

2013 Field Trial Results

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

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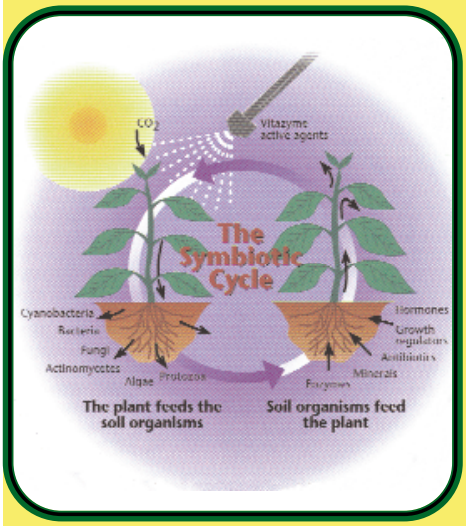
2013 Vitazyme Field Trial Results

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

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

Improved Symbiosis: The Secret of Vitazyme's Action

All plants that grow in soils develop an intimate relationship between the roots and the organisms that populate the root zone. The teeming billions of bacteria, fungi, algae, cyanobacteria, protozoa, and other organisms that grow along the root surfaces — the rhizosphere — are much more plentiful than in the bulk of the soil. This is because roots



feed the organisms with dead root epidermal cells as well as compounds exuded from the roots themselves. The plant may inject 25% or more of its energy, fixed in the leaves as carbohydrates, amino acids, and other compounds, into the root zone to feed these organisms, for a very good purpose.

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

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

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

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

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

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

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

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

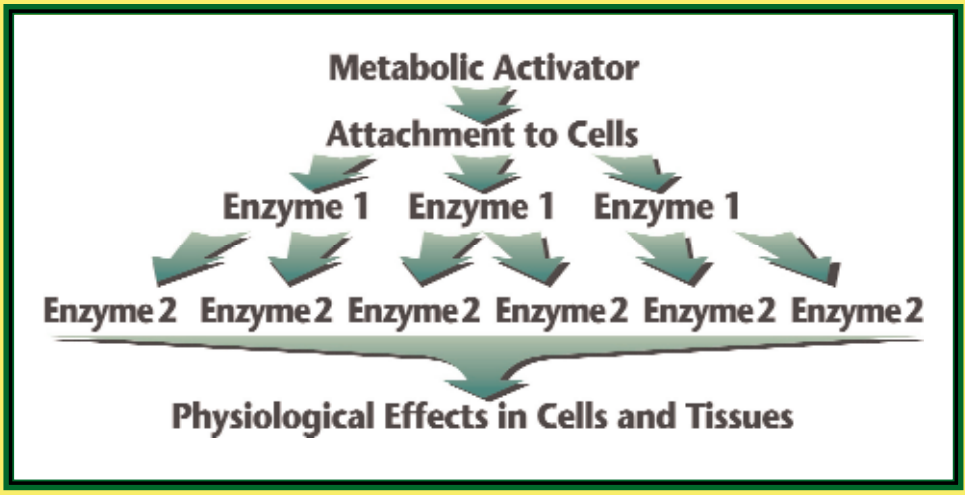
Soil Organic Matter			Previous Crop		Compaction		Soil NO_3-N Test		
Low(<1.5%)	Medium(1.5-3%)	High(>3%)	Non-legume	Legume	Much	Little	Low	Medium	High
1	2	3	1	3	1	3	2	4	6

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

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

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

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



Vitazyme Highlights for 2013

The year 2013 continued the legacy of excellent responses to Vitazyme across many soil types and management systems in countries throughout the world. Let us briefly summarize some of the more outstanding results in this section.

Some Highlights for 2013

1 Several trials on cherries, apples, peas, wheat, and barley in Washington state proved the great efficacy of the program for these crops, For cherries, the color, size, weight, brix, pressure, and grade all improved; yield increased by 24 to 27% over the controls. Apples showed similar results, and moved the fruit more towards the premium grade. Winter pea yield improved by an amazing 46% with Vitazyme!

2 Coffee in Viet Nam showed excellent responses to the Vitazyme program, as an established plantation increased in yield by 29%, while a coffee nursery produced great improvements in early germination, a height advantage of 57 to 75%, and increased leaf numbers of 33 to 75%. Coffee aroma and taste have been superior in unofficial evaluations.

3 Corn studies in the Upper Midwest proved again the reliability of the program to increase yields. At Cedar Falls, Iowa, yields improved significantly at both 50% and 100% nitrogen (14 and 13%, respectively), especially when combined with Quantum microbes, where yields reached up to 23% more than the control. Trials at South Dakota State University produced significant yield increases of up to 8.7% at four nitrogen levels, and SGS near Brookings, South Dakota, found increases of up to 6.3 bu/acre with Vitazyme.

4 A wide array of crop tests in Mexico showed the potential of the program to improve the growth and yield of cilantro, corn, sorghum, celery, sugar cane, strawberries, cucumbers, eggplant, and other crops. A greenhouse trial with strawberries produced a berry yield increase of 300% over the control, while spider mite populations plummeted.

5 Rice studies in Viet Nam and the Philippines continued to display excellent responses to Vitazyme for this most important food staple. Increases were 22 to 39% in Viet Nam, and a massive 68% increase in a Philippine demonstration.

6 Extensive Paraguayan studies with wheat, using seed or foliar applications, showed fine improvements in growth parameters, seed weight, and yield (up to 62%), especially when Vitazyme was combined with foliar applied nutrients.

7 Fine results on peas, wheat, and barley in Ukraine reinforce the superb data from that country that has been generated now for many years. Not only were yields improved, but resistance to fungal diseases as well..

Vitazyme Field Tests for 2013

Apples

Organic Apples

Researcher: Jacob Hesseltine Orondo, Washington
Farmer: John Hope
Location: Golden Harbor Orchards,
Sprayer: Fan-atomizer, 100 gal/acre, 4 mph
Variety: Ambrosia
Rootstock: M106/M7
Tree age: 12+ years
Soil type: sandy loam; pH 7.0
Tree density: 1,500 to 2,500/acre (high density, super spindle/central leader system)
Experimental design: A 4-acre block of Ambrosia organically grown apples was treated with the Vitazyme program to determine effects of the product compared with an untreated area on the other side of a field road.

1. Control **2. Vitazyme**

Fertilization: spring: 13% feather meal, Metalosate micronutrients (Mn, B, Fe, Cu, P); midseason: K.

Vitazyme application: 21.3 oz/acre (1.64 liters/ha) sprayed at pink (April 25), petal fall (May 4), and first cover (May 15)

Weather for 2013: favorable for apple development

Crop load: medium to high

Fruit quality results: On September 19, 48 average apples were harvested and graded from several trees in several rows from the two treatments. The following data were determined.



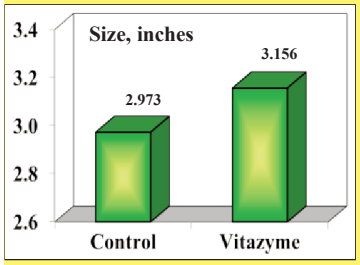
Note the superior size of these treated apples, and their improved color, compared to the untreated controls. Yield appeared to be at least 15% more with Vitazyme treatment.



The Vitazyme treated Ambrosia apples were colored well, and were larger than the controls.

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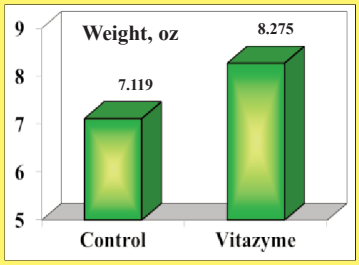
Fruit Size[1]



[1]Using a Cranston fruit sizer.

Increase in fruit size with Vitazyme: 6%

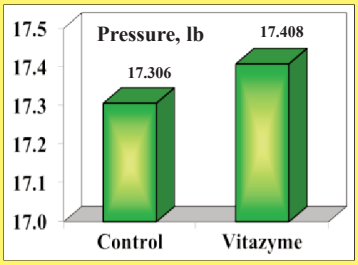
Fruit Weight[1]



[1]Using a Matrix-500 digital scale.

Increase in fruit weight with Vitazyme: 16%

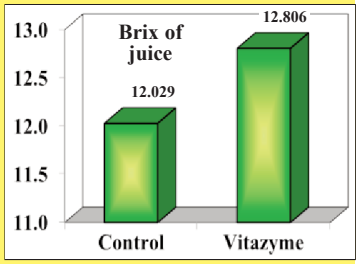
Fruit Pressure[1]



[1]Using a QA Supplies Penetrometer.

Increase in fruit pressure with Vitazyme: 1%

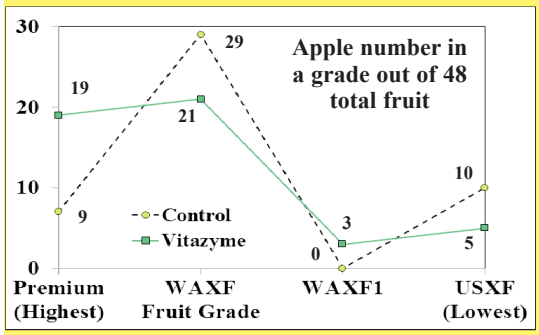
Fruit Brix[1]



[1]Using an Atago PAL-1 refractometer.

Increase in fruit brix with Vitazyme: 7%

Washington State Organic Fruit Grade[1]



[1]This grading system is based on color, the highest grade being Premium and the lowest grade USXF; assisted by Sherry Hesseltine.

Percentage of apples in a grade

Grade	Control	Vitazyme
Premium	19%	40%
WAXF	60%	44%
WAXF1	0%	6%
USXF	21%	10%

Vitazyme greatly improved coloration of the apples, moving the grades to higher levels as indicated by the graph and the table at left.

Yield results: No yield data were collected.

Conclusions: This apple study, comparing three applications of Vitazyme on Ambrosia organic apples with no applications, revealed that this product improved the quality of the fruit significantly. Not only were fruit size (+6%), weight (+16%), pressure (+1%), and Brix (+7%, or 0.8 percentage-point) improved, but the fruit grade was moved toward better coloration, such that 40% of the Vitazyme treated apples received the Premium grade, compared to only 19% of the untreated apples. Had yields been determined, the treated apples would have yielded considerably better than the control apples, and given a much higher income per acre. The value of the Vitazyme program for organic apples in Washington is thus revealed.

Apples

Researcher: Jacob Hesseltine
Location: Gebbers Farms, Brewster, Washington
Sprayer: Turbo Mist, 200 gal/acre, 1.5 mph
Growers: Mac Gebbers and Franco Lucas
Variety: Gala
Tree density: 3 x 11 feet
Tree age: 3 and 4 years
Rootstock: 9 clone

Experimental design: A 10-acre block of Gala apples was divided in half, with Vitazyme applied four times to one half and Stimplex applied at the same times to the other half. Evaluations were made of the effectiveness of each product to improve apple yield and quality.

1. Stimplex **2. Vitazyme**

Fertilization: The standard nutrient program for the orchard.

Vitazyme application: 16 oz/acre at full pink (May 10), petal fall (May 20), first cover (June 3), and pre-harvest (August 2)

Stimplex application: 48 oz/acre at the same dates as for Vitazyme

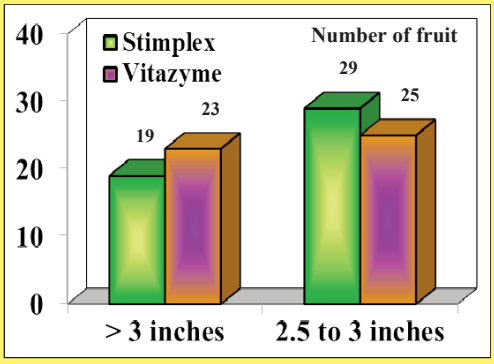
Weather for 2013: favorable for apple development

Quality results: On August 30, 48 randomly selected fruit from each treatment were harvested and evaluated for quality parameters.

Increase in fruit size with Vitazyme: 1.6%

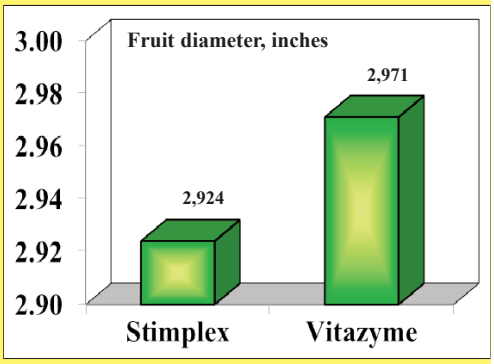
Vitazyme moved the fruit to a larger size compared with Stimplex, the average apple being 0.047 inch (1.6%) larger.

Fruit Size[1]



[1]A Cranston fruit sizer was used.

Average Fruit Size

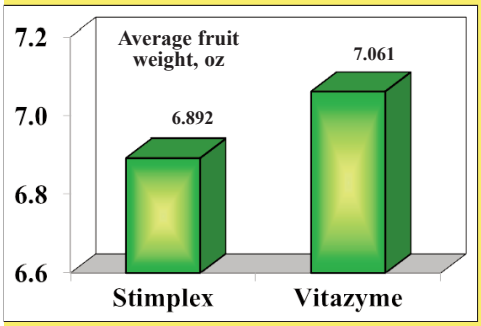






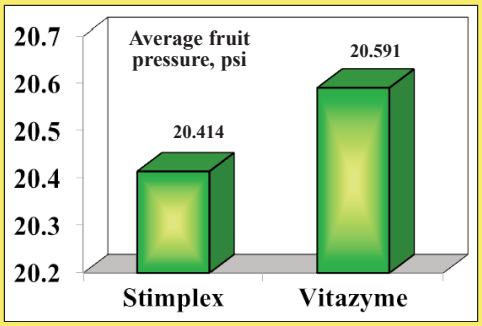
The Gala apples in the photo at left reveal normal color and size for Stimplex treatment, but with Vitazyme (right photo) both color and size were improved.

Fruit Weight[1]



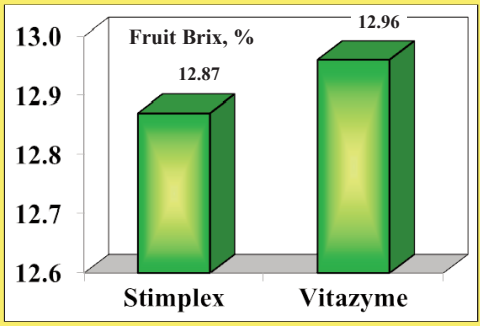
[1]A Matrix-500 digital scale was used.

Fruit Pressure[1]



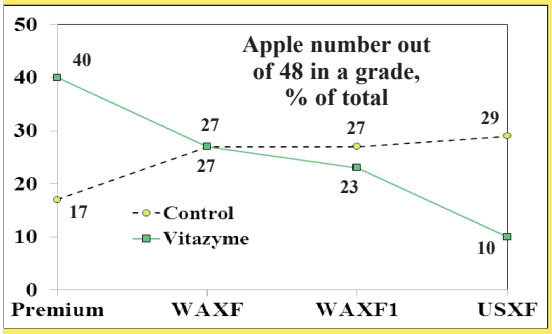
[1]A QA Supplies penetrometer was used.

Fruit Brix[1]



[1]An Atago PAL-1 refractometer was used.

Fruit Grade (Washington State System)[1]



[1]This grading system is based on color, the highest grade being Premium and the lowest grade being USXF. The grading was assisted by Sherry Hesseltine who has over 15 years of experience in fruit grading.



The Vitazyme treated apples are bigger and better colored in this Washington study.

These data clearly show that Vitazyme improved the fruit grade markedly as compared with Stimplex. There were many more Premium apples and far fewer USXF apples.

<u>*Yield results*</u>: No yield determinations could be made.

<u>*Grade Improvement With Vitazyme*</u>
Increase in Premium grade: 23%
Decrease in USXF grade: 19%

Increase in fruit weight with Vitazyme: 2.5%

Increase in fruit pressure with Vitazyme: 0.9%

Increase in fruit Brix with Vitazyme: 0.9%-point

<u>*Conclusions*</u>: This Washington State Gala apple trial revealed that Vitazyme improved apple quality above Stimplex seaweed extract, with four applications of each at recommended rates. There were meaningful improvements in apple size (1.6%), weight (2.5%), pressure (0.9%), and brix (0.9%-point), but the improvement in fruit grade was remarkable, with many more Premium apples (23%) and far fewer USXF apples (-19%) with Vitazyme. Though official yield data was not measured, both the researcher and the grower noted that the younger trees on the Vitazyme treated half of the block yielded several bins more than did the younger trees on the Stimplex half.

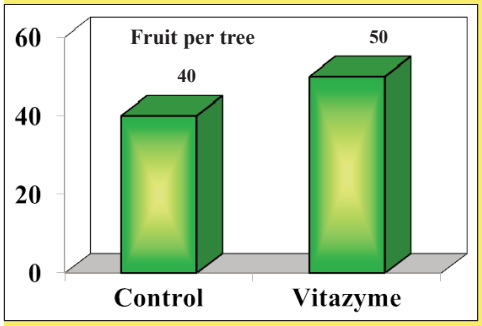
Avocados

Researcher: unknown *Farmer*: Tran Minh Nhuong *Location*: Ea Po, Dak Nong Province, Viet Nam
Variety: unknown *Years in production*: 5 *Planting density*: 550 plants/ha
Experimental design: Six avocado trees for each treatment — one with Vitazyme and the other an untreated control — were selected near each other to evaluate the effects of Vitazyme on the yield of fruit.

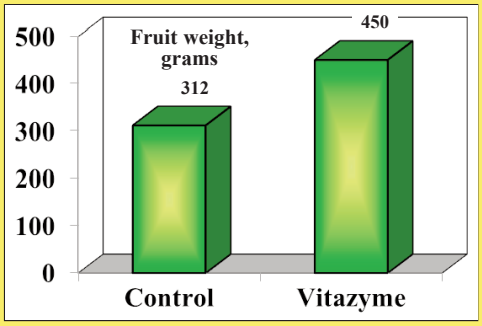
1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 0.5 liter applied per tree to all six trees, five times during the year
Yield results:

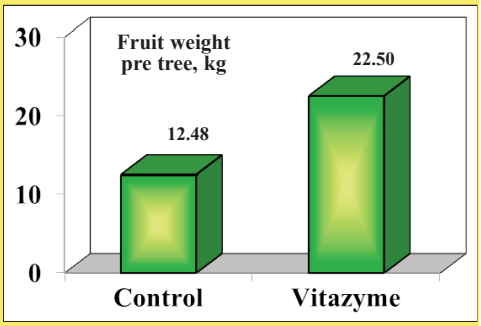
Fruit Number[1]



Fruit Weight



Fruit Yield[1]



[1]Per avocado tree.

[1]Per avocado tree per year.

Increase in fruit number with Vitazyme: 25%

Increase in fruit weight with Vitazyme: 44%

Increase in fruit yield with Vitazyme: 80%

Fruit number, weight, and yield all increased dramatically with Vitazyme application.
Income results: Costs of Vitazyme: 24,000 VND/tree
Increase in income with Vitazyme: 162,500 VND/tree
Conclusions: An avocado study in Viet Nam, using six trees for each treatment, revealed that Vitazyme greatly improved the yield (+80%), number (+25%), and size (+44%) of fruit. Moreover, the income per tree was raised by 162,500 VND. It was observed during the trial that **many avocado fruit fell prematurely in the control treatment, but not in the Vitazyme treatment**. This program is shown to be a most excellent adjunct to avocado production in Viet Nam.

Spring Barley

Researcher: Jacob Hesseltine *Farmer*: Tom Stahl *Location*: Waterville, Washington
Variety: Gallatin spring barley *Previous crop*: summer fallow *Soil type*: volcanic ash
Planting date: May 7 to 10, 2013 *Planting rate*: 54 lb/acre *Tillage*: minimum
Experimental design: A 229-acre field of spring barley was selected for this trial, the outer perimeter treated with Vitazyme to evaluate the effect of this production plant characteristics.

1. Control **2. Vitazyme**

Fertilization: 40 lb/acre of N applied as anhydrous ammonia; 5 lb/acre of S
Vitazyme application: 13 oz/acre (1 liter/ha) sprayed on the leaves and soil on June 10 along with 16 oz/acre of Bromoxynil and 8 oz/acre of Barrage. A 90-foot sprayer made two passes around the field, leaving the center portion untreated with Vitazyme.
Weather for 2013: excessive late season rain, unfavorable for crop production
Pre-harvest evaluation: On August 9, 20 typical plants



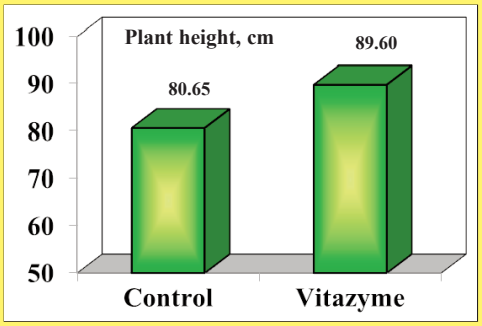
The heads of the treated barley are larger and better filled than the control heads.



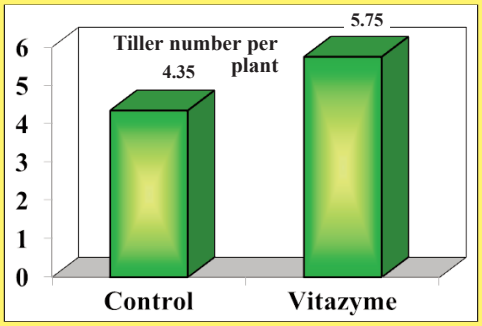
The roots and number of tillers were much improved with only one foliar and soil Vitazyme application.

from each treatment were dug to evaluate several parameters. Values for the 20 plants were averaged.

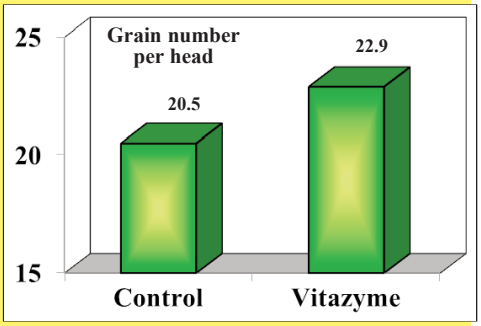
Plant Height*



Productive Tiller/Plant

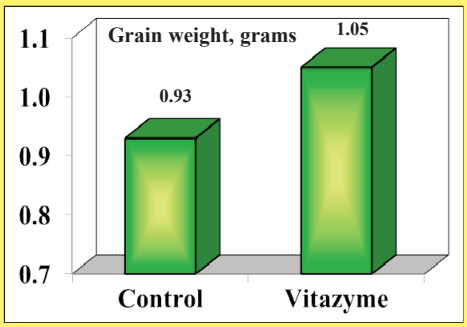


Grains Per Head

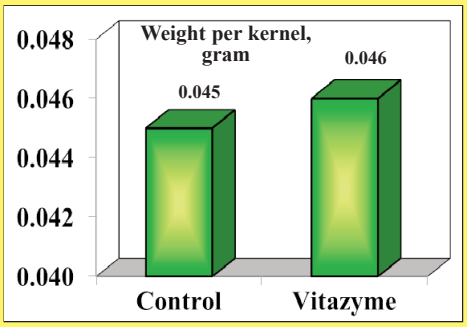


*Measured from soil level to tip of tallest tiller.

Grain Weight Per Head



Grain Weight Per Kernel



Yield results: none

Conclusions: This central Washington spring barley trial revealed that Vitazyme improved all plant and grain parameters, especially productive tillers per head (+32%), but grains per head (+12%) and grain weight per head as well (+13%); kernel weight was slightly increased. These data show that the yield was certainly enhanced with Vitazyme even though yield values were not obtained.

Increases with Vitazyme

- Plant height 11%
- Productive tillers/plant ... 32%
- Grains per head 12%
- Grain weight/head 13%
- Grain weight/kernel 2%

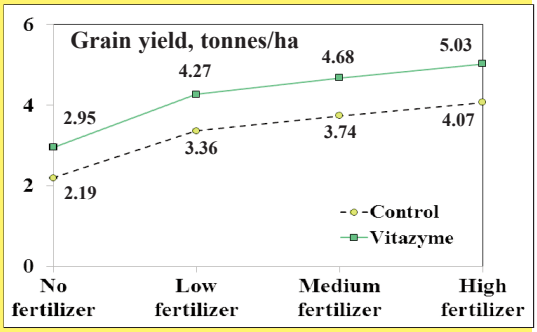
Spring Barley

Researcher: V.V. Plotnikov *Research organization*: Scientific, Innovation, and Technology Center of the Institute of Forages and Agriculture of Podillya NAAS
Variety: Nabat
Location: National Academy of Agricultural Sciences, Ukraine
Previous crop: buckwheat
Planting date: April 19, 2013 *Planting rate*: 4 million seeds/ha
Soil type: ash gray soil (humus = 2.2%, hydrolyzed-N = 8.4 mg/100 g of soil, P = 15.8 mg/100 kg of soil, exchangeable K = 12.4 mg/100 g of soil, pH = 5.
Soil preparation: disking, plowing, harrowing
Experimental design: A small plot spring barley experiment was set up with four replications, to show the effectiveness of Vitazyme as a modifier of yield, protein, and disease incidence. Four levels of fertility were employed.

Treatment	Nitrogen	Phosphorus	Potassium
	kg/ha	kg/ha	kg/ha
1. Control	0	0	0
2. Control + Vita	0	0	0
3. Low fertility	30	20	30
4. Low fert + Vita	30	20	30
5. Medium fertility	45	30	45
6. Medium fert + Vita	45	30	45
7. High fertility	60	40	60
8. High fert + Vita	60	40	60

Fertilization: See the treatment table above. Phosphorus and potassium amendments were applied in the fall, and nitrogen was applied in the spring.
Vitazyme application: (1) a seed treatment of 1 liter/tonne of seed; (2) a foliar spray at tillering of 1 liter/ha
Yield results: Fertilizer levels improved barley grain yield, and Vitazyme at each level further increased the yield, by 24 to 35%.

Barley Yield

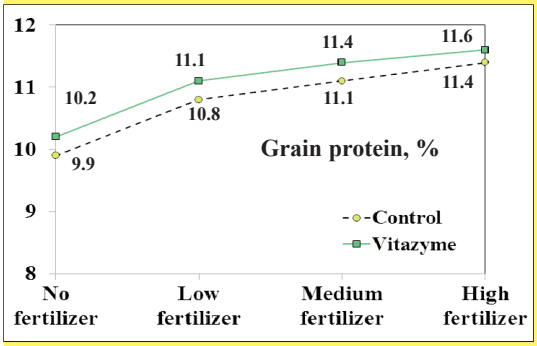


Increase in yield with Vitazyme

- No fertilizer 35%
- Low fertilizer 27%
- Medium fertilizer 25%
- High fertilizer 24%

Continued on the next page

Grain Crude Protein



Increase in crude protein with Vitazyme

No fertilizer 0.3%-point
Low fertilizer 0.3%-point
Medium fertilizer ... 0.3%-point
High fertilizer 0.2%-point

Income results: Net income increased at each fertility level, with Vitazyme improving income the most at the high fertilizer rate.

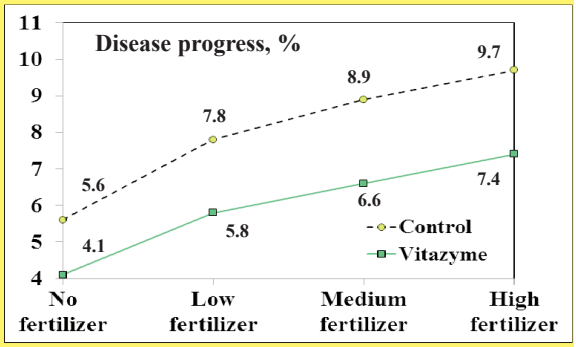
Grain crude protein results: The increase in grain crude protein followed fertility levels, and Vitazyme nominally increased protein at each level.

Dark brown patch results: There was a 100% incidence of brown patch fungus for all treatments. All plants were infected with this fungal disease, but the disease progress was greatest with higher fertilizer levels; Vitazyme slowed the progress by 1.5 to 2.3%-points.

Increase in net income with Vitazyme

No fertilizer ..... 1,052 UAH/ha
Low fertilizer ..... 1,307 UAH/ha
Medium fertilizer ... 1,358 UAH/ha
High fertilizer ..... 1,392 UAH/ha

Dark Brown Patch Disease



Conclusions: In the words of the researchers,

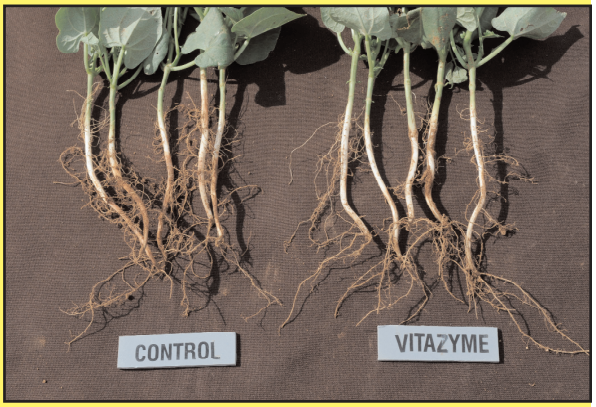
1. In the case of no fertilizers, application of Vitazyme for spring barley of the Nabat variety, at a rate of 1 L/tonne of seed and 1 L/ha at the tillering stage, provided a grain yield increase of 0.76 tonne/ha, or 35%.
2. At middle and high nutrition backgrounds of spring barley plants ($N_{30-60}P_{20-40}K_{30-60}$) and Vitazyme application, the grain yield increase was 0.91-0.96 tonne/ha, or 24-27%.
3. Vitazyme use when growing spring barley on the plot without fertilizers provided a profit of 1052 UAH/ha; with ($N_{30-60}P_{20-40}K_{30-60}$) the profit was 1307-1392 UAH/ha, respectively.
4. Vitazyme use at respective development stages provided a slight increase in raw protein content in spring barley grain, by 0.2-0.3%.
5. Vitazyme application on spring barley plantings decreased the dark brown patch affect on leaves by 24-27%.

Bush Beans

Researcher: Hermilo Sanchez Sanchez, Ph.D.
University location: Autonomous University of Puebla, San Juan Acateno, Teziutlan, Puebla, Mexico
Variety: Strike
Planting date: August 13, 2013
Row spacing: 1.0 meter
Soil type: Pellic vertisol (clayey, dark, high fertility)
Tral location: field at Tepalcingo, Mexico
Seeding rate: 30 kg/ha
Experimental design: A bean trial was laid out in a Latin square using four treatments and four replications, with each plot five rows wide (1 meter apart) and 5 meters long (25 m^2). The total plot area was 16 plots, or 400 m^2. The purpose of the trial was to evaluate the effect of two Vitazyme applications on the growth, yield, and quality of bush beans under normal field conditions.

Treatment	Seed treatment[1]	Soil/Foliar treatment[2]
	ml/ha on seeds	liters/ha
1. Control	0	0
2. Vitazyme 1	200	0.5
3. Vitazyme 2	250	1.0
4. Vitazyme 3	300	1.5

[1]For four plots (100m^2), 300g of seed were treated with 2.0, 2.5, and 3.0 ml of Vitazyme along with 3.0, 2.5, and 2.0 ml of water for Treatments 2, 3, and 4, respectively. A total of 5 ml of solution was used for the 300 g of seed in each case.
[2]For four plots (100 m^2), 2 liters of water were sprayed on the plants and soil, mixed with 5, 10, and 15 ml of Vitazyme for Treatments 2, 3, and 4 respectively.



Note the larger and better developed roots for the bean plants treated with Vitazyme on the right.

Fertilization: unknown
Vitazyme application: Seed treatments were performed by mixing the Vitazyme and water with 300 g of seeds in a plastic bag; then the seeds were dried for 15 to 30 minutes and planted that day or the following day. The soil and foliar sprays were done using a calibrated backpack sprayer, with a 200 liters/ha output.
White fly control: Confidor 350 SC
Rust control: Manzate 80 WP

Statistical evaluations: The Statistical Analysis System (SAS) was used to evaluate treatment means, and the Tukey test (P = 0.05) was used to separate these means. In all of the following data sets, means followed by the same letter are not significantly different at P = 0.05.

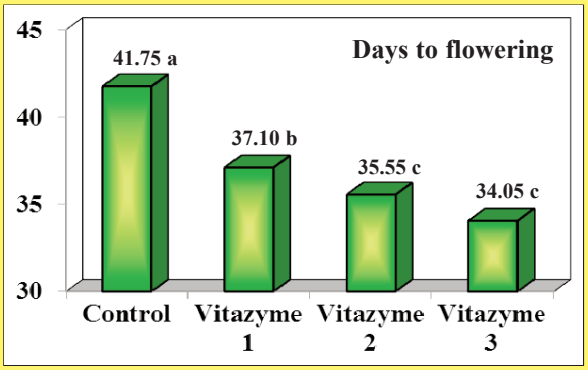
Days to blossom results: Over a week was cut off from the time from planting to flowering for the highest Vitazyme rate, while both of the other rates reduced flowering time by 4.65 and 6.20 days, all significant reductions.

