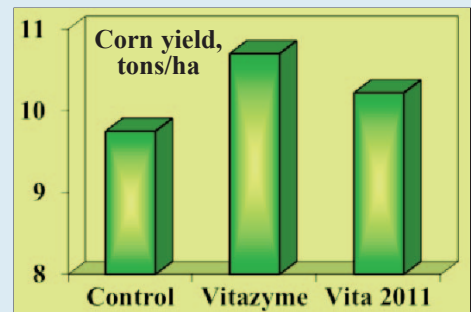
Variety: DKS 2960 (FAO 250)

Previous crop: corn

Seeding rate: 80,000 seeds/ha

Corn Yield

Treatment	Grain yield tons/ha	Yield change tons/ha	Income increase hrn/ha
Control	9.75	—	—
Vitazyme	10.70	0.95 (+10%)	1,700
Vita in 2011	10.22	0.47 (+5%)	880



Continued on the next page

Vitazyme application: 1 liter/ha sprayed on the leaves and soil at five to six mature leaves

Yield and income results: See the graph and table on the previous page. Vitazyme produced an excellent 10% yield increase with 1 liter/ha applied, and there was a significant 5% increase from residual effects from 2011 applications

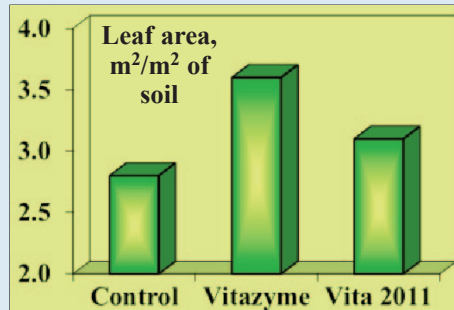
Increase in yield with Vitazyme, 1 liter/ha: 10%
Increase in yield with Vitazyme, applied in 2011: 5%

Leaf area results: A great response in leaf area was noted with Vitazyme application, 29% more leaf area with the 1 liter/ha application, and 11% more with the 2011 treatment. The carryover effect was very apparent.

Conclusions: A replicated Ukrainian corn study, using Vitazyme at the 5 to 6 leaf stage, provided a yield increase of 10%, and a consequential income increase of 1,700 hrn/ha. Corn treated on the same plots in 2011 caused a respectable 5% yield increase. Corn leaf area was also increased by Vitazyme (by 29%) for the 1 liter/ha application, and by 11% with the 2011 treatments. These results show the strong carryover effect of the product, and the highly positive and profitable yield results, making it an excellent choice for farmers in Ukraine.

Leaf Area

Treatment	Leaf area m ² /m ² of soil	Leaf area change m ² /m ² of soil
Control	2.8	—
Vitazyme	3.6	0.8 (+29%)
Vita in 2011	3.1	0.3 (+11%)



Increase in leaf area with Vitazyme, 1 liter/ha: 29%
Increase in leaf area with Vitazyme, applied in 2011: 11%

Corn

Researcher: Eddie Pearson

Variety: Pioneer 2058

Seeding rate: 26,500 seeds/acre

Experimental design: Two adjacent corn fields, both treated equally and of the same soil type, were selected to compare a single Vitazyme treatment with an untreated area. A 65-acre field served as the untreated control, and an adjacent 10-acre area was treated with Vitazyme.

Location: Hooser Farm, Frost, Texas

Planting date: February 27, 2012

Row spacing: 30 inches

1. Control

2. Vitazyme

Fertilization:

before planting, 150 lb/acre anhydrous ammonia (82-0-0 % N-P₂O₅K₂O), 150 lb/acre 18-46-0, and 150 lb/acre 32-0-0; during growth, 110 lb/acre 34-0-0 sidedressed

Vitazyme application: 13

oz / acre sprayed over the leaves and soil sometime between February 27 and May 10, 2012

Harvest date: July 19, 2012

Yield results: At harvest, three 30-foot typical sections of row for both treatments were picked and bagged, to make a com-



Although the roots were fairly dry and curled when this photo was taken, it can be noted that the Vitazyme treated corn roots are thicker and longer, and the stalks are thicker. Note the entire plants to the right.



The treated corn plants on the right have wider leaves and more leaf area, coupled with more roots to produce the 12% yield increase noted in this south Texas study.

Corn Yield

Treatment	Ear number	Ear weight lb	Estimated grain ¹ lb	Yield ² bu/acre	Yield change bu/acre
Control	110	58.8	47.0	162.5	—
Vitazyme	123 (+12%)	65.8 (+12%)	52.6	181.8	19.3 (+12%)

¹A shelling percentage of 80% grain on the ear is estimated. Moisture content is estimated at 14%.

²Area harvested for each treatment = 0.0051653 acre. 1 bushel = 56 lb.

posite 90-foot (225 ft.²) row sample for each.

Income results: Based on corn valued at \$8.30/bu, 13 oz/acre of Vitazyme increased the value of corn produced by \$160.19/acre.

Aflatoxin levels: Samples of corn grain from each treatment were sent to A and L Laboratories in Lubbock, Texas. Both samples tested negative (<2 ppb) for aflatoxins.

Conclusions: By applying 13 oz/acre one time to this corn field in southern Texas, the yield was increased by 19.3 bu/acre, giving an increased income of about \$160/acre. This shows the efficacy of even a single application of Vitazyme for corn, although the total program recommended a 13 oz/acre application on the seeds at planting, which likely would have increased the yield even more.

- **Increase in ear number with Vitazyme: 12%**
- **Increase in ear weight with Vitazyme: 12%**
- **Increase in yield with Vitazyme: 12%**

Grass Hay

A Testimonial

Researcher: John Clark, Advanced AquaTronics International Corp., Pompano Beach, Florida

Farmer: Jim Lush

Location: Brush Creek, Tennessee

Experimental design: Vitazyme was provided to the grower for a hay trial. The farmer applied the product to 40 acres of grass hay land and harvested the crop without weighing the yield, or comparing with an untreated control. He gave the following report.

“John, thank you for making me aware of your Organazyme [Vitazyme] product. I was very skeptical at first, but after speaking to Paul Syltie, Ph.D., I decided to give Organazyme a try. I have a farm in middle Tennessee, and we normally cut 60 acres of hay, which is enough to keep our cows and horses in hay for the winter. Last year we were only able to cut 40 acres. This meant I would have to buy hay to get through the winter. To my surprise, we got the same amount of hay cutting 40 acres as we did the year before cutting the full 60 acres. The only difference was, I used your Organazyme [Vitazyme]!”

John, I am constantly looking for ways to increase my production while cutting my costs. This year I will cut the full 60 acres, which means [by] using Organazyme [Vitazyme] I should harvest one-third more hay than I need. That’s a huge increase.

Thank you again!”

Jim Lush, Brush Creek, Tennessee

Grapes (Table)



Vitazyme plus Ethrel on grapes in Chile produced excellent coloration and earlier maturity compared to the untreated control, as seen to the right.



Ethrel alone did not enhance early grape coloration nearly as much as did a combined Ethrel plus Vitazyme spray. This photo was taken the same day as the one on the left.

Researcher: Rodrigo Retamal

Location: San Fernando, Region VI, Chile

Variety: Crimson Seedless

Farm: Agrícola El Tambo (Rio Blanco)

Cooperating organization: Syngenta, Santiago, Chile

Continued on the next page

Experimental design: A vineyard of Crimson Seedless grapes were divided into Vitazyme + Ethrel and Ethrel treated portions to evaluate the relative effects of the two products on grape yield

1. Ethrel once

2. Vitazyme three times + Ethrel once

Fertilization: unknown

Vitazyme application: 2 liters/ha two times during the growing season on the leaves and fruit

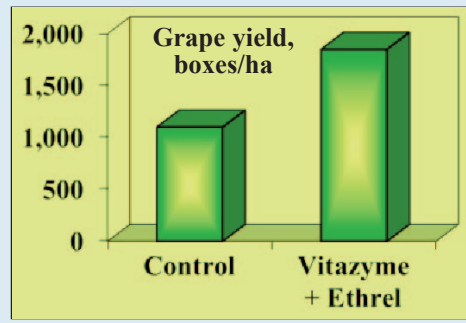
Ethrel application: 700 ml/ha at veraison for both treatments on the leaves and fruit

Yield results: see table and graph

Conclusions: In this Chile table grape study, Vitazyme (two applications at 2 liters/ha), greatly enhanced the yield of Crimson Seedless grapes when combined with on Ethrel application, as compared to Ethrel alone. These results show a good synergism between the two products, and should help alleviate some of the stress caused by Ethrel on the plant, leading to better long-term yield and plant health.

Grape Yield

Treatment	Yield boxes/ha	Yield change boxes/ha
Control (Ethrel)	1,100	—
Vitazyme + Ethrel	1,850	750 (+68%)



• **Increase in grape yield with Vitazyme: 68%**

Grapes (Table)
A Grape Maturity Evaluation



Grapes in Chile receiving neither Ethrel nor Vitazyme did not mature and color as early as did fruit treated with either of these products. Note also the lack of uniformity of the ripening process.

Researcher: Rodrigo Retamal
Farm: Fruticola Del la Fuente
Location: Melipilla, Metropolitan Region, Chile
Cooperating organization: Syngenta, Santiago, Chile
Variety: Red Globe (C20)

Experimental design: A vineyard was divided into three portions to evaluate the effects of Ethrel and Vitazyme on the maturation of Red Globe grapes, as compared to an untreated control.

- 1. Control
- 2. Ethrel once
- 3. Vitazyme twice

Fertilization: unknown

Vitazyme application: 2 liters/ha on the leaves and fruit on January 20, and again on February 4, 2012

Ethrel application: 0.5 liter/ha on February 4, 2012

Harvest results: The bunches of fruit that remained on the plants after the first and second pickings — conducted on March 6 and March 14 — were counted for each treatment, as a measure of maturity of the grapes

Yield results: See the graphs on the next page.

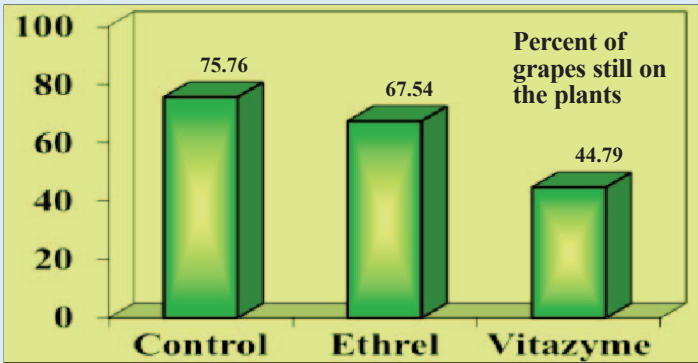


When only Ethrel was applied to the grapes, maturity and coloration were enhanced significantly, but not as well as for Vitazyme alone; see the photo below.

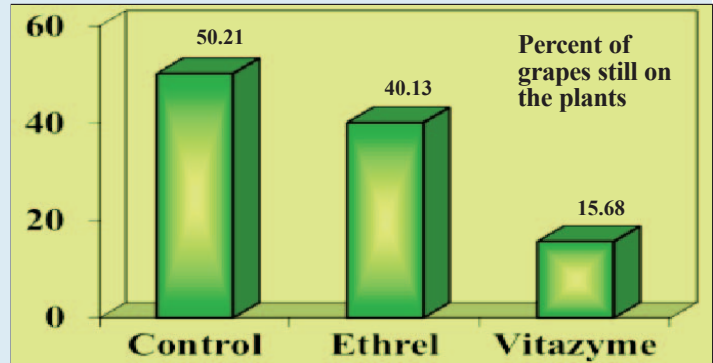


Vitazyme treated grapes colored and matured very well, as can be seen on this photo taken the same day as the other two treatments in this study. This enabled more bunches to be picked earlier than for either the control or the Ethrel treatment.

**Bunches Remaining After the First Picking
(March 6)**



**Bunches Remaining After the Second Picking
(March 14)**



Greater percent of harvested grapes for the first picking (March 6)

Vitazyme vs. Control 30.97%
Vitazyme vs. Ethrel 22.75%

Greater percent of harvested grapes for the first picking (March 14)

Vitazyme vs. Control 34.53%
Vitazyme vs. Ethrel 24.45%

Conclusions: In a table grape trial near Santiago, Chile, Vitazyme applied at 2 liters/ha on 46 and 31 days before the first picking on March 6, 2012, resulted in faster maturation of the grapes than for Ethrel (22.75% fewer bunches left) and the control (30.97% fewer bunches left). Similar results occurred for the March 14 second picking; 24.45% fewer bunches remaining than for Ethrel, and 34.53% fewer bunches than for the control. These results show how Vitazyme can hasten grape maturity, and enable the growers to market their grapes earlier, thereby fetching a better price.

Grapes (Table)

A Grape Maturity Evaluation



Ethrel treated grapes in Chile in this Autumn Royal trial did not ripen as quickly as did the Vitazyme treated fruit on the right.

Note how the grapes treated with Vitazyme in this trial have already colored well and are ready for harvest, unlike the Ethrel treated bunches in the left-hand photo.

Researcher: Rodrigo Retamal

Farm: Fruticola Del Rosario

Location: Collina, Metropolitan Region, Chile

Cooperating organization: Syngenta, Santiago, Chile

Variety: Autumn Royal

Experimental design: A vineyard was divided into two treatments, Ethrel and Vitazyme, in order to evaluate the effectiveness of these two crop amendments on the maturity of the crop, as determined by the percent of grapes harvested at each picking.

1. Ethrel

2. Vitazyme

Fertilization: unknown

Vitazyme application: 2 liters/ha on the leaves and fruit on February 18, 2012 (10% of the fruit at veraison)

Ethrel application: 0.3 liter/ha on the leaves and fruit at veraison

Harvest results: Three grape harvests were recorded, on March 1, March 12, and April 4, 2012. The percentage of the total bunches harvested was calculated for each picking for both treatments, using the data from the table on the next page.

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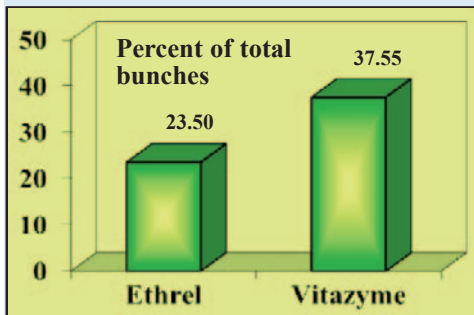
Grape Bunches Remaining After Harvest

Treatment	Total bunches	Bunches remaining after picking		
		Harvest 1	Harvest 2	Harvest 3
Ethrel	31.20	23.87	18.40	7.60
Vitazyme	34.80	21.73	13.13	6.60

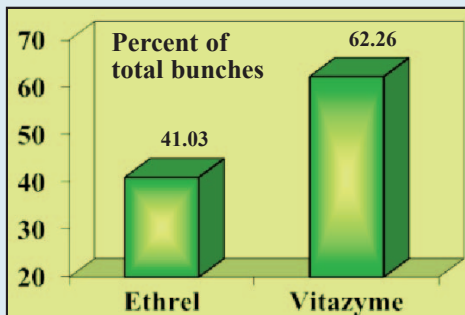
For all three pickings, Vitazyme provided a significantly greater percentage of ripe grapes compared to the standard Ethrel treatment, especially for the first and second pickings.

• **Increase in bunches with Vitazyme: 12%**

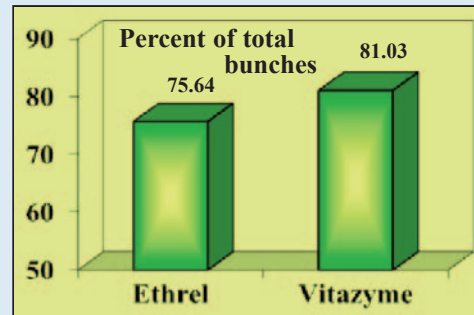
Bunches Harvested at First Picking (March 1)



Bunches Harvested at First Picking (March 12)



Bunches Harvested at First Picking (April 4)



Conclusions: This table grape trial in Chile, comparing Vitazyme with Ethrel (the industry standard) to provide early fruit ripening, showed that for all three pickings Vitazyme increased the number of mature bunches versus Ethrel. The first picking was enhanced by 14.05% above Ethrel, the second picking by 21.23%, and the third picking by 5.34%. The results show that Vitazyme is superior to Ethrel in terms of advancing fruit ripening so that the grapes can be picked earlier to take advantage of better grape prices. If the total bunches counted for each treatment is indicative of yield, then Vitazyme also improved grape yield above Ethrel by about 12%.

Increase in bunches harvested with Vitazyme vs. Ethrel

First picking 14.05%
Second picking 21.23%
Third picking 5.39%

Grapes (Table)

Researcher: Rodrigo Retamal

Location: San Fernando, Region VI, Chile

Variety: Red Globe

Experimental design: Red Globe table grapes were selected for a trial to compare Vitazyme with Ethrel in a vineyard. Separate areas were treated to evaluate product effects on grape yield.

1. Ethrel once

Vitazyme application: 2 liters/ha sprayed on the leaves and fruit three times during the growing season

Ethrel application: 700 ml/ha sprayed on the plants at veraison

Yield results: See the table and graph.

Conclusions: A study in Chile comparing Ethrel and Vitazyme on Red Globe grapes revealed that Vitazyme, using three applications, markedly improved grape yield (+31%) compared to Ethrel. This result shows the great value of Vitazyme for grapes in Chile, and no need for the usual Ethrel application.

