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

2014 Crop Results

Vitazyme on Soybeans

University of Missouri - Bradford Research Center

Researcher: Majula Nathan, Ph.D. *Location*: University of Missouri Bradford Research Center, Columbia, Missouri *Variety*: Pioneer 94MO1 *Population*: 180,000 seeds/acre
Row spacing: 30 inches *Planting date*: June 12, 2013

Experimental design: A replicated soybean study (four replications) was set up using a randomized complete block design, with plots four rows wide and 400 feet long (0.09183 acre per plot.) Two Vitazyme applications were made — at planting on the seeds and at bloom — to determine the effect of the product on soybean leaf tissue analysis, bean yield, and growth and seed parameters.

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

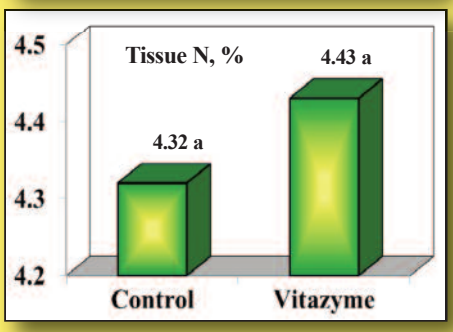
Fertilization: according to soil test recommendations using 0-46-62 lb/acre N-P_2O_5-K_2O before planting

Vitazyme application: (1) 13 oz/acre equivalent on the seeds, mixed thoroughly, just before planting; (2) 13 oz/acre on the leaves and soil at full bloom (R-2) on July 17.

Weather during the 2013 growing season: A wet spring delayed planting, and a drought in August and early September caused some abortion of pods.

Tissue nutrient levels: The youngest, most fully expanded leaves were collected at R-5, on September 6, from 24 plants of each plot for nutrient analysis. These samples were analyzed for N, P, K, Ca, and Mg at the University of Missouri.

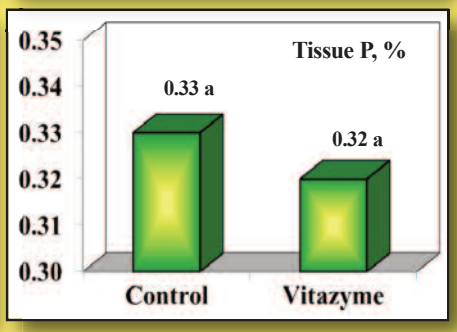
Soybean Tissue Nitrogen



P > F = 0.364

Increase in N with Vitazyme: 3%

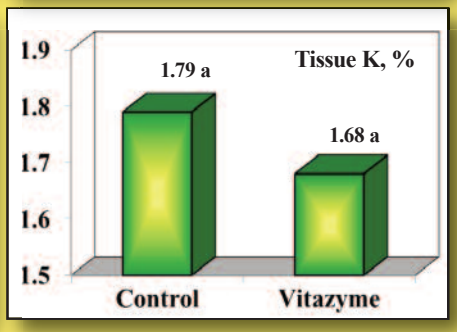
Soybean Tissue Phosphorus



P > F = 0.567

Decrease in P with Vitazyme: 3%

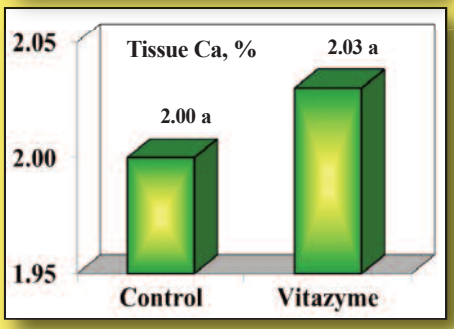
Soybean Tissue Potassium



P > F = 0.306

Decrease in K with Vitazyme: 6%

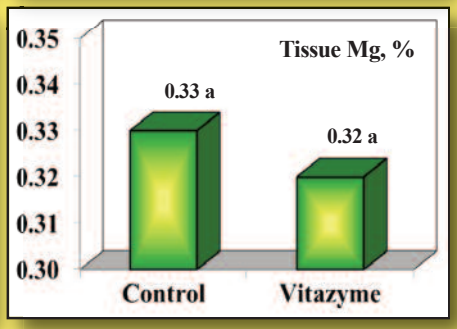
Soybean Tissue Calcium



P > F = 0.845

Increase in Ca with Vitazyme: 2%

Soybean Tissue Magnesium



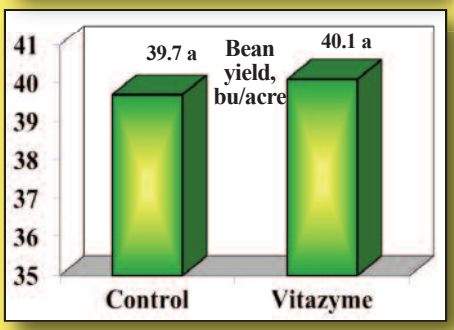
P > F = 0.556

Decrease in Mg with Vitazyme: 3%

There was very little change in tissue elemental levels with Vitazyme application compared with the control treatment.

Growth and yield parameter results: Before harvest, various plant and seed parameters were measured.

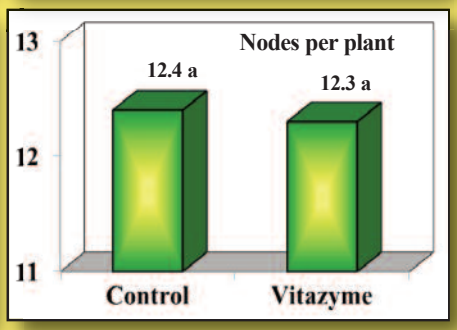
Soybean yield



P > F = 0.840

Increase with Vitazyme: 1%

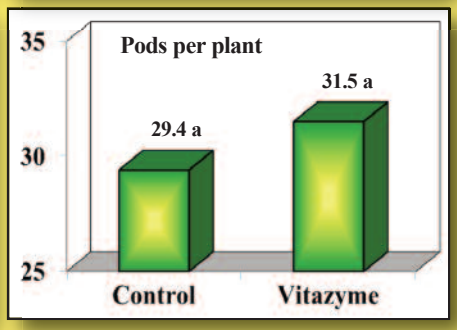
Nodes Per Plant



P > F = 0.806

Decrease with Vitazyme: -1%

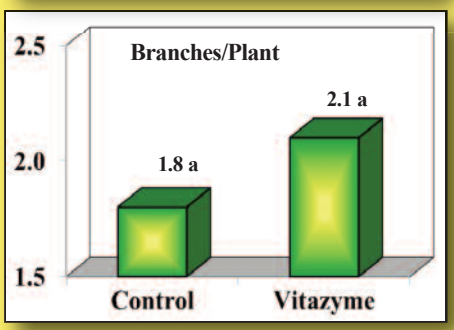
Main Stem Pods Per Plant



P > F = 0.179

Increase with Vitazyme: 7%

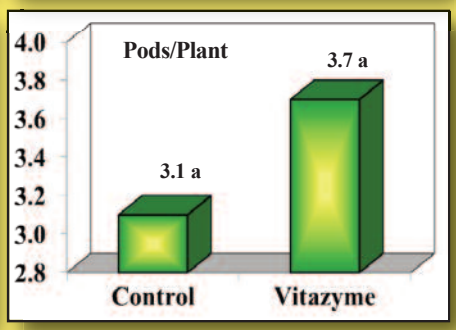
Branches Per Plant



P > F = 0.396

Increase with Vitazyme: 17%

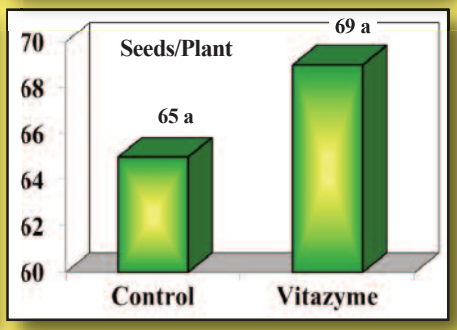
Branch Pods Per Plant



P > F = 0.433

Increase with Vitazyme: 19%

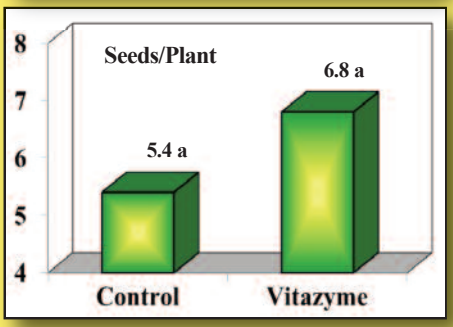
Main Stem Seeds Per Plant



P > F = 0.350

Increase with Vitazyme: 6%

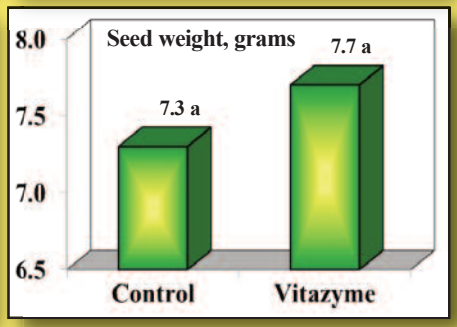
Branch Seeds Per Plant



P > F = 0.387

Increase with Vitazyme: 26%

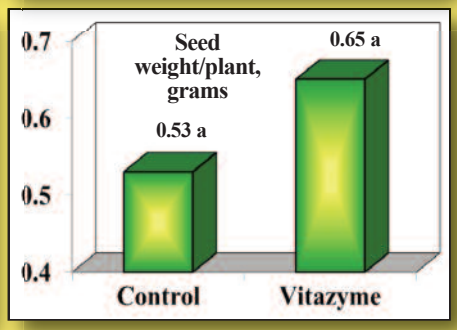
Main Stem Seed Weight Per Plant



P > F = 0.603

Increase with Vitazyme: 5%

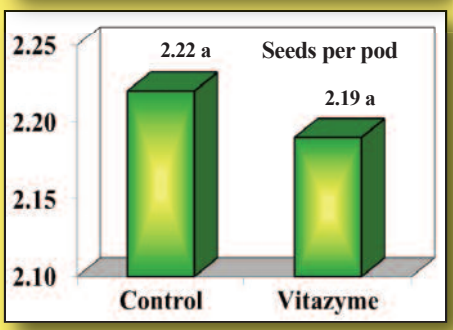
Branch Seed Weight Per Plant



P > F = 0.351

Increase with Vitazyme: 23%

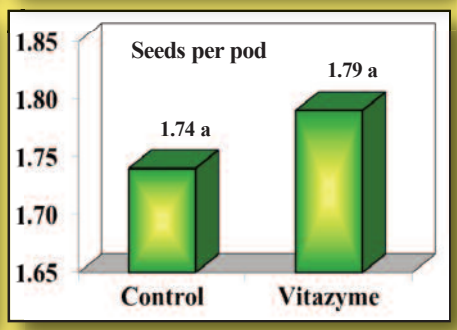
Main Stem Seeds Per Pod



P > F = 0.755

Decrease with Vitazyme: (-) 1%

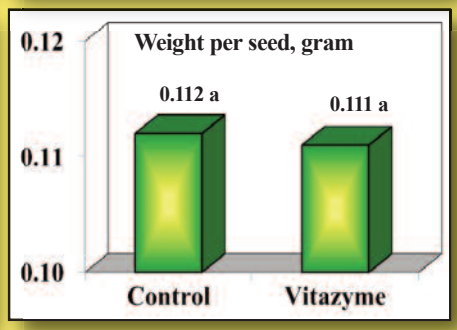
Branch Seeds Per Pod



P > F = 0.679

Increase with Vitazyme: 3%

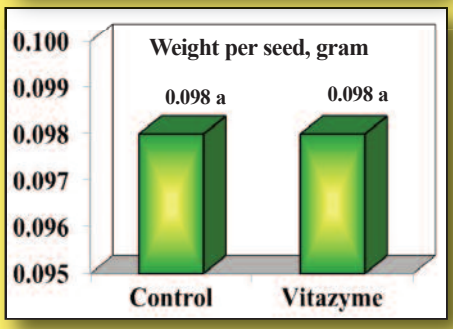
Main Stem Weight Per Seed



P > F = 0.830

Decrease with Vitazyme: 1%

Branch Weight Per Seed



P > F = 0.994

Soybean yield was increased only 1% by Vitazyme, although most plants characteristics were improved substantially, in particular pod number, branches, and seed weight per plant. However, pod abortion during the summer drought caused a loss of yield potential by season's end.

Crude protein and oil results: The crude protein and oil content of the beans were determined at the University of Missouri, and showed little difference between the two treatments, Vitazyme being only slightly higher for both.

Treatment	Crude protein, %	Oil, %
Control	23.7	37.4
Vitazyme	23.9	37.5

Conclusions: A replicated soybean trial at the University of Missouri in 2013 proved that Vitazyme can substantially improve plant and seed characteristics. In this study, however, a summer drought caused many pods to abort so that the potential yield increase was reduced to only 1%. Tissue element levels were changed little, and bean oil and protein levels were only slightly elevated by Vitazyme. Plant and seed characteristics were affected as follows.

Change with Vitazyme

Nodes per plant ..... -1%	Main stem seed weight ..... +5%
Main stem pods per plant .... +7%	Branch seed weight per plant ... +23%
Branches per plant ..... +17%	Main stem seeds per plant ..... -1%
Branch pods per plant ..... +19%	Branch seeds per plant ..... +3%
Main stem seeds per plant ... +6%	Main stem weight per seed ..... +1%
Branch seeds per plant ..... +26%	Branch weight per seed 0%

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2014 Crop Results

Vitazyme on Soybeans

Agricultural Custom Research and Education Services (ACRES)

Researcher: Bertel Schou, Ph.D.
Research organization: Agricultural Research and Educational Services
Location: Cedar Falls, Iowa
Variety: NuTech 7240 (Roundup Ready)
Planting rate: 53 lb/acre
Planting date: May 19, 2014
Planting depth: 1.5 inches
Soil type: Aredale loam (36% sand, 42% salt, 22% clay, 4.6% organic matter, pH = 6.2, cation exchange capacity = 17.6 meq/100 g)
Soil test results: (Perry Agricultural Laboratory, Bowling Green, Missouri): total exchange capacity = 25.00, pH = 5.8, organic matter = 3.2%, nitrogen = 82 lb/acre, sulfur (as sulfate) = 30 lb/acre, phosphorus = 117 lb/acre, calcium (Ca) = 5,793 lb/acre, magnesium (Mg) = 805 lb/acre, potassium (K) = 232 lb/acre, sodium (Na) = 75 lb/acre, boron (B) = 2.36 lb/acre, iron (Fe) = 686.6 lb/acre, manganese (Mn) = 109.6 lb/acre, copper (Cu) = 3.0 lb/acre, zinc (Zn) = 11.6 lb/acre; base saturations: Ca = 57.9, Mg = 13.4, K = 1.2, Na = 0.9, other bases = 5.8, H = 21.0.
Row width: 30 inches
Planting conditions: good
Tillage: conventional
Previous crop: corn
Experimental design: A randomized complete block design of a small plot study was used to evaluate the effect of Vitazyme and seaweed, alone and together, on the yield of soybeans. The treatments were replicated four times, and plants were four rows wide x 30 feet long (0.00689 acre/plot).

Treatment	In-furrow at planting	Foliar
1. Control	0	0
2. Vitazyme	13 oz/acre	13 oz/acre
3. Seaweed	2 quarts/acre	2 quarts/acre
4. Vitazyme + Seaweed	13 oz/acre + 2 quarts/acre	13 oz/acre + 2 quarts/acre

Fertilization: according to soil test
Vitazyme application: (1) 13 oz/acre in-furrow at planting (May 19, 2014) using 38 ml/gallon at 10 gallons/acre; (2) 13 oz/acre on the leaves and soil at V6-R1 (July 2, 2014), using 26 ml/gallon at 10 gallons/acre
Seaweed application: obtained from Ocean Organics; (1) 2 quarts/acre in-furrow at planting (May 19, 2014) using 189 ml/gallon at 10 gallons/acre; (2) 2 quarts/acre on the leaves and soil at V6-R1 (July 2, 2014) using 126 ml/gallon at 15 gallons/acre
Weather for 2014: Growing conditions for the trial were very good with below-normal temperatures and adequate precipitation, except for a few days in June and August that received irrigation water.

Harvest date: October 6, 2014

Bean moisture results:

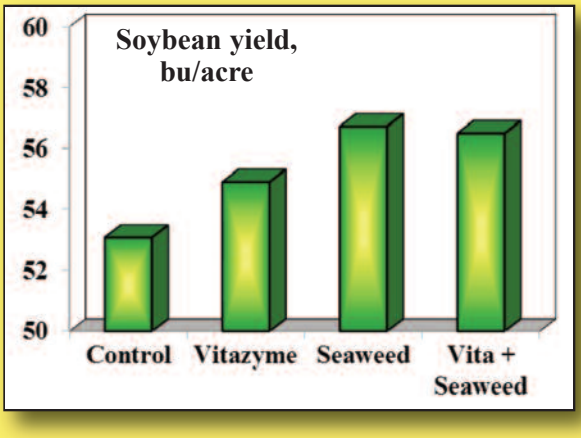
Treatment	Bean moisture	Moisture change
	%	%
1. Control	13.45	—
2. Vitazyme	13.47	(+) 0.02
3. Seaweed	13.44	(-) 0.01
4. Vitazyme + Seaweed	13.44	(-) 0.01

The moisture content of the beans was nearly identical for all four treatments.

Bean yield results:

Treatment	Bean yield[1]	Yield change
	bu/acre	bu/acre
1. Control	53.08 b	—
2. Vitazyme	59.90 a	6.82 (+13%)
3. Seaweed	56.73 ab	3.65 (+7%)
4. Vitazyme + Seaweed	56.50 ab	3.42 (+6%)
LSD (P = 0.05)	3.04	
CV	3.36%	
Treatment F	8.627	
Treatment probability	0.005	

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



Increase in soybean yield with Vitazyme: 13%

Vitazyme significantly increased the soybean yield at P = 0.005, a great increase above the control, and greater than the seaweed by 6%. The combined products showed no synergism in this study.

Conclusions: A replicated soybean study in east-central Iowa revealed that two applications of Vitazyme significantly increased the soybean yield above the control (+13%). Seaweed at two applications increased bean yield by 7%, which was statistically equal to the Vitazyme treatment as well as to the control. The two products combined did not reveal a synergine, though possibly a synergine could be realized if the two were applied seperately, perhaps a week apart as revealed on studies on grapes.

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2013 Crop Results

Vitazyme on 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
Tillage: soybeans planted directly into standing corn stalks
Soil type: Okoboji

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.

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

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.

Increase in bean yield with Vitazyme: 3.2%

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.

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2013 Crop Results

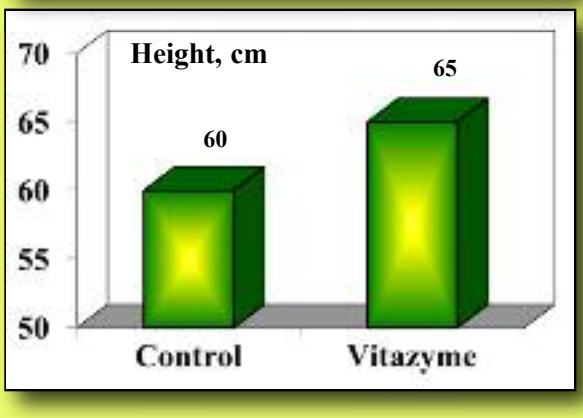
Vitazyme on Soybeans

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 at 70 Days



Increase in plant height with Vitazyme: 8%

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/m^2 for both treatments.

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%

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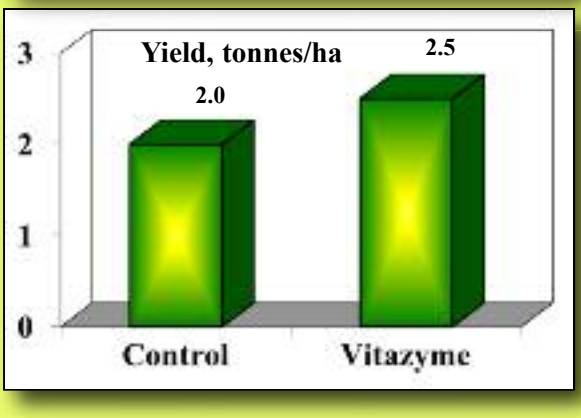
Only the unfilled and 1 seed/pod parameters were not increased with Vitazyme application, the pod number, 2-seeded pods, 3-seeded pods, and weight of 1,000 seeds all improved with the product.

Bean Yield



Increase in yield with Vitazyme: 25%

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

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.

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2013 Crop Results

Vitazyme on 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
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.

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

Increase in soybean yield with Vitazyme: 3.5%

Decrease in bean moisture with Vitazyme: 0.6 percentage point

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.