Days to maturity results: The number of days to complete pod formation were counted. Nearly 10 days were cut off the time to pod formation for the highest Vitazyme application, while about 5 and 8 days were removed for the lowest and medium rates. The two highest rates were significantly reduced in time to maturity compared to the control.

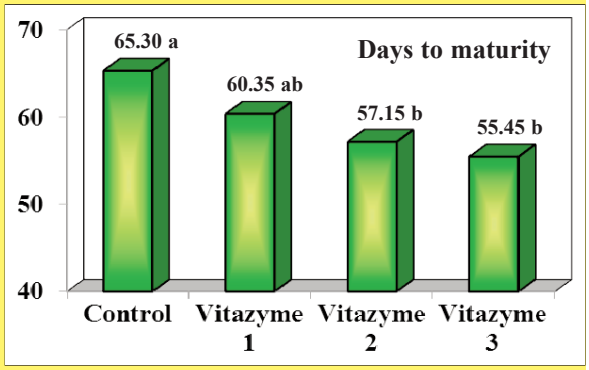
Days to harvest results: All Vitazyme treatments significantly reduced the time to harvest, the time reduction greater as the rate increased, with up to an 8.10 day decrease with the highest rate.

Pod and seed results: All pod and seed parameters improved with Vitazyme application, the higher application rates giving bigger increases. Pod length increased the most — up to 62% — while 100-seed weight increased from 20 to 37%.

Flower Blossoms



Days to Maturity



Reduction in Days to Flowering

Vitazyme 1 ..... 4.65 days
Vitazyme 2 ..... 6.20 days
Vitazyme 3 ..... 7.70 days

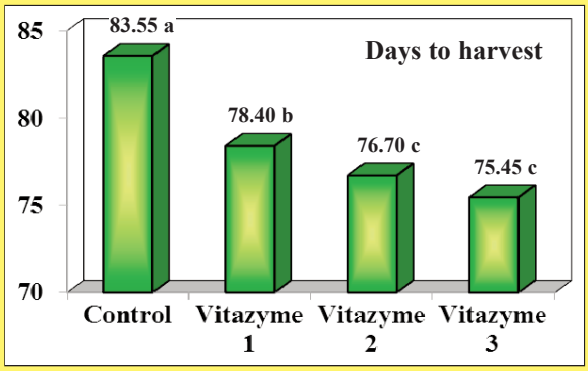
Reduction in Days to Maturity

Vitazyme 1 ..... 4.95 days
Vitazyme 2 ..... 8.15 days
Vitazyme 3 ..... 7.85 days



The Vitazyme treated beans on the right are more aggressive, having filled the interrows; control plants on the left have not.

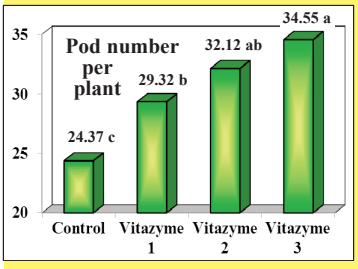
Days to Harvest



Reduction in Days to Harvest

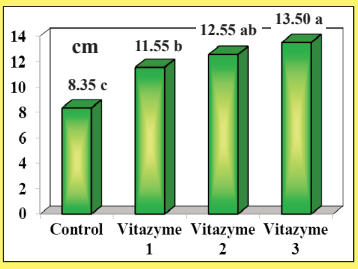
Vitazyme 1 ..... 4.95 days
Vitazyme 2 ..... 8.15 days
Vitazyme 3 ..... 7.85 days

Pods Per Plant[1]



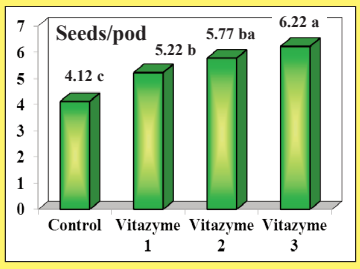
[1]Ten random plants from each plot were counted, 20 days after flowering.

Pod Length[1]



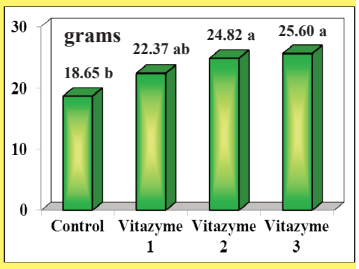
[1]Ten random pods from each plot were selected, and pods were measured from the base of the stem to the pod tip.

Seeds Per Pod[1]



[1]Seed number from ten random pods for each plot were counted.

100-Seed Weight[1]



[1]The weight of 100 seeds from the seeds collected in the seeds per pod analysis was determined.

Increase in Pods with Vitazyme

Vitazyme 1 ..... 20%
Vitazyme 2 ..... 32%
Vitazyme 3 ..... 42%

Increase in Pod Length with Vitazyme

Vitazyme 1 ..... 38%
Vitazyme 2 ..... 50%
Vitazyme 3 ..... 62%

Increase in Seeds/Pod with Vitazyme

Vitazyme 1 ..... 20%
Vitazyme 2 ..... 32%
Vitazyme 3 ..... 42%

Increase in 100-Seed Weight with Vitazyme

Vitazyme 1 ..... 20%
Vitazyme 2 ..... 33%
Vitazyme 3 ..... 37%

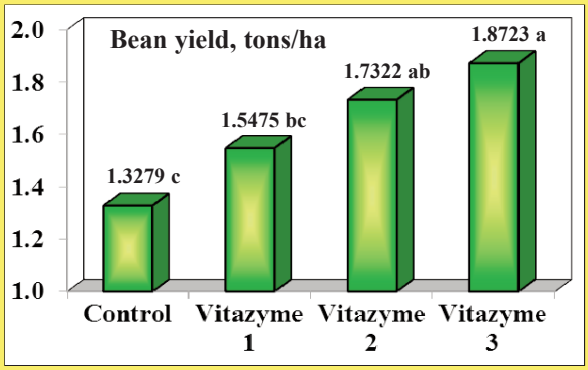
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Yield results: Harvesting was completed on October 20, 2013. The seeds produced by 10 representative plants from each plot were weighed. Yield of beans increased with the rate of Vitazyme application, moving from 17% at the lowest rate to 41% at the highest rate.

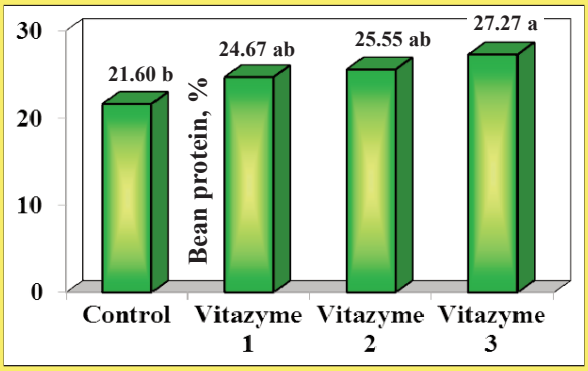
Protein results: Protein was measured using the Kjeldahl method on beans from each plot. The all-important nutritional parameter of protein increased significantly by a remarkable 26% with the high rate of Vitazyme addition. The low rate resulted in a 14% protein increase, and the medium rate an 18% increase, both large but not significant.

Seed moisture and ash results: Association of Official Analytical Chemists methods were used. Moisture percentage of the seeds was reduced as Vitazyme application levels increased, at the same time that ash levels (mineral contents) increased, showing that the product improves the uptake of soil elements for improved nutritional value.

Bean Yield



Bean Protein



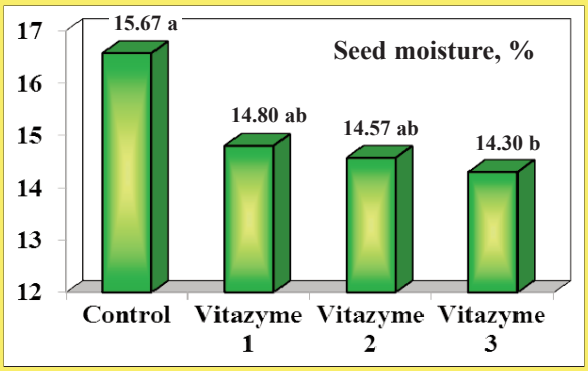
Increase in Bean Yield

Vitazyme 1	17%
Vitazyme 2	30%
Vitazyme 3	41%

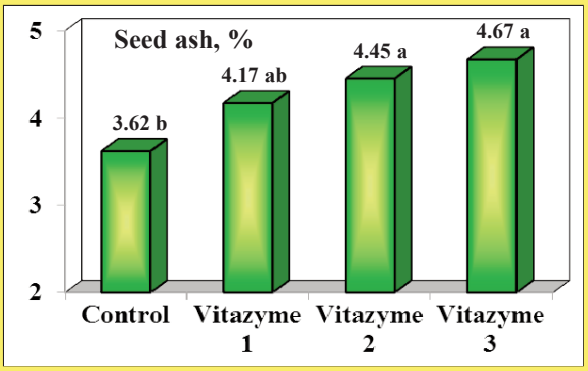
Increase in Bean Protein

Vitazyme 1	14%
Vitazyme 2	18%
Vitazyme 3	26%

Seed Moisture



Seed Ash



Reduction in Seed Moisture

Vitazyme 1	-1.77%-points
Vitazyme 2	-2.00%-points
Vitazyme 3	-2.27%-points

Increase in Seed Ash

Vitazyme 1	15%
Vitazyme 2	23%
Vitazyme 3	29%

Conclusions of the Mexican researcher:

1. The Product Vitazyme, applied as a seed treatment at dosages of 200, 250 and 300 ml/30 kg of seeds/hectare, followed by a leaf spray in early bloom at 0.5, 1.0 and 1.5 liters/ha, respectively, induced a significant effect on the variables days to flowering, days to physiological maturity, and days to harvest, as well as on the number of pods per plant, length of pods, and the number of seeds per pod, recording significant statistical differences as compared to the untreated control.
2. There was a significant effect of the Vitazyme, applied as a seed treatment at dosages of 200, 250 and 300 ml/30 kg of seeds/hectare, followed by a leaf spray in early bloom at 0.5, 1.0 and 1.5 l/ha, respectively, on bean yield, since it recorded statistically higher values than the untreated control.
3. With regard to grain quality variables, only the rate of 300 ml/30 kg of seeds/hectare seed treatment followed by a leaf spray of 1.5 l/ha, induced statistical differences with the control; however, all Vitazyme treatments in every tested rate recorded better values than the untreated control.
4. There were no toxic effects on the dry bean crop after applying Vitazyme, in seed treatment at rates of 200, 250 and 300 ml/30 kg of seeds/hectare, followed by a foliar spray in early bloom at 0.5, 1.0 and 1.5 liters/hectare, respectively.

A quote from Thomas Jefferson, 1781, *Notes on the State of Virginia*

"Those who labour in the earth are the chosen people of God, if ever he had a chosen people, whose breasts he has made his peculiar deposit for substantial and genuine virtue. It is the focus in which he keeps alive that sacred fire, which otherwise might escape from the face of the earth."

Cherries

Researcher: Jacob Hesseltine
Farmer: Dylan Campbell
Variety: Sweetheart
Location: Crane and Crane Orchards, Brewster, Washington
Rootstock: Mazard
Sprayer: Turbo Mist, 200 gal/acre, 1.5 to 1.8 mph
Soil type: sandy loam
Tree age: 20 years
Tree density: 16 x 12 feet (227/acre)

Experimental design: Two neighboring, very similar 6-acre blocks of cherries were selected to compare the effects of Vitazyme with Stimplex liquid seaweed extract. Yield and fruit characteristics were evaluated.

1. **Vitazyme + Stimplex**
2. **Stimplex twice**

Fertilization: standard for the crop
Vitazyme application: 20 oz/acre (1.5 liters/ha) at first cover; Stimplex was applied at green tip as a first application (Vitazyme was not yet available).
Stimplex application: 48 oz/acre (3.7 liters/ha) at green tip, and again at first cover
Crop load: medium
Weather for 2013: favorable for cherry production
Harvest date: July 16, 2013



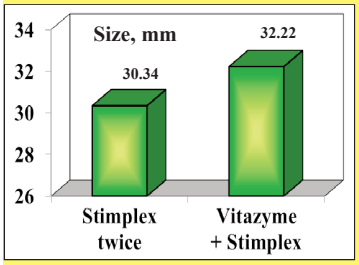
With Stimplex only the cherry color was fairly light, and size quite small on average.



With a Vitazyme application at first cover, the cherries were larger and much better colored.

Fruit quality results: On the harvest date, 50 randomly selected, average cherries were picked from several harvested bins from the outer row of both blocks. The following parameters were evaluated for each group of cherries.

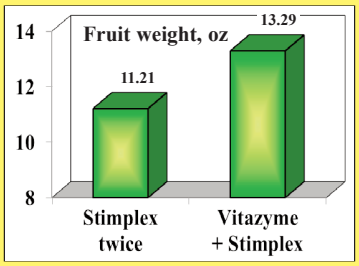
Fruit Size[1]



[1]Determined using a Cranston fruit sizer.

Increase in fruit size with Vitazyme: 6%

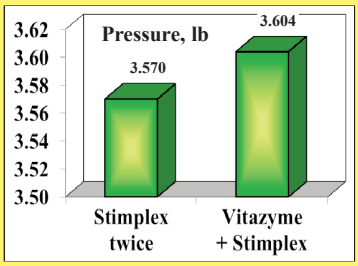
Fruit Weight[1]



[1]Determined with a Matrix-500 digital scale.

Increase in fruit weight with Vitazyme: 19%

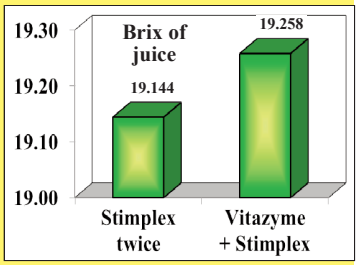
Fruit Pressure[1]



[1]Determined with a QA Supplies Penetrometer.

Increase in fruit pressure with Vitazyme: 1%

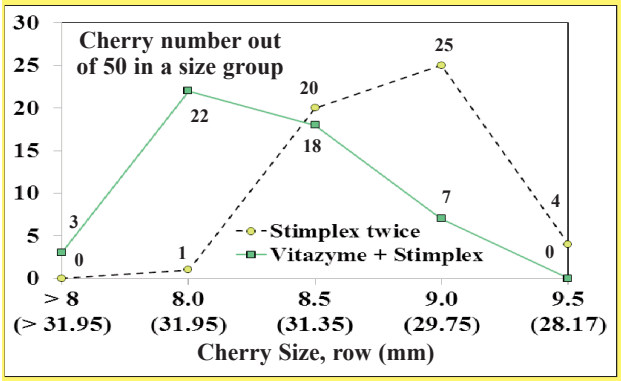
Fruit Brix[1]



[1]Determined using an Atago PAL-1 refractometer.

Increase in fruit brix with Vitazyme: 1%

Cherry Size Review



Note: Cherry Sizes are designated by "row", which originated when the size was determined by the number of fruit that would fit across the top row of a cherry box. The smaller the number, the larger the cherries.

Percentage of Cherries in Size Groups

Size	*Stimplex*	*Vitazyme/Stimplex*
> 8	0%	6%
8.0	2%	44%
8.5	40%	36%
9.0	50%	14%
9.5	8%	0%

Vitazyme plus Stimplex early gave by far the largest cherries. They tended to be of the 8.0 to 8.5 row size, while Stimplex alone gave an 8.5 to 9.0 row size.

Color results: Both the researcher and pickers noted the Vitazyme treated cherries had better color, on average, than did the Stimplex treatment.

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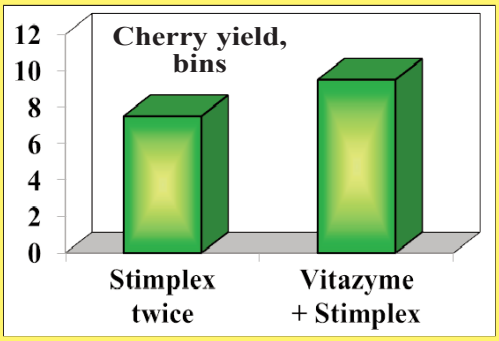
Yield results: On July 16, 2013, one outer row of each block was picked clean. The yields of these rows are indicated below. A per acre yield determination was not made.

Income results: Besides yielding much greater income from 27% more yield with Vitazyme, the product cost was less with Vitazyme. This product costs around $60/gallon, while Stimplex retails for around $50/gallon. With recommended rates of 16 to 20 oz/acre for Vitazyme, and 48 to 56 oz/acre for Stimplex, then the cost of Stimplex is about twice that of Vitazyme.

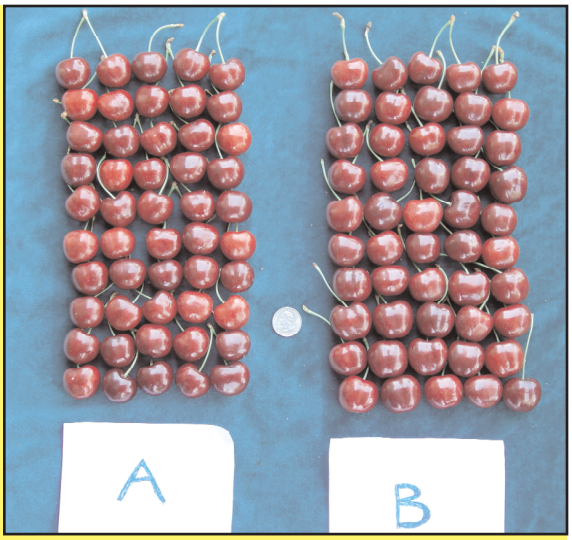
Conclusions: This cherry study in Washington, comparing Vitazyme after a Stimplex application with Stimplex applied twice, revealed that Vitazyme in the program improved the yield by 27% while improving cherry color and overall quality and size. The very important size was increased by 6%, with most cherries in the 8.0 to 8.5 row range, compared to the 8.5 to 9.0 row range for Stimplex only. Fruit weight, pressure, and Brix were all increased by Vitazyme as well, and income was markedly improved by the program. These results prove how effective a cherry growing program, using Vitazyme as an integral input, will increase yield, quality, and profits.

Cherry Yield

Treatment	Cherry yield	Yield change
	bins	bins
Stimplex twice	7.5	—
Vitazyme	9.5	2.0 (+27%)



Increase in cherry yield with Vitazyme: 27%



Cherries placed side-by-side reveal the color and size differences with a single Vitazyme application, even with 27% more yield.

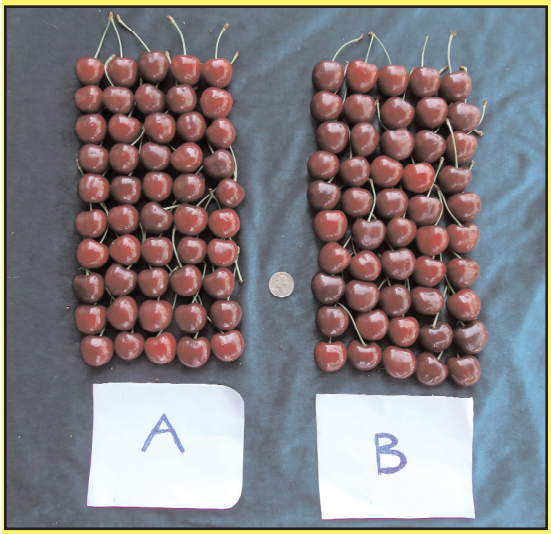
Cherries

Researcher: Jacob Hesseltine
Growers: Mac and Cass Gebbers
Location: Gebbers Farms, Brewster, Washington
Variety: Sweetheart
Tree age: 7 years
Sprayer: Turbo Mist, 200 gal/acre, 1.5 mph
Tree density: 6 x 8 feet
Rootstock: Mazard

Experimental design: A 10-acre block of cherries was selected for this study to evaluate the relative effectiveness of Vitazyme and Stimplex kelp extract in affecting the yield and quality of cherries. Ten rows in the middle of each block were treated five times during the growing season with each product, and at the same times.

1. Stimplex **2. Vitazyme**

Fertilization: The standard nutrient program for the orchard.



Note the larger size and better color of the Vitazyme treated cherries (B) versus those treated with Stimplex. Vitazyme produced 24% more yield.

Vitazyme application: 16 oz/acre at white, petal fall, shuck fall, one week after shuck fall, and two weeks after shuck fall

Stimplex application: 48 oz/acre at the same dates as Vitazyme was applied.

Weather for 2013: favorable for cherry growth

Quality results: On July 18, two rows of cherry trees within both treatments were picked clean to evaluate quality and yield parameters. Fifty average cherries from each treatment were selected for quality determinations.



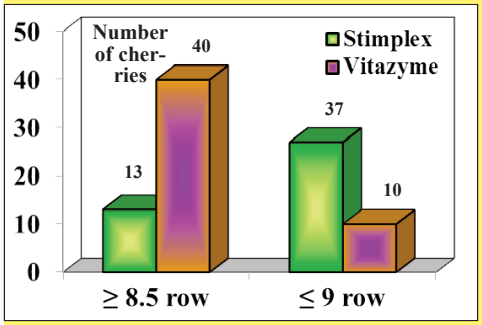
Stimplex gave an ordinary fruit set, as can be seen here.



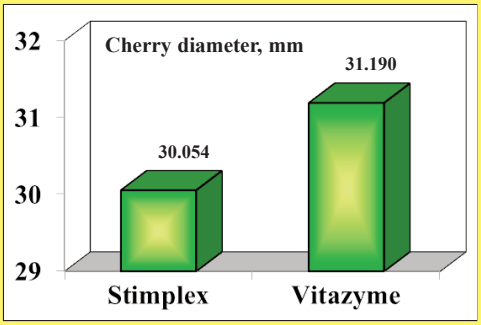
Vitazyme fruit set was noticeably greater, especially on the inside branches of the trees.

It is clear that Vitazyme produced larger cherries, on average, than did Stimplex. While the average diameter was improved by 3.8%, the number of 8.5 row or greater fruit rose by 208%, while the smaller size of 9 row or less fell by 63% with Vitazyme.

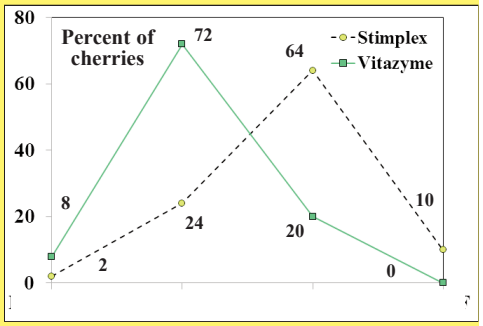
Cherry Size



Average Cherry Size



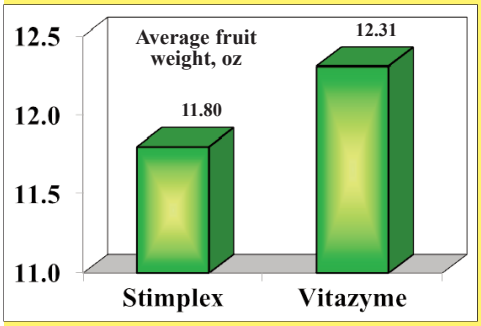
Cherry Size Breakdown



Increase in cherry diameter with Vitazyme: 3.8%

Here we see a more detailed breakdown of cherry size in terms of percentage of the total. The total size profile was shifted towards larger fruit with Vitazyme treatment compared to Stimplex.

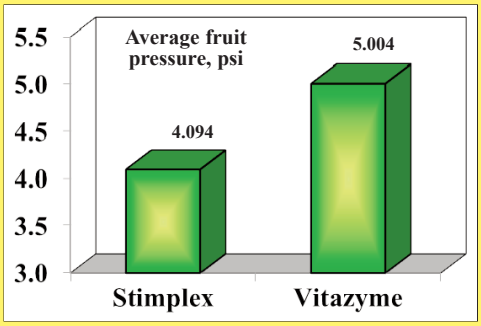
Fruit Weight[1]



[1]Measured with a Matrix-500 digital scale.

Increase in fruit weight with Vitazyme: 4.3%

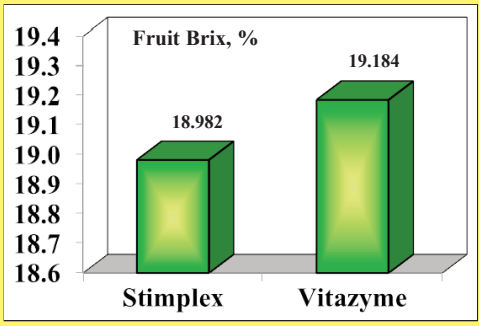
Fruit Pressure[1]



[1]Measured with a QA Supplies penetrometer.

Increase in fruit pressure with Vitazyme: 22%

Fruit Brix[1]



[1]Measured with an Atago PAL-1 refractometer.

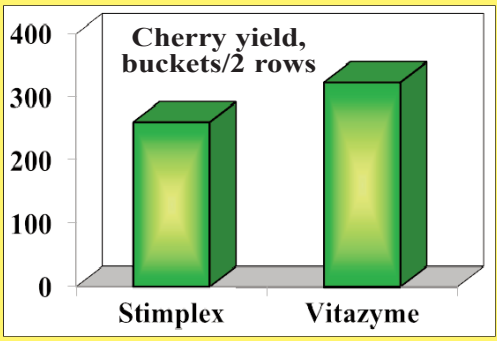
Increase in fruit Brix with Vitazyme: 0.20%-point

Vitazyme improved fruit weight, fruit Brix, and especially fruit pressure by an amazing 22%. This improvement is very important for safety in shipping and storage. Thus, all internal fruit qualities were enhanced with Vitazyme compared to Stimplex.

Cherry Yield

Treatment	Yield	Yield change	Yield, 2 rows[1]	Yield per acre[2]	Value of crop[3]
	buckets	buckets	pounds/2 rows	pounds/acre	dollars/acre
Stimplex	260	—	3,900	15,982.2	18,379.53
Vitazyme	323	63 (+24%)	4,845	19,854.8	22,833.02

[1]1 bucket = 15 lb.
[2]Assuming an area of 0.244 acre for two rows.
[3]Price = $1.15/lb.



Increase in cherry yield with Vitazyme: 24%

Yield results: Results are from two rows of each treatment.
Income results: The extra income from cherry sales is $4,453.49/acre. Product cost is as follows:

Cherry Income

Product	Cost	Amount applied[1]	Total cost	Cost difference
	$/gal	gal/acre	$/acre	$/acre
Stimplex	50	1.875	93.75	+56.25
Vitazyme	60	0.625	37.50	—

[1]Stimplex: 48 oz/acre x 5 applications = 240 oz, or 1.875 gal.; Vitazyme: 16 oz/acre x 5 applications = 80 oz/acre, or 0.625 gal.

Cost : Benefit ratio with Vitazyme: 118.76 : 1

Stimplex cost $56.25/acre more to apply than Vitazyme.
Conclusions: This in-orchard cherry study in Washington proved that Vitazyme performed much better than did Stimplex seaweed extract in terms of yield (24%), added income ($4,453.49/acre), cost:benefit ratio (118.76 : 1), and quality parameters such as fruit size (3.8% larger diameter), fruit weight (4.3%), fruit pressure (22%), and fruit Brix (0.2%-point). The

Continued on the next page

fruit was sweet, firmer for storage and transport, and larger for customer preference. Also, the researcher noted that there was **much better and consistent fruit set in the Vitazyme treated trees, especially in the interior of the trees where less fruit was concentrated**. Vitazyme is shown to be an excellent product for cherry growers in Washington.



Harvested Cherries having Stimplex applied were quite variable in color, and smaller than the Vitazyme treated cherries.



Vitazyme treated cherries were larger, had higher Brix and stronger skins, and were generally more acceptable for marketing.

Cherries

Researcher: Jacob Hesseltine
Growers: Mac Gebbers and Franco Lucas
Location: Gebbers Farms, Brewster, Washington
Variety: Skeena
Tree age: 8 years
Sprayer: Turbo Mist (200 gal/acre, 1.5 mph)
Tree density: 6 x 8 feet
Rootstock: Mazard

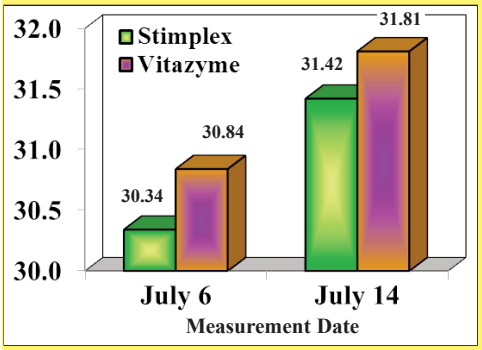
Experimental design: The 10 center rows of a 20-acre block of cherries were treated with Vitazyme five times, while the remainder of the block was treated five times with Stimplex seaweed extract. The objective of the study was to compare the relative merits of the two products in terms of affecting cherry quality.

1. Stimplex **2. Vitazyme**

Fertilization: the standard nutrient program for the farm
Vitazyme application: 16 oz/acre applied at white, petal fall, shuck fall, one week later, and one week after that
Stimplex application: 48 oz/acre applied at the same times as Vitazyme
Weather for 2013: favorable for cherry production
Quality results: On July 6, two sets of samples were taken from two different areas of the Vitazyme treated rows, and two sets of samples were likewise taken from the Stimplex treated areas. This exercise of sampling fruit from two areas of each treatment was repeated on July 14. The data for each date were then averaged. Forty cherries were harvested for one comparison, and 50 cherries for the other three.

July 6 and July 14 Quality Results

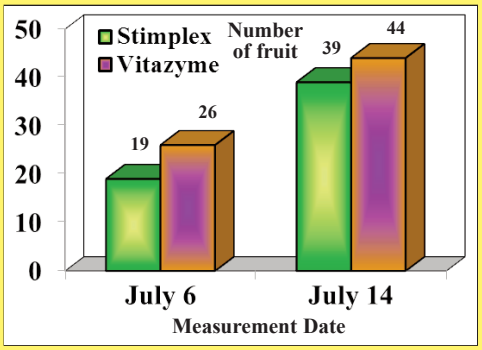
Fruit Diameter, mm



Increase in fruit diameter with Vitazyme: 1.6 to 1.2%

Though not a great increase, the fruit diameter increase at both dates was significant with Vitazyme.

Fruit Size, ≥ 8.5 Row[1]

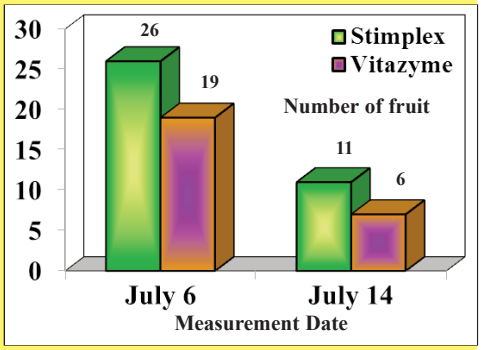


[1]Measured with a Cranston fruit sizer.

Increase in fruit size (≥ 8.5 row) with Vitazyme: 37 to 13%

Vitazyme greatly increased the larger grade of fruit at both dates.

Fruit Size, ≤ 9 Row[1]

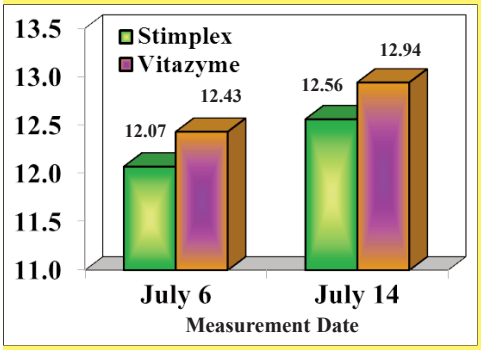


[1]Measured with a Cranston fruit sizer.

Decrease in fruit size (≤ 9 row) with Vitazyme: 27 to 36%

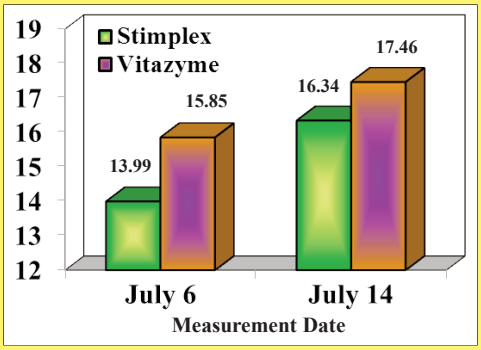
The percentage of smaller fruit was significantly reduced on both dates with Vitazyme.

Fruit Weight[1], g



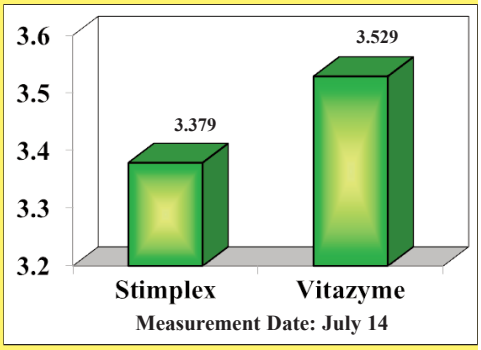
[1]Measured with a Matrix-500 digital scale.

