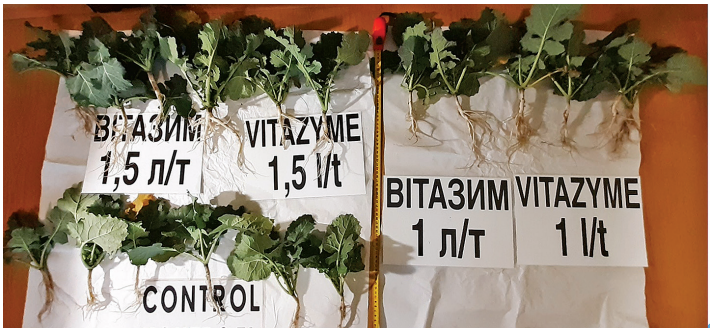
Winter Canola *with Vitazyme application—A Fertilizer Efficiency Study*

Researcher: V. V. Plotnikov
Research organization: Agro Expert International, Kaharlyk, Ukraine; Plant Designs International, Rochester, New York; National Academy of Agrarian Sciences of Ukraine, Institute of Feed and Agriculture of Podillia, Ukraine
Location: Vinnytsia District, Vinnytsia Region, Agronomichne Village, Ukraine; central Ukraine (440-590 mm of rain per year)
Variety: Monopolist Elite
Planting date: September 7, 2023
Planting rate: 1 million seeds/ha
Previous crop: winter wheat
Tillage: disking to 6-8 cm, plowing to 20-22 cm, pre-planting cultivation with a combined Europack unit to 2.5-3.5 cm
Soil type: gray podzolic (2.0% organic matter)
Experimental design: A canola field was divided into an untreated control and a Vitazyme treated portion to evaluate the effect of this product on growth parameters before winter, and then on growth effects as well as seed yield and quality in 2024.

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

Fertilization: unknown
Vitazyme application: seed treatment before planting at 1.0 liter/ton of seed and 1.5 liters/ton of seed

Plant growth parameter results: The plants for both treatments were evaluated on November 27, 2023, when fall growth had ceased. Plant values were averaged.

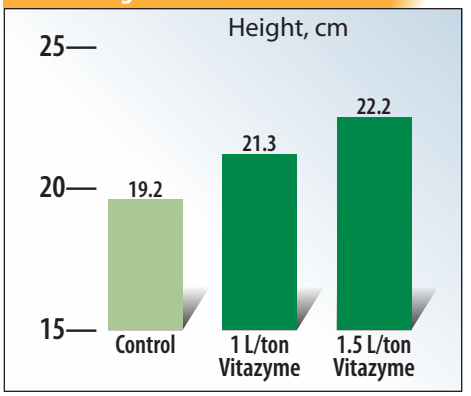


The superiority of leaf growth for the Vitazyme treatments in this photograph is clearly seen, compared to the untreated control plants on the bottom.

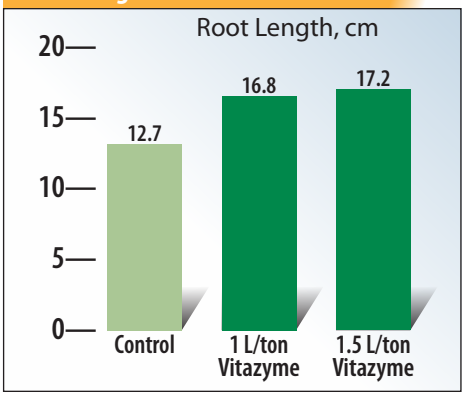
The Vitazyme treated area to the right is clearly noted for being taller and denser, and the treated plant laid out on the right is much more growthy than the untreated plants.

This photo shows the small plot combine used to harvest samples of the Vitazyme treated and control areas of the field trial. The yields of the Vitazyme treatments were 12% and 15% greater than the untreated control plot.

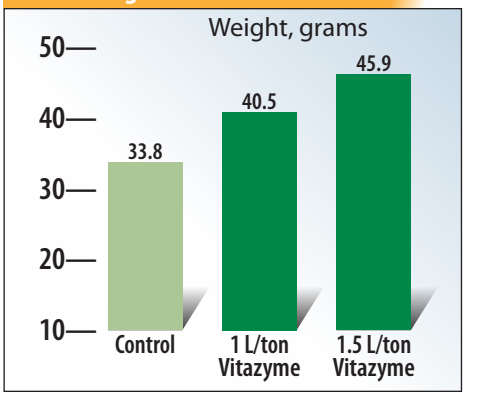
Plant Height



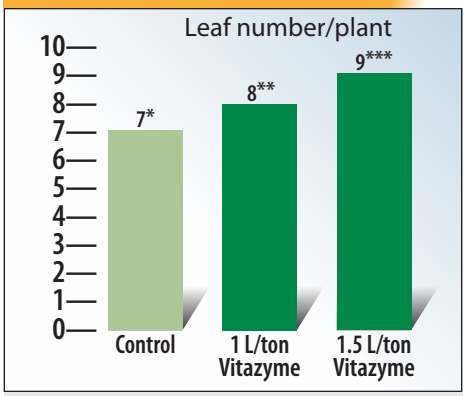
Root Length



Plant Weight



Leaf Number Per Plant

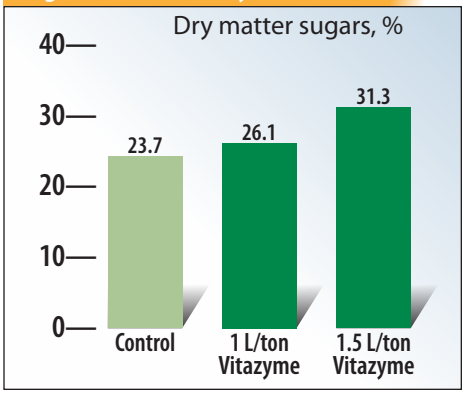


Plant maturity rating:
*BBCH 24 **BBCH 25 ***BBCH 26

Increase in plant growth parameters with Vitazyme		
	1 liter/ton	1.5 liters/ton
Plant height	11%	16%
Root length	32%	35%
Plant weight	20%	36%
Leaf number	14%	29%

Winter hardiness results: The ability of the canola crop to withstand winter cold was evaluated with the sugar concentration analysis before winter. Plants were harvested on November 27, 2023, and the sugar content was determined.

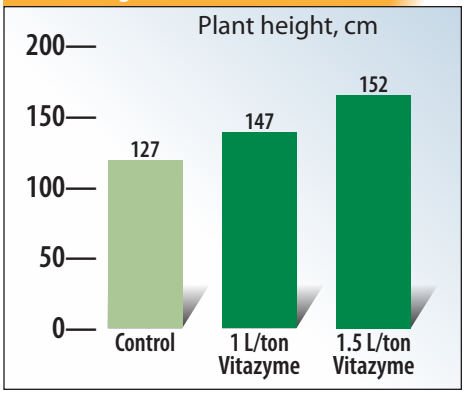
Sugar Content of Dry Matter



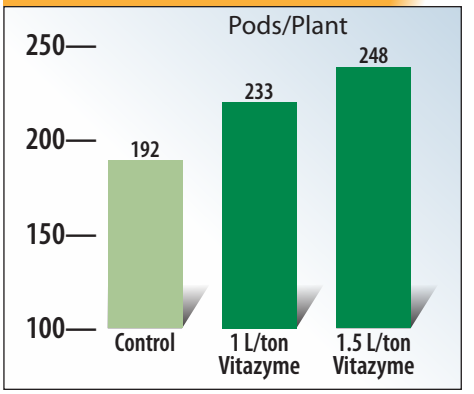
Sugar content increase with Vitazyme
1 liter/ton of seed 10%
1.5 liters/ton of seed 32%

Spring growth parameter results: On June 21, 2024, plant height and pod number/plant were measured.

