Vital Earth Resources
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2013 Crop Results

Vitazyme on Oil Palm

A Testimonial

MARIA PIEDAD ESTATE
MP1 Oil Palm- Passion Fruit-Cocoa- Fattening Cattle

Santo Domingo, May 26, 2013

Gentlemen
Summer Zone
Quito, Ecuador

From my consideration:

According to your request and for your knowledge I share the results obtained with the use of the following products; Nitro 30, TKO, Pacha Mama, Novaplex, Caltec, Essentlal, Vltazyme, and Companion according to the protocols agreed since 2008.

Oil Palm:
The long-term result has been of sustained color and stable production. The soil maintains its level of elements, very constant, and being totally organic (zero chemicals) for 6 years, the microbial balance, and its nutritional balance are excellent. The pH rose to a level of 6.25 and is holding.

These products are important and their use is positive for the crops I manage. The production achieved with the economic balance of costs is excellent. However, the most outstanding is the recovery of the soil and the elimination of the use of chemical products for sustainable production.

Sincerely,
Rodrigo H. Yépez, Proprietor

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2010 Crop Results

Vitazyme on Oil Palm

A Testimonial

MARIA PIEDAD ESTATE
MP1 Oil Palm, Fattening Cattle - Matamba
MP2 Maracuyá – Monterrey

Santo Domingo, February 16, 2010

Gentlemen
Summer Zone
Quito, Ecuador

From my consideration:

For your knowledge I submit the results obtained after the applications made with the following products: Pacha Mama, Novaplex, Nitro30, Caltec, TKO, Vitazyme, Essential, and Companion in the conditions, regulations and amounts agreed for the oil palm and passion fruit crops, during the period Feb-2008 and Feb-2010.

Oil Palm:
The immediate result was that the plants visually changed in a positive way in about 5 weeks, especially their color, from a light yellowish green to a dark, glossy green. The long-term result has been sustained color and a 20% increase in production. Plants show significant energy.

The soil has maintained a stable level of elements, the natural balance of micro-organisms and bacteria has allowed an almost total reduction of insecticides, the pH has remained stable and has improved to a very efficient level of 6.3. Chemical fertilization has not been necessary.

The use of these products is positive; for the production, the economic part, but above all the recovery of the soil to a more friendly and natural state with the environment.

Sincerely, Rodrigo H. Yépez, Proprietor

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2004 Crop Results

Vitazyme on Oil Palm (Nursery Plants)

Asociacion Nacional de Cultivadores de Palma Africana (ANCUPA)

Researcher: Ing. Francisco Chavez M.
Location: ANCUPA Experimental Station, Santo Domingo, Ecuador
Variety: African oil palm, hybrid cv.
Soil type: unknown
Planting time: 2003

Experimental design: A variety of biostimulant materials were evaluated in an oil palm plantation nursery to evaluate their effects on oil palm seedling rooting, and then their potential to improve early growth and reduce the time to field planting. Only results for Vitazyme will be reported in this summary.

1. Control **2. Vitazyme**

Fertilization: unknown

Vitazyme application: 3 cc per plant, diluted in water, sprayed in a 1 meter radius around the plant at trial initiation in May and June

Root and growth results: During 2003, at initiation of the oil palm seedling study, the oil palm seedlings were analyzed for root number, weight, and percent dry matter. This process was repeated in July and again sometime later.

*Root Weight**

	Root wet weight, g			Root dry weight, g		
Treatment	**Initial**	**Eval. 1**	**Eval. 2**	**Initial**	**Eval. 1**	**Eval. 2**
Vitazyme	72.70	90.90 (+25%)	178.07 (+145%)	23.07	37.25 (+61%)	60.87 (+164%)
	[Eval. 1 vs. Eval. 2 ..... +96%]			[Eval. 1 vs. Eval. 2 ..... +63%]		
Control	61.40	68.90 (+12%)	50.45 (–18%)	17.62	26.85 (+52%)	15.40 (–13%)
	[Eval. 1 vs. Eval. 2 ..... –27%]			[Eval. 1 vs. Eval. 2 ..... –43%]		

*Methodology for this determination is not known.