Fruit Brix[1], %



[1]Measured with an Atago PAL-1 refractometer.

Fruit Pressure[1], psi



[1]Measured with a QA Supplies penetrometer.

Increase in fruit weight with Vitazyme: 4 to 3%

The weight of the fruit was consistently increased with Vitazyme compared to the Stimplex treatment.

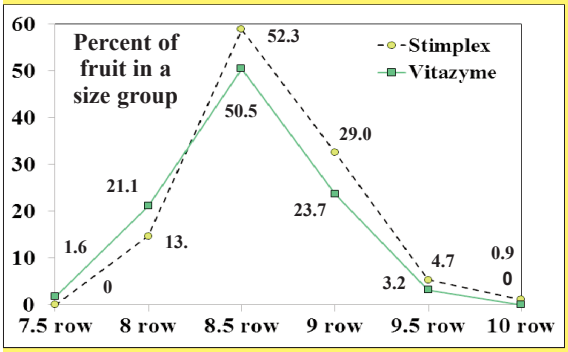
Increase in fruit Brix with Vitazyme: 1.86 to 1.12%-points

Sugars in the fruit were improved greatly at both measuring times by Vitazyme,

Increase in fruit pressure with Vitazyme: 4.4%

Fruit pressure increased with Vitazyme application, which improves shipping and storage qualities of the cherries.

Average Fruit Sizes (for four samplings)



Vitazyme moved the fruit size toward the larger fruit compared to Stimplex.

<u>Conclusions</u>: This cherry trial in Washington, comparing five applications of Vitazyme and Stimplex seaweed extract in their respective treatments, revealed that all quality parameters were improved with Vitazyme; fruit diameter (up to 1.6%), fruit weight (up to 4%), fruit Brix (up to 1.86%-points), fruit pressure (4.4%), and the size spectrum. The sizes were moved toward the larger 8 and 8.5 row grade with Vitazyme. Also, the researcher noted **much improved fruit set throughout the entire Vitazyme treated area, whereas the Stimplex areas had much more missing fruit, especially in the interiors of the trees**. Vitazyme has been shown in this trial to be a superior agent for improving cherry production. No yield data were taken.



The fruit set with Stimplex was quite limited on treated trees.



Vitazyme treated trees displayed a superior fruit set.

Facts About Hunger in the World, Hunger That Vitazyme Can Help Alleviate

- Nearly 842 million people are suffering from hunger today.
- Ninety-eight percent of people suffering from hunger live in developing countries.
- Hunger kills more people every year than AIDS, malaria, and tuberculosis combined.
- Hunger causes the deaths of about 5 million children each year.

Cilantro

Researcher: Israel Calva Pali *Farmer*: Adolfo Camarillo Flowers *Location*: Palmarito, Puebla, Mexico *Variety*: unknown

Experimental design: A small parcel of a cilantro field, two rows wide by 30 meters long, was sprayed with Vitazyme to evaluate the effects of the product on crop yield and characteristics.

1. Control **2. Vitazyme**

Fertilization: unknown

Vitazyme application: 1 liter/ha applied 12 days after crop emergence on a small strip of the field (65 ml of Vitazyme in 1.5 liters of water)

Growth results: An assessment in September of 2012 revealed that the Vitazyme treatment produced darker green leaves (more chlorophyll) and denser, more numerous leaves than the untreated plants alongside.

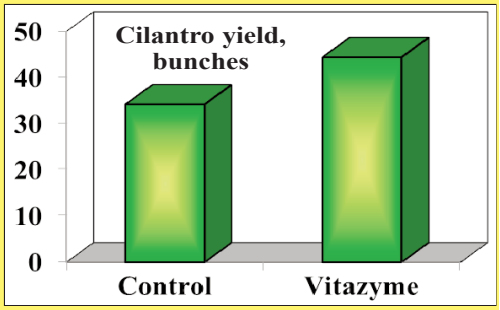
Yield results: Harvest date is unknown, but results were as follows:

Conclusions: A cilantro demonstration study in Mexico revealed that Vitazyme improved growthiness and color (chlorophyll) of the plants, giving rise to a 30% increase in yield. This result shows the usefulness of the program for cilantro production in Mexico.

Increase in cilantro yield with Vitazyme: 30%

Cilantro Yield

Treatment	Crop Harvested	Yield change
	bunches	bunches
Control	34.2	—
Vitazyme	44.4	10.2 (+30%)



Coffee

Researcher: unknown *Farmer*: Pham Van Quyen *Location*: Buon Nui, Tam Thang, Viet Nam

Variety: unknown *Age of plants*: 6 years *Harvest date*: November 5 to 20, 2013

Experimental design: A coffee plantation was divided into Vitazyme treated (0.6 ha) and untreated (0.4 ha) portions to evaluate the effect of the product on coffee bean production and profits.

1. Control **2. Vitazyme**

Fertilization: unknown

Vitazyme application: 500 ml of Vitazyme in 200 liters of water (0.25%) sprayed on the leaves and soil at 3 liters/ha, four times per year

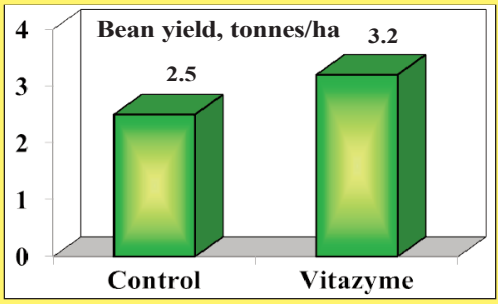
Yield results: The field was harvested on January 20, 2013. The increase in yield with Vitazyme applied four times a year was an excellent 28%.

Income results: Vitazyme costs: 4,560,000 VND/ha

Increase in income with Vitazyme: 16,440,000 VND/ha

Conclusions: This coffee trial in Viet Nam, using four annual applications of Vitazyme at 3 liters/ha each time, revealed that the bean yield was improved by 28%, while net income was raised by 16,440,000 VND/ha. These results prove the great efficacy of Vitazyme for coffee culture in Viet Nam.

Coffee Yield



Increase in bean yield with Vitazyme: 28%

Coffee

Researcher: unknown *Farmer*: Tran Thi Tuoi *Location*: Tam Thang, Cu Jut, Dak Nong Province, Viet Nam

Variety: unknown *Age of plants*: 5 years *Harvest date*: November 9 to 28, 2013

Experimental design: A coffee plantation was divided into Vitazyme treated (0.8 ha) and untreated (0.4 ha) portions to evaluate the effect of the product on coffee bean production and profits.

1. Control **2. Vitazyme**

Fertilization: unknown

Vitazyme application: 500 ml of Vitazyme in 200 liters of water (0.25%) sprayed on the leaves and soil at 3 liters/ha, four times per year

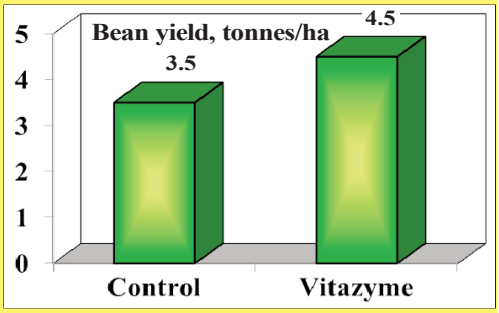
Yield results: Vitazyme greatly improved bean yield with four annual applications of 3 liters/ha each time.

Income results: Vitazyme costs: 6,000,000 VND/ha

Increase in income with Vitazyme: 24,000,000 VND/ha

Conclusions: A plantation coffee trial with Vitazyme, using four annual applications at 3 liters/ha each time, resulted in a 29% yield increases. **Most of this benefit resulted from less premature fruit falling, and the number of fruit per cluster was also higher.** Income was increased by 24,000,000 VND/ha, to prove the great effectiveness of this program for coffee producers in Viet Nam.

Coffee Yield



Increase in bean yield with Vitazyme: 29%

Coffee

Seedlings

Researcher: unknown *Greenhouse location*: Bao Anh, Ea Tling, Cu Jut, Dak Nong Province, Viet Nam
Variety: unknown *Seed soaking*: 16 hours *Incubation*: 4 days
Experimental design: A greenhouse with coffee seedlings was divided into plants receiving Vitazyme, and those receiving none to evaluate the product's effect on germination, maturation rate, appearance, and salability. The seeds were grown in flats, and then transferred to bags.

1. Control **2. Vitazyme**

Vitazyme application: Vitazyme was used six times: (1) at seed soaking for 16 hours (controls were soaked in water); (2) 1% spray 10 days after seeding; (3) 1% spray 40 days after seeding; (4) 1% spray at the time of transfer to bags; (5) 1% spray 30 days after bagging; (6) 1% spray 90 days after bagging.

Trial 1

Seed soaking date: November 1, 2012
Seed incubation dates: November 1 to 4, 2012

Coffee Growth and Income Data

Parameter	Date	Days after planting	Variety TR9		Variety TR5		Variety TR4	
			Control	Vitazyme	Control	Vitazyme	Control	Vitazyme
Seed germination, %	Nov. 4	4	50	80	50	85	40	75
Seed germination, %	Dec. 3	30	50	90	50	90	45	85
Plants with leaves, %	Jan. 20	50	40	95	40	95	40	90
Live plants bagged, %	Jan. 29	59	97	99	97	99	96	98
Leaf number	May 29	179	4.5	6.0	4.5	6.0	5.0	6.0
Plant height, cm	May 29	179	17.5	27.5	17.5	27.5	17.5	27.5
Selling price, VND			2,500	3,000	2,500	3,00	2,500	3,000
Plants sold, % of total			50	80	50	80	50	80
Vitazyme cost, VND			—	140,000	—	140,000	—	140,000
Extra labor cost[1], VND			150,000	—	150,000	—	150,000	—
Income increase, VND/5,000 plants			—	2,500,000	—	2,500,000	—	2,500,000

[1]Extra cost due to smaller plants.

Trial 2

Seed soaking date: January 28, 2013
Seed incubation dates: January 28 to February 3, 2013

Conclusions: This coffee nursery trial in Viet Nam, using Vitazyme as a seed treatment and five soil and foliar treatments until selling time, revealed that ...

- Vitazyme increased seed germination at 4 to 6 days by 25 to 35%-points for all varieties.
- Vitazyme increased seed germination at 30 to 34 days by 40%-points for all varieties.
- Plants with visible leaves improved by 50 to 55%-points at 50 to 57 days for all varieties.
- Live plants that were bagged increased by 2%-points for all varieties.
- Leaf number was improved by 33 to 75% for all varieties.
- Plant height with Vitazyme increased by 57 to 75% for all varieties.
- Untreated plants required 150,000 VND more labor cost due to a small plant size.
- Extra income generated by Vitazyme was 2,500,000 VND for all varieties.
- Vitazyme treated plants were more salable due to bigger size and better appearance.

This program for coffee nurseries in Viet Nam is an excellent choice.

Coffee Growth and Income Data

Parameter	Date	Days after planting	Coffee variety (unknown)	
			Control	Vitazyme
Seed germination, %	Feb. 3	6	50	80
Seed germination, %	Mar. 3	34	50	90
Plants with leaves, %	Mar. 20	51	40	95
Live plants bagged, %	Mar. 30	61	97	99
Leaf number	May 30	122	2.0	3.5
Plant height, cm	May 30	122	10.0	17.5
Selling price, VND			2,500	3,000
Plants sold, % of total			50	80
Vitazyme cost, VND			—	140,000
Extra labor cost[1], VND			150,000	—
Income increase, VND/5,000 plants				2,500,000

[1]Extra cost due to smaller plants.

Corn

Researcher: Tim Heikens and Leonard Jansen
Variety: Golden Harvest H7891
Plant population: 33,000 seeds/acre
Farmer: Leonard Jansen
Row spacing: 30 inches
Soil type: silty clay loam (Mollisol)
Location: Lake Park, Iowa
Planting date: May 11, 2013

Experimental design: A 30-acre uniform corn field was sprayed with Vitazyme in alternating 90-foot sprayer strips through the field after the corn was growing. The purpose of the study was to determine if a single application could improve grain yield.

1. Control
2. Vitazyme



This field had alternate 90-foot sprayer widths treated with Vitazyme at 10 to 11 leaves.

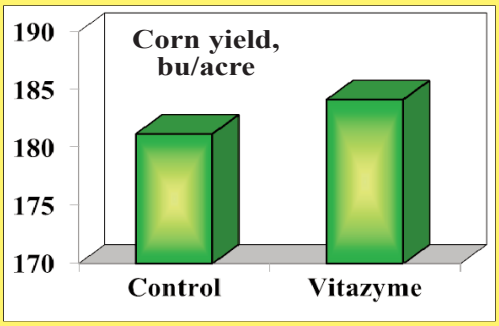


The treated plants responded to Vitazyme with a greater root mass, as evidenced here.

Fertilization: Total nutrients applied were 140-100-120 lb/acre of N-P_2O_5-K_2O.
Vitazyme application: 20 oz/acre (1.5 liters/ha) sprayed on the leaves and soil on July 6 at the 10 to 11 leaf stage
Weed control: 1.5 pints/acre of Steadfast on May 9; 1 quart/acre of Roundup on June 17
Weather during the season: a wet spring and a dry summer and fall
Harvest date: October 24, 2013
Yield results: A weigh wagon was used to quantify yields.

Corn Yield

Treatment	Corn yield	Yield change
	bu/acre	bu/acre
Control	181.19	—
Vitazyme	184.16	2.97 (+2%)





Corn ears from both treatments reveal that the Vitazyme treatment (right) had ears with two more rows than the controls.

Increase in grain moisture with Vitazyme: 1.0%

Grain moisture results: The Vitazyme treated corn had 17% moisture and the control corn had 18% moisture.
Conclusions: This corn trial in northwestern Iowa revealed that Vitazyme, applied at the 10 to 11-leaf stage at 20 oz/acre, produced about a 3 bu/acre yield increase. Grain moisture was 1.0% less. Had the product been applied at planting as well the yield improvement would likely have been much greater.

Corn

Vitazyme With Quantum Products at Two Nitrogen Rates

Researcher: Bertel Schou, Ph.D.
Educational Services), Cedar Falls, Iowa
Variety: Pioneer P9675 (Roundup Ready)
Planting rate: 38,000 seeds/acre
Tillage: field cultivated and harrowed
Research organization: ACRES (Agricultural Research and
Location: Cedar Falls, Iowa
Planting Depth: 1.5 inches
Row spacing: 30 inches
Planting date: June 20, 2013
BBCH scale: BCOR
Maturity: 96 days
Slope of plot: 4%
Previous crop: corn

Soil type: Maxfield silty clay loam (organic matter = 4.4%, pH = 6.3, cation exchange capacity = 17 meq/100 g of soil, drainage = excellent, fertility = excellent)
Experimental design: A small plot corn experiment was established in east-central Iowa to evaluate the effect of Vitazyme and two Quantum products on the yield of corn, at two nitrogen levels. Six replications were used, with a randomized complete block design. Individual plots were 15 x 30 feet, or 450 ft^2 per plot (0.01033 acre). This experiment had been put in earlier but was mistakenly fertilized incorrectly, so was redone and planted later with a short-season variety, so yielded less than the

original study would have.

Treatment	Nitrogen	Vitazyme	Quantum Light	Quantum VSC
1. Control	50%	0	0	0
2. Vitazyme	50%	In-furrow,Foliar	0	0
3. Quantum	50%	0	In-furrow, Foliar	In-furrow, Foliar
4. Vitazyme + Quantum	50%	In-furrow, Foliar	In-furrow, Foliar	In-furrow, Foliar
5. Control	100%	0	0	0
6. Vitazyme	100%	In-furrow, Foliar	0	0
7. Quantum	100%	0	In-furrow, Foliar	In-furrow, Foliar
8. Vitazyme + Quantum	100%	In-furrow, Foliar	In-furrow, Foliar	In-furrow, Foliar

Fertilization: 18-46-0% N-P_2O_5-K_2O applied per acre the fall of 2012; 50% N, 80 lb/acre urea-NH_4NO_3; 100% N, 160 lb/acre urea NH_4NO_3, all sidedressed

Vitazyme application: 13 oz/acre (1 liter/ha) in-row at planting; 13 oz/acre (1 liter/ha) on the leaves and soil at V8, August 9, 2013

Quantum application: Both Quantum products are produced by Applied and Experimental Biology, Jacksonville, Florida. Quantum Light is a proprietary blend of beneficial cultures and photosynthetic microbes that increase plant photosynthesis and growth. Quantum VSC contains photosynthetic microbes, hypercellulose, symbiotic microbes, and humic substances. These were applied at 1 gallon/acre each for both in-furrow and foliar applications, at the same times as Vitazyme. The two were applied together.

Weed control: post-emergence herbicides

Weather during the growing season: Temperatures were about average after a cool early season; spring was wet, but July and August were dry.

Harvest date: October 28, 2013

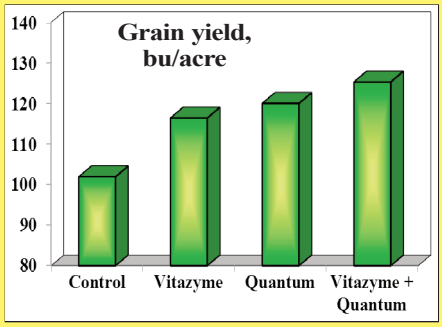
Yield results: The two center rows of each plot were harvested for yield results. Weights are corrected to 15.5% moisture.

Corn Yield

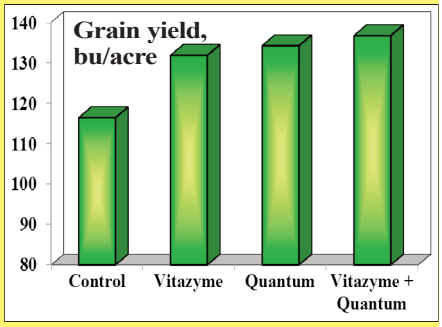
Treatment	Grain yield[1]	Yield change[2]
	bu/acre	bu/acre
50% Nitrogen		
1. Control	101.9 d	—
2. Vitazyme	116.4 c	14.5 (+14%)
3. Quantum	120.0 c	18.1 (+18%)
4. Vitazyme + Quantum	125.3 bc	23.4 (+23%)
100% Nitrogen		
1. Control	116.4 c	—
2. Vitazyme	131.8 ab	15.4 (+13%)
3. Quantum	134.2 ab	17.8 (+15%)
4. Vitazyme + Quantum	136.7 a	20.3 (+17%)
LSD (P = 0.05)	10.4	
CV (P = 0.05)	7.21%	
Replicate F	4.051	
Treatment F	10.244	

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

Yield at 50% Nitrogen



Yield at 100% Nitrogen



Increase in Yield With Vitazyme

	50% N	100% N
Vitazyme	14%	13%
Quantum Only	18%	15%
Vitazyme + Quantum	23%	17%

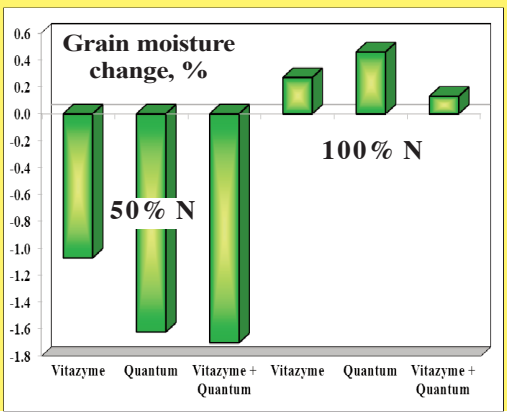
Vitazyme consistently boosted yield by 13 to 14% above the control at both nitrogen levels, while the Quantum products improved the yield by 15 to 18%. The two products together further boosted corn yield, to 17 to 23% above the control. In every cases the greatest increases were at the 50% nitrogen level. There appears to be a synergism between Vitazyme and Quantum materials, with additional boosts in yield of 2% at the 100% N level, and 5% at the 50% N level.

Grain Moisture

Treatment	Grain moisture[1]	Change[2]
	%	%
50% Nitrogen		
1. Control	25.00 a	—
2. Vitazyme	23.93 ab	-1.07
3. Quantum	23.38 ab	-1.62
4. Vitazyme + Quantum	23.30 b	-1.70
100% Nitrogen		
1. Control	23.89 ab	—
2. Vitazyme	24.16 ab	+0.27
3. Quantum	24.35 ab	+0.46
4. Vitazyme + Quantum	24.02 ab	+0.13
LSD (P = 0.05)	1.67	
CV	5.90%	
Replicate F	0.940	
Treatment F	0.869	

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

Change in Grain Moisture



Grain moisture results: Grain moisture was determined by a device on the plot combine. There was only one significant grain moisture change: a reduction of 1.70 percentage points with Vitazyme + Quantum at 50% N. Both Vitazyme and Quantum and Quantum alone also reduced grain moisture, but not significantly at 50% N. On the other hand, all treatments at 100% N slightly increased grain moisture.

Continued on the next page

Reduction in grain moisture with Vitazyme + Quantum at 50% N: 1.70%-point

Plant population results: All treatments had statistically the same population (23,980 to 22,092 plants/acre) except the control at 50% N, and Quantum products at 50% N, and Quantum products at 50% N, which had significantly lower populations. The good yield response of the Quantum treatment showed that these slightly reduced populations had little effect on the resultant yield.

Conclusions: A small plot corn study in east-central Iowa revealed that a late-planted Roundup Ready variety responded well to both two nitrogen levels, and also Vitazyme and Quantum products, alone or in combination. Vitazyme boosted the grain yield by 14% at 50% N, and by 13% at 100% N; Quantum Light + Quantum VSC increased the yields by 18% and 15% at 50 and 100% N, respectively. The products applied together in-row and foliar brought a synergistic improvement in yield above either product alone, the increases being 23% at 50% N and 17% at 100% N. Grain moisture was significantly reduced by the combined products at the 50% N level, but this reduction was not achieved at the 100% N level. Both products, and especially the products applied together, showed fine grain yield responses in this trial, and should be evaluated further as to their potential as excellent synergists for farmers in the Corn Belt.

Corn

Vitazyme and Fish

Researcher: Bertel Schou, Ph.D.
Research organization: ACRES (Agricultural Research and Educational Services), Cedar Falls, Iowa
Location: Cedar Falls, Iowa
BBCH scale: BCOR
Variety: Pioneer P0453HR (Roundup Ready)
Maturity: 104 days
Planting Depth: 1.5 inches
Planting rate: 38,000 seeds/acre
Row spacing: 30 inches
Slope of plot: 5%
Planting date: May 17, 2013
Previous crop: soybeans
Soil type: Kenyon loam
Tillage: conventional (field cultivating and harrowing)
Soil test values: pH = 6.9 , organic matter = 2.7%, cation exchange capacity = 20.0 meq/100 g, N = 74 lb/acre, SO_4-S = 16 lb/acre, P_2O_5 = 246 lb/acre, Ca = 5,743 lb/acre, Mg = 807 lb/acre, K2O = 302 lb/acre, Na = 94 lb/acre, B = 1.45 lb/acre, Fe = 539 lb/acre, Mn = 143.7 lb/acre, Cu = 2.3 lb/acre. Zn = 11.8 lb/acre; percent base saturations: Ca = 71.6%, Mg = 16.8%, K = 1.9%, Na = 1.0%, other bases = 4.6%, H = 4.0%.

Experimental design: A corn study having individual plots 15 x 30 feet (450 ft^2, or 0.0103 acre) was set up in a randomized complete block design, with six replicates. The purpose of the study was to determine the effects of Vitazyme and fish applied separately, and the two applied together in-furrow and foliar, on crop yield, moisture, and plant population.

Treatment	At planting	At V6R1	At R4
1. Control	0	0	0
2. Vitazyme	13 oz/acre	13 oz/acre	0
3. Fish	2 gal/acre	2 gal/acre	2 gal/acre
4. Vitazyme + Fish	13 oz + 2 gal (Trt. 2 + 3)	13 oz + 2 gal (Trt. 2 + 3)	2 gal/acre (Fish only)



The treated corn in all cases produced better roots than did the untreated control, especially the Vitazyme and fish together.



This fish and Vitazyme study in Iowa experienced good weather conditions and very high yields.

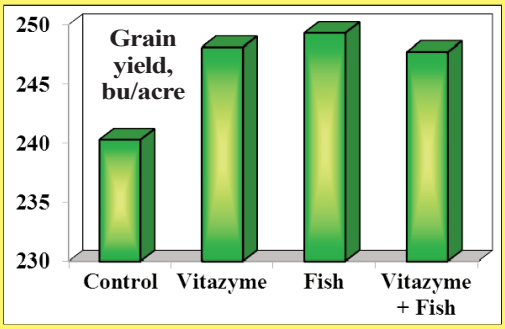
Fertilization: In the fall of 2012, 100 lb/acre of 18-46-0 (% N-P_2O_5-K_2O) and 100 lb/acre of 0-0-60. At 14 inches corn height, 100 lb/acre of N was applied as UAN (urea ammonium nitrate).
Vitazyme application: At planting (for Treatments 2 and 4), 13 oz/acre (1 liter/ha) in-row in a 10 gallon/acre solution; at V6 (Treatments 2 and 4), 13 oz/acre (1 liter/ha) sprayed on June 20 at 15 gallons/acre.
Fish application: Emulsified fish was applied at 2 gallons/acre in-row at planting (Treatments 3 and 4), and at 2 gallons/acre by foliar spray at V6 (Treatments 3 and 4) on June 20, as well as at V10 (Treatments 3 and 4) on August 26. The fish was mixed with water to give a 20 gal/acre output.
Weed control: Harness Xtra preplant (1.2 quarts/acre); Roundup postemergence at the recommended rate
Harvest date: October 25, 2013

Yield results: Means followed by the same letter are not significantly different at P=0.05 according to the Student-Newman-Kuels Test. Although only the fish treatment statistically exceeded the control, the three Vitazyme and fish treatments were equal, differing by 0.5% from each other. Vitazyme increased yield at the 6% confidence level, but the combined Vitazyme and fish did not enhance the yield above either product alone.

Corn Yield

Treatment	Corn Yield[1]	Yield change
	bu/acre	bu/acre
1. Control	240.3 b	—
2. Vitazyme	248.1 ab	7.8 (+3.2%)
3. Fish	249.3 a	9.0 (+3.7%)
4. Vitazyme + Fish	247.9 ab	7.6 (+3.2%)
LSD (P = 0.05)	8.0	
Standard deviation	6.5	
CV	2.6%	
Replicate F	1.73	
Treatment F	2.40	

[1]Adjusted to 15.5% moisture.



Increase in corn yield with Vitazyme: 3.2%

Increase in corn yield with Fish: 3.7%

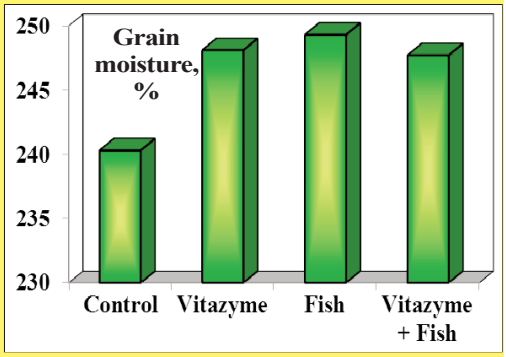
Increase in corn yield with Vitazyme + Fish: 3.2%

Plant population results: All final population values were nearly equal (36,459 to 36,776 plants/acre).

Grain moisture results: Only the combined Vitazyme + Fish treatment exceeded the control in grain moisture at P = 0.05. The other treatments were very close to each other.

Grain Moisture

Treatment	Grain moisture	Moisture change
	%	%
1. Control	18.92 b	—
2. Vitazyme	19.22 ab	+0.30
3. Fish	19.09 ab	+0.17
4. Vitazyme + Fish	19.73 a	+0.81
LSD (P = 0.05)	0.62	
Standard deviation	0.50	
CV	2.6%	
Replicate F	1.73	
Treatment F	2.92	



Conclusions: A replicated corn trial in east-central Iowa revealed that both Vitazyme and liquid fish, and the products combined, increased the yield of corn grain significantly **— Vitazyme alone and the two products together at P = 0.06, and fish alone at P = 0.05 — with the combined products not showing a synergistic effect. These yield increases were 7.8, 9.0, and 7.6 bu/acre for the Vitazyme, fish, and combined treatments, respectively. Plant population was not affected by either material, but grain moisture was greater than the control for the combined products by 0.81 percentage point at P =0.05.**

Corn

Vitazyme and Fish - Responses at Four Nitrogen Levels

Researcher: Sara Berg and Ron Gelderman, Ph.D. State University, Brookings, South Dakota Dakota
Planting date: May 15, 2013
Research institution: Department of Agronomy and Soils, South Dakota
Location: South Dakota State University Research Farm, Aurora, South
Variety: Dekalb 45-51
Soil type: Brandt silty clay loam
Planting rate: 32,000 seeds/acre
Row spacing: 30 inch



This corn study at South Dakota State University produced good responses for both Vitazyme and fish at four nitrogen levels.



Treated plants here are shown to have a bigger root system that has translated into better ear filling; at 50% of optimum N.

Continued on the next page

Soil test results: tested April 30, 2013; organic matter = 4.4%, NO_3-N = 32 lb/acre (to 24 inches), P (Olsen) = 20 lb/acre, K = 292 lb/acre, Zn = 2.56 lb/acre, S = 50 lb/acre (to 24 inches), pH = 5.5, salts (1:1) = 0.2 mmhos/cm

Experimental design: A small plot (10 x 45 feet, or 0.01033 acre) design with four replications was used to evaluate the effectiveness of Vitazyme and liquid fish in enhancing corn yield, plant population, and grain nutrient content as influenced by nitrogen rate. The fish was applied alone and with Vitazyme at the high nitrogen rate only. Statistics were calculated for Treatments 1 to 8, and also for Treatments 7 to 10

Fertilization: Nitrogen fertilizer (NH_4NO_3) was applied broadcast to the soil surface on May 15, just after planting. 100% N = 122 lb/acre of N; 75% N = 92 lb/acre of N; 50% N = 61 lb/acre of N.

Treatment	Nitrogen rate	Vitazyme	Fish
	% of optimal		
1. Control, 0% N	0	0	0
2. Vitazyme, 0% N	0	X	0
3. Control, 50% N	50	0	0
4. Vitazyme, 50% N	50	X	0
5. Control, 75% N	75	0	0
6. Vitazyme, 75% N	75	X	0
7. Control, 100% N	100	0	0
8. Vitazyme, 100% N	100	X	0
9. Fish, 100% N	100	0	X
10. Fish + Vitazyme, 100% N	100	X	X

Vitazyme application: (1) 13 oz/acre (1 liter/ha) in-furrow at planting, with 3 gallons of water per acre along with 10-34-0% N-P_2O_5-K_2O fertilizer; (2) 13 oz/acre (1 liter/h)a sprayed with a hooded plot sprayer on the leaves and soil at V8, on July 10, 2013

Fish application: (1) 2 gal/acre in a 5 gal/acre volume, with Vitazyme and 10-34-0% N-P_2O_5-K_2O, in-furrow at planting; (2) 2 gal/acre sprayed on the leaves and soil with a hooded plot sprayer at V8, on July 10, 2013; (3) 2 gal/acre on the leaves, hand-sprayed with a backpack sprayer at silking

Harvest date: October 25, 2013

Chlorophyll results: Chlorophyll readings were made with a Minolta SPAD meter at V10 (July 17, 2013), and again at R1 (August 1, 2013). No consistent results were noted, although the highest overall value recorded was for 100% N + Vitazyme at R1 (54.6), which was 1.2 points higher than the respective control treatment.

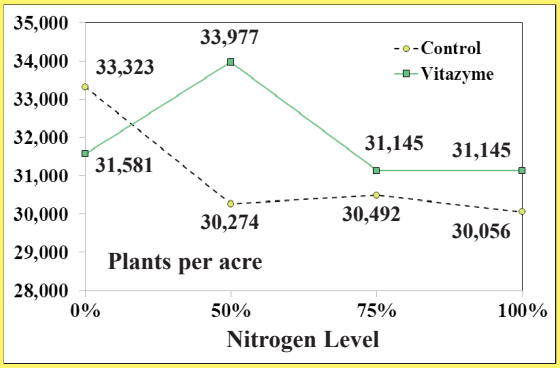
Population results: There was some benefit to plant stand shown with Vitazyme at three out of the four nitrogen levels. In every case except at 0% N, the Vitazyme and fish treatments exceeded the control treatments. Fish alone and Vitazyme + fish significantly exceeded the control in plants/acre.

Grain moisture results: There were no clear relationships between Vitazyme, fish, and nitrogen rates. At-harvest moisture was around 16.0 to 17.0%.

