Sunflowers with Vitazyme application

Notice the enhanced head size and development with the Vitazyme program in this Ukraine trial. The yield has been substantially improved and very profitably.

**Researcher:** V. V. Plotnikov  
**Research organizations:** Plant Designs International, Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine  
**Location:** Cherkasy Experiment Station of Bioresources, Drabiv District, Cherkasy Region, Drabovo-Bariatynske Village; Central Ukraine (440-590 mm of precipitation per year)  
**Variety:** CI Diamantis  
**Planting date:** April 19, 2019  
**Planting rate:** 50,000 seeds/ha  
**Previous crop:** winter wheat  
**Soil type:** typical Chernozem (humus = 3.9%)  
**Field preparation:** disking to 6-8 cm, plowing to 22-24 cm, cultivating in two tracks to 5-6 cm  
**Experimental design:** A sunflowers field was divided into conventionally treated and Vitazyme treated portions to evaluate the effects of Vitazyme on the yield of the crop.

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

**Fertilization:** 46 kg/ha of N cultivated in before planting; 4-10-20 kg/ha of N-P₂O₅-K₂O applied during planting  
**Vitazyme application:** 0.5 liter/ha sprayed on the leaves and soil at the eight-leaf stage on May 30.

**Yield results:**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield</th>
<th>Yield change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>3.75</td>
<td>—</td>
</tr>
<tr>
<td>Vitazyme</td>
<td>4.10</td>
<td>0.35 (+9%)</td>
</tr>
</tbody>
</table>

**Income results:** The extra 0.35 ton/ha gave an addition $95/ha income.  
**Conclusion:** Sunflowers grown in a Vitazyme trial in central Ukraine, using 0.5 liter/ha sprayed at the eight-leaf stage, gave an additional 0.35 ton/ha yield (9%), that provided $95/ha more income. This program is thus shown to be highly effective in increasing the yield and income for sunflower growers, even when used at lower than normal rates.

**Sunflower Yield**

- **Yield, tons/ha**
  - 5 — Control: 3.75  
  - 4 — Control: 3.75  
  - 3 — Vitazyme: 4.10  
  - 2 — Vitazyme: 4.10

**Increase in seed yield with Vitazyme: 9%**
**Researcher:** V. V. Plotnikov  
**Research organizations:** Plant Designs International, Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine  
**Location:** LLC “Herron Invest”, Yarmolynci District, Khmel’nytskii Oblast, Tarasivka Village, Ukraine; Western Ukraine (550-750 mm at precipitation per year)  
**Variety:** P62 LL 109  
**Planting date:** April 4, 2019  
**Planting rate:** 62,000 seeds/ha  
**Previous crop:** winter wheat  
**Soil type:** Podzolic Chernozem (humus = 3.3%)  
**Field preparation:** disking to 6-8 cm, plowing to 22-24 cm, cultivating in two tracks to 5-6 cm  
**Experimental design:** A sunflower field was divided into normally treated and Vitazyme treated portions to evaluate the effects of Vitazyme on the yield of the sunflower seeds.  

**Fertilization:** 80-0-30 kg/ha of N-P₂O₅-K₂O applied during plowing; 12-52-0 kg/ha of N-P₂O₅-K₂O applied during planting  
**Vitazyme application:** 1.0 liter/ha sprayed on the leaves and soil at the eight-leaf stage on May 15.

**Yield results:**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield</th>
<th>Yield change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>4.25</td>
<td>—</td>
</tr>
<tr>
<td>Vitazyme</td>
<td>4.60</td>
<td>0.35 (+8%)</td>
</tr>
</tbody>
</table>

**Income results:** An extra 0.35 tons/ha gave an additional $84/ha income.  
**Conclusion:** This Ukrainian study on sunflowers, using 1 liter/ha of Vitazyme sprayed on the crop at the eight-leaf stage, resulted in an excellent 0.35 ton/ha seed increase (8%). This yield increase resulted in $84/ha extra income, showing the considerable value of this program for sunflowers in Ukraine.
**Sunflowers with Vitazyme application**