Farm: Agricola El Tambo (Rio Blanco)

Cooperating organization: Syngenta, Santiago, Chile

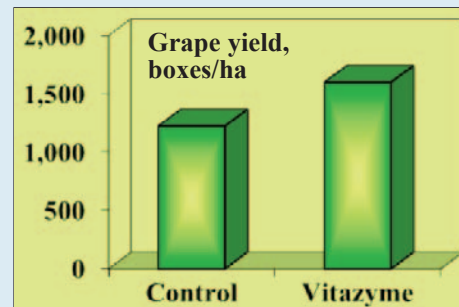
Fertilization: unknown

2. Vitazyme three times

Grape Yield

Treatment	Yield boxes/ha	Yield change boxes/ha
Control	1,225	—
Vitazyme	1,600	375 (+31%)

• **Increase in grape yield with Vitazyme: 31%**



Grapes (Table)

Researcher: Rodrigo Retamal

Location: San Fernando, Region VI, Chile

Variety: Red Globe

Experimental design: A vineyard of Red Globe grapes was divided into three treatments: Vitazyme and Ethrel, Ethrel, and a standard Ethrel and cytokinin treatment. The objective of the study was to compare yields of the three different treatment applications.

1. Ethrel + Cytokinin 2. Ethrel 3. Vitazyme three times + Ethrel

Vitazyme application: 2 liters/ha twice on the leaves and fruit during the growing season

Farm: Agricola El Maiten (Subsole)

Cooperating organization: Syngenta, Santiago, Chile

Fertilization: unknown

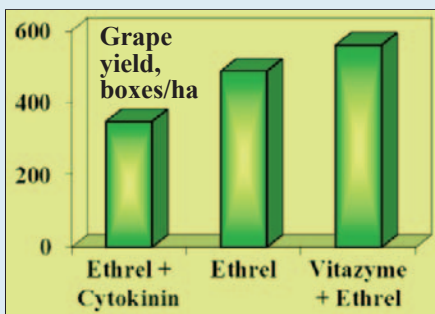
Ethrel application: 500 ml/ha at veraison on the leaves and fruit for all treatments

Cytokinin application: unknown rate at bud break

Yield results: See the following table and graph.

Grape Yield

Treatment	Yield boxes/ha	Yield change boxes/ha
Ethrel + Cytokinin	348	—
Ethrel	488	140 (+40%)
Vitazyme + Ethrel	560	212 (+61%)



Increase in grape yield with Vitazyme + Ethrel vs. Ethrel alone 15%* vs. Ethrel + Cytokinin ... 61%**

***Using Ethrel alone as the control.
Using Ethrel + Cytokinin as the control.

Conclusions: In this Chile trial with Red Globe grapes, Vitazyme plus Ethrel greatly exceeded all other treatments in terms of grape yield, being 15% greater than the Ethrel alone, and 61% greater than Ethrel plus a cytokinin bud-break application (the standard for the farm). These results prove that Vitazyme is a great grape yield enhancer, especially in combination with Ethrel.

Oranges

Researcher: Rodrigo Retamal

Farm: Agr. Millahue Fundo Palomar

Location: Panquehue, Region V, Chile

Cooperating organization: Syngenta, Santiago, Chile

Variety: Clemenules

Tree spacing: 3.00 x 5.50 meters

Tree age: 10 years

Fertilization: unknown

Experimental design: An orange orchard was divided into four treatments, having 30 trees per plot, to compare three different Vitazyme regimes (one with Ethylene) with an untreated control. Yields were compared for the four treatments.

Vitazyme application: 1 liter/ha at 40, 30, 20, and 10 days before harvest to the leaves and fruit for Treatment 2; 2 liters/ha at 30 and 10 days before harvest for Treatments 3 and 4. An air-blast sprayer was used, which delivered 1,500 liters of water per hectare

Ethylene application: 150 ml/ha to the leaves and fruit 10 days before harvest for Treatment 4.

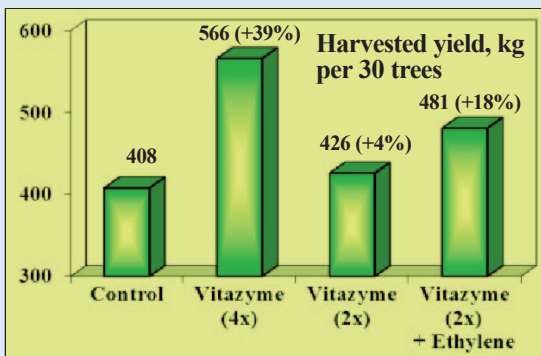
Yield results: Results of the first picking of June 26, 2012, are given on the right.

Conclusions: An orange trial conducted in Chile in 2012 compared three Vitazyme treatments with an untreated control, the plots having 30 trees each. For the first picking on June 26, the four Vitazyme treatments at 40, 30, 20, and 10 days before harvest resulted in a remarkable 39% yield increase of exportable fruit. Two Vitazyme treatments of 2 liters/ha at 30 and 10 days before harvest increased the orange yield only 4% above the control, but by adding a single ethylene treatment 10 days before harvest the yield rose to 18% above the control. In this trial the four 1 liter/ha Vitazyme applications yielded by far the best, but it is not known if an additional ethylene treatment might have boosted the yield even more, given that such a positive response was noted when ethylene was added with two 2 liter/ha Vitazyme applications. This product shows great responses for citrus growers in Chile.

Treatment	40 days before harvest (May 22)	30 days before harvest (May 25)	20 days before harvest (June 6)	10 days before harvest (June 16)
1. Control	0	0	0	0
2. Vitazyme (4x)	1	1	1	1
3. Vitazyme (2x)	0	2	0	2
4. Vitazyme (2x) + Ethylene	0	2	0	2 + Ethylene

----- liters/ha -----

Orange Yield



Increase in orange yield with Vitazyme

**1 liter/ha (4x) 39%
2 liters/ha (2x) 4%
2 liters/ha (2x) + Ethylene ... 18%**



These Clementine oranges are typical of those treated with Vitazyme and Ethrel in this Chile trial. Four applications of Vitazyme increased the yield by 39% compared to the untreated control.

Vital Earth Resources

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

2012 Crop Results

Vitazyme on Plantains

A Nursery Study

Researchers: Rodolfo Valenzuela and Cristhian Mazariegos, Foragro Development, Guatemala City, Guatemala, and Sergio Cordero, Supervisor, Producciones Agricolas del Sur, Guatemala

Location: La Blanca, Ocos Municipality, San Marcos Department, Guatemala

Variety: Cavendish

Experimental design: In a plantain nursery greenhouse, rows of young plants 74 meters long x 1 meter wide, with plants in 1 kg bags, were selected to evaluate the effect of Vitazyme plus Silfact surfactant on banana plant growth. Several beds were used for each treatment.

1. Control 2. Vitazyme + Silfact on 4-week plants 3. Vitazyme + Silfact on 5-week plants

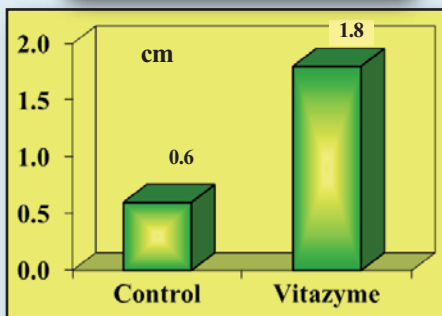
Vitazyme application: **Treatment 2** (4-week plants): (1) 50 ml of Vitazyme in 16 liters of water (0.31%) sprayed with a backpack sprayer on February 20, 2012; (2) 80 ml of Vitazyme in 16 liters of water (0.5%) sprayed with a backpack sprayer about three weeks later on March 13, 2012. **Treatment 3** (5-week plants): (1) 75 ml of Vitazyme in 16 liters of water (0.47%) sprayed with a backpack sprayer on February 20, 2012; (2) 80 ml of Vitazyme in 16 liters of water (0.5%) sprayed with a backpack sprayer about three weeks later on March 13, 2012.

Silfact application: This surfactant of Foragro was applied with all Vitazyme applications at 5 ml/16 liters of water (0.031%).

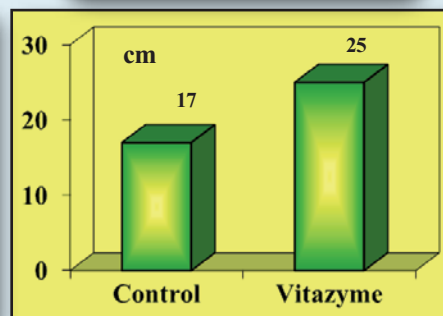
Growth results: Values for all parameters were collected on April 11, 2012, 51 days after the first treatment was made.

Trial With 4-Week Plants (Treatment 2)

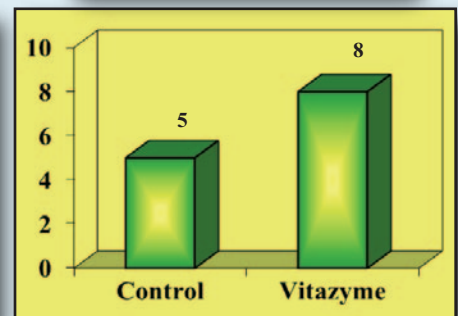
Trunk Diameter



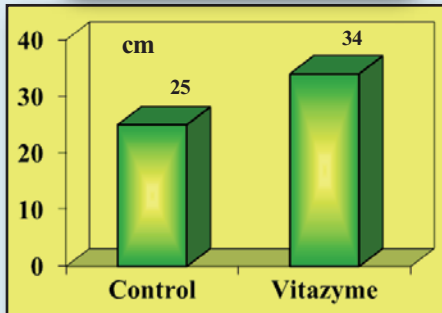
Plant Height



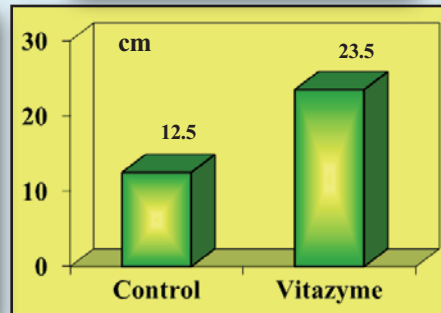
Leaf Number



Leaf Length

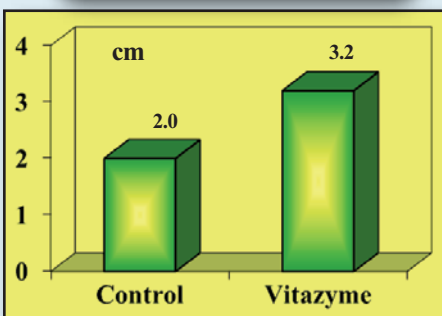


Leaf Width

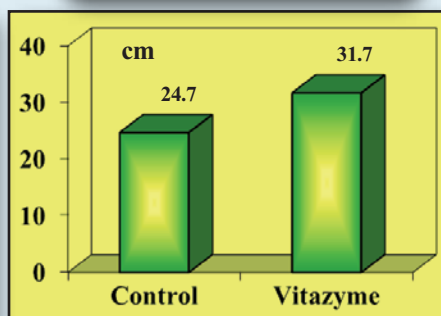


Trial With 5-Week Plants (Treatment 3)

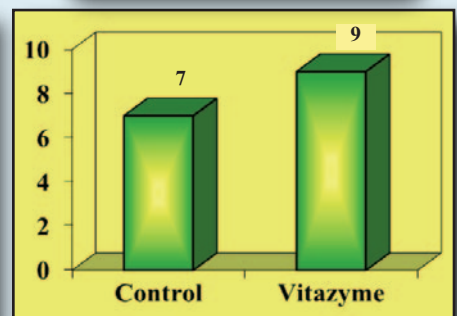
Trunk Diameter



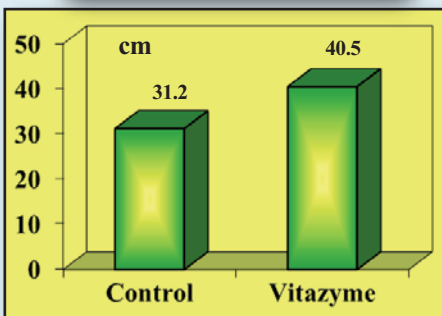
Plant Height



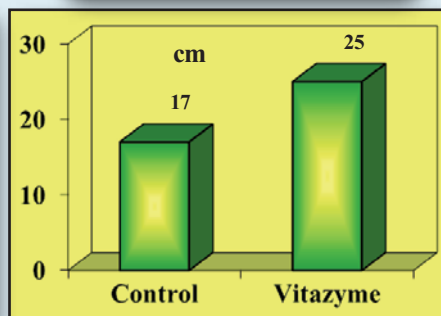
Leaf Number



Leaf Length



Leaf Width



Increases with Vitazyme

	<u>4-week plants</u>	<u>5-week plants</u>
Trunk diameter	1.2 cm (+200%)	1.2 cm (+60%)
Plant height	8 cm (+47%)	5 cm (+20%)
Leaf number	3 (+60%)	2 (+29%)
Leaf length	9 cm (+36%)	9.3 cm (+30%)
Leaf width	11 cm (+88%)	8 cm (+47%)

Note that every parameter was increased with Vitazyme applications, especially trunk diameter (200% and 60% for Treatments 2 and 3, respectively). Plant height, leaf number, and leaf length and width were also markedly improved, by 20% to 88%.

Conclusions: The researchers stated the following:

- “1. Plants treated with Vitazyme in both treatments showed a better growth versus plants that did not receive treatment.
 2. The plants that received the application of Vitazyme had a larger diameter [of stem] than the control.
 3. Both treatments that received the application of Vitazyme had a larger diameter than the control.
 4. In the variables leaf number, length, and width [of leaves] all treatments that received Vitazyme application gave better results than the untreated control.
 5. The root system showed thicker roots in the Vitazyme treated plants.
- The use of Vitazyme in nursery plantain banana by two foliar sprayings at 0.5% v/v (1 liter/200 liters of water), 5 and 8 weeks from planting, is recommended.”

Peas



The effect of Vitazyme treatment in this Guatemalan field study can be seen right to the row. Application in the seed row before covering produced this excellent response.



Another seed row application trial in Guatemala caused the pea plants on the right to continue producing well after the untreated control plants had begun senescing.

Researchers: Nery Larios and Cristhian Mazariegos, Foragro Development, Guatemala City, Guatemala

Location: Santa Maria Cauque and Chiricuyu, Santiago Zacatepeques, Guatemala

Variety: Ambassador

Planting dates: see below

Experimental design:

Three pea growers marked out areas for Vitazyme treatment and adjacent untreated areas. Three systems of Vitazyme application were implemented to determine the best use of the product for pea production.

Fertilization: unknown

Vitazyme application: Refer to the chart on the right.

Yield results: See the graph and table on the next page.

It is clear that peas responded excellently to Vitazyme as long as the product contacted the seeds at planting. Applying the product to the soil above the seeds a day after planting only slightly increased the yield.

Treatment	Vitazyme treatment	Area	Farmer	Location	Planting date
1	(1) 1 liter/ha on seeds in row before covering (2) 1 liter/ha at early bloom	200 m ²	Nicolas Garcia	Santa Maria	August 23
2	(1) 1 liter/ha on the seeds in row before covering (2) 1 liter/ha at early bloom	300 m ²	Juan Diaz	Santa Maria	August 23
3	(1) 1 lb of seeds soaked in a 10% solution (2) 1 liter/ha at early bloom	100 m ²	Rigoberto Itzol	Chiricuyu	August 23
4	(1) 1 liter/ha sprayed over covered row 1 day after planting (2) 1 liter/ha at early bloom	480 m ²	Rigoberto Itzol	Chiricuyu	August 22



Here are typical plants from a pea trial where the seeds were soaked before planting in a 10% Vitazyme solution. The yield was improved by 50% using this simple method.



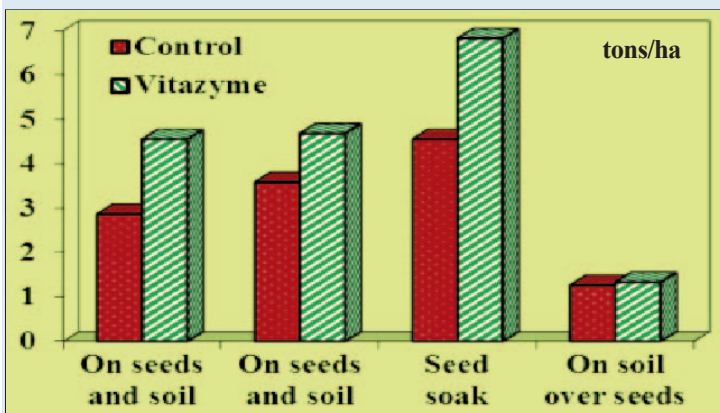
When Vitazyme was applied to the seeds in the row, making contact before covering, the yield was markedly improved by 30 to 59%.

Pea Yield

Location	Control tons/ha	Vitazyme tons/ha	Yield change tons/ha
1. Garcia (on seeds + early bloom)	2.86	4.55	+1.69 (+59%)
2. Diaz (on seeds + early bloom)	3.58	4.68	+1.09 (+30%)
3. Itzol (seed soak + early bloom)	4.55	6.82	+2.27 (+50%)
4. Itzol (on soil over seeds + early bloom)	1.26	1.33	+0.06 (+5%)



Peas in Guatemala are sometimes grown on steep hillsides such as this one, where a Vitazyme trial proved that a seed treatment can substantially improve pea yields.