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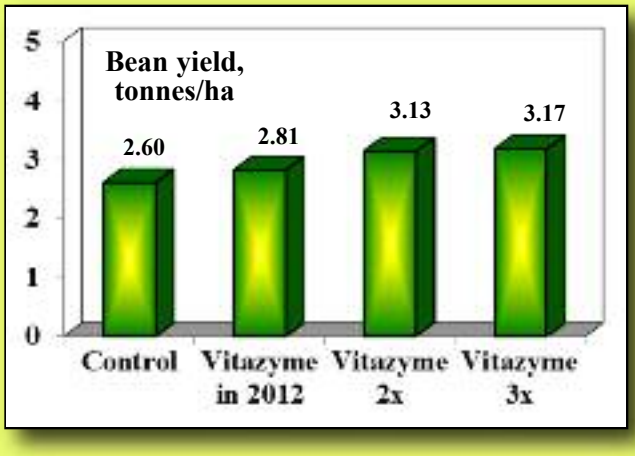
2013 Crop Results

Vitazyme on 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 *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*: soybeans *Planting date*: May 2, 2013
Soil preparation: disking, plowing, harrowing *Seeding rate*: 800,000 seeds/ha
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

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:



Increase in soybean yield

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

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:

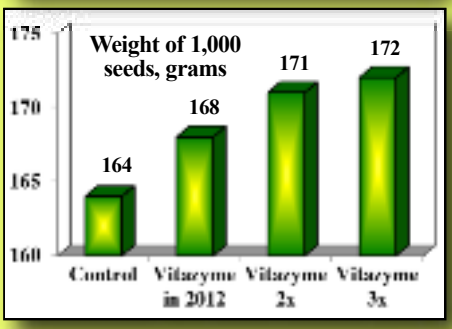
Increase in net income with Vitazyme

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

Two or three Vitazyme applications boosted the net income significantly over the control treatment. The carry-over was substantial, giving 840 UAH/ha more income.

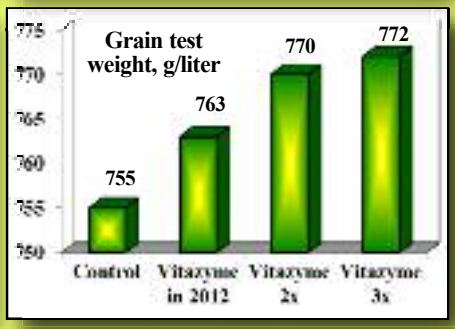
Grain quality results:

1,000 Seed Weight



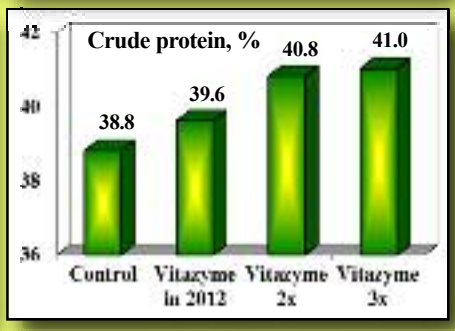
Increase in 1,000 seed weight with Vitazyme: 2 to 5%

Grain Density



Increase in grain density with Vitazyme: 1 to 2%

Crude Protein

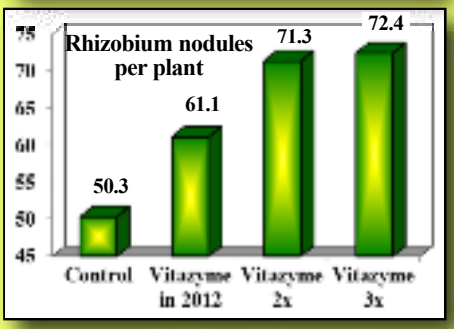


Increase in grain crude protein with Vitazyme: 0.8 to 1.2%-points

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

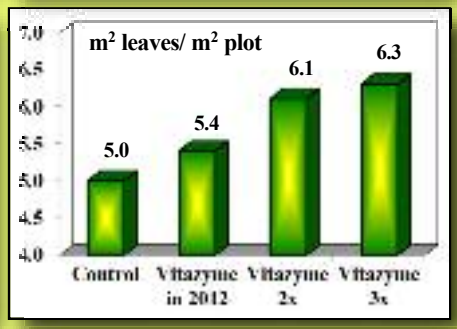
Plant characteristic results:

Rhizobium Nodules



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

Leaf Area



Increase in leaf area with Vitazyme: 8 to 26%

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.

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%.

4. Vitazyme application on seeds and plants, and carryover effects from 2012, provided an increase of nitrogen-fixing nodules of 9.7-18.6 nodules, and an increase of soybean leaf area of 0.4-1.3 m^2 per one square meter of the plot (m^2/m^2).

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2013 Crop Results

Vitazyme and Fish on Soybeans

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
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
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%.
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.

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)

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
Harvest date: October 2, 2013

Yield results:

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.

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.

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2012 Crop Results

Vitazyme on Soybeans

Researcher: Linden Heikens
Location: Lake Park, Iowa
Variety: Pioneer 91Y92
Planting date: May 26, 2012
Soil type: silty clay loam
Planting rate: 166,000 seeds/acre
Planting depth: 1.75 inches
Row spacing: 30 inches

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

1. Control **2. Vitazyme**

Fertilization: 100 lb/acre of 0-0-60% N-P_2O_5-K_2O, and 100 lb/acre 18-46-0, applied in April of 2012

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

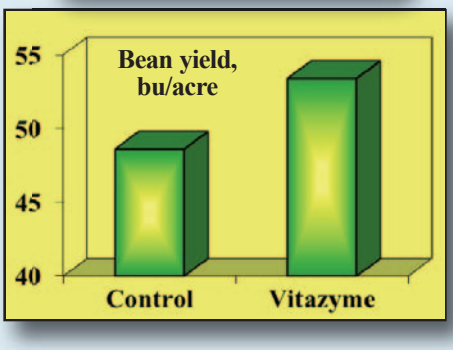
Herbicide application: pre-emergence (May 17, 2012), 2 lb/acre Encompass /AC and 32 oz/acre Roundup (glyphosate); early bloom (June 28, 2012), 0.3 oz/acre Cadet, 5 oz/acre Select, and 36 oz/acre Roundup along with Vitazyme

Harvest date: September 22, 2012

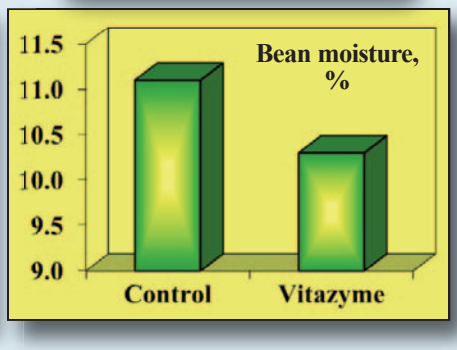
Yield results: A John Deere 9670 combine with a 630F platform and a weigh wagon were utilized.

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

Bean Yield



Bean Moisture



Increase in bean yield with Vitazyme: 10%

Decrease in bean moisture with Vitazyme: -0.8 %-point

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

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2012 Crop Results

Vitazyme on Soybeans

Free Amino Acid Levels -- University of Missouri

Researcher: Manjula Nathan, Ph. D. *Location*: University of Missouri, Columbia, Missouri
Variety: unknown *Planting date*: June 6, 2011 *Row spacing*: 15 inches
Seeding rate: 180,000 seeds/acre *Soil type*: unknown
Experimental design: A soybean area with plots of 15 feet by 200 feet (0.0689 acre), with four replications, was set up to compare Vitazyme treatment with an untreated control, and determine differences in yield, growth characteristics, and tissue levels of free amino acids. This report discusses the effect of Vitazyme on free amino acid levels, which are correlated with plant pathogen activity.

1. Control **2. Vitazyme**

Fertilization: none
Vitazyme application: The seeds were treated with 100% Vitazyme before planting to achieve a 13 oz/acre rate on 180,000 seeds; the untreated seeds received water only. A second Vitazyme application of 13 oz/acre was applied to the leaves and soil on July 13 (R1 stage).
Hail damage event: On July 3 a powerful hailstorm, dropping golf ball sized hailstones, severely damaged the beans, leaving only one trifoliate intact. The soybean plants quickly recovered and produced a reasonable crop.
Free amino acid analysis: Soybean leaves were harvested on July 28 (R3 stage) and August 18 (R5 stage), by collecting 24 of the youngest fully expanded trifoliates from each plot. These samples were washed and frozen for later analyses at a University of Missouri laboratory. The results of the second analysis (August 18 collection) are shown on the next page, except for those amino acids that were not present. The results of the first analysis (July 28 collection) did not show much difference between the two treatments, so are not shown.

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

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

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

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2012 Crop Results

Vitazyme on Soybeans

Yield and Plant Characteristics - University of Missouri

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

1. Control **2. Vitazyme**

Fertilization: none
Vitazyme application: The seeds were treated with 100% Vitazyme before planting to achieve a 13 oz/acre rate on 180,000 seeds; the untreated seeds received water only. A second Vitazyme application of 13 oz/acre was applied to the leaves and soil on July 13 (R1 stage).
Hail damage event: On July 3 a powerful hailstorm, dropping golf ball sized hailstones, severely damaged the beans, leaving only one trifoliate intact. The soybean plants quickly recovered, however, and produced a reasonable crop.
Plant analysis results: Twenty-four of the youngest fully expanded trifoliate leaves from each plot were harvested on July 28 (R3) and August 18 (R5) for analysis at the University of Missouri Soil and Crop Testing Laboratory. The July 28 data is not shown here because of lack of uniformity of the data. Below is the data for the August 18 sample. d.m. = dry matter.

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

Increase in leaf tissue levels with Vitazyme:

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

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

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

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

The elements varied little between the two treatments.

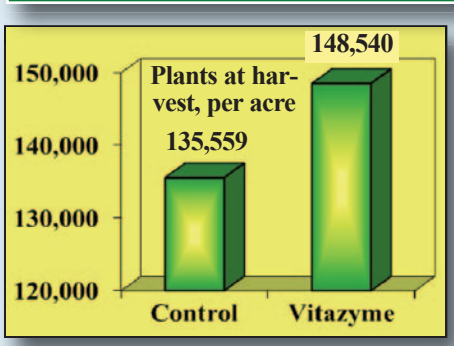
Treatment	Crude protein	Oil
	%	%
Control	33.5	19.5
Vitazyme	32.1	19.6

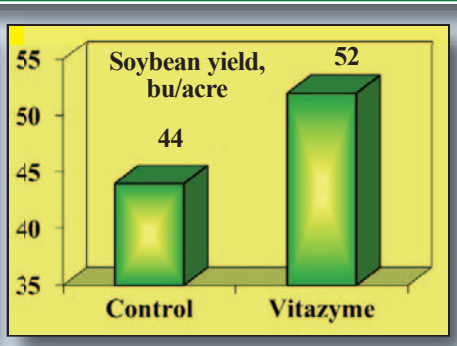
While crude protein dropped with Vitazyme, the oil content rose slightly, but neither change was great.

Yield and stand results:

Treatment	Stand count	Stand change	Bean yield[1]	Yield change
	plants/acre	plants/acre	bu/acre	bu/acre
Control	135.559	—	44 b	—
Vitazyme	148,540	12,981 (+10%)	52 a	8 (+18%)

[1]Letters a snd b are significantly different at P = 0.10.



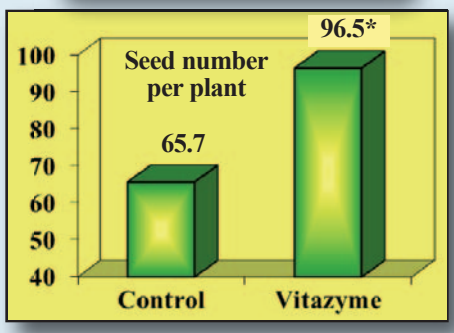


Increase in final stand with Vitazyme: 10%

Increase in yield with Vitazyme: 18%

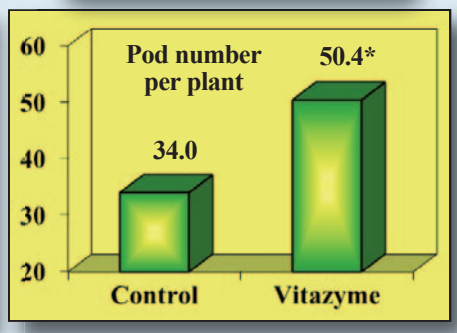
Vitazyme enhanced both the population and yield of the soybeans, even with a severe hailstorm in July.

Seeds Per Plant



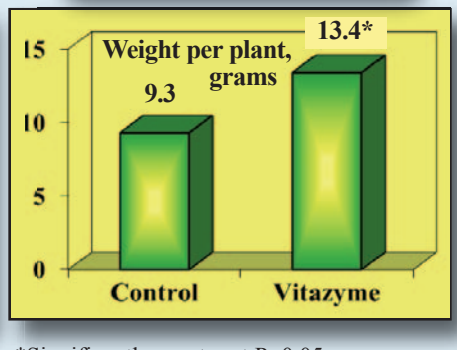
*Significantly greater at P=0.05.

Pods Per Plant



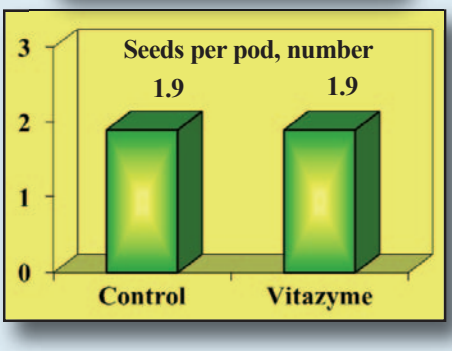
*Significantly greater at P=0.05.

Weight Per Plant

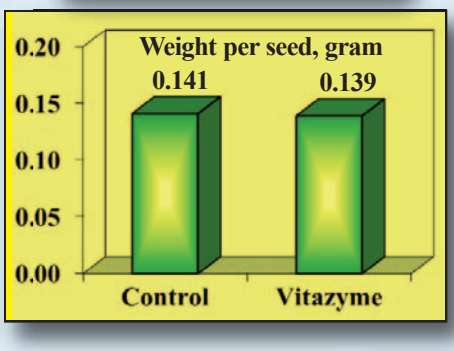


*Significantly greater at P=0.05.

Seeds Per Pod



Weight Per Seed



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

Increase with Vitazyme

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

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

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2012 Crop Results

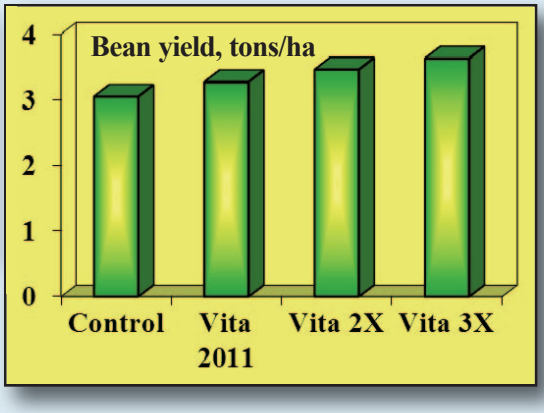
Vitazyme on Soybeans

Researcher: V. Plotnikov *Research organization*: National Academy of Agricultural Sciences
Location: Vinnytsia, Ukraine *Variety*: Hutoryanochka *Tillage*: conventional (disking, plowing, harrowing, and cultivation) *Soil type*: gray podzolic (2.2% organic matter, 8.4 mg/100 g of soil hydrolyzed N, 15.8 mg/100 g of soil P, 12.4 mg/100 g of soil exchangeable K, pH = 5.5)
Planting date: May 12, 2012 *Previous crop*: soybeans *Planting rate*: 750,000 seeds/ha
Experimental design: A small plot soybean trial, using 0.1 ha plots and four replications, was established to evaluate the effects of Vitazyme, applied two or three times, on soybean yield, income, nodulation, and quality. Some plots were placed on soils treated the previous year with Vitazyme to evaluate any carryover effects.

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

Fertilization: none
Vitazyme application: For Treatment 2, applications were made in 2011 on soybeans that had been treated twice. For Treatment 3, 1 liter/ton of seeds was applied before planting (May 12), and 0.5 liter/ha was sprayed on the leaves and soil at the second trifoliate (June 12). For Treatment 4, the same applications were made as for Treatment 3, plus an additional 0.5 liter/ha at branching (June 22).
Yield results:

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



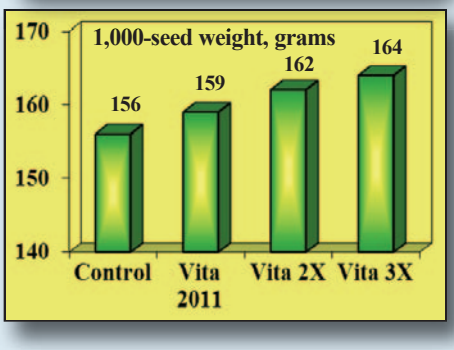
Yields of soybeans responded very well to Vitazyme application, with a carryover effect of 7%, and two applications giving a 13% increase. Three applications provided an excellent 19% yield improvement, granting 2,221 hrn more income per hectare.

Increase in soybean yield with Vitazyme

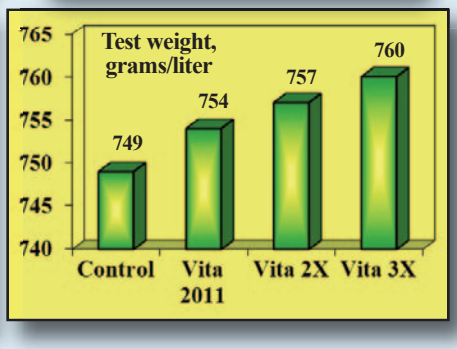
Carryover effect 7%
Vitazyme two times 13%
Vitazyme three times 19%

Bean quality results:

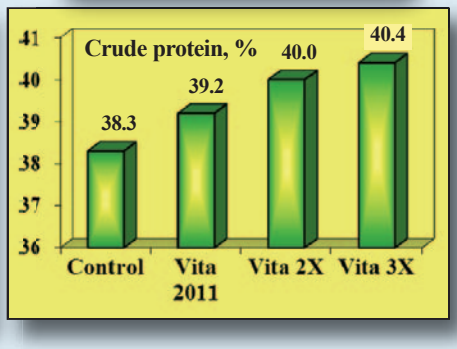
Weight of 1,000 Seeds



Bean Test Weight



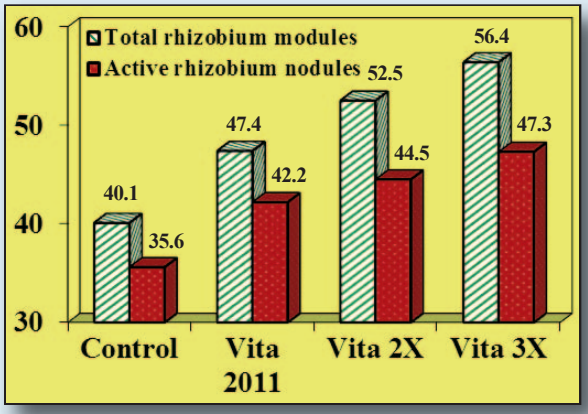
Crude Protein



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

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

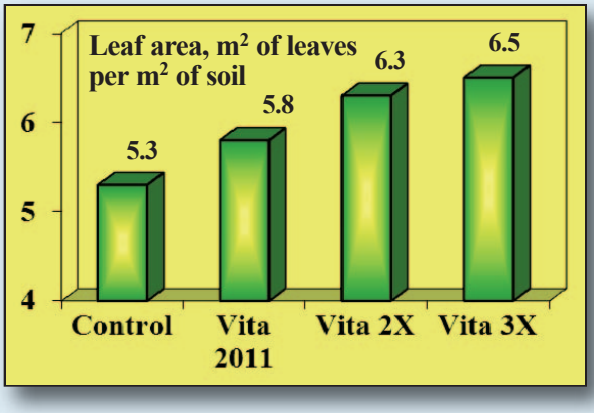
Rhizobium nodulation results: Counts were made of the nodules in the late flowering stage.



Increase in Rhizobium nodules with Vitazyme		
	Total	Active
Vitazyme carryover	+18%	+19%
Vitazyme twice	+31%	+25%
Vitazyme three times	+41%	+33%

Vitazyme n all cases caused great increases in *Rhizobium* nodulation of both total and active types. Three applications produced the greatest increases (33% more active nodules).

Leaf area results: At the late flowering stage, leaf area determinations were made.



Increase in leaf area with Vitazyme	
Vitazyme in 2011	+9%
Vitazyme twice	+19%
Vitazyme three times	+ 23%

Leaf area increased up to 23% as more Vitazyme was applied. There was a noticeable carryover effect of 9% from a 2011 application.

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

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2012 Crop Results

Vitazyme on Soybeans

Researcher: Bert Schou, Ph.D.
Research organization: Agricultural Custom Research and Education Services (ACRES)
Location: Cedar Falls, Iowa *Variety*: Pioneer 92M72 (non-GMO) *Previous crop*: corn
Soil type: Kenyon Loam (39% sand, 40% silt, 21% clay), 4.7% organic matter, pH = 5.9, C.E.C. = 16.8 meq/100g, fertility level = excellent, soil drainage = excellent *Planting depth*: 1.5 inches
Row spacing: 30 inches *Planting rate*: unknown *Seedbed at planting*: fine
Planting date: May 18, 2012 *Plot size*: 15 x 40 feet (600 ft.^{2}) *Tillage*: conventional
Irrigation: 3 inches total in late July and early August
Experimental design: A small plot, replicated trial, with four replicates, was set up to evaluate the ability of two Vitazyme variations, plus an amino acid formulation, alone and in combination, to affect soybean yield and quality.

