20th Edition

VITAZYME®

an All Natural Biostimulant Concentrate

2015 FIELD TESTS RESULTS

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

Compiled by Paul W. Syltie, Ph.D, Director of Research
Vital Earth Resources, 706 East Broadway
Gladewater, Texas 75647, USA
(903)845-2163 • www.vitalearth.com

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Introduction

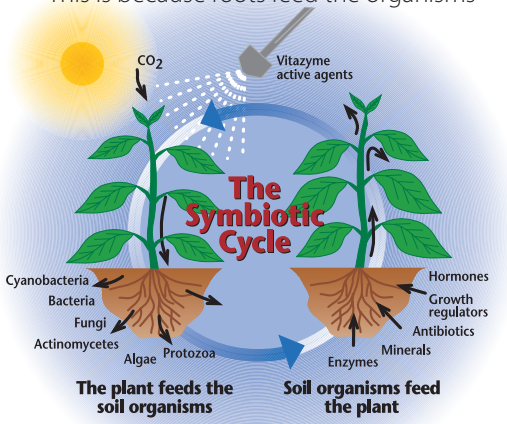
How Vitazyme works within the plant-soil system.

This edition of Vitazyme crop reports represents the twentieth 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 the 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 tranported 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 may be used for crop production at any degree of technology, from animal power and low inputs to GPS-guided tractor power and high fertility inputs. Please consult the Vitazyme User's Guide for details.

General use for field crops with less than optimal fertilization levels, when soil testing is not possible:

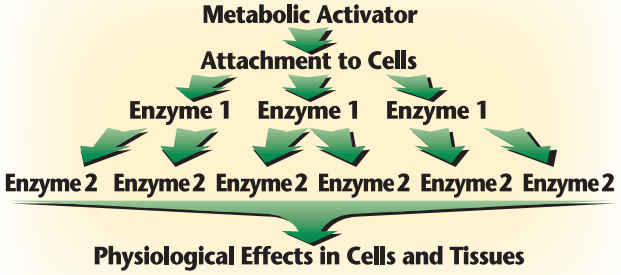
1. Apply normal levels of organic and commercial fertilizers.
2. Treat the seeds, transplant roots, or seed pieces whenever possible at planting. To treat seeds, typically use 250 ml/ha in the minimum water for good seed coverage. Mixing 1 liter/ton of seeds is also very effective. Dip roots or transplants in a 0.5 to 1% solution, or spray with a 5% solution.
3. Apply Vitazyme to the soil and/or leaves according to recommendations. In most cases use 1 to 1.5 liters/ha per application, from one to three times during the growing season.

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	Meduim	High
1	2	3	1	3	1	3	2	4	6
Total additive score: Apply this % optimum N:		15	14	13	12	11	10	9	8	7	6	5
		← 50-60% →				← 60-70% →				← 70-80% →		

General use for field crops with optimal fertilization and soil testing:

1. Test the soil at a reputable laboratory, and obtain expert fertilization recommendations.
2. Fertilizer nitrogen rates may be lowered somewhat, depending on soil conditions; refer to the table above.
3. Treat the seeds using a seed treater to achieve about 1 liter/ton of seed of actual product, or apply 1 liter/ha in-furrow at planting, with or without starter fertilizer.
4. Apply Vitazyme to the soil and/or leaves according to recommendations.

Remember that Vitazyme is a complement to other sound, sustainable crop management practices. Incorporate crop rotations, minimal tillage, erosion control, and adapted plant varieties whenever possible.



Vitazyme Highlights *from throughout the world.*

Vitazyme Highlights for 2015

Results from Vitazyme trials throughout the world in 2015 were excellent on all fronts. The following seven items indicate some of the most notable successes during this year.

1. As for 2014, results with cherries in Washington State were outstanding. Ten trials were established and evaluated which showed consistently excellent yield and quality improvements for Bing, Chelan, and Rainier varieties. Yields were improved by 20% in a measured pack-out trial with Chelan cherries, and in most cases the fruit was moved towards the larger size grades of 9.5 row and larger. Fruit Brix was improved by up to 2.54 percentage points, and fruit pressure by up to 17%. The photos accompanying the studies tell the story remarkably well.

2. Apple trees for nursery stock in central Washington showed excellent responses to Vitazyme as a root dip alone, or as a drip irrigation addition. The drip irrigation trial was in its second year, and showed a fine 14% height increase and an 13% caliper gain over the control, while producing 31% more branches. A root dip alone caused a 17% height increase.

3. A nitrogen and water efficiency trial with corn, conducted at South Dakota State University in 2014, was finally fully analyzed and revealed that nitrogen utilization at 125 lb/acre of nitrogen was boosted by 17%. At the same time, the yield improved significantly by 6% (9 bu/acre), and the yield loss from water stress was reduced from 14.2 bu/acre in the untreated control to 5.0 bu/acre with Vitazyme.

4. A series of trials in Mexico evaluated the effects of Vitazyme on peppers, corn, sorghum, tomatoes, melons, spinach, Broccoli, wheat, lettuce, dry beans, blackberries, and potatoes. Results were uniformly very good, with yields improving usually in the 5 to 15% range, and quality along with the yield.

5. The final analyses of Vitazyme effects on soybeans that were treated with glyphosate, and on the rhizosphere microbial populations and soil residues, revealed that, in addition to preventing the destruction of beneficial microbes like Pseudomonads and indole acetic acid bacteria, and preventing Rhizobium bacteria decline, Vitazyme decreased manganese oxidizing bacteria, increased soybean branching, and reduced glyphosate residues in the soil.

6. Results on corn, soybeans, wheat, sunflowers, and sugar beets in Ukraine were., like in past years, consistently positive in terms of both crop yield and quality. Sugar yield increases of up to 29%, wheat grain yield increases of 7 to 20%, and soybean yield improvements of up to 36% were among the fine results in this series of trials. These increases were complemented by improvements in wheat grain protein as well.

7. Research on the effects of certain adjuvants applied with Vitazyme showed very promising results. One particular vegetable-based material, trialed in east-central Iowa, proved to be synergistic, increasing the yield of soybeans by 5% above the initial increase from Vitazyme alone of 10%.

Apples *(Nursery—Organic)*

Researcher: Jacob Hesseltine
Research organization: Vital Grow Distribution LLC, Waterville, Washington
Farmers: Brian Talbot and Paul Carter, Pleasant Ridge Organic
Location: Wallula, Washington
Variety: Honeycrisp
Root stock: Bud 9
Planting date: early April
Tree spacing: 18 in between trees, 9 ft between rows
Soil type: sand
Experimental design: An 18-acre block of land was planted to Honeycrisp apples that had been grafted on to M9 rootstock. Eight rows received a Vitazyme root dip at planting and eight rows received a Tainio product root dip. The treatments were separated by untreated control rows. The purpose of the study was to evaluate the effectiveness of these two products in stimulating the growth of newly planted apple trees.

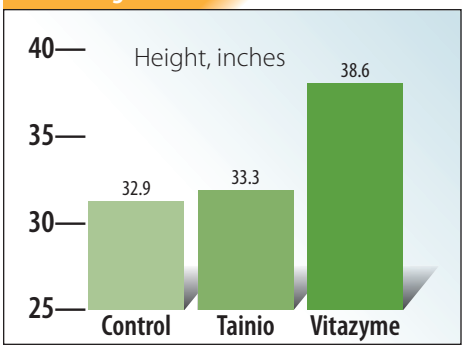
Young apple trees without Vitazyme show normal growth in this Washington study.

When Vitazyme was added to the growing program, growth was stimulated by 17% in height and 12% in trunk caliper.

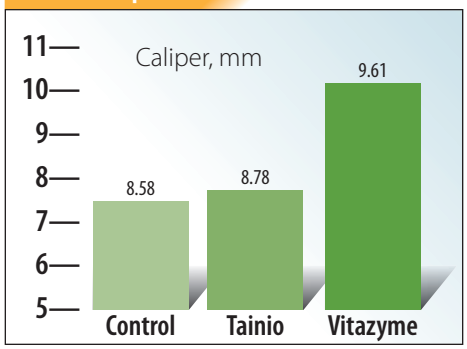
❶ *Control* ❷ *Tainio product* ❸ *Vitazyme*

Fertilization: 10 tons/acre of manure before planting
Vitazyme application: a root dip in a 5% solution at planting
Tainio product application: root dip of a label direction concentration of the powder
Growing season weather: quite favorable for tree growth, although very warm in June and July, which slowed growth
Growth results: Tree height and caliper

Tree Height



Trunk Caliper



measurements were made on 50 trees for all three treatments, using 10 trees per row in five rows of trees.

Conclusion: In this organic apple nursery trial, treating Honeycrisp nursery stock with either Vitazyme or a Tainio product as a root dip at planting, Vitazyme substantially outperformed the Tainio product, increasing tree height by 17% compared to a 1% increase with the Tainio tree dip. Similarly, trunk caliper was improved by 12% with the Vitazyme root dip, as compared to a 2% increase with the Tainio dip. These results show the superiority of Vitazyme as a root dip to stimulate the development of newly planted apple trees under stressful warm summer temperatures, and under organic program limitations.

Growth changes		
Parameter	Tainio	Vitazyme
Tree height	1%	17%
Trunk caliper	2%	12%

Vitazyme Field Tests for 2015

Apples *(Nursery) Year 2 of a Continuing Study*

Researchers: Jacob Hesseltine and Bruce Hesseltine
Research organization: Vital Grow Distribution LLC, Waterville, Washington
Farmer: C & O Nursery
Location: George, Washington
Variety: Gala Nic 29
Root stock: M-9337
Tree spacing: 12 x 56 inches
Experimental design: This is the second and final year of this study. Trees treated with Vitazyme last year on the north half of a 14-acre apple nursery (root dip at planting and three drip irrigation applications) received three Vitazyme applications in 2015. The untreated apple trees served as a control, to evaluate the effects of the product on tree growth.

C&O Nursery apple trees in the second year of this study, without treatment, show normal growth, but were greatly inferior to the Vitazyme treated trees.

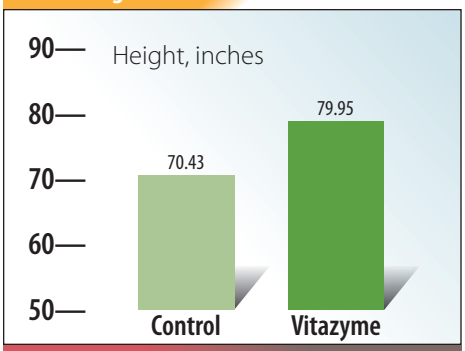
Note the greatly improved height, color, leaf size, and vitality of the Vitazyme treated apple trees after two successive years of applications.

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

Fertilization: standard nutrient program, with nitrogen added as required
Vitazyme application: 16 oz/acre applied three times through drip irrigation: (1) mid-April; (2) mid-May; (3) mid-June
Growing season weather: generally favorable
Growth results: The trees were dug in mid-November, but before that measurements were made on the two treatments on October 12, using 100 trees for each, 10 trees per row on 10 rows of each treatment.
Insect infestations: The Vitazyme treated trees were much less affected by insect pests than were the untreated trees.
Conclusion: The second year of this Gala apple nursery trial, comparing Vitazyme treated trees having received a root dip and three drip irrigation applications in 2014 and three drip irrigation treatments again in 2015, showed that the health, vigor, and insect pest resistance of the treated trees were considerably better than for trees in the untreated control. This improved health was reflected in taller trees (+14%), having greater trunk calipers (+13%) and many more branches (+31%) than the untreated control. The great utility of Vitazyme for improving the productivity of apple nurseries has been amply demonstrated in this two-year trial.

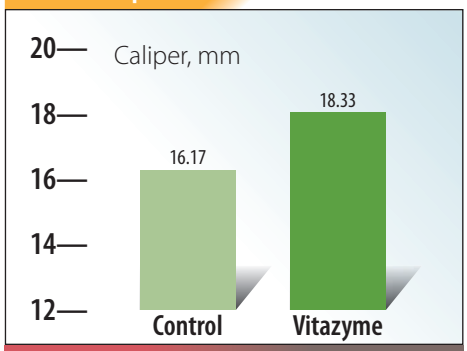
Apricots *with Vitazyme application*

Tree Height



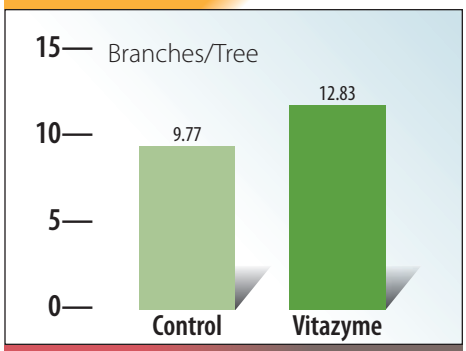
Increase in height with Vitazyme: 14%

Trunk Caliper



Increase in caliper with Vitazyme: 13%

Branch Number



Increase in branches with Vitazyme: 31%

Researcher: Jacob Hesseltine
Research Organization: Vital Grow Distribution LLC, Waterville, Washington
Farmer: Columbia River Investors (Weber Orchards)
Location: Rock Island, Washington
Variety: Perfection
Rootstock: unknown
Tree spacing: 20 x 20 feet
Tree age: 52 years
Experimental design: A 13-acre block of apricots was divided into three portions, a 5-acre Vitazyme treated area, a 5-acre Entraset treated area and a 3-acre untreated control. The purpose of the trial was to determine the effect of these two products on apricot size and quality.
Fertilization: only micronutrients

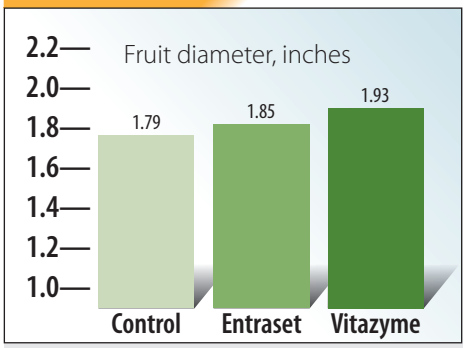
The Vitazyme treated apricots in this study showed greater fruit size and weight, higher Brix, as well as enhanced maturity compared to the Entraset treated fruit (left) and the control fruit (right).

1 ***Control*** **2** ***Entraset*** **3** ***Vitazyme***

Vitazyme application: 16 oz/acre applied two times: (1) first cover; (2) 10 days later. A Progressive Ag Lectro Blast Sprayer was used (80 gal/acre at 3.2 mph).

Growing season weather: generally favorable for crop development
Harvest dates: June 20, 2015
Size and quality evaluations: On June 15, 48 typical fruit were hand-picked from all three treatments in the same vicinity, and the following parameters were measured.

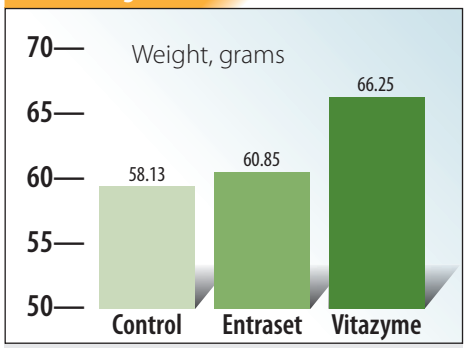
Fruit Size[1]



[1]Using a Cranston fruit sizer.

Increase in size with Vitazyme: 8%

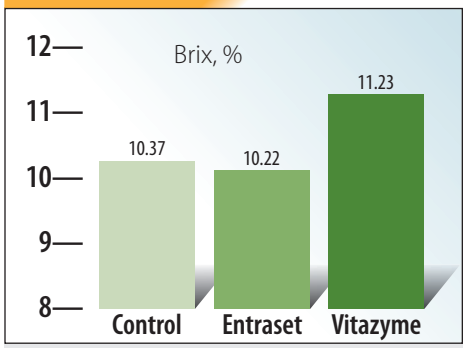
Fruit Weight[1]



[1]Using a Matrix-500 scale.

Increase in weight with Vitazyme: 14%

Fruit Brix[1]



[1]Using an Atago PAL-1 Penetrometer.

Increase in size with Vitazyme: 0.86%

Conclusion: This apricot trial in Washington, using two applications of Vitazyme at 16 oz/acre each time and the standard Entraset program revealed that Vitazyme markedly outperformed Entraset. Fruit size was 8% greater than the Control and 5% higher than with Entraset. The weight increase likely would translate into a 14% yield increase with Vitazyme if fruit numbers were the same for the treatments. Vitazyme increased fruit sugar by 0.86 percentage-point while Entraset slightly reduced fruit sugar. These results show the excellent benefit of Vitazyme for apricot production in Washington, and its superiority to Entraset.

Change in values		
Parameter	Entraset	Vitazyme
Fruit size	+3%	+8%
Fruit weight	+5%	+14%
Fruit Brix	- 0.15[a]	+0.86%[a]

[a]Percentage-points

Barley *with Vitazyme application*

Researchers: Martin Baltazar and Lucero Fernandez
Farm: Novasem
Research organization: Quimica Lucava
Location: Sayula, Jalisco, Mexico
Variety: Emerald
Planting date: January 14, 2015
Experimental design: A barley field was divided into a 1.5/hectare Vitazyme treated area, and the remainder of the field served as a control. The purpose of the trial was to discover the effect of Vitazyme on barley yield and profitability.

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

Fertilization: Unknown
Vitazyme application: (1) 0.25 liter/ha on the seeds at planting (January 14, 2015) ; (2) 1 liter/ha sprayed on the leaves and soil 37 days after planting (February 20, 2015).
Harvest date: April 29, 2015
Yield results:

Treatment	Sample yield	Yield	Yield change
	kg/0.175 ha	kg/ha	kg/ha
Control	510	2,914	—
Vitazyme	630	3,600	686(+24%)

Increase in barley yield with Vitazyme: 24%

Barley is being given the second Vitazyme application in a Mexican trial in Jalisco. A pronounced 24% yield response resulted.

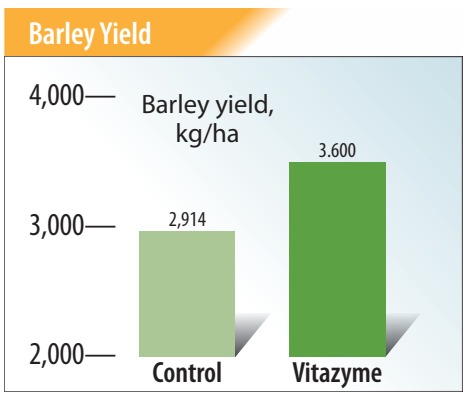
Income results:

Treatment	Yield	Yield change	Gross income[1]	Income change	Vitazyme cost[2]	Profit	Cost : Benefit
	kg/ha	kg/ha	USD/ha	USD/ha	USD/ha	USD/ha	
Control	2,914	—	874.2	—	—	—	—
Vitazyme	3,600	686	1,080.0	205.8	48.28	157.52	3.26

[1]Barley price = 0.30 USD/kg ; [2]Vitazyme cost (for 1.25 liters/ha) + relevant labor for 1 ha.

Increased profit with Vitazyme: 157.52 USD/ha
Cost : Benefit with Vitazyme: 3.26

Conclusion: A barley trial in Mexico, with Vitazyme applied to the seeds at planting and to the leaves and soil 37 days later, resulted in an excellent 24% grain yield increase. This increase gave 157.52 USD/ha more income, and a cost : benefit of 3.26, showing the excellent utility of the program for barley growers in Mexico.



Dry Beans *Recovery from Hail Damage*

Researchers: Agustin Peralta, Modesto Sánchez, and Israel Calva
Farmer: Modesto Sánchez
Research organization: Quimica Lucava
Location: La Purisima Hidalgo, Municipality of Tochtepec, Puebla, Mexico
Variety: Seminis 8551
Experimental design: A dry bean field that was injured by hail was treated on 70 rows with Vitazyme at 1 liter/ha. The purpose of the study was to evaluate the ability of the product to influence bean yield after hail damage compared to the untreated control.

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

Fertilization: The entire field received a foliar fertilizer treatment.
Vitazyme application: 1 liter/ha sprayed on the leaves on August 22, 2014, at ten days after the hail damage
Growth observation: The Vitazyme treated area produced the following effects compared to the untreated control/area:

- More flowers and pods
- Quicker plant recovery from the hail damage
- Fewer insect pests

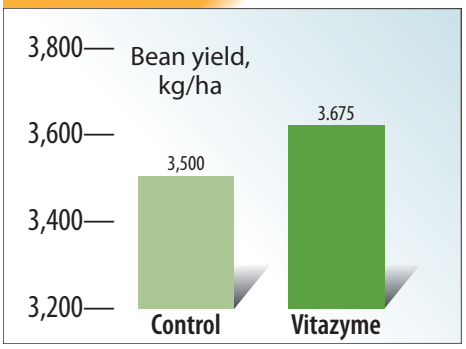
Harvest date: October 20, 2014
Yield results:

Treatment	Yield	Yield change
	kg/ha	kg/ha
Control	3,500	—
Vitazyme	3,675	175 (+5%)

Increase in bean yield with Vitazyme: 5%

Income results: At a price of 0.60 USD/kg, increase in dry bean income with Vitazyme: 105 USD/ha, with a single, 1 L/ha Vitazyme application (cost 32 USD/ha, including labor) for a net profit of 73 USD/ha.

Bean Yield



Conclusion: This dry bean study in Mexico showed that Vitazyme is able to aid in the rapid recovery of bean plants from hail damage. The yield was increased by 5%, with extra income of 105 USD/ha and a net profit of 73 USD/ha with a single application. The plants were less stressed than in the control areas, having more flowers and pods, and fewer insect pests.

Increase in bean income with Vitazyme: 105 USD/ha

Blackberries *with Vitazyme application*

Researchers: Lucero Fernandez
Farmer: Odilon Barragan
Research organization: Quimica Lucava
Location: Cieneguita Farm, Los Reyes, Michoacan, Mexico
Variety: Tuppi
Experimental design: An area of 1 hectare in a blackberry field was treated with four Vitazyme applications to evaluate the effect of the product on berry yield.

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

Fertilization: Unknown
Vitazyme application: 1 liter/ha sprayed on the leaves about every 30 days,, on September 3, October 10, November 11, and December 2, 2014.
Growth observations: Vitazyme produced the following:

- More flowers and fruit
- Higher quality fruit with a longer shelf life
- Greater uniformity in the crop
- Fewer rejects of fruit

Untreated blackberries did not have the size and uniformity, nor the quality, of the treated fruit as seen in the accompanying photo.

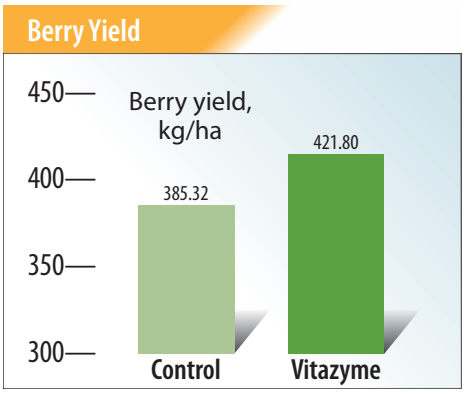
Blackberries treated with four Vitazyme applications yielded 9% more fruit than the control, which was of higher quality, more uniform, and which retained a longer shelf life.

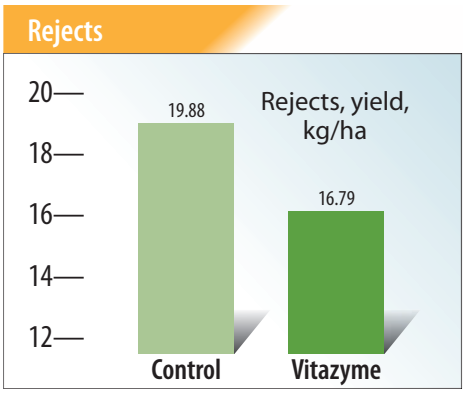
Harvest date: December 13, 2014, after about 100 days from the first application

Yield results: The number of cases per hectare were counted for both areas.

Treatment	Cases	Case weight	Total weight	Yield change	Rejects
	cases/ha	kg	kg/ha	kg/ha	kg/ha
Control	169	2.28	385.32	—	19.88
Vitazyme	185	2.28	421.80	36.48 (9%)	16.79

Conclusion: A blackberry trial with Vitazyme in Mexico showed that four monthly applications at 1 liter/ha each time, produced 9% yield increase, along with few rejected fruit. The treated crop was also more uniform, had more flowers and fruit, and produced higher quality fruit with a longer shelf life. All of these results point towards the great efficiancy of Vitazyme for use with blackberries in Mexico.





Increase in berry yield with Vitazyme: 9%

Decrease in rejects with Vitazyme: 3.09 kg/ha (16%)

Vitazyme Field Tests for 2015

Broccoli *with Vitazyme application*

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

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

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

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

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

Increase in broccoli yield with Vitazyme : 15%

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

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

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

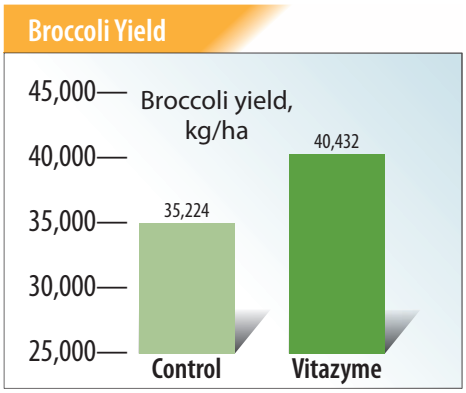
Conclusion: Vitazyme in this Mexican broccoli study, using three applications, resulted in an excellent 15% yield increase, with income improved by 1,341 USD/ha and cost : benefit by 11.4. This program is well adapted to broccoli production in Mexico.

Income results:

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

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

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



Chinese Cabbage *with Vitazyme application*

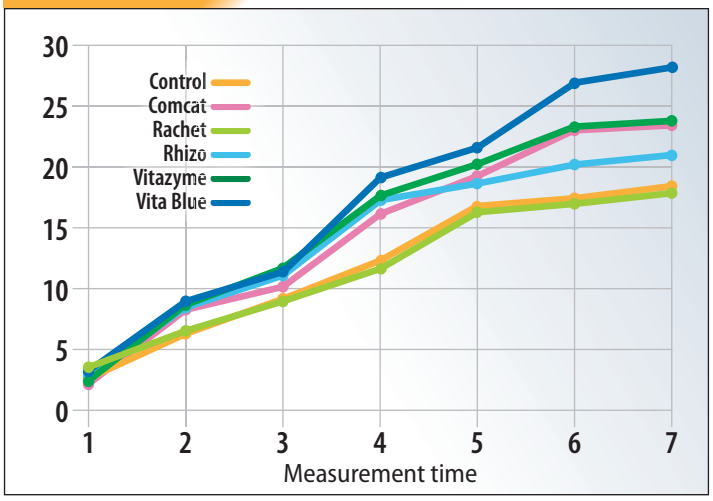
Researchers & organization: Personnel at the Research and Development Division, An Giang Plant Protection Joint Stock Company, Long Xuyen City, An Giang Province, Viet Nam.
Location: Hamlet 3, Tan Tay Village, Go Cong District, Tien Giang Province, Viet Nam
Variety: unknown
Planting date: April 21, 2015
Experimental design: Plot areas at 80 m^2 were prepared to evaluate the relative merits of several products on Chinese cabbage growth and yield. Products were applied two times.

Product	Dilute rate	Application rate
Control	0	0
Comcat 150 WP	0.3125 g/liter	0.125 kg/ha
Rachet	1.5 ml/liter	0.6 liter/ha
Rhizomyx 2.5 G	1 kg/1,000m^2	10 kg/ha
Vitazyme	3.125 ml/liter	1.25 liters/ha
*Vitazyme Blue	3.125 ml/liter	1.25 liters/ha

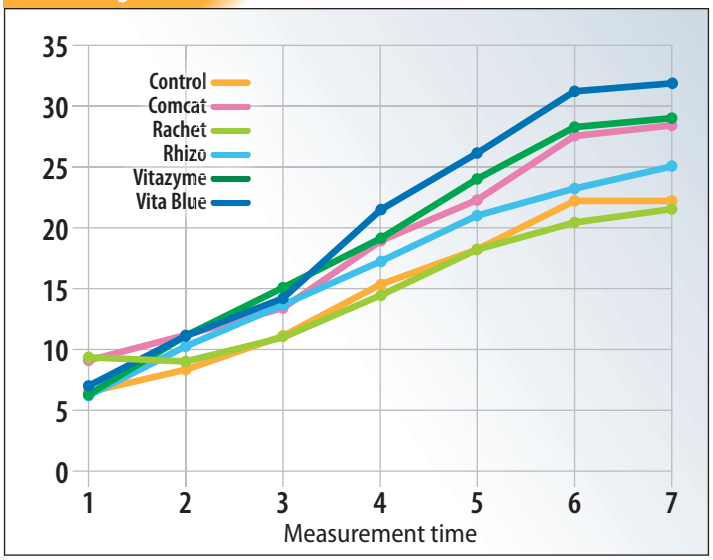
*Vitazyme Blue is a version of Vitazyme containing cobalt and certain other added components for greater responses in specialty crops.

Fertilization: (1) Before planting 4 to 5 days, 100 kg/1,000 m^2 P_2O_5; (2) seven days after planting 10 kg/1,000 m^2 urea (46% N); (3) 15 days after planting, 10 kg/1,000 m^2 urea and 5 kg/1,000 m^2 DAP (di-ammonium phosphate); (4) 25 days after planting, 7 kg/1,000 m^2 urea and 5 kg/1,000 m^2 DAP; (5) 32 days after planting, 20 kg/1,000 m^2 urea and 30 kg/1,000 m^2 16-16-8 % N - P_2O_5- K_2O
Product application: at the times shown above on April 21 (10 days after planting) and April 29 (18 days after planting).
Plant growth results: Thirty selected average plants for each plot were measured just before the product applications, and then every 7 days until harvest.

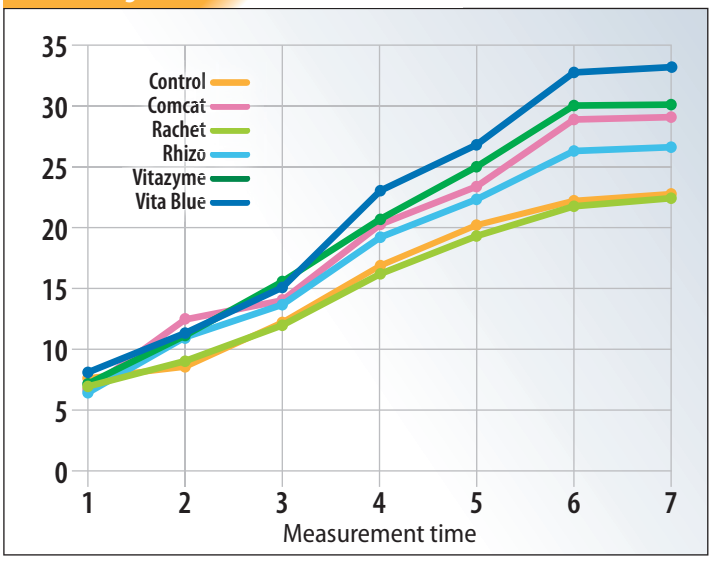
Leaf Width, cm



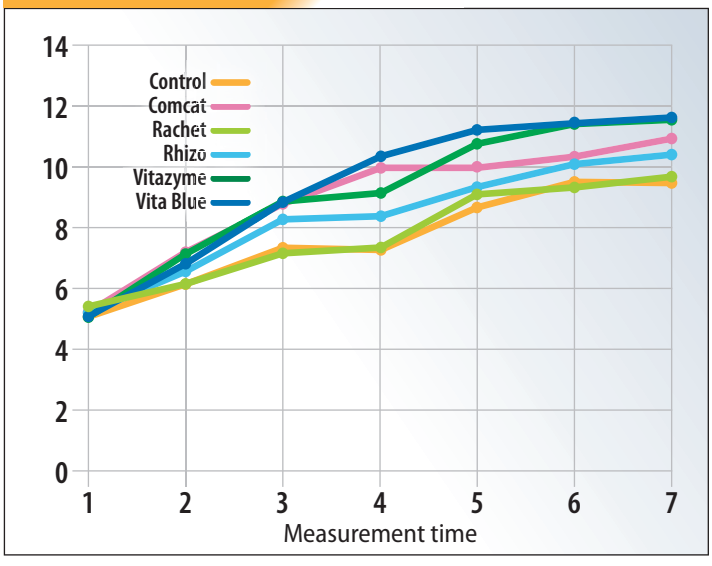
Leaf Length, cm



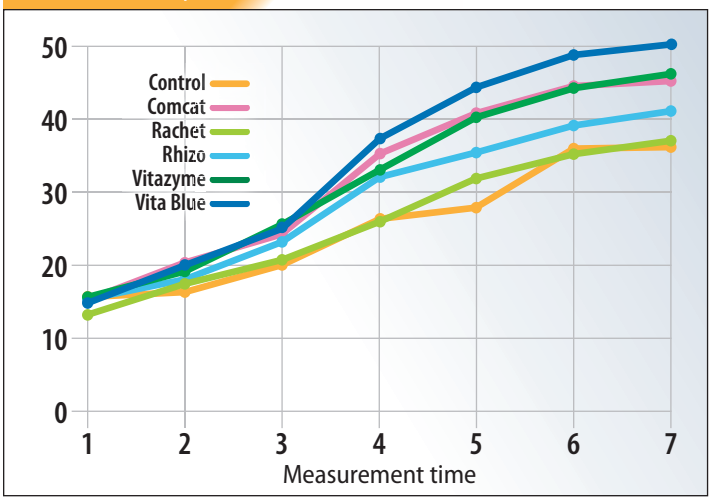
Plant Height, cm



Leaf Number, Per Plant

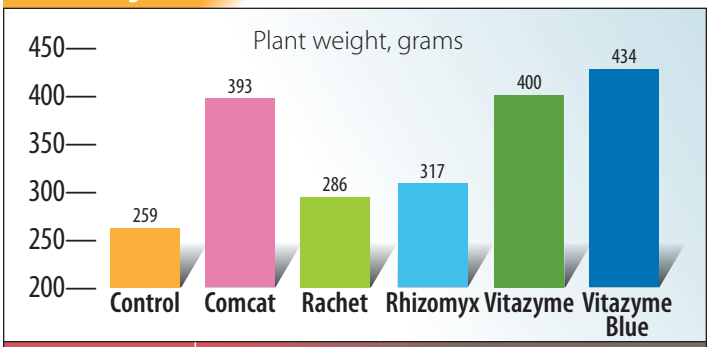


Head Diameter, cm



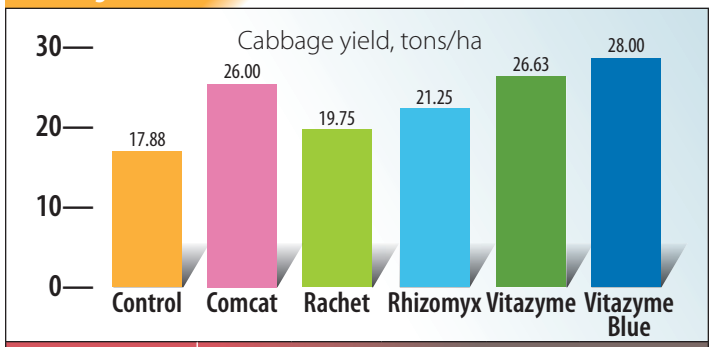
Conclusion: This Vietnamese demonstration trial, using plots that were 80m^2, and with sampling of 30 selected plants at seven times during the growing period, revealed that Vitazyme Blue performed the best in terms of plant height, leaf width, leaf length, leaf numbers, head diameter, plant weight (+67.6%), and final yield (+56.6%). These values were followed by Vitazyme, which increased plant weight by 54.4%, and final yield by 48.9%. Comcat 150 WP was slightly below Vitazyme in terms of growth response and yield, while Rachet and Rhizomyx 25G produced much lower yield increases. These results show the great efficiency of Vitazyme Blue as a yield-promoting agent for Chinese cabbage growers in Viet Nam, and also Vitazyme, followed by Comcat 150 WP.

Plant Weight



Increase above the Control:	51.7%	10.4%	22.4%	54.4%	67.6%

Cabbage Yield



Increase above the Control:	45.4%	10.5%	18.8%	48.9%	56.6%

Vitazyme Field Tests for 2015

Canola *with Vitazyme application*

Researchers: Jacob Hesseltine and Heba Khalid
Research organization: Vital Grow Distribution LLC, Waterville, Washington
Farmer: Jorgenson Brothers
Location: Coulee City, Washington
Variety: High Class 115 spring canola, Roudup Ready
Planting date: last week of April
Seeding rate: 3.5 lb/acre
Seedbed preparation: plowing, rod weeding
Previous crop: fallow in 2014, with fall canola, which froze out
Soil type: sandy loam
Experimental design: A 240-acre spring canola field was divided by a dirt road, which served as a separation for a 70-acre area treated with Vitazyme. The purpose of the study was to evaluate the effect of this product on plant characteristics.

Note the marked increase in pod number per plant and pod size with Vitazyme.

