# Peas *with Vitazyme application*

***Researcher:*** Rajnish Khanna, Ph.D.
***Research organization:*** e-Cultiver, Manteca, California
***Location:*** USDA/Plant Gene Expression Center, Albany, California
***Variety:*** unknown
***Planting date:*** August 21, 2024
***Potting Soil:*** Sunshine Mix #1 (Sungro Horticulture)
Pot size: 3 gal tall
***Experimental design:*** A greenhouse experiment evaluated the influence of Vitazyme on the development of peas, comparing the treated plants with untreated control plants. Eight plants were grown for each treatment.

❶ ***Control*** ❷ ***Vitazyme***

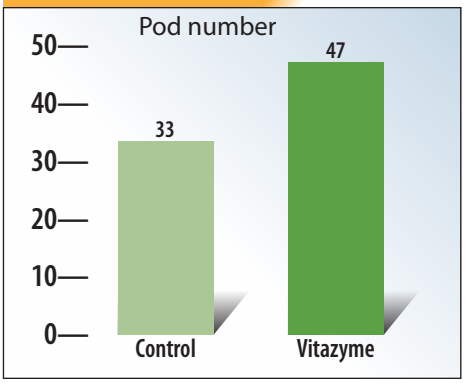
***Fertilization:*** Peters 20-20-20 water soluble fertilizer at 1:64 ppm, once per week
***Vitazyme applications:*** 1:100 dilution sprayed on the leaves to the dripping point, and to the soil, every two weeks
***Disease suppression:*** Floramite and Decathlon at 0.25 tsp/gal sprayed on the leaves
***Pea pod results:*** On October 25, 2024, the pods were harvested from each plant and weighed.

| Treatment | Pod number | Pod change | Pod weight | Weight change |
|---|---|---|---|---|
| | | | grams | grams |
| Control | 33 | — | 35.6 | — |
| Vitazyme | 47 | 14 (+42%) | 46.1 | 10.5 (+29%) |

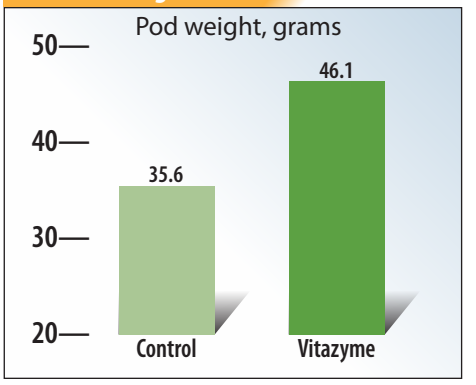
*Increase in pod number with Vitazyme: 42%*

*Increase in pod weight with Vitazyme: 42%*

**Pea Pod Number**




**Pea Pod Weight**




***Conclusions:*** This greenhouse pot study with peas revealed substantial increases in pod number and pod weight with Vitazyme application. The increases were 42% and 29% respectively. These results show the good effectiveness of Vitazyme for pea production.

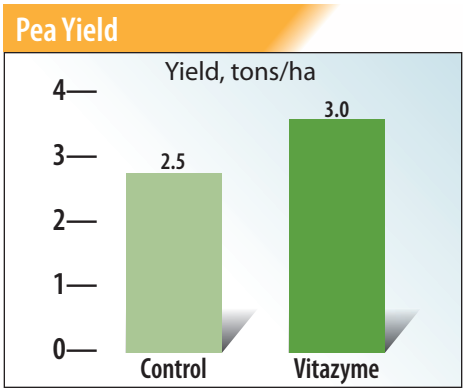
# Peas *with Vitazyme application*

***Researcher:*** V. V. Plotnikov
***Research organizations:*** Plant Designs International, Rochester, New York, and Agro Expert International, Kaharlyk, Ukraine
***Location:*** APC Vivsianytskii, Koziatyn District, Vinnytsia Region, Vivianyky Village, Ukraine; Central Ukraine (440-590 mm of precipitation per year)
***Variety:*** Audit, F2 generation ***Planting date:*** March 14, 2019 ***Planting rate:*** 1.1 million 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, harrowing to 5-6 cm
***Experimental design:*** A pea field was divided into normally treated and Vitazyme treated portions to evaluate the effects of Vitazyme on the yield of the peas.