Plant height



Pod Number Per Plant

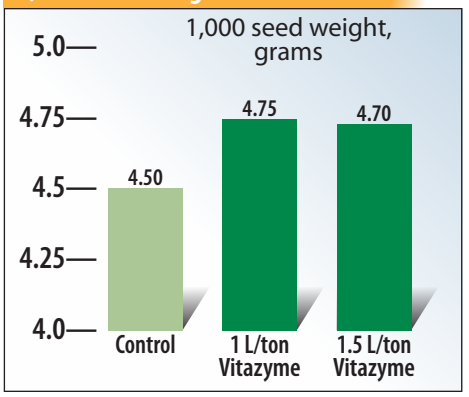


Plant height increase with Vitazyme
1 liter/ton of seed 16%
1.5 liters/ton of seed 20%

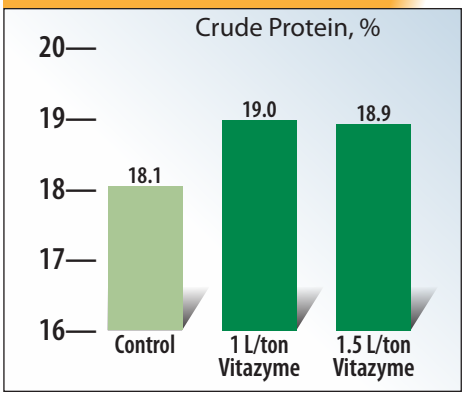
Pod number increase with Vitazyme
1 liter/ton of seed 21%
1.5 liters/ton of seed 29%

Seed quality results: Determinations were made at harvest (stage BBCH 86) of seed quality parameters.

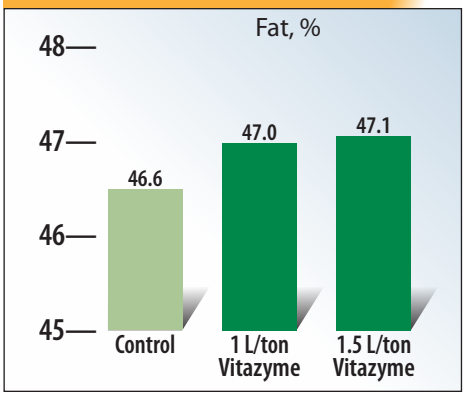
1,000 Seed Weight



Seed Crude Protein



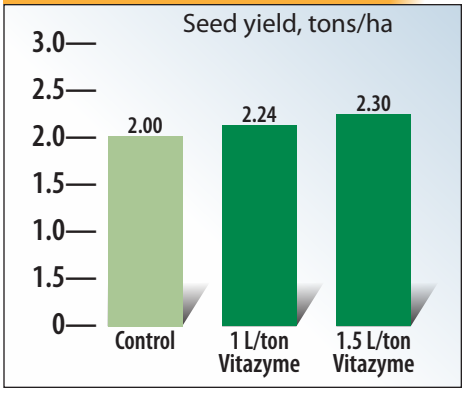
Seed Fat



1,000 seed weight increase with Vitazyme	*Crude protein increase with Vitazyme*	*Seed fat increase with Vitazyme*
1 liter/ton of seed 6%	*1 liter/ton of seed 0.9%-pt*	*1 liter/ton of seed 0.4%-pt*
1.5 liters/ton of seed 4%	*1.5 liters/ton of seed... 0.7%-pt*	*1.5 liters/ton of seed... 0.5%-pt*

Yield results:

Canola Seed Yield



Increase in canola seed yield with Vitazyme
1 liter/ton of seed 12%
1.5 liters/tons of seed 15%

Income results: The 1 liter/ton Vitazyme rate gave an income increase of $138/ha, while the 1.5 liters/ton rate produced a $173/ha increase.

Conclusions: This Ukrainian canola field study, which compared the effects of Vitazyme as a seed treatment at 1 and 1.5 liters/ton of seed, revealed that the fall growth of the canola plants was accelerated for all four parameters measured compared to the untreated control. These increases were highest for the 1.5 liters/ton application, and varied from 16% for plant height to 36% for plant weight. Winter, hardiness of the crop, as measured by tissue sugar content, was increased by 10 to 32% by Vitazyme. Spring measurements on plant growth showed that the Vitazyme seed treatment improved plant height by up to 20%, and pods per plant by up to 29%. Seed quality parameters were also improved by Vitazyme: 1,000 seed weight by up to 6%, crude protein by up to 0.9 percentage point, and seed fat by up to 0.5 percentage point. The yield at harvest was boosted by 0.24 ton/ha (12%) and 0.30 ton/ha (15%) by the 1 and 1.5 liters/ton treatments. Both of these treatments boosted the farmer's income significantly, by up to $173/ha. These results show the great viability of this biostimulant program for Ukrainian farmers with canola, with the 1.5 liters/ton of seed being the better of the two treatments.

Winter Canola *with Vitazyme application*

Researcher: V. V. Plotnikov
Research organization: Agro Expert International, Kaharlyk, Ukraine; Plant Designs International, Rochester, New York; National Academy of Agrarian Sciences of Ukraine, Institute of Feed and Agriculture of Podillia, Ukraine
Location: FG "Kolyvaylo," Vinnytsia District, Vinnytsia Region, Mizyakivski Khutory, Ukraine
Variety: Dominator
Planting date: September 6, 2023
Planting rate: 500,000 seeds/ha
Previous crop: winter wheat
Soil type: gray podzolic (2.0% organic matter)
Soil preparation: plowing to 20-22 cm, pre-planting cultivation with a combined Europak unit to 3-4 cm
Experimental design: A canola field was divided into an untreated control and Vitazyme treated portion to determine the effect of this biostimulant on plant development and seed yield.

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

Fertilization: 152 kg/ha N and 26 kg/ha S in the spring as a top dressing
Vitazyme application:
0.5 liter/ha sprayed on the leaves and soil at early flowering (BBCH 62) on May 2, 2024, tank mixed with a fungicide and insecticide

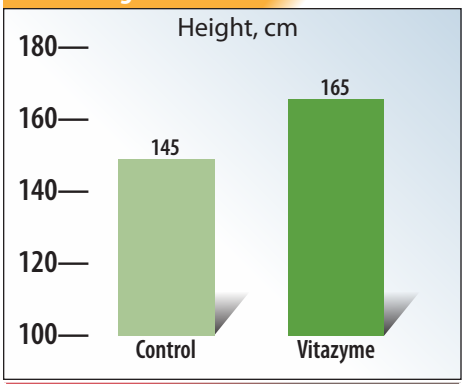
At harvest the Vitazyme treated winter canola is impressively tall and dense, and yielded 12% more than the untreated control.