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

Fertilization: 50 lb/acre of nitrogen in the fall of 2014

Vitazyme application: 13 oz/acre sprayed on the plants and soil in the spring, along with Roundup (glyphosate), using a 90-foot sprayer

Growing season weather: a very dry and hot summer

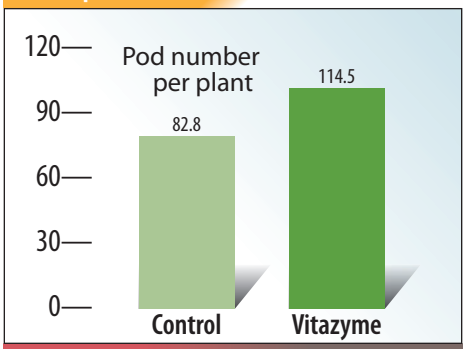
Harvest date: last part of August, 2015

Plant parameter results: On July 14, 10 typical plants were dug from both of the two treated areas, near to each other to minimize soil differences, to evaluate several plant parameters.

Conclusion: This split field spring canola trial in Washington, using just one Vitazyme application of 13 oz/acre, produced excellent plant responses when evaluated during the mid-growth period. Plant height was increased by 8%, pods per plant by 38%, stalk diameter by 27%, pod weight per plant by 47%, and average pod weight by 6%. These improvements set the stage for great yield increases, especially the greater pod number and weight per plant. It was not possible to separate the field areas for a yield evaluation, but it is presumed that a considerably greater yield was achieved on the Vitazyme treated area of the field.

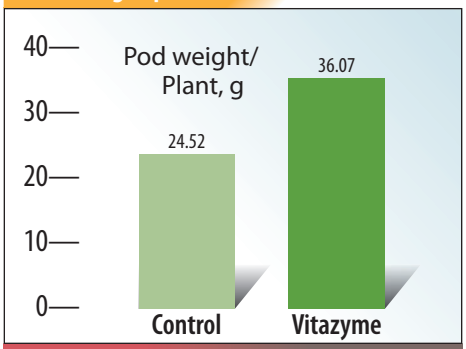
These results agree with responses of canola to Vitazyme noted in many other places across North America and the world, showing the great efficacy of this program for canola growers.

Pods per Plant



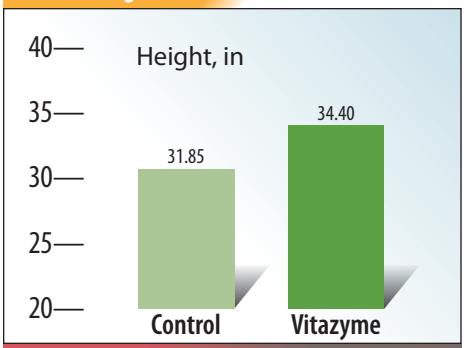
Increase with Vitazyme: 38%

Pod Weight per Plant



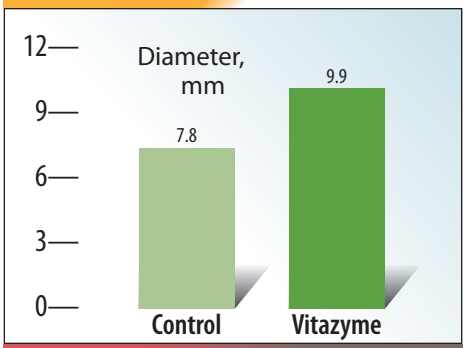
Increase with Vitazyme: 47%

Plant Height



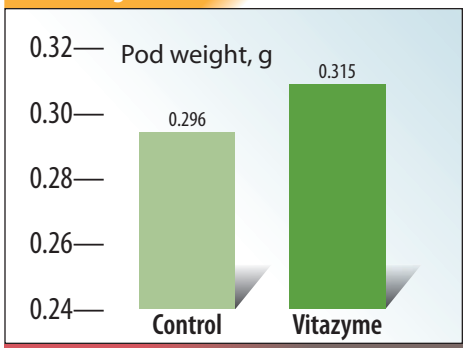
Increase with Vitazyme: 8%

Stalk Diameter



Increase with Vitazyme: 27%

Pod Weight



Increase with Vitazyme: 6%

Vitazyme Field Tests for 2015

Canola *A study conducted in 2013*

Research organization: SF- Soepenberg s.r.o., Trnava, Slovakia,

Farmer cooperation: Jatov Trnovec, Vahom, Slovakia

Variety: unknown

Experimental design: A canola field was divided into Vitazyme treated and untreated areas to evaluate the effect of this product on the yield of seeds.

1 Control 2 Vitazyme

Fertilization: unknown

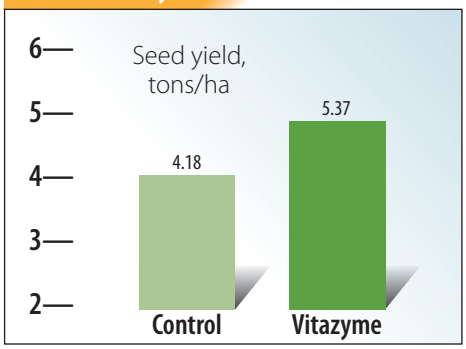
Vitazyme application: 1 liter/ha on the leaves and soil 50 days after planting, at flower formation along with fungicide and insecticide

Yield results:

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	4.18	—
Vitazyme	5.37	1.19 (+28%)

Increase in canola seed yield with Vitazyme: 28%

Canola seed yield



Conclusion: An excellent 28% yield increase resulted from a single 1 liter/ha Vitazyme application, applied 50 days after planting. Such results illustrate the great value of this product for canola growers in Slovakia.

Cantaloupe *with Vitazyme application*

Researcher: Agustin Peralta
Research organization: Quimica Lucava, Mexico
Farmer cooperation: Agr. Felipe Cuevas, manager
Location: Macsteca Melon Farm, Ceballos, Municipality of Mapimi, Durango, Mexico
Variety: Harris Moran Expedition
Transplanting date: April 22, 2015
Plant population: 20,000/ha
Row spacing: 2 meters
In-row density: 4 plants/meter
Experimental design: A cantaloupe field was utilized to evaluate Vitazyme's ability to enhance the growth, yield, and income of the crop. The treated area of the field was 2m X 260 m (0.052 ha).

A transplant dip and one foliar Vitazyme application produced an excellent 14% increase in melon yield for this Mexican trial.

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

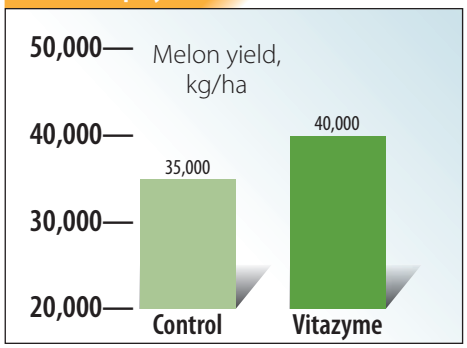
Vitazyme application: (1) a root drench at each plant site 6 days after transplanting (April 28, 2015), at 1.0 liter/ha; (2) a leaf and soil spray 30 days later (May 28, 2015), at 1 liter/ha.
Growth results: The vine length of the Vitazyme treated plants was 10 to 15 cm greater than for the control plants, and the leaves were darker green.
Yield results:

Treatment	Number[1]	Yield	Yield change
	melons/ha	kg/ha	kg/ha
Control	17,500	35,000	—
Vitazyme	20,000	40,000	5,000 (+14%)

[1]Average melon weight for both treatments was 2 kg.

Increase in melon yield with Vitazyme: 14%

Cantaloupe yield



Income results: Cantaloupe price is calculated at 0.065 U.S.D./kg, less product and application costs, giving 260 USD/ha added profit. The cost : benefit is thus 4.0.
Conclusion: A cantaloupe study in Mexico in 2015 revealed that a transplant drench, plus one more Vitazyme application at 1.0 liter/ha, increased melon yield by a substantial 14%. The income was increased by 260 U.S.D./ha, with a cost : benefit of 4.0. These results display the great efficacy of using Vitazyme for melon production in Mexico.

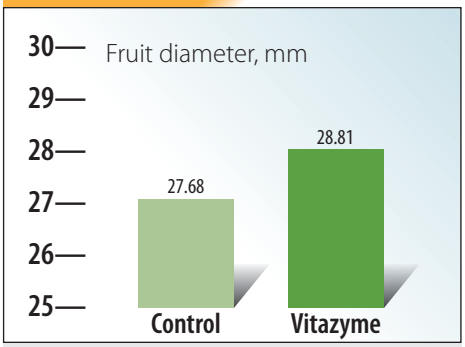
Bing Cherries *with Vitazyme application*

Researcher: Jacob Hesseltine
Research Organization: Vital Grow Distribution LLC, Waterville, Washington
Farmer: Peter Dufault, Double D Farms
Location: Mattawa, Washington
Variety: Bing
Rootstock: Mazzard
Tree age: 26 years
Tree spacing: 20 x 20 feet
Soil type: sandy loam
Experimental design: A 10-acre cherry block was divided into 5 acres of Vitazyme treatment (north half) and 5 acres for a control (south half) to discover the effect of the product on cherry size and quality.

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

Fertilization: 10 to 15 lb/acre of liquid urea the fall of 2014, 50 lb/acre of nitrogen in the spring
Vitazyme application: 16 oz/acre applied four times: (1) shuck fall; (2) 7 days later; (3) 7 days after application 2; (4) 7 days after application 3. A Rears Powerblast Sprayer applied 100 to 200 gal/acre at 3 mph, with 16 to 18 rpm.
Growing season weather: generally good, since harvesting was complete before the summer heat
Harvest dates: June 10 and 11, 2015

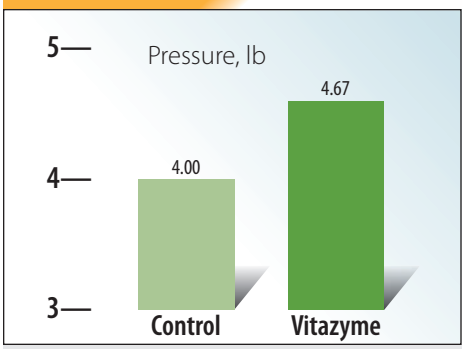
Fruit Size[1]



[1]Using a standard cherry sizer card.

Increase in size with Vitazyme: 4%

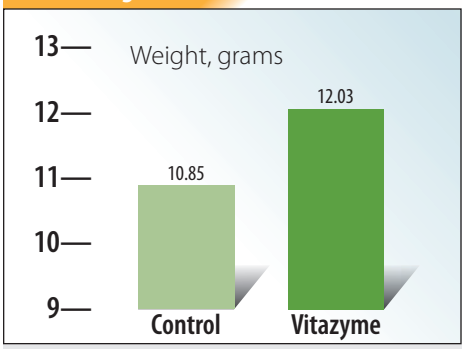
Fruit Pressure[1]



[1]Using a QA Supplies FT327 penetrometer.

Increase in pressure with Vitazyme: 17%

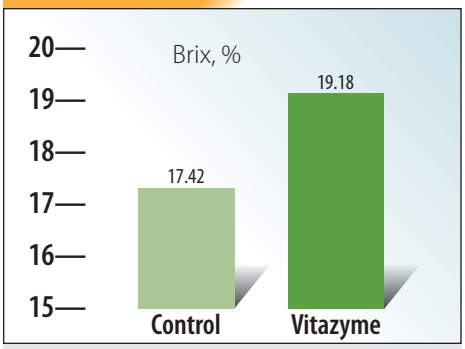
Fruit Weight[1]



[1]Using a Matrix-500 scale.

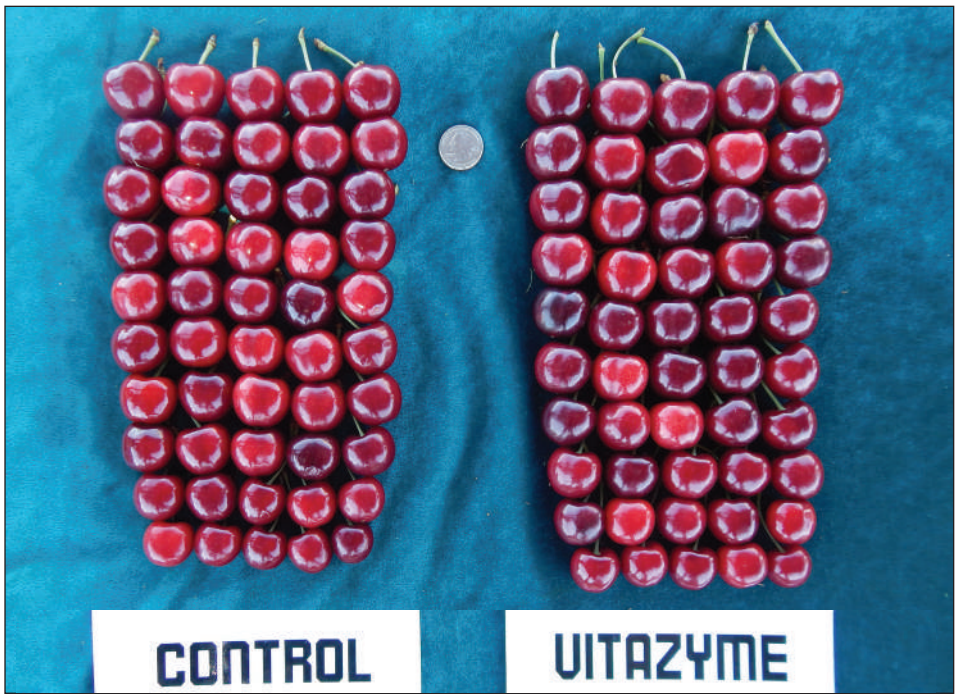
Increase in weight with Vitazyme: 11%

Fruit Brix[1]



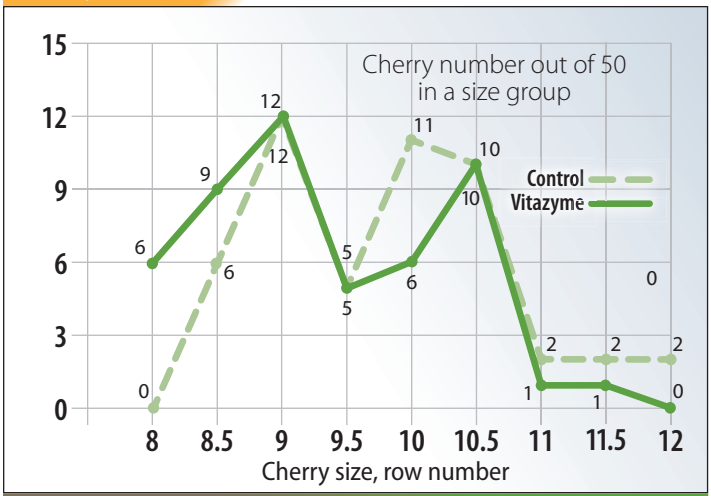
[1]Using an Atago PAL-1 Refractometer.

Increase with Vitazyme: 1.76%-points



The great difference in cherry size and weight is apparent in this comparison of 50 average fruit for the two treatments. Brix and pressure were also improved with Vitazyme.

Cherry number



	9.5 row or larger	10 row or smaller
Control	46%	54%
Vitazyme	64%	36%

Size and quality evaluations: On June 10, 50 typical cherries from both treatments were picked from several trees in the same vicinity to evaluate fruit parameters.

Conclusion: Applying Vitazyme four times at 16 oz/acre in this Washington Bing cherry trial resulted in substantial improvements in fruit size and quality. Size increased by 4%, weight by 11%, pressure by 17%, and Brix by 1.76 percentage-points, showing that sweeter, firmer cherries resulted which are favorable qualities for consumer acceptance, shipping, and storage. The size grades were moved to the larger 8 and 8.5-row sizes. The yield, though not measured, would likely have increased about 11%, if the cherry numbers were the same for both treatments. These results show the great efficacy of Vitazyme for cherry production in Washington.

Bing Cherries *with Vitazyme application*

Untreated Bing cherries at St. Hilaire were generally smaller than the treated fruit, with less fruit sugar and pressure.

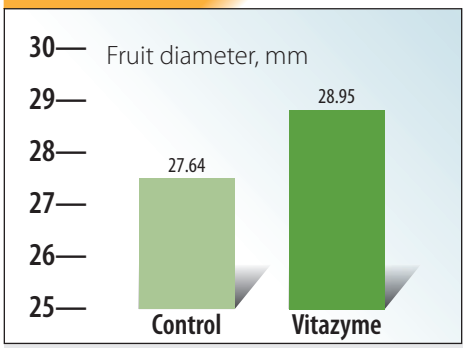
With Vitazyme applied four times, the fruit responded with greater size and quality, giving 70% of 9.5-row or larger cherries.

Researcher: Jacob Hesseltine
Research Organization: Vital Grow Distribution LLC, Waterville, Washington
Farmers: St. Hilaire & Sons
Location: Kennewick, Washington
Variety: Bing
Rootstock: Mazzard
Tree age: 32 years
Tree spacing: 20 x 20 feet (60 trees/row)
Soil type: sandy loam
Experimental design: Nine rows of a 13.5-acre cherry block were treated with Vitazyme, with the remaining rows left as controls to discover the effect of the product on cherry size and quality. Rainier trees were interspersed in the block.

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

Fertilization: standard nutrient program
Vitazyme application: 16 oz/acre applied four times: (1) "popcorn" stage; (2) petal fall; (3) first cover; (4) 30 days before harvest. An airblast sprayer applied 100 to 200 gal/acre.
Growing season weather: generally good, with the harvest complete before the greatest heat stress.
Harvest dates: June 7 and 8, 2015
Size and quality evaluations: On June 7, 50 typical cherries from both treatments were picked from several trees in the same vicinity to evaluate fruit parameters.

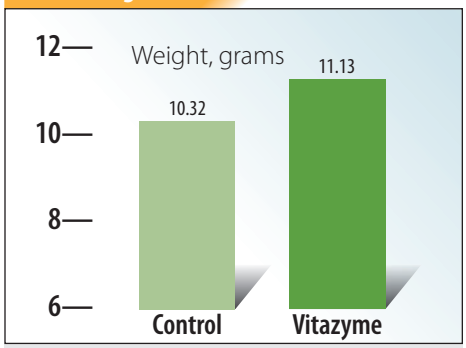
Fruit Size[1]



[1]Using a standard cherry sizer card.

Increase in size with Vitazyme: 5%

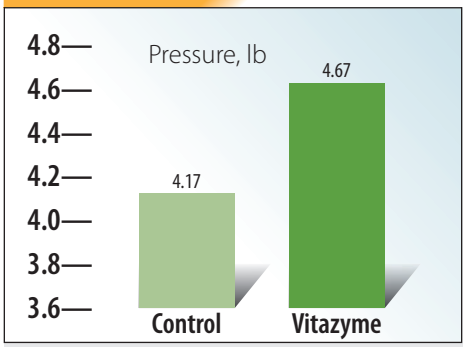
Fruit Weight[1]



[1]Using a Matrix-500 scale.

Increase in weight with Vitazyme: 8%

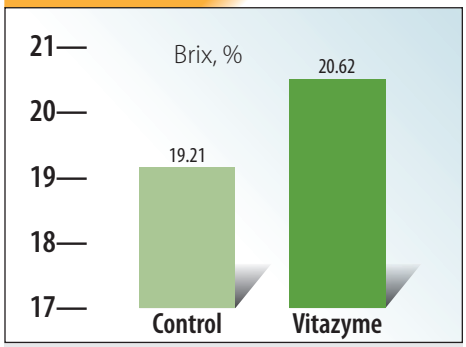
Fruit Pressure[1]



[1]Using a QA Supplies FT327 penetrometer.

Increase in pressure with Vitazyme: 11%

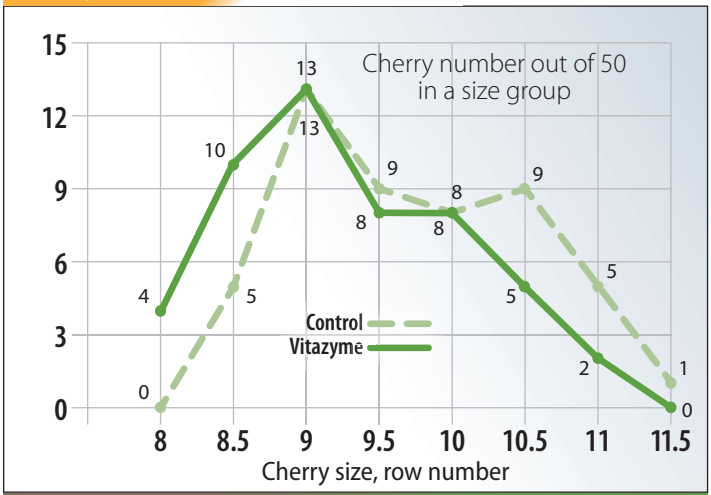
Fruit Brix[1]



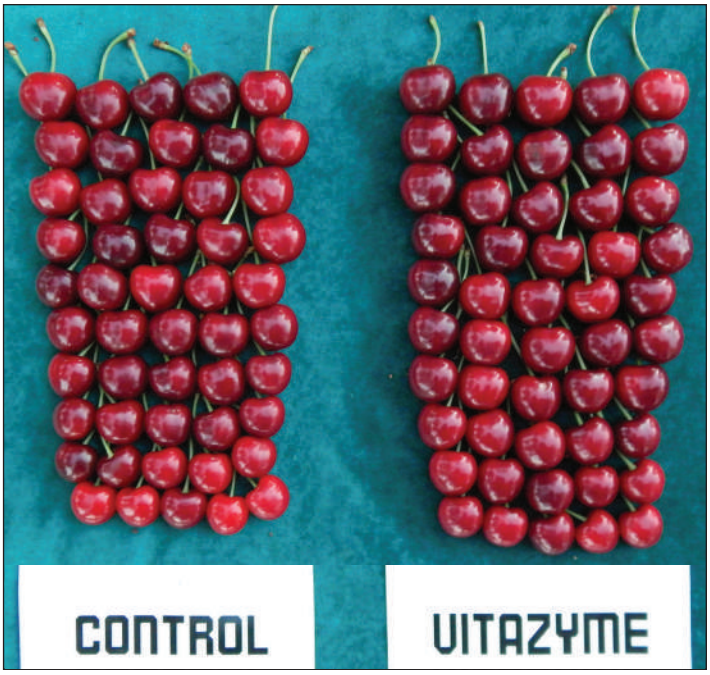
[1]Using an Atago PAL-1 Refractometer.

Increase with Vitazyme: 1.41%-points

Cherry number



	9.5 row or larger	10 row or smaller
Control	54%	46%
Vitazyme	70%	30%



The size and weight improvement for these Bing cherries at St. Hilaire orchard is obvious in this comparison of 50 typical fruit from both treatments.

Conclusion: A Bing cherry trial in Washington, utilizing Vitazyme in four 16 oz/acre applications from popcorn stage to 30 days before harvest, resulted in excellent responses of fruit: 5% increase in diameter, 8% increase in weight, 11% more pressure, and 1.41 percentage-points higher Brix . The treated cherries were larger on average as well. The cherries were firmer, sweeter, and larger than those produced by the untreated control, and would be more acceptable to the consumer and to shippers. The results show the excellent efficacy of this product for cherry growers in Washington.

Vitazyme Field Tests for 2015

Bing Cherries *with Vitazyme application*

Bing cherries at St. Hilaire & Sons Orchard that were untreated were smaller and less sweet than the treated fruit (see the accompanying photo)

These St. Hilaire Bing cherries are larger, better colored, sweeter, and firmer than the untreated fruit; four applications caused this effect.

Researcher: Jacob Hesseltine
Research Organization: Vital Grow Distribution LLC, Waterville, Washington
Farmers: St. Hilaire & Sons
Location: Kennewick, Washington

Variety: Bing
Rootstock: Mazzard
Tree age: 25 years
Tree spacing: 20 x 20 feet (60 trees/row)
Soil type: sandy loam

Experimental design: On a 35-acre block of Bing cherries, 12 rows were treated with Vitazyme, while the untreated rows served as controls. Rainier trees were interspersed among the Bing

cherry trees. The objective of the trial was to evaluate the effect of Vitazyme on cherry size and quality.

1 Control 2 Vitazyme

Fertilization: standard nutrient program

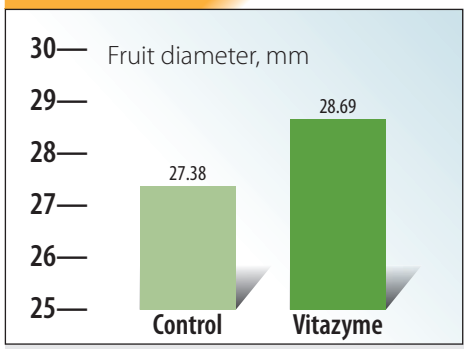
Vitazyme application: 16 oz/acre applied four times: (1) "popcorn" stage; (2) petal fall; (3) first cover; (4) 30 days before harvest, using an airblast sprayer at 100 to 200 gal/acre.

Growing season weather: generally good, with the harvest completed before the hottest summer temperatures arrived

Size and quality evaluations: On June 7, 50 typical cherries from both treatments were picked from several trees in the same vicinity to evaluate fruit parameters.

Conclusion: Bing cherries were trialed in Washington to determine the effect of Vitazyme biostimulant on the size and quality of the fruit. Four applications, from popcorn stage to 30 days before harvest, were applied at 16 oz/acre with an airblast sprayer, and caused excellent size and weight improvements (5% and 12%, respectively), along with many more cherries greater than 9.5-row, and fewer less than 10-row fruit, than in the untreated control. Fruit pressure was increased by 4%, and fruit Brix by 1.44 percentage-points. These excellent results prove the efficacy of this brassinosteroid-based product for cherry growers in the Pacific Northwest.

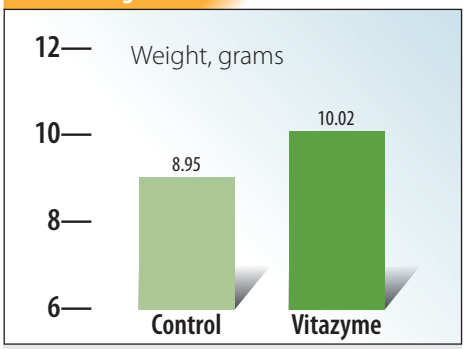
Fruit Size[1]



[1]Using a standard cherry sizer card.

Increase in size with Vitazyme: 5%

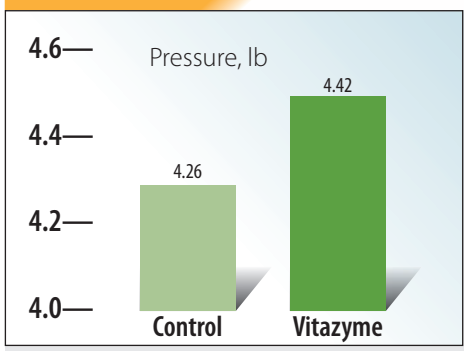
Fruit Weight[1]



[1]Using a Matrix-500 scale.

Increase in weight with Vitazyme: 12%

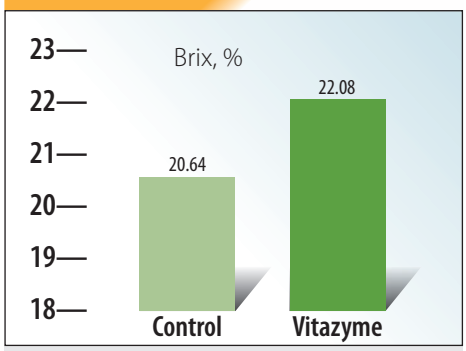
Fruit Pressure[1]



[1]Using a QA Supplies FT327 penetrometer.

Increase in pressure with Vitazyme: 4%

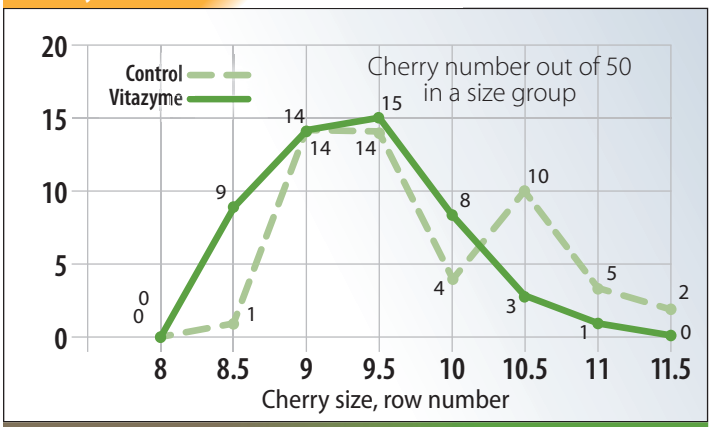
Fruit Brix[1]



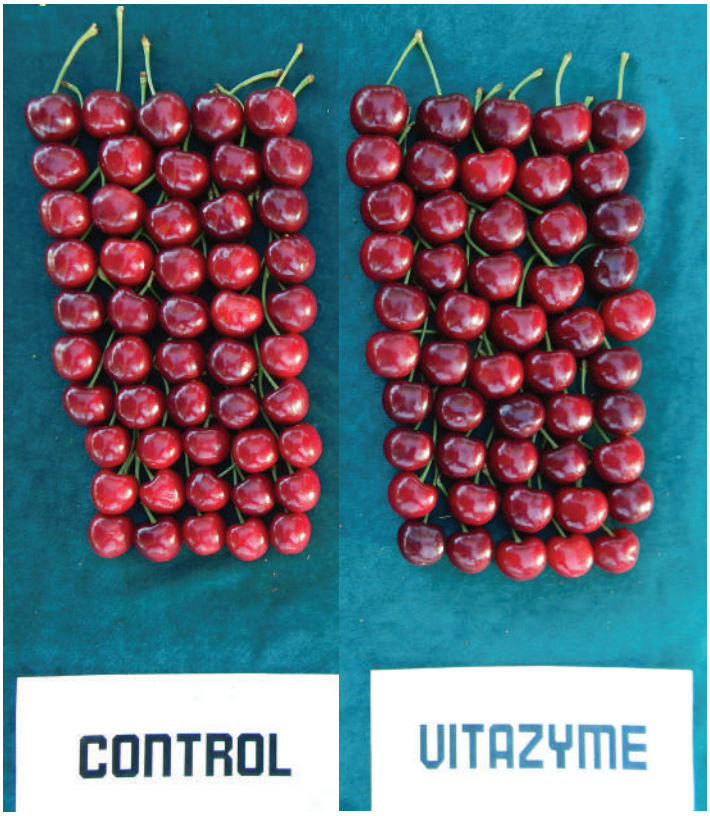
[1]Using an Atago PAL-1 Refractometer.

Increase with Vitazyme: 1.44%-points

Cherry number

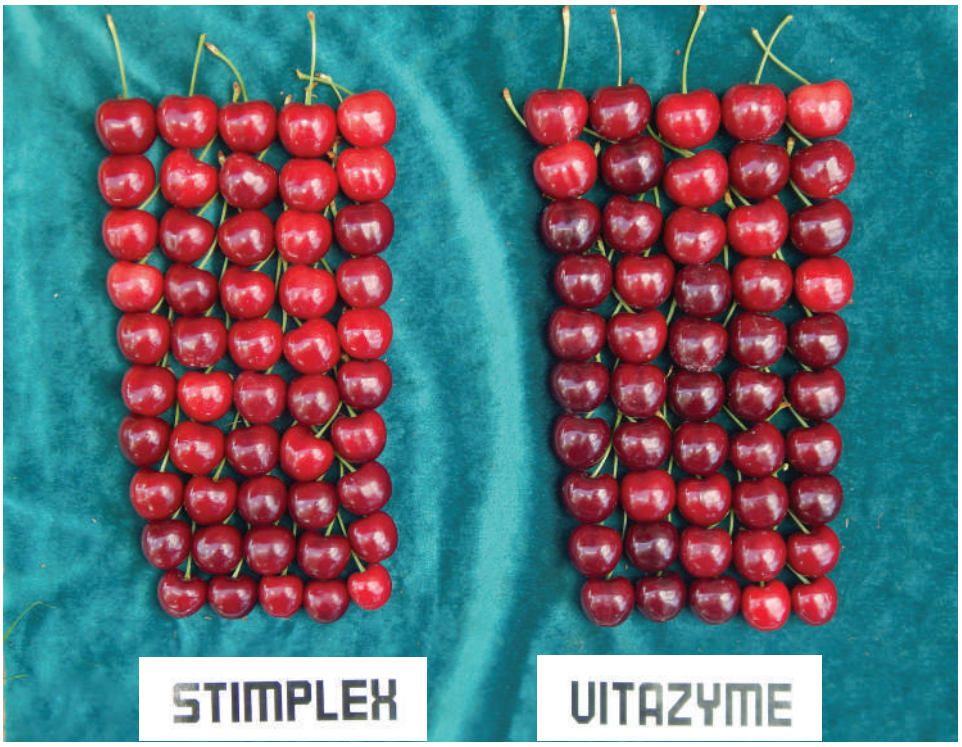


	9.5 row or larger	10 row or smaller
Control	58%	42%
Vitazyme	76%	24%



A comparison of typical fruit from the four treatments at this St. Hilaire & Sons Bing trial reveals a large difference in fruit size and quality from Vitazyme use..

Bing Cherries *with Vitazyme application*



Bing cherries at Skelton Farms that were treated with Stimplex were smaller and less sweet than the Vitazyme treated fruit.

Researcher: Jacob Hesseltine
Research Organization: Vital Grow Distribution LLC, Waterville, Washington
Farmers: Ed and Chris Skelton
Location: Pasco, Washington
Variety: Bing
Rootstock: Colt
Tree age: unknown
Tree spacing: 20 x 20 feet
Experimental design: A 10-acre cherry block was divided into 4 acres of Vitazyme treatment and 6 acres of Stimplex seaweed treatment to discover the effect of the two products on cherry size and quality.

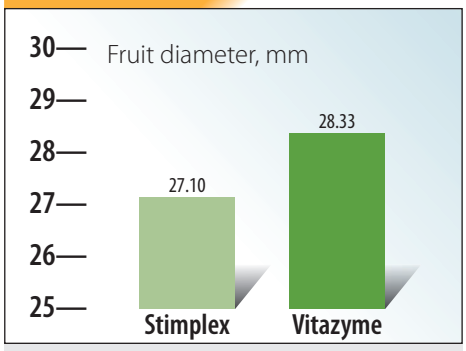
1 ***Stimplex*** **2** ***Vitazyme***

Fertilization: Standard nutrient program
Vitazyme application: 16 oz/acre applied three times: (1) petal fall; (2) 10 days later; (3) 10 days after the second application; an Accutech Airblast Raven sprayer applied 100 gal/acre at 2.5 to 3.0 mph.
Stimplex application: standard program recommendation, using three applications at the same times as for Vitazyme
Growing season weather: an early, warm spring followed by extreme summer heat that delayed maturity, coloring, and fruit finish

Size and quality evaluations: On June 12, 50 typical cherries from both treatments were picked from several trees in the same vicinity to evaluate fruit parameters.

Conclusion: This comparison between Vitazyme and Stimplex for treating cherries in Washington, using three applications of each, revealed that Vitazyme improved the diameter (+5%) and weight (+8%) of the fruit, plus pressure (+4%) and Brix (+1.19 percentage-point) more than did Stimplex. The fruit size was moved towards the larger grades, and if yield would have been measured it is likely that an 8% increase would have been achieved, based on similar fruit loads for both treatments. This study proves the great utility of Vitazyme as a cherry size and quality enhancer.

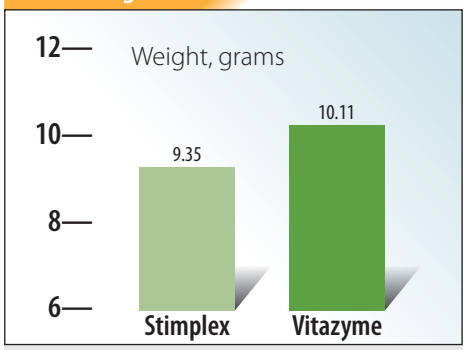
Fruit Size[1]



[1]Using a standard cherry sizer card.

Increase in size with Vitazyme: 5%

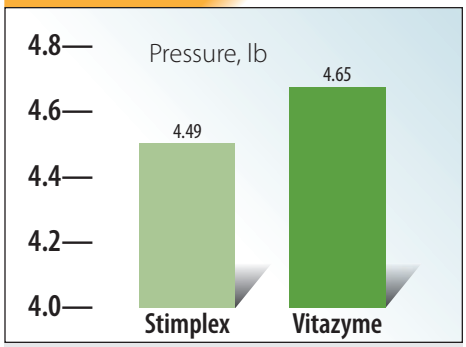
Fruit Weight[1]



[1]Using a Matrix-500 scale.

Increase in weight with Vitazyme:8%

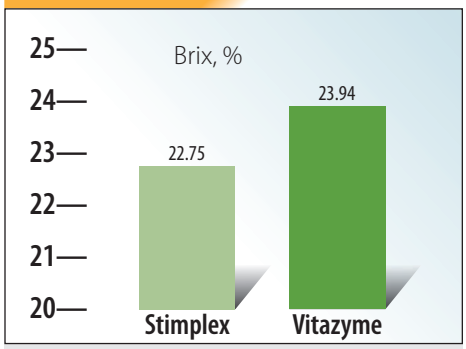
Fruit Pressure[1]



[1]Using a QA Supplies FT327 penetrometer.