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

***Fertilization:*** 69 kg/ha of N during cultivation before planting, and 6-26-0 kg/ha of N-$P_20_5$-$K_20$ during planting
***Vitazyme application:*** 1 liter/ha sprayed on the leaves and soil at flower budding, on May 8.
***Yield results:***

| Treatment | Yield | Yield change |
|---|---|---|
| | tons/ha | tons/ha |
| Control | 2.5 | — |
| Vitazyme | 3.0 | 0.5 (+20%) |




*Increase in yield with Vitazyme: 20%*

***Income results:*** The extra 0.5 ton/ha gave $81/ha more income.
***Conclusion:*** Peas grown in a field trial in central Ukraine responded very well to a 1 liter/ha foliar-soil spray at flower bud formation. The yield was improved by 0.5 ton/ha (20%), giving an income increase of $81/ha, showing the effectiveness of this program for pea growers.

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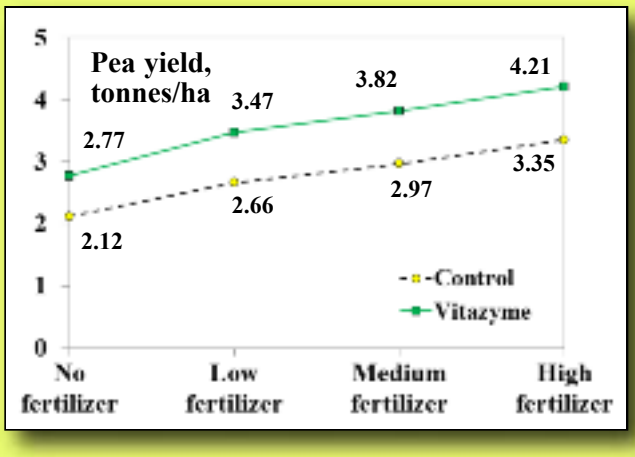
# 2013 Crop Results

# Vitazyme on Peas

*Researcher*: V.V. Plotnikov *Research organization*: Scientific, Innovation, and Technology Center of the Institute of Forages and Agriculture of Podillya NAAS *Location*: National Academy of Agricultural Sciences, Ukraine *Variety*: Tsarevych *Soil type*: ash gray soil (humus = 2.2%, hydrolyzed-N = 8.4 mg/100 g of soil, P = 15.8 mg/100 kg of soil, exchangeable K = 12.4 mg/100 g of soil, pH = 5.5) *Previous crop*: spring barley *Planting date*: April 22, 2013
*Soil preparation*: disking, plowing, cultivating *Planting rate*: 1.5 million seeds/ha
*Experimental design*: A small plot pea study, with four replications, was set up to evaluate the effects of Vitazyme, over four fertility levels, on the yield, profitability, and protein content of the pea crop.

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

*Fertilization*: See the treatment table above. Phosphorus and potassium amendments were applied in the fall, and nitrogen was applied in the spring.
*Vitazyme application*: (1) a seed treatment of 1 liter/tonne of seed; (2) 1 liter/ha sprayed on the leaves at the 5 to 6-leaf stage
*Yield results*:




**Yield increase with Vitazyme**

| | |
|---|---|
| No fertilizer | 31% |
| Low fertilizer | 30% |
| Medium fertilizer | 29% |
| High fertilizer | 26% |

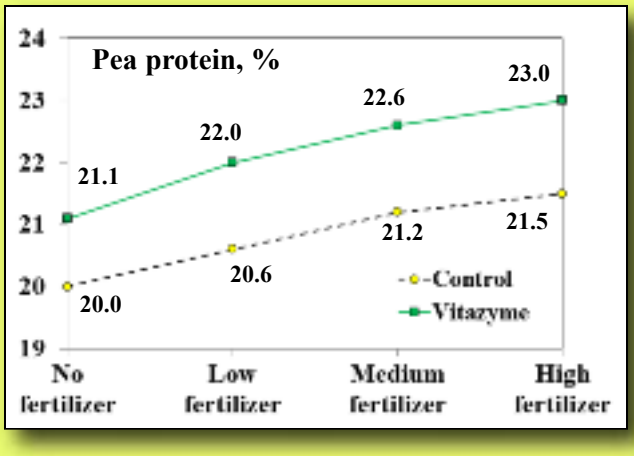
Pea yield increased as fertilizer rate increased, and Vitazyme improved the yield at each fertilizer level by 26 to 31%.

