VITAZYME®
an All Natural Concentrate

2011 Field Trial Results

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

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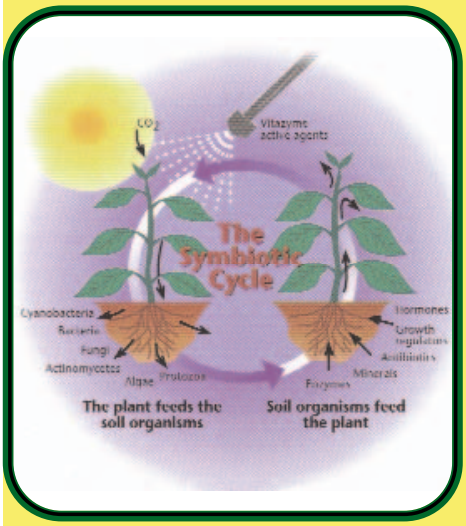
2011 Vitazyme Field Trial Results

This edition of Vitazyme crop reports represents the sixteenth 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 dissolve essential minerals, and reduced iron releases anionic elements. Organism types include mycorrhizae, cyanobacteria and various other bacteria, fungi, and actinomycetes.

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

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

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

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

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

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

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

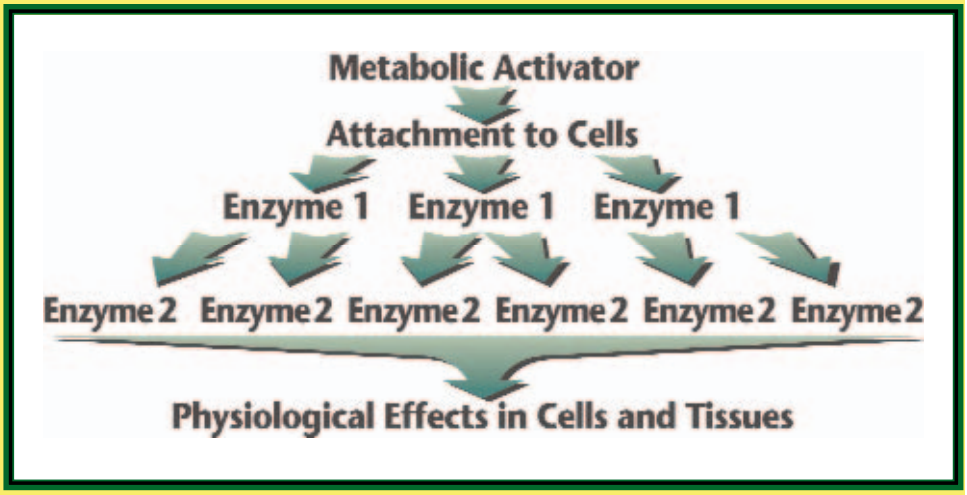
Soil Organic Matter			Previous Crop		Compaction		Soil NO_3-N Test		
Low(<1.5%)	Medium(1.5-3%)	High(>3%)	Non-legume	Legume	Much	Little	Low	Medium	High
1	2	3	1	3	1	3	2	4	6

Total additive score:	15	14	13	12	11	10	9	8	7	6	5
Apply this % of optimum N:	←	50-60%		→	←	60-70%		→	←	70-80%	→

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

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

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



Vitazyme Highlights for 2011

The year 2011 provided many interesting highlights for Vitazyme research throughout the world, confirming the consistently excellent responses from this innovative agricultural program with all soils, climates, and management schemes.

Some Highlights for 2011

1 Replicated trials in Russia for registration on wheat, sugar beets, and sunflowers gave superb results. Wheat grain yield increased by up to 16%, which reflected marked improvements in germination and winter survival, leaf chlorophyll, tillering, head size and grain number, and grain weight per plant. Sugar beet yield improved by a remarkable 30%, and unflower yields increased by 20%.

2 The third year of replicated testing at the National Academy of Agrarian Sciences in Vinnytsia, Ukraine, proved that Vitazyme continued its remarkably fine performance. Over three years now, corn yields have improved by 12%, soybeans by 23%, sugar beet sugar by 24 to 27% (depending on the amount of N fertilizer applied), and sunflowers by 19%.

3 Trials in the highlands of Viet Nam have given impressive responses with Vitazyme for coffee (up to 27%, giving $1,023/ha more income), soybeans (10%), rice (up to 19%), and corn (up to 13%). Use of the product on rice in the Mekong Delta continues to expand.

4 The Vitazyme program in Australia has grown significantly over the past year, in large part because of very positive results from trials with lettuce (up to a 50% increase), potatoes (40% increase in marketable tubers), carrots (17 to 33% increases), onions (10% yield increase), oranges (44% yield increase), and other crops.

5 In Chile, continuing trials with Syngenta have produced excellent coloration and enhanced maturity responses for grapes, cherries, and apples from late-season applications. Increases in the first picking apples of 30% were not uncommon. When early enough applications were made the yields were boosted up to 24%.

6 In Cuba, extensive studies on coffee and cocoa were completed, which produced fine responses in both nurseries and producing plantations.

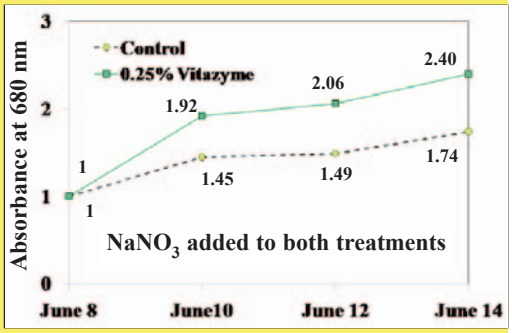
7 The fourth year of a continuing study on a corn-soybean rotation in Iowa revealed that the yield of soybeans was increased, as expected, but bean quality was also improved, available soil nutrients and balance were enhanced, and soil microbe populations were stimulated.

8 Continuing evaluations on the relative effectiveness of two Vitazyme formulations proved that a concentrated form of the product performs as well as does the normal product.

Vitazyme Field Tests for 2011

Algae

Researcher: Jeffery Lodge, Ph.D., Associate Professor of Biological Sciences
Institution: Rochester Institute of Technology, Rochester, New York
Experimental design: Various algae species are very effective at converting wastewater nutrients into oil that can be harvested and used as fuel in various applications. Any means to accelerate the growth of these algae would be highly beneficial to improve the conversion of wastewater to usable biofuel. These three species of algae – Scenedesmus, Chlamydomonas, and Chlorella – were used in three trial runs for each species, with eight flasks per trial having waste water and concentrations of Vitazyme of 0, 0.02%, 0.5%, 0.10%, 0.25%, 0.50%, 0.75%, and 1.00%. At two-day intervals, the absorbance of the solutions at 680 nm was measured to give response curves for the various Vitazyme concentrations over the 8-day test period. Algae growth is directly correlated with absorbance at 680 nm. A separate analysis was made with one algae species using two flasks, with 0.8 mg/ml of solution of $NaNO_3$, to increase the nitrogen content and evaluate Vitazyme activity (at 0.25% concentration) as a consequence.



1. Control **2. Vitazyme at several concentrations**

Absorbance results at eight dilutions: No consistent patterns of growth resulted from the Vitazyme treatments using three algae species and eight concentrations. In some cases the growth of the algae was increased, but in other cases it was not. Thus, this data is not reported here.

Absorbance results with added $NaNO_3$: When $NaNO_3$ was added at 0.8 mg/ml to two flasks, one containing Vitazyme and other no product, a considerable burst of growth of the algae was noted in the Vitazyme treated flask. This information is shown in the accompanying graph.

Conclusions: In this university study of algae growth in response to eight Vitazyme concentrations, results were not consistent using wastewater only, but when 0.9 mg/ml of $NaNO_3$ were added to the wastewater there was a great response in growth of the algae. After 6 days of growth, the 0.25% Vitazyme treatment had exceeded the control receiving no Vitazyme by 40%. These results show that a small amount of added nitrogen with Vitazyme will greatly accelerate algae growth in nitrogen-limited wastewater, much like adding nutrients to the soil will enhance Vitazyme activity in normal agronomic situations. Algae require nitrogen to metabolize the carbonaceous contents of wastewater, and by supplying extra nitrogen, plus the metabolizing enhancements of Vitazyme's active agents, the growth in a less nitrogen-deprived environment will proceed faster, making this product an excellent addition to algae production under these conditions.

• Increase in algae growth with Vitazyme at 6 days: 40%

Apples

Researcher: Gonzalo Ugarte B. *Organization*: Syngenta, Santiago, Chile
Location: Agrisouth States Chile, S.A., Chile *Variety*: Gala
Experimental design: An apple orchard was divided into a Vitazyme treated and untreated area to evaluate yield and color of the fruit.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 2 liters/ha, sometime before fruit coloration.
Yield results: Two pickings were made.
Color results: Values were taken at the fruit picking.
Conclusion: In this Chile apple study, Gala apples responded very well to 2 liters/ha of Vitazyme, increasing in yield by 13% and improving in color considerably over the untreated control; 43% of the treated apples had 50% color, while only 25% of the untreated fruit had 50% color. This program for apple yield and quality enhancement has been shown to be highly viable in Chile.

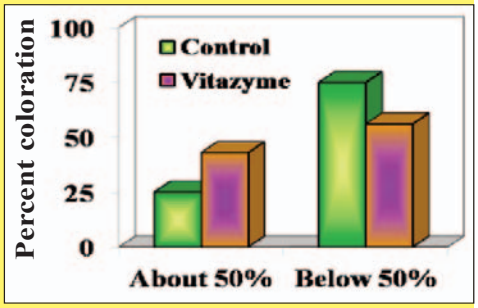
Apple Yield

Treatment	Picking 1	Picking 2	Total	Yield change
	(units unknown)			
Control	5.5	6.0	11.5	—
Vitazyme	4.5	8.5	13.0	1.5 (+13%)

• Increase in yield with Vitazyme

Apple Color

Treatment	Percent coloration	
	About 50%	Below 50%
	percent of fruit	
Control	25	75
Vitazyme	43	56



Apples

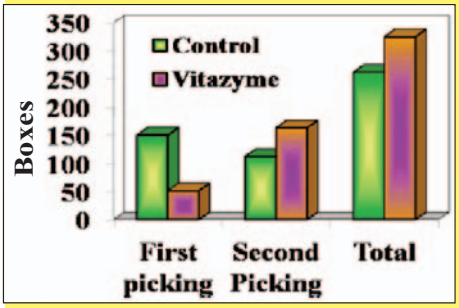
Researcher: Gonzalo Ugarte B. *Organization*: Syngenta, Santiago, Chile *Location*: Society Agricola Millahue, Fundo San Esteban *Variety*: Gala *Fertilization*: unknown
Experimental design: An apple orchard (variety Gala) was divided into a Vitazyme treated and an untreated area, with the objective of determining the yield, quality, and income of the crop as caused by this biostimulant.

1. Control **2. Vitazyme**

Vitazyme application: 2 liters/ha, sometime before fruit coloration.
Yield results: Two pickings were made.

Apple Yield

Treatment	First picking	Second picking	Total	Yield change
	boxes			
Control	150	112	262	—
Vitazyme	162 (+8%)	163 (+46%)	325	63 (+24%)



• Increase in income with Vitazyme: 2,431 USD/ha

• Return on investment with Vitazyme: 24.3 USD per 1 USD invested

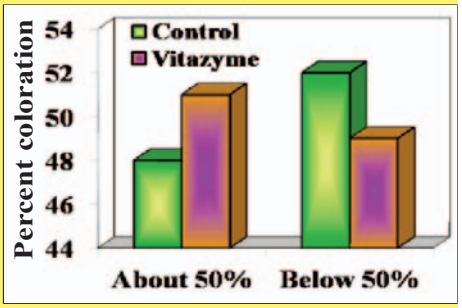
Fruit left on the tree after harvest: Some fruit cannot be marketed due to poor color so is left on the trees after harvest.
Color results: Color were determined at the first picking.

Yield increase with Vitazyme
First picking ..... +8%
Second picking ..... +46%
Total ..... +24%

Income results: See the table below.

Apple Color

Treatment	Percent coloration	
	About 50%	Below 50%
	percent of fruit	
Control	48	52
Vitazyme	51	49



Apple Income

Treatment	Crop yield	Crop value*	Value increase	Return on investment**
	boxes/ha	USD/ha	USD/ha	USD return/USD invested
Control	2,105	10,527	—	—
Vitazyme	2,612	13, 058	2,431	24.3

*Value of 5.00 USD/box.
**Value of 50.00 USD/liter of Vitazyme

Conclusion: An apple study in Chile, comparing Vitazyme (2 liters/ha) with the untreated control, resulted in excellent responses from this biostimulant. Total yield increased by 24% (+8% for the first picking and +46% for the second picking), color was improved slightly, and income was markedly increased with Vitazyme. Only 27% of the fruit was left on the trees due to poor coloration whereas the control trees had 48% fruit left. The product increased income by 2,431 USD/ha, and the return per 1 USD invested was 24.3 USD, proving this product is highly viable for apple production in Chile.

Apples

The Vitazyme treated apples clearly are better colored with either the 2 or 3 liters/ha application, compared to the untreated control. Better color earlier means better prices for the farmer.

Researcher: Gonzalo Ugarte B. *Organization*: Syngenta, Santiago, Chile
Location: Wapri Fundo Marengo, Chile *Variety*: Fuji
Experimental design: An apple orchard was divided into three treatments, a control and two Vitazyme treatments, to evaluate the effects of Vitazyme on fruit color and first picking yield.

1. Control 2. Vitazyme at 2 liters/ha 3. Vitazyme at 3 liters/ha

Fertilization: unknown
Vitazyme application: Two Vitazyme rates, 2 and 3 liters/ha, were sprayed on the leaves and fruit before fruit coloration.
Color results: Both the 2 and 3 liter/ha applications significantly improved fruit color at the time of the first picking.
Yield results: see table at right
Conclusion: This Fuji apple trial in Chile revealed that Vitazyme at both 2 and 3 liters/ha applied before coloration, improved the color significantly, but the yield was not enhanced due to the fact that the product was applied too late in the growth cycle to stimulate yield.

Apple Yield

Treatment	Yield, April 10
	kg for sampled area
Control	324
Vitazyme, 2 liters/ha	318
Vitazyme, 3 liters/ha	265

Apples

Researcher: Gonzalo Ugarte B. *Organization*: Syngenta, Santiago, Chile
Location: Society Agriculture La Rosa Sofruco, Chile
Variety: Gala
Experimental design: An apple orchard was divided into four treatments to evaluate the effects of Vitazyme, a defoliant, and a coloring agent on fruit grade and maturity for three pickings. Costs of the treatments were also tabulated.

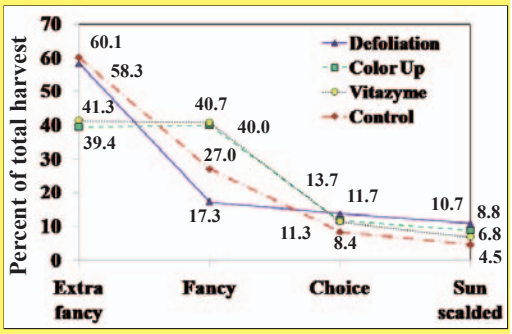
1. Defoliation 2. Color Up 3. Vitazyme 4. Color

Vitazyme application: 2 liters/ha before fruit coloration
Yield results and color: All treatments gave the same total yield, but picking yields varied greatly, as did costs.

Apple Yield and Color

Treatment	Harvest Per Picking			
	Defoliation	Color Up	Vitazyme	Control
	---------- kg/ha ----------			
1	49,400 (94%)	41,000 (80%)	36,400 (70%)	20,800 (38%)
2	2,600 (6%)	10,400 (20%)	15,600 (30%)	20,800 (38%)
3	0	0	0	10,400 (24%)
Total	52,000	52,000	52,000	52,000
Cost/ha, USD	1,058	579	100	0
Cost/tons ha, USD	20.4	11.1	1.9	0

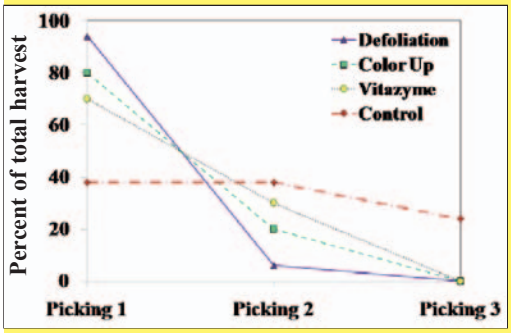
Apple Quality



Cost Per Ton • Hectare

	USD
Defoliation	20.4
Color Up	11.1
Vitazyme	1.9

Quality results: Four fruit categories were evaluated for this study.



Conclusion: This Gala apple trial in Chile revealed that, while the yields were the same for all treatments, there were considerable differences in the coloration and maturity, the treatment cost, as well as the fruit grade at harvest. The highest percentage of apples picked at the first harvest was for defoliation (94%), while Color Up gave an 80% first picking, and Vitazyme nearly as great a picking at 70%; the control gave only 38% for the first picking, All other apples were ready at the second picking, except for the control treatment, which yielded 24% for the third picking.

The treatment cost was by far the least with Vitazyme (1.9 USD/ton • ha), while Color Up cost 11.1 USD/ton • ha. Extra fancy apples were highest for the control (60.1%), but the quality dropped rapidly for fancy and choice grades. Defoliation produced nearly as many extra fancy apples as did the control, but the percentage of fancy fruit dropped below the levels of the other three treatments. Vitazyme and Color Up produced very similar fruit quality profiles – about 40% extra fancy and 40% fancy, with 11% choice. The defoliation treatment produced the greatest number of sun-scolded fruit (10.7%). Of all treatments, Vitazyme produced the greatest cost-benefit ratio, and likely the greatest net income as well, although an analysis of fruit value for the various categories was not undertaken.

Apples

Researcher: Gonzalo Ugarte B. *Organization*: Syngenta, Santiago, Chile *Location*: Wapti Fundo Marengo, Chile
Variety: Gala
Experimental design: An apple orchard was divided into three treatments, a control and two Vitazyme treatments, to determine the effect of the product on fruit color, and on yield in the earliest picking

1. Control **2. Vitazyme at 2 liters/ha** **3. Vitazyme at 3 liters/ha**

Fertilization: unknown
Vitazyme application: Either 2 or 3 liters/ha were sprayed on the leaves and fruit of the trees before fruit coloration.
Color results: ***Vitazyme at 2 liters/ha improved the color considerably, but the 3 liters/ha rate was even more effective in developing a deep red color of the skin.***
Yield results: Two pickings were recorded, on February 18 and March 4 of 2010.
Conclusion: This Gala apple trial in Chile showed that Vitazyme at both 2 and 3 liters/ha, applied before coloration, improved the color significantly at 2 liters/ha but markedly at 3 liters/ha. Because of the color improvement, more apples were able to be harvested during the first harvest on February 18, 4% more with the 2 liter/ha application and 32% more with the 3 liter/ha treatment. The total yield was not affected by Vitazyme because of the late application of the product during the growth cycle.

Apple Yield

Treatment	Yield, Feb. 18	Yield, Mar. 4	Total yield
	kg of sample area		
Control	78	318	396
Vitazyme, 2 liters/ha	81 (+4%)	259	339
Vitazyme, 3 liters/ha	103 (+32%)	262	366

Notice how either 2 or 3 liters/ha of Vitazyme, applied late in the season at fruit coloration, markedly improved the ripening of the apples.

• Increase in earlier fruit with Vitazyme: 4 to 32%

Conclusions from Syngenta on apple production with Vitazyme in Chile

- **Vitazyme improves apple quality in terms in fruit color and size.**
- **Vitazyme increases the percentage of harvested fruit, reducing the amount of fruit left on trees because of poor color.**
- **Vitazyme improves the profitability of the apple crop.**
- **Vitazyme increases tree vigor.**
- **The product is not the answer to all producer problems, but supports production in many ways.**

Spring Barley

Researcher: Unknown *Research coordinator*: I.V. Braginets
Research organization: Alfa-Agro, Ukraine *Variety*: unknown
Experimental design: A field was divided into a Vitazyme treated and an untreated portion to evaluate the effect of this product on crop yield.

1. Control **2. Vitazyme**

• Increase in barley yield with Vitazyme: 0.54 ton/ha 10.0 bu/acre

Fertilization: farm practice
Vitazyme application: 1 liter/ha sprayed on the leaves and soil with the herbicide
Yield results: No yield results are available, but the increase in yield is given.
Conclusion: This yield increase was an excellent result of Vitazyme application in this Ukraine study.

Barley

Farmer: AGRivision *Researcher*: Steven David *Location*: Goshen, Victoria, Australia
Research organization: Organic Farming Systems, Perth, Australia *Soil type*: sandy clay loam
Variety: unknown *Planting date*: June, 2010 *Fertilization*: farmer practice
Experimental design: A barley field was divided into three sections – the normal farmer practice, and two Vitazyme programs – to evaluate the effect of this product on barley yield and growth.

1. Control **2. Vitazyme on the seeds** **3. Vitazyme on the seeds and leaves**

Vitazyme application: (1) 1 liter/tonne of seed for Treatments 2 and 3; (2) 0.5 liter/ha on the leaves at early tillering
Growth results: Early barley growth was significantly increased by Vitazyme, as shown below.
Yield results: The crop was harvested in December of 2010.
Conclusion: In this Australian barley trial, Vitazyme applied on the seeds and again at early tillering significantly increased both early growth (+6%) as well as final grain yield (+12%). The seed treatment alone did not significantly improve plant growth or yield, revealing the importance of a foliar application on barley. This trial success reveals the great value of the Vitazyme program for barley production in Australia.

Barley Growth

Treatment	Barley growth*	Growth change
	NDVI analysis	
Control	0.713 b	—
Vitazyme on seeds	0.722 ab	0.009 (+1%)
Vitazyme on seeds and leaves	0.755 a	0.042 (+6%)

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

Barley Yield

Treatment	Grain yield*	Yield change
	tonnes/ha	tonnes/ha
Control	1.82 b	—
Vitazyme on seeds	1.82 b	0
Vitazyme on seeds and leaves	2.05 a	0.23 (+12%)

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

• Increase in early growth with Vitazyme twice: +6%

• Increase in yield with Vitazyme twice: +12%

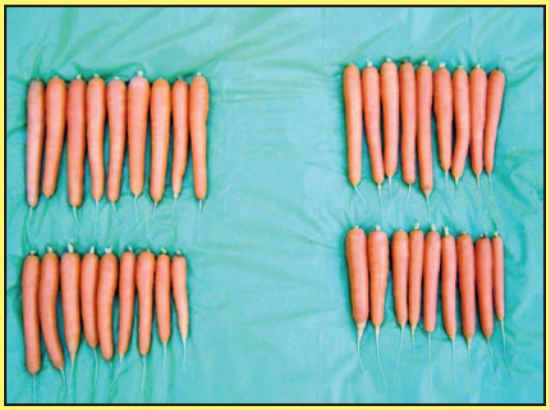
Carrots

Farmer: West Hills Farms *Researcher*: Steven David *Research organization*: Organic Farming Systems, Perth, Australia
Variety: Stefano *Soil type*: sand *Planting date*: March 18, 2010
Experimental design: A field area was divided into an untreated control and a Vitazyme treated area to evaluate the effect of the product on crop yield.
1. Control **2. Vitazyme**
Fertilization: unknown
Vitazyme application: (1) 1 liter/ha on the leaves and soil 28 days after planting; (2) 1 liter/ha on the leaves and soil 69 days after planting
Yield results: The carrots were sampled at harvest on August 4, 2010.
Conclusion: A carrot study in Australia showed that two Vitazyme applications greatly increased average root weight (+17%) at harvest. The final yield was considerably greater for the Vitazyme treatment, showing the great value of this program on carrots for Australia.

Carrot Yield

Treatment	Weight	Weight change
	grams/carrot	
Control	98.1	—
Vitazyme	114.6	16.5 (+17%)

• Increase in carrot weight with Vitazyme: 17%



Samples of carrots treated with Vitazyme, on the top, are longer and fuller compared to the untreated carrots on the bottom.

Carrots

Farmer: West Hills Farms *Researcher*: Steven David *Research organization*: Organic Farming Systems, Perth, Australia
Variety: Stefano *Soil type*: sand *Planting date*: April 28, 2010
Experimental design: A field area was divided into an untreated control and a Vitazyme treated area to evaluate the effect of the product on crop yield.
1. Control **2. Vitazyme**
Fertilization: unknown
Vitazyme application: (1) 1 liter/ha on the soil 5 days after planting; (2) 1 liter/ha on the leaves and soil 48 days after planting
Yield results: The carrots were sampled midway through the growth cycle on September 20, 2010, and weighed.
Conclusion: A carrot study in Australia showed that two Vitazyme applications greatly increased average root weight (+33%), as measured at midseason. The final yield was not measured, but presumably was considerably greater for the Vitazyme treatment, showing the great value of this program for carrots.

Carrot Yield

Treatment	Weight	Weight change
	grams/carrot	
Control	22.5	—
Vitazyme	30.0	7.5 (+33%)

• Increase in carrot weight with Vitazyme: 33%

The effect of Vitazyme on carrot vigor, size, and color can be seen right to the treated rows in this carrot filed study at West Hills Farms, Western Australia.

Cherries

Researcher: Claudia Lorena Muñoz *Farmer*: Pablo Garés
Location: San Francisco de Mostazal, Chile *Planting date*: 2004
Research organization: Syngenta, Santiago, Chile
Variety: Rainier *Plant spacing*: 5.0 x 2.5 meters

These cherries have not been treated with Vitazyme, and display normal coloration at this stage of development.

The Vitazyme treated cherries in this trial had developed much more color by November 7, the day they were sampled.

Experimental design: A Rainier cherry orchard was divided into a Vitazyme treated area and an area treated with the "standard" MT 1375, to determine the effect of the product on color development and harvest criteria over two pickings.

1. Vitazyme 2. MT 1375

Fertilization: unknown
Vitazyme application: 2 liters/ha on November 16, 2010, at straw-color, and 2 liters/ha 8 days later on November 24, 2010
MT 1375 application: 5 liters/ha applied on November 16, 2010, and again on November 24, 2010
Yield results: Actual yield data were not reported since the yield would not be affected by such a late application. However, coloration was affected and then time to harvest, so this data is reported in terms of percentage of total containers per picking.

Cherry Yield

Treatment	Fruit harvested per branch	
	Harvest 1	Harvest 2
	----- % of total harvest -----	
Vitazyme	72.7	27.3
MT 1375	72.4	22.5

Treatment	Percent of total harvest	
	Harvest 1	Harvest 2
	----- % of total harvest -----	
Vitazyme	75.2	24.8
MT 1375	72.4	27.6

• Increase in earlier harvested fruit with Vitazyme: 2.8%-points
• Increase in earlier harvested cherries per branch with Vitazyme: 4.8 cherries

Cherries

Researcher: Claudia Lorena Muñoz *Farmer*: Victor Gallardo
Organization: Syngenta, Santiago, Chile *Location*: Tinguiririca, Chile
Planting date: 2005 *Variety*: Bing
Plant spacing: 4.75 x 2.00 meters *Fertilization*: unknown

Experimental design: A cherry orchard was divided into three portions for evaluating Vitazyme and the standard MT 1375 treatment, in terms of the enhancement of coloration and harvest time, as well as fruit quality for export.

1. **Vitazyme, 2 liters/ha twice, early and late**
2. **Vitazyme, 2 liters/ha twice, middle and late**
3. **MT 1375, 5 liters/ha twice, middle and late**

Vitazyme application: Treatment 1: 2 liters/ha applied November 12, 2010, and November 25, 2010.
Treatment 2: 2 liters/ha applied November 18, 2010, and November 25, 2010. All sprays were made at 1,500 liters/ha.
MT 1375 application: 5 liters/ha applied November 18, 2010, and November 25, 2010
Yield results: Two harvests were made. The MT 1375 treatment was divided into two parts, and these harvest results have been averaged. No total yields were evaluated, since the treatments were applied late and were not designed to affect yield, only coloration. The percentage of early-harvested cherries was markedly increased with Vitazyme.

Cherry Yield

Treatment	Harvest 1*	Harvest 2**
	------ % harvested -------	
Vitazyme, twice (1)	75.7	24.3
Vitazyme, twice (2)	78.7	21.3
MT 1375, twice	55.8	44.2

*Vitazyme, December 14; MT 1375, 15 to 18 December and 20 to 23 December.
**Vitazyme, December 27; MT 1375, 23 December and 27 to 30 December.

Increased fruit harvested with Vitazyme
Vitazyme twice, early and late ..... +19.9%-points
Vitazyme twice, middle and late ..... +22.9%-points

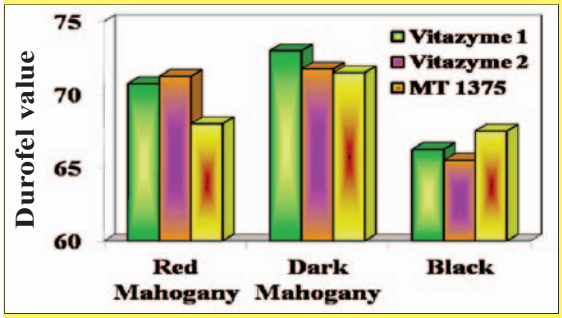
Color results: The percentage of red and dark mahogany cherries was improved significantly with Vitazyme, while the black-colored cherries were changed little; the fruit lacking color was greatly reduced.
Fruit firmness results: Vitazyme improved fruit firmness for the red and dark mahogany cherries.
Fruit brix results: There were no differences in fruit sugar for two of the treatments. All values were from 15.37 to 15.97 for the red mahogany fruit, and from 18.04 to 18.54 for the black cherries. However, for the dark mahogany cherries the MT 1375 treated cherries were 15.62 brix, while the average of the Vitazyme treatments was 17.24 brix, 1.62 units higher than the control.
Conclusion: A Bing cherry study in Chile revealed that Vitazyme, applied at 2 liters/ha twice shortly before fruit coloration, improved the coloration and maturity considerably over the MT 1375 treatment, enabling 20 to 23% more fruit to be har-

Cherry Firmness

Treatment	Red mahogany	Dark mahogany	Black
	durofel value		
Vitazyme, twice (1)	70.75	73.00	66.25
Vitazyme, twice (2)	71.25	71.75	65.50
MT 1375, twice	68.00	71.50	67.50

Cherry Color

Treatment	Red mahogany	Dark mahogany	Black	No color
	percent of fruit			
Vitazyme, twice (1)	43.16	45.78	8.26	5.60
Vitazyme, twice (2)	36.70	52.71	7.37	6.45
MT 1375, twice	34.90	44.13	9.39	11.59

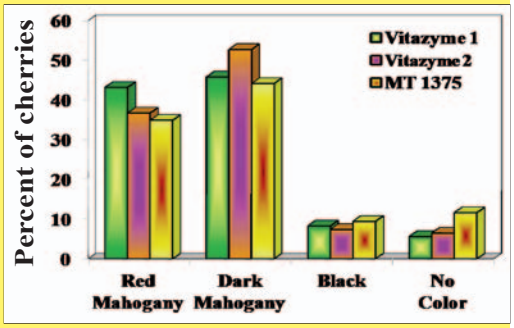


Enhancement of cherry color with Vitazyme*

Red mahogany .... +5.03%-points
Dark mahogany ... +5.12%-points
Black ..... -1.58%-points
No color ..... -5.57%-points

***Both Vitazyme treatments averaged.**

vested the first harvest. Fruit color was enhanced in both the red and dark mahogany categories, and the fruit without coloration were reduced significantly with Vitazyme. In addition, fruit firmness was enhanced by the product for these same two red categories, and sugar was maintained or increased, by up to 1.62 brix, with Vitazyme. The use of this product for cherries in Chile is seen to be a highly viable option. Because this was a study on fruit maturation and coloration, there was no yield data reported. Also, there was no absolute control having neither product applied.