**Researcher:** V.V. Plotnikov

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

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

**Variety:** Sumiko

**Planting date:** April 30, 2018

**Previous crop:** spring wheat

**Soil type:** brown podzolic (humus = 2.2%)

**Planting rate:** 55,000 seeds/ha

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

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

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

**Fertilization:** unknown

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

**Yield results:**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield</th>
<th>Yield change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tonnes/ha</td>
<td>tonnes/ha</td>
</tr>
<tr>
<td>1. Control</td>
<td>2.33</td>
<td>—</td>
</tr>
<tr>
<td>2. Vitazyme</td>
<td>2.77</td>
<td>0.44 (+19%)</td>
</tr>
</tbody>
</table>

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

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

**Researcher:** V.V. Plotnikov  
**Location:** Onufriivka District, Kirovograd Region, Vyshnivtsi Village, LTD Zlagoda, Ukraine  
**Variety:** NK Kondi  
**Planting date:** May 1, 2018  
**Previous crop:** winter wheat  
**Soil type:** dark brown podzolic (humus = 2.6%)  
**Planting rate:** 50,000 seeds/ha  
**Field preparation:** disking to 6-8 cm, plowing to 22-24 cm, cultivation to 4-5 cm  
**Experimental design:** A sunflower field was divided into a Vitazyme treated area and an untreated control area to determine the effect of this product, in two applications, on yield and profitability.

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

**Fertilization:** 44-26-26 kg/ha N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O at plowing; 34 kg/ha N at pre-planting cultivation  
**Vitazyme application:** (1) 0.5 liter/ha sprayed on the leaves and soil at the 8-leaf stage on June 10; (2) 0.5 liter/ha sprayed on the leaves at “basket formation” on June 21  
**Yield results:** (See bar graph to the right)  
**Income results:** The added yield of 16% (0.53 tonnes/ha) gained $185/ha more income.  
**Conclusions:** Two 0.5 liter/ha applications of Vitazyme in this Ukrainian sunflower study provided for an excellent seed yield increase at 0.53 tonne/ha (+16%), while returning the farmer an additional $185/ha of income, showing the great value of this program for sunflower growers in Ukraine.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield</th>
<th>Yield change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tonnes/ha</td>
<td>tonnes/ha</td>
</tr>
<tr>
<td>1. Control</td>
<td>3.35</td>
<td>—</td>
</tr>
<tr>
<td>2. Vitazyme</td>
<td>3.88</td>
<td>0.53 (+16%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sunflower Seed Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
</tr>
<tr>
<td>Vitazyme</td>
</tr>
</tbody>
</table>

Increase in seed yield with Vitazyme: 16%
**Sunflowers with Vitazyme application**

**Researcher:** Vadim Plotnikov  
**Research organization:** PJSC “Kurland”, Ukraine, Plant Designs, New York, USA, and Agro Expert International, Ukraine  
**Location:** Zhmerynka District, Vinnytsia Region, Tarasivka Village, Ukraine  
**Variety:** NK Roki  
**Seeding rate:** 50,000 seeds/ha  
**Planting date:** May 11, 2017  
**Previous crop:** wheat  
**Soil type:** brown podzolic; humus=2.0%  
**Seedbed preparation:** disking to 6-8 cm, plowing to 22-24 cm, harrowing to 5-6 cm  
**Experimental design:** A sunflower field was divided into Vitazyme treated and untreated control areas to determine the efficacy of the product in promoting yield increases.

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

**Fertilization:** 20-20-12 kg/ha N-P₂O₅-K₂O broadcast before plowing, and 32 kg/ha of N in-furrow at planting  
**Vitazyme application:** 1 liter/ha sprayed on the leaves and soil at the 10-leaf stage on June 25, 2017  
**Growing season weather:** dry  
**Yield results:**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Seed yield (tons/ha)</th>
<th>Yield change (ton/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control</td>
<td>3.11</td>
<td>—</td>
</tr>
<tr>
<td>2. Vitazyme</td>
<td>3.46</td>
<td>0.35 (+11%)</td>
</tr>
</tbody>
</table>

**Income increase:** At a price of $362.86/ton of sunflower seeds, the added 0.35 ton/ha gave an additional $127/ha income.

