



Strawberries with Vitazyme application

Researcher: Eng. Francisco Camacho and MC. Lucero Fernandez

Research organizers: Agrocamedel and Grupo Lucava, Mexico

Location of trial: Tarandacuao, Guanajuato, Mexico

Variety: Albion

Experimental design: A greenhouse of first-year strawberry plants (1 hectare) was treated with Vitazyme and compared to untreated strawberries to evaluate effects on yield, brix, shelf life, and revenue.

1 Control 2 Vitazyme

Fertilization: unknown

Vitazyme application: 1 liter/ha of Vitazyme four times at one-month intervals during blossoming

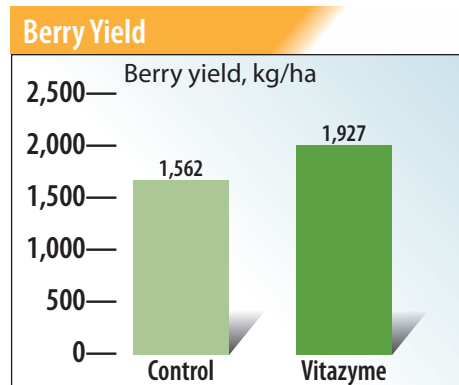


Vitazyme was sprayed on these strawberries four times at monthly intervals, producing 23% more yield and nearly 2 brix more sugar.

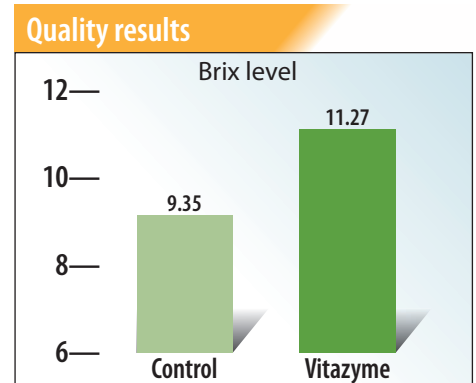
Yield results: The average yield per picking was determined.

Treatment	Berry yield kg/ha	Yield change kg/ha
1. Control	1,562	—
2. Vitazyme	1,927	365 (+23%)

Increase in strawberry yield with Vitazyme: 23%



Quality results: Brix determinations were made on a number of berries for each treatment.



Increase in brix with Vitazyme: 1.92 percentage-points (21%)

Shelf-life results: There was a remarkable improvement in shelf-life with the Vitazyme treated strawberries, as can be seen in this series of photos taken at 24, 48, 72, and 96 hours after harvest.



24 hours after picking, the Vitazyme treated strawberries on the left are better formed and shiny.



48 hours after picking, the treated berries on the left are still intact and show no deterioration, as do the control berries.



72 hours after picking the control berries are rapidly being consumed by fungi, while the Vitazyme treated fruit on the left has little damage.



96 hours after picking, fungi has totally overwhelmed the untreated strawberries on the right, and the treated berries still have considerably less damage.

Income results: The strawberries were valued at \$12 MXN/kg.

Treatment	Revenue \$MXN/ha	Revenue change \$MXN/ha
1. Control	18,749.25	—
2. Vitazyme	23,124.08	4,374.83 (+23%)

**Increase in revenue with Vitazyme:
\$4,375 MXN/ha (23%)**

Conclusions: This Mexican strawberry trial, using four Vitazyme foliar sprays at one-month intervals, proved that the product increased fruit brix by a remarkable 1.92 percentage points (21%), while increasing the yield by 23%. Revenue was also increased by 23% (\$4,375 MXN/ha), but perhaps the most remarkable effect of Vitazyme was the marked improvement in shelf-life, as evidenced by the photo display shown in this study. The Vitazyme program for strawberries in Mexico is thus shown to be an excellent adjunct to conventional production practices..



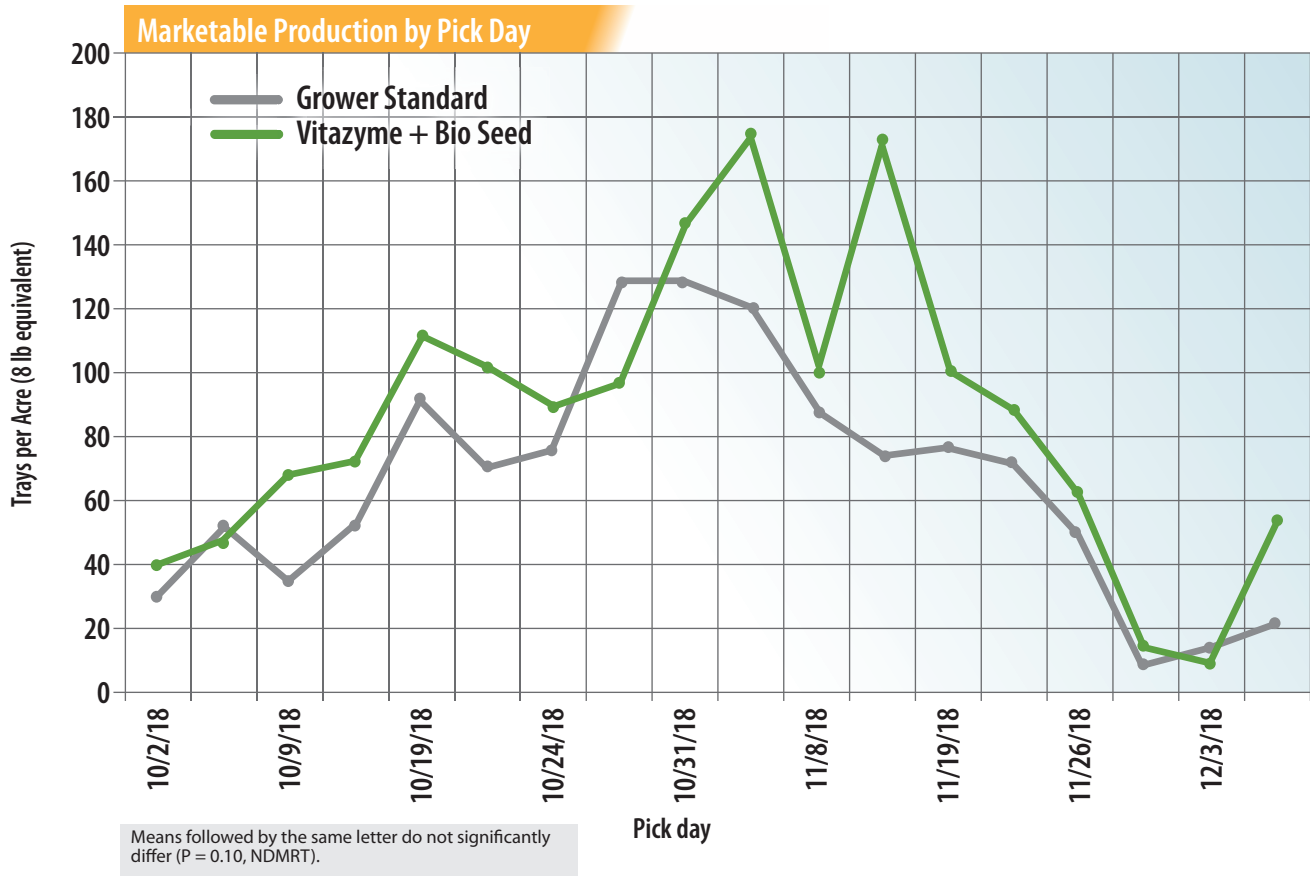
Strawberries with Vitazyme application (*Fragaria vesca* var. *americana*)

