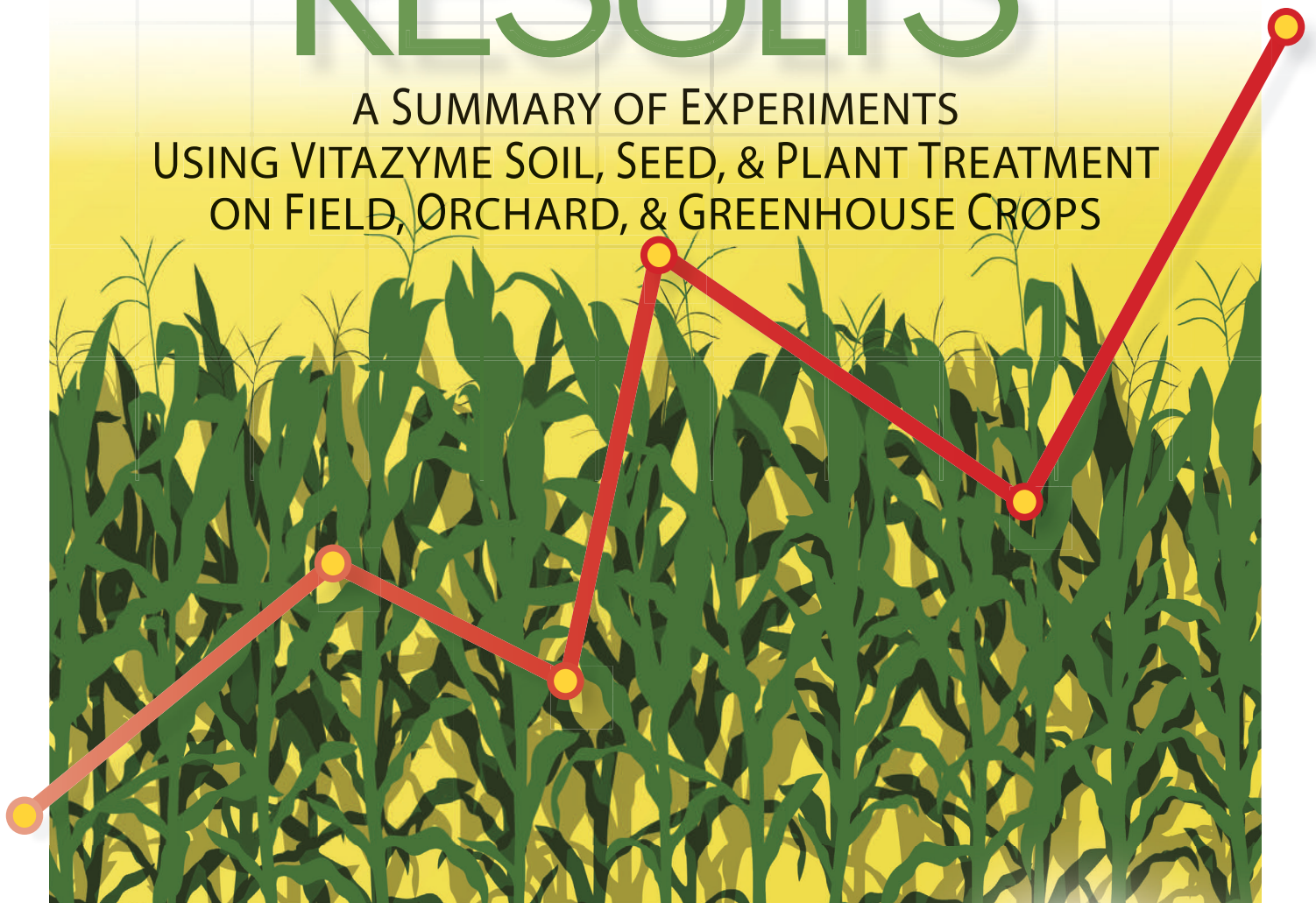


23rd Edition



2018 FIELD TESTS RESULTS

A SUMMARY OF EXPERIMENTS
USING VITAZYME SOIL, SEED, & PLANT TREATMENT
ON FIELD, ORCHARD, & GREENHOUSE CROPS



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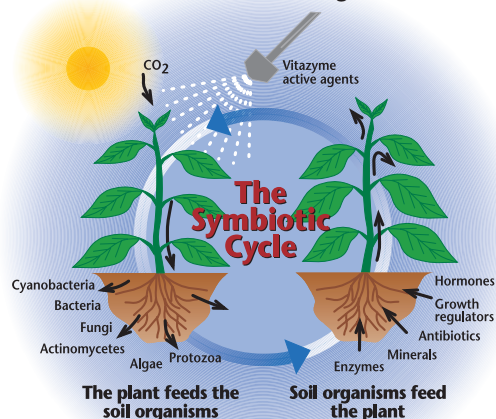
Introduction *How Vitazyme works within the plant-soil system.*

This edition of Vitazyme crop reports represents the twenty-third 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 transported to the leaves. The acids help dissolve essential minerals, and reduced iron releases anionic elements. Organism types include mycorrhizae, cyanobacteria and various other bacteria, fungi, and actinomycetes.

Vitazyme contains "metabolic triggers" that stimulate the plant to photosynthesize more efficiently, fixing more sunlight energy in the form of carbon compounds to increase

Soil Organic Matter			Previous Crop		Compaction		Soil NO ₃ -N Test						
Low ($<1.5\%$)	Medium ($1.5\text{--}3\%$)	High ($>3\%$)	Non-legume	Legume	Much	Little	Low	Medium	High				
1	2	3	1	3	1	3	2	4	6				
Total additive score:			15	14	13	12	11	10	9	8	7	6	5
Apply this % optimum N			50-60%		60-70%		70-80%						

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:

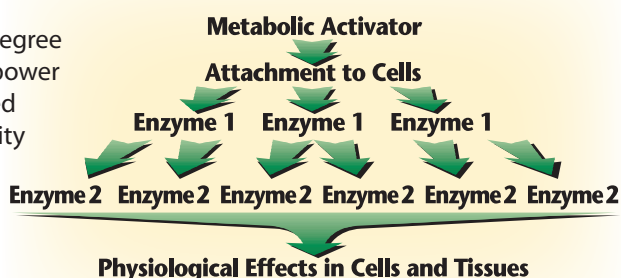
1. Apply normal levels of organic and commercial fertilizers.
2. Treat the seeds, transplant roots, or seed pieces whenever possible at planting. To treat seeds, typically use 250 ml/ha in the minimum water for good seed coverage. Mixing 1 liter/ton of seeds is also very effective. Dip roots or transplants 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.

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 2018

As in previous years, Vitazyme continued to perform with great consistency in 2018 wherever it was used throughout the world. The following highlights are noted from the research conducted during this year.

1. Results with cotton over three years at the National Semi-Arid Resources Research Institute in Uganda revealed a consistently excellent crop response, with increases in lint ranging as high as 48% compared to the untreated control. In most cases the 5% seed treatment plus foliar applications worked best, and the fiber length and strength were also improved significantly in these replicated studies. For example, there were more sympodia (58%), greater plant size (11% greater height), more bolls (38%), and more fruiting points (60%) with Vitazyme in the 2017/2018 trials.

2. Yields for various crops in Ukrainian trials increased for winter wheat (15%), winter canola (14%), spring barley (8%), grapes (11%), soybeans (17%), sunflowers (19%), and corn (14%), and protein levels also improved in wheat, showing consistently good results as in previous years. Some of these improvements in yield occurred in spite of application rates being reduced to only 0.5 liters/ha per application due to economic considerations.

3. A series of trials conducted at Agricenter International in Memphis, Tennessee, produced some excellent crop responses with Vitazyme alone, and in combination with Bio Seed, a seed treatment containing numerous species of beneficial bacteria and fungi that populate the root zone. Yield responses with green beans were 32%, and with onions 80% for the combined products. For Vitazyme alone, the yield for tomatoes increased by 103%, and for corn the increase was 28%, with the return on investment being 51.0 and 7.4, respectively, for the two crops.

4. Research conducted by David Holden in California showed impressive improvements in production with both strawberries and cabbage with both Vitazyme and Bio Seed. Berry yield was increased by 28% with the combined products — both applied as a soil drench at transplanting and Vitazyme sprayed five times during the trial period. This increased yield returned \$2,716/acre more income, or a return on investment of 35:1. The cabbage yield improvement was 10%, giving \$2,252/acre greater income. All improvements were statistically significant.

5. In yet another trial involving the synergism of Vitazyme with Bio Seed, the two products

applied on onions in Mexico achieved an amazing yield improvement of 25%, which gained the farmer \$2,177/ha more income. Vitazyme alone produced excellent yield increases in Jalisco State for tomatoes (50%), corn (40%), and rice (44%). All of these increases gave big increases in profitability for the farmers.

6. A study at South Dakota State University, to repeat work done in 2016 to investigate the ability of Vitazyme to improve nitrogen use efficiency with corn, revealed that such improvement is indeed real. The yield was increased by 11% for a seed application and 12% for a foliar application at V6 without added nitrogen, but the crop yield was at its maximum with only 75 lb/acre of nitrogen in 2018. Further work needs to be done using smaller applications of nitrogen to refine the results.

7. A tea trial in Viet Nam, using Vitazyme along with two other products, gave an excellent yield increase of tea leaves of 14% over a three-month period. However, Vitazyme alone produced the greatest harvest yield increase (25%) when only two applications of the product had been applied before the first harvest on April 7, and no other products had yet been applied.

Vitazyme Field Tests for 2018

Apples *with Vitazyme application*

Researcher: V.V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Tyrviv District, Vinnytsia Region, Stroints Village, LTD Eco Nika, Ukraine

Variety: Aidared (M9 rootstock)

Planting date: 2010 **Irrigation:** none

Soil type: brown podzolic (humus=2.1%)

Tree density: 4.0 x 1.5 m (1,666 trees/ha)

Experimental design: An apple orchard was divided into Vitazyme sprayed and untreated control areas to determine the effect of this product on the yield of fruit, as well as the profitability of its use.

① Control ② Vitazyme

Observations: At six months after these applications, there was a noticeable increase in leaf area for the Vitazyme treatments, but final results were not yet available.

Fertilization: 84-64-64 kg/ha of N-P₂O₅-K₂O applied the first half of the season

Vitazyme application: (1) 1.5 liters/ha sprayed on the leaves and soil at fruit set on May 10; (2) 1.5 liters/ha sprayed on the leaves and soil at one-third full size on June 5.

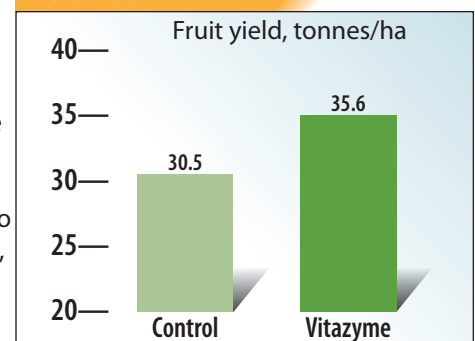
Yield results:

Treatment	Fruit yield tonnes/ha	Yield change tonnes/ha
1. Control	30.5	—
2. Vitazyme	35.6	5.1 (+17%)

Income results: The extra 5.1 tonnes/ha of apples in this study produced \$565/ha more income.

Conclusions: An apple trial in Ukraine, using two 1.5 liters/ha applications, at fruit set and at one-third full size fruit, produced an excellent yield increase of 17%, with added income at \$565/ha, showing the excellent utility of this program for apple growers in Ukraine.

Fruit Yield



Increase in fruit yield with Vitazyme: 17%

Avocados with Vitazyme application

Researcher: Steven David

Research organization: Sustainable Farming Solutions, Perth, Western Australia

Location: Western Australia

Variety: Unknown

Experimental design: Nursery avocado plants were treated with Vitazyme and compared with untreated controls to determine the effect of this product on root and top growth.

① Control ② Vitazyme

Vitazyme application: (1) Some plants were drenched at two times with a 1% Vitazyme solution; (2) other plants were drenched at two times with a 2% Vitazyme solution. Application timing is not known.

Growth results: Although no measurements were made, it was obvious by observation that both the 1% and 2% pot drenches improved root growth. This was especially true for the 2% drench, which displayed much greater root growth than the untreated control, and was substantially greater than the 1% drench. Note the accompanying photograph.



The circled root ball has been treated twice with a 2% Vitazyme drench, and reveals an amazing improvement in rooting; the 1% drench in the center also shows excellent rooting, far better than the control on the left.

Conclusions: This Western Australia Vitazyme trial revealed that either a 1% or 2% pot root drench, applied two times, greatly increased root growth and associated top growth and development. This product is thus shown to be an excellent adjunct to nursery applications of avocados to stimulate more rapid growth, and reduced time to reach transplanting size.

Bananas with Vitazyme application

Researcher: Theo Pobjoy

Research organization: Organic Farming Systems, Queensland Northern Territory, Australia

Variety: Unknown

Experimental design: Banana plants in a nursery were treated with a Vitazyme solution to compare with untreated plants and determine effects on plant growth.

① Control ② Vitazyme

Vitazyme application: a single 2% Vitazyme soil drench

Growth results: As evidenced by the accompanying photographs, it is obvious that the Vitazyme pot soil drench greatly increased the root and leaf growth, by at least 25%. No data on root or leaf parameters were collected.



Vitazyme applied as a single soil drench greatly improved leaf growth and development, as well as root growth (see the other photo).



The effect of the brassinosteroids, triacontanol, and other growth activators in Vitazyme have greatly improved the rooting for this banana plant, with only a 2% solution.

Conclusions: A banana nursery study in Queensland Northern Territory, Australia, with Vitazyme applied as a 2% soil drench, proved that total plant growth—roots and leaves—is greatly stimulated by this treatment. Banana growers could greatly profit from the use of this product in their nursery operations, and also in producing plantations as shown by other research trials.

Green Beans with Vitazyme application

Researcher: K. Bruce Kirksey, Ph. D.

Research organization: Agricenter International, Memphis, Tennessee

Location: Memphis, Tennessee

Variety: Blue Lake

Soil type: Falaya silty loam; good fertility and drainage; pH = 6.3

Planting date: July 5, 2018

Row spacing: 30 inches

Experimental design: A small-plot replicated green bean trial was conducted with Vitazyme and Bio Seed to evaluate the effects of these product, alone and together, on the yield of green beans. Plots were 10 x 30 ft, with four replications.

① **Control**

② **Vitazyme**

③ **Vitazyme + Bio Seed**

Fertilization: unknown

Vitazyme application: (1) 16 oz/acre (1.2 liters/ha) in-furrow at planting; (2) 16 oz/acre (1.2 liters/ha) sprayed on the leaves and soil at mid-bloom (E-M stage)

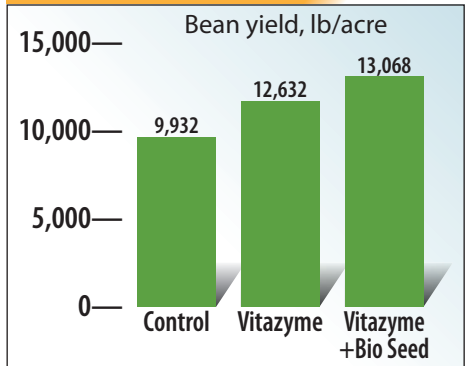
Bio Seed application: 50 grams/acre in-furrow mixed with Vitazyme at planting. Bio Seed is a combination of fungi and bacteria for rhizosphere population.

Yield results: The beans were hand harvested on October 14, on a 2.5 x 5.0 ft area.

Treatment	Yield ¹ lb/acre	Yield change lb/acre
1. Control	9,932 b	—
2. Vitazyme	12,632 a	2,701 (+27%)
3. Vitazyme + Bio Seed	13,068 a	3,136 (+32%)
Standard error	290	

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

Bean Yield



Increase in bean yield with Vitazyme: 27%

Increase in bean yield with Vitazyme + Bio Seed: 32%

Income results:

Treatment	Added income \$/acre	Added cost \$/acre	Added profit \$/acre	Return on investment
1. Vitazyme only	203	21	182	8.67:1
2. Vitazyme + Bio Seed	235	34	201	5.91:1

Conclusions: A small-plot replicated green bean trial in Tennessee proved that Vitazyme, applied at 16 oz/acre (1.2 liters/ha) in-furrow and again at mid-bloom, significantly increased the yield of beans by 2,701 lb/acre (27%). This increase produced an increase in profit of \$182/acre, and a return on investment of \$8.67 for every dollar invested in Vitazyme. By adding Bio Seed to the in-furrow treatment, the yield of beans was increased even more, by 3,136 lb/acre (32%), giving a net profit increase of \$201/acre, and a return on investment of 5.91:1. These results show not only a fine increase in yield and profitability of green bean production using Vitazyme, but also a synergism between Vitazyme and Bio Seed, though the difference between the Vitazyme and Vitazyme + Bio Seed treatments was not significant at P=0.05. These results reveal the great benefit of both products for green bean production.

Cabbage with Vitazyme application (*Brassica oleracea capitata alb*)

—A Synergism Trial with Bio Seed

Researcher: David Holden **Research organization:** Holden Research and Consulting, Camarillo, California

Study directors: Tristan Hudak **Location:** Deardorff Family Farms, Ventura County, Somis, California **Variety:** unknown

Soil test values: pH = 7.5, organic matter = 2.8%, estimated N-release = 85 lb/acre, P1 = 50 ppm, K = 301 ppm, Mg = 621 ppm, Ca = 2,676 ppm, Na = 113 ppm, NO₃-N = 10 ppm, SO₄-S = 21 pm, Zn = 1.4 ppm, Mn = 2 ppm, Fe = 6 ppm, Cu = 1.1 ppm, B = 0.8 ppm, percent base saturations = 3.9% K, 25.9% Mg, 67.7% Ca, 2.5% Na, cation exchange capacity = 19.7 meq/100 g (all analyses performed at A&L Western Agricultural Laboratories, Modesto, California)

Planting date: October 11, 2018 **Plot size:** 10 x 25 ft (250 ft²) **Replications:** 6

Design: randomized complete block design

Experimental design: A small-plot cabbage trial was initiated to evaluate the effect of Vitazyme and Bio Seed on cabbage growth, yield, and profitability.

① Control (Grower Standard) ② Vitazyme + Bio Seed

Fertilization: grower standard

Pest program: grow standard as needed

Vitazyme application: (1) 16 oz/acre (1.3 liters/ha) pre-plant transplant drench; (2) 16 oz/acre (1.3 liters/ha) foliar/soil spray 18 days after planting; (3) 16 oz/acre (1.3 liters/ha) foliar/soil spray 47 days after planting

Bio Seed application: 50 grams/acre as a soil drench at planting. Bio Seed is an array of beneficial bacteria and fungi that populate the root zone of plants.

Plant population results: no significant difference

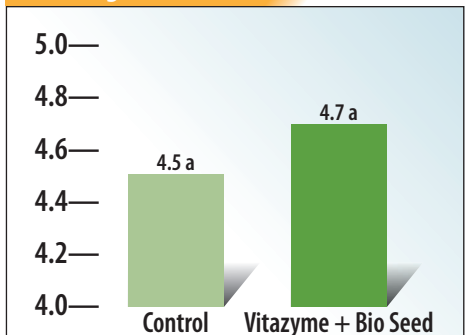
Root, shoot, and whole plant weights: no significant difference

Leaf chlorophyll values: as measured by a Minolta SPAD Meter, no significant difference

Plant vigor: 0 = least vigor, 5 = greatest vigor (see chart to the right)

Yield and income results: The harvest date was January 4, 2019.

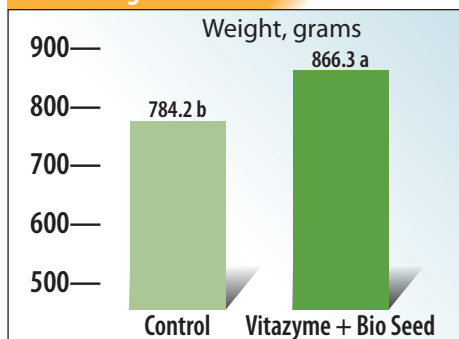
Plant Vigor¹



¹Means followed by the same letter are not significantly different at P = 0.10 according to Duncan's New MRT.

Increase in plant vigor with Vitazyme + Bio Seed: 0.2 point

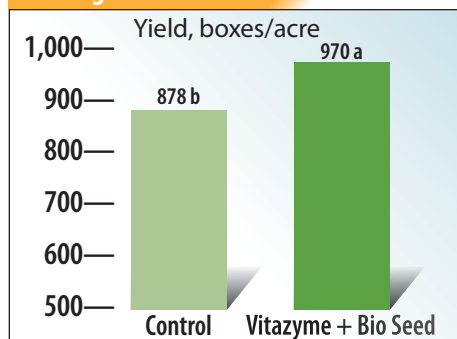
Head Weight¹



¹Means followed by the same letter are not significantly different at P = 0.10 according to Duncan's New MRT.

Increase in head weight with Vitazyme + Bio Seed: 10%

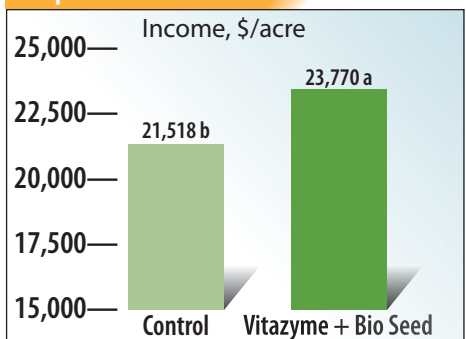
Cabbage Yield¹



¹Means followed by the same letter are not significantly different at P = 0.10 according to Duncan's New MRT.

Increase in cabbage yield with Vitazyme + Bio Seed: 10%

Crop Income¹



¹Means followed by the same letter are not significantly different at P = 0.10 according to Duncan's New MRT.

Increase in income with Vitazyme + Bio Seed: \$2,252/acre

Conclusions: A small-plot cabbage trial in Ventura County, California, in 2018-19, using Vitazyme at planting and twice foliar, plus Bio Seed at planting, caused a significant head weight increase (10%) and yield increase (10%), which provided for an increased income of \$2,252/acre. These results show the marked efficacy of these two complementary products for cabbage production in California.

Carrots with Vitazyme application



Researcher: Carina Rietema

Research organization: SPNA Kollumerwaard, The Netherlands

Location: SPNA Kollumerwaard, The Netherlands

Variety: Nerac

Soil type: clayey

Planting date: May 9, 2017

Experimental design: A carrot field was selected to test a number of seed and foliar products as to their effect on the yield and storability of carrot roots. Vitazyme was one of the products; data from other products was not obtainable.

① Control ② Vitazyme

Fertilization: Unknown

Vitazyme application: 1 liter/ha sprayed on the soil and foliage immediately after planting, and 6, 10, and 14 weeks after planting (May 9, June 22, July 21, and August 17 of 2017)

Results during growth: The visual appearance was compared on September 18.

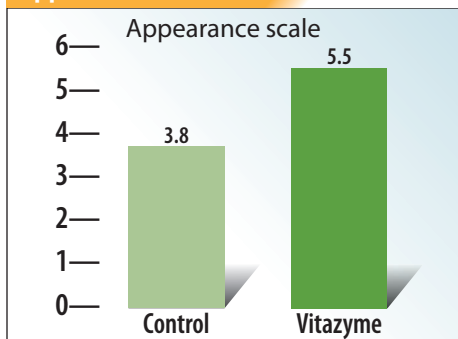


Yield results:

Above: The Vitazyme treated carrots on the right have endured storage conditions and appear to be quite clean and healthy, compared to the control on the left, and another treatment in the center.

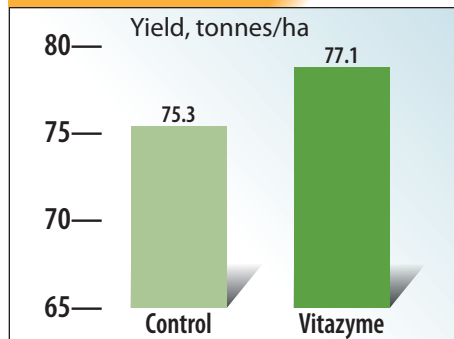
Below: This study in the Netherlands, which began in 2017 and continued through early 2018 to evaluate storage parameters, proved that Vitazyme can substantially reduce carrot storage problems.

Appearance Scale



Improvement in appearance with Vitazyme: 1.7 points

Carrot Yield



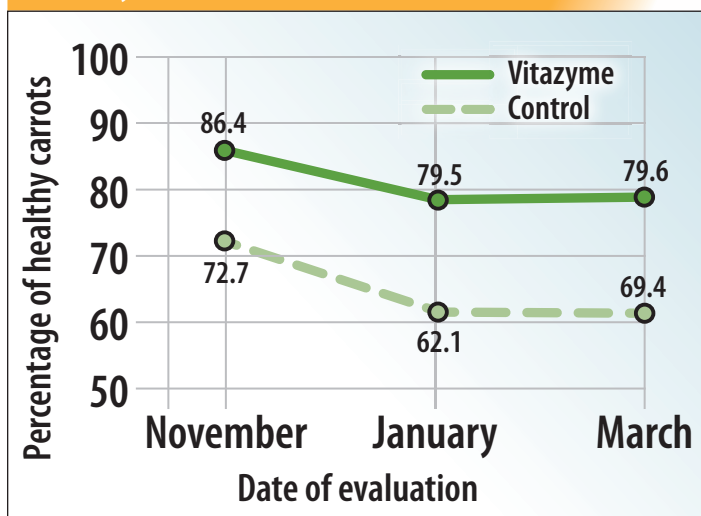
Improvement in carrot yield with Vitazyme: 1.8 tonnes/ha

Increase in healthy carrots with Vitazyme

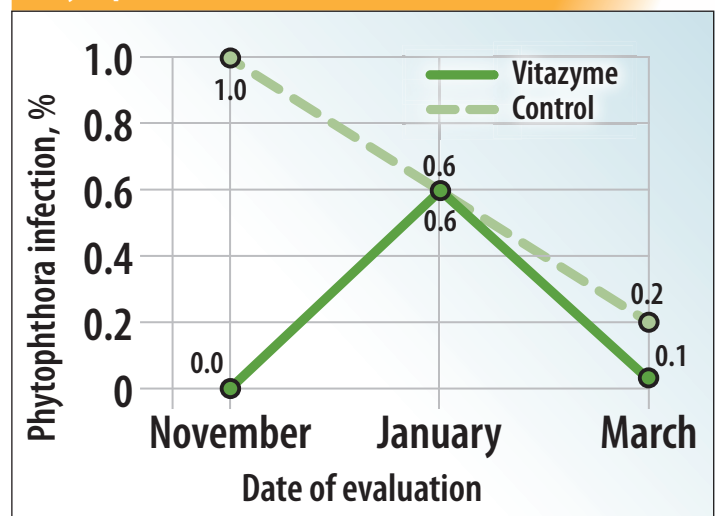
November 19%
January 28%
March 15%

Storage results: These results were determined in late 2017 and early 2018.

