Sugar Cane *A Summary of Results Since 2004*

Vitazyme treatment at Santiago de Cuba, Dos Rios Sugar Estate, Cuba triggered excellent leaf and stem growth, and more cane and sugar yield.

Rooting of the cane was greatly improved in this study at Villa Clara, Carlos Baliño Sugar Estate, Cuba with resultant higher sugar yields.

At Uruguay, Sancti Spiritus Sugar Estate, Cuba, growth and yield of the Vitazyme treated cane is obviously much greater than the control in this study.

A 1.5 liter/ha Vitazyme application at a trial in Estipac, Jalisco, Mexico, caused excellent growth stimulation and much improved sugar yield.

Researchers: Juan Carlos Diaz, along with Isel Creach, Rafael Zuaznabar, Martin Morales, Fidel Hernandez, Inoel Garcia, Omara Rojas, Juan Cruz Castaneda and Agustin Peralta

Research institution: INICA, Cuba and Quimica Lucava, Mexico

Summary of the studies: The following summary was written by Juan Carlos Diaz, and includes trials from Cuba and Mexico.

From 32 field trials conducted in eight sugar estates of six provinces between 2004 and 2008, in a cumulative area of 518 hectares of ratoon sugar cane treated with the natural biostimulant Vitazyme and 218 hectares of untreated control areas, an average cane yield increase of 15.69 t/ha, with an annual range between 11.02 and 17.04 t/ha, associated to increases in stalk length, diameter and weight, were recorded, resulting in mean profits of US$ 535/hectare, and a cost-benefit ratio (profit/costs) of 3.5 at a sugar price of only US$ 0.20/lb. Initial results of two other trials from Estipac, Jalisco, Mexico, in 2012-2013, showed a similar yield increase with Vitazyme: 15 t/ha. Greater yield increases were recorded in ratoon cane (after first harvest) than in plant cane. Best programs were two to three foliar sprayings, with a one month interval from 30-60 days after previous harvest, each at 1 to 1.5 L/ha, for a cumulative 2 to 3 L/ha. Alternately, the possibility of reducing fertilization between 25% and 50% when Vitazyme is applied, and producing similar to higher yields, was observed in two trials. No differential yield response by soils or varieties, and no effect on sugar content, were observed.

Sugar Cane *A Summary of Results Since 2004 cont.*

2005 Demonstration Plots, Dos Rios Estate, Santiago de Cuba				
Variety	Applications	Vitazyme yield	Control yield	Vitazyme increase
		MT/ha	MT/ha	MT/ha
C87-51	1 liter/ha once	39.41	28.05	11.36 (+40%)
C87-51	1 liter/ha once	51.78	36.10	15.68 (+43%)
C 1051-73	1 liter/ha twice	52.58	39.22	13.36 (+34%)

2006 Demonstration Plots in Five Provinces				
Province	Estate	Vitazyme yield	Control yield	Vitazyme increase
		MT/ha	MT/ha	MT/ha
Santiago	Dos Rios	34.56	16.78	17.78 (+106%)
Holguin	Cristino Naranjo	47.99	32.55	15.44 (+47%)
Havana	Hector Molina	35.16	25.96	9.2 (+35%)
Matanzas	España Republicana	72.31	57.17	15.14 (+26%)
Villa Clara	Carlos Baliño	32.35	31.05	1.30 (+4%)
Half of the applications at 1 liter/ha 3 times, and half at 1.5 liters/ha 2 times.				

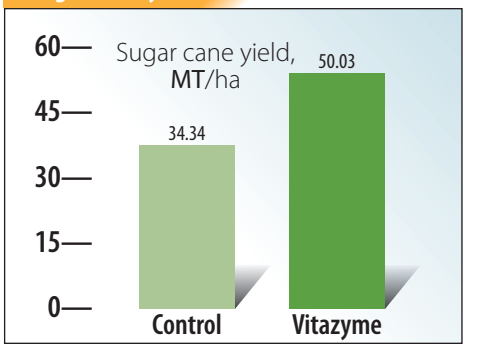
2007 Demonstration Plots in Holguin and Santiago de Cuba				
Province	Estate	Vitazyme yield	Control yield	Vitazyme increase
		MT/ha	MT/ha	MT/ha
Holguin[a]	Fernando de Dios	59.7	39.3	20.4 (+52%)
	Cristino Naranjo	74.6	69.7	4.9 (+7%)
Santiago de Cuba[b]	Chile	64.9	51.7	13.2 (+26%)
	Dos Rios	67.8	56.4	11.4 (+20%)
[a]Half of the applications at 1 liter/ha 3 times, and half at 1.5 liters/ha 2 times. [b]Two applications at 1.5 liters/ha.				

2008 Demonstration Plots at the Uruguay Sugar Estate, Sancti Spiritus				
Province	Applications	Vitazyme yield	Control yield	Vitazyme increase
		MT/ha	MT/ha	MT/ha
Sancti Spiritus	1.5 liters/ha twice	52.54	38.98	13.56 (+35%)

Overall Cuba Results for 2005 to 2008

Vitazyme yield, MT/ha 50.03
Control yield, MT/ha 34.34
Increase with Vitazyme,..... 15.69 (+46%)

Sugar cane yield



Sugar Cane *A Summary of Results Since 2004 cont.*

Economic Analysis of 3 liters/ha Vitazmye Applications for Ratoon Cane							
		Added cost vs. Control			Added income[c]	Profit	Cost : Benefit
Yield increase	Added sugar	Harvest/Process[a]	Vitazyme[b]	Total			
MT/ha	MT/ha	USD/ha	USD/ha	USD/ha	USD/ha	USD/ha	
15.69	1.569	54.92	100	154.92	690.63	535.71	3.5

[a]Harvesting and processing cost = 3.50 USD/ton of cane. [b]Vitazyme cost = 30 USD/liter; 1.5 liters/ha cost 45 USD/ha X2 applications = 90 USD/ha; two back pack applications cost 10 USD/ha. [c]Sugar price = 440 USD/ton.

Sugar Cane Yield Comparison of Vitazyme vs. Fitomas in Holguin and Santiago de Cuba			
Biostimulant	Cane yield	Control yield	Yield increase
	MT/ha	MT/ha	MT/ha
Vitazyme	66.94	49.90	17.04 (+34%)
Fitomas[a]	55.16	49.36	5.8 (+12%)

[a]Fitomas is a biostimulant produced in Cuba.

Yield increase

Vitazyme 34%
Fitomas 12%

Cane yield, Guadalupe Torres Farm, Estipac, Jalisco, 2012-13.	
	Cane MT/ha
Vitazyme: 2 applications at 1.5 L/ha	153
Untreated control	138
Difference	15 (+11%)

Cane yields in Matanzas, ratoon cane trial, on red Ferraliltic soil.	
Treatments	**Cane MT/ha**
Control with 100% of fertilization (130 kg/ha N + 100 kg/ha K_2O)	54.27
Vitazyme + 75% fertilization (97.5 kg/ha N + 75 kg/ha K_2O)	**61.38**
Standard error	5.33

Yields and their components in Santiago de Cuba, ratoon cane trial, on dark Sialitic Plastogenic soil.								
Treatments	**Rate**	**Stalk length**	**Stalk diameter**	**Stalk population x**	**Stalk weight**	**Cane yield**	**Sugar %**	**Sugar yield**
	(L/ha)	(cm)	(cm)	1000/ha	(kg)	(MT/ha)	cane	(MT/ha)
Absolute Control (without fertilizer and without Vitazyme)	—	210	2.68	70.9	1.17 c	82.99 b	14.40	11.95 c
Recommended fertilization (75 kg N/ha) without Vitazyme	—	214	2.85	67.8	1.29 bc	87.70 b	13.92	12.21 c
Vitazyme + 50% fertilizer (37.5 N/ha)	3 x 1	214	2.81	64.4	1.43ab	106.66a	14.11	15.05b
Vitazyme + 100% fertilizer (75 kg N/ha)	3 x 1	216	2.87	75.3	1.49a	112.89a	14.62	16.50a
Standard error		2.57	0.072	2.32	0.055	4.59	0.345	0.53

Conclusions: According to Dr. Juan Carlos Diaz,

- The application of the natural biostimulant Vitazyme produces marked increases in sugar cane growth and yield in comparison to untreated control areas, and to the Cuban biostimulant Fitomas, in various sugar cane varieties and types of soils.
- Such increases are higher in the ratoon cycle (after the first harvest) than in the plant cane cycle, although in both it produces good increases.
- You can reduce the fertilization between 25 and 50% in combination with the application of Vitazyme and obtain similar or higher yields than in the untreated control with 100% fertilization, but the largest increases in yields and profits are obtained when Vitazyme is applied with 100% of the recommended fertilization.
- Best application programs are between two and three sprayings to the foliage, at monthly intervals from 30-60 days after last harvest, at a rate between 1 and 1.5 L/ha, for a cumulative total of 2 to 3 L/ha.
- It is recommended to carry out two applications in sugar cane, preferably in the ratoon cycle (after the first harvest), each at 1 to 1.5 liters per hectare (cumulative dose of 2 to 3 liters per hectare), the first between 30 and 45 days after the previous harvest, or 60 days after planting for plant cane, and the second appllication at 30 days after the first. Apply with a backpack sprayer using a cone nozzle, preferably in bands, or with a tractor sprayer, applying on sugar cane leaves.
- The final dilution of Vitazyme should be sufficient for a good spray coverage, equivalent to around 200 liters per hectare in the first application and 300 liters per hectare in the second.