—A Synergism Trial with Bio Seed

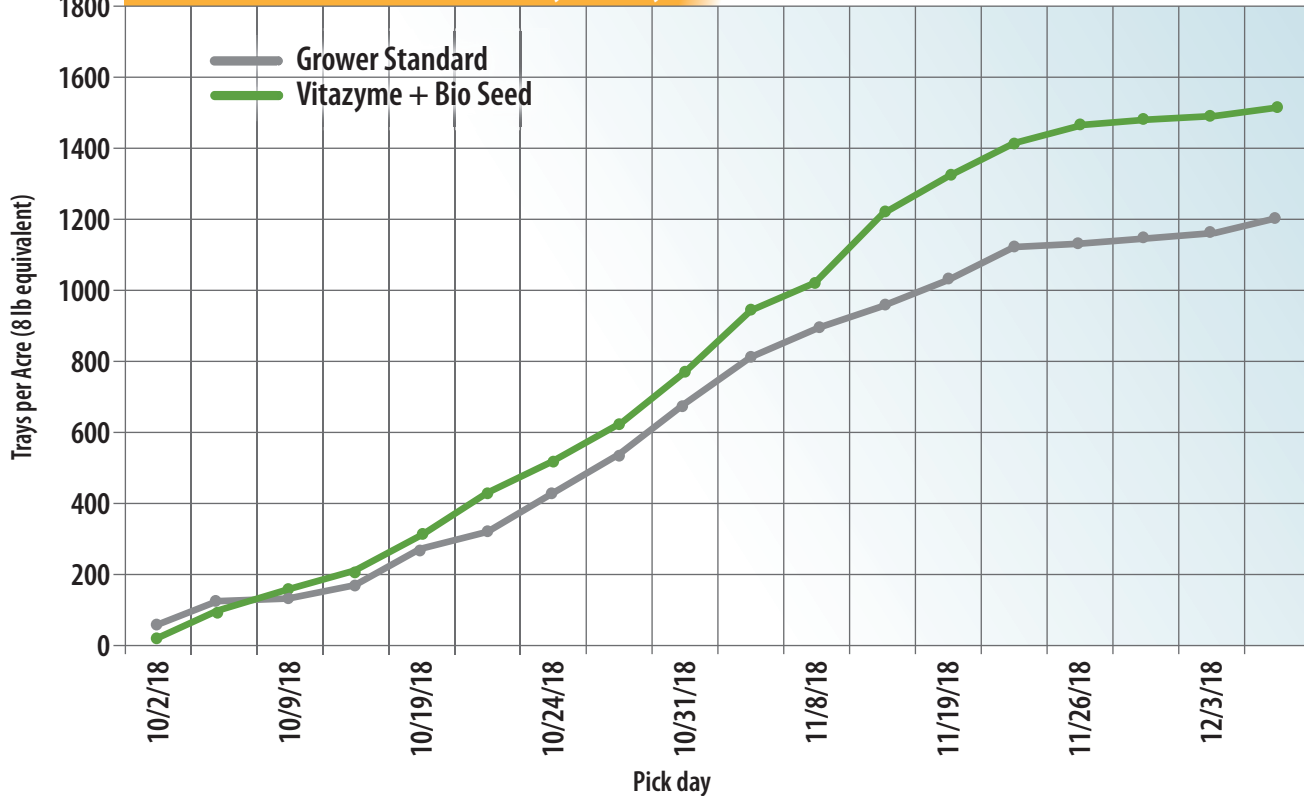
Researcher: David Holden **Research organization:** Holden Research and Consulting, Camarillo, California
Study directors: Tristan Hudak **Location:** Silent Springs Farms, Oxnard, California **Variety:** Portola
Soil test values: pH = 7.9, organic matter = 1.5%, estimated N-release = 52 lb/acre, P1 = 195 ppm, K = 263 ppm, Mg = 344 ppm, Ca = 2,760 ppm, Na = 206 ppm, NO₃-N = 39 ppm, SO₄-S = 321 pm, Zn = 2.3 ppm, Mn = 3 ppm, Fe = 8 ppm, Cu = 0.9 ppm, B = 3.7 ppm, percent base saturations = 3.7% K, 15.6% Mg, 75.8% Ca, 4.9% Na, cation exchange capacity = 18.2 meq/100 g of soil (all analyses performed at A&L Western Agricultural Laboratories, Modesto, California)
Planting date: July 16, 2018 **Plot size:** 4 x 6 meters (24 m²) **Replications:** 6
Design: randomized complete block design
Experimental design: A small-plot design was arranged to investigate the effects of Vitazyme and Bio Seed on the yield and profitability of this program on strawberry yield and profitability.

① **Control (Grower Standard)** ② **Vitazyme + Bio Seed**

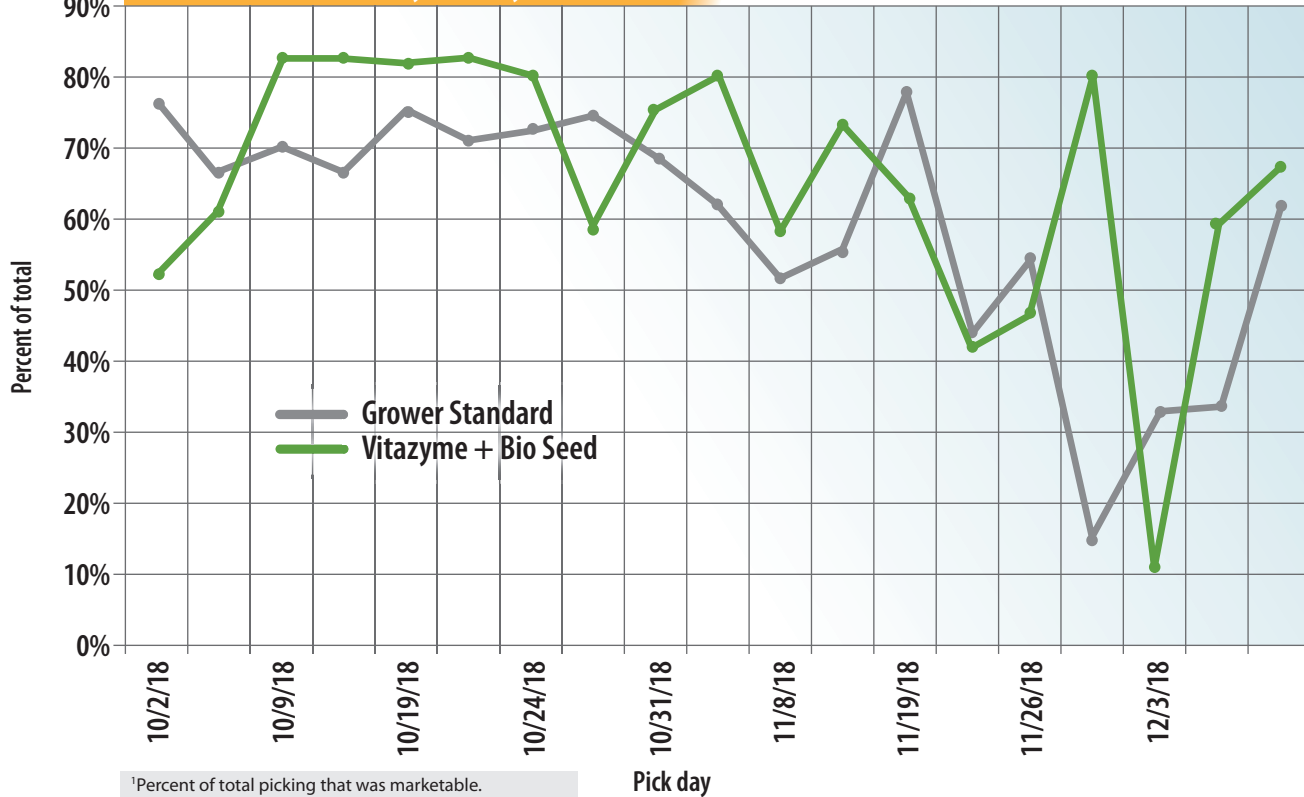
Fertilization: grower standard **Pest program:** grower standard as needed
Vitazyme application: (1) 16 oz/acre (1.3 liters/ha) as a soil drench to the plants at planting on July 16; (2) through (6) 16oz/acre (1.3 liters/ha) as a soil/foliar spray every three weeks, on August 15, September 4, September 24, October 9, and October 29
Bio Seed application: 50 grams/acre as a soil drench at planting. Bio Seed is an array of beneficial bacteria and fungi that populate the root zone of plants.
Canopy coverage results: no significant difference
Plant size results: no significant difference
Leaf chlorophyll values: as measured by a Minolta SPAD Meter, no significant difference
Yield and income results: The berries were picked 18 times during the trial period. Berry weight did not vary significantly between the two treatments during this period.