Increase in pressure with Vitazyme: 4%

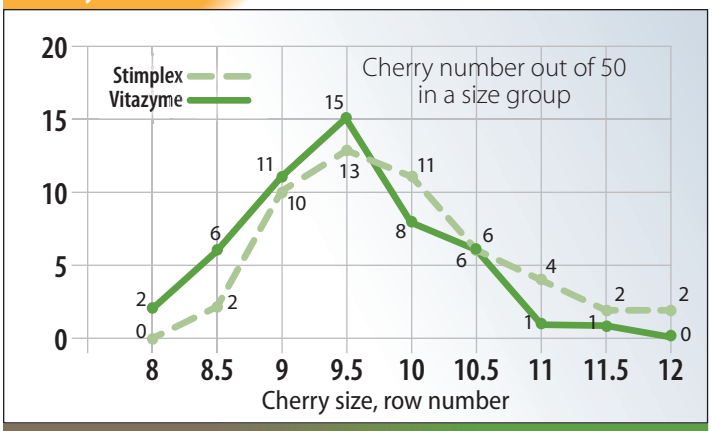
Fruit Brix[1]



[1]Using an Atago PAL-1 Refractometer.

Increase with Vitazyme: 1.19%-points

Cherry number



	9.5 row or larger	10 row or smaller
Stimplex	50%	50%
Vitazyme	68%	32%

Vitazyme Field Tests for 2015

Bing Cherries *with Vitazyme application*

The Stimplex treated Bing cherries at Pleasant Ridge Organic show a typical growth pattern, but are inferior in size and quality to the Vitazyme treated fruit; see the accompanying photo.

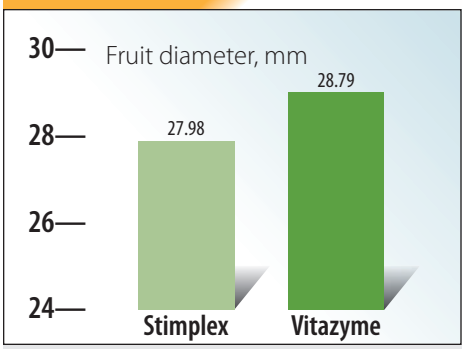
Note the superior coloration, size, and density of the Bing cherry crop after four Vitazyme applications.

Researcher: Jacob Hesseltine, Vital Grow Distribution LLC, Waterville, Washington
Farmers: Brian Tallbot and Paul Carter, Pleasant Ridge Organic
Location: Wallula, Washington
Variety: Bing
Rootstock: Mazzard
Tree spacing: 20 x 24 feet
Tree age: 29 years (planted in 1986)
Experimental design: A 36.3-acre organic cherry orchard, comprising three blocks, was divided into halves (east and west); Vitazyme was applied to the western half, while Stimplex seaweed was applied to the eastern half. The purpose of the trial was to evaluate the effect of both products on cherry size and quality for a comparison.

❶ *Stimplex* ❷ *Vitazyme*

Fertilization: Fall of 2014: 1,000 lb/acre of manure; 600 lb/acre of Perfect Blend Chicken Compost. Spring of 2015: 1,000 lb/acre of manure; 600 lb/acre of Perfect Blend Chicken Compost; 1,000 lb/acre of gypsum; fish, leaf applied; micro-nutrients, leaf applied.
Vitazyme application: 16 oz/acre four times, at full bloom (April 4), petal fall (April 10), shuck fall (April 18), and second shuck fall (April 25), using a Rear's Power Blast orchard sprayer, 2.4 mph, at 200 gal/acre of water.
Stimplex application: 56 oz/acre four times at the same time as for Vitazyme, using the same sprayer. An additional application of 80 oz/acre was sprayed over all areas, including the Vitazyme half, on May 4.
Pesticide application: worm control with Dipel (Bacillus thuringiensis); fireblight control with Serenade bacteriacide
Harvest dates: June 8 to 14, 2015
Growing season weather: mostly favorable, with early spring warmth and high temperatures during harvest
Quality results: Fruit was sampled on June 11, during harvest. Fifty typical cherries were picked from both treatments nearby one another and evaluated for several parameters.

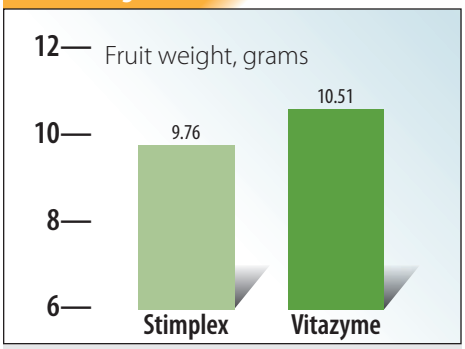
Fruit Size[1]



[1]Using a standard cherry sizer card.

Increase in size with Vitazyme: 3%

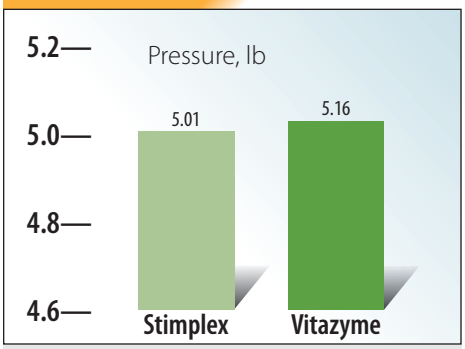
Fruit Weight[1]



[1]Using a Matrix-500 scale.

Increase in weight with Vitazyme: 8%

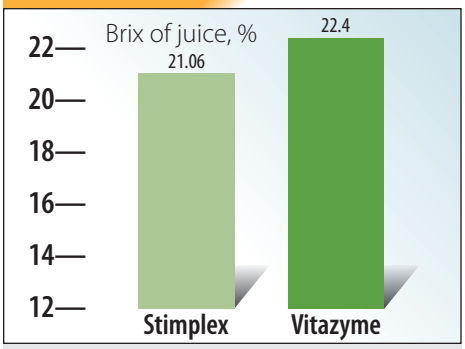
Fruit Pressure[1]



[1]Using a QA Supplies FT327 penetrometer.

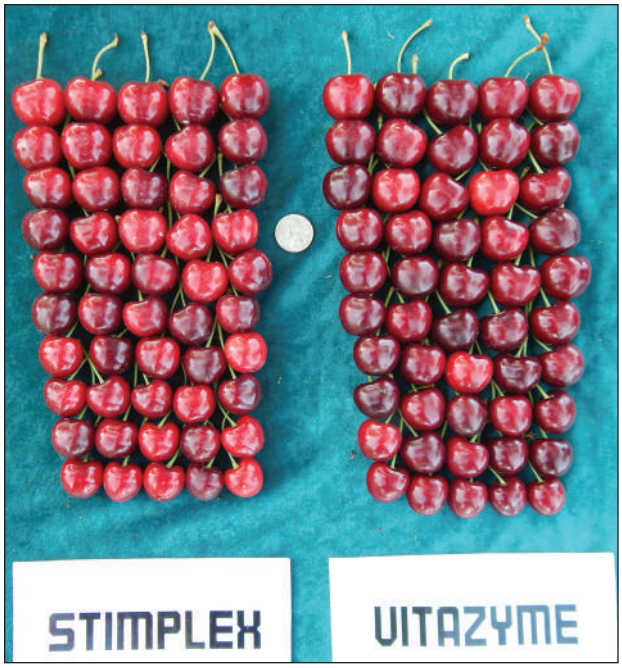
Increase in pressure with Vitazyme: 3%

Fruit Brix[1]



[1]Using an Atago PAL-1 Refractometer.

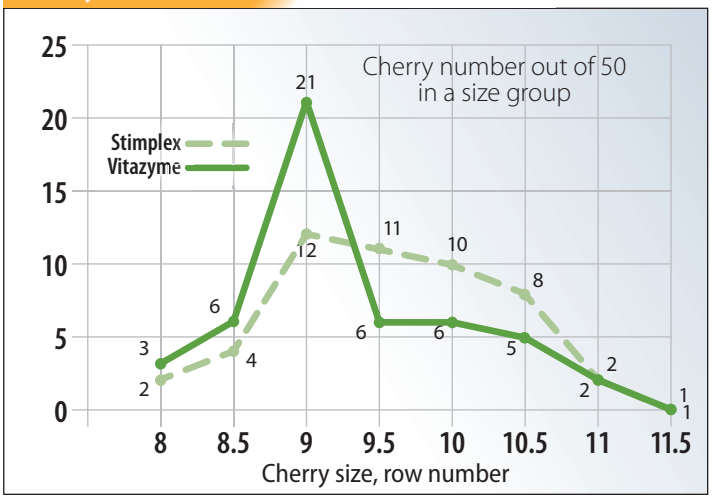
Increase with Vitazyme: 1.34%-points



The Vitazyme treated organic cherries here are 8% heavier, 3% higher in pressure, and 1.34% greater in Brix than the Stimplex treated fruit.

Conclusion: A Bing cherry trial in Washington proved that Vitazyme improved cherry quality considerably above fruit treated with Stimplex seaweed. Fruit diameter was improved by 3%, weight by 8%, pressure by 3%, and Brix by 1.34 percentage points. Fruit size was moved to larger sizes as well, with 9 row fruit most common with Vitazyme, and 9.5 row or larger being 72% of the total versus 58% for Stimplex; Vitazyme also produced fewer small cherries. The yield increase for Vitazyme was likely at least 8%, which was the increase in average fruit weight.

Cherry Size Distribution



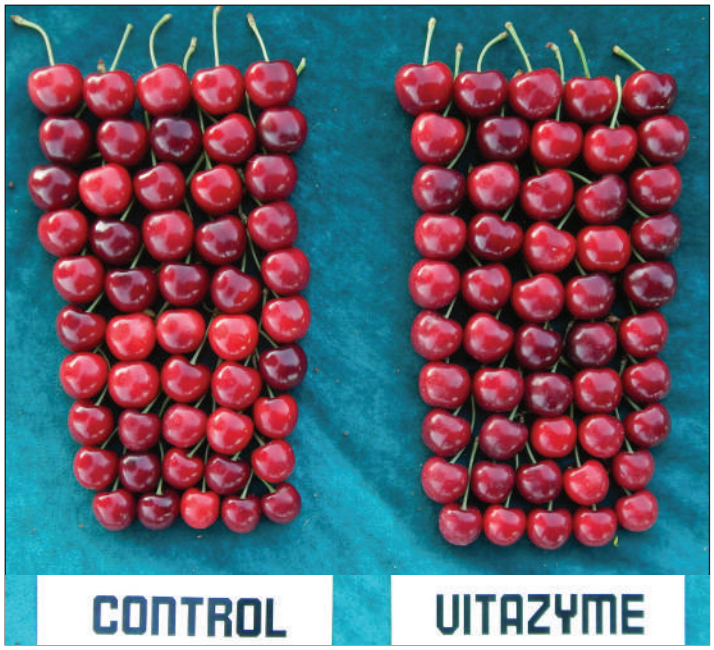
Vitazyme clearly produced larger cherries, moving the sizes toward the lower row numbers, with fewer small fruit.

	9.5 row or larger	10 row or smaller
Stimplex	58%	42%
Vitazyme	72%	28%

Economic results: Four applications are considered below.

Product	Cost	Rate	Cost/Application	Total Cost
	$/gal	oz/application	$/application	$/acre
Stimplex	50 (0.391/oz)	56	21.89	87.58
Vitazyme	60 (0.469/oz)	16	7.50	30.00
Cost savings with Vitazyme (four applications): $57.58/acre				

Bing Cherries *with Vitazyme application*



Two Vitazyme applications on Bing cherries at Weber Orchards produced bigger sized fruit than the control, with only 22% 10-row and smaller.

Notice the fine size and color of these Vitazyme treated Bing cherries at Weber Orchards.

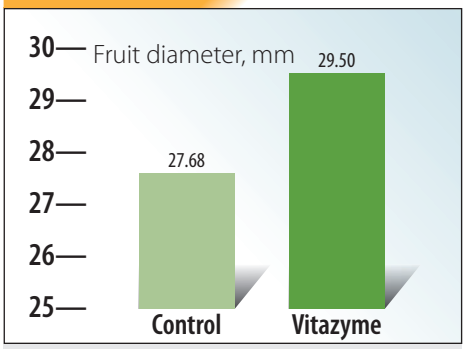
Researcher: Jacob Hesseltine
Research organization: Vital Grow Distribution LLC, Waterville, Washington
Farmer: Columbia River Investors (Weber Orchards)
Location: Rock Island, Washington
Variety: Bing
Rootstock: Mazzard
Tree age: 52 years (planted in 1963)
Tree spacing: 20 x 20 feet
Experimental design: Of a 19-acre cherry block, five acres on the east side were treated with Vitazyme to determine the product's effect on cherry size and quality. The untreated area served as a control.

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

Fertilization: 70 lb/acre of nitrogen, and 1 lb/acre of boron.
Vitazyme application: 16 oz/acre applied two times: (1) at first cover, and (2) 10 days later, using a Progressive Ag Lectro Blast sprayer (3.2 mph, 80 gal/acre)
Growing season weather: favorable, and harvested before high summer temperatures
Harvest dates: June 9, 2015
Growing season weather: mostly favorable, with the early spring warmth and high temperatures during harvest.

Size and quality results: On June 8, one day before harvest, 50 typical cherries from both treatments were collected and evaluted.

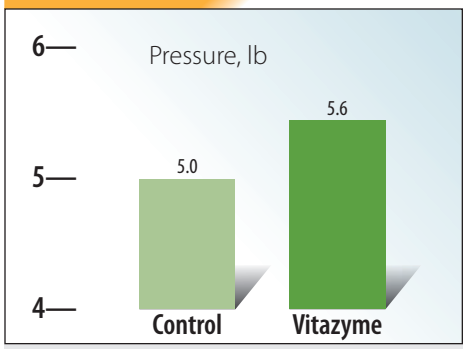
Fruit Size[1]



[1]Using a standard cherry sizer card.

Increase in size with Vitazyme: 7%

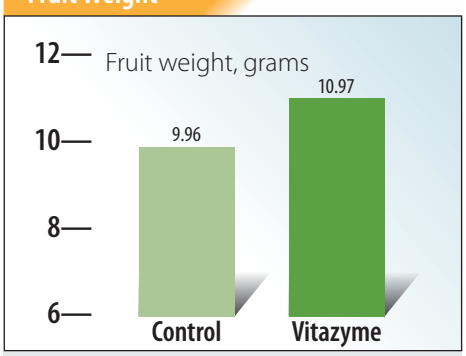
Fruit Pressure[1]



[1]Using a QA Supplies FT327 Penetrometer.

Increase in pressure with Vitazyme: 12%

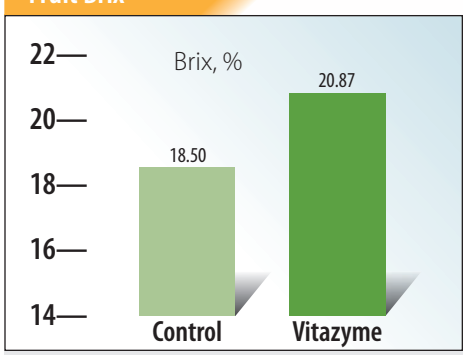
Fruit Weight[1]



[1]Using a Matrix-500 scale.

Increase in weight with Vitazyme: 10%

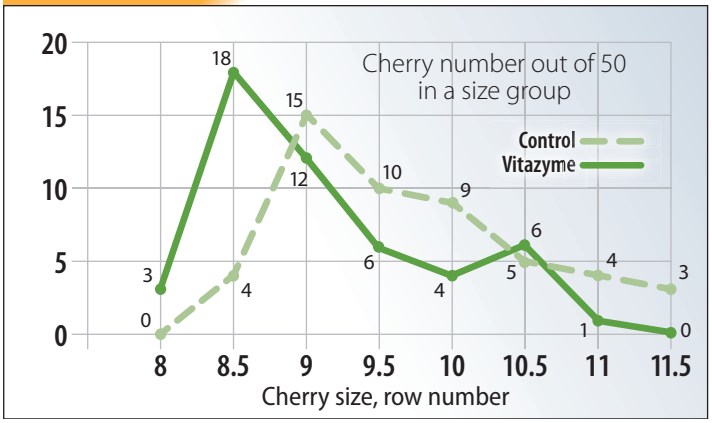
Fruit Brix[1]



[1]Using an Atago PAL-1 Refractometer.

Increase with Vitazyme: 2.37%-points

Cherry number



Vitazyme clearly produced larger cherries, moving the sizes toward the lower row numbers, with fewer small fruit.

	9.5 row or larger	10 row or smaller
Control	58%	42%
Vitazyme	78%	22%

Conclusion: A cherry study in Washington revealed that Vitazyme, applied at 16 oz/acre on the leaves two times, greatly improved cherry size and quality compared to an untreated control. Fruit size increased by 7%, fruit weight by 10%, fruit pressure by 12%, and fruit Brix by 2.37% percentage-points. Cherry size was moved toward the larger sizes, with 78% of the Vitazyme truited fruit 9.5 row or larger, compared to 58% for the untreated control. Yield likely increased by about 10%, following the 10% increase in fruit weight, assuming a similar fruit number for both treatments. Vitazyme as an addition to cherry grower programs is shown to be highly effective to improve cherry yield and quality.

Vitazyme Field Tests for 2015

Chelan Cherries *with Vitazyme application*

Untreated Chelan cherries at Double D Farms are typical of the crop for 2015; compare these with the adjoining photo.

Chelan cherries at Double D Farms show the increased size and improved development and color with Vitazyme.

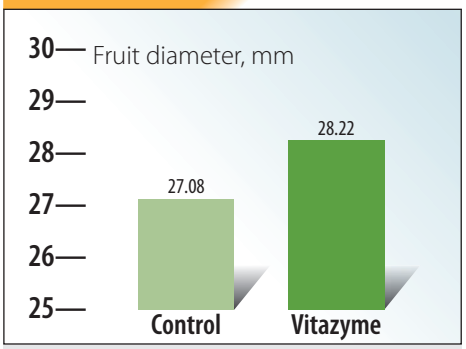
Researcher: Jacob Hesseltine
Research organization: Vital Grow Distribution LLC, Waterville, Washington
Farmer: Peter Dufault, Double D Farms
Location: Mattawa, Washington
Variety: Chelan
Rootstock: Mazzard
Tree age: 26 years
Tree spacing: 10 x 20 feet
Soil type: sandy loam
Experimental design: A 10-acre cherry block was divided into 5 acres of Vitazyme treatment (north half) and 5 acres of Control treatment (south half) to discover the effect of the product on cherry size and quality.

1 *Control* 2 *Vitazyme*

Fertilization: 10 to 15 lb/acre of liquid urea the fall of 2014, 50 lb/acre of dry nitrogen the spring of 2015, 4 tons/acre of compost, urea foliar feeding three times, micronutrients as needed
Vitazyme application: 16 oz/acre applied four times: (1) shuck fall; (2) 7 days later; (3) 7 days after the second application; (4) 7 days after the third application. A Rear's Power Blast Sprayer applied 100 to 200 gal/acre at 3 mph (16 to 18 rpm).
Growing season weather: generally good, with the crop harvested before the hottest summer temperatures arrived
Size and quality results: On May 28, 50 typical cherries from both treatments were picked from several trees in the same vicinity to evaluate fruit parameters.

Harvest date: May 31, 2015

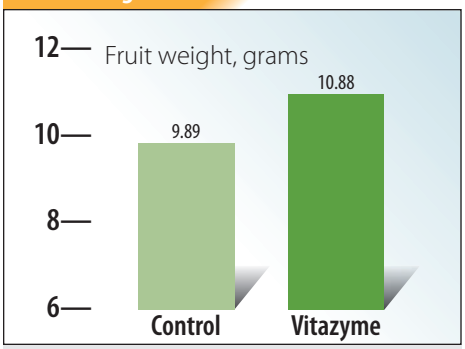
Fruit Size[1]



[1]Using a standard cherry sizer card.

Increase in size with Vitazyme: 4%

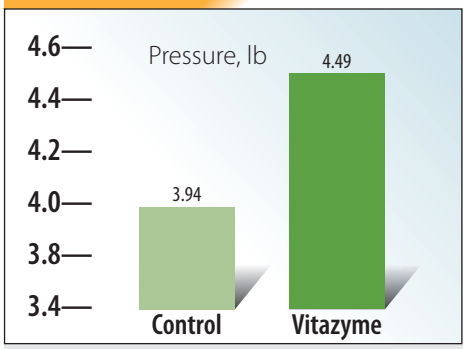
Fruit Weight[1]



[1]Using a Matrix-500 scale.

Increase in weight with Vitazyme: 10%

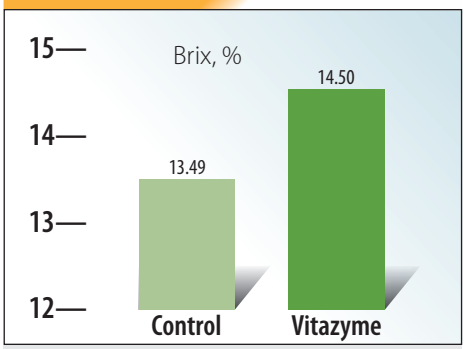
Fruit Pressure[1]



[1]Using a QA Supplies FT327 Penetrometer.

Increase in pressure with Vitazyme: 14%

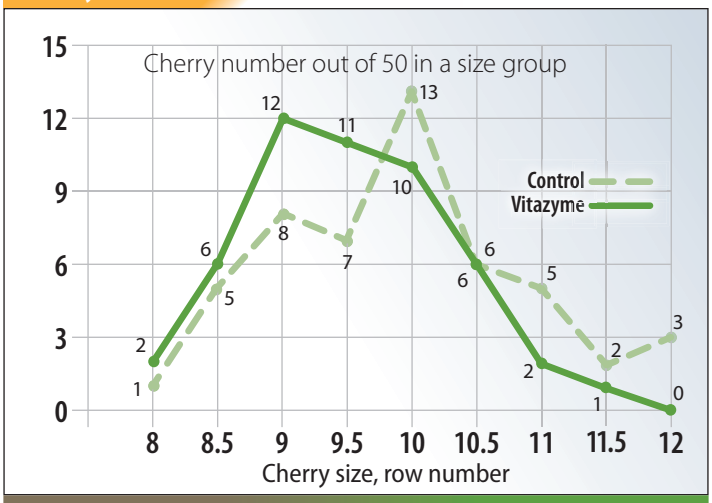
Fruit Brix[1]



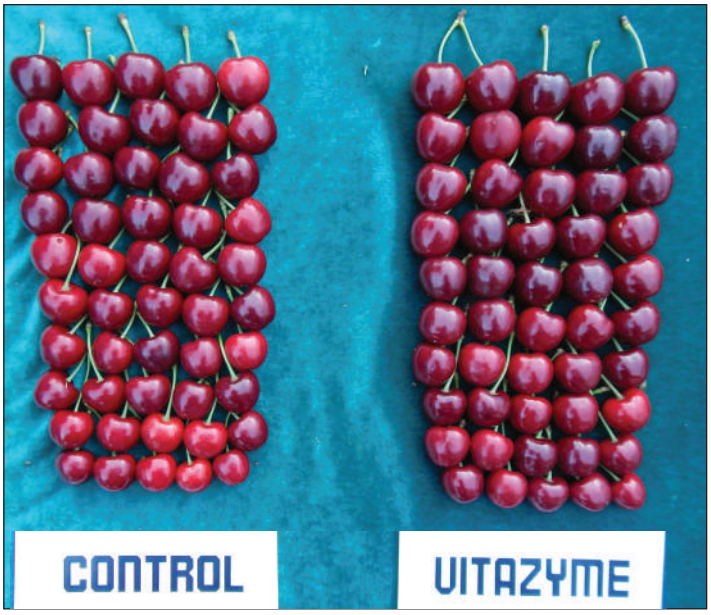
[1]Using an Atago PAL-1 Refractometer.

Increase with Vitazyme: 1.01%-points

Cherry number



	9.5 row or larger	10 row or smaller
Control	42%	58%
Vitazyme	62%	38%



Four Vitazyme treatments at Double D Farms increased fruit Brix and pressure, and moved 62% of the crop to size 9.5-row or larger.

Conclusion: A Chelan cherry trial in Washington, evaluating four Vitazyme applications at 16 oz/acre each, revealed that, compared to the untreated contol, the product improved fruit size by 4%, fruit weight by 10%, fruit pressure by 14% and fruit Brix by 1.01 percentage-points. The cherry diameter was shifted generally to the larger size grades. Estimated yield increases would be around 10%, proportional to the fresh weight increase assuming a similar cherry number for both treatments. These highly positive results show the great efficacy of Vitazyme for cherry growers in Washington.

Vitazyme Field Tests for 2015

Rainier Cherries (Organic) *with Vitazyme application*

Researcher: Jacob Hesseltine
Research organization: Vital Grow Distribution LLC, Waterville, Washington
Farmers: Brian Talbot and Paul Carter, Pleasant Ridge Organic
Location: Wallula, Washington
Variety: Rainier
Rootstock: Mazzard
Tree spacing: 20 x 24 feet
Tree age: 29 years (planted in 1986)
Experimental design: A 36.3-acre organic cherry orchard, comprising three blocks, was divided into halves (east and west); Vitazyme was applied to the western half, while Stimplex seaweed was applied to the eastern half. The purpose of the trial was to evaluate the effect of both products on cherry size and quality for a comparison.

1 Stimplex 2 Vitazyme

Fertilization: Fall of 2014: 1,000 lb/acre of manure; 600 lb/acre of Perfect Blend Chicken Compost. Spring of 2015: 1,000 lb/acre of manure; 600 lb/acre of Perfect Blend Chicken Compost; 1,000 lb/acre of gypsum; fish, leaf applied; micro-nutrients, leaf applied.
Vitazyme application: 16 oz/acre applied four times, at full bloom (April 4), petal fall (April 11), shuck fall (April 18), and second shuck fall (April 25), using a

Rear's Power Blast orchard sprayer, 2.4 mph, at 200 gal/acre of water.

Stimplex application: 56 oz/acre four times at the same time as for Vitazyme, using the same sprayer. An additional application of 80 oz/acre was sprayed over all areas, including the Vitazyme half, on May 4.

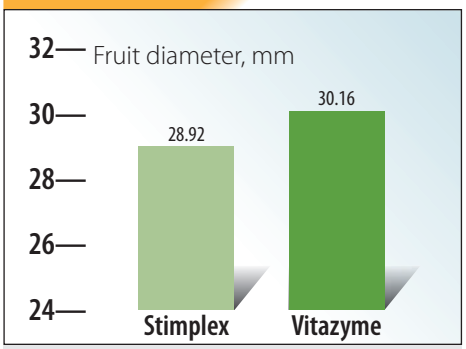
Pesticide applications: worm control with Dipel (Bacillus thuringiensis); fireblight control with Serenade bacteriacide

Harvest dates: June 8 to 14, 2015

Growing season weather: mostly favorable, with early spring warmth and high temperatures during harvest

Quality results: Fruit was sampled on June 11, during harvest. Fifty typical cherries were picked from both treatments nearby one another, and evaluated for several parameters.

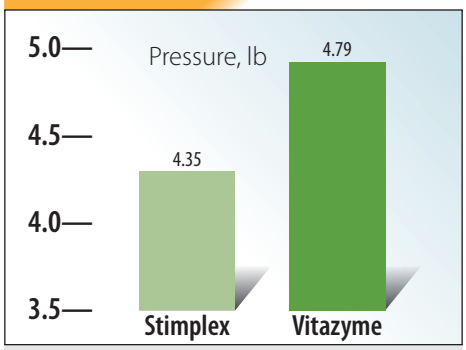
Fruit Size[1]



[1]Using a standard cherry sizer card.

Increase in size with Vitazyme: 4%

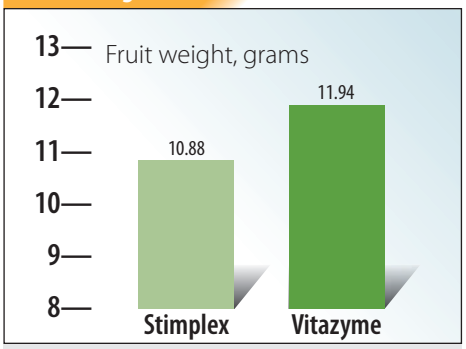
Fruit Pressure[1]



[1]Using a QA Supplies FT327 Penetrometer.

Increase in pressure with Vitazyme: 10%

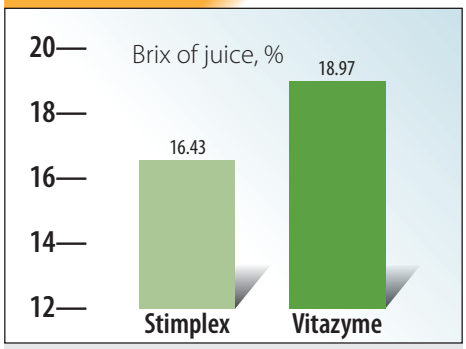
Fruit Weight[1]



[1]Using a Matrix-500 scale.

Increase in weight with Vitazyme: 10%

Fruit Brix[1]

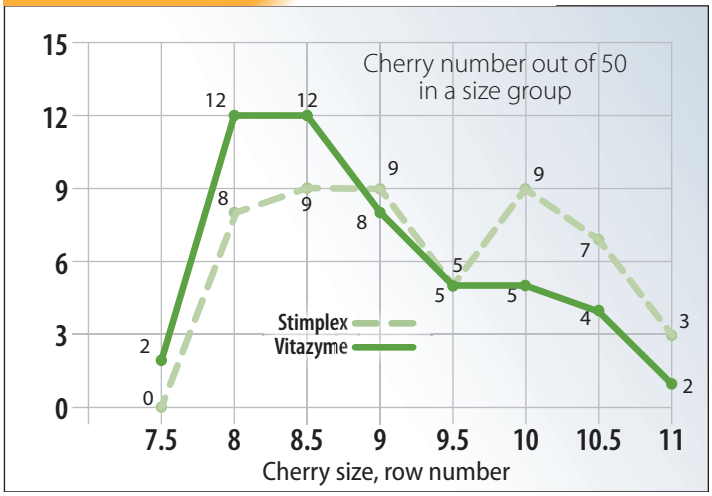


[1]Using an Atago PAL-1 Refractometer.

Increase with Vitazyme: 2.54%-points

Organic Rainier cherries treated four times with Vitazyme were larger, sweeter, and had higher fruit pressure than the Stimplex treated cherries; per acre product cost savings with Vitazyme were nearly $58.

Cherry Size Distribution



Vitazyme clearly produced larger cherries, moving the sizes toward the lower row numbers, with fewer small fruit.

	9.5 row or larger	10 row or smaller
Stimplex	62%	38%
Vitazyme	78%	22%

Economic results: Four applications are considered below.

Product	Cost	Rate	Cost/ Application	Total cost
	$/gal	oz/application	$/application	$/acre
Stimplex	50 (0.391/oz)	56	21.89	87.58
Vitazyme	60 (0.469/oz)	16	7.50	30.00

Cost savings with Vitazyme (four applications): $57.58/acre

Conclusion: A Rainier cherry trial in Washington proved that Vitazyme improved cherry quality considerably above fruit treated with Stimplex seaweed. Fruit diameter was improved by 4%, weight by 10%, pressure by 10% and Brix by 2.54 percentage points. Fruit size was moved to larger sizes as well, with 8 to 8.5 row fruit most common with Vitazyme, and 9.5 row or larger being 62% of the total versus 38% for Stimplex; Vitazyme also produced fewer small cherries. The yield increase for Vitazyme was likely at least 10%, parallel to the fresh weight increase, but when considering the added brassinosteroid effects of increased pollination rates and improved fruit sets, it is likely that the yield was further increased.

Vitazyme Field Tests for 2015

Rainier Cherries *with Vitazyme application*

Rainier cherries at Skelton Farms treated with Stimplex produced the typical size and conformation for this cherry variety, as seen here.

When three applications of Vitazyme were applied, the cherries increased in size, Brix, pressure, and weight compared to Stimplex seaweed treatment, though yield was not measured.

Researcher: Jacob Hesseltine
Research organization: Vital Grow Distribution LLC, Waterville, Washington
Farmers: Ed and Chris Skelton
Location: Pasco, Washington
Variety: Rainier
Rootstock: Maheleb
Tree age: unknown
Tree spacing: 20 x 20 feet
Experimental design: A 10-acre cherry block was divided into 4 acres of Vitazyme treatment and 6 acres of Stimplex seaweed treatment to discover the effect of the two products on cherry size and quality.

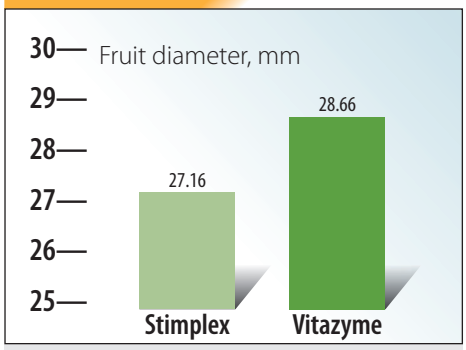
1 ***Stimplex*** **2** ***Vitazyme***

Fertilization: standard nutrient program
Vitazyme application: 16 oz/acre applied three times: (1) petal fall; (2) 10 days later: (3) 10 days after the second application; an AccuTech Airblast Raven Sprayer applied 100 gal/acre at 2.5 to 3.0 mph.

Stimplex application: standard program recommendation, using three applications at the same times as for Vitazyme
Growing season weather: an early, warm spring followed by extreme summer heat that delayed maturity, coloring, and fruit finish.

Size and quality evaluations: On June 12, 50 typical cherries from both treatments were picked from several trees in the same vicinity to evaluate fruit parameters.

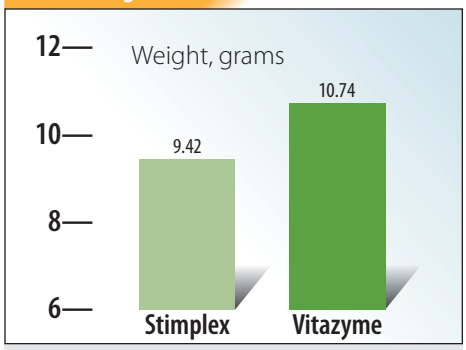
Fruit Size[1]



[1]Using a standard cherry sizer card.

Increase in size with Vitazyme: 5%

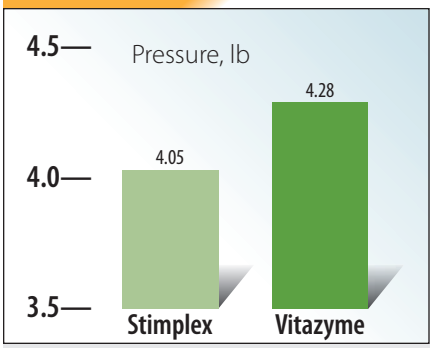
Fruit Weight[1]



[1]Using a Matrix-500 scale.

Increase in weight with Vitazyme: 14%

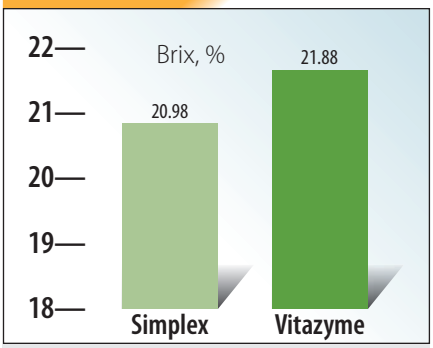
Fruit Pressure[1]



[1]Using a QA Supplies FT327 Penetrometer.

Increase in pressure with Vitazyme: 6%

Fruit Brix[1]



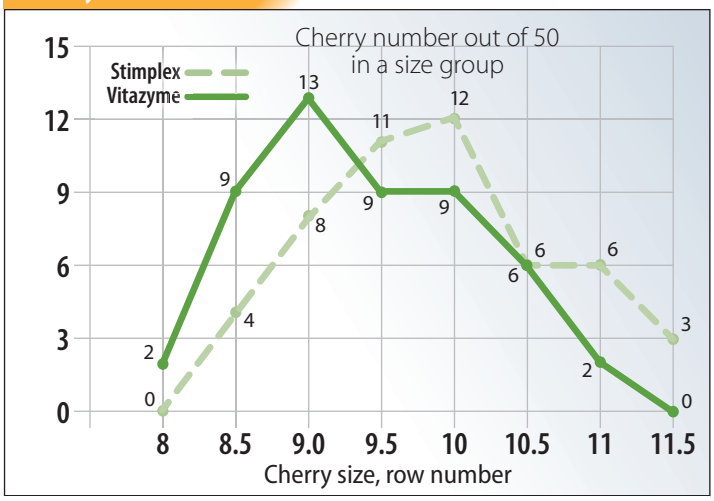
[1]Using an Atago PAL-1 Refractometer.