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(903) 845-2163 FAX: (903) 845-2262

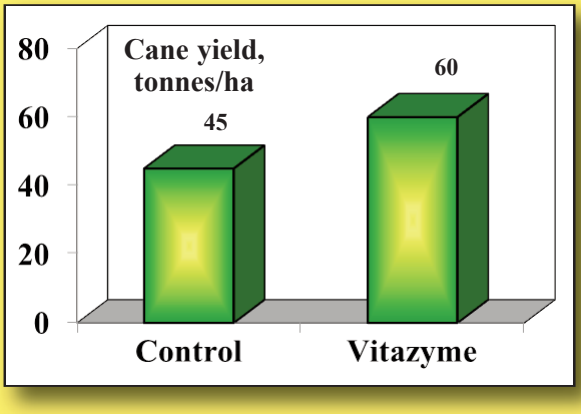
2013 Crop Results

Vitazyme on Sugar Cane

Researcher: unknown *Farmer*: Nguyen Dire Tinh *Location*: Ea Po—Cir Jut District, Viet Nam
Variety: unknown *Age of cane*: two years
Experimental design: A sugar cane field was divided into a Vitazyme treated and an untreated control area, each being 0.7 ha, to determine the effect of the product on cane yield.

1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 3 liters/ha, applied at the beginning of the rainy season on April 18, 2012, and again on June 18, 2012
Yield results: The field was harvested on January 20, 2013.



Increase in yield with Vitazyme: 33%

Vitazyme, using two foliar applications, gave a very high 33% increase in sugar cane yield.

Income results: Extra cost from Vitazyme: 2,520,000 VND/ha
Added income from the crop: 12,780,000 VND/ha
Return On Investment: 5.07:1

Conclusions: This sugar cane trial in Viet Nam revealed that two Vitazyme applications produced a 33% yield increase over the untreated control. This increase netted the farmer nearly 13 million VND/ha more income, and resulted in a 5.07:1 Return On Investment. This program is proven to be excellent for use with sugar cane in Viet Nam.

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2013 Crop Results

Vitazyme on Sugar Cane, Ratoon

Researcher: Yen Thao Tran *Farmer*: unknown *Location*: Mekong Delta, Viet Nam

Experimental design: A recently harvested sugar cane field was divided into a Vitazyme treated and control portion to investigate the effect of the product on sugar yields and profits for ratoon cane.

1. Control **2. Vitazyme**

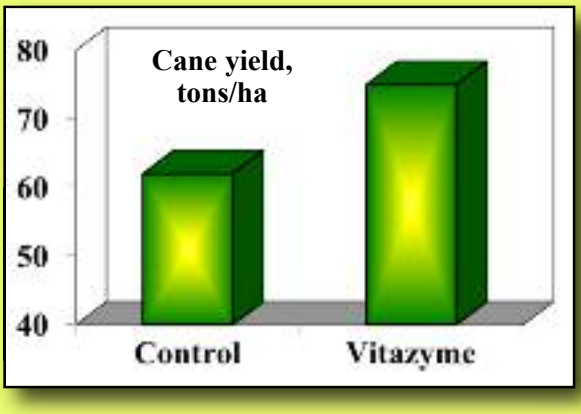
Fertilization: standard for the area and soil type

Vitazyme application: three applications: (1) 2 liters/ha, using 0.5 liter in a 200 liter barrel of water, with four barrels per hectare, applied when the first sprouts appeared with rains after harvest; (2) 2 liters/ha, using the same method as for (1), after one month; (3) 3 liters/ha, using 0.5 liter in a 200 liter barrel of water, with six barrels per hectare one month after the second application.

Yield results:

Treatment	Cane yield	Yield change
	tons/ha	tons/ha
Control	62	—
Vitazyme	75	13 (+21%)

Increase in yield with Vitazyme: 21%



Income results: The price of sugar cane is about 970 VND/kg. Increased income for this trial is 13,000 kg/ha x 970 VND/kg = 12.61 million VND/ha

Conclusions: A ratoon sugar cane trial in Viet Nam, using three applications, provided an excellent 21% yield increase (13 tons/ha), which gave 12.61 million additional VND/ha. This result is consistent with previous studies with Vitazyme on sugar cane in Viet Nam.

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2012 Crop Results

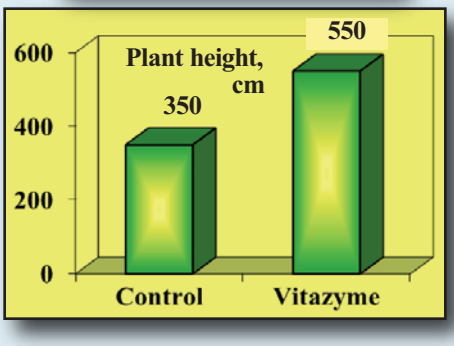
Vitazyme on Sugar Cane

Researcher: Adhe *Research Organization*: PT. Aneka Pangan Bermutu
Location: Dusun Barsari, Prigan - Pasuruan, East Java, Indonesia *Variety*: Bulu Lawang
Soil type: Andosol *Planting date*: November 29, 2011
Experimental design: One hectare of a sugar cane field was divided into a control (5,000m^2) and a Vitazyme treated area (5,000m^2), to determine the effects of the product on sugar cane growth and yield.

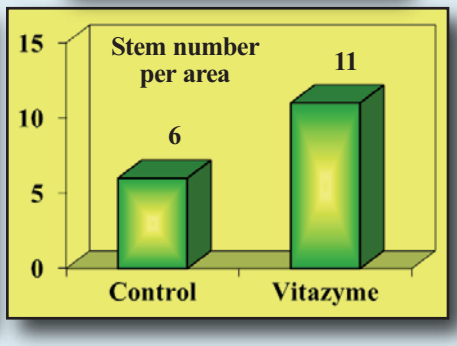
1. Control **2. Vitazyme**

Fertilization: normal for the area
Vitazyme application: at planting, a 1% solution on the seed pieces; 1 liter/ha on the plants and soil on December 21, 2011 (about 1 month), and on March 30, 2012 (about 4 months)
Crop characteristics: Evaluations were taken near harvest time, the end of September, 2012. Values are an average of several plants.

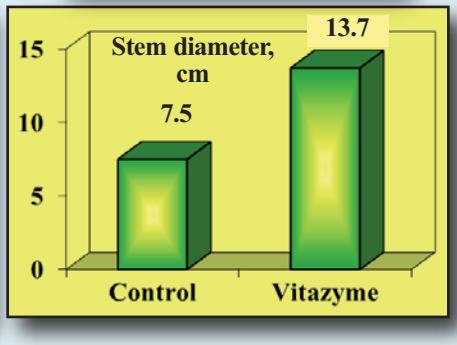
Plant Height



Stem Number



Stem Diameter



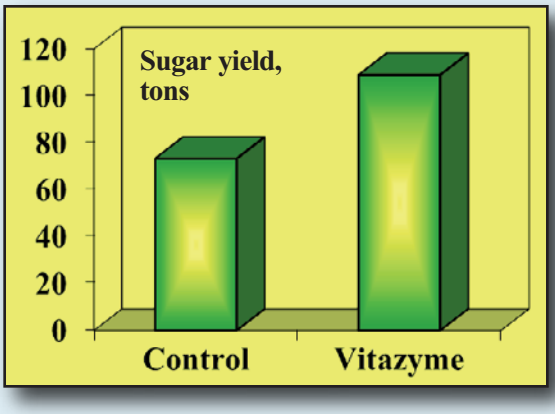
Increase with Vitazyme	
Plant height	57%
Stem number	83%
Stem diameter	83%

All plant growth parameters were markedly improved by Vitazyme.

Sugar cane yield: Harvesting was completed on September 28, 2012, 10 months after planting.

Treatment	Cane yield	Yield change
	tons	tons
Control	73.20	—
Vitazyme	108.89	35.69 (+49%)

Increase in yield with Vitazyme: 49%



Conclusions: This sugar cane trial in East Java, Indonesia, compared Vitazyme treatment (on the seed pieces, and two subsequent soil and foliar applications) with an untreated control. The Vitazyme treated cane grew more aggressively, greatly outdoing the control in terms of height (+57%), stem number (+83%), and stem diameter (+83%). Yield of the cane was dramatically increased (+49%) with Vitazyme, showing the great utility of this product for improving sugar cane culture in Indonesia.

Note the Vitazyme treated on the left, with the untreated sugar cane on the right. The growth difference was great by the end of the test period.

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

2007 Crop Results

Vitazyme on Sugar Cane

Researcher: Roberto Alvarez, Deputy Director
Location: Antonio Rojas Cooperative Farm, Hector Molina Sugar Enterprise, Cuba
Variety: CP52-43 *Field*: Field 17, Block 102
Crop type: ratoon
Experimental design: A production field of 9.39 ha was treated with Vitazyme to determine the effect on sugar yield compared to the expected yield.

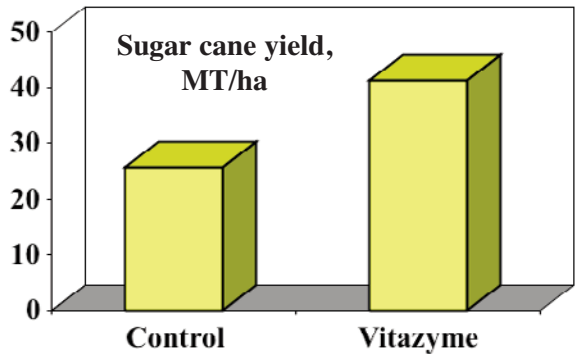
1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1.5 liters/ha twice (timing unknown)
Yield results: The harvest date was February 6 to 9, 2007.

Treatment	Yield	Change
	---------- MT/ha	----------
Control	25.70*	——
Vitazyme	41.36	15.66 (+61%)

*Estimate for the untreated field.

Increase in sugar cane yield: 61%



Conclusions: In this Cuban sugar cane trial, Vitazyme enhanced yield an amazing 61% above the expected control (untreated) yield, based on field records. Even though this field was scheduled for plowing and replanting, because of the excellent yield it will be used again. The yield increase was due to "much greater than expected growth in the Vitazyme treated fields than the controls, from the September estimates to the actual harvest in February."

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2007 Crop Results

Vitazyme on Sugar Cane

Researcher: Marylin Enriquez, technician
Location: Capitan Alberto Torres Cooperative *Watering*: rain-fed
Variety: Ty 7017 *Field*: 16, block 5204 *Crop type*: "carry-over" ratoon
Experimental design: A production field of 2.80 ha was treated with Vitazyme to determine the effect on sugar yield compared to the expected yield.