Cumulative Marketable Production by Pick Day

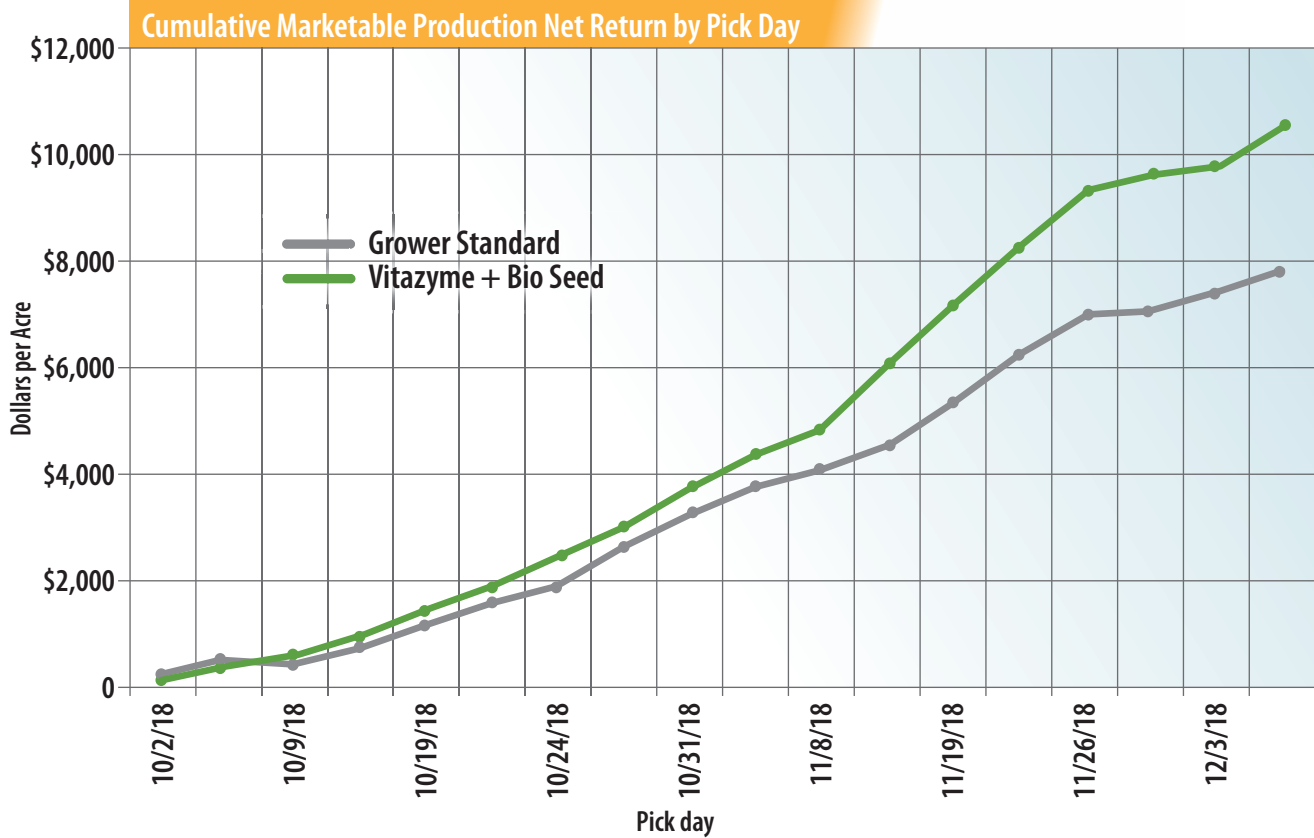


Marketable Utilization by Pick Day¹

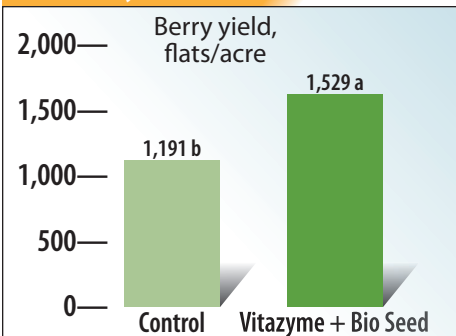


¹Percent of total picking that was marketable.

As can be seen in the graph, there was a strong tendency for the berries treated with Vitazyme and Bio Seed to be more marketable than the control berries.



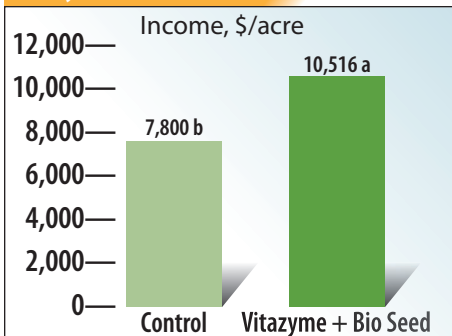
Total Berry Yield¹



¹Means followed by the same letter are not significantly different at P = 0.10 according to Duncan's New MRT.

Increase in berry yield with Vitazyme + Bio Seed: 28%

Berry Income¹



¹Means followed by the same letter are not significantly different at P = 0.10 according to Duncan's New MRT.

