Wheat, Spring

Researcher: V. V. Plotnikov *Location*: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station, Vinnytsia, Ukraine (Central Forest and Steppe Region) *Variety*: Pecherianka, Super Elite
Soil type: gray podzolic (organic matter = 2.2%, hydrolyzed N = 8.4 mg/100 g soil, P = 15.8 mg/100 g soil, exchangeable K = 12.4 mg/100 g soil, pH = 5.5) *Previous crop*: soybeans
Planting date: April 16, 2010 *Planting rate*: 6 million seeds/ha
Soil preparation: disking to 6 to 8 cm, tillage to 22 cm, harrowing to 4 to 5 cm
Experimental design: A wheat plot area, using a total area of about 1.0 ha, with four replicates, was established using two Vitazyme regimes to determine the product's effect on crop yield, grain quality, and plant growth characteristics.

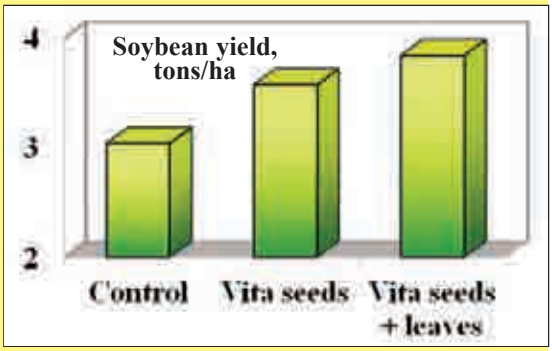
1. Control **2. Vitazyme on the seeds**
3. Vitazyme on the seeds, and leaves and soil

Fertilization: 30 kg/ha N, 30 kg/ha P_2O_5, and 30 kg/ha K_2O incorporated before planting
Vitazyme application: Treatments 2 and 3, a seed treatment at 1 liter/ha; Treatment 3, an additional foliar and soil treatment of 1 liter/ha on May 21, 2010
Yield results: See table and graph on the right.
Income results: Vitazyme improved crop income by 843 hrn/ha for the seed treatment alone, and by 1,098 hrn/ha for both the seed and foliar treatments.

Increase in grain yield with Vitazyme
Vitazyme on the seeds ..... +17%
Vitazyme on seeds + leaves ... +26%

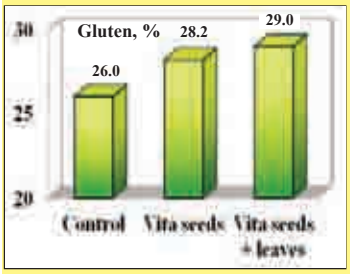
Vetch Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	3.04	---
2. Vitazyme, seeds	3.57	0.53 (+17%)
3. Vitazyme, seeds + leaves	3.84	0.80 (+26%)



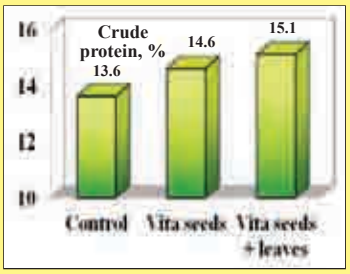
Grain quality results:

Grain Gluten



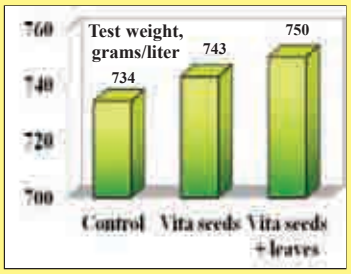
Vitazyme on the seeds enhanced grain gluten by 2.2%-points, while an additional foliar treatment raised gluten by 3.0%-points.

Crude Protein



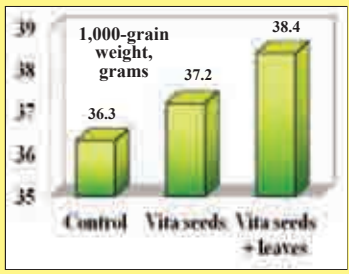
A seed treatment alone raised crude protein by 1.0%-point, while an additional foliar treatment boosted protein by 1.5%-points.

Test Weight



A single seed treatment increased grain density by 9 grams/liter, while an additional foliar treatment boosted it by 16 grams/liter.

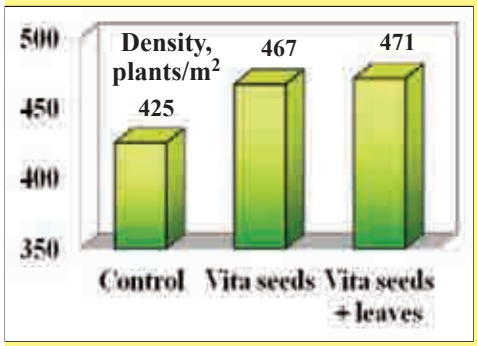
1,000-Grain Weight



Vitazyme on the seeds boosted 1,000-grain weight by 0.9 grams, and an added foliar spray further boosted this weight by 2.1 grams.

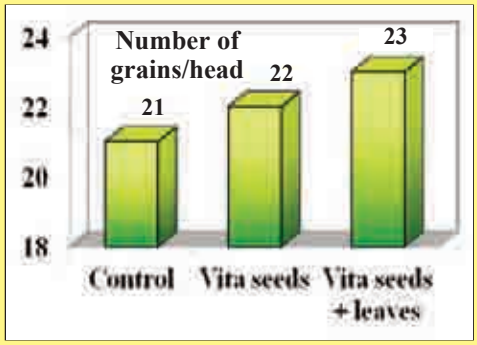
Plant structure results:

Plant Density



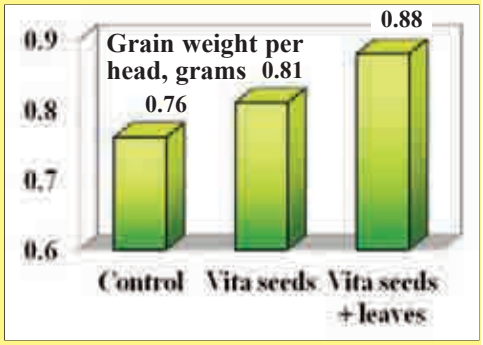
The seed treatment alone increased plant survival and density by 42 plants/m^2, while an additional foliar spray increased density by 46 plants/m^2.

Grains Per Head



There was an increase in seeds per head of 1 grain going from the control, to the single seed treatment, to the seed treatment plus foliar spray.

Grain Weight Per Head

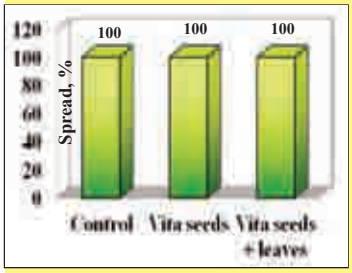


Grain weight per head was improved by a Vitazyme seed treatment alone by 0.05 gram, whereas an additional foliar spray raised that grain weight by 0.12 gram/head.

Disease results: Both oidium and septoriosis fungal diseases were evaluated.

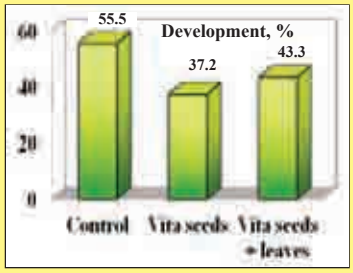
Oidium Disease

Oidium Spread



All plants for all three treatments were infected with oidium disease.

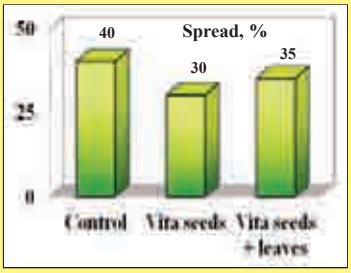
Oidium Development



The development of Oidium was somewhat less with both Vitazyme treatments, by 18.3% less for the seed treatment and by 12.2% less for the two treatments.

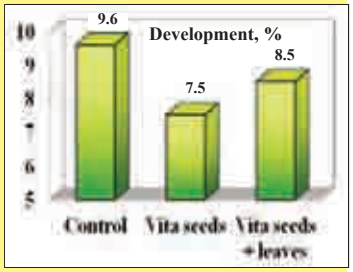
Septoriosis Disease

Septoriosis Spread



Septoriosis spread a bit less among the Vitazyme treated plants, being 10% fewer affected plants for the seed treatment alone, and 5% fewer for the two treatments.

Septoriosis Development



As for Oidium, septoriosis spread a bit less in the infected plant sites with Vitazyme, being 2.1% less for the seed treatment and 1.1% less for the seed plus foliar treatment.

Conclusion: A replicated spring wheat study at Vinnytsia, Ukraine, revealed that Vitazyme, whether applied at 1 liter/ha on the seeds, or with this treatment plus a 1 liter/ha foliar treatment in addition, greatly improved most parameters measured. These results are summarized below.

Parameter	Vitazyme effect	Parameter	Vitazyme effect
Grain yield	+17 to 26%	Grains per head	+1 to 2 grains/head
Income	+843 to 1,098 hrn/ha	Grain weight per head	+0.05 to 0.12 g/head
Grain Gluten	+2.2 to 3.0 %-points	Oidium spread	none
Crude protein	+1.0 to 1.5 %-points	Oidium development	-12.2 to 18.3%
Test weight	+9 to 16 grams/liter	Septoriosis spread	-5 to 10%
1,000-grain weight	+0.9 to 2.1 grams	Septoriosis development	-1.1 to 2.1%
Plant density	+42 to 46 plants/m^2		

Vitazyme is shown by this study to be a highly effective product for improving spring wheat yield, quality, and growth traits, and reducing disease susceptibility in Ukraine.

Wheat, Winter

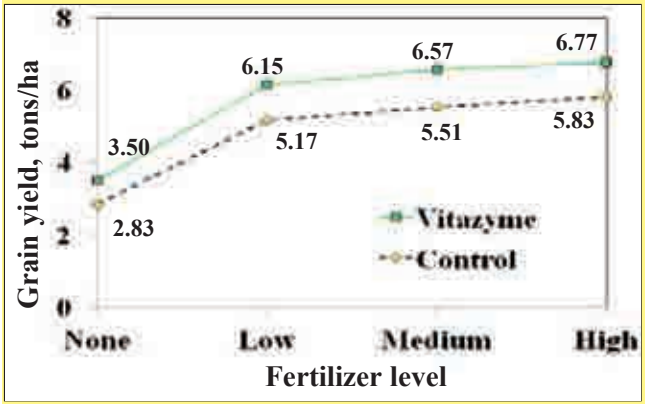
A Ukrainian Fertilizer Rate Trial

Researcher: V. V. Plotnikov *Location*: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station, Vinnytsia, Ukraine (Central Forest and Steppe Region) *Variety*: Liona, Super Elite
Soil type: gray podzolic (organic matter = 2.2%, hydrolyzed N = 8.4 mg/100 g soil, P = 15.8 mg/100 g soil, exchangeable K = 12.4 mg/100 g soil, pH = 5.5) *Previous crop*: summer vetch *Planting date*: October 9, 2009
Planting rate: 6 million seeds/ha *Soil preparation*: disking to 6 to 8 cm, tillage to 22 cm, harrowing to 3 to 4 cm

Treatment	Fertilizer	Vitazyme	Treatment	Fertilizer	Vitazyme
	kg/ha			kg/ha N-P_2O_5-K_2O	
1	0	no	5	0	yes
2	65-30-45	no	6	65-30-45	yes
3	100-45-70	no	7	100-45-70	yes
4	130-60-90	no	8	130-60-90	yes

Experimental design: A replicated field trial with Liona winter wheat was established using four rates of fertilizer and one Vitazyme treatment, to determine the yield, grain quality, and disease susceptibility of the crop in response to these treatments.

Grain Yield



Fertilization: fall, 30-30-30 kg/ha N-P_2O_5-K_2O tilled in; spring, 60 kg/ha N
Vitazyme application: (1) 1 liter/ha on the seeds at planting; (2) 1 liter/ha on the leaves in the spring
Yield results:

Increase in grain yield with Vitazyme with fertilizers*

No fertilizer..... +0.67 ton/ha (+24%)
65-30-45 ..... +0.98 ton/ha (+19%)
100-45-70 ..... +1.01 tons/ha (+18%)
130-60-90 ..... +0.94 ton/ha (+16%)

*Comparisons are made at the same fertility level.

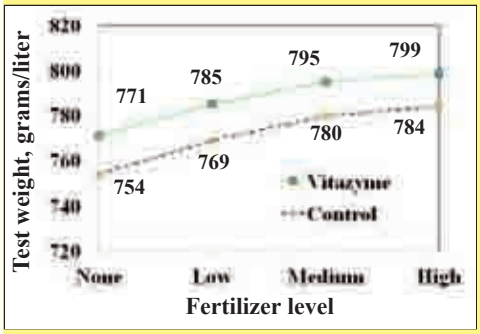
Continued on the next page

Note that at all fertilizer levels the Vitazyme addition markedly increased grain yield, especially at the zero rate, where a 24% yield increase resulted. The increase dropped a bit to a 16% yield increase at the highest fertilization rate. In all cases, fertilizer efficiency was improved with Vitazyme.

Income results: Using yields given above, the income was increased with Vitazyme by 817, 1,352, 1,401, and 1,286 hrn/ha from the lowest to the highest fertilizer rates, respectively, at the same fertilizer level.

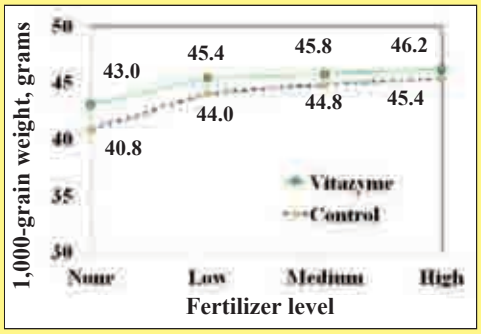
Quality results:

Test Weight



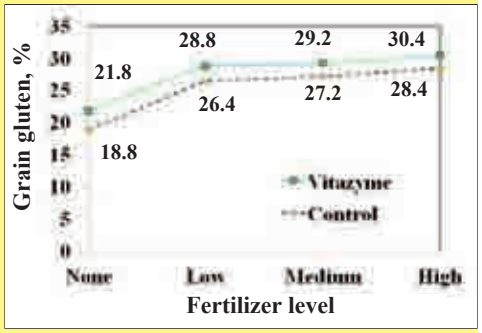
Vitazyme increased the grain density (grams/liter) successively above the untreated controls, at each fertilizer level, from 17 grams/liter at no fertilizer to 15 grams/liter at high fertilizer.

1,000-Grain Weight



At each fertilizer level, Vitazyme improved the 1,000-grain weight, by from 2.2 grams at zero fertilizer to 0.8 gram at high fertilizer.

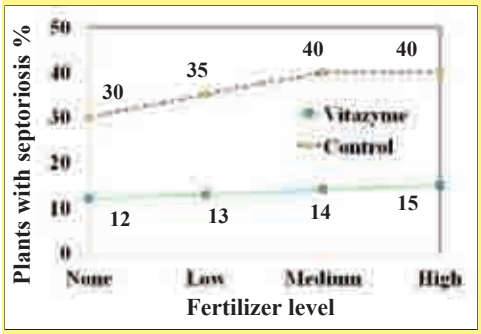
Gluten



The gluten content of the grain increased by 3.0 percentage points at zero fertilizer, and by 2.0 percentage points at the high fertilizer level in response to Vitazyme.

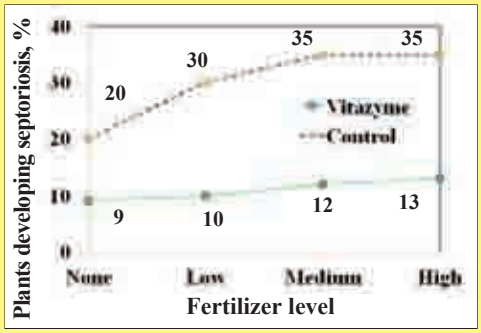
Disease results: Only septoriosis fungal disease was evaluated.

Spike Septoriosis Spread



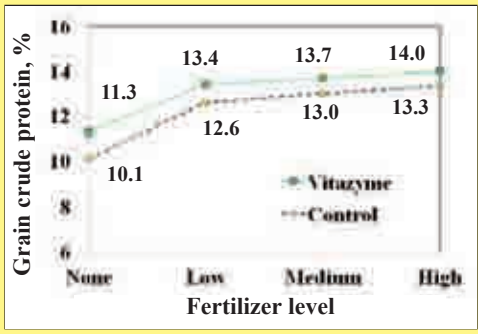
The spread of spike septoriosis was much higher with untreated wheat plants; Vitazyme had 18% fewer plants affected at zero fertilizer, but 25% fewer affected plants at high fertilizer levels.

Spike Septoriosis Development



Vitazyme greatly reduced the development of spike septoriosis at all fertilizer levels, by 11% less with no fertilizer to 23% less with the most fertilizer applied.