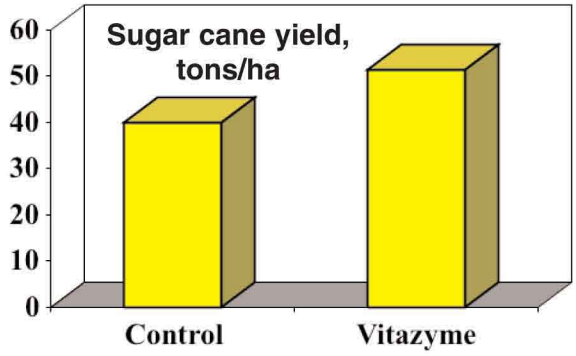
1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: .5 liters/ha twice (timing unknown)
Yield results: The harvest date was February 6 to 9, 2007.

Treatment	Yield	Change
	---------- tons/ha	----------
Control	40.00*	—
Vitazyme	51.45	11.45 (+29%)

*Estimated average for the field

Sugar cane yield increase: 29%



Conclusions: Vitazyme greatly enhanced the production of this sugar cane parcel, by 29% above the expected level. According to the researcher, "The Cooperative considers that the much higher actual yields, as compared to the estimated yields, were due to much greater than expected growth in the Vitazyme treated fields than the controls, from the September estimates to the actual harvest in February."

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2007 Crop Results

Vitazyme on Sugar Cane

Researcher: Marylin Enriquez, technician
Location: Capitan Alberto Torres Cooperative Farm, Hector Molina Sugar Enterprise, Cuba
Watering: rain-fed *Variety*: CP 52-43
Field: 20, block 5240 *Cane type*: ratoon
Experimental design: A production field of 5.56 ha was treated with Vitazyme to determine the effect on sugar yield compared to expected yield.

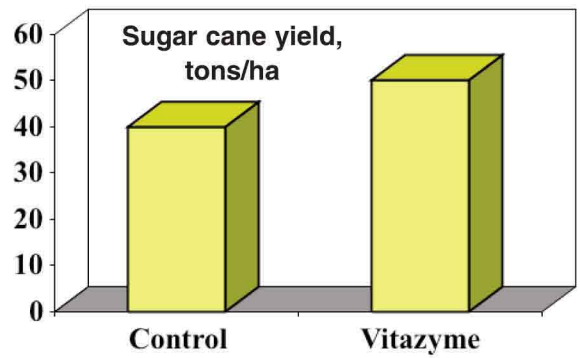
1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1.5 liters/ha twice (timing unknown)
Yield results: The harvest date was February 6 to 9, 2007.

Treatment	Yield	Change
	-------- tons/ha	--------
Control	40.00*	—
Vitazyme	50.11	10.11 (+25%)

*Estimated average for the field

Sugar cane yield increase: 25%



Conclusions: Vitazyme greatly enhanced the production of this sugar cane parcel, by 25% above the expected level. According to the researcher, "The Cooperative considers that the much higher actual yields, as compared to the estimated yields, were due to much greater than expected growth in the Vitazyme treated fields than the controls, from the September estimates to the actual harvest in February."

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2007 Crop Results

Vitazyme on Sugar Cane

Researcher: unknown
Location: Fernando Dios, Union 2, and Critino N. Canada Alto, Holguin Province, Cuba
Soil type: gleyey vertisol (calciustert) and fersialitic (inceptisol)
Cane type: ratoon
Experimental design: This study is one of several conducted in 2007 to discover the effectiveness of Vitazyme to increase sugar cane yield in the Holguin area of Cuba. Few details of the study are known except that the fields were large, in commercial production areas.

1. Control **2. Vitazyme**

Fertilization: according to recommendations
Vitazyme application: two, at 1 liter/ha each time
Yield results:

Treatment	Area	Total production	Area production	Change
	ha	MT	MT/ha	MT/ha
Control	26.8	1,261.3	47.0	—
Vitazyme	84.7	5,720.8	67.5	20.5 (+44%)

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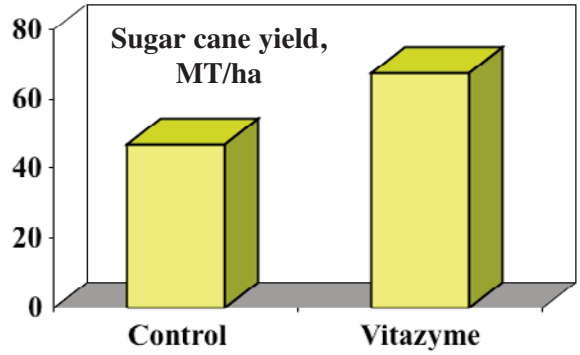

Increase in cane yield: 44%

Conclusions: In this commercial-scale Vitazyme trial in Holguin Province, Cuba, the increase in production was a very high 44% above the control. This result is included in the 2007 summary of Cuban demonstration trials on sugar cane, and continues to show the remarkable results that have been obtained with Vitazyme on

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(903) 845-2163 FAX: (903) 845-2262

2007 Crop Results

Vitazyme on Sugar Cane

Researcher: Roberto Alvarez, Deputy Director
Location: Antonio Rojas Cooperative Farm, Hector Molina Sugar Enterprise, Cuba
Variety: CP52-43 *Field*: Field 16, Block 201
Crop type: ratoon *Watering*: rain-fed
Experimental design: A production field of 8.27 ha was treated with Vitazyme to determine the effect on sugar yield compared to the expected yield.

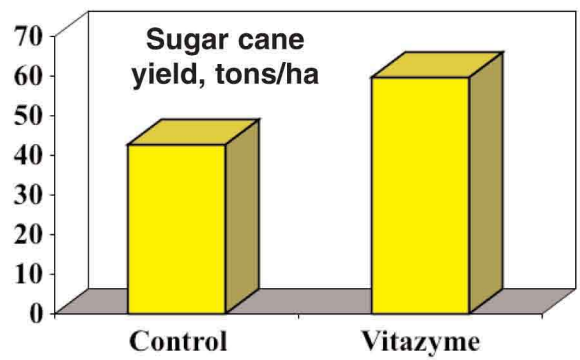
1. Control **2. Vitazyme**

Fertilization: unknown
Vitazyme application: 1.5 liters/ha twice (timing unknown)
Yield results: The harvest date was February 6 to 9, 2007.

Treatment	Yield	Change
	---------- tons/ha	----------
Control	42.80*	—
Vitazyme	59.55	16.75 (+39%)

*Estimate for the untreated field.

Increase in sugar cane yield: 39%



Conclusions: In this Cuban sugar cane trial, Vitazyme enhanced yield 39% above the expected control (untreated) yield, based on field records. Even though this field was scheduled for plowing and replanting, because of the excellent yield it will be used again. The yield increase was due to "much greater than expected growth in the Vitazyme treated fields than the controls, from the September estimates to the actual harvest in February."

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

2006 Crop Results

Vitazyme on Sugar Cane

Researchers: Ramon Gonzalez Diaz, Miguel Angel Same Deli, Eng. Alberto Suarez, Eng. Alfredo Perez Naranjo, Eng. Dailin Rodriguez Tarse, and Eng. Iraida Cabrero Chacon

Location: Calderon Farm, Dos Rios Sugar Enterprise, Palma Soriano Municipality, Santiago de Cuba Province, Cuba

Varieties: C87-51 and C1051-73 *Soil type*: Cambisol *Crop cycle*: first, second, and third ratoon

Experimental design: Preliminary results of this study are reported in the 2005 edition of *Vitazyme Field Trial Results*. This experiment on large-scale fields was designed to further ascertain the efficacy of Vitazyme to enhance sugar yields on Cuban soils. Three different blocks were utilized to test effects on first, second, and third ratoon cane. The fields were divided, and part was treated with Vitazyme and part left for a control.

1. Control **2. Vitazyme**

Fertilization: according to recommendations of the Fertilizer and Amendment Recommendation Service for ratoon cane on Cambisol soils; 60 to 80 kg of nitrogen per hectare

Vitazyme application: one 1 liter/ha application for C87-51 on the first and second ratoon cane, and two 1 liter/ha applications for C1051-73 on third ratoon cane, banded over the cane rows. The first applications were made July 5 to 12, 2004, and the second application on August 6, 2004.

Harvest date: unknown

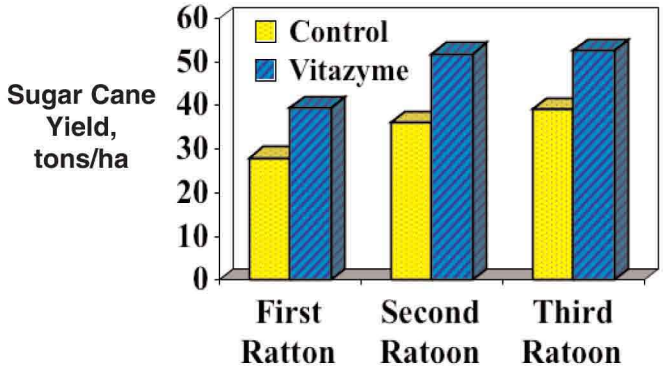
Yield results:

Block	Field	Area	Variety	Ratoon	Cane yield		
					Control	Vitazyme	Change
					---------- kg/ha ----------		
12	4, 5	12.06	C87-51	first	28.05	39.41	11.36 (+40%)
75	1, 2	15.78	C87-51	second	36.10	51.78	15.68 (+43%)
8	1, 2	7.52	C1051-73	third	39.22	52.58	13.36 (+34%)

Increase in first ratoon cane (1 liter/ha Vitazyme): 40%

Increase in second ratoon cane (1 liter/ha Vitazyme): 43%

Increase in third ratoon cane (2 liters/ha Vitazyme): 34%



Conclusions: For all three varieties of sugar cane at different ratoon stages in this Cuban trial, Vitazyme at either one or two applications produced excellent yield increases of from 34 to 43% above the control. These large sugar cane increases reveal the marked ability of this product to stimulate additional carbon fixation above usual levels in Cuban sugar cane management programs, and also illustrate how Vitazyme can improve nitrogen use efficiency, plus the more efficient use of other soil nutrients.