Enhancement of fruit firmness with Vitazyme*

Red mahogany .... +3.00 units
Dark mahogany ... +0.88 units

***Both Vitazyme treatments averaged.**

Cherries

The effect of two Vitazyme treatments on the fruit produced a marked improvement in coloration (right) compared to the control.

Researcher: Claudia Lorena Muñoz *Research technician*: Raul Osorio
Research organization: Syngenta, Santiago, Chile *Variety*: Lapins
Location: Hacienda Achondo, Chimbarongo, Chile
Experimental design: A cherry orchard was divided into two parts to evaluate the effects of Vitazyme on the yield, maturity, and quality of Lapins cherries for export.

1. Control **2. Vitazyme twice**

Fertilization: unknown
Vitazyme application: 2 liters/ha at straw-colored fruit on October 30, 2010, and again seven days later on November 6, 2010, applied through a sprayer delivering 1,500 liters/ha
Yield results: Three harvests were completed, on November 12, November 18, and November 22, 2010. Vitazyme was applied only 1 to 2 weeks before harvest, so no yield enhancement could be expected.

Cherry Yield

Treatment	Harvest 1	Harvest 2	Harvest 3	Total
	9 kg boxes/ha			
Control	283	582	1,020 (+10%)	1,885
Vitazyme	350 (+24%)	623 (+7%)	914	1,887

Increased fruit harvested with Vitazyme

Harvest 1 ..... 24%
Harvest 2 ..... 7%

Color results: Because these values are taken on the mature fruit at harvest, no detectable differences were noted between the two treatments.
Conclusion: This cherry study in Chile revealed that Vitazyme, applied at 2 liters/ha twice within two weeks of the commencement of harvest, improved the speed of fruit coloration, thus enabling more fruit to be picked comer to achieve a higher market value. Because of the late application time, there was no improvement in yield with Vitazyme as would be achieved with applications early during the growth cycle. There also was no change in the color of harvested fruit, since at harvest all of the fruit was mature. The study reveals the efficacy of this product to advance fruit coloration and promote early marketability.

Cherry Color

Treatment	FC	Red	Red mohag.	Dark mohag.	Black
	% in color category				
Control	0	14.5	66.3	18.3	0
Vitazyme	0	12.0	67.3	18.9	0.5

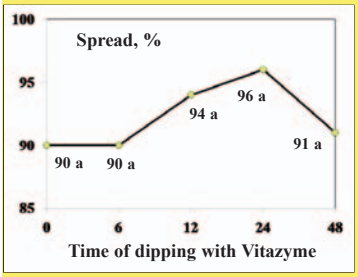
Cocoa

Researchers: Carlos Bustamante Gonzalez, Ph.D., and Maritza I. Rodriguez Castro, M.S.
Research institution: Ministry of Agriculture, Central Coffee and Cocoa Research Station, Santiago de Cuba, Cuba
Location: "The Mandarin" Farm, Cruce de los Baños, Third Front Municipality *Varieties*: unknown
Soil types: Typic Ustropept (U.S. classification), or Orthi-Eutric Cambisol (U.N. classification); pH = 6.24 to 7.63 (water extraction), organic matter = 3.4 to 5.7%, P_2O_5 = 7.2 to 191.9 mg/100g, K_2O = 26.6 to 183.1 mg/100g, K^+ = 0.97 to 6.67 meq/100 g, Ca^{+2} = 36.3 to 53.8 meq/100 g, Mg^{+2} = 9.1 to 38.4 meq/100 g, Na^+ = 1.4 to 2.1 meq/100 g.
Experimental design: A series of trials with cocoa was undertaken to evaluate the effects of Vitazyme on the germination and growth of cocoa seeds, the production of cocoa cuttings, the growth of the plants during their developmental stage, and the production and quality of fruit on mature trees. Replicated plots were used for these studies, and the data were statistically analyzed.

Trial on Cocoa Seedlings Originating from Seeds

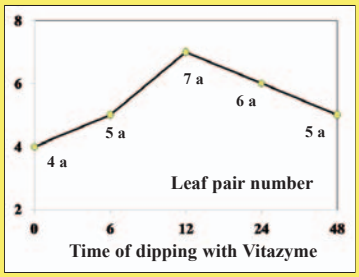
Treatments:
1. Control (water only)
2. Seed dipping, 5% Vitazyme for 6 hours
3. Seed dipping, 5% Vitazyme for 12 hours
4. Seed dipping, 5% Vitazyme for 24 hours
5. Seed dipping, 5% Vitazyme for 48 hours

Germination



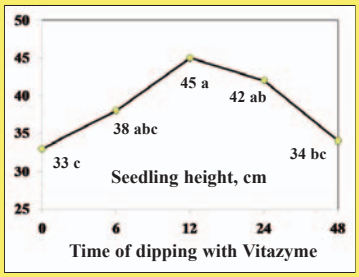
Means followed by the same letter are not significantly different at P=0.05.
No differences are significant, but all but the 6 hour dip increased seed germination.

Pairs of Leaves



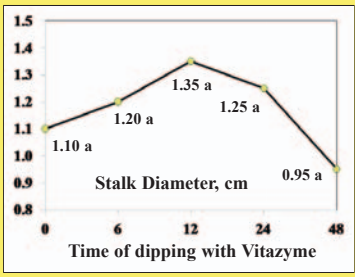
Means followed by the same letter are not significantly different at P=0.05.
Though differences are not significant from the control, all Vitazyme treatments increased the number of leaf pairs.

Seedling Height



CV=23.4%, SE=1.23, P=0.05
Means followed by the same letter are not significantly different at P=0.05

Stalk Diameter



Means followed by the same letter are not significantly different at P=0.05.
All but the 48 hour dip increased stalk diameter, though no increases were significant.

Increase in plant height with Vitazyme

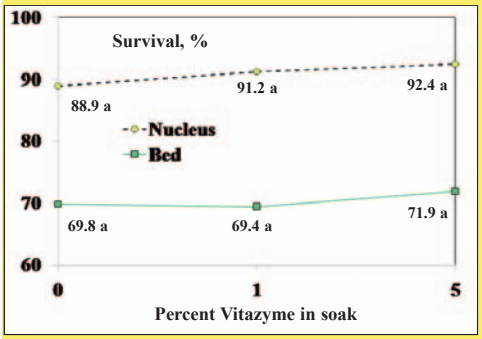
Dipping 6 hours	+15%
Dipping 12 hours	+36%
Dipping 24 hours	+27%
Dipping 48 hours	+3%

Both the 12 and 24 hour dips significantly increased plant height.

Trial on the Production of Cocoa Cuttings

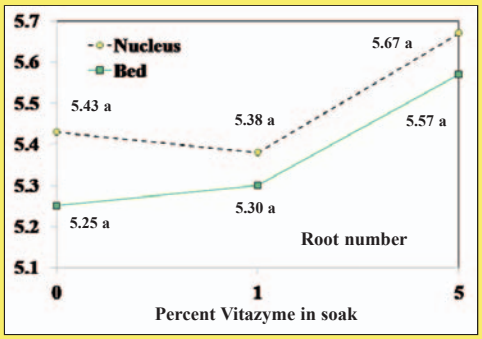
Treatments: The "bed" and "nucleus" methods (different bag types) were used, with the three treatments below.
1. Control
2. Cutting soak, 1% Vitazyme
3. Cutting soak, 5%

Survival



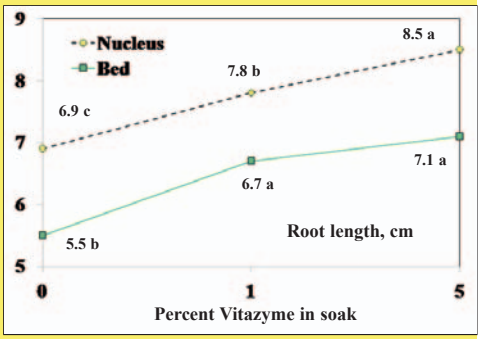
Means followed by the same letter are not significantly different at P=0.05
There was a slight trend of better survival for the nucleus system.

Root Number



Means followed by the same letter are not significantly different at P=0.05
For both methods of growing there was a non-significant spike in root numbers with the 5% Vitazyme soak.

Root Length



Nucleus: CV=9.36%, SE=0.874, P=0.05
Bed: CV=12.09%, SE=0.918, P=0.05
Means followed by the same letter are not significantly different at P=0.05
Both methods of growing cutting responded significantly to Vitazyme at both the 1% and 5% soak concentrations, especially at 5%.

Continued on the next page

Root length increases with Vitazyme

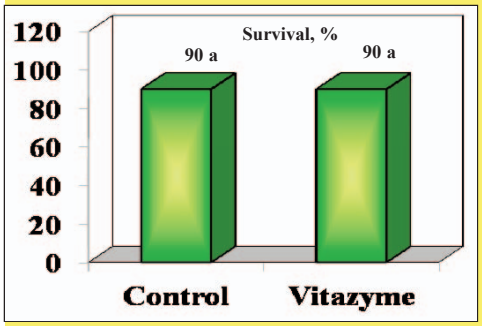
	Nucleus	Bed
1% soak	+ 13%	+22%
5% soak	+23%	+29%

Trial on Survival of Cocoa Grafts

Treatments: 1. Control
2. 1% Vitazyme on the soil and plant

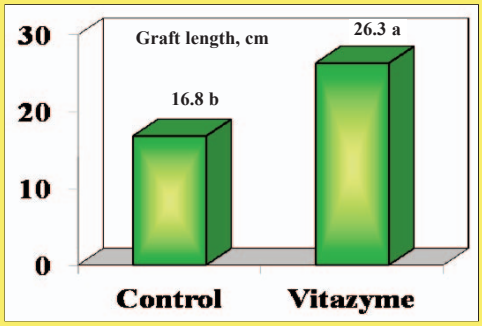
- **Increase in graft length with Vitazyme: 57%**

Bud Survival,%



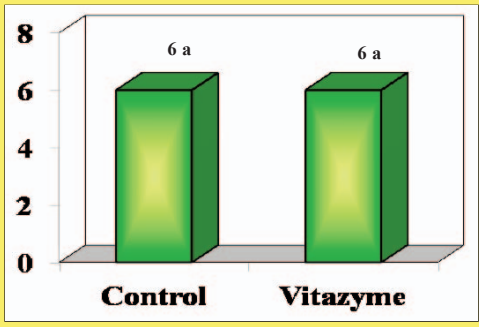
Means followed by the same letter are not significantly different at P=0.05.

Graft Length



CV=13.83%, SE=0.84, P=0.05
Means followed by the same letter are not significantly different at P=0.05.

Pairs of Leaves

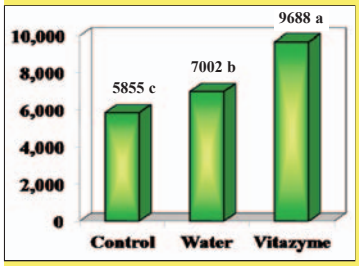


Means followed by the same letter are not significantly different at P=0.05.

Trial on Cocoa Growth During the Developmental Stage

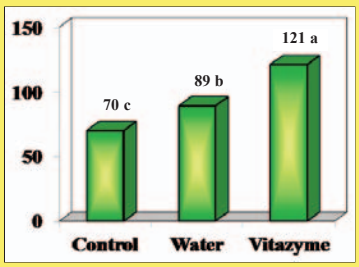
Treatments: 1. Control 2. Water every 60 days 3. Vitazyme (1 liter/ha) every 60 days

Flowers Per Plant



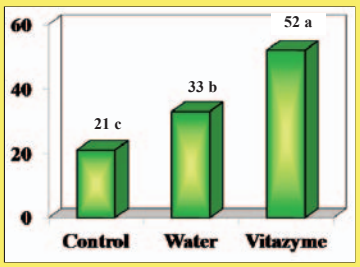
CV=11.84%, SE=0.902, P=0.05
Means followed by the same letter are not significantly different at P=0.05

Pod Set Per Plant



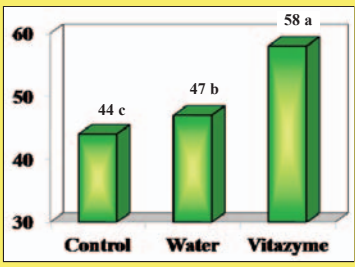
CV=10.00, SE=0.892, P=0.05
Means followed by the same letter are not significantly different at P=0.05

Harvested Pods/Plant



CV=13.83, SE=0.980, P=0.05
Means followed by the same letter are not significantly different at P=0.05

Vigor (Diameter)



CV=10.16, SE=0.770, P=0.05
Means followed by the same letter are not significantly different at P=0.05

- **Increase in flowers/plant with Vitazyme: 65%**
- **Increase in pods/plant with Vitazyme: 73%**
- **Increase in harvested pods/plant with Vitazyme: 148%**
- **Increase in diameter with Vitazyme: 32%**

Vitazyme significantly increased flowers per plant, pod set per plant, harvested pods per plant, and plant diameter. Interestingly, water sprayed on the plants also increased each parameter, but only by a fraction of the Vitazyme increase.

Trial on Yield and Quality of Cocoa

Treatments:
1. Control
2. Water only
3. Vitazyme, 0.5 liter/ha every 30 days
4. Vitazyme, 1.0 liter/ha every 30 days
5. Vitazyme, 1.0 liter/ha every 60 days
6. Vitazyme, 1.0 liter/ha every 90 days
7. Vitazyme, 1.0 liter/ha Sept.-Dec.
8. Vitazyme, 0.5 liter/ha Sept.-Dec. and April-June

The best results on yield and pod number were for Vitazyme at 1 liter/ha applied every 30 days, with the 0.5 liter/ha rate nearly as high; both were significantly greater than for the control and for Vitazyme applied only twice during the season. All Vitazyme treatments applied monthly were statistically equal. Water sprayed on the trees by itself gave a nonsignificant increase above the untreated control.

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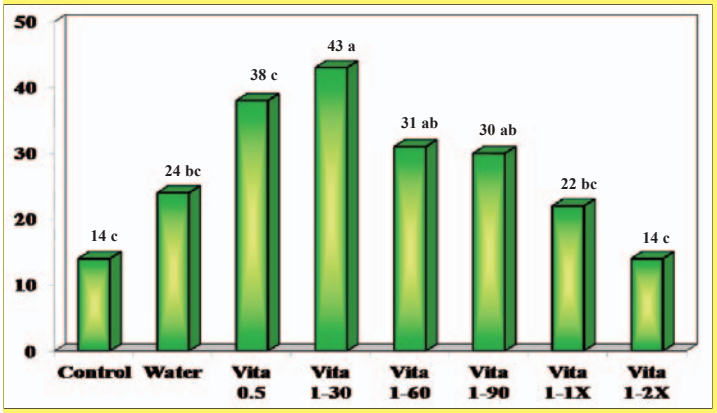
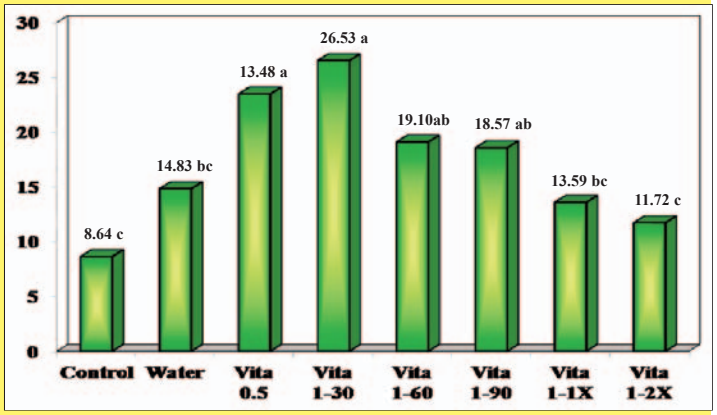
Pod Number Per Tree



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

Pod Number Per Tree



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

Conclusions: According to the researchers ...

1. Seeds dipped for 12 and 24 hours in a Vitazyme solution increased by 44% the height of cocoa seedlings.
2. Vitazyme increased root length of cocoa cuttings produced in litter beds and in bags with nucleus.
3. Vitazyme increased the length of cocoa grafts, which shortened the nursery period.
4. Vitazyme increased the number of flowers, fruit set, harvested pods, and stalk diameter in various stages of growth of cocoa plants.
5. The use of Vitazyme in established cocoa plantations doubled the number of pods per plant and consequently yields.

Increase in pod weight/tree with Vitazyme

0.5 liter/ha every 30 days	+172%
1.0 liter/ha every 30 days	+207%
1.0 liter/ha every 60 days	+121%
1.0 liter/ha every 90 days	+115%

Coffee

An Extensive Study in Cuba in the Nursery and Field

Researchers: Carlos Bustamante Gonzalez, Ph.D., and Maritza I. Rodriguez Castro, M.S.
Research institution: Ministry of Agriculture, Central Coffee and Cocoa Research Station, Santiago de Cuba, Cuba
Location: "The Mandarin" Farm, Cruce de los Baños, Third Front Municipality *Growing environment*: under palm tree shade
Varieties: "Robusta" (*Coffea canephora* Pierre ex Froehner) and *Coffea arabica*, cv. Catuai (ten varieties)
Soil types: Typic Ustropept (U.S. classification), or Orthi-Eutric Cambisol (U.N. classification); pH = 6.24 to 7.63 (water extraction), organic matter = 3.4 to 5.7%, P_2O_5 = 7.2 to 191.9 mg/100g, K_2O = 26.6 to 183.1 mg/100g, K^+ = 0.97 to 6.67 meq/100 g, Ca^{+2} = 36.3 to 53.8 meq/100 g, Mg^{+2} = 9.1 to 38.4 meq/100 g, Na^+ = 1.4 to 2.1 meq/100 g.
Experimental design: Over a four-year period an extensive series of trials on coffee, under nursery conditions to evaluate seedling propagation but also in the field to evaluate yield, was undertaken to quantify the effects of Vitazyme on crop response. All experiments were randomized and replicated. The experiments were as follows:

Nursery Experiments

These were divided into seedling production using grafts (asexual) or seeds (sexual).

1. Effects of application method on the production of coffee seedlings
2. Effects of time for soaking on the growth and development of coffee seedlings from seeds
3. Effects of time for soaking on the growth and development of coffee seedlings from grafts
4. Response of different coffee varieties to Vitazyme, and the relationship of the response to the presence of pergamino (a "parchment" coating) on the coffee seeds

1. Effects of application method on the production of coffee seedlings (using *Coffea canephora* Pierre), conducted from 2004 to 2007

a. Control: 40 grams of 10-8-4.5% N-P_2O_5-K_2O per 2 kg mixture, plus a foliar application of 1% urea from the third leaf pair
b. Vitazyme: 30 minute soaking times for cuttings using 5% Vitazyme on cuttings and/or rooted cuttings before transplanting in one treatment a 1% Vitazyme solution was used monthly as well.
c. In 2007, both a and b plus 75%, 50%, and 25% of the 100% control fertilizer, using the best treatment from the previous years

2. Effects of time of dipping on the growth and development of coffee seedlings produced from seeds (using *Coffea arabica* and *Coffea canephora* Pierre), conducted in 2005 and 2006

a. Control: foliar water spray only
b. Vitazyme: Seeds were dipped in a 5% Vitazyme solution for 6, 12, 24, and 48 hours; all treatments also received a 1% Vitazyme spray each month from the appearance of the second leaf pair until 80% were ready to transplant.

3. **Effects of application timing on the growth and development of coffee seedlings produced from grafts (using *Coffea canephora* Pierre), conducted from 2005 to 2007**
   a. Control
   b. Vitazyme: (1) 5% Vitazyme soak on grafts for 30 minutes, before planting; (2) 1% Vitazyme foliar spray at the first leaf pair; (3) 1% Vitazyme foliar spray at the second leaf pair; (4) 1% Vitazyme spray at the third leaf pair; (5) all four treatments

4. **Effects of Vitazyme on different coffee variations, and relationships to the presence of "pergamino" (parchment) on the coffee seeds (using 11 different varieties), conducted in 2006 and 2007**
   The seeds were soaked in a 5% Vitazyme solution for 1 hour, and dried in the shade before planting.

Established Plantation Experiments

Trial 1. Coffee arabica plantation, spacing 2 m x 1 m, on a Typic Utropept soil, pruned in 2000, an average yield of 1.2 tons/ha, given 80 grams/plant of 15-15-15% N-P_2O_5-K_2O, from 2005 to 2008
   a. 0.5 L/ha every 30 days
   b. 1.0 L/ha every 30 days
   c. 1.0 L/ha every 60 days
   d. 1.0 L/ha every 90 days
   e. 1.0 L/ha once a year, in Sept. to Dec.
   f. 0.5 L/ha in Sept.-Dec. + 0.5 L/ha in April-June
   g. Control (mineral fertilizer only)

Trial 2. Isla 5-15 variety, 70 plants per treatment, spacing 2 m x 1 m, shaded by the Carob tree (*Ceratonia siliqua* L.) on Typic Ustropept soil, planted in 1982, pruned of lower branches in 2000 and 2005
   a. Vitazyme applied at 1.0 L/ha each month to the soil and leaves
   b. Fertilizer only at 80 grams/plant per year of 15-15-15% N-P_2O_5-K_2O, in two applications

Results: A considerable volume of data was generated for this study, and only a small portion is included in this report. For the full 89-page translated reported please contact Vital Earth Resources to receive a copy. The researcher's conclusions will be listed here along with some supporting data.

1. Vitazyme increased growth indicators of *Coffea* seedlings from seeds, cuttings, and grafts.
2. The soaking of *Coffea* cuttings in a 5% Vitazyme solution for 30 minutes before planting, complemented by monthly spraying of the leaf canopy and soil with a 1% Vitazyme solution, produced greater seedling growth and foliar area (204%) with the substitution of 75% of the recommended mineral fertilizer rate for this stage of the crop. This rendered savings of 5,495 pecos for every 100,000 cuttings produced ... a reduction in production cost by $0.054 per seedling.

Vitazyme effects on growth parameters of* Coffea canephora *seedlings from cuttings, 2004

Height[2]	Stalk	Root diameter[2]	Leaf length[2]	Dry area[2]	Quality weight[2]	index[2]
	cm	cm	cm	cm^2	grams	
1. Control	17.63 d	0.15 b	21.63 c	142.8 b	0.66 c	0.06 d
2. 5% soak b.p., 30 min.	21.57 c	0.16 ab	26.48 a	177.7 a	0.97 a	0.08 c
3. 1% on soil leaves in bag	22.73 b	0.15 b	23.60 bc	167.0 a	0.85 b	0.09 b
4. 2 + 5% soak b.t.	24.40 a	0.18 a	25.27 ab	145.0 b	0.84 b	0.10 a
5. 2 + 1% monthly spray	24.53 a	0.16 ab	26.97 a	175.7 a	0.83 b	0.07 c
SEx	0.33***	0.16*	0.71**	6.53*	0.02***	0.004***
CV, %	2.59	7.70	4.96	7.00	4.82	7.70

[1]b.p. = before planting; b.t. = before transplanting.
[2]Means followed by the same letter are not significantly different at P=0.05 (*), 0.01 (**), and 0.001 (***).

3. The application of Vitazyme increased N and P contents in the roots of *Coffea* cuttings and their nutrient absorption. The accumulation of N by the tops was higher by 280% as compared to the untreated control, while in the root system phosphorus (230% of the control) and potassium (927% of the control) absorption prevailed.

Vitazyme effects on leaf nutrients of* Coffea canephora *seedlings from cuttings, 2005

Treatment[1]	Top[2]			Root[2]		
	N	P	K	N	P	K
	%			%		
1. Control	2.19 b	0.34 b	1.53 a	0.60 d	0.17 bc	1.53 a
2. 5% soak b.p., 30 min.	2.40 b	0.24 c	0.77 d	1.52 bc	0.17 bc	0.68 b
3. 5% soak b.t., 30 min	3.16 a	0.49 a	1.60 a	1.67 a	0.31 a	1.44 a
4. 1% monthly spray.	2.43 b	0.44 a	1.32 b	1.56 b	0.25 ab	1.32 a
5. 2 + 3	2.26 b	0.16 d	1.51 ab	1.58 b	0.19 bc	1.59 a
6. 2 + 4	1.28 c	0.16 d	1.04 c	1.50 c	0.13 c	1.04 ab
SEx	0.17***	0.01***	0.06***	0.14*	0.02**	0.16*

[1]b.p. = before planting; b.t. = before transplanting.
[2]Means followed by the same letter are not significantly different at P=0.05 (*), 0.01 (**), and 0.001 (***).

Continued on the next page

4. The efficiency of N, P, and K use reached their highest statistical values in the treatment with Vitazyme applied before planting, complemented with soil and *Coffea* leaf canopy spraying with a 1% solution.

Efficiency of use [EU] of nutrients as related to method of Vitazyme application in 2005

Treatment[1]	N^2	P_2O_5[2]	K_2O[2]
	---------- EU, mg of nutrients/g of root dry wt. ----------		
1. Control	0.13 d	0.31 c	0.23 c
2. 5% soak b.p., 30 min.	0.08 c	0.36 c	0.21 c
3. 5% soak b.t., 30 min.	0.12 d	0.32 c	0.21 c
4. 1% monthly spray	0.16 c	0.35 c	0.20 c
5. 2 + 3	0.20 b	1.36 b	0.41 b
6. 2 + 4	0.28 a	1.69 a	0.55 a
SEx	0.009***	0.068***	0.022***
CV, %	9.23	16.10	12.51

[1]b.p. = before planting; b.t. = before transplanting.
[2]Means followed by the same letter are not significantly different at P=0.05 (*), 0.01 (**), and 0.001 (***).

Summary of the performance of treatments during three seasons

Treatment[1]	Dry weight[a]			Leaf area[a]			Quality index[a]		
	2004	2005	2006	2004	2005	2006	2004	2005	2006
1. Control	a	c	bc	b	e	abc	d	bc	d
2. 5% soak b.p., 30 min.		c	c		d	ab		c	c
3. 5% soak b.t., 30 min	a	b	bc	a	c	bc	c	b	bc
4. 1% monthly spray.	b	b	a	a	b	d	b	bc	a
5. Treatments 2 + 3	b	a	b	b	b	cd	a	a	b
6. Treatments 2 + 4	b	a	bc	a	a	a	a	a	bc

[a]The letters for each year indicate significant differences if the letters are different.

5. Dipping of *Coffea arabica* seeds in a Vitazyme solution for 6 hours achieved similar seedling quality indexes as the control, with good efficiency in nitrogen use and in absorption of the existing phosphorus in the substrate. This period can be extended to 24 hours.
6. Dipping of *Coffea* canephora seeds in a Vitazyme solution for 12 hours achieved similar to higher seedling quality indexes compared to the control, with good efficiency in the absorption of phosphorus in the substrate.
7. It is feasible to soak the *Coffea* grafts in a 5% Vitazyme solution and to apply a complementary 1% solution to the leaf canopy from the fourth leaf pair, which produces a considerable increase in stalk height and diameter, top dry weight, and foliage. The monthly applications can cause an inhibitory effect on nutrient absorption.
8. Regardless of the fact that all varieties showed a positive response or increase in growth and quality to Vitazyme application, there were differences in the level of response. Thus, variety Costa Rica showed the greatest response to Vitazyme, followed (in descending order) by Bourbon, Dwarf San Ramón, Isla 6-11, Mundo Novo, Red Caturra, and Isla 6-12. On the other hand, variety Isla 5-15 showed the least response to the biostimulant, followed (in ascending order) by Villalobos, Guamuhaya, and Red Catuai.
9. Regardless of the variety, the response to Vitazyme was similar in seeds with and without “pergamino” (parchment) at the time of planting.
10. With the application of 0.5 L/ha of Vitazyme in April-June and 0.5 L/ha in September-December to the soil and to the plant, in established plantations, a similar crop yield was reached as by mineral fertilization, but coffee industrial yield and grain size increased and net profits of $1,776.14/ha were attained.
    [Note: The yields of coffee with Vitazyme were achieved with no mineral fertilization whatsoever, thus greatly inhibiting yield increases with Vitazyme, which would have significantly exceeded the control (mineral fertilizer only) treatment for the years 2005 to 2008.]
11. There was no variations in cup quality by applying Vitazyme to coffee plants, on Orthi-Eutric Cambisol soil.

Conclusions: In this extensive multi-year trial with Vitazyme on coffee in Cuba, using 5% seed and/or rooted plant soakings

Economic effects of Vitazyme in established coffee plantations

Treatment	Yield	Crop income	Fertilizer cost	Vitazyme cost	Total costs	Net revenue	Increase over control
	tons/ha	$/ha	$/ha	$/ha	$/ha	$/ha	$/ha
1. Commercial fertilizer	1.12	34,782.16	4,555.20	0	4,555.27	30,226.89	—
2. 0.5 L/ha monthly	0.85	26,474.81	0	674.94	674.94	25,799.87	4,427.02
3. 1.0 L/ha monthly	0.95	29,502.73	0	1,349.90	1,349.88	28,152.85	2,074.05
4. 1.0 L/ha every 60 days	0.86	26,785.37	0	449.96	449.96	26,335.41	3,891.48
5. 1.0 L/ha every 90 days	0.94	29,269.81	0	112.49	112.49	29,157.32	1,069.57
6. 1.0 L/ha Sept.-Dec.	0.98	30,279.11	0	224.98	224.98	30,054.13	(-) 172.76
7. 0.5 L/ha Apr.-June and Sept.-Dec.	1.04	32,220.08	0	217.05	217.05	32,003.3	1,776.14

for 30 minutes, with or without monthly 1% Vitazyme sprays, the treated plants responded exceedingly well to Vitazyme in terms of leaf area, top growth, root growth, nutrient uptake, and improved fertilizer efficiency. The best treatment was 5% before planting + 5% before transplanting + 1% monthly applications. In the plantation, Vitazyme did not increase yield harvested coffee due to a failure of the researchers to add any fertilizer along with Vitazyme to the treated areas. Nevertheless, an economic analysis showed that the Vitazyme treatments nearly always produced the greatest net profit.