Increase with Vitazyme: 0.9%-point

Conclusions: This Rainier cherry trial in Washington, which compared Vitazyme and Stimplex applied three times, revealed that all fruit parameters were increased with Vitazyme above the Stimplex application. Fruit size, fruit weight, fruit pressure and fruit Brix were enhanced by 5%, 14%, 6% and 0.9 percentage point, respectively, and the fruit was, on average, larger with Vitazyme, especially in the 8 to 9-row categories. Fruit yield would likely have shown a 14% increase with Vitazyme if the cherry number was similar in both treatments, since average fruit weight was 14% greater. These results illustrate the great efficacy of Vitazyme for cherry growers as compared to Stimplex use, not just with yield and quality but with program cost as well.

The size difference between Vitazyme and Stimplex treatment is obvious in this comparison of 50 typical cherries per treatment.

Cherry Size Distribution



Vitazyme clearly produced larger cherries, moving the sizes toward the lower row numbers, with fewer small fruit.

	9.5 row or larger	10 row or smaller
Stimplex	46%	54%
Vitazyme	66%	34%

Vitazyme Field Tests for 2015

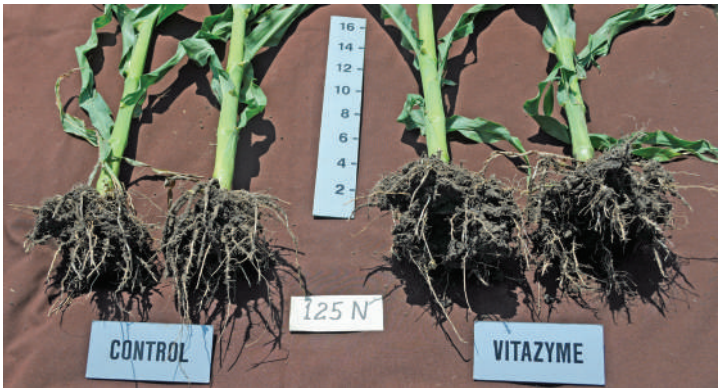
Corn — South Dakota State University—Nitrogen and Water Use Efficiency

Researchers: David Clay, Ph.D., and Craig Reicks, Research Assistant II
Research institution: South Dakota State University, Department of Plant Science, Brookings, South Dakota
Location: Aurora, South Dakota
Variety: NK N41Y-3000 GT (98-day hybrid)
Plant population: 32,000 seeds/acre
Tillage: conventional
Soil type: Brandt silty clay loam
Planting date: May 16, 2014

Experimental design: A site for small plot studies was selected at the South Dakota State University research facility near Aurora. Plots of 10 x 20 feet (5 x 10 feet harvested) were laid out with four treatments in a randomized complete block design to determine the effects of Vitazyme, applied to the seed, leaves, and both, on the yield, nitrogen-use efficiency, and water-use efficiency of corn. Three nitrogen rates were used.

	Vitazyme application			
Nitrogen rate	None	Seeds	Foliage	Seeds + Foliage
lb/acre	(treatment number)			
0	x(1)	x(4)	x(7)	x(10)
75	x(2)	x(5)	x(8)	x(11)
125	x(3)	x(6)	x(9)	x(12)

Fertilization: Urea was broadcast on June 4 over the appropriate plots at 75 or 125 lb/acre of nitrogen around planting time.



Corn receiving 125 lb/acre of N in this nitrogen efficiency trial at South Dakota State University produced a much greater root mass when treated with Vitazyme.

Typical ears for the 125 lb/acre nitrogen treatment reveal greater ear size with Vitazyme applied twice, leading to a 9 bu/acre (6%) yield increase and better nitrogen utilization.

Vitazyme application: (1) seed treatment of 5% Vitazyme, with 3.2 oz misted and mixed by hand with 10 lb of seed; (2) 13 oz/acre sprayed on the leaves and soil at the 6-leaf stage (V6) on July 9, at 15 gal/acre of solution. A non-ionic surfactant was added at 0.5% of the total solution.

Growing season weather: wetter than normal (12.33 inches for June through August, versus the average of 10.73 inches), and cooler than normal (1,585 growing degree days versus the average of 1,668)

Harvest date: The middle two rows of each plot were hand-picked on October 31, ears were dried at 140° F, and then shelled and weighed.

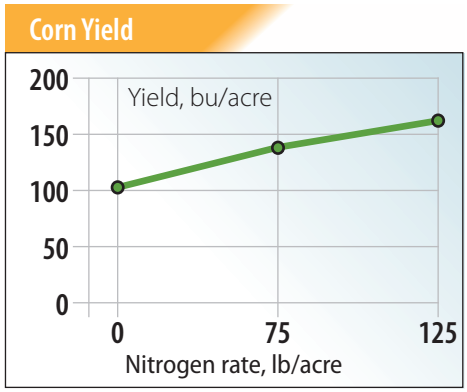
Yield results: NOTE: There were planting difficulties for the seeds treated with Vitazyme—populations were low—so these plots were replanted once the error was detected. However, the plants failed to respond normally, so these data have been eliminated from some analyses.

Nitrogen Fertilizer Effects

Treatment	Yield[1]	Yield change
	bu/acre	bu/acre
No nitrogen	106 c	—
75 lb/acre nitrogen	146 b	40 (+38%)
125 lb/acre nitrogen	160 a	54 (+51%)

[1] Yields followed by different letters are significantly different at P=0.01.

Nitrogen fertilizer produced a straight-line yield response over the three N levels, and over all Vitazyme treatments.



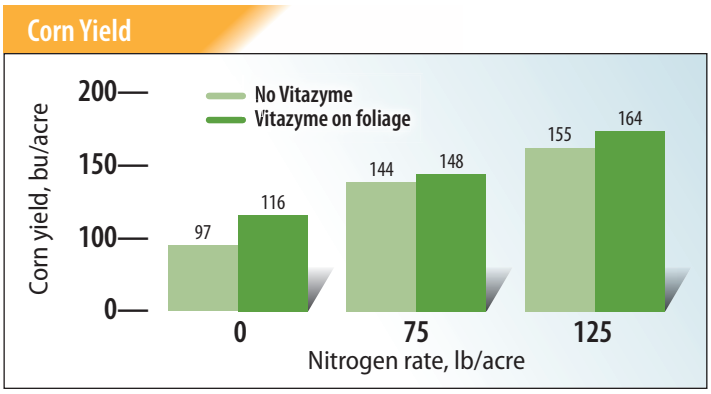
Vitazyme Effects at Three Nitrogen Levels

In this analysis, plots that received and did not receive the Vitazyme seed treatment are included.

Vitazyme applied to both the seeds and foliage overcame the drop in corn yield with the seed treatment above. The reason for this is not understood.

Nitrogen rate	Vitazyme	Grain yield	Yield change
lb/acre		bu/acre	bu/acre
0	0 Foliage	97 116	— +19[a](+20%)
75	0 Foliage	144 148	— +4[b](+3%)
125	0 Foliage	155 164	— +9[c](+6%)

[a]Significant at P=0.09; [b]Significant at P=0.40; [c]Significant at P=0.03.



Yield, nitrogen efficiency, and water efficiency effects:

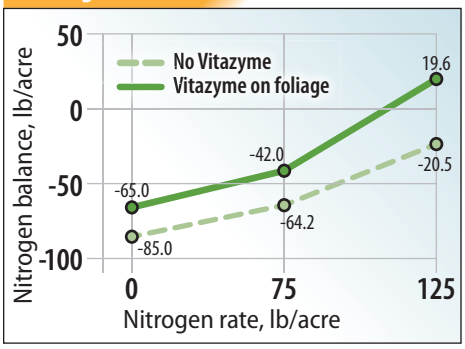
The determination of nitrogen (N) and water efficiency is done through the calculation of isotopes of nitrogen and carbon, using a mass spectrometer. The calculation of these efficiencies, and related parameters, is complex and will not be discussed here, but can be reviewed in a paper by K. Kim, D. Clay, C. Carlson, S. Clay, and T. Trooien entitled "Do synergistic relationships between nitrogen and water influence the ability of corn to use nitrogen derived from fertilizer and soil?" (Agronomy Journal 100 [3], 2008, pages 551-557).

The following analyses were made using only the foliar Vitazyme applications, to avoid the problems associated with the seed treatment, as discussed earlier. Probabilities of significant differences are indicated beneath each pair of values.

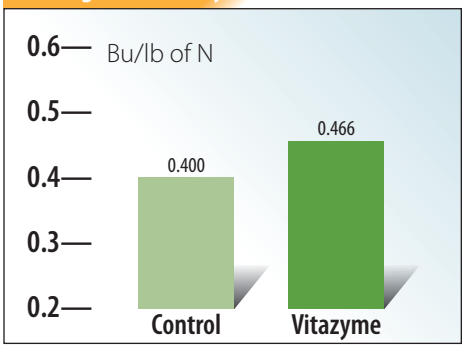
N-rate	Treatment	N-efficiency	N-balance[1]	^{15}N%	^{13}C%	^{15}N%	^{13}C%	Soil inorganic N balance
		bu/lb of N		—% in grain—		—% in stover—		lb/acre
0	Vitazyme	—	- 65.0	0.36	- 11.2	- 0.83	- 11.9	0.23
	Control	—	- 85.0	1.05	- 11.3	- 2.81	- 11.8	- 11.2
			p=0.48	p=0.41	p=0.72	p=0.30	p=0.34	p=0.58
75	Vitazyme	0.538	- 42.0	0.116	- 11.19	- 2.12	- 11.93	- 5.6
	Control	0.563	- 64.2	0.632	- 11.26	- 0.53	- 11.97	- 14.3
		p=0.61	p=0.11	p=0.16	p=0.08	p=0.65	p=0.79	p=0.49
125	Vitazyme	**0.466**	**19.6**	0.765	- 11.33	**- 0.66**	- 11.94	**29.5**
	Control	**0.400**	**- 20.5**	1.251	- 11.43	**5.76**	- 12.11	**- 16.2**
		p=0.01	**p=0.01**	p=0.44	p=0.23	**p=0.02**	p=0.43	**p=0.01**

[1]A higher value means more efficient uptake of N.

Nitrogen Balance



Nitrogen Efficiency at 125 lb/acre N



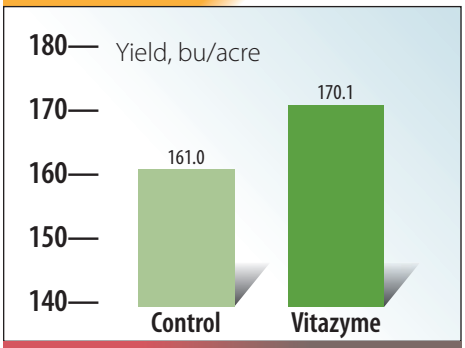
Increase in N-efficiency with Vitazyme: 17%

At all three nitrogen rates, foliar Vitazyme treatment increased N-use efficiency, especially at 125 lb/acre N.

At the typical farm-applied rate of 125 lb/acre of N, Vitazyme treated corn produced 0.066 more bushels/acre per pound of nitrogen than the control.

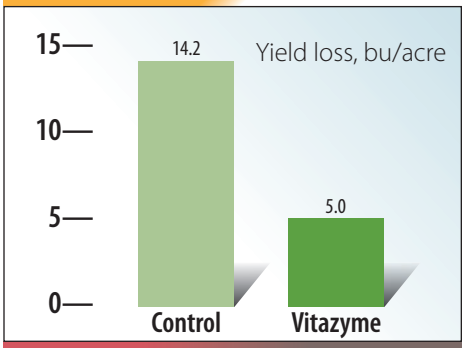
N-rate	Treatment	Grain yield	Yield loss, nitrogen stress	Yield loss, water stress
lb/acre		bu/acre	bu/acre	bu/acre
0	Vitazyme	94.4	20.1	60.9
	Control	105.8	12.4	57.2
		p=0.49	p=0.32	p=0.75
75	Vitazyme	146.2	5.66	23.7
	Control	152.0	2.60	21.1
		p=0.16	p=0.58	p=0.75
125	Vitazyme	**170.1**	0.634	**5.0**
	Control	**161.0**	0.470	**14.2**
		p=0.01	p=0.53	**p=0.02**

Grain Yield with 125 lb/acre N



Increase in grain yield with Vitazyme: 6%

Yield Loss from Water Stress at 125 lb/acre N



Yield loss reduction due to water stress with Vitazyme: 9.2 bu/acre

Conclusion: A corn trial in eastern South Dakota designed to evaluate the effects of Vitazyme seed and foliar treatments on grain yield, and nitrogen (N) and water use efficiency at three N levels, was impaired by a poor plant population for the seed treated plots. Thus, in most cases only the foliar treatment treated at V6 was evaluated. In spite of this limitation, Vitazyme improved grain yield significantly at the 125 lb/acre N rate (+6%), increased N-efficiency by 17%, and reduced the yield loss due to water stress by 9.2 bu/acre; the control yield loss at 125 lb/acre N was 14.2 bu/acre. The 0 and 75 lb/acre N rates did not show significant yield or N and water use responses, for unknown reasons. Moreover, N-balance was improved at all fertility levels, especially at the 125 lb/acre N application rate. Since this highest of the three rates is similar to a typical farmer N application rate, the value of Vitazyme use for improved nitrogen and water use efficiency is displayed in this study, the result being a 9.1 bu/acre yield increase. A seed treatment along with the foliar application would likely have triggered significant responses for all parameters at all three N application rates.

Corn *A Summary of Yield and Income Results in Mexico: 2012-2015*

The following results for corn trials in Mexico were compiled by Juan Carlos Diaz of Ag Biotech.

Vitazyme application: Seed treatment at 0.25 liter/ha, and a foliar treatment at 1 liter/ha 30 days after planting

Conclusion: These eight Mexican corn trials revealed the excellent efficacy of Vitazyme use, with a seed treatment and single foliar application.

Untreated corn in Atotonilco, Jalisco, Mexico, shows good growth, but nothing like that for Vitazyme (see the adjoining photo).

Two Vitazyme treatments greatly enhanced the growth of this corn, which is typical of the many trials conducted with this product in Mexico since 2012.

Corn yield							
Test site	**Year**	**Control**	**Vitazyme**	**Change**	**Income[1]**	**Net Profit**	**Cost : Benefit**
		tons/ha	tons/ha	tons/ha	USD/ha	USD/ha	
El Monte, Villa Corona, Jalisco	2012	8.6	10.5	1.9 (+22%)	426.06	382.87	8.9
La Mesita, Cocula, Jalisco	2012	12.8	15.3	2.5 (+20%)	560.60	517.41	12.0
El Llano, San Martin Hidalgo, Jalisco	2012	7.30	8.21	0.91 (+13%)	204.06	160.87	3.7
Camino a la Coronilla, Arneco, Jalisco	2012	11.1	13.0	1.9 (+17%)	426.06	382.87	8.9
Odilón Ramos, San Juan Acozac, Puebla	2012	4.75	10.00	5.25 (+111%)	1,177.26	1,134.07	26.3
Las Margaritas, Ayotlan, Jalisco	2014	13.00	13.81	0.81 (+6%)	182.20	139.01	3.2
Distrito Riego 11 Irapuato, Guanajuato	2014	9.670	10.437	0.767 (+8%)	171.99	128.80	3.0
El Cabezón, Ameco, Jalisco	2014	11.51	12.84	1.33 (+12%)	297.57	254.38	5.9
Daniel Hernandez, La Barca, Jalisco	2015	13.73	14.93	1.20 (+9%)	269.24	226.05	5.2
Mean		10.27	12.11	1.84 (+18%)	412.78	369.59	8.6

[1]Corn price = 224.24 USD/ton. Vitazyme cost = 27.27 USD/liter; at 1.25 liters/ha, the total cost was 34.10 USD/ha. Spraying cost (labor) for two sprayings = 9.09 USD/ha. Overall Vitazyme cost = 43.19 USD/ha.

Yield increase with Vitazyme: +18%

Net profit increase with Vitazyme: 369.59 USD/ha

Cost: Benefit increase with Vitazyme: 8.6

It is clear that this program provides excellent yield and profit increases for corn farmers in Mexico.

Corn *with Vitazyme application*

Researchers: Ernesto Infante, Lucero Fernandez, and Edgar Ortiz
Research organizations: La Mazorca and Quimica Lucava
Location: Daniel Hernandez Farm, La Barca, Jalisco, Mexico
Variety: Asgrow Antelope
Planting date: April 30, 2015
Row Spacing: 0.75 meter

Experimental design: A corn field of 4.75 ha was selected to treat 1.0 ha with Vitazyme, to determine effects of the product on crop growth, insect infestation, and yield. Two Vitazyme applications were made.

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

Fertilization: unknown
Vitazyme application: (1) seed treatment on a tarp before planting on April 30 using 250 ml of Vitazyme with a backpack sprayer, and allowing the seeds to dry before planting; (2) 1 liter/ha sprayed on the leaves and soil 30 days later on May 30
Harvest date: October 20, 2015
Growth results: The treated corn grew much faster than the control, being 10 to 15 cm taller in the early stages with

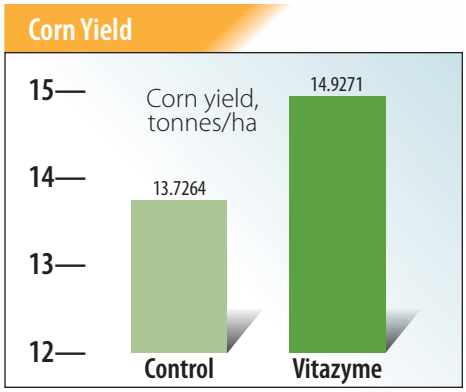
darker green leaves and considerably less incidence of fall army worm. A growth difference was visible even up to harvest, when the Vitazyme treated portion of the field was taller, with more leaf area, and larger ears.

Yield results: On October 20, 16 rows of the treated and the control areas were harvested for 205.6m, giving a harvested area of 2,467.2m^2

Treatment	Plot yield	Grain moisture	Moisture-corrected yield[1]	Yield change
	kg/2,467m^2	%	kg/ha	kg/ha
Control	3,385	13.96	13,726.4	—
Vitazyme	3,670	13.70	14,927.1	1,200.7 (+9%)

[1]Correction factor: (100-% H_2O)/86: Dry yield = (Correction factor) (Harvested yield/ha).

Increase in corn yield with Vitazyme: 9%



Income results: Using a corn price of $0.225 (U.S.)/kg, the income is as follows:

Treatment	Dry yield	Gross income	Income change	Net income change[1]	Cost : benefit[2]
	tons/ha	USD/ha	USD/ha	USD/ha	
Control	13.7264	3,088.44	—	—	—
Vitazyme	14.9271	3,358.60	270.16	226.89	5.2

[1]Vitazyme costs for overall 1.25 L/ha, including labor = 43.34 USD/ha. [2]Cost : Benefit = (Net income increase)/(Vitazyme cost).

Conclusions: This corn study in Mexico revealed that a 0.25 liter/ha Vitazyme seed treatment at planting, followed by a 1.0 liter/ha foliar and soil application 30 days later, greatly improved corn growth and yield. Faster growth of the plant, more leaf chlorophyll, and less army worm incidence led to a yield increase of 9%, and an excellent cost : benefit of 5.2, showing the excellent efficacy of this program for corn growers in Mexico.

Vitazyme Field Tests for 2015

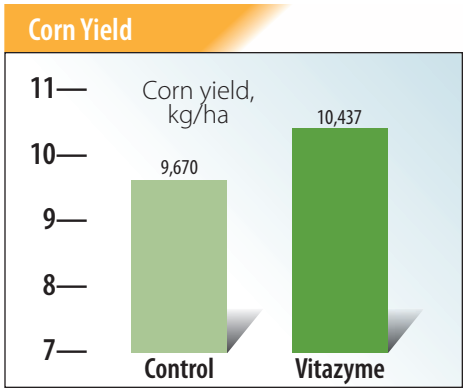
Corn *with Vitazyme application*

Researchers: Bartolo González and Lucero Fernandez
Farmer: Irrigation District 011
Research organizations: CVYTTS and Quimica Lucava
Location: Irapuato, Guanajuato, Mexico
Variety: CERES XR47
Planting date: May 12, 2014
Experimental design: A 1 hectare area of a corn field was treated twice with Vitazyme to determine its effects on growth, yield, and profitability compared to an adjoining untreated control area.
Fertilization: unknown
Vitazyme application: (1) a seed treatment at 250 ml/ha on May 12, 2014; (2) foliar and soil spray at 1 liter/ha on June 20, 2014
Growth observation: The Vitazyme treated plants had *more extensive roots* and *greater plant vigor*.
Harvest date: December 16, 2014

Yield results:

Treatment	Yield	Yield change
	kg/ha	kg/ha
Control	9,670	—
Vitazyme	10,437	767 (+8%)

Increase in corn yield with Vitazyme: 8%



Income results: The corn price was USD 0.25/kg. Vitazyme overall cost, including labor = USD 46.43/ha.

Added income with Vitazyme: 191.75 USD/ha
Added profit with Vitazyme: 145.32 USD/ha
Cost : Benefit with Vitazyme: 3.13

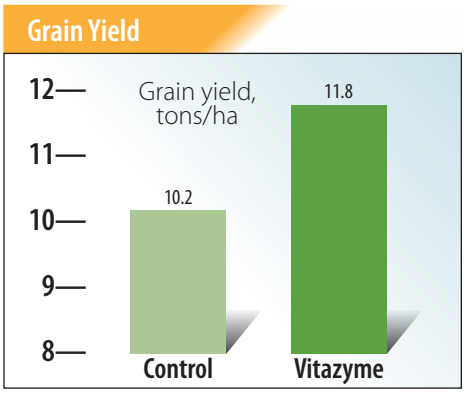
Conclusions: This Mexican corn trial showed an excellent yield increase (8%) and income improvement (145.32 USD/ha) with two Vitazyme applications, proving it's great efficacy for use in corn production in Mexico.

Corn *with Vitazyme application*

Researcher: V. V. Plotnikov
Research organizations: Agricultural LLC, "Palmira Vidhodivlya", Ukraine
Location: Zolotonosha District, Cherkasy Region, Voznesens'ke Village, Ukraine
Variety: DKS 4590 hybrid
Seeding rate: 75,000/ha
Planting date: April 26, 2015
Previous crop: soybeans
Cultivation methods: disking to 8 cm, plowing to 24 cm, cultivation to 6 cm
Experimental design: A trial with Vitazyme on corn involved dividing a field into a Vitazyme treated and an untreated area. The purpose of the trial was to evaluate the product's effects on corn yield and profitability.
Fertilization: 10 kg/ha N, 26 kg/ha $P_2 0_5$, and 26 kg/ha $K_2 0$ in-furrow at planting; 115 kg/ha N broadcast pre-plant
Vitazyme application: 1 liter/ha on the leaves and soil on May 31, 2015, at the 7 to 8-leaf stage
Yield results: Harvest date is unknown

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	10.2	—
Vitazyme	11.8	1.6 (+16%)

Increase in grain yield with Vitazyme: 16%



Income results: A 1 liter/ha application gave a profit increase of 4,710 UAH/ha.
Conclusions: In this Ukraine corn trial, a single soil and foliar Vitazyme application of 1 liter/ha, at the 7 to 8-leaf stage, resulted in a substantial yield increase of 16%, and a profit improvement of 4,710 UAH/ha. This result indicates the great efficacy of this program for use by corn growers in Ukraine.

Corn *with Vitazyme application*

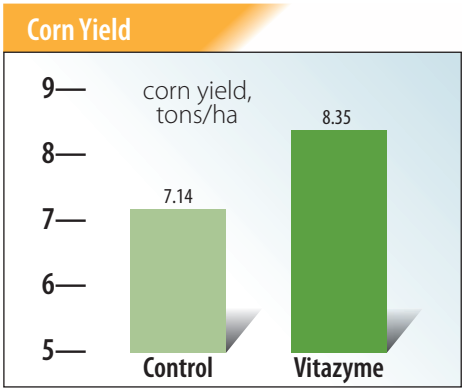
Researcher: V. V. Plotnikov
Research organization: Small Private Enterprise, "Firm Harant", Ukraine
Location: Teplyts'kyi District, Vinnytsya Region, Teplyk Town, Ukraine
Variety: P9175 hybrid
Seeding rate: 70,000/ha
Planting date: April 24, 2015
Previous crop: winter wheat
Soil type: podzolized chernozem
Cultivation methods: disking to 8 cm, plowing to 24 cm, cultivation to 6 cm
Experimental design: A corn field was divided into a Vitazyme treated and an untreated area to determine the effectiveness of Vitazyme for improving grain yield and profitability.

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

Fertilization: 18 kg/ha N, 18 kg/ha $P_2 0_5$, and 18 kg/ha $K_2 0$ in-furrow at planting; 90 kg/ha N pre-plant broadcast
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 7 to 8-leaf stage, on May 28, 2015.

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	7.14	—
Vitazyme	8.35	1.21 (+17%)

Increase in corn yield with Vitazyme: 17%



Yield results: Harvest date is unknown
Income results: Profit increased by 3,442 U UAH/ha with Vitazyme.
Conclusions: A corn trial in Ukraine in 2015, with 1 liter/ha sprayed on the leaves and soil at the 7 to 8-leaf stage, resulted in the yield increasing by a substantial 17%, giving 3,442 UAH/ha more profit. This great increase reveals the considerable efficacy of this program for corn in Ukraine.

Corn *a Synergism Study with Seaweed*

Researcher: Bertel Schou, Ph.D.
Research organization: ACRES Research, Cedar Falls, Iowa
Location: Cedar Falls, Iowa
Variety: Pioneer P0636AM
Seeding rate: 38,000 seeds/acre
Planting depth: 1.5 inches
Row width: 30 inches
Soil type: Floyd loam (pH=6.3, organic matter=4.0%, cation exchange capacity=15.5 meg/100g, fertility level=excellent, drainage=excellent)
Planting date: May 2, 2015
Experimental design: A small-plot corn trial, using a randomized and complete block design and four replicates, was laid out in plots that were 15 (six rows) x 30 feet, with the objective of determining the effectiveness of Vitazyme and seaweed to influence corn yield, alone and together.

1 Control **2 Vitazyme**
3 Seaweed **4 Vitazyme + Seaweed**

Corn treated twice with Vitazyme in this Iowa trial produced a much more massive root system, plus a 5% yield increase, than the untreated control. Seaweed did not produce a synergism with Vitazyme.

Fertilization: All plots received a fall (2014) broadcast application of 18-16-60 16/acre of N-$P_2 0_5$-$K_2 0$, and 100 lb/acre of N in 2015.

Vitazyme application: For Treatments 2 and 4, (1) 13 oz/acre in-furrow at planting on May 2; (2) 13 oz/acre on the leaves and soil at V6 on June 24.

Seaweed application: For Treatments 3 and 4, (1) 2 qts./acre in-furrow at planting on May 2; (2) 2 qts./acre on the leaves and soil at V6 on July 2; (3) 2 qts./acre on the leaves and soil at VT on July 29. The seaweed was from Ocean Organics bared in Waldoboro, Maine, and Ann Arbor, Michigan.

Growing season weather: Excellent, with rainfall evenly distributed throughout the spring and summer, and average temperatures were good for growth. Rainfall; April = 2.97 in.; May=5.62 in.; June=5.40 in.; July=4.65 in.; August=7.50 in.; September=3.33 in. Temperature (daily average maximum): April=66°, May=70°; June=80°, July=85°, August=79°, September=81°.

Harvest date: October 10, 2015

Corn moisture and population results: Grain moisture varied from 16.08 to 16.75% among treatments, and was not significant, while plant population also varied little among treatments.

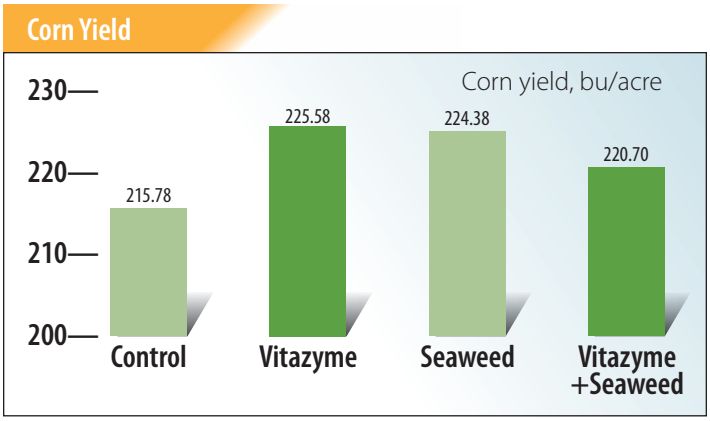
Yield results: The corn was harvested using a Massey-Ferguson plot combine, with an electronic scale and moisture meter.

Increase in Corn Yield

Vitazyme alone 5%
Seaweed alone..... 4%
Vitazyme + Seaweed..... 2%

Treatment	Corn yield[1]	Yield change
	bu/acre	bu/acre
1. Control	215.78 b	—
2 Vitazyme	225.58 a	9.80 (+5%)
3. Seaweed	224.38 ab	8.60 (+4%)
4. Vita + Seaweed	220.70 ab	4.92 (+2%)
LSD (P=0.05) ($P_2$0.05)	9.52	
CV	2.79	
Replicate probability	0.6926	
Treatment probability	0.2542	

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



Conclusions: A corn study conducted in east-central Iowa, using small plots with four replications, revealed that Vitazyme, applied at planting in-furrow and sprayed at V6, significantly increased corn yield by 9.80 bu/acre (5%). Seaweed alone, applied in-furrow and twice foliar, increased the yield by 8.60 bu/acre (4%), but the two products combined did not provide additive effects, increasing the yield by 4.92 bu/acre (2%). Grain moisture and plant population were not significantly affected by either product. Results in 2014 with corn at ACRES Research did not show a synergism between the two products when they were applied together, and it was hoped that by separating foliar applications by several days a synergism might occur. However, it did not. Both Vitazyme and seaweed applied alone gave excellent responses to corn yield in 2015.

Corn *A Study with Wet-Sol Adjuvent*

Researcher: Bertel Schou, Ph.D.
Research institution: ACRES (Agricultural Research and Education Services), Cedar Falls, Iowa
Location: Cedar Falls, Iowa
Variety: Pioneer P0636AM (GMO-RR)
Planting date: April 30, 2015
Planting rate: 38,000 seeds/acre
Planting depth: 1.5 inches
Row spacing: 30 inches
Soil type: Floyd Loam (pH=6.1, organic matter=4.0%, cation exchange capacity=15.5 meg/100g, fertility level=excellent, drainage=excellent)

Experimental design: A small-plot corn study was arranged in a randomized complete block design and four replicates, with plots that were 15 (6 rows) x 30 feet; the two center rows from each plot were harvested. The purpose of the study was to evaluate the effect of Wet-Sol 233, a non-ionic adjuvant, at different rates in-furrow and foliar, with and without Vitazyme, on the growth and yield of corn.

	Vitazyme		Wet-Sol 233	
Treatment	In-furrow	Foliar	In-furrow	Foliar
	----------oz/acre----------			
1	0	0	0	0
2	13	13	0	0
3	0	0	16	16
4	0	0	32	16
5	0	0	48	16
6	13	13	16	16

Fertilization: All plots received 18-16-60 lb/acre of N-P_2O_5-K_2O) in the fall of 2014, and 1.00 lb/acre of N in 2015.

Vitazyme application: For Treatments 2 and 6, (1) 13 oz/acre in-furrow at planting on April 30, 2015; (2) 13 oz/acre on the leaves and soil at V7 on June 23, 2015.

Wet-Sol 233 application: Wet-Sol 233 is a non-ionic surfactant produced by Scheaffer Oil, St. Louis, Missouri. For Treatments 3 to 6, (1) 16 to 48 oz/acre in-furrow at planting on April 30, 2015; (2) 16 oz/acre on the leaves and soil at V7 on June 23, 2015. For Treatment 6, Vitazyme was mixed with Wet-Sol.

Growing season weather: Excellent, with rainfall evenly distributed throughout the spring and summer, and the average temperatures were good for growth. Rainfall: April=2.97in.; May=5.62 in.; June=5.40 in.; July=4.65 in; August=7.50 in.; September=3.33 in, Temperature (daily average maximum): April=66; May=70; June=80; July=85; August=79; September=81.

Harvest date: October 8, 2015

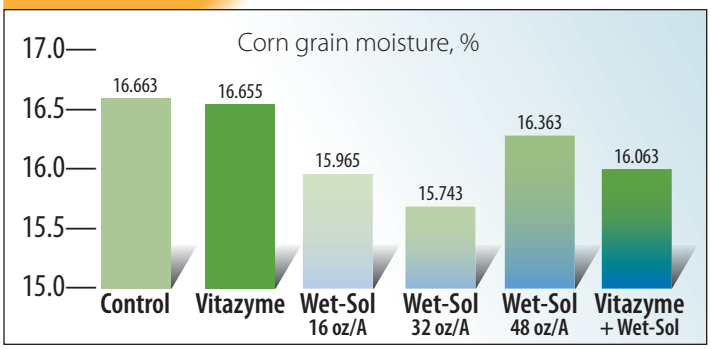
Plant population results (final): There were no significant differences among treatments from final population.

Grain moisture results: Harvest was completed using a Massey-Ferguson plot combine having an electronic scale and moisture tester.

Treatment	Grain moisture[1]	Moisture change
	%	%
1. Control	16.663 a	—
2. Vitazyme	16.655 a	(-)0.008
3. Wet-Sol 16 oz/A	15.965 a	(-) 0.698
4. Wet-Sol 32 oz/A	15.743 a	(-) 0.920
5. Wet-Sol 48 oz/A	16.363 a	(-) 0.300
6. Vita + Wet-Sol	16.063 a	(-) 0.600
LSD (P=0.05)	0.941	
CV	3.84	
Replicate probability	0.0334	
Treatment probability	0.2548	

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

Corn Grain Moisture



Decrease in Grain Moisture, %-points

Wet-Sol, 16 oz/acre..... 0.698
Wet-Sol, 32 oz/acre..... 0.920
Vitazyme + Wet-Sol, 16 oz/acre 0.600

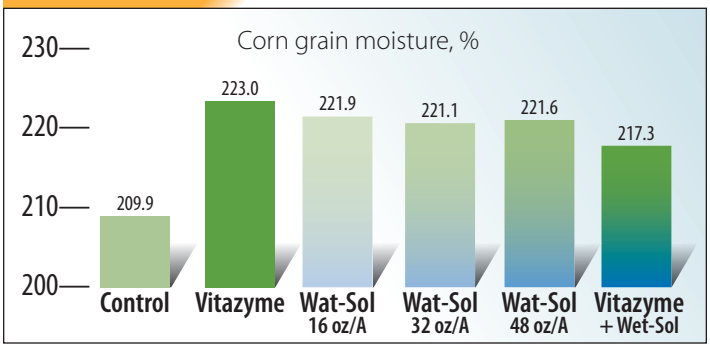
While none of the treatment means are significant, there was a definite trend for all of the Wet-Sol treatments to produce drier grain at harvest, up to 0.92% point at 32 oz/acre; Vitazyme alone did not produce such a decrease.

Yield results:

Treatment	Corn Yield[1]	Yield change
	bu/acre	bu/acre
1. Control	209.9 b	—
2. Vitazyme	223.0 a	13.1 (+6%)
3. Wet-Sol 16 oz/A	221.9 a	12.0(+6%)
4. Wet-Sol 32 oz/A	221.1 a	11.2 (+5%)
5. Wet-Sol 48 oz/A	221.6 a	11.7 (+6%)
6. Vita + Wet-Sol	217.3 ab	7.4 (+4%)
LSD (P=0.05)	8.2	
CV	2.49	
Replicate probability	0.0001	
Treatment probability	0.0355	

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

Corn Grain Moisture



Vitazyme alone produced the greatest yield increase, at 13.1 bu/acre (6%), a significant increase above the control but statistically equal to all three Wet-Sol treatments. Vitazyme and Wet-Sol

together did not produce a positive interaction, though the yield was not significantly less than the other treatments; neither was it greater than the control.

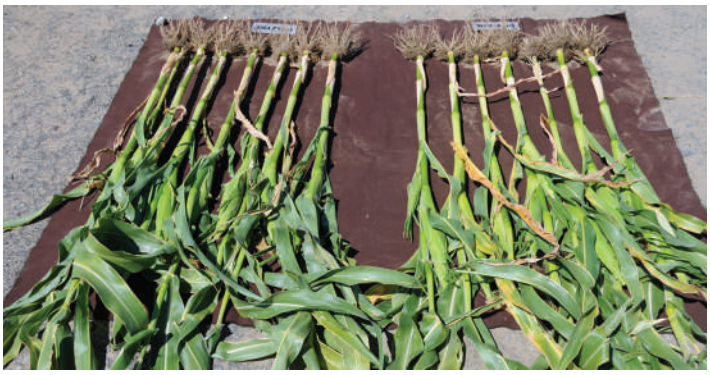
Increase in Corn Yield, %	
Vitazyme only	6%
Wet-Sol, 16 oz/acre	6%
Wet-Sol, 32 oz/acre	5%
Wet-Sol, 48 oz/acre	6%
Vitazyme + Wet-Sol, 16 oz/acre	4%

Conclusion: A corn study in east-central Iowa in 2015, a very good cropping year with near-record yields in the area, showed that both Vitazyme and Wet-Sol 233 produced significantly greater yields (P=0.05) than the control. This increase occurred at the 16, 32, and 48 oz/acre rates, with Vitazyme alone producing the highest overall yield of 223.0 bu/acre, an increase over the control of 6%. Vitazyme combined with Wet-Sol 233 did not produce on additive effect on yield, with a 4% yield increase. Wet-Sol 233 tended to produce drier corn at harvest, though not significantly so. These results show the ability of both Vitazyme and Wet-Sol to increase corn grain yields during an especially good cropping year, and their viability as major production tools for agriculture in the Corn Belt of the United States.