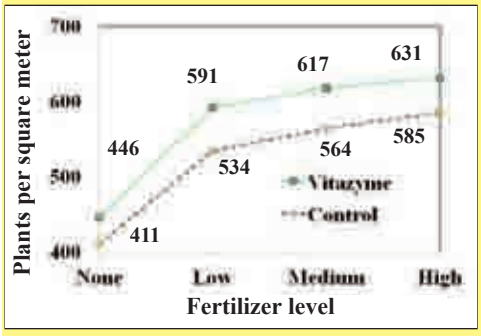
Crude Protein



Vitazyme increased crude protein of the grain at each fertilizer level, by 1.2 percentage points at zero fertilizer to 0.7 percentage point at the highest fertilizer level.

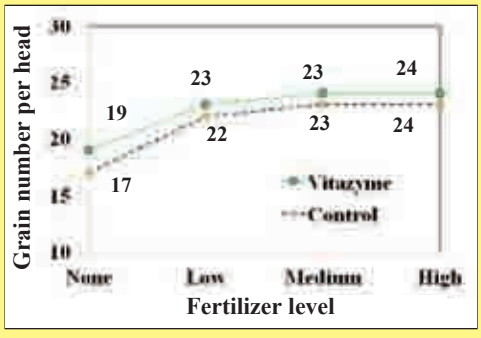
Wheat structure results:

Plant Density



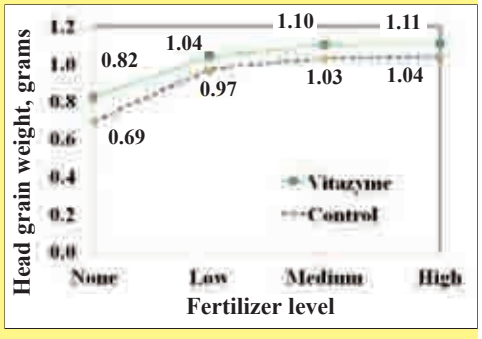
The seed and foliar treatments with Vitazyme increased the plant population at all fertilizer levels, by 35 plants/m^2 at no fertilizer and by 46 plants/m^2 at high fertilizer.

Grains Per Head



The number of grains per head was slightly favored by Vitazyme at each fertilizer level, by about one grain per head.

Grain Weight Per Head



Vitazyme consistently increased the weight of grain per head at each fertilizer level, from 0.13 gram/head at zero fertilizer to 0.07 gram/hand at high fertilizer. This result came from more grains/head plus a higher grain weight with Vitazyme.

Conclusion: Vitazyme in this Ukrainian winter wheat trial significantly improved the yield, profitably, quality, fungal infection, and growth characteristics at four fertilizer levels. The improvements were consistent for all parameters, and are summarized on the next page.

Parameter	Vitazyme effect	Parameter	Vitazyme effect
Grain yield	+16 to 24%	Septoriosis spread	-18 to 25%
Income	+817 to 1,401 hrn/ha	Septoriosis development	-11 to 23%
Grain test weight	+15 to 17 g/liter	Plant density	+35 to 46 plants/m2
1,000-grain weight	+0.8 to 2.2 g	Grains per head	+1 to 2 grains/head
Grain gluten	+2.0 to 3.0 %-points	Grain weight per head	+0.07 to 0.13 g/head
Crude protein	+0.7 to 1.2 %-points		

The data for this test show clearly that Vitazyme tends to improve crop yield, quality, and structural characteristics the most at the lower fertility levels (zero and 65-30-45 kg/ha N-P_2O_5-K_2O), while reducing the development and spread of the head fungal disease septoriosis the most at higher fertilizer levels (100-45-70 and 130-60-90 kg/ha N-P_2O_5-K_2O). These results display the great value of Vitazyme as a highly profitable crop amendment for Ukrainian winter wheat production.

Wheat, Winter

Researcher: V. V. Plotnikov *Location*: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station, Vinnytsia, Ukraine (Central Forest and Steppe Region)
Variety: Liona Super Elite *Planting date*: October 7, 2009
Planting rate: 6 million seeds/ha *Previous crop*: winter canola
Soil type: gray podzolic (organic matter = 2.2%, hydrolyzed N = 8.4 mg/100 g soil, P = 15.8 mg/100 g soil, exchangeable K = 12.4 mg/100 g soil, pH = 5.5) *Soil preparation*: disking 6 to 8 cm, tillage to 22 cm, and harrowing to 3 to 4 cm
Experimental design: An experimental area was divided into smaller plots, with four replicates for the Liona wheat variety. Three Vitazyme treatments were utilized to determine the effect of this product on winter wheat yield and quality.

1. **Control**
2. **Vitazyme (unknown treatment)**
3. **Vitazyme on seeds**
4. **Vitazyme on seeds, and foliar in spring**

Fertilization: fall, 30-30-30 kg/ha N-P_2O_5-K_2O tilled in: in the spring, 60 kg/ha N.

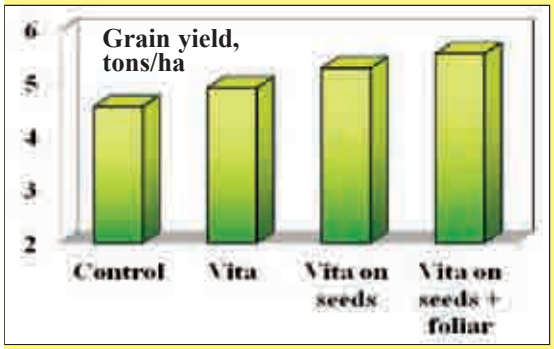
This winter wheat trial in Ukraine reveals a strong growth of well-filled heads with Vitazyme treatment, at 1 liter/ha.

Vitazyme application: Treatment 2, an unknown Vitazyme treatment; Treatment 3, a Vitazyme seed treatment to give 1 liter/ha; Treatment 4, a Vitazyme seed treatment to give 1 liter/ha plus a foliar spray at 1 liter/ha on April 30, 2010.

Yield results:

Grain Yield

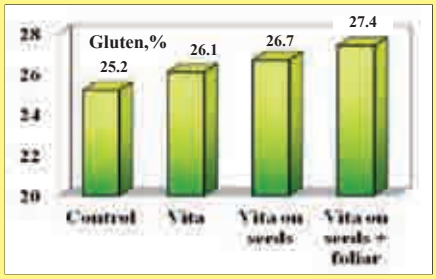
Treatment	Grain yield	Change
	tons/ha	tons/ha
1. Control	4.56	---
2. Vita (unknown)	4.91	0.35 (+8%)
3. Vita on seeds	5.28	0.72 (+16%)
4. Vita on seeds + leaves	5.55	0.99 (+22%)



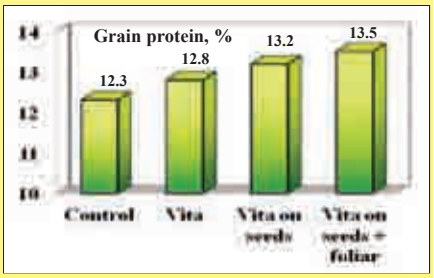
• Increase in grain with Vitazyme: 8 to 22%

Quality results:

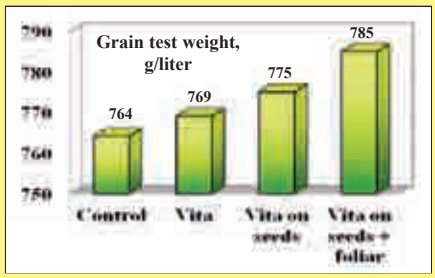
Gluten Content



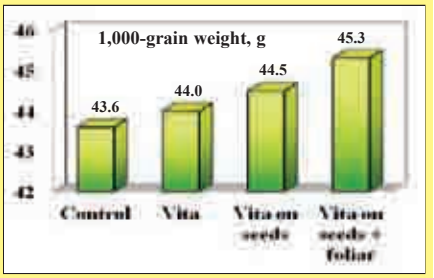
Crude Protein



Test Weight



1,000-Grain Weight



Income results: Profits were increased for the three Vitazyme treatments by 577 hrn/ha (Treatment 1), 1,123 hrn/ha (Treatment 2), and 1,368 hrn/ha (Treatment 3).

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Conclusion: A winter wheat trial in Ukraine, using a replicated plot design, revealed that Vitazyme increased grain yield by 8 to 22%, gluten content by 0.9 to 2.2 percentage points, crude protein by 0.5 to 1.2 percentage points, test weight by 5 to 21 grams/liter, and 1,000-grain weight by 0.4 to 1.7 grams. In all cases the smallest increase for each parameter was with an undefined Vitazyme treatment, the next highest increase was for a seed treatment, and the highest values were in all cases for Vitazyme applied as a seed treatment and again in the spring as a foliar treatment. This management regime is shown to be a great benefit for Ukrainian wheat farmers.

- ***Increase in gluten with Vitazyme: 0.9 to 2.2%-points***
- ***Increase in crude protein with Vitazyme: 0.5 to 1.2%-points***
- ***Increase in test weight with Vitazyme: 5 to 21 grams/liter***
- ***Increase in 1,000-grain weight with Vitazyme: 0.4 to 1.7 grams***

Wheat, Winter

Researcher: unknown
Company testing: Ukrzernoprom AGRO
Location: Tulchin raion, Vinnytsia oblast, Kleban, Ukraine
Planting date: October 7, 2009 *Variety*: Zolotokolosa
Planting rate: 6 million seeds/ha *Previous crop*: winter rape
Seedbed preparation: disking 6 to 8 cm deep, tillage 20 to 22 cm deep, and harrowing 4 to 5 cm deep (twice)
Experimental design: A winter wheat field was divided into an untreated control plus two Vitazyme treatments to evaluate the product's effects on wheat yield, quality, and profitability.

1. Control 2. Vitazyme, fall only 3. Vitazyme, fall and spring

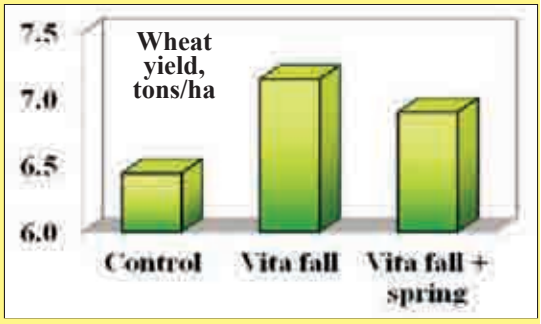
Fertilization: in the spring, 20-60-80 kg/ha of N-P_2O_5-K_2O
Vitazyme application: Treatments 2 and 3 received 1 liter/ha in the fall on September 9, 2009, and Treatment 3 received an additional 1 liter/ha on the leaves and soil on June 5, 2010.
Yield results: See the table and graph on the right.

- ***Increase in yield with Vitazyme: 7 to 11%***

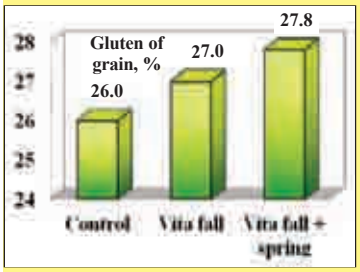
Grain quality results:

Wheat Yield

Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	6.44	---
2. Vitazyme, fall	7.15	0.71 (+11%)
3. Vitazyme, fall + spring	6.90	0.46 (+7%)

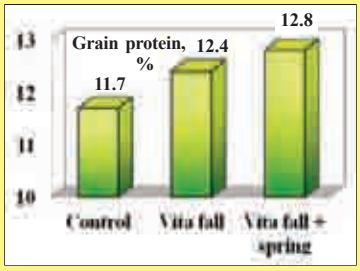


Gluten Content



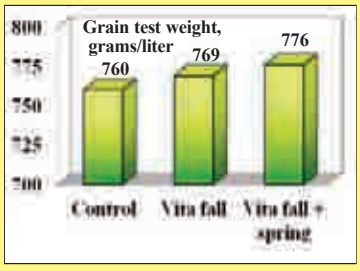
Increase with Vitazyme
Vitazyme once 1.0%-point
Vitazyme twice 1.8%-point

Crude Protein



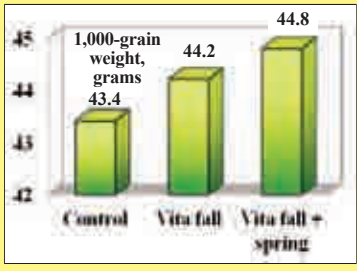
Increase with Vitazyme
Vitazyme once 0.7%-point
Vitazyme twice 1.1%-point

Test Weight



Increase with Vitazyme
Vitazyme once ..... 9 grams/L
Vitazyme twice ... 16 grams/L

1,000-Grain Weight



Increase with Vitazyme
Vitazyme once ..... 0.8 gram
Vitazyme twice ..... 1.4 grams

Income results: A single Vitazyme application increased income by 1,106 hrn/ha, while two applications increased income by 494 hrn/ha.
Conclusion: A winter wheat trial in Ukraine, using Vitazyme at 1 liter/ha in the fall or 1 liter/ha in the fall as well as in the spring, proved that the yield was increased by 11% with one application, but 7% with two. The income was increased by 1,106 hrn/ha, and 494 hrn/ha with the two treatments. Grain quality was improved the most with two Vitazyme applications, up to 1.8%-points for gluten, 1.1%-points for protein, 16 grams/liter for test weight, and 1.4 grams for 1,000-grain weight; a single application provided consistent increases in quality parameters, only slightly less than those from two applications.

Wheat, Winter

Researcher: unknown *Research organization*: Krasnodar Lukyanenko NIICX
Location: Krasnodar Region, Russia *Variety*: Moskvich *Seeding rate*: 5 million seeds/ha
Planting date: October 12, 2009 *Tillage*: disking *Previous crop*: sunflowers
Soil type: Chernozem (2.6 to 3.2% organic matter, pH = 5.1, available P_2O_5 = 45.0 to 48.4, available K_2O = 341 to 385 mg/kg, exchangeable bases = 28.9 to 31.8 mg/100 g od foil, saturation with Ca and Mg = 85.0 to 88.6%, texture = 66% clay and 34% silt), highly fertile

Experimental design: A wheat field was divided into untreated and Vitazyme treated plots, 40 m^2, using four replicates, with the objective of evaluating the product's effects on winter wheat growth and yield.

1. Control **2. Vitazyme**

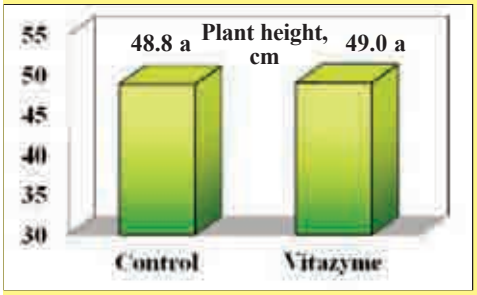
Fertilization: a fall application of 16-60-40 kg/ha N-P_2O_5-K_2O as $NH_4H_2PO_4$ and KCl; a spring application of 2 c/ha

Vitazyme application: (1) 1 liter/ha foliar sprayed at early heading and flowering on May 18, 2010, and (2) 1 liter/ha foliar sprayed at early ripening on May 28, 2010

Weather conditions: The climate is moderate continental, warm temperate, and humid. At planting and thereafter, conditions were warm and dry, but by freezeup rainfall and temperatures favored excellent hardening of the newly emerged plants. Springtime growth was hampered by dry and hot weather, which persisted into flowering and ripening of the grain. During harvest, excessive rain fell to negatively influence grain quality.

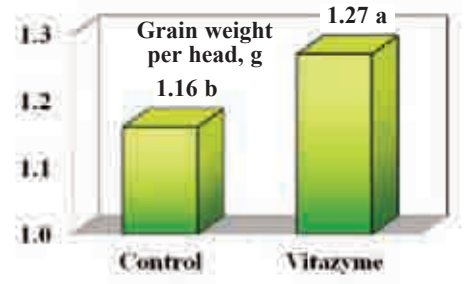
Yield results:

Stalk Height*



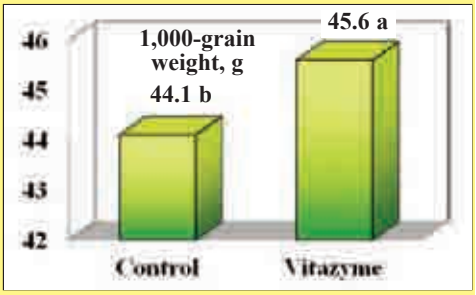
*Means followed by the same letter are not significantly different at P = 0.05.
$LSD_{0.05}$ = 1.2 cm.

Grain Weight Per Head*



*Means followed by the same letter are not significantly different at P = 0.05.
$LSD_{0.05}$ = 0.06 g.

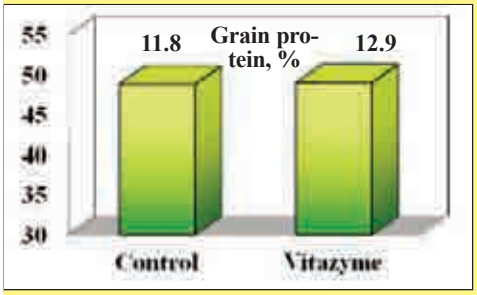
1,000-Grain Weight*



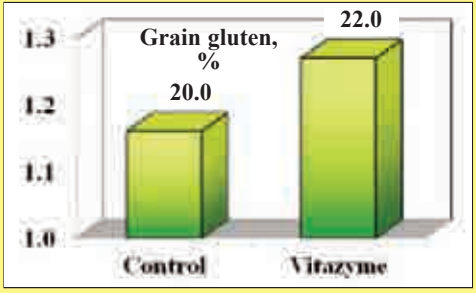
*Means followed by the same letter are not significantly different at P = 0.05.
$LSD_{0.05}$ = 0.5 g.