*Income results*:

| Vitazyme net income increase | |
|---|---|
| No fertilizer | 1,375 UAH/ha |
| Low fertilizer | 1,775 UAH/ha |
| Medium fertilizer | 1,857 UAH/ha |
| High fertilizer | 1,900 UAH/ha |

Net returns from Vitazyme increased with increasing fertilizer rate, up to 1,900 UAH/ha with the high rate.

*Pea protein results*:




| Crude protein increase with Vitazyme | |
|---|---|
| No fertilizer | 1.1%-point |
| Low fertilizer | 1.4%-point |
| Medium fertilizer | 1.4%-point |
| High fertilizer | 1.5%-point |

Protein levels were increased with fertilizers, and at each level Vitazyme boosted crude protein, up to 1.5%-point.

*Conclusions*: According to the researchers,

1. In cases without fertilizers, two Vitazyme applications to the pea seeds of Tsarevych variety, at 1 L/tonne for the seeds and 1 L/ha at 5-6 leaves, provided an increase of 0.65 tonne/ha, or 31%.

2. With middle and high fertilizer levels ($N_{20-45}P_{10-30}K_{20-45}$) and Vitazyme application, the yield increase was 0.81-0.86 tonne/ha, or 26-30%.

3. Vitazyme application on the fertilizer-free plot provided a profit of 1,375 UAH/ha, and with mineral fertilization systems of $N_{20-45}P_{10-30}K_{20-45}$, the profit was 1,775-1,900 UAH/ha.

4. Vitazyme application provided pea grain quality improvement; crude protein content was increased by 1.1-1.5%.

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# 2012 Crop Results

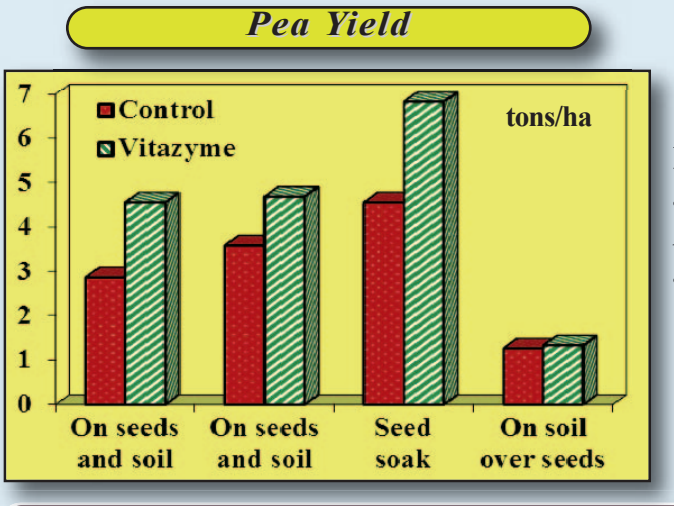
# Vitazyme on Peas

*Researchers*: Nery Larios and Cristhian Mazariegos, Foragro Development, Guatemala City, Guatemala
*Location*: Santa Maria Cauque and Chiricuyu, Santiago Zacatepeques, Guatemala
*Variety*: Ambassador *Planting dates*: see below
*Experimental design*: Three pea growers marked out areas for Vitazyme treatment, and adjacent untreated areas. Three systems of Vitazyme application were implemented to determine the best use of the product for pea production.