Overall increase in root wet weight: 145%
Overall increase in root dry weight: 164%

*Root Number**

	Primary root number			Secondary root number			Total Roots	
Treatment	**Initial**	**Eval. 1**	**Eval. 2**	**Initial**	**Eval. 1**	**Eval. 2**	**Initial**	**Eval. 2**
Vitazyme	7.75	10.50 (+35%)	10.00 (+29%)	32.50	69.50 (+114%)	64.75 (+99%)	40.25	74.75 (+86%)
	[Eval. 1 vs. Eval. 2 ..... –5%]			[Eval. 1 vs. Eval. 2 ..... –7%]				
Control	7.50	5.75 (–23%)	4.50 (–40%)	39.00	32.50 (–17%)	30.75 (–21%)	46.50	35.25 (–24%)
	[Eval. 1 vs. Eval. 2 ..... –22%]			[Eval. 1 vs. Eval. 2 ..... –5%]				

*Methodology for this determination is not known.

Increase in primary root number: 29%
Increase in secondary root number: 99%
Overall increase in root number: 86%

Root Dry Matter

Treatment	Dry matter in roots, %		
	Initial	Eval. 1	Eval. 2
Vitazyme	37.73	40.98 (+29%)	57.50 (+81%)
	[Eval. 1 vs. Eval. 2 ..... +40%]		
Control	28.70	38.97 (+36%)	24.50 (–15%)
	[Eval. 1 vs. Eval. 2 ..... –37%]		

Overall increase in root dry matter percentage: 81%

Conclusions: Vitazyme had a profound positive effect on the growth and development of young oil palm plants in this ANCUPA nursery trial in Ecuador. Both wet and dry root weights were increased during both the first and second growth intervals, but especially during the second period. Overall weight increases were 145% (wet) and 164% (dry). The untreated control, on the other hand, actually experienced root weight reductions for the same period, of –18% (wet) and –13% (dry).

Root number responded excellently to Vitazyme as well, especially the smaller, finer, secondary roots. Primary roots increased by 29% over the test period, while secondary roots increased by 99%, giving a total increase of 86%. At the same time, the untreated control lost root numbers, losing 22% of the primary roots and 5% of the secondary roots.

The percentage of dry matter in the roots increased markedly with Vitazyme, rising from 31.73 to 57.50% over the test period, at the same time that the percentage of dry matter in the roots of the untreated control dropped from 28.70% to 24.50%.

Vitazyme is clearly a very effective root growth enhancer for young oil palm plants. Three other treatments among the sixteen in this study also performed quite well, but **Vitazyme was overall the most consistent performer of all products tested.**

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2003 Crop Results

Vitazyme on Oil Palm *(Nursery Stock)*

Nigerian Institute for Oil Palm Research

Researchers: S,N. Utulu, Ph.D., and M.M. Ugbah, Ph.D. *Research Organization*: NIFOR, Benin City, Nigeria *Variety*: oil palm (unknown) *Planting date*: April, 2002
Soil type: Kulfo sand (2.5% clay, 3.0% silt, 94.5% sand) *Pot size*: 30 x 35 cm poly bags
Experimental design: Poly bags were spaced in a 45 x 45 cm pattern in the NIFOR palm nursery, laid out in a 3 x 2 factorial, randomized complete block design having four replicates. Twelve sprouted palm seeds were used for each plot in a 30 plot area. Two fertilizers were used, and shredded bunch refuse was placed on the pot surfaces a day after planting. The treatments were as follows:

Treatment	Nutripak[1]	Rustica[2]	Vitazyme[3]
1	O	O	O
2	O	O	X
3	X	O	O
4	X	O	X
5	O	X	O
6	O	X	X

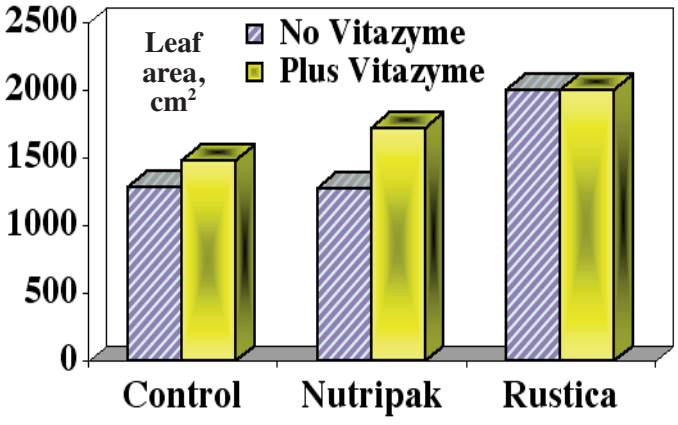
[1]A 3-year time-release packet of 57 g of a 12-4-12 N-P_2O_5-K_2O formulation; applied at pot filling 5 cm below the surface.
[2]A 12-12-17-2 formulation of N-P_2O_5-K_2O-Mg at 42 g per seedling, split equally at 2, 5, and 8 months after planting.
[3]A 0.5 liter per seedling dosage of a dilute solution applied at 0.91 liter/ha at 2 months after planting, and at 1.40 liters at 5 and 8 months after planting. These were made 1 to 2 days after the fertilizer applications.