Increase in berry income with Vitazyme + Bio Seed: \$2,716/acre

Conclusions: This small plot strawberry trial in California, using Vitazyme and Bio Seed in a root drench at planting, plus five Vitazyme applications on the leaves and soil every three weeks, showed excellent increases in berry yield over the course of the trial. While chlorophyll, canopy coverage, and plant size did not vary significantly between the two treatments, the yield increased by 28% with these two products, which led to an excellent income increase of \$2,716/acre (cost: benefit of 35:1). The percentage of marketable berries also was higher in most cases for the Vitazyme + Bio Seed treatment. These results show the great value of these two products used in combination for strawberry production in California.

With added costs of about \$76/acre with Vitazyme and Bio Seed, the added profit is \$2,640/acre, giving a cost: benefit ratio of 35:1.



Strawberries *A Thesis: Induction of Resistance to Gray Mold (Botrytis Cinerea)*

Researcher: Lucera Berenice Fernandez Alejandrez

Research institution: University of Guanajuato, Mexico, in cooperation with the University of Almeria, Spain

Degree objective: International Masters in Protected Agriculture (MIAP)

Location: Guanajuato, Mexico

Variety: Fragaria sp., variety Fortuna

Experimental design: A small-plot, replicated experiment was conducted in Irapuato, Guanajuato, México, in order to study the possible induction of resistance to Gray Mold (*Botrytis sp.*) in strawberries (*Fragaria sp.*), var. Fortuna, by a mixture of brassinosteroids + triacontanol + beta-vitamins (Vitazyme) and with the fungicide iprodione (Rovral WP 50), alone and combined.

Evaluations were made of Botrytis incidence, Brix and firmness of the fruit, yield, and income.

Fertilization: Unknown

Vitazyme application: Either 0.5, 1.0, or 1.5 liters/ha were applied at 15-day intervals to the leaves.

Rovral application: Either 1.0 or 1.5 liters/ha were applied to the leaves at 15-day intervals.

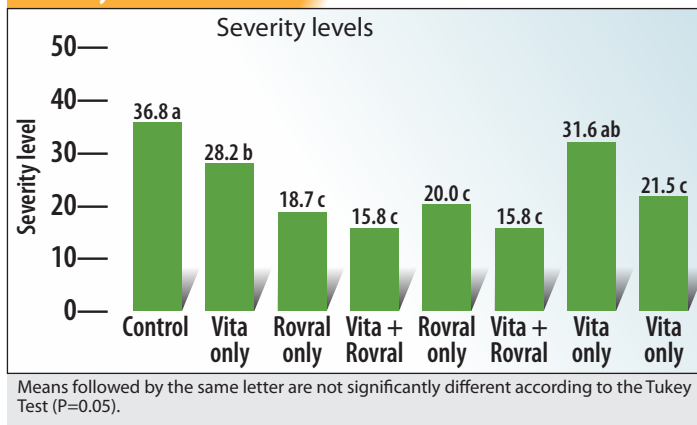
Treatment	Vitazyme* liters/ ha	Rovral* kg/ha
1. (Control)	0	0
2. (Vita only)	1.0	0
3. (Rovral only)	0	1.0
4. (Vita + Rovral)	1.0	1.5
5. (Rovral only)	0	1.5
6. (Vita + Rovral)	1.0	1.0
7. (Vita only)	0.5	0
8. (Vita only)	1.5	0



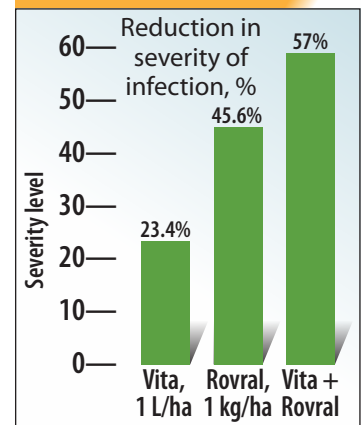
Strawberries are susceptible to fungal diseases under the right conditions, but Vitazyme is able to help the plant combat this problem through better nutrient uptake and improved plant health.

Botrytis infection results:

Severity of Infection

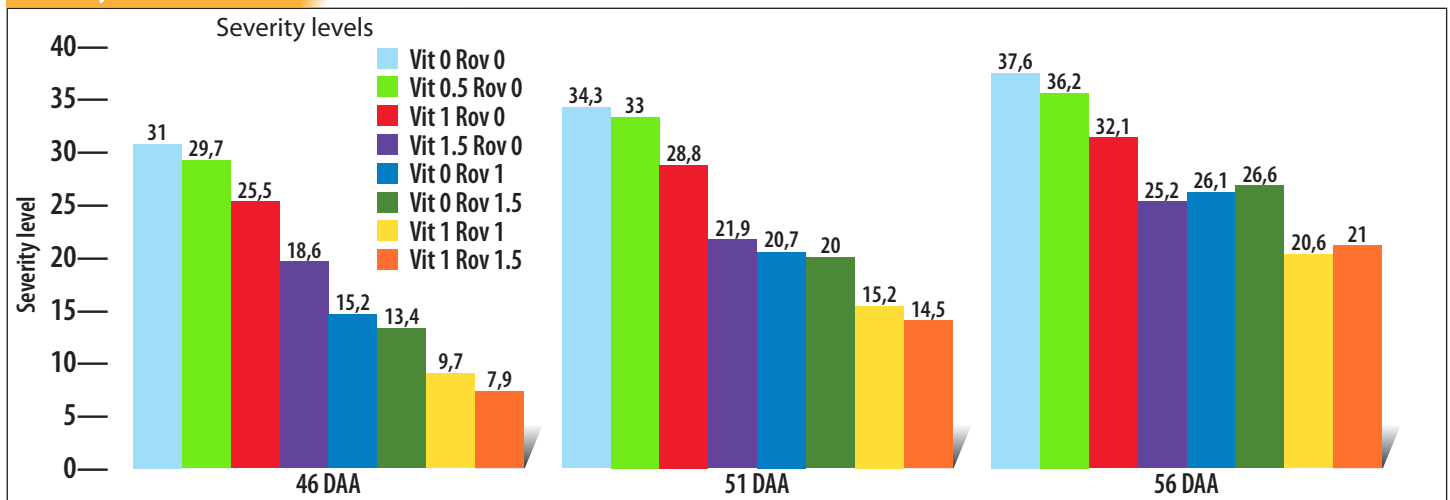


Reduction in Infection



Severity of Botrytis infection affected by Vitazyme and Rovral according to model $y = 0.813 - 44.102^* \text{Rov} + 8.205^* (\text{Rov})^2 + 0.436^* \text{DAA} \cdot \text{Rov} - 5.519^* (\text{Vit})^2 + 0.657^* \text{DAA}$. $R = 0.973$; $R^2 = 0.948$; Std. Error Estim. = 2.22; ANOVA $F=65.14$, sig = 0.000.