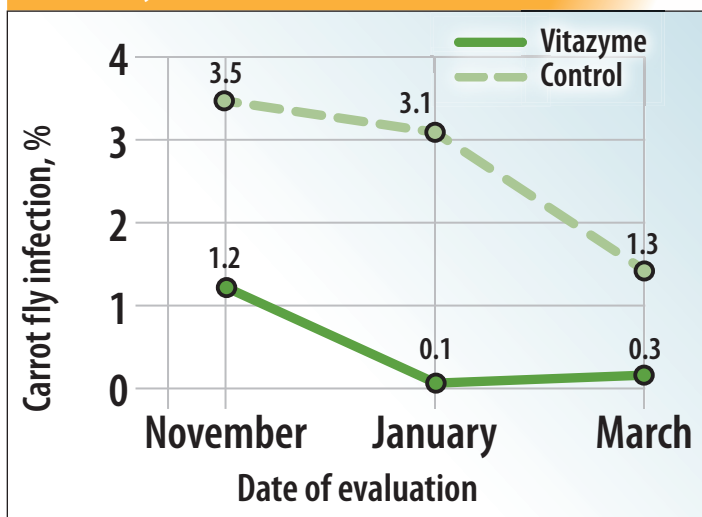
Healthy Carrots



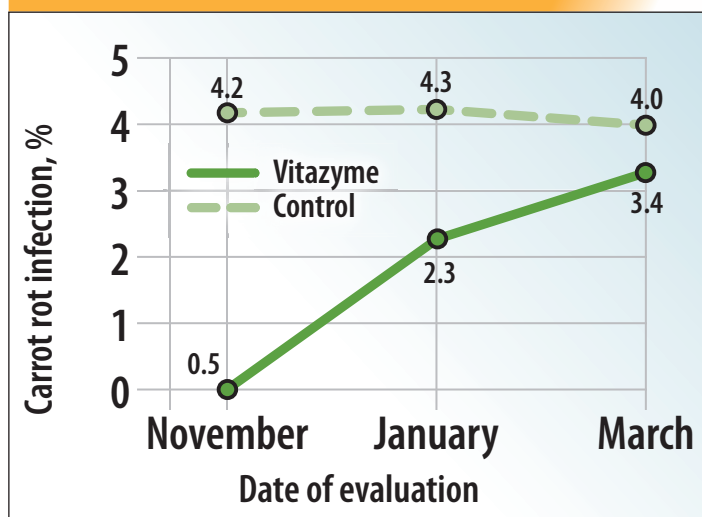
Phytophthora Incidence



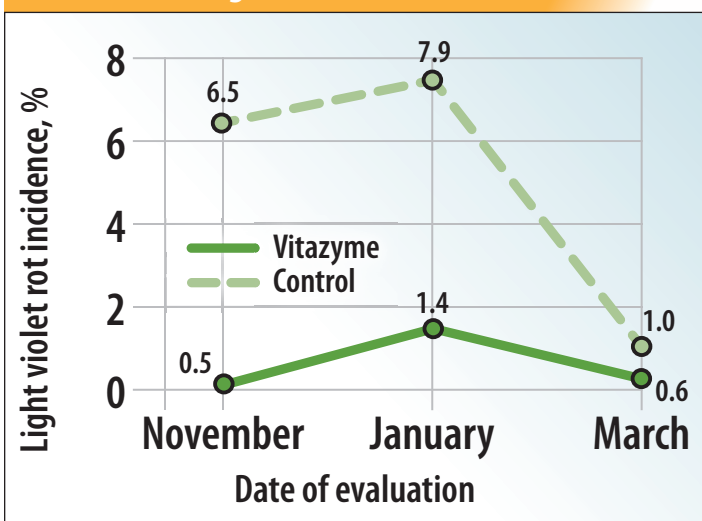
Carrot Fly Incidence



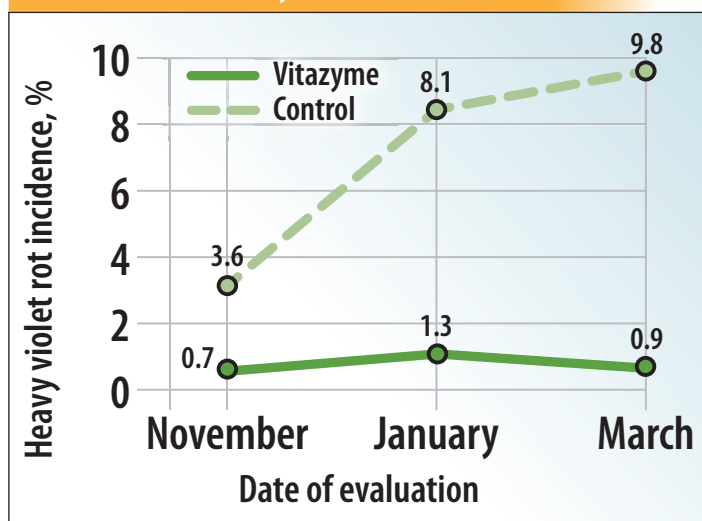
Carrot Rot Incidence



Violet Rot—Light



Violet Rot—Heavy



Reduction in light violet rot with Vitazyme

November	92%
January	82%
March	40%

Reduction in heavy violet rot with Vitazyme

November	81%
January	84%
March	91%

Conclusions: This carrot yield and storage quality study in the Netherlands revealed that four 1 liter/ha applications of Vitazyme, applied from planting to 14 weeks later, improved early growth and resulted in a 1.8 tonne/ha yield increase. Storage parameters were improved with Vitazyme, with substantial increases (15 to 28%) in healthy carrots throughout the 4-month evaluation period. Likewise,

phytophthora, carrot fly, carrot rot, and both light and heavy violet rot incidences were reduced, often greatly with Vitazyme. These results show that carrot growth, yield, and especially storability of carrots can be substantially improved with Vitazyme application, making it a good choice for farmers to use in carrot production.

Chickpeas with Vitazyme application

Researcher: V.V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Biliaivka District, Odessa Region, Maiaky Village, LTD Maiaky, Ukraine

Variety: Iordan

Planting date: April 16, 2018

Previous crop: winter wheat

Soil type: typical chernozem (humus=4.1%)

Planting rate: 600,00 seed/ha

Field preparation: disking to 6-8 cm, plowing to 20-22 cm, cultivation to 4-5 cm

Experimental design: A chickpea field trial was initiated in southern Ukraine by dividing a field into Vitazyme treated and untreated portions, to determine the effect of this product on chickpea yield.

① Control ② Vitazyme

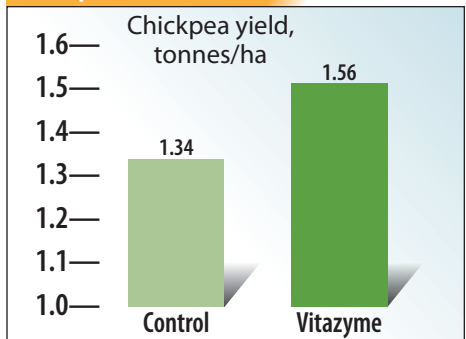
Fertilization: 16-16-16 kg/ha N-P₂O₅-K₂O at planting

Vitazyme application: 1 liter/ha sprayed on the soil on April 14, 2018

Yield results:

Treatment	Yield tonnes/ha	Yield change tonnes/ha
1. Control	1.34	—
2. Vitazyme	1.56	0.22 (+16%)

Chickpea Yield



Increase in chickpea yield with Vitazyme: 16%

Income results: The 0.22 tonne/ha yield increase improved income by \$199/ha.

Conclusions: A chickpea trial in southern Ukraine revealed a 16% yield increase with 1 liter/ha of Vitazyme applied on the soil before planting. This increase was highly profitable, giving the farmer \$199/ha more income, showing the great value of this program.

Corn with Vitazyme application—A Germination Study

Researcher: Steven David

Research organization: Sustainable Farming Solutions, Perth, Western Australia

Location: Western Australia **Variety:** Unknown

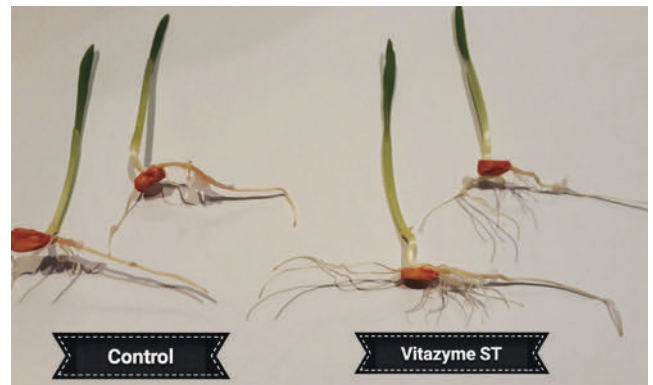
Experimental design: Corn seeds were treated with Vitazyme and compared with an untreated control treatment to determine the effect of this product on germination.

① Control ② Vitazyme

Vitazyme application: The treated seeds were treated on blotter paper with a 5% Vitazyme solution.

Growth results: Root and shoot growth were not measured, but can be clearly seen to be superior with the Vitazyme treatment. Note the accompanying photograph.

Conclusions: A corn seed treatment study with Vitazyme revealed that a 5% solution will dramatically enhance the development of roots and shoots.



Corn seeds treated with a 5% Vitazyme solution show much greater vitality on emergence than the untreated control. Note especially the improved rooting.

Corn with Vitazyme application—A Study on Synergism with WakeUp

Researchers: Steve Schmidt and Bert Schou, Ph.D.

Research organization: ACRES Research, Cedar Falls, Iowa

Location: Denver, Iowa **Variety:** P0 589 AM

Planting date: May 18, 2018 **Planting rate:** 34,600 seeds/acre

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

Plot size(harvested area): 5x60 feet

Soil type: Dickinson fine sandy loam (2% organic matter, 6.3 pH, 9.1 meq/100 grams cation exchange capacity).

Experimental design: A small-plot corn trial, with four replications and six treatments, was prepared in east-central Iowa to evaluate the effect of Vitazyme, applied at different times, on corn yield. An additional treatment was added to evaluate the effect of WakeUp adjuvant as a synergist with Vitazyme. (See table on next page)



A much more massive root system with the Vitazyme seed treatment produced an 8.0 bu/acre yield increase compared to the untreated control.

Treatment	Vitazyme			WakeUp	
	In-furrow	V6	R1	Spring	Summer
	oz/acre	oz/acre	oz/acre	oz/acre	oz/acre
1. Control	0	0	0	0	0
2. Vitazyme in-furrow	13	0	0	0	0
3. Vitazyme foliar/soil V6	0	13	0	0	0
4. Vitazyme foliar R1	0	0	13	0	0
5. Vitazyme foliar/soil V6 + R1	0	13	13	0	0
6. Vitazyme + WakeUp Spring in-furrow + Vitazyme + WakeUp Summer R1	13	0	13	4	4



Ear filling was enhanced considerably by a Vitazyme seed treatment at Denver, Iowa.

Fertilization: 90 lb/acre of N

Vitazyme application: (1) 13 oz/acre in-furrow (treatments 2 and 6); (2) 13 oz/acre to the leaves and soil at V6 on June 13 (Treatments 3 and 5); (3) 13 oz/acre to the leaves at R1 (silking; Treatments 4, 5, and 6).

WakeUp Spring application: 4 oz/acre in-furrow (Treatment 6).

WakeUp Summer application: 4 oz/acre at R1 (silking; Treatment 6)

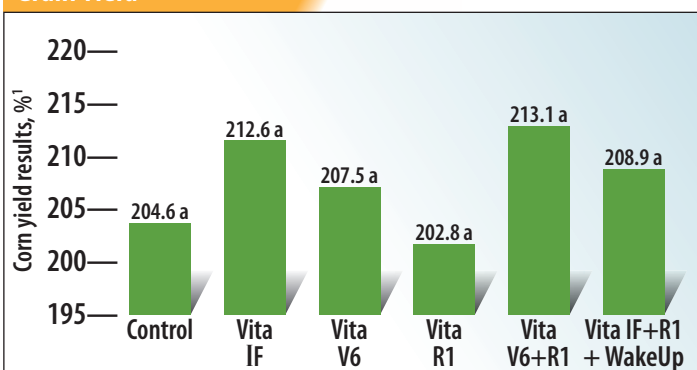
Harvest date: October 17, 2018, using a MF 8 plot combine

Plant population results: The treatments ranged in population from 32,210 to 33,165 plants/acre, and did not differ significantly at $P=0.05$ (F-value = 0.8866 for replicates, and 0.6809 for treatments).

Grain moisture results:

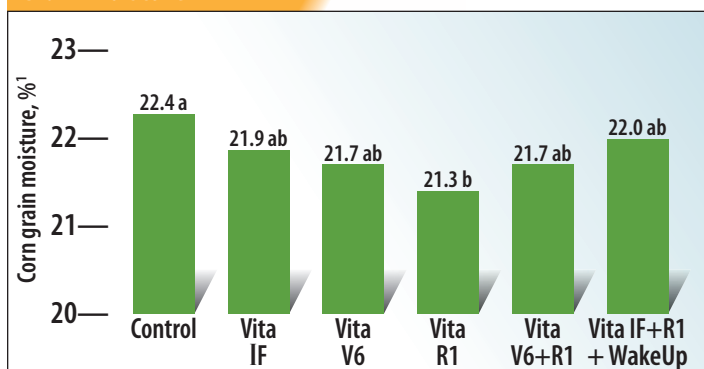
Grain yield results:

Grain Yield



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

Grain Moisture



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

Yield change with Vitazyme and WakeUp

Vitazyme in-furrow + 8.0 bu/acre (+4%)
 Vitazyme at V6 + 2.9 bu/acre (+1%)
 Vitazyme at R1 - 1.8 bu/acre (-1%)
 Vitazyme at V6 + R1 + 8.5 bu/acre (+4%)
 Vitazyme at IF + R1 + 4.3 bu/acre (+2%)
 + WakeUp IF + R1

Decrease in grain moisture at harvest with Vitazyme:
0.5 to 1.3 percentage points

Statistics

LSD ($P=0.05$) 1.12%
 Standard deviation 0.021%
 CV 1.19
 Replicate F 0.946
 Treatment F 0.542

Conclusions: A small-plot research trial in eastern Iowa, using Vitazyme at different times, and together with WakeUp application in one treatment, revealed that corn yield responded to Vitazyme applied in-furrow (+ 4%), and also when applied at V6 and R1 (silking) at 13 oz/acre each time. The WakeUp applications with Vitazyme gave only a 2% yield increase, implying that there was little apparent synergism between the two products, though none of the yield values were significantly different. The R1 application alone gave a slightly negative, insignificant response. This treatment however, gave a slight reduction in grain moisture. These results corroborate the consistent effect of Vitazyme to increase corn grain yields in the United States Corn Belt.

Statistics

LSD ($P=0.05$) 14.1 bu/acre
 Standard deviation ... 10.7 bu/acre
 CV 5.12
 Replicate F 0.350
 Treatment F 0.590

Corn Vitazyme on Corn—A Synergism Study with WakeUp and Environoc 40IC



Researcher: Gilman Farley and Jerry Carlson

Research organization: Biodyne Midwest, Fort Wayne, Indiana, and Renewable Farming, LLC, Cedar Falls, Iowa

Location: eastern Iowa

Variety: unknown

Planting dates: unknown (2017 cropping year)

Experimental design: Eight field areas were treated in 2017 with different treatments, using WakeUp Spring, Vitazyme, and Environoc 40IC in combinations, to determine the yield of corn on an eastern Iowa farm. Two of the field areas were untreated controls. Samples of two to 10 acres were harvested from each of the eight areas and analyzed for yield using a combine monitor.

Product	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8
	----- application in-furrow per acre -----							
1. WakeUp Spring	0	3 oz	3 oz	3 oz	3 oz	3 oz	0	3 oz
2. Vitazyme	0	8 oz	8 oz	8 oz	8 oz	8 oz	0	8 oz
3. Environoc 40IC	0	1 pint	0	1 pint	1 pint	0	0	0

Fertilization: according to soil test results, including chicken litter and gypsum

Vitazyme application: 8 oz/acre in-furrow to Plots 2, 3, 4, 5, 6, and 8.

WakeUp Spring application: This Renewable Farming product, a vegetable oil-based adjuvant, was applied at 3 oz/acre in-furrow to Plots 2, 3, 4, 5, 6, and 8.

Environoc 40IC application: This Biodyne product, containing various bacteria, nitrogen-fixing organisms, and

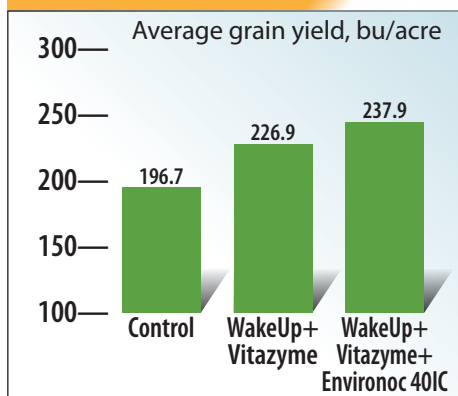
mycorrhizal fungi, was applied at 1 pint/acre in-furrow to Plots 2, 4, and 5.

Harvest date: unknown

Yield results: An 8-row combine with a calibrated yield monitor harvested areas of two to 10 acres of each treated field. The combine yield monitor maps were analyzed by Larry Eekhoff, a professional agronomist, and yield data was extracted from rows near each other to minimize soil effects. Plots having the same treatment are averaged in the table.

Treatment	Plot								Mean	Yield Change
	1	2	3	4	5	6	7	8		
	----- bu/acre -----									
1. Control	201.3	—	—	—	—	—	192.0	—	196.7	—
2. WakeUp Spring + Vitazyme	—	—	228.5	—	—	224.4	—	227.9	226.9	30.2(+15%)
3. WakeUp Spring + Vitazyme + Environoc 40IC	—	229.5	—	253.8	228.2	—	—	—	237.2	40.5(+21%)

Grain Yield



The plot yields for the control and WakeUp Spring + Vitazyme were very consistent, varying only 9.3 bu/acre and 4.1 bu/acre, respectively. Plot 4 of the three products combined yielded 25.6 bu/acre more than the lowest yield plot with that treatment, giving that treatment a 21% increase over the control and 6% more yield than the WakeUp + Vitazyme treatment.

Conclusions: This in-field study in eastern Iowa, comparing in-furrow applications at recommended rates of WakeUp Spring + Vitazyme and WakeUp Spring + Vitazyme + Environoc 40IC with the untreated control, revealed that these two combinations of products provided excellent synergisms for yield increases. These increases were 30.2 (15%) and 40.5 (21%) bu/acre for the respective treatments, revealing that an adjuvant, together with a biostimulant and appropriate microorganisms that fix nitrogen and help make nutrients available to plant roots, worked very well together. The surface tension reducing properties of WakeUp Spring to enhance cell membrane nutrient passage, plus the Environoc 40IC organisms which are triggered by the active agent of the Vitazyme, produced strong evidence of an excellent mutualism in this study. These yield increases were extremely profitable considering the low cost of the inputs, even for a year when grain prices were very low.

Corn with Vitazyme application—Mutualistic Effects with Environoc 401



Researcher: Gilman Farley

Research organization: Biodyne USA, Ft. Wayne, Indiana

Location: eastern Iowa

Variety: Unknown

Experimental design: A corn field was selected to evaluate the effectiveness of Vitazyme, together with Environoc 401, to improve grain yield as compared to an untreated area.

① Control ② Vitazyme + Environoc 401

Fertilization: 4 gal/acre of 6-24-6% N-P₂O₅-K₂O

Vitazyme application: 4 oz/acre (0.3 liter/ha)

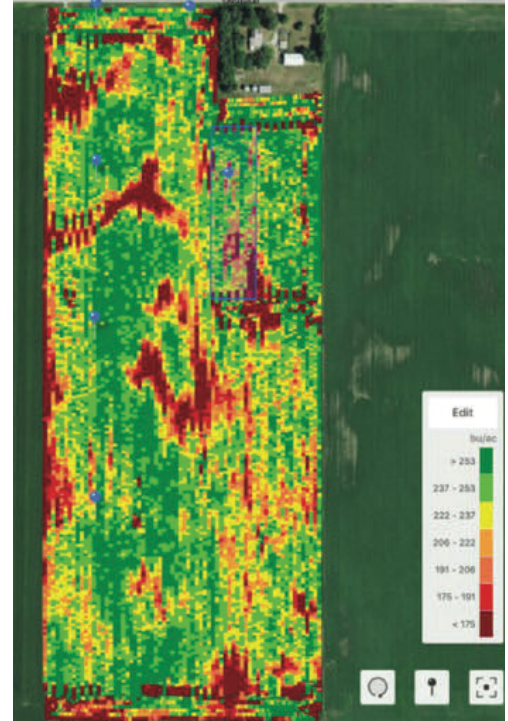
Environoc 401 application: 16 oz/acre in-furrow. Environoc 401 is a selection of beneficial microbes that populate the rhizosphere for increased growth.

Yield results: A combine monitor was used for yield determinations. The moisture content of the corn grain varied within a narrow range; 16.4% to 17.1%. Two side-by-side comparisons were made in the field.

Treatment	Yield bu/acre	Yield change bu/acre
Comparison 1:		
Control	228.8	—
Vitazyme + E 401	252.4	23.6 (+10%)
Comparison 2:		
Control	222.8	—
Vitazyme + E 401	235.9	13.1 (+6%)
Average:		
Control	225.8	—
Vitazyme + E 401	244.2	18.4 (+8%)

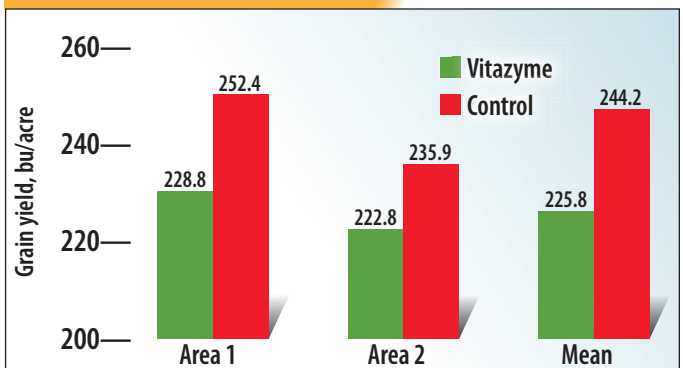
*Overall increase in corn yield
with Vitazyme: 8%*

Conclusions: This on-farm corn yield study in north-central Iowa, using Vitazyme together with Environoc 401 in-furrow at planting, revealed that the yield was markedly improved, by 13.1 to 23.6 bu/acre, averaging 18.4 bu/acre (+8%). This result shows the excellent effectiveness of this program for corn farmers in Iowa.



The Vitazyme + Environoc 401 effects on corn yield can be clearly noted on this combine monitor printout; see the darker green strip on the left half of the field.

Corn Yield



Corn with Vitazyme application—An Evaluation on Effects with Mexican Corn Rootworm



Researcher: Lucino Frias, Eng.

Research organization: Quimica Lucava, S. A., Celeya, Guanajuato, Mexico

Farmer: Octavio Solorzano

Location: Estipac, Jalisco, Mexico

Variety: Pioneer

Planting date: June 15, 2018

Experimental design: A 1 hectare area of a corn field was treated with Vitazyme, and compared with the adjoining untreated control area to evaluate the effect of this product on the damage caused by the Mexican corn rootworm (*Diabrotica virgifera zea*) on plant growth and yield.

① Control ② Vitazyme

Fertilization: unknown

Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 6-leaf stage, 25 days after planting (July 10, 2018)

Growth and yield results:

Nine Days After Application (July 19)

Note more abundant healthier roots with Vitazyme.



The roots of the Vitazyme treated corn on the right reveal superior growth compared to the untreated control on the left.

Twenty Days After Application (July 30)

The stem diameter is greater, the height is greater, and the plants are more vigorous with Vitazyme.



Notice how much more growthy is the treated corn on the right, which displays more leaves, thicker stalks, and a darker green color due to more chlorophyll.

Fifty-Seven Days After Application (September 5)

There was damage present by Mexican corn rootworm (*Diabrotica virgifera zea*), which was causing much plant lodging. However, plants treated with Vitazyme, because of their greater root development, recovered better.



Rootworm-damaged corn treated with Vitazyme has more aggressively turned upwards to regain its stature, compared to the untreated control plant.

Eighty-Five Days After Application (October 3)

It was observed that, even with the *Diabrotica* (Mexican corn rootworm) and lodging issues, plants and ears from the Vitazyme-treated area had better filling, better size and better weight, than the untreated control.

The Day Before Harvest

At this time, three samples of representative ears were collected from each treatment and weighed as-is.

Vitazyme

Weight: 392 grams



401 grams



371 grams



Untreated Control

Weight: 268 grams



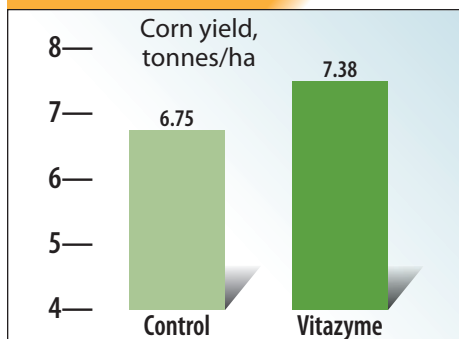
321 grams



314 grams

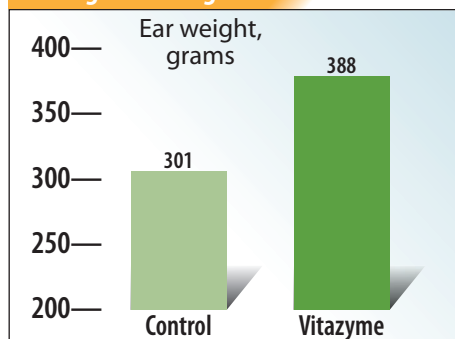


Corn Yield



Increase in yield with Vitazyme: 9%

Average Ear Weight



Increase in ear weight with Vitazyme: 29%

Conclusions:

- Vitazyme treated plants showed healthier and more abundant roots, thicker stems, and taller and more vigorous plants than the untreated control.
- Vitazyme treated plants rebounded stronger from lodging caused by the attack of Mexican corn rootworm (*Diabrotica virgifera zea*), in comparison with the untreated control.
- Plants and ears from the area treated with Vitazyme had better filling, better size, and 29% greater ear weight than those of the untreated control.
- Vitazyme caused a 9% yield increase (0.63 tonne/ha) with only a single 1 liter/ha foliar spray.

Income Results: At \$0.20/kg of grain, Vitazyme produced \$123/ha greater income.

Corn with Vitazyme application

Researcher: Gustavo Figueroa Ramirez

Location: Cofradia de Lepe, Municipality of Atengo, El Fresno Ranch, Jalisco, Mexico **Variety:** Unknown **Planting date:** June 28, 2018

Experimental design: A 4-hectare portion of a corn field was treated with two different Vitazyme application regimes to evaluate the effect of the product on corn growth and yield in a field setting.

① Control ② Vitazyme

Fertilization: unknown

Vitazyme application: (1) Seed treatment on June 28 of 0.25 liter of Vitazyme in 0.25 liter of water (50% solution) to coat seeds for 1 hectare; (2) 1 liter/ha sprayed by backpack sprayer at the 6-leaf stage; (3) 1 liter/ha sprayed by backpack sprayer at the 9-leaf stage. One small area received only treatment (3).

Growth observations: It was noted that the Vitazyme treated plants were much taller and had more leaf area than the control plants, with larger ears and considerably greater root development.



The Vitazyme treated corn displays excellent ear development, with filling to the tip and large kernels, giving a 35% greater yield than the control.

Preliminary Yield Results			
	Control	Vitazyme	Change
Complete plant weight, kg	1.02	2.72	+1.70 (+167%)
Ear weight with husk, grams	340	530	+190 (+56%)
Ear weight without husk, grams	250	350	+100 (+40%)



Plant height and leaf growth were enhanced greatly in this Mexican corn trial.

Conclusions: This Mexican corn study, using a seed treatment and two foliar treatments of Vitazyme, showed remarkable responses in terms of plant size and ear weight. Harvest is expected in January of 2019, at which time yield data will be available.

Corn with Vitazyme application

Researcher: James Anderson

Research organization: J & H Distributing, Belgrade, Minnesota

Location: Pederson Farms, Spicer, Minnesota

Variety: P9929AMXT and DCK 45-65

Planting date: unknown

Soil type: silty clay loam

Experimental design: A corn field of 132.2 acres was treated in part (89.3 acres) with Vitazyme in-furrow, to determine the effect of the product on corn yield.

① Control ② Vitazyme

Fertilization: unknown

Vitazyme application: 13 oz/acre (1 liter/ha) in-furrow at planting

Crop season weather: a cold and late spring, with a summer of average temperatures and above-average rainfall

Treatment	Yield bu/acre	Yield change bu/acre
1. Control	200.9	—
2. Vitazyme	208.6	7.7 (+4%)

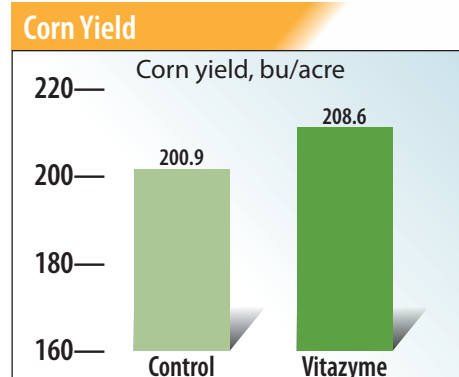


The Vitazyme seed treated plants are larger with considerably better developed root systems.



More full kernel development of the Vitazyme treated plants resulted in a higher yield of 8 bu/acre, a highly profitable application despite low corn prices.

Yield results: Both the control and treated grain were harvested at 22% moisture. A combine monitor was used to record yields.



Conclusions: An on-farm corn trial in central Minnesota proved that Vitazyme, applied in-furrow at 13 oz/acre (1 liter/ha) increased the grain yield by 7.7 bu/acre (4%), showing the high profitability of this amendment for corn farmers in the northern Corn Belt.

Increase in corn yield with Vitazyme: 4%

Corn with Vitazyme application

Researcher: David Clay Ph. D., and Graig Reicks

Research institution: Department of Plant Sciences, South Dakota State University, Brookings, South Dakota

Location: South Dakota State University, Field Research Facility, Aurora, South Dakota

Variety: DKC 47-47

Planting date: May 15, 2018

Planting rate: 30,750 seeds/acre

Planting depth: 2 inches

Row spacing: 30 inches

Soil type: Brandt silty clay loam

Experimental design: A replicated, randomized complete block design, with four replications, was set up in a small-plot corn trial, plots being six rows wide (15 feet) and 20 feet long. At harvest, 20 feet of the two middle rows were machine-harvested with a plot combine. Three nitrogen rates and three different times of application were utilized. Grain yield was measured, and nitrogen efficiency and water efficiency were to be determined through ¹⁵N and ¹³C analyses.

Vitazyme application	Nitrogen rate, lb/acre		
	0	75	125
	Treatment number		
Control	1	2	3
Seed only	4	5	6
Foliar V6 only	7	8	9
Seed + Foliar V6	10	11	12
Seed + Foliar R1	13	14	15

Fertilization: Nitrogen fertilizer was applied by hand as urea (46%N) to appropriate plots on June 1, when the corn was in the V1/V2 (one to two-leaf) stage.

Vitazyme application: Seed treatment (at planting on May 15): 156 ml of Vitazyme per 12.3 lb of seed, or 8 oz/acre sprayed on the seeds and mixed by hand in totes. **Foliar treatment** (on June 22 at V6, and on July 27 at R1): 13 oz/acre using a 15 gal/acre spray solution with a non-ionic surfactant (0.25%) and a backpack sprayer.