The dramatic improvement in rooting with Vitazyme can be seen on the right; two applications improved yield by 13.1 bu/acre (6%) above the untreated control.

Vitazyme Field Tests for 2015

Sweet Corn (for seed) *with Vitazyme application*



Seven corn plants from the Vitazyme treatment (left) and the control reveal a great improvement in leaf chlorophyll, stalk diameter, and plant health with Vitazyme.

Note the vastly improved kernel development with Vitazyme, showing the ability of the product's brassinosteroids to expedite pollination under very hot and dry conditions.

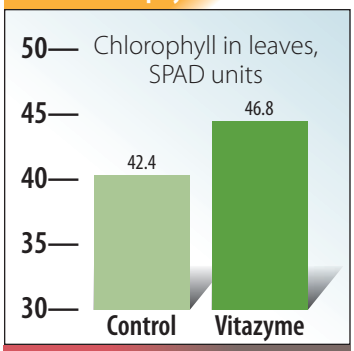
Researchers: Jacob Hesseltine and Paul Syltie, Ph.D.
Research organizations: Vital Grow Distribution LLC, Waterville, Washington, and Vital Earth Resources, Gladewater, Texas
Farmer: Peter Dufault
Location: Mattawa, Washington
Variety: Syngenta sweet corn
Planting date: May 5 and 6, 2015
Seeding rate: 38,500 seeds/acre
Row spacing: 30 inches
Previous crop: wheat, with buckwheat after
Soil Type: sandy loam
Seedbed preparation: strip tillage into buckwheat; Roundup sprayed before planting

Experimental design: A 125-acre circle of sweet corn for seed was split into two parts, one half treated with Vitazyme and the other half left untreated, with the objective being to evaluate the effect of this product on seed corn yield.

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

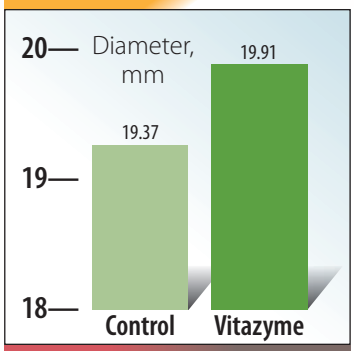
Fertilization: 4 tons/acre of dry manure, 37 lb/acre N in-furrow at planting, 265 lb/acre N through irrigation water
Vitazyme application: 13 oz/acre sprayed on the leaves and soil at the 3 to 4-leaf stage, along with Impact and Atrazine herbicides (sprayer gave 15 gal/acre, 5 mph, 30 psi)
Growing season weather: average spring weather but very hot summer temperatures, leading to poor pollination
Harvest date: August 20 and 21
Chlorophyll results: On August 5, chlorophyll evaluations were made using 35 ear leaves per treatment with a Minolta SPAD Chlorophyll Meter.
Plant and ear results: Ears and plants were evaluated on August 5, using seven plants for both treatments and averaging the values:
Insect pest results: Insect pressure, especially of earworms, was less in the treated part of the field.
Conclusions: A study in Washington

Leaf Chlorophyll



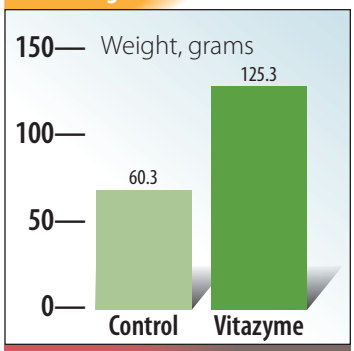
Increase in leaf chlorophyll with Vitazyme: 4.4 SPAD units

Stalk Diameter



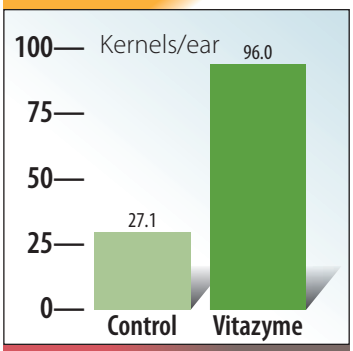
Increase in stalk diameter with Vitazyme: 3%

Ear Weight



Increase in ear weight with Vitazyme: 108%

Kernels Per Ear



Increase in kernel weight/ear with Vitazyme: 254%

on sweet corn for seed was severely affected by summer heat, which inhibited pollination and subsequent seed set. However, a single Vitazyme application of 13 oz/acre, applied at the 3 to 4-leaf stage greatly improved leaf chlorophyll and overall growth, resulting in a 3% greater stalk diameter. The brassinosteroids in the product greatly enhanced pollination of the treated area, resulting in a 108% increase in ear weight and a 254% increase in kernels per ear. There was less earworm damage in the treated areas, and of additional note is a neighboring field, where Vitazyme was applied together with herbicides, which produced a much better weed kill than the farmer had noted in previous years. It is hypothesized that Vitazyme's active agents trigger rapid metabolic processes, thereby opening the plant to an easier kill by a herbicide; i.e., a rapidly metabolizing plant is easier to kill than a stressed one. This program is excellent for promoting sweet corn yield for seed production, especially under heat-stressed conditions.

Vitazyme Field Tests for 2015

Lettuce *with Vitazyme application*

Researcher: Augustin Peralta
Research organization: Quimica Lucava, Mexico
Farmer: Venancio Olayo
Location: La Aventura Farm, Palmarito, Puebla, Mexico
Variety: unknown
Transplanting date: April 28, 2015
Experimental design: A lettuce field was treated with two Vitazyme applications on 0.5 ha, in an effort to evaluate the effect of the product on lettuce growth, yield, and profitability.

1 Control 2 Vitazyme

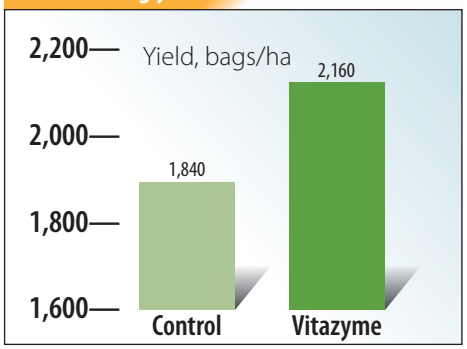
Fertilization: unknown
Vitazyme application: (1) 1 liter/ha sprayed on the leaves and soil on May 13 and June 13(15 and 46 days) after transplanting.
Growth results: Compared to the untreated control, Vitazyme treated plants displayed the following:
- Bigger root systems
- Greater leaf area and larger plants
- More leaf chlorophyll (deeper green color) and brighter color
- Less damage from Fusarium and other plant diseases
- Reduced sunspot damage

Yield results:

Treatment	Yield	Yield change
	bags/ha	bags/ha
Control	1,840	—
Vitazyme	2,160	320 (+17%)

Increase in lettuce yield with Vitazyme: 17%

Lettuce bag yield



Income results: Each bag was worth 2.258 USD. The extra 320 bags were valued at 723 USD/ha, and the Vitazyme cost 64.52 USD/ha, giving an added profit of 658.48 USD/ha. The cost benefit was 10.2 : 1.

Two Vitazyme applications on lettuce in Mexico produced much improved root and leaf growth, plus a 17% yield increase.

Conclusion: A lettuce trial in Puebla, Mexico, using two Vitazyme applications of 1 liter/ha, revealed an excellent yield response of 17%, 658 USD/ha more income, and a cost : benefit of 10.2 : 1. The treated plants were healthier with larger, deeper green leaves and larger root systems, having few disease and sunspot incidence, proving that Vitazyme is an excellent supplement for lettuce production in Mexico.

Added income with Vitazmye: 658.48 USD/ha

Cost : Benefit increase: 10.2 : 1

Onions *with Vitazyme application*

Researcher: Lucero Fernandez and Ivan Zazueta
Farmer: Gelasio Ramos
Research organization: Quimica Lucava, Mexico
Location: Canta Ranas Farm, Abasolo, Guanajuato, Mexico
Variety: Creole
Planting date: April 1, 2014
Experimental design: A 2 hectare area of an onion field was treated with Vitazyme three times, while the remainder of the field was left untreated, to evaluate the effect of the product on onion yield.

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

Fertilization: unknown
Vitazyme application: May 7, June 11, and July 24, 2014, at 1 liter/ha each time
Harvest date: December 29, 2014
Yield results: The crop was harvested after about 120 days.

Treatment	Yield	Yield change
	kg/ha	kg/ha
Control	41,233	—
Vitazyme	42,165	932 (+2.3%)

Yield increase with Vitazyme: 2.3%

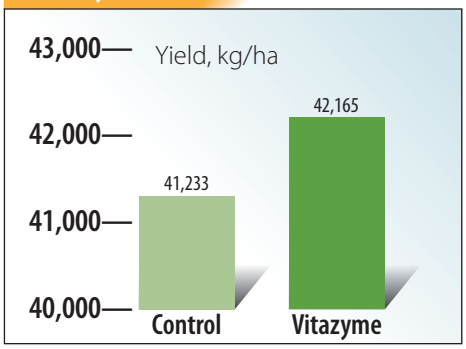
Income results:

Treatment	Yield	Gross Income[1]	Income change	Vitazyme cost	Profit	Cost : Benefit
	kg/ha	USD/ha	USD/ha	USD/ha	USD/ha	—
Control	41,233	23561,71	—	—	—	
Vitazyme	42,165	24094,29	532,57	101,79	430,79	4.2

[1]Price of onions = 0,5714 USD/kg.

Increased income with Vitazyme: 431 USD/ha
Greater Cost : Benefit with Vitazyme: 4.2

Onion yield



Conclusion: An onion trial in Mexico revealed that Vitazyme, applied three times, increased the yield by a modest 2.3%, but improved income by 431 USD/ha, giving a cost : benefit of applying the product of 4.2. These results show a good income increase from Vitazyme use on onions

Orchard Grass *with Vitazyme application*

Researchers: Gunnar and Gary Garms
Farm: Bale Counter, Inc.
Location: Smith, Nevada
Variety: Seco
Soil type: sandy loam
Experimental design: A 30-acre center-pivot field, with an established orchard grass stand, was fertilized at high rates and divided into two 15-acre areas, with half receiving Vitazyme after the first cutting. The objective of the trial was to determine if this product could benefit grass quality when added to a high fertility program.
Fertilization: All 30 acres received the following: *(see Fertilization table below.)*
Vitazyme application: 13 oz/acre sprayed on the west half of the pivot on June 17, for the second and third cuttings.
Actagro product applications: Several Actagro products were applied at recommended rates for each of the three cuttings
Weather for 2015: The season was very dry. Only 0.97 inch of precipitation was received for the 180 days of October 2014 through April 2015.
Yield results: No yield separation was made for the second and third cuttings of the two halves of the pivot. Total yields were as follows: *(see Yield results table to the left.)*
Hay quality results: Samples of third-cutting hay were collected about September 10 and sent to Dairyland Labs in De Pere, Wisconsin. All values are for a dry basis. *(see Hay quality results table on pg. 36)*

Fertilization table

Cutting	Dates	Nitrogen	Phosphorus	Potassium	Sulfate-S	Calcium	Zinc
		---------- lb/acre ----------					
First cutting	3/7-5/30	157	122	83	30	122	0.30
Second cutting	6/5-7/14	105	82	78	30	122	0.30
Third cutting	7/19-8/15	89	75	68	30	122	0.35
Total		351	279	229	90	366	0.95

Yield Results table

Cutting	Date	Growth time	Irrigation water	Yield
		days	inches	tons/acre
1	5/3	77	11.7	3.1
2	7/14	45	8.4	2.3
3	8/28	45	11.5	2.1
Total				7.5

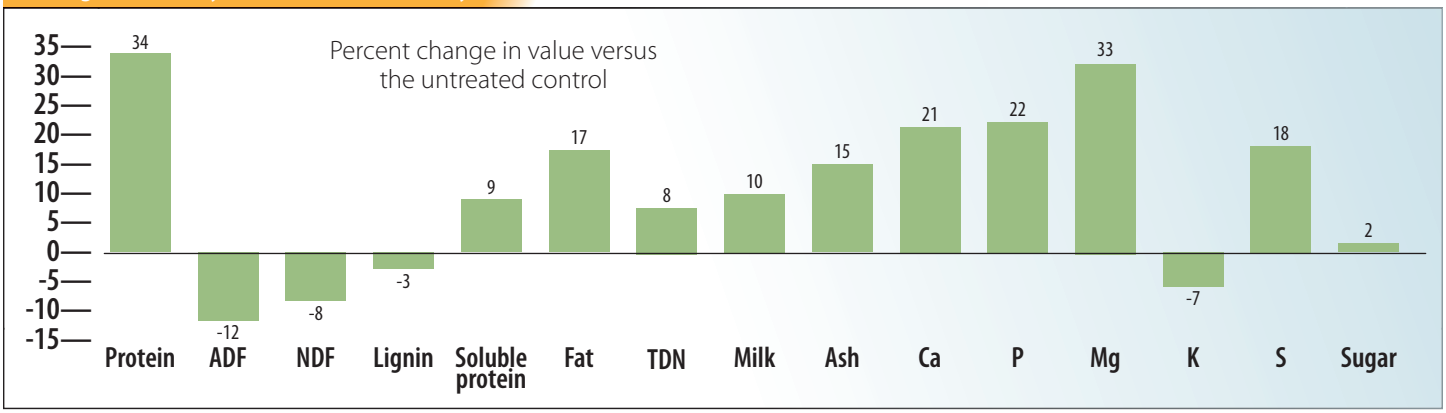
Hay Quality Results table

Treatment	Protein	ADF[1]	aNDF[2]	Lignin	Soluble protein	Fat	TDN[3]	Milk[4]
	%	%	%	%NDF	% crude protein	%	%	lb/ton of DM
Control	11.27	39.37	63.59	9.22	37.71	2.42	50.25	2,391
Vitazyme	15.11	34.74	58.69	8.91	41.16	2.82	54.45	2,628
Change	+34%	-12%	-8%	-3%	+9%	+17%	+8%	+10%

[1] ADF = acid detergent fiber; [2] aNDF = ash free neutral detergent fiber; [3] TDN = total digestible nutrients; [4] a measure of milk that can be produced from a ton of this forage; [5] WSC = water soluble carbohydrates.

Treatment	Ash	Calcium	Phosphorus	Magnesium	Potassium	Sulfur	Sugar (WSC)[5]
	%	%	%	%	%	%	%
Control	11.45	0.70	0.23	0.21	2.64	0.22	5.90
Vitazyme	13.15	0.85	0.28	0.28	2.45	0.26	6.01
Change	+15%	+21	+22%	+33%	-7%	+18%	+2%

Changes in Quality Parameters with Vitazyme



Conclusions: The addition of a single application of Vitazyme to this orchard grass mid-season, to the second and third cuttings, caused an undetermined yield change but a great improvement in forage quality. Protein improved a massive 34%, with fiber and lignin decreased. Fats, forage digestibility, sugar, and mineral contents of the forage increased to produce a calculated 10% improvement in milk production. This program is shown to be an excellent additon to a forage grower's program, especially when added to careful mineral fertilization and Actagro organic products.

Vitazyme Field Tests for 2015

Peppers *with Vitazyme application*

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

1 *Control* 2 *Vitazyme*

Vitazyme application: (1) transplant trays dipped in a 0.5% solution (1 liter/200liters of water) on March 16, three days before transplanting; (2) 1.0 liter/ha sprayed on the leaves and soil on April 26; (3) 1.0 liter/ha sprayed on the leaves and soil on May 15

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

Harvest date: June 24, 2015
Growth results:
April 23 observations (35 days after transplanting)
- Greater total root growth and health compared to the control plants
- More fine roots and root hairs

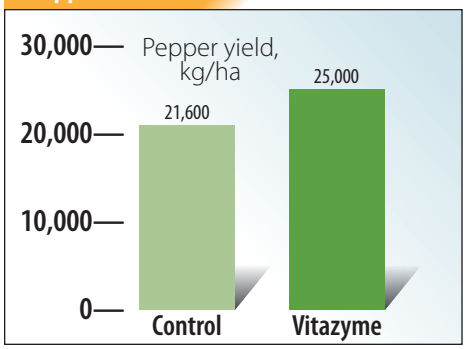
May 15 observations (57 days after transplanting)
- Greater overall plant growth and appearance than the control plants
- More leaves, flowers, and fruit
- Greater primary, secondary, and fine roots

Yield results:

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

Increase in pepper yield with Vitazyme: 16%

Pepper Yield



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

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

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

Vitazyme Field Tests for 2015

Potatoes *with Vitazyme application*

Researchers: Martin Perez, Jonathan Pedroza, and Lucero Fernandez
Farmer: Virginia Perez Heredia
Research organization: Quimica Lucava
Location: San Francisco del Rincon, Guanajuato, Mexico
Variety: Agatas
Planting date: January 31, 2015
Experimental design: A 2 ha part of a potato field was treated with three Vitazyme applications to determine the effect of the product on tuber yield and size, and income.

The third application of Vitazyme is being sprayed on the potato crop at San Francisco del Rincon in this Mexican trial.

An excellent response to three Vitazyme treatments is shown(right), with greater numbers and uniformity of tubers. Yield increased by 6%.

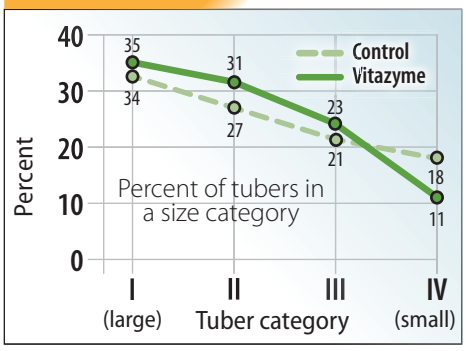
❶ *Control* ❷ *Vitazyme*

Fertilization: unknown
Vitazyme application: (1) banded over the seed pieces at 1 liter/ha at planting; (2) 1 liter/ha sprayed on the leaves and soil on March 26; (3) 1 liter/ha sprayed on the leaves and soil on April 25.
Harvest date: June 3, 2015, 123 days after planting
Growth observations: On April 25, plants were evaluated and showed the following:
- A greater number of tubers with Vitazyme
- Better tuber uniformity with Vitazyme
- Greater root development and thicker stems with Vitazyme

Tuber size evaluation: Two areas were harvested for each sample listed in the table below.

Notice that the Vitazyme treatment had more tubers in the larger categories (I, II, and III) compared to the control, while there were considerably fewer small tubers (IV).

Tuber Size

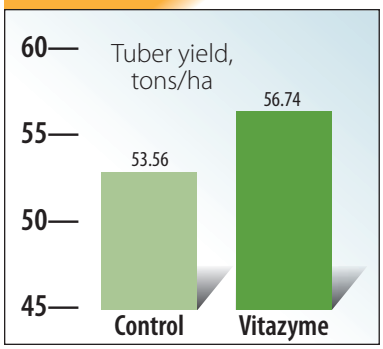


Tuber yield: The number of 100 kg sacks/0.3 ha were counted to determine the yield.

Tuber size						
Treatment	I	II	III	IV	Total	Change
	----------tons/ha----------					
Control	18.26	14.32	11.36	9.62	53.56	—
Vitazyme	19.70	17.65	13.26	6.14	56.75	3.19(+6%)

Increase in tuber yield with Vitazyme: 6%

Tuber Yield



Conclusion: A potato trial in Guanajuato, Mexico, revealed that three Vitazyme applications produced healthier plants having more roots, stems, and leaves, as well as a greater percentage of large tubers (sizes I, II, and III), and fewer small tubers (size IV) than the untreated control. The tuber yield was increased by 6%, giving a greater profit of 2,522 USD/ha. This income increase produced a cost : benefit of 21.5, showing the excellent efficacy of the program for Mexican potato production.

Income results:

Treatment	Yield	Yield change	Added income[1]	Net income[2]	Cost : Benefit
	kg/ha	kg/ha	USD/ha	USD/ha	
Control	53,560	—	—	—	—
Vitazyme	56,740	3,180	2,639	2,522	21.5

[1]Wholesale potato price = USD 0.83/kg. [2]Vitazyme program cost (with labor) = 117.24 USD/ha.

Added income with Vitazyme: 2,522 USD/ha
Increased cost : benefit with Vitazyme: 21.5

Vitazyme Field Tests for 2015

Potatoes *with Vitazyme application. A study conducted in 2013*

Research organization: Soepenberg and Agro Macaj, Kralova, Slovakia
Location: Senci, Slovakia
Variety: unknown
Experimental design: A potato field was divided into Vitazyme treated and untreated control areas to determine the yield of the crop.

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

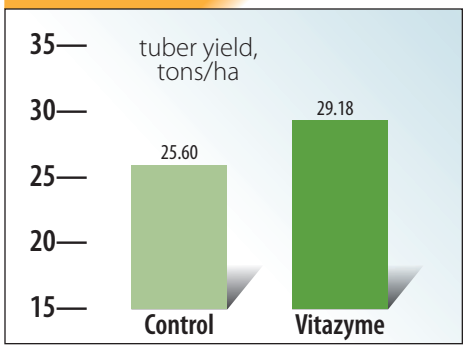
Fertilization: unknown
Vitazyme application: 1 liter/ha (time unknown)

Yield results:

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	25.60	—
Vitazyme	29.18	3.58 (+14%)

Increase in tuber yield with Vitazyme: 14%

Tuber Yield



Conclusions: Potatoes grown in Slovakia responded very well to Vitazyme, producing a 14% yield increase, showing the efficacy of this program for growers in this region.

Vitazyme Field Tests for 2015

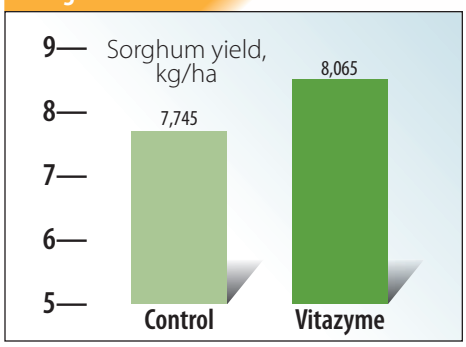
Sorghum *with Vitazyme application*

Researchers: Bartolo González and Lucero Fernandez
Farmer: Irrigation District 011
Research organizations: CVYTTS and Quimica Lucava
Location: Irapuato, Guanajuato, Mexico
Variety: Syngenta 5390
Planting date: May 16, 2014
Experimental design: A 1 hectare area of a sorghum field was treated twice with Vitazyme to determine its effects on growth, yield, and profitability compared to an adjoining untreated control area.
Fertilization: unknown
Vitazyme application: (1) a seed treatment at 250 ml/ha on May 16, 2014; (2) foliar and soil spray at 1 liter/ha on June 30, 2014
Growth observation: The Vitazyme treated plants had *more extensive roots* and *greater plant vigor*.
Harvest date: December 15, 2014
Yield results:

Treatment	Yield	Yield change
	kg/ha	kg/ha
Control	7,745	—
Vitazyme	8,065	320 (+4%)

Increase in sorghum yield with Vitazyme: 4%

Sorghum Yield



Income results: The sorghum price was 0.2382 USD/kg. Vitazyme overall cost = 46,43 USD/ha.

Added profit with Vitazyme: 29.80 USD/ha

Conclusions: This Mexican sorghum trial showed a good yield increase (4%) and income improvement (29.80 USD/ha) with two Vitazyme applications.

Vitazyme Field Tests for 2015

Soybeans *A Synergism Study with WakeUp*

Researcher: Jerry Carlson
Research organization: Renewable Farming LLC, Cedar Falls, Iowa
Location: Cedar Falls, Iowa
Variety: Pioneer 92M72
Planting date: May 29, 2015
Previous crop: Corn
Experimental design: A soybean field was selected to provide strips six rows wide and 350 feet long (0.121 acre), with five strips for the Vitazyme and Vitazyme + WakeUp treatments, and six strips for the untreated control. The objective of the study was to discover a possible interaction between Vitazyme and WakeUp to improve the yield response.

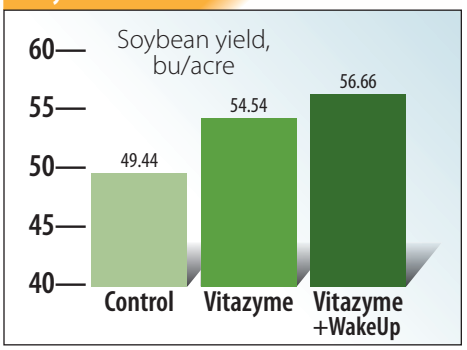
1 ***Control*** **2** ***Vitazyme*** **3** ***Vitazyme +WakeUp***

Fertilization: unknown
Vitazyme application: 13 oz/acre on July 8, with or without WakeUp Summer
WakeUp application: WakeUp Summer was applied along with Vitazyme at 5 oz/acre on Treatment 3 on July 8. WakeUp Summer is a surfactant made from vegetable origin that reduces water surface tension and "clear coats" leaves, cleans and softens the leaf cuticle for nutrient absorption, pulls nutrient ions into plants quicker, and reduces plant sap surface tension for more rapid movement of phloem solutes.
Weed control: Pre-emergent herbicide on May 28; Rhythm post-emergence on June 27; cultivation on July 1.
Harvest date: October 20, 2015
Growing season weather: favorable

Yield results: All plots are averaged for each treatment.

Treatment	Beans yield	Yield Change
	bu/acre	bu/acre
Control	49.44 b	—
Vitazyme	54.54 a	5.10 (+10%)
Vitazyme + WakeUp	56.66 a	7.22 (+15%)
Standard error:	1.67 (Vitazyme) 1.67 (Vitazyme + WakeUp) 1.56 (Control)	
Control vs. Vitazyme + WakeUp: P(0.10)=0.0018 Control vs. Vitazyme: P(0.10)=0.0131 Vitazyme vs. Vitazyme + WakeUp: P(0.10)=0.2421		
Statistics were performed using the Statistical Analysis System.		

Soybean Yield



Increase in bean yield

Vitazyme alone 10%
Vitazyme + WakeUp.....15%

Moisture and test weight results: Bean moisture at harvest varied from 8.55 to 8.60%, and test weight from 56.17 to 56.82 lb/bu, so were not significantly different.
Conclusions: A soybean trial in east-central Iowa, using Vitazyme and Vitazyme + WakeUp in 0.121-acre field strips, with six equal-sized control strips, revealed that Vitazyme significantly (P=0.0131) boosted bean yield (5.10 bu/acre, or 10%) over the control. WakeUp boosted yield even further, producing a synergism with Vitazyme by increasing yield another 2.12 bu/acre over Vitazyme alone for a 15% yield improvement. This increase was significant at P=0.0018. These results show that Vitazyme, applied at bloom, can significantly improve soybean yield, and WakeUp Summer applied with it can improve the yield even more. This product combination holds great promise for soybean production in Iowa.

Vitazyme Field Tests for 2015

Soybeans *A Soil Microbiology Study with Roundup (Glyphosate)*

Researcher: Manjula Nathan, Ph.D., and Robert Kremer, Ph.D.
Research institution: University of Missouri Department of Plant and Soil Science, and the U.S.D.A.-A.R.S., Columbia, Missouri
Location: Bradford Research Center, Columbia, Missouri
Variety: Asgrow 3832 (GMO)
Planting rate: 150,000 seeds/acre
Row spacing: 30 inches
Planting date: May 24, 2014
Experimental design: A replicated soybean trial was arranged with four replications and four treatments, using plots that were 4 rows (10 feet) x 200 feet. A randomized complete block design was used. Glyphosate (Roundup) was applied to two of the treatments to evaluate the effects of the product alone, as well as with Vitazyme, to note the potential of Vitazyme to remediate the toxic effects of glyphosate. These effects were measured by a number of factors including root Rhizobium Nodulation, root mass, rhizosphere microbial biomass, Fusarium root colonization, and populations of Pseudomonas and indoleacetic acid- producing bacteria in the rhizosphere. Glyphosate residues in the soil were also measured.

Treatment	Vitazyme	Glyphosate
1. Control	0	0
2 Vitazyme	x	0
3. Glyphosate	0	x
4. Vitazyme +Glyphosate	x	x

Fertilization: Nitrogen, phosphorus, and potassium were applied according to soil test recommendations. Thus, the required amount of O-46-62% N-P_2O_5-K_2O was applied before planting;
Vitazyme application: (1) 13 oz/acre (1 liter/ha) applied on the seeds before

planting; (2) 13 oz/acre (1 liter/ha) sprayed on the leaves and soil at early bloom, on July 18

Glyphosate application: On July 24, 36 oz/acre of Roundup herbicide was sprayed on appropriate plots. Any surviving weeds were hand pulled.

Weed control for the control and Vitazyme treatments: The entire field plot area was sprayed before planting with 1.25 pint/acre of Dual II magnum herbicide + 3 oz/acre of Fierce herbicide.

Growing season weather: favorable for soybean growth

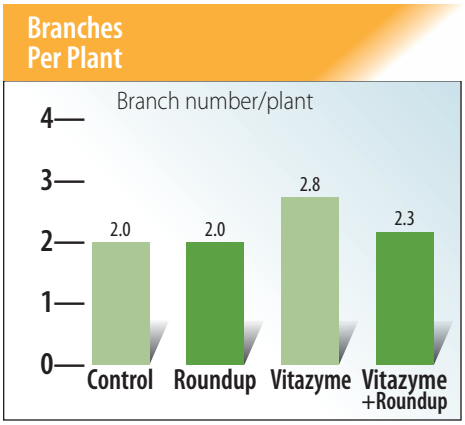
Harvest date: October 23, 2014

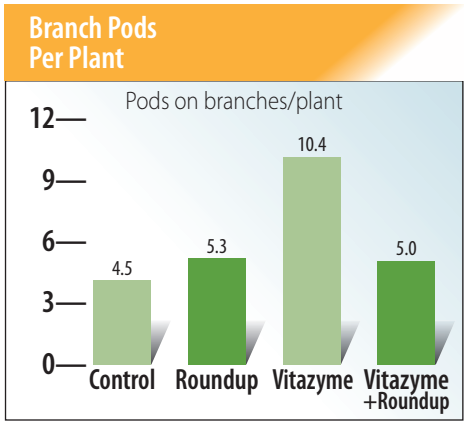
Yield results: Yield differences among the four treatments were not significant.

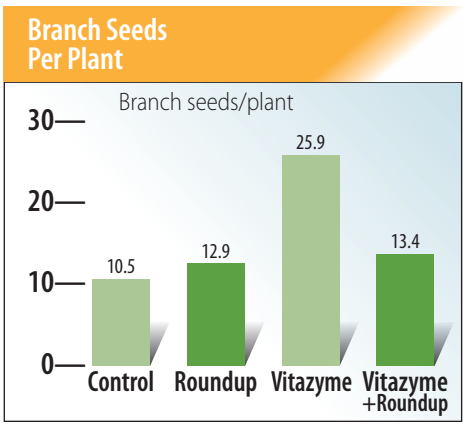
Plant characteristic results: Means followed by the same letter are not significantly different at P=0.05.

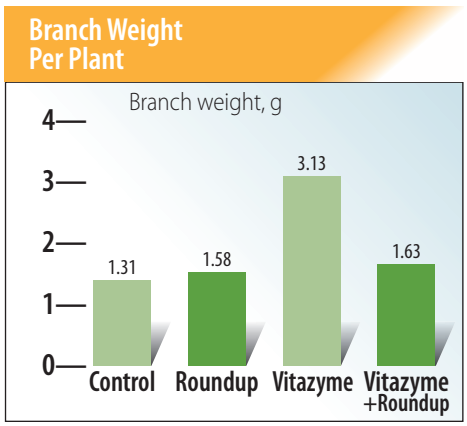
Treatment	Nodes/plant	Main stem pods/plant	Branches/ plant	Change	Branch pods/ plant	Change	Main stem seeds/plant
Control	15.3	28.0	2.0 b	--	4.5 b	--	78
Roundup	16.2	31.4	2.0 b	0	5.3 b	0.8 (+18%)	84
Vitazyme	16.0	31.3	2.8 a	0.8 (+40%)	10.4 a	5.9 (+131%)	89
Vita + Roundup	15.6	29.3	2.3 b	0.3 (+15%)	5.0 b	0.5 (+11%)	79

Treatment	Branch seeds/plant	Change	Main stem seed wt./plant	Branch wt./plant	Change	Main stem seeds/pod	Branch seeds/pod	Main stem seed wt.	Branch seed wt.
				grams	grams			grams	grams
Control	10.5 b	--	9,3	1.31 b	--	2.8	2.4	0.121	0.123
Roundup	12.9 b	2.4 (+23%)	10.3	1.58 b	0.27 (+21%)	2.6	2.4	0.123	0.117
Vitazyme	25.9 a	15.4 (+147%)	10.8	3.13 a	1.82 (+139%)	2.8	2.4	0.121	0.120
Vita + Roundup	13.4 b	2.9 (+28%)	10.4	1.63 b	0.32 (+24%)	2.7	2.4	0.131	0.132









Changes in Plant Characteristics				
	Branches/plant	Branch pods/plant	Branch seeds/plant	Branch wt./plant
Roundup only	0	+18%	+23%	+21%
Vitazyme only	+40%	+131%	+147%	+139%
Vita + Roundup	+15%	+11%	+28%	+24%

A soybean trial at The University of Missouri Bradford Research Center proved that Vitazyme can reverse the negative effects of glyphosate on soil microbiology and root growth.

Vitazyme greatly increased soybean branching, and the number of pods and seeds on these branches. This fact is reflected in a huge increase in branch weight per plant.

Soil microbial biomass and community structure results: All values are in nm/g of soil. Means followed by the same letter are not significantly different at P=0.05.

Treatment	TPLFA[1]		TBACT[2]		GNEG[3]		GPOS[7]		Anaerobes	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	pico moles /g dry soil		cfu/g soil		cfu/g soil		cfu/g soil		cfu/g soil	
Control	199	15.6	132 a	25.5	68.8	9.6	41.4	3.63	2.33	0.32
Roundup	201	47.1	123 ab	22.0	87.1	21.5	38.3	5.65	2.15	0.40
Vitazyme	193	41.1	107 b	14.2	64.2	17.9	38.3	4.20	1.95	0.13
Vita + Roundup	243	36.9	148 a	17.3	103.0	15.9	42.4	6.50	2.35	0.48
Probability>F	0.26		0.017		0.233		0.215		0.074	

Treatment	Actinomycetes		Total fungi		AM fungi[5]		Eukaryote bacteria	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	cfu/g soil		cfu/g soil		cfu/g soil		cfu/g soil	
Control	21.1	2.17	6.03	1.60	9.18	0.71	4.33	0.98
Roundup	19.9	2.14	11.40	2.10	7.15	1.00	3.73	1.06
Vitazyme	19.4	2.62	6.90	0.96	10.10	1.09	3.80	1.34
Vita + Roundup	20.3	2.60	12.80	3.12	9.48	0.50	5.13	0.83
Probability>F	0.452		0.810		0.143		0.121	

[1]TPLFA=total phospholipid fatty acids; [2]TBACT=total bacteria; [3]GNEG=gram negative bacteria; [4]GPOS=gram positive bacteria; [5]AM fungi=arbuscular mycorrhizal fungi. Std. Dev.=Standard Deviation.

Most values among the microbial community structure were not significantly different at P=0.05.

Only total bacteria was significant, and anaerobic bacteria mean differences were almost significant.

Soil biological and glyphosate residue measurement results: Means followed by the same letter are not significantly different at P=0.05.

Besides improving rhizosphere microflora and reducing glyphosate residues, Vitazyme increased branching and pod formation by up to 131%.

Treatment	Fusarium colonization		RFP[1]		RIPB[2]		SNFW[3]		SRDW[4]	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	colonies/100 cm root		cfu/g dry soil x 10^4		cfu/g dry soil x 10^4		g/plant		g/plant	
Control	9.56 b	0.83	36.6	15.0	25.0	5.72	6.31	2.29	13.4 b	3.34
Roundup	19.90 a	2.55	11.3	3.33	6.5	1.29	4.72	0.73	11.0 b	1.56
Vitazyme	9.31 b	0.59	43.0	9.73	21.8	10.30	6.96	0.87	13.5 b	0.78
Vita + Roundup	8.75 b	1.62	41.0	8.13	15.0	5.77	7.08	1.19	20.0 a	5.12
Probability>F	0.001		0.065		0.121		0.202		0.025	

Treatment	MNOX[5]		MNRED[6]		RORatio[7]		GRRS[8]	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	cfu/g soil		cfu/g soil				ug/g dry soil	
Control	18.4 b	5.01	13.0	3.76	0.72 a	0.13	68.0	27.1
Roundup	87.9 a	17.50	12.3	1.71	0.14 b	0.04	179.0	86.6
Vitazyme	25.3 b	9.22	21.4	6.90	0.86 a	0.05	64.7	20.3
Vita + Roundup	33.6 b	14.10	19.8	6.56	0.61 a	0.11	142.0	47.2
Probability>F	0.001		0.858		0.005		0.464	

[1] RFP=rhizosphere fluorescent pseudomonas bacteria; [2] RIPB=rhizosphere IAA-producing bacteria; [3] SNFW=soybean nodule fresh weight; [4] SRDW=soybean root dry weight; [5] MNOX=manganese oxidizing bacteria; [6] MNRED=manganese reducing bacteria; [7] Mn reducing/Mn oxidizing ratio; [8] GRRS=glyphosate residue.

