Responses of seedling emergence of three *Paspalum* species to environmental factors

N. Glison[1*], P. González Barrios[2], E. Correa[3], L. Viega[1], S. Saldanha[4], R. Reyno[5], E. Musacchio[6], P. Rush[6], G. Schrauf[6], P. Speranza[1].

1, Dep. Plant Biology; 2, Dep. Biometrics, Statistics y Computation; 3, Dep. Environmental Systems; Facultad de Agronomía, Udelar, Montevideo, Uruguay. 4, Experimental Station of San Antonio, Facultad de Agronomía, Udelar, Salto, Uruguay. 5, National Institute of Agricultural Research (INIA), Tacuarembó, Uruguay. 6, Department of Genetics, Facultad de Agronomía, UBA, C. A. Buenos Aires, Argentina. * Email: nigli@fagro.edu.uy

INTRODUCTION

In the warm-temperate regions of Uruguay and Argentina, the adoption of warm-season perennial grasses has been very limited. Slow and unpredictable establishment has been perceived as one of the most limiting factors for their use either as pure stands or in mixtures with cool season grasses. Among the best studied species are *P. dilatatum* and related species and *P. notatum*. In this study we analyzed a network of locations and sowing dates to understand the responses of single clone or inbred line of *P. dilatatum* cv. Chirú (**Chirú**), *P. dilatatum* ssp. *flavescens* (**Flav**), *P. urvillei* (**Urv**) and *P. notatum* (**Not**) to environmental factors and determine appropriate sowing dates.

MATERIALS & METHODOS

» Materials: Seeds produced in INIA La Estanzuela (Colonia, Uruguay). Each lot tested for viability (TZ test) and germination (21 d, 20/30°C) before use (Table 1).

» Design and layout: Split-split plot design with three replicates at four locations in 2013 and 2014 (Fig. 1). Each plot consisted of 45 viable seeds m^{-1} in three 1.2 m lines within four sowing date plots (insets Fig. 1), within two main plots (irrigated and non-irrigated).

» Data: Seedling emergence was estimated after 30 days.

Table 1. Seed lot quality

	Percentage of (%)	
Genotype	Viability	Germination
Chiru	55.4 ± 9.98	87.2 ± 12.1
Flav	74.2 ± 8.19	75.6 ± 14.6
Not	76.4 ± 14.6	34.3 ± 33.9
Urv	41.9 ± 5.99	66.6 ± 29.7