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2006 Crop Results

Vitazyme on Sugar Cane

Researchers: Alberto Torres and Hector Molina *Research organization*: Hector Molinas Sugar Enterprise, Capitan Alberto Torres Agricultural Production Cooperative, Cuba
Location: Cuba *Varities*: C323-68, C86-12 *Cane type*: ratoon
Fertilization: unknown *Soil type*: red ferralitic (eutrustox) and alluvial (vert-haptic phaeozen)
Experimental design: Large-scale field trials were conducted on several fields of sugar cane to evaluate the effects of Vitazyme on sugar production. Treatments were not replicated, but comparisons were made with paired fields.

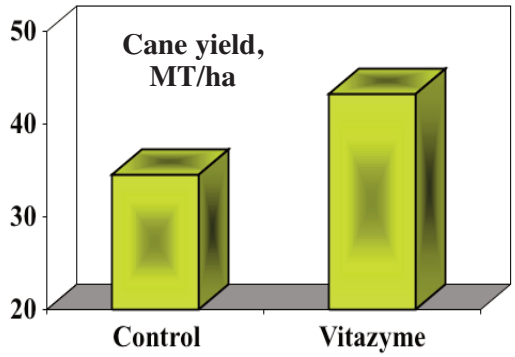
1. Control **2. Vitazyme**

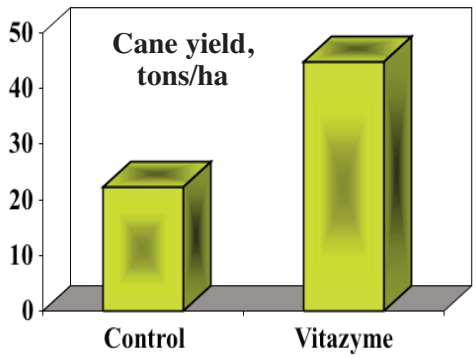
Tests On Red Ferralitic Soils

Treatment	Location	Cultivar	Yield	Change
	block/field		MT/ha	MT/ha
Control	5202/15	C323-68	34.6	—
Vitazyme[1]	5202/16	C323-68	43.3	8.7 (+25%)

[1]Three applications at 1 liter/ha each time.

Increase in cane yield with Vitazyme: 25%





Treatment	Location	Cultivar	Yield	Change	Ratoon Cycle
	block/field		MT/ha	MT/ha	
Control	5301/21	C323-68	22.4	—	4
Vitazyme[1]	5301/19	C323-68	44.7	22.3 (+100%)	13

[1]Two applications at 1.5 liters/ha each time.

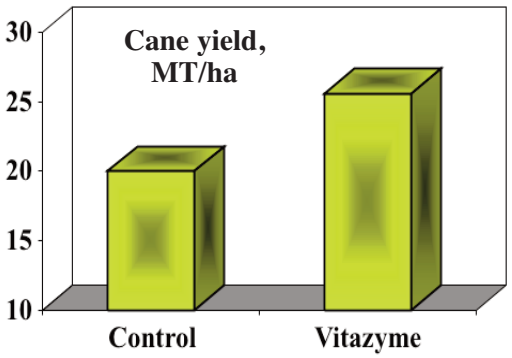
Increase in cane yield with Vitazyme: 100%

NOTE: The control treatment was in its fourth growth cycle, whereas the Vitazyme treatment was in its 13th. In spite of the usual yield reduction with long-term ratoon production, Vitazyme boosted the yield far above the four-cycle field.

Tests On Alluvial Soils

Treatment	Location	Cultivar	Yield	Change
	block/field		MT/ha	MT/ha
Control	5304/17	C86-12	20.6	
	5304/21	C86-12	13.4	
	5304/22	C86-12	26.0	
		Average	20.0	——
Vitazyme[1]	5304/15	C86-12	24.2	
	5304/19	C86-12	25.1	
	5304/20	C86-12	27.4	
		Average	25.6	5.6 (+28%)

[1]Two applications at 1.5 liters/ha each time.



Increase in cane yield with Vitazyme: 28%

Conclusions: In this Cuban sugar cane study, Vitazyme initiated excellent cane yield responses in both the red ferralitic and the alluvial soils, but especially in the red ferralitic soils. Of note is the fact that Vitazyme, at two applications of 1.5 liters/ha, prompted a doubling of cane yield with a very mature 13-cycle ratoon cane stand when compared to a nearby cane stand in only its fourth cycle. This response was greater than for any other comparison in this study. Responses to Vitazyme ranged from 25 to 100% in increased cane yield with 3 liters/ha total application, showing that the product is highly effective for improving sugar cane production

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

2005 Crop Results

Vitazyme on Sugar Cane

Preliminary Results On Large-Scale Field Trials

Researcher: Dr. Isel Creach
Soil type: Cambisol (Eutropept)
Row spacing: 1.6 meters
Location: Calderon Cooperation Farm, Blocks 14, 12, 75, and 8
Farm: Dos Rios, Palma Soriano, Santiago de Cuba, Cuba
Variety: C8612, C87-51, C87-51, and C1051
Previous crop: sugar cane, all harvested between February and April of 2003
Experimental design: Four sugar cane fields — a new planting (Block 14, Field 1), first ratoon (Block 12, Fields 4 and 5), second ratoon (Block 75, Fields 1 and 2), and third ratoon (Block 8, Fields 1 and 2) — were divided into Vitazyme treated and control areas to evaluate the product's effects in large scale field situations.

1. Control **2. Vitazyme**

Fertilization: according to SERFE (Fertilizer Service) recommendations, or 60 to 80 kg/ha N in ratoon cane; no fertilizer for newly planted cane
Vitazyme application: a Shogun backpack sprayer with a 16 liter capacity and a 300 l/ha spray volume (hollow cone nozzles), having 50% of the area treated in 80 cm bands over the rows. Rate: 1 liter/ha.
Harvest yield estimates: Stalk diameter and length were determined for 10 samples in four plots per treatment. Stalk population counts were made in 10 meters of row in four plots per treatment as well to determine stalks per meter of row. Then all of the stalks in one meter of row were cut, counted, and weighed to determine mean stalk weight. Finally, using stalks per meter and mean stalk weight, with a row spacing of 1.6 meters, the cane yield was determined in metric tons/ha.

New Planting

Variety C8612, planted in June of 2003; age 6 months at measurement; area treated, 8.03 ha

Treatment	Stalk length	Change	Stalk diameter	Change	Stalk population	Population change
	cm	cm	cm	cm	stalks/m	stalks/m
Control	121.9	—	2.54	—	8.8	—
Vitazyme	125.9	4.0 (+3%)	2.82	0.28 (+11%)	12.3	3.5 (+40%)

Increase in stalk length: + 3%

Increase in stalk diameter: + 11%

Increase in stalks/meter: + 40%

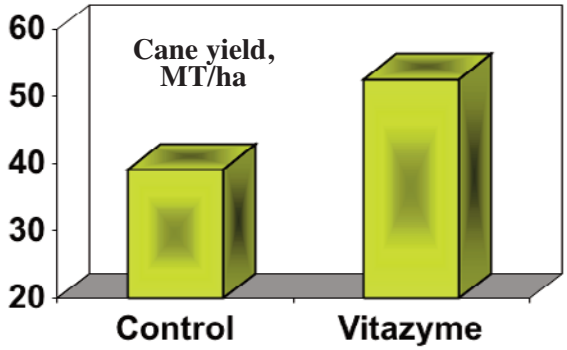
Vitazyme greatly increased new cane growth over the 6-month period of this trial.

First Ratoon

Variety C87-51; area treated, 12.06 ha; one application

Treatment	Stalk length	Length change	Stalk diameter	Diameter change	Stalk population	Population change	Stalk weight	Weight change	Yield	Yield change
	cm	cm	cm	cm	stalks/m	stalks/m	kg	kg	MT/ha	MT/ha
Control	189.2	—	2.23	—	9.03	—	0.69	—	38.94	—
Vitazyme	201.4	12.2 (+6%)	2.33	0.10 (+4%)	9.00	-0.03 (0%)	0.81	0.11 (+16%)	45.56	6.62 (+17%)

Increase in stalk length: + 6%
Increase in stalk diameter: + 4%
Increase in stalk weight: + 16%
Increase in cane yield: + 17%

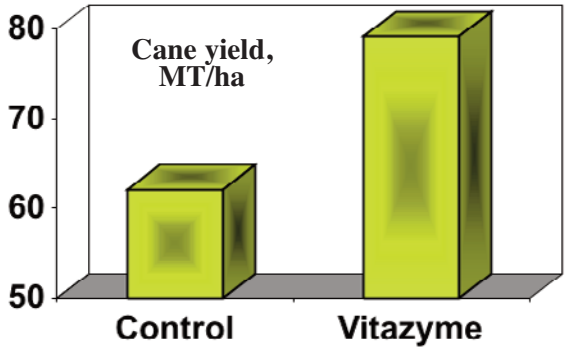


Second Ratoon

Variety C87-51; area treated, 10 ha; one application

Treatment	Stalk length	Length change	Stalk diameter	Diameter change	Stalk population	Population change	Stalk weight	Weight change	Yield	Yield change
	cm	cm	cm	cm	stalks/m	stalks/m	kg	kg	MT/ha	MT/ha
Control	216.2	—	2.33	—	11.83	—	0.84	—	62.11	—
Vitazyme	212.0	-3.8 (-2%)	2.34	0.01 (0%)	12.80	0.97 (+8%)	0.99	0.15 (+18%)	79.22	17.11 (+28%)

Increase in stalk population: + 8%
Increase in stalk weight: + 18%
Increase in cane yield: + 28%