Grain quality results:

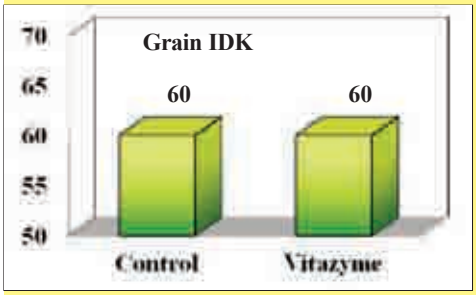
Protein



Gluten



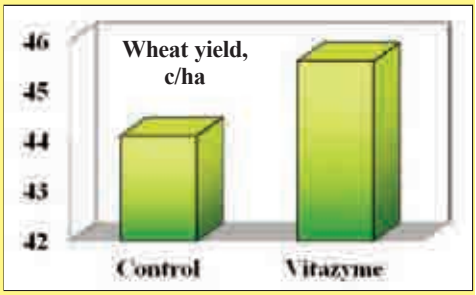
IDK



Grain Yield

Treatment	Income	Change
	c/ha	c/ha
Control	56.0 b	——
Vitazyme	62.2 a	6.2 (+11%)

*Means followed by the same letter are not significantly different at P = $_{0.05}$. LSD0.05 = 2.8 c/ha.



Conclusions: A winter wheat study, conducted in 40 m^2 plots in Russia, revealed that Vitazyme improved wheat growth and yield, as well as wheat grain quality, in nearly every case. These improvements are summarized below.

Parameter	Increase with Vitazyme
Grain weight per head	0.11 gram (9%)
1,000-grain weight	1.5 gram (3%)
Grain yield	6.2 c/ha (11%)
Protein of grain	1.1 %-points
Gluten of grain	2.0 %-points

Vitazyme for this study in Russia improved both winter wheat yield and quality. It is an excellent amendment for wheat growers.

- **Increase in wheat yield with Vitazyme: 11%**
- **Increase in gluten with Vitazyme: 2.0%-points**
- **Increase in grain per head with Vitazyme: 0.11 gram (+9%)**
- **Increase in 1,000-grain weight with Vitazyme: 1.5 gram (+3%)**
- **Increase in protein with Vitazyme: 1.1%-points**

Wheat

Farmer: Enrique Babyleck
Location: Pitrufquen, Chile
Previous crop: oats
Research organization: Syngenta
Variety: Kumpa
Planting date: May 2, 2009
Experimental design: Plots in a wheat field were marked with stakes, and seven treatments of Vitazyme, applied early and/or late, and with or without reduced N fertilizer, were added to determine the effects of these treatments on wheat growth parameters and grain yield.

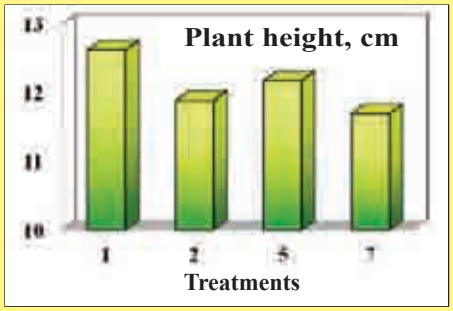
Treatment	Vitazyme rate*		Nitrogen
	Preemergence	BBCH32	% of optimum
	liters/ha	liters/ha	
1	1.0	0	100
2	1.5	0	100
3	1.0	1.0	100
4	1.5	1.5	100
5	1.5	0	50
6	1.5	1.5	50
7	0	0	100

*Triacontanol concentration: 0.0022 g/liter; brassinosteroid concentration: 0.013 g/liter.

A Syngenta wheat trial at the Babyleck farm, using several rates and combinations of Vitazyme and fertilizer, proved that yields could be increased by up to 8% with the program.

Plant Height At 54 Days After Planting

Treatment No.	Vita early	Vita late	N	Height	Change
	liters/ha		%	cm	
1	1.0	0	100	12.62	0.93 (+8%)
2	1.5	0	100	11.88	0.19 (+2%)
5	1.5	0	50	12.17	0.48 (+4%)
7	0	0	100	11.69	---



Increase in plant height with Vitazyme

1.0 L/ha at BBCH14, 100% N .... +8%
1.5 L/ha at BBCH14, 100% N .... +2%
1.5 L/ha at BBCH14, 50% N ..... +4%

Fertilization: according to recommendations
Vitazyme application: (1) 1.0 or 1.5 liters/ha on the leaves and soil at BBCH14, on June 26, 2009; (2) 1.0 or 1.5 liters/ha on the leaves and soil at stage BBCH 31, on October 5, 2009.
Growth results: see the following tables and graphs

Yield results:

Wheat Grain Yield

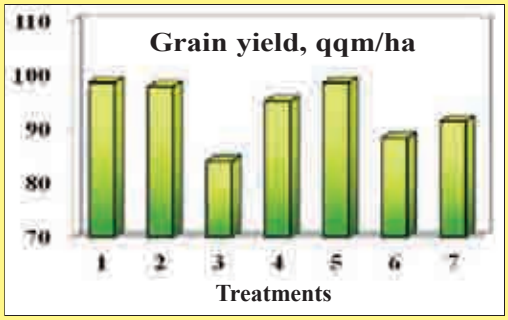
Treatment No.	Vita early	Vita late	N	Yield	Change
	liters/ha		%	number	
1	1.0	0	100	98.6	7.2 (+8%)
2	1.5	0	100	97.8	6.4 (+7%)
3	1.0	1.0	100	84.0	(-) 7.4 (-8%)
4	1.5	1.5	100	95.1	3.7 (+4%)
5	1.5	0	50	98.5	7.1 (+8%)
6	1.5	1.5	50	88.3	(-) 3.1 (13%)
7	0	0	100	91.4	---

Yield increase with Vitazyme

1.0 L/ha at BBCH14 ..... +8%
1.5 L/ha at BBCH14 ..... +7%
1.5 L/ha twice ..... +4%
1.5 L/ha at BBCH14 + 50% N ..... +8%

Tillers Per Plant At 54 Days After Planting

Treatment No.	Vita early	Vita late	N	Tillers	Change
	liters/ha		%	number	
1	1.0	0	100	1.70	(-) 0.35 (-17%)
2	1.5	0	100	1.50	(-) 0.55 (-27%)
3	1.0	1.0	100	1.85	(-) 0.20 (-10%)
4	1.5	1.5	100	1.75	(-) 0.30 (-15%)
5	1.5	0	50	1.95	(-) 0.10 (-5%)
6	1.5	1.5	50	1.85	(-) 0.20 (-10%)
7	0	0	100	2.05	---



All Vitazyme treatments reduced the number of tillers per plant.
Conclusion: In this Vitazyme study in Chile, evaluating the effects of the product on wheat treated with 1.0 and/or 1.5 liters/ha applied once or twice — with either 50% or 100% of the recommended N, the 1.0 and 1.5 liter/ha rates applied at the BBCH14 stage produced 7 to 8% yield increases. The 1.5 liters/ha rate applied twice (100% N) produced a 4% yield improvement, while a 50% fertilizer N reduction increased the yield by 8%; this was the most profitable treatment of all seven. Interestingly, these yield responses were not a reflection of tillers per plant, since all Vitazyme treatments reduced tillering. The yield improvement must have been due to larger heads and greater grain weight from Vitazyme application. This study proves the effectiveness of Vitazyme use on wheat in Chile.

Wheat

Farmer: Felipe Schmidt *Location*: Pailahueque, Chile
Research organization: Syngenta *Variety*: Caluga
Planting date: June 5, 2009 *Previous crop*: oats
Experimental design: A wheat field was divided into plots having Vitazyme treatment and no treatment for the purpose of evaluating the product's effects on wheat growth and yield, at both 100% and 50% nitrogen fertilization.

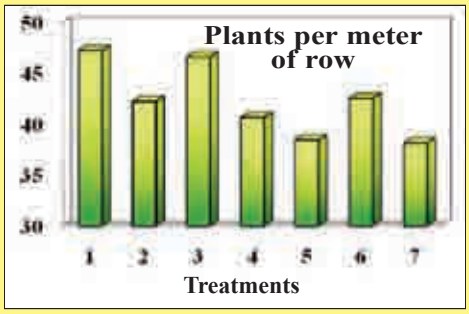
Treatment	Vitazyme rate*		Nitrogen
	Preemergence	BBCH32	% of optimum
	liters/ha	liters/ha	
1	1.0	0	100
2	1.5	0	100
3	1.0	1.0	100
4	1.5	1.5	100
5	1.5	0	50
6	1.5	1.5	50
7	0	0	100

*Triacontanol concentration: 0.0022 g/liter; brassinosteroid concentration: 0.013 g/liter.

A Vitazyme trial at the Schmidt farm in Chile revealed that the plant population, crop height, and yield of wheat were in most cases improved with the product.

Plant Population At 35 Days After Planting

Treatment No.	Vita early	Vita late	N	Population	Change
	liters/ha		%	plants per meter	
1	1.0	0	100	47.19	9.06 (+24%)
2	1.5	0	100	42.19	4.06 (+11%)
3	1.0	1.0	100	46.56	8.43 (+22%)
4	1.5	1.5	100	40.63	2.50 (+7%)
5	1.5	0	50	38.44	0.31 (+1%)
6	1.5	1.5	50	42.50	4.37 (+11%)
7	0	0	100	38.13	---



Fertilization: according to recommendations
Vitazyme application: (1) 1.0 or 1.5 liters/ha on the soil before emergence, on June 9, 2009; (2) 1.0 or 1.5 liters/ha on the leaves and soil at stage BBCH32, on October 5, 2009
Growth results: See the following tables and graphs.

Increase in plant population with Vitazyme

100% N

1.0 liter/ha early ..... +24%
1.5 liter/ha early ..... +11%
1.0 liter/ha twice ..... +22%
1.5 liter/ha twice ..... +7%

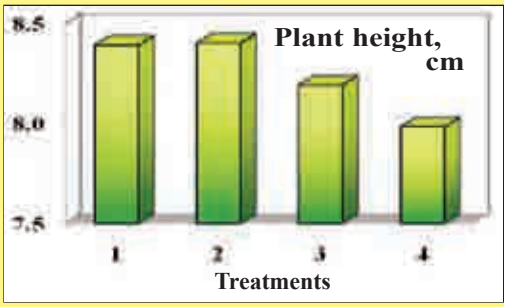
50% N

1.5 liter/ha twice ..... +11%

Plant Height At 59 Days After Planting

Treatment No.	Vita early	Vita late	N	Height	Change
	liters/ha		%	cm	
1	1.0	0	100	8.39	0.41 (+5%)
2	1.5	0	100	8.40	0.42 (+5%)
5	1.5	0	50	8.19	0.21 (+3%)
7	0	0	100	7.98	---

• Increase in plant height with Vitazyme: 3 to5%

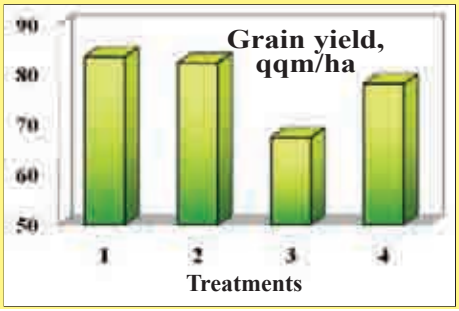


Grain Yield

Treatment No.	Vita early	Vita late	N	Yield	Change
	liters/ha		%	qqm/ha	qqm/ha
1	1.0	0	100	83.58	5.41 (+7%)
4	1.5	1.5	100	82.38	4.21 (+5%)
5	1.5	0	50	67.33	(-) 10.84 (-14%)
7	0	0	100	78.17	---

Increase in wheat yield with Vitazyme

1.0 liter/ha early ..... +7%
1.5 liter/ha twice ..... +5%



Yield results: See left.
Conclusion: In this wheat study with Vitazyme in Chile, using various 1.0 and 1.5 liter/ha applications, with a 50% fertilizer N application rate in some cases, all treatments improved

Continued on the next page

plant population, by up to 24% with the 1 liter/ha spray before emergence. At 59 days after planting, the height of the plants was improved by 3 to 5% above the control, while the harvested yield increased by 7% (5.41 qqm/ha) for the 1 liter/ha application preemergent; the 1.5 liter/ha rate before emergence gave a similar yield increase. A fertilizer N reduction of 50%, with a 1.5 liters/ha application before emergence, produced a yield below the control; apparently the available N in the soil was not sufficient for a yield increase despite Vitazyme's ability to improve N efficiency. These results show the great utility of using this product to improve wheat production in Chile.

Wheat

Farmer: Syngenta
Variety: Orvantis
Planting date: May 28, 2009
Location: Pua, Chile
Previous crop: barley

Experimental design: In this trial, a series of wheat plots was laid out in a field using seven treatments. The purpose of the study was to evaluate the effect of Vitazyme, with and without reduced fertilizer N, on wheat growth and yield.

Treatment	Vitazyme rate*		Nitrogen
	Preemergence	BBCH32	% of optimum
	liters/ha	liters/ha	
1	1.0	0	100
2	1.5	0	100
3	1.0	1.0	100
4	1.5	1.5	100
5	1.5	0	50
6	1.5	1.5	50
7	0	0	100

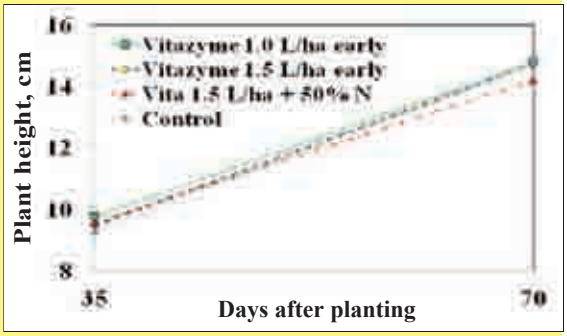
*Triacontanol concentration: 0.0022 g/liter; brassinosteroid concentration: 0.013 g/liter.

This wheat trial at Pua, Chile, revealed excellent tillering increases with Vitazyme, and 4 to 8% yield increases with Vitazyme applied at from 1.0 to 1.5 liters/ha before emergence.

Fertilization: according to recommendations
Vitazyme application: (1) 1.0 or 1.5 liters/ha on the leaves and soil shortly after emergence, on June 9, 2009; (2) 1.0 or 1.5 liters/ha on the leaves and soil at stage BBCH31, on October 9, 2009.
Growth results:

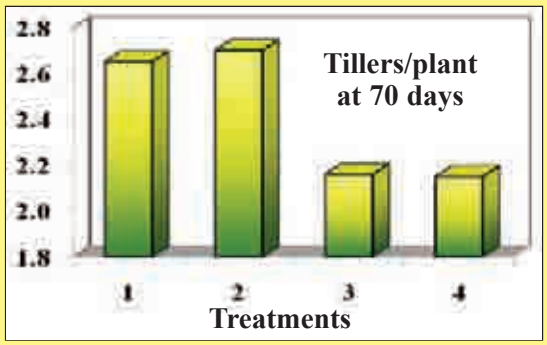
Plant Height At 35 and 70 Days After Planting

Treatment No.	Vita early	Vita late	N	Height	Change	Height	Change
	liters/ha		%	cm		cm	
1	1.0	0	100	9.77	0.51 (+6%)	14.79	0.09 (+1%)
2	1.5	0	100	9.48	0.22 (+2%)	14.72	0.02 (0%)
5	1.5	0	50	9.58	0.32 (+3%)	14.19	(-) 0.51 (-3%)
7	0	0	100	9.26	---	14.70	---



Tillers At 70 Days After Planting

Treatment No.	Vita early	Vita late	N	Tillers	Change
	liters/ha		%	number	
1	1.0	0	100	2.65	0.50 (+23%)
2	1.5	0	100	2.70	0.55 (+26%)
5	1.5	0	50	2.16	0.01 (0%)
7	0	0	100	2.15	---



Yield results:

Grain Yield

Treatment No.	Vita early	Vita late	N	Yield	Change
	liters/ha		%	qqm/ha	qqm/ha
1	1.0	0	100	111.6	4.4 (+4%)
2	1.5	0	100	116.3	9.1 (+8%)
3	1.0	1.0	100	101.6	(-) 5.6 (-5%)
4	1.5	1.5	100	104.4	(-) 2.8 (-3%)
5	1.5	0	50	103.8	(-) 3.4 (-3%)
6	1.5	1.5	50	95.3	(-) 11.9 (-11)
7	0	0	100	107.2	---

Increase in tillers with Vitazyme

1.0 liter/ha early ..... +23%
1.5 liter/ha twice ..... +26%

Conclusion: In this wheat study in Chile, using Vitazyme at 1.0 or 1.5 liters/ha shortly after emergence and/or about 18 weeks later, and with or

without nitrogen fertilizer, Vitazyme at 1.0 or 1.5 liters/ha, applied shortly after emergence, stimulated tillering by 23 to 26%, and increased yield of the grain by 4 to 8%. Other treatments did not cause increases in growth parameters or yield, especially Treatment 6 which received two 1.5 liter/ha Vitazyme applications. It appears that N fertilizer applications need to be maintained at optimum levels under Chilean conditions for Vitazyme to work best, and a second application later in the season does not add to yield responses. A single Vitazyme application early in the growth period gives the best results, and shows the product's excellent utility for Chile's agriculture.