**Conclusions:** A sunflower trial in a field in Ukraine in 2017, using a single 1 liter/ha application of Vitazyme at the 10-leaf stage, showed an 11% yield increase (0.35 ton/ha) despite very dry conditions during the growing season. This increase resulted in $127/ha greater returns to the farmer, revealing the excellent efficacy of this product for sunflower growers in Ukraine.
**Researcher:** Vadim Plotnikov  
**Research organization:** State Enterprise "Drabivske", Plant Designs, New York, USA, and Agro Expert International, Ukraine  
**Location:** Drabiv District, Cherkasy Region, Drabovo-Baryatinske Village, Ukraine  
**Variety:** NK Neoma  
**Seeding rate:** 50,000 seeds/ha  
**Planting date:** April 26, 2017  
**Previous crop:** wheat  
**Soil type:** typical Chernozem; humus=3.9%  
**Soil preparation:** disking to 6-8 cm, plowing to 22-24 cm, harrowing, to 5-6 cm  
**Experimental design:** A sunflower field was divided into Vitazyme treated and untreated control areas to determine the efficacy of this product in promoting yield increases.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Seed yield</th>
<th>Yield change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tons/ha</td>
<td>ton/ha</td>
</tr>
<tr>
<td>1. Control</td>
<td>3.05</td>
<td>—</td>
</tr>
<tr>
<td>2. Vitazyme</td>
<td>3.46</td>
<td>0.41 (+13%)</td>
</tr>
</tbody>
</table>

**Fertilization:** 120 kg/ha of nitrogen broadcast before planting, and 10-26-26 kg/ha of N-P₂O₅-K₂O in-furrow starter at planting  
**Vitazyme application:** 0.5 liter/ha sprayed on the leaves and soil at the 8 to 10-leaf stage on June 10, 2017  
**Growing season weather:** dry

**Yield results:**

- **Seed yield, tons/ha**
  - Control: 3.05
  - Vitazyme: 3.46

**Income increase:** At a price of $397.56/ton of sunflower seeds, the added 0.41 ton/ha gave an additional $163/ha income.

**Conclusions:** This Vitazyme full-scale field trial with sunflowers in the Ukraine, utilizing just one foliar/soil application of 0.5 liter/ha at the 8 to 10-leaf stage, provided an excellent 0.41 ton/acre (13%) seed yield increase, which gained the farmer $163/ha more income. These results show how useful this program is for sunflower growers in Ukraine.
Researcher: V. V. Plotnikov  
Research institution: Agro Expert International, Vinnytsya, Ukraine  
Location: L. L. C. Zelen’ky, Zelen’ky Village, Myronivs’kyi District, Kyiv Region, Ukraine  
Variety: NK Condi  
Planting date: May 5, 2016  
Seeding rate: 50,000 seeds/ha  
Soil type: podzolized  
Cultivation: disking to 6-8 cm, plowing to 20-22 cm, harrowing, and two cultivations to 4-5 cm  
Rainfall: 500-550 mm  
Experimental design: A sunflower field was divided into a Vitazyme treated and untreated area, with the objective of determining the effect of this product on the yield of the seeds.

### Yield results:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Seed yield</th>
<th>Yield change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>3.24</td>
<td>—</td>
</tr>
<tr>
<td>Vitazyme</td>
<td>3.54</td>
<td>0.30 (+9%)</td>
</tr>
</tbody>
</table>

**Income results:** Vitazyme increased net profit by 104 USD/ha.

**Conclusions:** This Vitazyme soil and foliar trial in Ukraine showed that only 1 liter/ha produced a 9% yield increase. Profits were substantially increased by 104 USD/ha, revealing the value of this product for sunflower production in Ukraine.
All trials were organized by V.V. Plotnikov, Ph.D., to determine the yield and profit-improving potential of Vitazyme. Fields were divided into Vitazyme and control areas.

