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**RESPONSES OF *PENNISETUM PURPUREUM* VC. CUBA CT-115 (ELEPHANT GRASS, NAPIER GRASS OR UGANDA GRASS) TO VITAZYME**

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Vitazyme is a growth stimulator and available information points out its positive effect on growth and yield of short-cycle crops. However, there is scarce information available on its use in pasture and forage species. Therefore, the objective was to study its influence on a forage variety (*Pennisetum purpureum* or elephant grass, napier grass or Uganda grass, cv. Cuba CT - 115).

**Effect of Vitazyme on establishment (at planting)**

The study was conducted during the period of establishment, from the moment of planting until the grass was established (135 days after planting).

The experiment was planted on a typical Red Ferrallitic soil. No irrigation or fertilization was used. An experimental layout of completely randomized plots, with 4 replications, was used, with two treatments: a) absolute control, and b) application of 1.5 L / ha Vitazyme at planting.

The dry matter yield and the proportion of leaves were higher ( $P < 0.01$ ) when Vitazyme was applied and the opposite happened in content of dead material, comprising dried leaves (table 1).

**Table 1. Effect of Vitazyme on the establishment of *Pennisetum* Cuba CT-115.**

Treatments	Yields, T DM / ha	Leaves, %	Dead material, %
Control	2.69 <sup>b</sup>	22.12 <sup>b</sup>	15.74 <sup>a</sup>
Vitazyme	3.10 <sup>a</sup>	28.32 <sup>a</sup>	6.93 <sup>b</sup>
St. Er. ±	0.10 **	0.78 **	0.93 **

<sup>ab</sup> Means with a common letter by column do not differ at  $P < 0.05$  (1955 Duncan).

\*\*  $P < 0.01$

**Ways to apply Vitazyme at planting**

The experiment was conducted in similar conditions as that previously described.

Treatments were: a) absolute control, b) application of 1.5 L / ha Vitazyme and planting, c) planting and application of 1.5 L / ha Vitazyme, d) application of 1.5 L / ha at 7 days after planting, e) application of 1.5 L / ha at 14 days after planting and f) application of 1.5 L / ha at 21 days after planting.

The highest dry matter yield and height were reached when Vitazyme was sprayed at the bottom of the furrow, immediately before planting. The leaf content was unchanged (table 2).

**Table 2. Ways to apply Vitazyme at planting.**

Treatments	Yield, g DM/m <sup>2</sup>	Height, cm	Leaves, %
Control	245.0 <sup>bc</sup>	73.6 <sup>b</sup>	23.2
1.5 L / ha + planting	303.2 <sup>c</sup>	86.2 <sup>c</sup>	26.9
Planting + 1.5 L / ha	193.2 <sup>ab</sup>	55.2 <sup>a</sup>	31.6
Apply 1.5 L / ha at 7 days	189.2 <sup>ab</sup>	80.0 <sup>bc</sup>	28.6
Apply 1.5 L / ha at 14 days	134.4 <sup>a</sup>	75.0 <sup>b</sup>	22.1
Apply 1.5 L / ha at 21 days	183.9 <sup>ab</sup>	74.6 <sup>b</sup>	24.5
St. Er. ±	21.2 ***	2.5 ***	2.2 NS

<sup>ab</sup> Means with a common letter by column do not differ at  $P < 0.05$  (1955 Duncan).

\*\*\*  $P < 0.001$ , NS = non-significant

### Effect of Vitazyme on established grass

The experiment was conducted under conditions similar as the previous, but on established pasture. The treatments were: a) absolute control and b) application of 1.5 L / ha Vitazyme after each cutting. The cuttings were made every 90 days on the drier season and every 60 days in the rainy season. Irrigation or fertilization were not used.

Dry matter yield was always higher when Vitazyme was applied (table 3). It was noteworthy the yield obtained when 1.5 L / ha Vitazyme was applied without the use of irrigation or fertilization. The total difference was 3.02 t DM / ha for Vitazyme.

**Table 3. Dry matter yields, t / ha.**

Rate, L / ha	Cuttings					Total
	Rainy season			Dry period		
	1	2	3	4	5	
0	2.96 <sup>a</sup>	3.40	2.05 <sup>a</sup>	2.53 <sup>a</sup>	1.05 <sup>a</sup>	11.99
1.5	3.29 <sup>b</sup>	3.70	2.60 <sup>b</sup>	3.00 <sup>b</sup>	2.42 <sup>b</sup>	15.01
St. Er. ±	0.03 *	0.23 NS	0.12 *	0.10 **	0.07 ***	

<sup>ab</sup> Means with a common letter by column do not differ at  $P < 0.05$  (1955 Duncan).