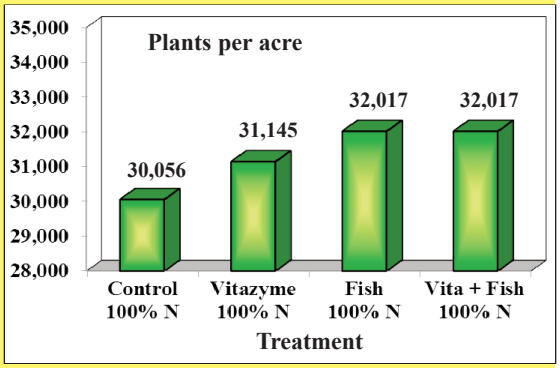
Grain test weight results: Weight per bushel of grain varied little across all of the treatments, ranging from 53.4 to 55.9 lb/bu for the eight nitrogen rate treatments. The Vitazyme + Fish treatment, however produced the heaviest grain at 56.4 lb/bu.

Grain yield results: See the graphs on the right.

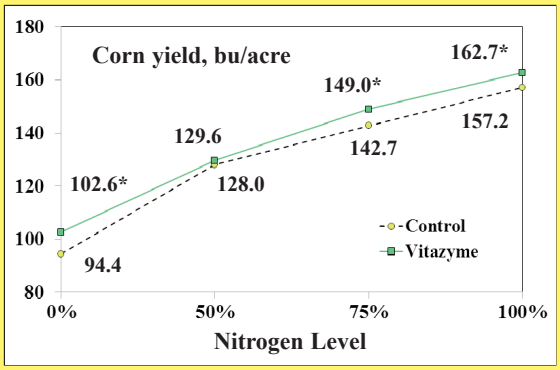
Plant Population and Nitrogen Rate



Plant Population With Vitazyme and Fish

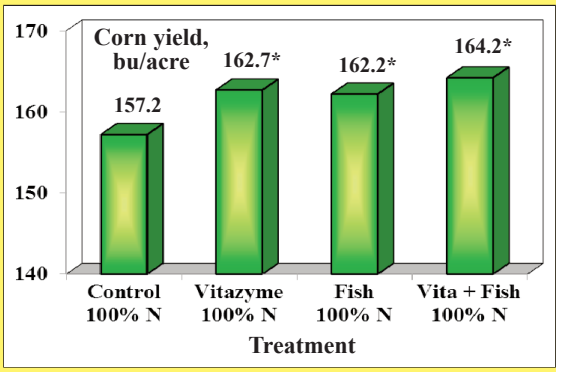


Grain Yield and Nitrogen Rate



*Significantly greater than the control treatment at the same nitrogen level at P = 0.05, according to the Statistical Analysis System, GLM.

Grain Yield With Vitazyme and Fish



*Significantly greater than the control treatment at the same nitrogen level at P = 0.05, according to the Statistical Analysis System, GLM.

Increase in Grain Yield With Vitazyme

0% N	8.7%
50% N	1.3%
75% N	4.4%
100% N	3.5%

Grain yield increases were consistent across all nitrogen levels, but the largest percentage increase (8.7%) was with no fertilizer nitrogen added.

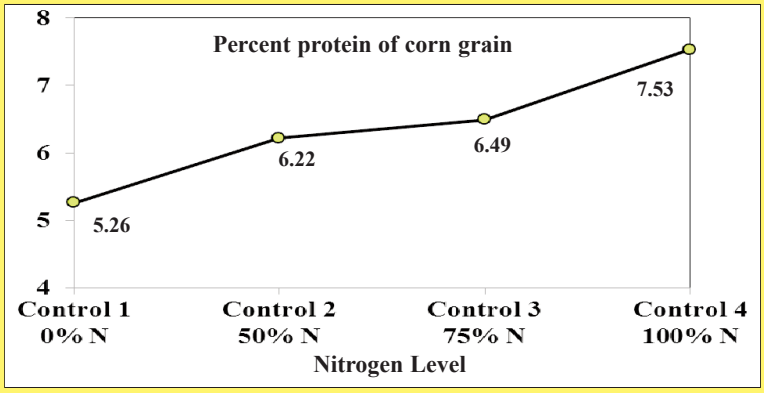
Increase in Grain Yield With Vitazyme and Fish - 100% N

Vitazyme only	3.5%
Fish only	3.2%
Vitazyme + Fish	4.5%

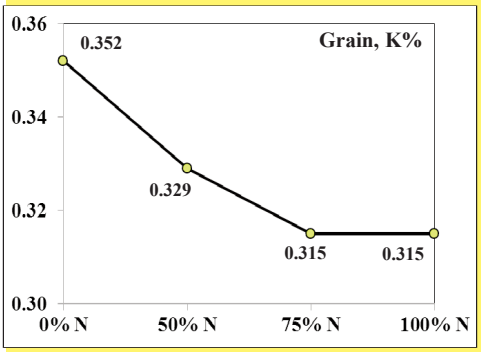
Both Vitazyme and fish alone significantly improved grain yield, but the combined Vitazyme and fish produced the highest yield — 4.5% higher than the 100% control — which was the highest yield of all ten treatments (164.2 bu/acre).

Grain quality results: Analyses of oil, protein, and starch were performed at the South Dakota State University diagnostic laboratory. Oil varied from 2.94 to 3.29%, protein from 5.26 to 7.53%, and starch from 57.74 to 58.87%. There was no effect of Vitazyme and fish on these contents although nitrogen levels increased the protein for the control and Vitazyme treatments. See the graph at right. Analyses of grain potassium, copper, iron, zinc, manganese, phosphorus, sulfur, magnesium, and calcium revealed no clear patterns of effects for Vitazyme and fish on these nutrients, although fish tended to increase potassium and phosphorus. Nitrogen increased some nutrient levels and reduced others. Values of both the control and Vitazyme treatments are averaged for each N level.

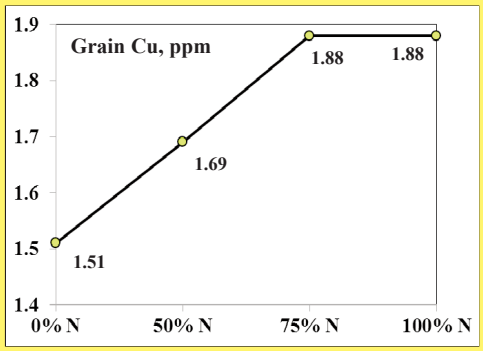
Protein of Grain and Nitrogen Level



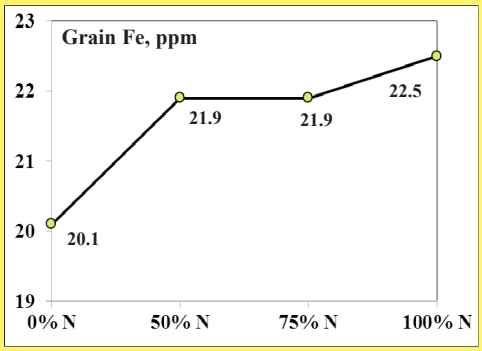
Grain K and N Level



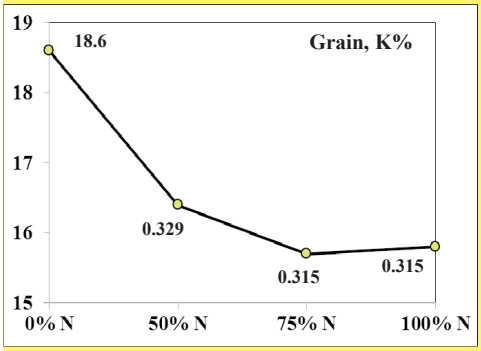
Grain Cu and N Level



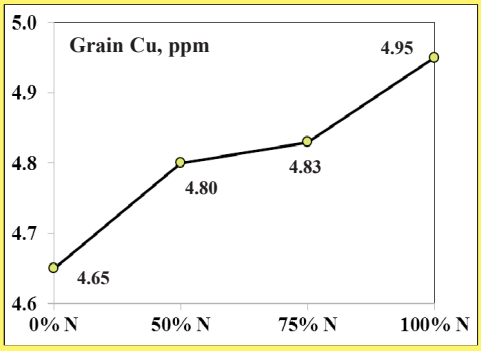
Grain Fe and N Level



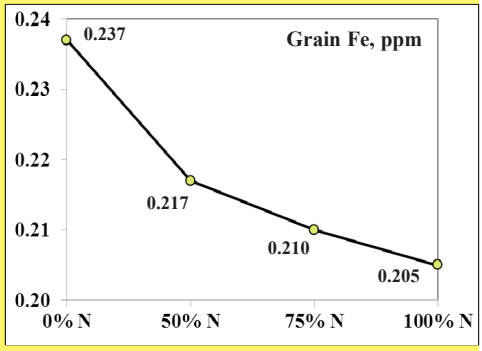
Grain Zn and N Level



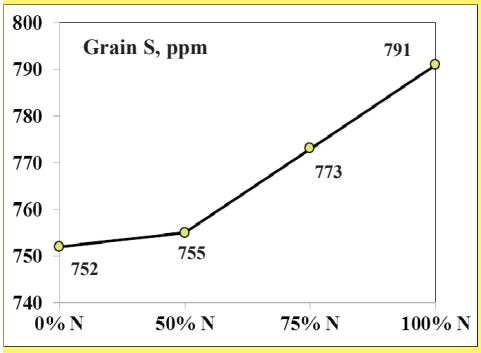
Grain Mn and N Level



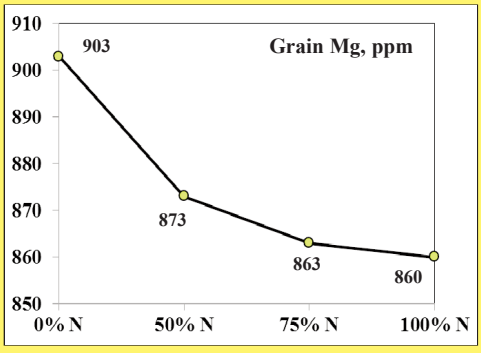
Grain P and N Level



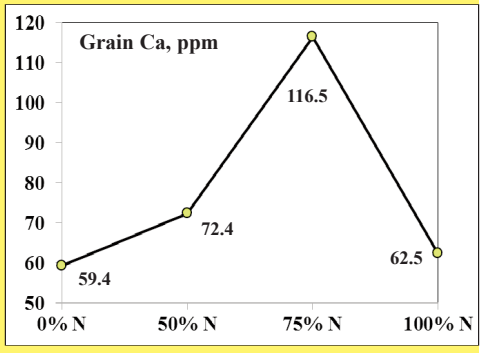
Grain S and N Level



Grain Mg and N Level

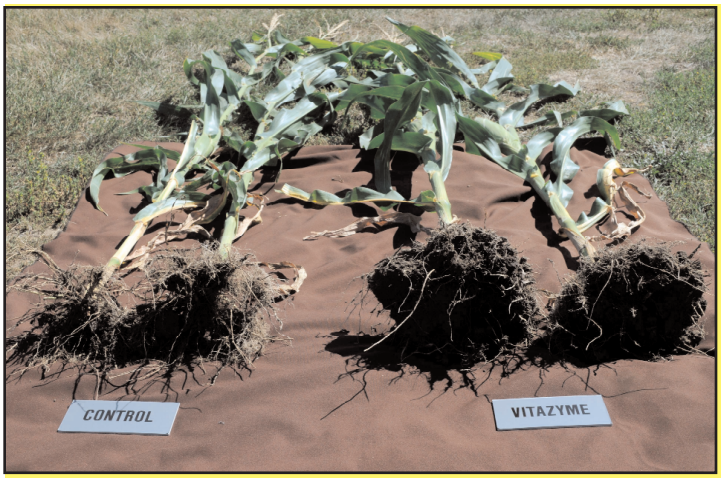


Grain Ca and N Level



Conclusions: A small plot corn study in east central South Dakota revealed that Vitazyme and fish **— Vitazyme applied at planting and at V8, and fish applied at planting, V8, and silking — significantly increased corn yield at all nitrogen fertilizer levels, by up to 8.7% at the 0% N level. The Vitazyme plus fish treatment at 100% N gave the highest yield of all ten treatments (164.2 bu/acre). Vitazyme increased plant population at the three highest nitrogen levels, and fish and fish plus Vitazyme also increased population at 100% N. Grain quality parameters were affected by nitrogen levels to some degree, the contents of protein, copper, iron, manganese, and sulfur increasing and the contents of potassium, zinc, phosphorus, and magnesium decreasing with increasing nitrogen fertilizer. This study reveals the usefulness of Vitazyme and fish, and especially the two combined, to increase corn yields under rainfed conditions in eastern South Dakota.**

Continued on the next page



Notice how well developed the roots are with Vitazyme; much soil clings to the root mass.



At 50% nitrogen, ear filling was much improved with Vitazyme compared to the control in this small sample.

Corn

A Nitrogen Rate Study

Researcher: Timothy Veldkamp
Research Organization: SGS Ag Research
Location: Aurora, South Dakota
Variety: 4055 Roundup Ready
BCCH Scale: BCOR
Planting Date: June 14, 2013
Planting rate: 32,000 seeds/acre
Planting depth: 1.5 inches
Row spacing: 30 inches
Tillage: conventional
Previous crop: soybeans
Soil type: Strayhoss Loam (pH = 6.5, organic matter = 4.5%, cation exchange capacity = 25 meq/100 g of soil, P = 14 lb/acre, K = 174 lb/acre, Zn = 1.22 lb/acre)
Experimental design: A small plot soybean study was designed to evaluate the effect of Vitazyme, at two nitrogen levels, on the yield of corn. The plots were 10 x 40 feet (0.009183 acre), and arranged in a randomized complete block design, with four replicates.

1. Control, 50% N **2. Vitazyme, 50% N** **3. Control, 100% N** **4. Vitazyme, 100% N**

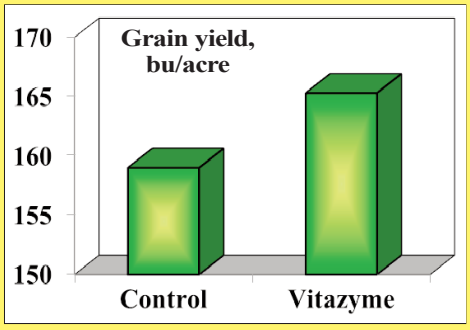
Fertilization: 50% N plots received 65 lb/acre of N; 100% N plots received 130 lb/acre of N
Vitazyme application: (1) 13 oz/acre (1 liter/ha) in the seed row at planting; (2) 13 oz/acre (1 liter/ha) on the leaves and soil at V8.
Weed control: 1.8 quarts/acre of Harness Xtra + 24 oz/acre of Roundup PowerMax on July 3; 24 oz/acre of Roundup PowerMax on August 8
Vigor results: Plant vigor was evaluated at the V2 stage on July 8, 2013. Values ranged from 5.8 to 6.3, and were not significantly different.
Harvest date: November 8, 2013
Yield results: The middle two rows of each plot were combined and weighed, and the moisture content was determined using an Almaco Grain Gauge.

Grain Yield

Treatment	Grain Yield[1]	Yield change[2]
	bu/acre	bu/acre
Control, 50% N	159.0 b	—
Vitazyme, 50% N	165.3 a	6.3 (+4%)
Control, 100% N	167.4 a	—
Vitazyme, 100% N	170.3 a	2.9 (+2%)
LSD (P = 0.10)	5.0	
CV	2.35%	
Replicate F	13.880	
Treatment F	6.138	

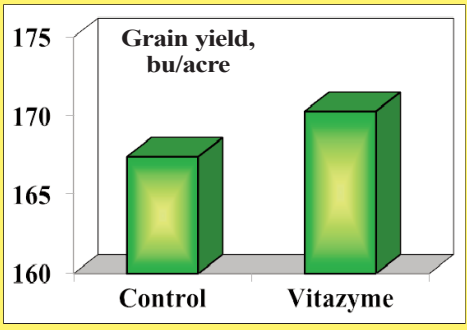
[1]Means followed by the same letter are not significantly different at P=0.10, according to the Student-Newman-Kuels Test.
[2]The Vitazyme means are compared with the control means at the same N level.

Grain Yield, 50% N



Increase in yield with Vitazyme, 50% N: 4%

Grain Yield, 100% N



Increase in yield with Vitazyme, 100% N: 2%

Vitazyme significantly increased grain yield at 50% N, boosting it by 6.3 bu/acre, while the 100% N application revealed that Vitazyme increased the yield by 2.9 bu/acre over the control, but not significantly. Vitazyme grain yield at 50% N was statistically the same as was the untreated grain yield at 100% N.

Test weight results: All values varied within a narrow range — 51.15 to 51.93 lb/bu — and none of the differences were significant. However, Vitazyme at both N levels slightly raised bushel weight.

Increase in test weight with Vitazyme

At 50% N ..... 0.78 lb/bu
At 100% N ..... 0.25 lb/bu



Early in the season the Vitazyme treated corn plants show superior leaf and stalk growth.



At the plot boundary of the 100% N level, the improved growth of Vitazyme is very noticeable.

Grain moisture results: There were no significant differences in grain moisture among the four treatments.

Conclusions: This corn trial with Vitazyme at two nitrogen levels, near Brookings, South Dakota, revealed that Vitazyme significantly improved corn yield at the 50% N level. This yield was only 2.1 bu/acre less than the 100% N treatment without Vitazyme, and not significantly different from it. This reveals the improved nitrogen efficiency often noted with the use of this product. The 100% N level gave a 2% (2.9 bu/acre) yield increase for Vitazyme; the two were statistically the same. Grain moisture was not affected by the treatments, but there appeared to be a slight improvement in grain bushel weight with Vitazyme. These results show the excellent value of this program for corn growers in the northern Corn Belt.



Note the larger, longer ears of the Vitazyme treated plants, including more mature second ears as well.

Corn

Vitazyme and Kelpek

Researcher: V.V. Plotnikov
Research organization: Scientific, Innovation, and Technology Center of the Institute of Forages and Agriculture of Podillya NAAS
Location: National Academy of Agricultural Sciences, Ukraine
Variety: DKS 2960, FAO 250
Previous crop: winter wheat
Planting date: May 10, 2013
Seeding rate: 80,000 seeds/ha
Soil type: ash gray soil (humus = 2.2%, hydrolyzed-N = 8.4 mg/100 g of soil, P = 15.8 mg/100 kg of soil, exchangeable K = 12.4 mg/100 g of soil, pH = 5.5)
Soil preparation: disking, plowing, harrowing, cultivating
Experimental design: A small plot experiment with four replications was prepared to evaluate the effects of Vitazyme and Kelpek on the yield and growth of corn.

1. Control **2. Vitazyme** **3. Kelpek**

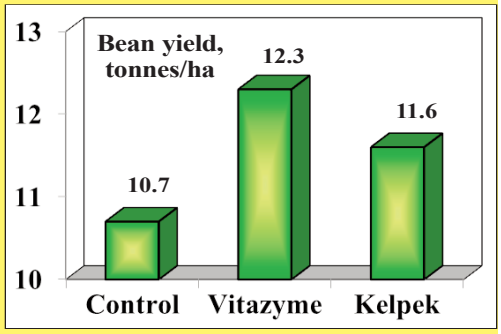
Fertilization: Before planting, 100-60-60 kg/ha of N-P_2O_5-K_2O were applied to the active test area.

Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 7 to 8-leaf stage (June 11, 2013)

Kelpek application: 2 liters/ha sprayed on the leaves and soil at the 7 to 8-leaf stage (June 11, 2013)

Yield results: Both Vitazyme and Kelpek substantially increased corn yield, but Vitazyme produced nearly double the increase of Kelpek (15%)

Corn Yield

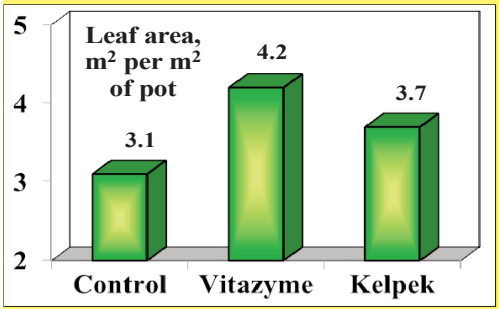


Increase In Yield

Vitazyme 15%
Kelpek 8%

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Leaf Area



Increase In Leaf Area
Vitazyme 35%
Kelpek 19%

Income results: Vitazyme clearly produced the greater income of the two products, more than doubling that achieved by Kelpek.

Increase In Net Income
Vitazyme ..... 1,690 UAH/ha
Kelpek ..... 780 UAH/ha

Leaf area results: Vitazyme nearly doubled the leaf area of corn versus Kelpek.
Conclusions: The authors of the report stated,

1. The treatment of corn hybrid DKS 2960 at the 7-8 leaf stage with Vitazyme, at 1 L/ha, gave a corn grain yield increase of 106 tonnes/ha, or 15%. When applying the competitive chemical Kelpek at a rate of 1 L/ha at the 7-8 leaf stage, the increase of corn grain yield was 0.9 tonne/ha, or 8%, and was 0.7 tonne/ha less than with Vitazyme.
2. With Vitazyme at 1 L/ha, the profit was 1,690 UAH/ha, which is 910 UAH/ha more than when applying Kelpek at 2 L/ha.
3. Vitazyme application at 1 L/ha gave an increase in corn leaf area of 1.1 m^2/m^2 of the plot. Applying Kelpek at 2 L/ha gave a corn leaf area increase of 0.6 m^2/m^2 of the plot, which is 0.5 m^2/m^2 less than when applying Vitazyme.

Corn

Researcher: unknown *Farmer*: Linh Thi Ngan *Location*: Dak Will, Cu Jut District, Dak Nong, Viet Nam
Variety: P4199 *Planting date*: August 10, 2013 *Planting rate*: 50,000 plants/ha
Experimental design: A corn field was divided into a Vitazyme treated and control area to determine the effects of this product on corn growth and yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: (1) seed treatment with a 5% solution before planting; (2) 2 liters/ha spray on the leaves and soil 15 days after planting; (3) 2 liters/ha spray on the leaves and soil 30 days after planting.
Germination results: Both treatments had over 95% germination.
Harvest date: December 12, 2013, 120 days after planting
Harvest and Yield results:

Increase in plant height with Vitazyme: 4%

Increase in ear height with Vitazyme: 10%

Increase in 1,000 seed weight with Vitazyme: 2%

Corn Harvest and Yield

Treatment	Plant height	Ear height	Drought resistance	Weight of 1,000 seeds	Seed color	Yield
	cm	cm		grams		tonnes/ha
Control	185	100	Fair	310	Light yellow	8.0
Vitazyme	192 (+4%)	110 (+10%)	Good	315 (+2%)	Dark yellow	9.0 (+13%)

Income results: The Vitazyme treated corn sold for 4,000 VND/kg, versus 3,800 VND/kg for the control corn.
Costs with Vitazyme: 1,420,000 VND/ha
Increased income with Vitazyme: 4,180,000 VND/ha
Return On Investment with Vitazyme: 2,94:1

Increase in yield with Vitazyme: 13%

Conclusions: A corn study in Viet Nam proved that a Vitazyme seed treatment, plus two soil and foliar applications, produced an excellent 13% yield increase. Drought tolerance was improved, as was seed weight (2%), and plant height (4%). Income was substantially increased, giving a Return On Investment of 2.94:1. This program is an excellent one for corn production in Viet Nam.

Corn

Researcher: Juan Carlos Diaz, Ph.D. *Farmer*: Ramiro Carlos Fonseen *Variety*: N 432 HJ (Eagle)
Location: El Ahuaje de Abajo Farm, San Nicolas, Cocula, Jalisco, Mexico *Planting date*: May 8, 2012
Experimental design: Corn to be used for leaves to wrap tamales was treated with Vitazyme on the seeds, and later on the leaves and soil, to one portion of a field, and compared with an untreated control to evaluate leaf production. The treated area was 1 ha.

1. Control **2. Vitazyme**

Increase in leaf yield with Vitazyme: 8%

Fertilization: unknown
Vitazyme application: (1) Seed treatment of 50 ml in 450 ml of water, to treat 55,000 seeds (a 20 kg bag planted 1 ha); (2) soil and foliar treatment of 1 liter/ha (13 oz/acre) at an unknown date.
Leaf yield result: Actual yield numbers for the two plots were not available, but the data reported an 8% increase in leaves with Vitazyme versus the control.
Conclusion: This Mexican corn study, utilizing two Vitazyme applications — a seed and a soil/foliar treatment — showed that this product significantly enhanced leaf production of the corn plants.

Corn

Researcher: Juan Carlos Diaz, Ph.D.
Location: San Juan Acozac, Puebla, Mexico
Farmer: Odilon Ramos
Variety: unknown

Experimental design: A corn field for fodder was divided into Vitazyme and control areas of 4,000 m^2 (0.4 ha) each, to evaluate the effect of the product on corn yield.

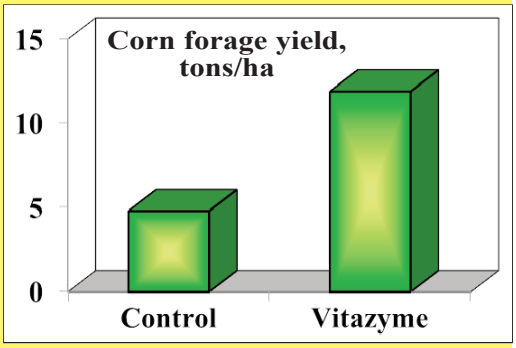
1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1 liter/ha (13 oz/acre) two times (timing unknown)
Yield results: Two cuttings were weighed for each treatment.
Conclusions: A forage corn study in Mexico revealed that Vitazyme applied twice during the growing season produced a remarkable 111% increase in yield. This program is highly effective for corn growers in Mexico.

Corn Yield

Treatment	Forage yield		Yield change
	tons	tons/ha	tons/ha
Control	1.9	4.8	—
Vitazyme	4.0	11.9	7.1 (+148%)

Increase in forage yield with Vitazyme: 148%



Corn

Researcher: Juan Carlos Diaz, Ph.D.
Location: El Chivero Field, El Llano Farm, San Martin Hidalgo, Jalisco, Mexico
Farmer: Eng. Salvador Sanchez Rica
Variety: Cimarron



Untreated corn plants show the usual expected development.



With Vitazyme, the corn plants are much growthier and have longer, more developed roots, and more leaf chlorophyll.

Experimental design: A corn field had 1 ha. selected to be treated with Vitazyme, applied to the seeds and later as a foliar spray, to evaluate effects on yield compared to an adjacent untreated area.

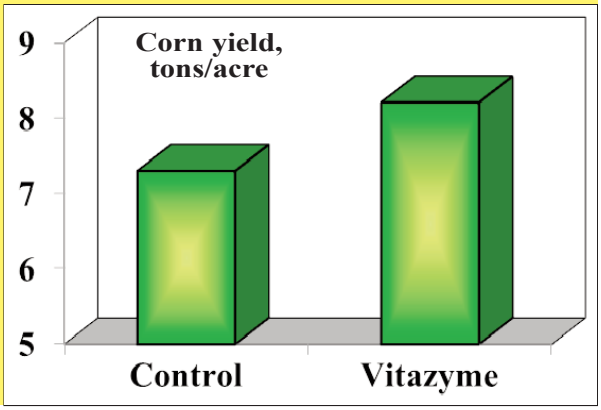
1. Control
2. Vitazyme

Fertilization: unknown
Vitazyme application: (1) Seeds were treated with 100 ml/20 kg of seed; (2) a spray of 1 liter/ha (13 oz/acre) was made to the leaves and soil sometime during growth.
Yield results: See table and graph at right.
Conclusions: This Mexican corn study revealed that a Vitazyme seed treatment and single foliar treatment increased grain yield by 12%, showing the program to be highly valuable for corn production in Mexico.

Corn Yield

Treatment	Corn yield	Yield change
	tons/ha	tons/ha
Control	7.30	—
Vitazyme	8.21	0.91 (+12%)

Increase in corn yield with Vitazyme: 12%



Corn

Researcher: Juan Carlos Diaz, Ph.D.
Location: El Monte Farm, Villa Corona, Jalisco, Mexico
Farmer: Eng. Jose Isabel Hernandez Soto
Variety: Cayman
Planting date: May 8, 2012

Experimental design: A corn field was divided into Vitazyme treated and control areas to determine the effect of a seed and foliar treatment on corn yield. The treated area was 1 ha.

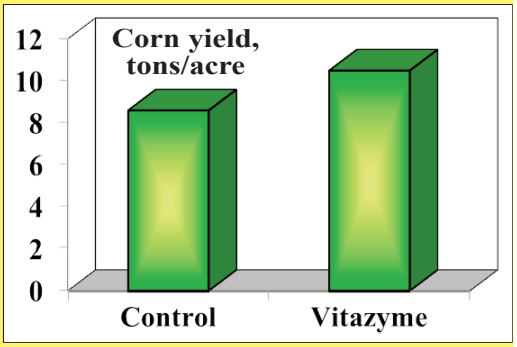
1. Control 2. Vitazyme

Fertilization: unknown
Vitazyme application: (1) Seed treatment, at 100 ml/20 kg of seed; (2) soil and foliar spray at 1 liter/ha (13 oz/acre) at an undetermined time
Yield results: See the table and graph on the right.
Conclusions: Applying a seed treatment and foliar spray to this corn study resulted in an excellent 22% yield increase.

Corn Yield

Treatment	Corn yield	Yield change
	tons/ha	tons/ha
Control	8.6	—
Vitazyme	10.5	1.9 (+22%)

Increase in corn yield with Vitazyme: 22%



Corn

Researcher: Juan Carlos Diaz, Ph.D.
Farmer: Eng. Jose Guadalupe Orozco Flores
Variety: Pioneer 3055
Location: Camino a la Coronilla Farm, Ameca, Jalisco
Planting date: May 8, 2012
Planting rate: 80,000 seeds/ha

Experimental design: A 1 ha plot was selected from a corn field to treat with Vitazyme, on both the seeds and leaves, to determine the effectiveness of the product to increase yield.



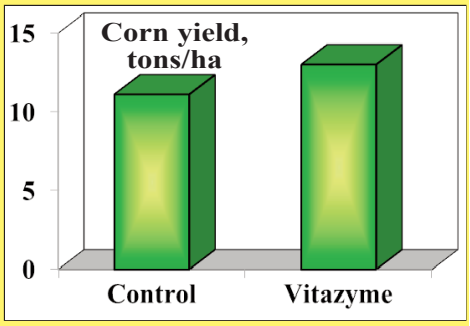
At the boundary of the treatment in this Mexican field, Vitazyme treatment has produced taller, more aggressive plants.

1. Control 2. Vitazyme

Fertilization: unknown
Vitazyme application: (1) A seed treatment of 50 ml in 450 ml of water, applied with Regent; (2) a soil and foliar spray treatment of 1.0 liter/ha at an unknown date
Yield results: See graph and table at right.
Conclusions: A corn study with Vitazyme in Mexico proved that the product increased grain yield substantially, by 17%, over the untreated control, showing the great effectiveness of this material to stimulate corn yield.

Corn Yield

Treatment	Corn yield	Yield change
	tons/ha	tons/ha
Control	11.1	—
Vitazyme	13.0	1.9 (+17%)



Increase in grain yield with Vitazyme: 17%

Corn

Researcher: Juan Carlos Diaz, Ph.D.
Farmer: Eng. Juan Carlos Flores Orozco
Variety: Pioneer 3055
Location: La Mesita Farm, Cocula, Jalisco, Mexico
Planting date: 90,000 seeds/ha
Irrigation: sprinkler

Experimental design: A 1.0 ha area of an irrigated corn field was treated with Vitazyme on the seeds, and later on the leaves and soil, in order to evaluate the product's ability to increase grain yield.

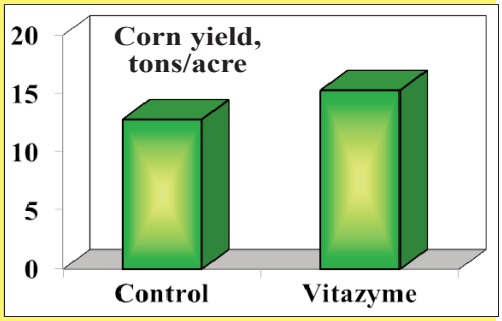
1. Control 2. Vitazyme

Fertilization: unknown

Corn Yield

Treatment	Corn yield	Yield change
	tons/ha	tons/ha
Control	12.8	—
Vitazyme	15.3	2.5 (+20%)

Increase in grain yield with Vitazyme: 20%



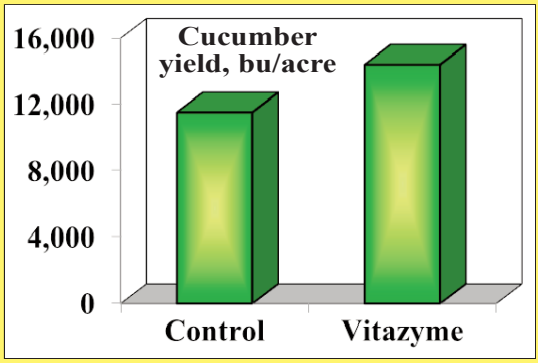
Vitazyme application: (1) Seeds were treated with a 10% solution; (2) leaves and soil were sprayed with 1 liter/ha (13 oz/acre) during growth at an unspecified time.
Yield results: See the table and graph on the previous page.
Conclusions: A corn study under irrigation, using a seed treatment and an additional foliar and soil spray, revealed that Vitazyme improved grain yield by 20% above the untreated control.