Treatment	TPLFA[1]		TBACT[2]		GNEG[3]		GPOS[7]		Anaerobes	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	pico moles /g dry soil		cfu/g soil		cfu/g soil		cfu/g soil		cfu/g soil	
Control	199	15.6	132 a	25.5	68.8	9.6	41.4	3.63	2.33	0.32
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	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	cfu/g soil		cfu/g soil		cfu/g soil		cfu/g soil	
Control	21.1	2.17	6.03	1.60	9.18	0.71	4.33	0.98
Roundup	19.9	2.14	11.40	2.10	7.15	1.00	3.73	1.06
Vitazyme	19.4	2.62	6.90	0.96	10.10	1.09	3.80	1.34
Vita + Roundup	20.3	2.60	12.80	3.12	9.48	0.50	5.13	0.83
Probability>F	0.452		0.810		0.143		0.121	

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Soil biological and glyphosate residue measurement results: Means followed by the same letter are not significantly different at P=0.05.

Treatment	Fusarium colonization		RFP[1]		RIPB[2]		SNFW[3]		SRDW[4]	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	colonies/100 cm root		cfu/g dry soil x 10^4		cfu/g dry soil x 10^4		g/plant		g/plant	
Control	9.56 b	0.83	36.6	15.0	25.0	5.72	6.31	2.29	13.4 b	3.34
Roundup	19.90 a	2.55	11.3	3.33	6.5	1.29	4.72	0.73	11.0 b	1.56
Vitazyme	9.31 b	0.59	43.0	9.73	21.8	10.30	6.96	0.87	13.5 b	0.78
Vita + Roundup	8.75 b	1.62	41.0	8.13	15.0	5.77	7.08	1.19	20.0 a	5.12
Probability>F	0.001		0.065		0.121		0.202		0.025	

Treatment	MNOX[5]		MNRED[6]		RORatio[7]		GRRS[8]	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
	cfu/g soil		cfu/g soil				ug/g dry soil	
Control	18.4 b	5.01	13.0	3.76	0.72 a	0.13	68.0	27.1
Roundup	87.9 a	17.50	12.3	1.71	0.14 b	0.04	179.0	86.6
Vitazyme	25.3 b	9.22	21.4	6.90	0.86 a	0.05	64.7	20.3
Vita + Roundup	33.6 b	14.10	19.8	6.56	0.61 a	0.11	142.0	47.2
Probability>F	0.001		0.858		0.005		0.464	

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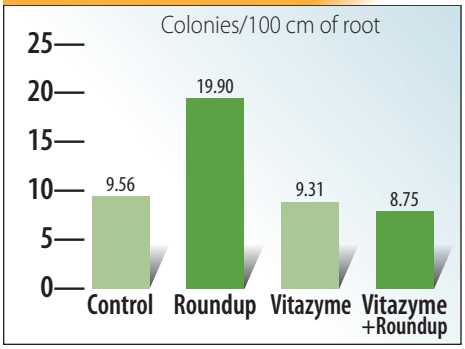
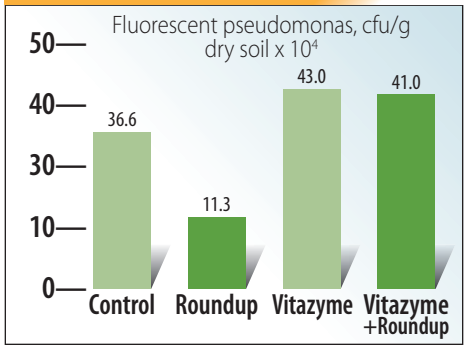
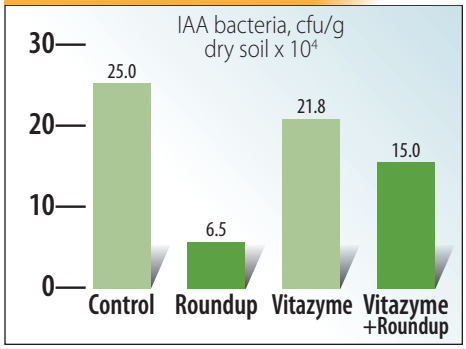
Fusariuam Colonization

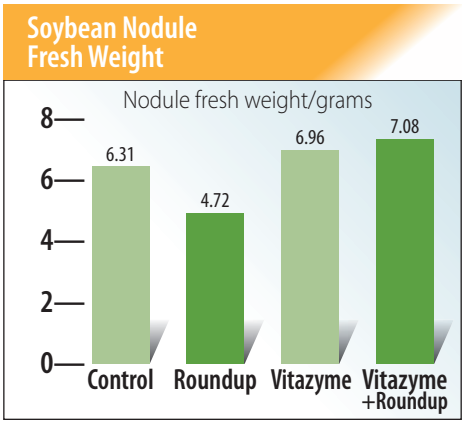


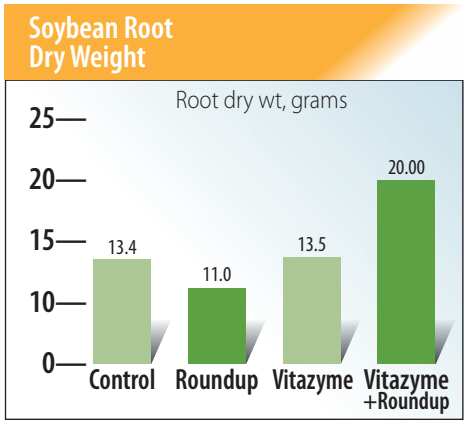
Rhizosphere Fluorescent Pseudomonas Bacteria

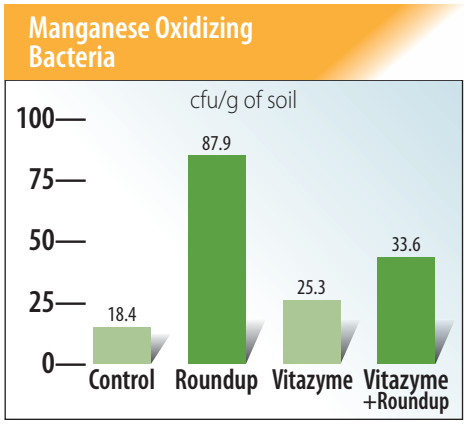


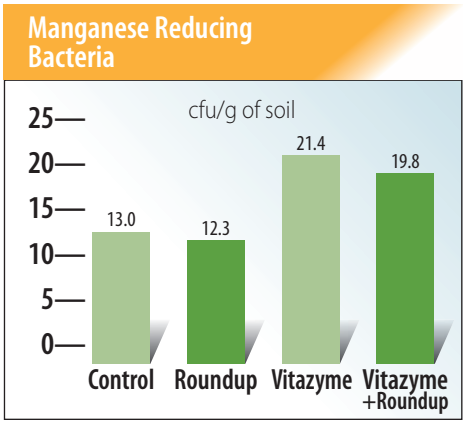
Rhizosphere Indole Acetic Acid Producing Bacteria

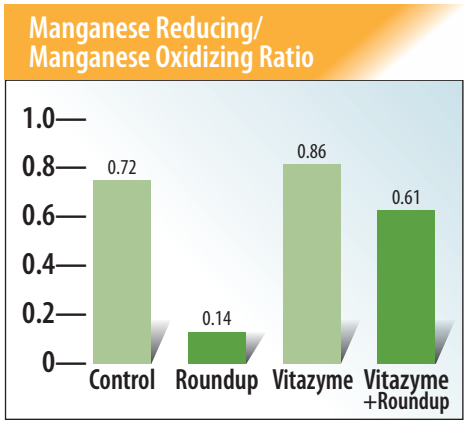


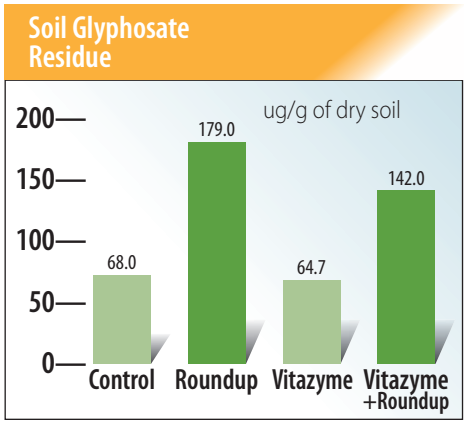












Note that Vitazyme overcame the suppressive effects of Roundup on beneficial soil bacteria (Fluorescent Pseudomonas and IAA-producing bacteria), as well as the beneficial manganese (Mn) reducing bacteria, which change manganese to the soluble +2 oxidation state for plant root uptake; the Mn oxidizing bacteria make the element insoluble and unavailable for plant use. The ratios of these Mn bacteria reflect these effects. Fusarium root colonization was greatly increased with Roundup, but totally alleviated by Vitazyme with Roundup. Roundup negatively impacted root and nitrogen-fixing nodule weights, while Vitazyme increased these two parameters, alone and especially along with Roundup for root weight. Vitazyme reduced glyphosate residues in the soil by 54 percentage points compared to glyphosate alone. These results show how beneficial Vitazyme is to reduce the negative impacts of Roundup in the rhizosphere.

Changes in Parameters vs. the Control

Parameter	Roundup only	Vitazyme only	Vitazyme + Roundup
Fusarium colonization	+108%	-3%	-8%
Rhizosphere Fluorescent Pseudomonas	-69%	+17%	+12%
Rhizosphere IAA-producing bacteria	-74%	-13%	-40%
Soybean nodule fresh weight	-25%	+10%	+12%
Soybean dry root weight	-18%	+1%	+49%
Manganese oxidizing bacteria	+378%	+38%	+83%
Manganese reducing bacteria	-5%	+65%	+52%
Ratio of Mn reducing/Mn oxidizing bacteria	-81%	+19%	-15%
Soil glyphosate residue	+163%	-5%	+109%

Discussion and conclusions: The following text is by Manjula Nathan, Ph.D.

Soybean yield was not significantly affected by Vitazyme treatment in 2014. However, there was a significant difference in the number of branches and branch pods per plant with Vitazyme treatment which resulted in more branch seeds and seed weight. Treatment with glyphosate reduced the number of branches and pods on branches in the Vitazyme treatment to that of the control. These results are interesting since Schon and Blevins (1990) in Missouri at the Bradford Research Center showed that foliar boron treatments also increased the number of soybean branches and branch pods/branch. The number of branches on soybeans will be affected by several factors including light penetration into the canopy, but also from the auxin/cytokinin balance in the plant. Unpublished field research by Reinbott and Blevins found that foliar and intravenous cytokinin application also increased branch and branch pod number on soybean. Cytokinins are produced at the plant root tips, so a large root system with more root tips could result in more soybean branching and pods per branch. In this case, Vitazyme could be stimulating root growth resulting in more branches and branch pods. However, this stimulus is lost when glyphosate is applied.

Soybean Root Growth and Nodulation

Previous studies revealed detrimental effects of glyphosate on nodulation and

root development in soybean grown on Mexico silt loam (Kremer and Means, 2009), the same environment for the current study. Glyphosate alone reduced root biomass relative to no-glyphosate treatment and, interestingly, Vitazyme appeared to counteract the inhibitory effects, resulting in significantly greater root biomass, and might stimulate root growth. Similar effects were observed for nodule biomass, although the increased biomass for Vitazyme was not significant, which may be due to variability in the replicate values. Nodule biomass serves as an indicator of effective nitrogen fixation of the Bradyrhizobium-soybean symbiosis; we did not measure actual nitrogen fixation by assay such as acetylene reduction, but prior experience has shown that nodule biomass correlates positively with acetylene reduction.

Soil Residual Glyphosate

Little information is currently available on glyphosate residues in soils resulting from prior application of Roundup herbicide in row crops. This is likely due to the popular assumption that glyphosate is readily dissipated, immobilized, and degraded in the environment. Results of this study show that glyphosate is indeed remaining in soil at detectable levels (ug glyphosate/g dry soil is equivalent to ppb). We analyzed rhizosphere soil because we previously demonstrated that glyphosate is actively released by treated soybean plants through roots (Kremer et al., 2005). An interesting revelation in this study is that although glyphosate was not applied to half the plots in 2014, residual chemical was detected suggesting that glyphosate was carried over from previous applications on this field site. Furthermore, the concentrations in plots receiving 2014 application were two to three times that in plots without glyphosate. Statistical analysis did not detect significant differences among the treatments, likely due to high variability in glyphosate concentrations from plots receiving applications, ranging from 91 to >300 ug/g of soil. More intensive sampling might reduce this variability. Nevertheless, results suggest that glyphosate is released in relatively high amounts through roots during the year of application, or it may accumulate over seasons. The latter possibility can be tested in 2015 by follow-up soil analysis from the 2014 plots. Based on results of the 2014 study, Vitazyme seems to have a slight, although non-significant, effect in reducing glyphosate in the soybean rhizosphere.

Microbiological Assays

We have consistently documented considerable increases in Fusarium root colonization, and a decrease in beneficial microorganisms in glyphosate-resistant soybean and corn with use of Roundup (Kremer and Means, 2009; Means and Kremer, 2007; Zobiole et al., 2010). Although Fusarium is a ubiquitous group of soil fungi, many species are opportunistic phytopathogens and may cause economically important diseases including wilts, root rots, and sudden death syndrome in soybean under optimum environmental conditions. Thus, a high root colonization by Fusarium species indicates a high potential for disease development. The 2014 soybean study confirmed that glyphosate treatment leads to high Fusarium root colonization relative to soybean not receiving glyphosate. Vitazyme treatment significantly reduced colonization in glyphosate treated soybean, possibly through improved root growth or stimulation of other microorganisms that suppress Fusarium growth and root colonization. The increases in the beneficial rhizobacteria, fluorescent Pseudomonas spp. and indole acetic acid (IAA)-producers, confirm this interaction of Fluorescent Pseudomonas spp. represent a group of Gram-negative bacteria that produce antibiotics , plant-growth-regulation compounds, and nutrient acquisition substances that benefit plant growth and development. The IAA producing bacteria stimulate root growth and aid in plant nutrient uptake. These bacterial groups were suppressed by glyphosate in 2014, confirming previous studies. Vitazyme appeared to overcome glyphosate effects although not significant at P=0.05; however, it is of interest to follow up to determine the impact of the product on potentially remediating effects of glyphosate on the rhizosphere microbial dynamics.

Microbial Community Characterization

Characterization of soil microbial groups indicates relative functioning of biological processes mediated by various microbial components based on their proportion of the total community. We used the phospholipid fatty acid (PLFA) characterization, which provides PLFA patterns that are distinctive for major soil microbial groups (Unger et al., 2013). The total PLFA is an index of the total microbial biomass in soil. In the 2014 soybean study, no differences were detected, likely because although the community may have differed among treatments (i.e., glyphosate treatment caused increases in Fusarium but decreased rhizobacteria, thereby balancing total PLFA), the general biomass remained at similar concentrations across treatments. The greatest impact of glyphosate detected using PLFA analysis was on the bacterial community shown as reductions in total bacteria, which reflects the reductions in cultural rhizobacteria reported as Pseudomonas spp. and IAA-producing bacteria. A notable effect of Vitazyme was the significantly (P=0.05) increased PLFA marker for total bacteria in the glyphosate treated soybean, which seems to coincide with an increase (although non-significant) for the Gram-negative bacteria, which include the Pseudomonas sp. and most of the IAA-producers.

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Unger, I.M., Goyne, K.W., Kremer, R.J., and Kennedy, A.C. 2013. Microbial community diversity in agroforestry and grass vegetative filter strips. Agroforestry Syst. 87:395-402.

Zobiole, L.H., R.J. Kremer, R.S. Oliveira, and J. Constantin. 2010. Glyphosate affects microorganisms in rhizospheres of glyphosate-resistant soybeans. J. Appl. Microbiol. 110:118-127.

Soybeans *with Vitazyme application*

Researcher: Steve May and others
Research organization: The Iowa Soybean Association, Ankeny, Iowa
Location: Washington County, Iowa
Variety: Asgrow AG3334
Planting date: May 23, 2015
Row spacing: 30 inches
Seeding rate: unknown
Previous crop: corn
Soil type: Taintor silty clay loam, Mahaska silty clay loam, Kalona silty clay loam (all had 0 to 2% slope)
Experimental design: A soybean field was selected for a replicated trial using six alternating field strips, of sprayer boom width (90 feet), to determine the effect of foliar-applied Vitazyme on soybean yield.

Vitazyme on the soybean leaves and soil with glyphosate(right) at an Iowa Soybean Association site show much greater leafing and branching compared to the untreated control.

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

Fertilization: unknown
Vitazyme application: 13 oz/acre on the leaves and soil with glyphosate, on July 1
Harvest date: October 8, 2015
Yield results: The combine speed was 3.9 mph.

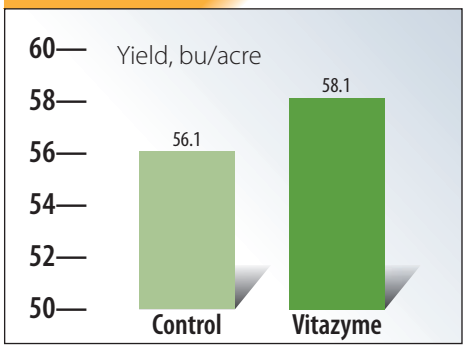
Treatment	Yield[1]	Yield change
	bu/acre	bu/acre
Control	56.1 b	—
Vitazyme	58.1 a	2.0 (+4%)

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

Yield increase with Vitazyme: 4%

These three soil types are closely associated with one another, and the only differences between Kalma and Taintor soils is that Kalma soil have no argillic horizon (a layer of higher clay content beneath the topsoil). Possibly the lack of this elevated subsoil clay content is related to the better response of the soybean crop to Vitazyme, such as by allowing better root penetration to the subsoil.

Bean Yield



Soil type	Part of trial		Yield		Yield increase *with Vitazyme*
	Control	Vitazyme	Control	Vitazyme	
	%	%	bu/acre	bu/acre	bu/acre
Taintor silty clay loam	24.3	33.0	56.4	58.2	1.8 (+ 3%)
Mahaska silty clay loam	14.2	13.9	54.6	56.1	1.5 (+3%)
Kalona silty clay loam	6.6	8.0	60.4	63.3	2.9 (+5%)

Conclusion: This replicated (with field strips) Iowa Soybean Association soybean trial in southeastern Iowa, using 13 oz/acre applied foliar with a herbicide, produced a significant yield increase of 2.0 bu/acre. Kalona soils, having no argillic horizon, gave the best increase (5%). This 4% improvement was highly profitable and shows the efficacy of the product for soybean growers in Iowa.

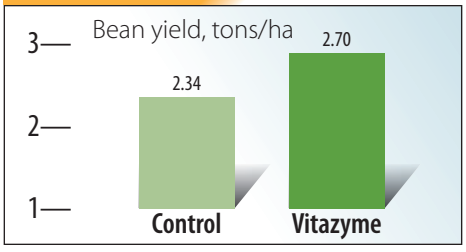
Soybeans *A Summary of Five Field Trials in Ukraine*

All trials were organized by V.V. Plotnikov, Ph.D, to determine the yield and profit-improving potential of Vitazyme. Fields were divided into Vitazyme treated and control areas.

1. Conducted by LLC "Atlantic Farms" at Myronivs'kyi District, Kyiv Region, Myronivka Farm, Ukraine, on a podzolized chernozem soil (organic matter = 2.8%).

Variety: Highpro
Seeding rate: 700,000 seeds/ha
Planting date: May 2, 2015
Previous crop: winter wheat
Cultivation methods: disking to 8 cm, plowing to 22 cm, cultivation to 5 cm
Fertilization: 16 kg/ha N, 16 kg/ha P_2O_5, 16 kg/ha K_2O in-furrow at planting
Vitazyme application: 1 liter/ha on the leaves and soil at the third trifoliate stage on June 1, 2015
Results: *(See bar chart to the right)*

Bean Yield trial #1

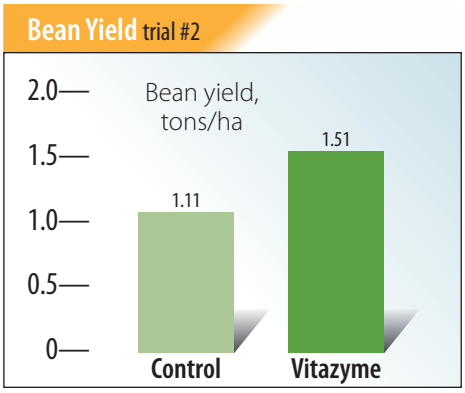


Yield increase with Vitazyme: 0.36 tons/ha(+15%)
Profit increase with Vitazyme: 2,534 UAH/ha

2. Conducted by Private Agricultural Enterprise "Vatutina" at Vil'shans District, Kirovohrad Region, Vil'shanka Town, Ukraine, on a podzolized chernozem soil (organic matter = 3.1%).

Variety: Volos
Seeding rate: 700,000 seeds/ha
Planting date: April 24, 2015
Previous crop: winter wheat
Cultivation methods: disking to 8 cm, plowing to 22 cm, cultivation to 5 cm
Fertilization: 16 kg/ha N, 16 kg/ha $P_2 0_5$, 16 kg/ha $K_2 0$ in-furrow at planting
Vitazyme application: 1 liter/ha on the leaves and soil at the third trifoliate stage on June 10, 2015
Results: *(See bar chart to the right)*

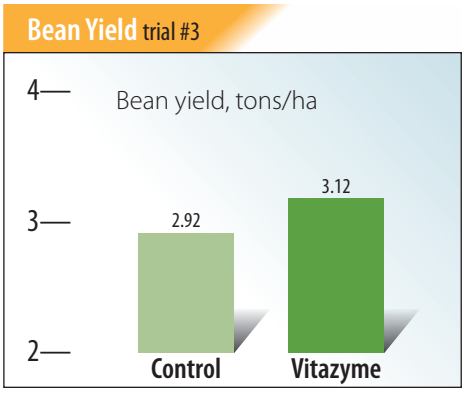
Yield increase with Vitazyme: 0.40 ton/ha(+36%)
Profit increase with Vitazyme: 2,870 UAH/ha



3. Conducted by Agricultural LLC "Skif" at Kotelevs 'kyi District, Poltava Region, Bil'sk Village, Ukraine, on a chernozem soil (organic matter = 3.2%).

Variety: Medison
Seeding rate: 700,000 seeds/ha
Planting date: April 30, 2015
Previous crop: corn
Cultivation methods: disking to 8 cm, plowing to 22 cm, cultivation to 5 cm
Fertilization: 35 kg/ha N, pre-plant incorporated; 16 kg/ha N, 16 kg/ha $P_2 0_5$, 16 kg/ha $K_2 0$ in-furrow at planting
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the fifth trifoliate, on June 23
Results: *(See bar chart to the right)*

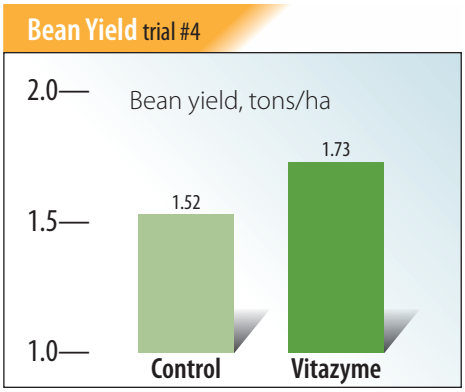
Yield increase with Vitazyme: 0.20 ton/ha(+7%)
Profit increase with Vitazyme: 1,190 UAH/ha



4. Conducted by Farming Enterprise "Korol" at Pervomayskyi District, Mykolayiv Region, Kamyanyi Mist Village, Ukraine, on podzolized chernozem soil (organic matter = 3.0%).

Variety: Don'ka
Seeding rate: 700,000 seeds/ha
Planting date: April 24, 2015
Previous crop: winter wheat
Cultivation methods: disking to 8 cm, plowing to 24 cm, cultivation to 5 cm
Fertilization: 35 kg/ha N, pre-plant incorporated; 15 kg/ha N, 15 kg/ha $P_2 0_5$, 15 kg/ha $K_2 0$ in-furrow at planting
Vitazyme application: 1 liter/ha on the seeds, four days before planting, on April 20, 2015
Results: *(See bar chart to the right)*

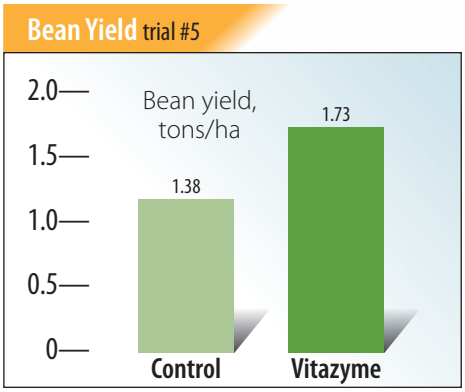
Yield increase with Vitazyme: 0.21 ton/ha(+14%)
Profit increase with Vitazyme: 1,694 UAH/ha



5. Conducted by Farming Enterprise "Yuzko-Agro", at Kivertsivs'Kyi District, Volyn' Region, Zviriv Village, Ukraine, on podzolized chernozem soil (organic matter = 1.8%).

Variety: Cheremosh
Seeding rate: 750,000 seeds/ha
Planting date: April 29, 2015
Previous crop: winter wheat
Cultivation methods: disking to 8 cm, plowing to 24 cm, cultivation to 5 cm
Fertilization: 35 kg/ha N, pre-plant incorporated; 16 kg/ha N, 16 kg/ha $P_2 0_5$, 16 kg/ha $K_2 0$ in-furrow at planting
Vitazyme application: 1 liter/ha on the seeds, eight days before planting, on April 21, and (2) 0.6 liter/ha on the leaves and soil at the third trifoliate stage on June 5, 2015
Results: *(See bar chart to the right)*

Yield increase with Vitazyme: 0.35 ton/ha(+25%)
Profit increase with Vitazyme: 2,572 UAH/ha



Summary of the Five Ukraine Soybean Trials

All five field trials in this Ukrainian Vitazyme study gave good to excellent responses to a seed treatment, a foliar spray, or a combined seed and foliar application. The average yield increase was 19.4%. Profit improvements also were sizable, averaging 2,172 UAH/ha. This program is an excellent choice for soybean growers in Ukraine.

Location	Yield increase	Profit increase
	%	UAH/ha
Central Ukraine (500-550 mm ppt.)		
"Atlantic Farms" — Myronivka	15	2,534
"Vatutina" — Vil'shanka	36	2,870
"Skif" — Bil'sk	7	1,190
Southern Ukraine (300-350 mm ppt.)		
"Korol" — Kamyanyi Mist	14	1,694
Western Ukraine (650-700 mm ppt.)		
"Yuzko-Agro" — Zviriv	25	2,572
Mean	19.4	2,172

Soybeans *A Synergism Study with Seaweed*

Bert Schou at ACRES Research explains plot treatments at the facility near Cedar Falls, Iowa.

Researcher: Bertel Schou, Ph.D.
Research organization: ACRES Research, Cedar Falls, Iowa
Location: Cedar Falls, Iowa
Variety: NuTech 7240
Seeding rate: 53 lb/acre
Planting depth: 1.5 inches
Row width: 30 inches
Soil type: Floyd loam (pH=6.3, organic matter=4.4%, cation exchange capacity=13.3 meg/100g, fertility level=excellent, drainage=excellent)
Planting date: May 7, 2015
Experimental design: A small-plot soybean trial, using a randomized complete block design and four replicates, was laid out in plots that were 15 (six rows) x 30 feet, with the objective of determining the effectiveness of Vitazyme and seaweed to influence bean yield, alone and together.

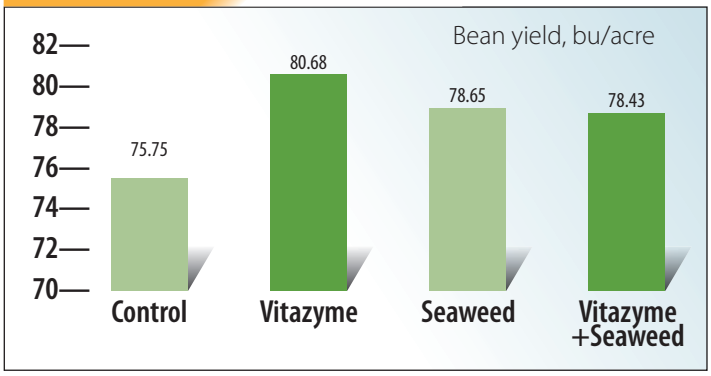
1 ***Control*** **2** ***Vitazyme***
3 ***Seaweed*** **4** ***Vitazyme + Seaweed***

Fertilization: All plots received a fall (2014) broadcast application of 18-16-60 lb/acre of N-P_2O_5-K_2O.
Vitazyme application: For Treatments 2 and 4, (2) 13 oz/acre in-furrow at planting on May 7: (2) 13 oz/acre on the leaves and soil at R1 on June 27.
Seaweed application: For Treatments 3 and 4, (1) 2 qts./acre in-furrow at planting on May 7; (2) 2 qts./acre on the leaves and soil at R1 on July 2. The seaweed was from Ocean Organics based in Waldoboro, Maine, and Ann Arbor, Michigan.
Growing season weather: Excellent, with rainfall evenly distributed throughout the spring and summer, and average temperatures were good for growth. Rainfall: April=2.97 in.; May=5.62 in.; June=5.40 in.; July=4.65 in.; August=7.50 in.; September=3.33 in. Temperature (daily average maximum): April=66; May=70; June=80; July=85; August=79; September=8.
Harvest date: September 25, 2015
Bean moisture results: Bean moisture varied from 11.86 to 12.17%, and differences among treatments were not significant.
Yield results: The beans were harvested using a Massey-Ferguson plot combine, with an electronic scale and moisture meter.

Treatment	Bean yield[1]	Yield change
	bu/acre	bu/acre
1. Control	75.75 b	—
2 Vitazyme	80.68 a	4.93 (+7%)
3. Seaweed	78.65 ab	2.90 (+4%)
4. Vita + Seaweed	78.43 ab	2.68 (+4%)
LSD (P=0.05)	3.99	
CV	3.66	
Replicate probability	0.9545	
Treatment probability	0.8906	

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

Bean Yield



Increase in Bean Yield

Vitazyme alone 7%
Seaweed alone.....4%
Vitazyme + Seaweed.....4%

Conclusions: This small-plot soybean trial in east central Iowa revealed that soybean yield was significantly improved (at P=0.05) by 4.93 bu/acre (+7%) with Vitazyme only—in-furrow and foliar at R1—during an especially favorable cropping year. Seaweed, applied in-furrow and foliar at R1 at 2 quarts/acre each time, increased the yield by 2.90 bu/acre (+4%), but the increase was not significantly greater than the control. Neither was the combined Vitazyme and Seaweed treatment, which increased bean yield by 2.68 bu/acre (4%). This combined treatment received foliar treatments of Vitazyme and seaweed at different times, separated by 5 days to minimize possible negative interactions that appeared during a 2014 Vitazyme-seaweed study by ACRES Research. However, the separated foliar applications did not remove the lack of positive interaction for the two products. Both Vitazyme and seaweed are highly effective agents for improving soybean yields in Iowa when applied at planting, and as a foliar at early bloom.

Vitazyme applied twice to the soybeans in this trial greatly increased top and root growth and branching, giving a 7% yield increase.

Vitazyme Field Tests for 2015

Spinach *with Vitazyme application*

Researcher: Agustin Peralta
Farmer: Venancio Olayo Navarro
Research organization: Quimica Lucava & Agroquimicos El Surco
Location: Campo La Aventura, Puebla, Mexico
Variety: unknown
Planting date: April 28, 2015
Experimental design: A 1 hectare spinach field was divided into equal parts of Vitazyme treated and untreated, to determine the effect of the product on spinach yield and profitability.

1 *Control* 2 *Vitazyme*

Fertilization: unknown
Vitazyme application: 1 liter/ha sprayed on the leaves and soil 15 days after planting, on May 13, 2015
Harvest dates: June 17 and June 25, 2015, 50 and 58 days after planting
Yield results: (See the table and chart to the right)
Crop observations: At harvest, the Vitazyme treated crop was superior to the control in the following ways:

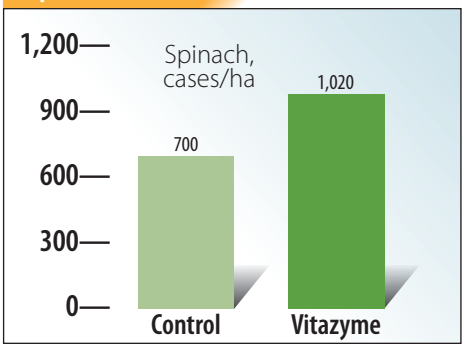
- Leaves and plants were larger.
- The leaf color was a richer, deeper green.
- Hardly any insect damage was noted, whereas the control spinach had slight damage.

Treatment	Yield[1]	Yield change
	cases/ha	cases/ha
Control	700	—
Vitazyme	1,020	320 (+46%)

[1]There cases were delivered to Wal-Mart. A case has 24 bunches of 5 cm diameter each.

Increase in spinach yield with Vitazyme: 46%

Spinach results



Profitability results:

Treatment	Yield	Gross income[1]	Vitazyme cost	Net return	Increased return	Cost : Benefit
	cases/ha	USD/ha	USD/ha	USD/ha	USD/ha	
Control	700	3,269.00	—	3,269.00	—	—
Vitazyme	1,020	4,763.40	33.33	4,730.07	1,461.07	43.8

[1]One case sold for 4.67 USD.

Increased return with Vitazyme: 1,461.07 USD/ha

Cost : Benefit with Vitazyme: 43.8

Conclusion: This spinach study in Mexico revealed that only a single Vitazyme application, at 1 liter/ha 15 days after planting, increased the yield a remarkable 46%. This yield increase resulted in a 1, 461.07 USD/ha improvement, which followed from a cost : benefit of about 44 : 1. Such results prove the great viability of the Vitazyme program for spinach and similar leaf crops in Mexico .

Sugar Beets *A Summary of two Field Trials in Ukraine*

Both trials were organized by V.V. Plotnikov, Ph.D., to determine the yield and profit-improving potential of Vitazyme. Fields were divided into Vitazyme treated and control areas.

1. Conducted by Agricultural LLC "Nyva" at Ulianivs'kyi District, Kirovohrad Region, Kamianyi Brid Village, Ukraine, on a podzolized chernozem soil (3.3% organic matter).

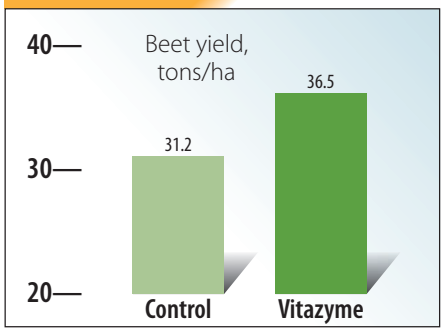
Variety: Olimpiada hybrid
Seeding rate: 100,000 seeds/ha
Planting date: April 25, 2015
Previous crop: winter wheat
Cultivation methods: disking to 8 cm, plowing to 27 cm, cultivation to 4 cm
Fertilization: 45 kg/ha N, 45 kg/ha P_20_5, 45 kg/ha K_20 in the fall of 2014; 70 kg/ha pre-plant incorporated in 2015
Vitazyme application: 1 liter/ha sprayed on the leaves and soil on June 18, 2015, together with 2 liters/ha of Wuxal Boron
Results: *(See bar charts to the right)*

2. Conducted by Agricultural LLC "Romaniv" at Luts'kyi District, Volyn' Region, Romaniv Village, Ukraine, on a gray podzolic soil (1.8% organic matter).

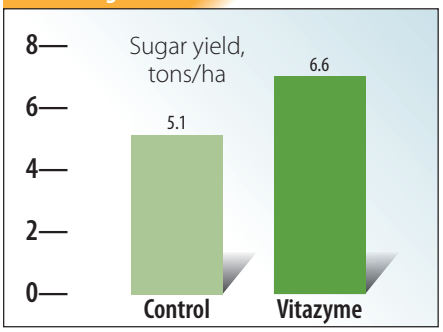
Variety: Boruta hybrid
Seeding rate: 100,000 seeds/ha
Planting date: April 28, 2015
Previous crop: winter wheat
Cultivation methods: disking to 8 cm, plowing to 27 cm, cultivation to 4 cm
Fertilization: 40 tons/ha of manure the fall of 2014 and plowed in; 60 kg/ha N, 60 kg/ha P_20_5, 60 kg/ha K_20 the spring of 2015 and incorporated
Vitazyme application: 1 liter/ha sprayed on the leaves and soil on June 21, 2015
Results: *(See bar charts to the right)*

Conclusion: This pair of Ukranian Vitazyme studies, using 1liter/ha applications, proved that both beet root yield and sugar content were increased, and thus total sugar yield. Average increases were 12.5% for beet yield, 1.75 percentage-points for sugar content, and 24% for sugar yield. Profit improved an average of 3,515 UAH/ha, to show the great viability of this program for Ukrainian agriculture.