Increase in coffee income with Vitazyme applied at 0.5 L/ha every month; $4,427.02/ha
Increase in coffee income with Vitazyme applied at 1.0 L/ha every 60 days; $3,891.48/ha
Increase in coffee income with Vitazyme applied at 1.0 L/ha every month; $2,074.05

These values were achieved without any supplemental fertilization, not the recommended prescription for Vitazyme use. These results reveal the great value of Vitazyme use for coffee in Cuba.

Coffee

Researcher/Farmer: Tran Thi Tuoi *Plant age*: 3 years
Location: Village 15, Tam Thang, Dak Nong Province, Viet Nam
Experimental design: A coffee plantation was divided into a Vitazyme treated area of 0.8 ha, with an untreated control area of 0.4 ha, to determine the effect of the product on coffee yield and profitability.

1. Control **2. Vitazyme**

Vitazyme application: 2 liters/ha (as 0.5 liter of Vitazyme in 200 liters of water) on the leaves and soil on June 27, July 28, and September 25, 2011

Three applications of Vitazyme, at 2 liters/ha each time, produced remarkable improvements in coffee foliage, stems, and beans, as seen here.

Coffee Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	2.1	—
Vitazyme	2.6	0.5 (+24%)

• Increase in yield with Vitazyme: 24%

Yield results:
Income results: See the table below.
Conclusion: This Vietnamese coffee trial, using three Vitazyme applications, increased yield by 24% and income by $872/ha.

Coffee Income

Treatment	Vitazyme[1]	Total costs	Total income	Net income	Extra profit
	VND/ha	VND/ha	VND/ha	VND/ha	VND/ha
Control	0	28,440,000	79,800,000	51,360,000	—
Vitazyme	2,060,000	30,500,000	98,800,000	68,300,000	17,440,00

[1]VND = Vietnamese dollar; 1 USD = 20,000 VND.

Increase in income with Vitazyme: 17,440,000 VND, or $872/ha

Coffee

Researcher/Farmer: Pham Van Quyen *Location*: Village Nui, Tam Thang, Dak Nong Province, Viet Nam
Plant age: 4 years
Experimental design: A coffee plantation was divided into a Vitazyme treated area of 0.6 ha, with an untreated control area of 0.4 ha, to determine the effect of the product on coffee yield and profitability.

1. Control **2. Vitazyme**

Vitazyme application: 2 liters/ha (as 0.5 liter of Vitazyme in 200 liters of water) on the leaves and soil on June 27, July 28, and September 15, 2011

Yield results: see table at right
Income results: see table at right
Conclusion: This Vietnamese coffee trial, using three Vitazyme applications, increased yield by 27% and income by $1,023/ha.

Coffee Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	2.2	—
Vitazyme	2.8	0.6 (+27%)

Coffee Income

Treatment	Vitazyme[1]	Total costs	Total income	Net income	Extra profit
	VND/ha	VND/ha	VND/ha	VND/ha	VND/ha
Control	0	32,260,000	83,600,000	51,340,000	—
Vitazyme	2,920,000	35,200,000	106,460,000	71,200,000	10,460,000

[1]VND = Vietnamese dollar; 1 USD = 20,000 VND.

• Increase in yield with Vitazyme: 27%

Increase in income with Vitazyme: 20,460,000 VND, or $1,023/ha

Coffee

Researcher/Farmer: Ho Le Kim Linh *Location*: Krong Pak District, Dal Lak Province, Viet Nam
Plant age: 5 years or older
Experimental design: A coffee plantation was divided into a Vitazyme treated area of 0.6 ha, with an untreated control area of 0.5 ha, to determine the effect of the product on coffee yield and profitability.

1. Control **2. Vitazyme**

Vitazyme application: 3 liters/ha (as 0.5 liter of Vitazyme in 200 liters of water) on the leaves and soil on June 27 and August 28, 2011
Yield results: see table at right
Income results: see table at right
Conclusion: This Vietnamese coffee trial, using three Vitazyme applications, increased yield by 8% and income by $521/ha.

• Increase in yield with Vitazyme: 8%

Coffee Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	3.7	—
Vitazyme	4.0	0.3 (+8%)

Coffee Income

Treatment	Vitazyme[1]	Total costs[2]	Total income	Net income	Extra profit
	VND/ha	VND/ha	VND/ha	VND/ha	VND/ha
Control	2,100,000	36,500,000	140,600,000	104,600,000	—
Vitazyme	2,680,000	37,000,000	152,000,000	115,000,000	10,820,000

[1]VND = Vietnamese dollar; 1 USD = 20,000 VND.
[2]The control had a Komix foliar treatment.

Increase in income with Vitazyme: 10,820,000 VND, or $521/ha

Coffee

Researcher/Farmer: Nguyen Van Hiep *Location*: Dak Ghenh Village, Dak Mil District, Dak Nong Province, Viet Nam
Plant age: 5 years or older
Experimental design: A coffee plantation was divided into a Vitazyme treated area of 0.8 ha, with an untreated control area of 0.2 ha, to determine the effect of the product on coffee yield and profitability.

1. Control **2. Vitazyme**

Vitazyme application: 2 liters/ha (as 0.5 liter of Vitazyme in 200 liters of water) on the leaves and soil on June 27, July 28, and August 28, 2011
Yield results: see table at right
Income results: see table at right
Conclusion: This Vietnamese coffee trial, using three Vitazyme applications, increased yield by 11% and income by $466/ha.

• Increase in yield with Vitazyme: 11%

Coffee Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	2.7	—
Vitazyme	3.0	0.3 (+11%)

Coffee Income

Treatment	Vitazyme[1]	Total costs	Total income	Net income	Extra profit
	VND/ha	VND/ha	VND/ha	VND/ha	VND/ha
Control	0	29,520,000	102,600,000	73,080,000	—
Vitazyme	2,480,000	32,000,000	114,000,000	82,000,000	9,320,000

[1]VND = Vietnamese dollar; 1 USD = 20,000 VND.

Increase in income with Vitazyme: 9,320,000 VND, or $466/ha

Corn

Corn tested at the Vinnytsia research station has consistently produced excellent yield increases with Vitazyme application.

Researcher: Unknown *Research organization*: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station
Location: Vinnytsia, Ukraine (Central Forest and Steppe Region)
Variety: Sangriya *Planting date*: unknown
Soil type: gray podzolic (organic matter = 2.2%, hydrolyzed N = 8.4 mg/100 g soil, P = 15.8 mg/100g soil, exchangeable K = 12.4 mg/100 g soil, pH = 5.5)
Experimental design: Replicated corn plots were prepared and treated with a Vitazyme treatment, and plots treated with Vitazyme were also used to evaluate a carryover effect, to evaluate the effect of the product on corn yield and profitability.

1. Control **2. Vitazyme on leaves and soil**
3. Vitazyme on leaves and soil in 2010

Vitazyme applications: 1 liter/ha at the 7 to 8-leaf stage (June 16, 2011) for Treatment 2
Yield results: See the table on next page.

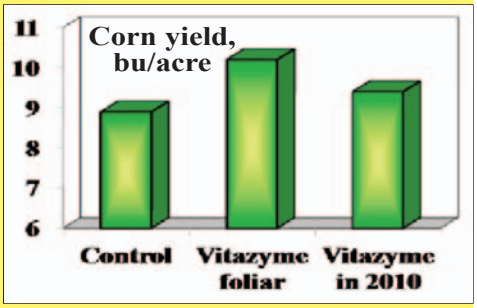
Income results:

- Income increase with a Vitazyme treatment: 2,050 hrn/ha
- Income increase with Vitazyme in 2010: 850 hrn/ha

Conclusion: This replicated corn trial in Vinnytsia, Ukraine, reveals what previous years' trials have shown ... that Vitazyme increases yield (+15% in 2011) and profitability (+2,050 hrn/ha in 2011) consistently. It is a product that powerfully improves agricultural productivity in Ukraine.

Corn Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	8.9	—
Vitazyme	10.2	1.3 (+15%)
Vitazyme in 2010	9.4	0.5 (+6%)



- ***Increase in yield with Vitazyme in 2010: 6%***
- ***Increase in yield with a Vitazyme foliar treatment: 15%***

Corn

Average Values for 2009 to 2011 in Ukraine

Researcher: V.V. Plotnikov
Location: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station, Vinnytsia, Ukraine (Central Forest and Steppe Region)

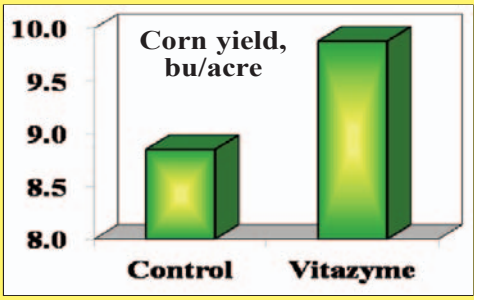
Conclusion: Over three years of demonstrations, Vitazyme is shown to be an excellent adjunct to corn production in Ukraine.

Demonstration plot values averaged over three years, 2009 to 2011

Three-Year Average

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	8.85	—
Vitazyme	9.88	1.03 (+12%)

[1]1 liter/ton on the leaves + soil at the 7 to 8-leaf stage.



- ***Three-year average increase with Vitazyme: 12%***

Corn

Researcher: Michael Rethwisch
Research organization: University of Nebraska-Lincoln Extension, David City, Nebraska
Location: Aurora, Nebraska
Variety: Kruger K-4510
Soil type: unknown
Experimental design: A corn field was divided into replicated strips with four different products, with Vitazyme applied to the side of the seeds, to evaluate the yield and test weight responses. All treatments received starter fertilizer under conventional tillage.

A silking, the Vitazyme treated corn was advanced in maturity, and had more total ears in the plants sampled.

For the same plants as sampled on the left, root development with Vitazyme is shown to be significantly improved at this stage.

Treatment	Starter fertilizer	Product rate
		amount/acre
1. Control	X	—
2. CALFA	X	10 oz
3. Foliar Blend	X	16 oz
4. Torque	X	8 oz
5. Vitazyme	X	13 oz

Fertilization: Besides typical N-P_2O_5-K_2O fertilizer, all products and the control received 5 gallons/acre of NaChurs 6-24-6 Starter fertilizer applied to the side of the seeds with a "splitter."
Vitazyme and other product applications: At planting, all four products were applied at the rates shown in the above table, using the "splitter."
Weather for the growing season: Rains were ample to excessive, and temperatures were somewhat below normal.
Test weight results: Grain volume weights were determined corrected to 15.5% moisture.
While none of the test weight values were significantly different, Vitazyme had the highest test weight, which was 0.3 lb/bu greater than the closest other product value.

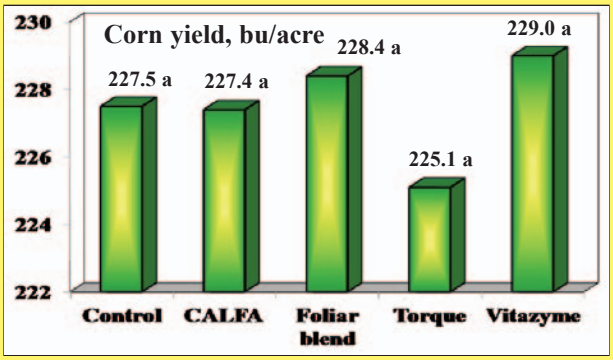
- ***Increase in test weight with Vitazyme: 0.08 lb/bu***

Continued on the next page

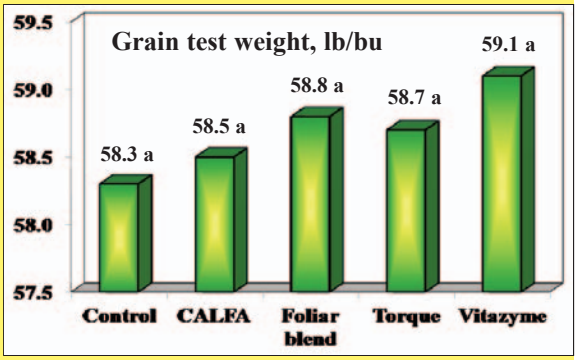
Yield results: Yield values were not significantly different among the five treatments, but Vitazyme produced the greatest yield: 1.5 bu/acre above the control.

Conclusion: In this eastern Nebraska corn study using four products applied at planting, using a "splitter", Vitazyme produced the highest yield and the heaviest test weight, although the values did not differ significantly. The reason for a less than significant response with Vitazyme may have been because the product was applied to the side of the seeds, not directly on them.

Corn Yield



Corn Weight



• Increase in yield with Vitazyme: 1.5 bu/acre

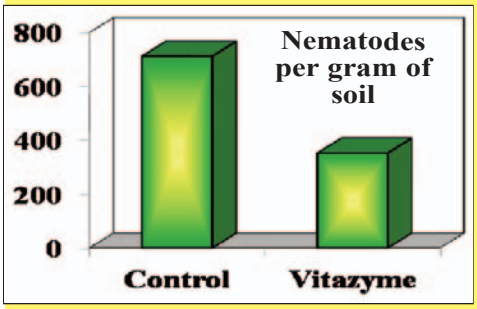
Corn
A Nematode Evaluation

Researcher: Michael Rethwisch *Research organization*: University of Nebraska - Lincoln Extension, David City, Nebraska
Location: Silver Creek, Nebraska *Variety*: Mycogen 2T832 *Soil type*: Darr sandy loam
Experimental design: A replicated corn trial having Vitazyme applied twice, plus the normal farming program, was evaluated for nematodes and statistically analyzed.

1. Control **2. Vitazyme**

Fertilization: normal farming program
Vitazyme application: 13 oz/acre (1 liter/ha) in the seed row with starter fertilizer at planting
Growing season weather: excessive rain and normal temperatures
Nematode results: After harvest in the fall of 2010, soil samples were taken in the vicinity of the roots of each plot and analyzed at the nematode testing facilities of the University of Nebraska at Lincoln.

Dagger Nematodes



Nematode Results

	Nematode species[1]		
Treatment	Stunt[2]	Lesion[3]	Dagger[4]
Control	119.5	119	711.8
Vitazyme	133.0	93	352.3 (-149%)
p-value (0.05)	0.61	0.36	0.0016**

[1]All data from each plot was subjected to statistical analyses to arrive at probabilities, as shown here.
[2]*Tylenchorhynchus* spp. They can possibly cause stunting of corn, and feed externally on the roots.
[3]*Pratylenchus* spp. These can be important root pathogens causing stunting of corn plants. They feed inside roots.
[4]*Xiphinema* spp. This nematode feeds externally on roots, and can survive sandy soils but is sensitive to tillage.

• Reduction in dagger nematodes with Vitazyme: 149%

Corn
A Greenhouse Study

Researcher: Paul W. Syltie, Ph.D. *Location*: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: yellow dent *Planting date*: February 14, 2011 *Soil type*: silt loam
Planting rate: 10 seeds/pot, thinned to 3 plants/pot
Experimental design: A replicated greenhouse pot study was conducted to evaluate the relative effectiveness of two Vitazyme formulations to increase plant growth. Eight replications were used.

1. Control **2. Vitazyme A** **3. Vitazyme B**

Fertilization: none
Vitazyme application: Vitazyme A: 100 ml/pot at planting of a 0.1% solution, from regular product; Vitazyme B: 100 ml/pot at planting of a 0.1% solution, diluted directly from concentrate
Plant height results: On March 22 at harvest, 36 days after planting, the plants were measured for height, and averaged for the three plants in each pot.

Increase in plant height with Vitazyme
Vitazyme A 3%
Vitazyme B 1%

Plant Height

Treatment	Plant height[1]	Height change
	cm	cm
Control	73.6 a	—
Vitazyme A	75.6 a	2.0 (+3%)
Vitazyme B	74.3 a	0.7 (+1%)
Block P	0.605	
Treatment P	0.463	
Model P	0.624	
$CV_{0.10}$	4.07%	
$LSD_{0.10}$	2.9 cm	

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

Plant Dry Weight

Treatment	Dry weight[1]	Weight change
	grams	grams
Control	9.28 b	—
Vitazyme A	9.95 a	0.67 (+7%)
Vitazyme B	9.75 a	0.47 (+5%)
Block P	0.018*	
Treatment P	0.011*	
Model P	0.008**	
$CV_{0.10}$	3.64%	
$LSD_{0.10}$	0.34 gram	

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

Increase in dry weight with Vitazyme
Vitazyme A 7%
Vitazyme B 5%

Dry weight results: On March 22 the roots were washed of all soil, and then dried in a drying oven at 120º F for 24 hours. Weights were recorded to the nearest 0.01 gram for the combined three plants of each pot.

Conclusion: This replicated greenhouse study with corn proved that both Vitazyme A (regular product) and Vitazyme B (direct dilution from concentrate) increased dry matter production significantly above the untreated control.

Both versions of Vitazyme performed well in this greenhouse trial, giving significant increases in dry matter production; note root development.

Corn

Researcher: Paul W. Syltie, Ph.D. *Location*: Vital Earth Resources Research Greenhouse, Gladewater, Texas

Variety: yellow dent
Pot size: 1 gallon
Planting date: November 12, 2010
Soil type: silt loam
Planting rate: 10 seeds/pot, thinned to 3 plants/pot
Experimental design: A replicated greenhouse pot study was conducted to evaluate the effect of two Vitazyme formulations to increase plant growth. Seven replicates were used.

1. Control 2. Vitazyme A
3. Vitazyme B

Fertilization: none
Vitazyme application: Vitazyme A: 100 ml/pot at planting of a 0.1% solution, for regular product; Vitazyme B: 100 ml/pot at planting of a 0.1% solution, diluted directly from concentrate
Plant height results: The plants were measured on December 15, 2010, and averaged for each pot.
Dry weight results: On December 15, 2010, the roots were washed free of soil, and dried in a drying oven at 120º F for 24 hours.

This greenhouse corn study with two versions of Vitazyme shows good growth for both, as revealed at harvest on the right.

Root and top development were improved by 16 to 19% for the two versions of Vitazyme; differences are clearly visible.

Plant Height

Treatment	Plant height[1]	Height change
	cm	cm
Control	68.9 b	—
Vitazyme A	73.0 a	4.1 (+6%)
Vitazyme B	76.1 a	7.2 (+10%)
Treatment P	0.0023**	
Model P	0.0023***	
CV	4.45%	
$LSD_{0.05}$	3.6 cm	

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

Plant Dry Weight

Treatment	Dry Weight[1]	Weight change
	grams	grams
Control	4.23 b	—
Vitazyme A	4.89 a	0.66 (+16%)
Vitazyme B	5.04 a	0.81 (+19%)
Treatment P	0.0006***	
Model P	0.0006***	
CV	7.06%	
$LSD_{0.10}$	0.37 gram	

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

Conclusion: A replicated pot trial in the greenhouse, using two variations of Vitazyme, proved that both corn height and dry weight responded significantly to both products. Height increased by 6% and 10%, respectively, for Vitazyme A and Vitazyme B, while dry weight increased by 16% and 19% for the two products. These results prove that both products are very effective for improving corn growth, especially Vitazyme B, the product made directly from concentrate.

- ***Increase in height with Vitazyme A: 6%***
- ***Increase in height with Vitazyme B: 10%***
- ***Increase in dry weight with Vitazyme A: 16%***
- ***Increase in dry weight with Vitazyme B: 19%***

Corn

A Concentration Series Study

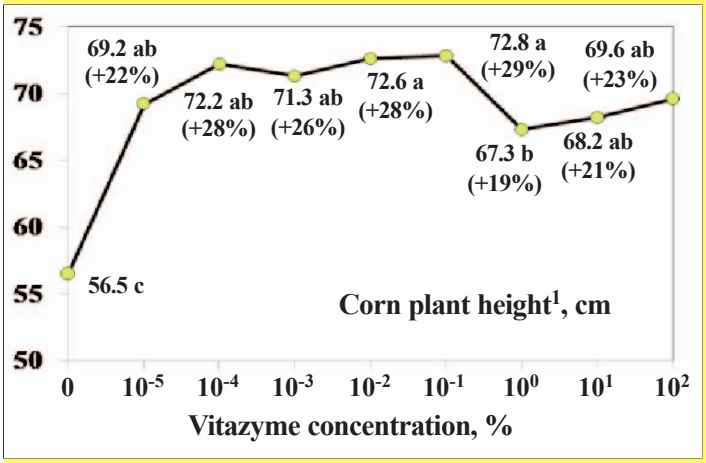
All dilutions of Vitazyme produced a growth increase above the control — even the 100% undiluted product — but the best responses were those approaching typical field recommendations of 13 oz/acre.

Researcher: Paul W. Syltie, Ph.D. *Location*: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: yellow dent *Soil type*: silt loam
Planting rate: 10 seeds/pot, thinned to 3 plants/pot
Planting date: November 15, 2010 *Pot size*: 1 gallon
Experimental design: A dilution series of Vitazyme was prepared and applied to pots in a replicated greenhouse setting, the purpose of which was to determine relative degrees of response to the active agents at varying concentrations. A completely randomized design was used, with eight replications.
Fertilization: none

Treatment	Vitazyme concentration
	%
1	0
2	0.00001 (10^{-5})
3	0.0001 (10^{-4})
4	0.001 (10^{-3})
5	0.01 (10^{-2})
6	0.1 (10^{-1})
7	1 (10^{0})
8	10 (10^{1})
9	100 (10^{2})

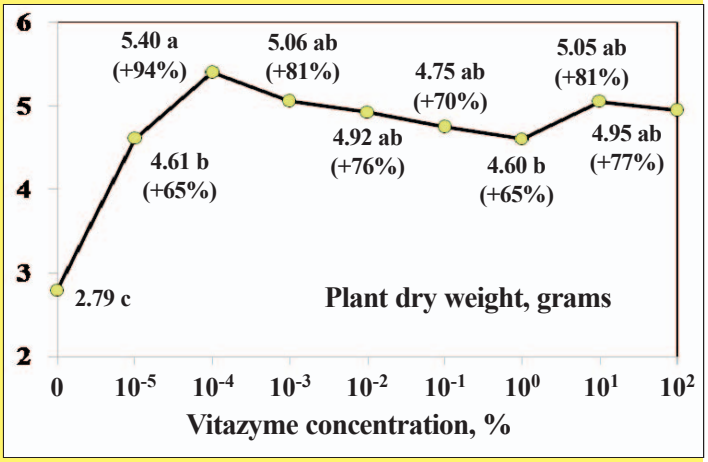
Vitazyme application: At planting, 100 ml of the eight dilutions were added to the soil surface of the appropriate pots, directly after seeding.
Plant height results: Plant heights were measured for the three plants of each pot at harvest, on December 15, 2010.
Dry Weight results: See the graph below and to the right.

Corn Plant Height[1]



Treatment P=0.0000***; Model P=0.0000***; CV=7.55%; $LSD_{0.05}$=5.2 cm[1]
[1]Means followed by the same letter are not significantly different at P=0.05 according to the Student-Newman-Keuls Test.

Corn Plant Dry Weight[1]



Treatment P=0.0000***; Model P=0.0000***; CV=7.55%; $LSD_{0.05}$=5.2 cm[1]
[1]Means followed by the same letter are not significantly different at P=0.05 according to the Student-Newman-Keuls Test.

Conclusions: Vitazyme at all concentrations improved the growth of corn above the control in terms of plant height and dry weight. All concentrations, from 10^{-5} to 10^{2}, gave significant responses for plant height, with the 10^{-2} and 10^{-1} dilutions giving the strongest responses (28% and 29%, respectively). Plant weight increases were statistically equal across the entire range of concentrations except for 10^{-5} and 10^{0} %, the highest values appearing at 10^{-4}, 10^{-3}, and 10^{1} %; the reason for this bimodal response is not known, The field application rates are typically represented by 10^{-2} to 10^{-3} % Vitazyme.

Corn

Researcher/Farmer: Nguyen Ngoc Tuan *Location*: Easling Town, Cu Jut District, Dak Nong Province, Viet Nam
Variety: 30 D55 *Planting season*: Summer – Fall, 2011
Experimental design: A corn field was divided into a Vitazyme treated area of 0.5 ha, and an untreated control area of 0.3 ha, to determine the effect of this product on the yield and profitability of the crop.
1. Control **2. Vitazyme**
Vitazyme application: (1) 5% Vitazyme seed spray just before planting; (2) 1 liter/ha sprayed on the leaves and soil 35 days after planting

Growth results: With Vitazyme the following effects were noted:

- Taller plants
- Stronger root systems
- Darker green leaves
- Excellent disease resistance from steaked leaf and stem rot
- During a drought period, plants showed no leaf rolling
- Seed color was brighter

Yield results: see table at right
Income results: see table below

Corn Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	8.0	—
Vitazyme	9.0	1.0 (+13%)

• Increase in corn yield with Vitazyme: 13%

Corn Income

Treatment	Vitazyme[1]	Total costs	Total income[2]	Net income	Extra profit
	VND/ha	VND/ha	VND/ha	VND/ha	VND/ha
Control	0	13,500,000	36,000,000	22,500,000	—
Vitazyme	500,000	14,000,000	38,250,000	26,500,000	4,000,000

[1]VND = Vietnamese dollar; 1 USD = 20,000 VND.
[2]Corn price = 4,500 VND/kg.

• Increase in income with Vitazyme: 4,000,000 VND, or $200.00/ha

Conclusion: This Vietnamese corn trial revealed that Vitazyme, applied on the seeds and also 30 days after planting, increased yield by 13%, while boosting profit by $200.00/ha. This program is highly effective for corn production in Viet Nam.

Corn

Researcher/Farmer: Tran Van Nhuong
Location: Village Tan Thanh, Eapo, Cu Jut District, Dak Nong Province, Viet Nam
Variety: SSC 557
Planting season: Summer – Fall, 2011
Experimental design: A corn field was divided into a Vitazyme treated area of 0.5 ha, and an untreated control area of 0.2 ha, to determine the effect of this product on the yield and profitability of the crop.

1. Control **2. Vitazyme**

Vitazyme application: 1.5 liters/ha sprayed on the leaves and soil 30 days after planting
Growth results: With Vitazyme the following effects were noted:

- Taller plants
- Stronger root systems
- Darker green leaves
- Excellent disease resistance from steaked leaf and stem rot
- During a drought period, plants showed no leaf rolling
- Seed color was brighter

Yield results: see table at right
Income results: see table below

Corn Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	7.4	—
Vitazyme	8.0	0.6 (+8%)

• Increase in corn yield with Vitazyme: 8%

Corn Income

Treatment	Vitazyme[1]	Total costs	Total income[2]	Net income	Extra profit
	VND/ha	VND/ha	VND/ha	VND/ha	VND/ha
Control	0	11,125,000	31,080,000	19,955,000	—
Vitazyme	575,000	11,700,000	33,600,000	21,900,000	1,945,000

[1]VND = Vietnamese dollar; 1 USD = 20,000 VND.
[2]Corn price = 4,200 VND/kg.

• Increase in income with Vitazyme: 1,945,000 VND, or $97.25/ha

Conclusion: This Vietnamese corn trial revealed that Vitazyme, applied once at 1.5 liters/ha at 30 days after planting, increased yield by 8%, while boosting profit by $97.25/ha. Had a seed treatment been applied, yields and profits would likely have improved even more.

Corn

Researcher/Farmer: Dinh Thi Ngan
Location: Village 2, Dak Will, Cu Jut District, Dak Nong Province, Viet Nam
Variety: NK 72
Planting season: Summer – Fall, 2011
Experimental design: A corn field was divided into a Vitazyme treated area of 0.9 ha, and an untreated control area of 0.5 ha, to determine the effect of this product on the yield and profitability of the crop.

1. Control **2. Vitazyme**

Vitazyme application: a 5% Vitazyme seed spray on the seeds before planting

Continued on the next page

Growth results: With Vitazyme the following effects were noted:

- Taller plants
- Stronger root systems
- Darker green leaves
- Excellent disease resistance from steaked leaf and stem rot
- During a drought period, plants showed no leaf rolling
- Seed color was brighter

Yield results: see table at right
Income results: see table below

Corn Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	8.0	—
Vitazyme	9.0	1.0 (+13%)

• Increase in corn yield with Vitazyme: 6%

Corn Income

Treatment	Vitazyme[1]	Total costs	Total income[2]	Net income	Extra profit
	VND/ha	VND/ha	VND/ha	VND/ha	VND/ha
Control	0	12,000,000	36,000,000	24,750,000	—
Vitazyme	250,000	12,250,000	38,250,000	27,000,000	2,250,000

[1]VND = Vietnamese dollar; 1 USD = 20,000 VND.
[2]Corn price = 4,500 VND/kg.

• Increase in income with Vitazyme: 2,250,000 VND, or $112.75

Conclusion: This Vietnamese corn trial revealed that Vitazyme, applied as a 5% seed treatment at planting, increased yield by 6%, while boosting profit by $112.75/ha. Had an additional foliar treatment been applied, yields and profits would likely have improved even more.

Corn

Researcher/Farmer: Nong Van Duc
Location: Village 7, Eapo Hamlet, Cu Jut District, Dak Nong Province, Viet Nam
Variety: NK 7328
Planting season: Summer – Fall, 2011
Experimental design: A corn field was divided into a Vitazyme treated area of 1.0 ha, and an untreated control area of 0.5 ha, to determine the effect of this product on the yield and profitability of the crop.
1. Control **2. Vitazyme**
Vitazyme application: (1) a 5% Vitazyme seed spray on the seeds before planting; (2) 1 liter/ha sprayed on the leaves and soil 35 days after planting
Growth results: With Vitazyme the following effects were noted:

- Taller plants
- Stronger root systems
- Darker green leaves
- Excellent disease resistance from steaked leaf and stem rot
- During a drought period, plants showed no leaf rolling
- Seed color was brighter

Yield results: see table at right
Income results: see table below

Corn Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	8.6	—
Vitazyme	9.7	1.1 (+13%)

• Increase in corn yield with Vitazyme: 13%

Corn Income

Treatment	Vitazyme[1]	Total costs	Total income[2]	Net income	Extra profit
	VND/ha	VND/ha	VND/ha	VND/ha	VND/ha
Control	0	11,250,000	38,700,000	26,700,000	—
Vitazyme	500,000	11,500,000	43,650,000	31,150,000	4,450,000

[1]VND = Vietnamese dollar; 1 USD = 20,000 VND.
[2]Corn price = 4,500 VND/kg.