Increase in pea yield with Vitazyme (all treated foliar at early bloom)

On seeds and soil at planting ... 30 to 59%
Seed soak at planting 50%
On soil after seed covering 5%

Conclusions: According to the researchers, "In Vitazyme treated plots were observed:

- Higher germination
- Greater growth of the root system
- More vigor and size of leaves and stems (greater leaf development)
- Longer life of the plant
- Greater resistance to *Fusarium*
- Greater and earlier flowering
- Less damage from waterlogging

At harvest, the average increase in the Vitazyme treated area over the untreated controls in the four trials was 42%, equivalent to 1.28 tons/ha. The most effective treatments were those having applications on the seeds in the rows before covering, and seeds soaked in a dilute (10%) Vitazyme solution before planting (30 to 59% yield increases). The least effective treatment was an application over the soil surface after covering (5% increase)."

These data show the importance of having Vitazyme make contact with the seeds at planting for a maximum crop response with peas."

Peas

A Fertilizer Rate Study

Researcher: V. Plotnikov

Location: Vinnytsia, Ukraine

Tillage: conventional (disking, plowing, and cultivating)

Soil type: gray podzolic (2.2% organic matter, 8.4 mg/100 g of soil hydrolyzed N, 15.8 mg/100 g of soil P, 12.4 mg/100 g of soil exchangeable K, pH = 5.5)

Experimental design: A pea experiment was established using 0.1 ha plots, with four replications, and four fertility regimes to evaluate the effect of Vitazyme on the yield and protein content of the peas.

Research organization: National Academy of Agricultural Sciences

Variety: Carevych super elite

Previous crop: spring barley

Planting date: April 24, 2012

Planting rate: 1.5 million seeds/ha

Treatment	Vitazyme	Nitrogen	Phosphate	Potash
		kg/ha		
1	0	0	0	0
2	X	0	0	0
3	0	20	10	20
4	X	20	10	20
5	0	30	20	30
6	X	30	20	30
7	0	45	30	45
8	X	45	30	45

Fertilization: Phosphorus and potassium dry fertilizers were fall applied in 2011, along with basic tillage. Nitrogen was applied in the spring during cultivation.

Vitazyme application: For Treatments 2, 4, 6, and 8, a seed treatment of 1 liter/ton of seed was made, and later 0.5 liter/ha was sprayed on the leaves and soil when the plants had five to six leaves.

Continued on the next page

Weather for 2012: favorable for crop development

Yield results: At all fertility levels, Vitazyme greatly increased the yield above the untreated control, by 21 to 25%. The percentage of increase declined slightly as the fertility levels rose.

Protein results: At all fertilizer levels crude protein increased consistently with Vitazyme application.

Conclusions: A Ukrainian replicated pea trial, comparing Vitazyme biosimulant with an untreated control, at four fertility levels, revealed that Vitazyme increased pea yield at all levels, by from 21 to 25%. Crude protein was likewise enhanced by this product, by 1.0 to 1.3 percentage points.

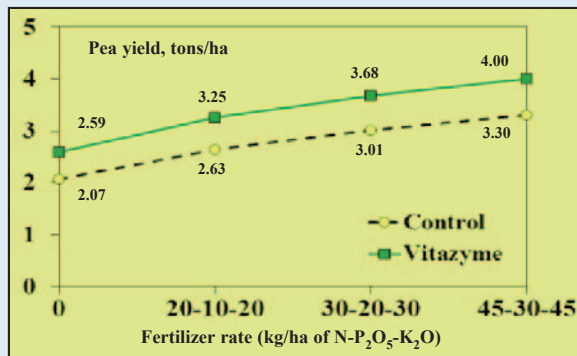
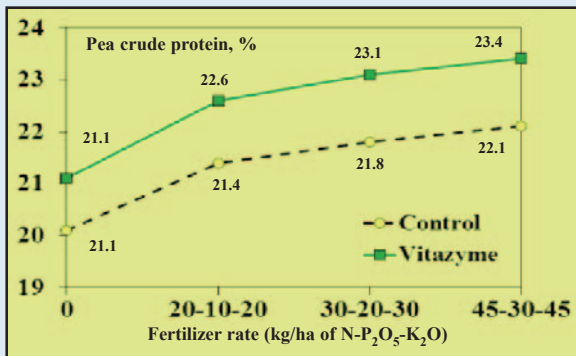
Thus, both yield and quality were improved by Vitazyme with all four fertility regimes, proving the great efficacy of this product in the context of a comprehensive soil and crop management system.

Pea Yield

Treatment	Yield increase with Vitazyme*	Income increase with Vitazyme*
	tons/ha	hrn/ha
2	0.52 (+25%)	1,192
4	0.62 (+24%)	1,452
6	0.67 (+22%)	1,582
8	0.70 (+21%)	1,660

*Yields and income are compared at the same fertility level.

Pea Crude Protein



Increase in crude protein with Vitazyme

No fertilizer	1.0 percentage point
Low N-P-K	1.2 percentage points
Medium N-P-K	1.3 percentage points
High N-P-K	1.3 percentage points

Increase in yield with Vitazyme

No fertilizer	25%
Low N-P-K	24%
Medium N-P-K	22%
High N-P-K	21%

Peppers

Researchers: Nelson Najarro and Cristhian Mazariegos, Foragro Development, Guatemala City, Guatemala.

Location: Jutiapa, Guatemala

Variety: Natali (sweet pepper)

Transplanting date: July 25, 2011

Planting rate: row spacing = 1.25 m; in-row spacing = 2.5 cm

Growth environment: plastic tunnels

Experimental design: A pepper field was selected to evaluate the ability of Vitazyme to increase crop population. Two 120-meter rows containing 800 seedlings in a 300 m² area were treated with a single Vitazyme drench.

1. Control

2. Vitazyme

Fertilization: unknown

Vitazyme application: Three days after transplanting, on July 28, 2011, a 1% Vitazyme solution was sprayed as a drench at the base of the transplants in the treated area. A total of 24 liters of solution was applied to the 800 seedlings, giving 30 ml/plant.



The untreated peppers in the plastic tunnel of this Guatemala trial were severely infected with fungal diseases after a wind tore off the plastic earlier in the season.



The adjoining tunnel, having pepper plants treated with Vitazyme that also had been exposed to outside contamination when winds blew off the plastic, grew luxuriously.



The control treatment did not produce the size and number of peppers that the Vitazyme treatment (photo to the right) did, in part because of severe disease infestation but also because the growth rate was less vigorous.



In contrast to the control (photo on the left), Vitazyme treated plants produced bigger and larger peppers that matured faster. These plants display superior size, vigor, and leaf chlorophyll development to fix carbon more effectively.

Growth results: At seven days after planting, the following results were noted with Vitazyme treatment as compared to the untreated control:

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



The untreated control treatment leaves were severely affected by a fungal infection after winds had blown off the canopy. Compare these with the Vitazyme treated plants.



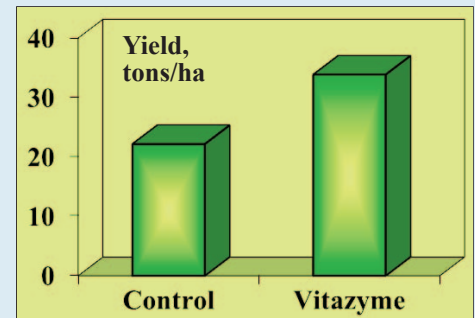
In spite of exposure to fungal spores in a tunnel adjacent to the control peppers, which also was blown off, notice how Vitazyme protected leaves from fungal infection.

Yield results: Note that all parameters of growth, especially yield, were dramatically increased with Vitazyme application.

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

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

Increase in yield with Vitazyme	
Fruit diameter	56%
Fruit length	62%
Fruit weight	16%
Fruit/ha	32%



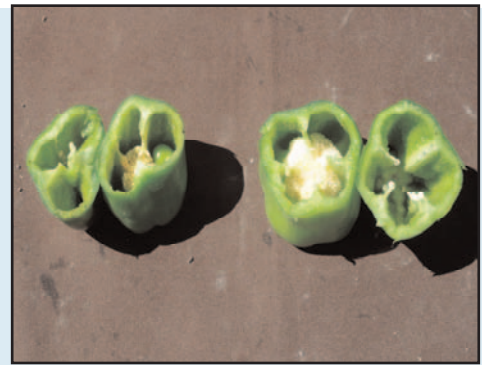
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A side-by-side comparison of treated and untreated plants illustrates vividly the great effect Vitazyme has on growth.



Pepper fruit and leaves from the plants shown in the left-hand photo reveal a great advantage for Vitazyme.



Typical fruit from the Vitazyme treated (right) and control peppers show superior size and quality with Vitazyme.

Pinto Beans

Seed Treatment Results in the Greenhouse

Researcher: Paul W. Syltie, Ph.D.

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas

Variety: pinto

Pot size: 1 gallon

Seeding rate: 12 seeds/pot, thinned to 3 plants/pot

Experimental design: Pinto bean seeds were treated with Vitazyme on January 17, 2012, and planted March 14, 2012, 57 days after treatment, to evaluate the effects of Vitazyme seed treatment over time on plant growth. Four replicates were used in a randomized complete block design.

1. Control

Fertilization: none

Vitazyme treatment: On January 17, pinto bean seeds was soaked in a 10% Vitazyme solution for 6 minutes, then dried on paper towels with a fan blowing across them for rapid drying. These seeds were stored in closed jars at room temperature, and untreated seeds were also placed in a jar to serve as a control.

Harvest date: April 5, 2012, 21 days after planting

Dry weight results: The roots of the beans were washed free of soil, and the plants were placed in a drying oven at 115 °F for 24 hours, then weighed to the nearest 0.01 gram. A 20% increase in dry weight was brought about by the Vitazyme seed treatment 57 days before planting.

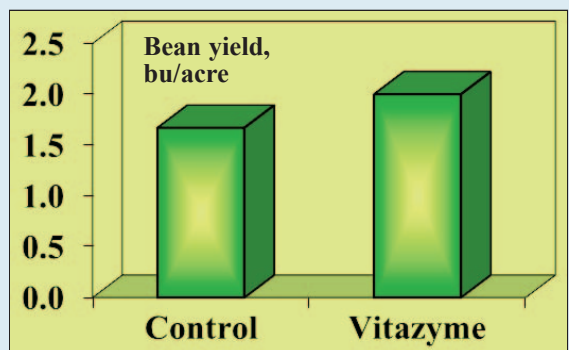
Conclusions: A greenhouse pot study, evaluating the effects of a Vitazyme seed treatment on pinto beans 57 days before planting, produced a 20% increase in plant dry weight over the test period. This result shows the effectiveness of this simple and inexpensive treatment on plant growth, and its long-term effectiveness after initial treatment.

Planting date: March 14, 2012

Soil type: silt loam

Pinto Bean Yield

Treatment	Dry Weight	Weight change
Control	1.67	—
Vitazyme seed trt.	2.00	0.33 (+20%)
Block P	0.1015	
Treatment P	0.0267*	
Model P	0.0581	
CV _{0.10}	6.336	
LSD _{0.10}	0.19 gram	



• Increase in dry weight with Vitazyme: 20%

Rice

Farmer: Jeanton Puno
Office, Malaybalay City, Philippines

Variety: unknown

Experimental design: A rice demonstration was conducted in a field to evaluate several growth parameters, as well as yield, in response to Vitazyme application.

Research Organization: Green World Woo Tehk Phils., Inc., and City Agriculture

Location: Purok 3, Managok, Malaybalay City, Philippines

Soil type: unknown

Report date: September 18, 2012

1. Control

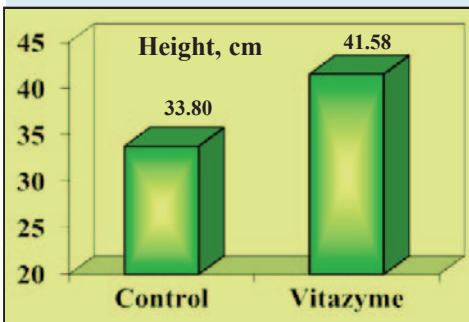
Fertilization: unknown

Vitazyme application: unknown

Growth parameter results: Two samples were collected from 1 meter² areas of each treatment, and measurements were taken on the plants within these two areas and averaged. For plant height, tiller number, and panicle length 25 plants were measured and averaged for each treatment.

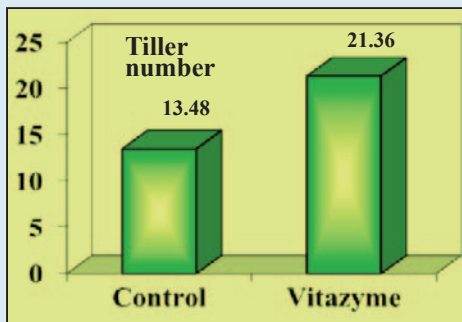
2. Vitazyme

Plant Height



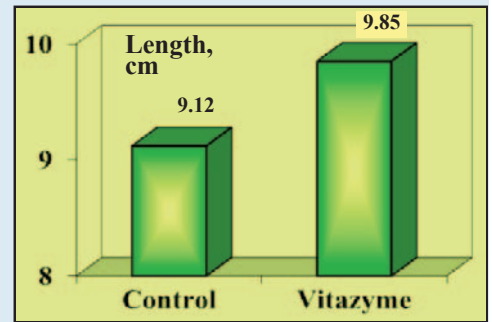
• Increase in plant height with Vitazyme: 23%

Tiller Number



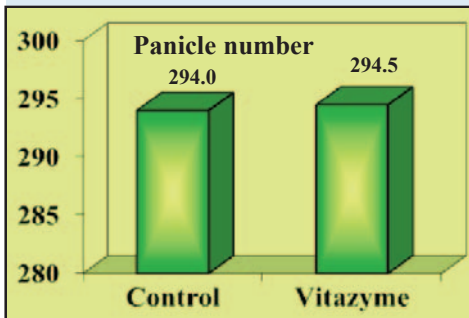
• Increase in tiller number with Vitazyme: 58%

Panicle Length



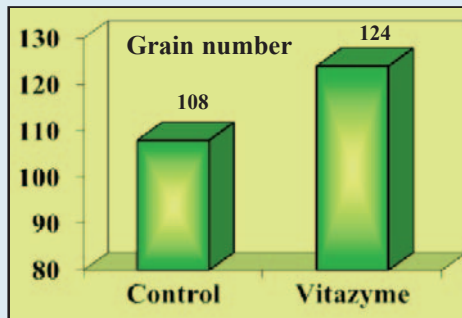
• Increase in panicle length with Vitazyme: 8%

Panicles Per Meter²



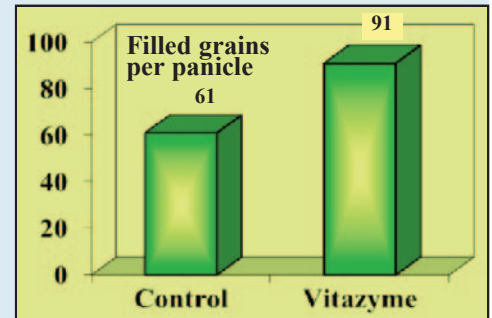
• Increase in panicles per meter² with Vitazyme: 0%

Grains Per Panicle



• Increase in grains per panicle with Vitazyme: 15%

Filled Grains



• Increase in filled grains with Vitazyme: 49%

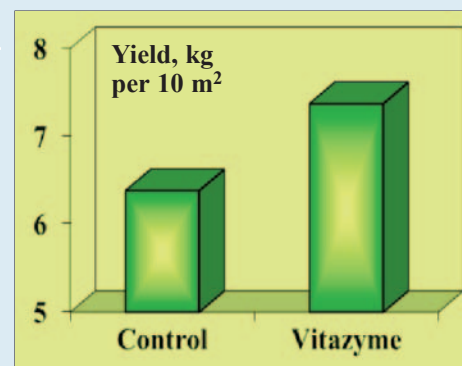
Yield results: see the following table and graph

Rice Yield

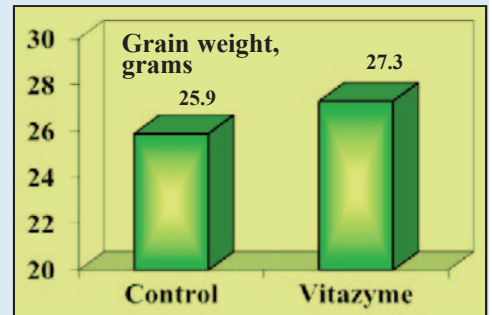
Treatment	Yield	Yield change
	kg, 2 x 5 m area	kg, 2 x 5 m area
Control	6.38	—
Vitazyme	7.37	1.99 (+31%)

• Increase in rice yield with Vitazyme: 31%

Conclusions: This rice trial in the Philippines proved that Vitazyme improved all plant parameters investigated, including plant height (+23%), tiller number (+58%), panicle length (+8%), grains per panicle (+15%), filled grains (+49%), and weight per 1,000 grains (+5%).



Weight Per 1,000 Grains



• Increase in 1,000-grain weight with Vitazyme: 5%

The yield was improved by 31%. These results reveal how this product is an excellent adjunct to rice culture in the Philippines.

Winter Rye

Researcher: V. Plotnikov

Location: Vinnytsia, Ukraine

Soil type: gray podzolic (2.2% organic matter, 8.4 mg/100 g of soil hydrolyzed N, 15.8 mg/100 g of soil P, 12.4 mg/100 g of soil exchangeable K, pH = 5.5)

Tillage: conventional (disking, plowing, and cultivation)

Experimental design: A replicated plot design was established using plots of 0.1 ha, and four replicates, to evaluate the effect of Vitazyme on the yield of winter rye.