Increase in wheat yield with Vitazyme

1.0 liter/ha early ..... +4%
1.5 liter/ha twice ..... +8%

Wheat

Farmer: Marcel Jakob *Location*: Curacautin, Chile
Research organization: Syngenta *Variety*: Otto
Planting date: August 5, 2009 *Previous crop*: wheat
Experimental design: A wheat field was divided into several strips to place Vitazyme treatments having one or two applications, plus some with reduced N applications. The objective of the study was to evaluate the product's effects on plant growth and crop yield.
Fertilization: according to recommendations

Treatment	Vitazyme rate*		Nitrogen
	Preemergence	BBCH32	% of optimum
	liters/ha	liters/ha	
1	1.0	0	100
2	1.5	0	100
3	1.0	1.0	100
4	1.5	1.5	100
5	1.5	0	50
6	1.5	1.5	50
7	0	0	100

*Triacontanol concentration: 0.0022 g/liter; brassinosteroid concentration: 0.013 g/liter.

A Syngenta wheat trial at the Marcel Jakob farm produced 9 to 15% increases in plant population. Unfortunately there was no yield data collected, but it may be presumed that yield would follow this population.

Plant Population At 19 Days After Planting

Treatment No.	Vita early	Vita late	N	Population	Change
	liters/ha		%	plants per meter	
1	1.0	0	100	53.75	4.37 (+9%)
2	1.5	0	100	55.94	6.56 (+13%)
3	1.0	1.0	100	56.56	7.18 (+15%)
4	1.5	1.5	100	55.63	6.25 (+13%)
5	1.5	0	50	55.00	5.62 (+11%)
6	1.5	1.5	50	56.56	7.18 (+15%)
7	0	0	100	49.38	---

Increase in plants/meter of row with Vitazyme

100% N

1.0 liter/ha early ..... +9%
1.5 liters/ha early ..... +13%
1.0 liter/ha twice ..... +15%
1.5 liters/ha twice ..... +13%

50% N

1.5 liters/ha early ..... +11%
1.5 liters/ha twice ..... +15%

Vitazyme application: (1) 1.0 or 1.5 liters/ha on the leaves and soil at BBCH14, on September 9, 2009; (2) 1.0 or 1.5 liters/ha on the leaves and soil at stage BBCH 32, on November 11, 2009.
Growth results: See the table above.
Yield results: No yield results are available from this study.
Conclusion: In this wheat study in Chile to evaluate Vitazyme effects on wheat growth, for all treatments, at both 50% and 100% N levels, the population of plants per meter of row was increased, from 9 to 15%. Unfortunately, no yield results are available for the study.

Wheat

Test farm: CIA *Research organization*: Syngenta *Location*: Pua, Chile
Variety: Otto *Previous crop*: barley *Planting date*: July 14, 2009
Experimental design: A series of four strips in a uniform field were planted to wheat, the strips separated by spaces about one meter wide. The purpose of the study was to evaluate the effect of Vitazyme applications, with and without a "Take-All Pack" fertilizer mix, on wheat yield.
Fertilizer: according to recommendations, plus a Take-All Pack for Treatments 2, 3, and 4

Treatment	Vitazyme Early	Vitazyme Late	Take-All Pack (TAP)
	liters/ha	liters/ha	
1	0	0	0
2	0	0	X
3	1.5	0	X
4	1.5	1.5	X

Vitazyme application: (1) For Treatments 3 and 4, 1.5 liters/ha at the BBCH 14-21 stage on September 14; for Treatments 4, 1.5 liters/ha at the BBCH 31 stage on October 30.

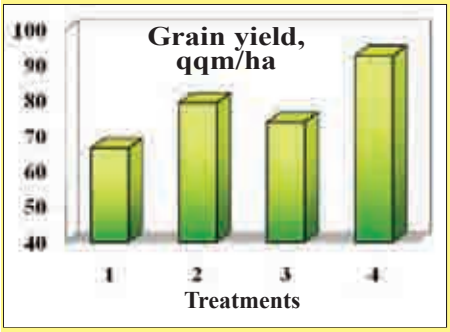
Yield results:

A vivid demonstration of Vitazyme's effect on enhancing a micronutrient fertilizer is displayed in this photo from Syngenta.

Wheat Grain Yield

No.	Treatment: Vita early	Vita late	TAP	Yield	Change[1] (control=Trt. 1)	Change[2] (control=Trt. 2)
	liters/ha	liters/ha		qqm/ha	qqm/ha	qqm/ha
1	0	0	0	66.56	---	---
2	0	0	X	79.25	12.69 (+19%)	---
3	1.5	0	X	73.88	7.32 (+11%)	(-) 5.37 (+7%)
4	1.5	1.5	X	92.75	26.19 (+39%)	13.50 (+17%)

[1]Yields are compared to the control (Treatment 1).
[2]Yields of Treatments 3 and 4 are compared to Treatment 2.



Conclusions: In this Chilean wheat demonstration at Pua, the Take-All Pack increased grain yield above the control by 19%. By adding Vitazyme to the crop in a single early application, the yield dropped slightly by 7%. However, when two applications were made, one early plus one later, the grain yield improved by a remarkable 17% (13.50 qqm/ha) compared to the TAP treatment only. It is possible that, in this study situation, a later application alone would have given the full increase noted, since an early application gave a decrease for some unknown reason. The demonstration lends support to the fact that Vitazyme, in the combination with a nutrient package designed to combat Take-All of wheat, is able, when applied at the proper time, to greatly increase wheat yield.

Change in wheat yield with Vitazyme

Using the untreated treatment as control

TAP only	+19%
TAP + Vitazyme early	+11%
TAP + Vitazyme twice	+39%

Using the TAP only treatment as control

TAP + Vitazyme early	-7%
TAP + Vitazyme twice	+17%

Wheat

A Summary of Four Trials

Research organization: Syngenta, Santiago, Chile

Experimental design: Four wheat field trials were set up in various locations across Chile, and are reported elsewhere. The purpose of the studies was to evaluate the effect of Vitazyme, applied at 1.0 or 1.5 liters/ha once or twice, with 50% or 100% fertilizer, on wheat yield.

Fertilization: according to recommendations

Vitazyme application: (1) 1.0 or 1.5 liters/ha on the soil before emergence, on June 9, 2009; (2) 1.0 or 1.5 liters/ha on the leaves and soil at stage BBCH 32, on October 5, 2009.

Yield results: See the following summary of the four trials.

Treatment	Vitazyme rate* Preemergence	Vitazyme rate* BBCH32	Nitrogen % of optimum
	liters/ha	liters/ha	
1	1.0	0	100
2	1.5	0	100
3	1.0	1.0	100
4	1.5	1.5	100
5	1.5	0	50
6	1.5	1.5	50
7	0	0	100

*Triacontanol concentration: 0.0022 g/liter; brassinosteroid concentration: 0.013 g/liter.

Wheat Grain Yield

No.	Treatment: Vita early	Vita late	N	Yield	Change
	cm	cm			
1	1.0	0	100	79.8	4.2 (+6%)
2	1.5	0	100	79.7	4.1 (+5%)
3	1.0	1.0	100	70.6	(-) 5.0 (-7%)
4	1.5	1.5	100	77.5	1.9 (+3%)
5	1.5	0	50	72.0	(-) 3.6 (-5%)
6	1.5	1.5	50	68.5	(-) 7.1 (-9%)
7	0	0	100	75.6	---

Conclusion: These four Chilean wheat trials proved that only one Vitazyme application, at either 1.0 or 1.5 liters/ha, applied early in the growing season, was necessary to provoke yield increases (5 to 6%). Two 1.5 liter/ha applications also increased the yield (3%). On average, reducing fertilizer N brought a yield reduction, showing the need to further investigate this unexpected result.

Increase in wheat grain yield with Vitazyme

1.0 liter/ha early	+6%
1.5 liters/ha early	+5%
1.5 liters/ha twice	+3%

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2009 Crop Results

Vitazyme on Wheat, winter

Researcher: O.V. Kornijchuk, V.V. Plotnikov, and agronomic scientists
Organization: Vinnytsia State Agricultural Experiment Station, Ukraine Academy of Agrarian Sciences, Vinnytsia, Ukraine *Variety*: Liona, super elite *Sowing rate*: 6 million seeds/ha
Location: Ukraine central forest-steppe area near Vinnytsia *Planting date*: September 30, 2000
Previous crop: spring vetch *Tillage*: plowing and cultivating
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 phosphorus, 12.4 mg/100 g of soil exchangeable potassium, and pH=5.5.
Experimental design: A field was divided into four fertility levels, replicated four times, and each regime had either Vitazyme or no Vitazyme. Yields were evaluated in response to Vitazyme.

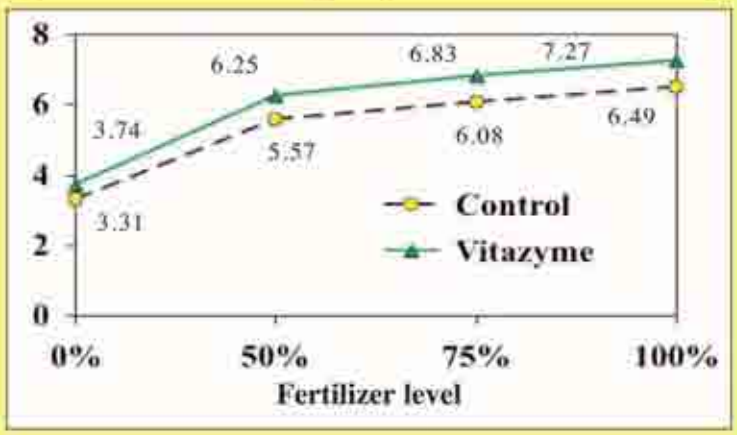
Treatment	Vitazyme	Nitrogen	Phosphorus	Potassium
		kg/ha		
1. No Fertilizer	0	0	0	0
2. 50% fertilizer	0	65	30	45
3. 75% fertilizer	0	100	45	70
4. 100% fertilizer	0	130	60	90
5. No fert + Vita	x	0	0	0
6. 50% fert + Vita	x	65	30	45
7. 75% fert + Vita	x	100	45	70
8. 100% fert + Vita	x	130	60	90

Fertilization: See the amounts applied in the table above.
Vitazyme application: Two sprimg applications of Vitazyme were made at 1liter/ha each time, on the leaves and soil.
Yield results:

Treatment	Grain yield	Yield change*
	kg/ha	
1. No Fertilizer	3.31	—
2. 50% fertilizer	5.57	—
3. 75% fertilizer	6.08	—
4. 100% fertilizer	6.49	—
5. No fert + Vita	3.74	0.43 (+13%)
6. 50% fert + Vita	6.25	0.68 (+12%)
7. 75% fert + Vita	6.83	0.75 (+12%)
8. 100% fert + Vita	7.27	0.78 (+12%)

*Comparisons are made between Vitazyme treated and untreated treatments at the same fertility level. Thus, 1 and 5, 2 and 6, 3 and 7, and 4 and 8 were compared.

Grain yield, tons/ha



Increase in grain yield with fertilizer*
No fertilizer ..... 3.53 tons/ha
50% fertilizer ..... 5.91 tons/ha (+67%)
75% fertilizer ..... 6.46 tons/ha (+83%)
100% fertilizer .... 6.88 tons/ha (+95%)

Increase in grain yield with Vitazyme	
With no fertilizer	13%
With 50% fertilizer	12%
With 75% fertilizer	12%
With 100% fetilizer	12%

*Values are averaged for Vitazyme treated and untreated treatments,

Quality results:

Grain Weight

Fertilization	Control	Vitazyme	Change
	grams/liter		
None	815	834	19 (+2%)
50%	826	844	18 (+2%)
75%	832	850	18 (+2%)
100%	832	852	20 (+2%)

1,000 Grain Weight

Fertilization	Control	Vitazyme	Change
	grams		
None	44.5	46.0	1.5 (+3%)
50%	45.0	47.5	2.0 (+4%)
75%	46.0	48.0	2.0 (+4%)
100%	46.0	48.1	2.1 (+5%)

Gluten

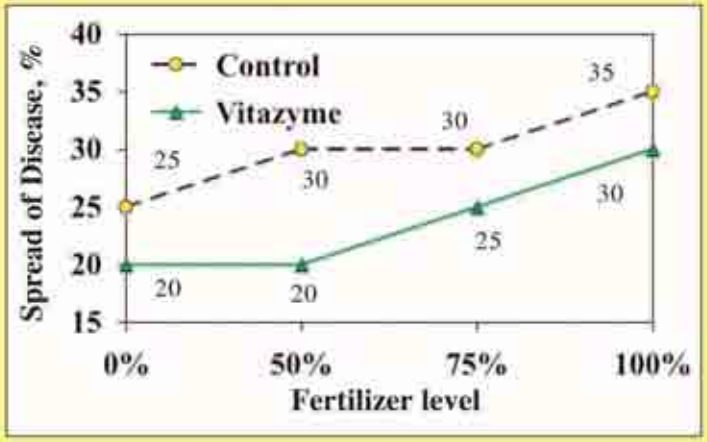
Fertilization	Control	Vitazyme	Change
	% gluten		
None	14.0	17.6	3.6 (+26%)
50%	23.6	27.6	4.0 (+17%)
75%	24.8	28.8	4.0 (+16%)
100%	27.1	30.0	2.9 (+11%)

Crude Protein

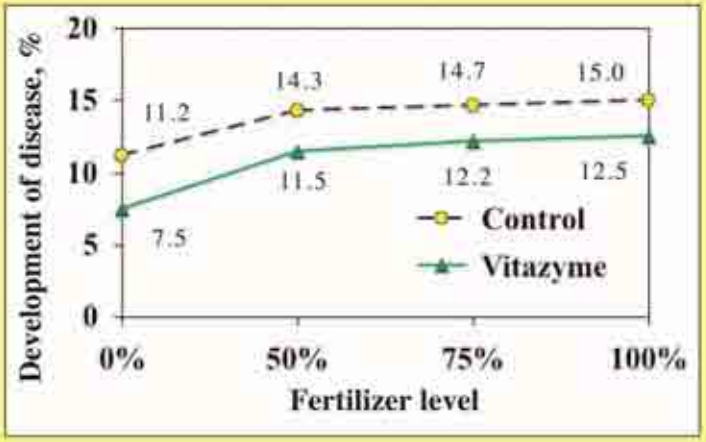
Fertilization	Control	Vitazyme	Change
	% protein		
None	8.3	9.8	1.5 (+18%)
50%	9.9	11.4	1.5 (+15%)
75%	10.3	11.5	1.2 (+12%)
100%	11.4	12.0	0.6 (+5%)

Disease results: Septoria disease effects

Disease Spread



Disease Development



Grain structure results:

Stem Density

Fertilization	Control	Vitazyme	Change
	stems/m²		
None	415	455	40 (+10%)
50%	615	658	43 (+7%)
75%	644	682	38 (+6%)
100%	651	691	40 (+6%)

Grain Number Per Head

Fertilization	Control	Vitazyme	Change
	grains/head		
None	18	19	1 (+6%)
50%	20	22	2 (+10%)
75%	22	23	1 (+5%)
100%	23	24	1 (+4%)

Grain Weight Per Head

Fertilization	Control	Vitazyme	Change
	grams/head		
None	0.80	0.87	0.07 (+9%)
50%	0.91	1.04	0.13 (+14%)
75%	1.00	1.10	0.10 (+10%)
100%	1.06	1.15	0.09 (+18%)

Income results:

- **Income increase at 0% fertilizer with Vitazyme: 120 hrn/ha**
- **Income increase at 50% fertilizer with Vitazyme: 410 hrn/ha**
- **Income increase at 75% fertilizer with Vitazyme: 477 hrn/ha**
- **Income increase at 100% fertilizer with Vitazyme: 507 hrn/ha**

Conclusions: This winter wheat study in Ukraine, using Vitazyme at four fertility levels with and without Vitazyme, revealed that this product gave a remarkable yield increase of 12 to 13% above the untreated control for each treatment comparison. This yield increase with Vitazyme was similar to the increase in yield with fertilizer: 12 to 13% increase at each fertility increment. Quality analyses revealed that grain weight, 1,000 grain weight, gluten, and crude protein all increased with Vitazyme, and disease incidence and spread were reduced as well. Stem density, grain number per load, and weight per head were all improved with Vitazyme, as was income: by 120 hrn/ha (no fertilizer) to 507 hrn/ha (100% fertilizer). These data clearly show that Vitazyme works together with fertilizer elements to improve wheat yield in a significant way, and this program is highly effective for improving the productivity and income of wheat growers in Ukraine.