• Increase in income with Vitazyme: 4,450,000 VND, or $222.50/ha

Conclusion: This Vietnamese corn trial revealed that Vitazyme, applied on the seeds as well as 35 days after planting, increased yield by 13%, while boosting profit by $222.50/ha. These results prove the great utility of the Vitazyme program to grow corn in Viet Nam.

Vitazyme's active agents include natural growth regulators that trigger the cellular DNA to produce the needed enzymes for faster growth and development. Two that are known are homobrassinolide and 1-triacontanol, but there are most likely others as well which will be discovered.

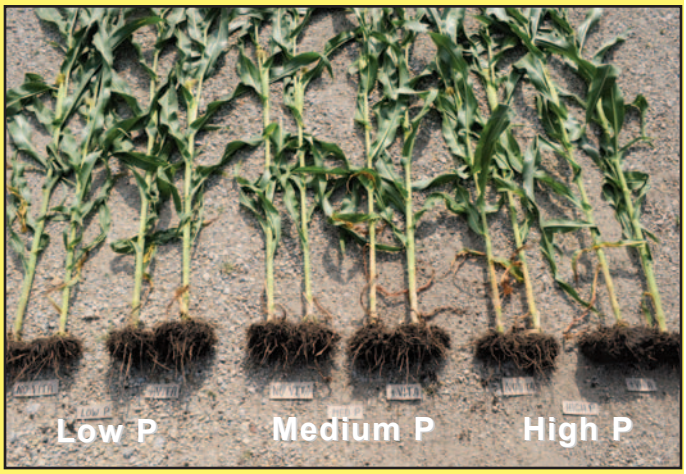
Corn

An Evaluation of Soil Phosphorus Levels and Two Formulations

Researcher: Bert Schou, Ph.D.
Research organization: Agricultural Custom Research and Education Services (ACRES)
Location: Cedar Falls, Iowa
Variety: Pioneer P0528 (non-GMO)
Planting depth: 2 inches
Soil type: Kenyon loam (34% sand, 46% silt, 20% clay, 3.6% organic matter, pH = 7.2, C.E.C. = 15 meq/100 g, fertility level = excellent, drainage = excellent)
Row spacing: 30 inches
Planting rate: 35,000 seeds/acre
Seedbed at planting: fine
Planting date: May 16, 2011
Plot size: 15 x 40 feet (600 ft.^{2})
Tillage: conventional
Experimental design: A small plot, six replicate study with corn, using three phosphorus levels in a phosphorus-deficient soil, received nine treatments, with two Vitazyme formulations. The trial was conducted to determine effects on corn yield and grain quality.

Treatment	Phosphorous	Vitazyme A[1]	Vitazyme B[1]
	lb/acre	oz/acre	oz/acre
1	0	0	0
2	0	13 (2X)	0
3	0	0	13 (2X)
4	65	0	0
5	65	13 (2X)	0
6	65	0	13 (2X)
7	130	0	0
8	130	13 (2X)	0
9	130	0	13 (2X)

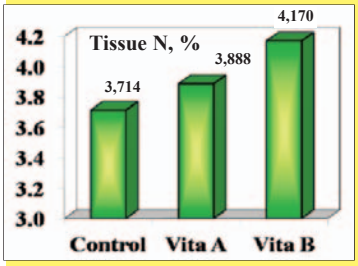
[1]2X = two applications.



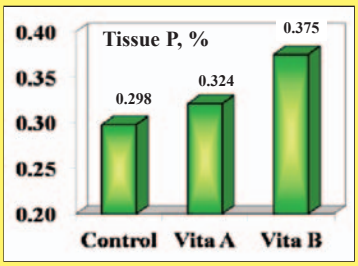
At all three P levels, the root development with Vitazyme is better with Vitazyme, showing its ability to activate roots and rhizosphere activity.

Fertilization: All plots received 100 lb/acre of nitrogen and 75 lb/acre of K_2O preplant, plus the P_2O_5 applications of 0, 65, or 130 lb/acre as shown in the table above
Weed control: Harness at 1.2 qt/acre preemergence, giving excellent weed control
Vitazyme application: (1) 13 oz/acre (1 liter/ha) in the seed row at planting on May 16, 2011; (2) 13 oz/acre (1 liter/ha) on the leaves and soil at V7 on June 30, 2011. Vitazyme A ad B are different formulations of Vitazyme.
Weather during the growing season: The season was favorable to the corn growth in terms of temperature and rainfall, although early July was quite dry.
Harvest date: October 15, 2011. A Massey-Ferguson 9 plot combine harvested the middle two rows of each plot, and the corn was weighed using an electronic scale.
Plant Population: There were no significant differences among the nine treatments, so these data are not included here.
Tissue test results: On July 12, 2011, tissue analyses were conducted on composite samples for each treatment at Perry Agricultural Laboratory, Bowling Green, Missouri. The results for the first three treatments (no added phosphorus) are presented here, to reveal effects of Vitazyme A and Vitazyme B on tissue element levels.

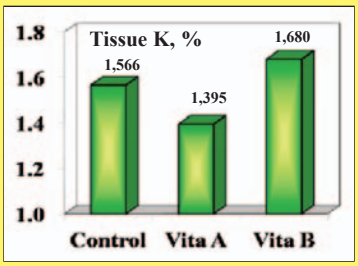
Nitrogen



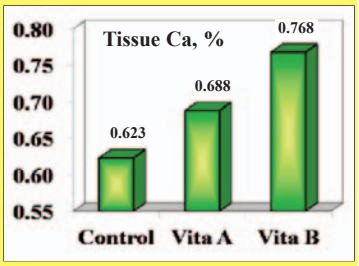
Phosphorus



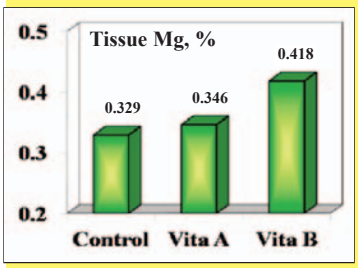
Potassium



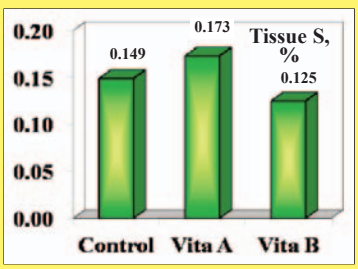
Calcium



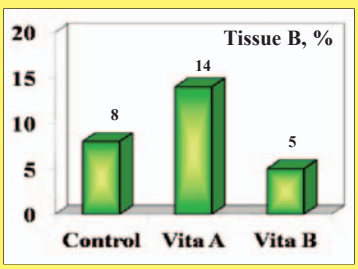
Magnesium



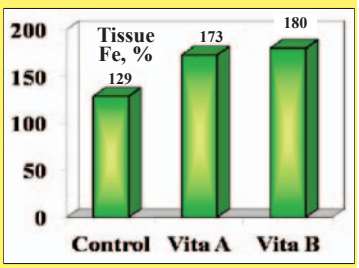
Sulfur



Boron



Iron



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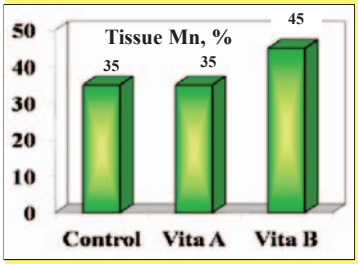
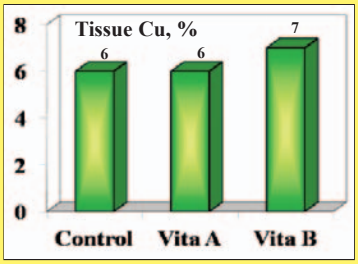
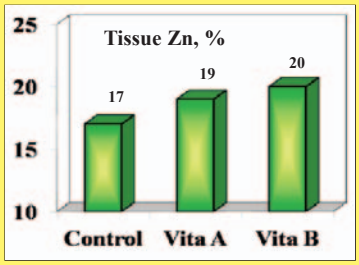
Manganese



Copper



Zinc



Notice that in most cases Vitazyme A and Vitazyme B increased the elemental composition of the corn tissue. For potassium, sulfur, boron, manganese, and copper there were either equal contents or a lower content of the element for one product or the other.

Test weight results: There were some differences in grain test weight.

Corn Test Weight

Treatment	Test weight[1]	Test weight change[2]
	lb/bu	lb/bu
1 (O P)	55.17 b	—
2 (O P, Vita A)	55.82 ab	0.65 (+1%)
3 (O P, Vita B)	55.57 ab	0.40 (+1%)
4 (Low P)	56.39 a	—
5 (Low P, Vita A)	55.94 ab	(-) 0.45 (-1%)
6 (Low P, Vita B)	56.25 ab	(-) 0.14 (0%)
7 (High P)	56.04 ab	—
8 (High P, Vita A)	56.48 a	0.44 (+1%)
9 (High P, Vita B)	56.55 a	0.51 (+1%)
$LSD_{0.05}$	0.77 lb/bu	
Standard deviation	0.66 lb/bu	
Replicate F	4.21	
Treatment F	2.86	
CV	1.18%	

[1]Means followed by the same letter are not significantly different at P=0.05 according to the Student-Newman-Keuls Test.
[2]Comparisons are made with the control at the same phosphorus level.

Corn Yield

Treatment	Yield[1]	Yield change[2]
	bu/acre	bu/acre
1 (O P)	187.1 c	—
2 (O P, Vita A)	190.3 bc	3.2 (+2%)
3 (O P, Vita B)	197.7 abc	10.6 (+6%)
4 (Low P)	196.7 abc	—
5 (Low P, Vita A)	195.8 abc	(-) 0.9 (0%)
6 (Low P, Vita B)	199.8 abc	3.1 (+2%)
7 (High P)	202.6 ab	—
8 (High P, Vita A)	203.3 ab	0.7 (0%)
9 (High P, Vita B)	209.9 a	6.6 (+3%)
$LSD_{0.05}$	9.7 bu/acre	
Standard deviation	8.3 bu/acre	
Replicate F	3.27	
Treatment F	4.13	
CV	4.19	

[1]Means followed by the same letter are not significantly different at P=0.05 according to the Student-Newman-Keuls Test.
[2]Comparisons are made with the control at the same phosphorus level.

Combined Phosphorus Test Weight for All Treatments

P level	Test weight	Test weight change
lb/acre	lb/bu	lb/bu
0	55.52	—
65	56.19	+0.67
130	56.36	+0.84

Combined Product Test Weight for All Treatments

Product	Test weight	Test weight change
	lb/bu	lb/bu
None	55.52	—
Vitazyme A	56.08	+0.21
Vitazyme B	56.12	+0.25

Note the trend towards higher test weight with higher P levels.
Both Vitazyme A and Vitazyme B show increased test weights versus the untreated controls. This result is likely due to the products' enhanced rhizosphere activation so more nutrients were available for uptake.

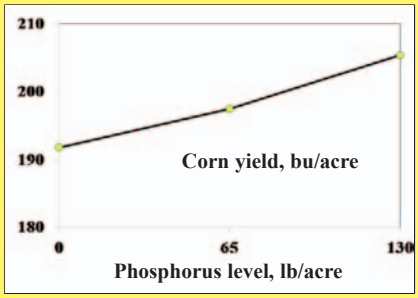
Yield results:

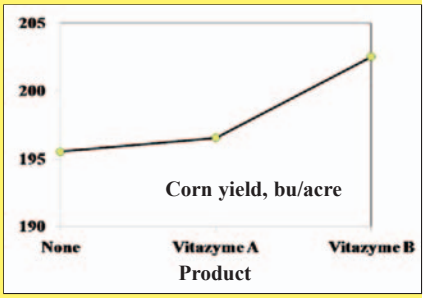
Combined Phosphorus Yield for All Treatments

P level	Yield	Yield change
lb/acre	lb/bu	lb/bu
0	191.7	—
65	197.4	+5.7 (+3%)
130	205.3	+13.6 (+7%)

Combined Product Yield for All Treatments

Product	Yield	Yield change
	lb/bu	lb/bu
None	195.5	—
Vitazyme A	196.5	+1.0 (+1%)
Vitazyme B	202.5	+7.0 (+4%)





With increasing phosphorus levels the yield of corn grain increased almost in a linear fashion, to 3 and 7% above the control at 65 and 130 lb/acre of phosphorus, respectively.

Vitazyme A, across all phosphorus levels, slightly increased corn yields, but Vitazyme B increased yields by 4%, or 7.0 bu/acre.

There was a trend across the treatments for higher yields due to higher fertilizer phosphorus applications and Vitazyme B. The highest overall treatment was combined high phosphorus plus Vitazyme B (Treatment 9), which increased yield by 22.8 bu/acre (+12%) above the untreated, low phosphorus control (Treatment 1).

Grain protein: A composite grain sample from each of the six replicates for the nine treatments was sent to Midwest Laboratories in Omaha, Nebraska, for the analysis of protein and elements. The various elements showed no trends among the treatments, but protein displayed interesting results.

There was no clear relationship between fertilizer and soil phosphorus and grain protein.

Corn Protein

Treatment	Crude protein[1]
	%
1 (O P)	6.42
2 (O P, Vita A)	6.80
3 (O P, Vita B)	6.66
4 (Low P)	6.80
5 (Low P, Vita A)	6.90
6 (Low P, Vita B)	6.60
7 (High P)	6.22
8 (High P, Vita A)	7.21
9 (High P, Vita B)	6.28

[1]Dry weight basis

Note that Vitazyme A improved grain protein by near 0.5%, although Vitazyme B had little effect.

Conclusion: A replicated small-plot study in east-central Iowa, using two Vitazyme versions with treatments at planting and V-7, and three phosphorous fertilizer levels, revealed several significant effects of phosphorous and Vitazyme on test weight, yield, and grain protein. The year was favorable for high yields, so yields varied from 187.1 to 209.9 bu/acre. The tissue element levels for the first three treatments, analyzed mid-season, revealed that both Vitazyme A and Vitazyme B increased element levels, with few exceptions.

Combined Phosphorus Protein for All Treatments

P level	Protein	Protein change
lb/acre	%	%
0	6.63	—
65	6.77	+0.14
130	6.57	-0.06

Combined Product Protein for All Treatments

Product	Protein	Protein change
	%	%
None	6.48	—
Vitazyme A	6.97	+0.49
Vitazyme B	6.51	+0.02

Test weight showed a positive impact from fertilizer phosphorous, increasing by 0.67 lb/bu for 65 lb/acre of P_2O_5, and by 0.84 lb/bu for 130 lb/acre of P_2O_5. Both Vitazyme A and Vitazyme B gave increases in the test weight, of 0.21 and 0.25 lb/bu, respectively. It is interesting that the highest test weights were for Treatments 8 and 9 (high P_2O_5, Vitazyme A and Vitazyme B, respectively), which produced significantly heavier grain than the low-P_2O_5, no-Vitazyme control (Treatment 1). This result reveals that higher phosphorous levels plus Vitazyme increase mineral uptake the most due to rhizosphere activation – especially phosphorous-extracting mycorrhizae – and increased availability of soil nutrients.

Yield results showed significant increases in corn grain with the high P_2O_5 + Vitazyme B treatment, which exceeded the no P_2O_5 and no P_2O_5 + Vitazyme A treatments. Of particular interest is the trend for increasing grain yield with both increasing phosphorous fertility and Vitazyme A and B, especially with Vitazyme B, which boosted corn yield by 7.0 bu/acre (4%) above the combined average of the no-Vitazyme phosphorous treatments at all P_2O_5 levels. The highest yield was for Treatment 9 – high P_2O_5 + Vitazyme – which boosted grain yield by 22.8 bu/acre over the no P_2O_5 + no Vitazyme control.

Grain protein responded with no pattern to added P_2O_5 fertilizer, but Vitazyme A increased protein by 0.49%-point across all three P_2O_5 fertilizer levels. This study reveals that, of the two Vitazyme formulations, Vitazyme B is the best in terms of test weight and yield enhancement, but Vitazyme A increased grain protein the most. Both products, however, improved yield, protein, and test weight of corn.

Corn

Researcher: Unknown *Research coordinator*: I.V. Braginets *Research organization*: Alfa-Agro, Ukraine
Variety: unknown *Fertilization*: farm practice
Experimental design: A field was divided into a Vitazyme treated and an untreated portion to evaluate the effect of this product on crop yield.

1. Control **2. Vitazyme**

• Increase in corn yield with Vitazyme: 1.72 tons/ha (27.4 bu/acre)

Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 10 to 12-leaf stage
Yield results: No yield results are available, but the increase in yield is given.
Conclusion: This yield increase was an excellent result of Vitazyme application in this Ukraine study.

Cotton

Researcher: John and Matthew Wilde, with Eddie Pearson *Location*: San Angelo, Texas

Right to the treatment line in the field, the effect on plant and boll development can be clearly seen at the Wilde cotton trial. No yield check was made, unfortunately.

Variety: FiberMax 9170 B2F *Planting date*: May 18, 2011
Experimental design: A 60-acre cotton field was divided into a Vitazyme + BR-61 treated area, and the remainder of the field was farmed conventionally. The purpose of the trial was to evaluate the effect of the products on cotton yield and growth characteristics.

1. Control **2. Vitazyme**

Fertilization: At planting, 5 gal/acre of a 32% N solution; at first square, 5 gal/acre of a 32% N solution; at first bloom, 5 gal/acre of a 32% N solution; at full bloom, 10 gal/acre of a 32% N solution; at full bloom, 10 gal/acre of a 32% N solution. BR-61, a Vital Earth soluble fertilizer (9-58-8% N-P_2O_5-K_2O + 0.12% Fe, 0.05% Mn, and 0.05% Zn) was applied through the irrigation water at 8 lb/acre at late bloom.
Vitazyme application: 8 oz/acre (0.7 liter/ha) twice during the growth cycle
Irrigation: buried drip tape under the rows through much of the growing season

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Weather: extremely dry and hot: over 100 days of 100º F + heat
Growth results: The Vitazyme and BR-61 treated cotton was darker green and growthier, as can be seen from the photograph. More chlorophyll in the leaves resulted in greater and more vigorous growth. At 85 to 95% open bolls, 19 plants were pulled from each treatment, and the bolls were counted.
Yield results: The harvest date was October 21, 2011. The yield for each area was not separated. An average yield of 2.15 bales/acre (1.075 lb/acre) was achieved with a grade of L 1.1, a staple of 35, leaf of 1.9, and Mic of 45.8.
Conclusion: This irrigated cotton trial at San Angelo, Texas, showed that two Vitazyme applications and one BR-61 application increased bolls by 4%, or 43 lb/acre more lint if the yield across the treated part of the field was increased by this much.

Cotton Bolls

Treatment	Total bolls	Bolls per plant
		bolls
Control	165	8.68 —
Vitazyme	172	9.05 (+4%)

• Increase in bolls per plant with Vitazyme + BR-61: 4%

Flax

Researcher: Unknown
Research organization: Alfa-Agro, Ukraine
Research coordinator: I.V. Braginets
Variety: unknown
Experimental design: A field was divided into a Vitazyme treated and an untreated portion to evaluate the effect of this product on crop yield.
1. Control **2. Vitazyme**

• Increase in flax yield with Vitazyme: 0.18 tons/ha (2.9 bu/acre)

Fertilization: farm practice
Vitazyme application: 1 liter/ha sprayed on the leaves and soil during growth
Yield results: No yield results are available, but the increase in yield is given.
Conclusion: This yield increase was an excellent results of Vitazyme application in this Ukraine study.

Grapes

Researcher: Paulo Rivara V.
Farmer: Agr. Don Ernesto (Tite Zenteno)
Organization: Syngenta, Santiago, Chile
Location: Los Andes, Region V, Chile
Variety: Crimson Seedless
Experimental design: A vineyard of Crimson Seedless grapes was divided into two Vitazyme and Ethrel portions – the Ethrel amount doubled in one plot – and an untreated control. The purpose of the test was to evaluate the effects of these treatments on fruit coloration development, to advance the harvest for exportation.

	Application time* and rate	
Treatment	**Berry softening**	**Fruit coloration**
1. Vitazyme	2.0 liters/ha	0
Vitazyme + Ethrel	0	2.0 liters/ha + 0.4 liter/ha
2. Vitazyme	2.0 liters/ha	0
Vitazyme + Ethrel	0	2.0 liters/ha + 0.2 liter/ha
3. Control	0	0

*Berry softening on January 27, 2011; fruit coloration on February 7, 2011.

Fertilization: unknown
Vitazyme application: 2.0 liters/ha at berry softening (January 27), and 2 liters/ha at the beginning of berry coloration, plus either 0.4 or 0.2 liter/ha Ethrel at that time (February 7), using an ESS sprayer at 70 liters/ha
Ethrel application: see above where 0.4 or 0.2 liter/ha were applied at the beginning of coloration with an ESS sprayer at 70 liters/ha
Harvest results: Three harvests were completed for Treatment 1, on February 23, March 2, and March 10, 2011. Harvests for Treatment 2 were performed on March 2, March 10, and March 14. The control treatment was harvested four times, on March 10, March 14, March 19, and March 25. The recording of harvests was not performed, so the data on advancement of coloration are not available. However, photos taken of the treatments on the same day reveal a marked improvement in coloration in Treatments 1 and 2.

Vitazyme + 0.4 liter/ha Ethrel colored the fruit well.

Vitazyme + 0.2 liter/ha Ethrel did an equally good job of coloring the grapes as did the 0.4 liter/ha rate.

Note how these control grapes lack much color on the same day as the two Vitazyme + Ethrel treatments.

Conclusion: Despite the fact that yield data for the harvests was not compiled, there was an obvious enhancement of coloration for both Vitazyme (at veraison) + Ethrel (at coloration) treatments versus the control. Based on harvest dates the 0.4 liter/ha Ethrel rate along with Vitazyme (Treatment 1) advanced the first harvest by 7 days, whereas the first control treatment harvest started 8 days after the first Vitazyme + Ethrel harvest. These Crimson Seedless grapes profited greatly from these combined treatments to gain more profit for the grower through earlier export marketing, The earlier coloration also resulted in one less harvest for both Vitazyme + Ethrel treatments than for the control treatment.

Grapes

Researcher: Paulo Rivara V. *Farmer*: Agr. Cerro Mauco (Ibo Marin)
Organization: Syngenta, Santiago, Chile *Location*: San Felipe, Region V, Chile *Variety*: Flame Seedless
Experimental design: A vineyard of Flame Seedless grapes was divided into Vitazyme, Ethrel, and ProTone portions to evaluate the effects of these three treatments on fruit coloration development, to advance the harvest for exportation.

1. Ethrel **2. Vitazyme** **3. ProTone**

Fertilization: unknown
Vitazyme application: 2.0 liters/ha at berry softening on December 28, 2010, and 2 liters/ha at the beginning of berry coloration on December 31, 2010, using an On Target sprayer at 400 liters/ha
Ethrel application: 0.5 liter/ha at the beginning of coloration on December 31, 2010, with an On Target sprayer at 400 liters/ha
ProTone application: 4.0 liters/ha at the beginning of coloration on December 31, 2010, with an On Target sprayer at 400 liters/ha
Harvest results: Three harvests were completed on the Ethrel treatment on January 24 and 29, and February 5, but no yield results were recorded. The Vitazyme treated grapes were harvested on January 31, and February 4 and 12; no yield values were made. The ProTone treatment was harvested on February 7, 14, and 21, with no yields recorded.

The grapes at this date showed good coloration

On the same date, Vitazyme treated grapes likewise were well colored.

The ProTone treated grapes were not nearly as colored on the same day as the other two products that were evaluated.

Conclusion: In this Flame Seedless test in Chile, Ethrel colored the grapes, on average, the earliest, the first harvest occurring January 24. The first Vitazyme harvest occurred 7 days later, while the ProTone treated grapes began to be harvested 7 days later than the first Vitazyme harvest. Thus, both Ethrel and Vitazyme improved grape color advancement for earlier marketing for export.

Grapes

Researcher: Paulo Rivara V. *Farmer*: Agr. El Retorno (Ex San Julio-Subsole)
Organization: Syngenta, Santiago, Chile *Location*: Santa Maria, Region V, Chile
Variety: Flame Seedless
Experimental design: A vineyard of Flame Seedless grapes was divided into Vitazyme + Ethrel, Ethrel only, and untreated portions to evaluate the effects of these three treatments on fruit coloration development, to advance the harvest for exportation.

1. Vitazyme + Ethrel **2. Ethrel** **3. Control**

Fertilization: unknown
Vitazyme application: 4.0 liters/ha at the beginning of berry coloration (20%), using an ESS sprayer at 100 liters/ha; Ethrel at 0.15 liter/ha along with Vitazyme
Ethrel application: see above, plus a separate treatment using 0.3 liters/ha Ethrel at the beginning of coloration (20%) using an ESS sprayer at 100 liters/ha
Harvest results: Note the color of the grapes on the same day, showing the advancement of color development and harvestability with Vitazyme + Ethrel as well as Ethrel only compared to the untreated control.
Conclusion: No harvest data nor yield data for specific harvests were available for this trial, but based on the excellent color response to both Vitazyme and Ethrel, it is presumed that these products greatly enhanced the early coloration and harvest of Flame Seedless grapes in this Chile trial. An earlier harvest means a better export price for these table grapes, and greater profits for the producer.

Continued on the next page

Note the superior coloration of the Vitazyme treated grapes in this photo.

Ethrel alone did a reasonable job of coloring these grapes, in a photo taken the same day as the other two.

Without Vitazyme or Ethrel, the grapes lacked good coloration and were not ready for harvest.

Grapes

Researcher: Paulo Rivara V. *Farmer*: Agr. Corpora *Organization*: Syngenta, Santiago, Chile
Location: San Felipe, Region V, Chile *Variety*: Red Globe
Experimental design: A vineyard of Red Globe grapes was divided into Vitazyme and control treatments, to evaluate the effects of these two treatments on fruit coloration development, to advance the harvest for exportation.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 4.0 liters/ha at first coloration on January 27, 2011, using an ESS sprayer at 70 liters/ha
Harvest results: The Vitazyme treatment was harvested twice, on February 24 and February 28, 2011. The control treatment was harvested March 2, March 9, and March 14, 2011.

Vitazyme applied to Red Globe grapes enhanced coloration and the advancement of harvest.

The control grapes, photographed on the same day, were able to be first picked 6 days later than the Vitazyme treated area.

Conclusion: This study of Red Globe grapes in Chile showed that Vitazyme can enhance the coloration of grapes significantly, so the farmer can advance the harvest by six days and fetch a higher export market price.

Grapes

Researcher: Paulo Rivara V. *Farmer*: Agr. Don Ernesto (Tite Zenteno)
Organization: Syngenta, Santiago, Chile *Location*: Los Andes, Region V, Chile
Variety: Flame Seedless
Experimental design: A vineyard of Flame Seedless grapes was divided into a Vitazyme + Ethrel and Ethrel only portion to evaluate the effects of these two treatments of fruit coloration development, to advance the harvest for exportation.

1. Vitazyme twice + Ethrel **2. Ethrel**

Fertilization: unknown
Vitazyme application: 2.0 liters/ha at berry softening, and 2 liters/ha at the beginning of berry coloration, using an ESS sprayer at 70 liters/ha; Ethrel at 0.15 liter/ha for the second applications along with Vitazyme
Ethrel application: see above, plus a separate treatment using 0.3 liter/ha Ethrel at the beginning of coloration with an ESS sprayer at 70 liters/ha
Harvest results: Three harvests were completed for the Ethrel treatment, on January 19, 26, and 31 of 2010, but no yield results were recorded. The Vitazyme + Ethrel treatments were harvested on January 10 and 14, 2010. Note the color of the grapes on the same day, showing the great advancement of color development and harvestability with Vitazyme + Ethrel.

Conclusion: Although no yield data for the three harvests are available, the greatly improved color of the Vitazyme + Ethrel treated grapes shows the ability of Vitazyme, applied at veraison and at coloring at 2 liters/ha, to advance coloration, and thus earlier, more profitable marketability of the fruit. Ethrel did not perform as well as Vitazyme in coloring fruit in this study of Flame Seedless grapes in Chile; the first harvest for Ethrel alone was 10 days later than for Vitazyme + Ethrel.

Note the deep color development on the day of this photo, from Vitazyme + Ethrel

The Ethrel treatment alone produced much greener grapes on the same day as those treated with Vitazyme (left photo).

Grapes

Researcher: Paulo Rivara V. *Farmer*: Fundo el Retiro, DDC *Organization*: Syngenta, Santiago, Chile
Location: Pudahuel, Metropolitan Region, Chile *Variety*: Crimson Seedless
Planting date: 2000 *Planting spacing*: 3.27 x 2.50 meters
Experimental design: A vineyard of Crimson Seedless table grapes was divided into three treatments to evaluate the effect of Vitazyme and Ethrel, alone and in combination, on the coloration of fruit and maturation for export.

1. Vitazyme twice **2. Vitazyme + Ethrel** **3. Ethrel once**

Fertilization: unknown
Vitazyme application: Treatment 1: 2 liters/ha on January 11, 2010, 15 days before coloration, and 2 liters/ha on January 27, at the beginning of coloration using an ESS sprayer at 60 liters/ha.
Treatment 2: Only the first application of Treatment 1, plus the Ethrel treatment below.
Ethrel application: 0.5 liter/ha on January 27, 2010, using an ESS sprayer delivering 60 liters/ha
Yield results: Three pickings were made, on March 16, April 1, and April 5, 2010.
Conclusion: This Flame Seedless trial in Chile revealed that two applications of Vitazyme improved the coloration and early harvest by 2% above the traditional Ethrel only application. The combined Vitazyme + Ethrel treatment improved the more valuable early harvest by 1%. Total yield was not affected by these Vitazyme applications late in the season, but earlier applications would likely have boosted yields as well as improved the amount harvested early even more.

Grape Yield

Treatment	Harvest 1*	Harvest 2*	Harvest 3*	Total*
	boxes harvested			
Vitazyme twice	640 (+2%)	355 (-9%)	213 (+30%)	1,208 (+2%)
Vitazyme + Ethrel	635 (+1%)	298 (+2%)	225 (+37%)	1,258 (+7%)
Ethrel	626 —	390 —	164 —	1,180 —

*All comparisons are with Ethrel alone.

Increased earlier harvest (Harvest 1)
Vitazyme twice ..... +2%
Vitazyme + Ethrel ..... +1%

Grapes

Researcher: Paulo Rivara V. *Farmer*: Felipe Guerra, Del Monte Fresh Produce
Organization: Syngenta, Santiago, Chile *Location*: Region V, Chile
Variety: Flame Seedless *Planting spacing*: 3.50 x 1.75 meters
Experimental design: A Flame Seedless vineyard was divided into Vitazyme, Ethrel, and untreated areas to evaluate the effects of these two products on earliness of coloration to achieve the maximum price in the exportation of table grapes.