Cucumbers

Researcher: Alejandro Reyes *Farmer*: Victorino Pacheco *Location*: Yecapixtla, Mexico *Variety*: unknown
Experimental design: A greenhouse cucumber trial compared a Vitazyme treated area with an untreated area to evaluate effects on crop growth and yield.
1. Control 2. Vitazyme
Fertilization: unknown
Vitazyme application: (1) Seedling trays were dipped in a 1% solution, (2) 20 days after (1), established transplants received a foliar spray; (3) at flowering a third spray was made; (4) a final spray was made after the first picking.

Cucumber Yield

Treatment	Corn yield	Yield change
	kg	kg
Control	11,520	—
Vitazyme	14,400	2,880 (+25%)



Growth results: An evaluation made in November, 2012, revealed improvements with Vitazyme.
- **Faster overall growth**
- **Better flowering and fruit set**
- **Longer lasting fruit**

Increase in cucumber yield with Vitazyme: 25%

Yield results: The Vitazyme treated area yielded 2,880 kg more cucumbers than did the untreated control, a 25% yield increase.
Conclusions: A Mexican greenhouse cucumber study produced 25% greater yield with Vitazyme applied four times, with the first at the seedling stage and the last after the first picking. Such an excellent response proves the great utility of this product for use in cucumber production in Mexico.

Cucumbers

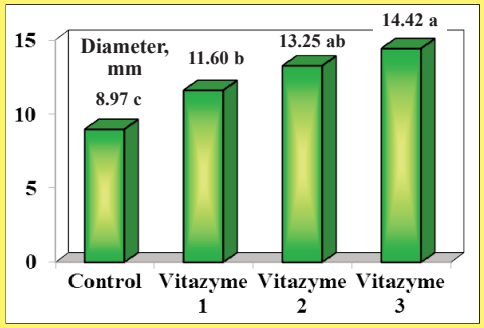
Researcher: Hermilo Sanchez Sanchez, Ph.D. *University location*: Autonomous University of Puebla, San Juan Acateno, Teziutlan, Puebla, Mexico
Trial location: commercial field at Tepalcingo, Morelos, Mexico
Variety: Centaur *Soil type*: Pellic vertisol (clayey, dark, high fertility)
Planting date: August 13, 2013 *Row spacing*: 1.0 meter *Seeding rate*: unknown
Experimental design: A cucumber field was selected for a plot area, in a Latin Square design, having four treatments and four replications. Each plot was five row wide and 5 meters long (25 m^2). The total plot area was 400 m^2 for 16 plots. The purpose of the trial was to determine the effect of a transplant and two foliar Vitazyme treatments on the growth and yield of cucumbers under field conditions.

Treatment	Transplant treatment[1]	Foliar treatment 1[2]	Foliar treatment 2[3]
	%	liters/ha	liters/ha
1. Control	0	0	0
2. Vitazyme 1	0.50	0.75	0.75
3. Vitazyme 2	0.75	1.00	1.00
4. Vitazyme 3	1.00	1.25	1.25

[1]Roots were dipped in Vitazyme solutions of these percentages.
[2]Applied 20 to 30 days after transplanting.
[3]Applied at early flowering.

Fertilization: unknown
Vitazyme application: (1) Transplants were dipped in the appropriate Vitazyme dilution just before planting; (2) leaves and soil were sprayed at 1 liter/ha with a backpack sprayer 20 to 30 days after transplanting; (3) leaves were sprayed at 1 liter/ha with a backpack sprayer at early bloom.
White fly control: Confidor 350 SC
Fungi control: *Pseudoperonospora cubensis* was controlled with Manzate 200.
Statistical evaluations: The Statistical Analysis System (SAS) was used, along with Tukey's Test, to evaluate differences among treatment means, at P = 0.05.
Growth and flowering results: See the following graphs.

Stem Diameter[1]



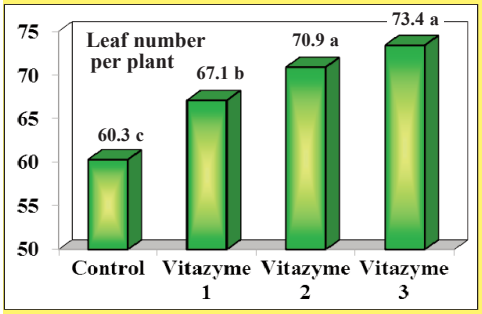
[1]Measured at ground level 45 days after transplanting for 10 random plants per plot; results are averaged.

Increase In Stem Diameter
Vitazyme 1 ..... 29%
Vitazyme 2 ..... 48%
Vitazyme 3 ..... 61%

The diameter of the stems increased a remarkable 61% with the highest Vitazyme rate, and all increases were significant.

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Leaves Per Plant[1]



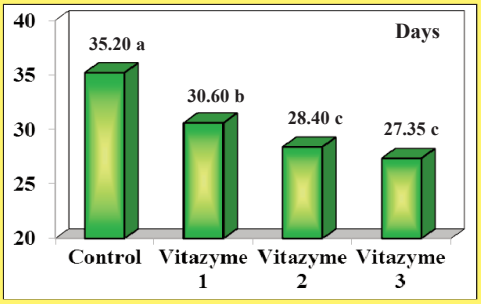
[1]Leaves of five typical plants were counted for each plot, and averaged.

Increase In Leaves/Plant

Vitazyme 1 ..... 11%
Vitazyme 2 ..... 18%
Vitazyme 3 ..... 22%

Leaves per plant progressively increased as Vitazyme applications increased, up to 22%.

Days to Flowering[1]



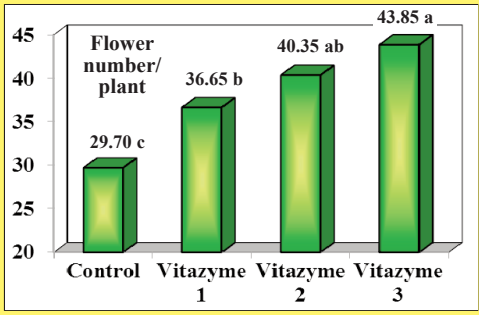
[1]Days from emergence to flowering of 10% of the plants.

Decrease in Days to Flowering

Vitazyme 1 ..... 4.60 days
Vitazyme 2 ..... 6.80 days
Vitazyme 3 ..... 7.85 days

Days to flowering decreased significantly by nearly 8 days with the highest rate of Vitazyme.

Flowers Per Plant[1]



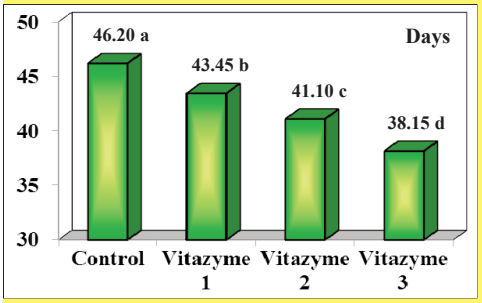
[1]The average of 10 random plants per plot, at 20% of total flowering for 10 randomly selected plants.

Increase In Flowers/Plant

Vitazyme 1 ..... 23%
Vitazyme 2 ..... 36%
Vitazyme 3 ..... 48%

Flowers per plant at 20% bloom increased significantly with the rate of application, reaching up to 48%.

Days to Fruit Set[1]



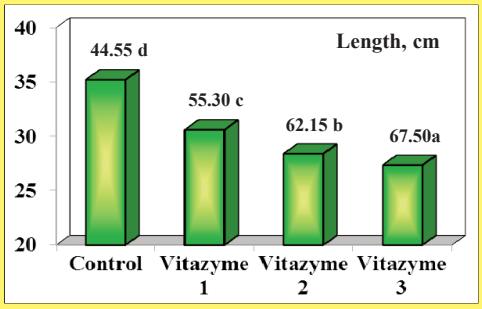
[1]Number of days from emergence to the set of 10% of the crop.

Decrease in Days to Fruit Set

Vitazyme 1 ..... 2.75 days
Vitazyme 2 ..... 5.10 days
Vitazyme 3 ..... 8.05 days

Vitazyme improved the rate of maturity, the highest rate significantly reducing the time to fruit set by over 8 days!

Root Length[1]



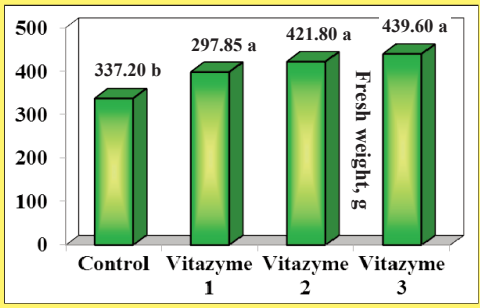
[1]Five random plants were dug per plot after yield evaluations, and the root lengths were averaged.

Increase in Root Length

Vitazyme 1 ..... 24%
Vitazyme 2 ..... 40%
Vitazyme 3 ..... 52%

Root length increased proportionally and significantly with increasing Vitazyme rate, reaching 52% greater root length.

Plant Fresh Weight[1]



[1]Five typical plants were selected for each plot, cut off at the base, and weighed, then averaged.

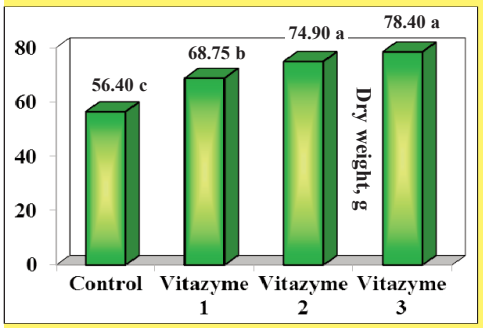
Increase in Fresh Weight

Vitazyme 1 ..... 18%
Vitazyme 2 ..... 25%
Vitazyme 3 ..... 30%

With increasing Vitazyme rate, the plant fresh weight increased significantly, reaching 30% more mass at the high rate.

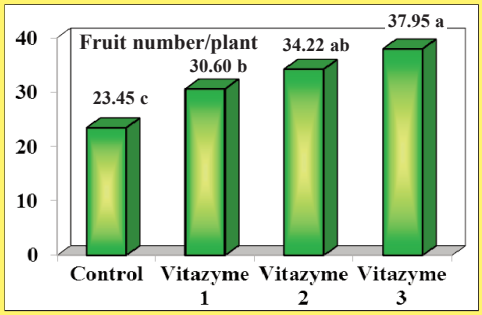
Fruit results:

Plant Dry Weight[1]



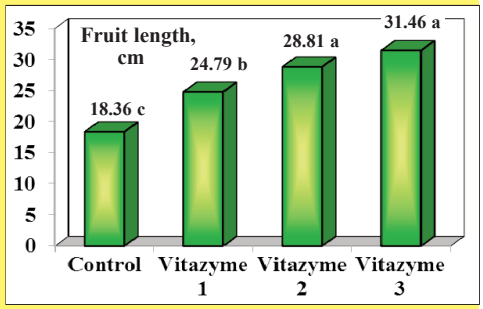
[1]The five plants for each plot were dried in a drying oven, and the plants were then weighed and averaged.

Fruits Per Plant[1]



[1]The total fruit number of five randomly selected plants from each plot were counted, and then averaged.

Fruit Length[1]



[1]Five fruits of the first floral internodes of five plants were selected, and the lengths were measured and averaged.

Increase in Dry Weight

Vitazyme 1 ..... 18%
Vitazyme 2 ..... 25%
Vitazyme 3 ..... 30%

Plant dry weight reflected the fresh weight, the highest Vitazyme rate increasing dry mass by 39%.

Increase in Fruits/Plant

Vitazyme 1 ..... 30%
Vitazyme 2 ..... 46%
Vitazyme 3 ..... 62%

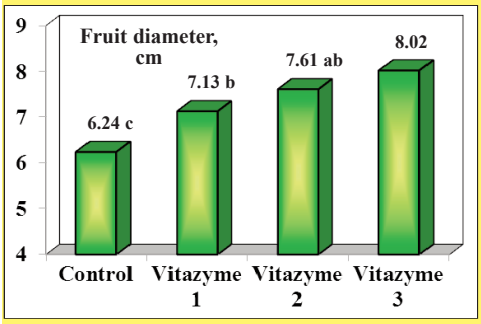
There was a great and significant increase in fruits per plant, the highest Vitazyme rate increasing the number by an amazing 62%.

Increase in Fruit Length

Vitazyme 1 ..... 18%
Vitazyme 2 ..... 25%
Vitazyme 3 ..... 30%

Fruit length was improved proportionally and significantly as the Vitazyme rate increased, the length improved by 35 to 71%

Fruit Diameter[1]



[1]The same five fruits from the first floral internodes of five plants were measured for diameter, and the results were averaged.

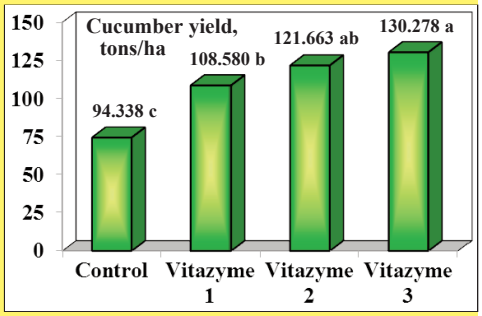
Increase In Fruit Diameter

Vitazyme 1 ..... 11%
Vitazyme 2 ..... 18%
Vitazyme 3 ..... 22%

Fruit diameter increased significantly at all levels of Vitazyme application, but not as greatly as the length. The highest level improved the diameter by 29%.

Cucumber yield results: Yields were compiled 20 days after the first ripe fruits were detected, by counting fruit numbers and weights. Values were converted to yields per hectare.
All yield increases were significant at P = 0.05, with the yield increasing from 15% of the control at the low Vitazyme rate to 38% above the control at the high rate.
Fruit quality results: In all cases, the quality parameters were significantly increased with Vitazyme application at the highest level (Vitazyme 3). Sugars increased up to 43%, and the increases were significant at all three application levels. Manganese and sulfur increased the least, but even they showed substantial improvements. Crop quality was markedly enhanced by Vitazyme application.

Cucumber Yield



Yield increases with Vitazyme

Vitazyme 1 ..... 15%
Vitazyme 2 ..... 29%
Vitazyme 3 ..... 38%

Treatment	Soluble solids	N	P	K	Ca	Mg	Mn	Zn	S
	Brix	%	%	%	%	%	ppm	ppm	ppm
Control	2.75 c	3.75 c	0.27 c	1.70 c	0.33 c	0.16 c	25.5 b	44.75 c	275.5 b
Vitazyme 1	3.36 b	4.62 b	0.34 b	2.22 b	0.42 b	0.25 b	29.7 ab	56.25 b	323.7 ab
Vitazyme 2	3.72 a	5.02 ab	0.38 ab	2.62 ab	0.49 ab	0.29 ab	33.0 ab	62.00 ab	367.2 ab
Vitazyme 3	2.94 a	5.30 a	0.40 a	2.95 a	0.56 a	0.31 a	36.0 a	65.25 a	394.5 a

Conclusions: The following conclusions are from the original Mexican report.

1. After applying Vitazyme at rates of 0.5, 0.75, and 1.0% as a pre-transplanting root dip, and 0.75, 1.0, and 1.25 L/ha, respectively, as two foliar sprays, treated cucumber plants showed significant effects on variables of growth and development, It positively influences the number of flowers per plant, there is shortening in the number of days to flowering and to fruit set, as well as higher yields.
2. With regards to the variables of quality of fruits, the rates of Vitazyme at 0.5, 0.75, and 1.0% in pre-transplanting root dip and 0.75, 1.0, and 1.25 L/ha, respectively, in two foliar sprays produced in treated plants a larger size of fruits, as well as an increase in the total concentration of soluble solids.
3. Likewise, when Vitazyme is applied, a greater concentration of macro and micronutrients is detected both in the plant and in the fruit, registering a greater effect with higher dosages of Vitazyme.
4. The evaluated dosages of Vitazyme demonstrated significant statistical differences in comparison with the untreated control, in the variables evaluated in this study.
5. There were no toxic effects to the crop of cucumber, after applying rates of Vitazyme of 0.5, 0.75, and 1.0% as a pre-transplant root dip, and 0.75, 1.0, and 1.25 L/ha as foliar sprays, respectively.

Mums

Researcher: Allejandro Reyes
Location: Santa Ana, Tenancingo, Mexico
Farmer: Ubaldo Martinez, Plantamar
Variety: Hartman
Experimental design: A greenhouse with mums was treated with Vitazyme on a bed, and results were compared to previous yields. Applications were made on a regular basis to evaluate the effect of the product on cuttings for propagation.

1. Control **2. Vitazyme**

Fertilization: A potassium product was applied to promote better stem thickness.
Vitazyme application: (1) 350 ml/70 liters of water (0.5%) on the leaves; (2) 52.5 ml/liter of water (5.25%)

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Growth results: In October of 2012, observations showed that Vitazyme made significant improvements:

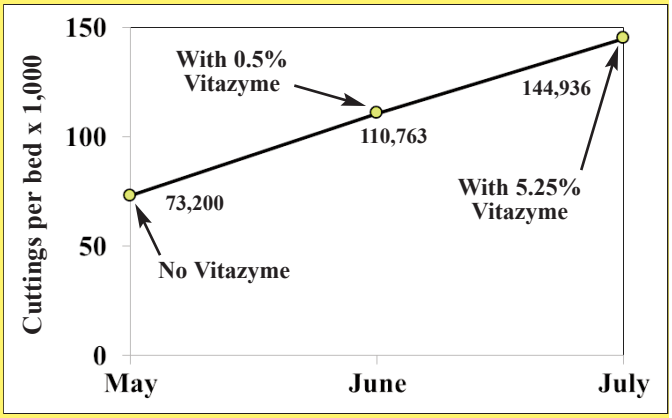
- **Better overall growth and yield of stems and leaves**
- **Faster growth rate**

Yield results: Thirty day intervals were analyzed

Mum Yield

Treatment	May yield	June yield*	July yield*
	cuttings/ha		
Control	73,200	(73,200)	(73,200)
Vitazyme	—	110,763 (+51%)	144,936 (+98%)

*Comparisons are made with data from the same bed in May before treatment.



Cutting increases with Vitazyme: 51 to 98%

Conclusions: Mums treated with either a 0.5% or 5.25% Vitazyme solution in a greenhouse setting in Mexico showed a great response, in terms of growth vigor and cutting production. Increases were 51% after one month and 98% after two months. The use of Vitazyme for mum cutting production is highly recommended.

Winter Peas

Researcher: Jacob Hesseltine *Farmer*: Tom Stahl
Location: Waterville, Washington *Planting rate*: 72 lb/acre
Variety: Windham dry yellow smooth
Previous crop: summer fallow *Planting depth*: 2 inches
Tillage: disking, chisel plowing, harrowing
Soil type: high clay with volcanic ash *Row spacing*: 16 inches
Seed treatment: fungicide + molybdenum
Planting date: August 30 to September 1, 2012
Experimental design: A 217.74-acre pea field was divided into a 40-acre Vitazyme treated area and untreated remainder, to evaluate the effect of one application of the product on pea yield.

1. Control **2. Vitazyme**

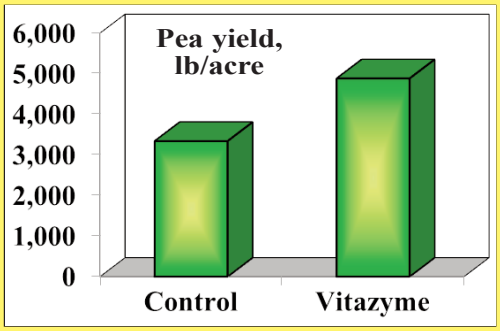
Fertilization: no mineral fertilizers, but Rhizobium in peat moss added at planting
Vitazyme application: 19.2 oz/acre (1.5 liters/ha) on May 8, 2013, by ground sprayer along with Intensity herbicide and Agitent crop oil
Weather for 2013: ample late-season rain, unfavorable for harvest, but severe wind storms arrived after harvest
Yield results:



This winter pea study proved that only one Vitazyme application in this field increased yield an amazing 46%!

Winter Pea Yield

Treatment	Pea yield	Yield change
	lb/acre	lb/acre
Control	3,338	—
Vitazyme	4,882	1.544 (+46%)



Conclusions: This winter pea study in Washington revealed that Vitazyme increased yield by an amazing 46%, using a single spring application of 19.2 oz/acre. Such a high increase shows the product's great efficacy in improving pea yield under these conditions. Income was increased by $288.64/acre, with a Return on Investment of 32.07:1.

Income results: The peas sold for $0.187/lb, giving an additional return of $288.64/acre with Vitazyme, or $11,545.60 more on the 40 treated acres, from a $360.00 investment.

Return on investment: 32.07 to 1

Increase in yield with Vitazyme: 46%

Why Vitazyme in needed by rice growers ... to keep up with demand!

Global rice production is expected to increase to a record 497 million tons in 2013-14, up about 1.3% from around 491 million tons in 2012-13, according to the FAO. Most of the increase in rice production will be seen in Asia. Rice consumption is also expected to increase in 2013-14, reaching around 490.4 million tons which is up about 2.5% from around 478.5 million tons in 2012-13.

Peas

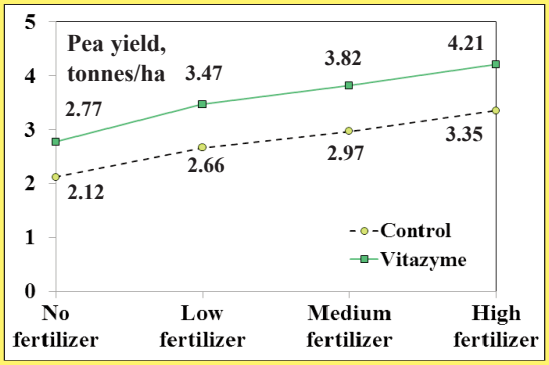
Researcher: V.V. Plotnikov *Research organization*: Scientific, Innovation, and Technology Center of the Institute of Forages and Agriculture of Podillya NAAS
Variety: Tsarevych
Location: National Academy of Agricultural Sciences, Ukraine
Previous crop: spring barley
Soil type: ash gray soil (humus = 2.2%, hydrolyzed-N = 8.4 mg/100 g of soil, P = 15.8 mg/100 kg of soil, exchangeable K = 12.4 mg/100 g of soil, pH = 5.5) *Planting date*: April 22, 2013
Planting rate: 1.5 million seeds/ha
Soil preparation: disking, plowing, cultivating
Experimental design: A small plot pea study, with four replications, was set up to evaluate the effects of Vitazyme, over four fertility levels, on the yield, profitability, and protein content of the pea crop.
Fertilization: See the treatment table on the right. Phosphorus and potassium amendments were applied in the fall, and nitrogen was applied in the spring.
Vitazyme application: (1) a seed treatment of 1 liter/tonne of seed; (2) 1 liter/ha sprayed on the leaves at the 5 to 6-leaf stage
Yield results: Pea yield increased as fertilizer rate increased, and Vitazyme improved the yield at each fertilizer level by 26 to 31%.
Income results: Net returns from Vitazyme increased with increasing fertilizer rate, up to 1,900 UAH/ha with the high rate.
Pea protein results: Protein levels were increased with fertilizers, and at each level Vitazyme boosted crude protein, up to 1.5%-point.
Conclusions: According to the researchers,

1. In cases without fertilizers, two Vitazyme applications to the pea seeds of Tsarevych variety, at 1 L/tonne for the seeds and 1 L/ha at 5-6 leaves, provided an increase of 0.65 tonne/ha, or 31%.
2. With middle and high fertilizer levels ($N_{20-45}P_{10-30}K_{20-45}$) and Vitazyme application, the yield increase was 0.81-0.86 tonne/ha, or 26-30%.
3. Vitazyme application on the fertilizer-free plot provided a profit of 1,375 UAH/ha, and with mineral fertilization systems of $N_{20-45}P_{10-30}K_{20-45}$, the profit was 1,775-1,900 UAH/ha.
4. Vitazyme application provided pea grain quality improvement; crude protein content was increased by 1.1-1.5%.

Treatment	Nitrogen	Phosphorus	Potassium
	kg/ha	kg/ha	kg/ha
1. Control	0	0	0
2. Control + Vita	0	0	0
3. Low fertility	20	10	20
4. Low fert + Vita	20	10	20
5. Medium fertility	30	20	30
6. Medium fert + Vita	30	20	30
7. High fertility	45	30	45
8. High fert + Vita	45	30	45

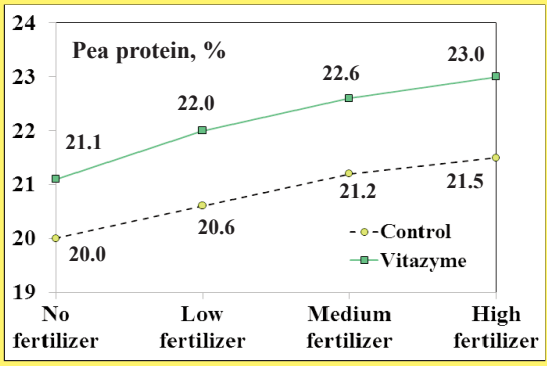
Increase in net income with Vitazyme
No fertilizer 31%
Low fertilizer 30%
Medium fertilizer 29%
High fertilizer 26%

Pea Yield



Increase in yield with Vitazyme
No fertilizer 31%
Low fertilizer 30%
Medium fertilizer 29%
High fertilizer 26%

Pea Protein



Increase in crude protein with Vitazyme
No fertilizer 1.1%-point
Low fertilizer 1.4%-point
Medium fertilizer ... 1.4%-point
High fertilizer 1.1%-point

Pepper (Black)

Four Farm Trials - Cu Jut District

Trial 1

Researcher: unknown *Farmer*: Dam Van Huan *Location*: Dak Rong Hamlet, Cu Jut District, Viet Nam
Variety: *Piper nigrum* *Plant population*: 1,600 pillars/ha
Experimental design: Pepper plants were treated with Vitazyme multiple times to evaluate its effect on pepper production, as compared to an untreated control.

1. Control **2. Vitazyme**

Continued on the next page

Fertilization: unknown
Vitazyme application: 500 ml of Vitazyme in 200 liters of water (0.25%) applied to 150 pepper pillars four times per year

Trial 1 Results

Treatment	Ear length	Flowering	Fruits/Ear	Ear falling	Yield/Pillar	Total yield
	cm		number		kg	kg/ha
Control	10	Long periods	22.5	Much	4.1	6,560
Vitazyme	11	Same time	27.0	None	5.8	9,200

Trial 2

Researcher: unknown *Farmer*: Lang Van Chanh *Location*: Bon U2-Dak Rong Hamlet, Cu Jut District, Viet Nam
Variety: unknown *Plant population*: 1,700 pillars/ha
Experimental design: Pepper plants were treated with Vitazyme multiple times to evaluate its effect on pepper production, as compared to an untreated control.
1. Control 2. Vitazyme
Fertilization: unknown
Vitazyme application: 500 ml of Vitazyme in 200 liters of water (0.25%) applied to 250 pepper pillars five times per year

Trial 2 Results

Treatment	Ear length	Flowering	Ear falling	Yield/Pillar	Total yield
	cm			kg	kg/ha
Control	10.5	Long periods	Much	4.1	7,480
Vitazyme	11.0	Same time	None	6.0	10,200

Trial 3

Researcher: unknown *Farmer*: Trien Van Muu *Location*: Cu Knia Hamlet, Cu Jut District, Viet Nam
Variety: unknown *Plant population*: 1,300 pillars/ha
Experimental design: Pepper plants were treated with Vitazyme multiple times to evaluate its effect on pepper production, as compared to an untreated control.
1. Control 2. Vitazyme
Fertilization: unknown
Vitazyme application: 500 ml of Vitazyme in 200 liters of water (0.25%) applied to 200 pepper pillars three times a year

Trial 3 Results

Treatment	Ear falling	Yield/Pillar	Total yield
		kg	kg/ha
Control	Falling 30-60 days before harvest	5.0	6,500
Vitazyme	None	5.3	6,890

Trial 4

Researcher: unknown *Farmer*: Nguyen Van Yan *Location*: Cu Knia Hamlet, Cu Jut District, Viet Nam
Variety: unknown *Plant population*: 1,800 pillars/ha
Experimental design: Pepper plants were treated with Vitazyme multiple times to evaluate its effect on pepper production, as compared to an untreated control.
1. Control 2. Vitazyme
Fertilization: unknown
Vitazyme application: 500 ml of Vitazyme in 200 liters of water (0.25%) applied to 100 pepper pillars five times a year

Trial 4 Results

Treatment	Ear length	Flowering	Fruits/Ear	Ear falling	Yield/Pillar	Total yield
	cm		number		kg	kg/ha
Control	11.0	Long periods	26.5	A few	6.3	11,340
Vitazyme	10.5	Same time	29.0	None	6.8	12,240

Trial Summary

Increases in Parameter Values With Vitazyme

Trial	Ear length	Flowering[1]	Fruits/Ear	Ear falling[2]	Yield
Trial 1	+20%	Improved	+20%	Improved	+41%
Trial 2	+5%	Improved	—	Improved	+36%
Trial 3	—	—	—	Improved	+6%
Trial 4	-5%	Improved	+9%	Improved	+8%

[1]*In all cases Vitazyme caused uniform flowering at the same time, while the control displayed flowering a number of times over a long period.*
[2]*Immature pepper ears fell 1 to 2 months before harvest to a lesser or greater degree for all trials, but few fell with Vitazyme.*

Income results: See the table on the next page.
Conclusions: This Viet Nam pepper trial at four locations revealed that Vitazyme, applied as a 0.25% solution three to five times per year, improved ear length (except in one case) and fruits per ear, and greatly reduced premature ear dropping while

causing flowering to occur at one time instead of over a one to two month period. Yield increased by 6 to 41%, and income by up to 162,000,000 VND/ha. **Return On Investment was boosted from 17 : 1 to 20 : 1, a very consistent response.** Based on these results, Vitazyme is highly recommended for pepper culture in Viet Nam.

Pepper Income

Trial	Applications	Estimated added income with Vitazyme	Vitazyme cost[1]	Return On Investment
		Vnd/ha	Vnd/ha	VND spent : VND returned
Trial 1	4	136,000,000	8,000,000	17 : 1
Trial 2	5	127,500,000	6,375,000	20 : 1
Trial 3	3	71,500,000	3,900,000	18.3 : 1
Trial 4	5	162,000,000	8,100,000	20 : 1

[1]Includes product plus labor to apply.

Other observations: **Vitazyme treated plants had darker green leaves and more buds by only 5 to 7 days after spraying.**

Potatoes

Researcher: Israel Calva Pali *Farmer*: Armando Ramirez *Location*: Free, Puebla, Mexico *Variety*: unknown
Experimental design: A potato field was divided into three treatment areas receiving Nutrisorb, Carbon Boost, and Vitazyme in separate areas, applied beneath the seed pieces at planting. The purpose of the trial was to evaluate the relative effectiveness of the three products to influence potato growth and yield.

1. Nutrisorb **2. Carbon Boost** **3. Vitazyme**

Fertilization: unknown
Vitazyme application: 1 liter/ha applied beneath the seed pieces at planting
Nutrisorb application: 8 liters/ha applied beneath the seed pieces at planting
Carbon Boost application: 0.5 liter/ha applied beneath the seed pieces at planting
Growth results: Evaluations were made during October of 2012, and revealed that Vitazyme outperformed the other two products:

- **Greater overall plant growth**
- **More stems per plant (3.5 versus 2.0)**
- **Greater stalk diameter**
- **Increased tuber number**
- **Improved tuber uniformity**

Yield results: A weigh wagon was used to quantify yields.
Conclusions: In this Mexican potato trial, Vitazyme greatly increased tuber yield above both Nutrisorb (+67%) and Carbon Boost (+21%), showing this product to be an excellent additive to potato growing programs in Mexico.

Potato Yield

Treatment	Tuber yield	Yield change*
	tons/ha	tons/ha
Nutrisorb	21	—
Carbon Boost	29	8 (+38%)
Vitazyme	35	14 (+67)

*Increase of Carbon Boost and Vitazyme over Nutrisorb.

Increase in tuber yield with Vitazyme

Above Nutrisorb 67%
Above Carbon Boost 21%

Raspberries

Researchers: Eng. Agustin Medinilla, Jr., and Juan Carlos Diaz, Ph.D. *Farmer*: Eng. Augustin Medinilla, Fortuna Far
Location: Tlajomuko de. Zuniga Municipality, Jalisco, Mexico
Variety: Himbo Tob
Soil type: sandy
Planting date: June 26, 2012
Experimental design: Several tunnels of raspberries, totalling 5,000 m^2, were treated with Vitazyme, while a single untreated tunnel (540 m^2) served as a control. The objective of the study was to evaluate the effect of the product on growth and yield of the raspberries.

1. Control
2. Vitazyme

Fertilization: unknown
Vitazyme application: 0.75 liter/ha applied twice, using a sprayer having 300 ml in 200 liters of water, at 500 ml/ha
Pesticides applications: Diazinon sulfur, and Neem extract sprayed weekly for insect and disease control
Growth observations: **Vitazyme treated plants grew larger and faster, with more fruit set.**



The untreated raspberry plants displayed inferior vigor and growth, as shown here.



Note the remarkable vigor and leafing of the Vitazyme treated plants located near the controls.

