Yield components in annual ryegrass and oats grown in association and monoculture

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Introduction Earliness of oats and higher growth rate of annual ryegrass later in the season explain the higher forage yield of annual ryegrass+oats association over monocultures (Améndola & Morales, 1997). However, changes in yield components of the species grown in association compared to monoculture have not been explored. This study aimed to determine leaf, stem and dead matter yield in annual ryegrass and oats when grown in association and monoculture at different nitrogen (N) levels.

Materials and methods Annual ryegrass (AR) and oats (O) in monoculture and associated (AR+O) were grown with 4 different levels of N: 0, 50, 100 or 150kg/ha. Experimental design was completely random with 5 replicates; the experimental unit was a pot with 2 plants of each species in monoculture and 1 of each species in the association. Three cuts were done at 5cm high. Statistical analyses were on leaf, stem and dead matter yields (dry matter basis) from the three cuts, comparing yield components in annual ryegrass grown in monoculture versus in association and in oats grown alone versus in association.

Results AR+O showed 4 and 17% higher forage yield, respectively, across N levels than O and AR (data not shown). Annual ryegrass grown in AR+O compared to AR showed 27, 56 and 68% higher ($P<0.05$) leaf, stem and dead matter yields, respectively. In both AR+O and AR, annual ryegrass reached the highest leaf and dead matter yields with 100kg N/ha (Table 1). Stem yield of oats was 30% higher when grown in monoculture than in association, and in both O and AR+O the highest stem yield of oats was reached with 100kg N/ha.

Table 1 Yield (g/m^2; sum of 3 cuts) by components in annual ryegrass and oats in monoculture and association at different levels of added N

	N level (kg/ha)	AR	AR+O	Mean	O	AR+O	Mean
(a) Leaf	0	133	325	279 b	114 b	151 ab	132
	50	298	390	344 b	184 ab	222 a	203
	100	390	455	422 a	238 a	157 ab	197
	150	422	536	479 a	238 a	162 ab	200
	Mean	336 b	427 a		193	173	
(b) Stem	0	49	81	65	106	124	114 b
	50	65	124	94	168	151	159 ab
	100	81	103	92	222	130	176 a
	150	87	130	108	220	146	183 a
	Mean	70 b	109 a		179 a	138 b	
(c) Dead matter	0	5	5	5 b			
	50	11	22	16 b			
	100	22	43	32 a			
	150	27	38	32 a			
	Mean	16 b	27 a				

Conclusions Annual Ryegrass yielded higher leaf, stem and dead matter when grown in association with Oats than in monoculture. This response was associated with higher forage yield of Annual Ryegrass+Oats mixture than monocultures. The higher yield of the association came from changes in yield components and not only from different growing cycle.

References

Amendola Massiotti, R. & B. Morales Méndez (1997). Competition between oats and annual ryegrass under grazing. *Proceedings of 18th International Grassland Congress,* Saskatoon, Saskatchewan, Canada, 119- 120