1. Control **2. Vitazyme** **3. Ethrel**

Fertilization: unknown
Vitazyme application: 2.0 liters/ha 15 days before coloring on January 2, 2010, using an ESS sprayer at 75 liters/ha; 2.0 liters/ha at coloring on January 10, 2010
Ethrel application: 0.5 liter/ha at coloration, using an ESS sprayer at 75 liters/ha

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Yield results: Three harvests were made for the grapes, on January 19 and 28, and February 4, 2010.

Increase in first harvest grapes
Vitazyme ..... +195%
Ethrel ..... +100%

Quality results:

Grape splitting: Vitazyme treated grapes had minor amounts of splitting compared to the Ethrel treatment and the control.

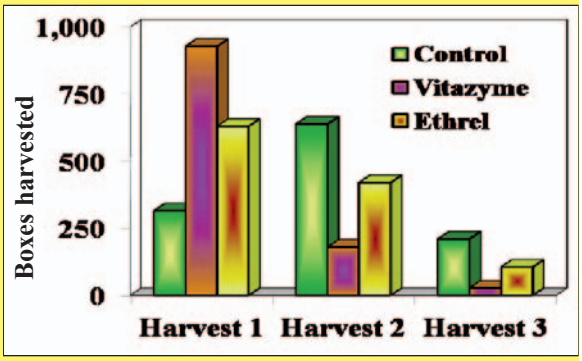
Grape brix: Vitazyme treated grapes tested 16.5 to 18.0 Brix, while Ethrel and untreated grapes produced grapes of 15.5 to 16.5 Brix.

Conclusion: This Flame Seedless table grape trial in Chile proved that Vitazyme greatly improved the early coloration and maturity of the grapes, using two 2 liter/ha applications before and at grape coloring, Ethrel provided a significant improvement as well, but not nearly the advancement in harvest as did Vitazyme.

Vitazyme increased the percentage of grapes in the first harvest by 195%, compared to 100% for Ethrel, showing the superiority of Vitazyme to advance coloration and maturity, and thus capture higher market prices versus untreated grapes. Besides, Vitazyme prevented many splits of the grapes compared to the Ethrel and control treatments, and the sugar of the fruit was about 1.25 Brix higher with Vitazyme. Because the product was applied late in the season there was no increase in yield; early applications would have boosted yield besides enhancing coloration and earlier marketability.

Grape Yield

Treatment	Boxes harvested			
	Harvest 1	Harvest 2	Harvest 3	Total
	% of total harvest			
Control	315	638	210	1,163
Vitazyme	928 (+195%)	180 (-72%)	27 (-87%)	1,135
Ethrel	630 (+100%)	420 (-34%)	105 (-50%)	1,155



Percent of total grapes, first harvest
Vitazyme 82%
Ethrel 55%
Control 27%

Grapes (Raisins)

A Testimonial

Researcher/Farmer: Craig Clyne
Project Supervisor: Steven David, Organic Farming Systems, Perth
Location: Australia
Variety: Sultana for raisins
Experimental design: A raisin vineyard received a production program from Organic Farming Systems, Perth, Western Australia. to evaluate the effects of the program on crop growth and yield.
Products applied: Vitazyme, Super Kelp (high in auxins), Organic Nitrogen, Humus 26, and Liquid Phosphorus
Weather: extremely wet and conducive to fungal growth
Testimonial:

> "We are really happy with the vine growth this year based on the program provided by Organic Farming Systems. We also used a Vitazyme program on three blocks of Sultana grapes and **saw a dramatic difference in vine colour & growth within a few days of application**."
>
> "2010/11 has been a very difficult season to manage downy mildew disease in vines .... **The three Vitazyme treated blocks also had our lowest incidence of disease (<2% disease)**."

[Note: Within three days of application, Vitazyme visibly improved vine color and growth.]

Lettuce

Farmer: Seedling Factory Systems, Perth, Australia
Researcher: Steven David
Research organization: Organic Farming
Variety: Ribai
Soil type: growing media
Planting date: May 24, 2010
Irrigation: overhead sprinkler
Tray size: 144 cells, or 25 ml per cell
Experimental design: A study on lettuce grown in multi-cell growing trays was initiated using Vitazyme and MicroPlus as drench treatments to treat trays, to evaluate the product's effects – alone and in combination – on the growth of roots and leaves.

1. Control **2. Vitazyme** **3. MicroPlus** **4. Vitazyme + MicroPlus**

Fertilization: normal nursery fertility
Vitazyme application: 1% solution soil drench at 500 ml/tray, giving 5 ml of product per tray, 7 days after seeding on June 1. For the combined products, this rate was also used.
MicroPlus application: 50 grams/100 liters of water at 500 ml/tray, giving 0.25 gram of product per tray, 7 days after seeding on June 1. For the combined products, this rate was also used. MicroPlus is an inoculum of *Streptomyces lydicus* WYEC 108 (0.0371%).

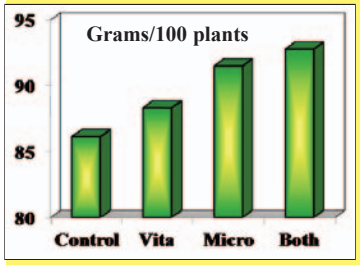
Yield results: Harvesting of the lettuce plants was completed on June 29, 2010, by washing the roots clean of potting media, separating the roots and leaves, and weighing each. Then the roots and leaves were dried and weighed again.

Lettuce Yield

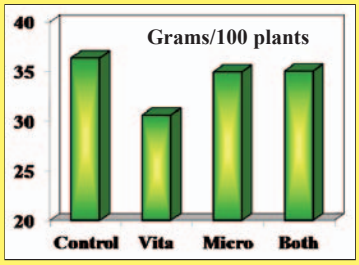
Treatment	Fresh weight			Dry weight		
	Shoots	Roots	Total	Shoots	Roots	Total
	g/100 plants			g/100 plants		
Control	86.13	26.37	112.50	6.32	1.51	7.84
Vitazyme	88.31 (+3%)	30.60 (+16%)	118.71 (+6%)	6.32 (+0%)	1.82 (+20%)	8.14 (+4%)
MicroPlus	91.50 (+6%)	34.96 (+33%)	126.46 (+12%)	6.83 (+8%)	1.89 (+24%)	8.72 (+11%)
Vita + Micro	92.78 (+8%)	35.06 (+33%)	127.84 (+14%)	6.99 (+11%)	1.92 (+26%)	8.91 (+14%)

Fresh Weight

Shoots



Roots

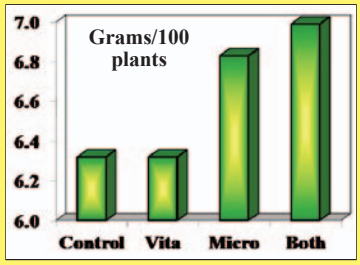


Fresh weight increases

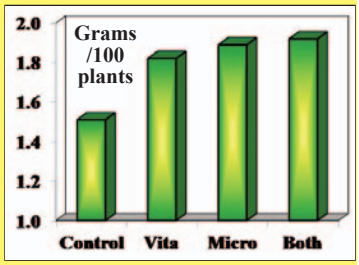
	Shoots	Roots	Total
Vitazyme	+3%	+16%	+6%
MicroPlus	+6%	+33%	+12%
Vita + Micro	+8%	+33%	+14%

Dry Weight

Shoots



Roots



Fresh weight increases

	Shoots	Roots	Total
Vitazyme	+0%	+20%	+4%
MicroPlus	+8%	+24%	+11%
Vita + Micro	+11%	+11%	+14%

Conclusion: A lettuce factory tray study in Australia, using Vitazyme and MicroPlus alone and together, revealed that both products improved both fresh and dry top and root weight. The increases were from 3 to 16% for Vitazyme, and from 6 to 33% for MicroPlus, while the combined products revealed an excellent synergism: increases of 8 and 11% in shoot fresh and dry weight, of 33 and 26% in root fresh and dry weight, and of 14 and 14% of total fresh and total dry weight were noted. Either product alone, but expecially the combined products, have been shown in this study to increase lettuce yield, and thus are excellent adjuncts to lettuce production.

Lettuce

Farmer: Glen Dobra *Researcher*: Steven David *Research organization*: Organic Farming Systems, Perth, Australia

Soil type: sand
Variety: Coral
Planting date: January, 2009
Experimental design: Adjacent beds of transplanted lettuce were selected to compare Vitazyme application with the conventional program on a production farm. The purpose of the trial was to determine the effect of the product on lettuce growth and yield.

1. Control 2. Vitazyme

Fertilization: farm standard
Vitazyme application: (1) tray drenching of transplants with a 1% Vitazyme solution; (2) 1 liter/ha sprayed on the leaves and soil 14 days after transplanting

Here is a view of the lettuce bed where the Vitazyme trial was conducted. Vitazyme increased both leaf and root growth a lot!

Lettuce heads close up reveal growthy, nicely shaped plants that eventually yielded 52% more total weight.

Growth results: Fresh and dry measurements were made 14 days after transplanting.

- **Increase in leaf growth at 14 days: +44%**
- **Increase in root growth at 14 days: +86%**

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Yield results: Harvesting occurred in late March, 2009.
Conclusion: Vitazyme in this Australian study, applied twice to transplants, greatly enhanced leaf (44%) and root (86%) growth at 14 days after transplanting. At harvest, the yield with Vitazyme exceeded the control by 52%, proving the great effectiveness of this product in lettuce production systems.

• *Increase in yield with Vitazyme: 52%*

Lettuce Yield

Treatment	Lettuce yield	Yield change
	grams/plot	grams/plot
Control	1,400	—
Vitazyme	2,130	730 (+52%)

Lettuce

Researcher: Steven David
Farmer: LIM Produce
Variety: unknown
Irrigation: fixed overhead
Research organization: Organic Farming Systems, Perth, Australia
Location: Wyalup, Western Australia
Soil type: sand
Plot size: 2 m x 8.7 m
Planting date: August 5, 2010

Experimental design: An onion planting was divided into two treatments with three replicates (six plots), one treatment being the farmer's program and the other being Vitazyme plus MicroPlus. The purpose of the study was to evaluate the effects of this program on onion number, disease, weight, and yield.
Fertilization: normal farm program
Vitazyme application: See the table below.
MicroPlus application: See the table below. MicroPlus is an inoculum of *Streptomyces lydicus* WYEC 108 (0.0371%).

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

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

Onions for this trial dug from the control area filled a pail as shown here. The number was similar to the treated area.

The Vitazyme and MicroPlus treatment, for the same area, produced an equal number of bulbs but larger ones.

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

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

Onion Yield

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

• *Increase in onion number: 1%* **• *Increase in bulb weight: 9%*** **• *Increase in onion yield: 10%***

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

Oranges

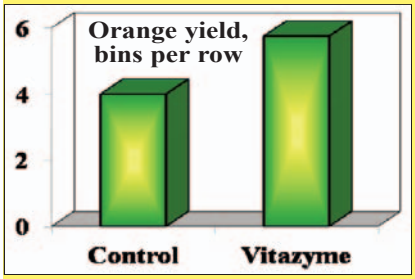
The two bottom oranges represent the size of fruit found in the Vitazyme treated portion of the orchard. Note the larger size as well as the improved color.

Researcher/Farmer: Eckersley
Location: Harvey, Western Australia
Variety: unknown
Soil type: loam
Irrigation: micro sprinklers
Experimental design: An orange grove was divided into a Vitazyme treated and a normal farmer program area to evaluate the effect of the product on orange yield.
1. Control **2. Vitazyme**
Fertilization: normal farm program
Vitazyme application: 1 liter/ha on the leaves, using an orchard sprayer, in December of 2009, and in January, March, and July of 2010

Yield results:

Orange Yield

Treatment	Orange yield	Yield change
	---- bins per row ----	
Control	4.0	—
Vitazyme	5.75	1.75 (+44%)



The Ekersley orange trial control area had noticeably fewer fruit per tree, as typified in this photo at Harvey, W. Australia.

Conversely, the Vitazyme treated trees revealed more fruit per tree, growthier trees, and better color, as seen here.

*Besides increasing total fruit number, **the fruit size was also increased with Vitazyme**.

Conclusion: An orange trial in Australia showed that four applications of Vitazyme increased the number and size of the fruit, to give a large 44% increase in yield. This program is thus shown to be highly effective for citrus growers in Australia.

Oranges

A Testimonial

The continued success of Vitazyme use on Monte Vista Ranches in California reveals the consistency of performance that farmers must depend on for their success.

Grower: Jody Wollenman
Farm: Monte Vista Ranches, Inc.
Location: Lindsay, California
Acres treated: about 2,000 acres
Treatment regime: four applications of 1 liter/ha each per year
Testimonial: **"As for the effects I have observed over the past few years with our Vitazyme applications, we are producing larger crops. That is, more 1,000-pound bins are produced per acre. In the early 2000's, before we were introduced to Vitazyme, our production was averaging 30 to 35 bins per acre, with some as high as 40. *Now, after four years of using Vitazyme, our production has been averaging 40 to 50 bins per acre, with some blocks as high as 70 bins!* This is very exciting, especially with the cost of farming getting more expensive every year."**

Potatoes

Researcher (farmer): Don Fitzpatrick *Location*: Houlton, Maine *Variety*: Dark red Norlan
Soil type: gravely loam *Planting date*: May 20, 2011 *Row spacing*: 34 inches *In-row spacing*: 8 inches
Experimental design: A 7-acre field was divided into 3 acres treated with Vitazyme at planting, applied in the seed row, and 4 acres untreated for a control. No other applications were made.

1. Control **2. Vitazyme**

Fertilization: 190-190-75 lb/acre of N-P_2O_5-K_2O applied through the planter at planting; 200 lb/acre of potassium magnesium sulfate (0-0-22-11-23% N-P_2O_5-K_2O-Mg-S) topdressed in mid-June when the plants were breaking through
Vitazyme application: 13 oz/acre in the seed row at planting through the Admire machine, along with Quadras and one other pesticide
Observations during growth: The Vitazyme treated plants had the following characteristics:

1. **Deeper green leaves**
2. **Longer leaf life; the control area died back earlier.**
3. **Leaves were shinier, and healthier looking.**
4. **The untreated area had a severe insect infestation, but the untreated area was fairly insect free, right to the dividing row.**

Continued on the next page

Harvest date: September 19, 2011
Weather: Temperatures were normal, but rain was excessive during the growing season.
Yield results:

Potato Yield

Treatment	Tuber yield	Yield change
	cwt/acre	cwt/acre
Control	305	—
Vitazyme	323	18 (6%)

Conclusion: This potato trial in northern Maine showed that Vitazyme increased tuber yield by 18 cwt/acre, 6% more than the untreated control. The increase was due to only a single application, at planting, and would likely have improved much more had one or two foliar treatments been made later on. The treated plants were more aggressive, healthier, and insect free during the growing season than the control plants.

• Increase in yield with Vitazyme: 6%

Potatoes

Researcher: Steven David
Research organization: Organic Farming Systems, Perth, Australia
Location: Manjimup, Western Australia
Planting date: December 1, 2010 *Variety*: Nadine
Experimental design: A potato field was divided into a Vitazyme treated and untreated area alongside, to determine the effect of the product on tuber yield and quality.

1. Control **2. Vitazyme**

Fertilization: usual farm practice, including TM21 plus Calsap
Vitazyme application: (1) 1 liter/ha in-furrow at planting; (2) 1 liter/ha on the leaves and soil at tuber initiation
Tuber quality: The Vitazyme treated tubers were **cleaner** at harvest, with **less skin damage and disease**.
Yield results: The field was sampled on April 14, 2011, 135 days after planting, and total weight, tuber number, and marketable tubers were evaluated.
Conclusion: A potato study in Western Australia revealed that Vitazyme, applied at planting and at tuber initiation, increased the total yield (3%), tuber number (20%), and marketable tubers (40%), while improving skin integrity by reducing skin damage and disease incidence. Vitazyme is shown to be an excellent addition to potato production in Australia.

This Western Australia trial proved that Vitazyme (tubers on the right) can especially increase the total marketable tubers (+40%)!

Potato Yield

Treatment	Total weight	Tuber number	Marketable tubers
	kg	number	number
Control	9.49	76	50
Vitazyme	9.81 (+3%)	91 (+20%)	70 (+40%)

• Increase in yield with Vitazyme: 3%
• Increase in tuber number with Vitazyme: 20%
• Increase in marketable tubers with Vitazyme: 40%

Potatoes

Pre-Planting Evaluation

Royal Blue potatoes treated with Vitazyme two times yielded very well, but did not require a preplant treatment.

Researcher: Steven David
Research organization: Organic Farming Systems, Perth, Australia
Location: Manjimup, Western Australia
Variety: Royal Blue
Planting date: December 1, 2010
Experimental design: To evaluate the effect of an early, pre-planting Vitazyme application on potato yield, a potato field was divided into two parts, both receiving at-planting and pre-row closure treatments, but one also receiving a pre-plant Vitazyme application.

1. Vitazyme twice **2. Vitazyme twice + pre-plant**

Fertilization: usual farm practice
Vitazyme application: Both treatments: (1) 1 liter/ha in-furrow at planting; (2) 1 liter/ha on the leaves and soil before row closure. Treatment 2 received an additional 1 liter/ha on the soil before planting during a rotary hoe operation.
Yield results: The treatments were sampled on April 14, 2011, 135 days after planting.

Potato Yield

Treatment	Tuber weight	Tuber number
	kg	number
Vitazyme twice	5.14	88
Vitazyme twice + preplant	4.92 (-4%)	83 (-6%)

Conclusion: This potato trial in Western Australia proved that an additional application of Vitazyme pre-plant did not benefit tuber yield and number, when both treatments received two other applications, at planting in the row and at pre-row closure. No untreated control was included in this study.

Rice

Researcher/Farmer: Trieu Van Muu
Location: Village 3, Cu Knia Hamlet, Cu Jut, Dak Nong Province, Viet Nam
Variety: TH3-3
Planting season: Summer – Fall, 2011
Experimental design: A rice field was divided into a Vitazyme treated area of 0.4 ha, and an untreated control area of 0.2 ha, to evaluate the effect of the product on rice yield and profitability.

1. Control **2. Vitazyme**

Vitazyme application: (1) on the seeds at 0.5 liter/50 kg of seeds at planting; (2) 1 liter/ha over the leaves at tillering; (3) 1 liter/ha on the leaves at heading

Yield results:

Rice Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	6.7	—
Vitazyme	8.0	1.3 (+19%)

• Increase in rice yield with Vitazyme: 19%

Income results:

Rice Income

Treatment	Vitazyme[1]	Total costs	Total income	Net income	Extra profit
	VND/ha	VND/ha	VND/ha	VND/ha	VND/ha
Control	0	16,000,000	40,200,000	24,200,000	—
Vitazyme	650,000	16,650,000	48,000,000	31,350,000	7,150,000

[1]VND = Vietnamese dollar; 1 USD = 20,000 VND.

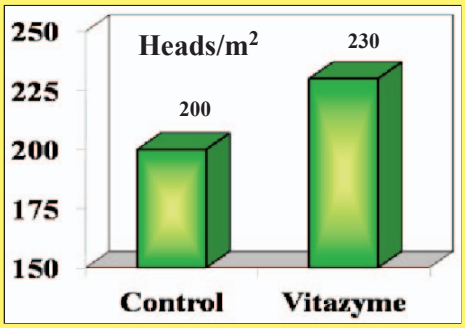
Maturity results: **Vitazyme application reduced the growth cycle by 5 days.**

Grain head results: At harvest the following data were determined.

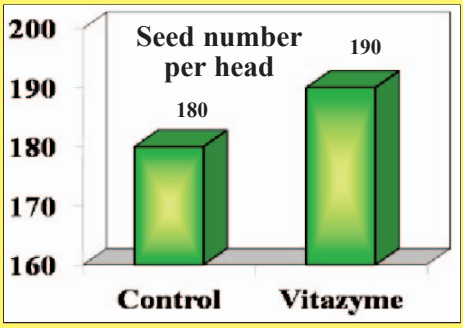
Conclusion: This Vietnamese rice study showed that Vitazyme, on the seeds and twice during development, substantially increased yield (+19%) and profits (+$357.50/ha), while reducing the time to maturity by 5 days and increasing heads/m^2 (+15%) and seeds/head (+6%). This program is shown to be highly effective and profitable for rice farmers in Viet Nam.

• Increase in heads with Vitazyme: 15%

Heads Per Meter^2



Seeds Per Head



• Increase in seeds/head with Vitazyme: 6%

Rice

Researcher/Farmer: H' Yer
Location: Ea Tling Town, Cu Jut District, Dak Nong Province, Viet Nam
Variety: BIO 404
Planting season: Summer – Fall, 2011
Experimental design: A rice field was divided into a Vitazyme treated area of 0.5 ha, and an untreated control area of 0.2 ha, to evaluate the effect of the product on rice yield and profitability.

1. Control **2. Vitazyme**

Vitazyme application: (1) young plants dipped in a 5% Vitazyme solution at planting; (2) 1 liter/ha on the leaves at heading

Yield results:

Rice Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	8.7	—
Vitazyme	9.2	. 0.5 (+6%)

Income results:

Rice Income

Treatment	Vitazyme[1]	Total costs	Total income	Net income	Extra profit
	VND/ha	VND/ha	VND/ha	VND/ha	VND/ha
Control	0	18,110,000	52,200,000	34,090,000	—
Vitazyme	390,000	18,500,000	55,200,000	36,700,000	2,610,000

[1]VND = Vietnamese dollar; 1 USD = 20,000 VND.

Conclusion: Vitazyme in this Vietnamese study applied at planting on the plants, and again at heading, increased the yield by 6%, and the net income by $130.50/ha, showing the program's great utility for rice producers in Viet Nam. One more Vitazyme application at tillering may have improved yield further.

• Increase in rice yield with Vitazyme: 6%

• Increase in income with Vitazyme: 2,160,000 VND, or $130.50/ha

Rice

Researcher/Farmer: Lin Thi Ngan
Location: Village 2, Dak Will Hamlet, Cu Jut, Dak Nong Province, Viet Nam
Variety: PHB-71
Planting season: Summer – Fall, 2011
Experimental design: A rice field was divided into a Vitazyme treated area of 0.3 ha, and an untreated control area of 0.1 ha, to evaluate the effect of the product on rice yield and profitability.

1. Control **2. Vitazyme**

Vitazyme application: a 5% spray on the seeds just before planting
Yield results:
Income results:

Rice Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	8.7	—
Vitazyme	9.2	. 0.5 (+6%)

Rice Income

Treatment	Vitazyme[1]	Total costs	Total income	Net income	Extra profit
	VND/ha	VND/ha	VND/ha	VND/ha	VND/ha
Control	0	17,870,000	54,000,000	36,130,000	—
Vitazyme	130,000	18,000,000	60,000,000	42,000,000	5,870,000

[1]VND = Vietnamese dollar; 1 USD = 20,000 VND.

Conclusion: This study in Viet Nam on rice, applied only as a seed treatment before planting, improved yield by 11%, resulting in a $293.50 increase in net income. Such a fine result could have been improved even more by one or two foliar applications during the growing season, but only a single seed treatment is shown to have excellent results in Vietnamese rice production.

• Increase in rice yield with Vitazyme: 11%

• Increase in income with Vitazyme: 5,870,000 VND, or $293.50/ha

Roses

Researcher: Joe Tew and Eddie Pearson
Location: Tyler Rose Nursery, Tyler, Texas
Soil type: fine sandy loam
Planting date: February, 2011 (exact date unknown)

The survival and size of newly planted roses was markedly improved with Vitazyme soaking of the stems for 5 hours before planting.

Experimental design: A field was planted to rose stems, spaced approximately 6 inches apart, in rows 4 feet apart. One row was treated with stems soaked in dilute Vitazyme and compared to the adjacent untreated row to determine growth and survival rate.

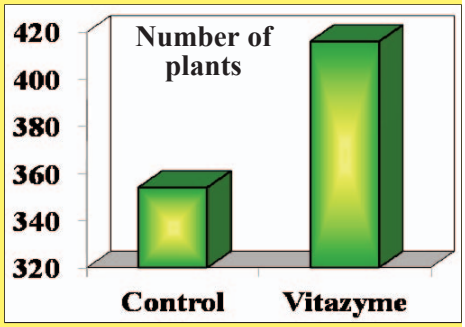
1. Control **2. Vitazyme**

Fertilization: none
Vitazyme application: The Vitazyme treated rose stems were about 7 inches inched long, and were soaked in a 0.1% solution for about 5 hours before planting.
Rose survival: Each live rose plant was counted in the two adjacent rows on May 31, 2011.

• Increase in plants with Vitazyme: 18%

Rose Survival Rate

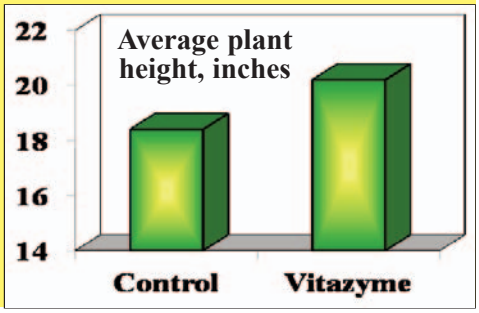
Treatment	Growing plants	Change
Control	354	—
Vitazyme	416	62 (+18%)



Rose height: On May 31, 2011, for typical 10-foot row sections directly across from one another in the two rows were measured, the plants for each section were counted, and the height of the longest branch from soil level to tip was measured. These values allowed a degree of replication to measure variability and statistical significance, although the plots were not randomized.

Rose Plant Height

Treatment	Plant height	Change	Plant number	Change
	inches	inches		
Control	18.4 a	—	13.8 a	—
Vitazyme	20.2 a	3.8 (+21%)	16.8 a	3.0 (+22%)
Block F	0.139		0.759	
Error F	0.223		0.395	
Model F	0.158		0.715	
CV, %	8.38%		28.08%	
$LSD_{0.10}$	2.7 inches		7.1 inches	



Conclusion: In this rose trial in eastern Texas, newly planted stems survived considerably better with Vitazyme, with 18% more surviving by total row count, and by 22% using a four replicate analysis. These similar results show that the replicate selection was quite accurate. However, due to great variations in survival for different positions of the rows, the error value was high as the results are not statistically significant. Plants treated with Vitazyme were 21% taller, on average, than the untreated plants, a difference that was significant at the 22% level. These results show the large response of rose plants to Vitazyme application despite severe cold periods and drought, using only 0.1% product in the stem dip.

- ***Increase in plant height with Vitazyme: 21%***
- ***Increase in surviving plants with Vitazyme: 22%***

Soybeans

Average Values for 2009 to 2011 in Ukraine

Researcher: V.V. Plotnikov
Location: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station, Vinnytsia, Ukraine (Central Forest and Steppe Region)
Conclusion: Over three years of demonstrations, Vitazyme is shown to be an excellent adjunct to soybean production in Ukraine, especially the seed plus foliar applications.

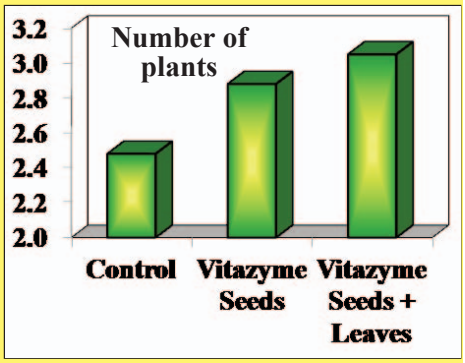
Demonstration plot values averaged over three years, 2009 to 2011

Three-Year Average

Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	2.48	—
2. Vitazyme on seeds[1]	2.88	0.40 (+16%)
3. Vitazyme on seeds + leaves[2]	3.05	0.57 (+23%)

[1]1 liter/ton of seeds; [2]1 liter/ha at branching.

Three-year average increases with Vitazyme
1 liter/ton of seed ..... +16%
1 liter/ton of seed + 1 liter/ha ..... +23%



Soybeans

Researcher: Unknown
Research organization: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station
Location: Vinnytsia, Ukraine (Central Forest and Steppe Region)
Variety: Kyivska 98
Planting date: unknown
Soil type: gray podzolic (organic matter = 2.2%, hydrolyzed N = 8.4 mg/100 g soil, P = 15.8 mg/100g soil, exchangeable K = 12.4 mg/100 g soil, pH = 5.5)
Experimental design: Soybean plots were prepared and treated with two Vitazyme treatments, to evaluate the effect of the product on bean yield and profitability.

1. Control **2. Vitazyme on seeds** **3. Vitazyme on seeds and soil**

Vitazyme applications: Treatments 2 and 3, 1 liter of Vitazyme per ton of seed on May 8, 2011; Treatment 3, 1 liter/ha on the leaves and soil at branching on June 21, 2011
Yield results: see table at right
Income results:
- Income increase with a Vitazyme seed treatment: +992 hrn/ha
- Income increase with a Vitazyme seed + foliar treatment: +1,364 hrn/ha

Soybean Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	2.24	—
2. Vitazyme, seeds	3.60	0.36 (+16%)
3. Vitazyme, seeds + foliar	2.79	0.55 (+25%)

Conclusion: This Ukrainian soybean study parallels other studies performed in Vinnytsia during previous years, showing that Vitazyme dramatically improved crop yield (16 to 25%), and increased income by from 992 to 1,364 hrn/ha, using a seed treatment, or a seed and a later foliar treatment. This program is proven to be consistent in its effects to aid in soybean productivity and profitability in Ukraine.

- ***Increase in yield with Vitazyme seed treatment: 16%***
- ***Increase in yield with Vitazyme seed + foliar treatment: 25%***

Vitazyme works through several modes of action, including accelerating the Cascade System, stimulating the rhizosphere, promoting the Oxygen-Ethylene Cycle, suppressing pathogens, increasing nutrient availability, and improving soil structure.

Soybeans

Researcher: Unknown
Research coordinator: I.V. Braginets
Research organization: Alfa-Agro, Ukraine
Variety: unknown
Experimental design: A field was divided into a Vitazyme treated and an untreated portion to evaluate the effect of this product on crop yield.

1. Control **2. Vitazyme**

• Increase in soybean yield with Vitazyme: 0.53 tons/ha (7.9 bu/acre)

Fertilization: farm practice
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at flower initiation
Yield results: No yield results are available, but the increase in yield is given.
Conclusion: This yield increase was an excellent result of Vitazyme application in this Ukraine study.

