Researcher: Theo Pobjoy  
Research organization: Organic Farming Systems, Queensland Northern Territory, Australia  
Variety: Unknown  
Experimental design: Banana plants in a nursery were treated with a Vitazyme solution to compare with untreated plants and determine effects on plant growth.

Control  Vitazyme

Vitazyme application: a single 2% Vitazyme soil drench  
Growth results: As evidenced by the accompanying photographs, it is obvious that the Vitazyme pot soil drench greatly increased the root and leaf growth, by at least 25%. No data on root or leaf parameters were collected.

Conclusions: A banana nursery study in Queensland Northern Territory, Australia, with Vitazyme applied as a 2% soil drench, proved that total plant growth—roots and leaves—is greatly stimulated by this treatment. Banana growers could greatly profit from the use of this product in their nursery operations, and also in producing plantations as shown by other research trials.
Vital Earth Resources  
706 East Broadway, Gladewater, Texas 75647  
(903) 845-2163 FAX: (903) 845-2262

2012 Crop Results

Vitazyme on Bananas  
A Nursery Study

Researchers: Rodolfo Valenzuela and Cristhian Mazariegos, Foragro Development, Guatemala City, Guatemala, and Sergio Cordero, Supervisor, Producciones Agrícolas del Sur, Guatemala  
Location: La Blanca, Ocós Municipality, San Marcos Department, Guatemala  
Variety: Cavendish

Experimental design: In a banana nursery greenhouse, rows of young plants 74 meters long x 1 meter wide, with plants in 1 kg bags, were selected to evaluate the effect of Vitazyme plus Silfact surfactant on banana plant growth. Several beds were used for each treatment.

1. Control  
2. Vitazyme + Silfact on 4-week plants  
3. Vitazyme + Silfact on 5-week plants

Vitazyme application:  
Treatment 2 (4-week plants): (1) 50 ml of Vitazyme in 16 liters of water (0.31%) sprayed with a backpack sprayer on February 20, 2012; (2) 80 ml of Vitazyme in 16 liters of water (0.5%) sprayed with a backpack sprayer about three weeks later on March 13, 2012.  
Treatment 3 (5-week plants): (1) 75 ml of Vitazyme in 16 liters of water (0.47%) sprayed with a backpack sprayer on February 20, 2012; (2) 80 ml of Vitazyme in 16 liters of water (0.5%) sprayed with a backpack sprayer about three weeks later on March 13, 2012.

Silfact application: This surfactant of Foragro was applied with all Vitazyme applications at 5 ml/16 liters of water (0.031%).

Growth results: Values for all parameters were collected on April 11, 2012, 51 days after the first treatment was made.

Trial With 4-Week Plants (Treatment 2)

<table>
<thead>
<tr>
<th>Trunk Diameter</th>
<th>Plant Height</th>
<th>Leaf Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control 1.8 cm</td>
<td>Control 17 cm</td>
<td>Control 5</td>
</tr>
<tr>
<td>Vitazyme 0.6 cm</td>
<td>Vitazyme 25 cm</td>
<td>Vitazyme 8</td>
</tr>
</tbody>
</table>
Note that every parameter was increased with Vitazyme applications, especially trunk diameter (200% and 60% for Treatments 2 and 3, respectively). Plant height, leaf number, and leaf length and width were also markedly improved, by 20% to 88%.
Conclusions: The researchers stated the following:

1. Plants treated with Vitazyme in both treatments showed a better growth versus plants that did not receive treatment.
2. The plants that received the application of Vitazyme had a larger diameter [of stem] than the control.
3. Both treatments that received the application of Vitazyme had a larger diameter than the control.
4. In the variables leaf number, length, and width [of leaves] all treatments that received Vitazyme application gave better results than the untreated control.
5. The root system showed thicker roots in the Vitazyme treated plants.

The use of Vitazyme in nursery plantain banana by two foliar sprayings at 0.5% v/v (1 liter/200 liters of water), 5 and 8 weeks from planting, is recommended.”
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**2012 Crop Results**

**Vitazyme on Bananas**

*A Nursery Study by Dole*

*Researcher:* Ing. J. Vargas and Juan Jose Aycart M., Ph. D.  
*Research organization:* Ubesa Dole, Ecuador Division, in cooperation with Summer Zone, Quito, Ecuador  
*Location:* Babahoya, Ecuador  
*Variety:* Cavendish  
*Soil type:* greenhouse mix

**Experimental design:** A banana nursery was divided into three sections, with a conventional fungicide, a biological fungicide plus humic acid plus biological stimulators, and a biological fungicide plus Vitazyme treatment applied to the three areas. The purpose of the test was to evaluate the effects of the treatments in determining infections of *Fusarium* and *Rhizoctonia* in the plant root systems.