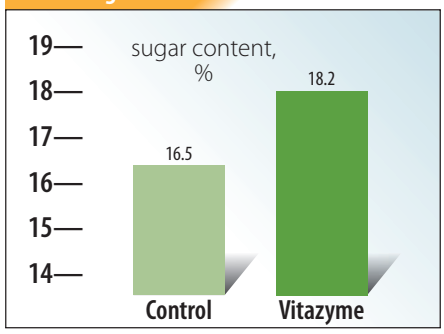
Beet Root Yield trial #1



Total Sugar Yield trial #1



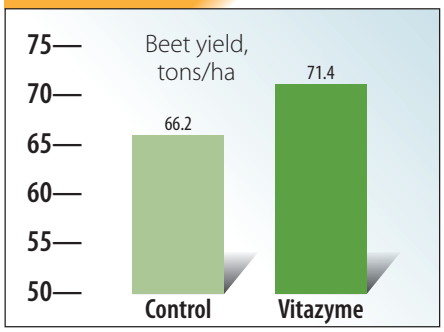
Beet Sugar Content trial #1



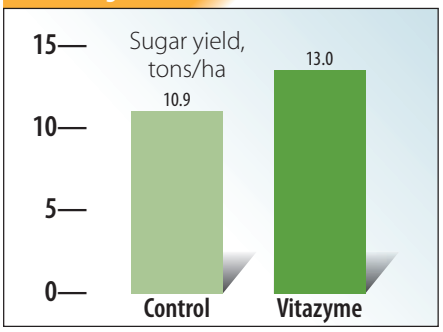
Increase with Vitazyme

Beet root yield...5.3 tons/ha (+17%)
Sugar content.....1.7 %-points
Sugar yield.....1.5 tons/ha (+29%)
Profit .....3,359 UAH/ha

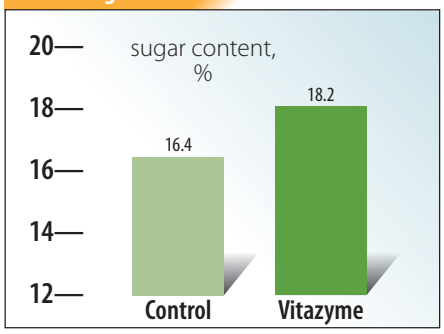
Beet Root Yield trial #2



Total Sugar Yield trial #2



Beet Sugar Content trial #2



Increase with Vitazyme

Beet root yield.....5.2 tons/ha (+8%)
Sugar content.....1.8 %-points
Sugar yield.....2.1 tons/ha (+19%)
Profit .....3,670 UAH/ha

Location	Beet yield	Sugar content	Sugar yield	Profit
	%	%-points	%	UAH/ha
Central Ukraine (500-550 mm ppt.)				
"Nyva" — Kamianyi Brid	17	1.7	29	3,359
Western Ukraine (650-700 mm ppt.)				
"Romaniv" — Romaniv	8	1.8	19	3,670
Mean	12.5	1.75	24	3,515

Sugar Beets *with Vitazyme application*

Sugar beets in a split-field trial in Minnesota showed that Vitazyme (right) produced bigger beets and more sugar yield.

The treated beets produced from 8 to 11% more sugar per acre, while having only a slightly reduced sugar content; beet nitrate was reduced.

Researchers: James Anderson and Paul W. Syltie, Ph.D.
Farmer cooperator: Mike Stamer, Stamer Farms, Inc., Willmar, Minnesota
Location: Barrett, Minnesota
Variety: Crystal 018
Planting date: April 15, 2015
Seeding rate: 58,800 seeds/acre
Soil type: silty clay loam, but variable
Experimental design: A 250-acre sugar beet field in western Minnesota was divided into Vitazyme treated and untreated areas in an effort to evaluate the effects of this product on sugar beet and sugar yield.

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

Fertilization: nitrogen balanced to 200 lb/acre across the field according to soil organic matter level: sulfur balanced to 16 to 36 lb/acre, also according to soil organic matter level
Vitazyme application: 13oz/acre applied in-furrow at planting.
Harvest date: October 10 to 20, 2015
Yield results: Eleven samples of beets were dug from 10-foot row lengths on each side of the treatment dividing line, giving 22 total samples, on September 22, 2015. Three control and three treated samples were sent to Minnesota Valley Testing Laboratories, Inc., in New Ulm, Minnesota, and the remaining 16 samples, half control and half treated, were sent to the Southern Minnesota Sugar Beet Coop laboratory at Belview, Minnesota.

Conclusions: A sugar beet trial near Barrett, Minnesota, using only an in-furrow Vitazyme treatment of 1 liter/ha, produced excellent and significant increases in beet number (22%), root weight (10 to 15%), and sugar yield (8 to 11%), depending upon whether Southern Minnesota Sugar Beet Coop or Minnesota Valley Testing Lab data are used. Beet nitrate content was less with Vitazyme, though not significantly, but the sugar content of the beets was significantly less with Vitazyme at the Sugar Beet Coop lab (-3%), though not at the Minnesota Valley Lab. A sugar yield increase of 8 to 11% is a great boost in production for only a single 13 oz/acre application, and shows the efficacy of this program for sugar beet growers in Minnesota.

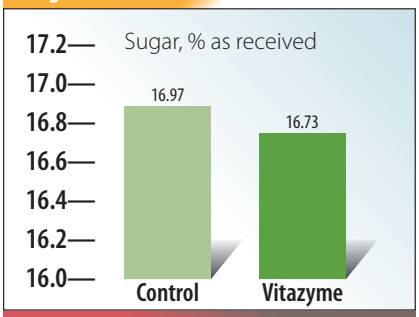
Barrett Field, Minnesota Valley Testing labs

Treatment		Moisture (as received)	Sugar content[a] (as received)	Sugar content (dry)	Beet weight[a] (as received)	Sugar yield	Sugar yield[a]
		%	g/100g	g/100g	lb/10ft	lb/10ft	lb/acre
Control	1	78.5	16.80	78.14	27.96	4.70	8,190
	2	77.4	16.90	74.78	25.44	4.30	7,493
	3	78.0	17.20	78.18	29.60	5.09	8,869
	Mean	77.9	16.97 a	77.03	27.67 a	4.70	8,184 b
Vitazyme	1	78.5	17.40	80.93	29.04	5.05	8,799
	2	78.3	15.80	72.81	30.06	4.75	8,277
	3	78.6	17.00	79.44	31.84	5.41	9,427
	Mean	78.5	16.73 a	77.73	30.31 a	5.07	8,834 a
Change			-0.24%	+0.70%	+2.64 lb/10ft (+10%)		+650 lb/acre (+8%)

[a]Means followed by the same letter are not significantly different at P=0.10.

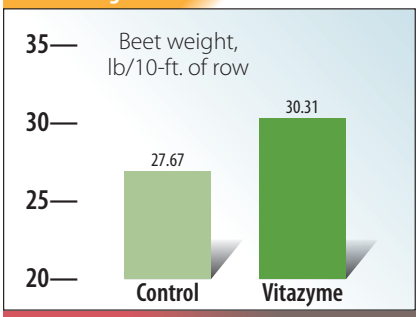
Beet weight: F-value=6.45; Probability>F=0.1263: Standard error=1.033
Sugar content: F-value=0.23; Probability>F=0.6815; Standard error=0.350
Sugar yield: F-value=90.3; Probability>F=0.0109; Standard error=366.3

Sugar Content



Decrease in sugar-% with Vitazyme: (-) 0.24%

Beet Weight



Increase in beet weight with Vitazyme: 10%

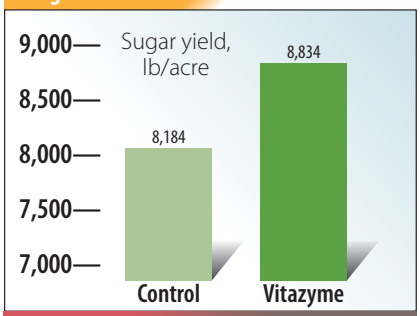
Barrett Field, Southern Minnesota Sugar Beet Coop

Treatment	Beet number[a]	Beet weight	Sugar Content	Nitrate	Sugar yield	Sugar yield
		lb/10ft	%	ppm	lb/10ft	lb/acre
Control-1	17	23.57	16.32	33	3.85	6,708
Control-2	13	26.67	15.77	36	4.21	7,336
Control-3	18	26.59	16.68	27	4.44	7,736
Control-4	16	23.65	16.92	22	4.00	6,970
Control-5	18	27.73	16.87	29	4.68	8,154
Control-6	16	28.25	16.66	98	4.71	8,207
Control-7	16	25.68	16.45	109	4.22	7,353
Control-8	22	28.84	16.37	29	4.72	8,224
Mean	17.0 a	26.37 b	16.51 a	47.9 a	4.35 a	7,586 b
Vitazyme-1	22	32.32	16.20	24	5.22	9,095
Vitazyme-2	24	31.28	15.90	35	4.97	8,660
Vitazyme-3	22	31.64	15.96	34	5.05	8,799
Vitazyme-4	19	28.34	16.08	33	4.56	7,945
Vitazyme-5	16	31.59	15.77	55	4.98	8,677
Vitazyme-6	20	29.69	16.11	25	4.78	8,329
Vitazyme-7	24	30.11	16.00	31	4.82	8,398
Vitazyme-8	19	27.30	16.03	36	4.38	7,632
Mean	20.8 a	30.28 a	16.01 b	34.1 a	4.85 a	8,442 a
Change	(+22%)	(+15%)	(-3%)	(-29%)	(+11%)	(+11%)

[a]Means followed by the same letter are not significantly different at P=0.10.

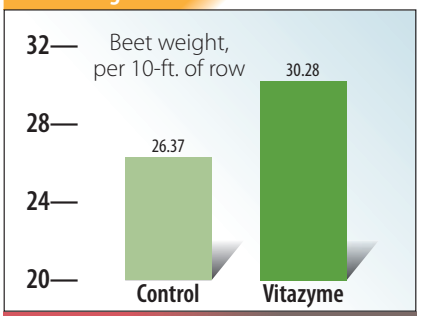
Beet number: F-value=7.91; Probability>F=0.0138; Standard error=0.9425
Beet weight: F-value=17.48; Probability>F=0.0009: Standard error=0.6593
Sugar content: F-value=12.91; Probability>F=0.0029; Standard error=0.0982
Nitrate: F-value=0.25; Probability>F=0.6234; Standard error=0.3098
Sugar yield: F-value=10.31 Probability>F=0.0063; Standard error=188.49

Sugar Yield



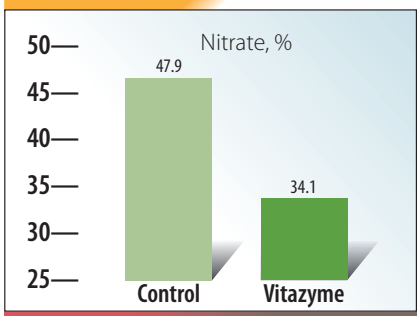
Increase in sugar yield with Vitazyme: 8%

Beet Weight



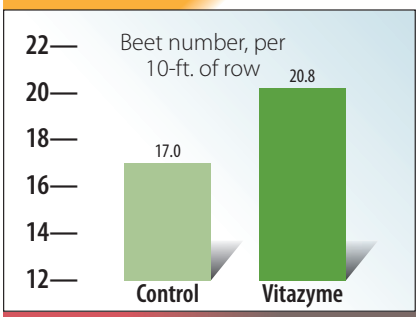
Increase in beet weight with Vitazyme: 15%

Beet Nitrate



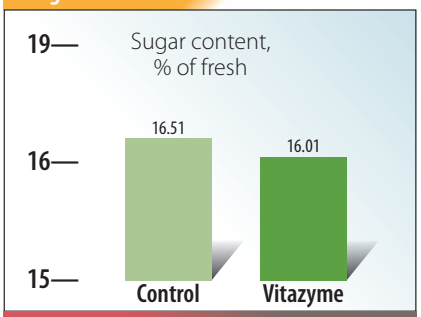
Decrease in beet nitrate with Vitazyme: (-) 29%

Beet Number



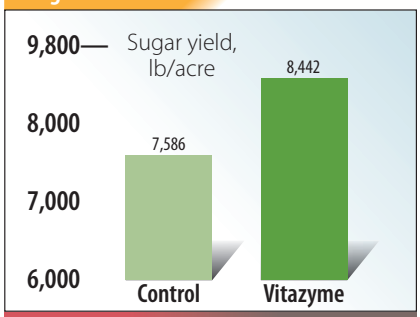
Increase in beet number with Vitazyme: 22%

Sugar Content



Decrease in sugar content with Vitazyme: (-) 3%

Sugar Yield



Increase in sugar yield with Vitazyme: 11%

Sugar Cane *A Summary of Results Since 2004*

Vitazyme treatment at Santiago de Cuba, Dos Rios Sugar Estate, Cuba triggered excellent leaf and stem growth, and more cane and sugar yield.

Rooting of the cane was greatly improved in this study at Villa Clara, Carlos Baliño Sugar Estate, Cuba with resultant higher sugar yields.

At Uruguay, Sancti Spiritus Sugar Estate, Cuba, growth and yield of the Vitazyme treated cane is obviously much greater than the control in this study.

A 1.5 liter/ha Vitazyme application at a trial in Estipac, Jalisco, Mexico, caused excellent growth stimulation and much improved sugar yield.

Researchers: Juan Carlos Diaz, along with Isel Creach, Rafael Zuaznabar, Martin Morales, Fidel Hernandez, Inoel Garcia, Omara Rojas, Juan Cruz Castaneda and Agustin Peralta

Research institution: INICA, Cuba and Quimica Lucava, Mexico

Summary of the studies: The following summary was written by Juan Carlos Diaz, and includes trials from Cuba and Mexico.

From 32 field trials conducted in eight sugar estates of six provinces between 2004 and 2008, in a cumulative area of 518 hectares of ratoon sugar cane treated with the natural biostimulant Vitazyme and 218 hectares of untreated control areas, an average cane yield increase of 15.69 t/ha, with an annual range between 11.02 and 17.04 t/ha, associated to increases in stalk length, diameter and weight, were recorded, resulting in mean profits of US$ 535/hectare, and a cost-benefit ratio (profit/costs) of 3.5 at a sugar price of only US$ 0.20/lb. Initial results of two other trials from Estipac, Jalisco, Mexico, in 2012-2013, showed a similar yield increase with Vitazyme: 15 t/ha. Greater yield increases were recorded in ratoon cane (after first harvest) than in plant cane. Best programs were two to three foliar sprayings, with a one month interval from 30-60 days after previous harvest, each at 1 to 1.5 L/ha, for a cumulative 2 to 3 L/ha. Alternately, the possibility of reducing fertilization between 25% and 50% when Vitazyme is applied, and producing similar to higher yields, was observed in two trials. No differential yield response by soils or varieties, and no effect on sugar content, were observed.

Conclusions: According to Dr. Juan Carlos Diaz,

- The application of the natural biostimulant Vitazyme produces marked increases in sugar cane growth and yield in comparison to untreated control areas, and to the Cuban biostimulant Fitomas, in various sugar cane varieties and types of soils.
- Such increases are higher in the ratoon cycle (after the first harvest) than in the plant cane cycle, although in both it produces good increases.
- You can reduce the fertilization between 25 and 50% in combination with the application of Vitazyme and obtain similar or higher yields than in the untreated control with 100% fertilization, but the largest increases in yields and profits are obtained when Vitazyme is applied with 100% of the recommended fertilization.
- Best application programs are between two and three sprayings to the foliage, at monthly intervals from 30-60 days after last harvest, at a rate between 1 and 1.5 L/ha, for a cumulative total of 2 to 3 L/ha.

2005 Demonstration Plots, Dos Rios Estate, Santiago de Cuba

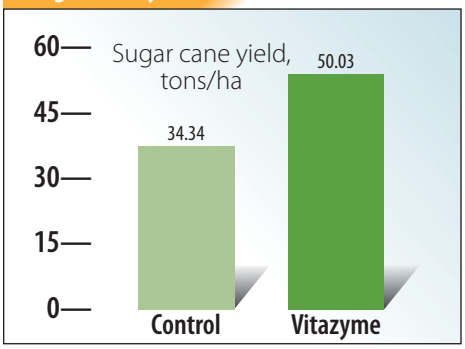
Variety	Applications	Vitazyme yield	Control yield	Vitazyme increase
		tons/ha	tons/ha	tons/ha
C87-51	1 liter/ha once	39.41	28.05	11.36 (+40%)
C87-51	1 liter/ha once	51.78	36.10	15.68 (+43%)
C 1051-73	1 liter/ha twice	52.58	39.22	13.36 (+34%)

2006 Demonstration Plots in Five Provinces

Province	Estate	Vitazyme yield	Control yield	Vitazyme increase
		tons/ha	tons/ha	tons/ha
Santiago	Dos Rios	34.56	16.78	17.78 (+106%)
Holguin	Cristino Naranjo	47.99	32.55	15.44 (+47%)
Havana	Hector Molina	35.16	25.96	9.2 (+35%)
Matanzas	España Republicana	72.31	57.17	15.14 (+26%)
Villa Clara	Carlos Baliño	32.35	31.05	1.30 (+4%)

Half of the applications at 1 liter/ha 3 times, and half at 1.5 liters/ha 2 times.

Sugar cane yield



2007 Demonstration Plots in Holguin and Santiago de Cuba				
Province	Estate	Vitazyme yield	Control yield	Vitazyme increase
		tons/ha	tons/ha	tons/ha
Holguin[a]	Fernando de Dios	59.7	39.3	20.4 (+52%)
	Cristino Naranjo	74.6	69.7	4.9 (+7%)
Santiago de Cuba[b]	Chile	64.9	51.7	13.2 (+26%)
	Dos Rios	67.8	56.4	11.4 (+20%)

[a]Half of the applications at 1 liter/ha 3 times, and half at 1.5 liters/ha 2 times. [b]Two applications at 1.5 liters/ha.

2008 Demonstration Plots at the Uruguay Sugar Estate, Sancti Spiritus				
Province	Applications	Vitazyme yield	Control yield	Vitazyme increase
		tons/ha	tons/ha	tons/ha
Sancti Spiritus	1.5 liters/ha twice	52.54	38.98	13.56 (+35%)

Overall Cuba Results for 2005 to 2008

Vitazyme yield, tons/ha 50.03
Control yield, tons/ha 34.34
Increase with Vitazyme,...15.69 (+46%)

- It is recommended to carry out two applications in sugar cane, preferably in the ratoon cycle (after the first harvest), each at 1 to 1.5 liters per hectare (cumulative dose of 2 to 3 liters per hectare), the first between 30 and 45 days after the previous harvest, or 60 days after planting for plant cane, and the second appllication at 30 days after the first. Apply with a backpack sprayer using a cone nozzle, preferably in bands, or with a tractor sprayer, applying on sugar cane leaves.
- The final dilution of Vitazyme should be sufficient for a good spray coverage, equivalent to around 200 liters per hectare in the first application and 300 liters per hectare in the second.

Economic Analysis of 3 liters/ha Vitazmye Applications for Ratoon Cane							
		Added cost vs. Control			Added income[c]	Profit	Cost : Benefit
Yield increase	Added sugar	Harvest/Process[a]	Vitazyme[b]	Total			
tons/ha	tons/ha	USD/ha	USD/ha	USD/ha	USD/ha	USD/ha	
15.69	1.569	54.92	100	154.92	690.63	535.71	3.5

[a]Harvesting and processing cost = 3.50 USD/ton of cane. [b]Vitazyme cost = 30 USD/liter; 1.5 liters/ha cost 45 USD/ha X2 applications = 90 USD/ha; two back pack applications cost 10 USD/ha. [c]Sugar price = 440 USD/ton.

Sugar Cane Yield Comparison of Vitazyme vs. Fitomas in Holguin and Santiago de Cuba			
Biostimulant	Cane yield	Control yield	Yield increase
	tons/ha	tons/ha	tons/ha
Vitazyme	66.94	49.90	17.04 (+34%)
Fitomas[a]	55.16	49.36	5.8 (+12%)

[a]Fitomas is a biostimulant produced in Cuba.

Yield increase

Vitazyme 34%
Fitomas 12%

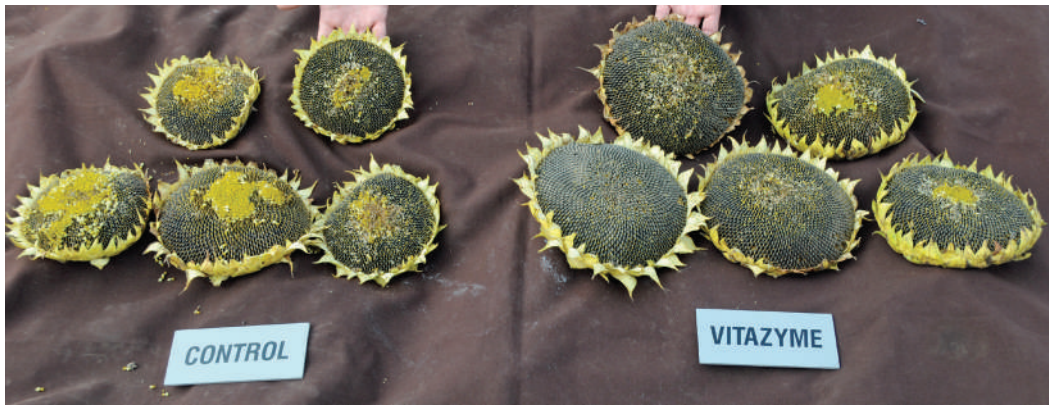
Cane yield, Guadalupe Torres Farm, Estipac, Jalisco, 2012-13.	
	Cane tons/ha
Vitazyme: 2 applications at 1.5 L/ha	153
Untreated control	138
Difference	15 (+11%)

Cane yields in Matanzas, ratoon cane trial, on red Ferraliltic soil.	
Treatments	**Cane t/ha**
Control with 100% of fertilization (130 kg/ha N + 100 kg/ha K_2O)	54.27
Vitazyme + 75% fertilization (97.5 kg/ha N + 75 kg/ha K_2O)	**61.38**
Standard error	5.33

Yields and their components in Santiago de Cuba, ratoon cane trial, on dark Sialitic Plastogenic soil.								
Treatments	**Rate**	**Stalk length**	**Stalk diameter**	**Stalk population x**	**Stalk weight**	**Cane yield**	**Sugar %**	**Sugar yield**
	(L/ha)	(cm)	(cm)	1000/ha	(kg)	(t/ha)	cane	(t/ha)
Absolute Control (without fertilizer and without Vitazyme)	—	210	2.68	70.9	1.17 c	82.99 b	14.40	11.95 c
Recommended fertilization (75 kg N/ha) without Vitazyme	—	214	2.85	67.8	1.29 bc	87.70 b	13.92	12.21 c
Vitazyme + 50% fertilizer (37.5 N/ha)	3 x 1	214	2.81	64.4	1.43ab	106.66a	14.11	15.05b
Vitazyme + 100% fertilizer (75 kg N/ha)	3 x 1	216	2.87	75.3	1.49a	112.89a	14.62	16.50a
Standard error		2.57	0.072	2.32	0.055	4.59	0.345	0.53

Sunflowers *A Summary of Three Field Trials in Ukraine*

All trials were organized by V.V. Plotnikov, Ph.D, to determine the yield and profit-improving potential of Vitazyme. Fields were divided into Vitazyme and control areas.



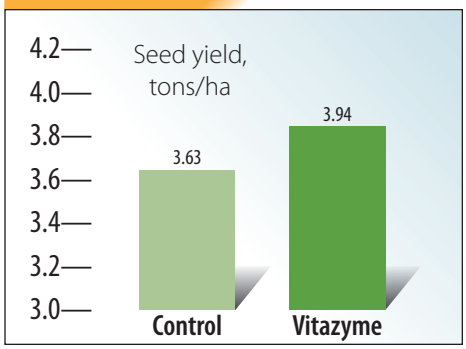
Sunflower response to Vitazyme has been uniformly excellent over the many years it has been trialed in several countries, including Ukraine where this trial took place.

1. Conducted by Agricultural Cooperative "Agrobusiness" at Kaharlystkyi District, Kyiv Region, Horohove Village, Ukraine, on a podzolized chernozem (3.1% organic matter).

Variety: NK Brio hybrid
Seeding rate: 50,000 seeds/ha
Planting date: April 25, 2015
Previous crop: winter wheat
Cultivation methods: disking to 8 cm, plowing to 22 cm, cultivation to 6 cm
Fertilization: 45 kg/ha N, pre-plant incorporated; 15 kg/ha N, 15 kg/ha $P_2 0_5$, 15 kg/ha $K_2 0$ in-furrow at planting
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 8-leaf stage on May 31, 2015
Results: *(See bar chart to the right)*

Yield increase with Vitazyme: 0.31 tons/ha(+9%)
Profit increase with Vitazyme: 2,114 UAH/ha

Seed Yield trial #1

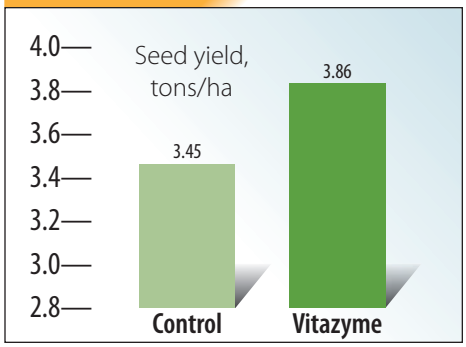


2. Conducted by JLLC "Palmira Vidhodivlya" at Zolotonosha District, Cherkasy Region, Voznesens'ke Village, Ukraine, on a chernozem soil (3.5% organic matter).

Variety: NK Kondi hybrid
Seeding rate: 50,000 seeds/ha
Planting date: April 21, 2015
Previous crop: winter wheat
Cultivation methods: disking to 8 cm, plowing to 22 cm, cultivation to 6 cm
Fertilization: 45 kg/ha, pre-plant incorporated; 15 kg/ha N, 15 kg/ha $P_2 0_5$, 15 kg/ha $K_2 0$ in-furrow at planting
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 6-leaf stage on, May 22, 2015
Results: *(See bar chart to the right)*

Yield increase with Vitazyme: 0.41 ton/ha(+12%)
Profit increase with Vitazyme: 2,954 UAH/ha

Seed Yield trial #2

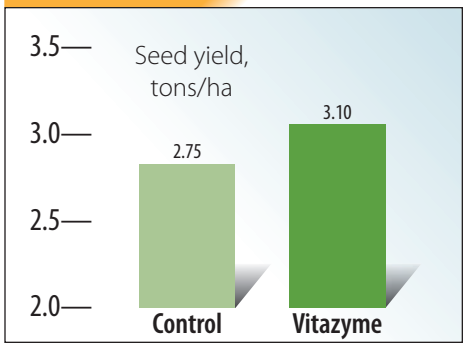


3. Conducted by CMTC "Nadiya Ukrayiny", at Kiliys'kyi District, Odesa Region, Kiliya Town, Ukraine, on a calcareous chernozem (2.5% organic matter).

Variety: LH55.43 KL hybrid
Seeding rate: 50,000 seeds/ha
Planting date: April 9, 2015
Previous crop: winter wheat
Cultivation methods: disking to 8 cm, plowing to 24 cm, cultivation to 6 cm
Fertilization: 35 kg/ha N, pre-plant incorporated; 16 kg/ha N, 16 kg/ha $P_2 0_5$, 16 kg/ha $K_2 0$ in-furrow at planting
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 6-leaf stage on May 5, 2015
Results: *(See bar chart to the right)*

Yield increase with Vitazyme: 0.35 ton/ha(+13%)
Profit increase with Vitazyme: 2,450 UAH/ha

Seed Yield



Location	Yield increase	Profit increase
	%	UAH/ha
Central Ukraine (500-550 mm ppt)		
"Agrobusiness" — Horohove	9	2,114
"Palmira Vidhadivlya" — Voznesens'ke	12	2,954
Southern Ukraine (300-350 mm ppt.)		
"Nadiya Ukrayiny" — Kiliya	13	2,450
Mean	11.3	2,506

Conclusion: All three of these sunflower trials produced excellent yield increase from a single 1 liter/ha foliar Vitazyme application at the 6 to 8 leaf stage. The average increase was 11.3%, and the average profit increase was 2,506 UAH/ha for all three trials. This program is shown to be an excellent addition to sunflower production programs in Ukraine.

Vitazyme Field Tests for 2015

Tomatoes *Testimonial: Comparison with a Rooting Compound*

Researcher: Lucero Fernandez and Ivan Zazueta
Research organization: Quimica Lucava, Mexico
Farmer cooperation: Gelasio Ramos, Canta Ranas Farm
Location: Abasolo Guanajuato, Mexico
Variety: unknown
Transplanting date: May 1, 2014
Experimental design: A 2-hectare tomato field was divided into a Vitazyme treated portion and a Radix 3000 treated part to evaluate the effectiveness of the two products to stimulate root growth.

1 ***Radix 3000*** **2** ***Vitazyme***

Vitazyme application: (1) seedling roots were dipped in a dilute Vitazyme solution at transplanting on May 1, 2014; (2) 1 liter/ha sprayed on the leaves and soil in June 11, 2014.
Radix 3000 application: Radix 3000 is a solution of indole-3-butyric acid (0.3%), an auxin that is designed to stimulate root growth and regeneration. It is generally applied as a 1% dilution at about 100 ml per plant. In this test the product was presumably applied at the same times and ways as for Vitazyme, using 1% solution.

Vitazyme in this Mexican tomato trial stimulated root development better than did Radix 3000, as can be clearly seen in this comparison.

Conclusion: An evaluation of plant roots at early blossoming revealed much superior rooting—of both main roots and root hairs—of the Vitazyme treated tomato plants, showing the potential of Vitazyme to replace root stimulants such as Radix 3000 in tomato culture.

Vitazyme Field Tests for 2015

Tomatoes *with Vitazyme application on Husk Tomatoes*

Researcher: Lucero Fernandez, Comparan Gomez, and Agustin Peralta
Farmer: Sergio Zarate
Research organization: Quimica Lucava
Location: El Verano Farm, Tecoman, Colima, Mexico
Variety: Husk tomato
Experimental design: A 1 hectare portion of a husk tomato field was treated with Vitazyme three times to evaluate the effect of the product on tomato yield and profitability.

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

Fertilization: unknown
Vitazyme application: (1) transplant drench at planting, 1 liter/ha in the drench water (December 16, 2014); (2) 1 liter/ha spray on January 20, 2015; (3) 1 liter/ha spray on February 18, 2015.
Harvest date: unknown. Twenty treated rows were compared with 20 untreated rows.

Yield results:

Treatment	Yield	Yield change
	kg/20 rows	kg/20 rows
Control	4,960	—
Vitazyme	6,820	1,860 (+38%)

Increase in tomato yield with Vitazyme: 38%

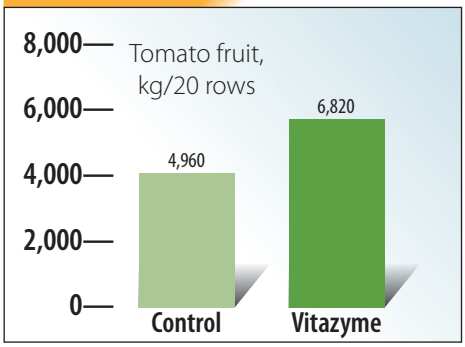
Income results:

Treatment	Income[1]	Income change
	USD/ha	USD/ha
Control	3166	—
Vitazyme	2303	864

[1] Husk tomato price = 0.464 USD/kg.

Added income with Vitazyme: 864 USD/ha

Yield results



Conclusion: This husk tomato trial in Mexico revealed how impressively Vitazyme can increase yields and profits. Three applications at 1 liter/ha improved the yield by 38%, which produced an income increase of 864 USD/ha.

Wheat *with Vitazyme application*

Researcher: Martin Garcia and Lucero Fernandez
Farmer: Ruben Garcia
Research organization: Agro Garna and Quimica Lucava
Location: San Gabriel, Penjamo, Guanajuato, Mexico
Variety: Cortazar
Planting date: January 2, 2015
Experimental design: Two hectares of a wheat field were treated with Vitazyme and compared to an adjoining untreated control. The purpose of the trial was to evaluate the ability of Vitazyme to affect yield and income of this crop.

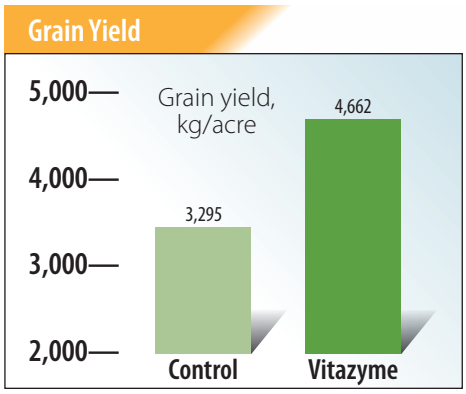
1 ***Control*** **2** ***Vitazyme***

Fertilization: unknown
Vitazyme application: (1) 0.25 liter/ha applied to the seeds at planting on January 2, 2015; (2) 1 liter/ha applied to the leaves and soil on February 25, 2015, 54 days after planting
Harvest date: May 11, 2015

Yield results:

Treatment	Yield	Yield change
	kg/ha	kg/ha
Control	3,295	—
Vitazyme	4,662	1.367 (+41%)

Increase in grain yield with Vitazyme: 41%



Income results:

Treatment	Yield	Gross income[1]	Added income	Added cost[2]	Net profit	Cost : Vitazyme
	kg/ha	USD/ha	USD/ha	USD/ha	USD/ha	
Control	3,295	635.94	—	—	—	—
Vitazyme	4,662	899.77	263.83	48.28	215.55	4.46

[1]Wheat price = 0.193 USD/kg; [2]cost of two Vitazyme applications (1.25 liters/ha) and relevant costs.

Increase in income with Vitazyme: 215.55 USD/ha
Increase in Cost : Benefit with Vitazyme: 4.46

Conclusions: A wheat study in Mexico, comparing two Vitazyme applications with an untreated control, revealed that this product greatly increased yield, by 41%. This increase gave a profit enhancement of 215.55 USD/ha, with a cost : benefit of 4.46, showing the program's excellent benefits for wheat growers in Mexico.

Winter Wheat *with Vitazyme application*

Researchers: Jacob Hesseltine and Heba Khalid
Research organization: Vital Grow Distribution LLC, Waterville, Washington
Farmer: Jordan Farms
Location: Waterville, Washington
Variety: Eltan soft white winter wheat
Planting date: August 25, 2014
Seeding rate: 45 lb/acre
Seedbed preparation: subsoiling, harrowing, disking, plowing cultivation, weeding
Previous crop: fallow
Soil type: clayey
Experimental design: Two adjoining and nearly identical fields, each having 155 acres with uniform past management history, were selected to compare the yield and quality of winter wheat as affected by Vitazyme. One field received Vitazyme and the other served as an untreated control.

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

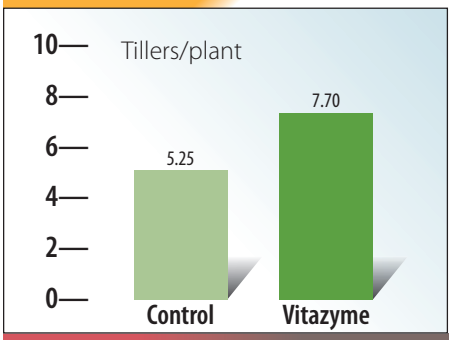
Fertilization: 60 lb/acre of nitrogen in July of 2014

Untreated winter wheat at Jordan Farms is shown to be much shorter and less dense in growth than the treated wheat in the accompanying photo.

Vitazyme treated soft white winter wheat (at tillering) is much thicker and taller than the untreated control, and yielded 6% more grain.

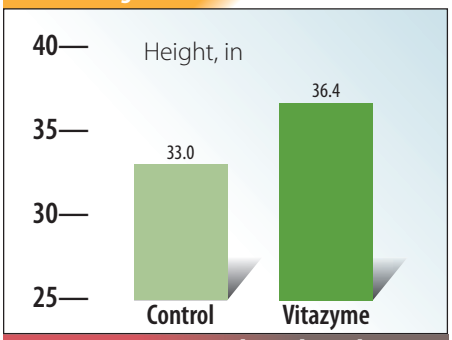
Vitazyme application: 12.4 oz/acre sprayed on the leaves and soil with a 90-foot boom sprayer the last part of April, along with Olympus Flex Broadleaf Herbicide, at the 3 to 5-tiller stage
Growing season weather: good growing conditions with little winter snow, and only 6 inches of precipitation from January to harvest; extreme heat in June and July to affect plant development.
Growth observations: The growers noted visible differences in growth during the growing season, with greater plant mass and more stems in the Vitazyme treatment, plus more stems and thicker stubble noted in the treated field after harvest.
Harvest dates: July 22 and 23, 2015
Plant parameter results: On July 12, 20 typical plants from each field were harvested, and parameters were measured for each one and averaged.