1. Control

2. Vitazyme

Fertilization: 50 kg/ha of dry nitrogen in the spring

Vitazyme application: 0.5 liter/ha on the leaves and soil at the boot stage (leaf tube formation)

Weather for 2012: favorable for crop development

Research organization: National Academy of Agricultural Sciences

Variety: Pikasso

Previous crop: corn

Planting date: October 13, 2011

Planting rate: 5.5 million seeds/ha

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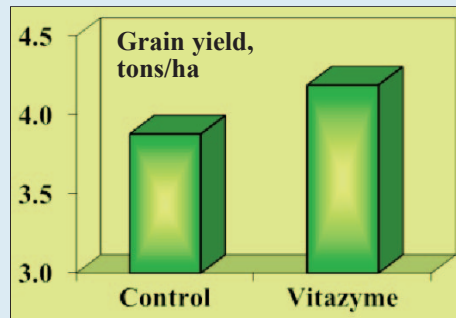
Yield results: See the table and graph to the right.

Conclusions: This replicated winter rye trial in Ukraine revealed that Vitazyme, applied at the boot stage at 0.5 liter/ha, increased grain yield by a sizeable 8%, resulting in improved income of 499 hrn/ha. The utilization of a seed treatment at fall planting would likely have boosted the yield and income even more. These results prove the excellent value of this product in agricultural systems for rye production in Ukraine.

Winter Rye Yield

Treatment	Grain yield tons/ha	Yield change tons/ha	Income increase hrn/ha
Control	3.88	—	—
Vitazyme	4.19	0.31 (+8%)	494

• Increase in yield with Vitazyme: 10%



Soil Respiration

Researcher: Hygrotech, South Africa

Research Coordinator: Cornelius Oosthuizen, I.E. Organics, South Africa

Location of study: Sondveld Region, Western Cape Province, South Africa

Soil type: sand

Experimental design: On an organic farm, very sandy soil was collected, some of which was treated with Vitazyme at 1 liter/ha (13 oz/acre). The respiration of soil organisms was measured on three samples of the Vitazyme treated soil, and on three samples of untreated soil. The methodology of determining CO₂ evolution was not indicated in the report.

1. Control

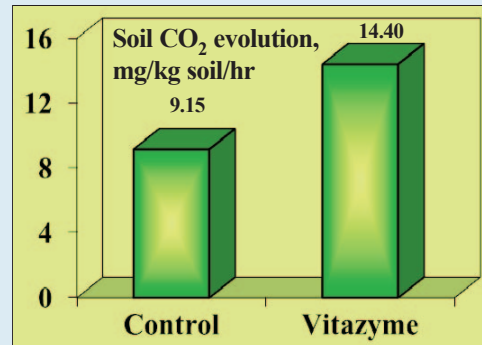
2. Vitazyme

Vitazyme application: No details were given.

Respiration results: See the following table and graph.

Soil Respiration

Treatment	Sample weight grams, average	Sampling time minutes	CO ₂ evolved mg/kg of soil/hour	Change in CO ₂ mg/kg of soil/hour
1. Control	20.004	30	9.15 b	—
2. Vitazyme	20.006	30	14.40 a	5.25 (+57%)
Block P	0.1577			
Treatment P	0.0034**			
Model P	0.0099**			
CV _{0.10}	3.20%			
LSD _{0.10}	1.33 mg/kg of soil/hour			



• Increase in soil respiration with Vitazyme: 57%

A great burst of CO₂ evolution resulted from Vitazyme application to this very sandy soil, showing that the product's active agents aggressively stimulate soil microbiota.

Conclusions: This South African study on soil respiration shows that Vitazyme greatly increased (+57%) CO₂ evolution in a very sandy organically treated soil in Western Cape Province. The product's active agents interacted with these bacteria, fungi, and other microbes to stimulate metabolic activity quite profoundly. Average conventionally treated Sandvold soils release from 3 to 5 mg/kg of soil of CO₂ per hour, while the non-Vitazyme treated soils of this organic farm released much more than that — 9.15 mg/kg of soil/hr — and Vitazyme treatment boosted CO₂ release far above this higher level.

Soybeans

Free Amino Acid Levels - University of Missouri

Researcher: Manjula Nathan, Ph. D.

Location: University of Missouri, Columbia, Missouri

Variety: unknown

Planting date: June 6, 2011

Row spacing: 15 inches

Seeding rate: 180,000 seeds/acre

Soil type: unknown

Experimental design: A soybean area with plots of 15 feet by 200 feet (0.0689 acre), with four replications, was set up to compare Vitazyme treatment with an untreated control, and determine differences in yield, growth characteristics, and tissue levels of free amino acids. This report discusses the effect of Vitazyme on free amino acid levels, which are correlated with plant pathogen activity.

1. Control

2. Vitazyme

Fertilization: none

Vitazyme application: The seeds were treated with 100% Vitazyme before planting to achieve a 13 oz/acre rate on 180,000 seeds; the untreated seeds received water only. A second Vitazyme application of 13 oz/acre was applied to the leaves and soil on July 13 (R1 stage).

Hail damage event: On July 3 a powerful hailstorm, dropping golf ball sized hailstones, severely damaged the beans, leaving only one trifoliolate intact. The soybean plants quickly recovered and produced a reasonable crop.

Free amino acid analysis: Soybean leaves were harvested on July 28 (R3 stage) and August 18 (R5 stage), by collecting 24 of the youngest fully expanded trifoliate leaves from each plot. These samples were washed and frozen for later analyses at a University of Missouri laboratory. The results of the second analysis (August 18 collection) are shown on the next page, except for those amino acids that were not present. The results of the first analysis (July 28 collection) did not show much difference between the two treatments, so are not shown.

In all but a few cases, Vitazyme lowered the amino acid level in the soybean plant tissue, with an overall 18% reduction in total free amino acids. This great reduction very likely would inhibit the proliferation of pathogenic bacteria, fungi, nematodes, and other organisms that would prey on the plant, reducing their number and activity, and the loss of production due to their presence.

Conclusions: In this University of Missouri study on the effect of Vitazyme on soybean yield, growth parameters, and free amino acid levels, the free amino acids were shown to be significantly reduced by two Vitazyme applications, one at planting (on the seeds) and one at the R1 stage. **The reduction was 18%, meaning the plant pathogens (bacteria, fungi, nematodes, viruses, and some insects) would be inhibited from damaging the plants. Vitazyme enhances metabolic cycles in plants, thus speeding the incorporation of free amino acids into proteins (proteosynthesis) and reducing their buildup in plant tissues.**

Amino Acid Levels

Amino acid*	Control µg/100 mg	Vitazyme µg/100 mg	Change µg/100 mg
Aspartic acid	20.86	12.25	-8.61
Threonine	22.25	18.02	-4.23
Serine	19.58	15.55	-4.03
Asparagine	17.78	16.98	-0.80
Glutamic acid	7.01	3.91	-3.10
Glutamine	6.12	6.07	-0.05
Proline	24.11	15.23	-8.88
Glycine	8.52	5.88	-2.64
Alanine	32.67	22.78	-9.89
Citrulline	2.14	2.35	+0.21
α-amino-n-butyric acid	2.59	2.05	-0.54
Valine	26.92	21.45	-5.47
Methionine	5.33	1.69	-3.64
Cystine	14.57	15.53	+0.96
Isoleucine	19.39	20.27	+0.88
Leucine	35.21	26.50	-8.71
Tyrosine	11.88	9.81	-2.07
Phenylalanine	25.99	17.86	-8.13
β-amino butyric acid	52.45	47.24	-5.21
Homocystine	0.83	2.52	+1.69
Tryptophan	6.69	7.75	+1.06
Ornithine	18.73	26.67	+7.94
Lysine	26.55	19.73	-6.82
Histidine	4.51	4.20	-0.31
Arginine	24.87	17.17	-7.70
Totals	437.55	359.46	-78.09 (-18%)

Soybeans

University of Missouri

Researcher: Manjula Nathan, Ph. D., and Timothy Reinbott, research station supervisor
Location: University of Missouri Division of Plant Sciences, Columbia, Missouri, research farm
Planting rate: 180,000 seeds/acre
Planting date: June 6, 2011
Experimental design: An experimental area was established with soybeans in plots that were 15 feet wide by 200 feet long (0.0689 acre), with four replications. The objective of the trial was to determine the effect of Vitazyme on bean yield and growth characteristics, and also to evaluate the effects of the product on free amino acid levels; this evaluation is discussed in a separate report.

Variety: unknown
Row spacing: 15 inches



This replicated soybean trial at the University of Missouri revealed that plant canopy size was increased with Vitazyme, as can be viewed in this photo taken several weeks after hail had severely damaged the plants.



Vitazyme treated plants had more leaves and a higher chlorophyll content than the control plants. Treated plants also had more seeds/plant, pods/plant, and weight/plant.

Continued on the next page

1. Control

2. Vitazyme

Fertilization: none

Vitazyme application: The seeds were treated with 100% Vitazyme before planting to achieve a 13 oz/acre rate on 180,000 seeds; the untreated seeds received water only. A second Vitazyme application of 13 oz/acre was applied to the leaves and soil on July 13 (R1 stage).

Hail damage event: On July 3 a powerful hailstorm, dropping golf ball sized hailstones, severely damaged the beans, leaving only one trifoliolate intact. The soybean plants quickly recovered, however, and produced a reasonable crop.

Plant analysis results: Twenty-four of the youngest fully expanded trifoliolate leaves from each plot were harvested on July 28 (R3) and August 18 (R5) for analysis at the University of Missouri Soil and Crop Testing Laboratory. The July 28 data is not shown here because of lack of uniformity of the data. The data for the August 18 sample is on the next page. d.m. = dry matter.



Hail in early July cut off most leaves from the soybean plants, but Vitazyme promoted more rapid recovery and an 18% yield increase. Here we see branches around a break.

Plant Analysis

Treatment	Nitrogen	N change	Phosphorus	P change	Potassium	K change	Crude protein	Protein change
	% d.m.	% d.m.	% d.m.	% d.m.	% d.m.	% d.m.	%	%
Control	3.40	—	0.26	—	1.35	—	21.3	—
Vitazyme	3.50	0.10 (+3%)	0.29	0.03 (+12%)	1.42	0.07 (+5%)	21.6	0.3 (+1.4%)

All leaf nutrient parameters and crude protein, especially leaf phosphorus, were increased with Vitazyme.

Bean analysis results: Soybean samples at harvest were analyzed for elements, protein, and oil at the University of Missouri Soil and Plant Testing Laboratory, with the following results.

Increase in leaf tissue levels with Vitazyme

- Nitrogen **3%**
- Phosphorus **12%**
- Potassium **5%**
- Crude Protein **1.4% (0.3%-point)**

Soybean Analysis

Treatment	N	P	K	Ca	Mg	Zn	Fe	Mn	Cu	B	Mo	S	N:S
	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm	%	
Control	5.32	0.55	1.66	0.35	0.27	35.6	59.8	26.4	10.5	39.2	1.6	0.18	29.5
Vitazyme	5.16	0.53	1.65	0.35	0.27	36.2	53.5	26.3	10.3	39.5	1.5	0.19	27.5

Crude Protein and Oil Content

Treatment	Crude protein	Oil
	%	%
Control	33.5	19.5
Vitazyme	32.1	19.6

Yield and stand results: See the following table and graphs.

Vitazyme enhanced both the population and yield of the soybeans, even with a severe hailstorm in July.

The elements varied little between the two treatments.

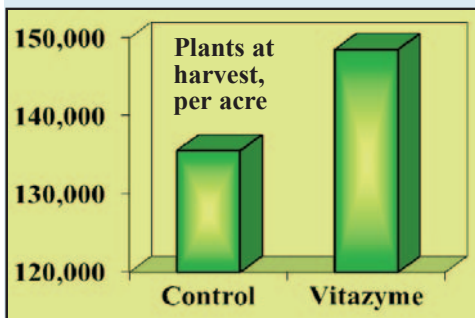
While crude protein dropped with Vitazyme, the oil content rose slightly, but neither change was great.

Soybean Yield and Stand

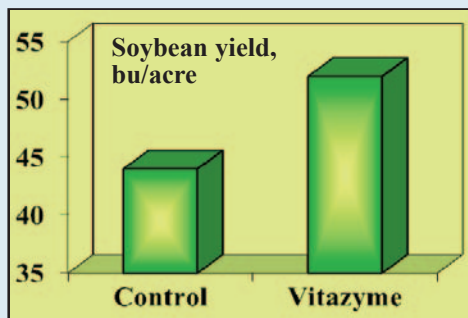
Treatment	Stand count	Stand change	Bean yield ¹	Yield change
	plants/acre	plants/acre	bu/acre	bu/acre
Control	135.559	—	44 b	—
Vitazyme	148.540	12.981 (+10%)	52 a	8 (+18%)

¹Letters a and b are significantly different at P = 0.10.

Soybean Plants at Harvest



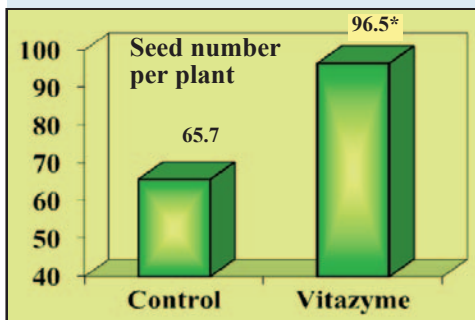
Soybean Yield



- **Increase in final stand with Vitazyme: 10%**
- **Increase in yield with Vitazyme: 18%**

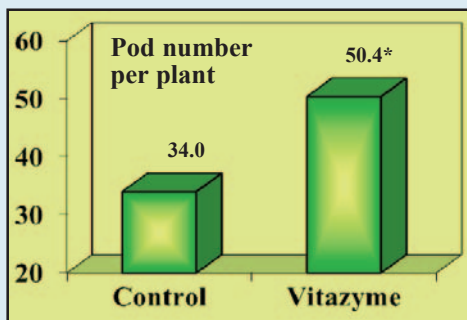
Vitazyme produced more vigorous plants having more pods, seeds, and plant weight. However, the seeds per pod and the weight per seed were the same for both treatments.

Seeds Per Plant



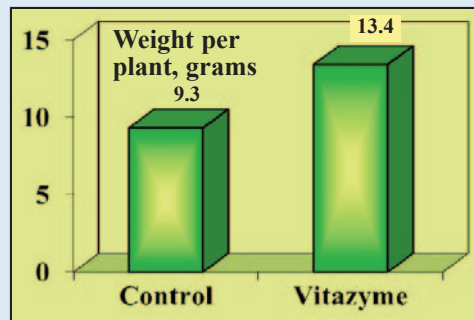
*Significantly greater at P = 0.05.

Pods Per Plant



*Significantly greater at P = 0.05.

Weight Per Plant

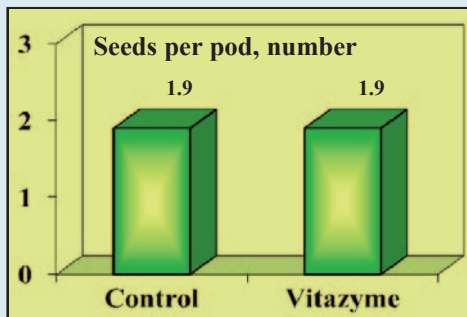


*Significantly greater at P = 0.05.

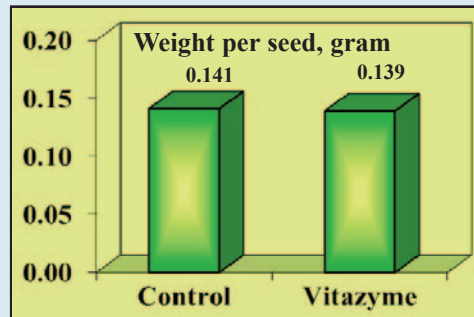
Increase with Vitazyme

Seeds per plant 47%
Pods per plant 48%
Weight per plant 44%

Seeds Per Pod



Weight Per Seed



Conclusions: A replicated plot study on soybeans at the University of Missouri – Columbia revealed that Vitazyme increased leaf nutrients during growth, especially for phosphorus (by 12%), and leaf crude protein as well. There was little effect in grain nutrient, protein, and oil levels. Growth parameters and yield were greatly enhanced: seeds per plant by 47%, pods per plant by 48%, and weight per plant by 44%; seeds per pod and seed weight were not affected. The final stand was improved by 10%, perhaps due to enhanced recovery after a severe hailstorm in early July, and yield was increased by 8 bu/acre, or 18%. These results show the great utility of using Vitazyme to improve soybean growth and yield in Missouri. Data on free amino acids in tissues are discussed in a separate report.

Soybeans

A Greenhouse Trial - Synergism with Amino Acids

Researcher: Paul W. Syltie, Ph.D.

Variety: "Common"

Soil type: silt loam

Experimental design: A greenhouse pot trial, using four replicates, was arranged to determine the effect of Vitazyme and amino acids, alone and in combination, on plant height and dry weight accumulation.

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas

Planting date: January 19, 2012

Pot size: 1 gallon

Planting rate: 12 seeds/pot, thinned to two plants per pot

1. Control

2. Vitazyme

3. Amino acids

4. Vitazyme + amino acids



The Vitazyme and amino acid trial is shown here in the research greenhouse. Both yield and dry weight were affected by the treatments. Notice the plants after the roots were washed in the photo on the right.

All three treatments in this experiment stimulated growth above the control, but there was no synergism noted with Vitazyme and amino acids for dry weight of the plants.

Continued on the next page

Fertilization: none
Vitazyme application: Pots of Treatments 2 and 4 received 100 ml/pot of a 0.1% Vitazyme solution just after seeding.

Amino acid application: A special liquid proprietary amino acid blend was applied at 100 ml/pot of a 0.04% solution to Treatments 3 and 4. For Treatment 4, the product was mixed with Vitazyme in 100 of water.

Harvest date: March 1, 2012, 41 days after planting

Height results: The two plants from each pot were measured to the nearest cm, and averaged. A statistical analysis was performed on these averages. All treatments increased the height of the soybean plants, the combined products doing this significantly (+7%).

