58ª REUNIÃO DA SBZ
ZOOTECNIA PARA SEGURANÇA ALIMENTAR
E SUSTENTABILIDADE CLIMÁTICA

August 12th to 16th,

Using Machine Learning to classify low-growing forage plants of *Megathyrsus maximus* (Syn. *Panicum maximum*)

Néstor Eduardo V. Frontado[1]*, Gelson dos S. Difante[1], Alexandre R. Araújo[2], Denise B. Montagner[2], Hitalo Rodrigues da Silva[1], Larissa P. R. Teodoro[3]

[1]Postgraduate Program in Animal Science, Faculty of Veterinary Medicine and Zootechny, Campo Grande/MS; Federal University of Mato Grosso do Sul; [2]Researcher, Campo Grande/MS; Brazilian Agricultural Research Corporation - Embrapa Beef Cattle.[3]Postgraduate Program in Agronomy, MS; Chapadão do Sul Campus. Federal University of Mato Grosso do Sul.
*Doctoral student – nestor.villamizar.frontado@gmail.com

Forage plants of the species *Megathyrsus maximus* (Syn. *Panicum maximum*) are an important alternative for the more than 160 million hectares devoted to meat production on pasture. Train and validate machine learning algorithms to identify the most accurate model in classifying cultivars and genotypes of this species. The objective was to evaluate the performance of two classification models low-growing *M. maximus* forages using dry mass production data and pasture structural and morphogenic variables as inputs. The machine learning models tested were Logistic Regression (REGL) and Random Forest (RF) and two metrics were used to assess accuracy, Percentage Correct (PC) and Kappa coefficient. The data was also subjected to confusion matrix analysis. The data was collected in a greenhouse at Embrapa Beef Cattle from September 2021 to February 2022. The soil used was typical Dystrophic Red, collected in the Cerrado in the 20-40 cm layer. The experimental design was in randomized blocks in a 3x2x5 factorial scheme, with three forage plants (BRS Tamani, PM422, and PM408), two doses of phosphorus (P), 19 mg dm^{-3} and 116 mg dm^{-3}; five doses of dolomitic limestone 0, 326, 653, 1306 and 2612 mg dm^{-3}. The best performance for classifying cultivars and genotypes of *M. maximus* was in the RF model, with an accuracy of 68.95% (PC) and 0.53 (Kappa), and the lowest in the REGL model, with an accuracy of 53.37% (PC) and 0.30 (Kappa). For the confusion matrix, the RF model showed the highest number of correct instances (307) and the lowest number of incorrect instances (143). The REGL model had the fewest correct instances (236) and the most incorrect instances (214). The use of machine learning with dry mass production, and structural and morphogenic data inputs is viable for classifying *M. maximus* cultivars and genotypes, and the Random Forest model is an alternative for discriminating low-growing *Megathyrsus maximus* forage plants.

Keywords: Computational intelligence, Machine learning, Panicum maximum, morphogenesis.

Acknowledgments: UFMS, Embrapa Beef Cattle, CNPq, UNIPASTO, CAPES, Fundect.