Severity of Infection

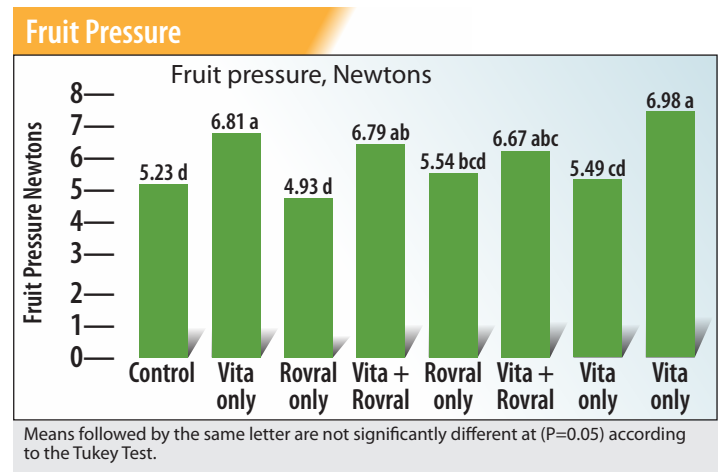
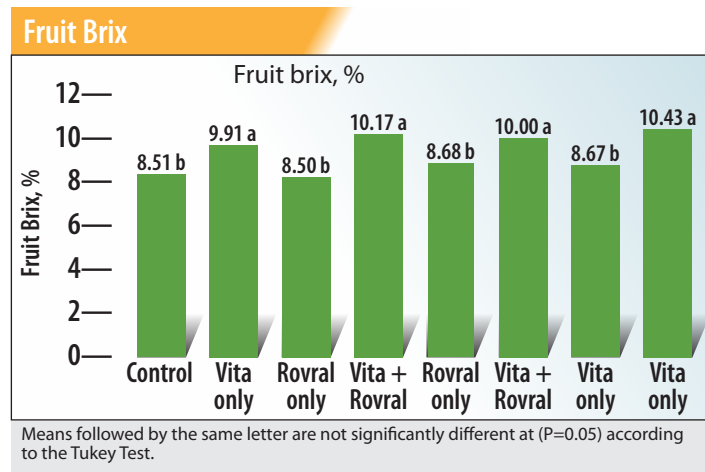


DAA = Days after application.

Both Vitazyme and Rovral had highly significant effects on the severity of Botrytis infection, as well as the incidence of it (data not shown). The best reductions in infection were with both products applied, as shown by the multiple regression analysis above.

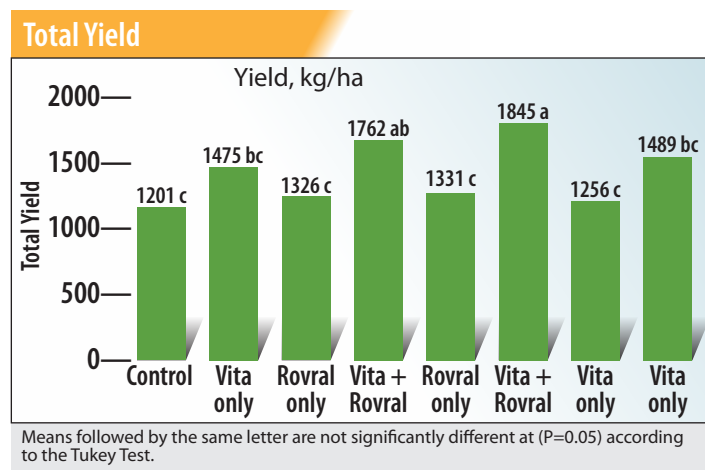
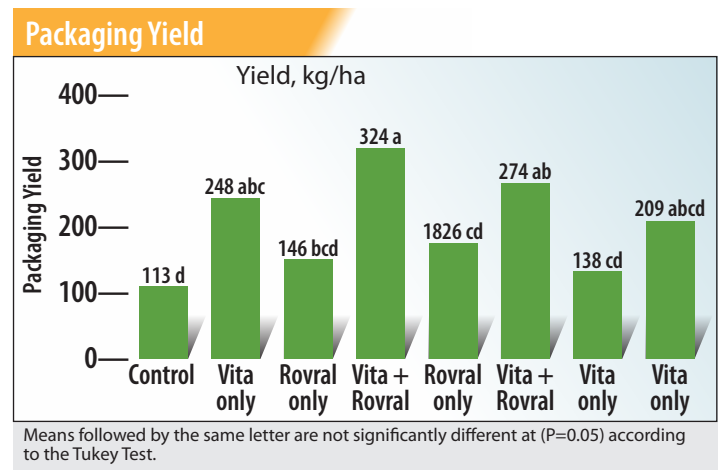
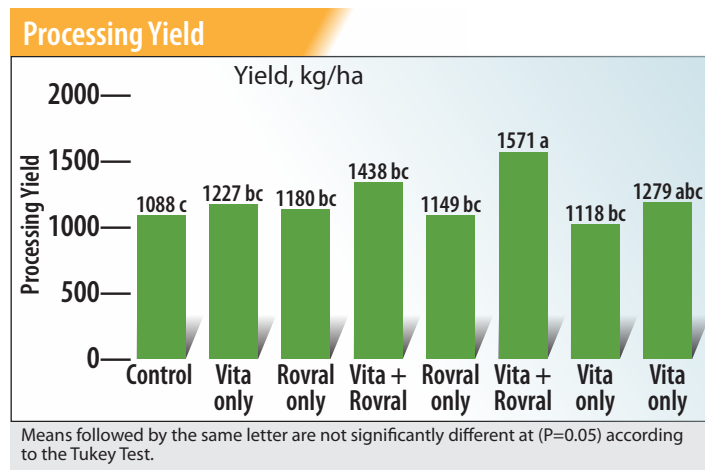
On the other hand, the effect of Rovral (both on incidence and on severity) was influenced by the DAA or interval between application and evaluation. Thus in Rovral alone, the difference between 1.5 kg/ha and the Absolute Control (without Rovral and Vitazyme) changed from 35.3% in the initial evaluation at 46 DAA (66-30.7) to only 10.7% in the third evaluation at 56 DAA (66-55.3) while in severity the difference between Rovral 1.5 kg/ha and the Absolute Control remains constant during three evaluations-intervals (DAA), which shows a more lasting effect on the disease in Vitazyme than in Rovral. Thus, with Vitazyme, in the three evaluations the difference is 16.8% in incidence (66-49.2), and in severity is 12.4% (31-18.6; 34.3-21.9; and 37.6-25.2).

Brix and firmness results:



Vitazyme alone, at manufacturer-recommended rates of 1 and 1.5 L/ha (Treatments 2 and 8, respectively), increased significantly both the Brix or % of soluble solids (mean increase over the control or rate zero of 1.40 and 1.92 percentage points), as well as fruit firmness in 1.58 and 1.74 Newtons, respectively, which represents a marked improvement in fruit quality, while Rovral had no effect whatsoever on these two parameters, at any rate.