\*  $P < 0.05$

\*\*  $P < 0.01$

\*\*\*  $P < 0.001$

NS not significant

### Time of application after cutting

The experiment was conducted in similar conditions as those previously described. The treatments were: absolute control and application of 1.5 L / ha Vitazyme immediately and at 7, 14, 21, 28 and 35 days after cutting. The work was conducted in the drier period, without irrigation or fertilization.

The lowest average dry matter yield of the drier season occurred in the absolute control and the largest was reached when applied a 28 days after the cutting, although it did not differ significantly from the other timings of Vitazyme application. The leaf content was also lowest in the control (table 4).

**Table 4. Time of Vitazyme application after cutting.**

Treatments	Yield, t DM / ha	Leaves, %
Control	3.17 <sup>b</sup>	32.96 <sup>bc</sup>
Immediately	3.50 <sup>ab</sup>	34.91 <sup>ab</sup>
At 7 days	3.37 <sup>b</sup>	36.95 <sup>a</sup>
At 14 days	3.75 <sup>ab</sup>	36.73 <sup>a</sup>
At 21 days	3.59 <sup>ab</sup>	37.27 <sup>a</sup>
At 28 days	4.25 <sup>a</sup>	33.69 <sup>bc</sup>
At 35 days	3.79 <sup>ab</sup>	32.34 <sup>c</sup>
St. Er. ±	0.75 *	2.10 *

<sup>ab</sup> Means with a common letter by column do no differ at P < 0.05 (1955 Duncan).

### Fertilization and nitrogen fertilizer application

The experiment was conducted in similar type of soil as the previous. The treatments were: a) absolute control, b) application of 1.5 L / ha Vitazyme without fertilizing, c) application of 150 kg N, d) application of 150 kg N + 1.5 L / ha Vitazyme, e) application of 100 kg N + 1.5 L / ha Vitazyme, f) application of 75 kg N + 1.5 L / ha Vitazyme and g) application of 50 kg N + 1.5 L / ha Vitazyme. As irrigation was not used, the experimental period was during the rainy season and the N rates are for that period.

In all cuttings Vitazyme application surpassed the absolute control and the fertilizer alone exceeded both. By combining both and particularly 75 kg N + Vitazyme, yield of dry matter did not differ (P < 0.001) to the application of 150 kg N (table 5).

**Table 5. Application of nitrogen and Vitazyme on yield, t DM / ha.**

Treatments	Cutting			Total
	1	2	3	
Control	2.05 <sup>c</sup>	2.50 <sup>b</sup>	1.05 <sup>d</sup>	5.60 <sup>d</sup>
Vitazyme (without N)	2.60 <sup>b</sup>	3.00 <sup>b</sup>	2.42 <sup>c</sup>	8.02 <sup>c</sup>
150 kg N	3.76 <sup>a</sup>	6.10 <sup>a</sup>	4.64 <sup>a</sup>	14.50 <sup>a</sup>
75 kg N + Vitazyme	3.95 <sup>a</sup>	5.90 <sup>a</sup>	3.75 <sup>b</sup>	13.60 <sup>a</sup>
50 kg N + Vitazyme	3.97 <sup>a</sup>	5.20 <sup>a</sup>	3.26 <sup>b</sup>	12.43 <sup>b</sup>
St. Er. ±	0.14 *	0.31 *	0.18 *	0.21 *

<sup>abcd</sup> Means with a common letter by column do no differ at P < 0.05 (1955 Duncan).

\* P < 0.001

## CONCLUSIONS

For the period of establishment:

- The application of 1.5 L / ha Vitazyme increased yield and reduced the proportion of dead material.
- The best time to apply the product was by spraying immediately before planting, in the bottom of the recently opened furrow, then planting and immediately covering.

For the period of production:

- When no fertilizer or irrigation was applied, Vitazyme 1.5 L/ha after each cutting increased yields significantly. The best yield was achieved when Vitazyme was applied 28 days after cutting.
- When fertilizer was available, the combination of 75 kg N / ha + Vitazyme 1.5 L/ha during the rainy season achieved similar yield as 150 kg N without Vitazyme.

## RECOMMENDATIONS

- To apply 1.5 L / ha Vitazyme at the time of planting, in the bottom of recently opened furrows, immediately before planting.
- In established fields, if fertilizer is not available, apply 1.5 L / ha Vitazyme after each cutting. If nitrogen fertilizer is available, apply 75 kg N / ha and 1.5 L / ha Vitazyme in split applications during the rainy season.



**King grass or Pennisetum purpureum shortly after harvest: plants treated with Vitazyme (right) show vigorous regrowth, compared to the untreated control (left). Animal Science Institute, Havana, Cuba.**