Harvest date: unknown



Vitazyme on the seeds, as well as on the leaves, produced better filled ears with larger kernels, as can be seen in this 2018 nitrogen efficiency study.



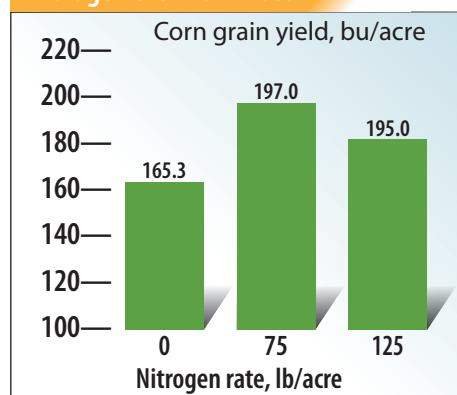
Notice the excellent root development with Vitazyme application at 75 lb/acre of nitrogen. This has led to better ear filling, as seen in the other photo.

Yield results:

Nitrogen Fertilizer Effect			
Vitazyme	N rate	Grain yield ¹	Yield change ²
	lb/acre	bu/acre	bu/acre
1. None	0	153 e	—
2. None	75	197 a	+ 44 (+29%)
3. None	125	195 ab	+ 42 (+27%)
4. Seed	0	170 cde	—
5. Seed	75	194 ab	+ 24 (+14%)
6. Seed	125	200 a	+ 30 (+18%)
7. Foliar V6	0	171 bcde	—
8. Foliar V6	75	197 a	+ 26 (+15%)
9. Foliar V6	125	190 abcd	+ 19 (+11%)
10. Seed + Foliar V6	0	167 de	—
11. Seed + Foliar V6	75	199 a	+ 32 (+19%)
12. Seed + Foliar V6	125	197 a	+ 30 (+18%)
13. Seed + Foliar R1	0	—	—
14. Seed + Foliar R1	75	198 a	n.a. ³
15. Seed + Foliar R1	125	193 abc	n.a. ³

¹Means followed by the same letter are not significantly different at P=0.05. ²Change vs. the O-N rate for that Vitazyme treatment. ³Data is not available.

Average Fertilizer Effect¹

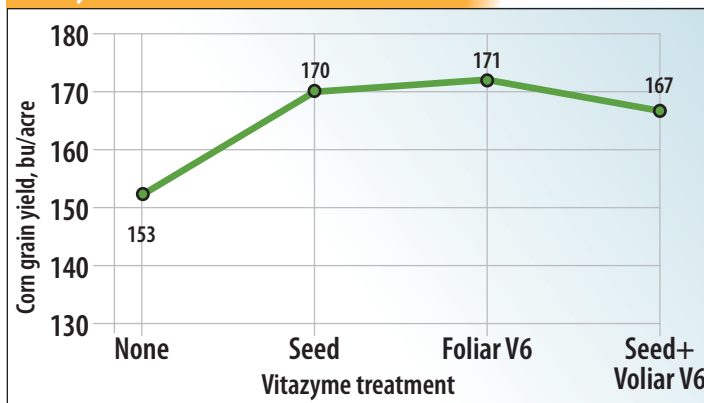


¹Averaged over all Vitazyme treatments.

Increase in yield with 75 lb/acre N:
31.7 bu/acre (+19%)

Increase in yield with 125 lb/acre N:
29.7 bu/acre (+18%)

Vitazyme Effects at 0 N



Vitazyme Treatment	Grain yield bu/acre	Yield change bu/acre
None	153	—
Seed	170	17 (+11%)
Foliar V6	171	18 (+12%)
Seed + Foliar V6	167	14 (+9%)

Increase in yield with seed treatment: 11%

Increase in yield with foliar treatment at V6: 12%

Increase in yield with seed + foliar treatment at V6: 9%

Vitazyme effects at the 75 and 125 lb/acre N rates were not significant, likely because the corn crop had reached its maximum yield potential at about 195 to 200 bu/acre.

Conclusions: This South Dakota State University corn study, using three nitrogen fertilizer rates, plus four Vitazyme application regimes, revealed that, with no added nitrogen, Vitazyme elevated the grain yield by 9 to 12% above the untreated control, by amounts of 14 to 18 bu/acre. At nitrogen rates of 75 and 125 lb/acre, however, the yields of all treatments were similar, varying from 190 to 200 bu/acre, so Vitazyme effects were not detected because the maximum yield potential had been reached even at 75 lb of N/acre. This medium application rate outyielded the high nitrogen rate by 2 bu/acre. It would have been proper during this trial to have utilized lower fertilizer nitrogen rates, such as 25 and 50 lb/acre, to evaluate fertilizer efficiency effects of Vitazyme at these lower rates.

Evaluations of nitrogen and water efficiency will be conducted on these 15 treatments during the coming months, and will be reported in upcoming data summaries.

Vitazyme Field Tests for 2018

Corn with Vitazyme application



Researcher: E. Bruce Kirksey, Ph. D.

Research organization: Agricenter International, Memphis, Tennessee

Location: Memphis, Tennessee

Variety: DK 65-19

Soil type: Falaya clay loam; good fertility and drainage; pH=6.4

Row spacing: 30 in

Plant population: 32,000 seeds/acre

Planting date: May 14, 2018

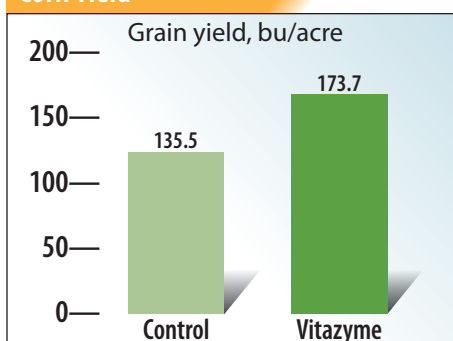
Experimental design: A small-plot replicated field corn trial was prepared using two Vitazyme applications, to determine the yield and profitability of this program compared to the untreated control. Four replications of plots 10 x 30 ft were used.

Yield results: The corn grain from each plot was shelled and weighed on September 14, using an Almaco plot combine. Two rows 25 ft long were harvested.

Treatment	Yield ¹ bu/acre	Yield change bu/acre
Control	135.5 b	—
Vitazyme	173.7 a	38.2 (+28%)
Standard error	4.1	

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

Corn Yield



Increase in corn grain with Vitazyme: 38.2 bu/acre (+28%)

① Control ② Vitazyme

Fertilization: unknown

Vitazyme application: (1) 13 oz/acre (1 liter/ha) in-furrow at planting; (2) 13 oz/acre (1 liter/ha) sprayed on the leaves and soil at V6

Income results:

Income results

Added income from the two applications... \$143/acre
Added costs..... \$17/acre
Net profit \$126/acre
Return on investment 7.41:1

Conclusion: A small-plot replicated corn trial in Tennessee revealed a dramatic increase in shelled corn yield with in-furrow and foliar(V6) Vitazyme applications. The yield increase was 38.2 bu/acre above the untreated control treatment, or 28% more. This increase netted \$128/acre more income, or a return on investment of 7.41:1. This increase, if extrapolated to a 1,000-acre corn farming operation, would give the farmer \$126,000 more profit, from product costing him only about \$17,000.

Corn with Vitazyme application

Researcher: V. V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Drabiv District, Cherkasy Region, Novomykolaivka Village, Private Enterprise Opal, Ukraine

Variety: ES Sensor, FAO 370

Planting date: April 30, 2018

Previous crop: winter wheat

Soil type: typical chernozem (humus = 4.1%)

Planting rate: 70,000 seeds/ha

Field preparation: disking to 6-8 cm, plowing to 22-24 cm, cultivation to 5-6 cm

Experimental design: A corn field was treated in part with two applications of Vitazyme, and compared with the untreated portion of the field, to evaluate the effect of the product on the yield and profitability of corn grain.

① Control ② Vitazyme

Fertilization: 123-30 kg/ha of N-P₂O₅ at planting; 10-26-26 kg/ha of N-P₂O₅-K₂O at planting

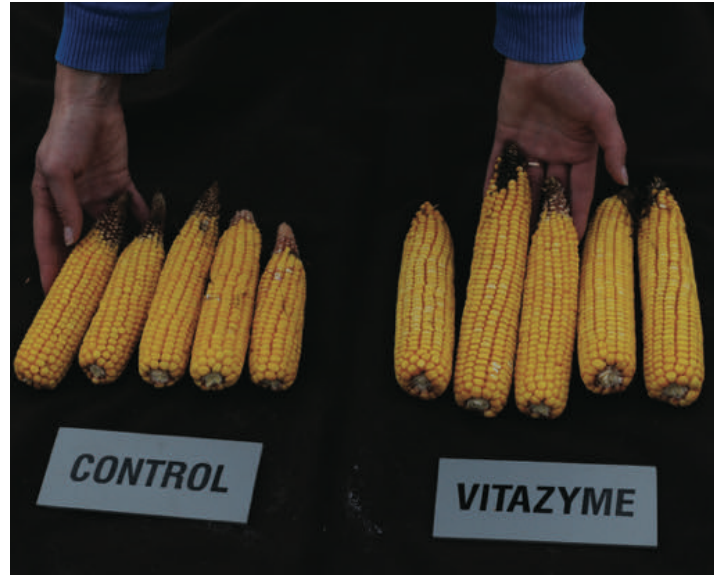
Vitazyme application: (1) 1 liter/ha sprayed on the soil pre-plant on April 27; (2) 0.5 liter/ha sprayed on the leaves and soil at the 7 to 8-leaf stage on May 30

Yield results:

Treatment	Yield tonnes/ha	Yield change tonnes/ha
Control	11.2	—
Vitazyme	12.8	1.6 (+14%)

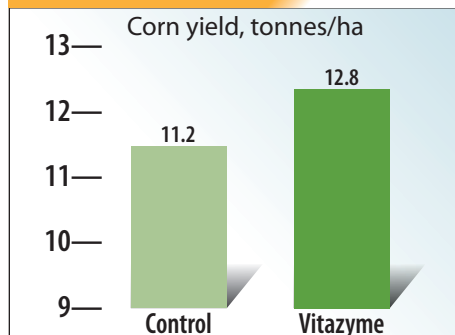
¹Means followed by the same letter are not significantly different at P=0.05.

**Increase in grain yield
with Vitazyme: 14%**



Corn produced using Vitazyme shows better filling and ear size as a result of superior nutrient uptake by an enlarged root system and activated rhizosphere.

Corn Yield



Income results: An extra yield of 1.6 tonnes/ha produced an income increase of \$281/ha.

Conclusion: This Ukrainian corn trial, using 1 liter/ha and 0.5 liter/ha sprays pre-plant and at the 7 to 8-leaf stage, respectively, resulted in an excellent 14% yield increase, which brought \$281/ha more income. This program is highly effective for corn producers in Ukraine.

Cotton with Vitazyme application—2018 Crop Results

Researcher: Pius Elobu, James Roland Ocan, Paul Ogabe, and John Olinga

Research organization: National Semi-Arid Resources Research Institute (NaSARRI) - Serere, Soroti-Uganda

Varieties: BPA 2002 (2015/2016 and 2016/2017 trials) and MS-2 (2017/2018 trial)

Experimental design: Three sets of replicated (four replications) cotton trials at several locations on consecutive years were conducted to evaluate the effects of Vitazyme on the yield, growth characteristics, and quality of cotton, using different application rates for the seeds and leaves. Each year of trials will be discussed in order.

Fertilization: unknown **Planting rate:** unknown

Vitazyme applications:

- **Seed treatments:** Concentrations of 0, 2.5, 5.0, and 10.0% Vitazyme were prepared using 25, 50, and 100 ml of product in 1.0 liter of water, and 5 kg of seed per liter of solution were soaked overnight and planted the next day. Seed for the 0% treatment was also soaked overnight.
- **Foliar treatments:** Rates of 0.5, 1.0, and 1.5 liters/ha were sprayed to some treatments at full bloom and 30 days later.

Treatment	Seed type	Seed Treatment	Foliar Treatment
1	Commercial	2.5%	—
2	Commercial	2.5%	0.5 liter/ha
3	Undelinted	2.5%	0.5 liter/ha
4	Commercial	5.0%	—
5	Commercial	5.0%	1.0 liter/ha
6	Undelinted	5.0%	1.0 liter/ha
7	Commercial	10.0%	—
8	Commercial	10.0%	1.5 liter/ha
9	Undelinted	10.0%	1.5 liter/ha
10	Undelinted	—	—
11	Commercial	—	—

2015/2016 Trials

Location: National Semi-Arid Resources Research Institute

Soil trials: unknown **Planting dates:** May 2015, August 2015

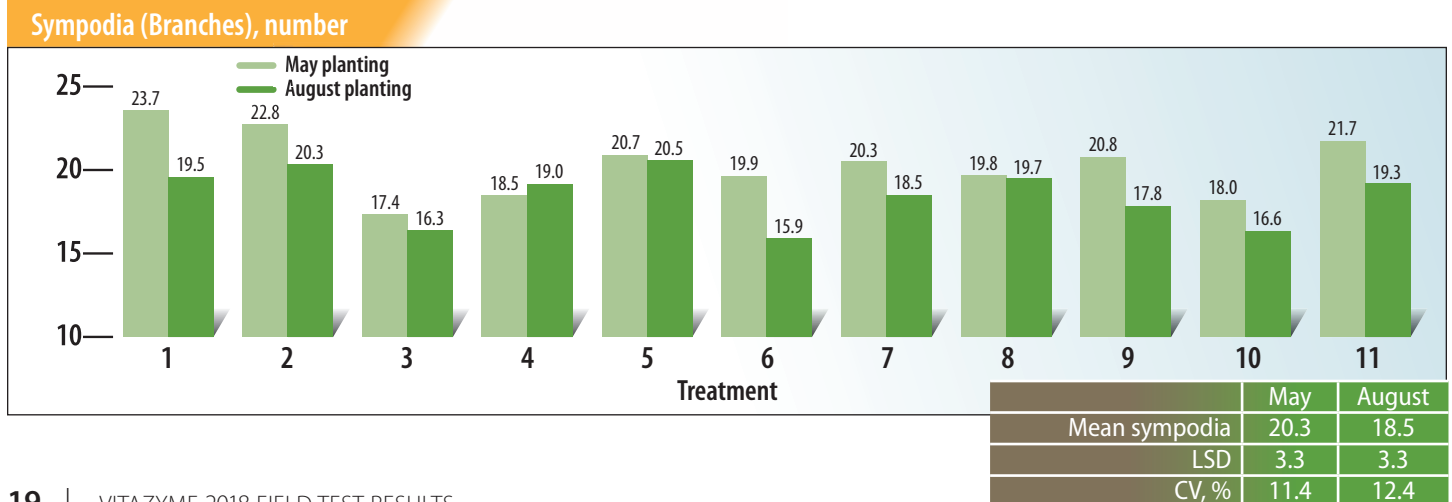
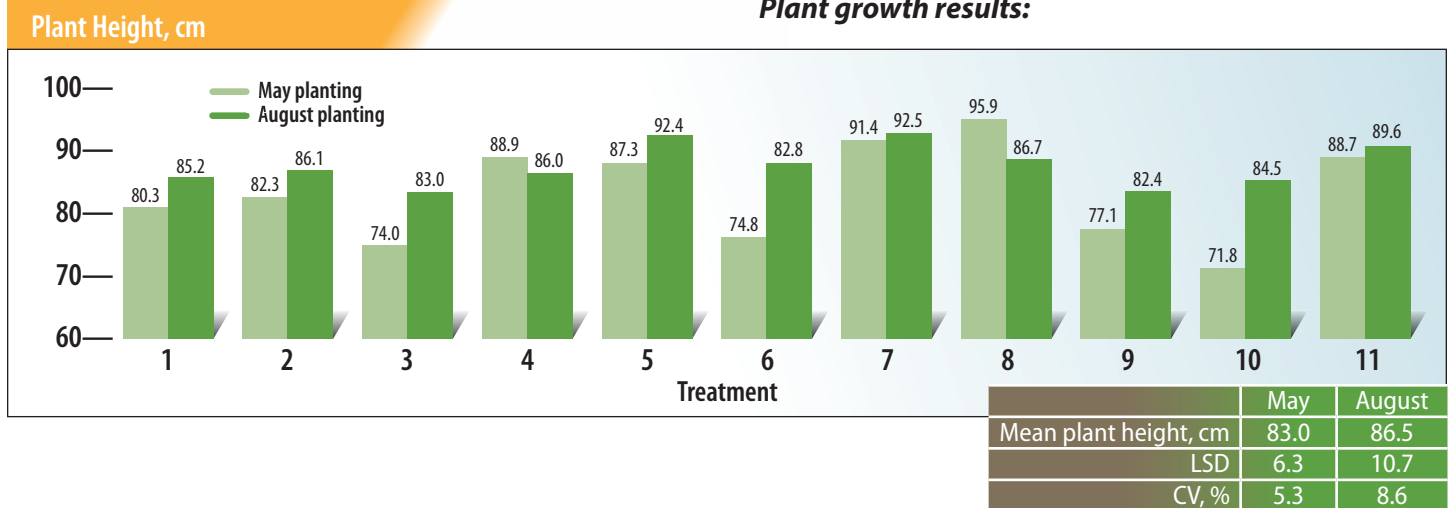
Plot size: 5.25 x 4.2 m

Row spacing: 75 cm between rows, 30 cm in rows (eight rows)

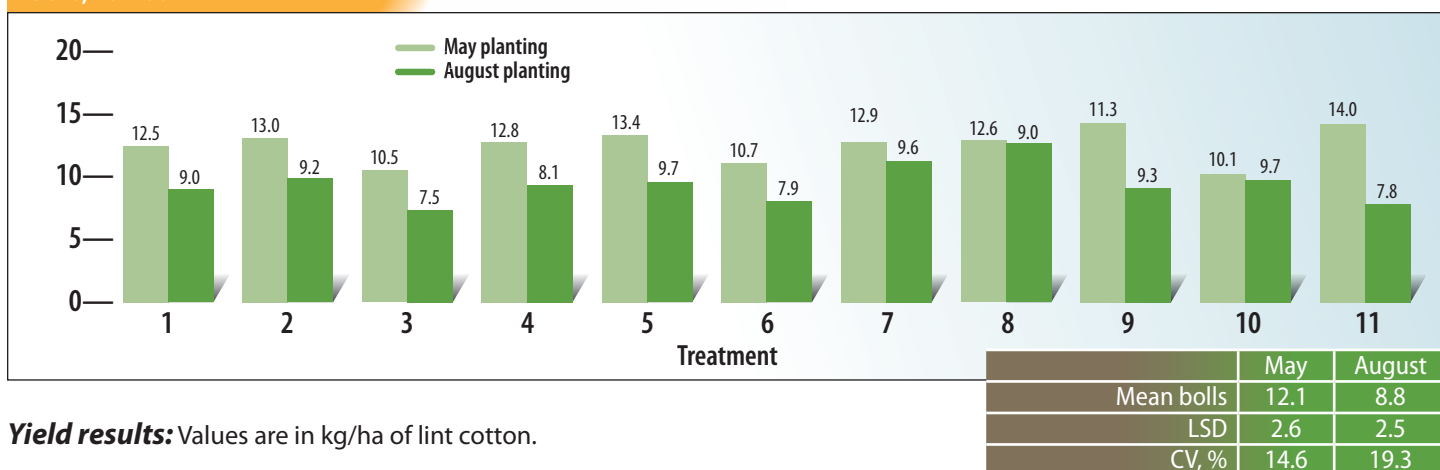
Harvested plots: inner six rows

Seed lots: (1) Delinted commercial seed dressed with bronopol fungicide. (2) Undelinted seed locally ginned with no seed dressing

Plant growth results:

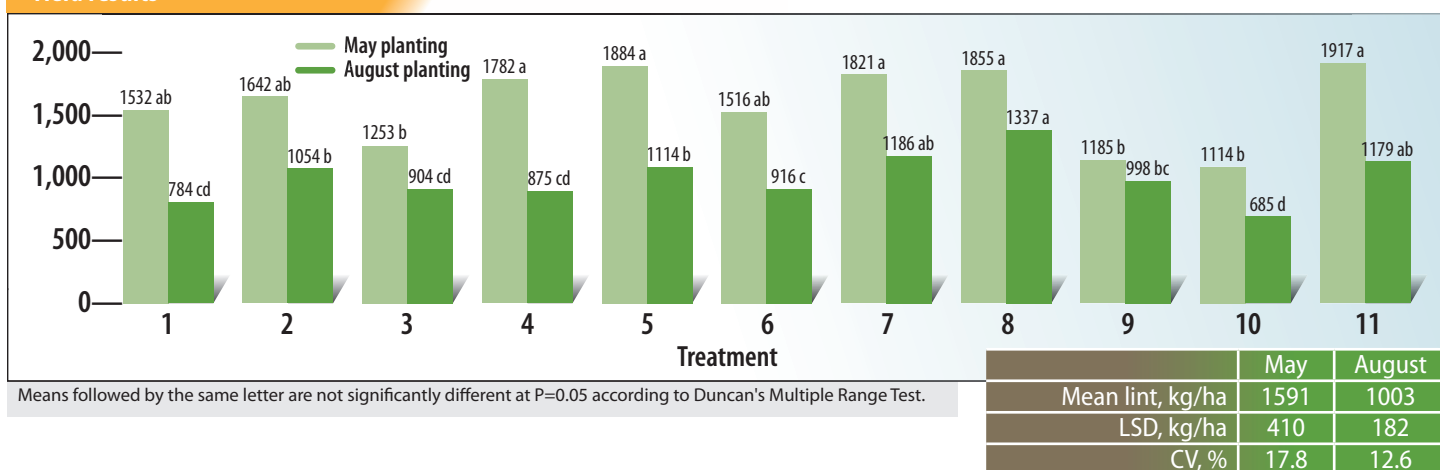


Bolls, number



Yield results: Values are in kg/ha of lint cotton.

Yield results

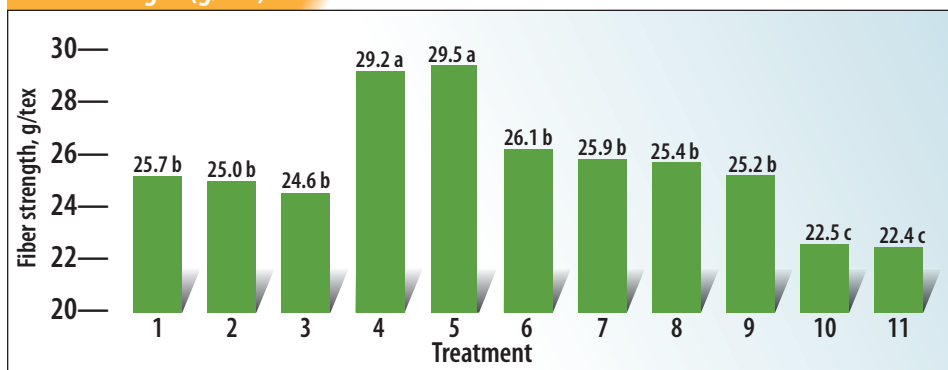


Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.

Preliminary conclusion from 2015/2016 trials and recommendations for 2016/2017 season: Results showed that there was a yield benefit when Vitazyme is used in cotton. The yield advantage comes only when compared to non-commercial cotton seed. No yield advantage was realized when Vitazyme treatments are compared with commercial controls. Provisionally, seed treatment with 5% or 10% solutions were consistently superior in the two planting periods at NaSARRI. There is need to verify these results for at least one more season and in another environment to give more authentic conclusions. There is also need to investigate the performance of Vitazyme when applied to some other crops which are grown in these areas of marginal soil fertility under semi-arid conditions.

Lint quality results: These results are for the August planting only.

Fiber Strength (g/tex)

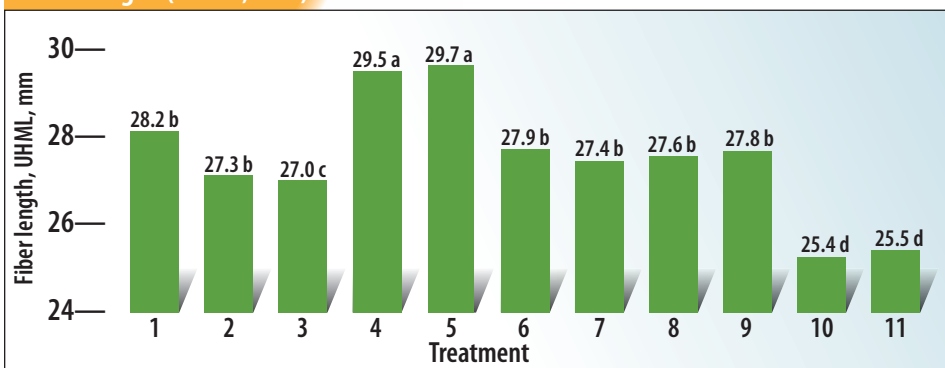


Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.

Fiber strength statistics

Strength, g/tex 25.6
 F - value <0.001
 LSD, g/tex..... 2.1
 CV, % 5.6

Fiber Length (UHML, mm)



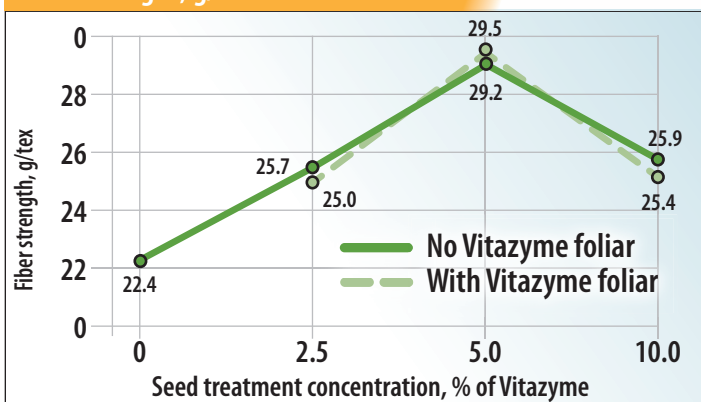
Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.

Fiber length statistics

Length, mm 27.6
 F - value <0.001
 LSD, mm 1.2
 CV, % 3.0

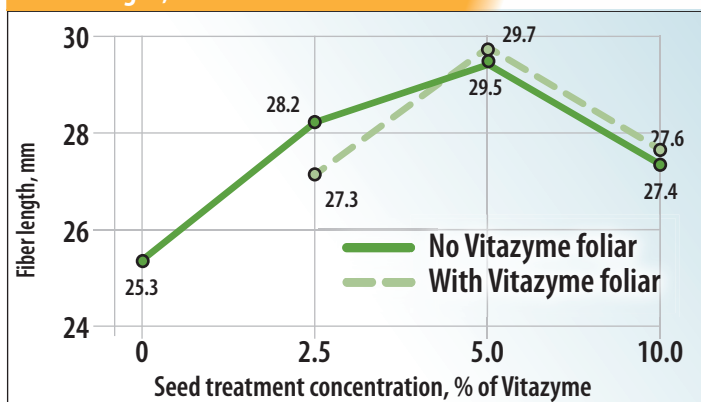
Vitazyme Effects on Cotton Lint Quality (August planting)

Fiber Strength, g/tex



Mean strength 25.6 g/tex
 LSD (0.05) 2.1 g/tex
 CV 5.6%

Fiber Length, mm



Mean length 27.6 g/tex
 LSD (0.05) 1.2 g/tex
 CV 3.0%

2016/2017 Trials

Location: National Semi-Arid
Resources Research Institute

Soil traits: unknown

Planting dates: July 2016, August
2016

Plot size: 5.2 x 4.2 m

Row spacing: 75 cm between rows, 30
cm in rows (eight rows)

Harvested plots: inner six rows

Seed lots: (1) Delinted commercial
seed dressed with bronopol fungicide;
(2) Undelinted seed locally ginned
with no seed dressing

Fertilization: unknown

Planting rate: unknown

Variety: BPA 2002

Vitazyme applications:

• Seed treatments:

Concentrations of 0, 5, and
10% Vitazyme were prepared
using 50 and 100 ml of product
in 1.0 liter of water, and 5 kg of
seed per liter of solution were
soaked overnight and planted
the next day. Seed for the 0%
treatment was also soaked
overnight.

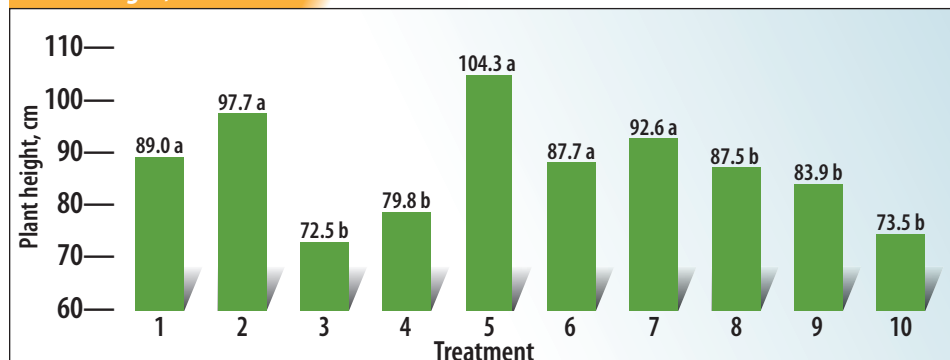
• **Foliar treatments:** 1 liter/ha of
Vitazyme was sprayed to some
treatments at full bloom and 30
days later.

