



# YIELD VARIATION, YIELD COMPONENTS, AND YIELD LOSSES IN RAINFED TALL FESCUE AND ANNUAL RYEGRASS SEED PRODUCTION IN SUBTROPICAL URUGUAY

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## INTRODUCTION

Annual ryegrass and tall fescue are the main species sown in pastoral dairy and beef production systems, in Uruguay. For both species, seed is produced in rainfed integrated crop-livestock systems. Average national yields for 2018-2021 were 0.33 and 0.98 tt seed/ha for tall fescue and annual ryegrass, respectively (INASE 2022). We do not know whether such low yields reflect climatic conditions, harvest losses, or both.

## AIMS

- to quantify variation in seed yield of annual ryegrass and tall fescue in commercial crops
- to assess what yield components explain yield variation
- to determine the magnitude of yield loss between yield at optimal cutting time (OCT) –an estimate of maximal attainable yield– and effectively harvested yield

## MATERIALS AND METHODS

During 2017 we measured the seed yield achieved in nine commercial crops of annual ryegrass (*Lolium multiflorum* L.) and 11 commercial crops of tall fescue (*Festuca arundinacea* Schreb.), in southwestern Uruguay.

Yield at optimal cutting time (OCT) was estimated in three 0.5 x 0.5 m quadrats per field crop. For this, spikes (ryegrass) and panicles (tall fescue) in each quadrat were cut by hand, and the number of spikes or panicles, total clean seed dry weight, and thousand seeds weight were measured.

Finally, the actual yield of clean seed produced by each field crop mechanically harvested with a combine was recorded.



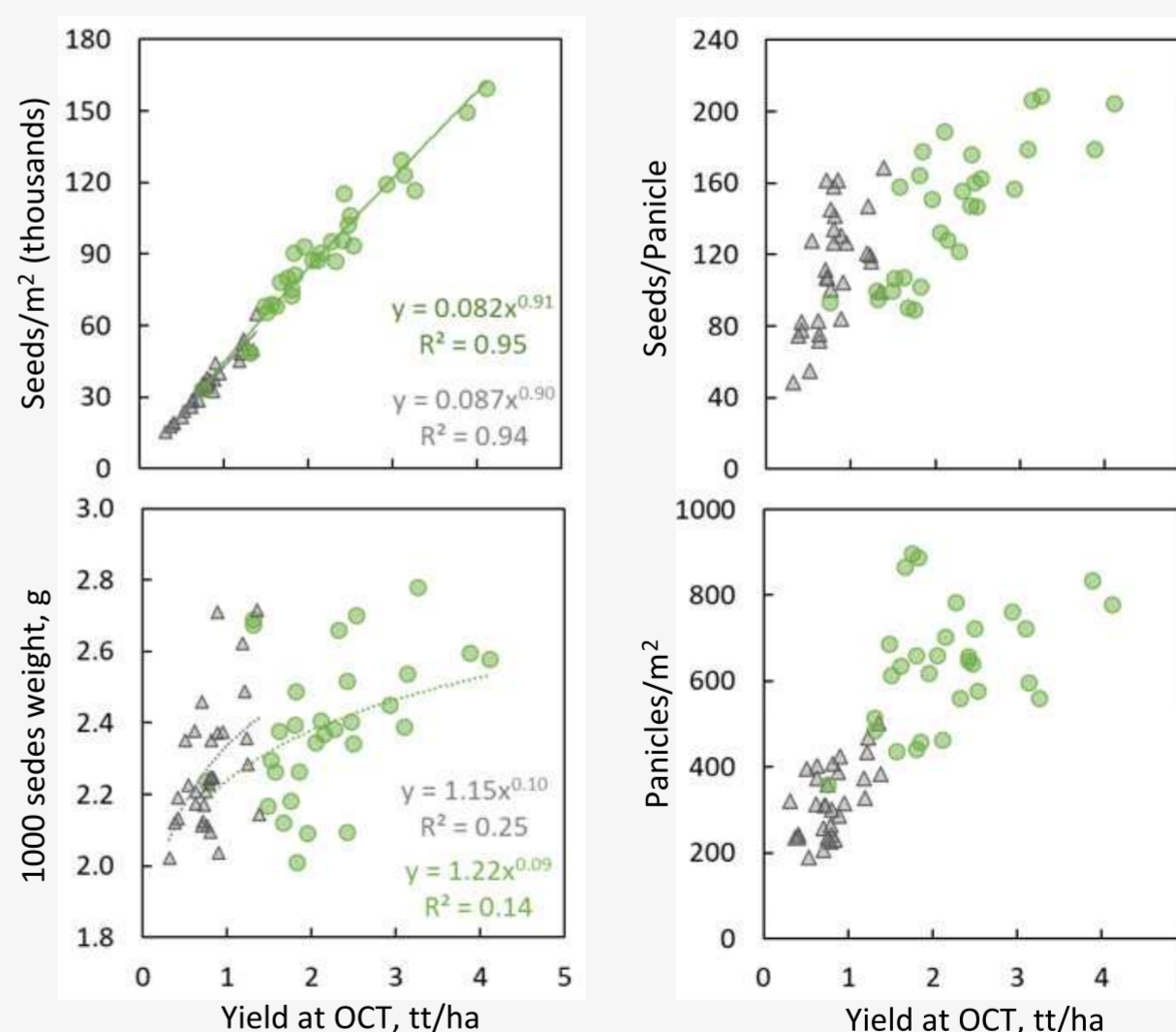
## RESULTS

Yield estimated by manual harvest at OCT was 2.19 and 0.80 tt/ha for annual ryegrass and tall fescue, respectively; more than twice the national average.

Variation in yield at OCT between and within fields was not related to variation in thousand's seed weight, which ranged between 2.0 and 2.8 g. Instead, the number of seeds per m<sup>2</sup> was the main determinant of variation in yield at OCT (Figure 1). In turn, variation in seed number/m<sup>2</sup> was explained more or less equally by changes in spikes or panicles/m<sup>2</sup> and seeds/spike or panicle (Figure 1). No evidence was found of inverse relationships between number of seeds/m<sup>2</sup> and thousand seeds weight.

Substantial differences between yield estimated at OCT and effectively harvested field yield indicate large seed losses, in both species and in all commercial crops. This loss ranged from 30 to 60% in annual ryegrass, and from 40 to 60% in tall fescue. In consequence, field yields ranged between 0.96 and 1.99 tt/ha for annual ryegrass (mean 1.32 tt/ha), and between 0.19 and 0.62 tt/ha for tall fescue (mean 0.39 tt/ha).

Figure 1. Relationship between yield determined manually at optimal cutting time (OCT) and several yield components in tall fescue (grey triangles) and annual ryegrass in commercial rainfed field crops in Uruguay (green circles).



## CONCLUSIONS

- Rainfed annual ryegrass and tall fescue seed production crops in subtropical Uruguay were able to generate high yields when measured at optimal cutting time. Yield variation was largely explained by the number of seeds per m<sup>2</sup>.
- Harvest losses were high: on average, 46% of generated yield was not harvested. Closing this yield gap provides a chance to increase the competitiveness of seed production of annual ryegrass and tall fescue in Uruguay.

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