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

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

Fertilization: none
Vitazyme application: For Treatments 2, 3, and 5, 13 oz/acre on the seeds at planting (May 18), and again at 13 oz/acre on the leaves and soil at V8R1 (early bloom; July 4), were applied. Treatments 2 and 5 received Vitazyme 1, and Treatment 3 received a slight modification called Vitazyme 2.
Amino acid application: A proprietary amino acid blend was applied to Treatments 4 and 5, to the seeds at 2 oz/acre on May 18, and to the leaves and soil at the V8R1 stage at 2 oz/acre on July 4. For Treatment 5, the amino acids were mixed with the Vitazyme.
Sprayer settings: seed treatment, 10 gallons/acre of 115 ml of Vitazyme in 3 gallons of water, or 18 ml of amino acids in 3 gallons of water; foliar and soil treatment, 15 gallons/acre of 77 ml of Vitazyme in 3 gallons of water, or 12 ml of amino acids in 3 gallons of water
Weed control: Stellar herbicide at 4 oz/acre, Basagran at 1 pint/acre, Select Max at 8 oz/acre, and the surfactant Class Act 17% at 1 pint/acre, applied June 20
Weather during the growing season: The season was hot and dry, with the July average high temperature being 92.3^o F, and the August high being 85.5^o F. Rainfall for April through October 12 was 12 inches, whereas the normal is 26 inches.
Harvest date: September 25, 2012. A Massey-Ferguson 9 plot combine harvested the middle two rows of

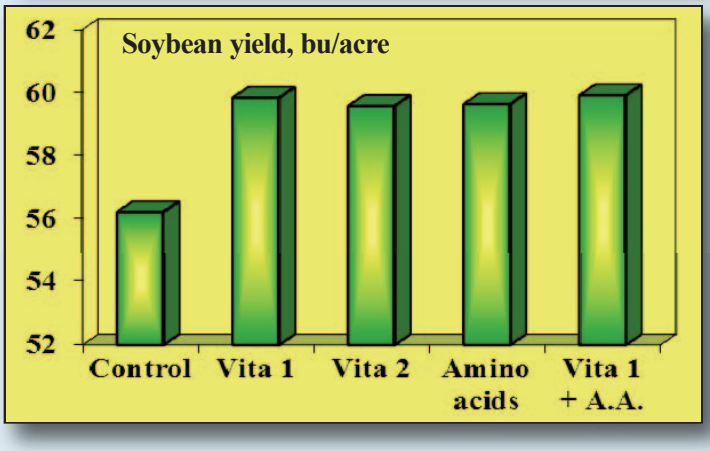
each plot, and the soybeans were weighed on an electronic scale.
Plant population results: no significant differences
Test weight results: no significant differences
Soybean protein results: Composite bean samples from the four replicates of each treatment were sent to Midwest Laboratories, Inc., Omaha, Nebraska, to evaluate protein levels. All five treatments varied within a narrow range, of 38.7 to 40.2%, the control being 39.4%.
Yield results: The two inner rows of each plot were harvested.

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

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

Yield increase with Vitazyme and amino acids

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



All four treatments increased soybean yield to about the same level: 6 to 7%. All displayed significant increases over the control, except Vitazyme 2, which was nearly significant.

Conclusions: A soybean replicated trial in east-central Iowa, during a hot and dry season, revealed that two varients of Vitazyme and an amino acid formulation, alone or together, all raised bean yield by 6 to 7%; all increases were significant, except for the Vitazyme 2 treatment, which was nearly so. Test weight and protein were not influenced significantly by the treatments. These results show the great efficacy of utilizing these materials for Corn Belt soybean production, since at $16.00/bu (the fall 2012 soybean price) a 3.62 bu/acre increase for Vitazyme 1 equals $57.92/acre greater income.

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2012 Crop Results

Vitazyme on Soybeans

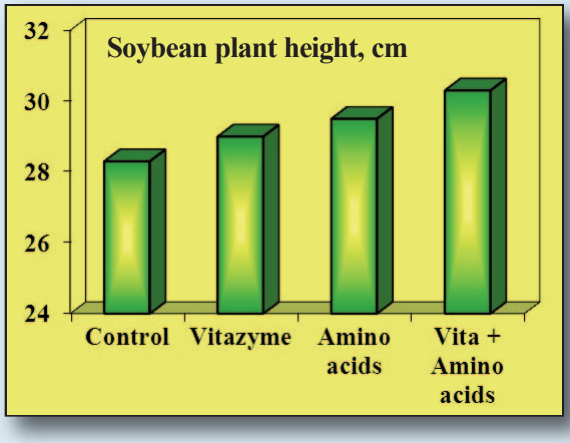
A Greenhouse Trial - Synergism with Amino Acids

Researcher: Paul W. Syltie, Ph.D.
Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: "Common" *Planting date*: January 19, 2012 *Pot size*: 1 gallon
Soil type: silt loam *Planting rate*: 12 seeds/pot, thinned to two plants per pot
Experimental design: A greenhouse pot trial, using four replicates, was arranged to determine the effect of Vitazyme and amino acids, alone and in combination, on plant height and dry weight accumulation.

1. Control **2. Vitazyme** **3. Amino acids** **4. Vitazyme + amino acids**

Fertilization: none
Vitazyme application: Pots of Treatments 2 and 4 received 100 ml/pot of a 0.1% Vitazyme solution just after seeding.
Amino acid application: A special liquid proprietary amino acid blend was applied at 100 ml/pot of a 0.04% solution to Treatments 3 and 4. For Treatment 4, the product was mixed with Vitazyme in 100 ml of water.
Harvest date: March 1, 2012, 41 days after planting
Height results: The two plants from each pot were measured to the nearest cm, and averaged. A statistical analysis was performed on these averages.

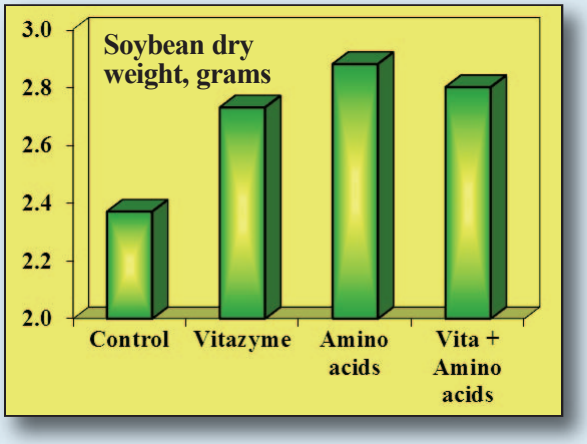
Treatment	Plant height	Height change
	cm	cm
1. Control	28.3 b	—
2. Vitazyme	29.0 ab	0.7 (+2%)
3. Amino acids	29.5 ab	1.2 (+4%)
4. Vita + A.A.	30.3 a	2.0 (+7%)
Block F	0.1105	
Main effects F	0.1338	
Model F	0.1006	
$CV_{0.10}$	3.83%	
$LSD_{0.10}$	1.5 cm	



Increase in plant height with Vitazyme + amino acids: 7%

All treatments increased the height of the soybean plants, the combined products doing this significantly (+7%).

Dry weight results: The plants from each pot were dried in a drying oven at 125° F for 24 hours, and weighed to the nearest 0.01 gram.



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

All of the treatments significantly improved soybean dry weight (P = 0.10) above the control, and were not significantly different from one another.

Increase in dry weight

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

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

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2011 Crop Results

Vitazyme on Soybeans

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

1. Control **2. Vitazyme**

Fertilization: farm practice
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at flower initiation
Yield results: No yield results are available, but the increase in yield is given.

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

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

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2011 Crop Results

Vitazyme on Soybeans

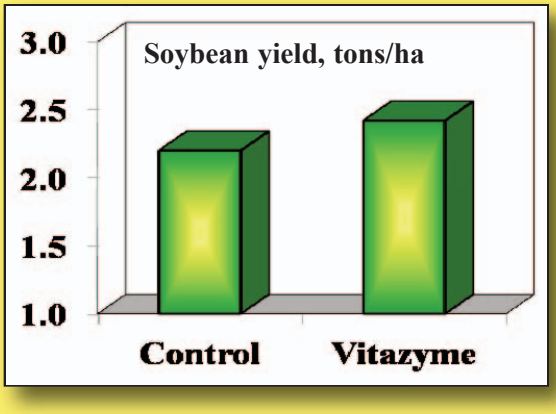
Farmer: unknown *Location*: Chau Thanh District, Dong Thap Province, Mekong Delta, Viet Nam
Variety: unknown *Soil type*: alluvial *Planting date*: February through May 2011
Experimental design: A soybean test involving 118 farmers on a total of 70 ha was initiated the spring of 2011 to evaluate the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

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: (1) 1 liter/ha on the leaves and soil 15 days after seeding; (2) 1 liter/ha on the leaves and soil 55 days after seeding
Yield results:

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

Increase in yield with Vitazyme: 10%



Growth results: Soybeans treated with Vitazyme showed **fewer insect and disease infestations** than the untreated beans.
Income results:

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

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

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

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

The improved net income with Vitazyme was due to ...
(1) increased yield
(2) reduced cost for plant protection

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

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Average Values for 2009 to 2011 in Ukraine

Vitazyme on Soybeans

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

Demonstration plot values averaged over three years, 2009 to 2011:

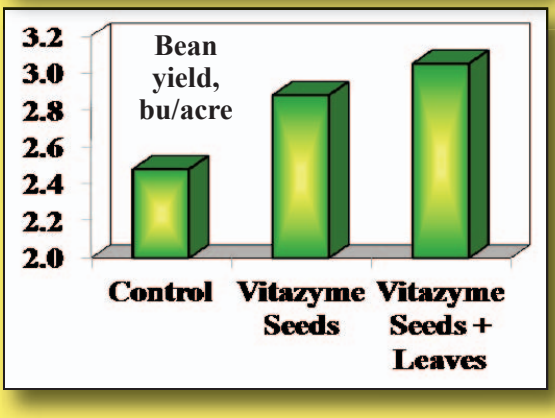
Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	2.48	—
2. Vitazyme on seeds[1]	2.88	0.40 (+16%)
3. Vitazyme on seeds + leaves[2]	3.05	0.57 (+23%)

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

Three-Year Average Increases With Vitazyme

1 liter/ton of seed ..... +16%
1 liter/ton of seed + 1 liter/ha ... +23%

Three-Year Average



Conclusion: Over three years of demonstrations, Vitazyme is shown to be an excellent adjunct to soybean production in Ukraine, especially the seed plus foliar applications.

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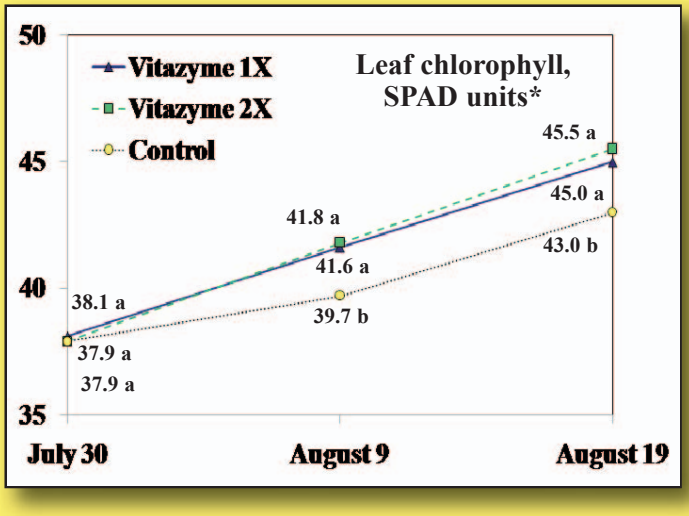
2011 Crop Results

Vitazyme on Soybeans

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

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

Fertilization: none
Vitazyme application: 13 oz/acre (1 liter/ha) directly over the seed at planting on May 28 for Treatments 2 and 3; 13 oz/acre (1 liter/ha) on the leaves and soil on July 20
Chlorophyll results: Chlorophyll readings were taken on July 30, August 9, and August 19 using an SPAD 502 meter on 30 leaflets per plot, using leaves from the top node having fully expanded leaves



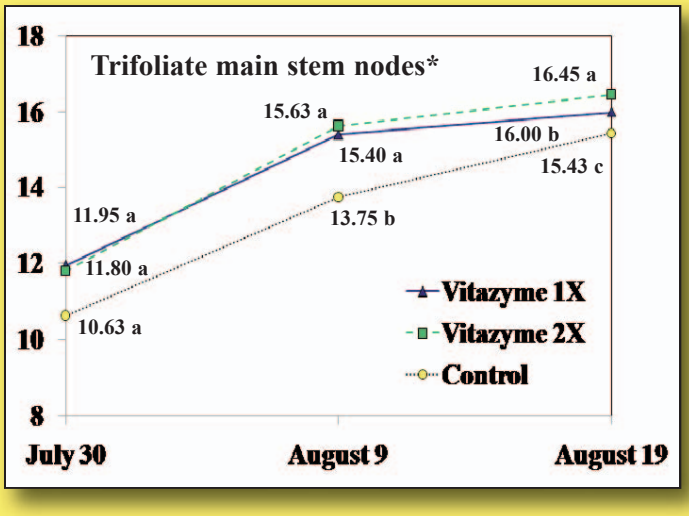
*Means followed by the same letter are not significantly different at P-0.05 according to the Tukey-Kramer HSD Test.

Increase in SPAD units with Vitazyme on August 19

Vitazyme once ..... 2.0 units
Vitazyme twice ..... 2.5 units

During the latter part of the growing season Vitazyme significantly increased leaf chlorophyll for both one and two applications.

Trifoliate main stem nodes results: On July 30, August 9, and August 19 the number of nodes on the main stem was counted for each plot, using ten randomly selected plants.



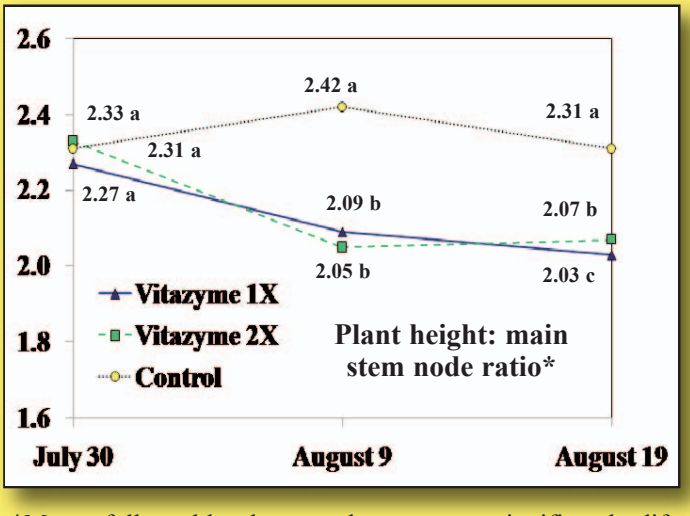
*Means followed by the same letter are not significantly different at P-0.05 according to the Tukey-Kramer HSD Test.

Increase in main stem nodes with Vitazyme

Vitazyme once ..... 4 to 12%
Vitazyme twice ..... 7 to 14%

In every case, both Vitazyme treatments significantly increased the number of nodes on the main stems, especially the two applications treatment.

Plant height:main stem node ratio results: The ration of plant height to the number of nodes on the stem was determined for July 30, August 9, and August 19 on ten randomly selected plants from each plot.



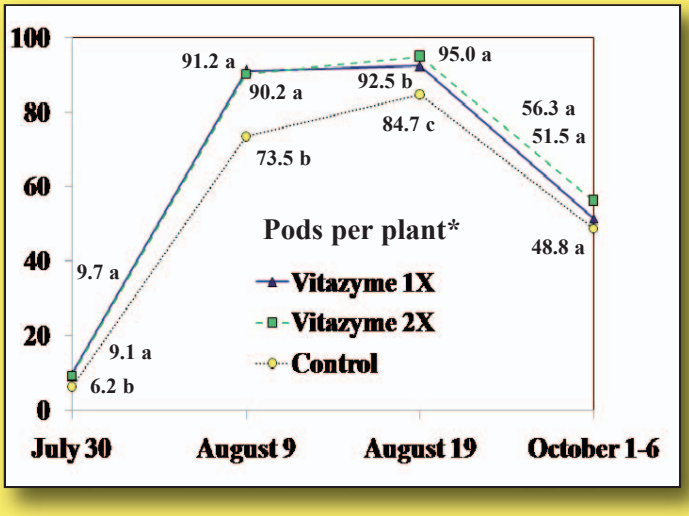
*Means followed by the same letter are not significantly different at P-0.05 according to the Tukey-Kramer HSD Test.

Change in plant height:main stem ratio with Vitazyme

Vitazyme once ... -0.28 to 0.33
Vitazyme twice ... -0.24 to 0.37

A low ratio of plant height to node number is desirable because a lower number means more nodes per unit height of stem. Both Vitazyme treatments significantly reduced the ratio.

Pods per plant results: The total pods per plant were counted on ten randomly selected plants for each plot on several dates.



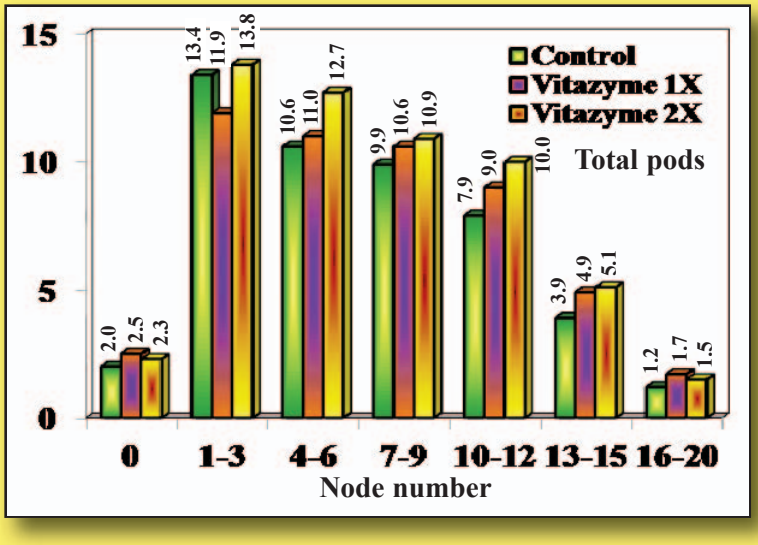
*Means followed by the same letter are not significantly different at P-0.05 according to the Tukey-Kramer HSD Test.

Increase in pods per plant with Vitazyme

Vitazyme once ..... 6 to 56%
Vitazyme twice ..... 15 to 47%

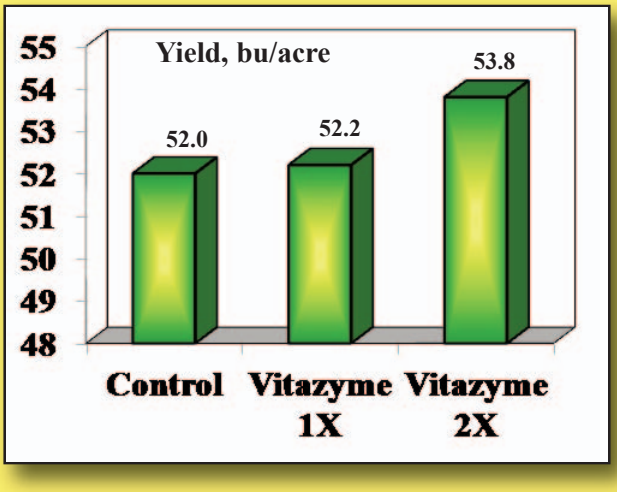
Vitazyme treatments increased pods per plant significant;y for the first three dates, but not for the last date. Many pods were aborted before harvest, giving a reduction for the October count.

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



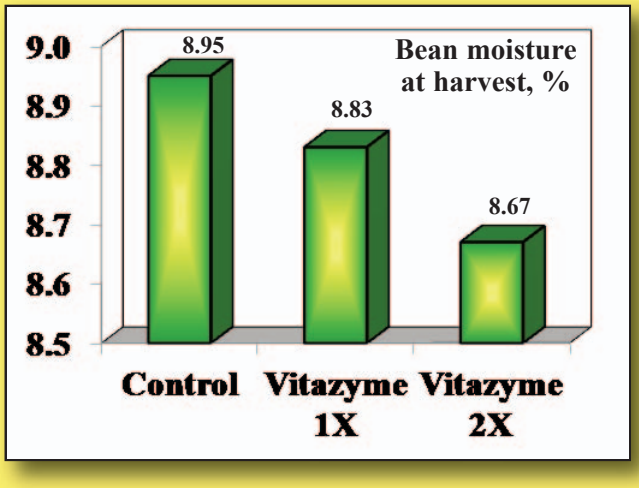
At most nodes, both Vitazyme treatments – especially the two application treatment – increased pods per node. None of the values were significantly different than the untreated control.

Yield results:



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

Moisture at harvest results:



Although the differences in bean moisture at harvest were not significant, both Vitazyme treatments – especially the two application treatment – dried down faster at harvest than did the control.

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

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2011 Crop Results

Vitazyme on Soybeans

Effects on Oil Content

Researcher: Michael Rethwisch
David City, Nebraska
Research organization: University of Nebraska — Lincoln Extension,
Location: Clay Center, Cortland, Bancroft, and Elba, Nebraska
Variety: Pioneer 93M11

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

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

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

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

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

Clay Center

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

Cortland

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

Bancroft

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

Elba

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

Average for All Locations

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

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

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2011 Crop Results

Vitazyme on Soybeans

An Evaluation of Two Formulations

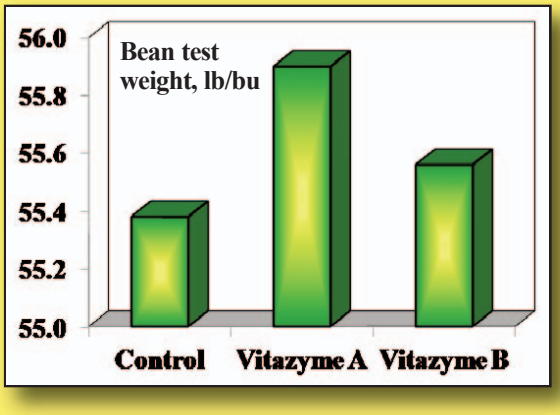
Researcher: Bert Schou, Ph.D. *Research organization*: Agricultural Custom Research and Education Services (ACRES) *Location*: Cedar Falls, Iowa *Variety*: NuTech 7249 (GMO)
Soil type: Floyd loam (42% sand, 39% silt, 19% clay, 4.4% organic matter, pH = 6.4, C.E.C. = 13.3 meq/100 g, fertility level = excellent, drainage = excellent) *Planting depth*: 2 inches
Row spacing: 30 inches *Planting rate*: 150,000 seeds/acre *Seedbed at planting*: fine
Planting date: May 19, 2011 *Tillage*: conventional *Plot size*: 15 x 40 feet (600 ft.^{2})
Experimental design: A small plot study, having six replicates, involved two Vitazyme formulations in a randomized complete block design. The purpose of the study was to evaluate the effectiveness of the two Vitazyme formulations on crop yield and quality.