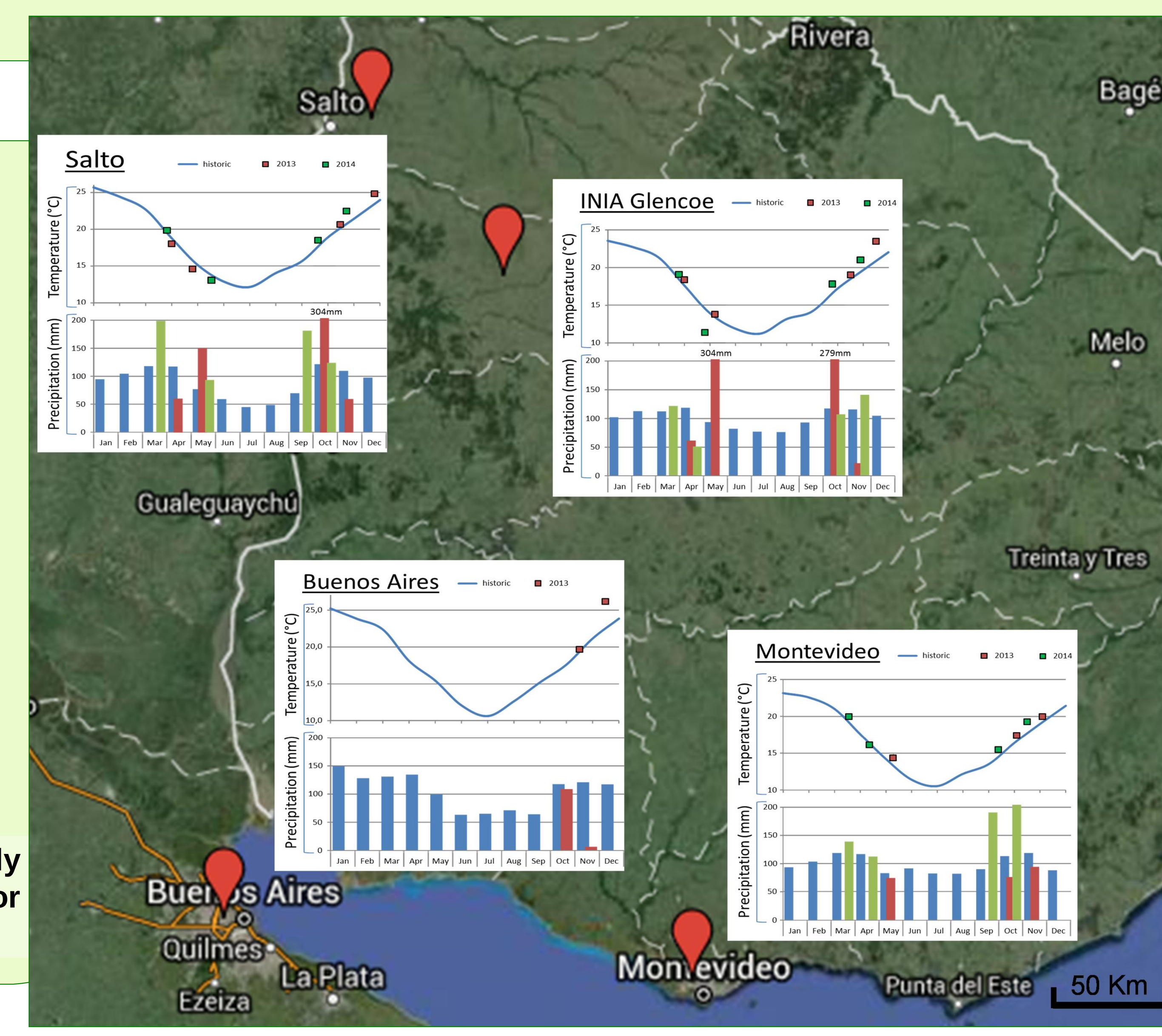

Fig. 1. Trial locations. The line and bar graphs show monthly temperature and precipitation historical averages in blue. Records for the experimental periods are shown in red (2013) and green (2014).

RESULTS & DISCUSSION

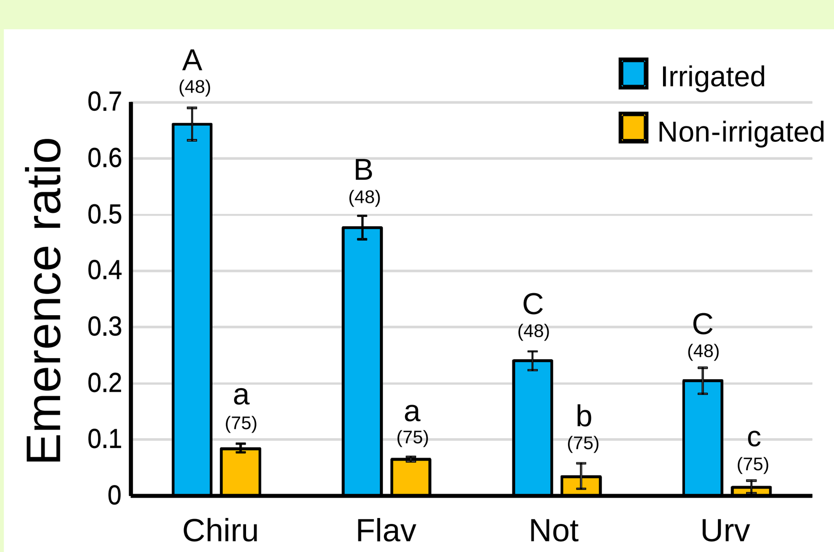

Fig. 2. Genotype mean emergence by irrigation regime (lines, S.E.; parenthesis, *n*).

Main effects:

- Significant effect for irrigation in all environments, except some late fall trials.

- Chirú (low dormancy) [1] showed consistently higher emergence. The genotype ranking was stable across environments (Fig. 2).