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2009 Crop Results

Vitazyme on Wheat

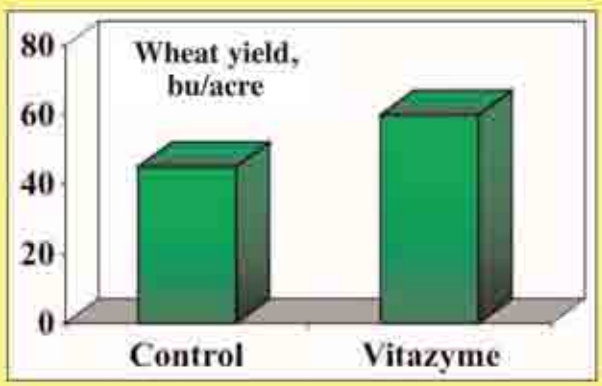
Researcher: Nathan Temples
Farm cooperator: Seyer Farms
Location: Oran, Missouri
Variety: Pioneer 25R47
Soil type: sandy loam
Planting rate: 2 bushels/acre
Planting date: October 10, 2009
Row-spacing: 7.5 inches
Irrigation: none

Experimental design: An 80-acre field was divided into two 40-acre portions, one of them treated with Vitazyme and the other with the fungicide Quilt to determine the effect of each on fungal suppression and yield.

1. Quilt fungicide **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 20 oz/acre at the flat-leaf stage
Quilt application: 21 oz/acre
Harvest date: June 20, 2009
Yield results:

Treatment	Yield	Yield change
	bu/acre	
Quilt	45	—
Vitazyme	60	15 (33%)



Increase in yield with Vitazyme: 33%

Income results:

Treatment	Income[1]	Product cost[2]		Net income[3]	Income change
	$/acre	$/gal	$/acre	$/acre	$/acre
Quilt	225.00	150.00	24.61	200.39	—
Vitazyme	300.00	60.00	9.38	290.62	+90.23

[1]Based on $5.00/bushel; [2]Vitazyme cost of $60.00/gal ($0.469/oz), and Quilt cost of $150.00/gal ($1.172/oz); [3]Net income of crop income – product cost.

Income increase with Vitazyme: $90.23/acre

Return on investment for Vitazyme: $9.62 per dollar invested

Conclusions: This Missouri wheat vs. fungicide study showed that Vitazyme did a much better job of controlling yield-limiting fungi, and boosting grain yield, than did Quilt fungicide. This income was 33% higher with Vitazyme than with the standard fungicides, and the net return was $90.23/acre higher, or $9.62 per dollar invested for Vitazyme.

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2009 Crop Results

Vitazyme on Wheat, spring

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 rate: 6 million seeds/ha
Previous crop: winter canola
Variety: Pecheryanka, super elite
Tillage: plowing, harrowing, cultivating
Planting date: April 13, 2009
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 phosphorus, 12.4 mg/100 g of soil exchangeable potassium, and pH=5.5.
Experimental design: A uniform field was divided into Vitayme treated and untreated plots of 1.0 ha plots, replicated four times, to discover the effect of the product on spring wheat yield and quality factors. Both Vitazyme treatments received product on the seed, and one of these had Vitazyme applied to the leaves as well.

1. Control **2. Vitazyme once** **3. Vitazyme twice**

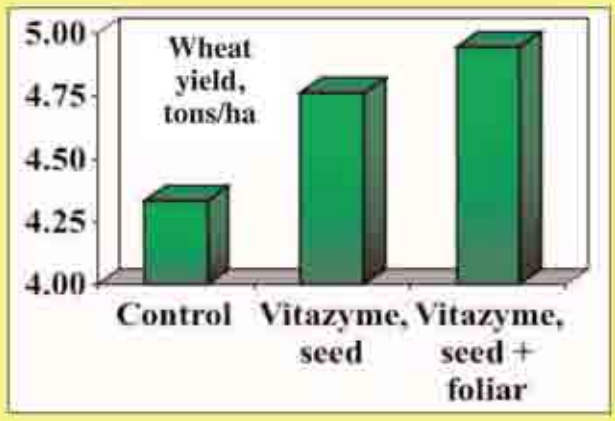
Fertilization: 60 kg/ha N, 30 kg/ha P_2O_5, and 60 kg/ha K_2O.

Vitazyme application: Both treatments received a seed treatment at planting, at 1.0 liter/ha, on April 12, 2009. Treatment 3 received an additional 1.0 liter/ha foliar and soil application on June 4, 2009.

Yield results:

Treatment	Wheat yield	Yield change
	tons/ha	tons/ha
1. Control	4.33	—
2. Vitazyme	4.76	0.43 (+10%)
3. Vitazyme, seed + leaves	4.94	0.61 (+14%)

Increase in wheat yield with Vitazyme
Seed treatment 10%
Seed + foliar treatments 14%



Quality results:

Grain Gluten

Treatment	Gluten	Change
	% gluten	
Control	25.6	—
Vitazyme	27.6	2.0 (+8%)
Vitazyme, seed + leaves	28.3	2.7 (+11%)

Increase in gluten with Vitazyme: 8 to 11%

Crude Protein

Treatment	Protein	Change
	% protein	
Control	10.6	—
Vitazyme	11.1	0.5 (+5%)
Vitazyme, seed + leaves	11.6	1.0 (+9%)

Increase in crude protein with Vitazyme: 5 to 9%

Grain Weight Per Liter

Treatment	Weight	Change
	------ grams	-------
Control	740	—
Vitazyme	751	9 (+1%)
Vitazyme, seed + leaves	759	19 (+3%)

Increase in grain weight with Vitazyme: 1 to 3%

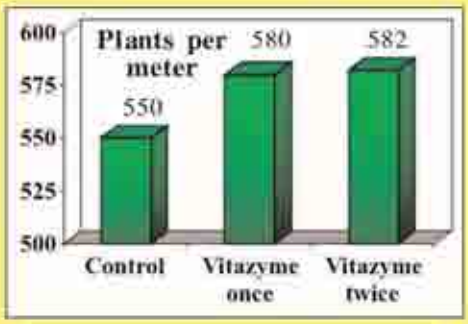
1,000 Grain Weight

Treatment	Weight	Change
	---grams/1,000 grams---	
Control	41.1	—
Vitazyme	42.3	1.2 (+3%)
Vitazyme, seed + leaves	43.5	2.4 (+6%)

Increase in 1,000 grain weight with Vitazyne: 3 to 6%

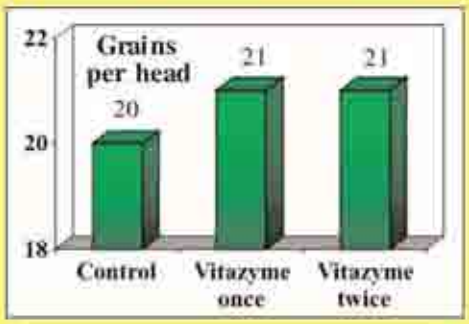
Grain structure results:

Stem Density



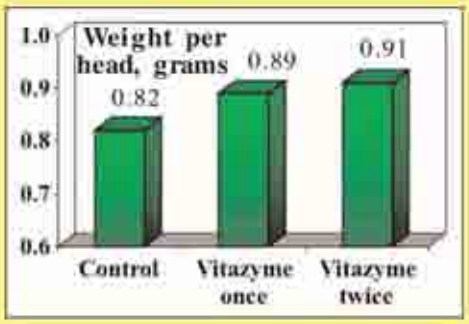
Increase in stem density with Vitazyme: 5 to 6%

Grain Number Per Head



Increase in grains per head with Vitazyme: 5%

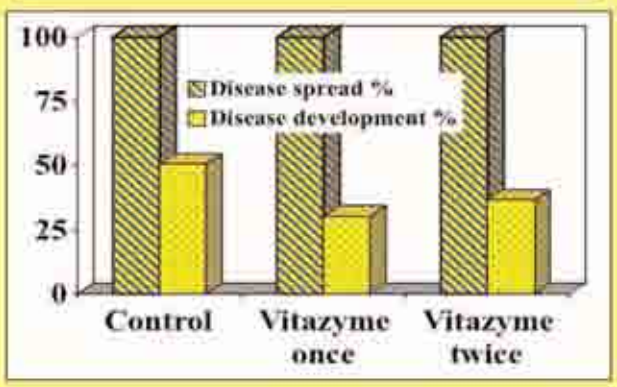
Grain Weight Per Head



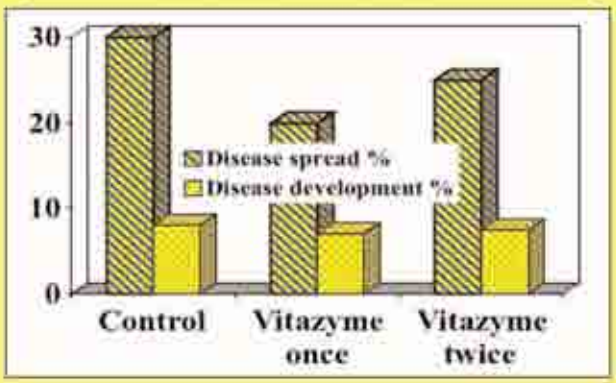
Increase in grain weight per head with Vitazyme: 9 to 11%

Disease results:

Farinaceous Mildew



Septoria Fungus



Income results:

- **Income increase with Vitazyme on the seeds: 367 hrn/ha**
- **Income increase with Vitazyme on the seeds + leaves: 342 hrn/ha**

Conclusions: This Ukrainian spring wheat trial proved that Vitazyme on the seeds at planting increased the yield by 10%, whereas an additional 1.0 liter/ha application added 4% more yield. Grain quality was also enhanced with Vitazyme in terms of gluten (+8 to 11%), crude protein (+5 to 9%), grain weight per liter (+1 to 3%), and 1,000 grain weight (+3 to 6%). Stem density, grain number per head, grain weight per head, and disease susceptibility were also increased with Vitazyme.

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2009 Crop Results

Vitazyme on Wheat, winter

Researcher: unknown *Organization*: Ukerzernoprom *Location*: Berdichiv area, Ukraine
Variety: Olesa *Soil type*: unknown *Planting date*: September 7, 2008

Experimental design: A wheat field was divided into Vitazyme treated and untreated areas, with the purpose of evaluating the effect of this product on grain yield.

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

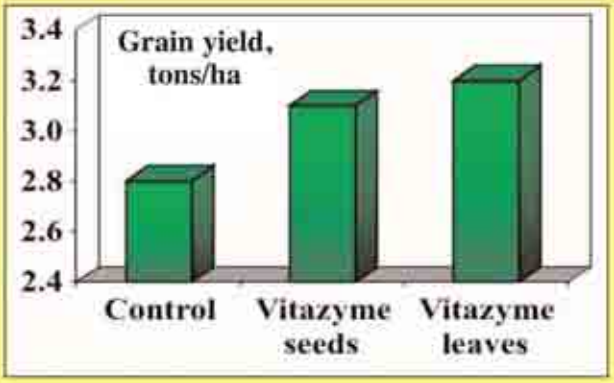
Fertilization: unknown

Vitazyme application: (1) Seeds treated with Vitazyme at 1 liter/ton of seed, on September 7, 2008, for Treatment 2; (2) leaves sprayed with Vitazyme at 1 liter/ha on October 22, 2008, when the plants were a few inches tall.

Yield results:

Treatment	Grain yield	Change
	tons/ha	tons/ha
1. Control	2.8	—
2. Vitazyme, seeds	3.1	0.3 (+11%)
3. Vitazyme, leaves	3.2	0.4 (+14%)

Increase in wheat yield with Vitazyme: 11 to 14%



Conclusions: This Ukraine winter wheat study revealed that Vitazyme, applied to the seeds at 1 liter/ton of seeds, increased grain yield by 11%. A foliar application in the fall increased yield by 14%. These results prove the great utility of this product to improve wheat yields in Ukraine.

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2009 Crop Results

Vitazyme on Wheat, winter

Researcher: unknown *Organization*: Ukerzernoprom
Location: Berdichiv Raion, Zhitomerski Oblast, Ukraine (central forest-steppe area)
Variety: Olecya
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/100 g of soil phosphorus, 12.4 mg/100 g of soil exchangeablr potassium, and pH=5.5.
Planting date: September 7, 2008
Tillage: tilled to 4-5cm
Experimental design: This winter wheat trial was established to evaluate the effect of Vitazyme, as a seed or foliar treatment, to enhance grain yield.

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

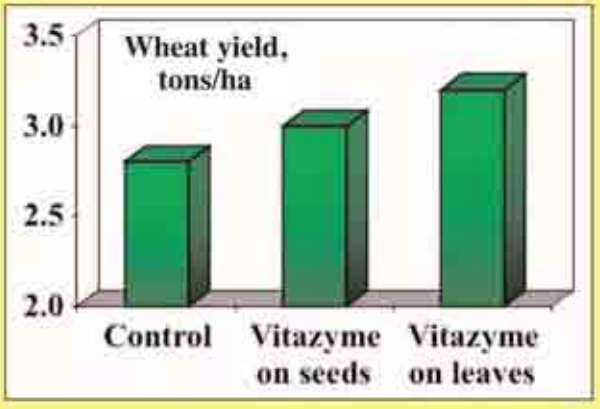
Fertilization: none
Vitazyme treatment: Treatment 2: 1.0 liter/ha at planting (September 7) with the seeds; Treatment 3: 1.0 liter/ha sprayed on the leaves and soil on October 22, 2008.
Yield results:

Treatment	Wheat yield	Yield change
	tons/ha	tons/ha
1. Control	2.8	—
2. Vitazyme, on seeds	3.1	0.3 (+11%)
3. Vitazyme, on leaves (fall)	3.2	0.4 (+14%)

Increase in wheat yield with Vitazyme

Fall, on seeds 11%

Fall, on leaves and soil 14%



Conclussions: This Ukraine winter wheat demonstration trial, using Vitazyme without fertilizer additions on the seeds only, or the leaves and soil only, revealed that the seed treatment produced an excellent 11% yield increase. A fall foliar/soil application alone increased the grain yield even more: 14%. Use of Vitazyme on either the seeds, or applied to the foliage, is shown to be an excellent practice for wheat farmers in Ukraine.

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2009 Crop Results

Vitazyme on Wheat, winter

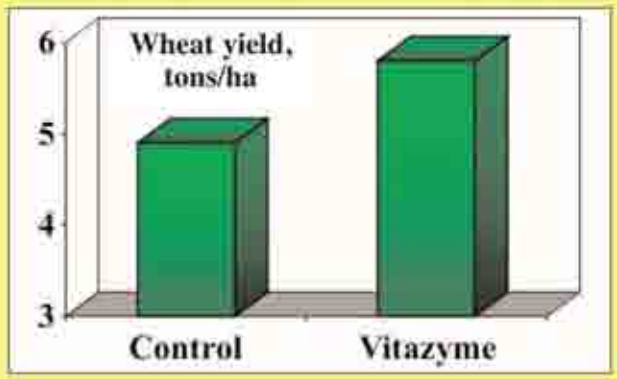
Researcher: O.V. Kornijchuk, V.V. Plotnikov, and agronomic scientists
Organization: Vinnytsia State Agricultural Experiment Station, Ukraine Academy of Agrarian Sciences, Vinnytsia, Ukraine *Variety*: Bilosnizhka, super elite *Planting rate*: 6 million seeds/ha
Location: Ukraine central forest-steppe area near Vinnytsia *Planting date*: September 3, 2008
Tillage: plowing and cultivation *Previous crop*: winter canola
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 phosphorus, 12.4 mg/100 g of soil exchangeable potassium, and pH=5.5.
Experimental design: A uniform field was divided into Vitazyme treated and untreated plots of 1.0 plots, replicated four times, to dicover the effect of the product on winter wheat yield.

1. Control **2. Vitazyme twice**

Fertilization: 60 kg/ha N
Vitazyme application: The Vitazyme treatment received a foliar/soil application at 1.0 liter/ha on April 30, 2009, and a second application on May 15, 2009.
Yield results:

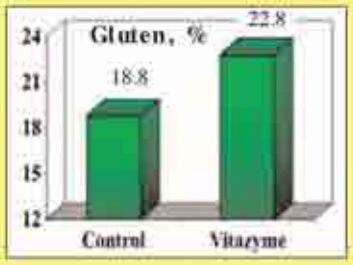
Treatment	Wheat yield	Yield change
	tons/ha	tons/ha
1. Control	4.9	—
2. Vitazyme	5.8	0.9 (+18%)

Increase in wheat yield with Vitazyme: 18%



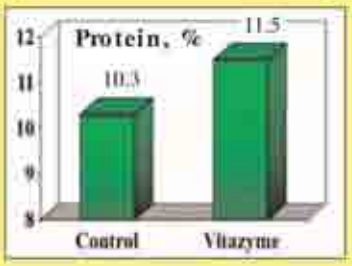
Grain quality results:

Gluten



Increase in gluten with Vitazyme: 21%

Crude Protein

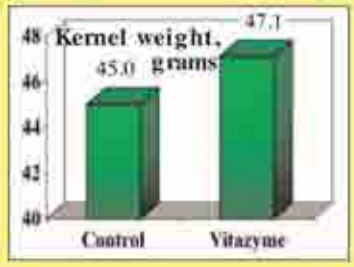


Increase in crude protein with Vitazyme: 12%

Grain Weight

Increase in liter weight with Vitazyme: 2.4%

Weight/1,000 Kernels



Increase in 1,000 kernel weight with Vitazyme: 5%

Income results:

Income increase with Vitazyme: 473 hrn/ha

Conclusions: This winter wheat trial at Vinnytsia, Ukraine, revealed that two spring applications of Vitazyme, at 1 liter/ha each time, gave a large yield increase of 18%. The grain was improved in gluten (+21%), protein (+12%), liter weight (+2.4%), and weight per 1,000 kernels (+5%), and the crop income was improved by 473 hrn/ha. Such large yield, quality, and income increases with two simple product application show that this program is a very good production practice for Ukrainian farmers.