1. **Conventional fungicides (Citex and Phyton)**
2. **Companion 2-3-2 (biological fungicide) + Essential 1-0-1 (humic acid + biostimulants)**  
3. **Companion 2-3-2 (biological fungicide) + Vitazyme**

**Fertilization:** standard for the nursery  
**Vitazyme treatment:** 5 ml in 20 liters of water to completely drench the plant roots and potting soil, along with Companion 2-3-2.  
**Companion 2-3-2 treatment:** 5 ml in 20 liters of water, along with Vitazyme (Treatment 3) or Essential 1-0-1 (Treatment 2) as a root and potting soil drench. The product is a biological fungicide containing *Bacillus* GBO3 (>65 million cells/ml), which produces natural antibiotics.  
**Essential 1-0-1 treatment:** 5 ml in 20 liters of water, along with Companion 2-3-2 in Treatment 2. The product is a “complete” biostimulant and nutritional supplement containing marine algae, humic acids, 20 amino acids, gibberellic acid, carbohydrates, vitamins, and hydrolyzed protein.

**Growth, survival, and pathogen results:** The plant source was Costa Rica.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Trial time</th>
<th>Transplant date</th>
<th>Transplants</th>
<th>Mortality of plants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>weeks</td>
<td></td>
<td>number</td>
<td>Transplanting</td>
</tr>
<tr>
<td>1. Conventional</td>
<td>43</td>
<td>Oct. 25, 2010</td>
<td>12,471</td>
<td>131</td>
</tr>
<tr>
<td>2. Companion + Essential</td>
<td>47</td>
<td>Nov. 27, 2010</td>
<td>11,845</td>
<td>207</td>
</tr>
<tr>
<td>3. Comparison + Vitazyme</td>
<td>46</td>
<td>Nov. 19, 2010</td>
<td>11,771</td>
<td>63</td>
</tr>
</tbody>
</table>

^1Fungi responsible for infection include *Fusarium* and *Rhizoctonia.*
The conventional treatment (1) had a higher fungal infection rate (3.8%) than the other two (0.3% and 0.6%), but the growth rate was good. Companion + Essential (Treatment 2) had the lowest fungal loss (0.3%), but plants grew slower than for the other two treatments, while Companion + Vitazyme (Treatment 3) also had a low fungal loss (0.6%), but had high growth rates.

**Conclusions:** This greenhouse banana trial in Ecuador proved that losses of plants due to *Fusarium* and *Rhizoctonia* infection could be reduced dramatically with both Companion + Essential and Companion + Vitazyme; both treatments brought the infection rate down from 3.8% in the control to 0.3% and 0.6% for the other two. However the Companion + Essential treatment produced a slower plant growth rate than did the other two. According to the researcher, “The seedlings of the two treatments [1 and 3] achieved a more rapid development, and could be transplanted at 6 weeks, with development comparable to that of 8 weeks. The control plants normally take 8 weeks in the greenhouse before being ready to deliver to fields.” This study shows that Vitazyme plus a biological fungicide greatly reduce root fungal growth and speed plant development.
2000 Crop Results

Vitazyme on Bananas
A demonstration

Researchers: Buck Hammer and Paul Syltie

Location: Gladewater, Texas

Soil type: very fine sandy loam

Planting date: summer, 1998

Experimental design: Two banana plants of approximately equal size were planted about six feet from each other in the front of the Vital Earth Resources Research Center. During the summer of 2000 the smaller of the two plants was sprayed periodically with a 1% Vitazyme solution on the leaf surfaces.

1. Control
2. Vitazyme

Shortly before a killing frost, an evaluation was made of growth parameters of the two plants.

Vitazyme application: leaf spray application of a 1% solution three times from mid-July to October

Leaf chlorophyll: On November 13, 2000, a Minolta SPAD chlorophyll meter was used to noninvasively measure the chlorophyll in 30 randomly selected positions for each of the two plants. These values were then averaged.