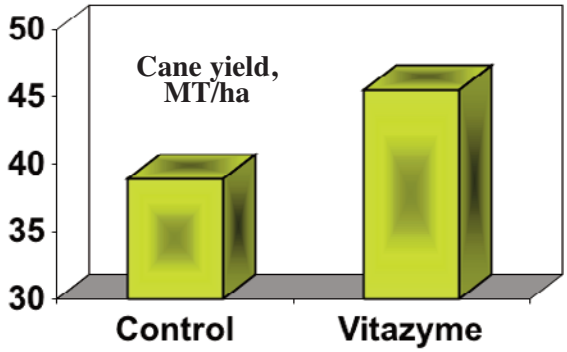


Third Ratoon

Variety C1051; area treated, 7.52 ha; two applications

Treatment	Stalk length	Length change	Stalk diameter	Diameter change	Stalk population	Population change	Stalk weight	Weight change	Yield	Yield change
	cm	cm	cm	cm	stalks/m	stalks/m	kg	kg	MT/ha	MT/ha
Control	170	—	2.51	—	8.15	—	0.77	—	39.22	—
Vitazyme	175	5 (+3%)	2.67	0.16 (+6%)	10.65	2.50 (+31%)	0.79	0.02 (+3%)	52.58	+13.36 (+34%)

Increase in stalk length: + 3%
Increase in stalk diameter: + 6%
Increase in stalk population: + 31%
Increase in stalk weight: + 3%
Increase in cane yield: + 34%



Preliminary results: Vitazyme, at 1 to 2 liters/ha total application, showed great promise in markedly increasing sugar production in these Cuban cane trials. As of the end of 2004, total cane growth and estimated cane yields increased substantially with Vitazyme, the all-important cane yield increasing by 17%, 28%, and 34% for first, second, and third year ratoon cane, respectively. Growth of newly planted cane also revealed excellent responses in stalk diameter and stalk population 6 months after planting and treating with Vitazyme.

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2005 Crop Results

Vitazyme on Sugar Cane

Preliminary Results On Large-Scale Field Trials

Researcher: Dr. Elio Angarica
Location: Calderon Cooperation Farm, Blocks 14, 12, 75, and 8
Soil type: Cambisol (Eutropept)
Farm: Dos Rios, Palma Soriano, Santiago de Cuba, Cuba
Row spacing: 1.6 meters
Variety: C8612, C87-51, C87-51, and C1051
Previous crop: sugar cane, all harvested between February and April of 2003
Experimental design: Four sugar cane fields — a new planting (Block 14, Field 1), first ratoon (Block 12, Fields 4 and 5), second ratoon (Block 75, Fields 1 and 2), and third ratoon (Block 8, Fields 1 and 2) — were divided into Vitazyme treated and control areas to evaluate the product's effects in large scale field situations.

1. Control **2. Vitazyme**

Fertilization: according to SERFE (Fertilizer Service) recommendations, or 60 to 80 kg/ha N in ratoon cane; no fertilizer for newly planted cane
Vitazyme application: a Shogun backpack sprayer with a 16 liter capacity and a 300 l/ha spray volume (hollow cone nozzles), having 50% of the area treated in 80 cm bands over the rows. Rate: 1 liter/ha.
Harvest yield estimates: Stalk diameter and length were determined for 10 samples in four plots per treatment. Stalk population counts were made in 10 meters of row in four plots per treatment as well to determine stalks per meter of row. Then all of the stalks in one meter of row were cut, counted, and weighed to determine mean stalk weight. Finally, using stalks per meter and mean stalk weight, with a row spacing of 1.6 meters, the cane yield was determined in metric tons/ha.

New Planting

Variety C8612, planted in June of 2003; age 6 months at measurement; area treated, 8.03 ha

Treatment	Stalk length	Change	Stalk diameter	Change	Stalk population	Population change
	cm	cm	cm	cm	stalks/m	stalks/m
Control	121.9	—	2.54	—	8.8	—
Vitazyme	125.9	4.0 (+3%)	2.82	0.28 (+11%)	12.3	3.5 (+40%)

Increase in stalk length: + 3%

Increase in stalk diameter: + 11%

Increase in stalks/meter: + 40%

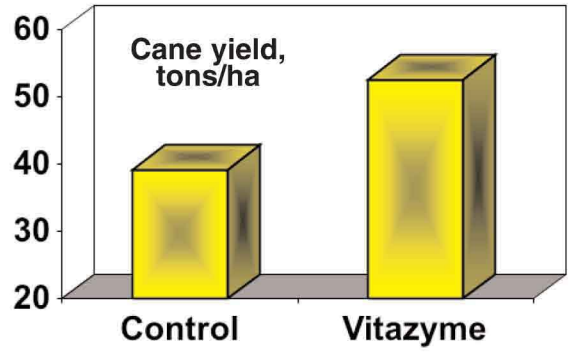
Vitazyme greatly increased new cane growth over the 6-month period of this trial.

First Ratoon

Variety C87-51; area treated, 12.06 ha; one application

Treatment	Stalk length	Length change	Stalk diameter	Diameter change	Stalk population	Population change	Stalk weight	Weight change	Yield	Yield change
	cm	cm	cm	cm	stalks/m	stalks/m	kg	kg	tons/ha	tons/ha
Control	189.2	—	2.23	—	9.03	—	0.69	—	38.94	—
Vitazyme	201.4	12.2 (+6%)	2.33	0.10 (+4%)	9.00	-0.03 (0%)	0.81	0.11 (+16%)	45.56	6.62 (+17%)

Increase in stalk length: + 6%
Increase in stalk diameter: + 4%
Increase in stalk weight: + 16%
Increase in cane yield: + 17%

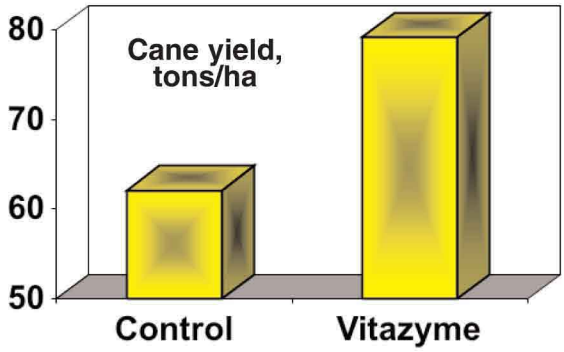


Second Ratoon

Variety C87-51; area treated, 10 ha; one application

Treatment	Stalk length	Length change	Stalk diameter	Diameter change	Stalk population	Population change	Stalk weight	Weight change	Yield	Yield change
	cm	cm	cm	cm	stalks/m	stalks/m	kg	kg	tons/ha	tons/ha
Control	216.2	—	2.33	—	11.83	—	0.84	—	62.11	—
Vitazyme	212.0	-3.8 (-2%)	2.34	0.01 (0%)	12.80	0.97 (+8%)	0.99	0.15 (+18%)	79.22	17.11 (+28%)

Increase in stalk population: + 8%
Increase in stalk weight: + 18%
Increase in cane yield: + 28%

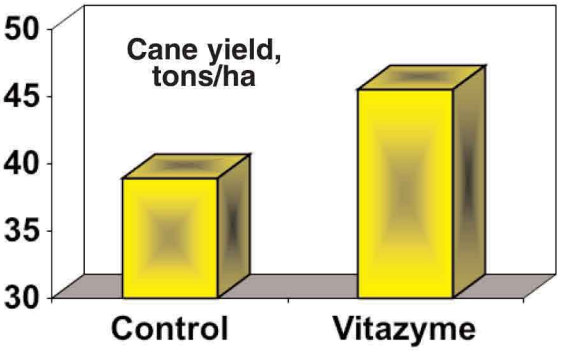


Third Ratoon

Variety C1051; area treated, 7.52 ha; two applications

Treatment	Stalk length	Length change	Stalk diameter	Diameter change	Stalk population	Population change	Stalk weight	Weight change	Yield	Yield change
	cm	cm	cm	cm	stalks/m	stalks/m	kg	kg	tons/ha	tons/ha
Control	170	—	2.51	—	8.15	—	0.77	—	39.22	—
Vitazyme	175	5 (+3%)	2.67	0.16 (+6%)	10.65	2.50 (+31%)	0.79	0.02 (+3%)	52.58	+13.36 (+34%)

Increase in stalk length: + 3%
Increase in stalk diameter: + 6%
Increase in stalk population: + 31%
Increase in stalk weight: + 3%
Increase in cane yield: + 34%



Preliminary results: Vitazyme, at 1 to 2 liters/ha total application, showed great promise in markedly increasing sugar production in these Cuban cane trials. As of the end of 2004, total cane growth and estimated cane yields increased substantially with Vitazyme, the all-important cane yield increasing by 17%, 28%, and 34% for first, second, and third year ratoon cane, respectively. Growth of newly planted cane also revealed excellent responses in stalk diameter and stalk population 6 months after planting and treating with Vitazyme.

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

2005 Crop Results

Vitazyme on Sugar Cane

Researchers: Monsana, Viteri, and Monserrate
Chief supervisor: Ing. Oscar Nuñez
Location: Marcelino Matidueña, Province of Guayas, Ecuador
Variety: *Sachrum officinarum*
Soil type: clayey

Experimental design: A uniform soil area was selected alongside a water channel, where six rows were treated with Vitazyme and Stimplex seaweed to determine effects on sugarcane seed piece germination and growth.

1. Control **2. Vitazyme + Stimplex treatment of seed pieces**

Fertilization: none

Vitazyme and Stimplex application: Seed pieces were immersed before planting in a solution of 1 liter of Vitazyme and 1 liter of Stimplex in 100 liters of water.

Tiller numbers and height:

Treatment	Total seed pieces	Meters of row[1]	Shoots, Oct. 1[2]	Shoots per seed	Shoots, Oct. 18[3]	Shoots per seed	Shoots per meter of row	Average height, cm
		m						
Control	1,239	110	505	0.41	845	0.69	7.67	23.2
Vitazyme	938	96	580	0.62	949	1.01	9.97	26.0

[1]Four rows for each treatment were measured and totalled.
[2]Thirty days after planting.
[3]Forty-five days after planting.