1. Conducted by Agricultural Cooperative "Agrobusiness" at Kaharlystkyi District, Kyiv Region, Horohove Village, Ukraine, on a podzolized chernozem (3.1% organic matter).

Variety: NK Brio hybrid
Seeding rate: 50,000 seeds/ha
Planting date: April 25, 2015
Previous crop: winter wheat
Cultivation methods: disking to 8 cm, plowing to 22 cm, cultivation to 6 cm
Fertilization: 45 kg/ha N, pre-plant incorporated; 15 kg/ha N, 15 kg/ha P₂O₅, 15 kg/ha K₂O in-furrow at planting
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 8-leaf stage on May 31, 2015
Results: (See bar chart to the right)

2. Conducted by JLLC "Palmira Vidhodivlya" at Zolotonosha District, Cherkasy Region, Voznesens'ke Village, Ukraine, on a chernozem soil (3.5% organic matter).

Variety: NK Kondi hybrid
Seeding rate: 50,000 seeds/ha
Planting date: April 21, 2015
Previous crop: winter wheat
Cultivation methods: disking to 8 cm, plowing to 22 cm, cultivation to 6 cm
Fertilization: 45 kg/ha N, pre-plant incorporated; 15 kg/ha N, 15 kg/ha P₂O₅, 15 kg/ha K₂O in-furrow at planting
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 6-leaf stage on May 22, 2015
Results: (See bar chart to the right)
3. Conducted by CMTC "Nadiya Ukrayiny", at Kiliys'kyi District, Odesa Region, Kiliya Town, Ukraine, on a calcareous chernozem (2.5% organic matter).

**Variety:** LH55.43 KL hybrid

**Seeding rate:** 50,000 seeds/ha

**Planting date:** April 9, 2015

**Previous crop:** winter wheat

**Cultivation methods:** disking to 8 cm, plowing to 24 cm, cultivation to 6 cm

**Fertilization:** 35 kg/ha N, pre-plant incorporated; 16 kg/ha N, 16 kg/ha P₂O₅, 16 kg/ha K₂O in-furrow at planting

**Vitazyme application:** 1 liter/ha sprayed on the leaves and soil at the 6-leaf stage on May 5, 2015

**Results:** (See bar chart to the right)

---

## Sunflowers 2015 Crop Results

### A Summary of Three Field Trials in Ukraine cont.

#### 3. Location: Central Ukraine (500-550 mm ppt)

<table>
<thead>
<tr>
<th>Location</th>
<th>Yield increase</th>
<th>Profit increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Agrobusiness&quot; — Horohove</td>
<td>9</td>
<td>2,114</td>
</tr>
<tr>
<td>&quot;Palmira Vidhadivlya&quot; — Voznesens'ke</td>
<td>12</td>
<td>2,954</td>
</tr>
</tbody>
</table>

#### 4. Location: Southern Ukraine (300-350 mm ppt)

<table>
<thead>
<tr>
<th>Location</th>
<th>Yield increase</th>
<th>Profit increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Nadiya Ukrayiny&quot; — Kiliya</td>
<td>13</td>
<td>2,450</td>
</tr>
</tbody>
</table>

**Mean**

| 11.3               | 2,506       |

**Conclusion:** All three of these sunflower trials produced excellent yield increase from a single 1 liter/ha foliar Vitazyme application at the 6 to 8 leaf stage. The average increase was 11.3%, and the average profit increase was 2,506 UAH/ha for all three trials. This program is shown to be an excellent addition to sunflower production programs in Ukraine.
Researcher: unknown
Research organization: Kernel Company, LLC, Ukraine
Location: Man’kivs’ky District, Cherkasy Region, Viktorivka Village, Ukraine
Variety: NK Dolbi
Planting rate: 50,000/ha
Planting date: May 19, 2014
Previous crop: winter wheat
Soil type: Chernozem, with 3.7% organic matter
Seedbed preparation: disk-plowing to 6-8 cm, plowing to 22 - 24 cm, harrowing, two cultivations to 5-6 cm
Experimental design: A sunflower field was divided into a Vitazyme treated area and an untreated control, to discover the effects of the product on seed yield and profitability. All plant protection and fertilization regimes were identical for both treatments.

