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Bruce E. Coulman
University of Saskatchewan, Canada

Cheryl Duncan
Agriculture and Agri-Food Canada, Canada

Tim Nelson
Agriculture and Agri-Food Canada, Canada

Arend Kleinhout
Holtug Strandvej, Denmark

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Establishment of perennial forage crops using fast-growing short-lived grasses as companion crops

Bruce Coulman¹, Cheryl Duncan², Tim Nelson², Arend Kleinhout³

¹University of Saskatchewan, 51 Campus Drive, Saskatoon, Sk. S7N 5A8 Canada E-mail: bruce.coulman@usask.ca;

²Agriculture and Agri-Food Canada, 107 Science Place, Saskatoon, Sk S7N 0X2 Canada; ³Holtug Strandvej 62, DK-4660, Store Heddinge, Denmark.

Key words : westerwolds ryegrass ,companion crop ,plant density ,dry matter yield

Introduction In the prairie region of western Canada , companion crops , usually small grain cereals , are often seeded with slow establishing perennial forage species to provide economic return in the year of establishment . Westerwolds ryegrass (*Lolium multiflorum*) is a fast establishing , high yielding forage grass that behaves as an annual in western Canada , which has the potential for use as a companion crop . Previous work showed that westerwolds ryegrass reduced the establishment of several grasses in the drier soil zones of western Canada (Jefferson et al .2000 ; Jefferson et al .2005) . The objective of this study was to compare the density and forage yields over three years of newly seeded stands of alfalfa (*Medicago sativa*) , meadow brome (*Bromus riparius*) and alfalfa-meadow brome mixtures established with and without a Westerwolds ryegrass companion crop in two soil zones .

Materials and methods Trials were seeded at Saskatoon ,Sk (dark brown chernozem) and Melfort ,Sk (thick black chernozem) in May of 2003 and 2004 in randomized complete block designs with four replicates . Perennial species (alfalfa cv AC Grazeland and meadow brome cv Paddock) were seeded at a rate of 100 seeds m⁻¹ in rows spaced 30 cm in plots of 1.2×6.0 m . In the alfalfa-meadow brome mixture treatment , 50 seeds m⁻¹ of each species were used . Westerwolds ryegrass cv Avance was mixed with the perennial species at rates of 30 , 12 and 0 seed m⁻¹ . In the year of establishment , dry matter yields (one or two cuts) and stand densities of each species were determined . Dry matter (DM) yields (two cuts each year) were taken in the two years following establishment . Yields of treatments with westerwolds ryegrass companion crops were expressed as a percentage of the same species with no companion crop .

Results The presence of a westerwolds ryegrass companion crop significantly increased the DM yield of meadow brome and alfalfa stands in the year of establishment (Table 1) . In the year after establishment , DM yields were reduced in meadow brome stands established with a companion crop , while alfalfa DM yields were only reduced at the highest companion crop seeding rate . Year 3 and total (3 year) DM yields were not different between the two companion crop and no companion crop treatments in both alfalfa and meadow brome stands . For meadow-brome alfalfa mixtures (data not shown) , results were identical to the pure meadow brome stands . For stand densities (data not shown) , the number of established alfalfa and meadow brome plants was usually reduced under the westerwolds ryegrass companion crop , regardless of the seeding rate .

Table 1 Dry matter yields of meadow brome and alfalfa stands established with a Westerwolds ryegrass companion crop expressed as a percentage of the no companion treatment .

Species	WR seeding rate (seeds m ⁻¹)	Yield (% of no WR companion crop)			
		Seeding year	Year 2	Year 3	Total (3 years)
Meadow brome	30	156*	58*	108	98
	12	214*	77*	98	100
	0 (DM yield kg ha ⁻¹)	2067	9540	5819	17425
Alfalfa	30	191*	78*	90	98
	12	154*	84	93	98
	0 (DM yield kg ha ⁻¹)	2871	8418	10095	21384

WR= Westerwolds ryegrass ; * Significantly (p<0.05) different from the no companion crop treatment .

Conclusions The use of a westerwolds ryegrass companion crop , seeded with meadow brome or alfalfa increased DM yields in the seeding year and decreased yields in the second year of the stand . Third year yields and three year total yields were not different from a seeding where no companion crop was used . Use of a westerwolds ryegrass companion crop provides increased forage yields in the establishment year without compromising total forage yields over the life of the stand .

References

- Jefferson , P .G . , Coulman , B .E . and Kielly , G .A . 2000 . *Agron . J.* 92 : 1291-1293 .
Jefferson , P .G . , Lyons , G . , Pastl , R . and Zentner , R .P . *Can . J . Plant Sci .* 85 : 135-146 .