Yield results:



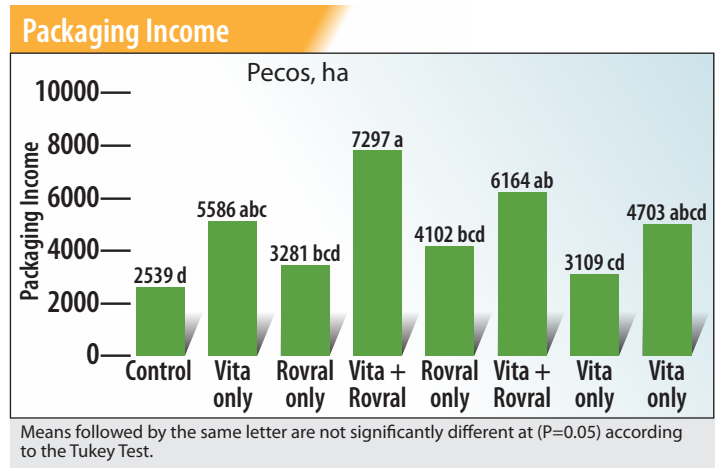
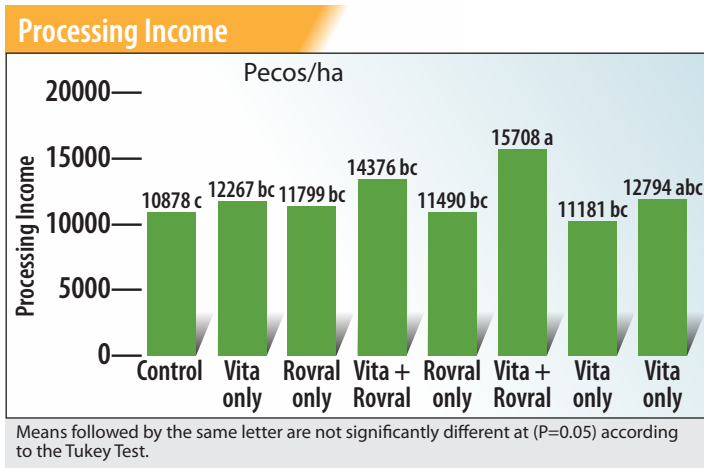
Total Yield Increase

Vitazyme, 0.5 L/ha	+5%
Vitazyme 1.0 L/ha	+23%
Vitazyme, 1.5 L/ha	+24%
Rovral, 1.0 kg/ha	+10%
Rovral, 1.5 kg/ha	+11%
Vita (1.0) + Rovral (1.0)	+54%
Vita (1.0) + Rovral (1.5)	+47%

The yield was increased the most by the combined Vitazyme + Rovral treatments (4 and 6), by 47% and 54%, respectively, Vitazyme alone progressively increased berry yield, by up to

24% above the control for the 1.5 liters/ha rate. Rovral alone increased the yield by 10% to 11%. Interestingly, the processing yield showed the fewest significant differences among treatments, while the packaging yield, which included the highest quality berries, showed remarkable differences among treatments. For example, a single 1 liter/ha Vitazyme treatment increased the packaging yield by 119%, while Vitazyme + Rovral increased the yield by 187%.

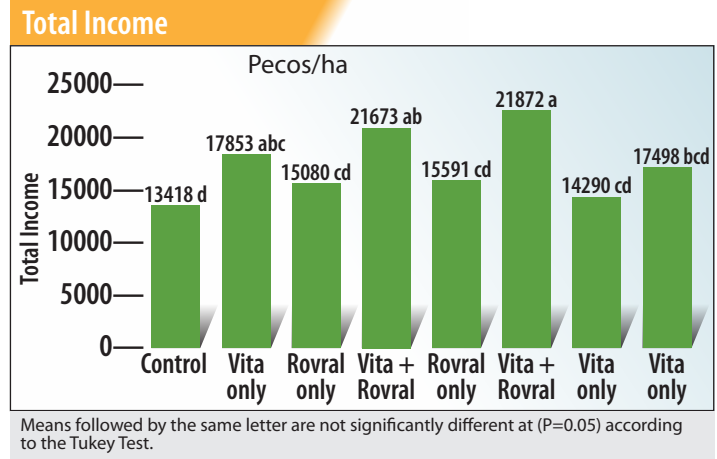
Income results: All values are gross income for the berry category.



Conclusions: This thesis study with Vitazyme and Rovral fungicide in Mexico, to control Botrytis infection on strawberries, revealed the great power of Vitazyme to control the fungus, as well as improve fruit quality (Brix and pressure). Especially effective was the combination of the two materials. Botrytis incidence and severity were greatly reduced with each product alone, and in combination: 23.4% with Vitazyme, 45.6% with Rovral, and 57.0% when combined. Regression analyses showed highly effective reduction of infection and severity, especially with the combined products. Fruit Brix was significantly increased by Vitazyme—up to 1.92 points higher with 1.5 liter/ha—and by the combined products as well, and fruit pressure followed a similar pattern being 1.75 Newtons higher for the 1.5 liter/ha Vitazyme treatment. Only the low Vitazyme treatment (0.5 liter/ha) and both Rovral treatments showed no quality parameter improvements.

Yields of the Vitazyme treatments were increased by up to 24%, while Rovral alone boosted the yield by 10 to 11%, but the products applied together gave a 47 to 54% total yield boost. The packaging yield was especially, and significantly, enhanced by Vitazyme at 1.0 liter/ha and the two products applied together.

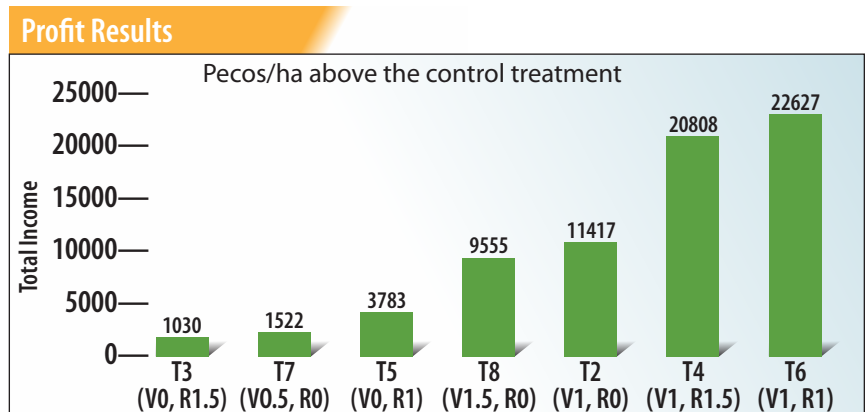
Finally, income was increased dramatically by Vitazyme at 1.5 liters/ha (9555 pecos/ha) and 1.0 liter/ha (11417 pecos/ha), but even more dramatically the yield was boosted by the combined Vitazyme and Rovral, at 20808 to 22627 pecos/ha. Especially noteworthy in this study is the observation that Rovral did not improve berry quality apart from Vitazyme, nor did it improve the yield nearly as much as Vitazyme alone. This study proves the great efficacy of Vitazyme, alone or combined with a fungicide, to control Botrytis fungi in strawberries, and thus greatly improve crop yield, quality, and net profits for the grower.



Profit results:

The net profit for each treatment was calculated using the following values.

Item	Cost
Vitazyme	530 pecos/liter
Rovral	812.60
Labor	100 pecos/ha



Vital Earth Resources

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2013 Crop Results

Vitazyme on Strawberries

Researchers: Eng. Agustin Medinilla, Jr., and Juan Carlos Diaz, Ph.D.

Farmer: Eng. Agustin Medinilla, Fortuna Farm

Location: Tlajomulco de Zuniga Municipality, Jalisco, Mexico

Variety: Albion

Soil type: sandy

Planting date: August 27, 2012

Experimental design: Five strawberry tunnels of 540 m² each were treated with Vitazyme, and 75 tunnels were left untreated to serve as controls. The objective of the study was to evaluate the effects of Vitazyme on strawberry yield.