Treatment	Seed type	Seed Treatment	Foliar Treatment
1	Commercial	5%	—
2	Commercial	5%	1 liter/ha
3	Undelinted	5%	—
4	Undelinted	5%	1 liter/ha
5	Commercial	10%	—
6	Commercial	10%	1 liter/ha
7	Undelinted	10%	—
8	Undelinted	10%	1 liter/ha
9	Commercial	—	—
10	Undelinted	—	—

Statistical analyses: Because the data from both plantings were similar, they were combined in the analysis of variance.

Plant growth results:

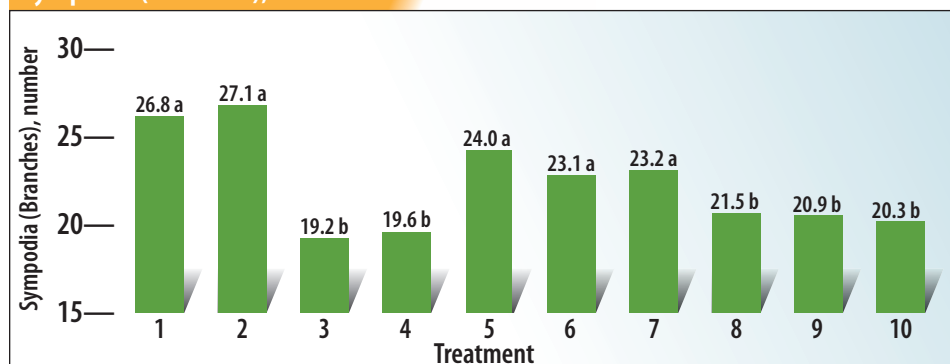
Plant Height, cm



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

Mean height 87.0 cm
LSD 17.8 cm
CV.....20.4%

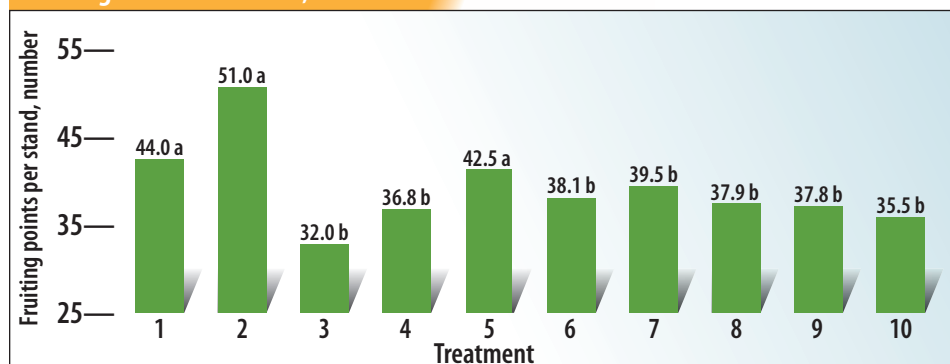
Sympodia (Branches), number



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

Mean sympodia 22.5 cm
LSD 5.2 cm
CV.....23.1%

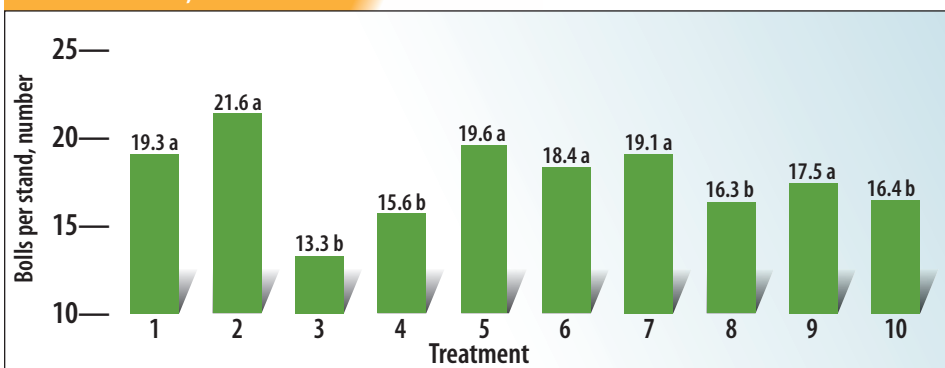
Fruiting Points Per Stand, number



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

Mean height 39.5
LSD 10.3
CV.....26.0%

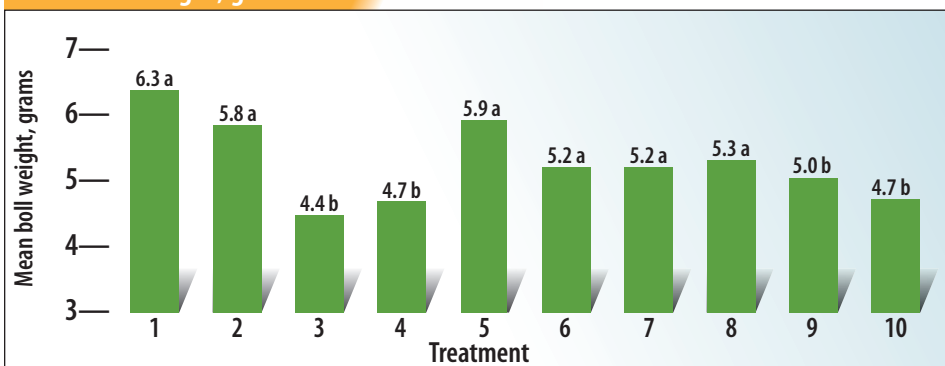
Bolls Per Stand, number



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

Mean bolls per stand 17.7
LSD 4.4
CV.....24.5%

Mean Boll Weight, grams



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

Mean boll weight 5.3 grams
LSD (0.05) 1.2 grams
CV.....23.5%

Lint yield results:

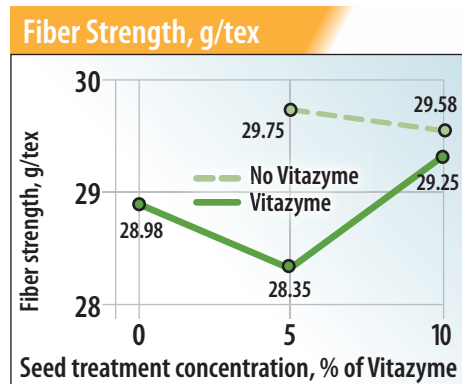
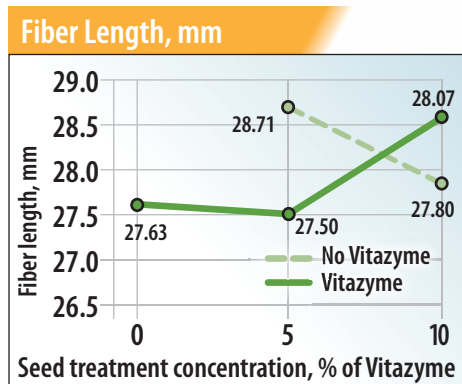
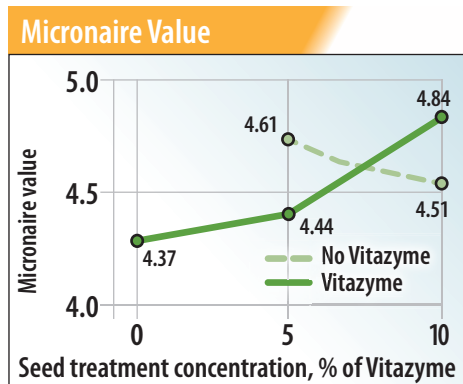
Treatment	Lint yield		Change from control*	
	kg/ha	kg/ha	kg/ha	%
1. Commercial, 5% seed	2,656.6 a	+473.7		+22
2. Commercial, 5% seed + foliar	3,236.8 a	+1,053.9		+48
3. Undelinted, 5% seed	1,652.3 c	- 434.9		-21
4. Undelinted, 5% seed + foliar	1,953.1 b	-134.1		-6
5. Commercial, 10% seed	2,514.8 b	+331.9		+15
6. Commercial, 10% seed + foliar	2,327.7 b	+144.8		+7
7. Undelinted, 10% seed	2,419.7 b	+332.5		+16
8. Undelinted, 10% seed + foliar	2,427.2 b	+340.0		+16
9. Commercial	2,182.9 b	—		—
10. Undelinted	2,087.2 b	—		—
Mean	2,345.8			
LSD (0.05)	638.71			
CV	27.2%			

*The commercial seed untreated treatment (9) was used as the control for Treatments 1, 2, 5, and 6, while the undelinted treatment was used as the control for Treatments 3, 4, 7, and 8.

Average Vitazyme yield increase
with commercial seeds: 23%

Average Vitazyme yield increase
with undelinted seeds: 3%

Lint quality results:



Mean micronaire4.54
LSD (0.05)0.46
CV.....7.0%

Mean fiber length28.33 mm
LSD (0.05)1.47 mm
CV.....3.6%

Mean fiber strength... 29.35 g/tex
LSD (0.05)2.87 g/tex
CV.....6.7%

2017/2018 Trials

Locations: National Semi-Arid Resources Research Institute, and farmer or company fields at Torora, Kaliso, Serere, Lira, Kiryandonga, and Arua Districts

Soil traits: In the 0 to 15 cm horizon, pH was 4.3 to 6.3, organic matter 3.6 to 5.8%, N 0.19 to 0.27%, P trace to 13.8 ppm, Ca 1.5 to 6.1 ppm, Mg 0.63 to 2.30 ppm, and K 0.12 to 0.88 ppm. Most soils were moderately to strongly acid, except for Serere (6.3), and all soils were medium to very low in all nutrients.

Planting date: June 2017

Plot size: 6.75 x 5.00 meters, with two replications

Seed lots: Only commercial seed was used in these trials, treated with bronopol fungicide.

Fertilization: unknown

Planting rate: unknown

Variety: MS-2

Vitazyme applications:

- **Seed treatments:** Concentrations of 0, 5, and 10% Vitazyme were prepared using 50 and 100 ml of product in 1.0 liter of water, and 5 kg of seed per liter of solution were soaked overnight and planted the next day. Seed for the 0% treatment was also soaked overnight.

• **Foliar treatments:** Vitazyme was sprayed over the plants at 1 liter/ha at full bloom.

Treatment	Seed Treatment	Foliar Treatment
1	—	—
2	—	1.0 liter/ha
3	5%	—
4	5%	1.0 liter/ha
5	10%	—
6	10%	1.0 liter/ha

Plant growth results:

Sympodia Branches, number		
Treatment	Sympodia*	Sympodia change
1	11.3 d	—
2	13.8 c	2.5 (+22%)
3	15.0 b	3.7 (+33%)
4	17.8 a	6.5 (+58%)
5	15.6 b	4.3 (+38%)
6	14.0 c	2.7 (+24%)
Mean	14.6	

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

Statistics

P-values for treatments.....<0.001
P-values for locations<0.001
P-values for interactions<0.018
LSD treatments1.2
LSD locations1.2
LSD interactions2.8
CV.....9.8%

Sympodia increases with Vitazyme: 24 to 58%

Plant Height, cm		
Treatment	Height*	Height change
	cm	cm
1	93.9 e	—
2	95.6 d	1.7 (+2%)
3	102.3 b	8.4 (+9%)
4	103.8 a	9.9 (+11%)
5	101.0 c	7.1 (+8%)
6	100.5 c	6.6 (+7%)
Mean	99.5	—

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

Statistics	
P-values for treatments.....	<0.001
P-values for locations	<0.001
P-values for interactions	<0.001
LSD treatments	0.78 cm
LSD locations	0.79 cm
LSD interactions	2.04 cm
CV.....	0.9%

Increase in plant height with Vitazyme: 2 to 11%

Cotton Bolls, number		
Treatment	Bolls*	Boll change
1	8.9 c	—
2	10.3 b	1.4 (+16%)
3	11.4 b	2.5 (+28%)
4	12.3 a	3.4 (+38%)
5	11.8 ab	2.9 (+33%)
6	11.0 b	2.1 (+24%)
Mean	10.9	—

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

Statistics	
P-values for treatments.....	<0.001
P-values for locations	<0.001
P-values for interactions	<0.012
LSD treatments	0.83
LSD locations	0.83
LSD interactions	2.04
CV.....	9.2%

Increase in boll number with Vitazyme: 16 to 38%

Cotton Fruiting Points, number		
Treatment	Fruiting points*	Points change
1	23.2 d	—
2	30.0 c	6.8 (+29%)
3	34.1 ab	10.9 (+47%)
4	37.2 a	14.0 (+60%)
5	33.6 b	10.4 (+45%)
6	29.8 c	6.6 (+28%)
Mean	31.2	—

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

Statistics	
P-values for treatments.....	<0.001
P-values for locations	<0.001
P-values for interactions	<0.053
LSD treatments	3.4
LSD locations	3.4
LSD interactions	8.4
CV.....	13.2%

Increase in cotton fruiting points with Vitazyme: 28 to 60%

Seed Cotton Yields, kg/ha		
Treatment	Yield*	Yield change
	kg/ha	kg/ha
1	878.5 c	—
2	965.7 b	87.2 (+10%)
3	1,040.2 b	161.7 (+18%)
4	1,142.8 a	264.3 (+30%)
5	1,033.1 b	154.6 (+18%)
6	1,000.6 b	122.1 (+14%)
Mean	1,010.1	—

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

Statistics

P-values for treatments.....<0.001
P-values for locations<0.001
P-values for interactions0.201
LSD treatments83.7 kg/ha
LSD locations83.7 kg/ha
LSD interactions205.1 kg/ha
CV.....10.0%

Increase in seed cotton yield with Vitazyme: 10 to 30%

Conclusions: Evidence is provided during the three years and from the different sites that Vitazyme improves cotton vigor and seed cotton yields in Uganda. Data from on-station trials in two seasons also showed that Vitazyme improves cotton fiber properties. It can be recommended that:

- Vitazyme may be registered in Uganda and added among the different products for use in cotton production.
- Seed dressing with 5% Vitazyme concentration is recommended for use. This may be followed by subsequent foliar applications of Vitazyme to cotton.
- Further studies on other application methods of Vitazyme, such as in-furrows and repeated foliar sprays will need to be done under Uganda's conditions.

- Possible use of Vitazyme in the production of many other crops grown in the country will need to be investigated.
- Measurements such as root and soil micro- and macro-diversities will need to be undertaken in Vitazyme studies, for a better understanding of Vitazyme's activities in Uganda's soils.

Especially noteworthy from the 2017/2018 multi-location trials was the revelation that a 5% seed treatment plus a 1 liter/ha foliar spray at full bloom gave great yield increases, averaging 30% across all six sites. This was a result of more sympodia (58%), greater plant size (11% greater height), more bolls (38%), and more fruiting points (60%).

Vitazyme Field Tests for 2018

Grapes with Vitazyme application



Researcher: V.V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Bilozersk District, Kherson Region, Dniprovsk Village, Agrarian Firm Radgosp Bilozerskii, Ukraine

Variety: Sukhomlynskyi bilyi

Planting date: 2008 **Irrigation:** yes

Soil type: chestnut (humus=2.2%)

Grape population: 3.3 x 1.25 m (2,421 plants/ha)

Field preparation: disking to 6-8 cm, plowing to 20-22 cm, cultivation to 4-5 cm

Experimental design: A grape vineyard was separated into Vitazyme treated and untreated portions, to evaluate the effect of the product on grape yield and profitability.

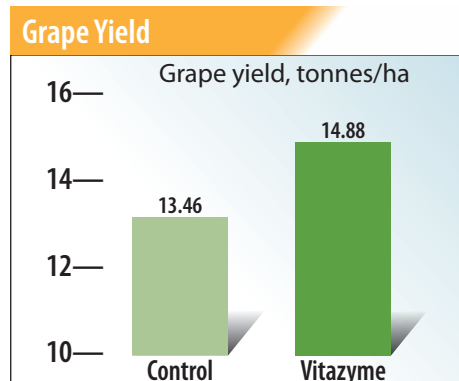
① Control ② Vitazyme

Fertilization: 48-48-48 kg/ha N-P₂O₅-K₂O applied the fall of 2017

Vitazyme application: (1) 1 liter/ha sprayed on the leaves and soil pre-flowering on May 5; (2) 1 liter/ha sprayed on the leaves and soil post-flowering on June 9

Yield results:

Treatment	Grape yield tonnes/ha	Yield change tonnes/ha
1. Control	13.46	—
2. Vitazyme	14.88	1.42 (+11%)



These grapes in Ukraine treated with Vitazyme show excellent filling to the tip of the bunch, and produced a superb yield.

Increase in grape yield with Vitazyme: 11%

Income results: An 11% increase in grape yield produced \$385/ha more income.

Conclusions: This Ukrainian grape trial, using two 1 liter/ha Vitazyme sprays, resulted in a good 11% yield increase that netted \$385/ha more income to the grower. This program is thus shown to be very effective for improving grape yields in Ukraine.

Lettuce with Vitazyme application

Researcher: Steven David

Research organization: Sustainable Farming Solutions, Perth, Western Australia

Location: Western Australia

Varieties: unknown

Planting date: March 20, 2018, for treatment in flats; unknown for field plantings

Experimental design: Three varieties of lettuce were selected for evaluation of the effects of Vitazyme on growth. One variety received a soil drench treatment at planting, and two varieties were treated at transplanting in the drench water.

① Control ② Vitazyme

Vitazyme applications:

- **Flat treatment:** A Vitazyme solution of unspecified concentration was applied to the seeds and soil media at planting on March 20, 2018.
- **Transplanting treatment:** A 2% Vitazyme solution was applied with the drench water at transplanting.



A red lettuce variety in Australia revealed an excellent leaf yield increase with Vitazyme applied as a 2% soil drench to the growth media.

Growth results: Although no data were collected, it is obvious from the photographs which accompany this report, taken about one month after application, that Vitazyme greatly improved root and leaf development. The leaf area of the treated plants in every case is much greater for treated plants, likely by 30 to 50%



This comparison between a Vitazyme treated lettuce plant (left) and the untreated control reveals a marked effect on leaf area and root development.



Another lettuce trial in Australia revealed similar results in terms of remarkably improved leaf and root growth from the natural growth regulators in the product.

Conclusions: This lettuce trial in Western Australia, using three varieties which were treated with a Vitazyme soil drench, either at planting in flats or at transplanting, revealed a great increase in leaf and root growth one month after the trial began. The product is shown to be an excellent supplement for lettuce growers to improve leaf yields.

Lettuce with Vitazyme application [Vitazyme is called Globaplant in Colombia.]

Researcher: Diana Urrea Ramirez

Research organization: Agroglobal S.A., Bogota, Colombia

Location: Andes Mountains

Variety: head lettuce

Planting density: unknown

Planting arrangement: four rows on raised beds

Experimental design: A lettuce field was treated with Vitazyme two times in a portion of the field, and the growth was compared to untreated plants nearby to evaluate the product's effects on plant weight and growth parameters.

① Control ② Vitazyme

Fertilization: unknown

Vitazyme application: (1) transplants were immersed in a 10% Vitazyme solution before planting; (2) a 0.5% solution (5 ml/liter) was sprayed on the plants and soil during growth

Yield results: Several plants were analyzed for each parameter.

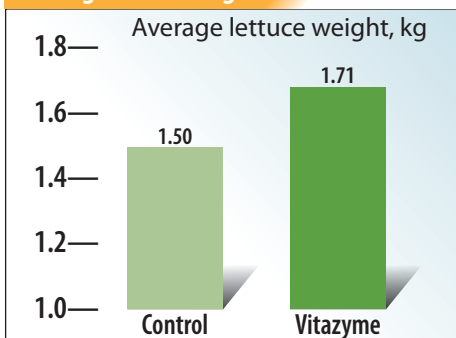
Treatment	Average weight kg	Total plants	Viable plants	Burst plants	Missing plants	Total weight* kg
1. Control	1.50	35	32	2	2	48.0
2. Vitazyme	1.71	35	34	0	0	58.1 (+21%)

*Viable plants only.

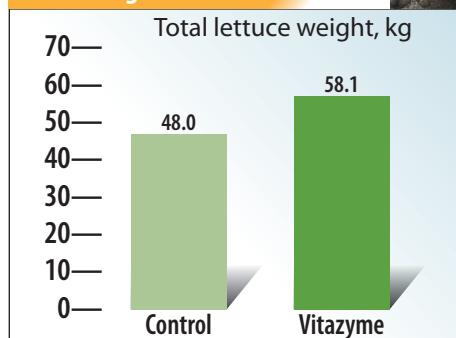


Treating lettuce and other crops with Vitazyme (Globaplant) is very simple, and the results are most excellent with only very small amounts of active agents.

Average Head Weight

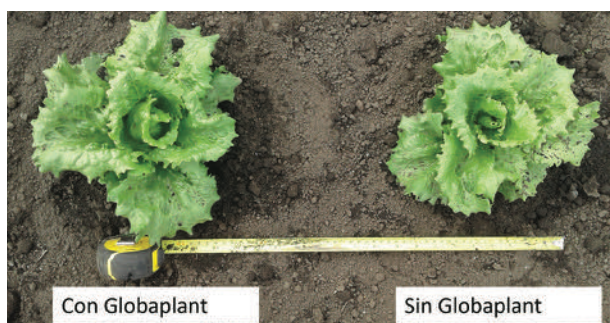


Total Weight



Increase in lettuce average head weight with Vitazyme: 14%

Increase in lettuce total weight with Vitazyme: 21%



The leaf size and development of Vitazyme (Globaplant) treated lettuce is easily noted in this photo. Enhanced root growth is commensurate with improved leaves.

Conclusions: A lettuce study in Colombia, using transplant and foliar applications, revealed several Vitazyme (Globaplant) effects. Head weight increased by 14%, as did total lettuce weight (21%). The Vitazyme treatment produced slightly more plants, and no burst heads, compared to the control which had fewer viable plants and two burst heads. These results show the considerable value of the Vitazyme (Globaplant) program for lettuce in Colombia.

Onions with Vitazyme application

Researcher: David Gray

Research organization: David Gray's AgroAdvantage,
O'Connor, Western Australia

Location: Myalup, Western Australia

Variety: Rhinestone

Soil type: unknown

Plot size: 25 meters long X 1.5 meter wide (standard bed)

Planting method: direct seeded

Planting date: August 3, 2017

Experimental design: A series of eight beds (one replication per treatment) were prepared for an onion trial, the seeds treated with different biostimulant combinations and zinc, alone and in combination, to determine early growth and final yield and quality effects on the bulbs. Only the Vitazyme and zinc results are shown in this review.

① Control ② Vitazyme ③ Vitazyme + Zinc



Note the greater leaf and root growth for these onion plants with Vitazyme application(right).



The standard farm practice in this trial produced onion bulbs that yielded 36.2 kg/plot. Compare these to the treated plot.



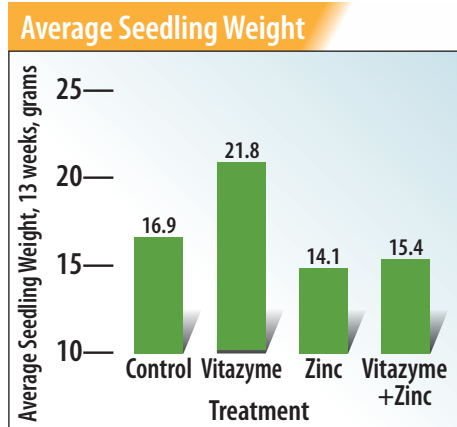
When Vitazyme and zinc were applied to the seeds before sowing, the plants responded greatly to produce bigger bulbs, especially in the 80+ mm range, and the yield was 23% higher than the control.

Fertilization: farm practice, equal for all plots

Vitazyme applications:

- **Vitazyme only:** Vitazyme at 100 ml/kg of seed was sprayed on the seeds, and the seeds were dried before sowing.
- **Zinc chelate only:** Zinc at 100 ml/kg of seed was sprayed on the seeds and dried before sowing.
- **Vitazyme + Zinc:** Vitazyme at 50 ml/kg of seed and zinc chelate (14% actual Zn) at 50 ml/kg of seed were sprayed on the seeds and dried before sowing.

Growth results: On November 2, 2017, 13 weeks after planting, sample plants were dug from each treatment and weighed.



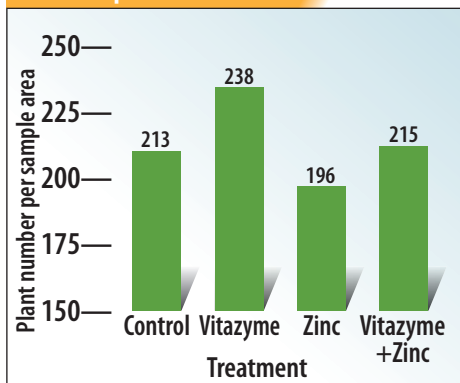
Change in seedling weight vs. control

Vitazyme +29%
Zinc -17%
Vitazyme + Zinc -9%

The only treatment that gave an increase in early growth was Vitazyme; only one other product combination gave an increase, and that was only 1%.

Yield and quality results:

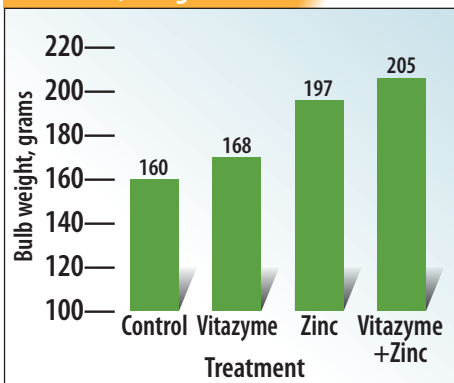
Plant Population



Population change

Vitazyme+12%
Zinc-8%
Vitazyme + Zinc+1%

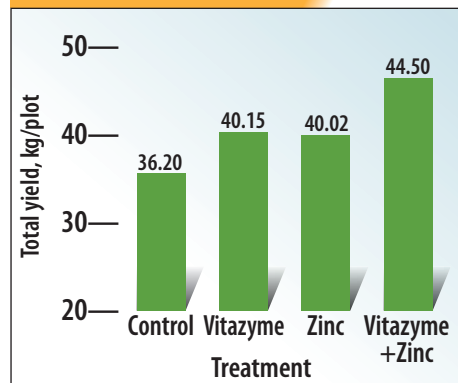
Bulb Size, Weight



Bulb weight increase

Vitazyme+5%
Zinc+23%
Vitazyme + Zinc+28%

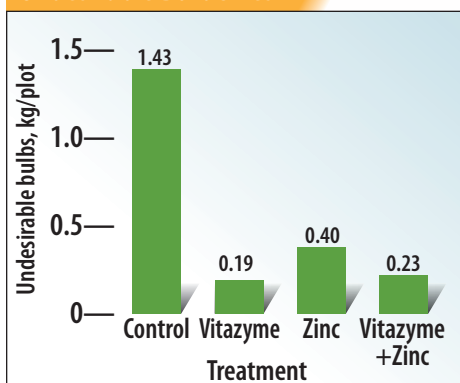
Total Yield



Total yield increase

Vitazyme+11%
Zinc+11%
Vitazyme + Zinc+23%

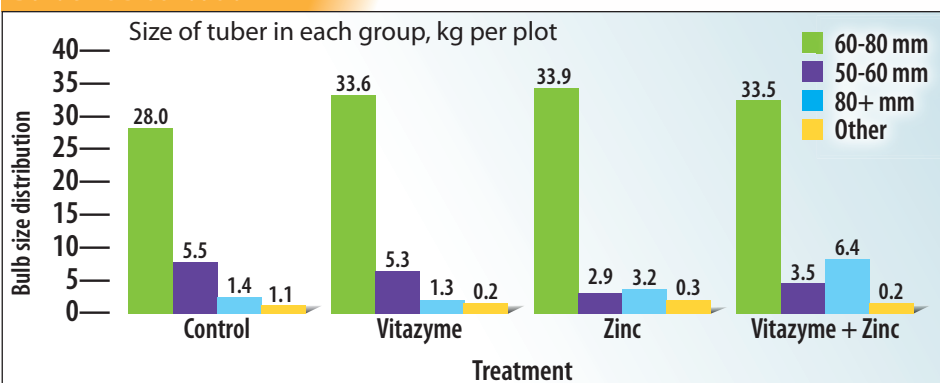
Undesirable Bulb Sizes



Undesirable sizes change

Vitazyme-87%
Zinc-72%
Vitazyme + Zinc-84%

Bulb Size Distribution



The Vitazyme and zinc treatments each produced similar weights of 60-80 mm bulbs, but the Vitazyme + Zinc treatment produced considerably more large (80+ mm) bulbs than any of the others.

Income results: Money values are in Australian dollars.

Parameter	Control	Vitazyme	Zinc	Vita + Zinc
Yield, kg/plot	90.50	100.38	100.05	111.25
Yield increase	—	11%	11%	23%
Gross income, \$/ha ¹	38,625	44,475	44,850	50,000
Treatment cost, \$/ha ²	0	401.34	391.59	396.47
Return on investment, \$/ha	0	5,448.66	5,833.41	11,278.53

¹Based on \$500/tonne for large onions, and \$400/tonne for small and medium onions. ²Treatment costs: 100 ml of Vitazyme costs \$9.48 and 100 ml of zinc chelate costs \$1.59. Application costs are included in addition.