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

Fertilization: none
Weed control: herbicides
Vitazyme application: (1) 13 oz/acre (1 liter/ha) in the seed row at planting on May 19, 2011; (2) 13 oz/acre (1 liter/ha) on the leaves and soil at R1 (14 inches height) on July 7, 2011
Weather during the growing season: The season was favorable for soybean growth in terms of temperature and rainfall, despite a dry early July.
Harvest date: October 8, 2011. A Massey Ferguson 8 plot combine harvested the middle two rows of plots, and the beans were weighed using an electronic scale.
Test weight results: There were some differences in test weight for the treatments.

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

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



Vitazyme A significantly increased bean test weight above the control, while Vitazyme B gave a nonsignificant test weight increase.

Yield results:

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

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

Neither of the products significantly increased yield, although Vitazyme B gave a 1.4 bu/acre yield increase.

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

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2011 Crop Results

Vitazyme on Soybeans

A Long-Term Crop and Soil Study: Year 4

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

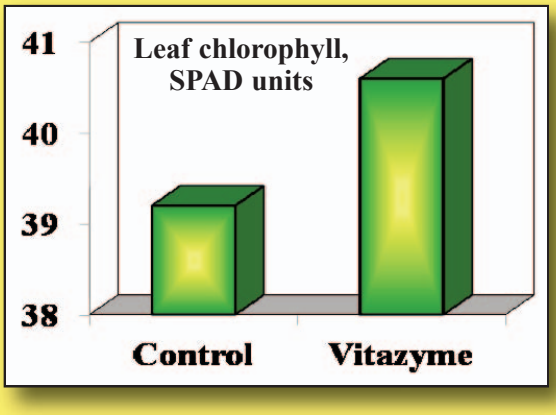
1. Control **2. Vitazyme**

Fertilization: none
Weed control: glyphosate
Vitazyme application: (1) 13 oz/acre (1 liter/ha) on the seeds in-furrow at planting (May 19); (2) 13 oz/acre (1 liter/ha) on the leaves and soil at R1 (July 7)
Weather during the growing season: The season was favorable to soybean growth in terms of temperature and rainfall, except for a dry early July.
Harvest date: October 8, 2011. A Massey-Ferguson 8 plot combine was used to harvest the three center rows of each plot; the beans were weighed electronically, and grain moisture was also measured at this time.
Leaf chlorophyll: On July 26, 2011, 25 random leaves of the first mature trifoliated were measured, and averaged for each plot using a Minolta SPAD meter.

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

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

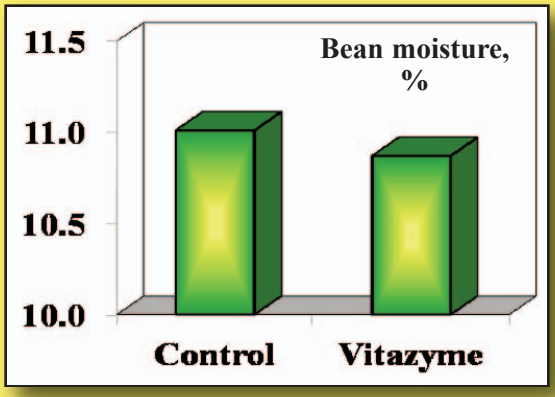
Increase in leaf chlorophyll with Vitazyme: 1.4 SPAD units



Bean moisture: There was a nonsignificant lower moisture content of the Vitazyme treated soybeans compared to those that were untreated.

Treatment	Bean moisture[1]	Change
	%	%
1. Control	11.01 a	—
2. Vitazyme	10.87 a	(-) 0.14
LSD (P=0.05)	0.81%	
Standard deviation	0.46%	
CV	4.22%	
Replicate F	0.845	
Treatment F	0.224	

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



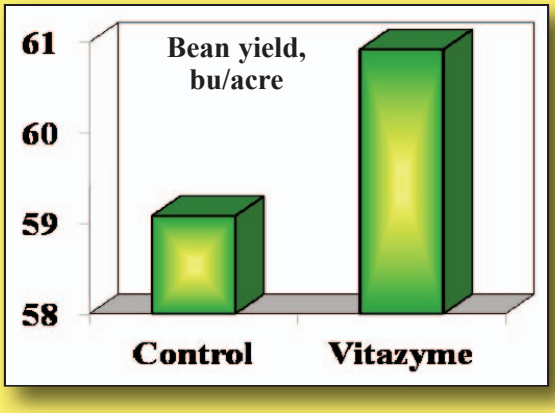
Reduction in bean moisture with Vitazyme: 0.14 percentage point

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

Yield results:

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

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



Increase in yield with Vitazyme: 2%

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

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

Treatment	Crude protein	Sulfur	Phosphorus	Potassium	Magnesium	Calcium	Iron	Manganese
	%	%	%	%	%	%	ppm	ppm
1. Control	42.08	0.30	0.602	1.96	0.266	0.332	85.6	34.4 b
2. Vitazyme	42.34	0.31	0.602	2.01	0.268	0.338	92.2	36.6 a
Treatment F		0.374			0.374		0.135	0.011*
$LSD_{0.1}$		0.01			0.004		7.5	1.0

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

Treatment	Copper	Zinc
	ppm	ppm
1. Control	11.6	33.8 b
2. Vitazyme	12.6	35.0 a
Treatment F		0.109*
$LSD_{0.1}$		1.2

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

Nutrient increases with Vitazyme

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

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

Soil microorganism results: A composite soil sample from each rep of both treatments was collected and sent to the Soil Food Web laboratory in Corvalis, Oregon, for microorganism analyses.

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

Improvements in microbial populations with Vitazyme

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

[1]Most of these nematodes are beneficial types.

Vitazyme increased the number of fungi, bacteria, actinomycetes, and protozoa in the soil versus the untreated control. The ratio of total fungi to total bacteria was 0.17 for the control, and 0.12 for the Vitazyme treatment, showing a preference to soil fungi with Vitazyme, a beneficial trait. Available nitrogen production by soil microorganisms was increased by 42% by Vitazyme treatment as well.

Soil results: Soil samples from each plot of both treatments were sent to Perry Agricultural Laboratory in Bowling Green, Missouri, for a broad analysis of minerals and other parameters. Statistical analyses were conducted on these data.

Treatment	Cation Exchange Capacity	pH	Organic Matter	Nitrogen	Sulfur	Phosphorus	Calcium	Magnesium
	meq/100 grams		%	lb/acre	ppm	lb/acre	lb	lb/acre
1. Control	27.34	5.64 b	2.68	73.6	7.8	128.4	5,398	1,077 b
2. Vitazyme	26.27	5.78 a	2.68	73.6	6.4	147.4	5,447	1,138 a
Treatment F	0.1215	0.0046**	1.000	1.000	0.431	0.452	0.575	0.015*
$LSD_{0.1}$	1.16	0.05	0.26	5.2	3.4	48.7	172.6	172.6

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

Treatment	Potassium	Sodium	Boron	Iron	Manganese	Copper	Zinc
	lb/acre	lb/acre	ppm	ppm	ppm	ppm	ppm
1. Control	272	80	0.65	241.2	57.4	0.94	4.60
2. Vitazyme	312	62	0.67	222.8	58.0	0.94	4.54
Treatment F	0.215	0.228	0.918	0.103	0.816	1.000	0.529
$LSD_{0.1}$	58	27	0.23	18.6	5.2	0.15	0.19

Changes in soil parameters with Vitazyme

pH ..... +0.14*
Organic matter ..... no change
Nitrogen ..... no change
Sulfur ..... -1.4 ppm
Phosphorus ..... +19.0 lb/acre
Calcium ..... +49 lb/acre
Magnesium ..... +61 lb/acre
Cation exchange capacity .... -1.07 meq/100g
Potassium ..... +40 lb/acre
Sodium ..... -18 lb/acre
Boron ..... +0.02 ppm
Iron ..... -18.4 ppm
Manganese ..... +0.6 ppm
Copper ..... no change
Zinc ..... -0.06 ppm

Note that most soil parameters were improved with Vitazyme, and significantly for pH and magnesium. Even sodium, which is undesirable at higher levels, was reduced in this study while calcium, magnesium, and potassium were increased.

Balance of Soil Cations

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

Treatment	Calcium Saturation	Magnesium Saturation	Potassium Saturation	Sodium Saturation	Hydrogen Saturation
	% B.S.	% B.S.	% B.S.	% B.S.	% B.S.
1. Control	49.64 b	16.51 b	1.29 b	0.64	25.8 a
2. Vitazyme	52.25 a	18.22 a	1.57 a	0.52	21.6 b
Treatment F	0.013*	0.002**	0.090*	0.294	0.005**
$LSD_{0.1}$	1.31	0.51	0.27	0.21	1.57

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

Control base saturations	Vitazyme base saturations
Ca 49.6	Ca 52.3
Mg 16.5	Mg 18.2
K 1.3	K 1.6
Na 0.6	Na 0.5
H 25.8	H 21.6

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

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

Leaf chlorophyll. Vitazyme significantly improved leaf chlorophyll in a midsummer evaluation, by 1.4 SPAD units.

Bean moisture at harvest. The treated soybeans were slightly dryer at harvest then were the untreated beans.

Bean yield. Vitazyme increased the yield above the control by 1.84 bu/acre (2%), which was not significant but was highly profitable.

Bean composition. Nearly all minerals and protein were increased in the beans with Vitazyme treatment – especially manganese and zinc, which responded significantly at P=0.10 – and only phosphorus did not respond at all.

Soil microorganisms. Both active and total bacteria and fungi increased above the control with Vitazyme (22 to 80%), but especially the fungi, leading to a lower fungi;bacteria ratio, a favorable result. Protozoa, beneficial nematodes, and actinomycetes also increased with Vitazyme, and projected nitrogen release rose by 37 lb/acre.

Soil parameters. After four years of treatment, the Vitazyme treated soils showed consistent improvements in availability of most elements – except sulfur, iron, copper, and zinc, and sodium, which declined – although soil organic matter and available nitrogen showed no change from the control; magnesium increased significantly at P=0.01. Soil pH increased significantly to 5.78 with Vitazyme. Of special interest is the fact that the cations all significantly moved towards a more favorable balance in terms percent base saturation, sodium declining at the same time.

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

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2011 Crop Results

Vitazyme on Soybeans

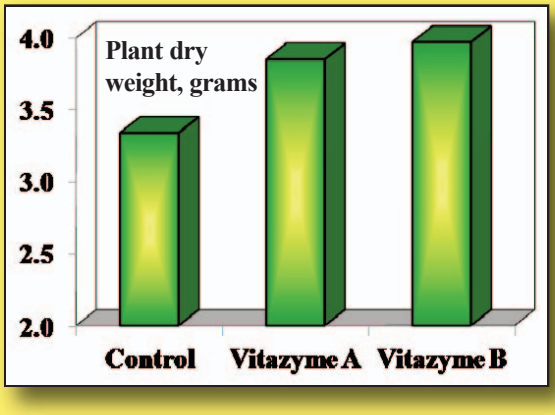
Researcher: Paul W. Syltie, Ph.D *Location*: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: Common *Pot size*: 1 gallon *Soil type*: silt loam
Planting rate: 12 seeds/pot, thinned to 3 plants/pot *Planting date*: November 12, 2010
Experimental design: A replicated greenhouse pot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

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

Fertilization: none
Vitazyme application: Vitazyme A: 100 ml/pot at planting of a 0.1% solution, for regular product; Vitazyme B: 100 ml/pot at planting of a 0.1% solution, diluted directly from concentrate
Dry weight results: The plant roots were washed clean of soil on December 15, and weighed to the nearest 0.01 gram.

Treatment	Dry Weight*	Weight change
	grams	grams
Control	3.34 b	—
Vitazyme A	3.85 a	0.51 (+15%)
Vitazyme B	3.97 a	0.63 (+19%)
Treatment P	0.0133*	
Model P	0.0133*	
CV	10.05%	
$LSD_{0.05}$	0.42 gram	

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



Increase in dry weight with Vitazyme A: 15%

Increase in dry weight with Vitazyme B: 19%

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

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2011 Crop Results

Vitazyme on Soybeans

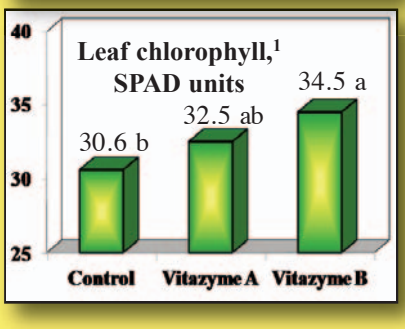
A Greenhouse Study

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

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

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

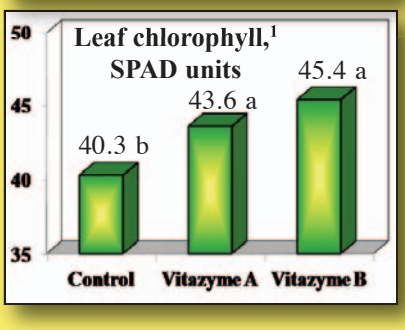
First Trifoliate



Block P - 0.399
Treatment P - 0.039*
Model P - 0.148
$CV_{0.10}$ - 7.86%
$LSD_{0.10}$ - 2.4 units

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

Second Trifoliate



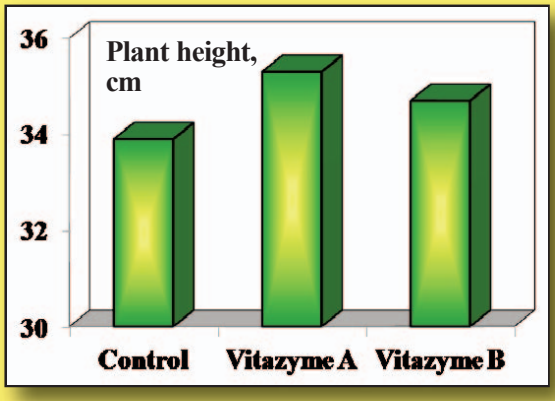
Block P - 0.679
Treatment P - 0.026*
Model P -0.182
$CV_{0.10}$ - 7.09%
$LSD_{0.10}$ - 2.9 units

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

Plant height results: At harvest on March 22, the heights of the three plants for each pot were measured and averaged.

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

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

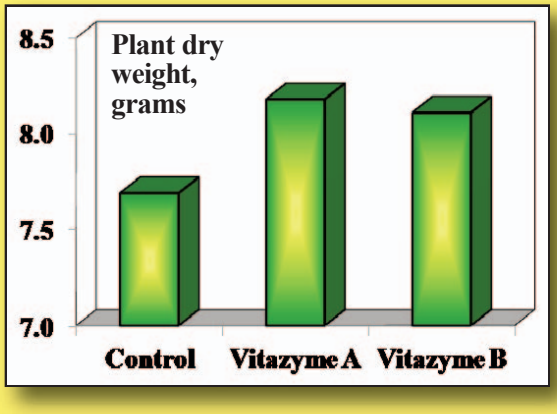


No significant differences were detected on plant height for the three treatments.

Dry weight results: On March 22, the soil was washed from the roots of all plants, and they were placed in a drying oven for 24 hours at 120º F. Weights were made to the nearest 0.01 gram.

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

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



Although the soybean dry weights were not significantly different, both Vitazyme types increased the weight.

Increase in dry weight with Vitazyme

Vitazyme A 6%
Vitazyme B 5%

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

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2011 Crop Results

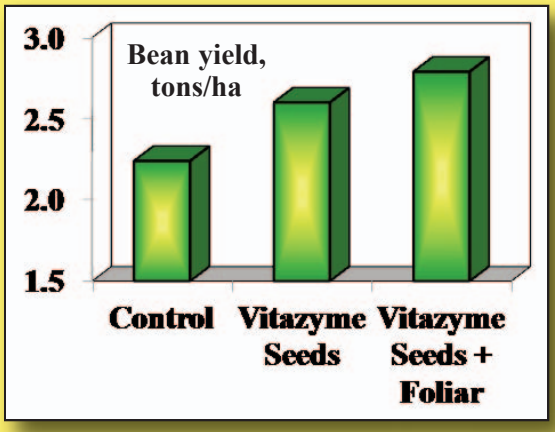
Vitazyme on Soybeans

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

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

Vitazyme applications: Treatments 2 and 3, 1 liter of Vitazyme per ton of seed on May 8, 2011; Treatment 3, 1 liter/ha on the leaves and soil at branching on June 21, 2011
Yield results:

Treatment	Yield	Yield change
	tons/ha	tons/ha
Control	2.24	—
Vitazyme, seeds	2.60	0.36 (+16%)
Vitazyme, seeds + foliar	2.79	0.55 (+25%)



Yield increase with a Vitazyme seed treatment: 16%
Yield increase with a Vitazyme seed + foliar treatment: 25%

Income results:

- Income increase with a Vitazyme seed treatment: +992 hrn/ha
- Income increase with a Vitazyme seed + foliar treatment: +1,364 hrn/ha

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

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2009 Crop Results

Vitazyme on Soybeans

A Long-Term Study: Year 2

Researcher: Bertel Schou, Ph.D. *Research organization*: ACRES (Agricultural Custom Research and Environmental Services), Cedar Falls, Iowa
Variety: Pioneer 92M40 (BBCH: BSOY) *Planting rate*: 62 lb/acre
Planting depth: 2 inches *Planting date*: May 21, 2009
Tillage: conventional (field cultivated and harrowed) *Row width*: 30 inches
Previous crop: corn

Experimental design: The same plots from the first year of this long-term study were preserved for the second year. These plots were arranged in a randomized complete block design, with five replicates and two treatments. The study is designed to assess the long-term effects of Vitazyme on the yield and growth of corn and soybeans in rotation, and especially the effects on the physical, chemical, and microbial properties of the soil.

1. Control **2. Vitazyme**

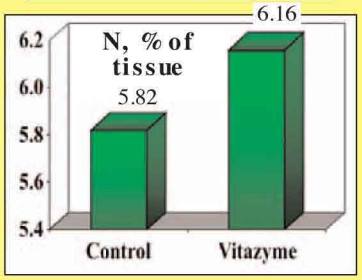
Fertilization: none

Vitazyme application: 13 oz/acre (1 liter/ha) in the seed furrow at planting (May 21, 2009), and 13 oz/acre (1 liter/ha) sprayed on the leaves and soil on June 23, 2009, at the V3 stage

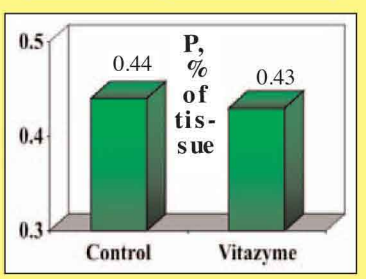
Weed control: glyphosate

Plant analyses: One sampling of leaves from the two treatments was made and sent to Midwest Laboratories, Omaha, Nebraska. Leaves were received on June 24, 2009, as a composite of the five replicates for each treatment.

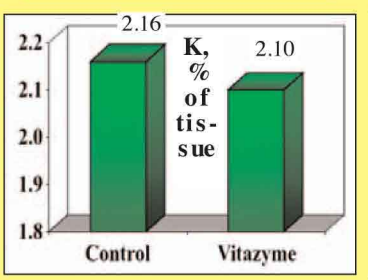
Nitrogen



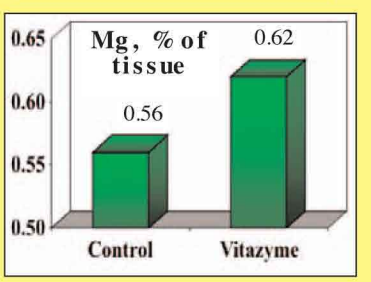
Phosphorus



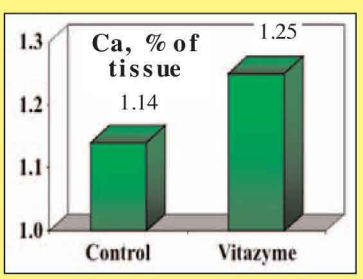
Potassium



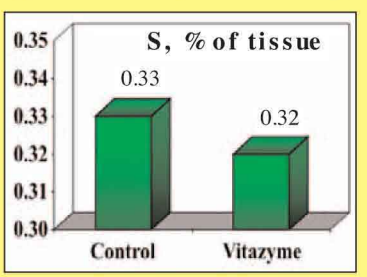
Magnesium



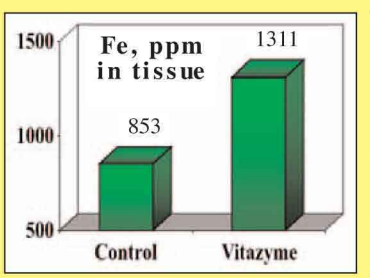
Calcium



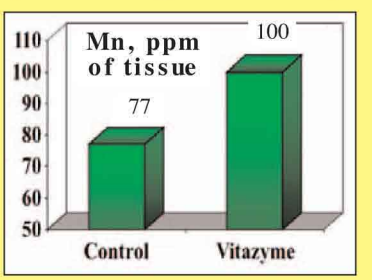
Sulfur



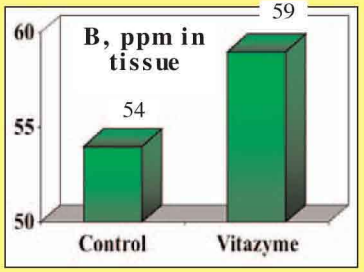
Iron



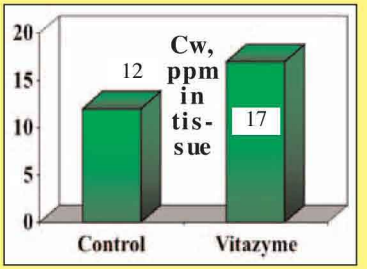
Manganese



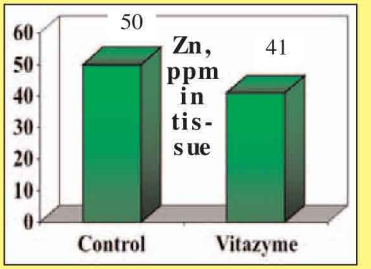
Boron



Copper



Zinc



Harvest date: The crop was harvested on September 29, 2009, with a Massey Ferguson 8 plot combine. Two rows 40 feet long were harvested from each plot.