| Treatment | Vitazyme treatment | Area | Farmer | Location | Planting date |
|---|---|---|---|---|---|
| 1 | (1) 1 liter/ha on seeds in row before covering<br>(2) 1 liter/ha at early bloom | 200m$^2$ | Nicolas Garcia | Santa Maria | August 23 |
| 2 | (1) 1 liter/ha on the seeds in row before covering<br>(2) 1 liter/ha at early bloom | 300 m$^2$ | Juan Diaz | Santa Maria | August 23 |
| 3 | (1) 1 lb of seeds soaked in a 10% solution<br>(2) 1 liter/ha at early bloom | 100 m$^2$ | Rigoberto Itzol | Chiricuyu | August 23 |
| 4 | (1) 1 liter/ha sprayed over covered row 1 day after planting<br>(2) 1 liter/ha at early bloom | 480 m$^2$ | Rigoberto Itzol | Chiricuyu | August 22 |

*Fertilization*: unknown
*Vitazyme application*: Refer to the above chart.
*Yield results*:

| Location | Control | Vitazyme | Yield change |
|---|---|---|---|
| | tons/ha | tons/ha | tons/ha |
| 1. Garcia (on seeds + early bloom | 2.86 | 4.55 | +1.69 (+59%) |
| 2. Diaz (on seeds + early bloom | 3.58 | 4.68 | +1.09 (+30%) |
| 3. Itzol (seed soak + early bloom | 4.55 | 6.82 | +2.27 (+50%) |
| 4. Itzol (on soil over seeds + early bloom) | 1.26 | 1.33 | +0.06 (+5%) |




It is clear that peas responded excellently to Vitazyme as long as the product contacted the seeds at planting. Applying the product to the soil above the seeds a day after planting only slightly increased the yield.

**Increase in pea yield with Vitazyme (all treated foliar at early bloom)**

**On seeds and soil at planting ..... 30 to 59%**
**Seed soak at planting ..... 50%**
**On soil after seed covering ..... 5%**

*Conclusions*: According to the researchers, "In Vitazyme treated plots were observed:

- **Higher germination**
- **Greater growth of the root system**
- **More vigor and size of leaves and stems (greater leaf development)**
- **Longer life of the plant**
- **Greater resistance to *Fusarium***
- **Greater and earlier flowering**
- **Less damage from waterlogging**

"At harvest, the average increase in the Vitazyme treated area over the untreated controls in the four trials was 42%, equivalent to 1.28 tons/ha. The most effective treatments were those having applications on the seeds in the rows before covering, and seeds soaked in a dilute (10%) Vitazyme solution before planting (30 to 59% yield increase). The least effective treatment was an application over the soil surface after covering (5% increase)."
These data show the importance of having Vitazyme make contact with the seeds at planting for a maximum crop response with peas.

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**2012 Crop Results**

# Vitazyme on Peas

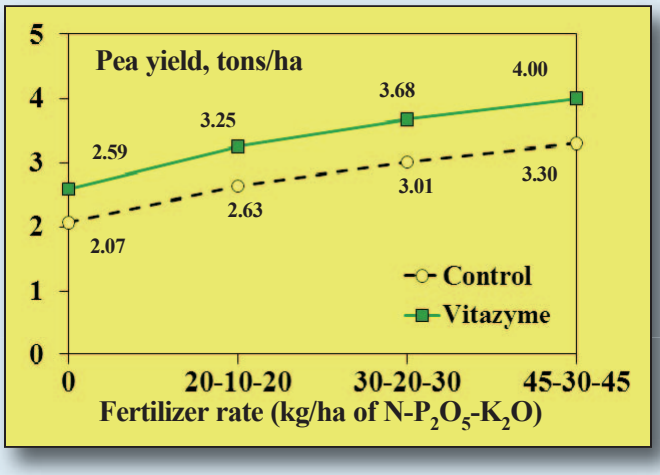
## *A Fertilizer Rate Study*

*Researcher*: V. Plotnikov *Research organization*: National Academy of Agricultural Sciences
*Location*: Vinnytsia, Ukraine *Variety*: Carevych super elite *Tillage*: conventional (disking, plowing, and cultivating) *Soil type*: gray podzolic (2.2% organic matter, 8.4 mg/100 g of soil hydrolyzed N, 15.8 mg/100 g of soil P, 12.4 mg/100 g of soil exchangeable K, pH = 5.5)
*Planting date*: April 24, 2012 *Previous crop*: spring barley *Planting rate*: 1.5 million seeds/ha
*Experimental design*: A pea experiment was established using 0.1 ha plots, with four replications, and four fertility regimes to evaluate the effect of Vitazyme on the yield and protein content of the peas.