Changes with Vitazyme + Stimplex

Increase in shoots/seed at 30 days: +51%
Increase in shoots/seed at 45 days: +46%
Increase in shoots/meter of row: +30%
Increase in shoot height: +12%

Shoot structure: Vitazyme + Stimplex produced many more secondary tillers per seed piece than did the control, and the leaves were of a stronger, more vital nature.

Conclusions: Vitazyme + Stimplex applied to the sugar cane seed pieces before planting resulted in a marked increase in tiller germination and vigor. The number of shoots per seed piece increased by 46% above the control at 45 days after planting, and shoots per meter of row by 30%. Treated shoot height also was 12% greater than the control, and the shoots were stronger with wider leaves.

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

2004 Crop Results

Vitazyme on Sugar Cane

Researcher: Eng. Fidel Hernandez *Location*: Espana Rep. Estate, Mantanzas Province, Cuba
Variety: Matanzas C323-68 *Type*: ratoon *Soil type*: Eutrustox (Ferralsol)
Experimental design: A 0.3 ha plot containing three replicates was established to evaluate the effects of Vitazyme and reduced fertilizer on sugar cane yield and sugar content. Three treatments were used.

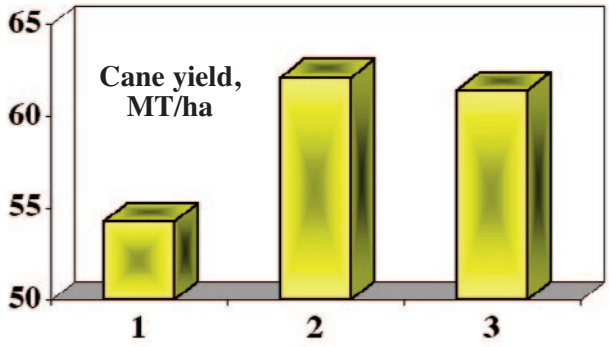
Treatment	Vitazyme	Fertilizer
1	0	100%
2	1 liter/ha x 3	100%
3	1 liter/ha x 5	75%

Fertilization: Fertilizer was applied at 100 or 75% of recommended rates to all treatments (100%: 130 kg/ha N, 100 kg/ha K_2O; 75%: 97.5 kg/ha N, 75 kg/ha K_2O).
Vitazyme application: 1 liter/ha three times broadcast monthly from the last harvest for Treatment 2, and five times for Treatment 3
Growth results:

Cane Yield

Treatment	Cane yield	Change vs. control
	MT/ha	MT/ha
1 (Control)	54.27	—
2 (100% fert. + 3x Vita.)	62.09	7.82 (+14%)
3 (75% fert. + 5x Vita.)	61.38	7.11 (+13%)

Cane yield increase: 13 to 14%

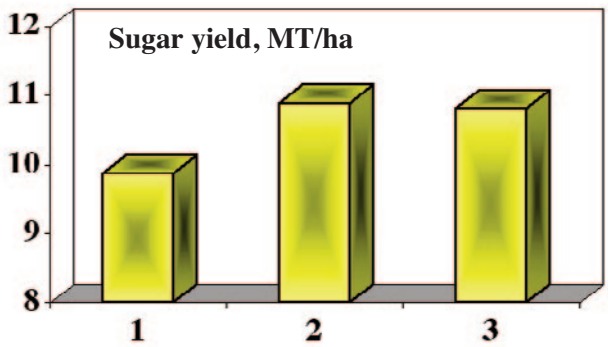


Sugar Yield

Treatment	Sugar yield*	Change vs. control
	MT/ha	MT/ha
1 (Control)	9.87 a	—
2 (100% fert. + 3x Vita.)	10.89 b	1.02 (+10%)
3 (75% fert. + 5x Vita.)	10.81 b	0.94 (+10%)

*Means followed by the same letter are not significantly different.
Standard error = 1.25 MT/ha

Sugar yield increase: 10%



Conclusions: The total cane yield was increased about the same (13 to 14%) by Vitazyme at either 100% or 75% fertilizer. This fact demonstrates that Vitazyme will enhance yields as well under reduced fertilizer regimes as under full fertilizer regimes: the 75% fertilizer treatment + Vitazyme applied five times gave about the same increase as did the 100% fertilizer treatment + Vitazyme applied three times. The sugar yield increase was about 10% for both of the Vitazyme treatments. **These increases show that Vitazyme is an excellent supplement for sugar cane production in Cuba in red Eutrustox or Ferralsol soils, especially since it reveals the potential to achieve high yields while reducing fertilizer use.**

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2004 Crop Results

Vitazyme on Sugar Cane

Researcher: Dr. Isel Creach *Location*: Santiago de Cuba, Cuba *Variety*: C89-147
Type: ratoon *Soil type*: Leptic haplustert
Experimental design: Four treatments were applied to a Latin square design, having four replicates of 64m^2, to evaluate the effect of Vitazyme on sugar cane yield at normal and 50% recommended N applications.

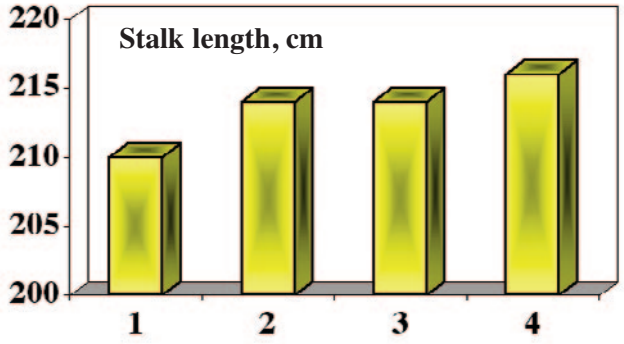
Treatment	Vitazyme	Nitrogen
1	0	0 (0%)
2	0	75 kg/ha N (100%)
3	1 liter/ha x 3	37.5 kg/ha N (50%)
4	1 liter/ha x 3	75 kg/ha N (100%)

Fertilization: Nitrogen was applied at 75 kg/ha for Treatments 2 and 4, and at 37.5 kg/ha for Treatment 3. The control (Treatment 1) received no fertilizer, as recommended for the crop cycle and soil of this study.
Vitazyme application: 1 liter/ha three times, monthly from the last harvest, for Treatments 3 and 4
Growth results:

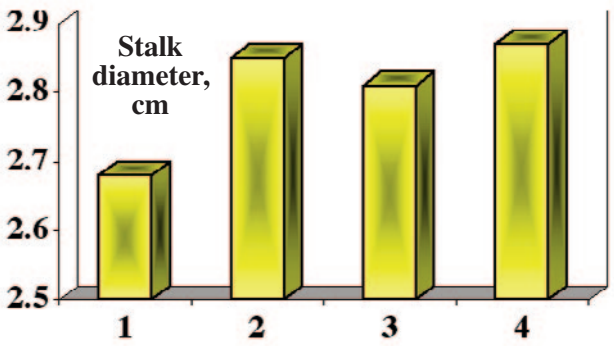
Stalk Length

Treatment	Stalk length	Change vs. Control vs. Trt. 1	Change vs. Control vs. Trt. 2
	cm	cm	cm
1 (Control)	210	—	—
2 (100% N)	214	4 (+2%)	—
3 (50% N + Vita.)	214	4 (+2%)	0
4 (100% N + Vita.)	216	6 (+3%)	2 (+1%)

Increase with Vitazyme: 1 to 3%



Stalk Diameter



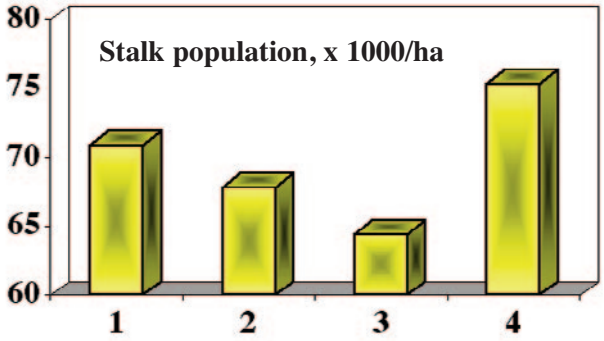
Treatment	Stalk diameter	Change vs. Control vs. Trt. 1	Change vs. Control vs. Trt. 2
	cm	cm	cm
1 (Control)	2.68	—	—
2 (100% N)	2.85	0.17 (+6%)	—
3 (50% N + Vita.)	2.81	0.13 (+5%)	(-) 0.04 (-1%)
4 (100% N + Vita.)	2.87	0.19 (+7%)	0.02 (+1%)

Increase with Vitazyme: 1 to 7%

Stalk Population

Treatment	Stalk diameter	Change vs. Control vs. Trt. 1	Change vs. Control vs. Trt. 2
	x 1000/ha	x 1000/ha	x 1000/ha
1 (Control)	70.9	—	—
2 (100% N)	67.8	(-)3.1 (-4%)	—
3 (50% N + Vita.)	64.4	(-)6.5 (-9%)	(-)3.4 (-5%)
4 (100% N + Vita.)	75.3	4.4 (+6%)	7.5 (+11%)

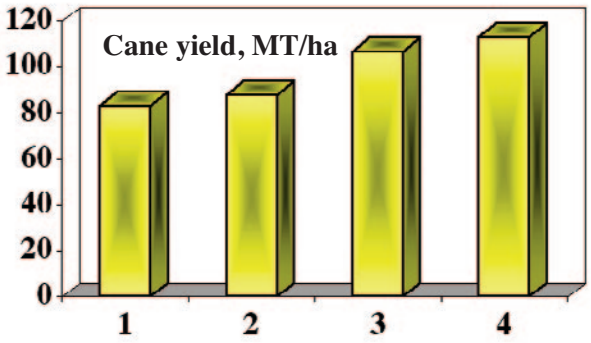
Change with Vitazyme: -9 to +11%



Vitazyme increased stalk length and diameter in most cases compared to the no nitrogen control, though stalk population was increased only by the 100% N + Vitazyme treatment (Treatment 4). Compared to the 100% N control, Vitazyme + 100% N increased stalk length (+1%), stalk diameter (+1%), and stalk population (+11%), while the 50% N + Vitazyme treatment (Treatment 3) improved none of these sugar cane growth parameters vs. Treatment 2, even though yield was significantly increased above it, as will be noted in the following analyses.