The canola on the left with a Vitazyme treatment at early flowering shows greater plant density than the untreated control plants on the right.

Growth parameter results: Measurements were made on June 26, 2024.

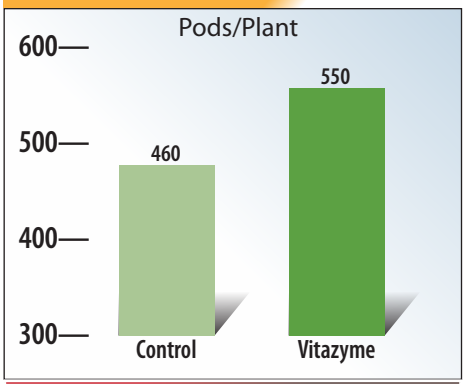
Yield results:

Plant Height



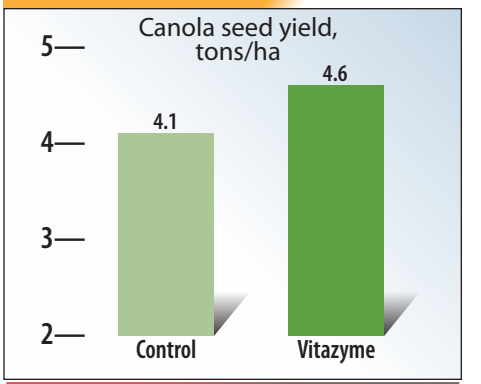
Increase in plant height with Vitazyme: 14%

Pods Per Plant



Increase in pods per plant with Vitazyme: 20%

Seed Yield



Increase in seed yield with Vitazyme: 12%

Income results: This single 0.5 liter/ha application of Vitazyme increased the income of the farmer by $276/ha.
Conclusions: A field-scale trial in central Ukraine, using a Vitazyme application of 0.5 liter/ha at early bloom, produced good improvements in plant height (14%) and pod number (20%) compared to the untreated control. These increases translated into a yield increase of 0.5 ton/ha (12%), which netted the farmer $276/ha greater income. This simple and inexpensive biostimulant is thus shown to be highly effective in improving the farmer's production and income without concerns of product toxicity.

Canola (Winter) *with Vitazyme Bio on Winter Canola*

Researchers: Vadim V. Plotnikov

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

Location: Salag Agro LLC, Bolgrad District, Odessa Region, Vesely Kut Village, Ukraine; southern Ukraine (270-350 mm of precipitation per year)

Variety: Hybrivok

Planting date: August 15, 2022

Planting rate: 400,000 seeds/ha

Previous crop: winter wheat

Tillage: disking to 10-12 cm

Planting depth: 2 cm with a Pottinger planter

Soil type: Mollisol (2.5% organic matter)

Experimental design: A field-scale winter canola trial in southern Ukraine was designed to compare the effect of Vitazyme Bio on canola seed yield. A portion of the field was left untreated while the rest of the field received a biostimulant application.

❶ *Control* ❷ *Vitazyme Bio*

Fertilization: An in-furrow application of 6 kg/ha of N and 11 kg/ha of P_2O_5 was made at fall planting. Then 40 kg/ha of N was top-dressed in the spring.

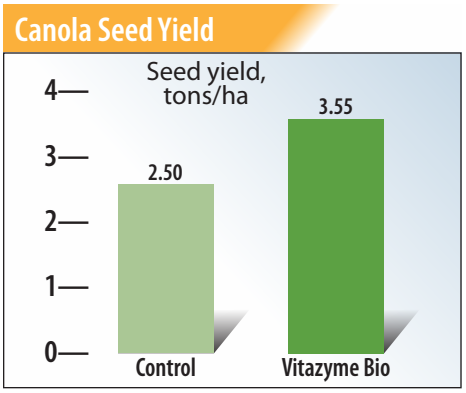
Vitazyme Bio application: 0.5 liter/ha sprayed on the leaves and soil at BBCH 59 (bud stage), on April 26, 2023

This beautiful field of canola was treated with Vitazyme Bio at the bud stage, and produced a major yield increase of 42% above the untreated control.

Yield results:

Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	2.50	—
2. Vitazyme Bio	3.55	1.05 (+42%)

Yield increase with Vitazyme Bio: 42%



Income results: : With a 1.05 ton/ha (42%) yield increase with Vitazyme Bio, the farmer netted $388/ha more income.

Conclusions: This winter canola trial, which utilized only 0.5 liter/ha of Vitazyme Bio in part of the field at the bud stage, revealed that the seed yield was improved by a remarkable 42% with this biostimulant. Income was also increased, by $388/ha. These results prove how profitable Vitazyme Bio use can be for canola farmers in southern Ukraine.

Canola *with Vitazyme Cold Start application*

Researchers: Vadim V. Plotnikov
Research organization: Agro Expert International, Kaharlyk, Ukraine, and Plant Designs International, Rochester, New York
Location: PAE "Oleksandrivs'ke," Uman District, Cherkasy Region, Oleksandrivka Village, Ukraine
Variety: Temptation
Planting date: August 27, 2021
Planting rate: 4 million seeds/ha
Previous crop: winter wheat
Tillage: disking to 6-8 cm, plowing to 28-30 cm, cultivation to 2-3 cm
Soil type: typical chernozem (4.2% organic matter)
Experimental design: A canola field was divided into a Vitazym Cold Start treated portion, while the remainder of the field was left untreated. The purpose of the trial was to evaluate the effect of Vitazyme Cold Start on canola yield.

This Vitazyme Cold Start treated canola in the Cherkasy Region yielded 24% more seed than the untreated control.

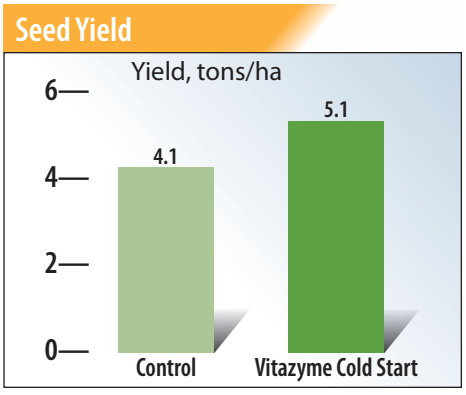
1 ***Control*** **2** ***Vitazyme twice***

Fertilization: 8-24-24 kg/ha of N-P_2O_5-K_2O in-furrow at planting; 108 kg/ha of N and 34 kg/ha of S broadcast in the spring
Vitazyme Cold Start application: 0.5. liter/ha sprayed foliar in the fall (October 12, 2021) at the BBCH 23 stage (6 leaves); 1.0 liter/ha sprayed foliar in the spring (April 30, 2022) at the BBCH 55 stage (budding). Vitazyme Cold Start is a cold and wet weather variation of regular Vitazyme.

Yield results:

Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	4.1	—
2. Vitazyme Cold Start	5.1	1.0 (+24%)

Yield increase with Vitazyme Cold Start: 24%



Income results: The effect of a 1.0 ton/ha yield increase was to increase the income to the farmer by $383/ha.

Conclusions: This winter canola field scale trial with Vitazyme Cold Start in Ukraine, using a fall foliar application of 0.5 liter/ha at the 6-leaf stage, and a spring foliar application of 1.0 liter/ha at the budding stage, provided an excellent 1.0 ton/ha yield increase (+24%). Such an increase provided the farmer an income increase of $383/ha, showing the great utility of this program for canola growers in Ukraine.