Conclusions: This Australian onion study, using single 1.5 meter wide beds, revealed that both Vitazyme and zinc chelate on the seeds were highly efficacious in increasing onion plant growth, and yield, quality, and income parameters. At 13 weeks after planting, Vitazyme increased plant weight by 29%—no other treatment responded positively—and also improved plant population by 12%, bulb weight by 5%, and yield by 11%; undesirable bulbs were reduced by 87%. Vitazyme also significantly improved the yield of 60-80 mm bulbs above the control. When combined with chelated zinc, Vitazyme revealed a strong synergism in terms of bulb weight (+28%), total yield (+23%), and the number of extra large onions. Zinc chelate alone did well, but showed less response for all parameters than Vitazyme + Zinc. The return on investment (ROI) was greatly improved when Vitazyme was combined with zinc on the seeds, reaching \$11,278.53 above the control; Vitazyme alone returned \$5,448.66, about the same as the zinc chelate.

Onions with Vitazyme application [Vitazyme is called Globaplant in Colombia.]



Researcher: Diana Urrea Ramirez

Research organization: Agroglobal S.A., Bogota, Colombia

Location: Municipality of Une, Cundinamarca Department, Colombia

Variety: Okinawa

Planting rate: unknown

Planting date: unknown

Experimental design: An onion field was divided into Vitazyme treated and untreated portions to evaluate the effect of the product on the yield and quality of the bulbs.

① Control ② Vitazyme

Fertilization: according to recommendations for soil building

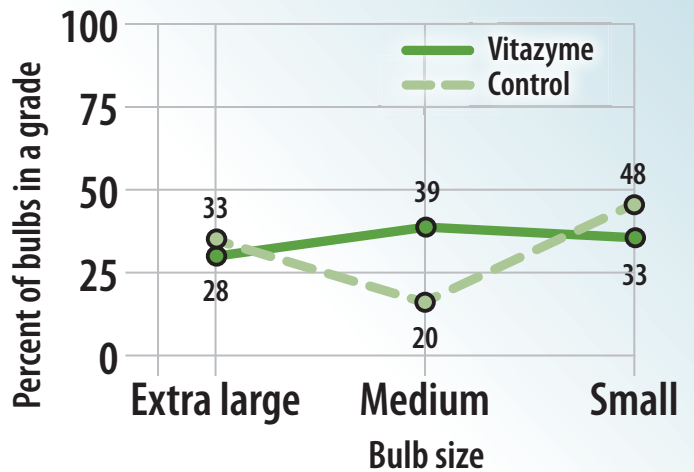
Vitazyme application: three applications of a 0.25% Vitazyme dilution to the leaves and soil, beginning at 8 days after germination; mixed with humic and fulvic acids

Harvest date: unknown

Crop density results: At harvest, the number of bulbs per unit area were counted.

Treatment	Bulb density bulbs/m ²	Density increase bulbs/m ²
Control	46	—
Vitazyme	61	15 (+33%)

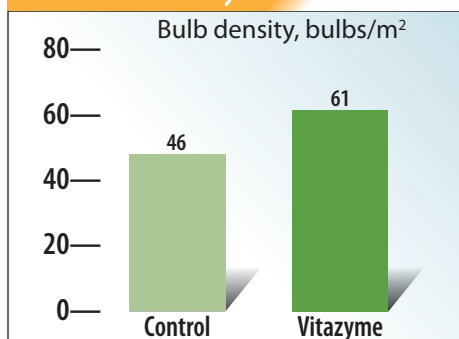
Onion Size Distribution



Yield results: An estimate of yield was made, using the weight of the three onion sizes per square meter, and extrapolating that to a full hectare.

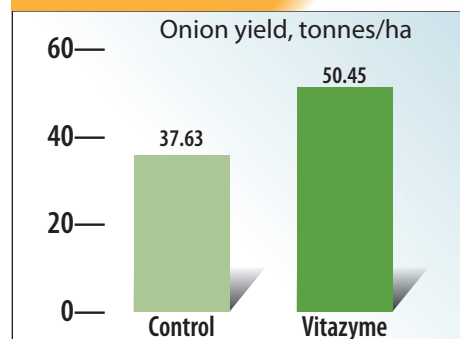
Conclusions: This onion trial in Colombia, comparing three Vitazyme applications to none on the Okinawa variety, revealed that Vitazyme (Globaplant) increased the total yield by 34%. The bulb number was increased for the medium size with Vitazyme, while the large and small sizes were reduced, revealing the tendency of the product to produce a uniform size. These results reveal the great utility of Vitazyme as an onion crop input in Colombia.

Onion Bulb Density



Increase in bulb density with Vitazyme: 33%

Onion Yield



Yield increase with Vitazyme: 34%

Onions with Vitazyme application—A Synergistic Study with Bioseed, Compared with Bactiva



Researcher: Lucero Fernandez, Antonio Medina, and Juan Diaz

Research organization: Quimica Lucava S.A., de C.V., Celaya, Guanajuato, Mexico, and AgBiotech, Inc., Lakeville, New York

Location: Los Pinos, Leon, Guanajuato, Mexico

Farm Manager: Hugo Medina

Variety: Carta Blanca

Soil type: clayey loam

Planting arrangement: double row of seedlings, 10 cm between rows and 10 cm in rows, 80.5 cm between adjacent double rows

Transplanting date: September 13 2017

Experimental design: An onion trial was designed using two replications of plots containing four rows (3.22 m wide) that were 49 m long. The total treated area of each treatment was 630 m² for the two plots, and the two center rows of each plot (157.5 m² per plot, and 315 m² per treatment) were evaluated for data. The purpose of the trial was to determine the effect of these treatments on onion yield and profitability.

① **Control** ② **Bio Seed + Vitazyme**

③ **Bactiva** ④ **Bio Seed**

Fertilization: October 3, 200 kg/ha of MAP (11-52-0% N-P₂O₅-K₂O) + 400 kg/ha of ammonium phosphate + 200 kg/ha of potassium sulfate; October 25, 50 kg/ha of Mg + 50 kg/ha of Ca; November 3, 50 kg/ha of Mg + 50 kg/ha of Ca; November 10, 100 kg/ha of potassium nitrate; November 17, 100 kg/ha of NKS; November 24, 100 kg/ha of NKS

Fungicide applications: Applications were made when the first symptoms of disease appeared.

Control plots: usual farm fungicides

Other plots: Quimica Lucava MM64-P (metalaxyl) and mancozeb, which are rather compatible with Tricoderma fungi in Bio Seed and Bactiva

Bio Seed application: a drench at 125 g/ha after transplanting + three 1 liter/ha Vitazyme sprays for three consecutive months. Bio Seed is a biopesticide and biofertilizer product for seed treatments which contains **Paenibacillus azotofixans**, **Bacillus megaterium**, **Bacillus mucilaginosus**, **Bacillus subtilis**, and **Tricoderma harzianum**, each at 1 x 10⁸ cfu/g, and mycorrhizae at 1 x 10² IP/g. The product is registered and developed in the USA by AgBioTech of Lakeville, New York.

Vitazyme application: 1 liter/ha sprays during consecutive months after Bio Seed treatment. Vitazyme is a proprietary fermentation product containing brassinosteroids, 1-triacontanol, B-vitamins, and other growth promoting agents, produced by Vital Earth Resources, Gladewater, Texas.

Bactiva applications: four drenches, totaling 1.25 kg/ha, beginning with 500 g/ha at transplanting + three monthly 250 g/ha drenches. Bactiva is a biopesticide and biofertilizer



A. Bioseed alone increased the yield substantially, but not as much as it did when combined with Vitazyme.



B. Vitazyme plus Bioseed produced 25% more bulb yield, and larger bulbs, than did the control in this Mexican trial.



C. When Bactiva was used alone, the yield and percentage of large bulbs were similar to the control.

containing 1 x 10⁸ CFU/g of **Trichoderma harzianum**, **Trichoderma reesei**, **Trichoderma viride**, **Gliocladium virens**, **Bacillus megaterium**, **Bacillus subtilis**, **Bacillus polymyxa**, and **Pseudomonas fluorescens**, gibberellins, cytokinins, seaweed and **Yucca schidigera** extracts, amino acids, fulvic acid, and several vitamins.

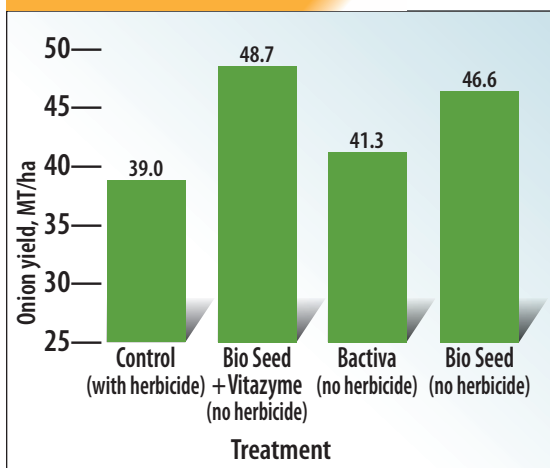
First application (September 14, 2017):

Product	Rate	Total application for 630m ²	Rate per plot (315m ²)	Rate per backpack fill
Bio Seed	125 g/ha	8 g	4g	1 g
Vitazyme	1 liter/ha	64 ml	32 ml	8 ml
Bactiva	500 g/ha	32 g	16 g	4 g

Yield results:

Treatment	Yield MT/ha	Yield change MT/ha	Sizes	
			Extras + Mediums % of total	Small + Waste % of total
Control	39.0	—	91.6	8.4
Bio Seed + Vitazyme	48.7	9.7 (+25%)	92.2	7.8
Bactiva	41.3	2.3 (+6%)	91.1	8.9
Bio Seed	46.6	7.5 (+19%)	93.6	6.4

Onion Yield



Increase in yield

Bio Seed + Vitazyme..... 25%
Bactiva 6%
Bio Seed 19%

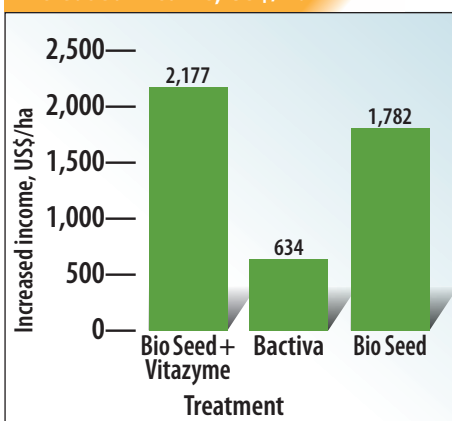
Income results:

Treatment	Crop value	Product cost*	Fungicide cost	Total cost	Profit	Added income
	dollars/ha	dollars/ha	dollars/ha	dollars/ha	dollars/ha	dollars/ha
Control	8,210.67	0	235.68	235.68	7,974.99	—
Bio Seed + Vitazyme	10,300.61	110.95	37.84	148.78	10,151.82	2,176.83
Bactiva	8,738.97	130.41	0	130.41	8,608.56	633.57
Bio Seed	9,857.63	25.00	75.68	100.68	9,756.95	1,781.96

*Bio Seed cost: \$200.00/kg; Vitazyme cost: \$28.65/liter; Bactiva cost: \$104.32/kg.

Conclusions: The programs of Bio Seed in a 125 g/ha drench at transplanting, plus three monthly 1 L/ha Vitazyme sprays on leaves and soil, and Bio Seed alone, in one 125 g/ha drench show very marked (24.7% and 19.3%, respectively) yield increases, better quality in percent of larger sized bulbs, and a marked reduction of required fungicides for good plant health, resulting in marked increases in added profits (2,177 and 1,782 US\$/ha, respectively) above the untreated control (with standard fungicide treatments), and also much larger (3-4 times) yield and net profit increases than with Bactiva in four monthly drenches: one at 500 g/ha, and three at 250 g/ha.

Increased Income, US\$/ha



Increase in income

Bio Seed + Vitazyme ... \$2,176.83/ha
Bactiva \$633.57/ha
Bio Seed \$1,781.96/ha

Vitazyme Field Tests for 2018

Onions with Vitazyme application—A Study with Bio Seed Treatment



Researcher: K. Bruce Kirksey, Ph.D. **Research organization:** AgriCenter International, Memphis, Tennessee

Location: Memphis, Tennessee **Variety:** unknown **Soil type:** Falaya silt loam; good fertility and drainage; pH = 6.3

Planting date: July 5, 2018 (transplants) **Row spacing:** 48 inches **In-row spacing:** 12 inches

Experimental design: A randomized complete block small-plot design was established with onions to evaluate the effect of Vitazyme and Bio Seed on the yield of these bulbs. The plot size was 10 x 30 ft., with one row per plot of transplants.

① Control ② Vitazyme ③ Bio Seed + Vitazyme

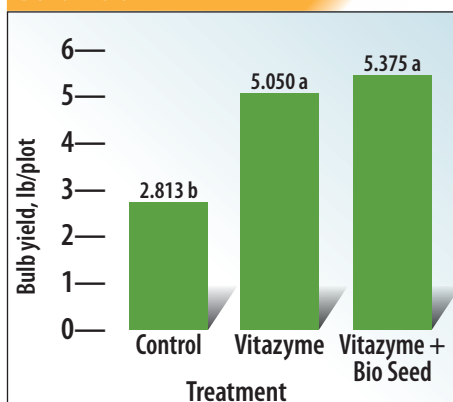
Fertilization: unknown

Vitazyme application: (1) soil/root drench at transplanting at 13 oz/ha (1 liter/ha) on July 5; (2) soil/foliar spray at the 3-leaf stage at 13 oz/acre (1 liter/ha) on July 28; (3) soil/foliar spray at the 6-leaf stage at 13 oz/acre (1 liter/ha) on August 23; (4) soil/foliar spray at E-M bulbing at 13 oz/acre (1 liter/ha) on September 7

Bio Seed application: 50 grams/acre (124 grams/ha) at transplanting in the drench water, with Vitazyme, on July 5. Bio Seed is a mixture of various bacteria and fungi for rhizosphere population.

Yield results: An area of 2.5 x 25 ft for each plot was hand harvested, and the bulbs were weighed.

Bulb Yield¹



¹Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.

Increase in yield with Vitazyme: 80%

Increase in yield with Vitazyme + Bio Seed: 91%

Conclusions: A small-plot onion study in Tennessee, using Vitazyme alone or with Bio Seed, showed that Vitazyme increased bulb yield by 80%, and with Bio Seed in the soil drench by 91%. These results show that these products are highly effective to improve yields in onion growing programs.

Peaches with Vitazyme application [Vitazyme is called Globaplant in Colombia.]



Researcher: Diana Urrea Ramirez
Research organization: Agroglobal S.A., Bogota, Colombia

Location: Andes Mountains

Variety: unknown

Tree density: unknown

Experimental design: A peach orchard was divided into Vitazyme treated and untreated areas to determine the effects of this product on peach yield and quality.

1 Control 2 Vitazyme

Fertilization: unknown

Vitazyme application: (1) a 0.5% solution (500 ml/200 liters) sprayed on the trees and soil at the beginning of flowering; (2) a 0.5% solution (500 ml/200 liters) sprayed on the trees and soil at full blossom, 15 days after the first application, (3) a 0.5% solution (500 ml/200 liters) sprayed on the leaves at fruit filling

Fruit quality results: It was observed that the Vitazyme treated trees produced fruit that was more uniform in size. There were many small, unfilled fruit in the untreated areas. Yields were not able to be determined.

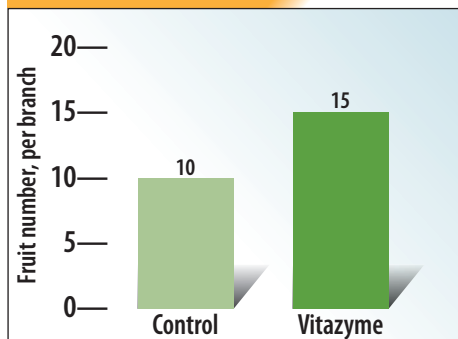


Note the increased size of the Vitazyme (Globaplant) treated peaches, a result of improved photosynthesis and increased energy capture for filling of the fruit.

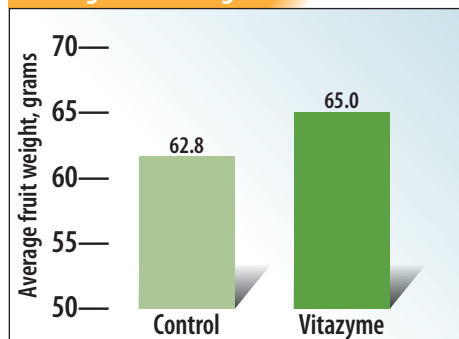


The treated fruit is noticeably larger than the untreated control, and the fruit was also sweeter as evidenced in taste tests. Notice also the improved coloration of the treated fruit.

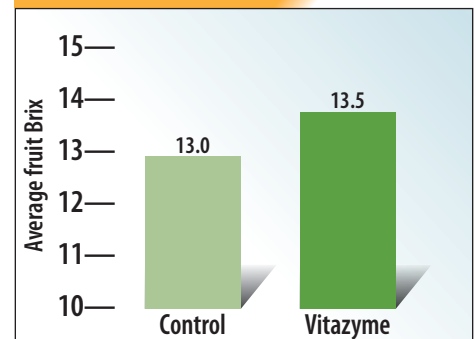
Fruit Per Branch



Average Fruit Weight



Fruit Brix



Increase with Vitazyme

Fruit per branch 50%
Average fresh weight 4%
Fruit Brix 0.5 %-points

Conclusions: A farm peach trial with Vitazyme, using three applications of a 0.5% solution, revealed that fruit number per branch increased an amazing 50%, while the fruit fresh weight improved by 4%. At the same time, fruit sugar (Brix) was boosted by 0.5 percentage point. Yield values were not determined, but Vitazyme would have greatly improved fruit yield, showing the great efficacy of this program for peaches in Colombia.

Potatoes with Vitazyme application [Vitazyme is called Globaplant in Colombia.]



Researcher: Luis Esneider Acosta and Yeison Torres

Research organization: Agroglobal S.A., Bogota, Colombia

Farmer: Nicolas Sierra

Location: Samaca, Boyaca, Vereda Centro, Colombia

Variety: R12

Planting date: December 22, 2017

Experimental design: A potato trial was initiated on 1.0 hectare of a potato field, where Vitazyme was applied to compare its effects with adjoining untreated control areas.

① Control ② Vitazyme

Fertilization: 15-15-15 % N-P₂O₅-K₂O + boron +zinc applied in-furrow at planting

Vitazyme applications: (1) 1 liter/ha, plus an insecticide and Proggib applied in-furrow at planting; (2) 1 liter/ha sprayed on the leaves and soil 38 days after planting; (3) 1 liter/ha sprayed on the leaves and soil 88 days after planting

Applications at 38 days after planting: Minerva 50 WP fungicide, Peg-p fertilizer, Magestic insecticide, clorpiryfos insecticide, and Yuma fungicide

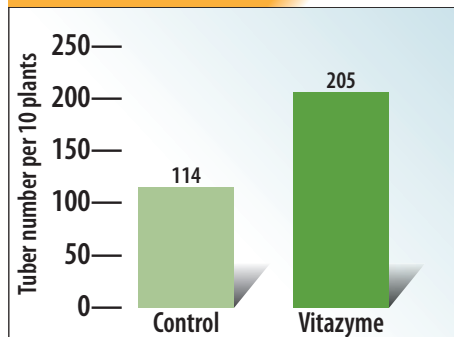
Applications at 88 days after planting: Dkp 500, Strike, Carrier, CaMg Nitrons, Green Mix, Irriplant CaMgK, Orthocide, Forum, Diligent, and Chlorpyricol

Growth and yield results at 143 days after planting: This sampling was performed 30 days before harvest, due to excessive rains. Ten plants from the treated and control areas were harvested for evaluations.



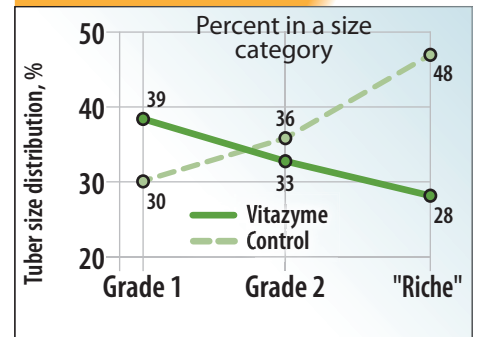
The effect of Vitazyme (Globaplant) to improve not only tuber numbers, but also uniformity of tubers and total yield, is clearly seen in this Colombia study.

Tuber Number



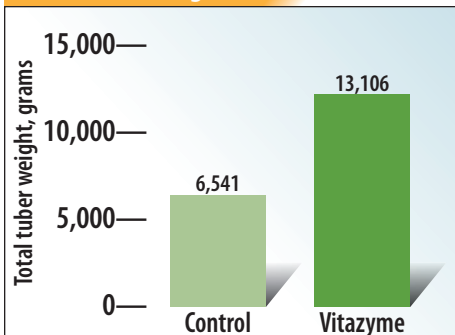
Increase in tuber number with Vitazyme: 80%

Tuber Size Distribution



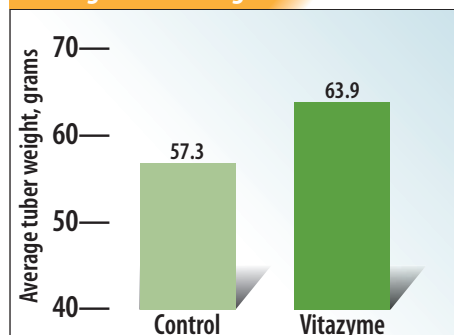
The Vitazyme treated plants had many larger tubers and many fewer small tubers.

Total Tuber Weight



Increase in total tuber weight with Vitazyme: 100%

Average Tuber Weight



Increase in average tuber weight with Vitazyme: 12%

Conclusion: A potato field trial in Colombia, using three 1 liter/ha Vitazyme (Globaplant) applications from planting to 88 days after planting, produced excellent results in terms of tubers per plant (+58%), total tuber weight (+100%), and average tuber weight (+12%). The size distribution for Vitazyme was skewed towards the larger sizes versus the untreated control. These results display the great efficacy of Vitazyme (Globaplant) for use with potato production in Colombia.

Potatoes with Vitazyme application [Vitazyme is called Globaplant in Colombia.]



Researcher: Luis Esneider Acosta and Yeison Torres

Research organization: Agroglobal S.A.,
Bogota, Colombia

Location: Samaca, Boyaca, Colombia

Variety: R1

Experimental design: A potato field was selected for a Vitazyme (Globaplant) trial, 1.0 hectare of which was treated with the Vitazyme program to compare with the untreated control. The purpose of the trial was to determine the effect of this product on potato growth and yield.

Fertilization: unknown

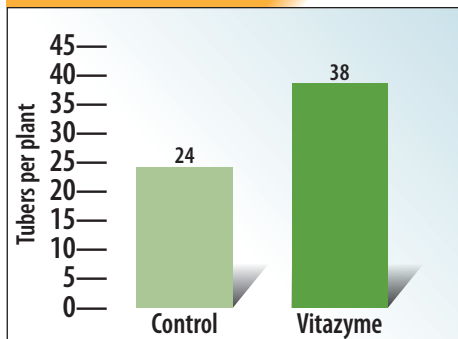
Vitazyme applications: (1) 1 liter/ha of Vitazyme (Globaplant) sprayed on the leaves and soil at an unspecified time, mixed with Progibb (a gibberellin growth regular) and an insecticide; (2) 1 liter/ha of Vitazyme (Globaplant) sprayed on the leaves and soil 71 days after the first application.



Yield results 133 days after planting: Two plants per treatment were evaluated.

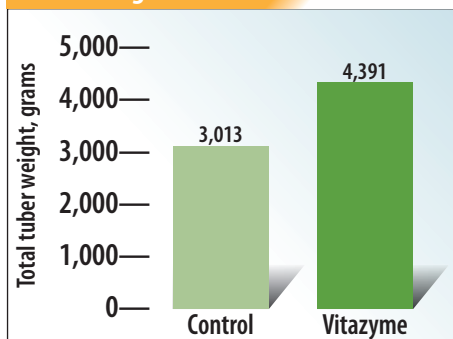
The effects of Vitazyme (Globaplant) on potato growth is obvious in this photo, showing greater top and root mass, more leaf chlorophyll, greater tuber number and size, and thus greater yield potential.

Tubers Per Plant



Increase in tuber number with Vitazyme: 58%

Tuber Weight Per Plant



Increase in tuber weight with Vitazyme: 46%

Conclusion: A potato trial in Colombia, using two Vitazyme (Globaplant) applications, revealed that the tuber number per plant was increased by 58% and the tuber weight per plant by 46% with Vitazyme. This program is an excellent one for potato growers in Colombia.

Potatoes with Vitazyme application [Vitazyme is called Globaplant in Colombia.]



Researcher: Diana Urrea Ramirez

Research organization: Agroglobal S.A., Bogota, Colombia

Location: Andes Mountains

Variety: unknown

Planting rate: unknown

Planting date: unknown

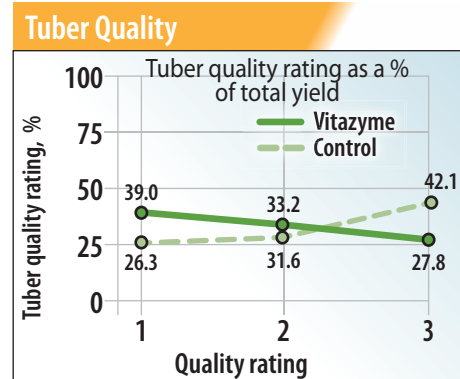
Experimental design: A potato field received Vitazyme on one portion, while the remainder of the field was left untreated. Yield and plant quality effects of the product were evaluated.

① Control ② Vitazyme

Fertilization: unknown

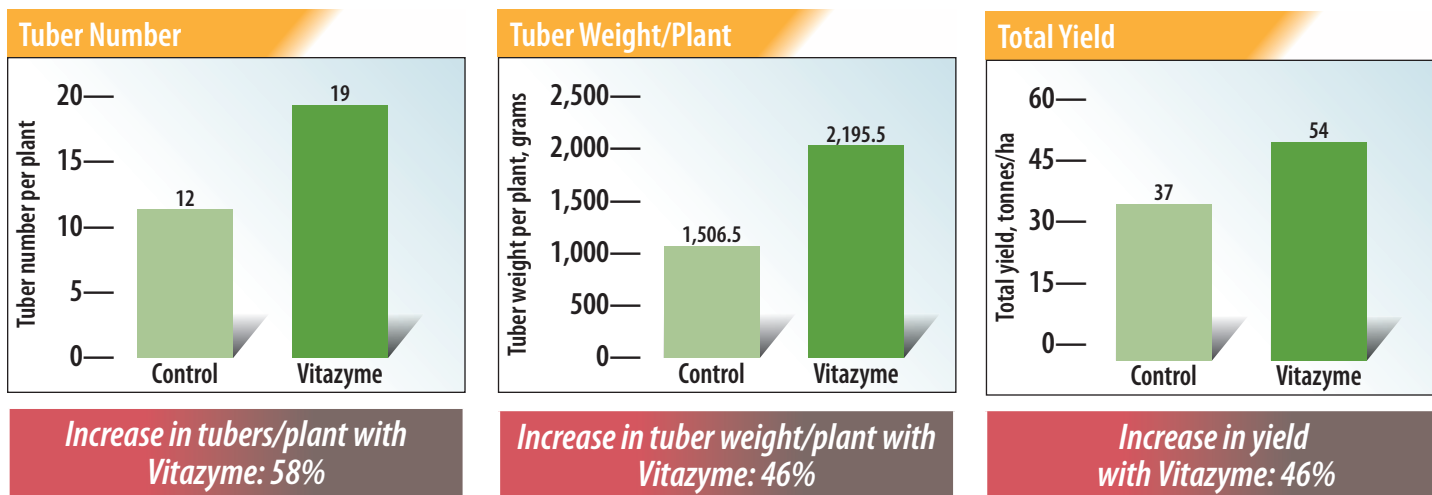
Vitazyme applications: (1) 1 liter/ha banded in-furrow at planting; (2) 1 liter/ha sprayed foliar along with a fungicide

Tuber quality results: The tubers for representative plants were classified into 3 categories, and calculated as a percentage of the total.



Vitazyme produced a much higher quality of tuber, on average, than the untreated control plants, the number 1 plants being 12.7% higher, with far fewer number 3 tubers as well.

Tuber yield results:



Conclusion: This potato trial with Vitazyme [Globaplant] in Colombia produced an excellent response from an in-furrow application, plus a foliar spray, both at 1 liter/ha. Compared to the untreated control, Vitazyme caused a 58% increase in

tuber number and a 46% increase in tuber weight per plant and yield. This program is shown to be an excellent addition to the agronomic practices of potato growers in Colombia.

Vitazyme Field Tests for 2018

Potatoes with Vitazyme application



Researcher: V.V. Plotnikov

Research organization: Plant Designs, Inc, Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Illintsi District, Vinnytsia Region, Slobodyshche Village, Gontareve Farm, Ukraine

Variety: Roko, first generation

Planting date: May 9, 2018

Previous crop: winter wheat

Soil type: typical chernozem (humus = 4.5%)

Planting rate: 42,000 tubers/ha

Field preparation: disking to 6-8 cm, plowing to 20-22 cm, cultivation to 10-12 cm

Experimental design: A potato field was divided into Vitazyme treated and untreated portions to evaluate the effectiveness of this program to increase tuber yield and income.