Grain moisture: There was no major difference in the moisture content of the two treatments.

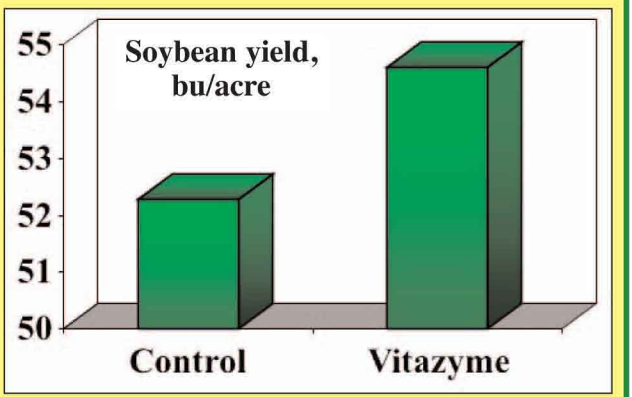
Control moisture: 14.10 Vitazyme moisture: 14.07

Yield results: All soybean yields were adjusted to 13.0% moisture.

Treatment	Bean yield*	Yield increase
	bu/acre	bu/acre
Control	52.28 a	—
Vitazyme	54.60 b	2.32 (+4%)
LSD (0.10)	2.13	
Standard deviation	1.58	
Coeff. of variation	2.96	
Replicate F	5.98	
Replicate probability	0.056	
Treatment F	5.38	
Treatment probability	0.081	

Change in soybean tissue elements with Vitazyme

N ..... +6%	Fe ..... +54%
P ..... -2%	Mn .... +30%
K ..... -3%	B ..... +8%
Mg .... +11%	Cu ..... +42%
Ca .... +10%	Zn ..... -18%
S ..... -3%	



Yield increase with Vitazyme: 4%

Conclusions: This long-term soil and crop study in Iowa, with soybeans grown the second year, revealed that the yield was significantly improved by 2.32 bu/acre (4%) with Vitazyme. Soil and plant analyses results showed improvements in tissue contents of N, Mg, Ca, Fe, Mn, B, and, Cu. These values will be monitored each year as the study progresses, as will other physical, chemical, and microbiological parameters.

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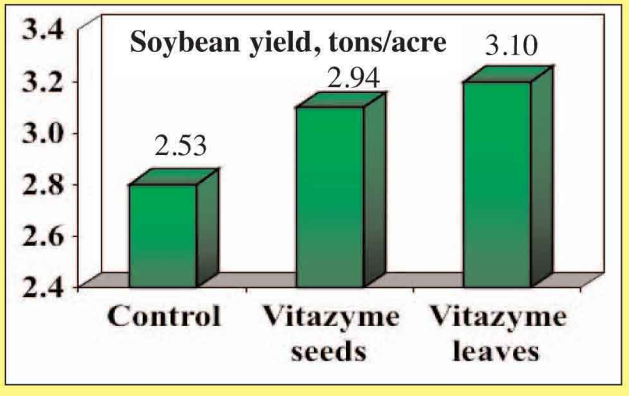
2009 Crop Results

Vitazyme on Soybeans

Researcher: O.V. Kornijchuk, V.V. Plotnikov, and agronomic scientists
Organization: Vinnytsia State Agricultural Experiment Station, Ukraine Academy of Agrarian Sciences, Vinnytsia, Ukraine
Location: Ukraine central forest-steppe area near Vinnytsia
Planting date: May 2, 2009
Seeding rate: 800,000 seeds/ha
Variety: Podil'ska 416, super elite
Tillage: plowing, harrowing, and cultivation
Previous crop: winter wheat
Soil type: gray forest steppe soil; in the 0-30 cm layer, 2.2% organic matter, 8.4 mg/100 g of soil "hydrolyzed nitrogen", 15.8 mg/100g of soil phosphorous, 12.4 mg/100 g of soil exchangeable potassium, and pH=5.5.
Experimental design: A uniform field was divided into plots of 1.0 ha each with three treatments and four replications . The objective of the study was to evaluate the effect of Vitazyme as either a seed application, or a seed plus foliar application, on the yield of soybeans.

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

Fertilization: 30 kg/ha N, 30 kg/ha P_2O_5, and 60 kg/ha K_2O
Vitazyme application: Treatment 2 received 1.0 liter of Vitazyme per ton of seed on May 1, 2009, and Treatment 3 received this treatment plus a foliar treatment of 1.0/liter/ha on June 20, 2009, at branching.
Yield results:



Increase in soybean yield with Vitazyme once: 16%

Increase in soybean yield with Vitazyme twice: 23%

Income results:

- **Income increase with Vitazyme on seeds: 1.104 hrn**
- **Income increase with Vitazyme twice: 1,343 hrn**

Conclusions: In Ukraine in 2009, this Vitazyme study with soybeans using either a seed treatment alone, or a seed treatment plus a foliar treatment, proved that this product increased yield by 16% (seed treatment) or 23% (seed and foliar treatment); income was also substantially increased in both cases. These excellent improvements show the great utility of this product in soybean culture in Ukraine.

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2009 Crop Results

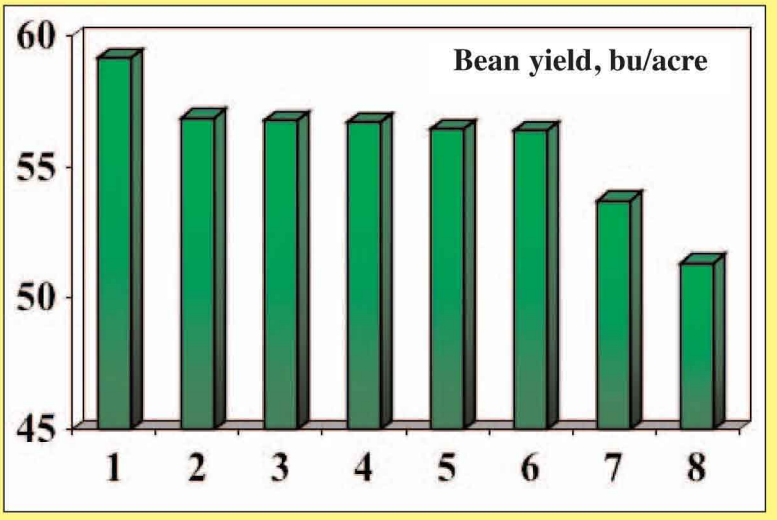
Vitazyme on Soybeans

Farmer: David Herbst *Location*: Herbst/Tierney Farms, Chaffee, Missouri, in cooperation with the University of Missouri Extension Service, Cape Girardeau and Jackson, Missouri
Variety: Nashville (Merschman) *Irrigation*: furrow, on a leveled field *Soil type*: silt loam
Previous crop: wheat, harvested before soybeans were planted (double-cropped)
Population: 140,000 seeds/acre *Planting date*: June 7, 2008 *Row spacing*: 30 inch
Experimental design: A soybean field was divided into plots that were 24 rows wide, and replicated two times, with a check (untreated) plot between each treatment. The purpose of the trial was to evaluate the relative effects of several biostimulants and foliar fertilizers.

1. Vitazyme
2. Foliar Blend
3. Impact
4. Foliar Blend + GroMax
5. GroMax
6. GroMax Plus
7. Headline (fungicide)
8. Control (no treatment)

Fertilization: none
Product applications: 13 oz/acre at R4 to R5
Yield results: The data below are from the higher yielding of the two plots from each treatment.

Treatment	Yield	Yield change
	bu/acre	bu/acre
1. Vitazyme	59.15	7.81 (+15%)
2. Foliar Blend	56.88	5.54 (+11%)
3. Impact	56.79	5.45 (+11%)
4. Foliar Blend + GroMax	56.70	5.36 (10%)
5. GroMax	56.45	5.11 (+10%)
6. GroMax Plus	56.40	5.06 (+10%)
7. Headline	53.72	2.38 (+5%)
8. Control	51.34	—



Soybean yield increase with Vitazyme: 15%

Conclusions: This soybean crop in a wheat-soybean double cropping situation revealed that, of all products used, Vitazyme performed the best, increasing the yield by 15% (7.81 bu/acre) above the control. This increase was 2.27 bu/acre above the next highest yield increase (Foliar Blend). Vitazyme was shown in this trial to be a highly effective soybean yield booster.

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2009 Crop Results

Vitazyme on Soybeans, Organic

Researcher: Dennis Demel
Location: Ogallala, Nebraska
Variety: Blue River 29A7C
Soil type: Cuma sandy loam
Plant population: unknown
Watering: center pivot
Tillage: conventional
Planting date: unknown

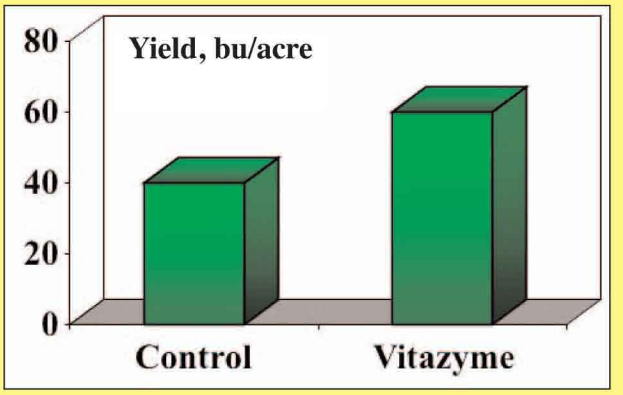
Experimental design: A soybean field was divided into a Vitazyme treated area (treated seeds only), and an untreated control area, with the objective to evaluate the effect of this product on the yield of soybeans grown under organic, irrigated conditions.

1. Control **2. Vitazyme**

Fertility treatments: In the fall of 2008 the field was subsoiled, and through drop tubes on the subsoiler were injected 0.5 gal/acre liquid humate, 1 gal/acre nitrogen (Summit), 0.5 gal/acre molasses, and 0.25 gal/acre fish. Also applied over all areas in the fall through the center pivot were 3 gal/acre nitrogen (Summit) with molasses and fish. In the spring, manganese, molasses, 1.4 gal/acre compost extract, and 1 oz/acre SP1 (Agri-Energy) were applied through the center pivot to all areas. At planting, 0.75 gal Dram 1 fish and Chilean nitrate, with Vitazyme, were applied in-furrow.
Rhizobium application: liquid, on the seeds at planting
Mycorrhizae application: 4 oz/acre in the seed box
Vitazyme application: 13 oz/acre in the furrow at planting
Test weight results: Both treatments produced soybeans weighing 57 lb/bushel.
Yield results: At harvest, eight rows were harvested from each side of the treatment boundary, with a 16-row separation between the strips that were 20 x 2,640 ft (1.212 acre). A weigh wagon was used to measure the yield.

Treatment	Yield	Yield change
	bu/acre	bu/acre
Control	48	—
Vitazyme	60	12 (+25%)

Increase in yield with Vitazyme: 25%



Conclusions: This organic soybean study in western Nebraska, under irrigation, revealed that Vitazyme increased bean yield by 25%, a very big increase. This large boost in yield with the product substantiates results with other organic producers, which have shown similar large yield improvements with the program. The grower was surprised with the degree of yield increase, but the weigh wagon had been properly calibrated.

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2009 Crop Results

Vitazyme on Soybeans

Researcher: Nathan Temples
Farm cooperator: David Murray Farms
Location: Sikeston, Missouri
Variety: Dyna-Gro
Soil type: sandy loam
Planting rate: 60 lb/acre
Planting date: June18, 2009
Row-spacing: 30 inches
Irrigation: four times

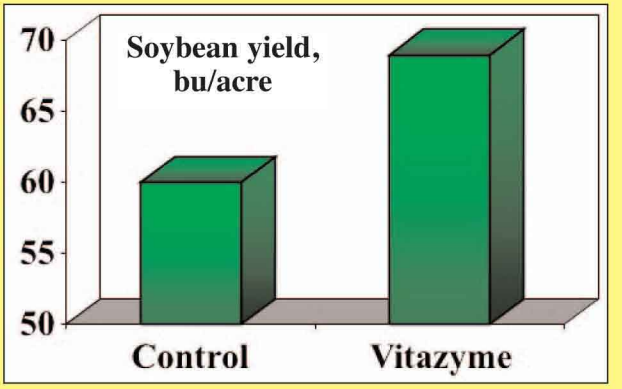
Experimental design: A soybean field was divided into Vitazyme treated (with the herbicide) and the untreated areas to determine the effects of the product on bean yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 13 oz/acre with the herbicide, 21 days after planting
Harvest date: November 13, 2009
Yield results:

Treatment	Yield	Yield change
	bu/acre	
Control	60	—
Vitazyme	69	9 (15%)

Increase in soybean yield with Vitazyme: 15%



Conclusions: In this Missouri study, Vitazyme applied along with a herbicide increased soybean yield by 15% over the untreated control.

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2009 Crop Results

Vitazyme on Soybeans

Researcher: Nathan Temples *Farm cooperator*: Halford farms *Location*: Bell City, Missouri
Variety: Crows 4817 *Soil type*: gumbo (high clay) *Planting rate*: 150,000 seeds/acre
Planting date: June 3, 2009 *Row-spacing*: 30 inches *Irrigation*: none

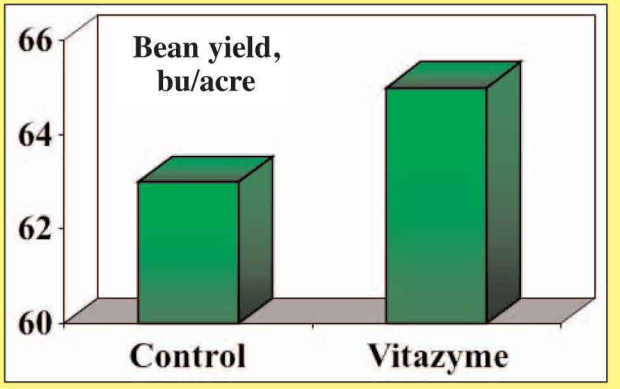
Experimental design: A 40-acre soybean field had 24 rows in the middle of the field treated with Vitazyme directly in the seed row. The objective was to evaluate the potential of this product to increase bean yields.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 8 oz/acre on the seeds at planting
Harvest date: October 15, 2009
Yield results: Yields were determined by combining a strip in the 24 treated rows and an adjacent untreated strip.

Treatment	Yield	Yield change
	bu/acre	
Control	63	—
Vitazyme	65	2 (3%)

Increase in soybean yield with Vitazyme: 3%



Conclussions: This Missouri study proved that Vitazyme, applied at 8 oz/acre to the seeds at planting, increased yield by 3%.

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2009 Crop Results

Vitazyme on Soybeans

Researcher: Nathan Temples
Location: Arbor, Missouri
Planting rate: 140,000 seeds /acre
Planting date: May 20, 2009
Farm cooperators: Donnie and Chris Wondel, D and C Farms
Variety: Asgrow 4922
Row-spacing: 30 inches
Soil type: gumbo (high clay)
Irrigation: none

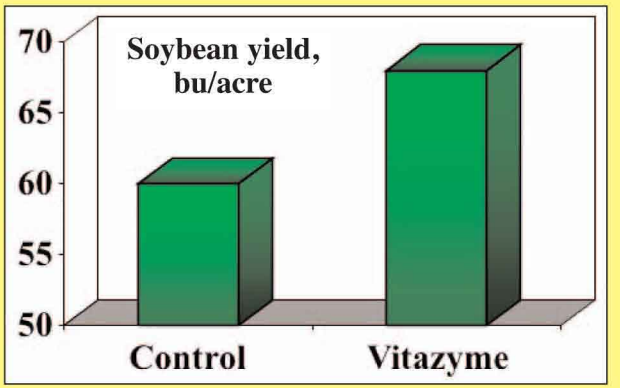
Experimental design: In a 55-acre soybean field, 24 rows were treated with Vitazyme on the seeds at planting, in an effort to evaluate the product's effects on soybean yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 8 oz/acre on the seeds at planting
Harvest date: October 20, 2009
Yield results:

Treatment	Yield	Yield change
	---------bu/acre	----------
Control	60	—
Vitazyme	68	8 (13%)

Increase in soybean yield with Vitazyme: 13%



Conclusions: This Missouri soybean study, with Vitazyme applied to the seeds at planting at 8 oz/acre, resulted in a substantial 8 bu/acre yield increase (+13%). This increase occurred in spite of a very high bean yield, showing that even with maximum yield the product works very well.

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2007 Crop Results

Vitazyme on Soybeans

Researchers: Fred Vaughn and Greg Wilson
Organization: Vaughn Agricultural Research Services
Location: Branchton, Ontario, Canada
Variety: Pioneer 91M80
BBCH Scale: BSOY
Planting rate: 101 kg/ha
Planting depth: 3.5 cm
Row spacing: 76 cm
Planting date: May 24, 2007
Seedbed conditions: dry, fine
Soil temperature at planting: 28.6°C
Soil: silt loam (31.9% sand, 53.7% silt, 14.4% clay), 6.2 pH, 14.2 meq/100 g CEC, good fertility
Field preparation: cultivation twice
Previous crops: 2005, potatoes (with Dual + Sencor); 2006, winter wheat (with Cobutox 600)
Experimental design: A uniform site was divided into plots that were 3x6 meters (six rows), using four treatments with six replications in a randomized complete block design. The objective of the study was to determine Vitazyme's ability to improve soybean yield with two applications. The treatments were as follows:

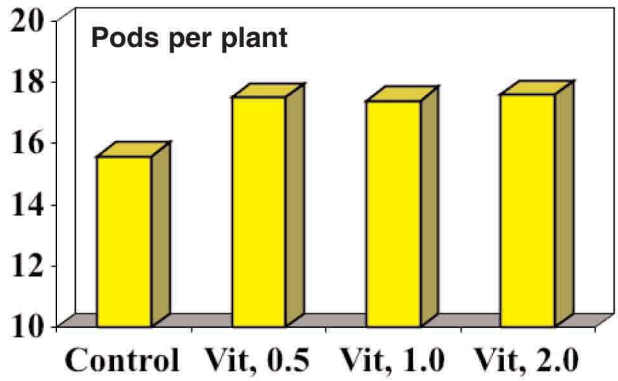
Treatment	At planting	Early bloom
	liters/ha	
1. Control	0	0
2. Vitazyme, 50%	0.5	0.5
3. Vitazyme, 100%	1.0	1.0
4. Vitazyme, 200%	2.0	2.0

Fertilization: 240 kg/ha of 6-24-24% N-P_2O_5-K_2O dry fertilizer spread over the trial site before planting
Vitazyme application: All rates were applied to appropriate plots on May 24 (to the seeds in the row) and June 26 (over the leaves and soil, using a 100 l/ha sprayer rate).
Crop emergence date: May 30, six days after planting
Weed control: Roundup (glyphosate) at 1 liter/ha on June 13, and at 1.5 liters/ha on July 19
Weather conditions: hot and dry during the middle and late part of the growing season
Harvest date: October 12, 2007. An area of 1.52 x 6.00 meters (the two center rows) was harvested for each plot.
Yield results: There were no significant differences in moisture content or bushel weight among the four treatments, so those values are not included here.

Pod Counts

Treatment	Pods/Plant*	Pod change
	pods	pods
1. Control	15.6 b	—
2. Vitazyme, 0.5 l/ha	17.5 a	1.9 (+12%)
3. Vitazyme, 1.0 l/ha	17.4 a	1.8 (+12%)
4. Vitazyme, 2.0 l/ha	17.6 a	2.0 (+13%)
LSD (P = 0.05)	1.7	
CV	8.24	
Bartlett's X2	3.899	
P (Bartlett's X2)	0.273	
Replicate F	5.022	
Replicate Prob (F)	0.0067	
Treatment F	2.626	
Treatment Prob (F)	0.0885	

*Average of 20 plants



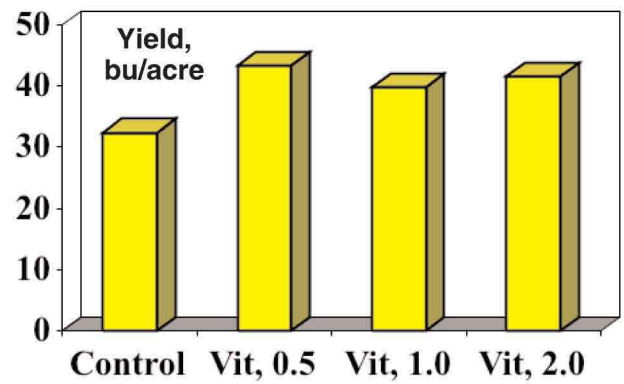
Increase in pod count

Vitazyme, 0.5 l/ha 12%
Vitazyme, 1.0 l/ha 12%
Vitazyme, 2.0 l/ha 13%

Vitazyme caused a 12 to 13% increase in pods per plant for the three treatment levels, which were significant at P = 0.05.