Canola *with Vitazyme Bio (Organic Vitazyme) application*

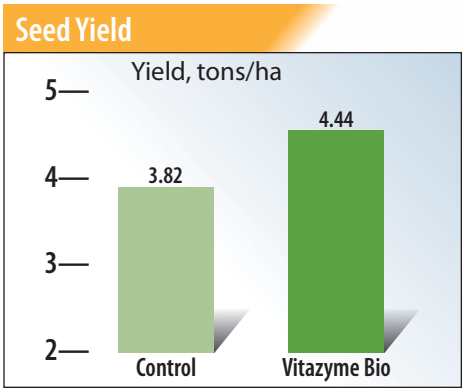
Researchers: Vadim V. Plotnikov
Research organization: Agro Expert International, Kaharlyk, Ukraine, and Plant Designs International, Rochester, New York
Location: PFC "Kolos," Bilhorod-Dnistrovsky District, Odessa Region, Marazliivka Village, Ukraine; southern Ukraine (270-350 mm of rain per year)
Variety: DK Impression KL
Planting date: August 8, 2021
Planting rate: 400,000 seeds/ha
Previous crop: winter wheat
Tillage: disking to 6-8 cm, direct seeding to 2 cm with a Mzuri planter
Soil type: typical Chernozem (4.0% organic matter)
Experimental design: A canola field was divided into a Vitazym Bio treated portion, while the remainder of the field was left untreated. The purpose of the trial was to evaluate the effect of Vitazyme Bio on canola yield.

❶ ***Control*** ❷ ***Vitazyme Bio***

Fertilization: 9-45-25 kg/ha of N-$P_2 0_5$-$K_2 0$) in-furrow at planting; 180 kg/ha of N and 42 kg/ha of S broadcast in the spring
Vitazyme Bio application: 0.8. liter/ha sprayed on the leaves at BBCH 59 (bud stage), on April 29, 2022.
Yield results:

Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	3.82	—
2. Vitazyme Bio	4.44	0.62 (+16%)

Yield increase with Vitazyme Bio: 16%



Income results: The additional 0.62 ton/ha yield with Vitazyme Bio produced an added $242/ha of income.

Conclusions: A field-scale canola trial conducted in southern Ukraine in 2022 revealed that a Vitazyme Bio application of 0.8 liter/ha, sprayed on the plants at the bud stage, produced an excellent yield increase of 0.62 ton/ha (+16%). This yield increase boosted net income to the farmer by $242/ha, showing the great value of the Vitazyme Bio program for Ukrainian farmers.

Canola (Winter) *with Vitazyme Bio application*

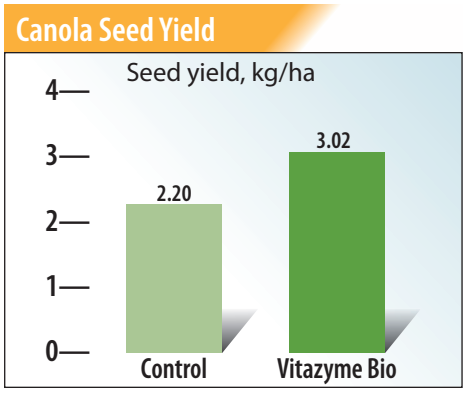
Researcher: V.V. Plotnikov
Research organization: Agro Expert International, Kaharlyk, Ukraine, and Plant Designs International, Rochester, New York
Location: "Alfa" Farm, Berezivka District, Odessa Region, Ryasnopol Village, Ukraine; southern Ukraine (270-3350 mm of rain per year)
Variety: Klavir KL ***Planting date:*** August 29, 2020 ***Planting rate:*** 0.35 million seeds/ha ***Previous crop:*** winter wheat
Tillage: disking to 5-6 cm, deep disking to 18-20 cm, cultivation to 3-4 cm ***Soil type:*** Chernozem (4.3% organic matter)
Experimental design: A canola field was divided into a Vitazyme Bio treated portion, with an untreated portion left as a control, to evaluate the effect of this product as a foliar spray on seed yield.

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

Fertilization: 16-16-16% N-P_2O_5-K_2O with the seeds at planting; 81 kg/ha N in the spring
Vitazyme Bio application: 0.5 liter/ha, sprayed on the leaves and soil on April 26, 2021, at early bloom (BBCH 59). Vitazyme Bio is the same as Organic Vitazyme, which is marked under that name in different parts of the world.
Yield results:

Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	2.20	—
2. Vitazyme Bio	3.02	0.82 (+37%)

Increase in seed yield with Vitazyme Bio: 37%



The application of only 0.5 liter/ha of Vitazyme Bio at early bloom caused a great increase in seed yield: 0.82 ton/ha (37%).

Income results: The 0.82 ton/ha yield increase resulted in a net income increase of $611/ha.
Conclusions: A winter canola split-field trial in southern Ukraine, using 0.5 liter/ha of Vitazyme Bio sprayed on the leaves at early bloom, resulted in a 0.82 ton/acre (37%) yield increase. This increase provided an additional $611/ha income, showing the considerable utility of this program for winter canola production.

Canola (Winter) *with Vitazyme application*

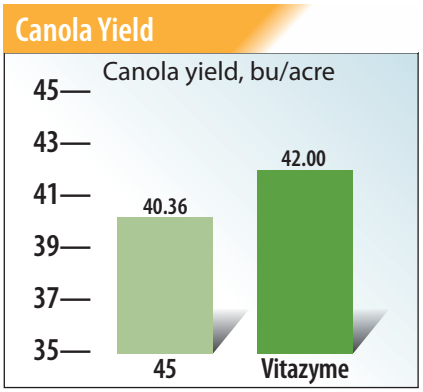
Researcher: Darrel Carlisle ***Research organization:*** Carlisle Liquid Starters, Carroll, Manitoba, Canada
Location: Carrol, Manitoba, Canada ***Variety:*** unknown ***Planting date:*** unknown
Experimental design: A A field of canola was treated in part with Vitazyme, to compare with another biostimulant ("45") applied alongside, to determine the effect of this product on the yield of canola seed.

1 ***"45"*** 2 ***Vitazyme***

Fertilization: unknown ***Vitazyme application:*** 1.0 liter/ha along with the herbicide
45 application: This product is also called Lignijoule in Western Canada, and is a by-product of the pulp and paper industry.
Yield results: At harvest, two combined samples of canola were collected and weighed for both products.

Treatment	Seed yield	Average yield	Yield change
	bu/acre	bu/acre	bu/acre
45	37.40	—	—
45	43.32	40.36	—
Vitazyme	39.16	—	—
Vitazyme	44.84	42.00	1.64 (+4%)

Increase in seed yield with Vitazyme: 4 %



Conclusions:
A canola trial in Manitoba, comparing a product called "45" with Vitazyme, showed a 4% better yield with Vitazyme. This increase was 1.64 bu/acre.