Tillers Per Plant



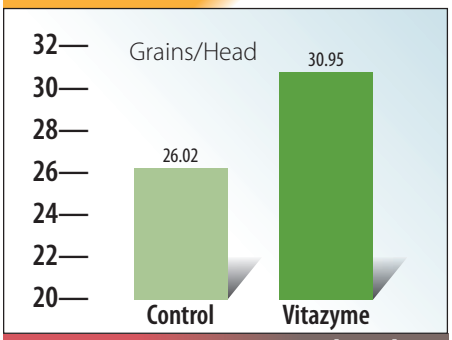
Increase in tillers per plant with Vitazyme: 47%

Plant Height



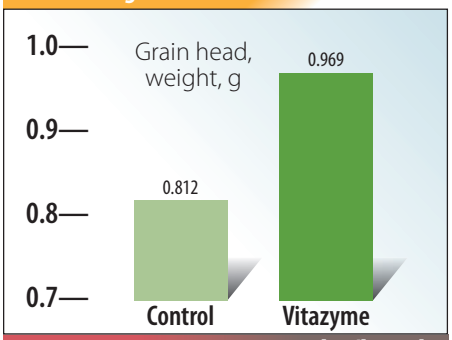
Increase in plant height with Vitazyme: 10%

Grains Per Head



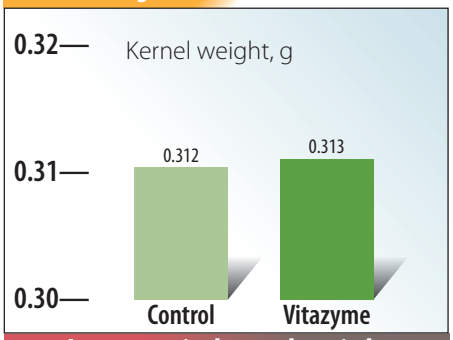
Increase in grain per head with Vitazyme: 19%

Grain Weight Per Head



Increase in grain weight/head with Vitazyme: 19%

Kernel Weight

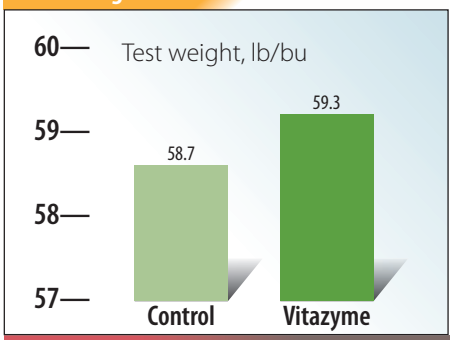


Increase in kernel weight with Vitazyme: 0%

All plant parameters but kernel weight increased with Vitazyme. Kernel weight is difficult to change.

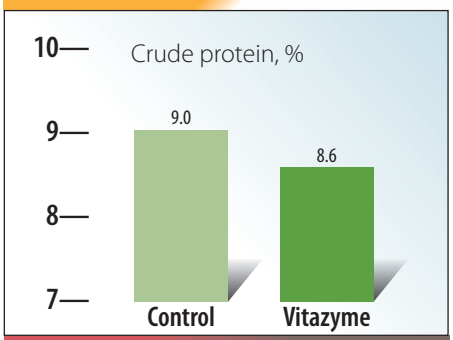
Grain quality results: At harvest, the grain from each field was weighed and sampled separately.

Test Weight



Increase in test weight with Vitazyme: 1%

Grain Protein



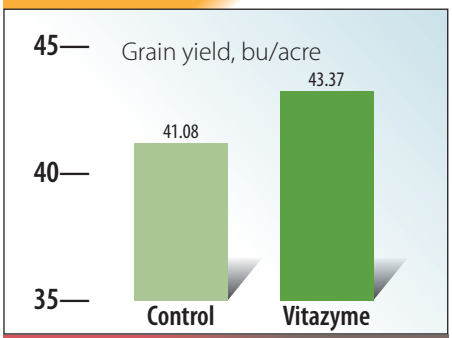
Decrease in crude protein with Vitazyme: (-) 0.4%-points

Test weight was marginally increased with Vitazyme, while grain protein decreased a bit, which is quite acceptable because low protein is needed for supreme quality of baker's flour. Less than 12% is considered premium quality.

Yield results:

Treatment	Yield	Yield change
	bu/acre	bu/acre
Control	41.08	—
Vitazyme	43.37	2.29 (+6%)

Grain Yield



Increase in grain yield with Vitazyme: 6%

Conclusions: A soft white winter wheat trial in Washington, comparing two 155-acre fields, one treated with a single 12.4 oz/acre Vitazyme application at 3 to 5 tillers, showed excellent improvements in plant and grain parameters (tillers per plant, height, grains per head, grain weight per head, and grain test weight. Weight per grain did not change, and crude protein of the grain decreased sightly (0.4 percentage points). **Differences in growth were noticeable between the two fields during the season, and stubble density was noticeably greater in the Vitazyme field.** Lower summer temperatures and greater rainfall would certainly have improved the response to Vitazyme, but a 6% yield increase was very acceptable. These results illustrate the effectiveness of this program for soft white winter wheat growers in Washington, especially during a dry and heat-stressed year.

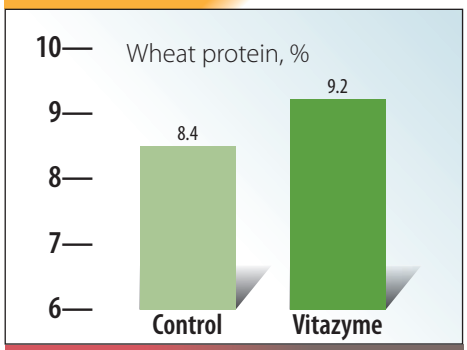
Winter Wheat *with Vitazyme application*

Researcher: Jacob Hesseltine
Research organization: Vital Grow Distribution LLC, Waterville, Washington
Farmer: Jordan Farms
Location: Withrow, Washington
Variety: Eltan soft white winter wheat
Planting date: August 27, 2014
Seeding rate: 40 lb/acre
Previous crop: fallow
Soil type: sandy loam
Seedbed preparation: subsoiling, harrowing, disking, plowing cultivation, weeding
Experimental design: Two adjoining fields that had equal cropping history were used to evaluate the effect of Vitazyme on wheat yield and protein level. One field of 160 acres was treated, and the other was left untreated as a control.

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

Fertilization: 60 lb/acre of nitrogen in July of 2014
Vitazyme application: 12 oz/acre sprayed on the leaves and soil with a 90-foot boom sprayer the spring of 2015, along with Olympus Flex broadleaf herbicide; plants were in the tillering stage (3 to 5 inches tall)
Growing season weather: good planting conditions in 2014, with very little snow cover through the winter; only six inches of precipitation from January, 2015, through harvest; extreme heat in June and July, which induced early maturity but less than optimal yields
Harvest dates: July 15 (control field) and July 17 (Vitazyme Field)
Protein results:

Wheat Protein

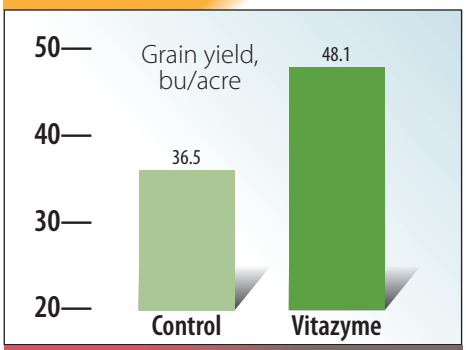


Increase in grain protein with Vitazyme: 0.8 %-point

Test weight results: Both treatments produced grain that weighted about 58 lb/bu.
Yield results:

Treatment	Yield	Yield change
	bu/acre	bu/acre
Control	36.5	—
Vitazyme	48.1	11.6 (+32%)

Grain Yield



Increase in grain yield with Vitazyme: 32%

Conclusions: A soft white winter wheat study in Washington, comparing a field receiving a single 12 oz/acre Vitazyme application at tillering compared to an untreated control field, showed that this product markedly improved grain yield—by 32%—while increasing protein by 0.8 percentage-point. This small protein increase did not detract from the baking quality of the flour, since bakeries need less than 12% protein for premium quality, and both fields produced grain having considerably less protein than this. Vitazyme is shown to be an excellent addition to soft white wheat programs in Washington, promoting both high yields and excellent quality.

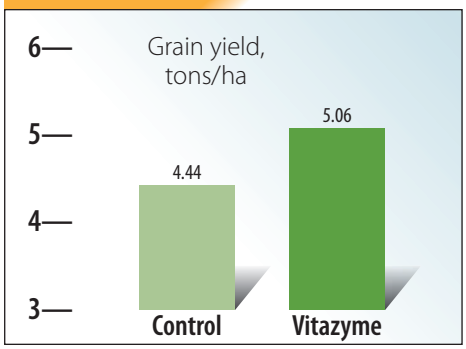
Winter Wheat *A Summary of Eight Field Trials in Ukraine*

All trials were organized by V. V. Plotnikov, Ph.D., to determine the yield, quality (gluten and protein), and profitability of Vitazyme use on different varieties of winter wheat in various locations across Unkraine.

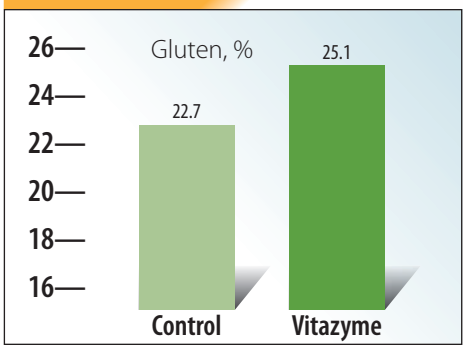
1. Conducted by Agricultural LLC, "Nyva", Ukraine

Location: Bershadskyi District, Vinnytsya Region, Sumivka Village, Ukraine
Variety: Smuglianka
Seeding rate: 6 million/ha
Planting date: October 3, 2014
Previous crop: sunflowers
Seedbed preparation: disking to 16 cm
Fertilization: 16 kg/ha N, 16 kg/ha $P_2 0_5$, and 16 kg/ha $K_2 0$ in-furrow at planting on October 3, 2014; 120 kg/ha N on the soil in the spring
Vitazyme application: 1 liter/ha at tillering in the spring on April 17, 2015
Results: *(See bar charts to the below and on the next page.)*

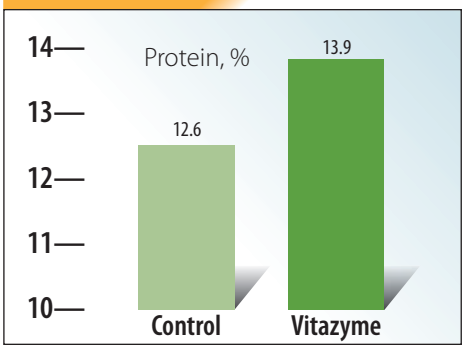
Grain Yield trial #1



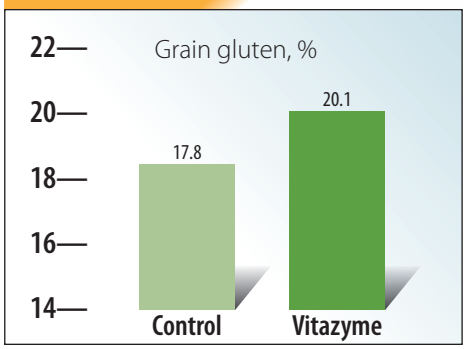
Grain Gluten trial #1



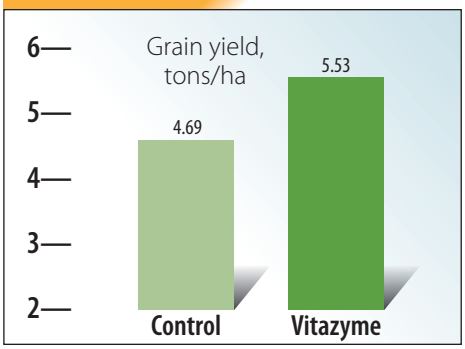
Grain Protein trial #1



Grain Gluten trial #2



Grain Yield trial #3



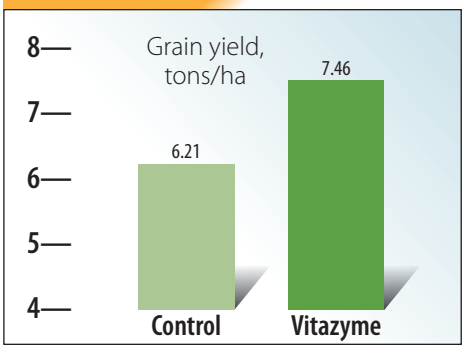
Increase with Vitazyme

Grain yield ..... 0.62 ton/ha (+14%)
Grain gluten.....2.4 %-points
Grain protein.....1.3 %-points
Profit .....1,742 UAH/ha

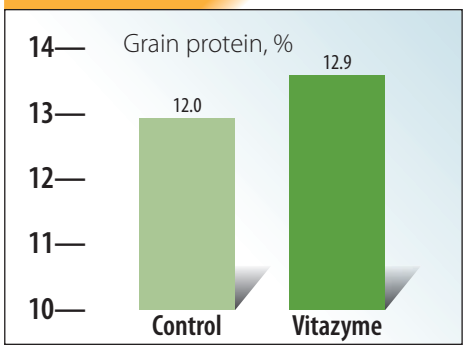
2. Conducted by Farming Enterprise "Kolyvailo", Ukraine.

Location: Vinnytsya District, Vinnytsya Region, Miziakivs'ki Hutory Village, Ukraine
Variety: Midas, F3 generation
Seeding rate: 6 million/ha
Planting date: September 30, 2014
Previous crop: winter rape
Seedbed preparation: disking to 8 cm, plowing to 22 cm, two cultivations to 5 cm
Soil type: gray podzolic (organic matter = 2.1%)
Fertilization: 16 kg/ha N, 16 kg/ha P_2O_5, and 16 kg/ha K_2O in-furrow at planting; 105 kg/ha N on the soil in the spring
Vitazyme application: 1 liter/ha on the seeds before planting on September 28, 2014; 1 liter/ha sprayed on the plants and soil at tillering, on April 26, 2015
Results: *(See following bar charts.)*

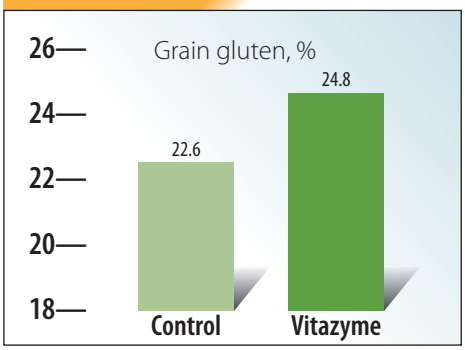
Grain Yield trial #2



Grain Protein trial #2



Grain Gluten trial #3



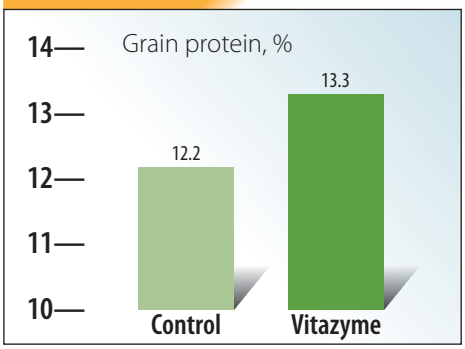
Increase with Vitazyme

Grain yield ..... 1.25 tons/ha (+20%)
Grain gluten.....2.3 %-points
Grain protein..... 0.9 %-point
Profit .....3,700 UAH/ha

3. Conducted by LLC "Atlantic Farms", Ukraine.

Location: Myronivs'kyi District, Kyiv Region, Myronivka Town, Ukraine
Variety: Snihurka
Seeding rate: 5.5 million/ha
Planting date: September 27, 2014
Previous crop: soybeans
Seedbed preparation: disking to 8 cm, plowing to 22 cm, two cultivations to 5 cm
Soil type: podzolized chernozem (3.2% organic matter)
Fertilization: 16 kg/ha N, 16 kg/ha P_2O_5, and 16 kg/ha K_2O in-furrow at planting; an additional 105 kg/ha N broadcast on the crop in the spring
Vitazyme application: 1 liter/ha over the plants and soil at the tillering stage, on April 26, 2015
Results: *(See following bar charts.)*

Grain Protein trial #3



Increase with Vitazyme

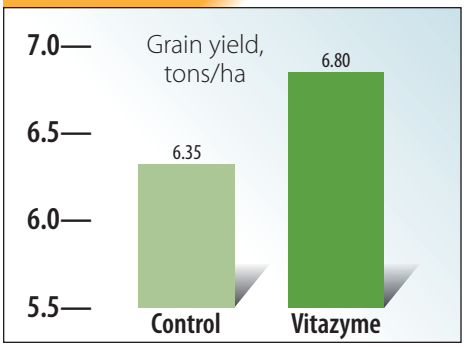
Grain yield ..... 0.84 ton/ha (+18%)
Grain gluten.....2.2 %-points
Grain protein.....1.1 %-points
Profit .....2,534 UAH/ha

4. Conducted by Agricultural LLC, "Rodyna", Ukraine

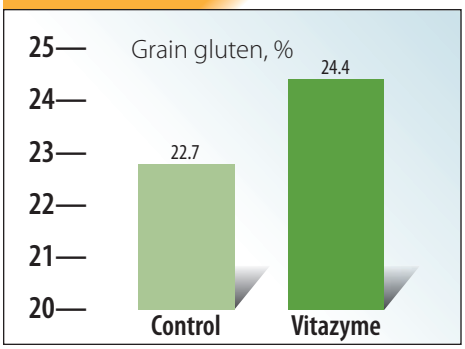
Location: Ul'yanis'kyi District, Kirovohrad Region, Syn'ky Village, Ukraine
Variety: Zolotokolosa
Seeding rate: 5.5 million/ha
Planting date: September 29, 2014

Soil type: podzolized chernozem (3.4% organic matter)
Preceding crop: soybeans
Cultivation methods: disking to 22 cm, two cultivations to 5 cm
Fertilization: 15 kg/ha N, 15 kg/ha $P_2 0_5$, and 15 kg/ha $K_2 0$ in-furrow at planting; 105 kg/ha N in the spring
Vitazyme application: 1 liter/ha applied to the seeds on September 25, four days before planting
Results: *(See following bar charts.)*

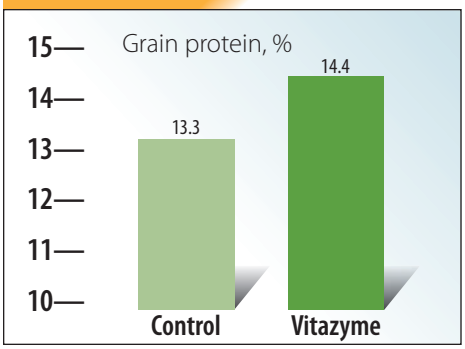
Grain Yield trial #4



Grain Gluten trial #4



Grain Protein trial #4



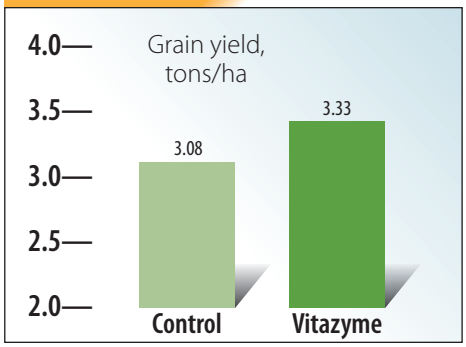
Increase with Vitazyme

Grain yield ..... 0.45 ton/ha (+7%)
Grain gluten.....1.7 %-points
Grain protein.....1.1 %-points
Profit.....1,497 UAH/ha

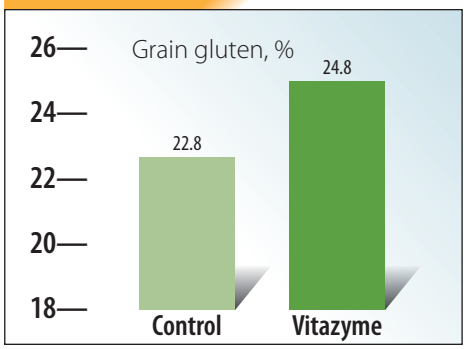
5. Conducted by Agricultural LLC, "Rozkishna", Ukraine

Location: Holovanivs'kyo District, Kirovohrad Region, Novosilka Village, Ukraine
Variety: Antonivka
Seeding rate: 5.5 million/ha
Planting date: September 26, 2014
Preceding crop: sunflowers
Soil type: podzolized chernozem (3.1% organic matter)
Cultivation methods: disking to 8 cm, plowing to 22 cm, cultivation to 5 cm
Fertilization: 16 kg/ha N, 16 kg/ha $P_2 0_5$, and 16 kg/ha $K_2 0$ in-furrow at planting; 70 kg/ha N in the spring
Vitazyme application: 1 liter/ha on the seeds on September 21, 2014, five days before planting
Results: *(See following bar charts.)*

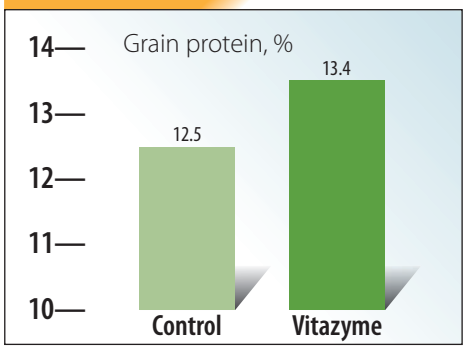
Grain Yield trial #5



Grain Gluten trial #5



Grain Protein trial #5



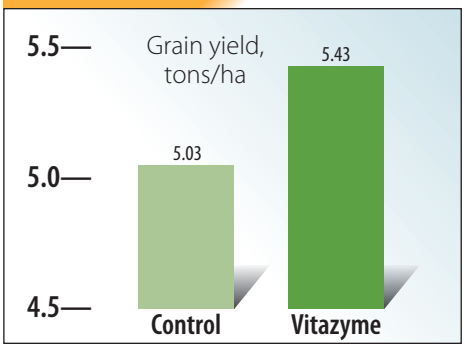
Increase with Vitazyme

Grain yield ..... 0.25 ton/ha (+8%)
Grain gluten.....2.0 %-points
Grain protein.....0.9 %-point
Profit.....777 UAH/ha

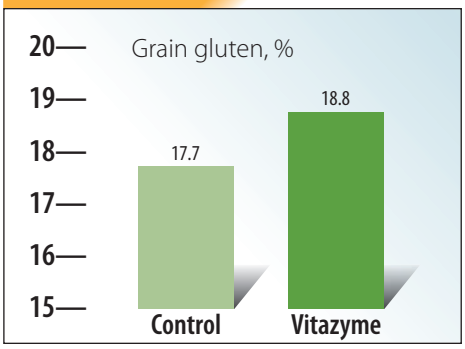
6. Conducted by Private Enterprise, "Kriachkivka, Agro-Plus", Ukraine

Location: Pyriatynskyi District, Poltava Region, Kriachivka Village, Ukraine
Variety: Blahodarka
Seeding rate: 6 million/ha
Soil type: chernozem (3.2% organic matter)
Planting date: October 1, 2014
Previous crop: sunflowers
Cultivation methods: disking to 22 cm, two cultivations to 5 cm
Fertilization: 15 kg/ha N, 15 kg/ha $P_2 0_5$, and 15 kg/ha $K_2 0$ in-furrow at planting; 150 kg/ha N in the spring
Vitazyme application: 1 liter/ha on the seeds six days before planting on September 25, 2014
Results: *(See following bar charts.)*

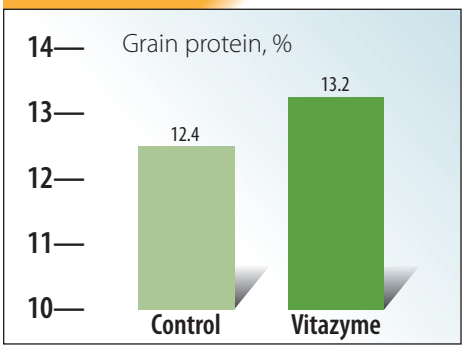
Grain Yield trial #6



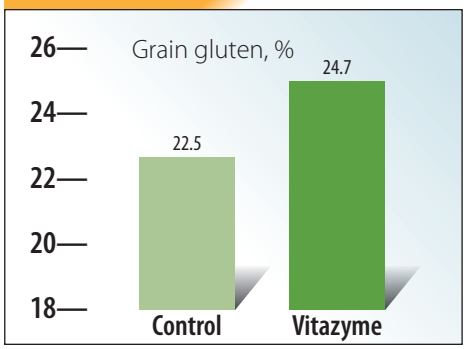
Grain Gluten trial #6



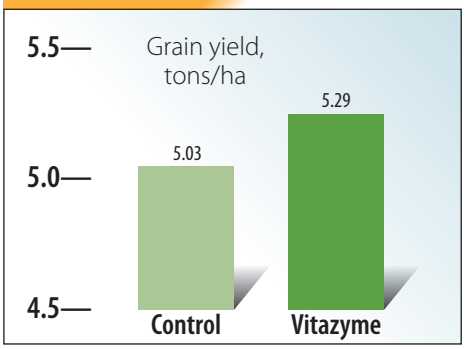
Grain Protein trial #6



Grain Gluten trial #7



Grain Yield trial #8



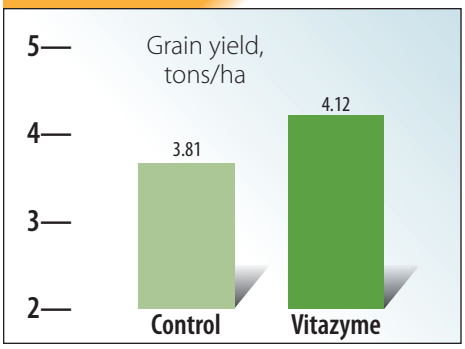
Increase with Vitazyme

Grain yield ..... 0.40 ton/ha (+8%)
Grain gluten.....1.1 %-points
Grain protein..... 0.8 %-point
Profit .....1,257 UAH/ha

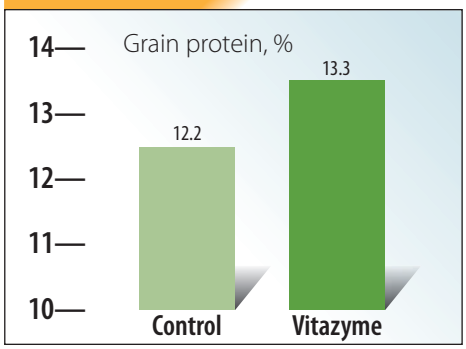
7. Conducted by Private Enterprise "Urozhay", Ukraine

Location: Domanivs'kyi District, Mykolayiv Region, Volodyrnyrivka Village, Ukraine
Variety: Shestopalovka
Seeding rate: 5.5 million/ha
Planting date: September 26, 2014
Previous crop: soybeans
Seedbed preparation: disking to 8 cm, plowing to 22 cm, cultivation to 5 cm
Fertilization: 16 kg/ha N, 16 kg/ha $P_2 0_5$, and 16 kg/ha $K_2 0$ in-furrow at planting; 105 kg/ha broadcast in the spring
Vitazyme application: 1 liter/ha on the seeds six days before planting on September 20, 2014
Results: *(See following bar charts.)*

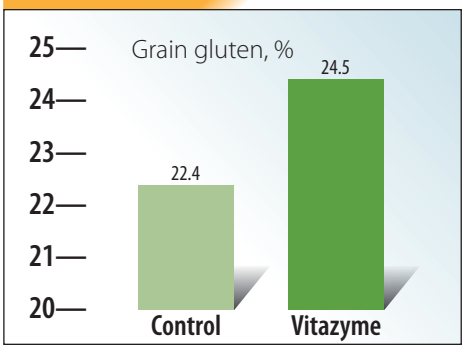
Grain Yield trial #7



Grain Protein trial #7



Grain Gluten trial #8



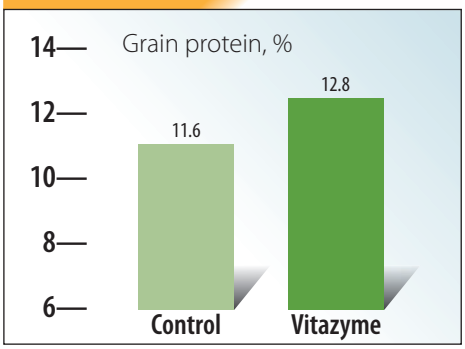
Increase with Vitazyme

Grain yield ..... 0.31 ton/ha (+8%)
Grain gluten.....2.2 %-points
Grain protein.....1.1 %-points
Profit .....993 UAH/ha

8. Conducted by Farming Enterprise "Oasis", Ukraine

Location: Pervomayskyi District, Mykolayiv Region, Ivanivka Village, Ukraine
Variety: Kniahynia Olha
Seeding rate: 5.5 million/ha
Planting date: September 25, 2014
Previous crop: peas
Seedbed preparation: disking to 8 cm, plowing to 22 cm, cultivation to 5 cm
Fertilization: 15 kg/ha N, 15 kg/ha $P_2 0_5$, 15 kg/ha $K_2 0$ in-furrow at planting; 105 kg/ha N in the spring
Vitazyme application: 0.5 liter/ha on the seeds on September 22, 2014, along with 0.5 liter/ha Wuxal Terios, three days before planting
Results: *(See following bar charts.)*

Grain Protein trial #8



Increase with Vitazyme

Grain yield ..... 0.26 ton/ha (+5%)
Grain gluten.....2.1 %-points
Grain protein.....1.2 %-points
Profit .....818 UAH/ha

Conclusion: These eight Ukrainian winter wheat studies show the great efficacy of using Vitazyme as a complement to the growth of the crop. The average yield increased by 11% with the product, and grain gluten and crude protein increased by 2.0 and 1.05 percentage points, respectively. The average profit increase was 1,662 UAH/ha. Note the following data summary.

(See Increase table on page 62.)

Location	Increase with Vitazyme			
	Yield	Gluten	Protein	Profit
	%	%-points	%-points	UAH/ha
Central Ukraine (500-550 mm ppt.)				
"Nyva" — Sumivka	14	2.4	1.3	1,742
"Kolyvailo"— Miziakivs'ki Hutory	20	2.3	0.9	3,700
"Atlantic Farms"— Myronivka	18	2.2	1.1	2,514
"Rodyna"— Syn'ky	7	1.7	1.1	1,497
"Rozkishna"— Novosilka	8	2.0	0.9	777
"Kriachkivka Agro-Plus"— Kriachkivka	8	1.1	0.8	1,257
Southern Ukraine (300-350 mm ppt.)				
"Urozhay" — Volodymyrivka	8	2.2	1.1	993
"Oasis" — Ivanivka	5	2.1	1.2	818
Mean	11	2.0	1.05	1,662

Vitazyme Field Tests for 2015

Winter Wheat *with Vitazyme application. A Study Conducted in 2013*

Research organization:
SF-Soepenberg s.r.o., Trnava, Slovakia
Farmer cooperator: Jatov Trnovec, Vahom, Slovakia
Variety: unknown
Experimental design: A winter wheat field was divided into Vitazyme treated areas to evaluate the effect of the product on wheat yield.
Fertilization: unknown

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

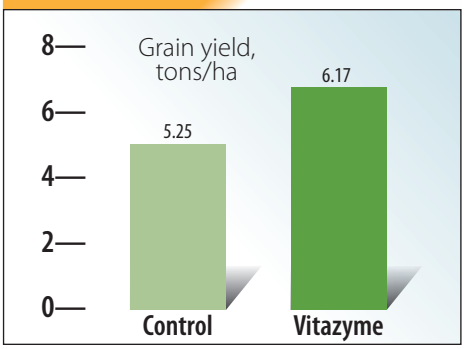
Vitazyme application: 1 liter/ha on the leaves and soil along with a herbicide application

Yield results:

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	5.25	—
Vitazyme	6.17	0.92 (+18%)

Increase in grain yield with Vitazyme: 18%

Grain Yield



Conclusions: In this winter wheat trial in Slovakia, Vitazyme produced an excellent yield increase of 18%, showing its great utitlity for wheat growers in that region.

Vitazyme Field Tests for 2015

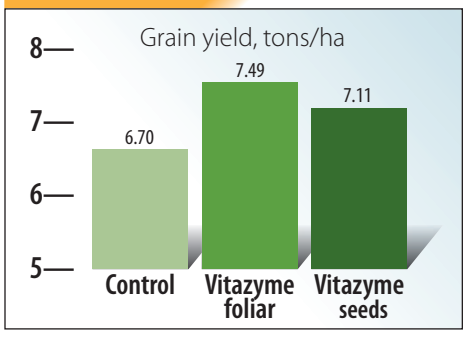
Winter Wheat *with Vitazyme application.*

Research organization:
SF-Soepenberg s.r.o., Trnava, Slovakia
Farmer cooperator: Jatov Trnovec, Vahom, Slovakia
Variety: unknown
Experimental design: Three field areas were selected to apply Vitazyme, as compared to an untreated control area, to evaluate the effectiveness of this biostimulant to increase grain yield.

Yield results:

Field	Vitazyme	Yield	Yield change
		tons/ha	tons/ha
Control	0	6.70	—
50	Foliar, 1 liter/ha	7.49	0.79 (+12%)
45	Seeds, 1 liter/ha	6.91	0.21 (+3%)
63	Seeds, 1 liter/ha	7.31	0.61 (+9%)
45 & 63	Mean, seeds	7.11	0.41 (+6%)

Grain Yield



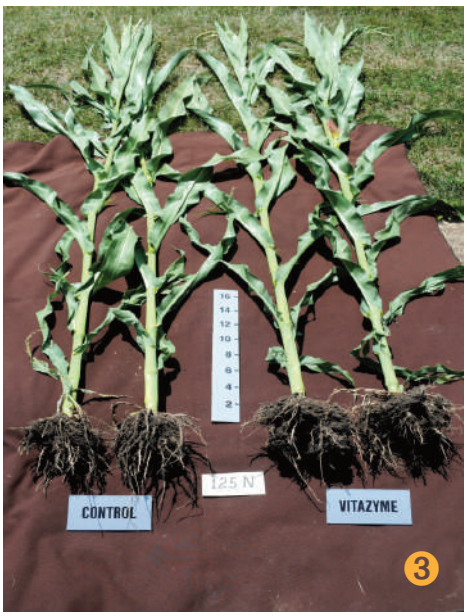
1 ***Control*** **2** ***Seed Treatment*** **3** ***Foliar Treatment***

Fertilization: unknown
Vitazyme treatment: Seed treatment: 1 liter/ha on the seeds before planting. Foliar treatment: 1 liter/ha to the leaves and soil, along with a herbicide application.

Increase in grain yield with Vitazyme on seeds: 6%
Increase in grain yield with Vitazyme on leaves: 12%

Conclusions: A winter wheat trial in Slovakia, using either a seed or foliar treatment, produced the greatest yield increase (12%) with 1 liter/ha on the leaves along with a herbicide application. Seed application produced a 6% average yield increase. These results show the great value of Vitazyme as either a seed or leaf application for winter wheat.

Vitazyme *Improves Nitrogen and Water Efficiency.*



A study conducted by Dr. David Clay and Graig Reicks at South Dakota State University, at the Aurora Research Farm in 2014 ***(photo 1)***, revealed that Vitazyme improves corn yield, while signifficantly increasing the effifficiency of nitrogen and water utilization. The season was wet and yields in general in the area were high, but even so a typical high nitrogen rate of 125lb/acre produced superior leaf and stalk growth ***(photo2)***, and expanded the root mass considerably above the non - Vitazyme treated control ***(photo 3)***. Ear size was noticeably increased in representative ears sampled at harvest time ***(photos 4 and 5)***. Note the longer and wider ears with Vitazyme treatment. The yield of grain was increased signifficantly by about 9 bu/acre, and nitrogen effifficiency was improved by 0.66 bu/lb of N. Moreover, the yield loss due to water stress was reduced from 14.2 bu/acre in the control to only 5,0 bu/acre with Vitazyme. These results show how a simple addition of this product to the grower's program can improve the yield of grain through improved fertilizer and water utilization. It is a program designed for corn growers everywhere whose intent is to maximize yields with a minimum of nitrogen use.

Corn yield at 125 lb N/acre

Control..... 161.0 bu/acre
Vitazyme ..... 170.1 bu/acre

Nitrogen efficiency at 125 lb/acre

Control..... 0.400 bu/lb of N
Vitazyme ..... 0.466 bu/lb of N

Yield loss from water stress at 125 lb N/acre

Control..... 14.2 bu/acre
Vitazyme ..... 5.0 bu/acre

Vital Earth Resources, 706 East Broadway • Gladewater, Texas 75647, USA • (903)845-2163 • www.vitalearth.com