<table>
<thead>
<tr>
<th>Leaf Chlorophyll</th>
<th>Control</th>
<th>Vitazyme</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf chlorophyll</td>
<td>25.5</td>
<td>32.8</td>
<td>+7.3</td>
</tr>
</tbody>
</table>

Increase in leaf chlorophyll: 7.3 SPAD units

Total leaves: On November 13, 2000, the total leaves for each plant were counted.

<table>
<thead>
<tr>
<th>Total Leaves</th>
<th>Control</th>
<th>Vitazyme</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total leaves</td>
<td>7</td>
<td>12</td>
<td>5(+71%)</td>
</tr>
</tbody>
</table>

Increase in leaves: 71%

Conclusions: In spite of the Vitazyme treated plant being the smallest initially, this plant quickly accelerated in growth after being treated. Leaf chlorophyll increased to fix more carbon and enhance plant growth such that the total leaf number by mid-November was 71% higher for the Vitazyme treated plant. While a single replicate does not prove such growth increases, yet these results give a strong indication of how well Vitazyme can improve banana growth.
2001 Crop Results

Vitazyme on Bananas
A demonstration

Researcher: Buck Hammer and Paul Syltie
Planting date: summer, 1998
Location: Vital Earth Resources Research Center, Gladewater, Texas
Soil type: Bowie fine sandy loam
Experimental design: This study continued the experiment begun in 2000. Two banana plants that were of nearly equal vigor and size the spring of 2000 were treated through the summer of 2000, giving a large advantage to the Vitazyme treatment. Treatments were continued the summer of 2001.

1. Control
2. Vitazyme

Fertilizer treatments: Both plants received a 6-inch layer of turkey manure compost (Vital Earth Premium Grade Compost) to about a foot in radius from the stem of the plants.

Vitazyme treatment: a leaf spray application of a 1% solution three times from June through September of 2001

Leaf chlorophyll: On October 19, a Minolta SPAD meter was used to evaluate the chlorophyll in the top five leaves of the main stem plants for each treatment (10 subsamples per plant).

<table>
<thead>
<tr>
<th>Leaf chlorophyll</th>
<th>Control</th>
<th>Vitazyme</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leaf chlorophyll</td>
<td>29.8</td>
<td>30.2</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Growth parameters: On October 19 a series of measurements were made to evaluate differences in the two plants. The main plants looked quite similar in 2001, likely due to the compost application to both stems, but the Vitazyme plant had many more tillers.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Control</th>
<th>Vitazyme</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main stem plus tillers</td>
<td>1</td>
<td>4</td>
<td>3 (+300%)</td>
</tr>
<tr>
<td>Heigts:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main stem, cm</td>
<td>132</td>
<td>133</td>
<td>1 (+1%)</td>
</tr>
<tr>
<td>Tillers</td>
<td>—</td>
<td>107, 83, 15</td>
<td></td>
</tr>
<tr>
<td>Total stem length, cm</td>
<td>132</td>
<td>338</td>
<td>206 (+156%)</td>
</tr>
<tr>
<td>Leaf number:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main stem</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Tillers</td>
<td>0</td>
<td>6, 6, 3</td>
<td></td>
</tr>
<tr>
<td>Total leaves</td>
<td>8</td>
<td>23</td>
<td>15 (+188%)</td>
</tr>
<tr>
<td>Longest leaf, cm</td>
<td>59</td>
<td>56</td>
<td>3 (-5%)</td>
</tr>
<tr>
<td>Widest leaf, cm</td>
<td>29</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>Stem circumference at 10 cm</td>
<td>15.5</td>
<td>18.0</td>
<td>2.5 (+16%)</td>
</tr>
</tbody>
</table>

Conclusions: Vitazyme continued to improve overall banana plant growth into the second year of this study. Although a liberal compost application to both plants tended to mask differences in soil fertility and growth elicited by Vitazyme so noted in 2000, differences in growth were still marked, especially in tillering ... where Vitazyme encouraged three tillers to none for the untreated plant.
2003 Crop Results

Vitazyme on Bananas (Organic)

Researcher/Farmer: Grupo Agricola Prieto
Location: Los Angeles, Pasaje, El Oro, Ecuador
Variety: Cavendish  Soil type: unknown (alluvial)  Tree spacing: standard

Experimental design: An organically operated banana field was split into two parts: conventionally treated, and Vitazyme added to the regime. The control treatment for some reason did not receive the usual organic amendments during the duration of the trial, so the production data is quite low. Monthly and bimonthly Vitazyme treatments were used. Root counts, nematodes, soil nutrients, and leaf nutrients were gathered twice for the first part of the study.