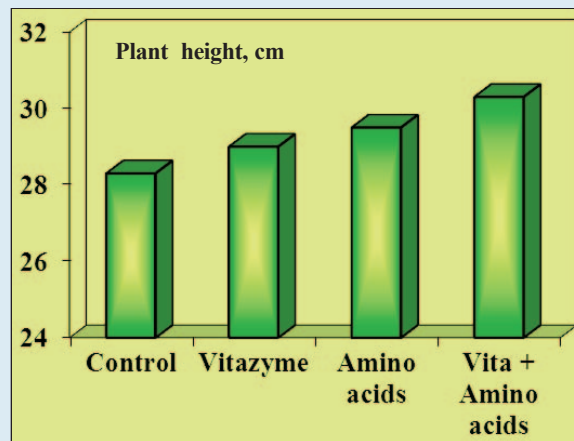
Dry weight results: The plants from each pot were dried in a drying oven at 125° F for 24 hours, and weighed to the nearest 0.01 gram. All of the treatments significantly improved soybean dry weight (P = 0.10) above the control, and were not significantly different from one another.

Conclusions: This greenhouse trial with soybeans revealed that both Vitazyme and amino acids improved the dry weight of the crop significantly, and the plant height as well for the combined products. No synergism of the products was detected in this trial, except for an indication of it in plant height response.

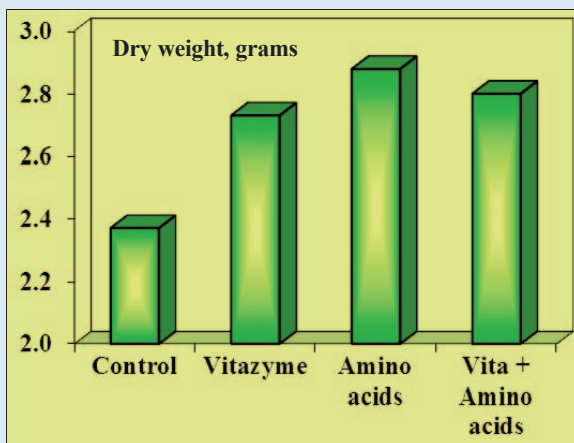
Soybean Plant Height

Treatment	Plant height cm	Height change cm
1. Control	28.3 b	—
2. Vitazyme	29.0 ab	0.7 (+2%)
3. Amino acids	29.5 ab	1.2 (+4%)
4. Vita + A.A.	30.3 a	2.0 (+7%)
Block F	0.1105	
Main effects F	0.1338	
Model F	0.1006	
CV _{0.10}	3.83%	
LSD _{0.10}	1.5 cm	

• Increase in plant height with Vitazyme + Amino acids: 7%



Soybean Dry Weight



Treatment	Plant dry weight grams	Weight change grams
1. Control	2.37 b	—
2. Vitazyme	2.73 a	0.36 (+15%)
3. Amino acids	2.88 a	0.51 (+22%)
4. Vita + A.A.	2.80 a	0.43 (+18%)
Block F	0.679	
Main effects F	0.0053**	
Model F	0.0216*	
CV _{0.10}	5.69%	
LSD _{0.10}	0.20 gram	

Increase in dry weight with Vitazyme

Vitazyme 15%
Amino acids 22%
Vitazyme + Amino acids 18%

Soybeans

Researcher: Bert Schou, Ph.D.

Location: Cedar Falls, Iowa

Soil type: Kenyon Loam (39% sand, 40% silt, 21% clay), 4.7% organic matter, pH = 5.9, C.E.C. = 16.8 meq/100g, fertility level = excellent, soil drainage = excellent

Row spacing: 30 inches

Planting date: May 18, 2012

Irrigation: 3 inches total in late July and early August

Experimental design: A small plot, replicated trial, with four replicates, was set up to evaluate the ability of two Vitazyme variations, plus an amino acid formulation, alone and in combination, to affect soybean yield and quality.

Fertilization: none

Vitazyme application: For Treatments 2, 3, and 5, 13 oz/acre on the seeds at planting (May 18), and again at 13 oz/acre on the leaves and soil at V8R1 (early bloom; July 4), were applied. Treatments 2 and 5 received Vitazyme 1, and Treatment 3 received a slight modification called Vitazyme 2.

Amino acid application: A proprietary amino acid blend was applied to Treatments 4 and 5, to the seeds at 2 oz/acre on May 18, and to the leaves and soil at the V8R1 stage at 2 oz/acre on July 4. For Treatment 5, the amino acids were mixed with the Vitazyme.

Research organization: Agricultural Custom Research and Education Services (ACRES)

Variety: Pioneer 92M72 (non-GMO)

Previous crop: corn

Planting depth: 1.5 inches

Seedbed at planting: fine

Tillage: conventional

Treatment	Vitazyme 1*	Vitazyme 2*	Amino acids*
1	0	0	0
2	13 oz/acre (2x)	0	0
3	0	13 oz/acre (2x)	0
4	0	0	2 oz/acre (2x)
5	13 oz/acre (2x)	0	2 oz/acre (2x)

*All applications were on the seeds at planting, and on the leaves and soil later.



The soybean trial at ACRES Research near Cedar Falls, Iowa, suffered some herbicide damage, but pulled out of the problem to yield over 59 bu/acre with Vitazyme 1.

The Vitazyme treated soybean plants in this sampling are clearly superior in height, leave area, stem diameter, pod number, and root size. A 6% yield increase resulted.

Sprayer settings: seed treatment, 10 gallons/acre of 115 ml of Vitazyme in 3 gallons of water, or 18 ml of amino acids in 3 gallons of water; foliar and soil treatment, 15 gallons/acre of 77 ml of Vitazyme in 3 gallons of water, or 12 ml of amino acids in 3 gallons of water

Weed control: Stellar herbicide at 4 oz/acre, Basagran at 1 pint/acre, Select Max at 8 oz/acre, and the surfactant Class Act 17% at 1 pint/acre, applied June 20

Weather during the growing season: The season was hot and dry, with the July average high temperature being 92.3° F, and the August average high being 85.5° F. Rainfall for April through October 12 was 12 inches; the normal is 26 inches.

Harvest date: September 25, 2012. A Massey-Ferguson 9 plot combine harvested the middle two rows of each plot, and the soybeans were weighed on an electronic scale.

Plant population results: no significant differences

Test weight results: no significant differences

Soybean protein results: Composite bean samples from the four replicates of each treatment were sent to Midwest Laboratories, Inc., Omaha, Nebraska, to evaluate protein levels. All five treatments varied within a narrow range, of 38.7 to 40.2%, the control being 39.4%.

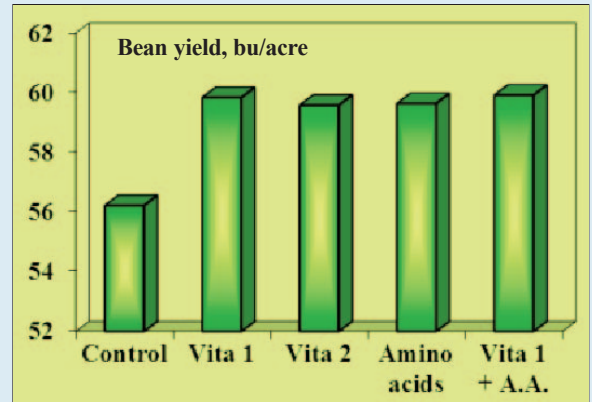
Yield results: The two inner rows of each plot were harvested. All four treatments increased soybean yield to about the same level: 6 to 7%. All displayed significant increases over the control, except Vitazyme 2, which was nearly significant.

Conclusions: A soybean replicated trial in east-central Iowa, during a hot and dry season, revealed that two variants of Vitazyme and an amino acid formulation, alone or together, all raised bean yield by 6 to 7%; all increases were significant, except for the Vitazyme 2 treatment, which was nearly so. Test weight and protein were not influenced significantly by the treatments. These results show the great efficacy of utilizing these materials for Corn Belt soybean production, since at \$16.00/bu a 3.62 bu/acre increase for Vitazyme 1 equals \$57.92/acre greater income.

Soybean Yield

Treatment	Yield ¹ bu/acre	Yield change bu/acre
1. Control	56.22 b	—
2. Vitazyme 1	59.84 a	3.62 (+6%)
3. Vitazyme 2	59.58 ab	3.36 (+6%)
4. Amino acids	59.64 a	3.42 (+6%)
5. Vita 1 + A.A.	59.92 a	3.70 (+7%)
LSD _{0.05}	3.39 bu/acre	
Standard deviation	2.53 bu/acre	
Replicate F	16.910	
Treatment F	1.960	
C.V.	6.09%	

¹Means followed by the same letter are not significantly different at P = 0.05, according to the Student-Newman-Keuls Test.



Increase in yield with Vitazyme and amino acids

Vitazyme 1	6%
Vitazyme 2	6%
Amino acids	6%
Vitazyme + Amino acids	7%

DID YOU KNOW ... that if Vitazyme was used on every arable acre in the United States (309,607,601 acres), using two applications per crop on average per year, and considering a total crop value of \$143,657,928,000, then a conservative 8% increase in output per acre from Vitazyme, at a cost of about \$274,686,080, would provide \$11,492,634,000 more per year to the farmers of the country, a return of \$41.84 per dollar invested in Vitazyme!!!

U.S. Census Bureau, 2012, using data for 2007

Soybeans

Researcher: V. Plotnikov
Location: Vinnytsia, Ukraine
 harrowing, and cultivation)
 hydrolyzed N, 15.8 mg/100 g of soil P, 12.4 mg/100 g of soil exchangeable K, pH = 5.5)
Planting date: May 12, 2012

Research organization: National Academy of Agricultural Sciences
Variety: Hutoryanochka
Soil type: gray podzolic (2.2% organic matter, 8.4 mg/100 g of soil
 hydrolyzed N, 15.8 mg/100 g of soil P, 12.4 mg/100 g of soil exchangeable K, pH = 5.5)
Previous crop: soybeans
Tillage: conventional (disking, plowing,
 harrowing, and cultivation)
Planting rate: 750,000 seeds/ha

Experimental design: A small plot soybean trial, using 0.1 ha plots and four replications, was established to evaluate the effects of Vitazyme, applied two or three times, on soybean yield, income, nodulation, and quality. Some plots were placed on soils treated the previous year with Vitazyme to evaluate any carryover effects.

1. Control 2. Vitazyme carryover 3. Vitazyme twice 4. Vitazyme three times

Fertilization: none

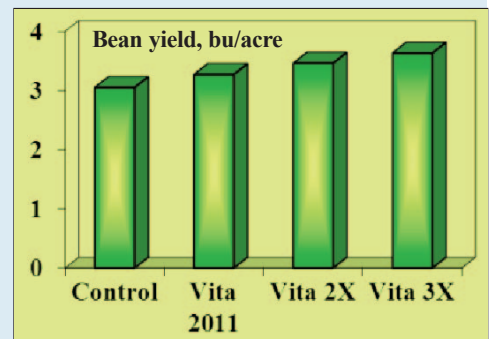
Vitazyme application: For Treatment 2, applications were made in 2011 on soybeans that had been treated twice. For Treatment 3, 1 liter/ton of seeds was applied before planting (May 12), and 0.5 liter/ha was sprayed on the leaves and soil at the second trifoliolate (June 12). For Treatment 4, the same applications were made as for Treatment 3, plus an additional 0.5 liter/ha at branching (June 22).

Yield results: Yields of soybeans responded very well to Vitazyme application, with a carryover effect of 7%, and two applications giving a 13% increase. Three applications provided an excellent 19% yield improvement, granting 2,221 hrn more income per hectare.

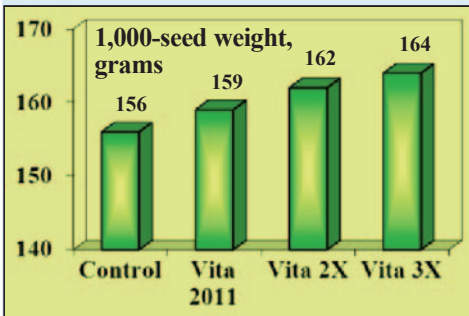
Bean quality results: All bean quality parameters were enhanced with Vitazyme, three applications doing better than two. There was good evidence of a carryover effect from 2011 as well.

Soybean Yield

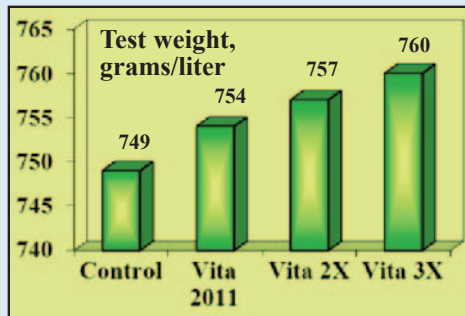
Treatment	Bean yield tons/ha	Yield change tons/ha	Income increase hrn/ha
1. Control	3.05	—	—
2. Vitazyme in 2011	3.27	0.22 (+7%)	924
3. Vitazyme 2X	3.46	0.41 (+13%)	1,602
4. Vitazyme 3X	3.63	0.58 (+19%)	2,221



Weight of 1,000 Seeds



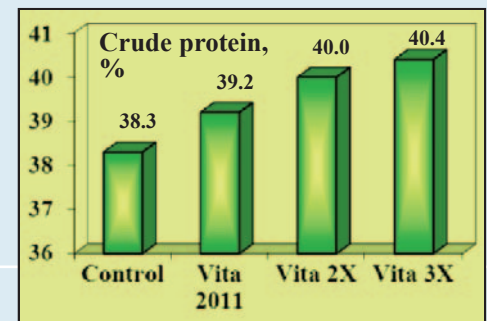
Bean Test Weight



Increase in soybean yield with Vitazyme

Carryover effect 7%
 Vitazyme two times 13%
 Vitazyme three times ... 19%

Bean Test Weight

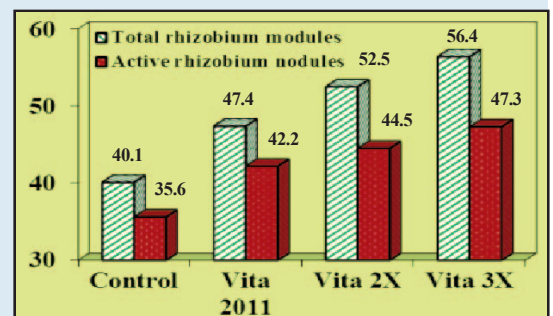


Increase in bean quality with Vitazyme

	1,000 seeds, grams	Test weight, grams/liter	Protein, %
Vitazyme carryover	3	5	0.9
Vitazyme twice	6	8	1.7
Vitazyme three times	8	11	2.1

Rhizobium nodulation results: Counts were made of the nodules in the late flowering stage. Vitazyme in all cases caused great increases in Rhizobium nodulation of both total and active types. Three applications produced the greatest increases (33% more active nodules).

Rhizobium Nodulation



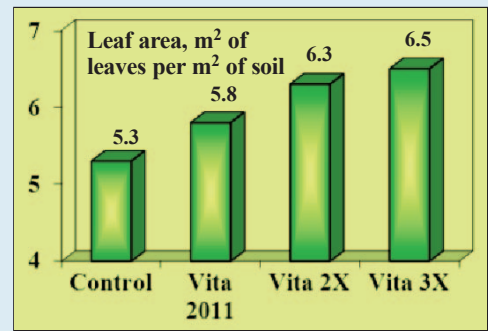
Increase in Rhizobium nodules with Vitazyme

	Total	Active%
Vitazyme carryover	18%	19%
Vitazyme twice	31%	25%
Vitazyme three times	41%	33%

Leaf area results: At the late flowering stage, leaf area determinations were made. Leaf area increased up to 23% as more Vitazyme was applied. There was a noticeable carryover effect of 9% from a 2011 application.

Conclusions: A soybean trial in Ukraine compared Vitazyme with an untreated control. Vitazyme was applied the year before and in 2012 on the seeds before planting at 1 liter/ton of seed, and either once or twice more during growth at 0.5 liter/ha. Yields responded consistently to all applications, increasing by 7% for the 2011 carryover effect, and 13 to 19% for the two and three application treatments, respectively. Bean quality also was positively influenced by Vitazyme, the 1,000-seed weight, test weight, and crude protein all responding to the applications in stairstep fashion. The 2011 treatment gave the smallest response in bean quality. Three Vitazyme applications produced 8 more grams per 1,000 seeds, 11 more grams per liter for test weight, and 2.1% more protein than the untreated control. Root nodulation was greatly enhanced by Vitazyme, increasing by up to 33% with three treatments, but by 19% with a 2011 application. Leaf area increases were from 9 to 23%. The *Rhizobium* nodulation and leaf area increases both point towards greater nitrogen and carbon fixation to stimulate growth that produced the yield and quality results noted in this study. Vitazyme is shown to be a very viable soybean amendment for Ukraine.

Leaf Area



Increase in leaf area with Vitazyme

Vitazyme in 2011 9%
Vitazyme twice 19%
Vitazyme three times ... 23%

Soybeans



Pods removed from the plants in the right-hand photo show the great advantage that Vitazyme provided to increase pod formation. The yield increase was 4.8 bu/acre.

By applying Vitazyme only once at early flowering, these soybeans responded very well. Note the height, leaf area, pod number, stem diameter, and root development.

Researcher: Linden Heikens

Location: Lake Park, Iowa

Variety: Pioneer 91Y92

Planting date: May 26, 2012

Soil type: silty clay loam

Planting rate: 166,000 seeds/acre

Planting depth: 1.75 inches

Row spacing: 30 inches

Experimental design: A soybean field was divided into Vitazyme treated and control areas, to determine the effects of Vitazyme on the yield from one application.