1. Control

2. Vitazyme

Fertilization: 50 kg/ha of nitrogen broadcast and incorporated before planting, and 10-26-26 kg/ha of N-P₂O₅-K₂O in-furrow at planting.

Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 6-leaf stage, on June 14

Yield results:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield</th>
<th>Yield change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tons/ha</td>
<td>tons/ha</td>
</tr>
<tr>
<td>Control</td>
<td>3.47</td>
<td>—</td>
</tr>
<tr>
<td>Vitazyme</td>
<td>3.68</td>
<td>0.21 (+6%)</td>
</tr>
</tbody>
</table>

Increase in sunflower yield with Vitazyme: 6%

Increase in income with Vitazyme: 956 UAH/ha

Income results: Income and expense calculations showed that the 1 liter/ha application increased net income by 956 UAH/ha ($60.71/ha at 1UAH = 0.0635 USD).

Conclusions: Sunflowers grown in Ukraine responded excellently to a single 1 liter/ha application of Vitazyme at the 6-leaf stage. The yield was improved by 6%, resulting in an increase in income of 956 UAH/ha ($60.71/ha), showing the excellent utility of utilizing this program on sunflowers in Ukraine.
Researcher: Unknown  
Research coordinator: I.V. Braginets  
Research organization: Alfa-Agro, Ukraine  
Variety: unknown  
Experimental design: A field was divided into a Vitazyme treated and an untreated portion to evaluate the effect of this product on crop yield.

1. Control  
2. Vitazyme

Fertilization: farm practice  
Vitazyme application: 1 liter/ha sprayed on the leaves and soil at the 10 to 12-leaf stage  
Yield results: No yield results are available, but the increase in yield is given.

Increase in sunflower yield with Vitazyme: 
0.45 ton/ha (16.7 bu/acre)

Conclusion: This yield increase was an excellent result of Vitazyme application in this Ukraine study.
Researcher: V.V. Plotnikov  
Location: National Academy of Agrarian Sciences, Vinnytsia State Agricultural Research Station, Vinnytsia, Ukraine (Central Forest and Steppe Region)

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

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield</th>
<th>Yield change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control</td>
<td>2.13</td>
<td>—</td>
</tr>
<tr>
<td>2. Vitazyme at head formation¹</td>
<td>2.54</td>
<td>0.41 (+19%)</td>
</tr>
</tbody>
</table>

¹1 liter/ha at head formation.

Conclusion: Over three years of demonstrations, Vitazyme is shown to be an excellent adjunct to sunflower production in Ukraine.
Vital Earth Resources
706 East Broadway, Gladewater, Texas 75647
(903) 845-2163     FAX: (903) 845-2262

2011 Crop Results

Vitazyme on Sunflowers

Researcher: V.D. Strelkov, Ph.D., and V.V. Morozovsky
Research organization: State Research Institution, All-Russian Research Institute of Biological Plant Protection, Russian Agricultural Academy
Location: Russia
Variety: Flagman
Soil type: Chernozem (Mollisol)
Field preparation: disking and plowing in 2010, and disking in April of 2011
Previous crop: winter wheat
Planting date: April 28, 2011
Planting rate: 10 kg/ha, adjusted to 40,000 plants/ha
Experimental design: A replicated trial with sunflowers was initiated on a field having plots of 25 m², using Vitazyme, a standard treatment (Epin-Extra), and an untreated control. The purpose of the trial was to determine the effect of the products on yield and quality of the crop.

