STRUCTURAL CHARACTERISTICS OF UROCHLOA *BRIZANTHA* CV DUNAMIS DURING ITS ESTABLISHMENT SUBJECTED TO DIFFERENT DOSES OF NITROGEN

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ABSTRACT

Dunamis Grass is a hybrid cultivar formed by the junction of two other brachiarias, Marandu (*Urochloa brizantha*) and Decumbens (*Decumbens cv. Basilisk*), known for having rustic characteristics and resistance to biotic and abiotic factors. The objective of this study was to evaluate the agronomic characteristics of Dunamis grass under a greenhouse cutting regime with three doses of nitrogen fertilization (50, 100 and 150mg/dm³ of N) plus control (without fertilization) in a completely randomized design with six replications. Structural characteristics (average leaf length, number of tiller leaves, final leaf length, total number of leaves in senescence, number of dead leaves, maximum plant height, number of tiller per plant, number of tiller per pot) will be evaluated. The experiment will be conducted at the Centro Universitário Tocantinense Presidente Antônio Carlos – (UNITPAC), located in the north of Tocantins.

Keywords: Hybrid. Junction. Agronomic.

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INTRODUCTION

In Brazil, pastures occupy a prominent position in the agricultural scenario, however, soils have serious fertility limitations. Thus, fertilizing represents an improvement in productivity rates per hectare and in the persistence of forages, even for species adapted to low soil fertility (LOPES et al., 2013).

According to estimates from the last Brazilian Agricultural Census of 2017, planted pastures throughout the national territory increased from 102.4 million hectares in 2006 to 111.7 million hectares in 2017 (IBGE, 2017). In general, pastures are conducted without proper nutrient replacement, a factor that makes their maintenance unfeasible (IEIRI et al., 2010).

The Dunamis (*Brachiaria Híbrida cv.)* is a hybrid resulting from the crossing of the brachiarias Marandu *(Urochloa brizantha)* and Decumbens *(Decumbens cv. Basilisk.)*, which united characteristics of agronomic interest of both varieties in a single plant. Their rooted stolons, absent in Marandu, have the potential to improve soil cover, reduce degradation, and extend the lifespan of pastures. This, in turn, promises to increase the productivity, sustainability, and profitability of Brazilian livestock farming (Milagro Agro Brasil, 2021).

Knowing that this species was produced through two species of the genus Urochloa, the best characteristics were selected in terms of resistance to biotic and abiotic factors, taking into account that in the original species it was not possible to obtain a good use of nitrogen in the form of topdressing.

The dynamics of N (nitrogen) in the soil is very complex and differentiated in relation to other nutrients. This nutrient has great mobility in the soil, undergoes numerous transformations mediated by microorganisms, has high movement at depth, transforms into gaseous forms and is lost by volatilization and has a low residual effect (Aguiar & Silva, 2005). As a result, part of the N applied to the pasture is often lost from the system, which reduces the efficiency of use, mainly because nitrogen fertilizers are usually applied in topdressing, without incorporation into the soil.

JUSTIFICATION

According to Embrapa (2014), by 2030, the global demand for pastures should increase by 33%, which would be possible due to the increased use of fertilizers, intercropping of grasses and legumes, and better management (EMBRAPA, 2023). Fertilization and soil correction, as well as proper pasture management, are determinants for nutritional quality, which promote substantial growth of the aerial part of the plant and intensify forage productivity (LOPES et al., 2013; CASTRO et al., 2016). Alexandrino et al. (2010) point out that in relation to grasses of the genus Urochloa, nitrogen fertilization is important from its establishment aiming at good pasture management, contributing significantly to the number of tillers until the development and length of leaves.

Brachiarias are forage plants widely used in pastures for cattle. They are generally known for their rusticity and ease of handling.

It is important to emphasize that this work has the characteristics of evaluating the possible changes or not resulting from the application of nitrogen in Dunamis grass, providing specific data on doses and demonstrating any changes in the tillering exposed by the plant. Having some points of answers about grass: nitrogen is an essential nutrient for the plant and its absence can cause chlorosis (yellowing of the leaves), stunted growth and lower biomass production (Martha Junior, G.B.; Vilela, L.; Kichel, A.N).

At optimal levels, brachiarias grow vigorously and produce more forage, promote a more robust root system, which improves water and nutrient absorption. Nitrogen directly affects the photosynthetic rate of the plant, which is nothing more than the ability to absorb light and nutrients, capturing and reserving energy to carry out the processes of plant development, it is also a component of chlorophyll (Primavesi, O.).