① Control ② Vitazyme

Fertilization: in the autumn of 2017, 60 tonnes/ha of manure, and 300-150-360 kg/ha of N-P₂O₅-K₂O

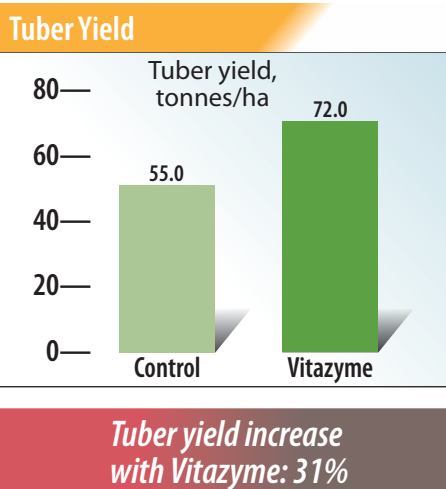
Vitazyme application: (1) 1 liter/ha sprayed on the leaves and soil at 15 to 20 cm plant height on June 14; (2) 1 liter/ha sprayed on the plants at early bloom on June 25

Yield results:

Treatment	Tuber yield tonnes/ha	Yield change tonnes/ha
Control	55.0	—
Vitazyme	72.0	17.0 (+31%)



Vitazyme applied to potatoes enhances chlorophyll development, thus fixing more carbon dioxide and sunlight energy for greater tuber production.



Income results: The tuber yield increase of 17 tonnes/ha provided \$2,006/ha more income

Conclusions: This Ukrainian potato study, which utilized two 1 liter/ha foliar/soil applications, at 15 to 20 cm height and at early bloom, caused a remarkable yield increase of 31%, leading to \$2,006/ha more income. This program is thus shown to be highly effective for potato growers in Ukraine.

Rice with Vitazyme application

Researcher: Agr. Luciano Frias

Research organization: Quimica Lucava, Celeya, Guanajuato, Mexico

Farmer: Teodoro Gutierrez

Location: La Gargantilla Farm, Municipality of Tomatlan, Jalisco, Mexico

Variety: unknown

Experimental design: A 5.0 hectare area of a rice field was used as a trial area for Vitazyme and control treatments of the field, to determine the effect of this product on the yield and profitability of rice.

① Control ② Vitazyme

Fertilization: unknown

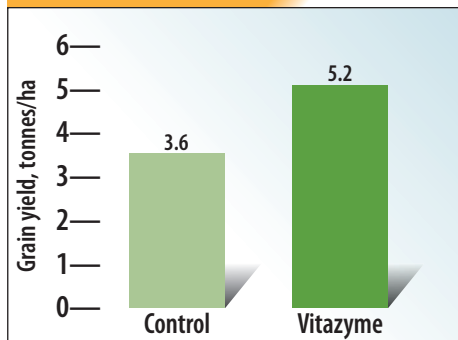
Vitazyme application: 1 liter/ha on the leaves during crop development, on September 20

Yield results:

The Vitazyme treated rice on the left shows superior head length and kernel number compared to the untreated head on the right in this Mexican trial.



Grain Yield



Income results: At a price for rice of \$220/tonne, the increased value of the rice was **\$352/ha**.

Conclusions: This rice trial in Jalisco, Mexico, using one 1 liter/ha Vitazyme foliar application, resulted in an increased yield of 1.6 tonnes/ha (+44%) which provided \$352/ha more income to the farmer. Such results show the great value of this program for rice growers in Mexico. It is expected that a seed treatment and an additional foliar application would have increased the yield and profit even more.

Increase in grain yield with Vitazyme: 1.6 tonnes/ha (+44%)

Roses with Vitazyme application

Researcher: Jan Ties Malda

Research organization: Cebeco Mertstoffen B. V. and SPNA Kollumerwaard, the Netherlands

Location: SPNA Kollumerwaard, the Netherlands **Variety:** unknown

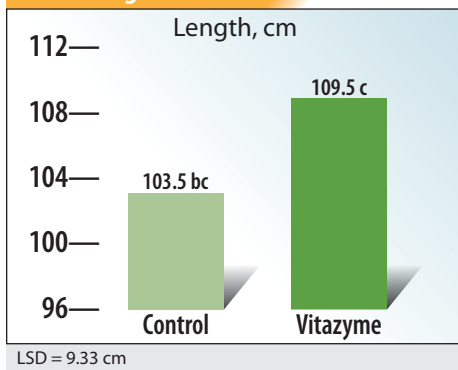
Experimental design: A replicated rose study was established for a number of products, including Vitazyme, to determine the effect of the products on a number of growth parameters and on plant composition. Only the control and Vitazyme data are available for this report.

① Control ② Vitazyme

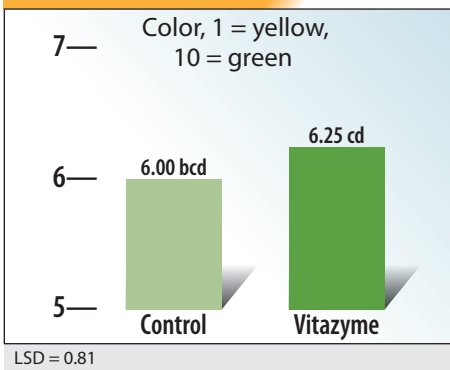
Fertilization: unknown **Vitazyme application:** unknown

Growth results:

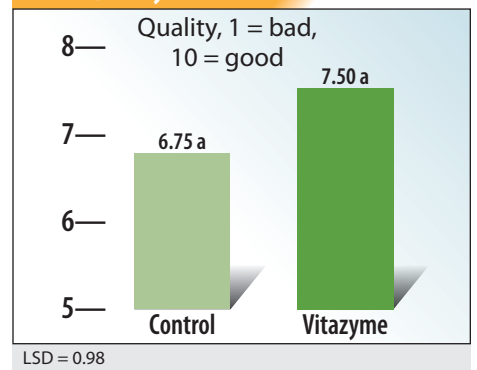
Stem Length

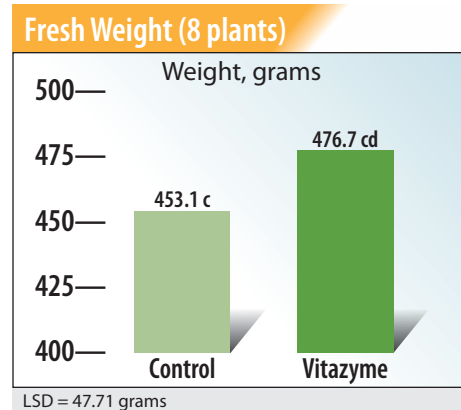
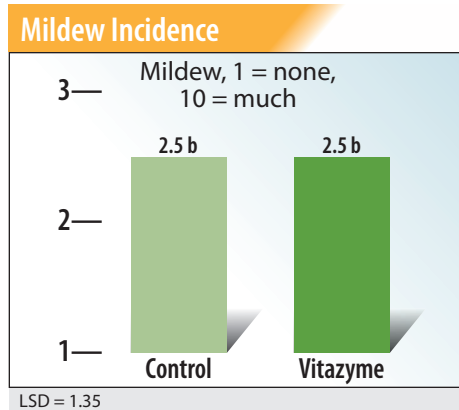
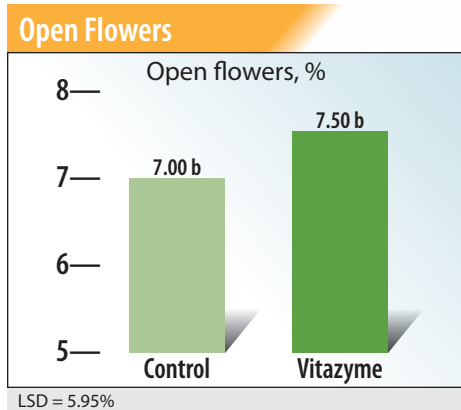


Leaf Color



Root Quality





Increases with Vitazyme

Stem length 6 %
 Leaf color 0.25 points
 Root quality 0.75 points
 Open flowers 0.50 %-points
 Mildew incidence no change
 Fresh weight (8 plants) .. 5 %

Conclusion: A rose trial in the Netherlands, which included several plant supplements including Vitazyme, revealed some good improvements in growth and plant composition compared to the control.

Because no other product data was included, it was not possible to compare the various products. Stem length, leaf color, root quality, open flowers, and fresh plant weight were all improved with Vitazyme, and the levels of all nutrients were increased from 1 to 24%, except for molybdenum and chloride. Most comparisons were not significantly different, but the consistent improvement for all parameters and elements demonstrates the value of Vitazyme to facilitate rose growth in the Netherlands.

Plant composition results: Leaf analyses were conducted on a number of elements. All data is presented on a dry weight basis.

Treatment	Potassium	Sodium	Calcium	Magnesium	Nitrogen	Sulfur	Phosphorus	
-----umol/kg. dm-----								
Control	815 bc	5.4 ab	260.8 bc	115.0 abc	1,677.5 de	55.3 bc	117.8 b	
Vitazyme	865 cd	6.5 abc	283.0 d	119.3 bc	1,697.5 e	59.0 de	126.0 d	
LSD	52	2.3	19.4	8.0	89.7	3.5	6.3	
Change	+6%	+20%	+9%	+4%	+1%	+7%	+7%	
	Iron	Manganese	Zinc	Boron	Copper	Molybdenum	Chloride	Silicon
-----umol/kg. dm-----								
Control	1,450	1,270.0 b	453.8 cd	7,025 e	22.5 ab	48.8 a	48.8 a	301.5
Vitazyme	1,800	1,305.0 b	474.0 d	7,300 e	23.2 ab	46.4 a	46.6 a	345.3
LSD	1,092.5	188.2	46.3	422	22.9	7.2	8.5	72.2
Change	+24%	+3%	+4%	+4%	+3%	-5%	-5%	+15%

Vitazyme Field Tests for 2017

Soybeans with Vitazyme application—A Study on Synergism with WakeUp



Researchers: Steve Schmidt

Research organization: ACRES Research, Cedar Falls, Iowa **Location:** Denver, Iowa **Variety:** Emerge 1993

Planting date: May 22, 2018 **Planting rate:** 130,000 seeds/acre **Planting depth:** 1.5 inches

Row spacing: 30 inches **Plot size(harvested area):** 7.5 x 60 feet **Tillage:** strip-till

Soil type: Sparta loamy fine sand (1.5% organic matter, 6.2 pH, 6.5 meq/100 grams cation exchange capacity).

Experimental design: A small-plot soybean trial, using four replications and six treatments, was prepared in east-central Iowa in order to evaluate the effect of Vitazyme, applied at different times, on the yield of soybeans. In addition, a treatment utilizing WakeUp adjuvant was added to investigate possible synergisms with Vitazyme.

Treatment	Vitazyme			WakeUp	
	In-furrow	V6	R3	Spring	Summer
	oz/acre	oz/acre	oz/acre	oz/acre	oz/acre
1. Control	0	0	0	0	0
2. Vitazyme in-furrow	13	0	0	0	0
3. Vitazyme foliar/soil V6	0	13	0	0	0
4. Vitazyme foliar R3	0	0	13	0	0
5. Vitazyme foliar/soil V6 + R3	0	13	13	0	0
6. Vitazyme + WakeUp Spring in furrow + Vitazyme + Wake Up Summer R3	13	0	13	4	4

Fertilization: starter mix of 3 gal/acre MPK (0-52-34% N-P₂O₅-K₂O), 1 quart/acre humate, and 4 oz/acre Super Trace

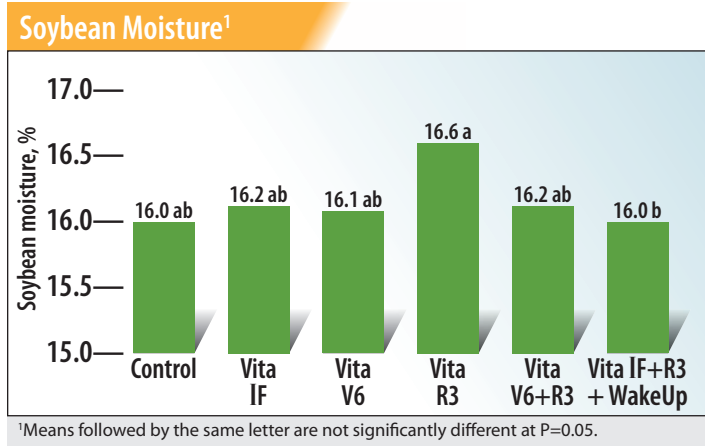
Vitazyme application: (1) 13 oz/acre in-furrow (Treatments 2 and 6); (2) 13 oz/acre to the leaves and soil at V6 June 28 (Treatments 3 and 5), and 13 oz/acre to the leaves at R3 (Treatments 4, 5, and 6).

WakeUp Spring application: 4 oz/acre in-furrow (Treatment 6)

WakeUp Summer application: 4 oz/acre to the leaves at R3 (Treatment 6)

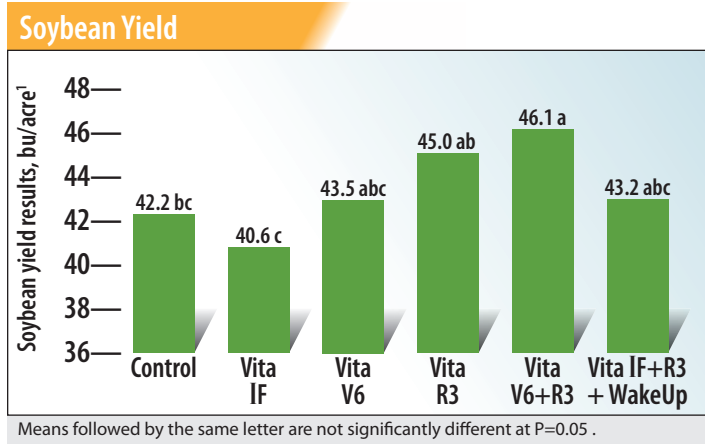
Herbicide application: Pre-emergence: 6 oz/acre Zidua Pro, 24 oz/acre Roundup, 16 oz/acre 2, 4-D, 2 lb/acre AMS. Post-emergence (first): 10 oz/acre Outlook, 10 oz/acre Arrow, 2.5 lb/acre AMS. Post-emergence (second): 16 oz/acre Flexstar, 8 oz/acre Select Max, 4 oz/acre MSO, 3 oz/acre Fultec

Soybean moisture results:



Only the Vitazyme application at R3 caused a significantly higher bean moisture content at harvest than the control.

Soybean yield results:



Conclusion: A small-plot soybean trial in east-central Iowa, using three application times for Vitazyme and WakeUp adjuvant, revealed that soybean moisture at harvest varied little, but soybean yield was improved significantly (9%) with Vitazyme applied at the V6 and R3 stages. In addition, the R3 application alone increased yield by 7%, and V6 application by 3%. The in-furrow application did not produce a yield increase, which is contrary to most soybean studies in past years. WakeUp did not produce a significant interaction with Vitazyme when both were applied in-furrow and at the R3 stage. This trial reveals the potential great efficacy of Vitazyme application at the R3 (early pod) stage of plant development.



Vitazyme applied foliar at V6 and R3 gave a significant yield response of 9% in this Iowa replicated study.

Statistics	
LSD (P=0.05)	0.6%
Standard deviation	0.1%
CV.....	0.93
Replicate F	0.569
Treatment F	0.434

Statistics	
LSD (P=0.05)	3.7 bu/acre
Standard deviation	2.9 bu/acre
CV.....	6.4
Replicate F	0.044
Treatment F	0.065

Increase in yield	
Vitazyme at V6	(+3%)
Vitazyme at R3	(+7%)
Vitazyme at V6 + R3.....	(+9%)
Vitazyme in-furrow + R3	(+2%)
+WakeUp in-furrow + R3	

Soybeans with Vitazyme application

Researcher: V.V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Gorohiv District, Volyn Region, Ugryniv Village, LTD Shevchenko, Ukraine

Variety: Cassidi, first generation

Planting date: May 1, 2018

Previous crop: winter wheat

Soil type: soddy podzolic (humus = 1.5%)

Planting rate: 500,000 seeds/ha

Field preparation: disking to 6-8 cm, plowing to 20-22 cm, cultivation to 4-5 cm

Experimental design: A soybean field in western Ukraine was treated in part with one application of Vitazyme, while the rest of the field was left untreated to serve as a control. The purpose of the trial was to determine the effectiveness of this product on soybean yield and income.

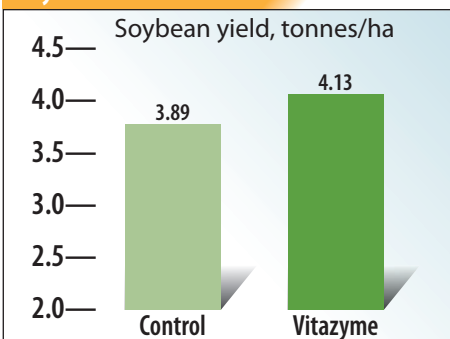
① Control ② Vitazyme

Fertilization: none

Vitazyme application: 1 liter/ha sprayed on the soil before planting, on April 30, 2018

Yield results:

Soybean Yield



Yield increase with Vitazyme: 6%

Income results: This soybean yield increase of 0.24 tonne/ha gave an increased income of \$86/ha.

Conclusions: A single 1liter/ha Vitazyme application for this western Ukraine soybean trial resulted in a respectable income increase of \$86/ha. The yield increase was 6% (0.24 tonne/ha), showing the benefit of this program for soybean growers in Ukraine.

Soybeans with Vitazyme application

Researcher: V.V. Plotnikov

Research organization: State Enterprise "Scientific Innovation Center of the Institute of Feeding and Agriculture of Podillia of the National Academy of Agrarian Sciences of Ukraine"

Location: Vinnytsia District, Vinnytsia Region, Agronomichne Village, Ukraine

Variety: Diadema, elite **Planting date:** May 5, 2018

Previous crop: spring wheat

Soil type: dark-brown podzolic (humus = 2.2%)

Planting rate: 0.75 million seeds/ha

Field preparation: disking 6-8 cm, plowing to 20-24 cm, cultivation to 4-5 cm

Experimental design: A soybean field was divided into a Vitazyme treated and untreated area to determine the effects of this product on crop yield and income.

① Control ② Vitazyme

Fertilization: none

Vitazyme application: (1) 0.5 liter/ha foliar spray on July 10, at bud formation, and (2) 0.5 liter/ha on August 4 at "green beans" stage

Yield results: (See bar graph to the right)

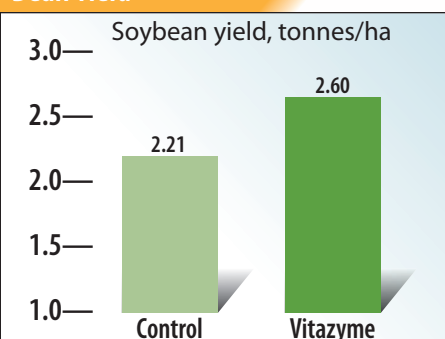
Income results: The increased yield of 0.39 tonne/ha provided \$140/ha more income.

Conclusions: A soybean trial in Ukraine, using Vitazyme at 0.5 liter/ha at bud formation and when the beans had developed significantly, revealed a 17% yield improvement, plus \$140/ha greater profitability, showing the great efficacy of this program for soybean growers in Ukraine.



V.V. Plotnikov writes field notes for a soybean trial. The program has reveal excellent yield improvements with Vitazyme consistently over the years.

Bean Yield



Increase in soybean yield with Vitazyme: 17%



Spring Barley with Vitazyme application

Researcher: V.V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Kolyvailo Farm, Vinnytsia District, Vinnytsia Region, Miziakivski Village, Ukraine

Variety: Nezabudka, third generation

Planting date: April 12, 2018

Previous crop: corn

Soil type: dark-brown podzolic (humus=2.0%)

Planting rate: 4 million seeds/ha

Field preparation: disking to 6-8 cm, plowing to 20-22 cm, cultivation to 4-5 cm

Experimental design: A barley field was treated in part with Vitazyme, to compare with the untreated portion of the field and evaluate the effect on yield and profitability.

① Control ② Vitazyme

Fertilization: 77-23-4 kg/ha N-Ca-Mg before planting; 10-26-26 N-P₂O₅-K₂O at planting

Vitazyme application: 1 liter/ha sprayed on April 10.

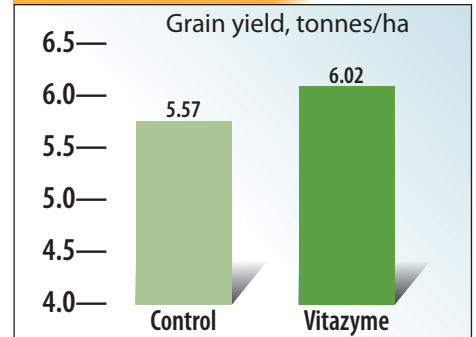
Yield results: (See bar graph to the right)

Income results: The extra 0.45 tonnes/ha produced \$114/ha more income.

Conclusions: This Ukraine spring barley trial, using one 1 liter/ha Vitazyme application, revealed that the yield increased by 8% (0.45 tonnes/ha), a substantial improvement that produced \$114/ha more income. This program is proven to be an excellent practice for barley production in Ukraine.

Treatment	Yield tonnes/ha	Yield change tonnes/ha
1. Control	5.57	—
2. Vitazyme	6.02	0.45 (+8%)

Grain Yield



Increase in grain yield with Vitazyme: 8%



Strawberries with Vitazyme application (*Fragaria vesca* var. *americana*)

—A Synergism Trial with Bio Seed

Researcher: David Holden **Research organization:** Holden Research and Consulting, Camarillo, California

Study directors: Tristan Hudak **Location:** Silent Springs Farms, Oxnard, California **Variety:** Portola

Soil test values: pH = 7.9, organic matter = 1.5%, estimated N-release = 52 lb/acre, P₁ = 195 ppm, K = 263 ppm, Mg = 344 ppm, Ca = 2,760 ppm, Na = 206 ppm, NO₃-N = 39 ppm, SO₄-S = 321 ppm, Zn = 2.3 ppm, Mn = 3 ppm, Fe = 8 ppm, Cu = 0.9 ppm, B = 3.7 ppm, percent base saturations = 3.7% K, 15.6% Mg, 75.8% Ca, 4.9% Na, cation exchange capacity = 18.2 meq/100 g of soil (all analyses performed at A&L Western Agricultural Laboratories, Modesto, California)

Planting date: July 16, 2018 **Plot size:** 4 x 6 meters (24 m²) **Replications:** 6

Design: randomized complete block design

Experimental design: A small-plot design was arranged to investigate the effects of Vitazyme and Bio Seed on the yield and profitability of this program on strawberry yield and profitability.

① Control (Grower Standard) ② Vitazyme + Bio Seed

Fertilization: grower standard **Pest program:** grower standard as needed

Vitazyme application: (1) 16 oz/acre (1.3 liters/ha) as a soil drench to the plants at planting on July 16; (2) through

(6) 16oz/acre (1.3 liters/ha) as a soil/foliar spray every three weeks, on August 15, September 4, September 24, October 9, and October 29

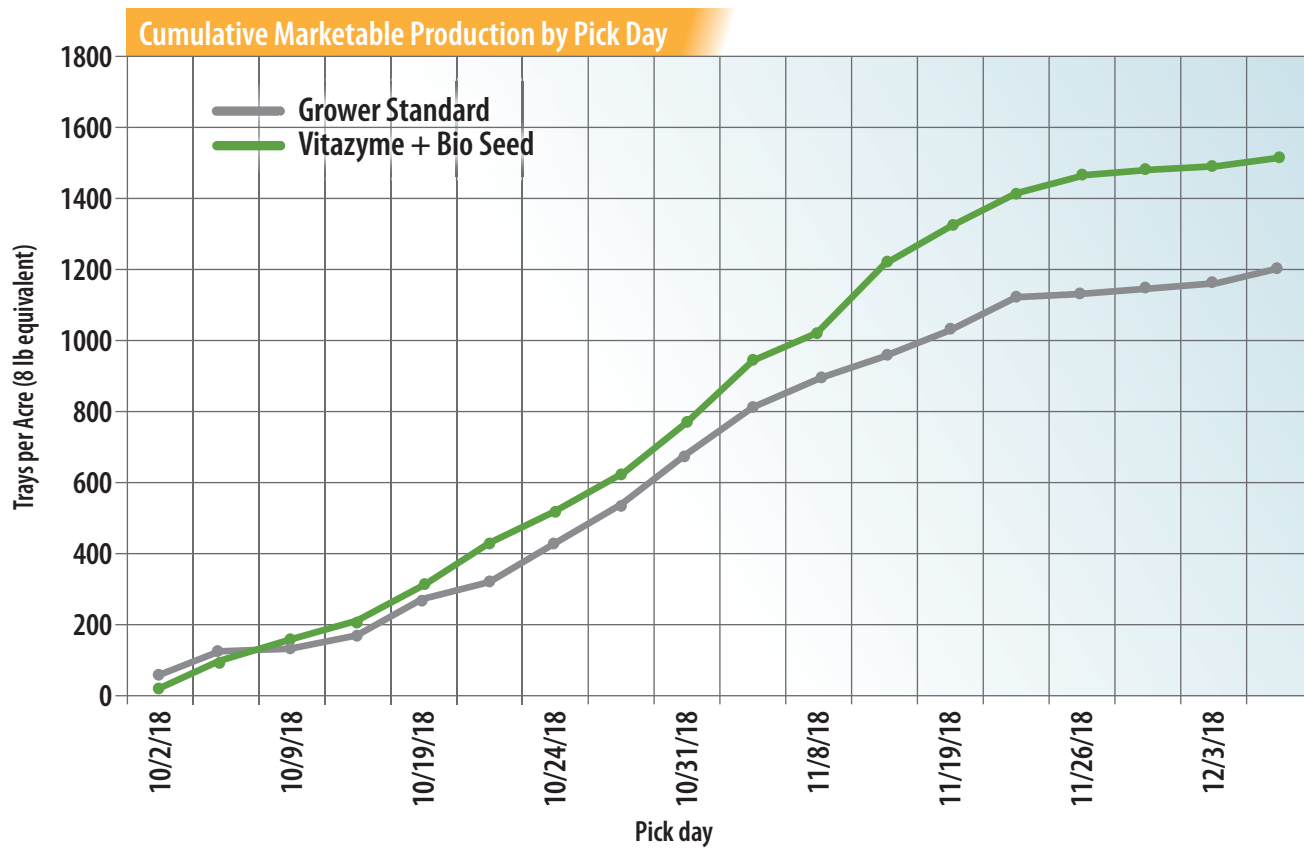
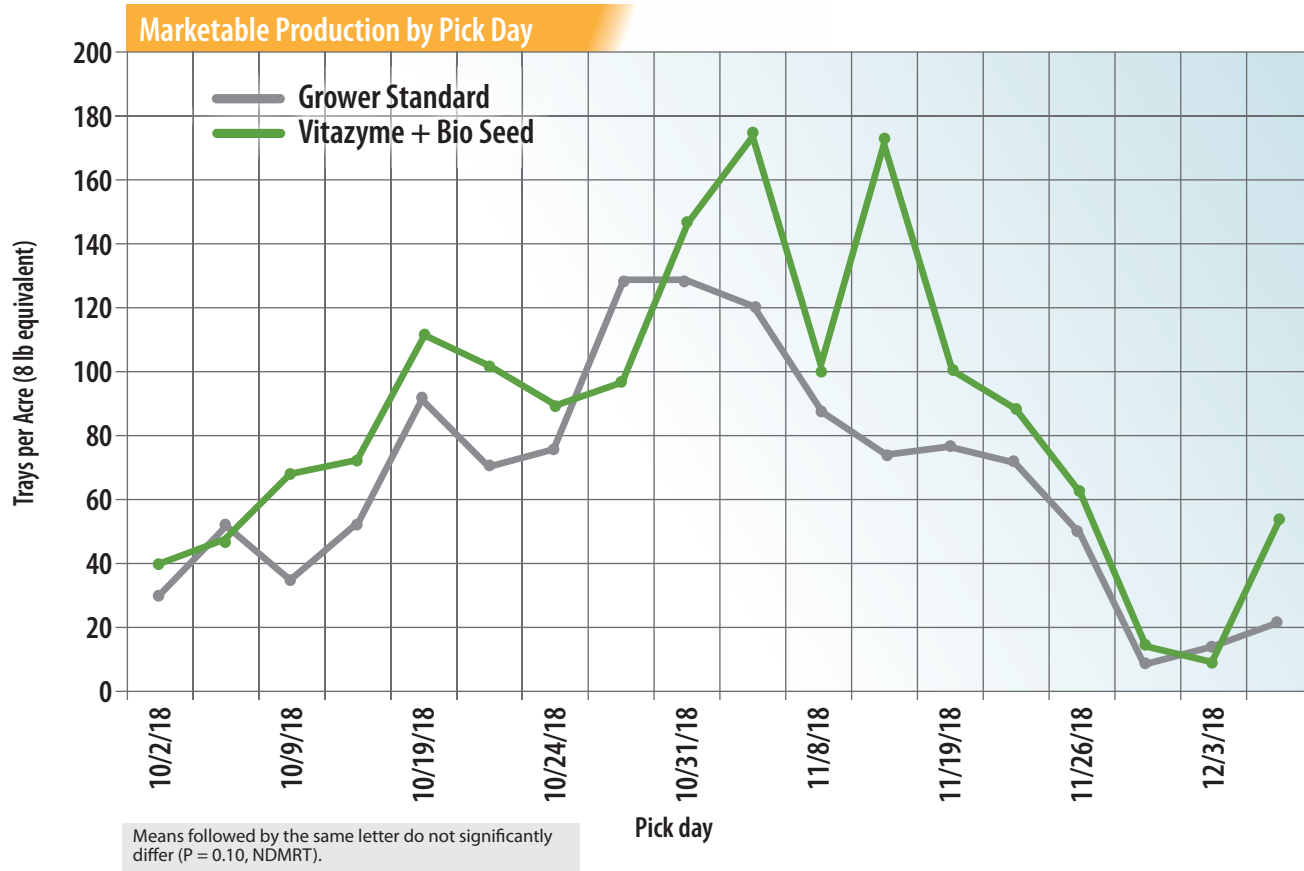
Bio Seed application: 50 grams/acre as a soil drench at planting. Bio Seed is an array of beneficial bacteria and fungi that populate the root zone of plants.