1. Control

2. Vitazyme

Fertilization: 100 lb/acre of 0-0-60% N-P₂O₅-K₂O, and 100 lb/acre 18-46-0, applied in April of 2012

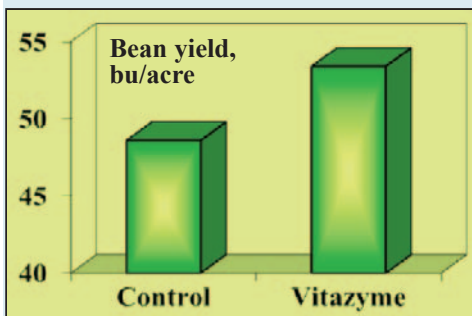
Vitazyme application: 13 oz/acre at early bloom (June 28, 2012), along with herbicides

Herbicide applications: pre-emergence (May 17, 2012), 2 lb/acre Encompass /AC and 32 oz/acre Roundup (glyphosate); early bloom (June 28, 2012), 0.3 oz/acre Cadet, 5 oz/acre Select, and 36 oz/acre Roundup along with Vitazyme

Harvest date: September 22, 2012

Yield results: A John Deere 9670 combine with a 630F platform and a weigh wagon were utilized.

Soybean Yield

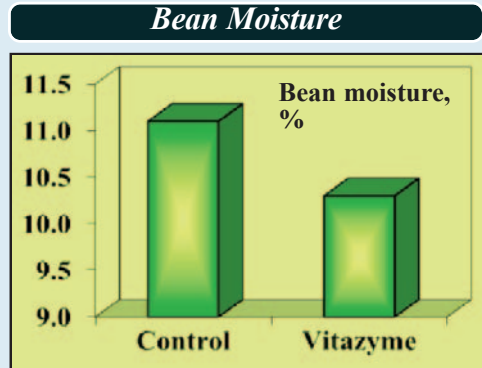


Treatment	Area	Total yield	Area yield	Yield change	Bean moisture	Moisture change
	acres	lb	bu/acre	bu/acre	%	%
Control	1.61	4,699	48.6	—	11.1	—
Vitazyme	1.61	5,161	53.4	4.8 (+10%)	10.3	-0.8

Continued on the next page

Conclusions: This soybean field trial in northwestern Iowa, using a single foliar Vitazyme application at early bloom, provided a 10% yield increase along with 0.8% less bean moisture at harvest. An income increase of about \$67.20/acre — using a price of \$14.00/bu — was realized, making the return on product invested about 15:1. Not only was the yield improved, but the beans were drier at harvest, indicating maturity was reached sooner with Vitazyme. Had a treatment been made to the seeds at planting, the yield increase would likely have been greater. These results prove the great efficacy of this program for soybeans in Iowa.

- **Increase in bean yield with Vitazyme: 8%**
- **Decrease in bean moisture with Vitazyme: -0.8%-point**



Sugar Beets



Sugar beets treated with Vitazyme in southwestern Minnesota responded very well, as they have now for three years at Huhnerkoch Farms.

Beet root weight and leaf area were markedly improved from only a single Vitazyme application of 13 oz/acre. This improvement resulted in an estimated 1.0 ton/acre increase.

Researcher: James Anderson
Variety: Beta
Planting date: April 19, 2012
Experimental design: A 60-acre sugar beet field was divided into Vitazyme treated and untreated areas, to determine the effects of this product on beet yield and sugar content.

Farmers: Matt and Brian Huhnerkoch
Population: 45,000 to 50,000 seeds/acre
Irrigation: center pivot

Location: Belview, Minnesota
Soil type: clay loam

1. Control

2. Vitazyme

Fertilization: unknown

Vitazyme application: 13 oz/acre on the seeds at planting

Rainfall: Only about 6 inches fell during the growing season.

Yield results: Due to harvest restrictions it was impossible to measure exact yields of the two areas, but the farmers estimated that the Vitazyme treatment produced 1.0 ton/acre more beets.

Sugar results: Evaluations of sugar were made for the two treatments.

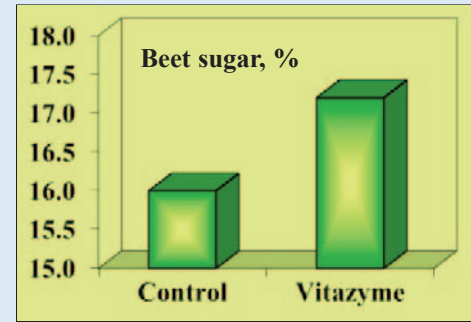
Conclusions: A sugar beet trial with Vitazyme produced an excellent 1.2 percentage-point increase in beet sugar compared with the control. The yield increase was estimated at 1.0 ton/acre. These results are similar to those observed during the previous two years at Huhnerkoch Farms.

- **Increase in beet yield with Vitazyme: 1.0 ton/acre (est.)**

Beet Sugar

Treatment	Sugar content	Sugar change
Control	%	%
Vitazyme	16.0	—
	17.2	+1.2

- **Increase in sugar with Vitazyme: 1.2 percentage points**



For drought and other stressful conditions, the brassinosteroids in Vitazyme are highly effective in reducing the stress and delivering top yields!

Vital Earth Resources

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

2012 Crop Results

Vitazyme on Sugar Cane

Researcher: Adhe

Research Organization: PT. Aneka Pangan Bermutu

Location: Dusun Barsari, Prigan - Pasuruan, East Java, Indonesia

Variety: Bulu Lawang

Soil type: Andosol

Planting date: November 29, 2011

Experimental design: One hectare of a sugar cane field was divided into a control (5,000m²) and a Vitazyme treated area (5,000m²), to determine the effects of the product on sugar cane growth and yield.

1. Control

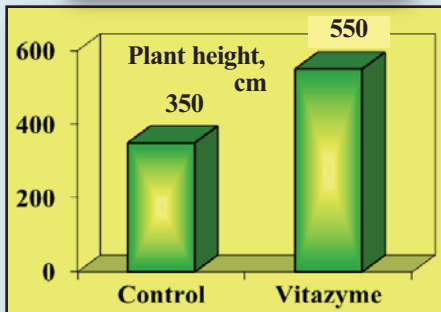
2. Vitazyme

Fertilization: normal for the area

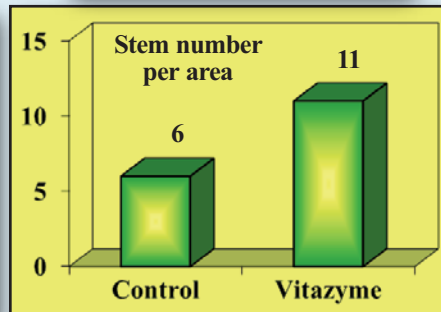
Vitazyme application: at planting, a 1% solution on the seed pieces; 1 liter/ha on the plants and soil on December 21, 2011 (about 1 month), and on March 30, 2012 (about 4 months)

Crop characteristics: Evaluations were taken near harvest time, the end of September, 2012. Values are an average of several plants.

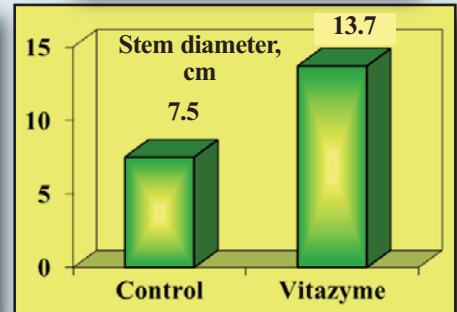
Plant Height



Stem Number



Stem Diameter



Increase with Vitazyme

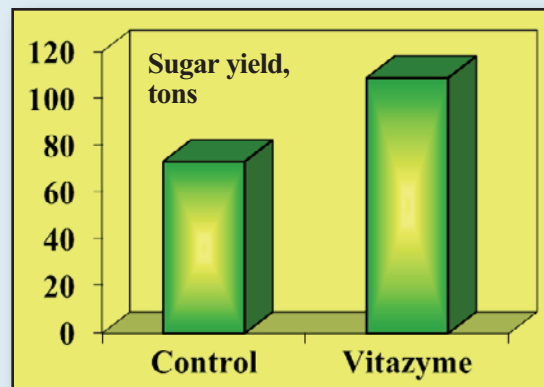
Plant height	57%
Stem number	83%
Stem diameter	83%

All plant growth parameters were markedly improved by Vitazyme.

Sugar cane yield: Harvesting was completed on September 28, 2012, 10 months after planting.

Treatment	Cane yield	Yield change
	tons	tons
Control	73.20	—
Vitazyme	108.89	35.69 (+49%)

**Increase in yield with
Vitazyme: 49%**



Conclusions: This sugar cane trial in East Java, Indonesia, compared Vitazyme treatment (on the seed pieces, and two subsequent soil and foliar applications) with an untreated control. The Vitazyme treated cane grew more aggressively, greatly outdoing the control in terms of height (+57%), stem number (+83%), and stem diameter (+83%). Yield of the cane was dramatically increased (+49%) with Vitazyme, showing the great utility of this product for improving sugar cane culture in Indonesia.



Note the Vitazyme treated on the left, with the untreated sugar cane on the right. The growth difference was great by the end of the test period.

Sugar Cane



Control area leaves of this Indonesian sugar cane study are typical for producers. Compare them with leaves having Vitazyme treatment in the right-hand photo.

Vitazyme treated sugar cane leaves are wider and longer, with more of them per plant. A stem number and stem diameter increase of 83% led to a yield improvement of 49%.

Researcher: Adhe **Research Organization:** PT. Aneka Pangan Bermutu
Location: Dusun Barsari, Prigan - Pasuruan, East Java **Variety:** Bulu Lawang
Soil type: Andosol **Planting date:** November 29, 2011
Experimental design: One hectare of a sugar cane field was divided into a control (5,000 m²) and a Vitazyme treated area (5,000 m²), to determine the effects of the product on sugar cane growth and yield.

1. Control **2. Vitazyme**

Fertilization: normal for the area

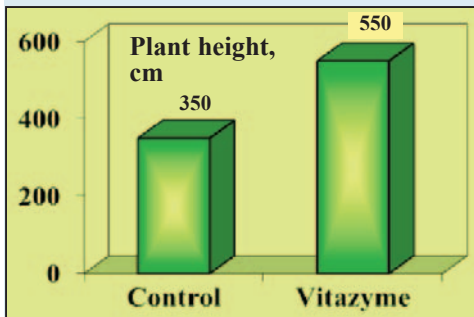
Vitazyme application: at planting, a 1% solution on the seed pieces; 1 liter/ha on the plants and soil on December 21, 2011 (about 1 month), and on March 30, 2012 (about 4 months)

Crop characteristics: Evaluations were taken near harvest time, the end of September, 2012. Values are an average of several plants. All plant growth parameters were markedly improved by Vitazyme.

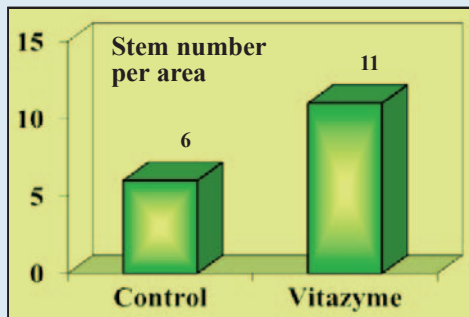


Cane plants harvested near each other in adjacent trial plots reveal remarkable differences in height and total biomass ... a 57% height difference.

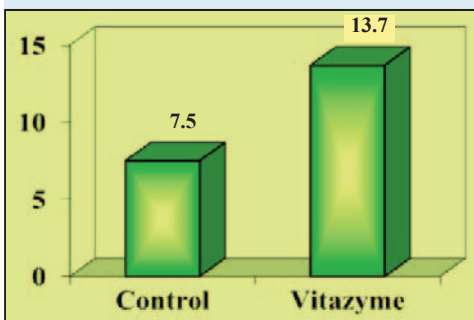
Plant Height



Stem Number

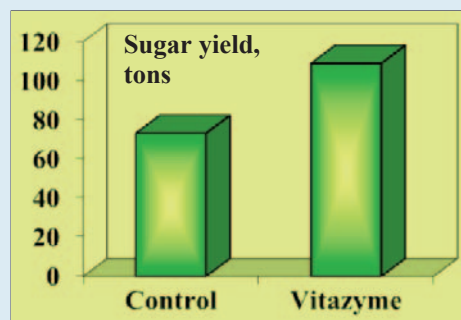


Stem Diameter



Sugar Cane Yield

Treatment	Cane yield (%)	Yield change (%)
Control	73.20	—
Vitazyme	108.89	35.69 (+49%)



Increase with Vitazyme
 Plant height 57%
 Stem number 83%
 Stem diameter 83%

• Increase in yield with Vitazyme: 49%

Continued on the next page

Sugar cane yield: Harvesting was completed on September 28, 2012, 10 months after planting.

Conclusions: This sugar cane trial in East Java, Indonesia, compared Vitazyme treatment (on the seed pieces, and two subsequent soil and foliar applications) with an untreated control. The Vitazyme treated cane grew more aggressively, greatly out-doing the control in terms of height (+57%), stem number (+83%), and stem diameter (+83%). Yield of the cane was dramatically increased (+49%) with Vitazyme, showing the great utility of this product to improve sugar cane culture in Indonesia.



The roots and stems of the untreated control were typical for the plantation, as shown in the photo above. Compare these with the treated plants in the photo to the right.

Vitazyme applied to these sugar cane plants, harvested near those plants in the photo on the left, show remarkably improved stem diameter (+ 83%) and root development.

Tobacco

Two Sites in Guatemala

Researchers: Roberto Garcia and Eng. Cristhian Mazariegos of Foragro, Guatemala City, Guatemala; Eng. Gustavo Portillo, Head of Plant Protection, Casa Export Tobacco Company, Guatemala

Location: San Jose (km 133), Teculután for the Jose Illescas site; San Augustin Acasaguastlan (km 145.5) for the Carlos Barrientos site

Variety: NC7

site); November 1, 2011 (Barrientos site)

humidity, 66% (ave.); meters above sea level, 235 (Illescas site), and 255 (Barrientos site)

Experimental design: For both trials, plots had side-by-side Vitazyme and control areas, each of 1.0 manzana (0.7 ha). The objective of the trial was to determine the yield and quality of tobacco produced by Vitazyme and untreated areas.

1. Control

2. Vitazyme

Fertilization: unknown

Vitazyme application: (1) transplant drench 2 days before transplanting (700 ml in 30 liters of water, or 2.3%), in a pool having 21,000 tobacco seedlings, with 90 trays to transplant into 1 manzana (0.7 ha); applied with a watering can; (2) foliar spray of 1.0 liter/ha with a backpack sprayer 21 days after transplanting; (3) foliar spray at 1.0 liter/ha 42 days after planting



Right to the dividing line of this split field comparison, Vitazyme shows a markedly better response for tobacco in Guatemala. Notice the leaves and plants in the other photos.



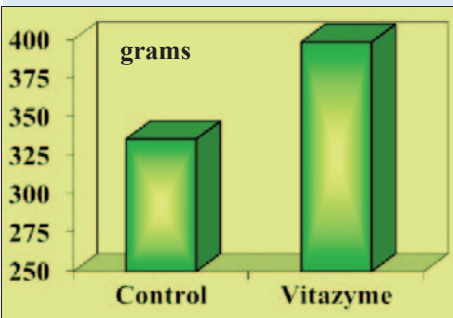
Average leaves harvested from the two treatments show a great difference in leaf area. Vitazyme treated leaves are also darker green, indicating the photosynthesis is greater.

Plant and yield results: Four samplings were made of five contiguous plants for each plot during the growing season. Harvesting was completed for both trials on February 15, 2012.

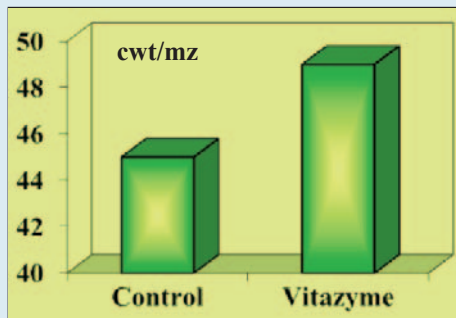
Jose Antonio Illescas Site

Treatment	Leaf chlorophyll	Root weight, fresh	Plant height	Yield
	color	grams	meters	cwt/mz
Control	pale green	335.6	1.94	45
Vitazyme	dark green	398.5 (+19%)	1.95 (+1%)	49 (+9%)

Root Weight



Leaf Yield



• Other data showed increases in leaf area and thickness with Vitazyme

Vitazyme increased both root and leaf weights at this site, by 19% and 9%, respectively. Plant height was not affected, but **treated plants were much darker green, indicating more chlorophyll with Vitazyme application.**

Average plants selected from the control and treated areas display a marked superiority of the Vitazyme treated plants. The yield was improved by 9 to 10%.



Carlos Rolando Barrientos

Treatment	Leaf chlorophyll	Root weight, fresh	Plant height	Yield
	color	grams	meters	cwt/mz
Control	pale green	325.6	1.94	39
Vitazyme	dark green	368.5 (+13%)	2.05 (+6%)	43 (+10%)

• Other data showed increases in leaf area and thickness with Vitazyme

As at the Jose Illescas site, both the root weight and leaf yield were increased with Vitazyme, by 13% and 10%, respectively. In addition, leaf length was increased by 6%. **Foliar analysis results:** Leaves from one of the sites were harvested and analyzed for nutrients.