Dunamis grass (*Dunamis, Brachiarias Hibrida cv.*) and characterized as the third generation of brachiarias, that is, the evolution of the species and the resolution of problems previously suffered by Brazilian cattle raising.

GENERAL OBJECTIVE

To evaluate whether there will be changes in the structure of Dunamis grass under different doses of nitrogen.

THEORETICAL FRAMEWORK

PASTURE SEEDS

Within pasture management, the choice of seeds is a very important step for the beginning of every production cycle, success in pasture formation depends on a good seed, and its use is totally justifiable, since seed represents only about 10% of the total cost of pasture formation (MACEDO et al., 2005).

There are many factors that affect seed quality, especially genetic, physiological and environmental factors. As genetic, differences in vigor, longevity and advantages measured by heterosis stand out.

Physiological diseases have their action determined by the environment during production, harvesting, processing and storage. Sanitary factors are characterized by the deleterious effects of microorganisms and insects associated with seeds. In the same way that problems of yield reduction are observed at the field level, quality reduction may also occur for marketing and sowing purposes, due to the incidence of pathogens (LUCCA, 1985).

As highlighted at the beginning, the cost of seed within the formation of a pasture represents only 10% of the total cost of formation (MACEDO et al., 2005), based on losses caused by malformation, introduction of undesirable pathogens within the property, soil degradation, the expense with the seed becomes almost derisory.

MORPHOLOGIES OF BRACHIARIAS

The grasses of the genus Brachiarias, about 90 species, commonly called brachiaria, have a markedly tropical distribution, with Equatorial Africa as their center of origin (Ghisi, 1991).

Morphological characteristics such as plant height, stalk/leaf ratio, growth rates, tillering dynamics, removal of apical meristems, leaf expansion, among others, have a direct relationship with forage productivity and quality, in addition to subsidizing the adoption of more appropriate management practices (COSTA et al., 2003).

(*BRIJANTA CV IN UROCH. MARANDU)*

The name Marandu, given to cultivar, means "novelty" in the Guarani language, and was the one that best translated the prominence given to this new alternative forage for the cerrado (Embrapa, 1984).

Belonging to the genus brachiarias, classified as brachiarias brizantha (Hochst ex A. RICH.) STAPF. cv. marandu, this grass originates from a volcanic region of Africa, where soils generally have good fertility levels, with annual rainfall of around 700 mm and about 8 months of drought in winter (Rayman, 1983).

It is a very robust cespitous plant, 1.5 to 2.5 m high, initial stems prostrate, but producing predominantly erect tillers. It has very short and curved rhizomes, erect flowering stems, often with tillering at the upper nodes, which leads to the proliferation of inflorescences, especially under cutting or grazing regime. It has hairy sheaths and eyelashes at the margins, generally longer than those between us, hiding the knots, which gives the impression of dense hairiness in the vegetative stalks. Its leaf blades are linear-lanceolate, sparsely hairy on the ventral surface and glabrous on the dorsal surface. The inflorescences are up to 40 cm long, usually with 4 to 6 racemes, quite equidistant along the axis, measuring 7 to 10 cm in length, but can reach 20 cm in very vigorous plants. It has unil spikelets serialized along the rachis, oblong to elliptical-oblong, 5 to 5.5 mm long by 2 to 2.5 mm wide, sparsely hairy at the apex (Valls and Sen Dulsky, 1984).

UROCHOLA (DECUMBENS CV. BASILISK.)

It is a perennial species, which occurs natively in tropical East Africa at altitudes above 800 m, under a moderately humid climate, in open pastures, or in areas with sporadic shrubs and in fertile soils (BOGDAN, 1977).

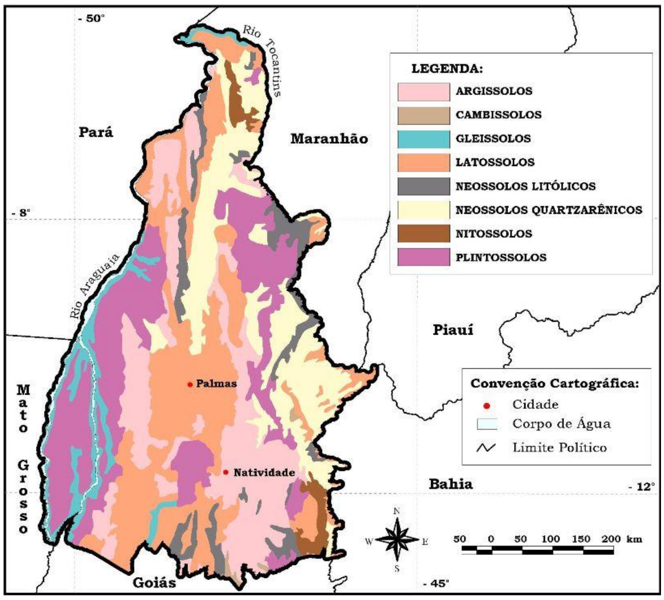
Brachiaria decumbens cv. Basilisk is probably one of the most well-known and cultivated grasses in the entire tropical region.