Canola (Spring) *with Vitazyme application*

Researcher: William Hamman, Ph.D., and Donald Scott Walker
Researcher organization: Hamman AG Research, Inc., Lethbridge, Alberta, Canada ***Location:*** Coalhurst, Alberta, Canada
Variety: RRLL ***Planting date:*** May 29, 2020 ***Planting rate:*** 6 kg/ha ***Planting depth:*** 2 cm ***Row spacing:*** 25 cm
Planting method: plot drill ***Soil conditions at planting:*** moist ***Plot size:*** 4 m x 8 m ***Tillage method:*** reduced till
Soil type: dark brown Chernozem; sandy clay loam; organic matter= 1.8%, pH= 8.35, cation exchange capacity = 27.4 meq/100g; fertility level = good, drainage = good
Experimental design: A small-plot replicated canola trial, using four replications arranged in a replicated complete block design, was established using varying application times and methods of Vitazyme, to determine the effect of this biostimulant on the yield of spring canola.

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

Treatment	Vitazyme applicaton[1]				
	Seeds	In-furrow	Pre-plant	Foliar/Soil	Early flower
1. Control	0	0	0	0	0
2. Vitazyme on seeds	1 liter/ton[a]	0	0	0	0
3. Vitazyme in-furrow	0	1 liter/ton[b]	0	0	0
4. Vitazyme on soil pre-plant	0	0	1 liter/ton[c]	0	0
5. Vitazyme foliar/soil early	0	0	0	1 liter/ton[d]	0
6. Vitazyme in-furrow + early flower	1 liter/ton	0	0		1 liter/ton[e]

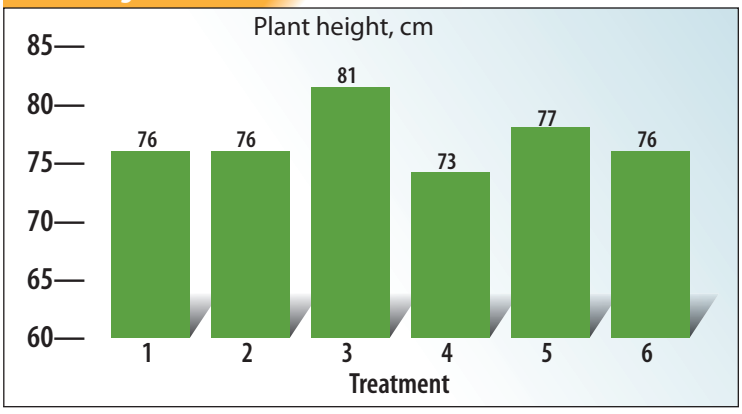
[a]Applied with a seed treater on May 29.
[b]Applied May 29.
[c]Applied May 29 just before planting.
[d]Applied at early heading on June 19, along with Liberty herbicide.
[e]Applied at early flowering on July 15.

Growing season weather: July, August, and September were especially dry.
Fertilization: unknown
Vitazyme application: All rates were 1 liter/ha at the times shown on the table.
Liberty herbicide: Liberty is a BASF nonselective herbicide that controls a broad spectrum of broadleaf and grassy weeds. It is used to control weeds for LibertyLink canola and other LibertyLink crops. The active ingredient is glufosinate ammonium.
Harvest date: September 11, 2020, using a Zurn 150 plot combine, harvesting an area of 1.5 x 8.0 meters for each plot (12.0m^2).

Plant height results: Data was collected August 18.

Treatment	Plant height
	cm
1. Control	76
2. Vitazyme on seeds	76
3. Vitazyme in-furrow	81
4. Vitazyme on soil pre-plant	73
5. Vitazyme foliar/soil early	77
6. Vitazyme in-furrow + early flower	76
CV	6.67
Replicate F	0.21
Treatment F	1.01
Treatment probability (P=0.05)	0.447
LSD (P=0.05)	7.7

Plant Height

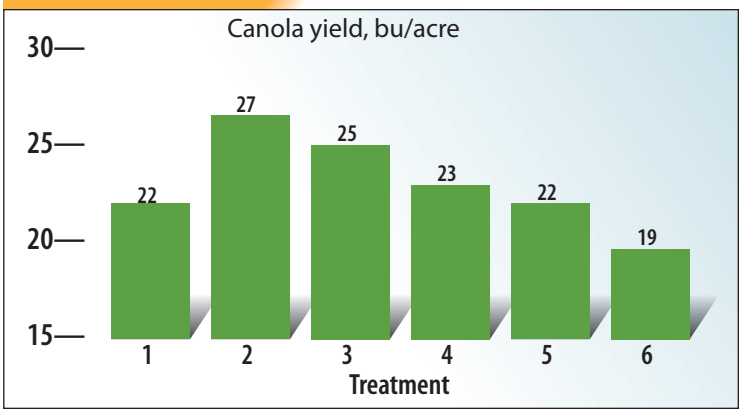


Increase in plant height with Vitazyme applied in-furrow: 5 cm (+7%)

Yield results:

Treatment	Yield	Yield change
	bu/acre	bu/acre
1. Control	22	—
2. Vitazyme on seeds	27	5 (+23%)
3. Vitazyme in-furrow	25	3 (+14%)
4. Vitazyme on soil pre-plant	23	1 (+5%)
5. Vitazyme foliar/soil early	22	0 —
6. Vitazyme in-furrow + early flower	19	(-) 3 (-14%)
CV	18.8	
Replicate F	0.69	
Treatment F	1.43	
Treatment probability (P=0.05)	0.27	
LSD (P=0.05)	6.4	

Canola Yield



Increase in canola yield with Vitazyme

Seeds ..... +23%
In-furrow ..... +14%
Pre-plant..... +5%

Conclusions: This small-plot canola trial in Alberta, Canada, revealed that Vitazyme improved plant height by 7% during an early August evaluation. Yield effects were excellent with the seed treatment, giving a 23% yield increase, although due to plot variability the increase was not significant a P=0.05. The in-furrow and pre-plant soil treatment gave small yield increases, of 14% and 5%, respectively, while the application with Liberty herbicides brought no yield effect. The in-furrow plus early flower applications reduced yield for unknown reasons, possibly due to one unusually low-yielding plot. The Vitazyme seed and in-furrow treatments are shown to be good yield stimulators of canola under Alberta conditions despite a very dry summer.

Canola (Winter) *with Vitazyme application*

Researcher: V. V. Plotnikov
Research organization: Plant Designs International, Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine
Location: PE AF "Dzvony", Peremyshl District, Lviv Region, Bolotnya Village, Ukraine: western Ukraine (550-750 mm of rain per year)
Variety: Seifer ***Planting date:*** August 20, 2018 ***Planting rate:*** 0.5 million seeds/ha ***Previous crop:*** winter wheat
Tillage: disking to 5-6 cm, plowing to 26-28 cm, cultivation to 2-3 cm ***Soil type:*** dark-gray podzolic (2.2% organic matter)
Experimental design: A winter canola field was divided into an untreated control area and a Vitazyme treated area—one application at budding—to evaluate the effect of this biostimulant on canola seed yield.