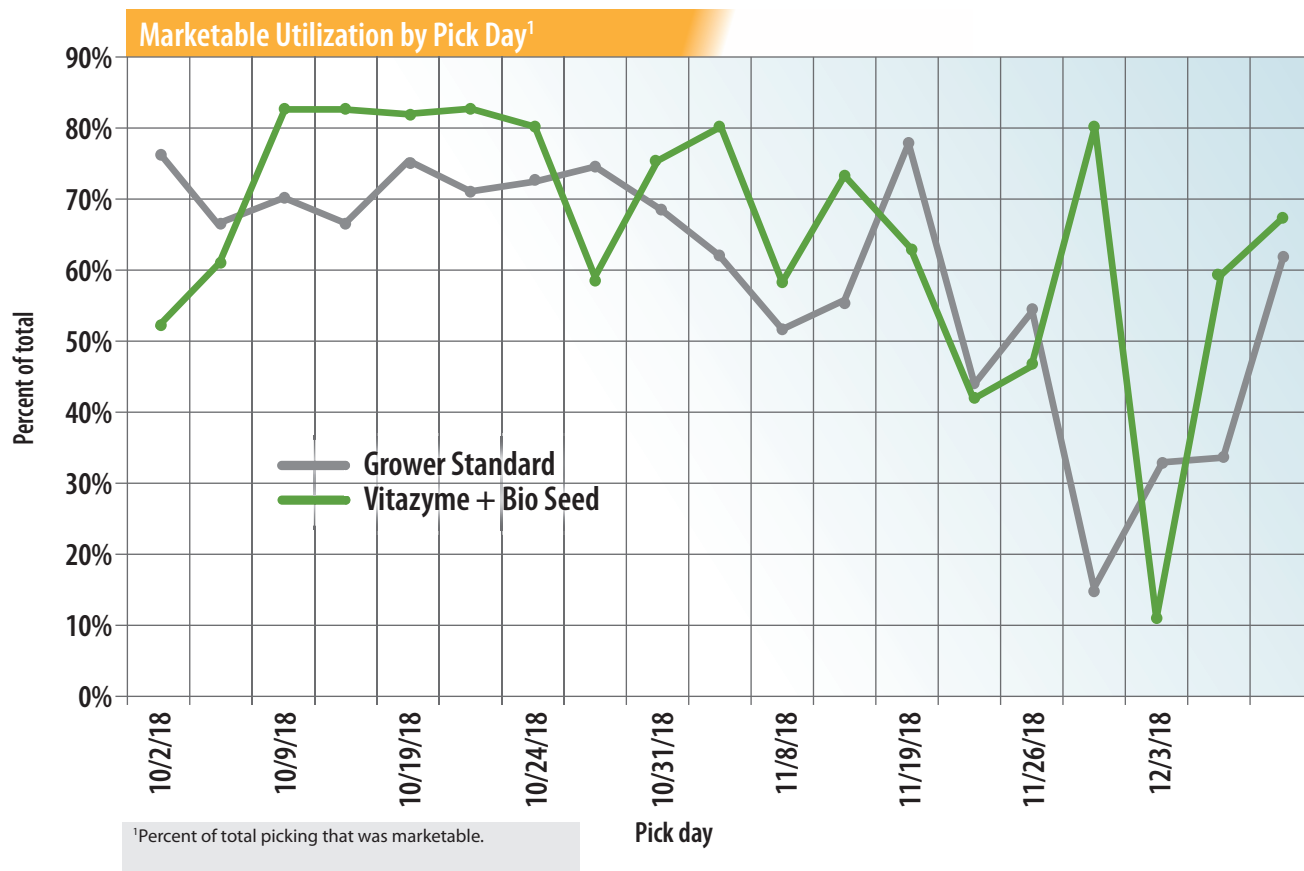
Canopy coverage results: no significant difference

Plant size results: no significant difference

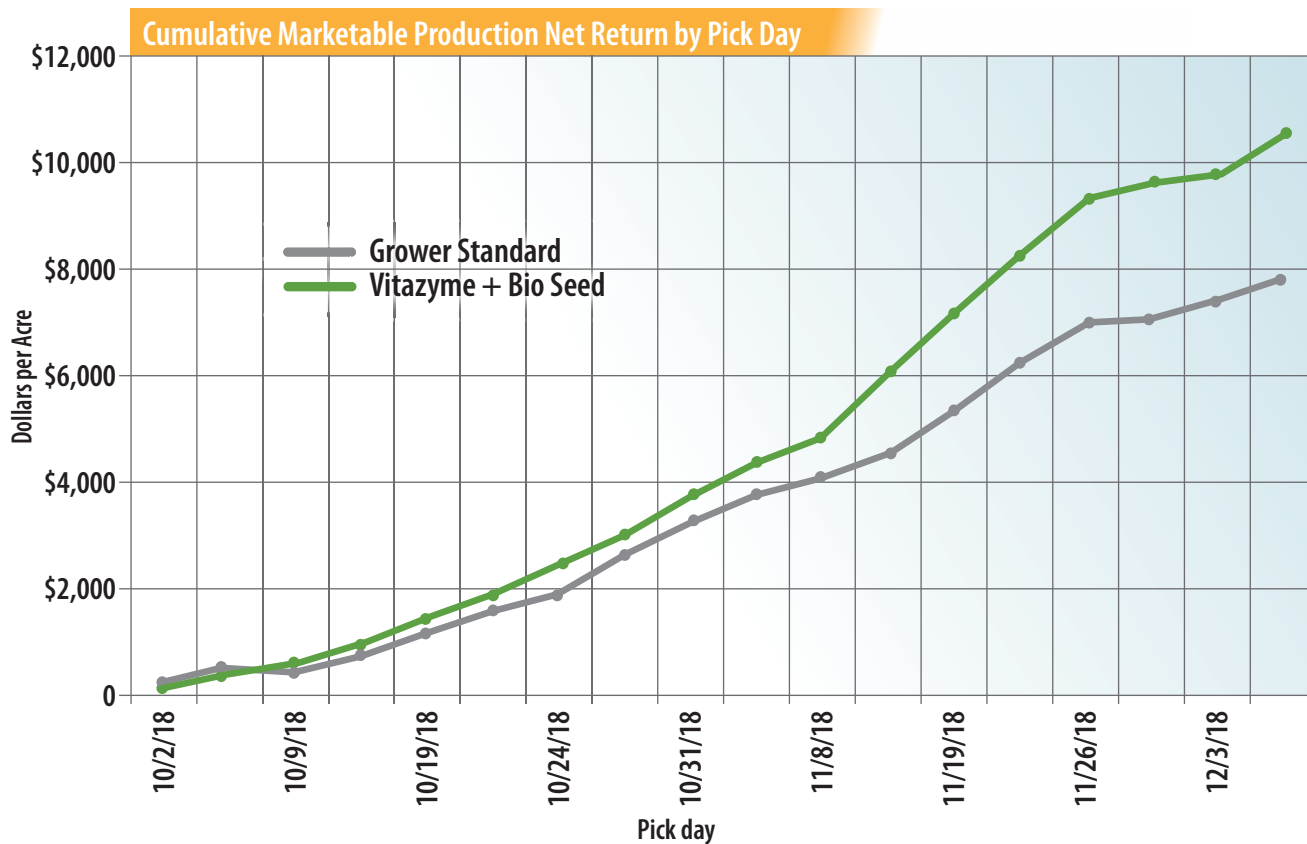
Leaf chlorophyll values: as measured by a Minolta SPAD Meter, no significant difference

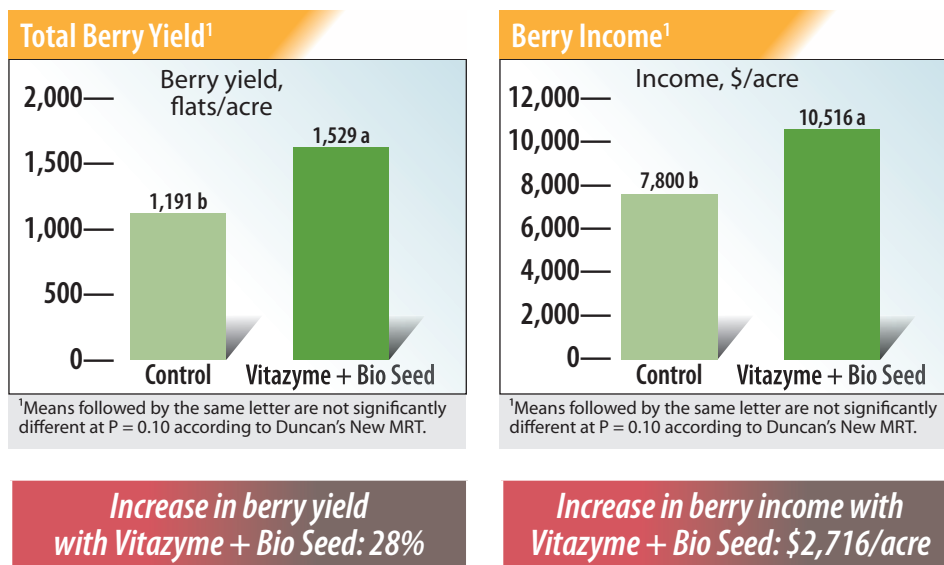
Yield and income results: The berries were picked 18 times during the trial period. Berry weight did not vary significantly between the two treatments during this period.





As can be seen in the graph, there was a strong tendency for the berries treated with Vitazyme and Bio Seed to be more marketable than the control berries.





With added costs of about \$76/acre with Vitazyme and Bio Seed, the added profit is \$2,640/acre, giving a cost: benefit ratio of 35:1.

Conclusions: This small plot strawberry trial in California, using Vitazyme and Bio Seed in a root drench at planting, plus five Vitazyme applications on the leaves and soil every three weeks, showed excellent increases in berry yield over the course of the trial. While chlorophyll, canopy coverage, and plant size did not vary significantly between the two treatments, the yield increased by 28% with these two products, which led to an excellent income increase of \$2, 716/acre (cost: benefit of 35:1). The percentage of marketable berries also was higher in most cases for the Vitazyme + Bio Seed treatment. These results show the great value of these two products used in combination for strawberry production in California.

Sunflowers with Vitazyme application

Vitazyme Field Tests for 2018



Researcher: V.V. Plotnikov

Research organization: State Enterprise "Scientific Innovation and Technology Center of the Institute of Feeding and Agriculture of Podilla of the National Academy of Agrarian Sciences of Ukraine"

Location: Vinnytsia District, Vinnytsia Region, Agronomichne Village, Ukraine

Variety: Sumiko

Planting date: April 30, 2018

Previous crop: spring wheat

Soil type: brown podzolic (humus = 2.2%)

Planting rate: 55,000 seeds/ha

Field preparation: disking to 6-8 cm, plowing to 22-24 cm, cultivation to 5-6 cm

Experimental design: A sunflower field was divided into a Vitazyme treated area, leaving the rest of the field untreated to determine the effect of this product on the yield of sunflower seeds.

① Control ② Vitazyme

Fertilization: unknown

Vitazyme application: (1) 0.5 liter/ha sprayed on the leaves and soil at the 8-leaf stage on June 8; (2) 0.5 liter/ha sprayed on the leaves at "basket formation"



Notice the larger heads and higher yield for the Vitazyme treated plants. Birds have eaten many of the seeds in some heads.

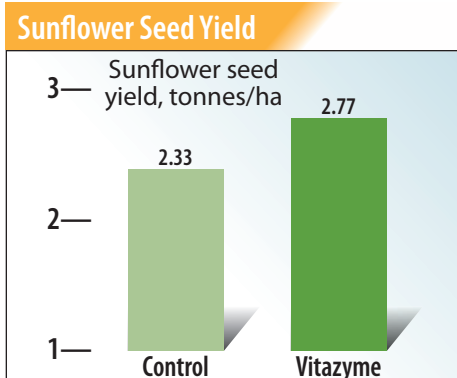


These Ukrainian sunflowers produced significantly better when treated with Vitazyme twice during the growing season.

Yield results:

Treatment	Yield tonnes/ha	Yield change tonnes/ha
1. Control	2.33	—
2. Vitazyme	2.77	0.44 (+19%)

*Increase in sunflower yield
with Vitazyme: 19%*



Income results: The extra yield of 0.44 tonne/ha resulted in \$150/ha more income.

Conclusions: A sunflower field trial in Ukraine produced a 19% yield increase from two 0.5 liter/ha Vitazyme applications, at the 8-leaf and “basket formation” stages. With an income increase of \$150/ha, this program is seen to be highly effective for sunflower growers in Ukraine.

Vitazyme Field Tests for 2018

Sunflowers with Vitazyme application



Researcher: V.V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Onufriivka District, Kirovograd Region, Vyshnivtsi Village, LTD Zlagoda, Ukraine

Variety: NK Kondi **Planting date:** May 1, 2018 **Previous crop:** winter wheat

Soil type: dark brown podzolic (humus = 2.6%) **Planting rate:** 50,000 seeds/ha

Field preparation: disking to 6-8 cm, plowing to 22-24 cm, cultivation to 4-5 cm

Experimental design: A sunflower field was divided into a Vitazyme treated area and an untreated control area to determine the effect of this product, in two applications, on yield and profitability.

① Control ② Vitazyme

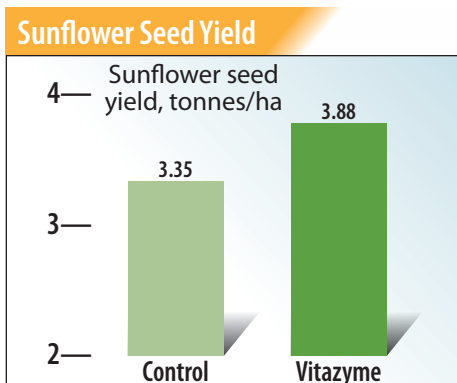
Fertilization: 44-26-26 kg/ha N-P₂O₅-K₂O at plowing; 34 kg/ha N at pre-planting cultivation

Vitazyme application: (1) 0.5 liter/ha sprayed on the leaves and soil at the 8-leaf stage on June 10; (2) 0.5 liter/ha sprayed on the leaves at “basket formation” on June 21

Yield results:

Treatment	Yield tonnes/ha	Yield change tonnes/ha
1. Control	3.35	—
2. Vitazyme	3.88	0.53 (+16%)

*Increase in seed yield
with Vitazyme: 16%*



Income results: The added yield of 16% (0.53 tonnes/ha) gained \$185/ha more income.

Conclusions: Two 0.5 liter/ha applications of Vitazyme in this Ukrainian sunflower study provided for an excellent seed yield increase at 0.53 tonne/ha (+16%), while returning the farmer an additional \$185/ha of income, showing the great value of this program for sunflower growers in Ukraine.

Tea with Vitazyme application—A Synergism Study with Three Products



Researcher: personnel of Loc Troi Group, Viet Nam

Research organization: Loc Troi Group, Viet Nam

Farmer: Bui Qui Phai

Location: Tan Phong Ward, Lai Chau City, Lai Chau Province, Viet Nam

Variety: unknown

Plant age: 40 years

Experimental design: A 1,200 m² portion of a tea plantation was treated with Vitazyme and two other products, and compared to an adjoining 900m² area that used the grower's traditional program, to determine the effect of this program on tea yield and profitability.

① Control

② Vitazyme + Boom + Silimax

Date	Vitazyme	Boom	Silimax
	1 liter/ha	1 liter/ha	?
March 1	x	o	o
March 22	x	o	o
April 9	o	x	o
April 17	x	o	o
April 23	x	o	o
May 11	o	x	o
May 17	x	o	o
May 24	o	o	x
June 14	o	x	o
June 6	x	o	o

All products were sprayed over the leaves on the appointed dates

Fertilization: unknown

Vitazyme application: 1 liter/ha sprayed at six times from March 1 to June 6, 2018

Boom F application: 1 liter/ha sprayed three times from April 9 to June 14, 2018. Boom F is a nitrobenzene plus trace mineral fertilizer.

Silimax application: an unknown application rate. Silmax is a 10% silicon product produced by HumaGro.



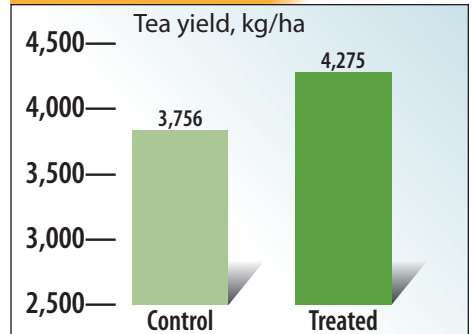
This tea trial in Viet Nam revealed how Vitazyme, along with two other products, gave an excellent 14% yield response. Note that the 25% yield response for the April 7 picking was due solely to Vitazyme.

Yield results: Three harvests were made for the two treatments during the trial period, on April 7, May 11, and June 6, 2018.

Date	Tea Yield		Yield change
	Control	Treated	
	kg/ha	kg/ha	kg/ha
April 7	334	417	83 (+25%)
May 11	211	250	39 (+18%)
June 6	3,211	3,608	397 (+12%)
Total	3,756	4,275	519 (+14%)

Overall tea yield increase with Vitazyme + Boom + Silimax: 14%

Tea Yield



Quality results: The quality of the tea was very good, eligible for export to the European Union.

Income results: The extra 519 kg/ha of tea was worth **8,500,000 VND/ha**.

Conclusions: A study on tea in Viet Nam, using six 1 liter/ha Vitazyme applications, three Boom applications, and a single Silimax application, over a three-month period resulted in a cumulative yield increase of 519 kg/ha over three pickings, which was 14% greater than the untreated control yield. This led to 8,500,000 VND/ha more income. These results demonstrate the considerable efficacy of this program to improve tea yields and profitability in Viet Nam, but it also shows that **Vitazyme alone produced the greatest harvest yield increase—25%—when only two applications of this product had been applied before the first harvest on April 7, and no other products had yet been applied.**

Tobacco with Vitazyme application



Researchers: T. Chipeta, J. Matandika, J. B. Mumba, and Neil A. Mphembera

Research organization: Farmers Organization Limited, Malawi

Location: Kandiya Research Station, Lilongue District, and Mwimba Research Station, Kasungu District

Soil types: relatively infertile **Variety:** KRK 26

Plot size: 4.8 m x 7.2 m, with four ridges spaced 1.2m apart

Plant density: 0.6 m in-row spacing, or 12 plants per row and 48 plants per plot

Experimental design: A small-plot replicated design (four replications) was established at two Malawi research stations to determine the root mass, leaf number, plant height, stem diameter, leaf area, yield, color distribution, and grade of cured leaves as influenced by fertilizer and Vitazyme, alone and in combination. (see table to the right)

Fertilization: **100% fertilizer** (Treatments 2 and 3) received 32.4 g/plant of Super D and 6.24 g/plant of CAN, broadcast. **75% fertilizer** (Treatments 4 and 5) received 24.3 g/plant of Super D and 4.68 g/plant of CAN. **50% fertilizer** (Treatments 6 and 7) received 16.2 g/plant of Super D and 3.12 g/plant of CAN.

Vitazyme application: Treatments 3, 5, and 7 were treated with Vitazyme in three ways: (1) seedlings to be transplanted were dipped in a 2.3% solution (700 ml of Vitazyme in 30 liters of water); (2) during transplanting, 1.0 liter/ha was added to the transplanting water; (3) at 21 days after transplanting, 1.0 liter/ha was sprayed on the plants and soil.

Sampling method: Ten plants were sampled from the two middle ridges of the plots, except for yield analyses, when 20 plants were sampled.

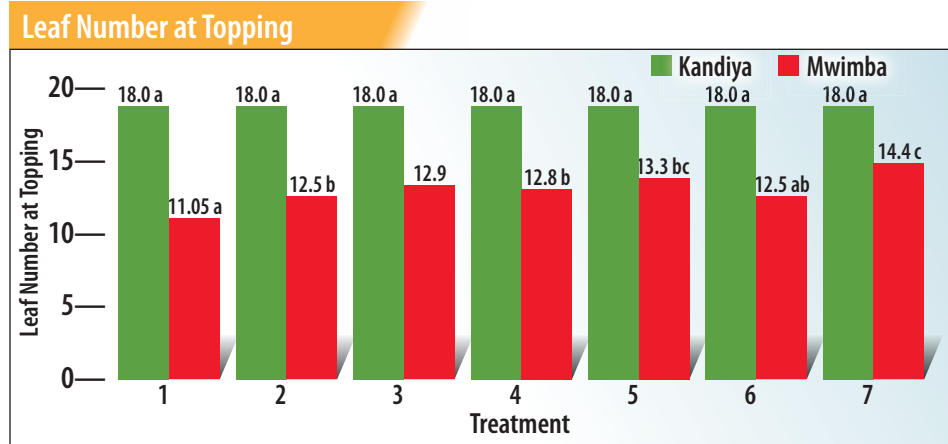
Data analysis: An Analysis of Variance was performed on the data, and means were separated by Fisher's Protected Least Significant Difference Test at $P = 0.05$.

Growing season weather: Rainfall during the growing season was 895 mm at Kandiya and 739 at Mwimba, within the range of rainfall for tobacco growth of 500 to 1,250 mm.

Stand counts: There was a perfect stand of plants at harvest at the Mwimba station, and 17.5 to 19.5 plants in the two inner rows at the Kandiya station. Differences were not significant.

Growth and yield results: Data was taken from 10 plants per plot except for yield, where 20 plants were used.

Treatment	Fertilizer	Vitazyme
1	o	o
2	100%	o
3	100%	Yes
4	75%	o
5	75%	Yes
6	50%	o
7	50%	Yes

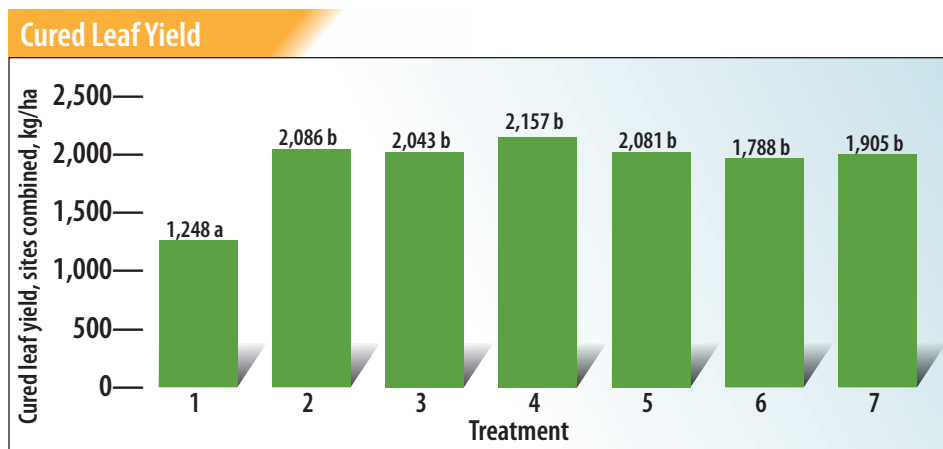


Statistics

Overall mean 12.77 %
 SED 0.73
 LSD 1.534
 CV 1.7%
 Prob F 0.014

Vitazyme increases

At 100% fertilizer 3 %
 At 75% fertilizer 4%
 At 50% fertilizer 15%

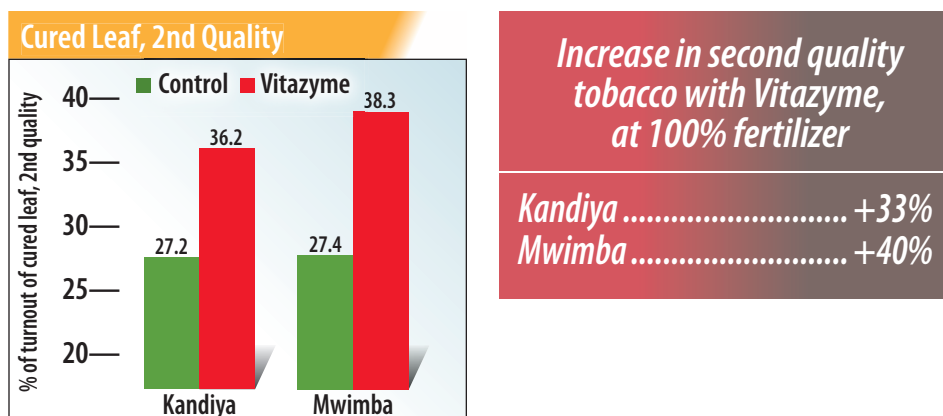


Statistics	Vitazyme yield change
Overall mean 1901 kg/ha	At 100% fertilizer -2%
SED 233 kg/ha	At 75% fertilizer -4%
LSD 469 kg/ha	At 50% fertilizer +7%
CV 7.1%	
Prob F 0.005	

There were no significant differences among the paired treatments at the same fertilizer level, with and without Vitazyme, for either location for dry root mass, final plant height, stem diameter, lower leaf area, middle leaf area, and upper leaf area. Neither were there significant differences between Vitazyme and control treatments at the same fertilizer level.

Leaf quality results:

- **Leaf color:** There were no significant differences between Vitazyme and untreated treatments at the same fertilizer levels, but there were differences that were almost significant, yet with no consistent pattern across fertilizer levels and locations.
- **Leaf grades:** Only one significant difference appeared between Vitazyme treated and untreated treatments at the same fertilizer level for either location. This difference, for second quality at both locations, is shown graphically below.



Conclusions: This tobacco study in Malawi, utilizing the same treatments as a study conducted in 2017, revealed fewer responses than noted in 2017. Leaf number and second quality leaf turnout were enhanced with Vitazyme, but most parameters were not significantly improved with Vitazyme at the same fertilizer level. The 2017 study revealed marked improvements with Vitazyme treatment for root volume, plant height, stem diameter, leaf area, leaf quality and color, and yield, especially at the 75% fertilizer level (+26%). Reasons for the reduced response to Vitazyme in 2018 are not known.

Tomatoes with Vitazyme application

Researchers: Giovanni Gomez (Magussa), Luciano Frias (Quimica Lucava), and Juan C. Diaz, Ph.D. (Ag Biotech)

Grower: Marco A. Casillas

Farmer: Juan Carlos Baltazar

Research organization: Chimica Lucava S. A., Celeya, Guanajuato, Mexico

Location: La Noria Farm, Casillas Agricultural Group, Autlan, Jalisco, Mexico

Variety: Saladette T16

Row spacing: 1.4 meters

Experimental design: A tomato trial on 1 hectare in a trellised area, using 12 rows 90 meters long (1,512 m²), was selected for a Vitazyme trial to evaluate the effect of this product on the growth and yield of the tomato crop. Both treatments were assessed on 1,512 m².

1 Control 2 Vitazyme

Fertilization: unknown

Vitazyme application: (1) 1 liter/ha in the transplant drench; (2, 3, 4, 5, and 6) 0.5 liter/ha to the leaves and soil every 15 days; August 15 and 29, September 12 and 26, and October 10

Growth results: The treated area had an average height of 175 cm, 15 cm more than the control, which averaged 160 cm. Vitazyme also produced considerably more foliage with the treated plants, as evidenced in the accompanying photos.

Yield results: A typical plant from both treatments was selected and evaluated.



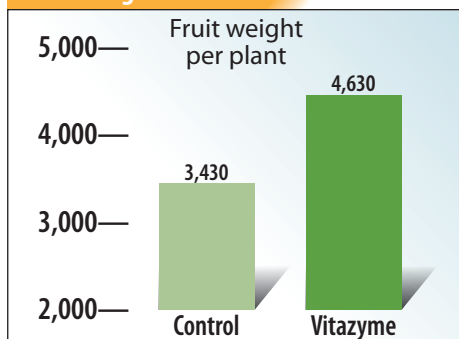
The treated tomatoes on the left display considerably greater leaf growth and row fill than the untreated plants on the right.



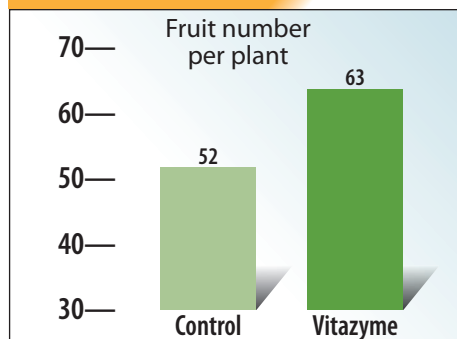
This Magussa tomato trial revealed the potential for Vitazyme to increase not only the total number of fruit, but their average weight as well.

