

# Intra-Specific Competition and Self-Thinning in Orchardgrass

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**W**hen a grass stand is seeded, thousands of live seeds are spread per square meter. But over time the number of plants declines and individual plant size increases.

It may be assumed that more vigorous plants expand at the expense of plants that are either genetically less vigorous, or are randomly disadvantaged by local biotic and abiotic factors. While it is common practice to plant many more seeds than there will be productive plants, the process of what is referred to as self-thinning is not well understood. For example, is there a natural selection in the sward towards more vigorous and competitive individuals and, importantly, are these individuals also more productive?

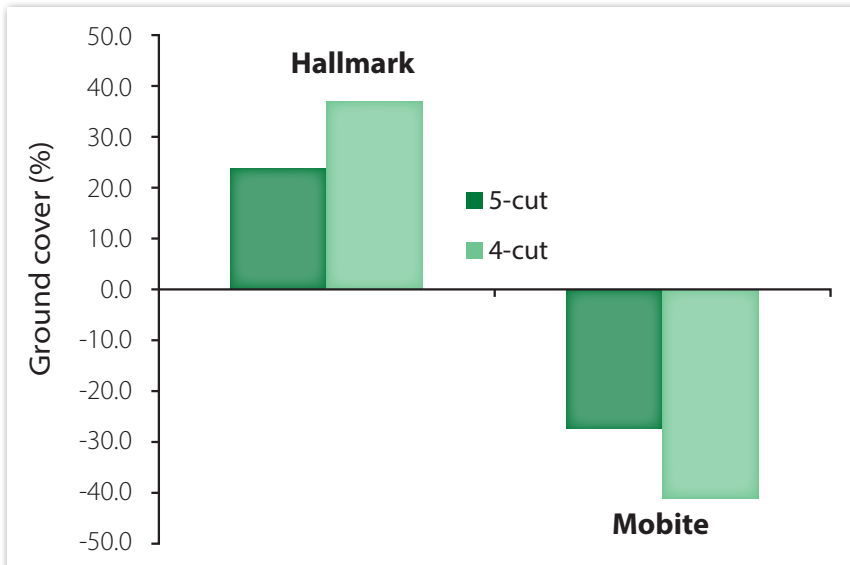
We studied the process of intra-specific self-thinning and the outcome on crop production by tracking the fate of two varieties of orchardgrass seeded together in a mono-specific but binary-cultivar sward. We planted the varieties at equal populations in two configurations: a random broadcast mix or in alternate double rows spaced about 30 cm (12 in) apart (Fig. 1). It was considered that planting in separate rows would reduce competition and provide some measure of protection for the less vigorous variety (assuming they were not identically vigorous), compared to broadcast

seeding. We chose two varieties with contrasting maturity: Hallmark is early maturing and Mobite is late maturing, with about 20 days difference at full flowering between the two. Both varieties were shown to be well adapted to the region in uniform trials and both were recommended for use by farmers as a way to spread out the harvesting period. The two varieties were visually distinguishable from one another by their leaf colour; Hallmark bluish-green and Mobite yellow-green. In our study, we were also interested in whether there would be an overall yield advantage from growing the two varieties together rather than separately, due to a niche separation, in this case temporal niches. Finally, we assessed whether the relative competitiveness of the varieties was altered by timing of harvest. We compared the typical 5-cut system with first harvest in early May with a 4-cut system in which the first cut was delayed until the third week in May, as can happen with poor harvesting weather.

Both varieties established well in the seeding year, and in the following spring, each comprised about 50% of the canopy as measured with an inclined point quadrat frame. By late September in the second harvest year, ground cover of the early-maturing Hallmark increased by over 20% and the late-maturing Mobite decreased a similar amount in



Figure 1. Alternate double row planting of an early (Hallmark) and late (Mobite) maturing variety of orchardgrass. Hallmark is more blue green and Mobite is more lime green in colour.