Soybeans

Farmer: unknown
Location: Chau Thanh District, Dong Thap Province, Mekong Delta, Viet Nam
Variety: unknown
Soil type: alluvial
Planting date: February through May 2011
Experimental design: A soybean test involving 118 farmers on a total of 70 ha was initiated the spring of 2011 to evaluate the effects of Vitazyme on soybean yield and profitability.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: (1) 1 liter/ha on the leaves and soil 15 days after seeding; (2) 1 liter/ha on the leaves and soil 55 days after seeding
Yield results: see table at right
Growth results: Soybeans treated with Vitazyme showed **fewer insect and disease infestations** than the untreated beans.
Income results: The improved net income with Vitazyme was due to ...
(1) increased yield
(2) reduced cost for plant protection

Soybean Yield

Treatment	Soybean yield	Yield change
	tons/ha	tons/ha
Control	2.20	—
Vitazyme	2.42	0.22 (+10%)

• Increase in yield with Vitazyme: 10%

Soybean Income

Parameter	Control	Vitazyme
	---- Vietnamese dollars/ha[2] ----	
Total income	33,000,000	36,420,000
Total expenditures[1]	15,297,000	14,920,000
Net income	17,703,000	21,500,000
Extra profit with Vitazyme	—	3,797,000

[1]Costs for the control soybeans were 6,953 VND/kg of crop; for Vitazyme soybeans, the costs were 6,156 VND/kg of crop.
[2]1 USD = 20,000 VND.

Plant protection chemicals	Applications of sprays for plant protection	
	Control	Vitazyme
Pesticides	5	4.4
Anti-disease products	2	1.6
Herbicides	1	1

• Increase in profit with Vitazyme: 3,797,000 VND/ha ($189.85)

Conclusion: A soybean study in the Mekong Delta of Viet Nam, involving 118 farmers and 70 ha of land, compared two Vitazyme applications to none, and revealed that the yield with this product was increased by 10%. Besides, the number of pesticides and anti-disease products applied with Vitazyme treatments was reduced, further reducing costs. The total returns from Vitazyme application were $189.85/ha (3,797,000 VND/ha) greater than for the control areas.

Soybeans

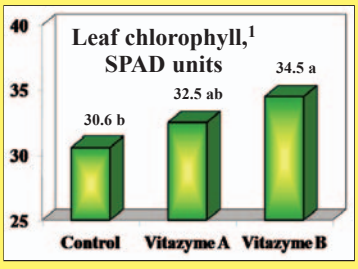
A Greenhouse Study

Researcher: Paul W. Syltie, Ph.D.
Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: common
Pot size: 1 gallon
Soil type: silt loam
Planting rate: 12 seeds/pot, thinned to 3 plants/pot
Planting date: February 14, 2011
Experimental design: A replicated greenhouse pot study was established to evaluate the effects of two Vitazyme formulations on the growth of soybeans. Seven replications were utilized.

1. Control **2. Vitazyme A** **3. Vitazyme B**

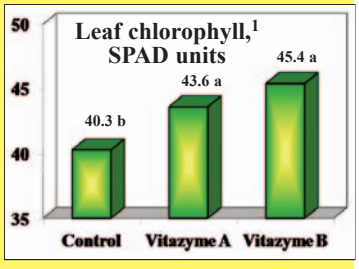
Fertilization: none
Vitazyme application: Vitazyme A: 100 ml/pot at planting of a 0.1% solution, from regular product; Vitazyme B: 100 ml/pot at planting of a 0.1% solution, diluted directly from concentrate
Chlorophyll results: At harvest on March 22, chlorophyll determinations were made on the first fully expanded trifoliate, as well as on the second trifoliate; the values for the same pot were averaged. A Minolta SPAD meter was used.

First Trifoliate



Block P=0.399; Treatment P=0.039*; Model P=0.148; $CV_{0.10}$=7.86%; $LSD_{0.10}$=2.4 units
[1]Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls-Test.

Second Trifoliate



Block P=0.679; Treatment P=0.026*; Model P=0.182; $CV_{0.10}$=7.09%; $LSD_{0.10}$=2.9 units
[1]Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Keuls-Test.

Plant height results: At harvest on March 22, the heights of the three plants for each pot were measured and averaged. No significant differences were detected on plant height for the three treatments.

Dry weight results: On March 22, the soil was washed from the roots of all plants, and they were placed in a drying oven for 24 hours at 120° F. Weights were made to the nearest 0.01 gram. Although the soybean dry weights were not significantly different, both Vitazyme types increased the weight.

Conclusion: A replicated greenhouse trial with regular Vitazyme, as well as Vitazyme diluted directly from concentrate, revealed significant improvements in leaf chlorophyll for both the first and second mature trifoliates, up to 5.1 SPAD units for Vitazyme B. Both Vitazyme A and Vitazyme B increased plant height (2 to 4%) and dry weight (5 to 6%), but not significantly. These results reveal a tendency of both products to increase crop yield by elevating the rate of photosynthesis and nutrient uptake.

Soybean Plant Height

Treatment	Plant height[1]	Height change
	cm	cm
Control	33.9 a	—
Vitazyme A	35.3 a	1.4 (+4%)
Vitazyme B	34.7 a	0.8 (+2%)
Block P	0.288	
Treatment P	0.422	
Model P	0.334	
CV	5.70%	
$LSD_{0.10}$	1.9 cm	

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

Soybean Dry Weight

Treatment	Dry weight[1]	Weight change
	grams	grams
Control	7.69 a	—
Vitazyme A	8.18 a	0.49 (+6%)
Vitazyme B	8.11 a	0.42 (+5%)
Block P	0.714	
Treatment P	0.335	
Model P	0.641	
CV	8.11%	
$LSD_{0.10}$	0.62 gram	

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

Increase in dry weight with Vitazyme
Vitazyme A 6%
Vitazyme B 5%

Soybeans

Soybeans treated with either version of Vitazyme showed an excellent rooting and top growth response, clearly visible here.

Researcher: Paul W. Syltie, Ph.D
Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: Common *Pot size*: 1 gallon *Soil type*: silt loam
Planting rate: 12 seeds/pot, thinned to 3 plants/pot
Planting date: November 12, 2010
Experimental design: A replicated greenhouse pot study was conducted to evaluate the effect of two Vitazyme formulations to increase plant growth. Seven replicates were used.

1. **Control**
2. **Vitazyme A**
3. **Vitazyme B**

Fertilization: none

Vitazyme application: Vitazyme A: 100 ml/pot at planting of a 0.1% solution, for regular product; Vitazyme B: 100 ml/pot at planting of a 0.1% solution, diluted directly from concentrate

Dry weight results: The plant roots were washed clean of soil on December 15, and weighed to the nearest 0.01 gram.

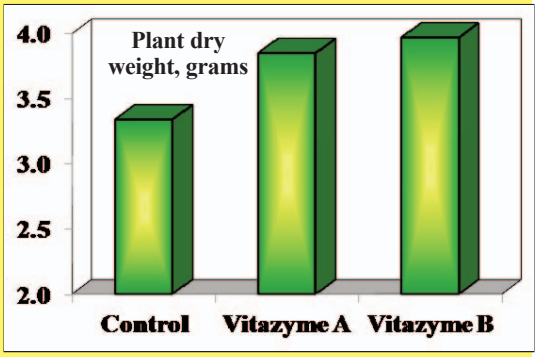
Conclusion: A replicated greenhouse soybean study, using two Vitazyme formulations, revealed that both significantly increased dry weight accumulation over the control treatments, by 15% for Vitazyme A and by 19% for Vitazyme B. The results reveal the excellent effectiveness of both products to improve soybean growth, especially the B formulation that is made directly from concentrate.

- ***Increase in dry weight with Vitazyme A: 15%***
- ***Increase in dry weight with Vitazyme B: 19%***

Soybean Dry Weight

Treatment	Dry weight[1]	Weight change
	grams	grams
Control	3.34 b	—
Vitazyme A	3.85 a	0.51 (+15%)
Vitazyme B	3.97 a	0.63 (+19%)
Treatment P	0.0133*	
Model P	0.0133*	
CV	10.05%	
$LSD_{0.10}$	0.42 gram	

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



Vitazyme is currently being used in many countries around the world, including the Unites States, Canada, Guatemala, Ecuador, Chile, Australia, New Zealand, Philippines, Viet Nam, South Korea, Indonesia, Egypt, South Africa, Kenya. Ukraine, Russia, Switzerland, Slovakia, Turkey, and other nations.

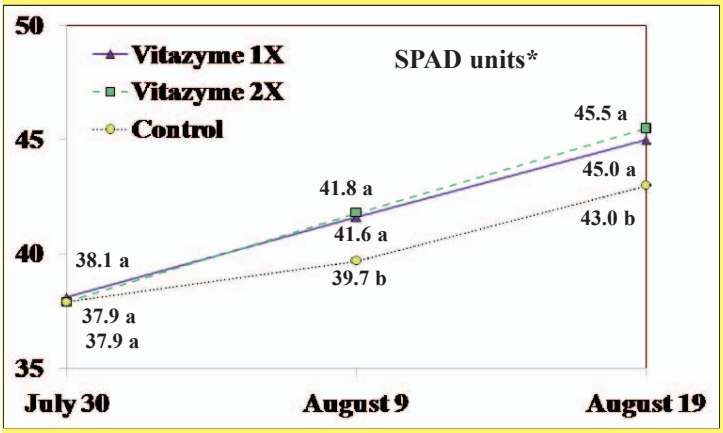
Soybeans

Researcher: Michael Rethwisch, S.J. Boggs, T. Peterson, and B. Whitson
Research organization: University of Nebraska-Lincoln Extension, David City, Nebraska
Location: Waverly, Nebraska *Variety*: Pioneer 93M11 *Planting date*: May 28, 2010
Previous crop: corn *Tillage*: disking once before planting
Soil type: Kennebec silt loam (pH=5.6-7.3, low salinity, high water availability, excellent permeability)
Seeding rate: 133,000 seeds/acre *Row spacing*: 30 inches
Experimental design: A soybean field in eastern Nebraska was divided into plots that were 12 rows wide x 1,100 feet long. Four replications were utilized. Upon those were superimposed several seed and foliar treatment products applied at low rates to enhance crop growth. The responses to these products were evaluated, including leaf chlorophyll, nodes, height, pods, pod distribution on the nodes, yield, moisture of the beans at harvest, and certain other parameters. Some of the products were fungicides. Only the results with Vitazyme are reported here.

1. Control **2. Vitazyme on seeds** **3. Vitazyme on seeds + leaves**

Fertilization: none
Vitazyme application: 13 oz/acre (1 liter/ha) directly over the seed at planting on May 28 for Treatments 2 and 3; 13 oz/acre (1 liter/ha) on the leaves and soil on July 20

Leaf Chlorophyll



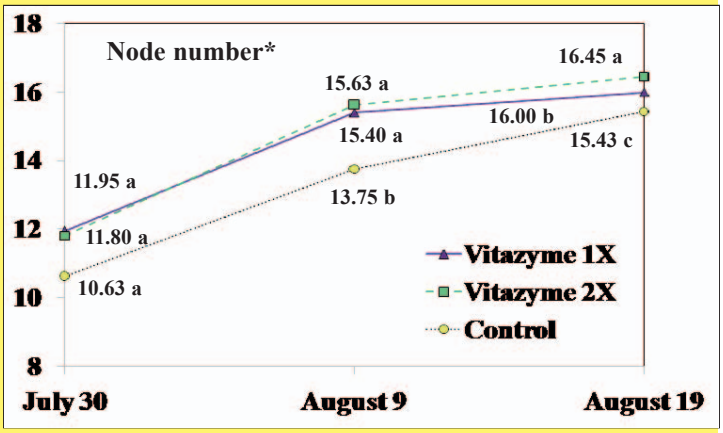
Chlorophyll results: Chlorophyll readings were taken on July 30, August 9, and August 19 using an SPAD 502 meter on 30 leaflets per plot, using leaves from the top node having fully expanded leaves. During the latter part of the growing season Vitazyme significantly increased leaf chlorophyll for both one and two applications.

Trifoliate main stem nodes results: On July 30, August 9, and August 19 the number of nodes on the main stem was counted for each plot, using ten randomly selected plants.
In every case, both Vitazyme treatments significantly increased the number of nodes on the main stems, especially the two applications treatment.

*Means followed by the same letter are not significantly different at P-0.05 according to the Tukey-Kramer HSD Test.

Increase in SPAD units with Vitazyme, August 19
Vitazyme once ..... 2.0 units
Vitazyme twice ..... 2.5 units

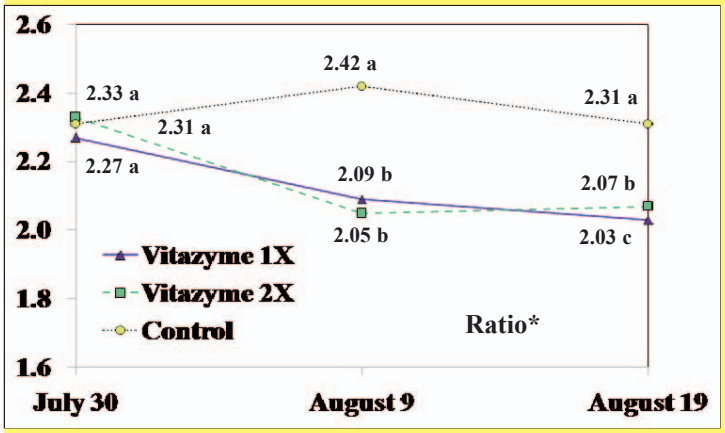
Trifoliate Main Stem Nodes



*Means followed by the same letter are not significantly different at P-0.05 according to the Tukey-Kramer HSD Test.

Increase in main stem nodes with Vitazyme
Vitazyme once ..... 2.0 units
Vitazyme twice ..... 2.5 units

Plant Height:Main Stem Node Ratio



*Means followed by the same letter are not significantly different at P-0.05 according to the Tukey-Kramer HSD Test.

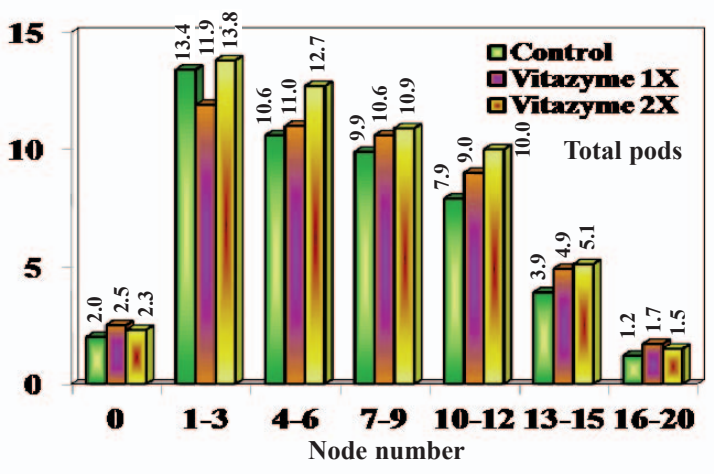
Change in plant height:main stem ratio with Vitazyme
Vitazyme once ..... -0.28 to 0.33
Vitazyme twice ..... -0.24 to 0.37

Plant height:main stem node ratio results: The ration of plant height to the number of nodes on the stem was determined for July 30, August 9, and August 19 on ten randomly selected plants from each plot.
A low ratio of plant height to node number is desirable because a lower number means more nodes per unit height of stem. Both Vitazyme treatments significantly reduced the ratio.

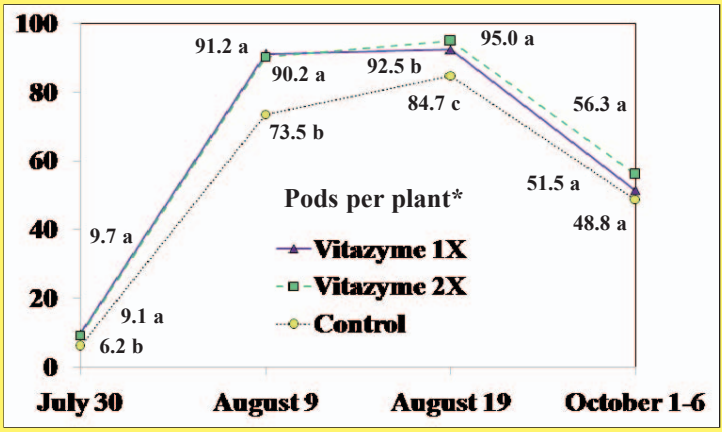
Pods per plant results: The total pods per plant were counted on ten randomly selected plants for each plot on several dates. Vitazyme treatments increased pods per plant significant;y for the first three dates, but not for the last date. Many pods were aborted before harvest, giving a reduction for the October count.

Pod distribution results: At harvest, 15 consecutive plants from one of the middle four rows in each plot were collected, and the number of pods was counted for each main stem node.

Soybean Pod Distribution



Soybean Pods



*Means followed by the same letter are not significantly different at P-0.05 according to the Tukey-Kramer HSD Test.

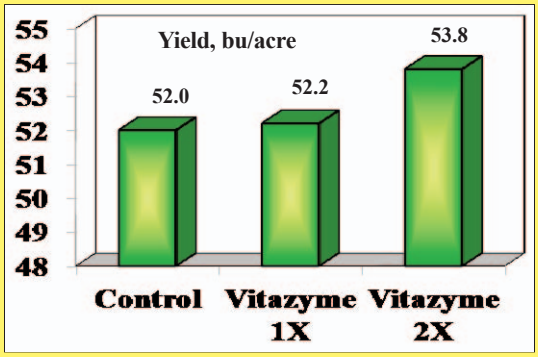
Increase in pods per plant Vitazyme
Vitazyme once ..... 6 to 56%
Vitazyme twice ..... 15 to 47%

At most nodes, both Vitazyme treatments – especially the two application treatment – increased pods per node. None of the values were significantly different than the untreated control.

Yield results: Vitazyme treatments increased yield slightly, especially for the two applications, but these increases were not significant at P=0.05.

Conclusions: A replicated soybean study in eastern Nebraska revealed that Vitazyme, as either a seed or a seed plus foliar treatment, significantly improved leaf chlorophyll (2.o to 2.5 SPAD units), main stem nodes (4 to 14%), plant height;main stem node ratios (-0.24 to -0.37), and pods per plant (6 to 56%). Both treatments – especially the seed plus foliar treatment – increased the pods distributed along the stem, and slightly increased yield and reduced moisture at harvest. The lack of a significant yield response is likely due to a lack of adequate soil fertility to fill the pods that were available to fill as the season progressed. These results show the utility of Vitazyme as a powerful tool for soybean producers in the Corn Belt of the United States.

Soybean Yield



Soybeans

Effects on Oil Content

The Vitazyme treated soybeans display larger, more aggressive plants with greater yield potential. The beans also contain more oil.

Researcher: Michael Rethwisch *Research organization*: University of Nebraska — Lincoln Extension, David City, Nebraska

Location: Clay Center, Cortland, Bancroft, and Elba, Nebraska

Variety: Pioneer 93M11

Experimental design: Four soybean field locations in Nebraska were selected to place replicated trials using several products. These products included inoculants, humates, fertilizers, and non-microbial biostimulants, of which Vitazyme was one. Evaluations were made of yield, protein, and oil to determine effects of these products on economically important parameters.

Product applications: All products were applied according to the manufacturers' recommendation, with Vitazyme applied at 13 oz/acre (1 liter/ha) at planting using a "splitter" (products were placed beside the seeds). An untreated control was included at all four sites.

Yield results: For all four sites, yield did not vary significantly, ranging from 64.3 to 71.9 bu/acre at Clay Center, from 66.5 to 70.1 bu/acre at Cortland, from 59.9 to 62.2 bu/acre at Bancroft, and from 68.1 to 71.7 bu/acre at Elba.

Continued on the next page

Protein results: The protein content of the soybeans showed no significant difference amongst all treatments at all four locations, ranging from 34.07 to 34.53% at Clay Center, from 35.19 to 35.53% at Cortland, from 32.83 to 33.35% at Bancroft, and from 34.03 to 34.28% at Elba.

Oil results: At all four sites the Vitazyme treated soybeans produced the highest oil content, although none of the differences among treatments were significant at P=0.05. Because of this consistency of response, the data are presented here.

Clay Center

Treatment	Oil content, %
Vitazyme	**19.35**
CALFA	19.34
Carbon Boost-S	19.33
CMPX	19.31
GreenSol 48	19.31
BioGerminator 11-0-1	19.30
BioGerminator 3-0-1	19.27
Control	19.24
GS-48	19.12
CXMPX	19.11

Cortland

Treatment	Oil content, %
Vitazyme	**19.36**
CALFA	19.24
Carbon Boost-S	19.23
CMPX	19.21
GreenSol 48	19.18
BioGerminator 11-0-1	19.18
BioGerminator 3-0-1	19.11
Control	19.11
GS-48	19.08
CXMPX	19.01

Bancroft

Treatment	Oil content, %
Vitazyme	**19.71**
CALFA	19.70
Carbon Boost-S	19.69
CMPX	19.63
GreenSol 48	19.61
BioGerminator 11-0-1	19.60
BioGerminator 3-0-1	19.60
Control	19.59
GS-48	19.58
CXMPX	19.46

Conclusions: It is clear from the total averages from all four locations that Vitazyme had a real effect on soybean oil content. The product boosted content by 0.09 percentage point above the next closest oil value, while the other nine treatments varied within a range of only 0.10 percentage point. This product elicited a small but consistent boost in bean oil content in this four-location Nebraska soybean study.

Elba

Treatment	Oil content, %
Vitazyme	**20.03**
CALFA	19.99
Carbon Boost-S	19.98
CMPX	19.97
GreenSol 48	19.94
BioGerminator 11-0-1	19.93
BioGerminator 3-0-1	19.91
Control	19.90
GS-48	19.90
CXMPX	19.87

Average for All Locations

Treatment	Oil content, %
Vitazyme	**19.62**
CALFA	19.53
Carbon Boost-S	19.53
CMPX	19.52
GreenSol 48	19.50
BioGerminator 11-0-1	19.50
BioGerminator 3-0-1	19.46
Control	19.46
GS-48	19.46
CXMPX	19.43

Soybeans

An Evaluation of Two Formulations

Both Vitazyme formulations produced bigger plants having larger leaves, more leaf area, and more vigorous root systems.

Researcher: Bert Schou, Ph.D.

Research organization: Agricultural Custom Research and Education Services (ACRES) *Location*: Cedar Falls, Iowa

Variety: NuTech 7249 (GMO)

Soil type: Floyd loam (42% sand, 39% silt, 19% clay, 4.4% organic matter, pH = 6.4, C.E.C. = 13.3 meq/100 g, fertility level = excellent, drainage = excellent)

Planting depth: 2 inches *Row spacing*: 30 inches

Planting rate: 150,000 seeds/acre *Seedbed at planting*: fine

Planting date: May 19, 2011 *Tillage*: conventional

Plot size: 15 x 40 feet (600 ft.^{2})

Experimental design: A small plot study, having six replicates, involved two Vitazyme formulations in a randomized complete block design. The purpose of the study was to evaluate the effectiveness of the two Vitazyme formulations on crop yield and quality.

1. **Control**
2. **Vitazyme A**
3. **Vitazyme B**

Fertilization: none

Weed control: herbicides

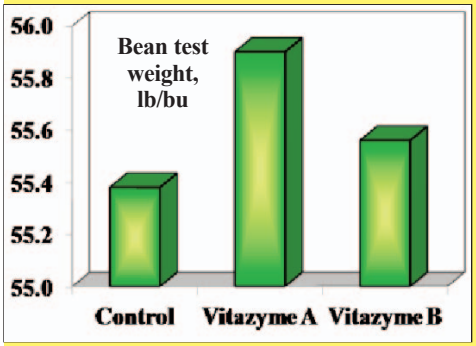
Vitazyme application: (1) 13 oz/acre (1 liter/ha) in the seed row at planting on May 19, 2011; (2) 13 oz/acre (1 liter/ha) on the leaves and soil at R1 (14 inches height) on July 7, 2011

Weather during the growing season: The season was favorable for soybean growth in terms of temperature and rainfall, despite a dry early July.

Harvest date: October 8, 2011. A Massey Ferguson 8 plot combine harvested the middle two rows of plots, and the beans were weighed using an electronic scale.

Test weight results: There were some differences in test weight for the treatments. Vitazyme A significantly increased bean test weight above the control, while Vitazyme B gave a nonsignificant test weight increase.
Yield results: Neither of the products significantly increased yield, although Vitazyme B gave a 1.4 bu/acre yield increase.

Soybean Test Weight



Treatment	Test weight[1]	Test weight change
	lb/bu	lb/bu
1. Control	55.38 b	—
2. Vitazyme A	55.90 a	0.52 (+1%)
3. Vitazyme B	55.56 ab	0.18 (0%)
$LSD_{0.05}$	0.50 lb/bu	
Standard deviation	0.39 lb/bu	
Replicate F	1.54	
Treatment F	2.71	
CV	2.77	

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

Soybean Yield

Treatment	Soybean yield[1]	Yield change
	bu/acre	bu/acre
1. Control	63.9 a	—
2. Vitazyme A	63.4 a	(-) 0.5 (0%)
3. Vitazyme B	65.2 a	1.3 (+2%)
$LSD_{0.05}$	2.3 bu/acre	
Standard deviation	1.8 bu/acre	
Replicate F	3.64	
Treatment F	1.68	
CV	2.77%	

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

Conclusion: A replicated soybean study in east-central Iowa revealed that two Vitazyme formulations improved bean test weight, the Vitazyme A formulation significantly, above the control. Yield increases were not significant, though Vitazyme B improved yield by 1.3 bu/acre over the control. Very high yields during this favorable cropping year may indicate reduced crop stress, thus limiting the crop's response as yields approached the maximum.

Soybeans

A Long-Term Crop and Soil Study: Year 4

Researcher: Bert Schou, Ph.D.
Research Organization: Agricultural Custom Research and Education Services (ACRES)
Location: Cedar Falls, Iowa *Variety*: Nu Tech 7244
Soil type: Kenyon loam (34% sand, 46% silt, 20% clay, 4.5% organic matter, pH = 7.3, C.E.C = 17.8 meq/100 g, fertility level = excellent, drainage = excellent) *Planting depth*: 2 inches
Planting rate: 150,000 seeds/acre *Row spacing*: 30 inches
Plot size: 15 x 50 feet (600 ft^2)
Seedbed at planting: fine
Planting date: May 19, 2011
Tillage: conventional
Previous crop: corn (with glyphosate)
Experimental design: The fourth year of research on the long-term effects of Vitazyme on crop yield and quality, and on soil conditions, was conducted on the same plots as the previous three years. Two treatments were utilized, as during previous years, and with five replicates.

1. Control **2. Vitazyme**

Responses to Vitazyme were noted right to the treated row, as can be seen in this photo. Note especially the darker green color on the right.

Fertilization: none
Weed control: glyphosate
Vitazyme application: (1) 13 oz/acre (1 liter/ha) on the seeds in-furrow at planting (May 19); (2) 13 oz/acre (1 liter/ha) on the leaves and soil at R1 (July 7)
Weather during the growing season: The season was favorable to soybean growth in terms of temperature and rainfall, except for a dry early July.
Harvest date: October 8, 2011. A Massey-Ferguson 8 plot combine was used to harvest the three center rows of each plot; the beans were weighed electronically, and grain moisture was also measured at this time.

Leaf Chlorophyll

Treatment	Leaf chlorophyll[1]	Chlorophyll change
	SPAD units	SPAD units
1. Control	39.2 b	—
2. Vitazyme	40.6 a	+1.4

[1]Means followed by the same letter are not significantly different at P=0.05 according to the Student-Newman-Kuels Test. $LSD_{0.05}$=0.7 SPAD unit.

Leaf chlorophyll: On July 26, 2011, 25 random leaves of the first mature trifoliated were measured, and averaged for each plot using a Minolta SPAD meter.

- ***Increase in leaf chlorophyll with Vitazyme: 1.4 SPAD units***

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Bean test weight: There was a nonsignificant increase in test weight with Vitazyme versus the control, of 0.14 lb/bu (55.43 lb/bu for Vitazyme, versus 55.29 lb/bu for the control).

Yield results: The yield increase with Vitazyme was not significant at P=0.05, but was highly profitable, At $12.00/bu, this 1.85 bu/acre increase was worth $22.08/acre

• Increase in yield with Vitazyme: 2%

Grain quality results: Samples of soybeans from each plot was sent to Midwest Laboratories, Omaha, Nebraska, for analyses of protein and minerals. Statistical analyses were conducted on these data.

All parameters, except phosphorus and protein, increased in the beans from Vitazyme application. Increases were not always large or significant, but they were positive.

Soybean Yield

Treatment	Bean yield[1]	Yield change
	bu/acre	bu/acre
1. Control	59.08 a	—
2. Vitazyme	60.92 a	1.84 (+2%)
LSD (P=0.05)	3.75 bu/acre	
Standard deviation	2.13 bu/acre	
CV	3.56%	
Replicate F	10.388	
Treatment F	1.860	

[1]Means followed by the same letter are not significantly different according to the Student-Newman-Kuels Test (P=0.05).

Soybean Quality

Treatment	Crude protein	Sulfur	Phosphorus	Potassium	Magnesium	Calcium	Iron	Manganese	Copper	Zinc
	%	%	%	%	%	%	ppm	ppm	ppm	ppm
1. Control	42.08	0.30	0.602	1.96	0.266	0.332	85.6	34.4 b	11.6	33.8 b
2. Vitazyme	42.34	0.31	0.602	2.01	0.268	0.338	92.2	36.6 a	12.6	35.0 a
Treatment F		0.374			0.374		0.135	0.011*		0.109*
$LSD_{0.10}$		0.01			0.004		7.5	1.0		1.2

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

Soil microorganism results: A composite soil sample from each rep of both treatments was collected and sent to the Soil Food Web laboratory in Corvallis, Oregon, for microorganism analyses. Vitazyme increased the number of fungi, bacteria, actinomycetes, and protozoa in the soil versus the untreated control. The ratio of total fungi to total bacteria was 0.17 for the control, and 0.12 for the Vitazyme treatment, showing a preference to soil fungi with Vitazyme, a beneficial trait. Available nitrogen production by soil microorganisms was increased by 42% by Vitazyme treatment as well.

