Effects of Between Row and Within Row Spacing on Alfalfa Seed Quality

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Introduction Proper between row and within row spacing is essential for optimizing alfalfa seed yields and stand longevity . However , few reports have detailed the effects of between row and within row spacing on alfalfa seed quality . The experiment was designed to determine the effects of between row and within row spacing on alfalfa seed germination and hard seed percentage .

Materials and methods The field experiment was conducted at the Hexi Corridor , northwestern China (39°37′N , 98°30′E , altitude 1480 m) from 2004 to 2006 . The experiment utilized a randomized complete block design with four replications . Treatments were arranged as 3 × 4 × 3 factorial combination of three between row spacings [60 cm , 80 cm , and 100 cm] , four within row spacings [15 cm , 30 cm , 45 cm , and 60 cm] and three alfalfa varieties [WL232HQ , Derby , and Algonquin] . Individual plot size was 4 .5 m by 8 m with 1 .5 m spacing between the adjacent plots . Four replicates of 100 seeds harvested from each plot were evaluated by standard germination test .

Results Seeds from between row and within row spacing treatments showed germination exceeded 90% for non-hard seed during three years , although these differences were not significant (Table 1) . The between row and within row spacing treatments did not produce significant differences in hard seed . On the other hand , the variety Algonquin produced significantly more hard seeds in three years . The percentage of hard seeds ranged from 14 .0% to 42 .0% and was quite variable among three years , which were probably due to the different weather conditions especially during anthesis and seed set .

Table 1 *Average values for standard germination and hard seed** .

Treatments		Hard seed (%)			Germination(%)		
		2004	2005	2006	2004	2005	2006
Between row spacing treatments	60cm	36 .8a	15 .7a	26 .4a	99 .2a	97 .6a	93 .6a
	80cm	37 .6a	16 .6a	26 .3a	98 .9a	97 .4a	93 .9a
	100cm	40 .3a	14 .1a	23 .0a	99 .0a	97 .0a	95 .0a
Within row spacing treatments	15cm	38 .7a	15 .0a	25 .2a	98 .5a	96 .9a	94 .3a
	30cm	37 .5a	14 .9a	24 .1a	99 .3a	97 .4a	93 .8a
	45cm	37 .8a	15 .7a	26 .1a	99 .0a	97 .8a	93 .7a
	60cm	39 .0a	16 .3a	25 .5a	99 .2a	97 .2a	94 .8a
Variety treatments	WL-232HQ	35 .1b	14 .0b	21 .6b	99 .0a	97 .7a	93 .7a
	Derby	37 .6b	14 .3b	22 .9b	99 .2a	96 .9a	94 .1a
	Algonquin	42 .0a	18 .1a	31 .2a	98 .9a	97 .4a	94 .7a

* Means in the same column with different letters are significantly different ($P \leqslant 0.05$) .

Conclusions There were no significant adverse effects differentiated by low or high density on seed germinability during three years and seeds from every treatment showed higher germination than 90% . This is probably due to the fact that plants with a small reproductive load , such as alfalfa , can maintain seed quality to a greater extent than plants with a large reproductive load (Iannucci , 2002) .

Reference

Iannucci , A . , N . Di Fonzo , and P . Martiniello . 2002 . Alfalfa (Medicago sativa L .) seed yield and quality under different forage management systems and irrigation treatments in a Mediterranean environment . *Field Crops Res* . 78 , 65-74 .