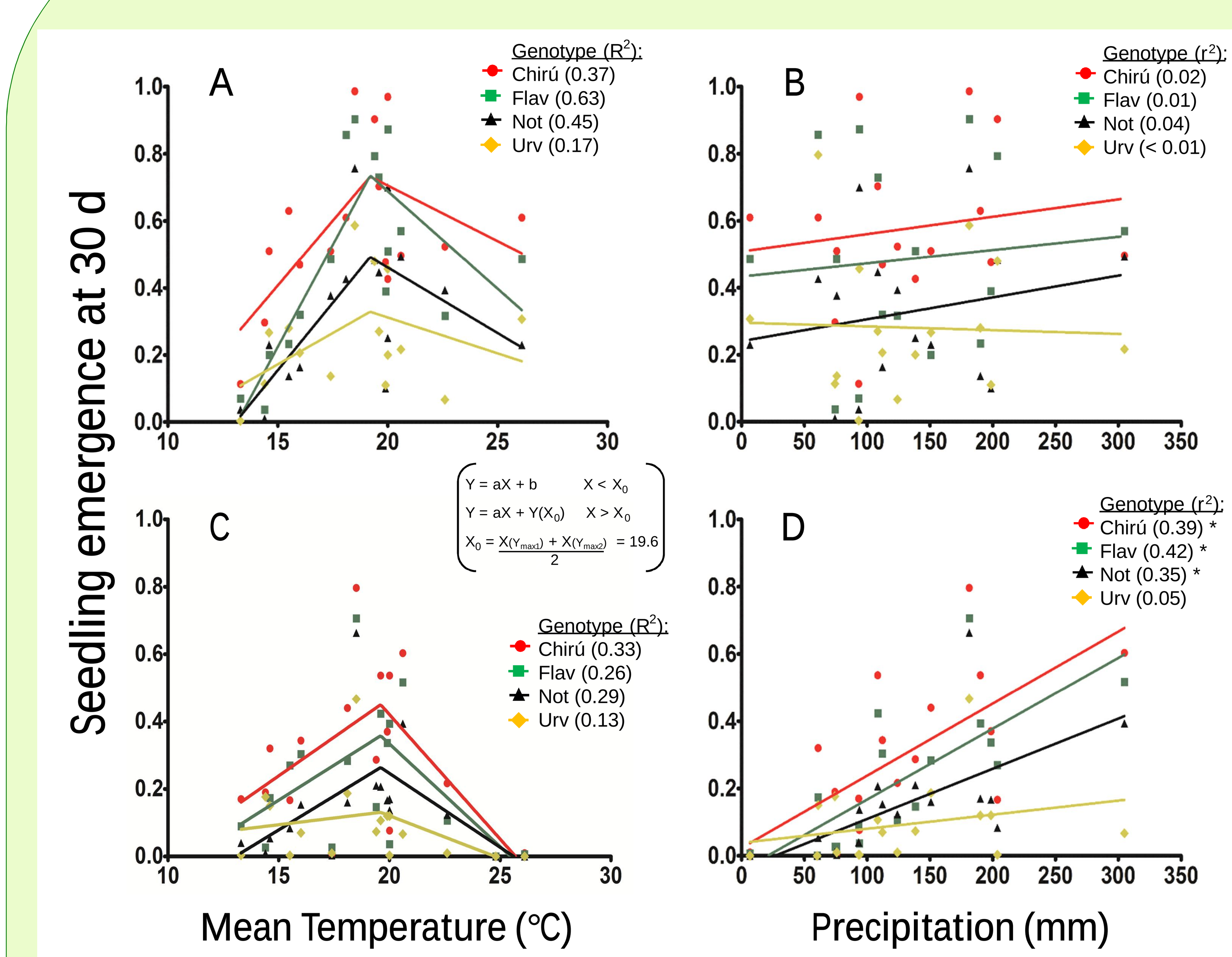

Fig. 3. Associations between emergence of each genotype and mean temperature or precipitation for irrigated (A, B) and non-irrigated (C, D) plots. In A and C a bilinear model was adjusted, and linear models were adjusted for B and D. Asterisks indicate significant slope estimates. (Graphs and analysis were performed with "Graphpad Prism, v.5.01").

In irrigated plots:

- Emergence was positively associated with mean temperature when <20ºC, but not with higher temperatures (Fig. 3A).

- It is suggested that seeds may have entered in secondary dormancy at high temperatures [2]

In non-irrigated plots:

- Positive trends for precipitation but no linear trends were found for temperature (Fig. 3 C and D). Water availability was limiting.

- Emergence often was better in early dates than in later ones for each season.

CONCLUSIONS

- Choosing low dormant genotypes will improve stand establishment in all scenarios.

- Higher seedling emergence was achieved with high water availability and temperatures between 18 and 20ºC. These conditions are usual in the region in the early fall and early spring.

REFERENCES

[1]: Glison et al. 2015. Grass Forage Sci., 70, 144-153

[2]: Batlla and Benech-Arnold 2010, Plant Mol. Biol., 73, 3-13

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