Nutrient increases with Vitazyme

Crude protein 0.26%-pt
Sulfur 0.01%-pt
Potassium 0.05%-pt
Magnesium 0.002%-pt
Calcium 0.006%-pt
Iron ..... 6.6 ppm
Manganese ..... 2.2 ppm
Copper ..... 1.0 ppm
Zinc ..... 1.2 ppm

Soil Microorganisms

Treatment	Active Bacteria	Total Bacteria	Active Fungi	Total Fungi	Amoebic Protozoa	Nematodes	Nitrogen Release	Actinomycetes
	µg/gram	µg/gram	µg/gram	µg/gram	µg/gram	number/gram	lb/acre	µg/gram
1. Control	8.31	1,762	11.2	304	7,376	7.23	88	2.94
2. Vitazyme	11.90	3,166	14.5	372	34,657	18.30	125	4.30

Soil results: Soil samples from each plot of both treatments were sent to Perry Agricultural Laboratory in Bowling Green, Missouri, for a broad analysis of minerals and other parameters. Statistical analyses were conducted on these data. Note that most soil parameters were improved with Vitazyme, and significantly for pH and magnesium. Even sodium, which is undesirable at higher levels, was reduced in this study while calcium, magnesium, and potassium were increased.

Improvements in microbial populations with Vitazyme

Active bacteria ..... +43%
Total bacteria ..... +80%
Active fungi ..... +29%
Total fungi ..... +22%
Amoebic protozoa ... +370%
Nematodes ..... +153%
Nitrogen release ..... +37 lb/acre
Actinomycetes..... +46%

[1]Most of these nematodes are beneficial types

Soil Parameters

Treatment	Cation Exchange Capacity	pH	Organic Matter	Nitrogen	Sulfur	Phosphorus	Calcium	Magnesium
	meq/100 grams		%	lb/acre	ppm	lb/acre	lb	lb/acre
1. Control	27.34	5.64 b	2.68	73.6	7.8	128.4	5,398	1,077 b
2. Vitazyme	26.27	5.78 a	2.68	73.6	6.4	147.4	5,447	1,138 a
Treatment F	0.1215	0.0046**	1.000	1.000	0.431	0.452	0.575	0.015*
$LSD_{0.10}$	1.16	0.05	0.26	5.2	3.4	48.7	172.6	172.6

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

Treatment	Potassium	Sodium	Boron	Iron	Manganese	Copper	Zinc
	lb/acre	lb/acre	ppm	ppm	ppm	ppm	ppm
1. Control	272	80	0.65	241.2	57.4	0.94	4.60
2. Vitazyme	312	62	0.67	222.8	58.0	0.94	4.54
Treatment F	0.215	0.228	0.918	0.103	0.816	1.000	0.529
$LSD_{0.10}$	58	27	0.23	18.6	5.2	0.15	0.19

Changes in soil parameters with Vitazyme

pH ..... +0.14*
Organic matter ..... no change
Nitrogen ..... no change
Sulfur ..... -1.4 ppm
Phosphorus ..... +19.0 lb/acre
Calcium ..... +49 lb/acre
Magnesium ..... +61 lb/acre
Cation exchange capacity .... -1.07 meq/100g

Potassium ..... +40 lb/acre
Sodium ..... -18 lb/acre
Boron ..... +0.02 ppm
Iron ..... -18.4 ppm
Manganese ..... +0.6 ppm
Copper ..... no change
Zinc ..... -0.06 ppm

Balance of Soil Cations

Vitazyme had a remarkable effect on the percentages of base saturation for all of the measured cations, moving the composition of the soil colloid towards a more favorable balance.

Treatment	Calcium Saturation	Magnesium Saturation	Potassium Saturation	Sodium Saturation	Hydrogen Saturation
	% B.S.	% B.S.	% B.S.	% B.S.	% B.S.
1. Control	49.64 b	16.51 b	1.29 b	0.64	25.8 a
2. Vitazyme	52.25 a	18.22 a	1.57 a	0.52	21.6 b
Treatment F	0.013*	0.002**	0.090*	0.294	0.005**
$LSD_{0.10}$	1.31	0.51	0.27	0.21	1.57

B.S. = base saturation
*Means followed by the same letter are not significantly different at P=0.10 according to the Student-Newman-Kuels Test.

Control base saturations
Ca 49.6
Mg 16.5
K 1.3
Na 0.6
H 25.8

Vitazyme base saturations
Ca 52.3
Mg 18.2
K 1.6
Na 0.5
H 21.6

All of the elements moved in favorable directions with Vitazyme compared to the control, after four years of treatment. Calcium, magnesium, and potassium increased, while sodium and hydrogen decreased, thus providing better nutrient availability to plants, as mediated by the added microbial stimulation of Vitazyme's active agents. This microbe evidence is available for this year and previous years as well.

Conclusion: The fourth year of a long-term study into the effects of Vitazyme on crop yield (corn-soybean rotation), crop quality, and soil characteristics has shown that this product continues to favorably affect the yields and quality of the crop, and also improves soil parameters. Soybeans were grown in 2011, following corn in 2010, and the following results were obtained.

Leaf chlorophyll. Vitazyme significantly improved leaf chlorophyll in a midsummer evaluation, by 1.4 SPAD units.
Bean moisture at harvest. The treated soybeans were slightly dryer at harvest then were the untreated beans.
Bean yield. Vitazyme increased the yield above the control by 1.84 bu/acre (2%), which was not significant but was highly profitable.
Bean composition. Nearly all minerals and protein were increased in the beans with Vitazyme treatment – especially manganese and zinc, which responded significantly at P=0.10 – and only phosphorus did not respond at all.
Soil microorganisms. Both active and total bacteria and fungi increased above the control with Vitazyme (22 to 80%), but especially the fungi, leading to a lower fungi;bacteria ratio, a favorable result. Protozoa, beneficial nematodes, and actinomycetes also increased with Vitazyme, and projected nitrogen release rose by 37 lb/acre.
Soil parameters. After four years of treatment, the Vitazyme treated soils showed consistent improvements in availability of most elements – except sulfur, iron, copper, and zinc, and sodium, which declined – although soil organic matter and available nitrogen showed no change from the control; magnesium increased significantly at P=0.01. Soil pH increased significantly to 5.78 with Vitazyme. Of special interest is the fact that the cations all significantly moved towards a more favorable balance in terms percent base saturation, sodium declining at the same time.

These results show the considerable benefit of Vitazyme for soybeans and for soil characteristics over a long-term use program on highly fertile Iowa soils.

Sugar Beets

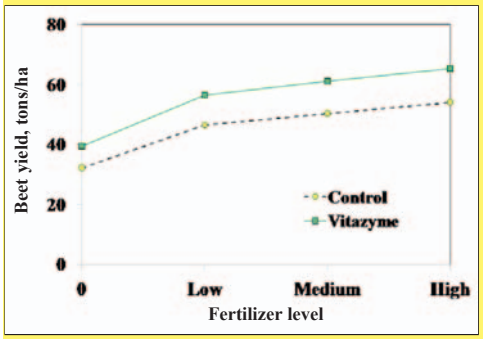
Researcher: Unknown *Location*: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station, Vinnytsia, Ukraine (Central Forest and Steppe Region) *Variety*: Leonora
Soil type: gray podzolic (organic matter = 2.2%, hydrolyzed N = 8.4 mg/100 g soil, P = 15.8 mg/100 g soil, exchangeable K = 12.4 mg/100 g soil, pH = 5.5)
Experimental design: A plot area of about 1 ha was planted to sugar beets, and a trial with four replicates using one Vitazyme treatment and four levels of fertilization was placed upon it. The objective of the test was to evaluate the effect of Vitazyme and fertilizer level on the yield of sugar for the beets.

1. No fertilizer, no Vitazyme
2. No fertilizer, plus Vitazyme
3. Low fertilizer, no Vitazyme
4. Low fertilizer, plus Vitazyme
5. Medium fertilizer, no Vitazyme
6. Medium fertilizer, plus Vitazyme
7. High fertilizer, no Vitazyme
8. High fertilizer, plus Vitazyme

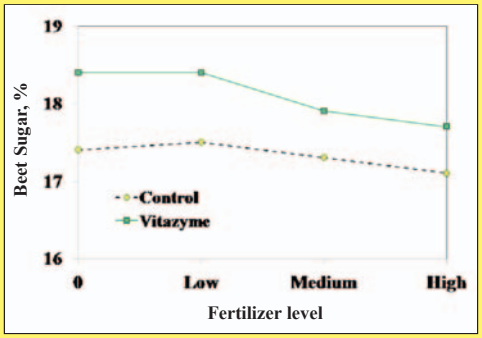
Fertilization: Phosphorus and potassium were applied in the fall during the main tillage operation, and nitrogen was spring applied, and incorporated before planting.
Treatments 3 and 4: 80-60-80 kg/ha N-P_2O_5-K_2O
Treatments 5 and 6: 120-90-120 kg/ha N-P_2O_5-K_2O
Treatments 7 and 8: 160-120-160 kg/ha N-P_2O_5-K_2O
Vitazyme application: 1 liter/ha sprayed on the leaves and soil (1) June 21, 2011, and (2) July 10, 2011
Sugar and beet yield results:

Treatment	Beet yield	Change	Sugar content	Change	Sugar yield	Change
	tons/ha	tons/ha	%	%-points	tons/ha	tons/ha
1. No fert, no Vita	32.3	—	17.4	—	5.6	—
2. No fert, + Vita	39.5	7.2 (+22%)	18.4	+1.0	7.3	1.7 (+30%)
3. Low fert, no Vita	46.5	—	17.5	—	8.1	—
4. Low fert, + Vita	56.5	10.0 (+22%)	18.4	+0.9	10.4	2.3 (+28%)
5. Medium fert, no Vita	50.4	—	17.3	—	8.7	—
6. Medium fert, + Vita	61.1	10.7 (+21%)	17.9	+0.6	10.9	2.2 (+25%)
7. High fert, no Vita	54.1	—	17.1	—	9.2	—
8. High fert, + Vita	65.3	11.2 (+21%)	17.7	+0.6	11.6	2.4 (+26%)

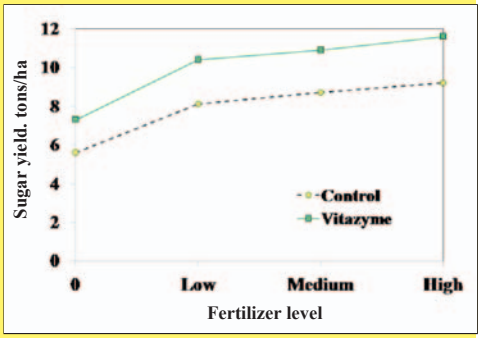
Beet Yield



Sugar Content



Sugar Yield



Vitazyme gave uniform increases in yield (21 to 22%) at all four fertility levels, and also increased sugar content of the beets (by 0.6 to 1 percentage point) despite higher yields, though sugar content increased a bit less as the fertilizer levels and yields increased. Final sugar yield for all four fertilizer levels was markedly improved by Vitazyme (25 to 30%).
Income results: Profits with Vitazyme were improved markedly at all four fertilizer levels, from 3,280 hrn/ha for none added, to 4,680 hrn/ha at the low level, to 5,030 hrn/ha for the medium level, and to 5,280 hrn/ha for the high fertilizer level.
Conclusion: This sugar study in Ukraine, using four fertilizer levels and one Vitazyme regime (1 liter/ha applied twice to the leaves and soil), showed that beet and sugar yields were markedly and uniformly improved at all fertilizer levels. Besides, the sugar content of the beets was increased by 0.6 percentage point or more, the increase decreasing slightly as the fertilizer rate increased. These results are summarized below.
The Vitazyme program is shown to be an excellent practice to incorporate into sugar beet production in Ukraine.

Increases with Vitazyme

	No fert	*Low fert*	*Medium fert*	*High fert*
Beet Yield	***22%***	***22%***	***21%***	***21%***
Sugar content	***1.0 %-pt***	***0.9 %-pt***	***0.6 %-pt***	***0.6 %-pt***
Sugar yield	***30%***	***28%***	***25%***	***26%***
Profit	***3,280 hrn/ha***	***4,680 hrn/ha***	***5,030 hrn/ha***	***5,280 hrn/ha***

Sugar Beets

Three-Year Averages with Four Fertilizer Levels

Researcher: V.V. Plotnikov
Location: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station, Vinnytsia, Ukraine (Central Forest and Steppe Region)

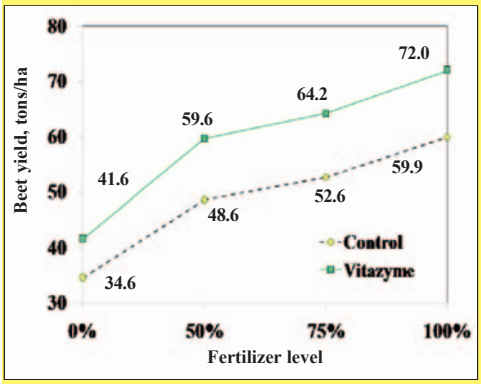
	Fertilizer			
Treatment	**N**	**P_2O_5**	**K_2O**	**Vitazyme[1]**
		kg/ha		liter/ha
1. No Vita + 0% fert.	0	0	0	0
2. Vita + 0% fert.	0	0	0	1+1
3. No Vita + 50% fert.	80	60	80	0
4. Vita + 50% fert.	80	60	80	1+1
5. No Vita + 75% fert.	120	90	120	0
6. Vita + 75% fert.	120	90	120	1+1
7. No Vita + 100% fert.	160	120	160	0
8. Vita + 100% fert.	160	120	160	1+1

[1]Applied at 1 liter/ha twice, in mid-June and early July.

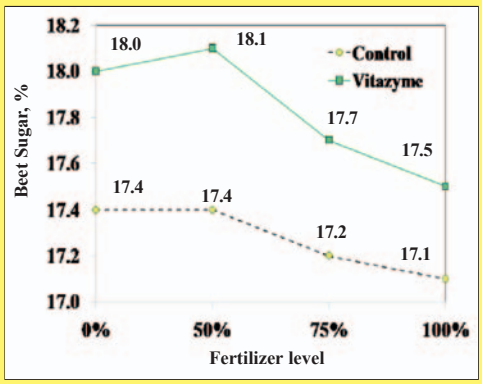
Note how both the roots and tops of these Ukrainian sugar beets are much bigger with Vitazyme. Sugar increases for all N levels for three yeras were 24 to 27%.

Average Values Over Three Years 2009 to 2011

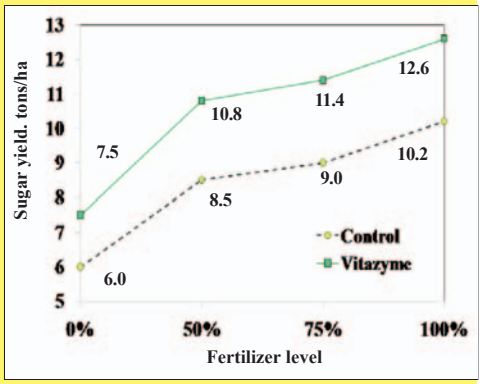
Beet Yield



Sugar Content



Sugar Yield



Increase in beet yield with Vitazyme

No fert ..... +20%
50% fert ..... +23%
75% fert ..... +22%
100% fert ..... +20%

Increase in beet sugar with Vitazyme

No fert ..... +0.6 percentage point
50% fert ..... +0.7 percentage point
75% fert ..... +0.5 percentage point
100% fert ..... +0.4 percentage point

Increase in sugar yield with Vitazyme

No fert ..... +25%
50% fert ..... +27%
75% fert ..... +27%
100% fert ..... +24%

Increased income with Vitazyme

No fert ..... +3,180 hrn/ha
50% fert ..... +5,180 hrn/ha
75% fert ..... +5,480 hrn/ha
100% fert ..... +5,730 hrn/ha

Conclusion: Three years of sugar beet trials in Ukraine have revealed that two applications of 1.0 liter/ha greatly increased yield, sugar content, and sugar yield at each of four fertilizer levels. The extra income at the four levels ranged from 3,180 to 5,730 hrn/ha. These results prove the great efficacy of this program for sugar beet production in Ukraine.

Sugar Beets

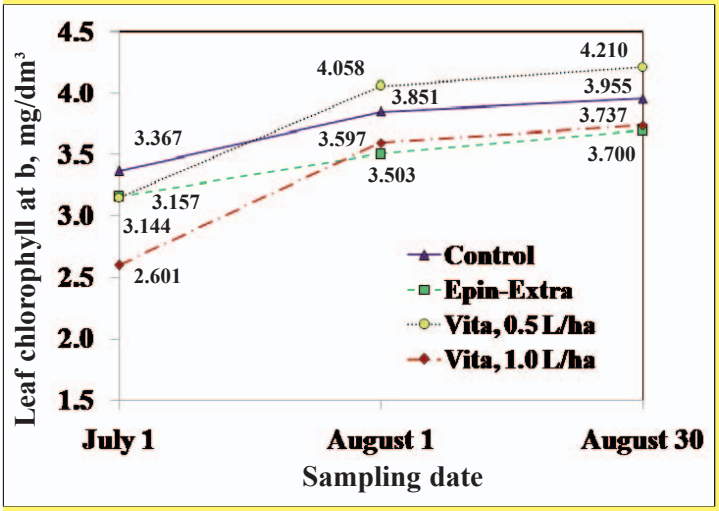
Researcher: V.D. Strelkov, Ph.D., and D.Y. Nazarenko *Research organization*: State Research Institution, All-Russian Research Institute of Biological Plant Protection, Russian Agricultural Academy
Location: Russia *Variety*: Leopard *Previous crop*: winter wheat
Planting rate: 6 to 7 seeds/meter *Planting depth*: 3 to 4 cm *Planting date*: April 25, 2011

Experimental design: A sugar beet test area of 100 m^2 was divided into four replicates with four treatments: a control, a standard stimulant product (Epin-Extra), and two Vitazyme treatments. The objective of the study was to measure the effects of these products on the growth, yield, and sugar production of the beets.

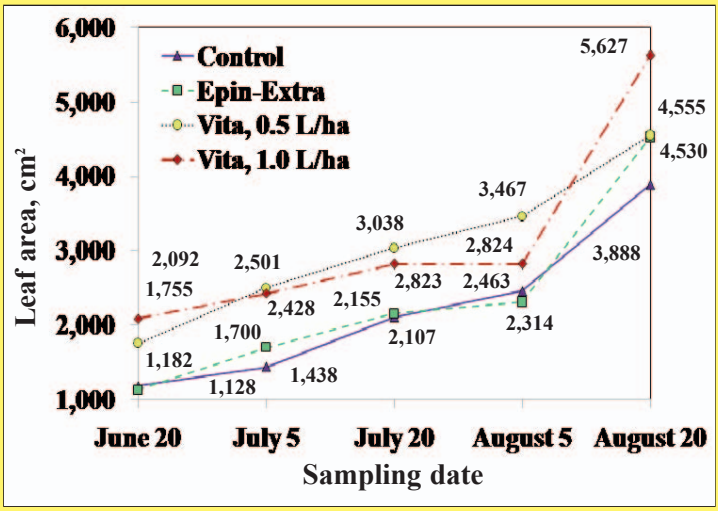
Treatment	Seed treatment	2-4 leaves	6-8 leaves
1. Control	0	0	0
2. Epin-Extra	0.012 L/ton	0.1 L/ha	0
3. Vitazyme	0	0.5 L/ha	0.5 L/ha
4. Vitazyme	0	1.0 L/ha	1.0 L/ha

Fertilization: 120 kg/ha N, 120 kg/ha P_2O_5, and 120 kg/ha K_2O dry fertilizer in September of 2010
Vitazyme application: either 0.5 or 1.0 liter/ha sprayed on the leaves and soil with 300 liters/ha of water (see the table) at 2 to 4 leaves on May 30, and at 6 to 8 leaves on June 9, 2011
Epin-Extra application: 0.012 liter in 10 liters of water applied to 1 ton of seed on April 25, 2011; 0.1 liter/ha in 300 liters/ha at 2 to 4 leaves on May 30, 2011
Weed control: Vector (1liter/ha) + Caribou (30 g/ha) + Lontrel (100 g/ha) at the second leaf pair; 30 days later, Fusilad Forte at 1 liter/ha
Leaf chlorophyll: The highest chlorophyll levels of the leaves as the season progressed were with the 0.5 liter/ha Vitazyme treatment. The was followed by the control, and then the 1.0 liter/ha Vitazyme treatment. The Epin-Extra values were lowest.
Leaf area results: On five days during the growing season – June 20, July 5 and 20, and August 5 and 20 – the leaf area was measured using an AAC-100 meter. Both Vitazyme treatments caused the greatest leaf areas of the four treatments.

Leaf Chlorophyll



Leaf Area



- ***Highest leaf chlorophyll density: Vitazyme at 0.5 liter/ha***

Increase in leaf area with Vitazyme (August 20)

0.5 liter/ha ..... +17%
1.0 liter/ha ..... +45%

Yield results: The beets were harvest on August 30 by hand. Plant density at this time was 93,000 plants/ha.

Soil Parameters

Treatment	Tuber weight	Weight change	Tuber yield	Yield change	Beet sugar	Sugar change	Sugar yield	Yield change
	kg	kg	centners/ha	centners/ha	%	% point	centners/ha	centners/ha
1. Control	0.56	—	520.8 c	—	16.2 c	—	84.4 c	—
2. Epin-Extra	0.65	0.09 (+16%)	604.5 b	83.7 (+16%)	16.6 c	+0.4	100.3 b	15.9 (+19%)
3. Vitazyme, 0.5 L/ha	0.68	0.12 (+21%)	632.4 a	111.6 (+21%)	17.4 b	+1.2	110.0 a	25.6 (+30%)
4. Vitazyme, 1.0 L/ha	0.64	0.08 (+14%)	595.2 b	74.4 (+14%)	18.4 a	+2.2	109.5 a	25.1 (+30%)
$HCP_{0.05}$			17.0		0.6			

Conclusion: This sugar beet trial in Russia revealed that Vitazyme, especially at 0.5 liter/ha applied twice, but also the 1.0 liter/ha rate, greatly improved weight (14 to 21%), root yield (14 to 21%), sugar content of the roots (1.2 to 2.2%-points), and total sugar yield (30%). These improvements were a reflection of a greater leaf area to photosynthesize and fix carbon, as

well as improvements in the chlorophyll content of the leaf tissue as measured by a meter. The usual seed and foliar treatment, Epin-Extra, increased all growth and yield parameters but resulted in a much smaller sugar increase than did either Vitazyme treatment.

Increase in tuber weight with Vitazyme	Increase in tuber yield with Vitazyme	Increase in sugar content with Vitazyme	Increase in sugar yield with Vitazyme
0.5 liter/ha 21%	0.5 liter/ha 21%	0.5 liter/ha 1.2%-pts	0.5 liter/ha 30%
1.0 liter/ha 14%	1.0 liter/ha 14%	1.0 liter/ha 2.2%-pts	1.0 liter/ha 30%

Sugar Beets

Researcher: James Anderson
Farmer: Bob, Brian, and Matt Huhnerkoch
Location: Belview, Minnesota
Variety: Crystal 265
Soil type: clay loam
Previous crop: corn
Experimental design: A sugar beet field was divided into a Vitazyme treated and untreated portion to evaluate the effects of the product on sugar beet yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 13 oz/acre (1 liter/ha) applied after planting, and half ways through the growing season
Weed control: glyphosate
Weather for 2010: very wet all season
Chlorophyll results: On July 26, 2010, 30 random leaves from each treatment were measured for chlorophyll using a Minolta SPAD Meter; the values were then averaged for each treatment.

• Increase in leaf chlorophyll with Vitazyme: +5.2 SPAD units

In this Minnesota sugar beet trial, the response to Vitazyme was a highly profitable 8%. At midseason, leaf chlorophyll was 5.2 SPAD units higher!

Disease susceptibility: **Vitazyme reduced the succeptibility of the roots the beet rot.**
Yield results: see table at right

• Increase in yield with Vitazyme: 8%

Conclusion: An on-farm sugar beet trial in southern Minnesota in 2010 revealed that Vitazyme increased sugar beet growth, disease resistance, and yield. The 1.8 tons/acre yield increase represented an 8% boost in yield, resulting from considerably more leaf area and chlorophyll (+5.2 SPAD units), showing this program to be highly productive for sugar beet growers in Minnesota.

Leaf Chlorophyll

Treatment	Leaf chlorophyll	Change
	SPAD units	
Control	39.7	—
Vitazyme	44.9	+5.2

Sugar Beet Yield

Treatment	Beet yield	Yield change
	tons/acre	
Control	23.9	—
Vitazyme	25.7	+1.8 (+8%)

Sunflowers

Researcher: Unknown
Research organization: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station
Location: Vinnytsia, Ukraine (Central Forest and Steppe Region)
Variety: MAS-91A
Planting date: unknown
Soil type: gray podzolic (organic matter = 2.2%, hydrolyzed N = 8.4 mg/100 g soil, P = 15.8 mg/100g soil, exchangeable K = 12.4 mg/100 g soil, pH = 5.5)
Experimental design: Sunflower plots were prepared and treated with Vitazyme to evaluate the effect of the product on sunflower seed yield and profitability.

1. Control **2. Vitazyme on leaves**

Vitazyme applications: 1 liter/ha on the leaves at head formation on June 16, 2011
Yield results: see table at right
Income results: Income increase with a Vitazyme treatment: +1,376 hrn/ha

Sunflower Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	2.82	—
Vitazyme	3.30	0.48 (+17%)

• Increase in yield with Vitazyme foliar treatment: 17%

Conclusion: This replicated sunflower trial in Vinnytsia, Ukraine, in 2011 revealed that Vitazyme improved yield by 17%, while income increased by 1,376 hrn/ha. These results mirror the sunflower data from previous years, and show how effective this program is for Ukrainian agriculture.

Sunflowers

Average Values for 2009 to 2011 in Ukraine

Researcher: V.V. Plotnikov *Location*: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station, Vinnytsia, Ukraine (Central Forest and Steppe Region)

Demonstration plot values averaged over three years, 2009 to 2011

Sunflower Yield

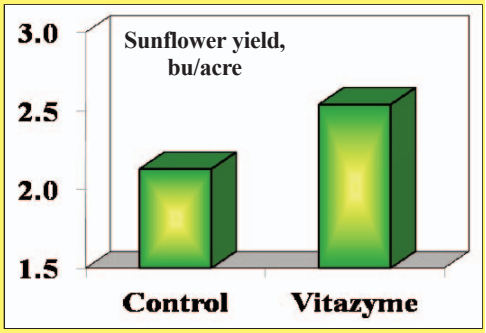
Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	2.13	—
2. Vitazyme at head formation[1]	2.54	0.41 (+19%)

[1]1 liter/ha at head formation.

• Three-year average increase with Vitazyme: +19%

Conclusion: Over three years of demonstrations, Vitazyme is shown to be an excellent adjunct to sunflower production in Ukraine.

Three-Year Average



Sunflowers

Researcher: Unknown
Research coordinator: I.V. Braginets
Research organization: Alfa-Agro, Ukraine
Variety: unknown
Experimental design: A field was divided into a Vitazyme treated and an untreated portion to evaluate the effect of this product on crop yield.

1. Control **2. Vitazyme**

Fertilization: farm practice
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 10 to 12-leaf stage
Yield results: No yield results are available, but the increase in yield is given.

• Increase in sunflower yield with Vitazyme: 0.45 ton/ha (16.7 bu/acre)

Conclusion: This yield increase was an excellent result of Vitazyme application in this Ukraine study.

Note the larger heads with the Vitazyme treatment, giving rise to yield increases throughout trials in Ukraine. The green areas on the heads are bird damage.

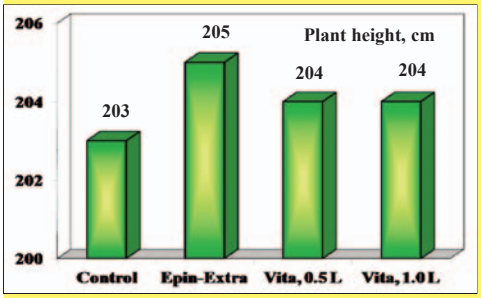
Sunflowers

Researcher: V.D. Strelkov, Ph.D., and V.V. Morozovsky *Research organization*: State Research Institution, All-Russian Research Institute of Biological Plant Protection, Russian Agricultural Academy
Location: Russia *Variety*: Flagman *Soil type*: Chernozem (Mollisol)
Field preparation: disking and plowing in 2010, and disking in April of 2011
Previous crop: winter wheat *Planting date*: April 28, 2011
Planting rate: 10 kg/ha, adjusted to 40,000 plants/ha
Experimental design: A replicated trial with sunflowers was initiated on a field having plots of 25 m^2, using Vitazyme, a standard treatment (Epin-Extra), and an untreated control. The purpose of the trial was to determine the effect of the products on yield and quality of the crop.

1. Control
2. Epin-Extra
3. Vitazyme (0.5 L/ha) at head formation (budding)
4. Vitazyme (1.0 L/ha) at head formation (budding)

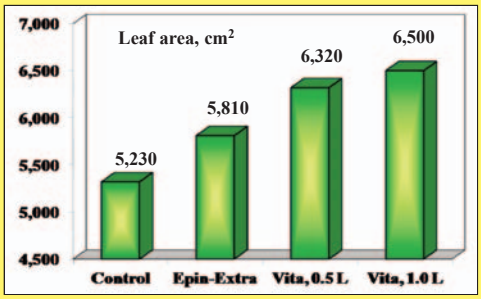
Fertilization: ammonium phosphate plus potassium (16-16-16% N-P_2O_5-K_2O) at 2 centners/ha in rows
Vitazyme application: either 0.5 or 1.0 liter/ha with a backpack sprayer at the beginning of head formation (budding), applied in 250 liters/ha of water on June 15, 2011
Epin-Extra application: applied at 0.004 liter/ton of seed in 10 liters of water, as well as 0.04 liter/ha on the plants at 2 to 3 true leaves, in 250 liters/ha of water with a backpack sprayer, on May 24, 2011
Plant growth results: At the beginning of ripening the height and leaf area of each plot were measured using AAC-100 methods.

Plant Height



$HCP_{0.05}$=3.25 No Significant differences.
There was little effect of Vitazyme or Epin-Extra on plant height.

Leaf Area



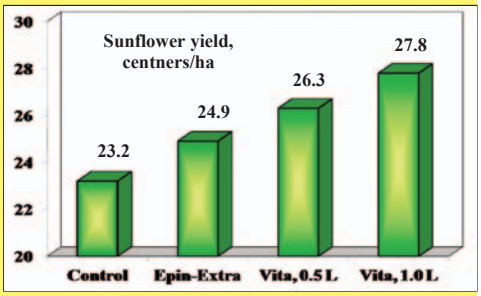
$HCP_{0.05}$=70.3 Significant differences.
Both Vitazyme treatments substantially increased leaf area, leading to greater photosynthesis and yield potential. Epin-Extra increased leaf area nominally.