Originally from the Great Lakes plateau in Uganda, it was taken to Australia in 1930 and reproduced by seedlings, at first, until the dormancy of its seeds broke (AERO, 2020).

Brachiaria decumbens has a prostrate growth habit, with an average height of 50 cm to 100 cm. It emits a large number of stolons, well rooted and with protected growth points. *Brachiaria decumbens* has lower yield potential when compared to cultivars of the brizantha species and lower response to fertilization (AERO, 2020).

SOILS OF THE NORTHERN REGION

To characterize the soils of the State of Tocantins, soil maps of the Araguaia Basin – Tocantins were used, at a scale of 1:1,000,000, prepared by PRODIAT (Brasil, 1982), according to the Brazilian Soil Classification System (Embrapa, 1999), and the surfaces of soil occurrence were surveyed by means of a planimeter (Figure 1)



(Source, IMPAR, 2005, Figure 1)

The Red-Yellow Latosols, the Quartz Sands (Quartzarenic Neosols) and the Litholic Soils (Litholic Neosols) predominate in the State, which together make up 63.8% of the state's surface. The Red-Yellow Latosols represent about 32.9% (91,310 km²) of the state's surface. They are presented with inclusions and in associations with concretionary Pétric Plintosols (Concretionary Soils), Quartz Sands (Quartzarenic Neosols), Red-Yellow Podzolics (Red-Yellow Ultisols) and Litholic Soils (Litholic Neosols).

They occur in all micro-regions of the state, especially in Rio Formoso, Gurupi, Dianópolis and Porto Nacional. The Quartz Sands (Quartzarenic Neosols), with about 18% (49,881 km²) of the state surface, have in the micro-regions of Jalapão, Bico do Papagaio and Araguaína their main occurrence. They are associated with and include Red-Yellow Latosols, Yellow Latosols, litholitholytic Plintosols (Hydromorphic Laterite), Concretionary Perisols (Concretionary Soils) and Podzolic Plintosols (Ultisols).

Litholic Soils (Litholic Neosols), like Red-Yellow Latosols, also occur in all micro-regions, appearing in third place in terms of surface of occurrence in the State. They represent about 12.9% (35,847km²). They are associated with and include Red-Yellow Podzolics (Red-Yellow Ultisols), Concretionary Soils (Concretionary Pétric Plinthosols), Red-Yellow Latosols (Red-Yellow Ultisols) and Rocky Outcrops.

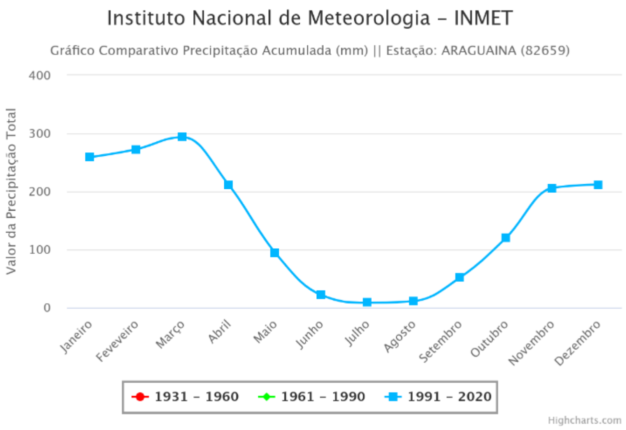
In the micro-region of Dianópolis, the presence of this soil is predominant, representing 28.5% of the soils occurring there. Red-Yellow Podosols (Red-Yellow Ultisols) appear associated with Red-Yellow Latosols, Yellow Latosols, Litholic Soils (Litholic Neosols), Concretionary Soils (Concretionary Pétric Plintosols) and Cambisols. They represent about 9.5% of the state soils and have the micro-region of Miracema do Tocantins as their main area of occurrence, reaching about 50.3% of the total of the micro-region.

