Effect of Cultivar, Row Spacing and Seeding Rate on Alfalfa Hay Yield

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Key words : Alfalfa , cultivar , row spacing , seeding rate , forage yield

Introduction Density of alfalfa stand required for high yield varies as the area and climatic conditions change (Tesar and Marble , 1988 ; Kephart et al , 1992) . Little information is available on the effects of cultivar , row spacing and seeding rate on alfalfa hay yield in the western China . A field experiment was conducted in Yunmen City , Jiuquan , Gansu Province , China to evaluate the effects of cultivar , row spacing and seeding rate on alfalfa hay yield .

Materials and methods The field experiment was conducted at Yumen Daye alfalfa forage production site located in Jiuquan , Gansu . Three cultivars of alfalfa were established in the spring of 2003 . Initial chemical characteristics of the soil (0-20 cm) were : pH 8 .5 , organic matter 0 .74g kg^{-1} dry matter , available N 25 .0 mg kg^{-1} , available P 4 .3 mg kg^{-1} (Olsen method) , available K 126 .0 mg kg-1 (NH4Ac) , total salt 21 .8 g kg^{-1} . The experiment utilized a randomized complete block design with three replications . Each replication had 24 treatment combinations . Treatments were arranged as 3×2×4 factorial combination of three cultivars (C) [Zhongmu No .1 , Gannong No .3 , WL232] , two row spacings (R) [15 cm , 25 cm] and four seeding rates (S , kg ha^{-1}) [14 , 20 , 26 , 32] . Individual plot size was 2 .0 m by 5 .0 m with 1 .5-m spacing between the adjacent plots .

Table 1 *Average forage hay yield (kg DM ha^{-1}) in three cultivars , two row spacing and four seeding rates in* 2004 *and* 2005 .

Factor	Level	Forage yield	
		2004	2005
Cultivar	Zhongmu No . 1	15060a	19320a
	Gannong No . 3	14550a	18525a
	WL232	15075a	17310a
Row space	15cm	17535a	19350a
	25cm	12255b	17415b
Seeding rate	14 kg ha^{-1}	13350c	17535b
	20 kg ha^{-1}	14580b	18300b
	26 kg ha^{-1}	15675a	21060a
	32 kg ha^{-1}	15975a	16650b

Note : Different letters in the same factor in each year means significantly different ($p<0.05$) according to the Duncan's Multiple Range Test .

Table 2 *Statistical probabilities of F test for main effects , and their interactions on forage yield .*

Treatments	df	2004	2005
Cultivar (C)	2	0 .83ns	1 .56ns
Row space (R)	1	194 .57**	4 .23*
Seeding rate (S)	3	9 .90**	4 .17*
C×R	2	9 .53**	0 .61ns
C×S	6	6 .76**	0 .65ns
R×S	3	2 .62ns	1 .44ns
C×R×S	6	4 .96**	0 .23ns

Note : ns and ** mean not significant and significant at the 0 .01 probability level , respectively .

Results The results indicated that both row spacing and seeding rates had significant effects on forage yield in two years , but the yield was not significantly different among three cultivars . All interaction effects except for row spacing × seeding rate were significant in the first production year , but were not significantly different in second year .

Conclusions In the west of Gansu , China , a seeding rate of 26 kg ha^{-1} and a row spacing of 15cm have the highest alfalfa forage yield . There was no significant difference in forage yield among Zhongmu No .1 , Gannong No .3 , WL232 cultivars , but Zhongmu No .1 as a salt tolerance cultivar offered slightly higher yield than other two cultivars .

References

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