| Treatment | Vitazyme | Nitrogen | Phosphate | Potash |
|---|---|---|---|---|
| | | kg/ha | | |
| 1 | 0 | 0 | 0 | 0 |
| 2 | X | 0 | 0 | 0 |
| 3 | 0 | 20 | 10 | 20 |
| 4 | X | 20 | 10 | 20 |
| 5 | 0 | 30 | 20 | 30 |
| 6 | X | 30 | 20 | 30 |
| 7 | 0 | 45 | 30 | 45 |
| 8 | X | 45 | 30 | 45 |

*Fertilization*: Phosphorus and potassium dry fertilizers were fall applied in 2011, along with basic tillage. Nitrogen was applied in the spring during cultivation.
*Vitazyme application*: For Treatments 2, 4, 6, and 8, a seed treatment of 1 liter/ton of seed was made, and later 0.5 liter/ha was sprayed on the leaves and soil when the plants had five to six leaves.
*Weather for 2012*: favorable for crop development

*Yield results*:




| Treatment | Yield increase with Vitazyme* | Income increase with Vitazyme* |
|---|---|---|
| | tons/ha | hrn/ha |
| 2 | 0.52 (+25%) | 1,192 |
| 4 | 0.62 (+24%) | 1,452 |
| 6 | 0.67 (+22%) | 1,582 |
| 8 | 0.70 (+21%) | 1,660 |

*Yields and income are compared at the same fertility level.

**Yield increase with Vitazyme**

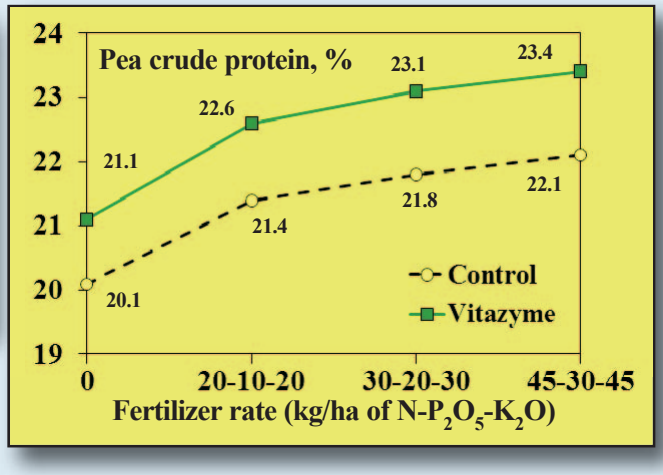
**No fertilizer ..... 25%**
**Low N-P-K ..... 24%**
**Medium N-P-K ..... 22%**
**High N-P-K ..... 21%**

At all fertility levels, Vitazyme greatly increased the yield above the untreated control, by 21 to 25%. The percentage of increase declined slightly as the fertility levels rose.

*Protein results*:

**Crude protein increase with Vitazyme**

**No fertilizer ..... 1.0 percentage point**
**Low N-P-K ..... 1.2 percentage points**
**Medium N-P-K ... 1.3 percentage points**
**High N-P-K ..... 1.3 percentage points**




At all fertilizer levels crude protein increased consistently with Vitazyme application.

*Conclusions*: A Ukrainian replicated pea trial, comparing Vitazyme biostimulant with an untreated control, at four fertility levels, revealed that Vitazyme increased pea yield at all levels, by from 21 to 25%. Crude protein was likewise enhanced by this product, by 1.0 to 1.3 percentage points. Thus, both yield and quality were improved by Vitazyme with all four fertility regimes, proving the great efficacy of this product in the context of a comprehensive soil and crop management system.