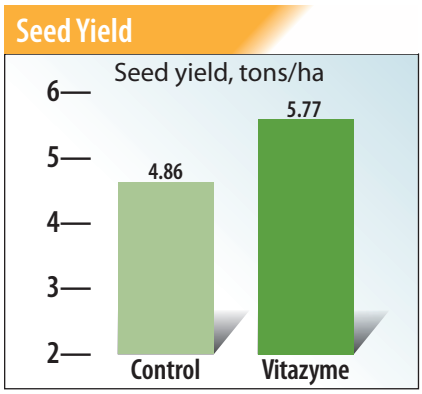
1 ***Control*** 2 ***Vitazyme***

Fertilization: 30-60-90 kg/ha of N-P_2O_5-K_2O during fall plowing; 170-10-13 kg/ha of N-Mg-S in the spring
Vitazyme application: 1.0 liter/ha sprayed on the leaves at budding on May 1, 2019

Yield results:

Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	4.86	—
2. Vitazyme	5.77	0.91 (+19%)

Increase in seed yield with Vitazyme: 19%



Income results: As a result of the yield increase of 19%, the net income for this trial was increased by $439/ha

Conclusions: A winter canola trial in western Ukraine in 2018-19, which compared an untreated control portion of a field with a portion sprayed with 0.7 liter/ha of Vitazyme in the spring, resulted in a great 19% yield increase, and a $439/ha net income increase. These results prove the excellent efficacy of Vitazyme for improving the productivity and profits of canola growers in Ukraine.

Canola (Winter) *with Vitazyme application*

Researcher: V.V. Plotnikov
Research organizations: Plant Designs International, Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine
Location: LLC "Spelta", Bilgorod-Dnistrovsk District, Odesa Region, Petrivka Village, Ukraine; Southern Ukraine (270-350 mm of precipitation per year)
Variety: Sherpa,
Planting date: August 30, 2018
Planting rate: 0.5 million seeds/ha
Previous crop: winter wheat
Soil type: Typical chernozem (humus=4.1%)
Field preparation: disking to 10-12 cm plowing to 20-22 cm, cultivation to 3-4 cm
Experimental design: A winter canola field was divided into conventionally treated and Vitazyme treated portions to evaluate the effects of Vitazyme on the yield of the seeds.

❶ ***Control*** ❷ ***Vitazyme***

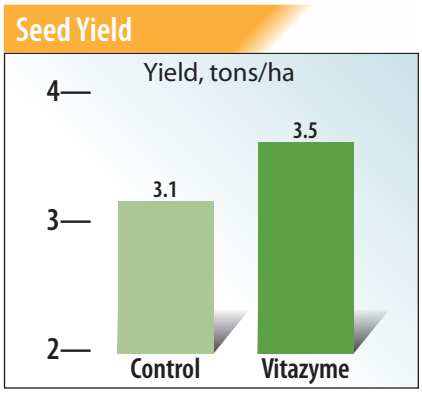
Fertilization: 32-52-24 kg/ha of N-P_2O_5-K_2O applied during fall plowing; 20 kg/ha of N applied at planting; 170 kg/ha of N and 36 kg/ha of S applied in the spring
Vitazyme application: 1.0 liter/ha sprayed on the leaves and soil at early flowering on April 28, 2019

Tall, well-branched plants having well-filled seeds is the result of the Vitazyme program for this canola fileld, which yielded 13% more than the untreated control.

Yield results:

Treatment	Yield	Yield change
	tons/ha	tons/ha
1. Control	3.1	—
2. Vitazyme + Cold Start	3.5	0.4 (+13%)

Increase in yield with Vitazyme: 13 %



Income results: An extra 0.4 ton/ha of canola seeds produced added income of $140/ha.
Conclusions: A winter canola trial conducted in Ukraine in 2018-2019, using a single Vitazyme foliar/soil spray at eary flowering of 1.0 liter/ha, produced an excellent 13% yield increase, grossing $140/ha more income for the farmer. This result points to the excellent responses farmers can expect with canola in Ukraine using the Vitazyme program.

Winter Canola *with Vitazyme application*

Researcher: V. V. Plotnikov
Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine
Location: Bilgorod-Dnistrovskii District, Odessa Region, Petrivka Village, LTD Spelta, Ukraine
Variety: Mercedes ***Planting date:*** August 20, 2017
Previous crop: winter wheat
Soil type: typical chernozem (humus = 4.1%)
Planting rate: 400,000 seeds/ha
Field preparation: disking to 10-12 cm, plowing to 20-22 cm, cultivation to 3-4 cm
Experimental design: A winter canola field in southern Ukraine, planted in the late summer of 2017, was treated in part with Vitazyme the spring of 2018, and compared with untreated portions of the field to determine the product's effect on seed yield and profitability.

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

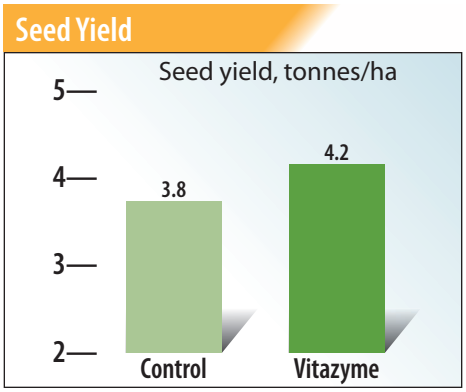
Fertilization: 32-52-24 kg/ha N-P_2O_5-S at plowing; 20 kg/ha P_2O_5 at planting; 170-36 kg/ha N-S in the spring
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at early flowering on May 2

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

Yield results:

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

Increase in seed yield with Vitazyme : 10%



Income results: A 0.4 tonne/ha yield increase gave $178/ha greater income.
Conclusions: A western Ukraine winter canola study, using Vitazyme at 1 liter/ha in the spring at early flowering, resulted in a yield increase of 10%, while boosting income by $178/ha. These results reveal the good efficacy of the program for canola growers in Ukraine.

Winter Canola *with Vitazyme application*

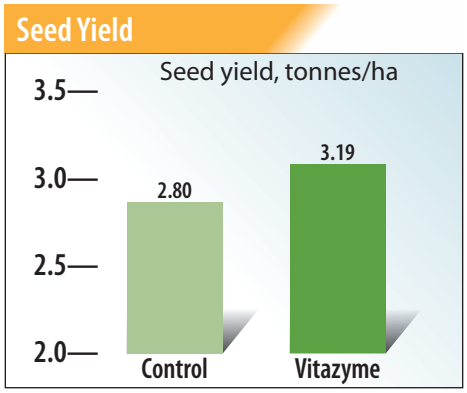
Researcher: V. V. Plotnikov
Research organization: Plant Designs, Inc., Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine
Location: Ivanove District, Odessa Region, Rosiiska Slobidka Village, Agricultural Farm Zolota Osin, Ukraine
Variety: Gybrirok ***Planting date:*** August 20, 2017 ***Previous crop:*** winter wheat
Soil type: typical chernozem (humus = 4.1%) ***Planting rate:*** 500,000 seeds/ha
Field preparation: disking to 14-16 cm, cultivation to 3-4 cm
Experimental design: A field trial in southern Ukraine with winter canola was prepared in 2017, with one portion of the field treated with Vitazyme the spring of 2018 to evaluate the effect of this product on canola yield and profitability.

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

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

Yield results:

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



Increase in seed yield with Vitazyme : 14%

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

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

Winter Canola *with Vitazyme application*

Researcher: Vadim Plotnikov
Research organization: "Zolota osin" Farm, Ukraine, Plant Designs, New York, USA, and Agro Expert International, Ukraine
Location: Ivanivka District, Odessa Region, Rosiiska Slobidka Village, Ukraine
Variety: ES Artist
Seeding rate: 0.4 million seeds/ha
Planting date: August 15, 2016
Previous crop: wheat
Soil type: typical Chernozem; humus=4.1%
Soil preparation: disking to 10-12 cm, plowing to 20-22 cm, harrowing to 3-4 cm
Experimental design: A winter canola field was divided into Vitazyme treated and untreated control areas to determine the efficacy of this product in promoting yield increases.