**Figure 2.** Change in ground cover over two growing seasons in broadcast mixtures comprised of an early (Hallmark) and late (Mobite) maturing variety of orchardgrass under two harvesting regimens measured with an inclined point quadrat (unpublished data).

broadcast stands harvested 5 times per year (Fig. 2). The dominance of the early variety was greatly increased under the 4-cut late harvest system compared to the 5-cut early harvest system; under 4-cut management, Hallmark cover increased by about 40% over its initial level and Mobite cover declined by a similar amount. The increasing dominance of Hallmark was also observed where the two varieties were seeded in alternate rows (not shown). It should be emphasized that despite the apparent benefit for Hallmark, delayed harvest might be considered more ideal for Mobite than for Hallmark based on their phenology. Despite our careful observations we saw no evidence of any plant mortalities among either variety; it seemed rather that plants became smaller and eventually did not grow back after harvest. This implies a non-catastrophic but nonetheless lethal outcome for many plants, in contrast to death caused by acute injury due to extreme cold or drought.

Growing the two varieties together did not result in increased yield compared to growing them separately. Rather, yields of both mixed and alternate-row swards were intermediate between those of monoculture Hallmark and monoculture Mobite, whether harvested four or five times (Fig. 3). The separation of temporal niches did not offer an advantage in stand productivity for the grass variety mixes.

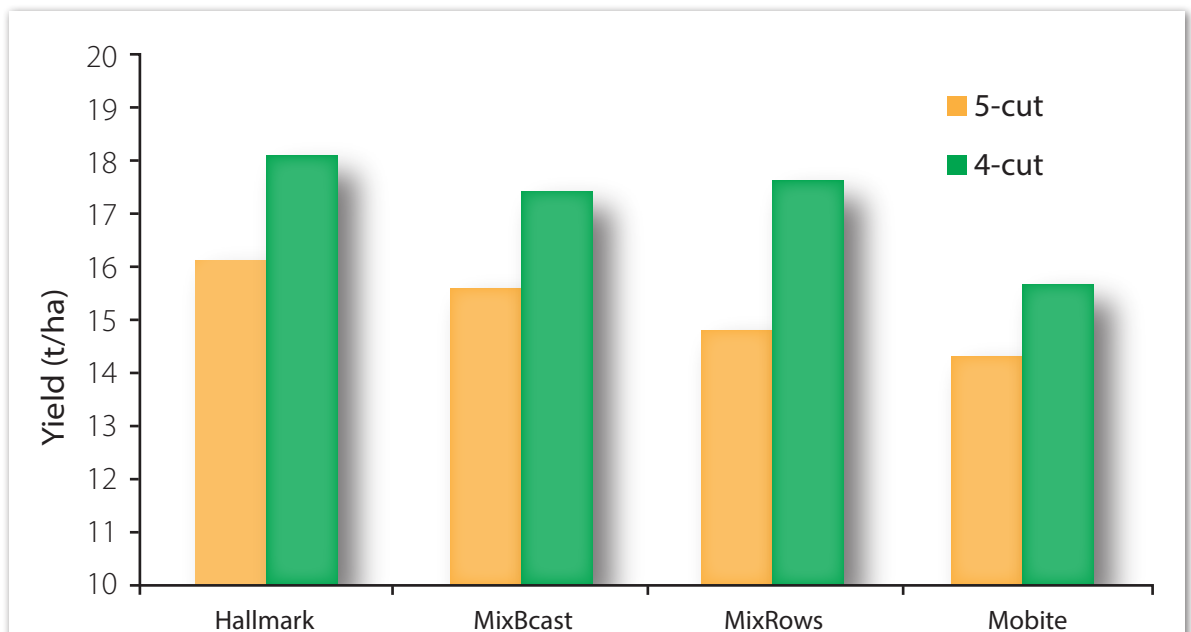
This study emphasizes the importance of intraspecific competition which often goes unnoticed in grass stands. We surmise that the early maturing variety was more competitive in early spring due to more aggressive growth and taller plants, and was thus able to crowd out the later maturing variety. The late maturing variety was programmed for better growth potential later in the spring, when more of the space was already occupied and the overall growing conditions were somewhat less favourable. Delaying the first cut allowed

more time for the early variety to dominate over the late variety. Thus the study showed that harvest management may affect the relative competitive ability of grass varieties and may influence composition of swards. 🌿

**References available online at [www.farmwest.com](http://www.farmwest.com)**

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**Figure 3.** Annual yield (average of first and second production years) of an early (Hallmark) and late (Mobite) maturing orchardgrass variety grown alone or in broadcast and alternate-row mixes under a 4- and 5-cut harvesting schedule (unpublished data) (for T/ac multiply by 0.45).