	Control	Vitazyme	Change
Fruit weight per plant, grams	3,430	4,630	+1,200 (+35%)
Fruit number per plant	52	63	+12 (+24%)
Average fruit weight, grams	67.3	73.5	+6.2 (+9%)

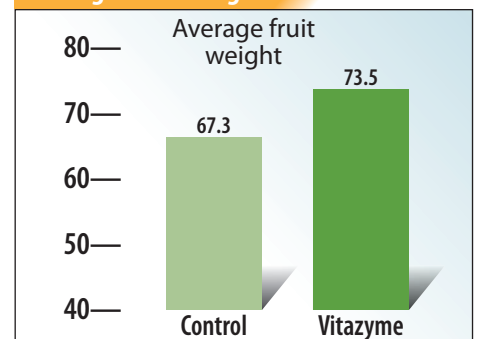
Fruit Weight



Fruit Number



Average Fruit Weight



Increase in fruit weight: 35%

Increase in fruit number: 24%

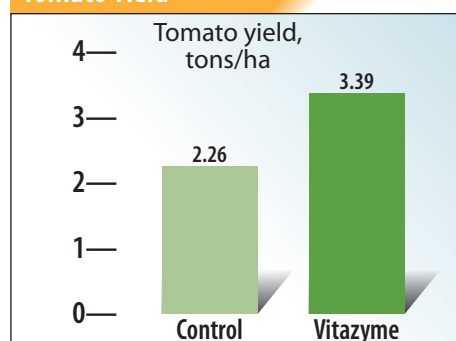
Increase in average fruit weight: 9%

By multiplying the fruit weight/plant and fruit number/plant, a 50% yield increase is evident, which increase is equivalent to 1.13 tons/ha (see the chart below). The data below is for the third picking, and with pickings every three days for two months, then 20 pickings would be made.

Parameter	Control	Vitazyme	Change
Cases per 1,512 m ²	20	28	8 (+40%)
Gross case weight, grams	17,860	19,070	—
Empty case weight, grams	765	765	—
Net case weight, grams	17,095	18,305	1,210 (+7 %)
Yield per 1,512 m ² , grams	342	513	171 (+50%)
Total yield, tons/ha	2.26	3.39	1.13 (+50%)

Increase in tomato yield with Vitazyme: 50%

Tomato Yield



Conclusions: In this Autlan, Jalisco, Mexican tomato study, applying Vitazyme as a transplant drench, and then five times every 15 days at 0.5 liter/ha, resulted in excellent growth and yield responses

These excellent results show the great value of using Vitazyme for tomato production in Mexico.

Fruit weight per plant.....+ 35%
Fruit number per plant+ 24%
Plant height.....+ 9 %
Harvested cases per picking+ 40%
Net fruit weight per harvested case+ 7%
Fruit yield per hectare.....+ 50%

Vitazyme Field Tests for 2018

Tomatoes with Vitazyme application



Researchers: K. Bruce Kirksey, Ph.D. **Research organization:** Agricenter International, Memphis, Tennessee
Location: Memphis, Tennessee **Variety:** Mountain Merit **Soil type:** Falaya silty loam; good fertility and drainage; pH= 6.3
Experimental design: A small-plot replicated tomato trial was established to evaluate the effect of Vitazyme on the yield and profitability for tomatoes. Plots were 10 x 30 ft, with four replications.

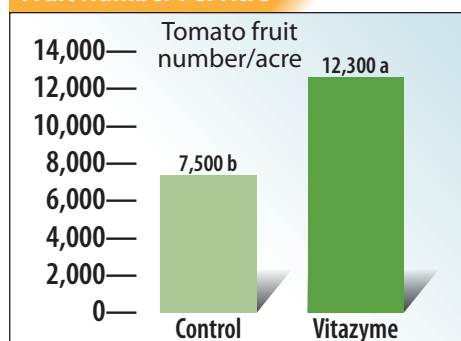
① Control ② Vitazyme

Fertilization: unknown

Vitazyme application: 13 oz/acre (1 liter/ha) at four times; (1) transplant drench (July 5), (2) early bloom (August 10), (3) fruit set (August 23), and (4) first picking (September 10)

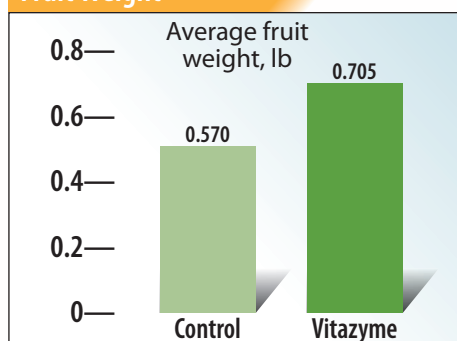
Yield results: Six pickings were completed, picking all fruit with a "star" on the bottom, or with at least a slight tinge of red.

Fruit Number Per Acre¹

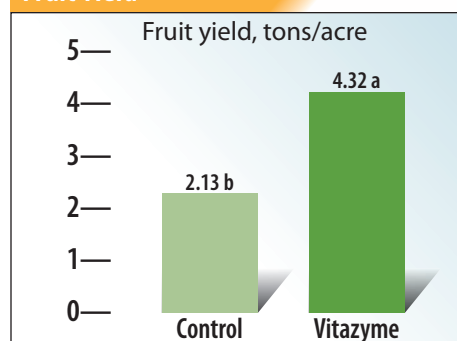


¹Standard error = 860 fruit/acre. Means followed by the same letter are not significantly different at P = 0.05.

Fruit Weight



Fruit Yield¹



¹Standard error = 0.24 tons/acre. Means followed by the same letter are not significantly different at P = 0.05.

Increase in fruit/acre with Vitazyme: 4,800 (+64%)

Increase in fruit weight with Vitazyme: 0.135 lb (+24%)

Increase in fruit yield with Vitazyme: 2.19 tons/acre (+103%)

Income results:

Control	Extra income	Extra costs	Added profit
	\$/acre	\$/acre	\$/acre
Control	—	—	—
Vitazyme	1,753	34	1,719

Return on investment: 51 : 1

Conclusion: A small-plot tomato trial in Tennessee, using four Vitazyme applications of 13 oz/acre from transplanting to first picking, produced excellent responses in terms of fruit number per acre (+64%), fruit average weight (+24%), and total fruit yield (+103%). By more than doubling the yield, the added profit from these four applications was \$1,719/acre, a return on investment of 51:1, showing the great effectiveness of this program for tomato production.

Vitazyme Field Tests for 2018

Wheat with Vitazyme application



Researcher: David Gray

Research organization: David Gray's Agro Advantage, O'Connor, Western Australia

Location: Dumblebung, Western Australia

Variety: Mace

Planting date: April 24, 2018

Planting rate: 60 kg/ha

Previous crop: barley

Soil type: medium clay loam

Planting method: Stilleto knife point with press wheels

Row spacing: 9 inches

Plot size: 4 x 40 meters

Experimental design: A barley experiment, using two replicates of four treatments and 4 x 40 meter plots, was established to evaluate the effects of Vitazyme and MicroPlus, alone and in combination, on the growth, yield, and quality of wheat.

① **Control** ② **Vitazyme**

③ **MicroPlus** ④ **Vitazyme + MicroPlus**

Fertilization: Preplanting: 80 kg/ha Agstar Extra, and 60 liter/ha Flexi-N. Post-planting: 50 liters/ha Flexi-N

Vitazyme application: 10% fulvic acid was added to the Vitazyme; applied at 2.5 liters/tonne of seed

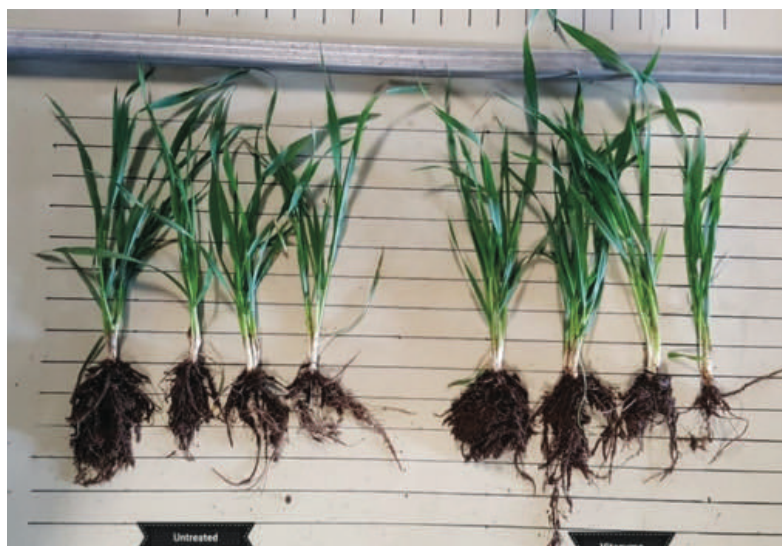
MicroPlus application: MicroPlus is a formulation of 14 beneficial bacteria and fungi; including mycorrhizal fungi; applied at 3 kg/tonne of seed

Herbicide application: Preemergent herbicides: 2 liters/ha Weedmaster Argo, 2.5 liters/ha trifluralin. Post-emergent herbicide: 750 ml/ha Howitzer

Fungicide application: Preemergent fungicide: 200 ml/ha flutriafol

Growth results: On July 26, 2017, visual assessments of plants dug from the various plots showed the following. Note the accompanying photos.

Treatment	Leaf mass	Root mass
1. Control	n.a.	n.a.
2. Vitazyme	+	+
3. MicroPlus	o	o
4. Vita+MicroPlus	+	+



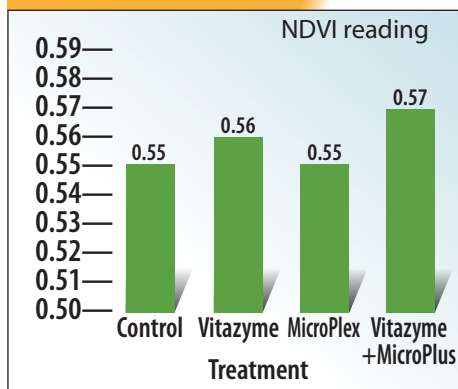
Vitazyme application alone, at 2.5 liters per tonne of seed, plus fulvic acid (right side) gave an excellent boost to both leaf and root mass, and the grain yield increased by 7%.



When MicroPlus was added to the Vitazyme, there was a yield increase in root and leaf growth, but yield did not reveal a synergism.

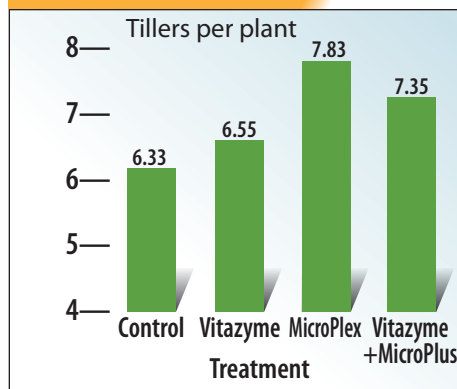
Both Vitazyme alone and with MicroPlus gave excellent growth responses to the leaves and roots.

NDVI Index at First Node¹



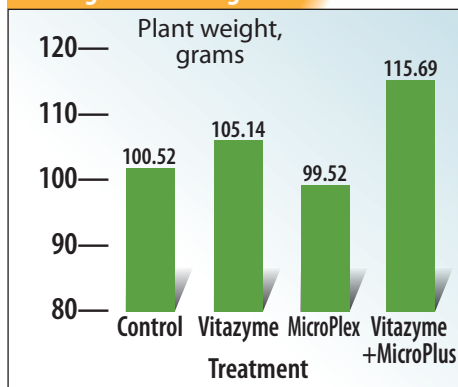
¹NDVI = Normalized Difference Vegetation Index. This is a graphical index that analyzes remote sensing measurements, taken from a satellite or other aerial device. It is a measurement of the near infrared (NIR) and red electromagnetic frequencies to calculate the total reflectance of leaves as related to the amount of chlorophyll.

Tiller Count¹



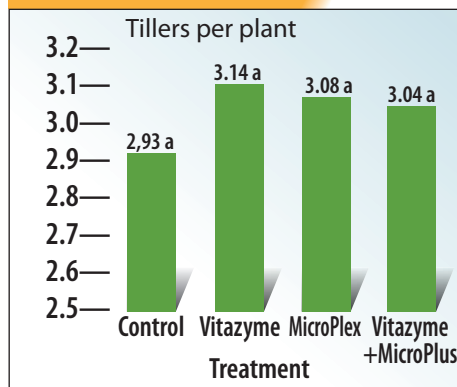
¹The average of 20 plants per plot, or 40 total plants.

Average Plant Weight¹



¹The average of 10 plants per treatment.

Harvested Yield¹



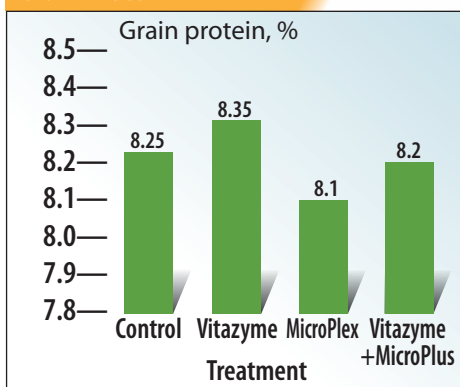
¹Means followed by the same letter are not significantly different at P = 0.05. There was considerable variation in plot yield due to growing conditions and soil variations.

*Increase in plant weight
with Vitazyme: 5%*

*Increase in grain yield
with Vitazyme : 7%*

*Increase in plant weight
with Vitazyme + MicroPlus: 15%*

Grain Protein



Conclusions: A wheat trial in Western Australia, utilizing two plots per treatment, revealed that Vitazyme alone produced the highest grain yield, 7% greater than the control yield. This yield was also the highest in protein of all treatments, being 0.1% greater than the control. NDVI indexes showed the greatest leaf density for the combined Vitazyme and MicroPlus treatment, as evidenced in the photos as well. MicroPlus alone gave the greatest number of tillers per plant. Because of variations among plots caused by uneven germination and soil variations, as well as there being only two replications, significant yield differences were not detected among the four treatment. However, the indications from superior responses to Vitazyme for root mass and leaf area, HDVI indexes, plant weight, grain yield, and grain protein reveal a reasonable confidence to farmers that this product is a valuable input for wheat farmers in Australia.

Winter Canola with Vitazyme application

Researcher: V. V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Bilgorod-Dnistrovskii District, Odessa Region, Petrivka Village, LTD Spelta, Ukraine

Variety: Mercedes **Planting date:** August 20, 2017

Previous crop: winter wheat **Soil type:** typical chernozem (humus = 4.1%)

Planting rate: 400,000 seeds/ha

Field preparation: disking to 10-12 cm, plowing to 20-22 cm, cultivation to 3-4 cm

Experimental design: A winter canola field in southern Ukraine, planted in the late summer of 2017, was treated in part with Vitazyme the spring of 2018, and compared with untreated portions of the field to determine the product's effect on seed yield and profitability.



Notice the larger and deeper-penetrating root system of the Vitazyme treated winter canola. Better roots mean greater uptake of nutrients for higher yields.

① Control ② Vitazyme

Fertilization: 32-52-24 kg/ha N-P₂O₅-S at plowing; 20 kg/ha P₂O₅ at planting; 170-36 kg/ha N-S in the spring

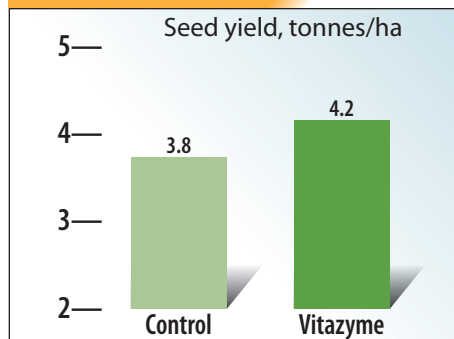
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at early flowering on May 2

Yield results:

Treatment	Seed yield tonnes/ha	Yield change tonnes/ha
1. Control	3.8	—
2. Vitazyme	4.2	0.4 (+10%)

*Increase in seed yield
with Vitazyme : 10%*

Seed Yield



Income results: A 0.4 tonne/ha yield increase gave \$178/ha greater income.

Conclusions: A western Ukraine winter canola study, using Vitazyme at 1 liter/ha in the spring at early flowering, resulted in a yield increase of 10%, while boosting income by \$178/ha. These results reveal the good efficacy of the program for canola growers in Ukraine.

Winter Canola with Vitazyme application

Researcher: V. V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Ivanove District, Odessa Region, Rosiiska Slobidka Village, Agricultural Farm Zolota Osin, Ukraine

Variety: Gybrirok **Planting date:** August 20, 2017 **Previous crop:** winter wheat

Soil type: typical chernozem (humus = 4.1%) **Planting rate:** 500,000 seeds/ha

Field preparation: disking to 14-16 cm, cultivation to 3-4 cm

Experimental design: A field trial in southern Ukraine with winter canola was prepared in 2017, with one portion of the field treated with Vitazyme the spring of 2018 to evaluate the effect of this product on canola yield and profitability.

① Control ② Vitazyme

Fertilization: unknown

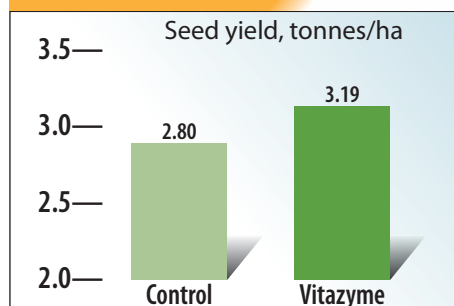
Vitazyme application: 0.5 liter/ha during bud formation on April 26

Yield results:

Treatment	Seed yield tonnes/ha	Yield change tonnes/ha
1. Control	2.80	—
2. Vitazyme	3.19	0.39 (+14%)

Increase in seed yield with Vitazyme : 14%

Seed Yield



Income results: A seed increase of 0.39 tonne/ha produced \$184/ha additional income.

Conclusions: Vitazyme at bud formation in this southern Ukrainian canola trial produced a yield increase of 14%, using only 0.5 liter/ha of the product. This led to an income increase of \$184/ha, showing the great utility of the program for canola growers in Ukraine.

Winter Wheat with Vitazyme application

Researcher: V. V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Kolyvailo Farm, Vinnytsia District, Vinnytsia Region, Miziakivski Hutory Village, Ukraine

Variety: Midas, third generation

Planting date: October 10, 2017

Previous crop: sunflowers

Soil type: gray podzolic (humus = 2.0%)

Planting rate: 6 million seeds/ha

Field preparation: disking to 6-8 cm, plowing to 20-22 cm, cultivation to 4-5 cm

Experimental design: A winter wheat field was divided into Vitazyme treated and untreated areas to determine the effect of this product on the yield, quality, and profitability of the crop.

① Control ② Vitazyme



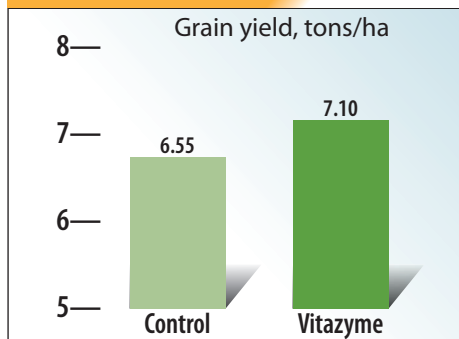
In this random plant sampling, Vitazyme is shown to promote rooting and top growth, leading to a higher yield.

Fertilization: 15-40-40 kg/ha of N-P₂O₅-K₂O at fall sowing; 186-48 kg/ha of N-S in the spring

Vitazyme application: 1 liter/ha on October 8, 2017, sprayed over the soil

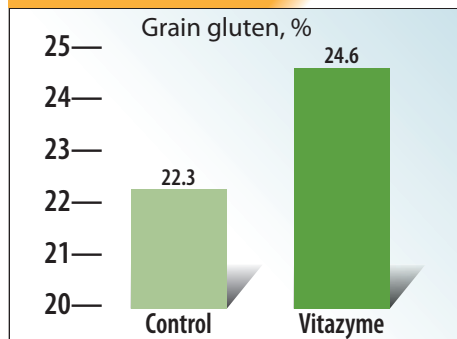
Yield and grain quality results: The harvest date is unknown.

Grain Yield



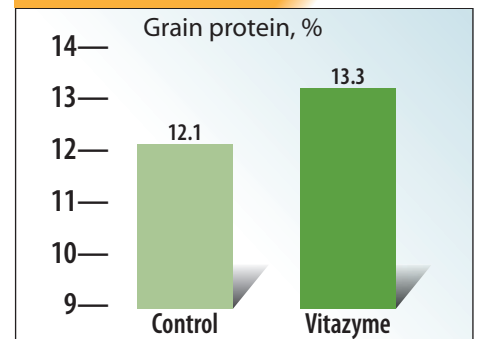
Increase in grain yield with Vitazyme: 8%

Grain Gluten



Increase in grain gluten with Vitazyme: 2.3 %-points

Grain Protein



Increase in grain proteins with Vitazyme: 1.2 %-points

Income results: The improvement in yield and grain quality provided an extra \$129/ha income for the farmer.

Conclusions: A winter wheat study in central Ukraine, using only one 1 liter/ha application of Vitazyme, showed an 8% increase in grain yield, along with significant increases in grain gluten (2.3 percentage points) and grain protein (1.2 percentage points). These improvements provided \$129/ha more income, and proved the considerable efficacy of this product for improving wheat production in central Ukraine.

Winter Wheat with Vitazyme application

Researcher: V. V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Bilgorod-Dnistrovskii District, Odessa Region, Petrivka Village, LTD Spelta, Ukraine

Variety: Midas, elite

Planting date: September 21, 2017

Previous crop: winter canola

Soil type: typical chernozem (humus = 4.1%)

Planting rate: 5 million seeds/ha

Field preparation: disking to 6-8 cm, disking to 14-16 cm, cultivation to 4-5 cm

Experimental design: A winter wheat field in southern Ukraine was divided into Vitazyme treated and untreated areas, and compared to determine the effect of this product on the yield, quality, and profitability of the biostimulant.

① Control ② Vitazyme

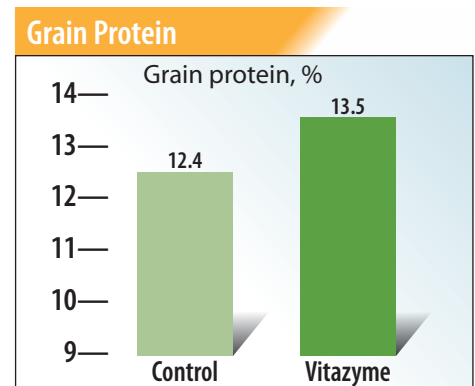
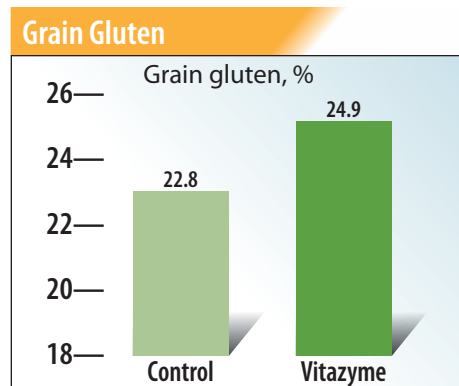
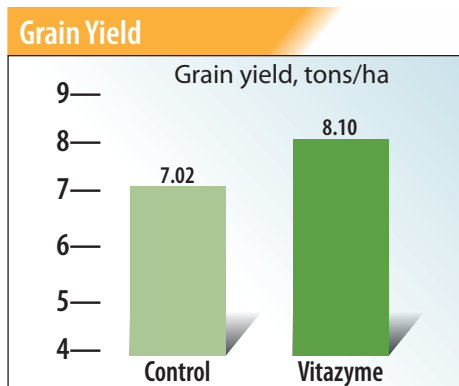
Fertilization: 18-18-18 kg/ha of N-P₂O₅-S at disking; 20 kg/ha at planting; 170-36 kg/ha N-S in the spring

Vitazyme application: (1) 0.5 liter/ha sprayed on the leaves and soil at the 3-leaf stage on October 26, 2017; (2) 0.5 liter/ha sprayed on the leaves and soil at tillering on April 16, 2018



A Vitazyme seed treatment for wheat (left-hand plants) stimulates germination and seedling development, an effect that compounds during the growing season as can be seen here.

Yield and quality results:



Increase with Vitazyme

Grain yield 15 %
 Grain gluten 2.1 %-points
 Grain crude protein 1.1 %-points

Income results: An increase in yield of 2.1 tonnes/ha, coupled with an improvement in crude protein and gluten, resulted in \$243/ha more income.

Conclusions: This southern Ukraine winter wheat trial, using two 0.5 liter/ha Vitazyme applications, resulted in an excellent 15% yield increase, along with good increases in gluten and crude protein, with a 1.1 percentage point improvement for protein. These increases produced \$243/ha more income for the farmer and reveal the great efficacy of this program for wheat farmers in Ukraine.



Winter Wheat with Vitazyme application

Researcher: V. V. Plotnikov

Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine

Location: Bilgorod-Dnistrovskii District, Odessa Region, Petrivka Village, LTD Spelta, Ukraine

Variety: Balaton, elite **Planting date:** September 21, 2017 **Previous crop:** winter canola

Soil type: typical chernozem (humus = 4.1%) **Planting rate:** 5 million seeds/ha

Field preparation: disking to 6-8 cm, disking to 14-16 cm, cultivation to 4-5 cm

Experimental design: A winter wheat field in southern Ukraine was divided into Vitazyme treated and untreated areas to evaluate the effect of this product on the yield and quality, as well as profitability, for winter wheat.

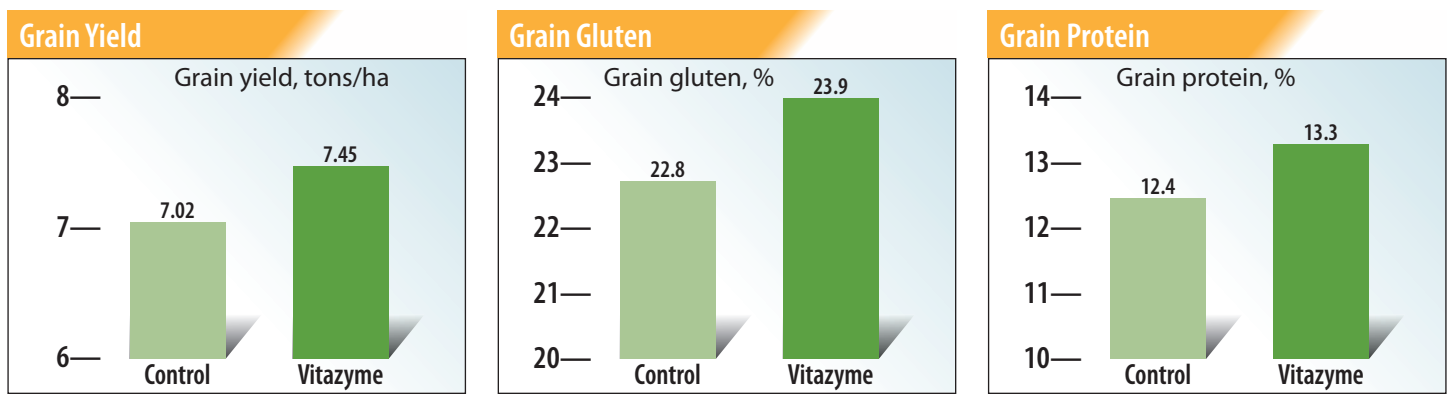
① Control ② Vitazyme

Fertilization: 18-18-18 kg/ha of N-P₂O₅-S at disking; 20 kg/ha P₂O₅ at planting; 170-36 kg/ha N-S in the spring

Vitazyme application: 0.5 liter/ha sprayed on the leaves and soil in the fall of October 26, 2017

Income results: The improvement of grain yield and quality resulted in \$95/ha added income.

Yield and quality results:



Increase with Vitazyme

Grain yield 6 %
 Grain gluten 1.1 %-points
 Grain crude protein 0.9 %-point

Conclusions: This winter wheat trial in southern Ukraine, using a single spring application of Vitazyme at only 0.5 liter/ha, resulted in a respectable yield increase of 6%, while boosting grain gluten and crude protein by 1.1 and 0.9 percentage points, respectively. These results show the excellent utility of this program for Ukrainian wheat growers.



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 significantly increasing the efficiency 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 significantly by about 9 bu/acre, and nitrogen efficiency 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

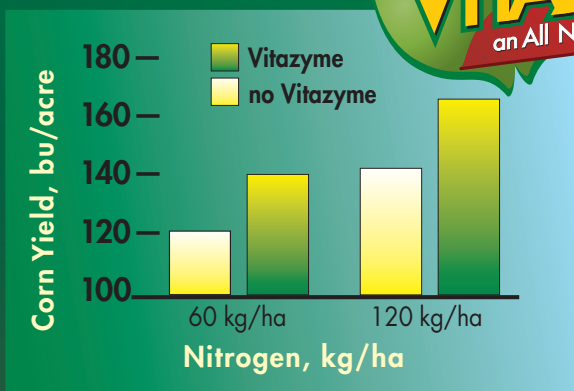
Nitrogen efficiency at 125 lb/acre

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

SEE WHAT **VITAZYME**[®] DID IN CANADA TO IMPROVE NITROGEN UTILIZATION!



At Branchton, Ontario, **VITAZYME** produced significant yield increases of 16% at both 60 and 120 kg/ha of nitrogen.

- Increase with Vitazyme at 60 kg/ha: \$74.40/acre!
- Increase with Vitazyme at 120 kg/ha: \$90.00/acre!

THE YIELD WITH VITAZYME AT 60 KG/HA OF NITROGEN WAS STATISTICALLY THE SAME AS THE YIELD AT 120 KG/HA OF NITROGEN WITHOUT VITAZYME!



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