Soybean Yield

Treatment	Yield	Yield change
	bu/acre	bu/acre
1. Control	32.4 b	—
2. Vitazyme, 0.5 l/ha	43.3 a	10.9 (+34%)
3. Vitazyme, 1.0 l/ha	39.8 a	7.4 (+23%)
4. Vitazyme, 2.0 l/ha	41.5 a	9.1 (+28%)
LSD (P = 0.05)	3.68	
CV	7.63	
Bartlett's X2	1.472	
P (Bartlett's X2)	0.689	
Replicate F	2.146	
Replicate Prob (F)	0.1156	
Treatment F	15.358	
Treatment Prob (F)	0.0001	



Increase in soybean yield

Vitazyme, 0.5 l/ha 34%
Vitazyme, 1.0 l/ha 23%
Vitazyme, 2.0 l/ha 28%

All three Vitazyme treatments provided an increase in yield of from 23 to 34%, all of which were significantly different at 0.001%.

Income results: At a soybean price of $9.00/bushel, the increased income for the treatments is as follows:

Treatment	Yield increase	Income increase
	bu/acre	bu/acre
Vitazyme, 0.5 l/ha	10.9	98.10
Vitazyme, 1.0 l/ha	7.4	66.60
Vitazyme, 2.0 l/ha	9.1	81.90

Conclusions: Vitazyme applied to soybeans in this Canadian study, at 0.5, 1.0, and 2.0 liters/ha applied at planting and early bloom, brought about an excellent yield enhancement at all application levels: 23 to 34%. These yield increases resulted in improved crop income of from $66.60 to $98.10/acre, excellent increases for very nominal extra input costs. This study shows the great potential for Vitazyme to enhance the production of soybeans across the southern areas of Canada where this crop is grown.

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2006 Crop Results

Vitazyme on Soybeans

Agricultural Custom Research Education Services

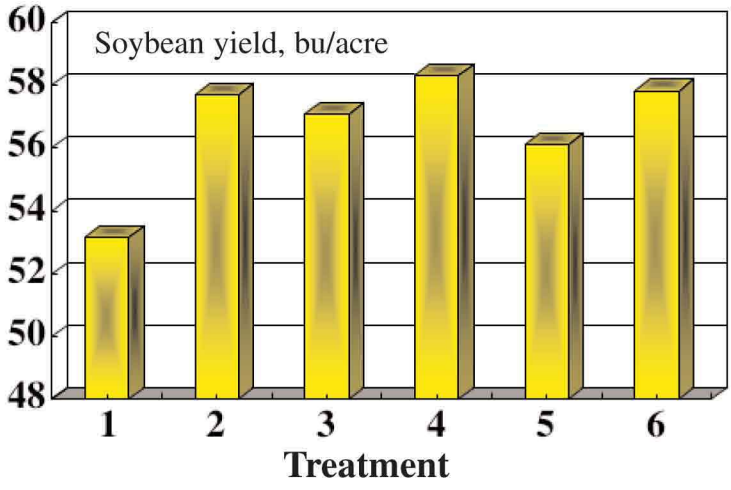
Researcher: Bert Schou, Ph.D. *Location*: Cedar Falls, Iowa *Variety*: Pioneer 92M72 (non-GMO)
Soil type: Floyd loam (pH 6.8, organic matter 4.2%, CEC 15.7, good fertility)
Previous crop: corn *Planting depth*: 1.5 inches *Planting rate*: 47 lb/acre
Row spacing: 30 inches *Planting date*: May 8, 2006 *Tillage*: conventional
Experimental design: A randomized complete block design with six replicates and six treatments was set up in a uniform area having 6-row plots of 15 x 40 feet (0.0138 acre). The purpose of the trial was to discover the effect of Vitazyme, Actinovate, glucose, and combinations of these products on soybean yield and bean moisture content. The Student-Newman-Keuls test was used to separate treatment means.

Treatment	Product	Rate
1	None	0
2	Vitazyme	13 oz/acre x 2
3	Actinovate	1 oz/acre x 2
4	Actinovate + Vitazyme	1 oz/acre + 13 oz/acre x 2
5	Actinovate + Vitazyme + Glucose	1 oz/acre + 13 oz/acre + 2.5 lb/acre x 2
6	Vitazyme + Glucose	13 oz/acre + 2.5 lb/acre x 2

Fertilization: none
Vitazyme application: 13 oz/acre on the seeds at planting, and on the leaves and soil at 3.5 trifoliates on June 28
Actinovate: Actinovate SP is a formulation of *Streptomyces lydicus* WYEC 108 that will populate the root zone to elicit soil pathogen control (Pythium, Rhizoctonia, Phytophthora, Veticillium, Fusarium, and other fungi); 1 lb/acre mixed with Vitazyme on May 8 at planting, and again on June 28 for a soil/foliar application.
Glucose: a microbial stimulant, applied with Vitazyme and Actinovate for both applications at 2.5 lb/acre
Harvest date: October 8, 2006
Yield and bean moisture results: The two center rows of each plot were harvested with a plot combine, and the beans were weighed with an electronic scale. Bean moisture was also determined at harvest for each plot.

Treatment	Bean yield*	Change	Bean moisture*	Change
	bu/acre	bu/acre	%	%-points
1. Control	53.15 b	—	10.43 a	—
2. Vitazyme	57.70 a	4.55 (+9%)	10.35 a	-0.08
3. Actinovate	57.10 a	3.95 (+7%)	9.82 a	-0.61
4. Actinovate + Vitazyme	58.33 a	5.18 (+10%)	9.82 a	-0.61
5. Actinovate + Vita. + Glucose	56.10 ab	2.95 (+6%)	10.07 a	-0.36
6. Vitazyme + Glucose	57.83 a	4.68 (+9%)	9.80 a	-0.63
LSD (P=0.05)	3.28		1.04	
Standard deviation	2.76		0.87	
Coeff. of variation	4.86%		8.68%	

*Means followed by the same letter are not significantly different according to the Student-Newman-Keuls-Test.



Increase in Bean Yield With...

Vitazyme 9%
Actinovate 7%
Vitazyme + Actinovate 10%
Vitazyme + Glucose 9%

All treatments but Treatment 5 significantly increased soybean yield at P=0.05, with the increases ranging from 6 to 10% above the control. Vitazyme plus Actinovate gave the greatest increase (+10%), but this increase was only slightly more than Vitazyme alone, Bean moisture drydown was not significantly affected by the treatments because all of the beans were dry at harvest, although all of the treatments produced slightly dryer beans, from 0.08 to 0.63 percentage point..

Income results: At $6.00/bu for soybeans, the following income increases have been calculated.

Treatment	Product	Income increase
2	Vitazyme	$27.30/acre
3	Actinovate	$23.70/acre
4	Actinovate + Vitazyme	$31.08/acre
5	Actinovate + Vitazyme + Glucose	$17.70/acre
6	Vitazyme + Glucose	$28.08/acre

Conclusions: In this replicated soybean study in Iowa, all but one treatment produced significant yield increases (P=0.05) of from 2.95 to 4.68 bu/acre (6 to 10%). The greatest increase was with Vitazyme + Actinovate, although Vitazyme alone produced a 9% yield increase. These yield increases produced income increases of from $17.70 to $28.08/acre. Grain moisture did not vary significantly among the eight treatments because all of the grain was harvested when almost completely dry, although all treatments produced somewhat dryer beans at harvest than did the untreated control..

This study shows that Vitazyme alone produced nearly the greatest yield improvement, and other treatments or combinations did not significantly exceed this result. The use of Vitazyme is a highly profitable practice in Iowa, and has been proven to consistently increase soybean yields and profits since 1995.

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2005 Crop Results

Vitazyme on Soybeans

Researcher/Farmer: Dale Carter *Location*: Coatesville, Indiana *Variety*: Pioneer 93 B68
Planting date: May 10, 2005 *Soil type*: Fincastle silty clay loam *Previous crop*: corn
Population: 179,000 seeds/acre *Row spacing*: 15 inches *Tillage*: no-till

Experimental design: A soybean field was treated on one part, across the rows, with Vitazyme, and the other part was left untreated.

1. Control **2. Vitazyme**

Fertilization: none (residual fertility from corn last year)
Vitazyme application: 13 oz/acre on the soil surface about one week before planting
Weather: cooler than normal
Results: About August 26 the data shown below was collected. Forty plants from each field area, closely separated, were dug with a potato fork — four plants per dig with 10 digs — and trifoliate leaves and pods were counted for the 40 plants.

Treatment	Trifoliates	Change	Pods	Change	Roots	Biological activity
	number/40 plants					
Control	420	—	1,100	—	Standard roots structure	No fungi seen; few sowbugs*
Vitazyme	520	100 (+24%)	1,330	230 (+21%)	Long,stronger main roots More fine roots	More fungal threads on corn residue; many sowbugs*

*Fungi are the first organisms to begin crop residue breakdown. Sowbugs consume the organic material that is breaking down.

Increase in trifoliate leaves: +24%

Increase in pods: +21%

Conclusions: This Indiana soybean study revealed that only one Vitazyme application at planting increased the number of trifoliate leaves by 24%, while pods were increased by 21%. In addition, root growth and soil biological activity were enhanced. Unfortunately a yield check could not be made because the product was applied across the rows, making it impossible to keep treatments separate while combining down the field.

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2005 Crop Results

Vitazyme on Soybeans

Agricultural Custom Research Education Services

Researcher: Bert Schou, Ph.D. *Location*: Cedar Falls, Iowa *Variety*: Pioneer 92M72 (non-GMO)
Soil type: Floyd loam (pH 6.8, organic matter 4.2%, CEC 15.7, good fertility)
Previous crop: corn *Planting depth*: 1.5 inches *Planting rate*: 49 lb/acre
Row spacing: 30 inches *Planting date*: May 10, 2005 *Tillage*: conventional
Experimental design: A Latin square design with eight replicates and eight treatments was set up in a uniform area having 6-row plots of 15 x 40 feet (0.0138 acre). The purpose of the trial was to discover the effect of Vitazyme, a new Vitazyme variant (Product X), a possible synergist with Vitazyme (Product Y), and another possible synergist (Product Z) on soybean yield and bean moisture content. The Student-Newman-Keuls test was used to separate treatment means.

Treatment	Product	Rate
1	None	0
2	Vitazyme	13 oz/acre x 2
3	Vitazyme + Product Y	13 oz/acre each x 2
4	Vitazyme + Product Y	6.5 oz/acre each x 2
5	Product Y	13 oz/acre x 2
6	Product X + Product Y	6.5 oz/acre each x 2
7	Product Z	16 oz/acre x 2
8	Vitazyme + Product Z	13 oz/acre (Vita.) + 16 oz/acre (Z) x 2

Fertilization: none
Vitazyme application: 13 oz/acre pr 6.5 oz/acre on the seeds at planting, and on the leaves and soil at 3.5 trifoliates
Product X application: 6.5 oz/acre on the seeds at planting, and on the leaves and soil at 3.5 trifoliates
Product Y application: 13 oz/acre or 6.5 oz/acre on the seeds at planting, and on the leaves and soil at 3.5 trifoliates
Product Z application: 16 oz/acre on the seeds at planting, and on the leaves and soil at 3.5 trifoliates
Harvest date: October 4, 2005
Yield results: The two center rows of each plot were harvested with a plot combine, and the grain was weighed with an electronic scale

Treatment	Bean yield*	Change	Moisture*	Change
	bu/acre	bu/acre	%	%
1. Control	39.3 b	—	15.45 a	—
2. Vitazyme	45.0 a	5.7 (+15%)	15.67 a	+0.22
3. Vita + Prod Y	45.4 a	6.1 (+16%)	15.41 a	-0.04
4. Vita + Prod Y (1/2 rate)	45.0 a	5.7 (+15%)	16.15 a	+0.70
5. Product Y	43.4 a	4.1 (+10%)	15.51 a	+0.06
6. Prod X + Prod Y (1/2 rate)	44.7 a	5.4 (+14%)	15.51 a	+0.06
7. Product Z	44.1 a	4.8 (+12%)	15.95 a	+ 0.50
8. Vita + Prod Z	45.0 a	5.7 (+15%)	16.04 a	+0.59
LSD (P=0.05)	2.37		1.158	
Standard deviation	2.34		1.146	
Coeff. of variation	5.32%		7.3%	

*Means followed by the same letter are not significantly different according to the Student-Newman-Keuls-Test.

All treatments significantly increased soybean yield at P=0.05, with the increases ranging from 10 to 16% above the control. Vitazyme plus Product Y at the full rates gave the greatest increases (+16%) while Product Y alone gave the smallest increase (+10%). Grain moisture drydown was not significantly affected by the treatments, likely because all of the beans were dry at harvest.

Yield Changes

Vitazyme ..... +15%
Vitazyme + Product Y
Full Rate ..... +16%
Half Rate ..... + 15%
Product Y ..... +10%
Product X + Product Y
Half rate ..... +14%
Product Z ..... +12%
Vitazyme + Product Z ..... +15%

Income results: At $4.50/bu for soybeans, the following income increases have been calculated.

Treatment	Bean increase	Extra income
	bu/acre	$/acre
2. Vitazyme	5.7	25.65
3. Vita + Prod Y	6.1	27.45
4. Vita + Prod Y (1/2 rate)	5.7	25.65
5. Product Y	4.1	18.45
6. Prod X + Prod Y (1/2 rate)	5.4	24.30
7. Product Z	4.8	21.60
8. Vita + Prod Z	5.7	25.65

Conclusions: In this replicated soybean study in Iowa, all treatments produced significant yield increases (P=0.05) of from 4.1 to 6.1 bu/acre (10 to 16%). The greatest increase was with Vitazyme + Product Y, although Vitazyme alone produced a 15% yield increase. These yield increases produced income increases of from $18.45 to $27.45/acre. Grain moisture did not vary significantly among the eight treatments because all of the grain was harvested when completely dry.

This study shows that Vitazyme alone produced nearly the greatest yield improvement, and other treatments or combinations did not significantly exceed this result.

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2004 Crop Results

Vitazyme on Soybeans

A Testimonial on Emergence and Yield

Researcher: Dennis Parrett
Location: near Cecelia, Kentucky
Variety: NK 39Q4
Row spacing: drilled in 7.5-inch rows with a no-till planter
Soil type: Crider silty clay loam
Planting date: May 5, 2003
Experimental design: A soybean field was planted with seed treated with dry inoculant plus straight, undiluted Vitazyme put into a planter box. After the planter ran out of treated seed, the last part of the field was planted with untreated seed.
Fertilization: unknown
Vitazyme application: 6 oz/acre of straight undiluted Vitazyme on the seeds in the planter box together with dry rhizobium inoculant; this gave very good seed contact for both the Vitazyme and the inoculant.
Germination time: The treated seeds had emerged by May 9, four days after planting, despite cold soil temperatures, which was several days before the untreated beans.

Days to emergence: 4 days after planting

Yield results: 56.8 bu/acre in a dry year. Surrounding fields yielded less, though exact yields are not known.
Conclusions: Vitazyme applied straight to seeds at planting, stimulated soybean germination by a great degree over the untreated soybeans, despite cold soil temperatures, and resulted in higher bean yields despite a very dry growing season.

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2003 Crop Results

Vitazyme on Soybeans *(Foliar vs. Soil Application)*

Researcher: Paul W. Syltie, Ph.D.
Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: unknown *Planting rate*: 10 seeds/pot thinned to 3 plants/pot
Soil type: Bowie very fine sandy loam *Planting date*: March 13, 2003 *Pot size*: 1 gallon
Experimental design: A greenhouse study was established to discover the relative effect of soil versus foliar application of Vitazyme on soybean growth. Ten replicates were established for each treatment in a complete block design. Temperatures were maintained at 55° to 80°F during the study, with no artificial light.

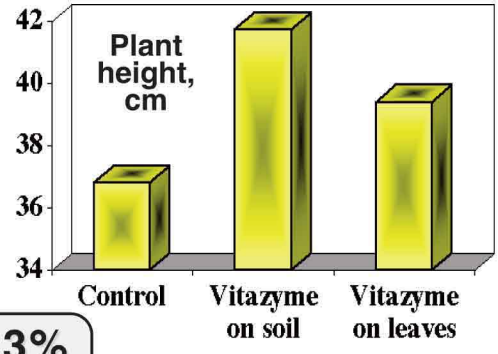
1. Control 2. Vitazyme on the soil 3. Vitazyme on the leaves

Fertilization: All plants were given 0.5 g/pot at planting of a 21-7-12% N-P_2O_5-K_2O pelleted, slow release fertilizer. This fertilizer gave an effective rate of 46 lb/acre of N, applied to the soil surface as a starter.
Vitazyme application: Vitazyme was applied to the soil surface only of Treatment 2 on March 27 when the first true leaves were fully expanded. It was also applied (a spray of a 1% solution) to the leaves of the plants of Treatment 3 on March 27; most of the spray beaded on the cotyledons and in the midrib of the undersides of the leaves. Care was taken to avoid applying any product to the soil surface.
Harvest date: April 23, 2003, 41 days after planting
Harvest results: The soybean roots were washed free of soil, the heights were measured, and then all plants were dried at about 115°F for one day, and weighed to the nearest 0.01 gram.

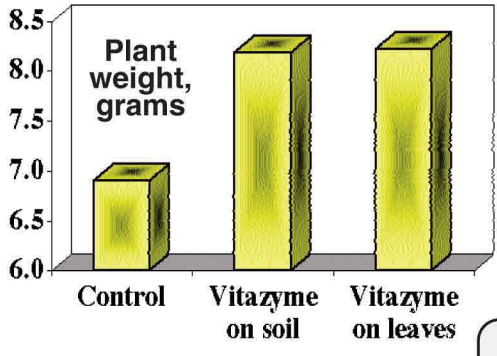
Plant Height

Treatment	Plant height*	Height change
	cm	cm
1. Control	36.8 b	—
2. Vitazyme on soil	41.7 a	4.9 (+13%)
3. Vitazyme on leaves	39.4 a	2.6 (+7%)

*Means followed by the same letter are not significantly different at P=0.10 according to the Tukey-Kramer Test. $LSD_{0.1}$=1.8 cm.



Plant height increase (soil applied): 13%



Plant Dry Weight

Treatment	Dry weight*	Weight change
	grams	grams
1. Control	6.90 b	—
2. Vitazyme on soil	8.18 a	1.28 (+19%)
3. Vitazyme on leaves	8.22 a	1.32 (+19%)

*Means followed by the same letter are not significantly different at P=0.1 according to the Tukey-Kramer Test. $LSD_{0.1}$=0.69 grams.

Dry weight increase (soil applied): 19%

Conclusions: Vitazyme applied to soybeans on either the foliage or soil in this greenhouse study showed a remarkably similar response for both methods. Both increases in dry matter accumulation were 19% above the control, and were highly significant. The increase in plant height was also highly significant for both soil and foliar applications of Vitazyme. It is concluded from this study that **either soil or foliar applied Vitazyme are equally effective in stimulating carbon fixation and plant growth of soybeans.** This study has given results similar to a parallel study on corn using soil or foliar applied product.

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2001 Crop Results

Vitazyme on Soybeans

Farmer: Blaine Nelson | *Location*: Wakefield, Nebraska | *Variety*: Rolling Meadows 279
Row spacing: 30 inches | *Population*: 150,000 seeds/acre | *Soil type*: silty clay loam
Planting date: May 15, 2001 | *Irrigation*: none | *Previous crop*: corn

Experimental design: A 94 acre field was treated entirely with Vitazyme except for one small 1 acre portion.

1. Control **2. Vitazyme**

Fertilization : none

Vitazyme treatment: 20 oz/acre sprayed over the leaves and soil along with Roundup Ultra herbicide on June 12, 28 days after planting

Growing season weather: hot and dry, especially during July and August, but with a very timely 3-inch rain in August

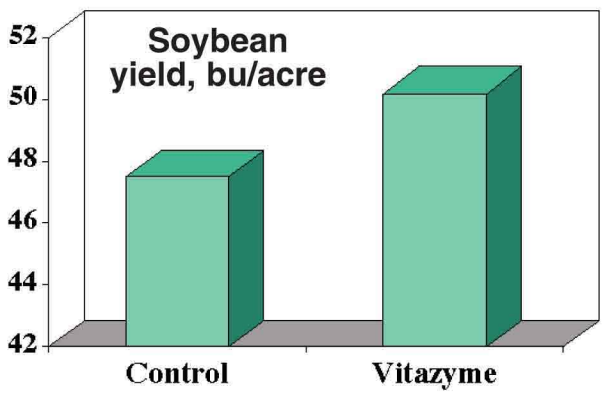
Harvest date: October 5, 2001

Growing season observations: **"Soon after applying Vitazyme it was obvious to notice that the treated plants were 2 to 3 inches taller, and were bigger and healthier."** — Blaine Nelson

Yield results: Areas were harvested and weighed on each side of the treatment boundary, and yields were calculated based on field measurements. Bean moisture contents were also determined.

	Control	Vitazyme	Change
		bu/acre	
Bean yield	47.5	50.2	2.7 (+6%)

Bean yield increase: 6%



Moisture content:

	Control	Vitazyme	Change
		% H_2O	
Bean moisture	11.6	11.2	0.4

Decrease in bean moisture: 0.4%

Income results: Estimated value of soybeans, before government payments: $4.20/bu. 2.7 bu/acre x $4.20/bu = **$11.34/acre more income**.

Conclusions: This Nebraska soybean study showed that only one application of Vitazyme can increase yield by 6% on a good year, which was very profitable. Two applications could have further increased the yield, especially during a year that is less than optimal.

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2000 Crop Results

Vitazyme on Soybeans (Organic)

Farmer: Mike Saeli *Location*: Savannah, New York *Variety*: Vinton (for tofu)
Planting date: *Row spacing*: 30 inches *Soil type*:
Experimental design: An area of a soybean field was treated with Vitazyme, while the rest of the field was left untreated.