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2008 Crop Results

Vitazyme on Wheat

Researcher/Farmer: Blaine Middleton
Variety: TAM 111 hard red winter wheat
Planting date: November 14, 2007
Row width: 9.5 inches
Location: Lamesa, Texas ["West Home" Farm]
Soil type: sandy loam
Planting rate: 75 lb/acre
Planting depth: 2 inches
Watering: center-pivot irrigation with electronic treatment

Experimental design: An irrigated circle was divided into treated and untreated sections. A 30-acre area was treated by irrigation water with Vitazyme, while an adjacent untreated 30-acre area of wheat served as the control.

1. Control **2. Vitazyme**

Fertilization: (1) 270 lb/acre of 9-21-21-5% N-P_2O_5-K_2O-S spread dry at planting; (2) 30 gal/acre of 32% N through the center pivot system during March 8 to 15, 2008.

Vitazyme application: (2) 13 oz/acre (1 liter/ha) after emergence, on December 7, 2007; (2) 13 oz/acre at spring greenup, on February 20.

Irrigation, rainfall, and weather: The summer was hotter than normal, and rainfall was very limited, only 2.4 inches of rain. Irrigations: 19 in all, totalling 14.6 inches.

Harvest date: June 4, 2008

Yield results:

Treatment	Total yield, 30 acres	Yield	Change
	lb	bu*	bu/acre
Control	140,020	2,334	77.8	—
Vitazyme	161,860	2,698	89.9	12.1 (+16%)

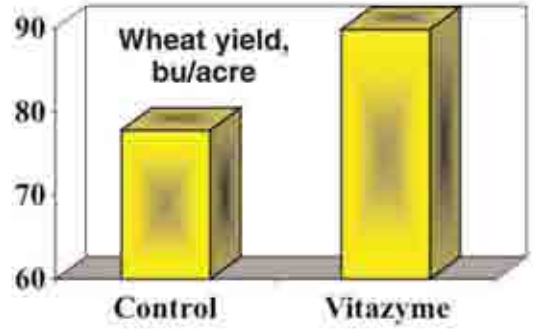
*Based on 60 lb/bu for wheat.

Increase in wheat yield: 16%

Income results: A value of $8.00/bu is used in this table.

Treatment	Yield	Income	Change
	bu/acre	$/acre	$/acre
Control	77.8	622.40	—
Vitazyme	89.9	719.20	96.80

Increase in income with Vitazyme: $96.80/acre



Conclusions: In this hard red winter wheat study in western Texas, Vitazyme applied twice through the irrigation water during a hot, dry summer provided a very large yield increase of 16%. This increase resulted in an income increase of $96.80/acre, showing the great utility of Vitazyme for wheat production in western Texas. Presumably the product is enabling the crop to make a better use of fertilizer nitrogen, as demonstrated in several other studies

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2008 Crop Results

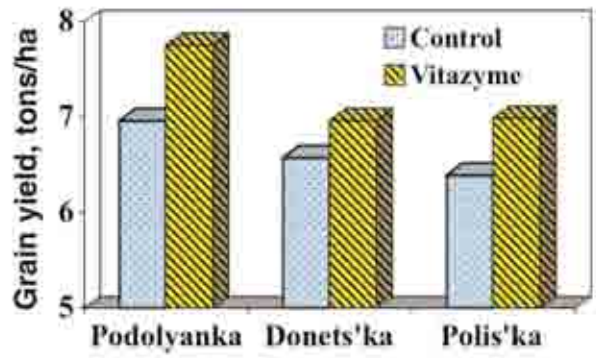
Vitazyme on Winter Wheat

Researchers: O.V. Kornijchuk, V. V. Plotnikov, and agronomic scientists
Organization: Vinnytsia State Agricultural Experiment Station of Forage Institute, Ukraine Academy of Agrarian Sciences, Vinnytsia, Ukraine
Location: Ukraine central forest – steppe area near Vinnytsia
Variety: Podolyanka, Donets'ka 48, and Polis'ka 90 *Seeding rate*: 6 mil/ha
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/100 g of soil phosphorus, 12.4 mg/100 g of soil exchangeable potassium, and pH = 5.5.
Planting date: October 1, 2007 *Previous crop*: spring vetch *Tillage*: tilled to 4-5 cm.
Experimental design: A uniform field area was selected to place 1.0 ha plots, replicated four times, over the test area. The objective was to determine if Vitazyme could favorably influence crop yields for this gray forest soil area of Ukraine.

1. Control **2. Vitazyme applied two times**

Fertilization: In the fall of 2007 a broadcast application of 30-60-90 kg/ha N-P_2O_5-K_2O was made. In the spring, 120 kg/ha of nitrogen was applied at two times (50 and 70 kg/ha).
Vitazyme application: 1 liter/ha applied on April 22, and again on May 13, 2008
Harvest date: unknown

Treatment	Grain yield	Yield change	
	tons/ha	tons/ha	%
1. Control			
Podolyanka	6.97	—	—
Donets'ka 48	6.58	—	—
Polis'ka 90	6.39	—	—
2. Vitazyme twice			
Podolyanka	7.76	+0.79	+11
Donets'ka 48	6.97	+0.39	+6
Polis'ka 90	6.99	+0.60	+9



Increase in wheat yield with Vitazyme

Podolyanka 11%
Donets'ka 48 ..... 6%
Polis'ka 90 ..... 9%

Yield results:

Vitazyme increased wheat grain yield by 6 to 11% for the three varieties.

Treatment	Gluten content	Gluten change	Crude protein	Protein change
	%	%-points	%	%-points
1. Control				
Podolyanka	22.5	—	11.5	—
Donets'ka 48	21.9	—	11.5	—
Polis'ka 90	23.4	—	12.0	—
2. Vitazyme twice				
Podolyanka	23.2	+0.7	12.3	+0.8
Donets'ka 48	22.4	+0.5	12.1	+0.6
Polis'ka 90	24.4	+1.0	12.5	+0.5

Increase in gluten with Vitazyme

Podolyanka 0.7%-pts
Donets'ka 48 ..... 0.5%-pts
Polis'ka 90 ..... 1.0%-pts

Increase in protein with Vitazyme

Podolyanka 0.8%-pts
Donets'ka 48 ..... 0.6%-pts
Polis'ka 90 ..... 0.5%-pts

Quality results:

Income results: Based on current grain prices, the increase in income from Vitazyme for the three varieties was as follows:

Podolyank ..... 747 hrn/ha
Donets'ka ..... 218 hrn/ha
Polis'ka ..... 507 hrn/ha

Conclusions: Vitazyme applied twice during during the spring growth period resulted in a substantial 6 to 11% increase in yield; Podolyanka variety gave the highest increase, that resulted in a 747 hrn/ha income increase. The quality of the grain was also improved with Vitazyme, the gluten content increasing from 0.5 to 1.0 percentage points, and crude protein from 0.5 to 0.8%. These results prove that this crop treatment is highly effective for improving the yield, quality, and income of winter wheat in Ukraine on these gray forest-steppe soils. Had Vitazyme been applied to the seeds in the fall, or to the newly emerged plants, it is likely that the results would have been even more favorable than with only spring applications.

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2008 Crop Results

Vitazyme on Wheat

Researcher/Farmer: Blaine Middleton
Variety: TAM 111 hard red winter wheat
Planting date: November 14, 2007
Row width: 9.5 inches
Location: Lamesa, Texas ["East Home" Farm]
Soil type: sandy loam
Planting rate: 75 lb lb/acre
Planting depth: 2 inches
Watering: center-pivot irrigation with electronic treatment

Experimental design: An irrigated circle was divided into treated and untreated sections. A 30-acre area was treated by irrigation water with Vitazyme, while the remaining area under the circle was left untreated. An adjacent 30-acre area of wheat served as the control.

1. Control **2. Vitazyme**

Fertilization: (1) 270 lb/acre of 9-21-21-5% N-P_2O_5-K_2O-S spread dry at planting; (2) 30 gal/acre of 32% N through the center pivot system during March 8 to 15, 2008.

Vitazyme application: (2) 13 oz/acre (1 liter/ha) after emergence, on December 7, 2007; (2) 13 oz/acre at spring greenup, on February 20.

Irrigation, rainfall, and weather: The summer was hotter than normal, and rainfall was very limited, only 2.4 inches of rain. Irrigations: 19 in all, totaling 14.3 inches.

Harvest date: June 5, 2005

Yield results:

Treatment	Total yield, 30 acres	Yield	Change
	lb	bu*	bu/acre	bu/acre
Control	124,600	2,077	69.2	—
Vitazyme	161,220	2,687	89.6	20.4 (+29%)

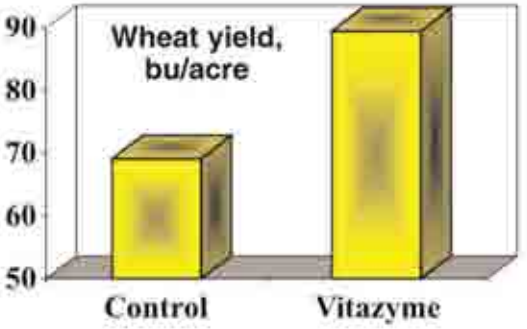
*Based on 60 lb/bu for wheat.

Increase in wheat yield: 29%

Income results: A value of $8.00/bu is used in this table.

Treatment	Yield	Income	Change
	bu/acre	$/acre	$/acre
Control	69.2	553.60	—
Vitazyme	89.6	716.80	163.20

Increase in income with Vitazyme: $163.20/acre



Conclusions: In this hard red winter wheat study in western Texas, Vitazyme applied twice through the irrigation water during a hot, dry summer provided a superb yield increase of 29%. This increase resulted in an income increase of $163.20/acre, showing the great ability of Vitazyme to assist wheat growers in semi-arid regions. Presumably the product is enabling the crop to make a better use of fertilizer nitrogen, as demonstrated in several other studies.

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2008 Crop Results

Vitazyme on Wheat

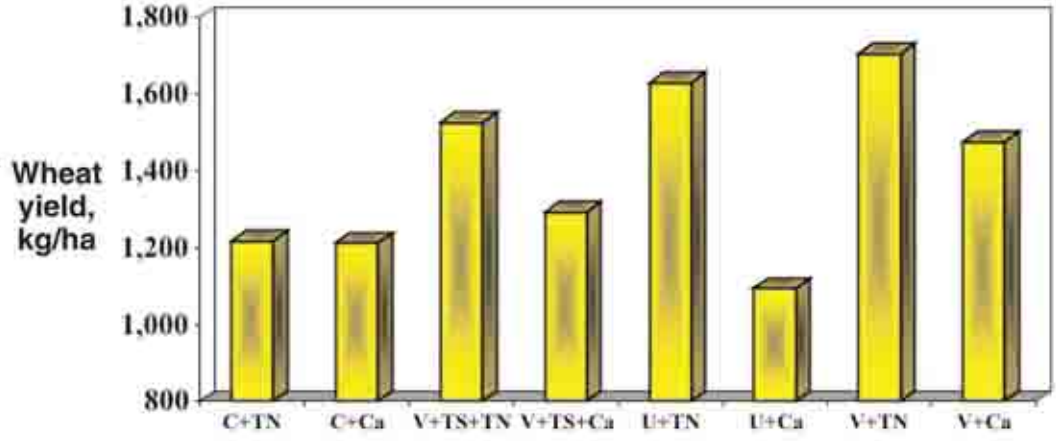
Researcher: Richard Stonewigg *Research Organization*: Lachian Kenya Limited
Location: near Nairobi, Kenya *Variety*: unknown *Soil type*: unknown
Planting date: unknown
Experimental design: An area of winter wheat was divided into small plots, with soil treatments in the main plots and foliar treatments in the sub-plots. The treatments were as follows:

Main Plot Treatments (soil applications at planting)	Sub-Plot Treatments (foliar applications)
1. Control	Twin N
2. Control	Impact Ca
3. Vitazyme + Turbo-Seed +Zn	Twin N
4. Vitazyme + Turbo-Seed + Zn	Impact Ca
5. Urea + DAP (Diammonium P)	Twin N
6. Urea + DAP (Diammonium P)	Impact Ca

Fertilization: *Turbo-Seed* is soluble phosphorus + zinc, copper, and magnesium EDTA + humic acid (to help prevent scorching): this was sprayed into the seed row at 15 kg/ha. *Trade Corp Zn* is a zinc formulation, applied to the soil at 100 g/ha. *Diammonium phosphate* (DAP) and *urea* were both applied to the soil at 150 kg/ha each.
Foliar feeding: *Twin-N* is nitrogen-fixing microbes, applied to the leaves at 1 vial/ha. *Impact Ca* is a calcium + nitrogen formulation sprayed on the leaves at 5 liters/ha.
Vitazyme application: 1 liter/ha sprayed in the seed row at planting
Yield results:

Treatment	Yield	Yield change*
	kg/ha	kg/ha
1. Control + Twin N	1,218	—
2. Control + Impact Ca	1,212	—
3. Vitazyme + Turbo-Seed + Zn + Twin N	1,526	308 (+25%)
4. Vitazyme + Turbo-Seed + Zn + Impact Ca	1,294	82 (+7%)
5. Urea + DAP + Twin N	1,629	417 (+34%)
6. Urea + DAP + Impact Ca	1,094	(-) 118 (-10%)
7. Vitazyme + Twin N	1,704	486 (+40%)
8. Vitazyme + Impact Ca	1,475	263 (+22%)

*Comparisons are made with the appropriate control treatment: Treatments 3, 5, and 7 versus Treatment 1, and Treatments 4, 6, and 8 versus Treatment 2.



Conclusions: In this Kenyan study using various soil and foliar products, all soil applied products stimulated yield, but to different degrees, and with considerable interaction with other products (which effects could not be interpretated due to a lack of replication). The interaction of soil applied products was highest, by far, with Twin N, and the lowest with Impact Ca, giving the following average yields:

Twin N (Treatments 3, 5, and 7): 1,620 kg/ha

Impact Ca (Treatments 4, 6, and 8): 1,288 kg/ha

Increase with Twin N vs. Impact Ca: 322 kg/ha (+26%)

Vitazyme worked very well with Turbo-Seed and zinc to increase the yield by 25% with Twin N, and by 7% with Impact Ca. ***The highest average yield, however, was with Vitazyme alone with Twin N or impact Ca***, as shown in the following table.

Average of the Twin-N and Impact Ca treatments for all four main-plot treatments

Treatment	Yield	Increase in yield
	kg/ha	kg/ha
Control	1,215	—
Vitazyme + Turbo-Seed + Zn	1,410	195 (+16%)
Urea + DAP	1,362	147 (+12%)
Vitazyme	1,590	375 (+31%)

Increase in wheat yield with vitazyme only: 31%

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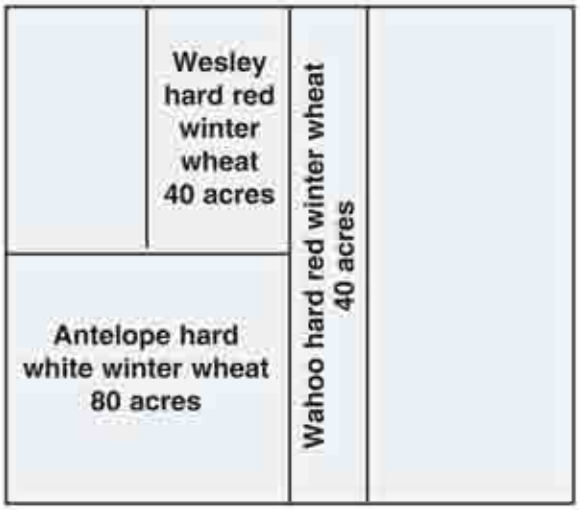
2007 Crop Results

Vitazyme on Wheat (Winter)

Value of a Seed Application Using 50% Nitrogen

Researcher/Farmer: Jim Dolezal
Varieties: Wesley hard red winter, Antelope hard red white
Row spacing: 10 inches
Planting dates: September 12 to October 3, 2006
Location: Julesburg, Colorado
Seeding rate: 52 lb/acre
Planting depth: 1.25 inches
Soil type: sandy loam

Experimental design: A 160-acre block having uniform soils was selected to compare three hard winter wheat varieties — one of them white and two of them red — with all fertility treatments equal, the only difference being that Vitazyme was applied to the seeds of two varieties (hard red wheats) but not to the highest-yielding white wheat variety. Only about 50% of the usual nitrogen rate was applied. Vitazyme was applied in the spring to all areas. The field design and varieties were as follows:



	Fertilizer		Vitazyme	
Field	N	P	Seed	Foliar
Wesley	X	X	X	X
Antelope	X	X	O	X

Fertilization: All areas received 22 lb/acre of P_2O_5 in-furrow at planting, as well as 25 lb/acre of N sprayed foliar in March of 2007. This nitrogen rate was a bit less than 50% of the usual 55 to 58 lb/acre recommended nitrogen rate.