1. Vitazyme monthly  2. Vitazyme bimonthly  3. Control

Fertilization: Only certified organic fertilizer was applied to the treatments. For some unknown reason the control received no fertility amendments during the trial period.

Vitazyme application: Treatment 2 received 1 liter/ha each month, while Treatment 1 received 1 liter/ha every two months.

Irrigation: The control and Treatment 1 were watered as needed, but Treatment 2 was given less water than required due to irrigation system problems, which resulted in somewhat reduced yields.

Soil analyses: No major differences in soil nutrient levels were noted during the first part of the growing season, so this data is not included here.

Plant growth: Root growth was evaluated on May 2, 2003, for the control and Vitazyme treatments (1). Analyses were made at Nemalab, S.A., in Machala, Ecuador.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Live roots*</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>38.5</td>
<td>0</td>
</tr>
<tr>
<td>Vitazyme</td>
<td>80.6</td>
<td>42.1 (+109%)</td>
</tr>
</tbody>
</table>

*Grams of live roots per 10 plants for 10 dm³ of soil

Increase in live roots: 109%

Yield results: Yield totals were tallied for each treatment over a period of 8 weeks, and included the average age of the bunch at harvest, weight of the bunch, and the number of hands on the bunch. Totals of all bunches are given in the table, and averages are then calculated, for bunch age, weight, and hands.
### Table 1: Banana Growth Data

<table>
<thead>
<tr>
<th>Week</th>
<th>Treatment 1 (Vitazyme monthly)</th>
<th>Treatment 2 (Vitazyme bimonthly)</th>
<th>Treatment 3 (control)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Age</td>
<td>Weight</td>
</tr>
<tr>
<td>36</td>
<td>15</td>
<td>165</td>
<td>497</td>
</tr>
<tr>
<td>37</td>
<td>4</td>
<td>41</td>
<td>138</td>
</tr>
<tr>
<td>38</td>
<td>11</td>
<td>114</td>
<td>360</td>
</tr>
<tr>
<td>39</td>
<td>11</td>
<td>118</td>
<td>350</td>
</tr>
<tr>
<td>40</td>
<td>3</td>
<td>30</td>
<td>90</td>
</tr>
<tr>
<td>41</td>
<td>4</td>
<td>41</td>
<td>129</td>
</tr>
<tr>
<td>42</td>
<td>7</td>
<td>80</td>
<td>232</td>
</tr>
<tr>
<td>43</td>
<td>4</td>
<td>40</td>
<td>115</td>
</tr>
<tr>
<td>Totals</td>
<td>59</td>
<td>629</td>
<td>1,911</td>
</tr>
<tr>
<td>Average</td>
<td>10.7</td>
<td>32.4</td>
<td>4.51</td>
</tr>
</tbody>
</table>

### Graphs

- **Bunch Age**: Average bunch age, weeks
- **Bunch Weight**: Average bunch weight, lb
- **Number of Hands**: Average number of hands per bunch
- **Number of Bunches**: Total bunches
- **Total Bunch Weight**: Total bunch weight, lb

### Increase in total bunch number (Vitazyme bimonthly): 129%

### Increase in total bunch weight (Vitazyme bimonthly): 161%

**Conclusions**: This study on organic bananas in Ecuador revealed that the age of the bunches at harvested was slightly less for the control. The bunch weight was greatest for the Vitazyme applied every other month: this weight was 0.9 lb/bunch more than the monthly applied treatment, and 4.2 lb/bunch more than the control. Hands/bunch was identical for both Vitazyme treatments, but was 0.3 hands/bunch less for the control. Vitazyme greatly improved overall root growth, increasing live root mass by 109% over the control. Vitazyme applied every other month produced the greatest number of bunches, and the greatest total weight, exceeding the monthly applied Vitazyme and especially the control.

Caution must be taken in extrapolating these results too far, because the control treatment did not receive any organic fertilizers during this study, and the monthly applied treatment (Treatment 1) did not receive adequate irrigation water at times. These factors very likely contributed to the the less than expected performance of the monthly applied treatments, and to lower production than expected for the control. The monthly treated plants actually appeared stronger than the bimonthly treated bananas.

Of additional interest is the fact that the mother–son–grandson succession of tillers was noticeably improved with both Vitazyme treatments. If the trial had been monitored through another generation of bunches, the effect of Vitazyme reducing the time from flowering to harvest would have been quite dramatic.