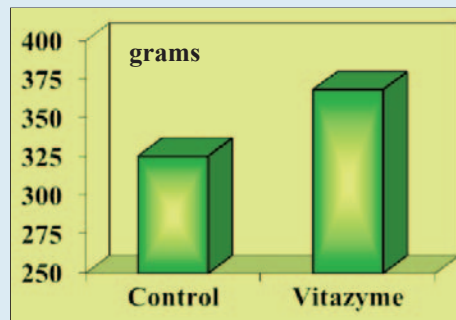
Treatment	N	P	K	Ca	Mg	S	B	Cu	Fe	Mn	Zn
	%	%	%	%	%	ppm	ppm	ppm	ppm	ppm	ppm
Control	3.56	0.42	5.00	3.03	0.57	3075	42.5	20.2	158.5	57.0	64.5
Vitazyme	3.19	0.37	4.37	2.55	0.47	2930	39.1	18.8	219.5	50.5	46.9

The nutrient composition of the control leaves was highest, but this did not improve tobacco quality above the Vitazyme treated leaves.

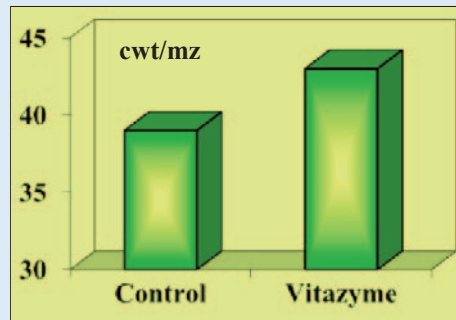
Conclusions: A study on tobacco at two farms in Guatemala compared Vitazyme treatment with an untreated control. The conclusions of the researchers is as follows:

1. The biological efficacy of Vitazyme in increasing leaf blade size and thickness, as well as coloring of tobacco curing, as compared to the untreated controls, was demonstrated.
2. Tobacco plant root growth was greater, with more weight and volume of secondary and adventitious roots in the Vitazyme treatments.
3. Leaf analysis did not indicate damage to the quality of the leaves by the use of Vitazyme.
4. Higher yields of tobacco per unit area rendered production increases of 4 cwt (hundred weight) per manzana (0.7 ha), or 0.45 tons/ha (9 to 10%, according to trials) in the Vitazyme treatment compared with the untreated control....
The application of Vitazyme in tobacco crops, by carrying out three applications during the [growth] cycle, the first as a drench at transplanting, and the second and third by foliar sprays at 3 and 6 weeks after planting, all at a rate of 0.7 liter/manzana (1.0 liter/ha), is recommended."

Root Weight



Leaf Yield



Tomatoes

Researchers: Nelson Najarro and Cristhian Mazariegos, Foragro Development, Guatemala City, Guatemala.

Location: San Manuel Chaparron, Department of Jalapa, Guatemala

Variety: Toliman

Soil type: silty clay

Climate: temperature, 25 to 35°C; relative humidity, 55% average

Planting rate: 4,500 plants/plot

Transplanting date: August 24, 2011

Altitude: 830 meters

Experimental design: Within a field of 0.5 ha receiving transplanted tomatoes, two plots of 2,500 m² were marked to evaluate tomato growth and yield characteristics caused by Vitazyme treatment versus an untreated control.

1. Control

2. Vitazyme

Fertilization: technical standard for high tomato production

Vitazyme treatment: (1) a drench of 500 ml of Vitazyme in 200 liters of water (0.25%) applied to the root zone of each treatment on August 25, 2011, two days after transplanting; (2) a repeat of the first treatment, 13 days later on September 6, 2011; (3) a foliar spray of 2.5 ml of Vitazyme per liter of water (0.25%) on September 13, 2011, 18 days after transplanting; (4) a repeat of the third treatment, 30 days after transplanting on September 26, 2011.

Flower and fruit results: On October 14 and 24, 45 and 65 days after transplanting, flowers and fruits/plant were counted.

45 Days After Transplanting

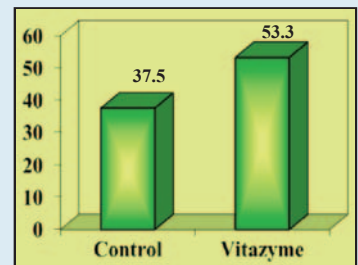
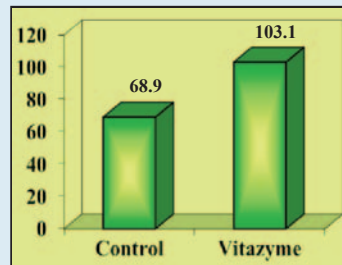
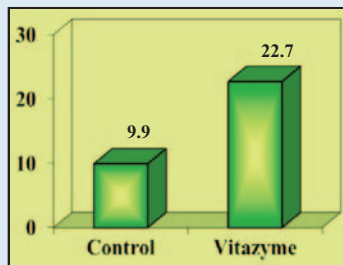
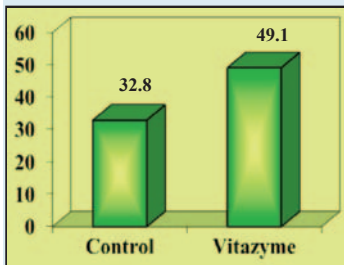
60 Days After Transplanting

Flowers

Fruits

Flowers

Fruits



At both evaluation times the number of flowers and fruits were greatly increased with Vitazyme. In both cases, a 50% flower increase was realized, while 42% to 129% increases in fruit were produced.

Yield results: Five pickings were made, on December 1, 15, 22, and 29 of 2011, and on January 5 of 2012. Fruit characteristics were also measured at each picking.

Increase with Vitazyme

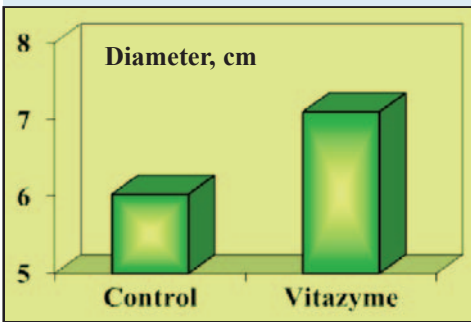
	45 days a.t.*	65 days a.t.*
Flowers	16.3 (+50%)	34.2 (+50%)
Fruits	12.8 (+129%)	15.8 (+42%)

*a.t. = after transplanting

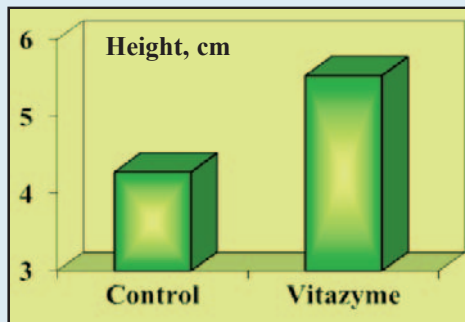
Treatment	Fruit diameter cm	Fruit height cm	Fruit weight grams	Fruits/plot number	Yield/plot kg
December 1, 2011					
Control	6.42	4.42	98.6	6,230.5	614.2
Vitazyme	7.33	5.42	106.0	7,836.5	830.7
December 15, 2011					
Control	6.50	4.50	102.58	12,094.5	1,240.7
Vitazyme	7.75	6.08	106.00	16,792.5	1,780.0
December 22, 2011					
Control	7.08	5.08	105.1	23,456.0	2,464.8
Vitazyme	8.58	7.00	107.2	28,733.8	3,079.3
December 29, 2011					
Control	6.25	4.42	83.4	21,623.5	1,803.8
Vitazyme	7.00	5.42	88.5	26,121.7	2,311.8
January 5, 2012					
Control	3.92	3.00	66.5	10,628.5	706.8
Vitazyme	4.83	3.75	79.0	13,434.0	1,061.3
	Average	Average	Average	Total fruits/ha	Total tons/ha
Control	6.03	4.28	91.2	296,132	27.32
Vitazyme	7.10	5.53	97.3	371,674	36.25

All parameters of yield were improved by the four Vitazyme treatments: fruit diameter (18%), fruit height (29%), fruit weight (7%), fruits/ha (26%), and most importantly fruit yield (33%).

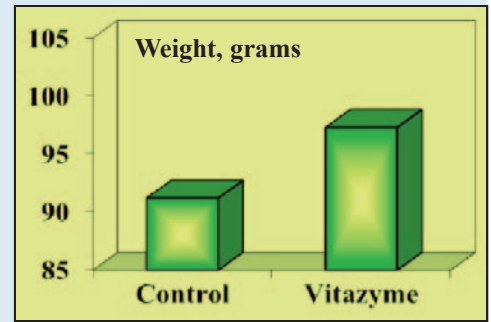
Fruit Diameter, Average



Fruit Height, Average

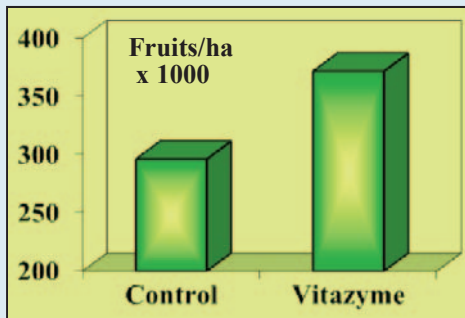


Fruit Weight, Average

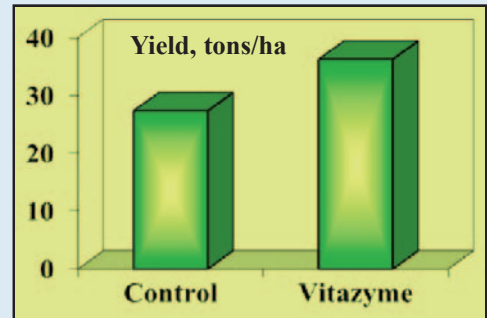


- Increase in fruit diameter with Vitazyme: 18%
- Increase in fruit height with Vitazyme: 29%
- Increase in fruit weight with Vitazyme: 7%
- Increase in fruits per hectare with Vitazyme: 26%
- Increase in yield per hectare with Vitazyme: 33%

Total Fruits Per Hectare



Total Yield Per Hectare



The Vitazyme treated tomatoes on the right show much greater leaf area, more fruit, stronger stems, and better roots than the control plants on the left.

Fruit from the plants in the left-hand photo have been picked and laid out to show how Vitazyme increases fruit set and size, and thus production ... a 33% increase here.

Conclusions: This Guatemalan tomato trial proved the great effectiveness of Vitazyme – applied four times during the growth cycle – to spur plant and fruit development and yield. Treated plants produced many more flowers and fruits during development (at 45 and 65 days after transplanting) than did the untreated control plants, exceeding the controls by 50% in flowers and 42% to 129% in fruits. During the five harvests, Vitazyme gave large increases in average fruit diameter (18%), fruit height (29%), fruit weight (7%), fruit per hectare (26%), and yield per hectare (33%). With major improvements in both size and yield, these effects of Vitazyme on the tomato crop prove its great efficacy for tomato growers in Guatemala.

Watermelons

Researchers: Robert Garcia and Cristhian Mazariegos, Foragro Development, Guatemala City, Guatemala; Alex Diaz and William Sosa, Heads of Plant Protection, Proingasa Classic, Guatemala **Company:** Proingasa Classic

Location: Site 8, Section 3, Valves 5 and 6, km 132, Senegal, Rio Hondo, Zacapa Dept., Guatemala

Variety: Extasis

Soil type: silty clay

Climate: temperature, 27 to 38°C; relative humidity, 63%

Altitude: 230 meters above sea level

Planting date: October 22, 2011

Experimental design: A watermelon field was selected for a Vitazyme trial, with the treated area being 2 manzanas (1.4 ha). The objective of the trial was to determine the ability of this product to improve watermelon yield and quality.

1. Control

2. Vitazyme

Continued on the next page



The effectiveness of Vitazyme in improving watermelon leaf growth, chlorophyll development, and plant vigor is readily seen here. Note the markedly growthier plants on the right.

These irrigated watermelons in Guatemala have been treated with Vitazyme, and display the usual excellent growth commonly noted with its use.

Fertilization: unknown

Vitazyme applications: (1) Roots of the seedlings were dipped into a drum containing a 1% Vitazyme solution (1 liter in 100 liters of water) for one manzana (0.7 ha), to give 1.4 liters/ha; (2) foliar and soil spray of 1.4 liters/ha at 23 days after planting; (3) foliar and soil spray of 1.4 liters/ha at 43 days after planting (sprayer had a 1,100-liter capacity, with purple Albuz nozzles applying 0.49 liter/minute).

Growth results: *Vitazyme treatments had greater leaf area and root mass than the control plants.*

Yield and quality results: Harvesting was completed December 18, 2011. A remarkable increase in the sugar content of the melons with Vitazyme was realized, nearly 2 percentage points. This 1.85 increase represented a 15% increase in Brix. The Vitazyme treated melons were firmer at harvest, meaning there would be less damage to the fruit during shipping. The melon count showed a hefty 11% increase with Vitazyme application, reflecting a sizable yield increase.

Melon Brix

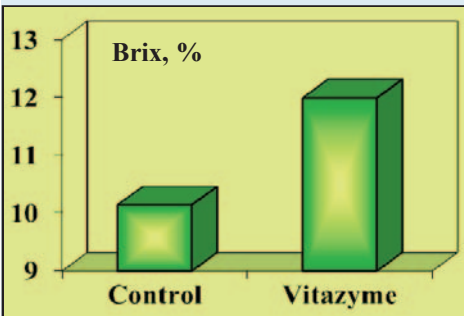
Treatment	Brix	Change
	%	%
Control	10.14	—
Vitazyme	11.99	+1.85 (+15%)

Melon Firmness (Grade)

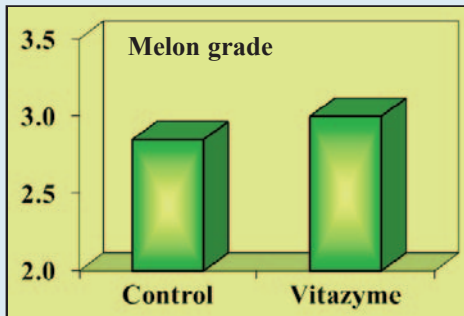
Treatment	Grade	Change
	%	%
Control	2.85	—
Vitazyme	3.00	0.15 (+5%)

Melon Yield

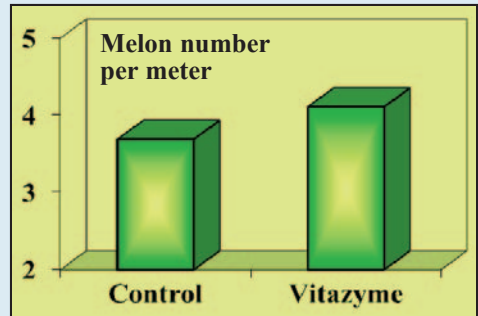
Treatment	Fruit number	Change
	number/meter	number/meter
Control	3.69	—
Vitazyme	4.11	0.42 (+11%)



• **Increase in fruit Brix with Vitazyme: 1.85 points**



• **Increase in fruit firmness with Vitazyme: 5%**



• **Increase in fruit number with Vitazyme: 11%**

Conclusions: This Guatemala watermelon trial, using a transplant treatment and two foliar/soil applications, proved that Vitazyme can improve melon sweetness (1.85 Brix more soluble solids), firmness (+5%), and yield of melons per linear meter of row (11%). The results prove the efficacy of the product in Guatemalan watermelon production systems.

In spite of the fact that farmers comprise less than 2% of the total population, and they are notoriously energy-inefficient, the average U.S. farmer feeds 155 people. In 1960, a farmer fed just 26 people. American farmers ship more than \$100 billion of their crops and products to many nations. U.S. farmers produce about 40 percent of the world's corn, using only 20 percent of the total area harvested in the world. Farmers are a direct lifeline to more than 23 million U.S. jobs of all types.

Wheat

Seed Treatment Results in the Greenhouse

Researcher: Paul W. Sylie
Variety: hard red winter
Soil type: silt loam

Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Planting date: March 14, 2012
Seeding rate: 50 seeds/pot
Pot size: 1 gallon
Fertilization: none



Wheat that had been Vitazyme seed treated 57 days before planting responded slightly in terms of plant dry weight increase. However, the root mass dramatically increased.

Although there was no significant increase in dry weight from Vitazyme seed treatment, there was an obvious improvement in leaf chlorophyll development, seen here.

Experimental design: Wheat seeds were treated on January 1, 2012, and planted on March 14, 2012, 57 days after treatment, to evaluate the effects of Vitazyme seed treatment over time. Four replicates were used in a randomized block design to enable a statistical evaluation.

1. Control

Vitazyme treatment: On January 17, wheat seeds were soaked in a 10% Vitazyme solution for 6 minutes, then dried on paper towels with a fan blowing over them for rapid evaporation. The seeds were stored at room temperature.

Harvest date: April 5, 2012, 21 days after planting

Dry weight results: The plants were washed free of soil and placed in a drying oven at 115° F for 24 hours, then weighed to the nearest 0.01 gram. While Vitazyme produced a small increase of 1%, this increase was not significant.

Conclusions: Wheat seeds planted in the greenhouse 57 days after a seed treatment were stimulated to produce 1% more biomass at 21 days after planting. This was a nonsignificant increase in growth, but an indication that the seed treatment was having a positive effect.

