The effect of harvest management on forage production and self-reseeding potential of Italian ryegrass (*Lolium multiflorum* L.)

P.W. Bartholomew and R.D. Williams
USDA-Agricultural Research Service, Grazinglands Research Laboratory, PO Box 1730, Langston University, Langston, OK 73050, USA, Email: PBarthol@luresext.edu

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IntroductionIf Italian ryegrass (*Lolium multiflorum L.*) (IRG) can be managed to produce a seed output sufficient for effective re-establishment, without compromising forage yield, it may provide an alternative to perennial cool-season grasses in the Southern Great Plains of the U.S.A. The reduction in cost of replanting and avoidance of cultivation offered by a self-seeding crop may be particularly useful in low-input production systems. We examined the effect of dates of initial harvest in spring and of partial harvests on forage yield, seed output and re-establishment of Italian ryegrass.

Materials and methods Italian ryegrass was oversown without tilling into dormant unimproved warm-season pasture in the autumn of 2002. In spring of 2003 ("year 1"), initial harvest date treatments, 17 April (H1), 1 May (H2) and 15 May (H3), were combined with forage offtake treatments of 100, 76 and 53% of available forage at each harvest. The different offtake treatments were achieved through use of modified blades on a sickle-bar mower. Following the initial harvest, IRG was allowed to regrow, set seed and to re-establish from seed deposited without further management input. Re-establishment was measured at the end of year 1 and forage production at the end of April 2004 ("year 2"). The effectiveness of reseeding in year 2 was measured by counts of seed deposition in July and of seedling emergence in September.

Results Early harvest and reduced offtake decreased forage yield at first harvest in year 1, but increased the amount of seed deposited and number of seedlings re-established in year 1 (Table 1). There was a residual effect of harvest date and offtake treatments in year 1on forage production of the self-seeded crop that was manifested in a lower mean yield with a late harvest and with the increased offtake treatments. However, in year 2 there was no significant difference ($P>0.05$) in seed deposition, mean seed weight or emerged seedling numbers among year 1 harvesting treatments. Mean seedling emergence by mid-October of year 2 was 91seedlings/m^2.

Table 1 Effects of first year initial harvest (H1, 17 April; H2, 1 May; H3,15 May) and proportion of offtake on forage yield, seed deposition and re-establishment of Italian ryegrass

	Treatments	Forage yield (MT/ha)		Seed deposition (seeds/m^2)		Re-establishment (seedlings/m^2)	
		Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Initial harvest	H1	1.03	1.78	7510	2510	4990	92
	H2	1.90	1.93	5410	2020	2800	110
	H3	2.87	1.58	2460	1670	710	71
LSD ($P<0.05$)		0.385	0.219	2982	NS	1767	NS
Offtake (%)	53	1.39	1.82	6530	2120	3540	70
	76	1.86	1.79	5800	2040	2960	105
	100	2.54	1.69	3050	2050	2010	98
LSD ($P<0.05$)		0.214	0.134	1387	NS	943	NS

Conclusion Italian ryegrass re-established satisfactorily in its first season of self-seeding and forage yield at the end of April in year 2 was comparable with that obtained from drilled IRG harvested at the same time. However, this satisfactory early-season growth did not translate into an effective second cycle of self-seeding; on average only 4% of seeds deposited by mid-July had emerged as seedlings by mid-October. The seedling population achieved by self-seeding in year 2 was on average 22% of the lowest population achieved in year 1, and only 15% of that produced by drilling IRG at 30kg/ha in the autumn. The poor re-seeding performance in year 2 may have resulted from a combination of high seedling populations, and associated low seed weight, and from premature germination arising from greater than average rainfall in June and July in year 2. The results demonstrate the uncertainty of self-seeding as a means of pasture renewal.