Fertilizer treatment: see above
Vitazyme application: see above
Growth results: At 2, 6, 9, and 12 months after planting, measurements were made of plant height, leaf number, stem girth, and leaf area. At the termination of the experiment in April of 2003, fresh plant weight and the num-

Leaf Area

Treatment	Leaf area*	Change**
	cm^2	cm^2
1. Control	1291	——
2. Vitazyme only	1486	195 (+15%)
3. Nutripak only	1280	——
4. Nutripak + Vita	1725	445 (+35%)
5. Rustica only	2003	——
6. Rustica + Vita	2008	5(0%)

*Levels of significance arenot known.
**The changes compare a treatment to its appropriate control: Treatment 1 vs 2, 3 vs 4, and 5 vs 6.



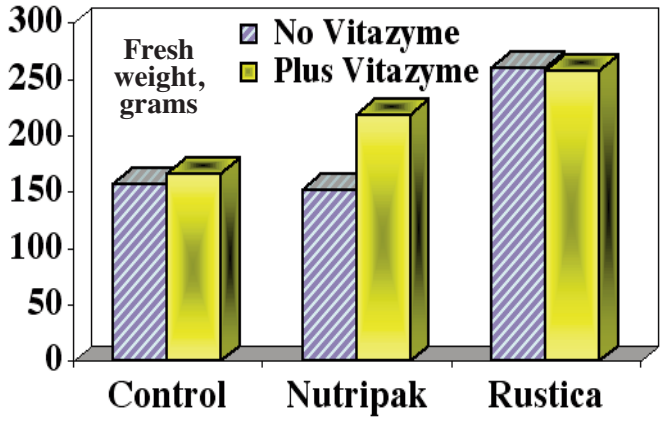
Increase in leaf area of Vitazyme alone: +15%

Increase in leaf area of Vitazyme with Nutripak: +35%

ber of transplantable and surviving seedlings were determined. However, only a portion of the data collected was obtained for this report, so only the data received is reported here.

Vitazyme increased the growth of the leaves considerably compared to the control (+15%) and with Nutripak (+35%). It is likely that these increases are significant. However, Vitazyme did not improve the leaf area of the Rustica (highly soluble) fertilizer for some reason, perhaps because the nutrient levels were already very high and pushing optimum levels.

Plant Fresh Weight



Treatment	Fresh weight*	Change**
	grams	grams
1. Control	157	——
2. Vitazyme only	166	9 (+6%)
3. Nutripak only	152	——
4. Nutripak + Vita	218	66 (+43%)
5. Rustica only	260	——
6. Rustica + Vita	257	-3 (0%)

*Levels of significance arenot known.
**The changes compare a treatment to its appropriate control: Treatment 1 vs 2, 3 vs 4, and 5 vs 6.

Increase in fresh weight of Vitazyme with Nutripak: +43%

Vitazyme likely significantly increased plant fresh weight with Nutripak, though not with no fertilizer or with Rustica highly soluble nutrients.

Conclusions: In this replicated study on oil palm seedlings in Nigeria using two different fertilizers — one slow release (Nutripak) and one rapid release (Rustica) — **Vitazyme interacted very favorably with the slow release Nutripak to increase leaf area by 35% after one year, and to increase plant fresh weight by 43%. Vitazyme alone increased leaf area by 15%, and fresh weight by 6%.** The reasons for not increasing growth parameters with the rapid release Rustica may be due to the sufficiency of nutrients, so that Vitazyme could do little in this small pot environment to make more nutrients available.

According to the researchers, Dr. Utulu and Dr. Ugbah,

"1. Vitazyme boosted the activity of Nutripak and also stimulated the leaf area and fresh weight of seedlings that did not receive Rustica and Nutripak."

"2. Visual scoring for phytotoxicity did not implicate Nutripak or Vitazyme as phytotoxic to the oil palm seedlings."

Vitazyme has been shown in this study to be a highly effective booster of a slow release fertilizer for oil palm seedling growth. It is also very effective to be used by itself as a soil fertility and plant growth booster for the highly weathered tropical soils used in this study.