Vitazyme application: All but the Antelope variety received 13 oz/acre of Vitazyme applied through the tubes behind the seed drop tubes. In the spring, Vitazyme at 13 oz/acre was applied over all areas with the foliar sprayed nitrogen.

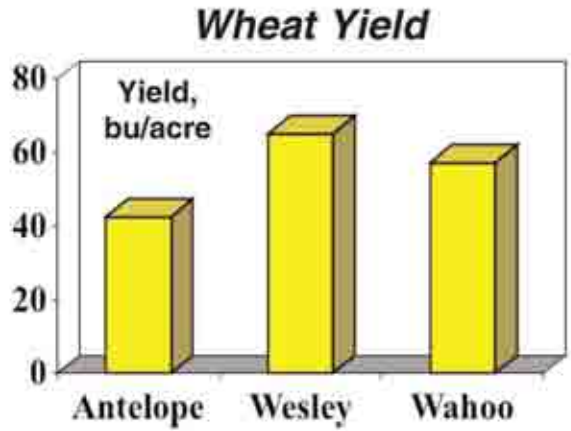
Weather for 2007: good rains, about 17 inches from planting in 2006 to the end of the 2007 growing season

Harvest date: July 10 and 11, 2007

Yield results:

Variety	Vitazyme Seed	Vitazyme Foliar	Yield	Increase vs. Wesley
			bu/acre	bu/acre
Wesley red	X	X	65.1	22.5 (+53%)
Wahoo red	X	X	O	14.6 (+34%)
Antelope white	O	X	42.6	—

Increase in wheat yield with a Vitazyme seed treatment: 34 to 53%



Conclusions: This wheat yield study in northeastern Colorado revealed that with a 50% reduction in nitrogen, yields were still excellent when Vitazyme was applied. However, it was essential that Vitazyme be applied to the seeds at planting to achieve the highest yield potential. The two hard red winter wheat varieties — Wesley and Wahoo — having similar yield potential, yielded from 57.2 to 65.1 bu/acre, while the Antelope hard white wheat, having inherently a greater yield potential than the red wheats, produced only 42.6 bu/acre. Because the Antelope white wheat did not receive a fall at-planting Vitazyme application while both red wheat varieties did, all other fertilizer and spring Vitazyme applications being equal across all areas, it is deduced that ***a fall at-planting Vitazyme application of 13 oz/acre is very important to achieve optimum dryland wheat yields***.

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2003 Crop Results

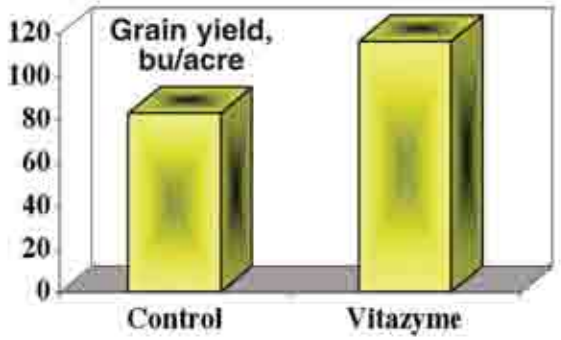
Vitazyme on Winter Wheat

Researcher: David Schemm *Location*: Arrow S Farms, Sharon Springs, Kansas
Variety: Jagger *Planting rate*: 120 lb/acre *Soil type*: Keith sandy clay loam
Previous crop: corn *Planting date*: September 20, 2002
Experimental design: A center pivot covering 120 acres was divided into halves, the north side treated with Vitazyme and the south half left untreated. All other treatments were the same across the pivot area.

1. Control **2. Vitazyme**

Fertilization: 18 lb/acre of N as a 28% ammonia solution on about January 20, 2003, when the wheat was all germinated. Total available N: about 60 to 70 lb/acre due to residual N from a failed corn crop in 2002.
Vitazyme application: 13 oz/acre applied with the 28% N solution on January 20
Irrigation: 550 gal/minute well, and 8 inches applied to the crop
Weather: An 8-inch moisture deficit existed for 2002, and by October of 2003 another 4.5-inch deficit had accumulated.
Harvest date: July 20 to 25, 2003
Yield results: The yield of the two 60-acre parcels was estimated closely by bin volume during combining.

Treatment	Grain yield	Change
	bu/acre	bu/acre
Control	83	—
Vitazyme	116	33(+40%)



Increase in grain yield: 40%

Income results: The average price for winter wheat in western Kansas in October of 2003 was $3.10/bu. At that price, the extra income per acre resulting from Vitazyme applications was 33 bu/acre X $3.10/bu =$102.30/acre. Using a cost of $4.00/13 oz of product the return from Vitazyme was $25.58 for every dollar invested.

Increased return: $102.30/acre **Cost:benefit ratio: 25.58:1**

Conclusions: The average of this wheat yield was **100 bu/acre** across all 120 acres of the center pivot test area, which was **the highest yield of wheat for the entire county during 2003.** An *average* yield of irrigated wheat is 60 bu/acre for western Kansas, and a *good* irrigated yield is 80 bu/acre.

Vitazyme not only increased the yield of the wheat by 40%, but also **improved the standability of the wheat** due to greater stem strength (more cellulose, callose, and lignin deposition). **The grower estimated that the treated wheat had 20 to 30% more plants standing at harvest than did the untreated control. This benefit resulted in an income increase of $102.30/acre, with a cost:benefit ratio of about 25:1.**

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2002 Crop Results

Vitazyme and Southeast Mix on Wheat

Researcher: Paul W. Syltie, Ph.D.
Location: Vital Earth Resources Research Greenhouse, Gladewater, Texas
Variety: winter wheat *Soil type*: Bowie very fine sandy loam
Planting date: February 22, 2002 *Pot type*: 1 gallon *Population*: about 80 seeds/pot (0.5 tsp)
Experimental design: A complete block design was set up using eight replicates for each of four treatments. The soil was carefully packed into each pot, watered evenly, and then treated with the materials. Plants were watered on demand, and grown in the greenhouse at about 85°F for a high and 60°F for a low temperature.

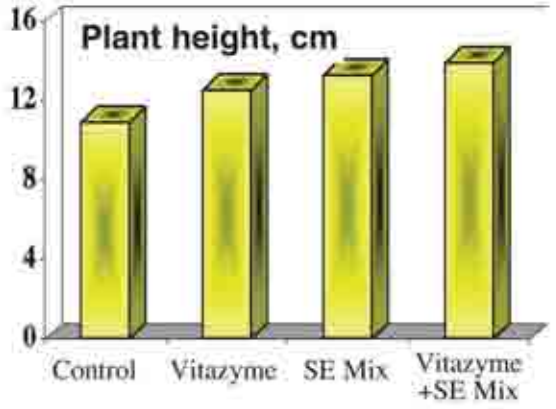
1. **Control**
2. **Vitazyme only**
3. **Southeast Mix only**
4. **Vitazyme + Southeast Mix**

Fertilizer application: Each pot received 0.23 gram per pot of $(NH_4)_2SO_4$ to equal a 100 lb/acre application, or 21 lb/acre of N and 20 lb/acre of S for a "starter" effect.
Vitazyme application: After planting on February 22, 50 ml of a 0.002% Vitazyme solution was applied to the soil surface of each pot for Treatment 2. This application was equal to the amount of Vitazyme contained in the Southeast Mix of Treatment 4. By mistake, an additional application of Vitazyme was made to Treatment 4 so that the actual amount of active ingredients was twice that of Treatment 2. Field and greenhouse trials, however, have demonstrated that a doubled rate of Vitazyme will not give a plant response that exceeds that of the usual rate.
Southeast Mix application: Regular Southeast Mix granules, a "Sucrate", were applied to the soil surface of the pots of Treatment 3 at 1 gram per pot; this rate equaled 10 lb/1,000 ft^2. The Southeast Mix for Treatment 4 had been prepared earlier at the facilities of American Minerals. Two ounces of Vitazyme were mixed with the binder of 50 lb of Southeast Mix during processing, a 0.04 oz/lb rate. At 10 lb/1,000 ft.^{2} of Southeast Mix application, this would then give a Vitazyme application rate of about 18 oz/acre. This product was also applied at 1 gram per pot, as for Treatment 3.
Product specifications: **Vitazyme:** a liquid fermentation product of various plant materials, organisms, simple and complex carbohydrates, and other materials to yield a multiple mode of action - multiple active agent metabolic stimulator containing natural growth regulators (triacontanol, etc.), vitamins (B-complex, etc.), enzymes, and other phytoactive substances that are biologically active at very low application rates. Producer: Vital Earth Resources, Gladewater, Texas.
Southeast Mix: a sucrate carboxylate containing a simple carbohydrate binder, together with various minerals (Fe, 18.7%; Mn, 7.8%; Zn, 7.3%; Cu, 3.1%; B, 3.1%), with granules able to quickly break down in water to supply nutrients to plants. Producer: American Minerals, Dunedin, Florida.
Harvest date: April 30, 2002, 67 days after planting.
Growth observations: The plants of Treatment 1 (the untreated control) began to die back towards the end of the growth period. Such a dieback did not occur for any of the other treatments. With up to 80 or more plants per pot there was great nutrient and space competition in each pot, so that performance of the products could be measured under highly stressed conditions.
Height results: On April 30 all of the plant roots were washed clean of soil, and any weeds were removed. An

average height measurement was made for the plants of each pot.

Treatment	Plant height*	Change vs. the control
	---------- cm ----------	
4. Vitazyme + Southeast Mix	13.9 a	+ 3.0 (+ 28%)
3. Southeast Mix	13.3 ab	+ 2.4 (+ 22%)
2. Vitazyme	12.5 b	+ 1.6 (+ 15%)
1. Control	10.9 c	—

* Means followed by the same letter are not significantly different at P=0.10, according to the Student-Newman-Keuls Test. $LSD_{0.10}$=1.2 cm.



Both Vitazyme and Southeast Mix significantly increased plant height over the control, by 15 to 22%, but the combined products caused a 28% increase in plant height.

Increase in height with Vitazyme + SE Mix: 28%

Plant number results: The number of live plants was counted for each pot and subjected to a statistical analysis.

Treatment	Plant number*
3. Southeast Mix	78.3 a
4. Vitazyme + Southeast Mix	77.1 a
2. Vitazyme	76.5 a
1. Control	72.9 a

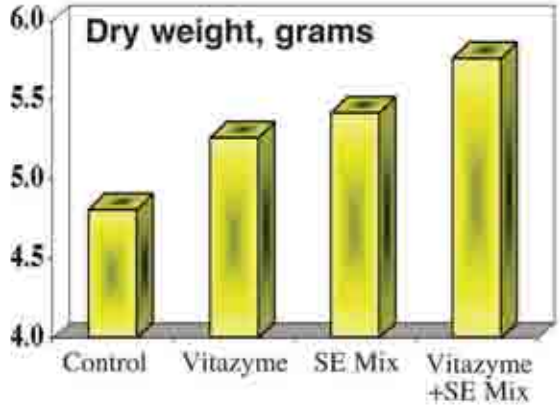
* Means followed by the same letter are not significantly different at P=0.10, according to the Student-Newman-Keuls Test. $LSD_{0.10}$=6.2.

There were no statistical differences among the treatments for plants per pot, but interestingly the Vitazyme and Southeast Mix pots produced the greatest number of surviving plants. Apparently the added nutrients and the biostimulant compounds of the two products helped more wheat seedlings survive. The treated pots exceeded the conrols by from 3.6 to 5.4 plants per pot.

Dry weight results: The plants were dried in a drying oven at 115° F for one day, and dry weights were taken to the nearest 0.01 gram. These results showed highly significant differences among treatment means.

Treatment	Dry weight*	Change vs. the control
	---------- grams ----------	
4. Vitazyme + Southeast Mix	5.76 a	0.95 (+ 20%)
3. Southeast Mix	5.42 a	0.61 (+ 13%)
2. Vitazyme	5.26 ab	0.45 (+ 9%)
1. Control	4.81 b	—

* Means followed by the same letter are not significantly different at P=0.10, according to the Student-Newman-Keuls Test. LSD_{010}=0.52 g.



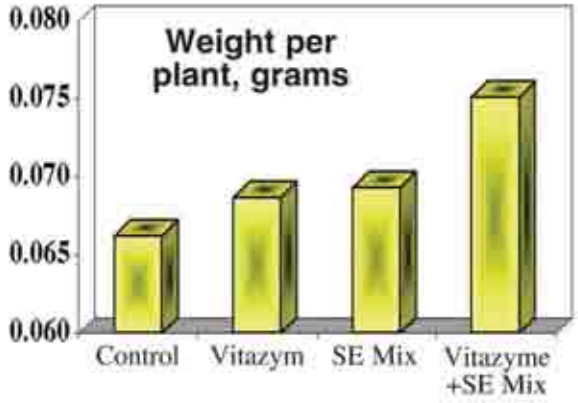
Increase in dry weight with Vitazyme + SE Mix: 20%

The dry weight of the wheat seedlings was significantly increased above the control by both Southeast Mix alone (+ 13%) and especially by Southeast Mix plus Vitazyme (+ 20%), showing that soil and fertilizer nutrients were being utilized more effectively when Vitazyme was present. Vitazyme alone increased dry weight over the control by 9%, but this increase was not significant at P=0.10.

Weight per plant results: The total dry weight for each pot was divided by the number of plants for each pot to obtain the average weight per plant.

Treatment	Weight per plant*	Change vs. the control
	grams	
4. Vitazyme + Southeast Mix	0.0751 a	0.0089 (+ 13%)
3. Southeast Mix	0.0693 b	0.0031 (+ 5%)
2. Vitazyme	0.0687 b	0.0025 (+ 4%)
1. Control	0.0662 b	—

* Means followed by the same letter are not significantly different at P=0.10, according to the Student-Newman-Keuls Test. LSD_{010}=0.0057 g.



Increase in weight/plant with Vitazyme + SE Mix: 13%

Even though Treatments 2, 3, and 4 had the highest plant populations, they also produced the greatest weight per plant, especially Treatment 4 where Vitazyme plus Southeast Mix yielded a 13% greater weight per plant than did the control. This shows that Vitazyme significantly improved nutrient utilization together with Southeast Mix nutrients, with plants that were significantly bigger than with either of the two products alone.

Conclusions: Both Vitazyme and Southeast Mix proved to be effective agents in stimulating wheat growth along with a nominal amount of starter nitrogen and sulfur added at planting, the Vitazyme effect due to biostimulant compounds and the Southeast Mix due to nutrients in the "sucrate" form. These stimulating effects were evident in terms of plant height, dry weight, and weight per plant at harvest. However, the combined Vitazyme and Southeast Mix proved by all means to be the most effective treatment, in all cases producing the greatest height and dry matter accumulation. These results correspond with other studies which demonstrate the ability of Vitazyme phytoactive agents to enhance plant uptake of minerals and nitrogen from either native or applied sources. Note especially the report "Vitazyme and Greenup on Corn", available through Vital Earth Resources.

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2002 Crop Results

Vitazyme on Wheat

Research Farm: Nowlin Farm *Location*: Coolidge, Arizona *Variety*: a pastry wheat variety
Previous crop: unknown *Soil type*: unknown *Planting date*: unknown

Experimental design: A large field was divided into two sections: Vitazyme treated with a reduced input of certain fertilizers (101 acres), and full fertilizer without Vitazyme (86 acres).

1. Control + full fertilizer **2. Vitazyme + 50% of some fertilizers**

Fertilization: 400 lb/acre N plus other inputs over all areas. At the beginning of grain filling the control area received a foliar application of 4 lb/acre of urea, 14 oz/acre of phosphorus, 36 oz/acre of ViGorator, 1.5 oz/acre of cobalt, 0.75 oz/acre of Xcite, and 0,8 oz/acre of silica. The Vitazyme treated area received Vitazyme (see below) plus 4 lb/acre of urea, 14 oz/acre of phosphorus, 18 oz/acre of ViGorator, 8 oz/acre of sulfur, and 1.5 oz/acre of silica.

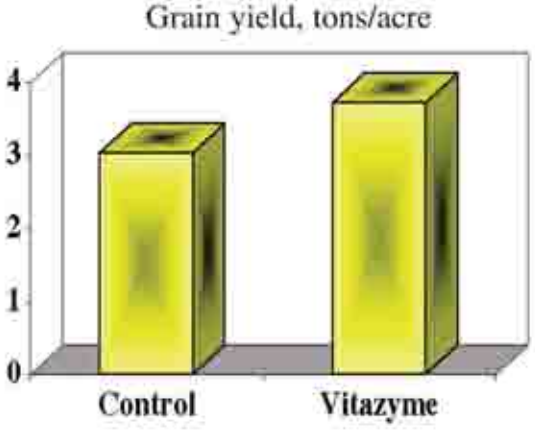
Vitazyme application : 13 oz/acre to the foliage at the beginning of grain fill

Harvest results: The last days of May the crop was harvested, and the various loads of grain were weighed from each area. These load weights were tallied for both areas. In addition, the bushel weights and protein levels for the loads were determined and averaged for the two areas.

