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

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Abstract

Rainfed field seed yields for tall fescue and annual ryegrass in Uruguay are estimated to be close to 0.33 and 0.98 tt seed/ha, respectively. These values are far lower than those reported for other regions worldwide, what might reflect the subtropical climate, less adjusted crop management or greater losses during harvest. To better understand these differences, we quantified seed yield of 20 tall fescue and annual ryegrass commercial crops in southwestern Uruguay to assess what yield components explain yield variation, and to determine the magnitude of losses between yield estimated by manual harvest at optimal cutting time (OCT) and effectively harvested field yield. In this survey of more than 800 has of rainfed commercial crops, yields estimated at OCT were as high as 1.4 and 4.1 tt seed/ha for tall fescue and annual ryegrass, respectively. These are values comparable to those achieved in more temperate climates, particularly for annual ryegrass. Variation in yield at OCT was largely unrelated to variation in thousand's seed weight, which ranged between 2.0 and 2.8 g. Therefore, the main determinant of yield was the number of seeds per m². We found no evidence of an inverse relationship between these two yield components. As a consequence, yield appears to be largely determined by management factors that determine both the number of panicles (tall fescue) or spikes (ryegrass) per m², and the number of seeds per panicle or spike, rather than by conditions during the filling period affecting individual seeds' weight. High numbers of seeds per m² were associated with crops that attained some 500 panicles or 800 spikes per m² and 160 seeds/panicle or 200 seeds/spike. Despite the comparatively high generated yields, effectively harvested field yields were far lower, averaging 0.4 tt seed/ha in tall fescue and 1.3 tt/ha in annual ryegrass, close to the national average for the 2018-2021 period of 0.33 and 0.98 tt seed/ha for tall fescue and annual ryegrass, respectively. Therefore, a substantial loss of yield was observed between yield estimated manually at OCT and the effective mechanically harvested field yield: between 40 and 60% in tall fescue, and between 30 and 60% in annual ryegrass. What caused such losses is unclear, but could involve the effect of delayed timing in cutting (windrowing) and in harvesting the swath, which would both lead to dehiscence associated with low seed humidity. These processes would determine loss of the earlier maturing, heavier seeds. Further losses could have happened inside the combine, which would involve blowing off lighter seeds. Once causes are identified and solved, there is a chance to increase the competitiveness of seed production of tall fescue and annual ryegrass in subtropical Uruguay by reducing yield losses.

Keywords: yield loss, yield gap, yield components, tall fescue, annual ryegrass, subtropical environment.