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

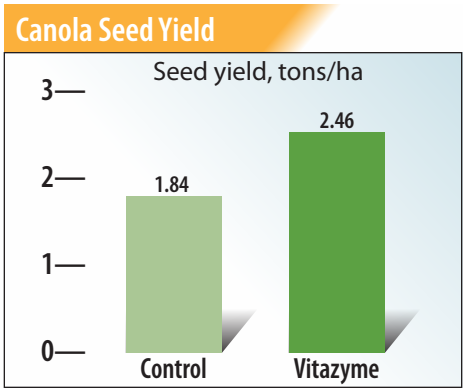
Fertilization: 12-12-12 kg/ha of N-P_2O_5-K_2O as starter at planting, and 52 kg/ha of N broadcast in the spring
Vitazyme application: 0.5 liter/ha sprayed on the leaves and soil at flower bud formation (April 30, 2017)
Growing season weather: dry
Yield results:

Treatment	Seed yield	Yield change
	tons/ha	ton/ha
1. Control	1.84	—
2. Vitazyme	2.46	0.62 (+34%)

Increase in seed yield with Vitazyme: 34%

Income results: At a price of $475.81/ton of canola seed, the added 0.62 ton/ha gave an additional $295/ha income.

Vitazyme treatments on canola in Ukraine resulted in excellent growth enhancement for both samples shown on the right side of this photo.



Conclusions: This winter canola southern Ukraine farm field Vitazyme trial, using one 0.5 liter/ha spray in the spring, proved that this program increased yield by 0.62 ton/ha (34%). This increase provided another $295/ha income, showing that Vitazyme is a highly viable adjunct to farming programs for canola growers in Ukraine.

Canola *A study conducted in 2013*

Research organization:
SF- Soepenberg s.r.o., Trnava, Slovakia,
Farmer cooperation: Jatov Trnovec, Vahom, Slovakia
Variety: unknown
Experimental design: A canola field was divided into Vitazyme treated and untreated areas to evaluate the effect of this product on the yield of seeds.

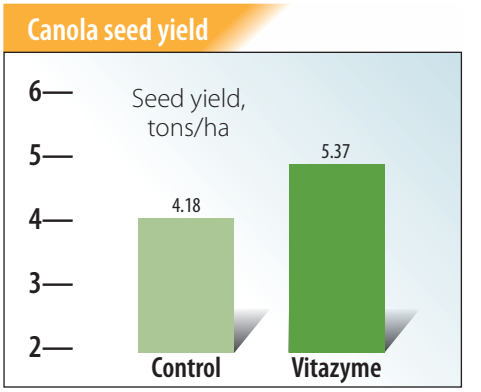
1 ***Control*** **2** ***Vitazyme***

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

Yield results:

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

Increase in canola seed yield with Vitazyme: 28%



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

Canola *with Vitazyme application*

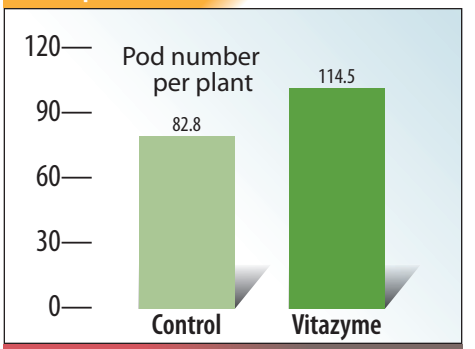
Researchers: Jacob Hesseltine and Heba Khalid
Research organization: Vital Grow Distribution LLC, Waterville, Washington
Farmer: Jorgenson Brothers
Location: Coulee City, Washington
Variety: High Class 115 spring canola, Roudup Ready
Planting date: last week of April
Seeding rate: 3.5 lb/acre
Seedbed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

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

Fertilization: 50 lb/acre of nitrogen in the fall of 2014
Vitazyme application: 13 oz/acre sprayed on the plants and soil in the spring, along with Roundup (glyphosate), using a 90-foot sprayer
Growing season weather: a very dry and hot summer
Harvest date: last part of August, 2015
Plant parameter results: On July 14, 10 typical plants were dug from both of the two treated areas, near to each other to minimize soil differences, to evaluate several plant parameters.
Conclusion: This split field spring canola trial in Washington, using just one Vitazyme application of 13 oz/acre, produced excellent plant responses when evaluated during the mid-growth period. Plant height was increased by 8%, pods per plant by 38%, stalk diameter by 27%, pod weight per plant by 47%, and average pod weight by 6%. These improvements set the stage for great yield increases, especially the greater pod number and weight per plant. It was not possible to separate the field areas for a yield evaluation, but it is presumed that a considerably greater yield was achieved on the Vitazyme treated area of the field. These results agree with responses of canola to Vitazyme noted in many other places across North America and the world, showing the great efficacy of this program for canola growers.

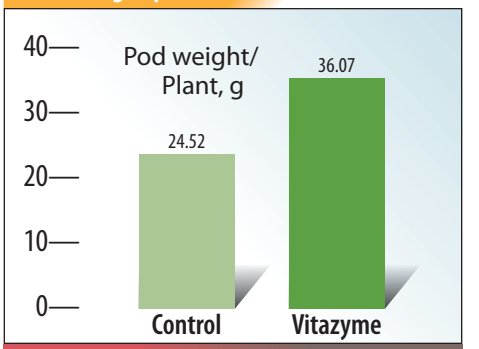
Note the marked increase in pod number per plant and pod size with Vitazyme..