1. Control **2. Vitazyme**

Fertilizer treatment: liquid fish with the seeds at 4 gal/acre
Vitazyme treatment: 13 oz/acre with the liquid fish on the seeds at planting
Harvest date: November 7, 2000
Leaf chlorophyll: On August 16, twenty leaves from each treatment were measured with a Minolta SPAD meter, and averaged

Leaf Chlorophyll

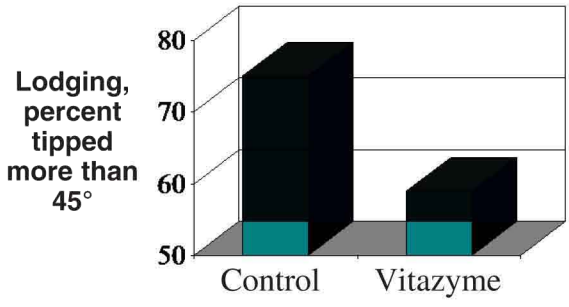
	Control	Vitazyme	Change
		SPAD units	
Leaf chlorophyll	46.9	49.2	+2.3

Leaf chlorophyll increase: 2.3 SPAD units

Lodging: At harvest time it was very apparent that the Vitazyme treatment had less lodging due to stronger stems. To evaluate lodging, a measurment was made from typical plants that were more or less than a 45 degree angle from the verticle.

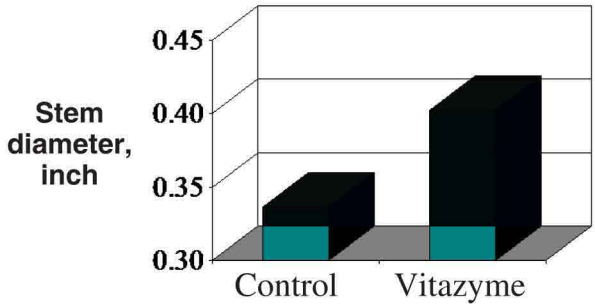
Lodging

	Control	Vitazyme	Change
		plants more than 45°	
Plants lodged	75%	59%	(–)16%



Decrease in lodging: 16%

Stem diameter: Since there was an obvious difference in stem diameter, seven typical plants from each treatment were measured.



Stem Diameter

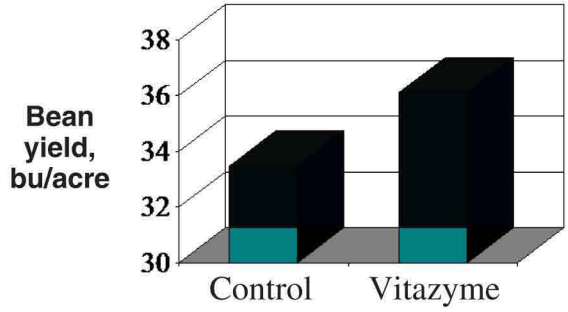
	Control	Vitazyme	Change
		inch	
Stem diameter	0.336 b	0.402 a	0.066(+20%)

Increase in stem diameter: 20%

Yield results: Fifteen rows that were 590 feet long were harvested from each treatment. The area harvested for each was 0.5079 acre.

Soybean yield

	Control	Vitazyme	Change
		lb	
Weight per test area	1,020	1,100	80(+8%)
		bu/acre	
	33.47	36.10	2.63(+8%)



Grain yield increase: 8%

Grain moisture content:

Grain Moisture

	Control	Vitazyme	Change
		%	
Grain moisture	14.70	14.45	0.25

Grain moisture decrease: 0.25%

Conclusions: Vitazyme applied to soybeans in this side–by–side field study produced more vigorous growth during the season, as a consequence of chlorophyll levels being higher due to a more active rhizosphere. Stem diameter was increased (by 20%), and as a result lodging was reduced (by 16%). Soybean yield increased by 2.63 bu/acre, which was sizable for this organic crop.

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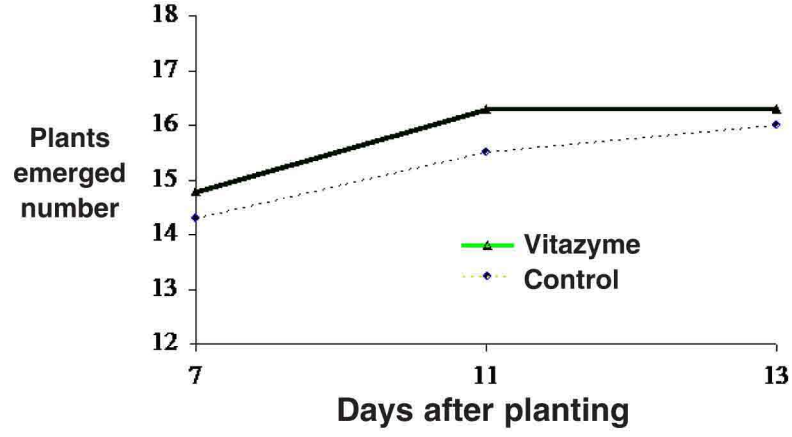
2000 Crop Results

Vitazyme on Soybeans (Tray Study)

Agricultural Custom Research and Educational Services

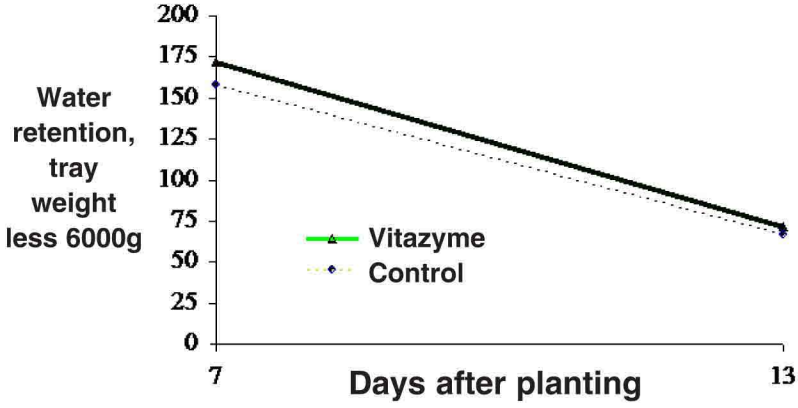
Researcher: Bertel Schou, Ph.D.
Location: Cedar Falls, Iowa
Variety: Unknown
Soil type: Maxfield silt loam, surface soil
Tray size and type: 10 x 21 inches, slotted tray inside a solid tray, and a paper liner below
Experimental design: Trays were placed under full-spectrum grow-lights that shone 14 hours per day, with an air temperature of 65 to 85°F. Each tray had 6,000 grams of the sieved silt loam soil, which formed a two-inch layer in which two furrows were made. Twenty seeds were placed every 2 inches in the two furrows and covered. Then a measured amount of water was added, first to obtain ideal planting conditions, and subsequent waterings were accounted for as well to give a net water usage. Typical field water loss is 0.25 to 0.35 in/day. Four replicates were used in the study. Measurements were taken 7, 11, and 13 days after planting.
Vitazyme application: The equivilant of 13 oz/acre Vitazyme was applied to the soil surface at planting.
Growth parameters measured:

Plants Emerged



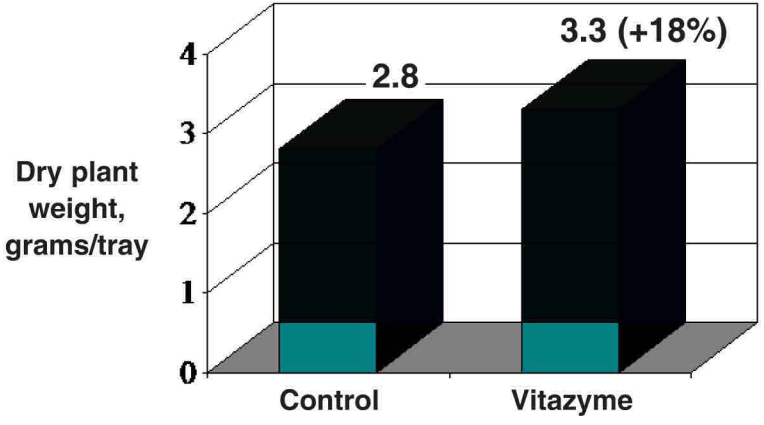
Vitazyme improved seed emergence and early growth vigor slightly throughout the 13-day growth period.

Soil and Plant Water Retention



The amount of water remaining in the trays, after additions were subtracted, was highest for the Vitazyme trays. This shows that Vitazyme reduced water loss from the soil and plants, and thus improved water use efficiency.

Dry Plant Weight – Day 13



At the conclusion of the study the Vitazyme treated seedlings had greater total weight, meaning their growth rate exceeded that of the control for the first 13 days after planting.

Dry weight increase: 18%

Conclusion: Vitazyme improved plant emergence in this soybean tray study. Also, these treated plants made more efficient use of water, and ended up producing greater dry matter (+18%) than the controls.

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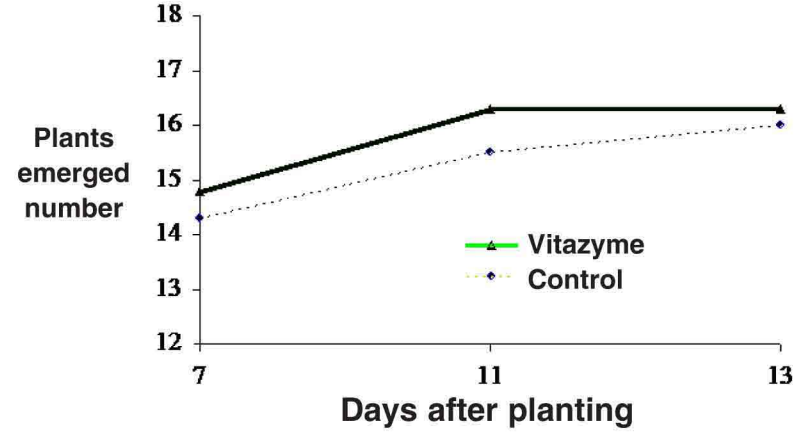
2000 Crop Results

Vitazyme on Soybeans (Tray Study)

Agricultural Custom Research and Educational Services

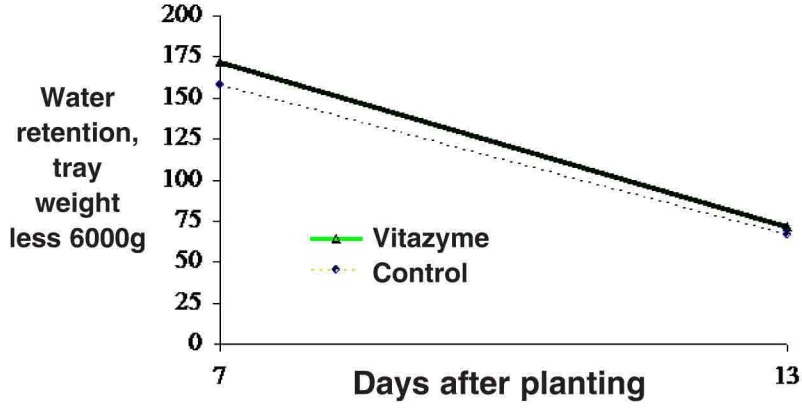
Researcher: Bertel Schou, Ph.D.
Location: Cedar Falls, Iowa
Variety: Kruger K 242 Roundup Ready
Soil type: Maxfield silt loam, surface soil
Tray size and type: 10 x 21 inches, slotted tray inside a solid tray, and a paper liner below
Experimental design: Trays were placed under full-spectrum grow-lights that shone 14 hours per day, with an air temperature of 65 to 85°F. Each tray had 6,000 grams of the sieved silt loam soil, which formed a two-inch layer in which two furrows were made. Twenty seeds were placed every 2 inches in the two furrows and covered. Then a measured amount of water was added, first to obtain ideal planting conditions, and subsequent waterings were accounted for as well to give a net water usage. Typical field water loss is 0.25 to 0.35 in/day. Four replicates were used in the study. Measurements were taken 7, 11, and 13 days after planting.
Vitazyme application: The equivilant of 13 oz/acre Vitazyme was applied to the soil surface at planting.
Growth parameters measured:

Plants Emerged



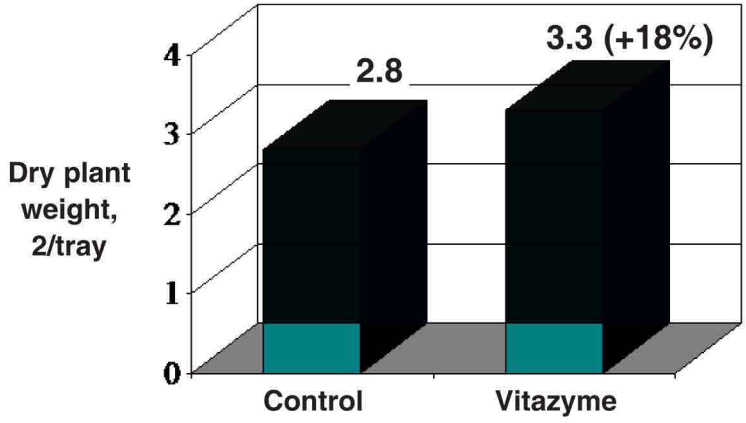
Vitazyme improved seed emergence and early growth vigor slightly throughout the 13-day growth period.

Soil and Plant Water Retention



The amount of water remaining in the trays, after additions were subtracted, was highest for the Vitazyme trays. This shows that Vitazyme reduced water loss from the soil and plants, and thus improved water use efficiency.

Dry Plant Weight – Day 13



At the conclusion of the study the Vitazyme treated seedlings had greater total weight, meaning their growth rate exceeded that of the control for the first 13 days after planting.

Dry weight increase: 18%

Conclusion: Vitazyme improved plant emergence in this soybean tray study. Also, these treated plants made more efficient use of water, and ended up producing greater dry matter (+18%) than the controls.

Income results: A corn price of $1.75/bu is estimated.

Conclusions: In this study evaluating Vitazyme and Actagro humic acids on corn yield and other parameters, grain yield was significantly increased with Vitazyme (+7%) and with humic acids (+8%), but not when the two products were combined. The grain per plant was also significantly increased with Vitazyme (+9%), showing that individual corn plants were larger and able to produce larger ears when treated with Vitazyme. This improvement did not occur with the other two treatments. Grain moisture at harvest, plant population, and grain test weight were not affected significantly by any of the treatments, though the product combination increased the test weight by 0.4 lb/bu over the control. Both Vitazyme and humic acids significantly improved corn production, but not a combination of the two, in this Iowa corn study. Vitazyme alone increased income by $13.65/acre.

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2000 Crop Results

Vitazyme on Soybeans

Farmer: Ron Stutzman, Brubaker Consulting Group Arkport, New York
Variety: Golden Harvest 2170 Roundup Ready
Soil type: silt loam
Location: Stutzman Research Farm,
Planting date: June 1, 2000
Row spacing: 30 inches
Planting population: 196,000 seeds/acre

Experimental design: A randomized complete block design was set up using a plot size of 10 x 50 ft. (0.0115 acre). Three treatments with four replicates (12 total plots) were selected.

1. Control 2. Vitazyme on seeds 3. Vitazyme foliar

Fertilization: Unknown

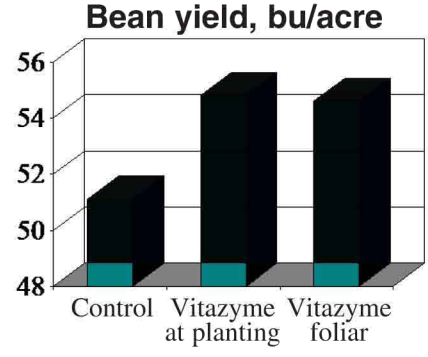
Vitazyme treatments: The seed treatment (Treatment 2) received 13 oz/acre concentrated on the seed row, and the foliar treatment (Treatment 3) was sprayed over the leaves and soil at a plant height of 15 inches.

Harvest date: November 3, 2000

Yield results: The test weight and grain moisture content of the soybeans did not vary much amongst the three treatments. Thus, these data are not included in this report. The soybeans were harvested with a plot combine.

	Control*	Vitazyme at planting*	Vitazyme foliar*
		bu/acre	
Soybean yield	51.1 a	54.8 a (+7%)	54.6 a (+7%)

* Means followed by the same letter are not significantly different at P=0.10 according to Tukey's Honestly Significance Difference Test. $LSD_{0.10}$=8.25.



Soybean yield increase (on seeds): 7%

Soybean yield increase (on leaves/soil): 7%

Income results: A price of $5.00/bu is estimated.

	Control	Vitazyme at planting	Vitazyme foliar
		$/acre	
Soybean yield	255.50	274.00	273.00

Income increase (on seeds): $18.50/acre

Income increase (on leaves/soil): $17.50/acre

Conclusions: Vitazyme at 13 oz/acre applied one time to the seeds, or to the leaves and soil at 15 inches plant height, produced nearly equal yield increases (7%, or about 3.6 bu/acre). This increase was highly profitable, the cost:benefit ratio being about 3.5:1. If the two applications had been made to the same treatments it is very likely the results would have been significantly better than either of Treatments 2 or 3.

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2000 Crop Results

Vitazyme on Soybeans

A testimonial

Farmer: Joe Ike
Researcher: Jake Gephart, Agway, Inc.
Variety: Asgrow Roundup Ready
Seeding rate: unknown
Location: Interlaken, New York
Soil type: unknown
Planting date: May 5, 2000
Row width: 30 inches
Experimental design: Vitazyme was applied on a portion of a 75-acre soybean field, while the rest of the field was left untreated.
Fertilization: unknown
Harvest date: November 3 and 4, 2000
Vitazyme application: 13 oz/acre with fertilizer, banded beneath the seeds

Yellow streaks developed early on in the plants across the field due to some sort of fungal attack during the cold, wet season. Later, Joe Ike noticed that the streaks in the field were gone where Vitazyme had been applied. **Vitazyme apparently produced a positive nutritional response with these soybeans that translated into disease resistance for whatever fungal organism was attacking these soybeans.**

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2000 Crop Results

Vitazyme on Soybeans

A testimonial

Farmer: Jim Clise
Researcher: Jake Gephart, Agway, Inc.
Varieties: Apk 25b Roundup Ready; Apk 198 Roundup Ready
Location: Waterloo, New York
Soil type: variable
Row width: 30 inches
Experimental design: All fields listed below were totally treated with Vitazyme
Fertilization amount: 250 lb/acre of 6-24-24% N-P_2O_5-K_2O, applied pre-plant, and incorporated
Vitazyme application: 13 oz/acre with Roundup (glyphosate) herbicide, just before canopy row closure

Field	Area	Planting date	Harvest date	Yield
	acres			bu/acre
1	50	June 26	November 13	65
2	25	June 14	November 11	44
3	14	June 14	November 12	23
4	100	June 15	November 14	53
5	12	June 17	November 16	30

Conclusions: According to Jake Gephart, **"Although the beans suffered white mold disease, the Vitazyme helped save the bean crop." This benefit was achieved because Vitazyme gave the beans a very vigorous start, enabling them to better resist the mold early on.** The very cool and wet growing season gave ample opportunity for fungal diseases to attack the crop in 2000.

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1999 Crop Results

Vitazyme on Soybeans

Farmer: John Smucker
Variety: APK 190 (Roundup Ready)
Planting date: May 17, 1999
Soil type: gravelly loam
Location: Leicester, New York
Supervisor: Harold Upton, Agway Inc.
Harvest date: November 5, 1999
Seeding rate: 190,000/acre (30-inch rows)

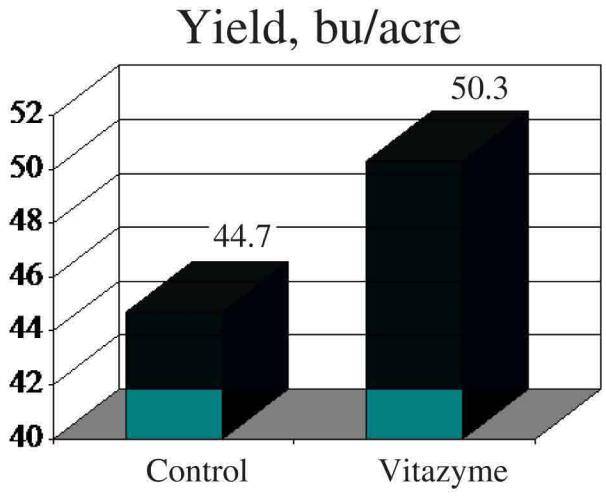
Experimental design: An 18-acre field was split into two equal parts, one half receiving Vitazyme and the other half receiving no treatment. At harvest, 0.7 acre was harvested from the treated side and 0.9 acre from the control side.

1. Control **2. Vitazyme**

Fertility treatments: 225 lb/acre 7-20-28 N-P_2O_5-K_2O, 0.35 lb/acre Mn, and 0.35 lb/acre Zn applied preplant
Vitazyme treatment: 13 oz/acre sprayed on the leaves and soil with Roundup (glyphosate) at early bloom
Yield results:

Treatment	Yield		Increase
	bu/acre		bu/acre
Control	44.7	---	
Vitazyme	50.3		5.6 (+13%)

Yield increase: 13%



Income increase: A price of $5.50/bu is estimated.

Income increase: $30.80/acre

Comments: In spite of a hot and dry summer the soybean yield increase with Vitazyme was substantial, amounting to $30.80/acre at a price of $5.50/bu for soybeans. Mr. Smucker commented, "I don't know what that stuff is, but next year I want to use a lot of it." Within a few days of applying Vitazyme the sprayed leaves turned darker green, compared to the control soybean leaves.