Rice

Researchers: Febilino Rebote and Francisco L. Calotes, Jr.
Farmer: Mr. and Mrs. Jeanton Puno, managed by Pacifico Lagos
Location: Malaybalay City, Philippines
Variety: unknown
Planting date: May 22, 2012
Transplanting date: June 11, 2012

Experimental design: A field demonstration was devised on a paddy of transplanted rice, using the previous crop as the control to compare the yield with the following crop on the same soil using Vitazyme for both a transplant treatment, and for field application.

1. Control **2. Vitazyme**

Fertilization: 3 bags of 21-0-0% N-P_2O_5-K_2O on June 27, and 3 bags of the same fertilizer on July 12, about 80 days before harvest

Vitazyme application: (1) 5% Vitazyme was sprayed on the drained paddy surface 4 hours before transplanting; sprayers received 8 tablespoons/sprayer load; (2) a spray of Vitazyme on the plants 20 days after transplanting (July 2), using 8 tablespoons/sprayer load; (3) the same treatment as (2), 60 days after transplanting on August 11.

Harvest date: September 18, 2012

Yield results:

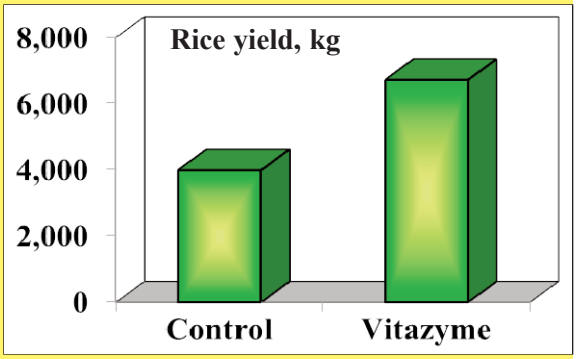
Rice Yield

Treatment	Rice yield	Test weight	Total yield	Yield change
	cavans*	kg/cavan*	kg	kg
Control	105	38	3,990	—
Vitazyme	160	42	6,720	2,730 (+68%)

*A cavan here is a volume measure of grain.

Increase in test weight with Vitazyme: 11%

Increase in grain yield with Vitazyme: 68%



Conclusions: This rice demonstration plot revealed that Vitazyme increased rice grain yield on the same paddy area by 68%; grain weight per volume was improved by 11%. The previous rice crop grown on the paddy was used as the untreated control, so differences in weather conditions were not accounted for. Even so, great differences in crop growth were revealed in side-by-side photographs of an adjoining untreated paddy, so the yield increase was at least partially validated.

Rice

Researcher: U Than Tun
Location: Yangon, Myanmar
Farmer: U Kyaw Zaw Aung, Dagon Agricultural Group
Variety: HYV
Planting date: December 23, 2012



A rice trial in Myanmar provided excellent responses with Vitazyme, Here is a test field.



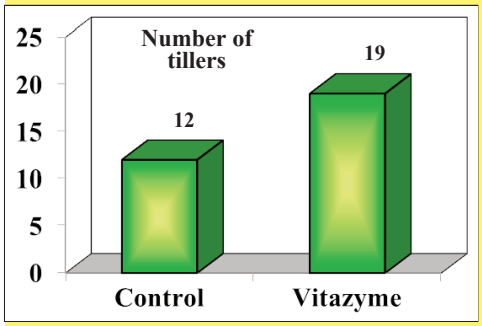
Notice the much fuller heads, and greater number, with Vitazyme treatment. The leaves are also larger and have more chlorophyll.

Experimental design: A rice paddy was divided into two portions: a Vitazyme treated area and an untreated control area. The objective of the study was to evaluate the ability of this product to influence rice growth and yield.

1. Control **2. Vitazyme**

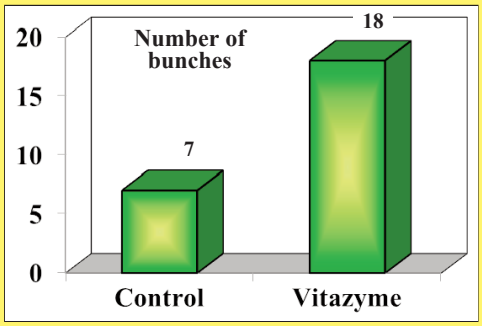
Fertilization: The Vitazyme area received Vital 101 fertilizer, and the control area received 100-25-25 kg/acre of urea (46% N), triple superphosphate (46% P_2O_5), and potash, respectively. Total nutrients applied were about the same for both areas.
Vitazyme application: 1 liter/ha (13 oz/acre) over the leaves by sprayer 50 days after planting (February 10, 2013), and 85 days after planting (March 19, 2013)
Harvest date: April 10, 2013
Growth results: Vitazyme clearly improved both tillers and bunches by a great margin.

Tillers*



*The manner in which tillers were counted is not known.

Bunches*

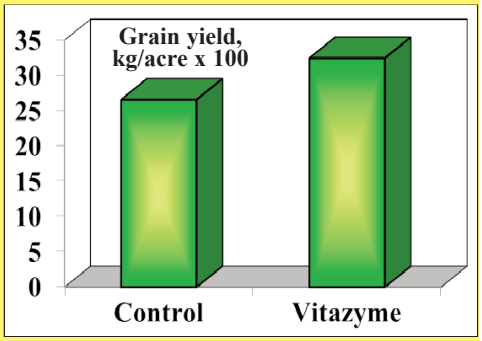


*The definition of this parameter, and the way they were counted, are not known.

Increase with Vitazyme
Tillers 58%
Bunches 157%

Yield results: On April 10, two typical meter square areas of each treatment were selected for harvest, and the grain was threshed and weighed.

Rice Yield



Conclusions: A rice study in Myanmar revealed that Vitazyme, applied at 50 and 85 days after planting, produced excellent increases in tillering (+58%), and provided a 22% yield increase. This result indicates the great efficacy of this product for rice production in Myanmar.

Treatment	Grain yield	Yield per acre	Yield change
	g/m² average	kg/acre	kg/acre
Control	664	2,656	—
Vitazyme	811	3,244	588 (+22%)

Increase in rice yield with Vitazyme: 22%

Rice

Researcher: Unknown
Farmers: 55 farmers
Research organization: Agricultural Research Station of Cu Jut District
Location: Dak Rong and Cu Knia, Dak Ning Province, Viet Nam
Variety: RVT
Planting date: summer of 2013
Experimental design: The farmers treated a portion of a field with Vitazyme treated seeds, and sprayed the product three times in addition to evaluate the effects of the product on rice yield compared to an adjoining untreated control. A total of 18.7 ha of rice were treated with the program.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: a seed treatment, and 1 liter/ha on the leaves applied with a backpack sprayer three times during the growing season (times unspecified)
Growth observations: **improved insect and disease resistance with Vitazyme**
Yield results:

Increase in rice yield with Vitazyme: 1.0 to 1.5 tonnes/ha

Conclusions: This area-wide rice demonstration, involving 55 farmers, revealed that a Vitazyme seed treatment, plus three foliar treatments, improved rice yield substantially, by about 18% over a normal 6 to 8 tonnes/ha. This result shows the consistent yield improvements to be expected with Vitazyme application in Viet Nam. Individual farm yield data were not available.

Rice

Researcher: unknown
Farmer: Trieu Van Muu
Location: Mekong Delta, Viet Nam
Variety: RVT
Planting date: January 2, 2013
Experimental design: A rice trial was designed in a producer field to evaluate the effects of Vitazyme on the growth, yield, and profitability of a rice crop.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: a seed treatment, and three 1 liter/ha foliar applications (dates unspecified)
Growth results: Most measured parameters were improved with Vitazyme, in particular head length, seeds per head, and heads per square meter. All of these improvements gave rise to a higher yield.

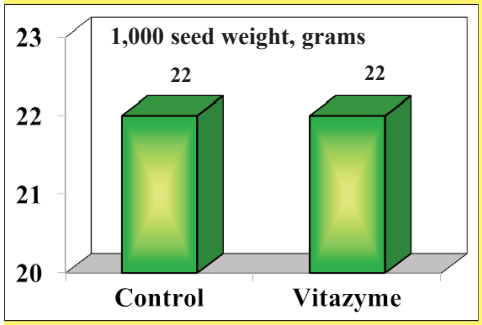
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Rice Growth

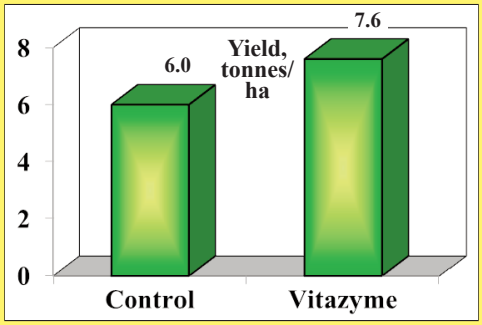
Treatment	Germination	Plants/m²	Heads/Plant	Height	Head length	Seeds/Head	Firm seeds	Heads/m²
	%	number/m²	number/plant	cm	mm	number	number	number/m²
Control	95	38	4	100	24	250	180	150
Vitazyme	98	38	5	105	30	340	185	190

Yield results: The plots were harvested on April 29, 2013, 118 days after planting.

Weight of 1,000 Seeds



Grain Yield



Improvement in Rice Growth With Vitazyme

- Germination ... +3%-points
- Plants/m² ..... +0%
- Heads/Plant ... +25%
- Plant height ... +5%
- Head length ... +25%
- Seeds/head .... +36%
- Firm seeds .... +3%
- Heads/m² ..... +27%

Increase in rice yield with Vitazyme: 27%

Vitazyme greatly improved grain yield, a result of enhancing head weight and heads per area. No effect on seed weight was noted.

Income results: Extra cost for Vitazyme: 1,121,000 VND/ha
Income increase from Vitazyme: 8,479,000 VND/ha
Cost : Benefit Ratio: 7.56:1

Conclusions: A rice study in Viet Nam, using a seed treatment and three foliar treatments, revealed that Vitazyme improved most plant growth parameters including germination percentage (+3%), plant height (+5%), heads/plant (+25%), head length (+25%), seeds/head (+36%), and heads/meter² (+27%). Grain yield was boosted by 27%, and income by 8,479,000 VND/ha, with a cost:benefit ratio of 7.56:1. This trial proves the great utility of Vitazyme for rice production in Viet Nam.

Rice

Researcher: U Than Tun
Farm: Dagon Agricultural Group
Location: Ywarthargyi Township, Yangon Region, Myanmar
Variety: HVV
Soil type: sandy
Planting date: January 23, 2013
Experimental design: A rice paddy was divided into a Vitazyme treated and control area to evaluate the effect of the product on grain yield and tillering.

1. Control **2. Vitazyme**

Fertilization: The Vitazyme area received Vital 101 fertilizer, and the control area received 100-25-25 kg/acre of urea (46% N), triple superphosphate (46% P_2O_5), and potash, respectively. Total nutrients applied were about the same for both areas.

Vitazyme application: (1) 1 liter/ha (13 oz/acre) on February 2; (2) 1 liter/ha (13 oz/acre) spray on March 20, and (3) 1 liter/ha (13 oz/acre) spray on April 10.

Harvest date: May 9, 2013



Note the taller stems and greater tillering with Vitazyme in this Myanmar study, which gave a 39% yield increase.



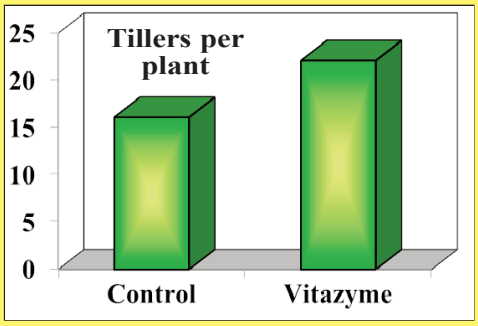
The Vitazyme treated plants have many more heads for the same number of plants.

Growth results: Plants were harvested from a meter square area of both treatments. Each square meter had 23 plants. A great increase in tillering resulted from three Vitazyme applications.

Rice Growth

Treatment	Tillers	Change
	number	number
Control	16.1	—
Vitazyme	22.1	6 (+37%)

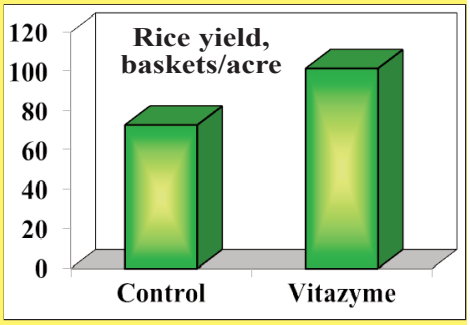
Increase in tillers with Vitazyme: 37%



Yield results: Grain was threshed and weighed from the heads of a one square meter area for each treatment.
The yield increase parallels the improvement in tillering, being 39% with Vitazyme.
Income results: The price of rice was about 4,000 Kyt/basket.

Rice Yield

Treatment	Grain yield	Yield change
	baskets/acre	baskets/acre
Control	72.81	—
Vitazyme	101.56	28.75 (+39%)



Increase in rice yield with Vitazyme: 39%

Rice Income

Treatment	Gross income	Fertilizer cost	Net income	Extra income
	Kyt	Kyt	Kyt	Kyt
Control	291,240	62,000	229,240	—
Vitazyme	406,240	170,000	236,240	7,050

Conclusions: A rice study in Myanmar produced a 37% increase in tillering and a 39% increase in yield with Vitazyme. Consequently, yield was increased by 7,050 Kyt for the test area, though this area was not specified in the report. The Vitazyme program is shown to be an excellent benefit to rice growers in Myanmar.

Soybeans

Researcher: Tim Heikens
Farmer: Tim Heikens
Location: Lake Park, Iowa
Variety: Asgrow
Planting date: June 12, 2013
Row spacing: 7.5 inches
Plant population: 145,000 seeds/acre
Previous crop: corn
Soil type: Okoboji
Tillage: soybeans planted directly into standing corn stalks
Experimental design: A 30-acre uniform soybean field was treated with Vitazyme, except for a 90-foot strip that served as a control. The purpose of the study was to evaluate the effect of this product on the yield of soybeans.

1. Control **2. Vitazyme**

Fertilization: 100 lb/acre of 0-0-60% N-P_2O_5-K_2O the fall of 2012
Vitazyme application: 20 oz/acre (1.5 liters/ha) sprayed on the leaves and soil at flowering, the first part of July
Weed control: Roundup (glyphosate) herbicide
Aphid control: insecticide
Growing season weather: wet spring, dry summer and fall
Harvest date: October 8, 2013
Yield results: A weigh wagon was used to weigh samples from the two treatments. Moisture content was about the same for both treatments at harvest (11.9 to 12.1%), and test weight was a bit higher for the control treatment.
Conclusions: A soybean study in northwestern Iowa in 2013 revealed that Vitazyme improved the yield by 3.2%. A higher increase would likely have been achieved if an early, at-planting treatment had been made, in addition to the 20 oz/acre spray made at bloom.

Soybean Yield

Treatment	Yield	Yield change
	bu/acre	bu/acre
Control	52.8	—
Vitazyme	54.5	1.7 (+3.2%)

Increase in soybean yield with Vitazyme: 3.2%

Soybeans

Researcher: Linden Heikens and Leonard Jensen
Farmer: Leonard Jansen
Location: Lake Park, Iowa
Variety: Golden Harvest S20-Y2 (Roundup Ready)
Row spacing: 15 inches
Seeding rate: 150,000/acre
Previous crop: corn
Planting date: May 15, 2013
Tillage: stalks chopped in the fall of 2012, and ripped; field cultivated before planting
Experimental design: A 100-acre, uniform soybean field was treated with Vitazyme except for an 80-foot strip to serve as a control. The objective of the study was to evaluate the effect of this product on soybean yield.

1. Control **2. Vitazyme**

Fertilization: 18-46-60 lb/acre of N-P_2O_5-K_2O, plus 9 lb/acre of S and 1 lb/acre of Zn

Continued on the next page



Good weather and fertility helped this test field produce a bumper soybean crop in 2013.



Note how the Vitazyme treated soybeans are taller and have more leaves. A shortage of rain prevented late-season pods from filling; had they filled, the yield difference would have been greater.

Vitazyme application: 13 oz/acre sprayed foliar on July 1, at early flowering
Weed control: Sonic herbicide at 3 oz/acre on May 16 (preemergence), and Roundup (glyphosate) at 1 quart/acre with Vitazyme on July 1; Roundup (glyphosate) again at 1 quart/acre on July 22
Weather for 2013: a wet spring, followed by a dry summer and fall
Harvest date: October 10, 2013
Yield results: A harvest sample was taken for the control strip and the Vitazyme treated areas and weighed in a weigh wagon.

Increase in soybean yield with Vitazyme: 3.5%

Decrease in bean moisture with Vitazyme: 0.6 percentage point

Soybean Yield

Treatment	Yield	Yield change	Bean moisture	Moisture change
	bu/acre	bu/acre	%	%
Control	57.61	—	10.8	—
Vitazyme	59.62	2.01 (+3.5%)	10.2	-0.6

Conclusions: This northwestern Iowa soybean study revealed that Vitazyme, applied once with a Roundup application at early bloom, increased the bean yield by 3.5%, while reducing bean moisture at harvest by 0.6 percentage point. A Vitazyme application at planting would very likely have substantially improved this yield increase.

Soybeans

Vitazyme and Fish

Researcher: Bertel Schou, Ph.D.
Research organization: ACRES (Agricultural Research and Educational Services), Cedar Falls, Iowa
Location: Cedar Falls, Iowa
BBCH scale: BSOY
Variety: NuTech 7240 (Roundup Ready)
Planting depth: 1.5 inches
Row spacing: 30 inches



Root and plant growth were vastly superior with Vitazyme and fish, but the dry weather later in the season prevented good pod filling.



Note how greatly the Vitazyme and fish stimulated plant rooting and stem diameter compared to the untreated control.

Planting rate: 53 lb/acre *Planting date*: June 1, 2013 *Slope of plot*: 2%
Tillage: conventional (field cultivating and harrowing) *Previous crop*: corn
Soil type: Maxfield silty clay loam *Harvest date*: October 2, 2013
Soil test values: pH = 6.3, organic matter = 4.7%, cation exchange capacity = 36.5 meq/100 g, N = 97 lb/acre, SO_4-S = 31 lb/acre, P_2O_5 = 278 lb/acre, Ca = 10,225 lb/acre, Mg = 1,129 lb/acre, K_2O = 250 lb/acre, Na = 99 lb/acre, B = 1.7 lb/acre, Fe = 232.2 lb/acre, Mn = 95.4 lb/acre, Cu = 2.2 lb/acre. Zn = 18.0 lb/acre; percent base saturations: Ca = 70.0%, Mg = 12.9%, K = 0.9%, Na = 0.6%, other bases = 5.1%, H = 10.5%.

Treatment	At planting	At V6R1	At R4
1. Control	0	0	0
2. Vitazyme	13 oz/acre	13 oz/acre	0
3. Fish	2 gal/acre	2 gal/acre	2 gal/acre
4. Vitazyme + Fish	13 oz + 2 gal (Trt. 2 + 3)	13 oz + 2 gal (Trt. 2 + 3)	2 gal/acre (Fish only)

Experimental design: A soybean area having plots that were 30 x 10 feet, with six replications, in a randomized complete block configuration, was set up to evaluate the effect of Vitazyme and fish, alone and together, on the yield and growth of soybeans.
Fertilization: In the fall of 2012, 100 lb/acre of 18-46-0 (% N-P_2O_5-K_2O) and 100 lb/acre of 0-0-60.
Vitazyme application: At planting, for Treatments 2 and 4, 13 oz/acre (1 liter/ha) in-row in a 10 gallon solution; at V6R1 (Treatments 2 and 4), 13 oz/acre (1 liter/ha) sprayed on July 19 at 15 gallons/acre.
Fish application: At planting, for treatments 3 and 4, 2 gallons/acre in-row; at V6R1, 2 gallons/acre on the leaves on July 19; at R4, 2 gallons/acre on the leaves on August 22.
Weed control: herbicides, including glyphosate
Yield results: None of the treatments yielded significantly more than the control at P = 0.05. Increases varied from 2.0% for Vitazyme to 4.6% for the fish; the products together gave a 3.8% yield increase.
Bean moisture results: There were no significant differences in soybean moisture, which ranged from 12.49 to 12.64%.
Conclusions: This Iowa soybean study, using Vitazyme and fish alone and in combination, revealed that yields were improved but not significantly. These increases were from 2.0 to 4.6%, and there appeared to be no synergism between the two products, even though testimonials from growers indicate that Vitazyme and fish products work exceptionally well in combination.

Soybean Yield

Treatment	Yield[1]	Yield change
	bu/acre	bu/acre
1. Control	57.85 a	—
2. Vitazyme	58.98 a	1.13 (+2.0%)
3. Fish	60.53 a	2.68 (+4.6%)
4. Vitazyme + Fish	60.03 a	2.18 (+3.8%)
LSD (P = 0.05)	3.72	
Standard deviation	3.03	
CV	5.1%	
Replicate F	4.992	
Treatment F	0.451	

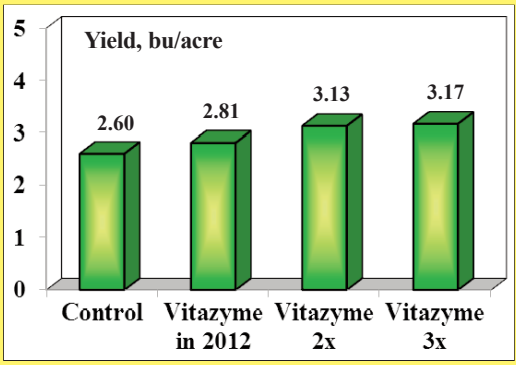
[1] Means followed by the same letter are not significantly different at P = 0.05 according to the Student-Newman-Kuels Test.

Soybeans

Researcher: V.V. Plotnikov *Research organization*: Scientific, Innovation, and Technology Center of the Institute of Forages and Agriculture of Podillya NAAS *Location*: National Academy of Agricultural Sciences, Ukraine *Variety*: Khutorianochka *Previous crop*: soybeans
Soil type: ash gray soil (humus = 2.2%, hydrolyzed-N = 8.4 mg/100 g of soil, P = 15.8 mg/100 kg of soil, exchangeable K = 12.4 mg/100 g of soil, pH = 5.5) *Planting date*: May 2, 2013 *Seeding rate*: 800,000 seeds/ha
Soil preparation: disking, plowing, harrowing
Experimental design: A small plot soybean study was conducted, with four replications, to determine the effect of Vitazyme on bean yield, profitability, quality, and plant characteristics. One treatment was on soils treated with Vitazyme in 2012 to evaluate the carryover effect.

Treatment	2012 treatment	Seed treatment	Third trifoliate	Branching
		liter/tonne	liter/ha	liter/ha
1. Control	0	0	0	
2. Vitazyme carryover	X	0	0	0
3. Vitazyme twice	0	1	1	0
4. Vitazyme three times	0	1	0.5	0.5

Soybean Yield



Fertilization: All phosphorus and potassium fertilizers were applied the fall of 2012.
Vitazyme application: See the table above. The seed treatment was applied May 2, at planting time, the third trifoliate soil and foliar spray on June 11, and the branching soil and foliar spray on June 18.
Yield results: There was a small carryover effect from Vitazyme applied in 2012, and a sizable yield increase (20 to 22%) for both two and three Vitazyme applications.
Income results: Two or three Vitazyme applications boosted the net income significantly over the control treatment. The carryover was substantial, giving

Increase in net income with Vitazyme

Carryover effect ..... 840 UAH/ha
Vitazyme twice ..... 1,850 UAH/ha
Vitazyme three times ..... 2,050 UAH/ha

Increase in soybean yield

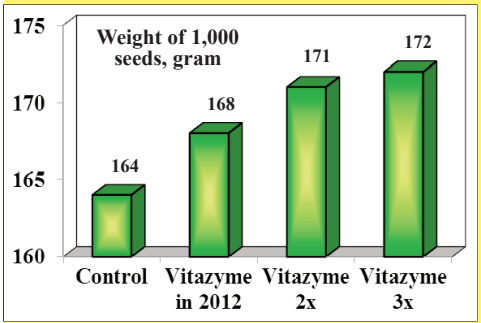
Carryover effect 8%
Vitazyme twice 20%
Vitazyme three times ... 22%

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840 UAH/ha more income.

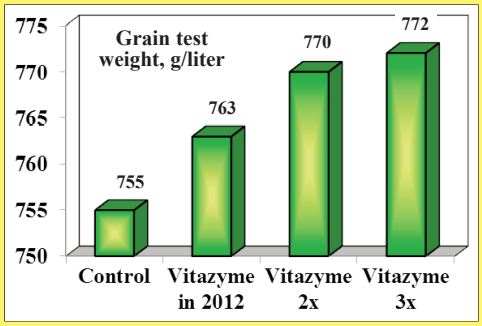
Grain quality results: All three grain quality parameters were slightly improved with all three Vitazyme regimes, in particular protein, which increased by up to 1.2%-points.

1,000 Seed Weight



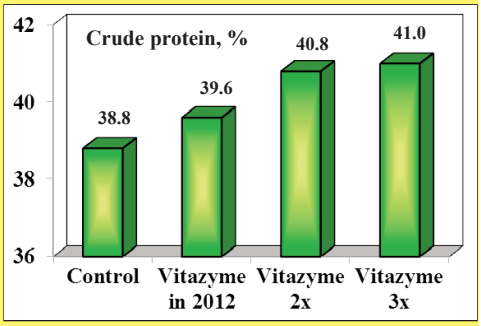
Increase in 1,000 seed weight with Vitazyme: 2 to 5%

Grain Density



Increase in grain density with Vitazyme: 1 to 2%

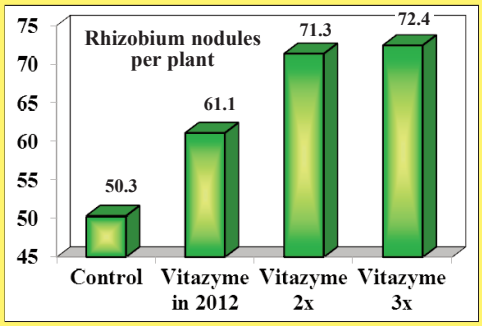
Crude Protein



Increase in grain crude protein with Vitazyme: 0.8 to 1.2%-points

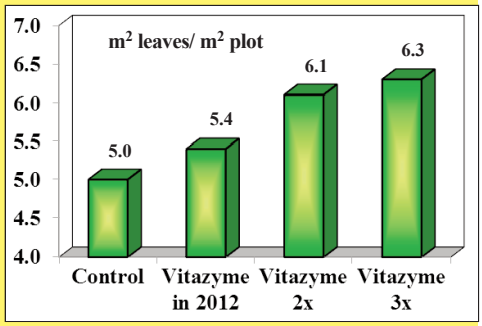
Plant characteristic results: Both nodule number and leaf area of the plants increased with the number of Vitazyme applications. Three applications improved nodule number by an amazing 44%, and leaf area by 126%, but the two-application treatment was nearly as effective.

Rhizobium Nodules



Increase in nodules per plant with Vitazyme: 21 to 44%

Leaf Area



Increase in leaf area with Vitazyme: 8 to 26%

Conclusions: The researchers concluded,

1. Soybean plants with either one or two foliar treatments (1 L/ha, and 1 L/ha + 0.5 L/ha) of Vitazyme, on top of a 1 L/tonne seed treatment, provided a yield increase of 0.52-0.57 tonne/ha, or 20-22%, and a profit of 1,850-2,050 UAH/ha.
2. The impact of Vitazyme applied in 2012 on soybean yield provided a yield increase of 0.21 tonne/ha (8%), and a profit of 840 UAH/ha.
3. Vitazyme application provided soybean seed quality improvement; the weight of 1,000 seeds increased by 4-8 grams, grain density by 8-17 grams/L, and crude protein by 0.8-2.2%.

Soybeans

Researcher: unknown *Farmer*: Dam Van Huan *Location*: Dakrong, Cu Jut, Dak Nong, Viet Nam
Variety: DT 26 *Planting date*: April 28, 2013

Experimental design: A soybean field was divided into a Vitazyme treated area and an untreated control area, to determine the effect of this product on plant growth parameters and bean yield.

1. Control **2. Vitazyme**

Fertilization: unknown

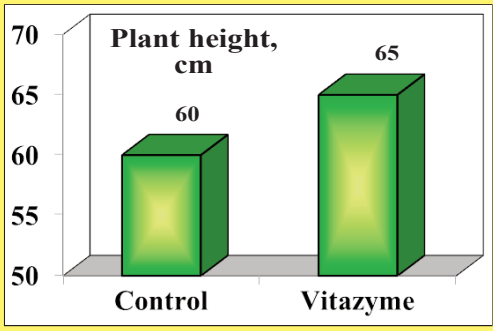
Vitazyme application: 1 liter/ha at 2, 4, and 6 weeks after planting

Plant growth results: Both treatments germinated on May 5, 2013, 7 days after planting, and had more than 98% germination.

Plant height was somewhat greater with Vitazyme at 70 days after planting.

Yield results: The crop was harvested July 29, 2013. There were 32 plants/m² for both treatments.

Plant Height



Increase in plant height with Vitazyme: 8%

Soybean Growth and Yield Parameters

Treatment	Pods/Plant	Unfilled pods/Plant	Pods with ...			Weight of 1,000 seeds
			1 seed	2 seeds	3 seeds	
	number	number	number	number	number	grams
Control	24	6	5	10	3.2	191
Vitazyme	30	4	3	20	3.7	195

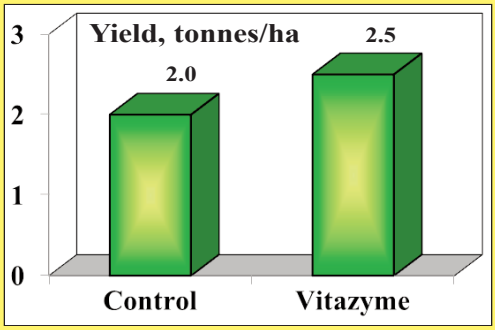
Change With Vitazyme

Pods/Plant	+25%
Untilled Pods/Plant	-50%
Pods With 1 Seed	-67%
Pods With 2 Seeds	+100%
Pods With 3 Seeds	+16%
Weight of 1,000 Seeds	+2%

Only the unfilled and 1 seed/pod parameters were not increased with Vitazyme application, the pod number, 2-seeded pods, 3-seeded pods, and weight of 1,000 seeds all improved with the product.

A sizable increase of 25% in yield was realized from the program.

Soybean Yield



Increase in soybean yield with Vitazyme: 25%

Income results: Extra cost for Vitazyme: 1,500,000 VND/ha
Increase in income for Vitazyme: 6,000,000 VND/ha
Return On Investment: 4:1

Conclusions: A soybean trial in Viet Nam, using three foliar applications of the product, produced a sizable 25% yield increase as a result of larger plants having 25% more pods, fewer unfilled pods, twice as many 2-bean pods, and 16% more 3-bean pods than the control. The seeds were 2% heavier as well. This yield increase produced 6,000,000 VND/ha more income, and a 4:1 Return On Investment, showing the great efficacy of Vitazyme for soybean production in Viet Nam.

Strawberries

Researchers: Eng. Agustin Medinilla, Jr., and Juan Carlos Diaz, Ph.D.
Farmer: Eng. Agustin Medinilla, Fortuna Farm
Location: Tlajomulco de Zuniga Municipality, Jalisco, Mexico
Variety: Albion
Soil type: sandy
Planting date: August 27, 2012

Experimental design: Five strawberry tunnels of 540 m^2 each were treated with Vitazyme, and 75 tunnels were left untreated to serve as controls. The objective of the study was to evaluate the effects of Vitazyme on strawberry yield.

1. Control **2. Vitazyme**



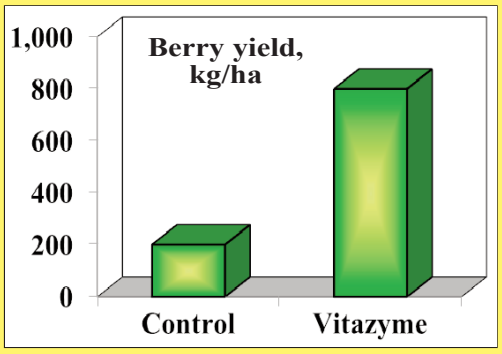
Strawberries grown in this greenhouse setting without Vitazyme produced much less fruit, and experienced considerable spider mite damage.

Strawberry Yield

Treatment	Berry yield		Yield change
	kg/ha	kg/ha	kg/ha
Control	10	200	—
Vitazyme	40	800	600 (+300%)

*Vitazyme tunnels (5) totalled 0.27 ha, and the control tunnels (75) totalled 4.05 ha

Increase in berry yield with Vitazyme: 300%



Fertilization: unknown

Vitazyme application: 0.75 liter/ha applied twice, using a sprayer having 300 ml of product in 200 liters of water, at 500 liters/ha output

Pesticide applications: Diazinon, sulfur, and Neem extract sprayed weekly for insect and disease control

Yield results: Berries were picked every two days. Results given below are approximations of actual yield results.