2. Vitazyme seed treatment

Wheat Dry Weight

Treatment	Dry weight	Weight change
	g	g
Control	5.71 a	—
Vitazyme seed trt.	5.78 a	0.07 (+1%)
Block P	0.1124	
Treatment P	0.6984	
Model P	0.1548	
CV _{0.10}	4.18%	
LSD _{0.10}	0.40 gram	

Winter Wheat

A Fertilizer Rate Study

Researcher: V. Plotnikov
Location: Vinnytsia, Ukraine

Research organization: National Academy of Agricultural Sciences
Tillage: conventional (disking, plowing, and cultivating)
Variety: Carivna

Soil type: gray podzolic (2.2% organic matter, 8.4 mg/100 g of soil hydrolyzed N, 15.8 mg/100 g of soil P, 12.4 mg/100 g of soil exchangeable K, pH = 5.5)

Planting date: October 7, 2011
Previous crop: peas

Planting rate: 6 million seeds/ha

Experimental design: A replicated plot design was initiated with winter wheat, using four fertility levels, to evaluate the effect of Vitazyme on wheat yield, quality, disease incidence, and plant traits at four fertility levels. Four replications were used, and the plots were 0.1 ha in area.

Treatment	Vitazyme	Nitrogen	Phosphate	Potash
kg/ha				
1	0	0	0	0
2	X	0	0	0
3	0	60	30	45
4	X	60	30	45
5	0	90	40	60
6	X	90	40	60
7	0	120	50	75
8	X	120	50	75

Continued on the next page

Fertilization: Phosphorus and potassium fertilizers were applied in the fall of 2011 during basic tillage, and nitrogen was applied in the spring.

Vitazyme application:

For Treatments 2, 4, 6, and 8, a seed treatment of 1 liter of Vitazyme per ton of seed was applied, and later 0.5 liter/ha was applied to the leaves and soil at the boot stage (leaf tube formation).

Weather for 2012: favorable for crop development

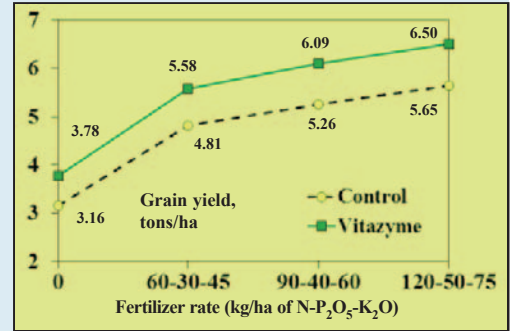
Yield results: Note that at all fertility levels the yield was increased, but especially at the lowest level (20%). When low and medium rates were applied, the yields increased by 16%, and the high fertilizer rate boosted the yield by 15%. These results correspond with other studies over the years which have shown that the highest percentage yield increases are with the lower soil fertility levels. At any fertilizer application level, Vitazyme in this study has been shown to be an excellent, highly profitable addition to Ukrainian wheat production systems.

Quality results: All quality parameters responded positively to Vitazyme application – test weight, 1,000-grain weight, gluten, and protein – the higher fertilizer application rates giving somewhat reduced responses. Note that protein increased from 1.1 to 1.2 percentage points for all fertility levels.

Wheat Yield

Treatment	Yield increase with Vitazyme* tons/ha	Income increase with Vitazyme* hryvnia/ha
2	0.62 (+20%)	1,095
4	0.77 (+16%)	1,457
6	0.83 (+16%)	1,581
8	0.85 (+15%)	1,623

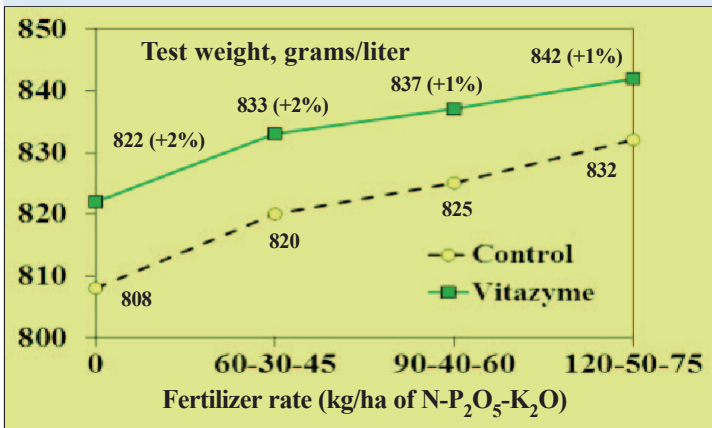
*Yields and income are compared at the same fertility level.



Increase in yield with Vitazyme

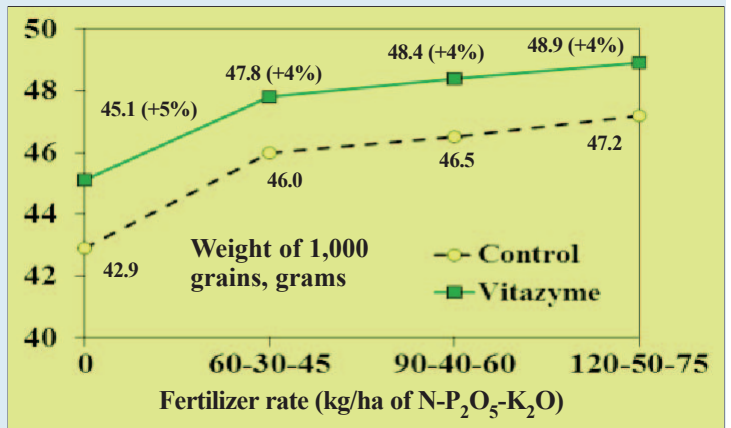
No fertilizer	20%
Low N-P-K	16%
Medium N-P-K	16%
High N-P-K	15%

Grain Test Weight



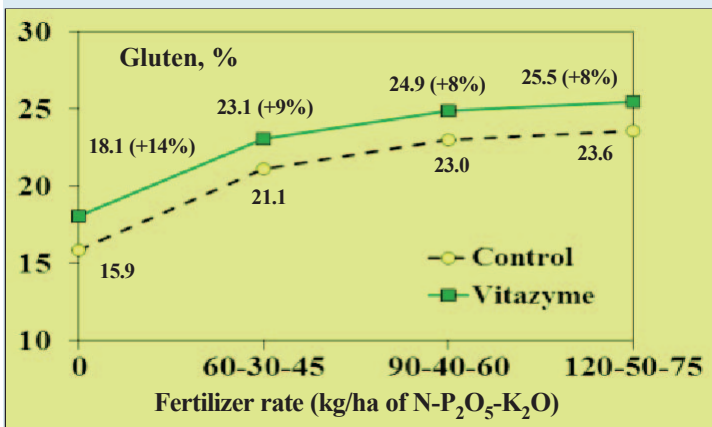
• Increase in test weight with Vitazyme at the same fertilizer level: 1 to 2%

Weight of 1,000 Grains



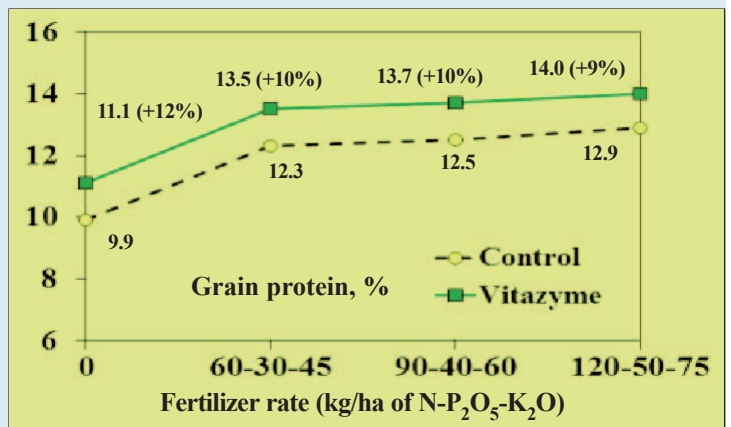
• Increase in 1,000-grain weight with Vitazyme at the same fertilizer level: 4 to 5%

Grain Gluten



• Increase in grain gluten with Vitazyme at the same fertilizer level: 8 to 14%

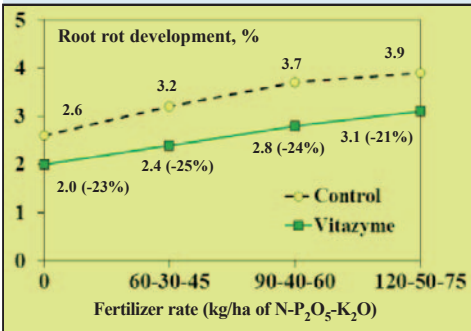
Grain Crude Protein



• Increase in grain crude protein with Vitazyme at the same fertilizer level: 9 to 12%

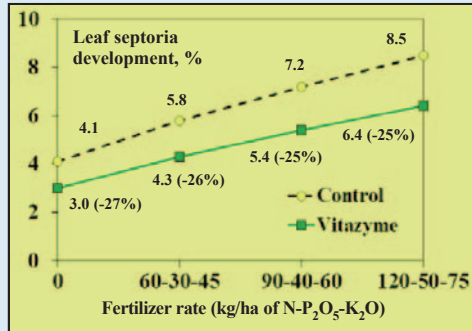
Disease results: In every case Vitazyme reduced damage of fungi to roots, leaves, and heads, by from 17 to 27%. The greatest protection percentage-wise was found at the lowest fertility levels.

Root Rot Damage



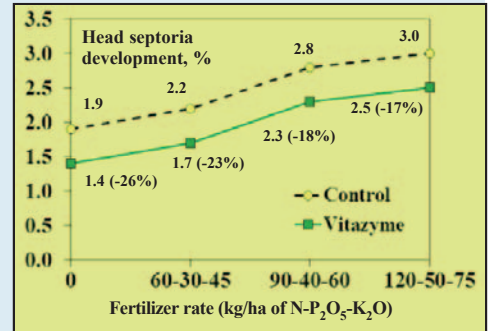
• **Decrease in root rot development with Vitazyme at the same fertilizer level: 21 to 25%**

Leaf Septoria Damage



• **Decrease in leaf septoria development with Vitazyme at the same fertilizer level: 25 to 27%**

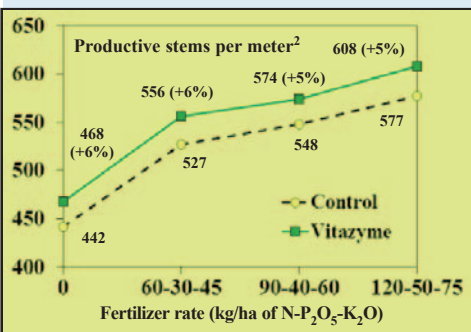
Head Septoria Damage



• **Decrease in head septoria development with Vitazyme at the same fertilizer level: 17 to 26%**

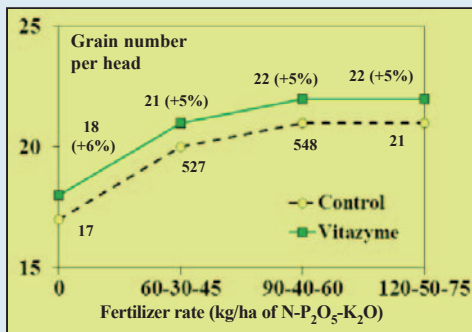
Plant structure results: Note that all parameters measured – stem density, grains per head, and grain weight per head – were enhanced by Vitazyme at all fertilizer levels, especially percentage-wise at the lower fertilizer rates.

Stem Density



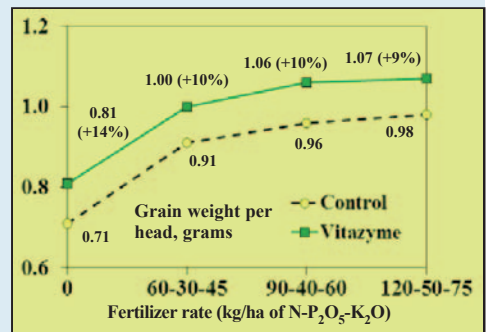
• **Increase in productive stems with Vitazyme at the same fertilizer level: 5 to 6%**

Grains Per Head



• **Increase in grains per head with Vitazyme at the same fertility level: 5 to 6%**

Head Grain Weight



• **Increase in grain weight per head with Vitazyme at the same fertilizer level: 9 to 14%**

Conclusions: In this replicated Ukrainian study with Carivna wheat at four fertility levels, Vitazyme proved itself to be a very consistent crop enhancer. The product increased yield by 15 to 20%, the highest percentage increases at the lowest fertilizer levels. Income was also boosted substantially. Grain quality was likewise enhanced: test weight by 1 to 2%, 1,000-grain weight by 4 to 5%, gluten by 8 to 14%, and crude protein by 9 to 12%. Fungal root rot damage was reduced by up to 25%, and both leaf and head septoria development were reduced by 17 to 27%. Plant physical traits showed improvements as well, with productive stem density increasing by 5 to 6%, grains per head by the same amount, and grain weight per head by 9 to 14%. These consistent results show the great value of Vitazyme in improving both the quality and yield of winter wheat in Ukraine.

Winter Wheat

Researcher: V. Plotnikov

Location: Vinnytsia, Ukraine

Tillage: conventional (disking, plowing, cultivating)

Seedbed preparation: plowing, harrowing, and cultivation

Soil type: gray podzolic (2.2% organic matter, 8.4 mg/100 g of soil hydrolyzed N, 15.8 mg/100 g of soil P, 12.4 mg/100 g of soil exchangeable K, pH = 5.5)

Experimental design: Plots of 0.1 ha, with four replicates, were laid out to evaluate the effect of Vitazyme on several winter wheat varieties at the Vinnytsia research station. The purpose of the trial was to evaluate the effect of one Vitazyme application on the yield of grain as compared to the untreated control.

1. Control

2. Vitazyme

Research organization: National Academy of Agricultural Sciences

Varieties: several (see later in this report)

Previous crop: corn

Planting date: October 13 and 18, 2011

Planting rate: 6 million seeds/ha

Continued on the next page

Fertilization: 50 kg/ha of dry nitrogen in the spring

Vitazyme application: 0.5 liter/ha on the leaves and soil at the boot stage (leaf tube formation)

Weather for 2012: favorable for all crops

Yield results: All varieties of winter wheat at both planting dates showed excellent yield increases with Vitazyme, ranging from 7 to 22%, with added income of up to 1,265 hrn/ha

Treatment	Planting date	Grain yield			Extra income
		Control	Vitazyme	Yield change	
		tons/ha	tons/ha	tons/ha	hrn/ha
Carivna	October 13	4.11	4.54	0.43 (+10%)	765
Lisova pisnya	October 13	3.56	3.94	0.38 (+11%)	665
Popelyushka	October 13	3.06	3.74	0.68 (+22%)	1,265
Zymoyarka	October 13	3.29	3.51	0.22 (+7%)	391
Torrild	October 13	3.28	3.60	0.32 (+10%)	545
Skagen	October 13	3.20	3.74	0.54 (+17%)	985
Carivna	October 18	3.44	3.77	0.33 (+10%)	565
Lisova pisnya	October 18	3.23	3.60	0.37 (+11%)	645
Popelyushka	October 18	3.24	3.55	0.31 (+10%)	525
Zymoyarka	October 18	2.92	3.22	0.30 (+10%)	505

Conclusions: This winter wheat trial at the National Academy of Sciences in Vinnytsia, Ukraine, revealed that Vitazyme, applied at 0.5 liter/ha at the boot stage, produced excellent yield increases of from 7 to 22% for six varieties, whether applied on October 13 or October 18. Extra income ranged from 291 to 1,265 hrn/ha, proving the excellent value of Vitazyme for winter wheat production in Ukraine. A seed treatment would likely have boosted yield more.

Yield increase with Vitazyme

October 13 planting

Carivna	10%
Lisova pisnya	11%
Popelyushka	22%
Zymoyarka	7%
Torrild	10%
Skagen	17%

October 18 planting

Carivna	10%
Lisova pisnya	11%
Popelyushka	10%
Zymoyarka	10%

Vitazyme Helps You Go That Extra Mile, and It Is So Easy To Use!

Today's world of agriculture does not allow for many errors in your production system, especially major ones. Every year the world of modern technology encourages improvements in efficiency of energy and fertility inputs, to squeeze every last bit of use from our hard-earned dollars to maximize next year's crop.

Perhaps you have overlooked one of the easiest ways to achieve this input maximization in an extremely simple and amazingly effective approach. This way involves simply adding Vitazyme to the sprayer or fertilizer tank at the time you normally apply a fertilizer or spray a pesticide. The correct application times for this material will usually fit into your normal fertilizer and spray programs.

When should you apply it to give the best benefit? Any time the crop is growing! That said, the usual times to apply for the best benefit are ...

At planting. Place 13 oz/acre (1 liter/ha) of Vitazyme in the starter fertilizer tank.

In the seed treater. Add the

concentrate to your other materials to achieve about 1 quart (1 liter) per ton of seed.

With herbicide, fungicide, and insecticide sprays. Place Vitazyme at 13 oz/acre (1 liter/ha) in the tank along with glyphosate or other chemicals, at knee height for corn and



sorghum, at early bloom for beans and cotton, or at any time as the crop enters its major growth period. A followup application closer to crop maturity adds further benefits.

Injected through irrigation systems. Inject 13 oz/acre (1 liter/ha) into the system at planting, and at

early bloom or some other growth stage.

This simple addition to your farming operations will reap consistent rewards by making fertility inputs more effective, even enabling a cutback in nitrogen applications. Disease pressure will be reduced because free amino acid levels in plant tissues will be less.

Yields will be enhanced, and above all profits will be boosted. Typical returns on investment are from 5:1 to 40:1, or higher. Note the information box on page 43.

Vitazyme makes the soil-plant system more efficient by stimulating metabolic cycles, by inhibiting susceptibility to disease, and by stimulating the root microbial population. This can all be achieved by simply adding the product to your usual operations. It is that simple, and the cost is low. Returns are high!

Vitazyme will indeed help you go that extra mile in achieving greater efficiency from your crop inputs. It is the consistent, highly effective help you may have overlooked, and it is so simple to use!