- 1. Control
- 2. Epin-Extra
- 3. Vitazyme (0.5 L/ha) at head formation (budding)
- 4. Vitazyme (1.0 L/ha) at head formation (budding)

Fertilization: ammonium phosphate plus potassium (16-16-16% N-P₂O₅-K₂O) at 2 centners/ha in rows
Vitazyme application: either 0.5 or 1.0 liter/ha with a backpack sprayer at the beginning of head formation (budding), applied in 250 liters/ha of water on June 15, 2011
Epin-Extra application: applied at 0.004 liter/ton of seed in 10 liters of water, as well as 0.04 liter/ha on the plants at 2 to 3 true leaves, in 250 liters/ha of water with a backpack sprayer, on May 24, 2011
Plant growth results: At the beginning of ripening the height and leaf area of each plot were measured using AAC-100 methods.

<table>
<thead>
<tr>
<th>Plant Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
</tr>
<tr>
<td>203</td>
</tr>
</tbody>
</table>

HCP₀.₀₅ = 3.25  No Significant differences.
There was little effect of Vitazyme or Epin-Extra on plant height.

<table>
<thead>
<tr>
<th>Leaf Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
</tr>
<tr>
<td>5,320</td>
</tr>
</tbody>
</table>

HCP₀.₀₅ = 70.3  Significant differences.
Both Vitazyme treatments substantially increased leaf area, leading to greater photosynthesis and yield potential. Epin-Extra increased leaf area nominally.
**Yield Results:** Harvest was completed on September 23, 2011, using a Xere-125 combine. Yield as well as seed characteristics were evaluated.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield</th>
<th>Yield change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>23.2</td>
<td>—</td>
</tr>
<tr>
<td>Epin-Extra</td>
<td>24.9</td>
<td>1.7 (+7%)</td>
</tr>
<tr>
<td>Vitazyme, 0.5 L/ha</td>
<td>26.3</td>
<td>3.1 (+13%)</td>
</tr>
<tr>
<td>Vitazyme, 1.0 L/ha</td>
<td>27.8</td>
<td>4.6 (+20%)</td>
</tr>
<tr>
<td>HCP_{0.05}</td>
<td>1.14</td>
<td></td>
</tr>
</tbody>
</table>

All three treatments increased yield, but Vitazyme at both rates produced a much bigger increase than did Epin-Exta.

**Increase in leaf area with Vitazyme**

- 0.5 liter/ha .................. +19%
- 1.0 liter/ha .................. +22%

**Increase in yield with Vitazyme**

- 0.5 liter/ha .................. +13%
- 1.0 liter/ha .................. +20%

**Head Diameter**

- HCP_{0.05} = 0.45
- All treatments increased head diameter, especially the Vitazyme treatments.

**Seeds Per Head**

- HCP_{0.05} = 28.5
- Seeds per head were markedly increased by all three treatments, but most by Vitazyme.

**Increase in head diameter with Vitazyme**

- 0.5 liter/ha .................. +11%
- 1.0 liter/ha .................. +13%

**Increase in seeds/head with Vitazyme**

- 0.5 liter/ha .................. +23%
- 1.0 liter/ha .................. +31%
**Conclusion:** This replicated sunflower study in Russia showed that Vitazyme applied at head formation, using either 0.5 or 1.0 liter/ha, greatly improved leaf area (19 to 22%), as well as final yield (13 to 20%), and harvest characteristics such as head diameter, seeds per head, seed weight per head, 1,000 seed weight, and seed weight per head weight. The 1.0 liter/ha rate was superior to the 0.5 liter/ha rate in most cases. Epin-Extra, a commonly used seed treatment in Russia, produced modest improvements in growth and yield, but they were far inferior to Vitazyme responses. Vitazyme is shown to be an excellent management tool for increasing sunflower yields and growth in Russia.

**Seed Weight Per Head Weight**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Ratio of seed wt:head wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>2.0</td>
</tr>
<tr>
<td>Epin-Extra</td>
<td>1.8</td>
</tr>
<tr>
<td>Vita, 0.5 L</td>
<td>1.7</td>
</tr>
<tr>
<td>Vita, 1.0 L</td>
<td>1.7</td>
</tr>
</tbody>
</table>

HCP$_{0.05}$ = 0.20

Clearly the three treatments produced more seeds per head, so the seed weight to head weight ratios were reduced, especially for the two Vitazyme treatments.