1. Control

2. Vitazyme

Fertilization: unknown

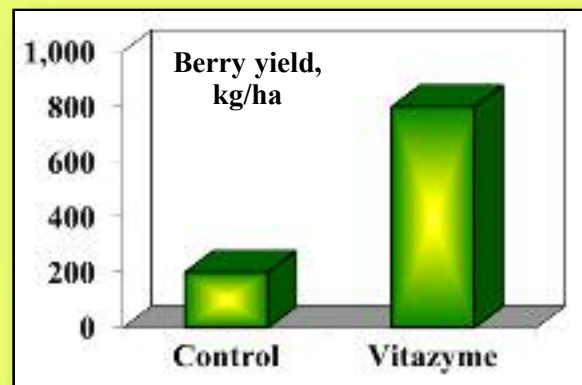
Vitazyme application: 0.75 liter/ha applied twice, using a sprayer having 300 ml of product in 200 liters of water, at 500 liters/ha output

Pesticide applications: Diazinon, sulfur, and Neem extract sprayed weekly for insect and disease control

Yield results: Berries were picked every two days. Results given below are approximations of actual yield results.

Treatment	Yield*		Yield change
	kg/ tunnel	kg/ha	kg/ha
Control	10	200	—
Vitazyme	40	800	600 (+300%)

*Vitazyme tunnels (5) totalled 0.27 ha, and the control tunnels (75) totalled 4.05 ha



**Increase in berry yield with
Vitazyme: 300%**

Growth results: Vitazyme treated strawberries had the following characteristics compared to the untreated control:

- Many more flowers
- Much larger fruit
- Very little red spider mite (*Tetranychus urticae*) infestation

Conclusions: A strawberry trial in plastic tunnels in Jalisco, Mexico, showed that Vitazyme, applied foliar two times during the growing season, greatly increased flowering and fruit size, while reducing red spider mite damage. The result was a 300% increase in berry yield from a very minor input cost, proving the great efficacy of this program for strawberry production in Mexico.

Vital Earth Resources

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2003 Crop Results

Vitazyme on Strawberries

Researcher: Danny Hicks and Daniel Galt, Ph.D.

Research organization: Hulst Research Farm Services, Inc., Hughson, California

Variety: Seascape

Soil type: unknown

Experimental design: A field area divided into eight plots 5 by 25 feet, in a randomized complete block design, was established to investigate the effects of Vitazyme and an untreated control on the yield and quality of strawberries. Four replicates were used.

1. Control

2. Vitazyme

Fertilization: unknown

Vitazyme treatments: Vitazyme was applied at 13 oz/acre over the leaves and soil of the appropriate plots on April 29, May 13, and May 27, 2003. A CO₂-charged backpack sprayer was used with a 5-foot boom and three TeeJet 8003 flat fan nozzles, at 30 psi and 50 gallons/acre.

Weather: Weather during this study turned exceptionally hot, effectively stopping fruit set by late May. Four days in the mid-90s during the third week of May slowed fruit set, and three days in the high 90s during the last week of May, ended fruit set. Then a 100°F temperature on June 3 was followed by lower temperatures in the mid-80s for two weeks. This cooler weather initiated flowering and fruit set again so a final berry weight was taken on June 11. According to the researchers, **“Since all six berry weight events favored Vitazyme, a late spring with ‘regular’ temperatures could have resulted in lower variability across the trial, and samples taken on a weekly basis in such a case should result in greater measurable differences.”**

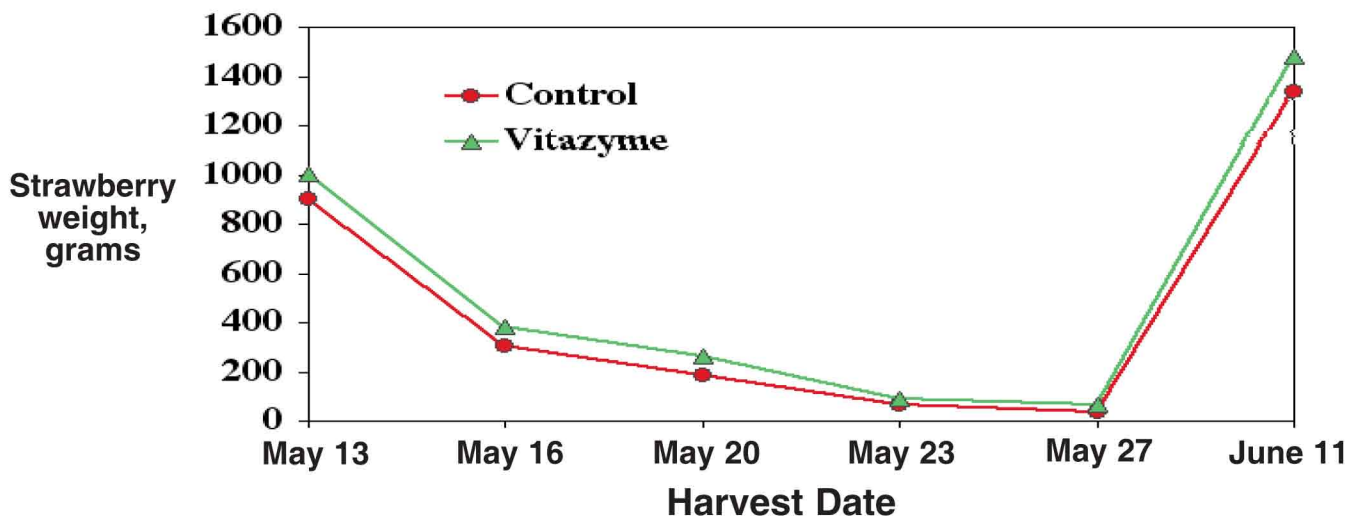
Yield and quality, and plant results: Berry weights were taken on May 13, 16, 20, 23, 27, and June 13, 2003. All marketable fruit was included in the totals, defined as berries having at least 50% red color, less all culls (those that were rotted, bird damaged, or insect damaged). At the final harvest on June 13 the degree of brix was determined on ten berries from each plot, using a Bausch and Lomb refractometer. On June 17, plants (with roots) from each plot were harvested and divided into tops and roots. Analysis of Variance was calculated for all data using P = 0.10 as the level of significance.

Harvested Berry Weights*

Treatment	May 13	May 16	May 20	May 23	May 27	June 11	Total**
Control	900.0 a	305.0 b	185.0 b	66.8 a	33.0 a	1,340.0 a	2,829.8 a
Vitazyme	1,005.0 a	380.0 a	262.0 a	91.0 a	65.2 a	1,480.0 a	3,283.2 a
Change	105.0 (+12%)	75.0 (+25%)	77.0 (+42%)	24.2 (+36%)	32.2 (+98%)	140.0 (+10%)	453.4 (+16%)
LSD _{0.10}	325.3	67.4	64.1	27.3	69.3	644.4	499.7

*Treatment means are not significantly different at P=0.10 if letters are the same, according to the Tukey-Kramer Test.

