TILLER DYNAMIC OF DWARF ELEPHANTGRASS (PENNISETUM PURPUREUM CV. MOTT) UNDER DEFOLIATION

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ABSTRACT
A field study was conducted at the Animal Production Research Center of the University of Zulia, Venezuela. The objective of this experiment was to evaluate the tiller dynamic of dwarf elephantgrass (*Pennisetum purpureum* cv. Mott) under three cutting frequencies (CF) 28, 42 and 56 days and three cutting heights (CH) 10, 20 and 40 cm in order to estimate basal (BT), aerial (AT) and dead tillers (DT). The experiment was laid out as a split-plot trial with three replications. The number of basal tillers increased as CF was shortened and CH was increased. The intensity of defoliation independent of CF affected the number of aerial tillers. Cut at 10 cm produced 86% less aerial tillers than clipping at 40 cm. The number of dead tillers per plants increased with continuous heavy defoliation. The maximum number of dead tiller was 63 (28-day frequency at 10 cm stubble height).

KEYWORDS
Pennisetum purpureum cv. Mott, tiller dynamics, defoliation

INTRODUCTION
Mott dwarf elephantgrass has been introduced into many of the tropical and subtropical regions of the world during the last decade. This grass is very persistent, highly productive and produces a substantial amount of high quality forage if managed properly under grazing or clipping (Sollemberger *et al*., 1988).

The total production of herbage and the persistence of tufted grasses can be markedly reduced when herbage is removed too frequently and too intensively by cutting or grazing animals. Although the relation of harvesting practices to the development of grassland is known in a general way from observations, and more specifically for a few species from experimental studies, there is still a definite need for further experimental work. It is important to determine the management practices necesary to obtain optimum production and longevity. Few studies have been made on regrowth capabilities of dwarf elephantgrass. In order to determine the proper management of this grass, it is important to study the effect of various defoliation management practices on tiller dynamics of dwarf elephantgrass.

MATERIALS AND METHODS
A field experiment was conducted during 1994 at the Animal Production Research Center of the University of Zulia, Venezuela, to study tiller dynamics of dwarf elephantgrass (*Pennisetum purpureum* cv. Mott) under defoliation. The experiment was conducted on a sward established the previous year, which was propagated vegetatively by stem cuttings of 25 cm placed horizontally, about 20 cm apart, in shallow furrows and covered with 2 to 3 cm of soil, with row spacing of 1 m. Irrigation, weed control and a fertilizer with 250 kg/Ha of 12-24-12 were provided to the sward in order to maintain active growth. The climate is a tropical dry forest with an average annual precipitation of 1050 mm and 29°C.

This experiment consisted of nine treatment combinations of three frequencies of harvest (28, 42 and 56 days). The experiment laid out is a split-plot trial with three replications. Main plot were cutting frequencies (CF) and subplot were cutting heights (CH).

Measurements included basal, aerial and dead tillers. Tillers were marked with wire loops colored so that an individual tiller could be located and data recorded on successive sampling dates. Number and type of tillers per plants were determined at the time of each harvest. Tillers were counted from 5 plants/treatment. The initial number of main tillers in each plant was recorded and used as a covariante in subsequent statistical analysis.

RESULTS AND DISCUSSION
An analysis of Table 1 indicates that the number of basal tillers increased as the cutting interval was reduced and the plants were harvested closer to the ground. The number of basal tillers varied from 68 (28-day frequency at 10 cm cutting height) to 46 (56-day frequency at 20 or 40 cm cutting height). A similar result was reported by Rodríguez *et al*., 1986.

By maintaining under severe defoliation, dwarf elephantgrass responded with the reduction of the elongation rates of internodes and assumed a more prostrate growth habit, and a higher production of basal tillers resulted in plants with these habits. According to Jones (1985) when stem apices are removed apical dominance is broken and the rate of tiller production is increased by activation of basal bud.

The number of aerial tillers affected by defoliation practices is shown in Table 1. Frequency of harvest although significant had less of an influence on aerial tiller number than cutting height. Increasing the cutting height from 10 to 40 cm, at least resulted in an increase in aerial tillers of aproximately 37%. The presence of aerial tillers in all treatment combinations should be considered as an indication of tillering ability of dwarf elephantgrass.

The number of dead tillers per plant increased as the frequency of harvest was shortened and intensity of defoliation was increased. The number of dead tillers varied from 63 (28-day frequency at 10 cm cutting height) to 21 (56-day frequency at 20 cutting height). When the apical meristem of a tiller is removed, that tiller is no longer capable of initiating new leaves unless an axillary bud at an above ground node on the tiller initiates growth. Continuous removal of apical meristem may result in reduced tiller density or a new tiller with reduced vigor. Apparently the first effect of increased removal of apical meristem is to force the development of more new tillers. As long as the plant is capable of initiating new tillers, tiller density is not decreased and may actually be increased. While individual tiller weight was not determined in this study, tillers were visibly shorter and smaller with more frequent and shorter cutting. Evidently more severe defoliation which resulted in more apical meristem removal, and reduced carbohydrate levels, eventually weakened the plants to the point where tillers died.

The data indicated that dwarf elephantgrass would not tolerate continuous heavy defoliation. Clipping at 42 or 56-day interval and 20 cm or higher gave maximum aerial tillers and minimum dead tillers, factors which contributed to regrowth, stand density and longevity of dwarf elephantgrass after one year of defoliation.

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Table 1
Basal, aerial and dead tillers of dwarf elephantgrass under defoliation

	Frequency of harvest (days)								
	28			42			56		
	Cutting height (cm)								
	10	20	40	10	20	40	10	20	40
Basal tillers	68[a]	58[b]	57[b]	65[a]	64[a]	63[a]	48[c]	46[c]	46[c]
Aerial tillers	29[e]	47[c]	55[b]	30[e]	45[c]	69[a]	27[e]	34[d]	38[d]
Dead tillers	63[a]	51[b]	49[b]	35[c]	25[d]	23[d]	30[c]	21[d]	25[d]

Values on the same line with different superscripts are different, LSD $P<0.05$.