**Increase in seed weight with Vitazyme**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Increase in seed weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 liter/ha</td>
<td>+27</td>
</tr>
<tr>
<td>1.0 liter/ha</td>
<td>+38</td>
</tr>
</tbody>
</table>

HCP$_{0.05}$ = 3.75

All three treatments increased per head seed weight significantly.

**Increase in 1000 seed weight with Vitazyme**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Increase in 1000 seed weight (grams)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 liter/ha</td>
<td>+2 grams</td>
</tr>
<tr>
<td>1.0 liter/ha</td>
<td>+1 gram</td>
</tr>
</tbody>
</table>

HCP$_{0.05}$ = 0.94

The three treatments all increased the 1,000 seed weight significantly.

**Increase in seed:head weight ratio with Vitazyme**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Increase in seed:head weight ratio (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 liter/ha</td>
<td>-27%</td>
</tr>
<tr>
<td>1.0 liter/ha</td>
<td>-38%</td>
</tr>
</tbody>
</table>
Vitazyme on Sunflowers

Researcher: Unknown  
Research organization: National Academy of Agrarian Sciences, Vinnytsia
State Agricultural Research Station  
Location: Vinnytsia, Ukraine (Central Forest and Steppe Region)
Variety: MAS-91A  
Planting date: unknown
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)
Experimental design: Sunflower plots were prepared and treated with Vitazyme to evaluate the effect of the product on sunflower seed yield and profitability.

1. Control  
2. Vitazyme on leaves

Vitazyme applications: 1 liter/ha on the leaves at head formation on June 16, 2011

Yield results:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield</th>
<th>Yield change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>2.82</td>
<td>—</td>
</tr>
<tr>
<td>Vitazyme foliar</td>
<td>3.30</td>
<td>0.48 (+17%)</td>
</tr>
</tbody>
</table>

Yield increase with a Vitazyme foliar treatment: 17%

Income results: Income increase with a Vitazyme treatment: +1,376 hrn/ha

Conclusion: This replicated sunflower trial in Vinnytsia, Ukraine, in 2011 revealed that Vitazyme improved yield by 17%, while income increased by 1,376 hrn/ha. These results mirror the sunflower data from previous years, and show how effective this program is for Ukrainian agriculture.
**2009 Crop Results**

**Vitazyme on Sunflowers**

*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  
*Seeding rate:* 5 kg/ha  
*Planting date:* May 22, 2009  
*Previous crop:* winter wheat  
*Variety:* Gelio 06 AK0324  
*Tillage:* plowing, harrowing, and cultivation  
*Soil type:* gray forest steppe soil; in the 0-30 cm layer, 2.2% organic matter, 8.4 mg/100 g of soil “hydrolyzed nitrogen”, 15.8 mg/100g of soil phosphorous, 12.4 mg/100 g of soil exchangeable potassium, and pH=5.5.  
*Experimental design:* A uniform field was divided into plots of 1.0 ha each with two treatments and four replications. The objective of the study was to evaluate the effect of Vitazyme as either a seed application, or a seed plus foliar application on the yield of sunflowers.

1. **Control**  
2. **Vitazyme, once foliar**

*Fertilization:* 45 kg/ha N  
*Vitazyme application:* Treatment 2 received 1.0 liter applied to the leaves and soil on June 25, 2009, at “basket” formation.

**Yield results:**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Seed yield</th>
<th>Yield change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tons/ha</td>
<td>tons/ha</td>
</tr>
<tr>
<td>Control</td>
<td>1.54</td>
<td>——</td>
</tr>
<tr>
<td>Vitazyme</td>
<td>1.91</td>
<td>0.37 (+24%)</td>
</tr>
</tbody>
</table>

**Increase in seed yield with Vitazyme: 24%**

**Income results:**

**Income increase with Vitazyme: 632 hrn/ha**

**Conclusions:** Sunflowers raised with Vitazyme (foliar at 1 liter/ha) in Ukraine produced 24% more seeds, and 632 hrn/ha more income compared to the control treatment. This product has proven itself to greatly improve sunflower production and profits in Ukraine.