**This difference is significant at P=0.11, a level at which considerable confidence may be placed

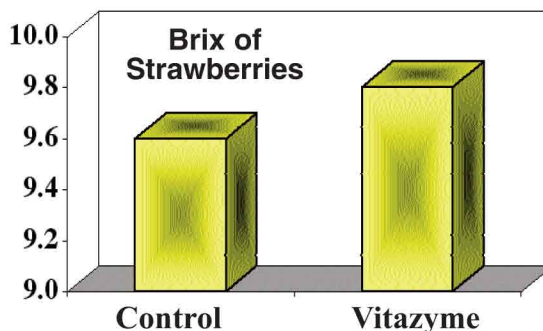


Increase in total berry weight with Vitazyme: 16%

Fruit Brix Value

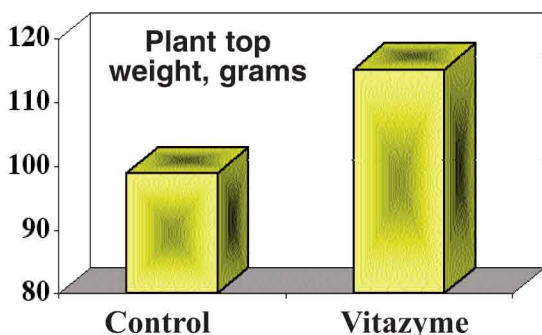
Treatment	Brix value*	Brix change
Control	9.60 a	—
Vitazyme	9.80 a	0.20 (+2%)

*Means followed by the same letter are not significantly different according to the LSD. $LSD_{0.10}=0.75$.



Increase in Brix with Vitazyme: 0.2 units

Plant Top Weight



Treatment	Top weight*	Weight change
Control	98.8 a	—
Vitazyme	115.1 a	16.3 (+16%)

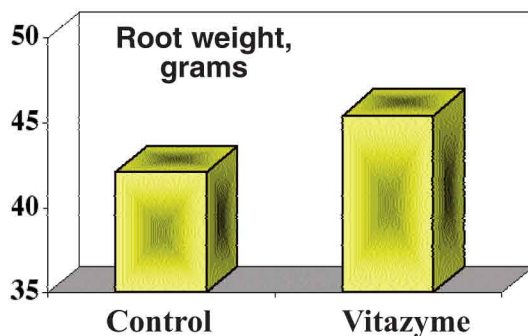
*Means followed by the same letter are not significantly different according to the LSD. $LSD_{0.10}=24.1$ grams.

Increase in plant top weight with Vitazyme: 16%

Plant Root Weight

Treatment	Root weight*	Weight change
Control	42.1 a	—
Vitazyme	45.4 a	3.3 (+8%)

*Means followed by the same letter are not significantly different according to the LSD. $LSD_{0.10}=9.3$ grams.



Increase in plant root weight with Vitazyme: 8%

Conclusions: This replicated strawberry trial in California proved that Vitazyme, applied to the leaves and soil, is capable of increasing the growth, yield, and quality of strawberries. In particular, the following points are emphasized:

- **Harvested berry weight was increased 16%. The report said, “While this difference is not significant at the 0.10 level of significance, it would be significant at approximately the 0.11 level.”**
- **Fruit brix was elevated by 0.2 unit, meaning the fruit was somewhat sweeter.**
- **Top growth of the plants was increased by 16%.**
- **Root growth of the plants was increased by 8%.**

Vitazyme can assist strawberry growers to increase yields and quality to a substantial degree, and to increase income as well. According to the researcher, **“Even though the combined sample weights of the Vitazyme plots weren’t statistically superior to those of the untreated control [though the trial was significant at P=0.11], farmers would use any product resulting in a 16% increase in yield.”**

Income projections:

Typical returns in *California coastal areas*, assuming a 12 ton/acre crop, with the harvest spread evenly throughout the growing season

No Vitazyme

Season and market	Production*	Price**	Total income
	lb/acre	\$/lb	\$/acre
Early-season fresh	8,000	1.25	10,000
Mid-season fresh	8,000	0.84	6,720
Late-season fresh	8,000	0.28	2,240
		Total	18,960

*Assuming the production is relatively uniform throughout the year.

**Early-season fresh: \$10.00/8 lb flat; mid-season fresh: \$6.75/8 lb flat; Late-season fresh: \$0.28/lb.

Plus Vitazyme

Season and market	Production*	Price**	Total income
	lb/acre	\$/lb	\$/acre
Early-season fresh	9,280	1.25	11,600.00
Mid-season fresh	9,280	0.84	7,795.20
Late-season fresh	9,280	0.28	<u>2,598.40</u>
		Total	21,993.60

*Assuming the production is relatively uniform throughout the year. Production is based on yields obtained by Hulst Research in 2003, which showed a 16% yield increase.

**Early-season fresh: \$10.00/8 lb flat; mid-season fresh: \$6.75/8 lb flat; Late-season fresh: \$0.28/lb.

Increase with Vitazyme: \$3,033.60/acre

Typical returns in the *northern San Joaquin Valley*, assuming a 4.5 ton/acre crop, with the harvest spread evenly over the growing season

No Vitazyme

Season and market	Production*	Price**	Total income
	lb/acre	\$/lb	\$/acre
Early-season fresh	3,000	1.25	3,750
Mid-season fresh	3,000	0.84	2,520
Late-season fresh	3,000	0.28	<u>840</u>
		Total	7,110

*Assuming the production is relatively uniform throughout the year.

**Early-season fresh: \$10.00/8 lb flat; mid-season fresh: \$6.75/8 lb flat; Late-season fresh: \$0.28/lb.

Plus Vitazyme

Season and market	Production*	Price**	Total income
	lb/acre	\$/lb	\$/acre
Early-season fresh	3,480	1.25	4,350.00
Mid-season fresh	3,480	0.84	2,923.20
Late-season fresh	3,480	0.28	<u>974.40</u>
		Total	8,247.60

*Assuming the production is relatively uniform throughout the year. Production is based on yields obtained by Hulst Research in 2003, which showed a 16% yield increase.

**Early-season fresh: \$10.00/8 lb flat; mid-season fresh: \$6.75/8 lb flat; Late-season fresh: \$0.28/lb.

Increase with Vitazyme: \$1,137.60/acre

Vital Earth Resources

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2000 Crop Results

Vitazyme on Strawberries

Grower: Saechow

Researcher: Kumen Meservy

Location: Fairfield, California

Variety: unknown

Planting date: fall of 1999

Experimental design: Two fields of 2 and 3 acres of a strawberry operation were used for this study. One was treated with Vitazyme and the other left untreated.

1. Control (Field A, 2 acres)

2. Vitazyme (Field C, 3 acres)

Fertilization: the same for both fields

Irrigation: the same for both fields

Pesticides: the same for both fields

Vitazyme treatment: 13 oz/acre sprayed two times

Yield results: Actual yields are proprietary, though the increase with Vitazyme was allowed to be released.

Yield increase with Vitazyme: 140 cases/acre

Income results: Value per case of strawberries: \$12.00

Income increase with Vitazyme: \$1,680.00/acre

Plant growth observations:

Grower's comments:

"The plants of Field C [with Vitazyme] were **generally healthier.**"

"The treated berries, even after chemical applications, were **much sweeter** than the controls."

Researcher's comments:

"The application of crop protection chemicals will usually reduce the Brix levels of most crops by 4 to 10 Brix points. **These Vitazyme treated strawberries were exceptionally sweet, even after the application of chemicals to control powdery mildew!** Other Vitazyme dealers who received Saechow berries felt that the quality and flower were outstanding, the best in Northern California.