**PP 105 Nitrogen fertilisation during spring delayed heat stress in tall fescue (***Lolium arundinaceum* **Schreb.) swards.** Jáuregui, J.M. <sup>1,2</sup>\*, Lattanzi, F.<sup>3</sup> y Berone, G.D.<sup>4</sup>

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La fertilización nitrogenada durante primavera retrasó el estrés térmico en pasturas de Festuca alta (Lolium arundinaceum Schreb.)

### Introduction

Measuring canopy temperature under conditions of high atmospheric demand is an effective way to determine heat and/or drought stress of plants. Canopy temperature (CT) affects transpiration, stomatal aperture, photosynthesis, respiration, water status and other important physiological processes in plants (AI-Faraj et al., 2000). The difference between air ( $T_{air}$ ) and canopy ( $T_{can}$ ) temperature is a good indicator of plant stress. Both grazing intensity and nitrogen fertilisation could affect CT and  $T_{air}-T_{can}$  by creating swards with different heights and/or soil covers.

In a previous abstract we presented evidence that CT and  $T_{air}-T_{can}$  of Tall fescue plants were linked to the water content of soils (Jáuregui et al., 2019). The objective of this work was to evaluate the role of grazing and nitrogen fertilisation on canopy temperature of tall fescue swards grown in Paysandú, Uruguay.

# Materials and methods

Canopy temperature was measured during October-December 2013, in 3-year old tall fescue sward (cv. Estanzuela Tacuabé) in Paysandú (Uruguay). Sward had received the factorial combination of two grazing intensities during late winter (Hard [H] and Lax [L]; 9 and 12 cm postgrazing residual height, respectively) and two levels of nitrogen (N) fertilisation (0 and 92 kg N/ha) during spring. These treatments were arranged in a complete randomized block design, with three replicates. Each paddock was 0.2 ha. A full description is given by Jáuregui et al. (2016). Measurements were made on five transects per paddock. A Testo 825 Infrared thermometer (Omni Instruments, UK) with a resolution of 0.5°C was used. On 15, 23 and 29.Oct, and on 5 and 18.Dec ten canopy temperature measurements per transect were obtained between noon and 3 PM, at 50 cm above the canopy by holding the thermometer at a straight angle, and avoiding areas of bare soil. Air temperatures were recorded with an automatic meteorological station (Vantage Pro 2TM, Davis Instruments, Hayward, CA).

Statistical analysis were carried out with JMP®, Version 11 (SAS Institute Inc., Cary, NC) and plots were drawn using Sigmaplot® version 14 (Systat Software, San Jose, CA).

## **Results and discussion**

Canopy temperatures increased as the spring progressed and air temperatures increased. L-N100 treatment had lower (p<0.05) CT and T<sub>air</sub>-T<sub>can</sub> than the other treatments. However, the largest effect was attributed to N fertilisation (highest "F" value). In four out of five dates, the addition of N fertiliser during spring decreased both CT and T<sub>can</sub>-T<sub>air</sub>. At the end of October, only the N fertilised treatments had a T<sub>can</sub>-T<sub>air</sub> lower than 0, indicating that the rest of the treatments were experiencing stress. Increasing N fertilisation could have increased water use efficiency (WUE). Such increase in WUE would have resulted in a larger canopy development which could have reduced soil temperature and evaporation, and leaving more water for the plants to transpire and cool down the canopy.



Figure 1 (a) Canopy and (b) Canopy- Air temperatures of tall fescue swards under grazing growing in Paysandú, Uruguay.

### Conclusions

Adding N fertiliser during spring could be an effective way of reducing heat stress in tall fescue swards. Reducing grazing intensity also appears to be important, but to a lesser extent than N fertilisation.

#### References

JAUREGUI, J.M., MICHELINI, D.F. y LATTANZI, F.A. 2016. Grass and forage science, 72(3), 454-466.

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