Yield and quality results:

Cane Yield



Treatment	Cane yield*	Change vs. Control vs. Trt. 1	Change vs. Control vs. Trt. 2
	MT/ha	MT/ha	MT/ha
1 (Control)	82.99 b	—	—
2 (100% N)	87.70 b	4.71 (+6%)	—
3 (50% N + Vita.)	106.66 ab	23.67 (+29%)	18.96 (+22%)
4 (100% N + Vita.)	112.89 a	29.90 (+36%)	25.19 (+30%)

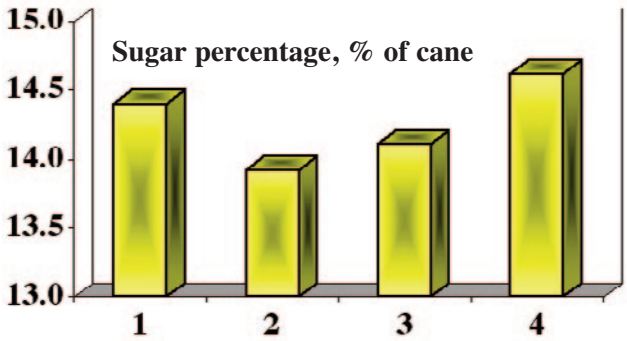
*Means followed by the same letter are not significantly different.
Standard error = 4.59 MT/ha

Increase with Vitazyme: 22 to 36%

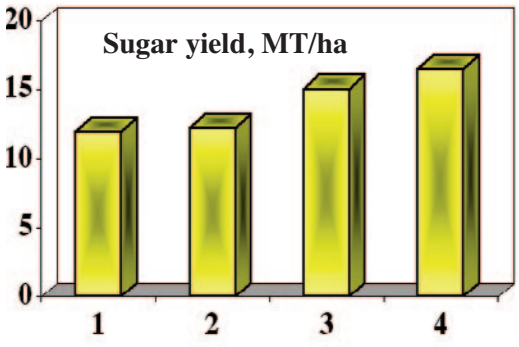
Sugar Percentage

Treatment	Stalk diameter	Change vs. Control vs. Trt. 1	Change vs. Control vs. Trt. 2
	%	%	%
1 (Control)	14.40	—	—
2 (100% N)	13.92	(-)0.48 (-3%)	—
3 (50% N + Vita.)	14.11	(-)0.29 (-2%)	0.19 (+1%)
4 (100% N + Vita.)	14.62	0.22 (+2%)	0.70 (+5%)

Change with Vitazyme: -2 to +5%



Sugar Yield



Treatment	Cane yield	Sugar yield*	Change vs. Control vs. Trt. 1	Change vs. Control vs. Trt. 2
	MT/ha	MT/ha	MT/ha	
t/ha				
1 (Control)	82.99 b	11.95 c	—	—
2 (100% N)	87.70 b	12.21 c	0.26 (+2%)	—
3 (50% N + Vita.)	106.66 ab	15.05 b	3.10 (+26%)	2.84 (+23%)
4 (100% N + Vita.)	112.89 a	16.50 a	4.55 (+38%)	4.29 (+35%)

*Means followed by the same letter are not significantly different. Standard error (sugar yield) = 0.53 t/ha; standard error (cane yield) = 4.59 t/ha.

Increase with Vitazyme: 23 to 38%

Sugar cane yield was significantly increased above both the no N control and the 100% N control by Vitazyme, by from 29 to 36%. Compared to the 100% N control, Vitazyme significantly boosted total yield at the 100% N level (29%), and almost at the 50% N level as well (22%). Sugar percentage of the cane was not significantly affected.

The all-important sugar yield was boosted by a highly significant 38% (4.55 tons/ha) by Vitazyme + 100% N above the no N control, and by 35% (4.29 MT/ha) above the 100% N control. **The 50% N + Vitazyme treatment (Treatment 3) increased the sugar yield a substantial 23% above the 100% N control, representing a savings in nitrogen fertilizer while at the same time increasing sugar yield.**

Economic calculations by the Cuban researchers: The three Vitazyme treatments, plus the control treatment, were evaluated for income using two sugar prices. The results are shown below.

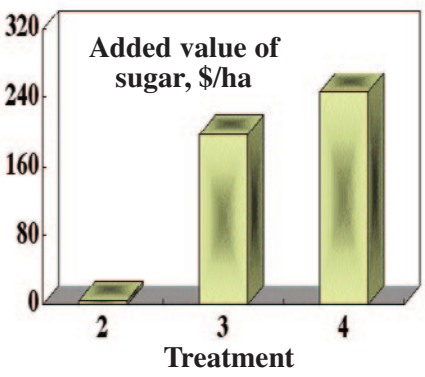
Treatment	Cumulative Vitazyme rate	Cane yield	Increased cane yield	Sugar yield	Sugar increase[1]	Extra cost of production	Added value of sugar at[2] ... $0.06/lb	Added value of sugar at ... $0.07/lb	Added income of sugar at ... $0.06/lb	Added income of sugar at ... $0.07/lb
	l/ha	MT/ha	MT/ha	MT/ha	MT/ha	$/ha	$/ha	$/ha	$/ha	$/ha
1 (no N)	0	82.99	—	9.13	—	—	—	—	—	—
2 (100% N)	0	87.70	4.71	9.65	0.52	63.61	**68.74**	**80.24**	**5.13**	**16.63**
3 (50% N)	3	106.66	23.67	11.73	2.60	146.41	**343.72**	**401.18**	**197.31**	**254.77**
4 (100% N)	3	112.89	29.90	12.42	3.29	187.77	**434.94**	**507.65**	**247.17**	**319.88**

[1] At 11% recoverable sugar of the cane yield.

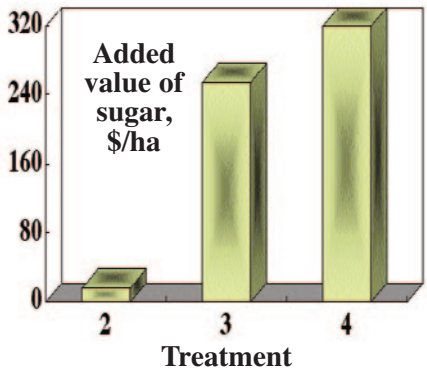
[2] Sugar values are $132.20/MT (for $0.06/lb) and $154.30/MT (for $0.07/lb).

Added Value of Sugar from Vitazyme Use

At $0.06/lb



At $0.07/lb



Treatment	Extra cost per dollar of added sugar ... at $0.06/lb	at $0.07/lb
	$/lb	$/lb
1 (no N)	—	—
2 (100% N)	0.92	0.79
3 (50% N)	0.43	0.37
4 (100% N)	0.43	0.37

Treatments 3 and 4 both gave excellent returns on investment, with only $0.43/lb extra cost per dollar of added sugar (at $0.06/lb), and $0.37 extra cost per dollar of added sugar (at $0.07/lb). Treatment 3 was especially of interest because it received only 50% of the recommended nitrogen along with

Vitazyme, but still produced added returns as high as did the 100% nitrogen plus Vitazyme treatment.
Conclusions: **In this Cuban sugar cane trial, Vitazyme applied three times during the growing season substantially and significantly improved the growth, cane yield, and sugar yield versus both the no N control and the 100% N control.** The sugar yield was improved by a highly significant 35% above the 100% N level with Vitazyme applied at the same N level. **Only 50% N + Vitazyme also increased yield above the 100% N, by 23%, showing how effective both Vitazyme + standard fertilization, and Vitazyme along with reduced fertilizer, are in promoting more profitable sugar production in Cuba on haplustert or calcaric-eutric vertisol soils, for a ratoon sugar cane crop.**

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

2004 Crop Results

Vitazyme on Sugar Cane

Researcher: Dr. Isel Creach *Location*: Santiago de Cuba, Cuba *Variety*: C86-12
Type: new planting *Soil type*: Haplustert *Row spacing*: 1.6 meters
Experimental design: A sugar cane trial having four replicates in a Latin rectangle of 64 m^2 was established to evaluate the growth and yield of this crop in response to various Vitazyme applications. Fertility was used as recommended for newly planted cane. Twelve treatments were used.

	Vitazyme			
Treatment	**Rate**	**Applications**	**Cumulative dosage**	**Placement**
	l/ha		l/ha	
1	0	0	0	—
2	0.5	3	1.5	broadcast
3	0.5	3	1.5	band
4	0.5	5	2.5	broadcast
5	0.5	5	2.5	band
6	1	3	3	broadcast
7	1	3	3	band
8	1	5	5	broadcast
9	1	5	5	band
10	1% + 1*	2	soak + 2	broadcast
11	2.5% +1*	2	soak + 2	broadcast
12	5% + 1*	2	soak + 2	broadcast

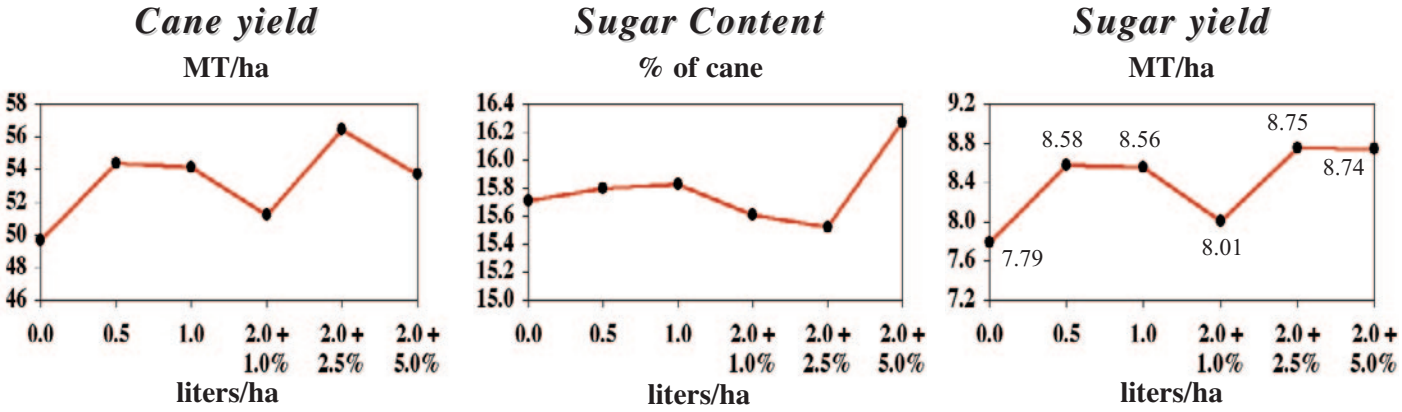
*Cane sets were soaked in the indicated solutions (v/v) for 5 minutes before planting.