Pods per Plant



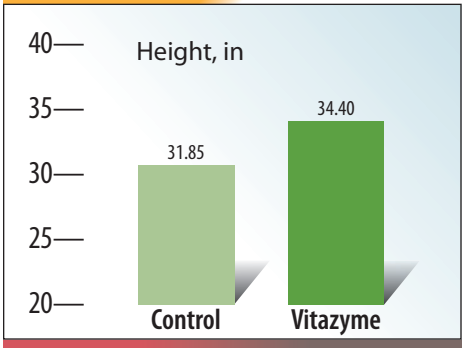
Increase with Vitazyme: 38%

Pod Weight per Plant



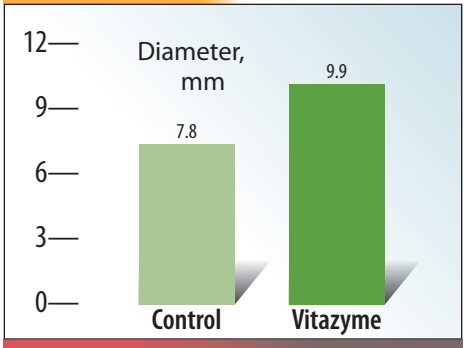
Increase with Vitazyme: 47%

Plant Height



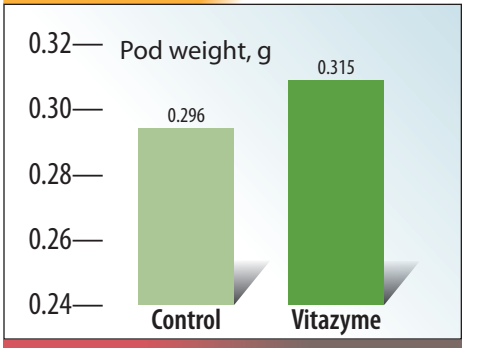
Increase with Vitazyme: 8%

Stalk Diameter



Increase with Vitazyme: 27%

Pod Weight



Increase with Vitazyme: 6%

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

2009 Crop Results

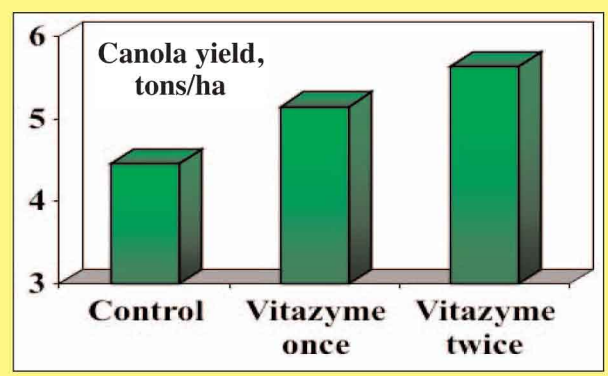
Vitazyme on Canola

Researcher: O.V. Kornijchuk, V.V. Plotnikov, and agronomic scientists
Organization: Vinnytsia State Agricultural Experiment Station, Ukraine Academy of Agrarian Sciences, Vinnytsia, Ukraine *Seeding rate*: 7 kg/ha *Seeding date*: August 30, 2008
Location: Ukraine central forest-steppe area near Vinnytsia *Previous crop*: spring barley
Variety: Black Giant, super elite *Tillage*: plowing, cultivation, and harrowing
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, replicated four times, to discover the effect of the product on the canola yield.

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

Fertilization: in the fall of 2008, 30 kg/ha N, 60 kg/ha P_2O_5, and 90 kg/ha K_2O; in the spring of 2009, 90 kg/ha of N.
Vitazyme application: Treatment 1 received a fall application at 1.0 liter/ha on October 22, 2008, and Treatment 2 received this treatment plus another in the spring on April 30, 2009, at 1.0 liter/ha.
Yield results:

Treatment	Canola yield	Yield change
	tons/ha	tons/ha
1. Control	4.46	—
2. Vitazyme	5.15	0.69 (+15%)
3. Vitazyme, fall + spring application	5.64	1.18 (+26%)



Increase in canola yield with Vitazyme

Fall application 15%
Fall + Spring application 26%

Income results:

- **Income increase with fall Vitazyme: 1,663 hrn/ha**
- **Income increase with fall + spring Vitazyme: 2,786 hrn/ha**

Conclusions: This winter canola trial at Vinnytsia, Ukraine, revealed that a single Vitazyme application in the fall, at 1 liter/ha, gave a large yield increase of 15%. An additional spring application at 1 liter/ha provided nearly double the fall-only application: 26%. Both reatments resulted in substantial increases in income, of 1,663 and 2,786 hrn/ha. These results prove the great utility of this product to improve winter canola yields under Ukrainian soil and climatic conditions.

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

2008 Crop Results

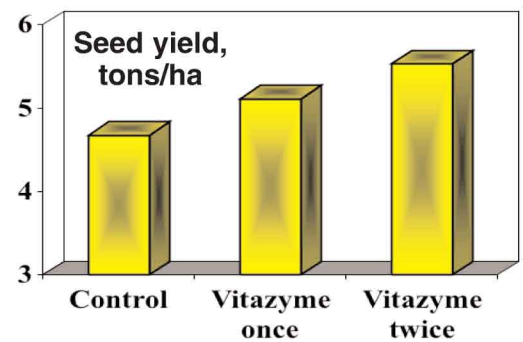
Vitazyme on Winter Canola

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 of Ukraine near Vinnytsia
Variety: Black Giant Super – Elite *Seeding rate*: 6 kg/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 potasium, and pH = 5.5.
Planting date: August 18, 2007 *Previous crop*: winter wheat
Tillage: plowing to 22 cm, and cultivation to 3-4 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 in the fall 3. Vitazyme applied both fall and spring

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, 90 kg/ha of nitrogen was applied.
Vitazyme application: for Treatment 2, 1 liter/ha over the leaves and soil on October 5, 2007 (8 to 10 leaves), and for Treatment 3, 1 liter/ha on October 5, 2007, and also 1 liter/ha on May 15, 2008 (bloom).
Harvest date: unknown
Yield results:

Treatment	Seed yield	Change
	tons/ha	tons/ha
Control	4.67	—
Vitazyme 1x	5.11	0.44 (+9%)
Vitazyme 2x	5.53	0.86 (+18%)



Increase in yield with fall application: 9%
Increase in yield with fall and spring applications: 18%

Income results: Based on current canola prices, the increase in income from Vitazyme for the two treatments is as follows:

Fall application ..... 952 hrn/ha
Fall and spring application ..... 1,855 hrn/ha

Conclusions: A fall application of Vitazyme (1 liter/ha) after planting resulted in a sizeable 9% increase in canola yield in Ukraine. Applying a second 1 liter/ha application in the spring doubled this yield increase to 18%, showing how effective this fertility supplement is to improve yields and profits on canola in Eastern Europe. Income increases were substantial for the two treatments: 952 and 1,855 hrn/ha, respectively.

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

1999 Crop Results

Vitazyme on Canola

Farmer: James Harrison
Location: North Yorkshire, England
Variety: Martina (a high uric acid industrial oil variety)
Planting date: unknown
Harvest date: unknown
Soil type: sandy clay loam

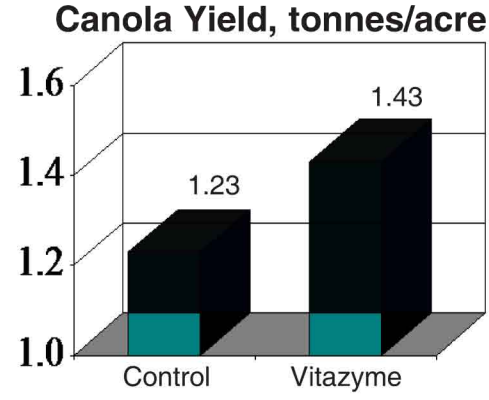
Experimental design: A canola field was divided into two parts, one treated with Vitazyme and the "Eco-Ag" System and the other left untreated.

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

Fertility treatments: no P_2O_5 or K_2O and reduced nitrogen fertilizer
Vitazyme applications: Vitazyme was applied at recommended rates with other Eco-Ag products.
Yield results:

	Control	Vitazyme	Increase
Yield, tonnes/acre	1.23	1.43	0.20 (+16%)

Yield increase: 16%



Income results: Canola price = $254.40/tonne.

	Control	Vitazyme
Income	$312.91/acre	$363.79/acre

Income increase: $50.88/acre

Comments: Using Vitazyme within the Eco-Ag program meant the crop required less fertilizer, especially nitrogen, than the conventional program. Even so, the Eco-Ag program still produced the highest yield and a sizeable income increase.