Of the Concretionary Soils (Concretionary Pétric Plintosols), about 7.9% are associated with and with inclusions of Red-Yellow Latosols (Red-Yellow Ultisols), Red-Yellow Podzolics, Hydromorphic Laterite (Litholympintic Petrosols) and Quartz Sands (Quartzarenic Neosols), mainly in the micro-region of Jalapão. The Glysated Soils (Gleisols) and the Hydromorphic Laterites (Litholithic Pétric Plinthosols) occur with greater intensity in the Rio Formoso micro-region and represent, respectively, 6% and 6.5% of the soils of the State. They are associated with and include Alluvial Soils (Fulvic Neosols) and Hydromorphic Soils (Gleisols).

There are areas with Purple Latosols in Bico do Papagaio, with Yellow Latosols in Rio Formoso, with Terra Roxa (Red Nitosols) in Dianópolis and with Reddish Brunizem (Chernosols) in Bico do Papagaio and Araguaína. Regarding agricultural suitability, about 55.4% (153,752 km²) of the soils in the state are classified as suitable for tropical fruit trees and crops, 14.1% (36,006 km²) suitable for planted pastures, 17.6% (48,717 km²) for silviculture and natural pasture and 12.9% (35,322 km²) without agricultural suitability (EMBRAPA, December/2000).

WEATHER

The data presented in figure 2 represent the behavior of rain and temperature throughout the year in the state. Climatological averages are values calculated from a series of data from 30 years observed. It is possible to identify the rainiest/driest and hot/coldest seasons in a region.



(SOURCE: INMET, figure 2)

In summary, climate data obtained through monitoring organizations has a great function within the production chain, guiding the producer's decision-making within their cultural treatments, the temperature oscillation in the state of Tocantins and one of the challenges that cultivars have in their adaptation and expression of their maximum productive potential.

The state of Tocantins is under the domination of the semi-humid tropical climate, predominant in the central region of Brazil, being characterized by the occurrence of a dry seasonal period and a rainy period. It usually has a season with drought of about 4 to 5 months, and the occurrence of rainfall concentrated in the summer (EMBRAPA). The region of Araguaína-TO has a humid tropical climate, with a maximum temperature ranging between 30 and 34 ºC and a minimum between 19 and 21 ºC. The vegetation that predominates in the region is the cerrado, but part of the municipality's territory consists of transition forest between the cerrado and the Amazon forest (IBGE, 2018).

NITROGEN FERTILIZATION

Nitrogen fertilization with urea in Dunamis grass pastures is an essential practice to improve forage productivity and quality. Nitrogen is one of the most important nutrients for grass growth, and urea is one of the most widely used nitrogen sources in livestock and agriculture due to its nitrogen content (about 46%).

The application of urea can significantly increase dry matter production, providing greater forage availability for livestock. It promotes a higher concentration of proteins in the grass leaves, improving the nutritional value of the pasture. Nitrogen stimulates tillering (emission of new shoots) of the grass, increasing the density of the pasture.

MATERIAL AND METHODS

EXPERIMENTAL DESIGN

The experiment will be carried out at the Presidente Antônio Carlos University Center – UNITPAC, located in the municipality of Araguaína, state of Tocantins, northern region of the country, whose climate is defined as humid tropical (AW, according to the Koppen-Geiger classification), with average annual precipitation around 1,800 mm to 2,000 mm, and annual temperature ranging between 24°C and 27°C. The rainy season occurs between the months of November and April and the dry season extends from May to October. The predominant soil type in the area is Neosol and the part that will be used in pots will be corrected with a proportion of 1.5 t per ha, equivalent to 150g per dm². The doses of nitrogen used will be 0, 50, 100 and 150g per dm².

TREATMENTS

The treatments will consist of different levels of nitrogen application:

1. T1: 0 kg/ha de N (testemunha)
2. T2: 50 kg/ha de N
3. T3: 100 kg/ha de N
4. T4: 150 kg/ha de N

SOIL PREPARATION AND PLANTING

For soil preparation: it will be used as a substrate for planting seeds base fertilization (nitrogen extract).

The Dunamis grass seeds will be planted in pots.

APPLICATION OF TREATMENTS

Nitrogen application will be carried out in topdressing, divided into three applications during the growing phase (initial, intermediate and before harvest).

DATA COLLECTION AND STATISTICS

For data collection, a metric ruler and scissors will be used. The visual analysis will be carried out in order to ascertain the number of tillers in senescence.

A completely randomized design will be used, with 4 treatments and 6 replications, totaling 24 experimental units. Will the data be submitted to analysis of variance by the test?

DISCUSSION OF THE RESULTS

The results will be interpreted based on the effects of different nitrogen levels on growth, nitrogen use efficiency and physical characteristics of Dunamis grass.

The practical implications for pasture management and environmental sustainability will also be discussed.

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