Growth results: Vitazyme treated strawberries had the following characteristics compared to the untreated control:

- **Many more flowers**
- **Much larger fruit**
- **Very little red spider mite (*Tetranichus urticae*) infestation**

Conclusions: A strawberry trial in plastic tunnels in Jalisco, Mexico, showed that Vitazyme, applied foliar two times during the growing season, greatly increased flowering and fruit size, while reducing red spider mite damage. The result was a 300% increase in berry yield from a very minor input cost, proving the great efficacy of this program for strawberry production in Mexico.



Vitazyme application only two times dramatically improved leaf and fruit growth, and tripled the yield. There was little spider mite damage.*

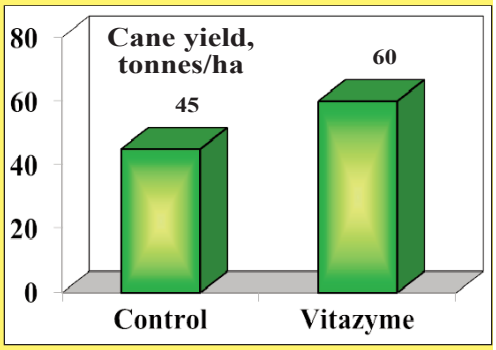
Sugar Cane

Researcher: unknown *Farmer*: Nguyen Dire Tinh *Location*: Ea Po—Cir Jut District, Viet Nam
Variety: unknown *Age of cane*: two years
Experimental design: A sugar cane field was divided into a Vitazyme treated and an untreated control area, each being 0.7 ha, to determine the effect of the product on cane yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 3 liters/ha, applied at the beginning of the rainy season on April 18, 2012, and again on June 18, 2012
Yield results: The field was harvested on January 20, 2013. Vitazyme, using two foliar applications, gave a very high 33% increase in sugar cane yield.
Income results: Extra cost from Vitazyme: 2,520,000 VND/ha
Added income from the crop: 12,780,000 VND/ha
Return On Investment: 5.07:1
Conclusions: This sugar cane trial in Viet Nam revealed that two Vitazyme applications produced a 33% yield increase over the untreated control. This increase netted the farmer nearly 13 million VND/ha more income, and resulted in a 5.07:1 Return On Investment. This program is proven to be excellent for use with sugar cane in Viet Nam.

Sugar Cane Yield



Increase in cane yield with Vitazyme: 33%

Sugar Cane

Researcher: Juan Carlos Diaz, Ph.D. *Farmer*: Eng. Jose Isabel Hernandez Soto *Starting date of study*: May 8, 2012
Location: El Monte Farm, Villa Corona, Jalisco, Mexico *Variety*: 2086
Experimental design: A recently harvested sugar cane field was divided into a Vitazyme treated and control area to evaluate the effect of two foliar applications on crop yield. The treated area was 1.0 ha.
Fertilization: unknown
Vitazyme application: (1) 1.5 liters/ha (20 oz/acre) on the ratoon field on May 8; (2) 1.5 liters/ha (20 oz/acre) on the growing field sometime later
Yield results: Yields were not available, but the increase in millable stalks with Vitazyme was 16.5%.
Conclusion: Two applications of Vitazyme on this ratoon sugar cane field in Mexico produced an excellent millable stalk increase of 16.5%.



Vitazyme treatment in Mexico produced bigger plants on the right compared to the untreated control on the left.



Leaves taken from the plants of the treatment on the left-hand photo show longer and wider leaves with Vitazyme treatment.

Increase in millable stalks with Vitazyme: 16.5%

Sugar Cane, Ratoon

Researcher: Yen Thao Tran *Farmer*: unknown *Location*: Mekong Delta, Viet Nam
Experimental design: A recently harvested sugar cane field was divided into a Vitazyme treated and control portion to investigate the effect of the product on sugar yields and profits for ratoon cane.

1. Control **2. Vitazyme**

Fertilization: standard for the area and soil type
Vitazyme application: three applications: (1) 2 liters/ha, using 0.5 liter in a 200 liter barrel of water, with four barrels per

hectare, applied when the first sprouts appeared with rains after harvest; (2) 2 liters/ha, using the same method as for (1), after one month; (3) 3 liters/ha, using 0.5 liter in a 200 liter barrel of water, with six barrels per hectare one month after the second application.

Yield results: See table and graph at right.

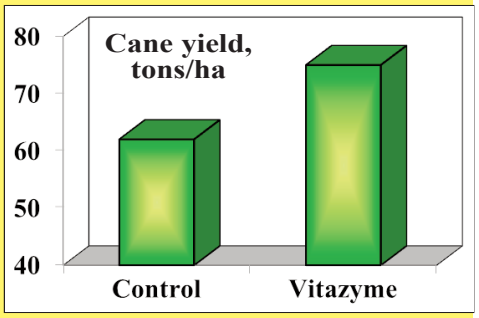
Income results: The price of sugar cane is about 970 VND/kg. Increased income for this trial is 13,000 kg/ha x 970 VND/kg = 12.61 million VND/ha

Conclusions: A ratoon sugar cane trial in Viet Nam, using three applications, provided an excellent 21% yield increase (13 tons/ha), which gave 12.61 million additional VND/ha. This result is consistent with previous studies with Vitazyme on sugar cane in Viet Nam.

Sugar Cane Yield

Treatment	Cane Yield	Yield Change
	tons/ha	tons/ha
Control	62	—
Vitazyme	75	13 (+21%)

Increase in cane yield with Vitazyme: 21%



Tomatoes

Researcher: Erg. Benjamin Hernandez Romero, Lucava, S.A.
Location: Altamira, Tamaulipas, Guatemala
Row spacing: 1.9 meters
Farmer: Eduardo Mejia
Variety: Tisset 8554 (salad tomato)
Row length: 180 meters

Experimental design: A tomato field was divided into Vitazyme treated and control areas. The treated area was 0.5 ha, which comprised 15 bed rows. The objective of the study was to determine the effectiveness of Vitazyme to affect tomato yield under irrigated conditions.

1. Control **2. Vitazyme**

Fertilization: unknown

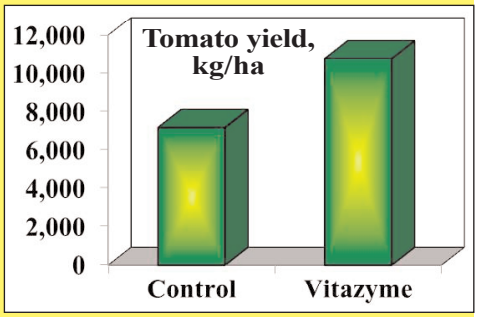
Vitazyme application: 1.5 liters/ha (750 ml in 50 liters of water for 0.5 ha) sprayed (1) 20 days after transplanting on October 10, 2012, at 15 to 25 cm. tall, (2) 30 to 40 days after transplanting, and (3) immediately after the first picking

Yield results: Only the first two pickings are recorded in this data.

Tomato Yield

Treatment	Yield	Area yield	Yield change
	kg/0. 5 ha	kg/ha	kg/ha
Control	3,600	7,200	---
Vitazyme	5,400	10,800	3,600 (+50%)

Increase in tomato yield with Vitazyme: 50%



Conclusion: The results of this Guatemala tomato trial were “extraordinary”, in the words of the researcher. A 50% yield increase was realized with the first two pickings, a result of greater and faster plant growth, superior blossoming, and more rapid development of larger fruit. These results show the potential of Vitazyme to improve the yields and profits of tomato growers in Guatemala.

Tomatoes

Researcher: Alejandro Reyes
Location: Yecapixtla, Morelia, Mexico
Farmer: Victorino Pacheco
Variety: red table

Experimental design: A greenhouse trial was conducted with Vitazyme on all rows except for two, which served as control rows. Both pre and post-transplant applications were made to determine the efficacy of the product for greenhouse tomato production.

1. Control **2. Vitazyme**

Fertilization: unknown

Vitazyme application: During transplant growth, trays were dipped in a 1% solution. After transplanting, plants were drenched with Vitazyme an undisclosed number of times.

Growth results: An evaluation in December of 2012 revealed the following with Vitazyme applications:

- **More flowers**
- **Less virus disease incidence.**

Yield results: No harvest date was given. **Two Vitazyme treated rows produced 450 kg more tomatoes than did the two untreated rows over 3.5 months of the cropping cycle.**

Conclusion: Although actual yields of the two treatments are not available in this Mexican greenhouse tomato trial, the Vitazyme treatment produced 450 kg more fruit than did the control, showing the efficacy of this program for tomato production in Mexico.

Husk Tomatoes (*Physalis ixocarpa*)

Researcher: Juan Carlos Diaz, Ph.D. *Farmer*: Urbana Andrade Silva *Variety*: *Physalis ixocarpa*
Location: Tochapan, Palmarito, State of Puebla, Mexico *Planting date*: unknown
Experimental design: A field of husk tomatoes was divided into a 1.0 ha area treated with Vitazyme, and the rest of the field received Citoquin, another biostimulant. The objective of the study was to evaluate the relative effectiveness of the products on tomato growth and yield.

1. Citoquin **2. Vitazyme**

Fertilization: unknown
Vitazyme application: (1) 1 liter/ha at early bloom on June 5, 2012 (63 ml in each 25 liter backpack, at 200 liters/ha applied); (2) 1 liter/ha 15 days later on June 20, 2012
Citoquin application: applied in several applications (number not known) at 500 ml/ha. Citoquin has 250 ppm gibberellins, 200 ppm cytokinins, and 20 ppm auxins.
Yield results: The harvest date is not known.
Growth results: Compared to Citoquin, Vitazyme produced ...

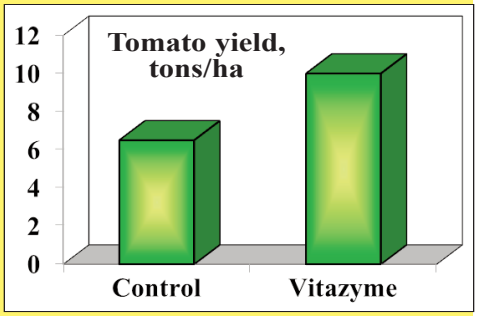
- **Longer plant life**
- **Greater leaf area**
- **Darker green leaf color (more chlorophyll)**

Conclusions: A husk tomato study in Mexico revealed that Vitazyme greatly increased fruit yield (+54%) from plants that had more leaf chlorophyll, were larger, and lived longer, showing that this product is an excellent adjunct to tomato culture in Mexico.

Husk Tomato Yield

Treatment	Tomato Yield	Yield change
	tons/ha	tons/ha
Control	6.5	—
Vitazyme	10.0	3.5 (+54%)

Increase in tomato yield with Vitazyme: 54%



Winter Wheat

Researcher: Jacob Hesseltine *Farmer*: Garth Hinderer *Location*: Waterville, Washington
Variety: Eltan soft white winter wheat *Previous crop*: fallow
Planting date: mid August, 2012 *Planting rate*: 60 lb/acre
Tillage: plowing, harrowing, cultivation
Experimental design: A 39.54-acre field was separated into two portions: 21.82 acres for Vitazyme application and 17.72 acres for an untreated control. Vitazyme was spring applied by air, to evaluate the effects of the product on winter wheat.

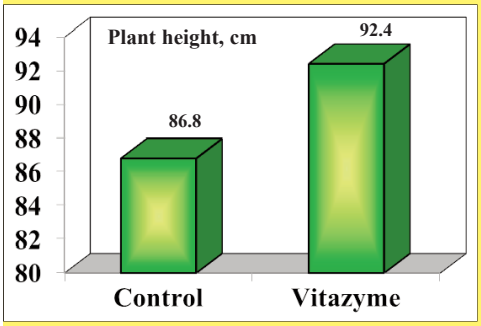
1. Control **2. Vitazyme**

Fertilization: 50 lb/acre of N and 10 lb/acre of S applied in the spring
Vitazyme application: 11.7 oz/acre (0.9 liter/ha) applied by air on the 21.82 acres on May 20
Weather for 2013: good, but with considerable late season rain that interfered with harvest
Harvest date: August 20 and 21, 2013
Pre-harvest evaluation: On August 8, 20 plants from both the Vitazyme and control areas were dug to evaluate plant parameters. Values are averages for the 20 plants.



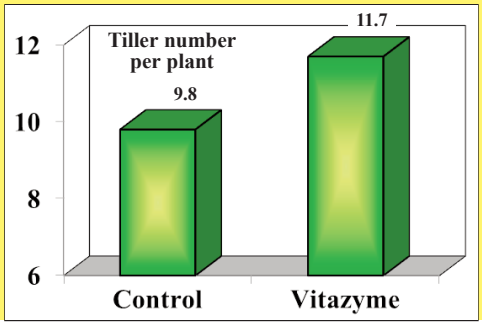
The treated plants are taller, have larger and heavier heads, thicker stems, and more tillers.

*Plant Height**

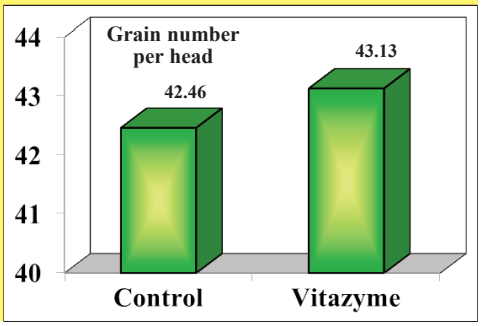


*Measured from soil level to tip of tallest tiller.

Productive Tillers/Plant



Grains Per Head

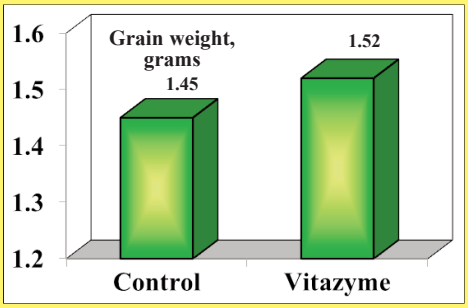


Increases with Vitazyme:

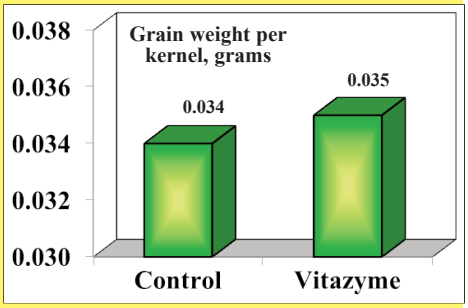
Plant height 6%
Productive tillers/plant ... 19%
Grains per head 2%
Grain weight/head 5%
Grain weight/kernel 3%

Yield results: A severe wind and rain storm on August 10 damaged the crop, the Vitazyme treatment more so than the control due to taller plants and heavier heads. *Conclusions*: A soft white winter wheat study in central Washington revealed that Vitazyme improved every plant parameter measured, especially productive tillers per plant (+19%). Grain yield was increased by 11%, and would likely have increased even more had the crop been harvested before a severe storm struck. Also, an application on the seeds, or early in the crop cycle, would likely have improved the yield increase, as would have a full 13 oz/acre application rate. This study shows the excellent effectiveness of foliar applied Vitazyme for wheat production in Washington.

Grain Weight Per Head



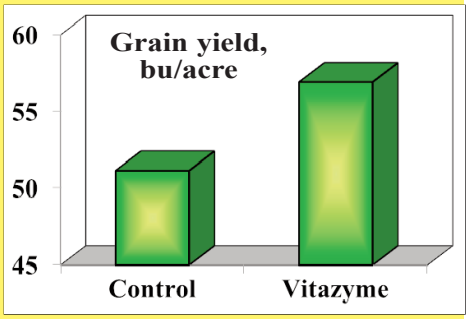
Grain Weight Per Kernel



Winter Wheat Yield

Treatment	Grain Yield	Yield Change
	bu/acre	bu/acre
Control	51.15	—
Vitazyme	56.92	5.77 (+11%)

Increase in grain yield with Vitazyme: 11%





The control wheat was much shorter and had fewer heads than did the Vitazyme treated wheat (see right).



Note the excellent height and thickness of the heads with Vitazyme compared to the control (see left).

Wheat

Researcher: Ricardo Cabrera
Variety: Itapua 75
Planting date: March 7, 2013
Row spacing: 0.17 m (6.6 inches)
Experimental design: A wheat experiment was designed for an area having 18 rows (3.06 m) that were 18 meters long for each of eight treatments, The area was 55 m^2 for each treatment, or 440.6 m^2 for the entire study. The purpose of the experiment was to determine the yield and growth characteristics of wheat as affected by Vitazyme alone at three rates, Vitazyme plus other treatments, and other treatments alone.

Research organization: DVA, Paraguay *Trial location*: Capitan Miranda, Paraguay

Treatment	Seed treatment[1]	Treatment at 30 days after emergence[2]	Treatment at flag leaf emergence[3]
Control	0	0	0
Complesal Semillon	200 ml	200 ml	1 L
Ascofol Zn	200 ml	200 ml	1 L
Comp Sem + Vitazyme	200 ml + 150 ml	200 ml + 0.5 L	2 L + 0.5 L
Ascofol + Vitazyme	100 ml + 150 ml	200 ml + 0.5 L	2 L + 0.5 L
Vitazyme 1 (low)	100 ml	0.5 L	0.5 L
Vitazyme 2 (medium)	150 ml	1.0 L	1.0 L
Vitazyme 3 (high)	200 ml	1.5 L	1.5 L

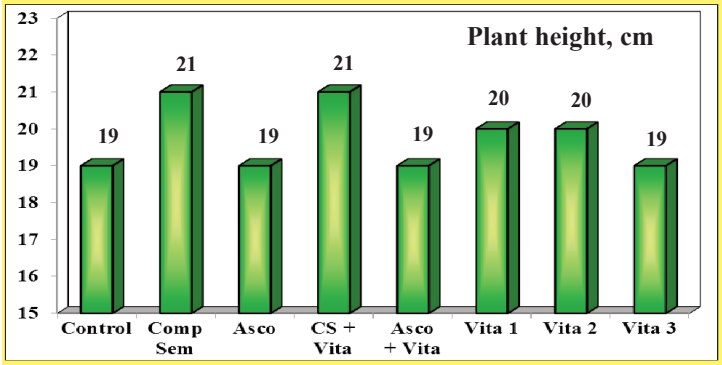
[1]Seeds were treated with a seed treater to the seed surface at the indicated rates, before planting.
[2]Sprayed on the leaves and soil at 30 days after plant emergence.
[3]Sprayed on the leaves and soil at flag leaf emergence.

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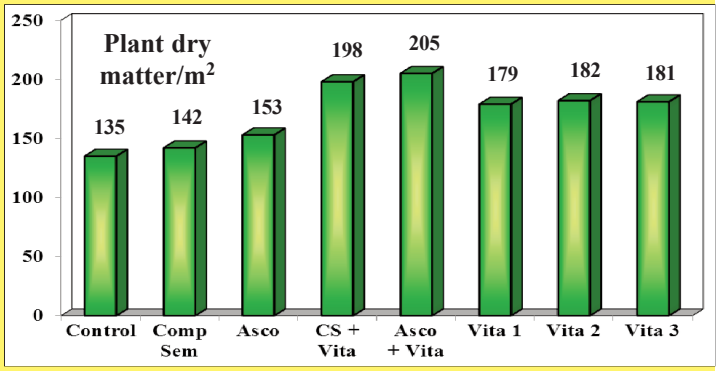
Fertilization: 200 kg/ha of 18-46-0 N-P_2O_5-K_2O before planting
Vitazyme application: See the table on the previous page.
Complesal Semillon: a foliar fertilizer, applied as shown in the table on the previous page
Ascofol Zn: a solution of seaweed (*Ascophyllum nodosum*) and certain nutrient elements, especially zinc (possibly 0.6%), applied as shown in the chart on the previous page
Seed treatment results at 15 days:

Plant Parameters 15 Days After Emergence

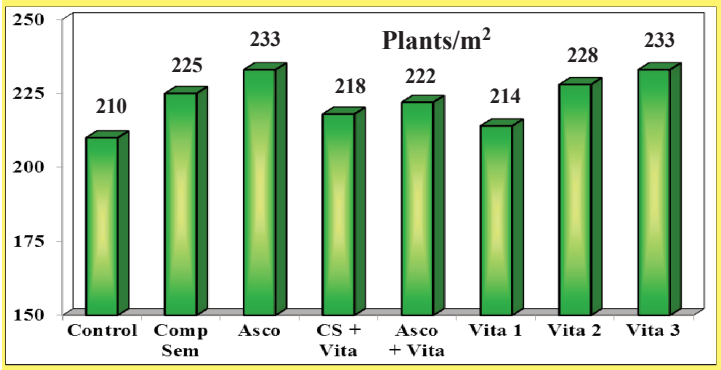
Plant Height



Dry Matter Per Meter^2



Plant Number Per Meter^2



Increase in Dry Matter at 15 Days

2. Complesal Semillon ..... +5%
3. Ascofol Zn ..... +13%
4. Comp Sem + Vitazyme ..... +47%
5. Ascofol + Vitazyme ..... +52%
6. Vitazyme low ..... +33%
7. Vitazyme medium ..... +35%
8. Vitazyme high ..... +34%

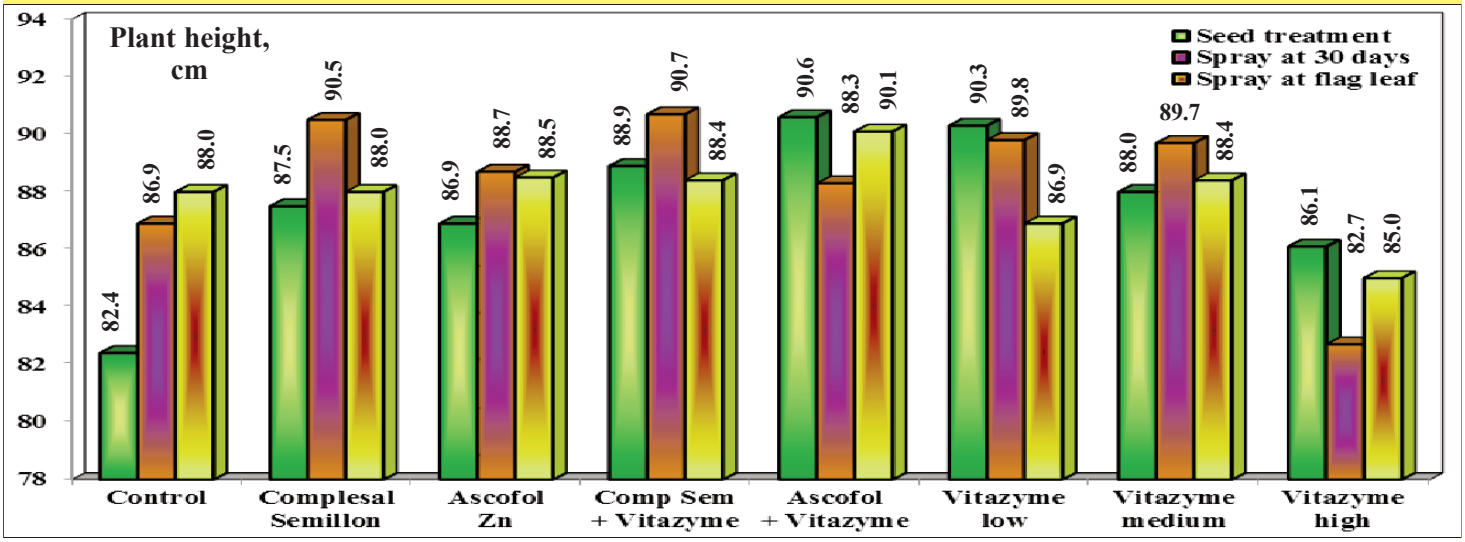
Increase in Plants at 15 Days

2. Complesal Semillon ..... +7%
3. Ascofol Zn ..... +11%
4. Comp Sem + Vitazyme ... +4%
5. Ascofol + Vitazyme ..... +6%
6. Vitazyme low ..... +2%
7. Vitazyme medium ..... +9%
8. Vitazyme high ..... +11%

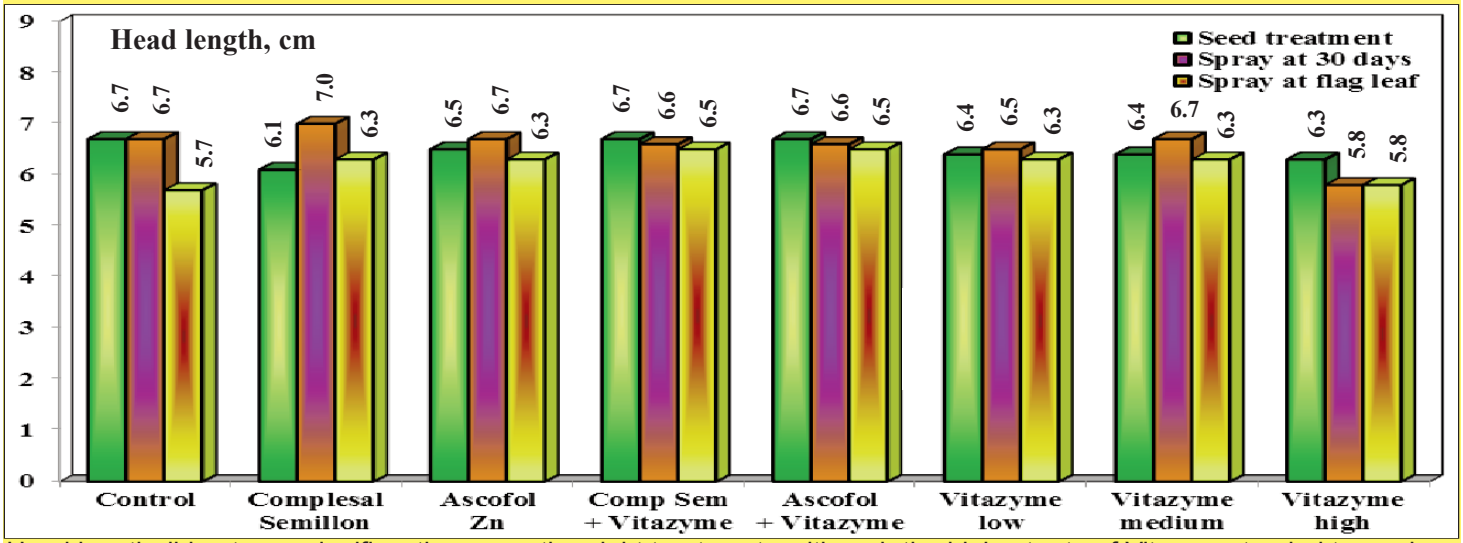
At 15 days after planting, the seed treatments all increased the plant number (surviving seedlings) and the dry matter per unit area. Plant height was affected erratically by the several treatments.

Harvest and yield results: There was considerable variability in plant height, though most treatments exceeded the height of the control for all three application regimes. In general, the foliar application at 30 days increased plant height the most for the Complesal Semillon, Ascofol Zn, Complesal Semillon + Vitazyme, and Vitazyme at the medium level. Vitazyme seed treatment and the other treatments all exceeded the control in height by a lot.

Plant Height At Harvest

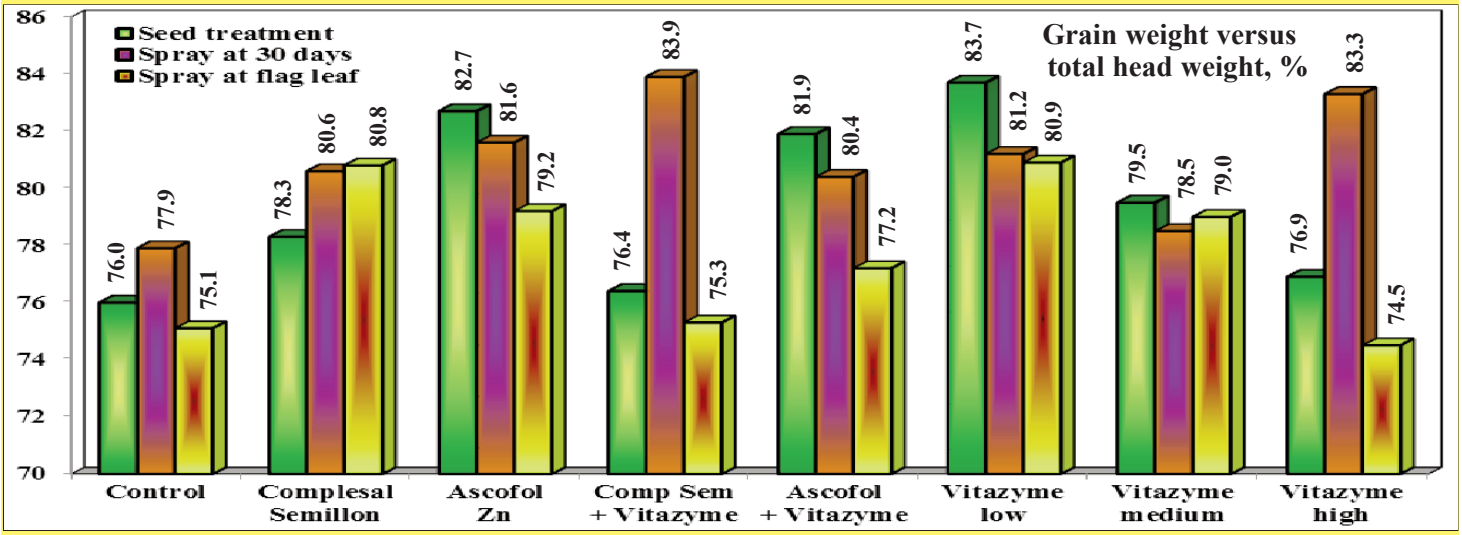


Head Length



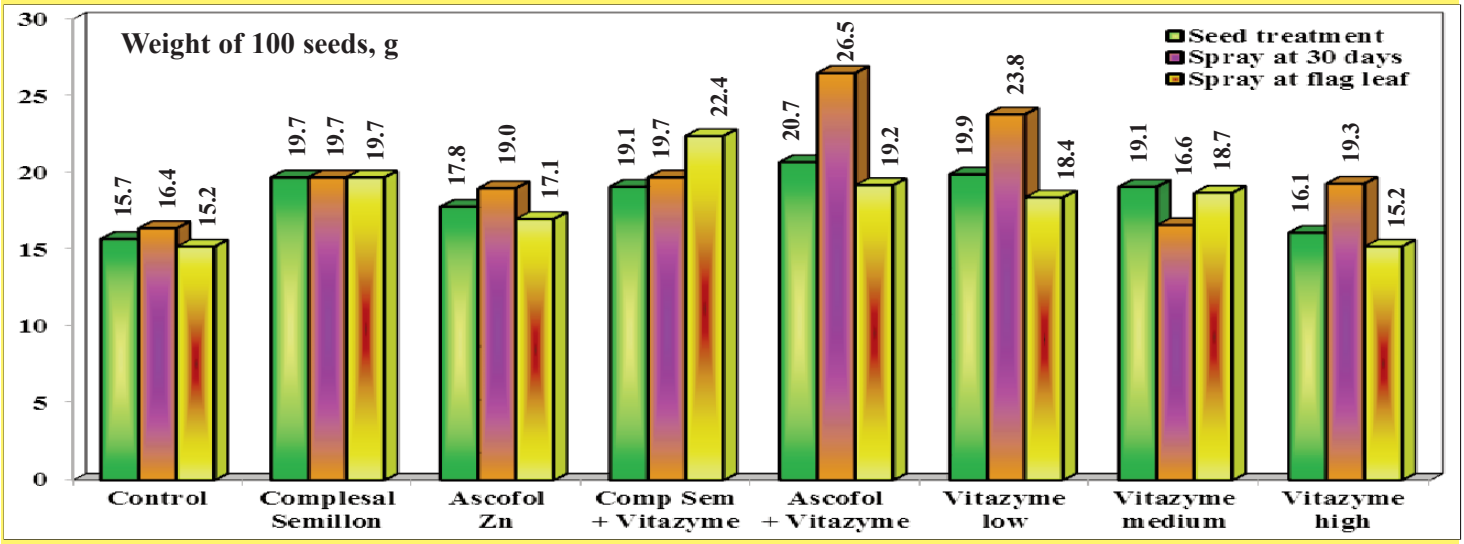
Head length did not vary significantly among the eight treatments, although the highest rate of Vitazyme tended to produce the shortest heads.

Percent Grain in Heads



Numbers did not vary dramatically, but the highest values were for Vitazyme + Complesal Semillon and the high Vitazyme applications at 30 days after emergence.