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1998 Crop Results

Vitazyme on Soybeans (Organic)

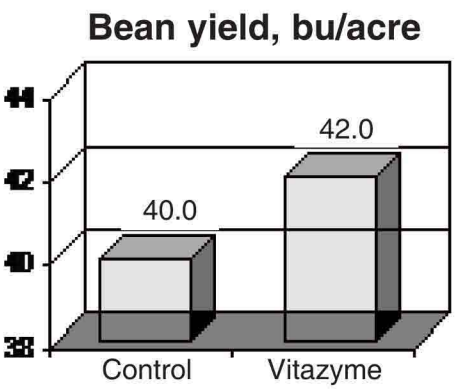
Farmer: Robin Hermanson *Location*: Garretson, South Dakota *Variety*: Ramy
Seeding rate: unknown *Previous crop*: spring wheat *Planting date*: unknown
Experimental design: A soybean field was divided into two portions, having the following treatments:

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

Fertilizer treatments: At planting, 1 gal/acre of liquid fish, an herbal blend, and 2 oz/acre of Nutrapathis Soil Conditioner were applied in an 8-inch band on the soil above the seed, and below the seed row in a band. Ten gallons of solution were used in each band.
Vitazyme applications: (1) 13 oz/acre along with the planting solution at planting, and (2) 7 oz/acre over the leaves and soil at early bloom.
Harvest date: unknown
Yield results:

	Control	Vitazyme	Increase
Yield, bu/acre	40.0	42.0	2 (+5%)

Yield Increase: 5%



Income results: The organic soybean price obtained by this grower is $19.00/bu.

	Control	Vitazyme	Increase
Total income	$760.00/acre	$798.00/acre	$38.00/acre

Income increase: $38.00/acre

Comments: Although the yield increase due to Vitazyme in this study was not remarkable, it was highly profitable. Quality parameters for the organically grown beans were not evaluated in this study. On August 28, chlorophyll readings using the Minolta SPAD meter on 20 randomly selected plants for each treatment showed 50.0 for Vitazyme and 49.2 for the control.

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1997 Crop Results

A Comparison of RenewPlus with Vitazyme on Soybeans

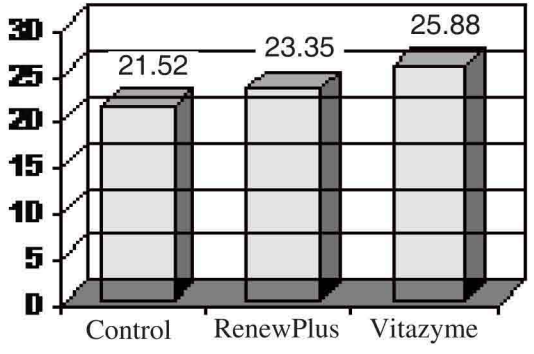
Researcher: Paul W. Syltie *Location*: Gladewater, Texas (Vital Earth Resources Research Center)
Variety: Pioneer 9592 *Seeding rate*: 10 seeds/pot, thinned to 3 plants/pot
Soil type: sandy loam (from Arkansas) *Planting date*: February 12, 1997 *Pot type:* one gallon
Vitazyme and RenewPlus treatments: 0.1% solution, 100 ml applied to each pot after planting and thorough watering *Harvest date*: April 8, 1997
Data collected: The roots were washed free of soil, and the plants were dried at about 115 degrees F in a drying oven, after which weights were taken.

Treatment	Dry weight*
Control	21.52 c
RenewPlus	23.35 b
Vitazyme	25.88 a
$LSD_{0.05}$	1.70

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

Yield Increase: 20%

Plant dry weight, g/pot



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1998 Crop Results

Vitazyme on Soybeans

Iowa State University of Science and Technology

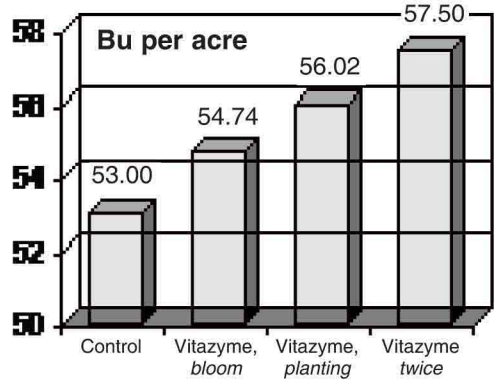
Researcher: Ivan E. Anderson, Ph.D. *Location*: Berkey Research Farm, Ames, Iowa
Seeding date: May 13, 1998 (adequate moisture) *Variety*: Prairie Brand B246
Seeding rate: 140,000 plants/acre *Row spacing and depth*: 30 inches, 1.5 inches deep
Experimental design: A randomized complete block design with six replications was set up on a Clarion loam, with plots 10 feet wide and 40 feet long (0.009183 acre; four rows per plot). Four treatments were used:

1. **Control (no Vitazyme)**
2. **Vitazyme at early bloom**
3. **Vitazyme on the seed at planting**
4. **Vitazyme on the seed at planting, and at early bloom**

Fertility and tillage treaments: Phosphorus and potassium levels were maintained above medium soil test levels.
Vitazyme applications: Vitazyme was applied to the seed row at planting at 15 oz/acre, and on the leaves and soil at early bloom at 15 oz/acre, to appropriate plots.
Harvest date: September 29
Yield results:

OVERALL RESULTS

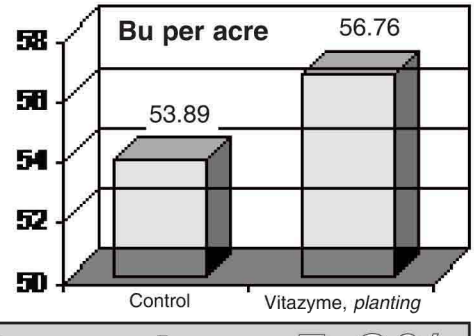
Treatment	Bean yield, bu/acre	Increase
1. Control	53.00	--
2. Vitazymeat bloom	54.74	1.74 (+3.3 %)
3. Vitazyme at planting	56.02	3.02 (+5.7 %)
4. Vitazyme twice	57.50	4.50 (+8.5 %)



Yield increase, Vitazyme twice: + 8.5%

SEED TREATMENT RESULTS

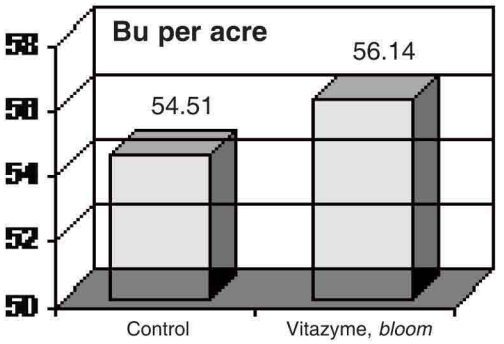
Treatment	Bean yield, bu/acre	Increase
1. Control	53.89	--
2. Vitazyme at planting	56.76	2.87 (+5.3 %)



Yield increase, seed treatment: + 5.3%

FOLIAR TREATMENT RESULTS

Treatment	Bean yield, bu/acre	Increase
1. Control	54.51	—
2. Vitazyme at bloom	56.14	1.63 (+3.0%)



Yield increase, foliar treatment:

Income results: "Overall results" are used here. Average soybean value in Iowa: about $6.00/bu.

Treatment	Income	Increase
1. Control	$318.00/acre	--
2. Vitazyme twice	$328.44/acre	$10.44/acre
3. Vitazyme at planting	$336.12/acre	$18.12/acre
4. Vitazyme at bloom	$345.00/acre	$27.00/acre

Income increase, Vitazyme twice: $27.00/acre

Conclusions: Vitazyme significantly increased soybean yields in central Iowa when applied on the foliage at early bloom, on the seeds at planting, and on both the seeds and foliage. The greatest increase was with both the seed and foliar applications. This dual application translated to a 4.5 bu/acre increase, or an increase in income of $27.00/acre. Vitazyme is therefore viewed as a highly profitable amendment for soybeans in central Iowa, as has been demonstrated in several other tests in the state as well.

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1997 Crop Results

Vitazyme on Soybeans

Researcher: William (Bill) Goodell
Seeding date: May 20, 1997
Location: Shortsville, New York
Row width: 7 inches
Seeding rate: 57 lb/acre
Variety: Terra 200
Experimental design: A field was split, half treated with Vitazyme and half left untreated.

1. **Control (no Vitazyme)**
2. **Vitazyme at planting**

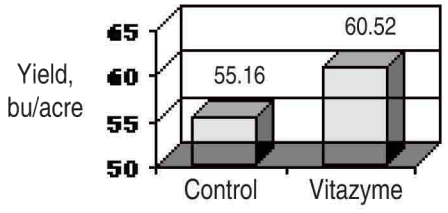
Fertility treatments: All of the field received 5.4 gal/acre 9-18-9 plus 2.6 gal/acre 0-0-30 on the seeds at planting.
Vitazyme application: 12 oz/acre along with the fertilizer at planting.
Soil: Ontario loam, 3 to 10% slope; 7.8 mg/100 g cation exchange capacity.
Tillage: conservation tillage (chisel plow)
Previous crop: corn
Harvest date: October 8, 1997
Yield results:

	Control	Vitazyme	Increase with Vitazyme
Soybean yield	55.16 bu/acre	60.52 bu/acre	5.36 bu/acre

Yield Increase: 10%

Income results: The price of corn in New York is about $7.00/bu.

	Control	Vitazyme
Soybean income	$386.12/acre	$423.64/acre



Income Increase: $37.52/acre

Leaf chlorophyll increase: An average chlorophyll value for 20 leaves was obtained for each treatment on July 13, 1997, using a Minolta SPAD meter.

	Control	Vitazyme
SPAD units of chlorophyll	41.7	43.8

Chlorophyll increase: 2.1 SPAD units

Comments: The cropping year was very favorable. Vitazyme treated plants were noticably bigger on July 13 than the control plants.

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1997 Crop Results

Vitazyme on Soybeans

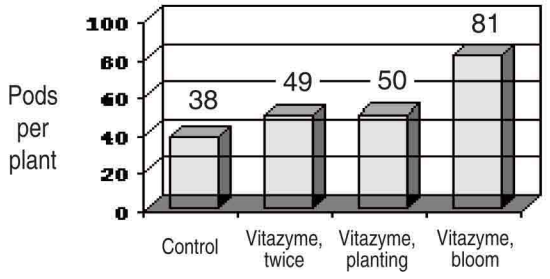
Researcher: Dan Easton, Easton Agri-Consulting, Inc
Seeding date: June 4, 1997 (adequate moisture) *Location*: Bagley, Iowa *Variety*: Pioneer RR soybeans
Seeding rate: 80,000 plants/acre *Row spacing and depth*: 30 inches, 1.5 inches deep
Experimental design: A randomized complete block design with six replications was set up on a Clarion loam, with plots 10 feet wide and 40 feet long (0.009183 acre).

Four treatments were used:

1. **Control (no Vitazyme)**
2. **Vitazyme on the seed at planting, and at early bloom**
3. **Vitazyme on the seed at planting**
4. **Vitazyme at early bloom**

Fertility and tillage treatments: Soils were sampled before planting and after harvest for analysis of basic soil parameters. No fertilizers were applied. The field was chisel plowed in the fall and disked in the spring.
Vitazyme applications: Vitazyme was applied to the seed row at planting at 13 oz/acre, and on the leaves and soil at early bloom (July 21) at 13 oz/acre, to appropriate plots.
Harvest date: October 20, 1997
Bean pod count results: Bean pods on representative plants from each treatment were counted on September 25.

Treatment	Average pods/plant	Increase
1. Control	38.0	—
2. Vitazyme twice	49.0	+29%
3. Vitazyme at planting	50.0	+32%
4. Vitazyme at bloom	81.0	+113%

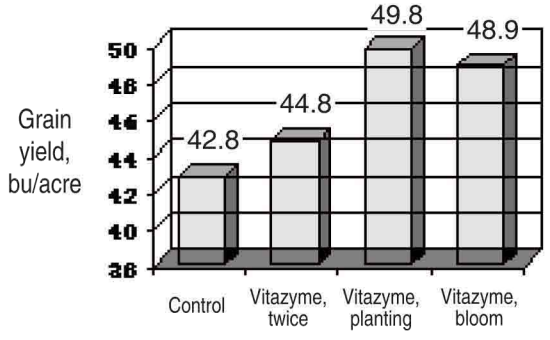


Pod increase (bloom application): 113%

Yield results:

Treatment	Grain yield*	Increase
	bu/acre	bu/acre
1. Control	42.8 c	—
2. Vitazyme twice	44.8 b	2.0 (+5%)
3. Vitazyme at planting	49.8 a	7.0 (+16%)
4. Vitazyme at bloom	48.9 a	6.1 (+14%)

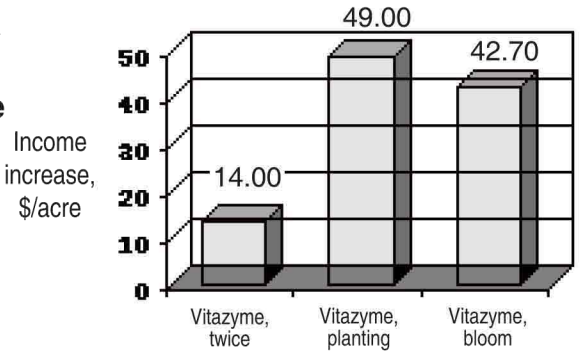
*Means followed by the same letter are not significantly different at P=0.05 (Duncan's Multiple Range Test).



Yield increase (planting application): 16%

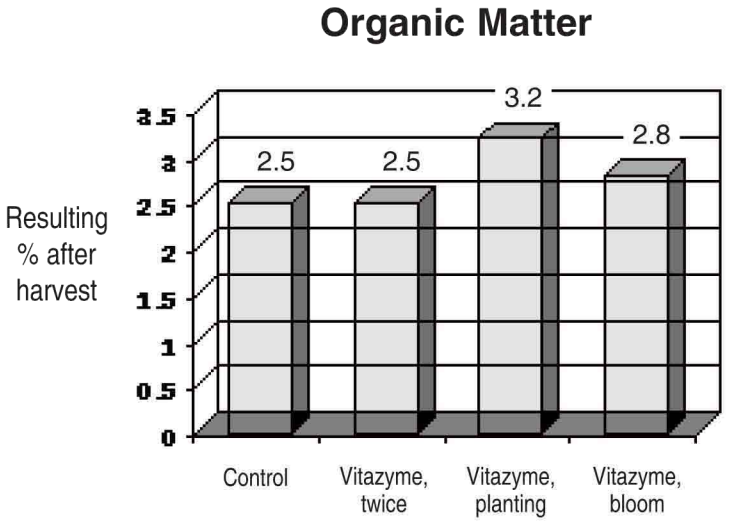
Income results: Average soybean value in Iowa: about $7.00/bu

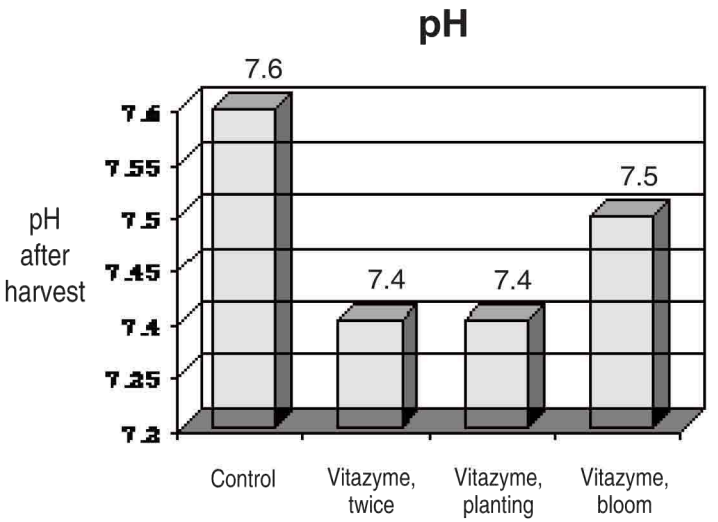
Treatment	Income	Increase
1. Control	$299.60/acre	—
2. Vitazyme twice	$313.60/acre	$14.00/acre
3. Vitazyme at planting	$348.60/acre	$49.00/acre
4. Vitazyme at bloom	$342.30/acre	$42.70/acre



Income increase (planting application): $49.00/acre

Soil test results: Changes in soil parameters from before planting to after harvest were similar for all treatments for P, K, Mg, Ca, and cation exchange capacity. Nitrate-N ended up slightly higher for all three Vitazyme treatments, but organic matter and pH levels showed greater differences.





Comments: The cropping year was excellent in central Iowa during 1997 despite a cool and wet spring.

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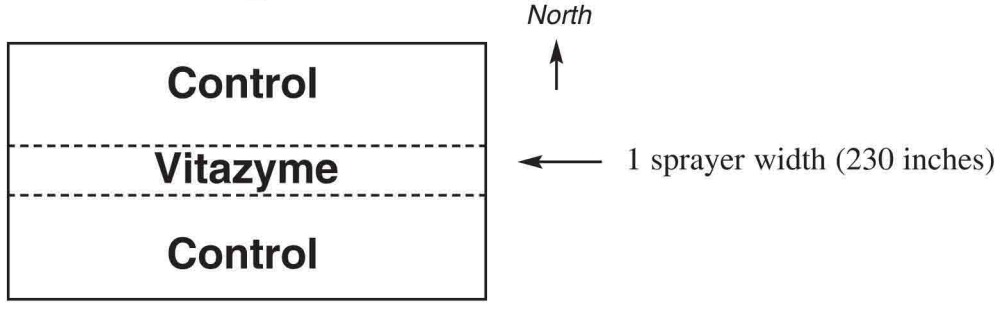
1997 Crop Results

Vitazyme on Soybeans

Researcher: Gerald Yoder
Location: Wellman, Iowa
Variety: Pioneer 9306
Seeding rate: 230,000 seeds/acre
Seeding date: May 1, 1997
Previous crop: corn
Row width: 7.5 inches
Tillage method: no-till
Experimental design: Two treatments were evaluated:

1. **Control (no Vitazyme)**
2. **Vitazyme sprayed once on the foliage and soil**



Vitazyme application: Vitazyme was applied to the foliage and soil at 13 oz/acre along with a herbicide spray when the soybeans were about one foot high.
Harvest date: October 2, 1997
Yield results: A weigh wagon was used to determine bean weights for strips harvested on both sides of the the applied Vitazyme strip.

	Control	Vitazyme
Soybean yield, north strip	67.62 bu/acre	69.82 bu/acre
Soybean yield, south strip	65.03 bu/acre	67.07 bu/acre
Average yield	**66.33 bu/acre**	**68.45 bu/acre (+2.12 bu/acre)**

Soybean yield increase: 4%

Income results: Farmgate value of soybeans, mid-Iowa: $7.00/bu

	Control	Vitazyme
Value of soybeans:	**$464.3/acre**	**$479.15/acre**

Income increase: $14.84/acre

Note: No sprayer cost is calculated, since Vitazyme was applied along with a herbicide.

Moisture at harvest:

	Control	Vitazyme
North strip	10.7%	10.2%
South strip	10.8%	10.0%
Average moisture	**10.8%**	**10.1%**

Moisture decrease: 0.7 percentage point

Leaf chlorophyll on August 17: An SPAD meter was used.

	Control	Vitazyme
SPAD units of chlorophyll (20 plants for each treatment)	**46.0**	**47.7**

Chlorophyll increase: 1.7 units

Pods: Five random plants from each treatment were selected, and pods were counted.

	Control	Vitazyme
Total pods	**166**	**250**

Pod number increase: 51%

Other observations and comments: Because the Vitazyme treated soybeans were drier at harvest, it may be presumed that they matured faster than the control beans. During August it was possible to view the field and pick out the treated strip due to a darker green color. The cropping year was excellent.

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1997 Crop Results

Vitazyme on Soybeans

Researcher: Waymond Lipsey, Agri-Research
Location: Danville, Iowa
Variety: Pioneer 9281 *Seeding date*: May 30, 1997
Seeding rate: 150,000 seeds/acre *Row width*: 30 inches
Experimental design: Four treatments were evaluated, in a completely randomized design having six seplications. Plots were 10 x 40 feet (0.0091827 acre).

1. **Control (no Vitazyme)**
2. **Vitazyme at 13 oz/acre at planting**
3. **Vitazyme at 13 oz/acre at early bloom**
4. **Vitazyme at 13 oz/acre at planting and at early bloom**

2	1	1	4	3	4
3	4	2	3	1	3
4	2	1	4	2	3
1	3	2	4	1	2

North ↑

Fertility treatments: none *Fertility level*: high *Tillage*: conventional
Soil type: Mahaska silty clay loam (pH = 6.8; cation exchange capacity = 20.8 meq/100 g.
Vitazyme application: Vitazyme was applied at 13 oz/acre at planting (directly on the seeds), at early bloom, or at both times.
Harvest date: October 1, 1997
Yield results: A plot combine was used to harvest the plots.

	Soybean yield	
Treatment	**lb/plot***	**bu/acre***
Control	24.0 c	43.56 c
13 oz/acre at planting	24.6 b	44.65 b
13 oz/acre at early bloom	25.5 a	46.28 a
13 oz/acre at planting and early bloom	25.8 a	46.83 a

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

Yield increase

At planting: 3%
At early bloom: 6%
At both times: 8%

Income results: The price of soybeans in Iowa is about $7.00/bu.

Treatment	**Soybean value**	**Increase in Value**
Control	$304.92/acre	0
13 oz/acre at planting	$312.55/acre	$7.63/acre
13 oz/acre at early bloom	$323.96/acre	$19.04/acre
13 oz/acre at planting and early bloom	$327.81/acre	$22.89/acre

Income increase

13 oz/acre
at early bloom
$19.04/acre

Comments: The year was very favorable for soybean yields.