Increase in leaf area with Vitazyme
0.5 liter/ha ..... +19%
1.0 liter/ha ..... +22%

Yield results: Harvest was completed on September 23, 2011, using a Xere-125 combine. Yield as well as seed characteristics were evaluated.

Sunflower Yield

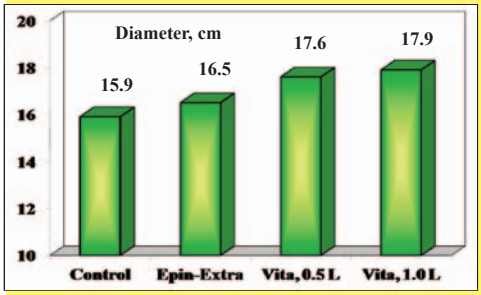
Treatment	Yield	Yield change
	centners/ha	centners/ha
1. Control	23.2	—
2. Epin-Extra	24.9	1.7 (+7%)
3. Vitazyme, 0.5 L/ha	26.3	3.1 (+13%)
4. Vitazyme, 1.0 L/ha	27.8	4.6 (+20%)
$HCP_{0.05}$	1.14	



All three treatments increased yield, but Vitazyme at both rates produced a much bigger increase than did Epin-Extra.

Increase in yield with Vitazyme
0.5 liter/ha ..... +13%
1.0 liter/ha ..... +20%

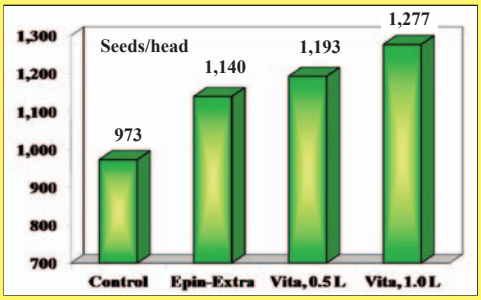
Head Diameter



$HCP_{0.05}$=0.45
All treatments increased head diameter, especially the Vitazyme treatments.

Increase in head diameter with Vitazyme
0.5 liter/ha ..... +11%
1.0 liter/ha ..... +13%

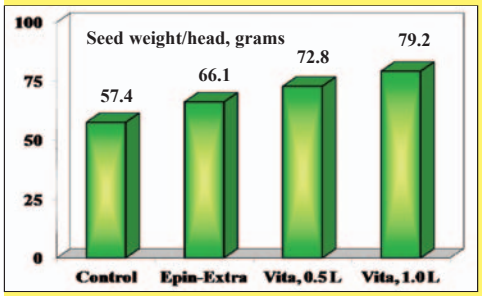
Seeds Per Head



$HCP_{0.05}$=28.5
Seeds per head were markedly increased by all three treatments, but most by Vitazyme.

Increase in seed/head with Vitazyme
0.5 liter/ha ..... +23%
1.0 liter/ha ..... +31%

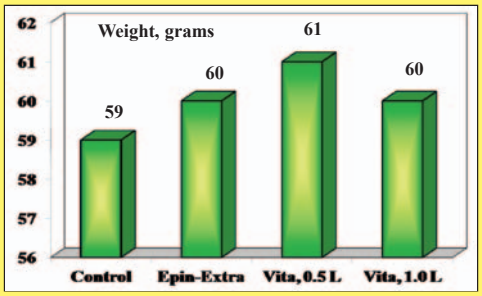
Seed Weight Per Head



$HCP_{0.05}$=3.75
All three treatments increased per head seed weight significantly.

Increase in seed weight with Vitazyme
0.5 liter/ha ..... +27%
1.0 liter/ha ..... +38%

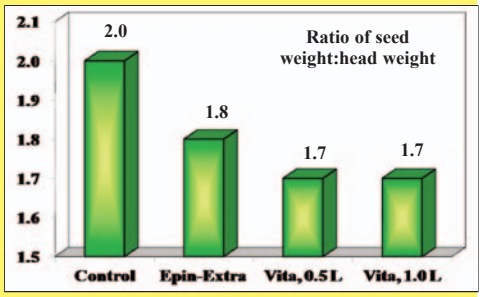
Weight of 1,000 Seeds



$HCP_{0.05}$=0.94
The three treatments all increased the 1,000 weight significantly.

Increase in 1,000 seed weight with Vitazyme
0.5 liter/ha ..... +2 grams
1.0 liter/ha ..... +1 gram

Seed Weight Per Head Weight



$HCP_{0.05}$=0.20
Clearly the three treatments produced more seeds per head, so the seed weight to head weight ratios were reduced, especially for the two Vitazyme treatments.

Increase in seed:head weight ratio with Vitazyme
0.5 liter/ha ..... -27%
1.0 liter/ha ..... -38%

Conclusion: This replicated sunflower study in Russia showed that Vitazyme applied at head formation, using either 0.5 or 1.0 liter/ha, greatly improved leaf area (19 to 22%), as well as final yield (13 to 20%), and harvest characteristics such as head diameter, seeds per head, seed weight per head, 1,000 seed weight, and seed weight per head weight. The 1.0 liter/ha rate was superior to the 0.5 liter/ha rate in most cases. Epin-Extra, a commonly used seed treatment in Russia, produced modest improvements in growth and yield, but they were far inferior to Vitazyme responses. Vitazyme is shown to be an excellent management tool for increasing sunflower yields and growth in Russia.

Winter Wheat

Farmer: AGRivision *Researcher*: Steven David
Research organization: Organic Farming Systems, Perth, Australia
Location: Goshen, Victoria, Australia
Variety: unknown *Planting date*: June 11, 2010
Experimental design: A replicated (four times) wheat trial in Australia involved three treatments, the farmer practice plus two Vitazyme treatments, to determine the effect of the product on crop growth and yield.

1. Control **2. Vitazyme on the seeds**
3. Vitazyme on the seeds and leaves

Fertilization: farmer practice
Vitazyme application: (1) 1 liter/tonne of seed for Treatments 2 and 3; (2) 0.5 liter/ha on the leaves at early tillering for Treatment 3
Growth results: Early growth was increased by 6 to 7% as a result of using the Vitazyme treatments.

Effects of Vitazyme on the seeds and leaves can be seen to the row in this Australian study. There are more leaves, so the interrows are covered on the left-hand side.

Wheat Growth

Treatment	Wheat growth	Growth change
	NDVI analysis	
Control	0.762	—
Vitazyme on seeds	0.812	0.050 (+7%)
Vitazyme on seeds and leaves	0.810	0.048 (+ 6%)

- ***Increase in NDVI growth index with Vitazyme: 6 to 7%***

Yield results: The crop was harvested in December of 2010.

- ***Increase in yield with Vitazyme twice: +12%***

Wheat Yield

Treatment	Grain yield*	Yield change
	tonnes/ha	tonnes/ha
Control	1.61 b	—
Vitazyme on seeds	1.63 b	0.02 (+1%)
Vitazyme on seeds and leaves	1.80 a	0.21 (+12%)

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

Conclusion: This replicated wheat study in Australia, using Vitazyme as a seed treatment alone, and as a seed treatment plus a foliar treatment, revealed that the product improved growth substantially early during the growth cycle. Final yield was significantly increased by 12% with the two applications, though the seed treatment alone did not significantly improve yield above the untreated control. These results show the great benefit of Vitazyme as a growth amendment for wheat in Australia.

Using a price of $300.00/tonne, this program yielded $60.30/ha additional income to the farmer.

Winter Wheat

Researcher: Unknown *Research coordinator*: I.V. Braginets
Research organization: Alfa-Agro, Ukraine *Variety*: unknown
Experimental design: A field was divided into a Vitazyme treated and an untreated portion to evaluate the effect of this product on crop yield.

1. Control **2. Vitazyme**

- ***Increase in wheat yield with Vitazyme: 0.6 ton/ha (8.9 bu/acre)***

Fertilization: farm practice
Vitazyme application: 1 liter/ha sprayed on the leaves and soil after the spring herbicide treatment
Yield results: No yield results are available, but the increase in yield is given.
Conclusion: This yield increase was an excellent result of Vitazyme application in this Ukraine study.

Winter Wheat

Researchers: R.M. Gafurov, Ph.D., and L.I. Malutova *Research organization*: Russian Agricultural Academy, State Research Institution, Moscow Research Institute of Agriculture "Nemchinovka"
Location: Russia *Variety*: Moscow-56
Planting rate: 4,500,000 seeds/ha
Soil type: sod-podzol (organic matter = 2.9%, pH = 5.7, available P = 170 to 190 mg/kg, exchangeable K = 92 to 110 mg/kg)
Experimental design: A wheat experimental area was treated with Epin-Extra, the typical seed and foliar treatment, and two Vitazyme treatments in

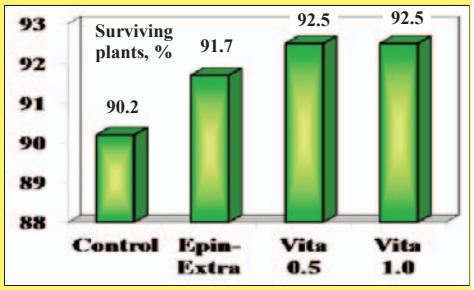
Treatment	Seed treatment	Tillering
1. Control	0	0
2. Epin-Extra	0.2 liter/ton	0.05 liter.ha
3. Vitazyme	0.5 liter/ton	0.5 liter/ha
4. Vitazyme	1.0 liter/ton	1.0 liter/ha

an effort to evaluate their effects on growth parameters and harvest data. Four replicates were used.
Fertilization: before fall planting, 64 kg/ha of N, 64 kg/ha of P_2O_5, and 64 kg/ha K_2O; at the beginning of regrowth, 36 kg/ha of NH_4NO_3
Vitazyme treatment: either 0.5 or 1.0 liter mixed with one ton of seed before planting on August 25, 2010; 0.5 or 1.0 liter/ha sprayed on the leaves and soil at tillering on May 15, 2011
Epin-Extra application: 0.2 liter/ton of seed before planting on August 25, 2010, and 0.1 liter/ha sprayed on the leaves and soil at tillering on May 15, 2011
Plant emergence results: See the table below.
Overwintering results: After winter, counts were made of surviving plants for each treatment.

Plant Emergence

Treatment	Emergence	Enhanced emergence	Plant population	Population change
	date		plants/m²	plants/m²
1. Control	Sept. 1	—	410	—
2. Epin-Extra	Aug. 30	+2 days	420	+10
3. Vitazyme, 0.5 L/ha	Aug. 30	+ 2 days	425	+15
4. Vitazyme, 1.0 L/ha	Aug. 30	+ 2 days	425	+15

Overwinter Survival Rate



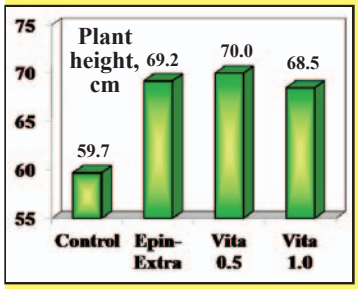
Reduction in time to emergence with Vitazyme
0.5 liter/ha ..... +2 days
1.0 liter/ha ..... +2 days

Increase in plant population with Vitazyme
0.5 liter/ha ..... +15 plants/m²
1.0 liter/ha ..... +15 plants/m²

Increase in surviving plants with Vitazyme
0.5 liter/ha ..... +2.3%-points
1.0 liter/ha ..... +2.3%-points

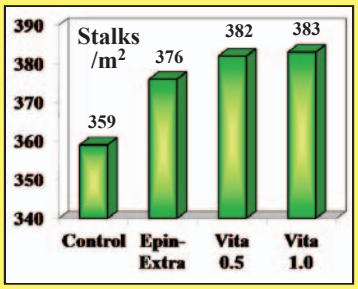
Growth results: The following values were determined from a 0.25 m² sheave selected from each treatment.

Plant height



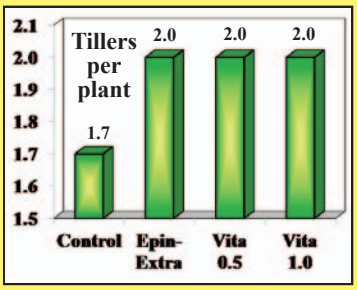
Increase in plant height with Vitazyme
0.5 liter/ha ..... +17%
1.0 liter/ha ..... +15%

Productive Stalks



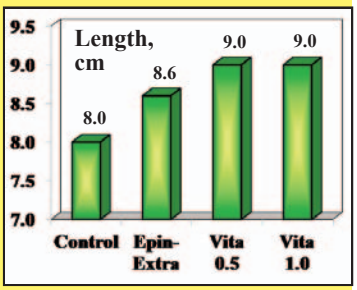
Increase in productive tillers with Vitazyme
0.5 liter/ha ..... +6%
1.0 liter/ha ..... +7%

Tillering



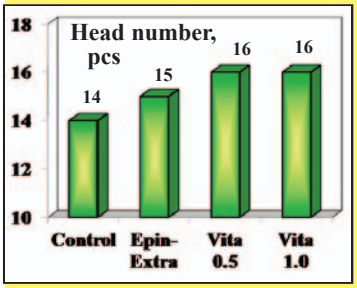
Increase in tillers with Vitazyme
0.5 liter/ha ..... +18%
1.0 liter/ha ..... +18%

Head Length



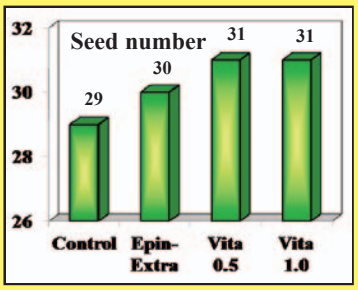
Increase in head length with Vitazyme
0.5 liter/ha ..... +13%
1.0 liter/ha ..... +13%

Head Number



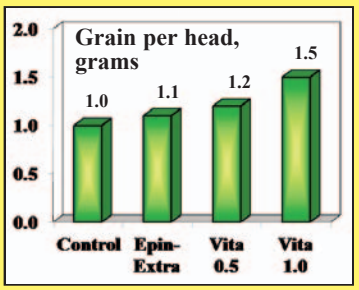
Increase in head number with Vitazyme
0.5 liter/ha ..... +14%
1.0 liter/ha ..... +14%

Seeds Per Head



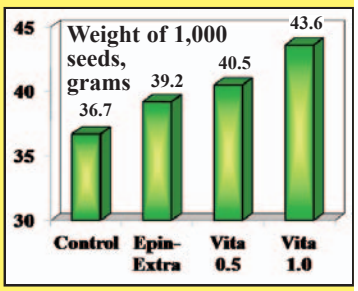
Increase in seeds per head with Vitazyme
0.5 liter/ha ..... +7%
1.0 liter/ha ..... +7%

Grain Weight Per Head



Increase in grain weight per head with Vitazyme
0.5 liter/ha ..... +20%
1.0 liter/ha ..... +50%

1,000-Seed Weight



Increase in 1,000-seed weight with Vitazyme
0.5 liter/ha ..... +10%
1.0 liter/ha ..... +19%

Continued on the next page

Vitazyme on the seeds and leaves at both 0.5 and 1.0 liter/ha substantially improved the seed and plant parameters at harvest. Three parameters include productive stalks (+6 to 7%), tillering (+18%), head length (+13%), head number (+14%), seeds per head (+7%), grain weight per head (+20 to 50%), and 1,000 seed weight (+10 to 19%). Epin-Extra increased these parameters as well, but not as greatly as did Vitazyme.

Yield and quality results: The crop was harvested on July 23, 2011, using a Sampo-1500 combine. The moisture of the grain was 13.9%.

Wheat Yield and Quality

Treatment	Yield[1]	Yield change	Protein	Protein change	Gluten	Gluten change
	tons/ha	tons/ha	%	%-points	%	%-points
1. Control	3.28 c	—	18.00	—	33.6	—
2. Epin-Extra	3.40 b	0.12 (+3%)	19.14	+1.14	35.9	+2.3
3. Vitazyme, 0.5 L/ha	**3.76 a**	**0.48 (+15%)**	18.43	+0.43	33.8	+0.2
4. Vitazyme, 1.0 L/ha	3.82 a	0.54 (+16%)	17.79	-0.21	32.6	-1.0
$HCP_{0.05}$	0.13					

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

The yield of wheat from both the 0.5 and 1.0 liter/ha rates of Vitazyme gave the highest yield increase (+15 and 16%), while Epin-Extra gave only a minimal 3% yield increase. On the other hand, Epin-Extra provided the highest protein and gluten increases. Vitazyme at 0.5 liter/ha gave small protein and gluten increases, so presents the best overall yield and grain quality treatment.

Conclusion: A replicated winter wheat trial in Russia revealed that Vitazyme, applied on the seeds and also at tillering, substantially improved seedling emergence (by 2 days) and survival, which carried over into overwinter survival as well. Growth parameters showed marked responses to both Vitazyme treatments, such as productive stalks (+6 to 7%), tillering (+18%), head length (+13%), head number (+14%), seeds per head (+7%), grain weight per head (+20 to 50%), and 100-seed weight (+10 to 19%). Yield was improved by 15 to 16%. Epin-Extra improved most parameters, but gave only a 3% yield increase. Protein and gluten were increased the most by Epin-Extra, and the 1.0 liter/ha Vitazyme treatment decreased protein and gluten. The overall best treatment, in terms of yield and quality, was the 0.5 liter/ton Vitazyme seed application plus a 0.5 liter/ha foliar treatment.

Winter Wheat

Researchers: university personnel

Research organization: Kubansky State Agrarian University, Department of Plant Physiology

Location: Krasnodar, Russia

Variety: Graciya

Soil type: leached black soil (organic matter = 3.5 to 4.5%, surface N = 0.16 to 0.18%, mobile P = 17.2 to 35.7 mg/100g, mobile K = 10.2 to 37.0 mg/100 g, total bases = 33.0 to 34.3 mg-ekv/100 g of soil)

Experimental design: A replicated winter wheat trial was set up in Russia to evaluate the effects of Epin-Extra, a standard growth stimulant, and Vitazyme at three rates on the growth, yield, and quality of the crop.

Treatment	Seed treatment	Early boot
1. Control	0	0
2. Epin-Extra	0.2 liter/ton	0.05 liter/ha
3. Vitazyme	0.1 liter/ton	0.1 liter/ha
4. Vitazyme	0.5 liter/ton	0.5 liter/ha
5. Vitazyme	1.0 liter/ton	1.0 liter/ha

In this Russian winter wheat study, Vitazyme greatly enhanced growth as can be witnessed from these samples taken during the summer of 2011. Note the degree of tillering, leaf size, chlorophyll development, and head number and size for the samples.

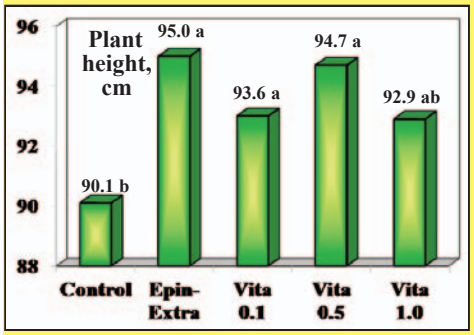
Fertilization: unknown

Vitazyme application: 0.1, 0.5, or 1.0 liter/ton of seed applied before planting; 0.1, 0.5, or 1.0 liter/ha sprayed on the leaves and the soil in the spring at the early boot stage

Epin-Extra: 0.2 liter/ton of seed applied before planting; 0.05 liter/ha sprayed on the leaves and soil in the spring at the early boot stage

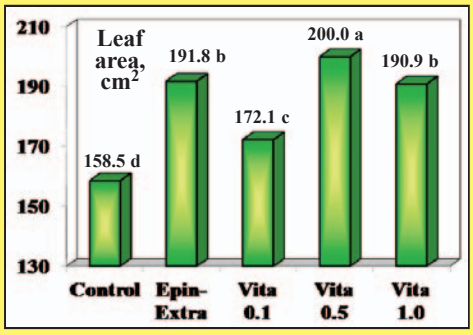
Growth results: Before harvest during growth, the height, leaf area, and weight of the plants were measured.

Plant Height[1]



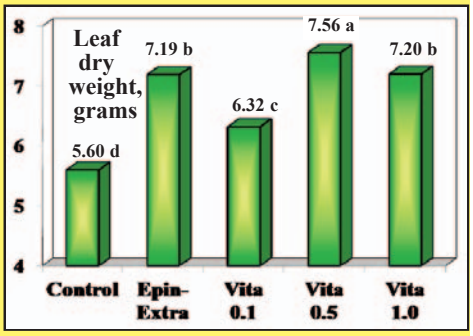
[1]$HCP_{0.05}$=3.2 cm. Means followed by the same letter are not significantly different at P=0.05

Leaf Area[1]



[1]$HCP_{0.05}$=6.3 cm^2. Means followed by the same letter are not significantly different at P=0.05

Dry Weight (Above-Ground)[1]



[1]$HCP_{0.05}$=0.21 grams. Means followed by the same letter are not significantly different at P=0.05

Increase in plant height with Epin-Extra and Vitazyme

Epin-Extra ..... +5%
0.1 liter/ha ..... +4%
0.5 liter/ha ..... +5%
1.0 liter/ha ..... +2%

All products provided height increases that were statistically equal, with all but the 0.5 liter/ha rate being greater than the control.

Increase in leaf area with Epin-Extra and Vitazyme

Epin-Extra ..... +21%
0.1 liter/ha ..... +9%
0.5 liter/ha ..... +26%
1.0 liter/ha ..... +20%

The four treatments all gave leaf area increases significantly greater than the control, especially Vitazyme at 0.5 liter/ha.

Increase in above-ground dry weight with Epin-Extra and Vitazyme

Epin-Extra ..... +28%
0.1 liter/ha ..... +13%
0.5 liter/ha ..... +35%
1.0 liter/ha ..... +29%

All treatments were significantly greater than the control for dry weight, especially the 0.5 liter/ha Vitazyme treatment.

Leaf productivity, chlorophyll, and carotene results:

Treatment	Leaf Productivity	Chlorophyll a+ b	Carotene
	g/dm^2	mg/g	mg/g
1. Control	3.53	8.47	2.39
2. Epin-Extra	3.75	9.46	2.58
3. Vitazyme, 0.1 L/ha	3.67	8.88	2.11
4. Vitazyme, 0.5 L/ha	3.78	9.63	3.20
5. Vitazyme, 1.0 L/ha	3.77	9.44	2.72

Change in leaf carotene with Epin-Extra and Vitazyme

Epin-Extra ..... +8%
0.1 liter/ha ..... -12%
0.5 liter/ha ..... +34%
1.0 liter/ha ..... +14%

Carotene was greatly increased by the 0.5 liter/ha Vitazyme treatment (34%), with the 0.1 liter/ha rate lowering the content.

Increase in leaf productivity with Epin-Extra and Vitazyme

Epin-Extra ..... +6%
0.1 liter/ha ..... +4%
0.5 liter/ha ..... +7%
1.0 liter/ha ..... +7%

All treatments increased leaf productivity by a similar level, from 4 to 7%

Increase in total leaf chlorophyll with Epin-Extra and Vitazyme

Epin-Extra ..... +12%
0.1 liter/ha ..... +5%
0.5 liter/ha ..... +14%
1.0 liter/ha ..... +11%

Chlorophyll a + b was increased by all treatments, by up to 14% by the 0.5 liter/ha Vitazyme application.

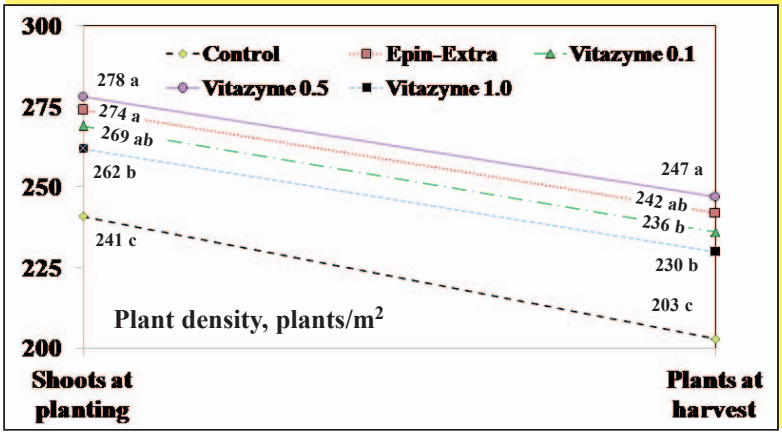
Crop density and survival results:

Plant Emergence

Epin-Extra ..... +14%
0.1 liter/ha ..... +12%
0.5 liter/ha ..... +15%
1.0 liter/ha ..... +9%

All treatments significantly increased plant emergence, especially the 0.5 liter/ha Vitazyme treatment.

Wheat Yield and Quality[1]



$HCP_{0.05}$ = 9.0 plants/m^2 $HCP_{0.05}$ = 7.9plants/m^2

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

Plant Survival

Epin-Extra ..... +14%
0.1 liter/ha ..... +12%
0.5 liter/ha ..... +15%
1.0 liter/ha ..... +9%

All treatments gave 88 to 89% survival, compared to 84% for the control treatment.

Continued on the next page

Harvest parameter results:

Treatment	Total tillers/plant[1]	Productive tillers/plant[1]	Head length[1]	Grains/plant[1]	Grain weight/plant[1]	Straw weight/plant[1]
	number	number	cm	number	grams	grams
1. Control	1.4 e	1.1 e	6.8 c	24.9 c	0.94 c	1.60 c
2. Epin-Extra	2.4 b	2.3 b	8.0 a	46.8 a	1.68 a	2.75 a
3. Vitazyme, 0.1 L/ha	2.2 d	2.1 c	7.5 b	43.1 b	1.49 b	2.53 b
4. Vitazyme, 0.5 L/ha	2.7 a	2.5 a	8.1 a	47.2 a	1.70 a	2.79 a
5. Vitazyme, 1.0 L/ha	2.3 c	2.0 d	7.2 b	41.9 b	1.44 b	2.48 b
$HCP_{0.05}$	0.07	0.06	0.3	1.3	0.06	0.08

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

Increase in tillers/plant with Epin-Extra and Vitazyme

Epin-Extra ..... +71%
0.1 liter/ha ..... +57%
0.5 liter/ha ..... +93%
1.0 liter/ha ..... +64%

All treatments significantly increased total tillers per plant, especially the 0.5 liter/ha Vitazyme applications, which exceeded all other treatments.

Increase in productive tillers/plant with Epin-Extra and Vitazyme

Epin-Extra ..... +109%
0.1 liter/ha ..... +91%
0.5 liter/ha ..... +127%
1.0 liter/ha ..... +82%

The productive tillers reflected the total tiller values, with Vitazyme at 0.5 liter/ha exceeding all other treatments.

Increase in head length with Epin-Extra and Vitazyme

Epin-Extra ..... +18%
0.1 liter/ha ..... +10%
0.5 liter/ha ..... +19%
1.0 liter/ha ..... +6%

Head length was significantly greater for all applications, especially Vitazyme at 0.5 liter/ha and Epin-Extra.

Yeld results:

Wheat Yield

Treatment	Yield	Yield increase
	centners/ha	centners/ha
1. Control	57.1 b	—
2. Epin-Extra	64.0 a	6.9 (+12%)
3. Vitazyme, 0.1 L/ha	62.8 a	5.7 (+10%)
4. Vitazyme, 0.5 L/ha	64.1 a	7.0 (+12%)
5. Vitazyme, 1.0 L/ha	62.4 a	5.3 (+9%)
$HCP_{0.05}$	2.9 centners/ha	

Increase in yield

Epin-Extra ..... +12%
0.1 liter/ha ..... +10%
0.5 liter/ha ..... +12%
1.0 liter/ha ..... +9%

All treatments significantly boosted yield – by 9 to 12% – above the control, the best yield being with Vitazyme at 0.5 liters/ha. All yields except the control were statistically equal.

Grain quality results:

Treatment	1,000-grain weight[1]	Glassiness	Gluten
	grains	%	%
1. Control	34.9 b	76.0	21.9
2. Epin-Extra	36.4 a	81.0	24.7
3. Vitazyme, 0.1 L/ha	35.8 ab	77.5	23.4
4. Vitazyme, 0.5 L/ha	36.3 a	81.0	24.5
5. Vitazyme, 1.0 L/ha	36.0 ab	78.0	23.0
$HCP_{0.05}$	1.1		

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

Conclusion: An in-depth replicated winter wheat study in Russia revealed that both Vitazyme (at three rates) and Epin-Extra improved seed germination (9 to 15%, Vitazyme at 0.5 liter/ha the highest) and survival through the winter (88 to 89%, Vitazyme at 0.5 liter being best). Plant height, leaf area, and dry weight were improved significantly by both products, the most with 0.5 liter/ha Vitazyme. Leaf chlorophyll and carotene were also increased by both Vitazyme and Epin-Extra, the 0.5 liter/ha Vitazyme rate giving a 34% increase in carotene. Harvest parameters also revealed the superiority of the 0.5 liter/ha Vitazyme rate, as values significantly improved at P=0.05 for all treatments for tillers/plant (57 to 93%), productive tillers/plant (82 to 127%), head length (6 to 19%), grains/plant (68 to 90%), grain weight/plant (53 to 81%), and straw weight/plant (55 to 74%). In each case the 0.5 liter/ha rate of Vitazyme gave the highest values. All treatments significantly improved the yield above the control, and were statistically equal, but 0.5 liter/ha Vitazyme gave the highest yield. Grain quality-weight, glassiness, and gluten content were all improved by the products as well. **In summary, the effectiveness of the treatments were Vitazyme (0.5 liter/ton of seed + 0.5 liter/ha foliar) > Epin-Extra > Vitazyme (1.0 liter/ton of seed + 1.0 liter/ha foliar) > Vitazyme (0.1 liter/ton of seed + 0.1 liter/ha foliar).**

Increase in 1,000-grain weight with Epin-Extra and Vitazyme

Epin-Extra ..... +4%
0.1 liter/ha ..... +3%
0.5 liter/ha ..... +4%
1.0 liter/ha ..... +3%

Vitazyme at 0.5 liter/ha and Epin-Extra significantly increased 1,000-grain weight above the control.

Increase in glassiness with Epin-Extra and Vitazyme

Epin-Extra ..... +7%
0.1 liter/ha ..... +2%
0.5 liter/ha ..... +7%
1.0 liter/ha ..... +3%

Glassiness was improved by all treatments, but especially by Vitazyme at 0.5 liter/ha and Epin-Extra.

Increase in grain gluten with Epin-Extra and Vitazyme

Epin-Extra ..... +72%
0.1 liter/ha ..... +58%
0.5 liter/ha ..... +74%
1.0 liter/ha ..... +55%

All treatments increased gluten content of the grain, but Epin-Extra + Vitazyme at 0.5 liter/ha increased it most.