Fertilization: None was needed in the plant cane cycle investigated, and in the soil type utilized, as recommended in Cuba for newly planted cane.
Vitazyme application: 1 liter/ha (13 oz/acre) monthly from planting
Individual treatment growth and yield results: The results for individual treatments for both growth and yield parameters showed that Vitazyme treatments, in all but one case, exceeded the control. Highest treatment values for sugar yield were as follows:

Treatment	**Cane yield**	**Sugar yield**	**Sugar increase vs. control**
	MT/ha	MT/ha	MT/ha
6	58.31 (+18%)	9.25	1.46 (+19%)
8	57.81 (+17%)	9.13	1.34 (+17%)
5	55.79 (+12%)	9.00	1.21 (+16%)
3	57.22 (+15%)	8.79	1.00 (+13%)
11	56.44 (+14%)	8.75	0.96 (+12%)

Growth and yield trends: An analysis was made of growth and yield parameters to display the trends of these parameters in this study.

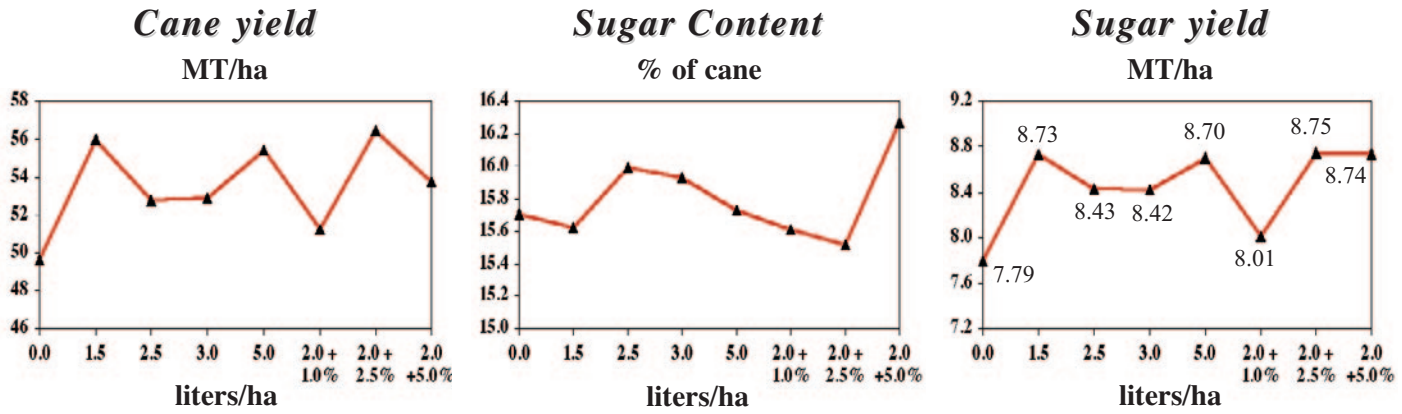
Rate of Vitazyme



Vitazyme in all cases raised cane and sugar yields, Both the 2.5 and 5.0% soaks plus two applications gave the best sugar increases.

- Sugar yield increase at 0.5 liter/ha — 0.79 MT/ha (+10%)
- Sugar yield increase at 1.0 liter/ha — 0.77 MT/ha (+10%)
- Sugar yield increase at 2 liters/ha + a 1.0% soak — 0.22 MT/ha (+3%)
- Sugar yield increase at 2 liters/ha + a 2.5% soak — 0.96 ton/ha (+12%)
- Sugar yield increase at 2 liters/ha + a 5.0% soak — 0.95 ton/ha (+12%)

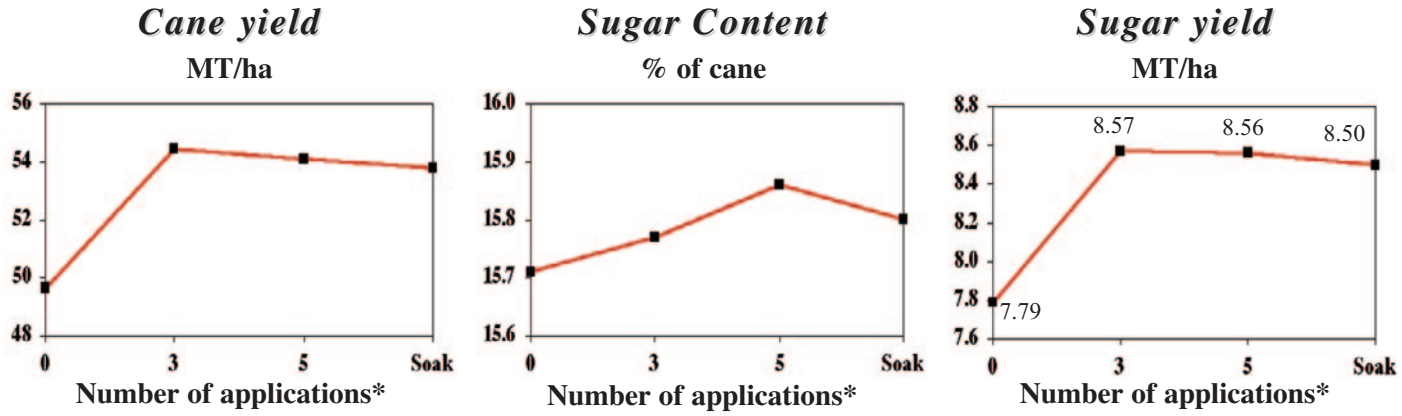
Cumulative Vitazyme Application



All Vitazyme cumulative applications increased sugar and cane yields, the highest increases being for 1.5, 5, and 2 liters/ha (with 2.5 and 5.0% soaks). Sugar content of the cane was affected little except for the 2 liter/ha + 5.0% soak, which boosted sugar to 16.27% of the cane.

- Sugar yield increase at 1.5 liters/ha — 0.94 MT/ha (+12%)
- Sugar yield increase at 2.5 liters/ha — 0.64 MT/ha (+8%)
- Sugar yield increase at 3 liters/ha — 0.63 MT/ha (+8%)
- Sugar yield increase at 5 liters/ha — 0.91 MT/ha (+12%)
- Sugar yield increase at 2 liters/ha + a 1.0% soak — 0.22 MT/ha (+3%)
- Sugar yield increase at 2 liters/ha + a 2.5% soak — 0.96 MT/ha (+12%)
- Sugar yield increase at 2 liters/ha + a 5.0% soak — 0.95 MT/ha (+12%)

Number of Vitazyme Applications



* The soak had two applications as well.

Vitazyme in every case increased cane yield and sugar yield. The sugar increase was uniform for all three applications, as was the sugar content of the cane.

- Sugar yield increase with three applications — 0.78 MT/ha (+10%)
- Sugar yield increase with five applications — 0.77 MT/ha (+10%)
- Sugar yield increase with a seed piece soak plus two applications — 0.71 MT/ha (+9%)

Economic calculations by the Cuban researchers: Six treatments, including the control, were evaluated for income using two sugar prices. The five Vitazyme treatments used in these calculations are those listed previously.

Treatment	Cumulative Vitazyme rate	Cane yield[1]	Increased cane yield	Sugar yield[2]	Sugar increase	Extra cost of production	Added value of sugar at[3] ...		Added income of sugar at ...	
							$0.06/lb	$0.07/lb	$0.06/lb	$0.07/lb
	l/ha	MT/ha	MT/ha	MT/ha	MT/ha	$/ha	$/ha	$/ha	$/ha	$/ha
1	0	49.64b	—	6.23	—	—	—	—	—	—
6	3	58.31a	8.67	7.40	1.17	66.35	**154.67**	**180.53**	**88.32**	**114.18**
8	5	57.81a	8.17	7.30	1.07	88.60	**141.45**	**165.10**	**52.85**	**76.50**
5	2.5	55.79ab	6.15	7.20	0.97	61.53	**128.23**	**149.67**	**66.70**	**88.14**
3	1.5	57.22a	7.58	7.03	0.80	50.53	**105.76**	**123.44**	**55.23**	**72.91**
11	4.5	56.44ab	6.80	7.00	0.77	75.80	**101.79**	**118.81**	**25.99**	**43.01**

[1] Means followed by the same letter are not significantly different at P=0.05 according to Duncan's Multiple Range Test.
[2] Sugar yield = Cane yield x % Sugar x 0.80.
[3] Sugar values are $132.20/MT (for $0.06/lb) and $154.30/MT (for $0.07/lb).

Treatment	Extra cost per dollar of added sugar ...	
	at $0.06/lb	at $0.07/lb
	$/lb	$/lb
1	—	—
6	0.43	0.37
8	0.63	0.54
5	0.48	0.41
3	0.48	0.41
11	0.74	0.64

Conclusions: In this Cuban sugar cane study in a new planting, Vitazyme increased the total sugar yield by about 10% for all treatments versus the untreated control. The best overall treatments appeared to be three broadcast applications (1 liter/ha), five broadcast applications (1 liter/ha), and five banded foliar applications (0.5 liter/ha). These were followed closely by the 2.5 or 5.0% five-minute seed piece soaks plus two Vitazyme applications. The most cost-effective treatment is the three broadcast 1 liter/ha foliar applications. Vitazyme is seen to be a very good supplement for improving the growth and yield of newly planted sugar cane in Cuba.