Grain Yield

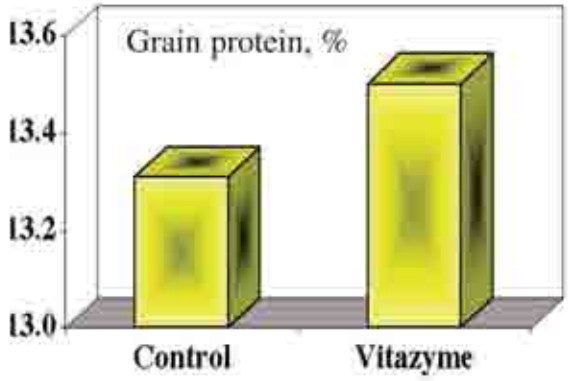
	Control*	Vitazyme**	Change
	tons/acre		
Grain yield	3.025	3.715	0.690 (**+23%**)

*Eight loads weighed; **12 loads weighed.



Vitazyme with reduced fertility inputs, applied late in the crop cycle, brought about a dramatic 23% increase in wheat yield in this study.

Grain Protein



	Control*	Vitazyme**	Change
	percent		
Grain protein	13.31	13.50	0.19

*Eight loads measured; **12 loads measured.

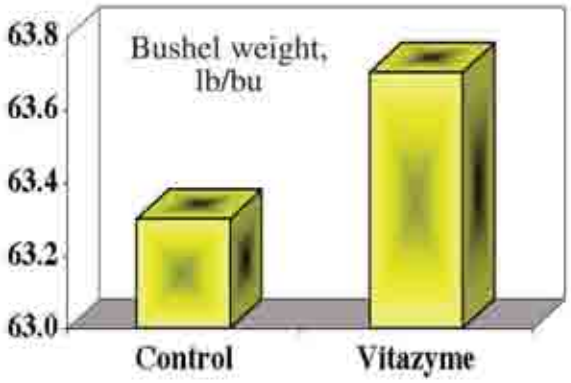
The protein of the grain was boosted by 0.19 percentage point by Vitazyme, despite the fact that some foliar applied fertility inputs were reduced by 50%. The plants were stimulated to make better use of the nitrogen and minerals available to them.

Bushel Weight

	Control*	Vitazyme**	Change
		lb/bushel	
Bushel weight	63.3	63.7	0.4

*Eight loads measured; **12 loads measured.

The Vitazyme treatment increased the density of the wheat grain by 0.4 lb/bushel, probably due to a higher concentration of minerals within the grain.



Increase in grain yield: 23%
Increase in grain protein: 0.19 percentage point
Increase in bushel weight: 0.4 lb/bu

Income results: Because the wheat was 13.0% protein or above , the grower received a premium price of $2.00/cwt over the usual price for the wheat. This premium price amounted to $7.50/cwt.

	Control	Vitazyme	Change
		$/acre	
Crop income	453.75	557.25	224.50

Increase in income: $103.50/acre

Conclusions: Vitazyme together with a reduced rate of certain foliar fertilizers, applied at the beginning of grain filling, brought about an improvement in all parameters measured in this Arizona pastry wheat study. Yield was boosted by 23%, grain protein by 0.19 percentage point, bushel weight by 0.4 lb/bu, and income by $103.50/acre. These effects resulted from Vitazyme's ability to stimulate rhizosphere microflora, allowing the plant to better utilize native and applied nutrients and to generate more its own nitrogen and growth enhancing compounds in the root zone such as growth regulators, antibiotics, various mineral-dissolving acids, and so forth.

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2002 Crop Results

Vitazyme on Wheat (Spring)

Researcher: Eltjo van Cingel *Farmer*: John Egeland *Location*: Fisher, Minnesota
Variety: Knudson hard red spring *Soil type*: clay loam *Seeding rate*: 90 lb/acre
Planting date: May 14, 2002

Experimental design: A field containing 89 acres was divided into three portions, 34 acres of an untreated control, 32 acres of Vitazyme only, and 23 acres of Vitazyme plus a fertilizer blend.

1. Control 2. Vitazyme 3. Vitazyme + fertilizer blend

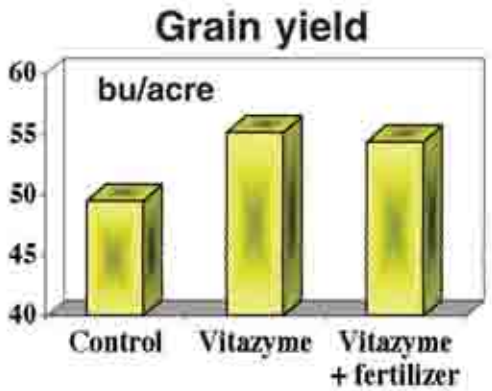
Fertilization: Unknown for Treatments 1 and 2, but Treatment 3 had a special blend of fertilizer applied based upon a soil test and the Albrecht system of soil balancing

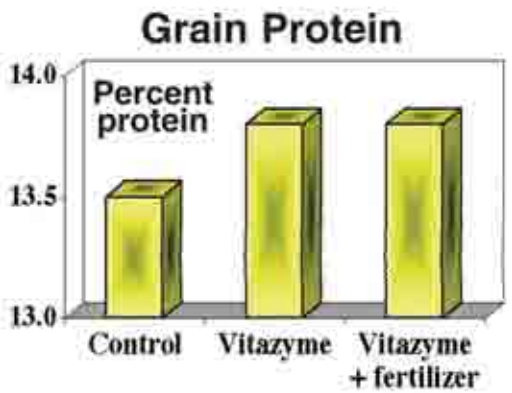
Vitazyme treatment: 13 oz/acre on the leaves and soil on June 17 by airplane, with a herbicide, for Treatments 2 and 3

Harvest date: August 21, 2002

Yield results: Actual truck weights were taken to insure an accurate yield calculation for all areas. Yield monitor results were also tabulated, and the highest yield for each treatment is given in one of the columns.

Treatment	Grain yield	Change	Protein	Highest yield	Test weight
	bu/acre	bu/acre		bu/acre	lb/bu
1. Control	49.5	—	13.5	57	58
2. Vitazyme	55.2	+5.7 (+12%)	13.8	59	58
3. Vitazyme + special blend	54.4	+4.9 (+10%)	13.8	60	57





Increase in Yield (2X): 12%

Increase in grain protein: 0.3 percentage point

Income results: This crop was contracted for $0.70/bu above the market value, so with a market value of $4.84/bu the contract price is $5.54/bu.

Treatment	Grain yield	Grain Value	Change in value
	bu/acre	$/acre	$/acre
1. Control	49.5	—	13.5
2. Vitazyme	55.2	305.81	31.58
3. Vitazyme + special blend	54.4	301.38	27.15

Increase in income: $31.58/acre

Cost:Benefit ratio: 7.9:1

Conclusions: Vitazyme applied to the leaves and soil of this hard red spring wheat variety in the Red River Valley significantly increased yield (+12%) and income ($31.58/acre); yield and return were slightly lower with the special blend of fertilizer. Moreover, the grain protein was enhanced slightly (0.3 percentage point) with both Vitazyme treatments. These results illustrate the rhizosphere stimulating effects of the product's active agents to take up more nutrients, while stimulating photosynthesis to fix more carbon and thus increase yields above the untreated control.

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2002 Crop Results

Vitazyme on Wheat
a Testimonial

Researcher: Michael Dustan
Variety: feed wheat
Planting date: October, 2001
Location: southwestern England (Wells, Somerset County)
Soil type: clayey; high Ca, low Mg, low trace minerals

Experimental Design: Four farms had fields that were treated with the Vitazyme program in Somerset County, with control areas left untreated. No total yield data were obtained, but responses were closely estimated on all four farms.

1. Control **2. Vitazyme**

Fertilization: Typical applications were 160 to 180 lb N/acre, and 200 to 300 lb/acre of a 0-24-24% N-P_2O_5-K_2O fertilizer.

Vitazyme application: 1 liter/ha (13 oz/acre) at the early flag leaf stage, towards the end of May

Harvest date: August, 2002

Yield and quality results: Average yield increases for the Vitazyme treatments for the four farms were 0.5 to 0.8 metric tonnes/acre.

Yield increases: 0.5 to 0.8 mt/acre

The heads and grains of the Vitazyme treated wheat were larger and plumper than for the untreated control.

Conclusions: Although the Vitazyme was applied very late in the growth cycle, the responses on these four English farms were excellent. Comments of the researcher were as follows:

- **The treated wheat responded immediately to the Vitazyme, results being visible within four days of application.**
- **The treated plants were better looking, bigger, and had less grain shriveling.**
- **It is a very easy-to-use product**
- **All of the farmers are very happy and impressed with Vitazyme.**
- **In one 70-acre block, he expected 1.0 to 1.5 tonnes/acre but after treatment actually harvested over 3.0 tonnes/acre.**

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2000 Crop Results

Vitazyme on Wheat (Winter)

Farmer: Mike Iller
Location: Twin Falls, Idaho
Variety: Stevens soft white winter wheat
Planting date: October 9, 1999

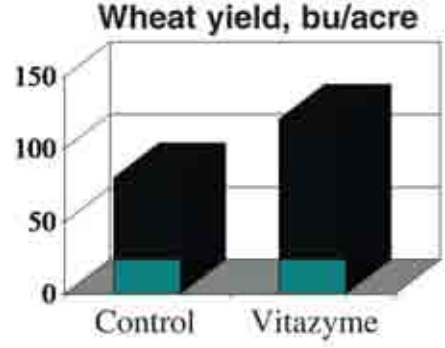
Experimental design: A wheat field of 40 acres was divided into two 20-acre portions having similar soils. One part was treated with Vitazyme and the other part was left untreated for a control. All fertility and management practices were the same for each portion.

1. Control **2. Vitazyme**

Fertilization: 10 tons/acre manure, 31 lb/acre N, and 39 lb/acre P_2O_5, the fall of 1999; 46 lb/acre N the spring of 2000
Vitazyme application: 26 oz/acre on the leaves and soil along with 1 pint/acre of 0-30-0
Harvest date: August 29, 2000
Yield results:

	Control	Vitazyme	Change
		bu/acre	
Grain yield	80.47	120.71	40.24 (+50%)

Yield increase: 50%



Income results: A price of $1.80/bu is estimated

	Control	Vitazyme	Change
		$/acre	
Gross income	144.85	217.28	(+) 72.43

Income increase: $72.43/acre

Conclusions: One application that was twice as concentrated as recommended boosted wheat yield in this Idaho study by 50%. This increase amounted to an excellent income enhancement of $72.43/acre.

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2000 Crop Results

Vitazyme on Winter Forage

Barley, Oats, and Wheat

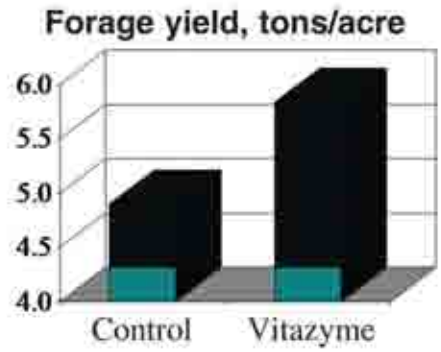
Farmer: Cornelius Van Diest
Location: Newberry Springs, California
Variety: barley, oats, and wheat varieties
Planting date: November 11, 1999
Soil type: light blow sand with high levels of boron in the subsoil
Seeding rate: 150 to 200 lb/acre
Experimental design: A center pivot system was divided into four quadrants. Three (90 acres) were treated with the Vitazyme program and one (30 acres) was left untreated.

1. Control **2. Vitazyme**

Fertilization: 18 lb/acre of NH_4NO_3 liquid at the sixth true leaf; 35 lb/acre of NH_4NO_3 liquid two times (sometimes three times) per cutting sequence, giving about 125 lb/acre total of the N fertilizer per crop
Vitazyme treatment: (1) On the seeds at planting at 6.4 oz/acre, with the starter fertilizer; (2) 13 oz/acre sprayed on the leaves and soil twice, after each nitrogen fertilizer application
Harvest date: April 11, 2000, for the Vitazyme treatment; April 14, 2000, for the control
Yield results:

	Control*	Vitazyme*	Change
		100 lb bales/acre	
Forage yield	98.0	116.7	18.7
		tons/acre	
Forage yield	4.900	5.833	(+) 0.933 (+19%)

Forage yield increase: 19%



Income results: A value of $125.00/ton is estimated

	Control	Vitazyme	Change
		$/acre	
Crop income	612.50	729.13	(+) 116.63

Income increase: $116.63/acre

Conclusions: This forage trial in the Mojave River drainage basin, with poor desert soils having high yield potential if managed well (12 tons/acre of 20% protein and 60% TDN alfalfa), showed the potential of Vitazyme to substantially increase grass forage yields and income. A 19% yield increase resulted in $116.63/acre more return, giving a 9:1 return on investment for a Vitazyme seed treatment and two foliar applications.

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1999 Crop Results

Vitazyme on Winter Wheat

Farmer: M. Wheeler *Location*: Kent, England *Variety*: Equinox (soft wheat)
Soil type: sandy loam *Planting date*: October, 1998 *Harvest date*: August, 1999

Experimental design: A field was divided into two parts, one treated with the "Eco-Ag" System and the other with conventional fertility methods.

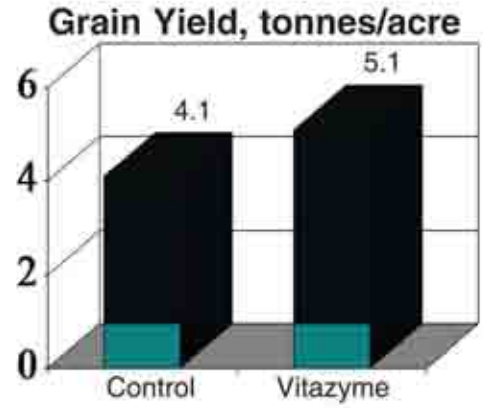
1. Control **2. Vitazyme + Eco-Ag products**

Fertility treatments: no P_2O_5 or K_2O and reduced nitrogen fertilizer. Nitrogen was applied twice to give 180 kg/ha (161 lb/acre) actual N, which was a 10% reduction in rate.

Vitazyme applications: Four applications of 250 ml/ha (3 oz/acre) each were applied at drilling, early spring, midseason, and flowering to give a 1 liter/ha total. Humic acids were also applied, and fungicide applications were made at reduced levels.

Yield results:

	Control	Vitazyme	Increase
Grain, tonnes/acre	4.1	5.1	1(+25%)



Grain increase: 25%

Income results: Price of wheat = $111.30/tonne

	Control	Vitazyme	Increase
Income	$456.33/acre	$567.63/acre	$111.30/acre

Income increase: $111.30/acre

Comments: Due to the excellent result, Mr. Wheeler will be using Vitazyme and the Eco-Ag System on all of his land in 2000. He also noticed a benefit to soil structure and available plant nutrients.

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1997 Crop Results

Vitazyme on Wheat

Researcher: Tom Bay
Location: Rushville, New York
Seeding date: October 6, 1996
Variety: Pioneer 2548 winter wheat
Previous crop: native sod
Seeding rate: 2.9 bu/acre

Experimental design: A wheat field was split into two portions, one part of 32 acres receiving Vitazyme and the other part of 43 acres receiving additional nitrogen but no Vitazyme.

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

Fertility treatments: The **control** received 5.4 gal/acre of Nature's 9-18-9 plus 2.6 gal/acre of 0-0-30 (liquid) in the fall at planting, applied directly to the seeds. The **Vitazyme treatment** received only 2.7 gal/acre (50%) of 9-18-9 plus 1.3 gal/acre of 0-0-30 and 0.5 gal/acre of sugar at planting. In the spring, **both treatments** received 60 lb N/acre as a 32% liquid plus 1 lb/acre Solubor.

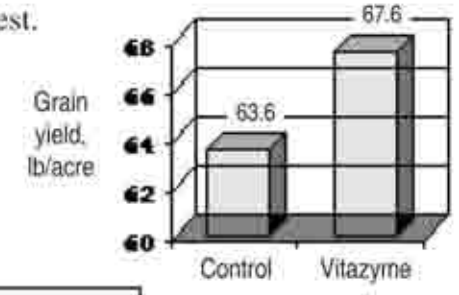
Vitazyme treatment: The Vitazyme treated portion of the field received 13 oz/acre injected with the fertilizer directly on the seed at planting.

Interseeded crop: Red clover was seeded to all areas, so no herbicides were used.

Harvest date: July 20, 1997

Yield results: Both plots had 13% moisture and 60 lb/bu grain at harvest.

Control	Vitazyme	Increase
63.6 bu/acre	67.6 bu/acre	4.0 bu/acre (+6%)



Yield increase: 6%

Income results: The price of wheat was estimated at $3.50/bu. The 9-18-9 and 0-0-30 fertilizer mix was worth about $2.50/gal.

	Control	Vitazyme	Increase
Grain value	$222.60	$236.60	$14.00/acre
Fertilizer savings	—	(4 gal/acre)	$10.00/acre

Income increase: $24.00/acre

Comments: Some field variability existed, but the two areas were fairly well matched so the yield comparison should be valid.