Weight of 100 Seeds



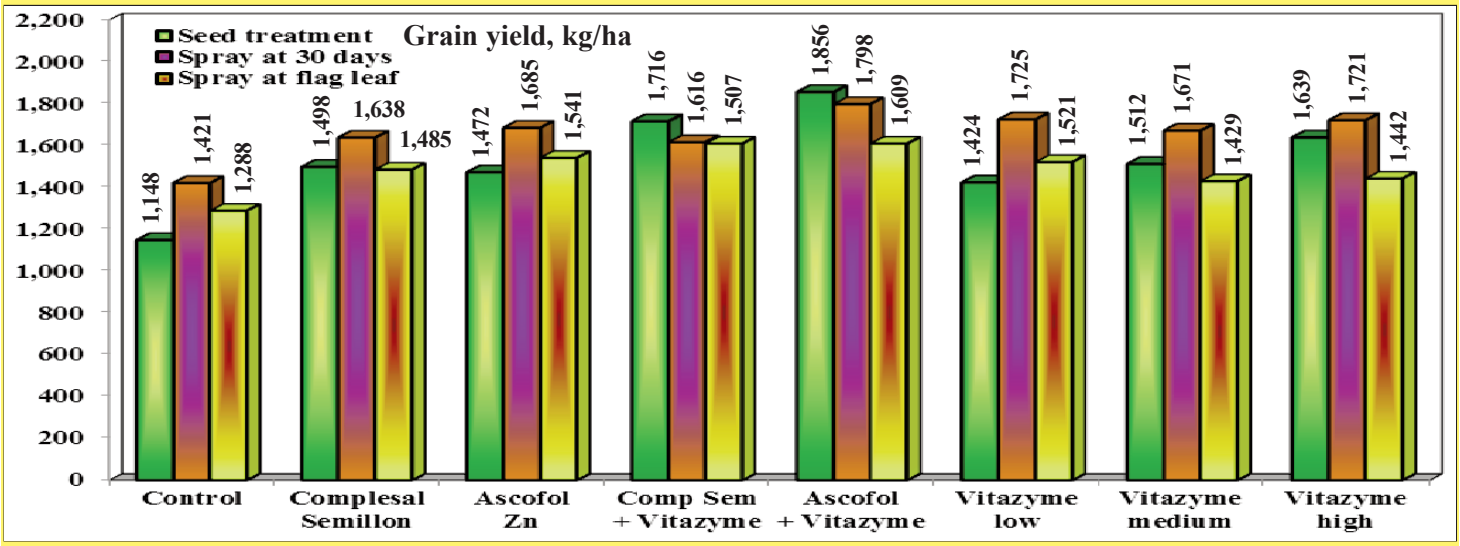
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In nearly every application regime the Vitazyme, with or without additives, improved seed weight, sometimes dramatically. The greatest increase was 62% with Vitazyme + Ascofol Zn.

Increase in 100 Seed Weight With Vitazyme

	Seed treatment	Foliar 30 days	Foliar flag leaf
2. Complesal Semillon	25%	20%	30%
3. Ascofol Zn	13%	16%	13%
4. Comp Sem + Vita	22%	20%	47%
5. Ascofol + Vita	32%	62%	26%
6. Vitazyme low	27%	45%	21%
7. Vitazyme medium	22%	1%	23%
8. Vitazyme high	3%	18%	0%

Grain Yield



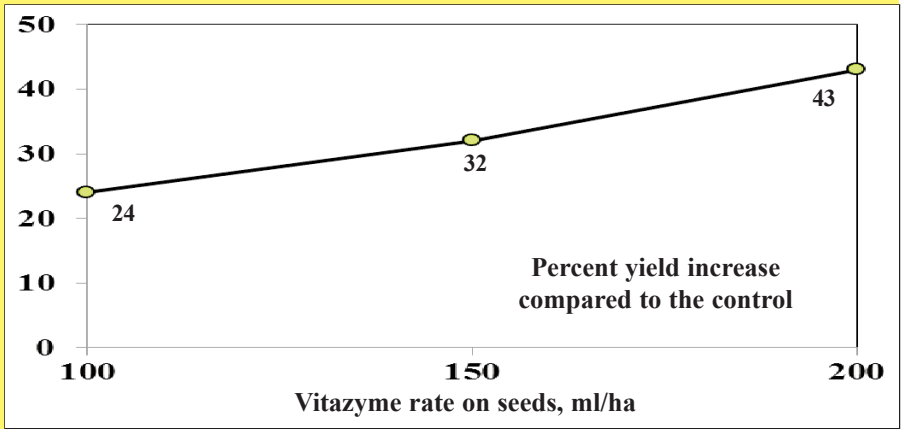
Every Vitazyme and product treatment increased the grain yield above the control. The smallest increase was 7%, and the highest was 62%, for the Ascofol Zn + Vitazyme seed treatment. The combination gave the highest yield for all three applications. Vitazyme seed treatment responses increased as the application level increased.

Increase in Grain Yield With Vitazyme

	Seed treatment	Foliar 30 days	Foliar flag leaf
2. Complesal Semillon	30%	15%	15%
3. Ascofol Zn	29%	19%	20%
4. Comp Sem + Vita	49%	7%	17%
5. Ascofol + Vita	62%	27%	25%
6. Vitazyme low	24%	21%	18%
7. Vitazyme medium	32%	18%	11%
8. Vitazyme high	43%	21%	12%

The grain response to the medium and high Vitazyme rates was 11 to 12%, while the low rate gave an 18% yield increase; yield responses for these two rates were much higher (18 to 21%) when applied 30 days after emergence.

Wheat Grain Response to Vitazyme Seed Application



Conclusions: According to the researcher, "According to what was observed in the field, in the first year's work, it was able to be noticed the good compatibility of Vitazyme with other products. Vitazyme by itself and in mixtures do not present any phytotoxicity effect, and according to the comparative bar graphs the most suitable moments of application would be in a seed treatment and in a foliar spray 30 days after emergence."

Winter Wheat

Vitazyme and Kelpek

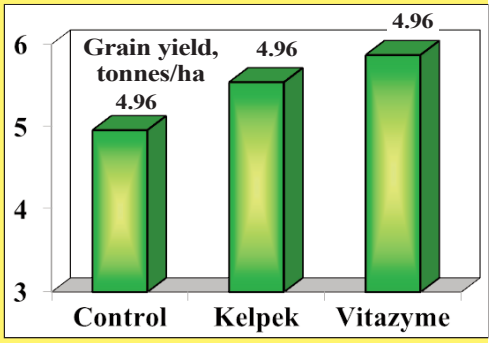
Researcher: V.V. Plotnikov *Research organization*: Scientific, Innovation, and Technology Center of the Institute of Forages and Agriculture of Podillya NAAS *Location*: National Academy of Agricultural Sciences, Ukraine *Variety*: Tsarivna *Previous crop*: soybeans
Soil type: ash gray soil (humus = 2.2%, hydrolyzed-N = 8.4 mg/100 g of soil, P = 15.8 mg/100 kg of soil, exchangeable K = 12.4 mg/100 g of soil, pH = 5.5) *Planting date*: October 7, 2012
Soil preparation: disking, plowing, cultivating *Planting rate*: 6 million seeds/ha
Experimental design: A replicated trial (four reps), with 0.1 ha plots, was established to evaluate the effectiveness of Vitazyme and Kelpek, applied at tillering, in affecting the yield and profitability of winter wheat.

1. Control **2. Kelpek** **3. Vitazyme**

Fertilization: fall, 0-30-45 kg/ha N-P_2O_5-K_2O plowed in; spring, 80 kg/ha N
Vitazyme application: 1 liter/ha sprayed on the leaves at tillering (April 25, 2013).
Kelpek application: 2 liters/ha sprayed on the leaves at tillering (April 25, 2013).
Yield results: See the graph at right.
Income results: Profit with Kelpek = 807 UAH/ha
Profit with Vitazyme = 1,511 UAH/ha
Conclusions: According to the Ukrainian researchers,

1. Vitazyme use at a rate of 1.0 L/ha at the tillering stage of winter wheat provided the increase of grain yields at the level of 0.91 tonne/ha, or 18%. When using a competitive product Kelpek at a rate of 2 L/ha at the tillering stage of winter wheat, the grain yield increase was 0.58 tonne/ha or 12%, and was 0.33 tonne/ha less than when using Vitazyme.
2. When using Vitazyme at a rate of 1.0 L/ha for winter wheat plants, the profit is 1,511 UAH/ha, which is 704 UAH/ha more than when Kelpek was applied at a rate of 2 L/ha.

Winter Wheat Yield



Increase in yield with ...
Kelpek 12%
Vitazyme 18%

Winter Wheat

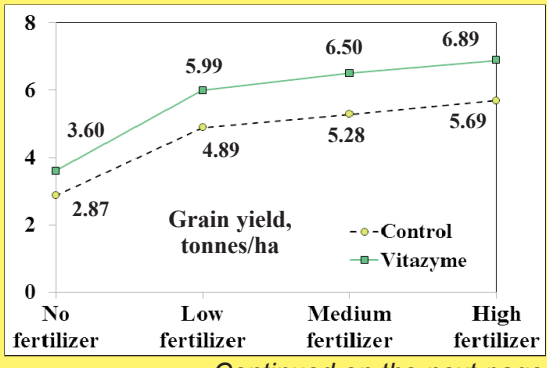
Researcher: V.V. Plotnikov *Research organization*: Scientific, Innovation, and Technology Center of the Institute of Forages and Agriculture of Podillya NAAS *Location*: National Academy of Agricultural Sciences, Ukraine *Planting date*: October 3, 2012 *Planting rate*: 6 million seeds/ha
Soil type: ash gray soil (humus = 2.2%, hydrolyzed-N = 8.4 mg/100 g of soil, P = 15.8 mg/100 kg of soil, exchangeable K = 12.4 mg/100 g of soil, pH = 5.5) *Previous crop*: peas *Variety*: Tsarivna
Soil preparation: disking, plowing, cultivating
Experimental design: A plot study with four replicates was set up with four fertility levels, to determine the effect of Vitazyme at each fertility level on grain yield, quality, yield parameters, and fungal diseases.
Fertilization: See the treatment table above. Phosphorus and potassium amendments were applied in the fall, and nitrogen was applied in the spring.
Vitazyme application: (1) a seed treatment of 1 liter/tonne of seed; (2) a foliar spray at tillering of 1 liter/ha
Yield results: At all fertility levels, Vitazyme increased the grain yield substantially, from 21 to 25%.
Income results: Increases in income from Vitazyme were as follows:
At all fertility levels Vitazyme improved profits, but the highest profit was realized at the medium level, followed closely by the high fertility level.

Treatment	Nitrogen	Phosphorus	Potassium
	kg/ha	kg/ha	kg/ha
1. Control	0	0	0
2. Control + Vita	0	0	0
3. Low fertility	60	30	45
4. Low fert + Vita	60	30	45
5. Medium fertility	90	40	60
6. Medium fert + Vita	90	40	60
7. High fertility	120	50	75
8. High fert + Vita	120	50	75

Increase in yield with Vitazyme
No fertilizer 25%
Low fertilizer 22%
Medium fertilizer 23%
High fertilizer 21%

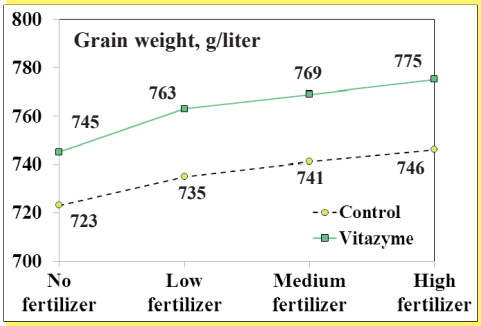
Increase in net income with Vitazyme
No fertilizer ..... 1,050 UAH/ha
Low fertilizer ..... 1,837 UAH/ha
Medium fertilizer ..... 2,044 UAH/ha
High fertilizer ..... 2,066 UAH/ha

Winter Wheat Yield

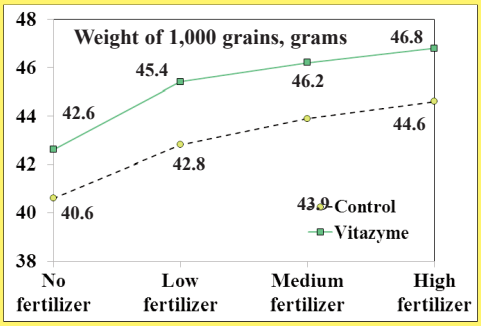


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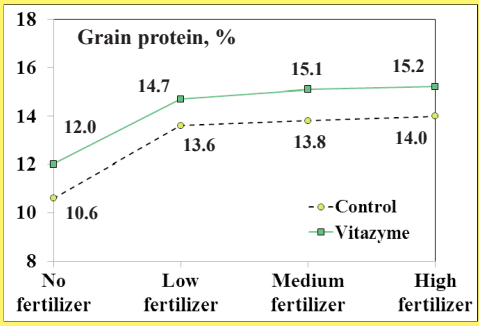
Grain Density



1,000 Grain Weight



Crude Protein



Increase in grain density with Vitazyme

- No fertilizer 3.0%
- Low fertilizer 3.8%
- Medium fertilizer 3.8%
- High fertilizer 3.9%

Increase in 1,000-grain weight increase with Vitazyme

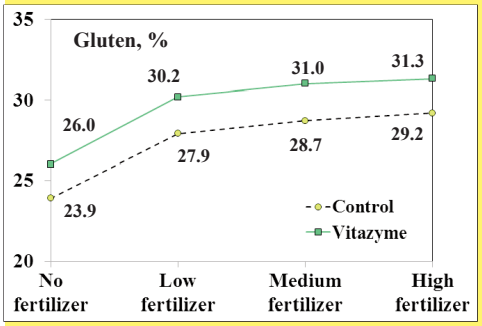
- No fertilizer 4.9%
- Low fertilizer 6.1%
- Medium fertilizer 5.2%
- High fertilizer 4.9%

Increase in crude protein with Vitazyme

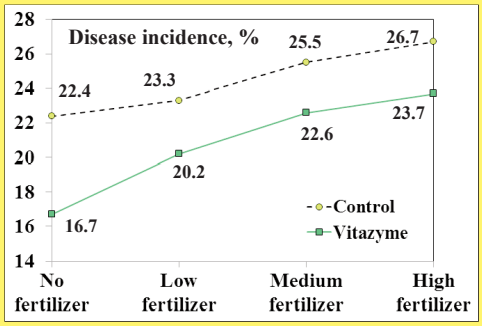
- No fertilizer 1.4%-points
- Low fertilizer ... 1.1%-points
- Medium fertilizer 1.3%-points
- High fertilizer ... 1.2%-points

Grain density results: Grain density is quite difficult to change, but Vitazyme consistently improved it by 3 to 4%.
1,000-grain weight results: The weight of 1,000 grains increased with the fertility level, and parallels the grain density data above.
Crude protein results: Increasing fertilizer rates uniformly raised grain protein, with Vitazyme consistently increasing the level above the control.
Grain gluten results: Grain gluten rose along with the fertilizer levels, and Vitazyme always exceeded the untreated control.

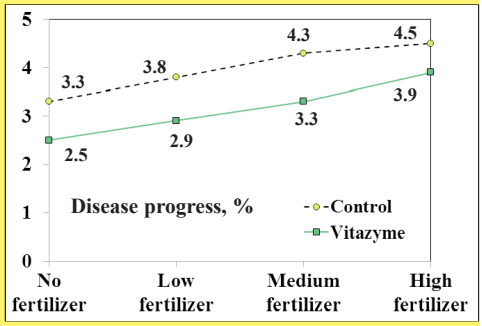
Grain Gluten



Root Rot Incidence



Root Rot Progress



Increase in gluten with Vitazyme

- No fertilizer 5.7%-points
- Low fertilizer 3.1%-points
- Medium fertilizer 3.0%-points
- High fertilizer ... 2.1%-points

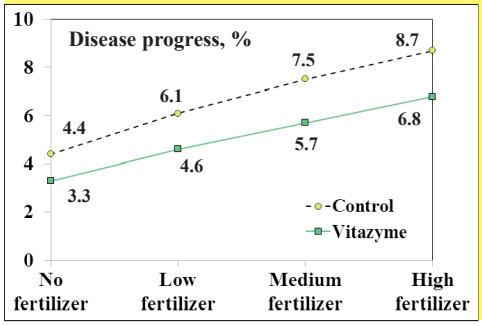
Reduction in root rot with Vitazyme

- No fertilizer ..... -5.7%-points
- Low fertilizer ..... -3.1%-points
- Medium fertilizer ..... -2.9%-points
- High fertilizer .... -3.0%-points

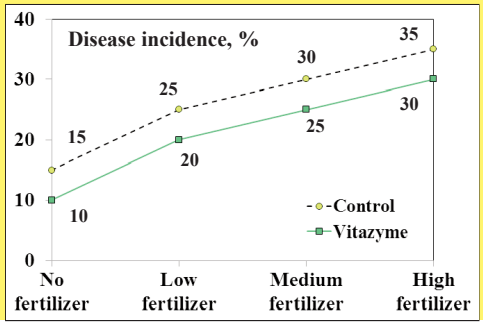
Root rot results: The incidence of root rot was less in the Vitazyme treated plots, but all incidences of root rot rose with fertilizer levels. Progress of the root rot complex increased with fertilizer level, but Vitazyme restricted its development at all levels versus the untreated control.

Speckled leaf blotch results: All treatments had 100% incidence of speckled leaf blotch disease, but the progress of the disease was reduced with Vitazyme. Progress increased with fertilizer level.

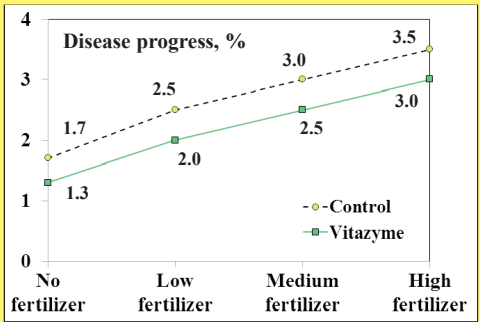
Speckled Leaf Blotch Progress



Speckled Spike Blotch Incidence



Speckled Spike Blotch Progress



Reduction in speckled leaf blotch disease with Vitazyme

No fertilizer 1.1%-points
Low fertilizer 1.5%-points
Medium fertilizer 1.8%-points
High fertilizer 1.2%-points

Reduction in speckled spike blotch disease with Vitazyme

No fertilizer ..... -5%-points
Low fertilizer ..... -5%-points
Medium fertilizer .... -5%-points
High fertilizer ..... -5%-points

Speckled spike blotch results: Vitazyme reduced speckled spike blotch fungal disease below the control levels, and all incidences increased with the fertilizer rate. Disease progress paralleled the disease incidence.

Wheat structural elements results: All three parameters increased with fertilizer level, and Vitazyme pushed the values in every case above the control values.

Increase in head density with Vitazyme: 5 to 6%

Increase in kernels/head with Vitazyme: 9 to 13%

Increase in grain weight/head with Vitazyme: 14 to 18%

Treatment	Head Density		Kernels/Head		Grain/Head	
	Control	Vitazyme	Control	Vitazyme	Control	Vitazyme
	------- heads/m^2 -------		----- kernels/head -----		------- grams -------	
No fertilizer	404	429 (+6%)	17.5	19.7 (+13%)	0.71	0.84 (+18%)
Low fertilizer	537	565 (+5%)	21.3	23.3 (+9%)	0.91	1.06 (+16%)
Medium fertilizer	556	586 (+5%)	21.6	24.0 (+11%)	0.95	1.11 (+17%)
High fertilizer	581	615 (+6%)	22.0	23.9 (+9%)	0.98	1.12 (+14%)

Conclusions: In the words of the researchers,

1. Without fertilizer application the double use of liquid organic mineral fertilizer Vitazyme for winter wheat seed dressing of Tsarivna variety, at a rate of 1 L/tonne, and for plant treatment at the tillering stage at a rate of 1.0 L/ha, provided compared to the control (without Vitazyme) the grain increase of 0.73% tonnes/ha, or 25%. The plots with mineral fertilization systems after Vitazyme application had yield increases of 1.11-1.22 tons/ha, or 21-23%.
2. Vitazyme use when growing winter wheat on the experimental plot without fertilizers gave the profit of 1,050 UAH/ha compared to the control, and the plots with NPK doses increased the profit by 1,837-2,044 UAH/ha.
3. Winter wheat grain of Tsarivna variety, grown with the use of Vitazyme, had better quality characteristics on every experimental plot compared to the control plot without Vitazyme use. The grain units increased by 22-29 grams/L, 1,000 grain weight by 2.0-2.6 grams, gluten by 2.1-2.3%, and crude protein by 1.1-1.4%.
4. On every plot of winter wheat of Tsarivna variety with various NPK doses, and also without fertilizers, with Vitazyme compared to the control, the plants affected by root rot decreased by 22-24%, speckled leaf blotch by 22-25% and speckled spike blotch by 14-23%.
5. The yield structure of winter wheat of Tsarivna variety under various backgrounds of nitrogen-phosphate-potassium fertilizers on every plot applied with Vitazyme was improved. The density of productive heads was increased by 25-34 units/m^2, the number of kernels in a head by 1.9-2.4 units, and grain weight from the head by 0.13-0.16 gram.
6. ***By using Vitazyme for a seed dressing and applied to winter wheat plants, without fertilizers the grain quality increased from the 6th to the 3rd class, and with $N_{60}P_{30}K_{45}$ application to the 1st class.***

Spring Wheat

Researcher: Jacob Hesseltine *Farmer*: Brandt Farms
Location: Waterville, Washington
Variety: Louise soft white spring wheat
Previous crop: wheat *Soil type*: sandy loam
Tillage: fall chisel plowing, spring harrowing and cultivation
Planting date: April 15, 2013 *Planting rate*: 60 lb/acre
Experimental design: A spring wheat field was divided in a 25-acre treated area, and the remainder was untreated, to evaluate the effect of Vitazyme on crop growth and yield.

1. Control 2. Vitazyme

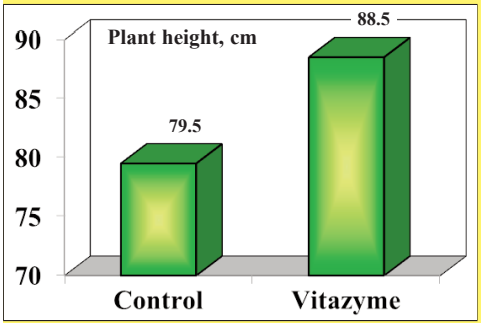
Fertilization: 40 lb/acre of N and 10 lb/acre of S at planting
Vitazyme application: 13 oz/acre (1 liter/ha) along with Solution 32 N and S in the air grain drill at planting; 13 oz/acre sprayed over the plants and soil 5 weeks later (about June 1) along with 2,4-D herbicide
Weather for 2013: Excessive late season rain was unfavorable for crop development, and a destructive wind and rain storm occurred on August 10.
Pre-harvest evaluation: On August 9, 20 typical plants from each treatment were dug to evaluate several parameters. Values for the 20 plants were averaged.



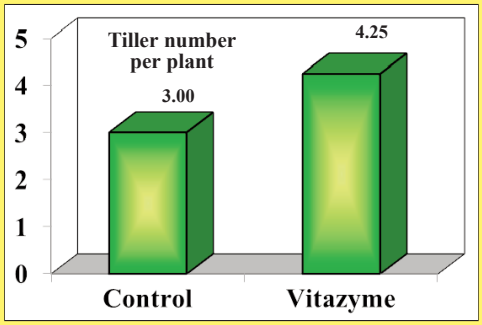
Wheat plants treated with Vitazyme were taller, with more tillers and heavier heads.

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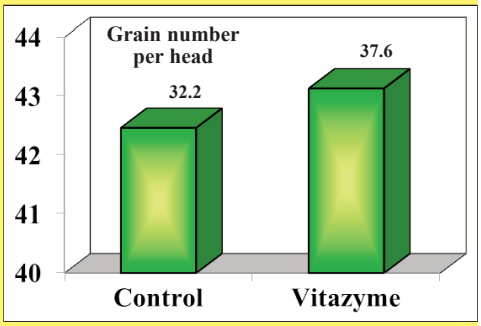
Plant Height*



Productive Tillers/Plant

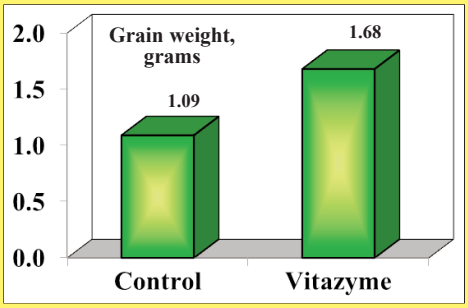


Grains Per Head

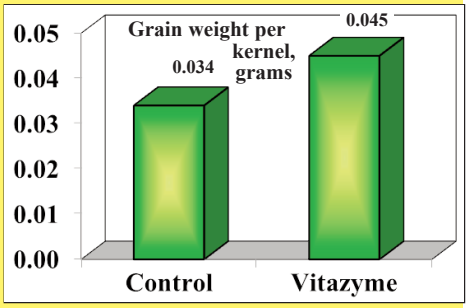


*Measured from soil level to tip of tallest tiller.

Grain Weight Per Head



Grain Weight Per Kernel



Increases with Vitazyme:

Plant height	11%
Productive tillers/plant	42%
Grains per head	17%
Grain weight/head	54%
Grain weight/kernel	32%

Yield results: No yield results were determined due to serious storm damage to both treatments. Reliable measurements could not be made. However, it is clear from the August 9 evaluations that a major yield advantage would have been achieved with Vitazyme had no storm damage occurred. That increase could easily had been 20% or more due to more productive tillers (42%), more grains per head (17%), greater grain weight per head (54%), and greater weight per kernel (32%).





The untreated wheat to the left is noticeably shorter and less tillered than the Vitazyme treated portion of the field .

Organics and Vitazyme Make a Hard-to-Beat Combination

Farmer and research results for the past 19 years have emphasized the great benefit of combining Vitazyme with organic materials of all kinds. The mutualistic effect of the two can sometimes be profound. Materials such as manure, compost, crop residues, green manure crops, liquid fish, and humic acids provide the "fuel", so to speak, for the microorganisms and earthworms to greatly proliferate in the presence of the brassinosteroids, vitamins, and other active agents in Vitazyme when they exert their modes of action in the root zone.

Spring Wheat

Production roundup



BY PETER RESCHKE
The writer is an editor with Ontario Farmer Publications
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Peter's Production blog (updated regularly): http://www.ontariofarmer.com

Perfect season produces top spring wheat yields

When the two highest-yielding fields in the province are in close proximity there are two possible explanations. Either these farmers are sharing production secrets or the area was blessed with exceptionally good weather.

In the case of the Ontario Spring Wheat Yield Challenge this year, it turns out the second explanation is the most plausible. "What can you say? We just hit a really good year," says Del Cressman, who topped the competition with a yield of 112.87 bushels from a field of Wilkin by C&M Seeds.

Interestingly, second place was also part of the Listowel-area family farm, with Cressman's daughter Sonya and her husband Mike Arent recording a yield of 95.46 bushels with the same variety. The only reason that field came up short was because it received a heavy windstorm, leaving some of it badly lodged. "We had to combine 40 or 50 acres going just one way," Cressman recalls.

Third spot belonged to Bill and Darlene Nater of Mitchell, whose field of C&M Sable tipped the scales at 88.89 bushels.

The contest was sponsored by Bayer Cropscience and C&M Seeds.

The winning yields were particularly impressive since Cressman readily admits he rarely exceeds 60 bushels with his spring wheat crops, prompting him to often reserve his best fields for more consistent crops. In the odd year that the yield moves higher, the sample falls short on protein, he says. "This year it all came together." The crop insurance yield for the whole farm was about 95 bushels and protein came in at 12.2 per cent.

The three components of this year's success were: high fertility, early planting and near-perfect weather, he says. "Getting the crop in early is very important. We just worked the ground once, rolled it and planted. Then we rolled it again."

The field has a history of poultry manure so fertility levels are high, Cressman says. Nevertheless he added another three tonnes of dry turkey manure prior to cultivating.

He applied Tilt for foliar disease control and later sprayed Caramba at heading. "I'm not sure how much of an effect it had, but disease was never an issue."

Cressman's only unconventional input was an application of Vitazyme, a liquid biostimulant that includes enzyme and vitamins to stimulate crop growth. The distributor's web site says it increases yields and quality while reducing the need for nitrogen.

Whether you subscribe to such inputs or not, Cressman says today's land prices put a greater emphasis on management. That includes driving more slowly at planting, looking after the soil, making sure that the crop gets off to the best possible start.

"Everyone is looking for that extra margin. It means your mentality has to change."



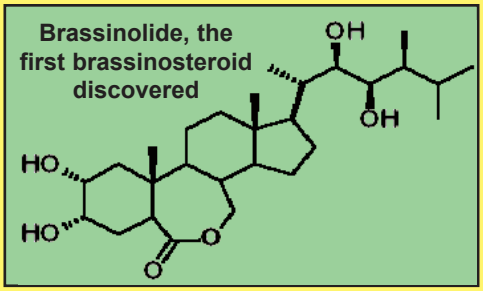
Farmers need to pay special attention to getting their crop off to a good start, yield challenge winner says

Brassinosteroids, the Hot Topic in Growth Regulation for the 21st Century

For many decades it was thought by plant physiologists that the major classes of growth regulators had already been discovered. Those classes are the auxins, cytokinins, and gibberellins, plus abscissic acid and ethylene.

Times have changed, and in 1979 J.W. Mitchell and co-workers isolated 4 mg of a compound from 227 grams of bee-collected rape pollen that turned out to be extremely active in plant systems. This compound was named brassinolide, since it came from a Brassica crop.

Since that time hundreds of studies have been done on the effects of not just brassinolide, but a whole array of related brassinosteroids on many types of plants. However, the road to understanding these unique compounds has not been an easy one, and even today it is not certain where these compounds are synthesized in plants. They are produced in all plant tissues, but are present at extremely low levels, and they act by unleashing or inhibiting specific genes in nuclear DNA, these effects then being transmitted to RNA and the enzymes that produce the compounds essential for growth and function in plants.



Brassinolide, the first brassinosteroid discovered

Brassinosteroids are noted for many effects on cells, tissues, and organs of plants, including the following:

- Promotion of cell expansion and elongation, working together with auxin to do so
- Aiding in cell division and cell wall regeneration
- Affecting cell membrane electrical and osmotic properties
- Improving chlorophyll development and photosynthesis
- Helping the plant resist diseases
- Enhancing vascular (xylem and phloem) differentiation
- Causing pollen tube elongation
- Protecting the plant from stresses of many sorts

It is this last effect—improving stress tolerance—that relates to the brassinosteroids' ability to affect protein and nucleic acid metabolism. These stresses include high or low temperatures, dry or wet conditions, soil salinity, and pathogen attacks. Since virtually all crops are stressed to some degree, the value of these amazing compounds can be appreciated.

Vitazyme contains levels of brassinosteroids that are within the active range (20 to 50 mg/ha for a 1 liter/ha application), and thus the great value of this product may be appreciated for all crops. As more research unfolds over the next few years, the mode of action of these amazing growth regulators in Vitazyme will become clearer.

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VITAZYME

A BIOSTIMULANT BASED ON HARD SCIENCE

Vitazyme has produced excellent yield responses for all crops in a variety of soil and climatic conditions since first marketed in the early 1990s. Though its effects were well recognized at very low application levels, the active agents were at first not known. As efforts to isolate these active agents have continued, several well-recognized compounds have been discovered in the product and are described below.

Brassinosteroids. Called "a growth regulator of the 21st Century", four of them have been isolated from Vitazyme. They are homobrassinolide, dolicholide, homodolicholide, and brassinone. All are effective at extremely low concentrations. They occur in Vitazyme at about 0.03 mg/ml. At the standard 1 liter/ha (13 oz/acre) application rate, 30 mg/ha are applied, which is well within the accepted active range of 20 to 50 mg/ha. (See V. A. Khripach, V. N. Zhabinskii, and A. E.. de Groot, 1999, *Brassinosteroids, a New Class of Plant Hormone*, Academic Press, San Diego, California.) Effects on plants include:

- Greater seed germination
- Increased crop yield
- Improved flowering
- Enhanced stress tolerance (temperature extremes, salinity, drought, and pesticides)
- Increased leaf chlorophyll and photosynthesis

Triacontanol. This well-researched compound is found in relative abundance in Vitazyme, at about 0.17 mg/ml. It can activate plant growth when applied at extremely low concentrations, less than 1 mg/ha. (See S. K. Ries, 1985, Regulation of plant growth with triacontanol, *CRC Critical Reviews in Plant Sciences*, Volume 2, Issue 1, CRC Press, Inc., Boca Raton, Florida.) Effects on plants include:

- Improved seedling growth
- Increased chlorophyll and photosynthesis
- Enhanced dry matter accumulation
- Increased crop yield

Glycosides. A major glycoside has been discovered in Vitazyme which has been shown in greenhouse studies by Vital Earth Resources to consistently increase dry matter yields of crops when applied at very low levels.

B Vitamins. Vitazyme contains about 0.45 mg/100 g of Vitamin B1 (thiamin), 0.03 mg/100 g of Vitamin B2 (riboflavin), and 0.19 mg/100 g of Vitamin B6 (pyridoxine). All of these stimulate plant growth and development, which lead to higher yields.

Research is continuing to uncover other active agents in Vitazyme, agents which may play a role in the growth responses that are noted. For research results on the product, contact Vital Earth Resources at (800)245-7645 or on the Web at www.vitalearth.com. There you will find hundreds of studies that verify the efficacy of this product across the world.

VITAZYME® an All Natural Biostimulant Concentrate