Effects of Different Plant Density on Seed Yield of Mongolia Wheatgrass

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Introduction Plant population density is the most important factor affecting seed production , especially for perennial crop (Askarian et al . , 1995 ; Chen Shu-ming et al . , 2005) . The optimal plant density can not only enhance the seed yield and quality , but also be beneficial to weed control , hence decreasing the cost of field management and improving the production effectiveness . The plant population density is mainly decided by row spacing and sowing rate . *Agropyron mongolicum* Keng . cv . Mengnong No .1 is a new variety with high drought and cold resistance , which is a favorable material to establish artificial pasture in arid and semi-arid areas in northern China . The purpose of the study is to determine the suitable row spacing and sowing rate for the pasture establishment .

Material and methods The test material was *Agropyron mongolicum* Keng . cv . Mengnong No .1 from Inner Mongolia Agricultural University . The Chinese breeding variety registration number was 305 . The purity of the seed was 82 .2% , the thousand-seed weight was 2 .2g , and the emergence number was 322 seedlings/g . The test was conducted on the Forage Experimental Station of Inner Mongolia Agricultural University in Hohhot . The row spacing was R1=19 cm , R2=38 cm , R3 =57 cm respectively , sowing rate was S1=0 .5 g/m , S2=1 .0 g/m , S3=2 .0 g/m , respectively . The length of sowing rows was 5 m . There were 5 sowing rows in each plot . The plots size varied from 5~15m^2 due to the different row spacings . There were 9 treatments with 3 replicates , a total of 27 plots with a randomized block design . The sowing date was on July 22 , 2004 . The total tillers number , reproductive tillers and seed yield were measured in the maturity period for three consecutive years from 2005 to 2007 .

Results In sowing year , the total tillers number was the highest in treatment R1S3 (19 cm+2 .0 g/m) , but lowest in treatment R3S1 (57 cm+0 .5 g/m) . The average tiller numbers were 8287 tillers /m^2 and 906 tillers /m^2 , respectively , which was mainly related to row spacing and sowing rate (Table 1) . The more seeds sowed , the more seedlings developed .

Table 1 *Test results of different combinations in three years .*

Treatment combinations	Row spacing (cm)	Plots areas (m^2)	Total tillers /m^2	Performance seed yield(g/m^2)		
				2005	2006	2007
R1S1	19	5	2264	24 .1 c	24 .2 c	32 .3 c
R1S2	19	5	4821	12 .0 d	13 .2 d	23 .4 d
R1S3	19	5	8287	7 .4 e	6 .6 e	7 .1 e
R2S1	38	10	1122	64 .0 a	56 .7 a	61 .8 a
R2S2	38	10	2152	66 .4 a	58 .6 a	62 .4 a
R2S3	38	10	4006	65 .2 a	57 .6 a	62 .2 a
R3S1	57	15	906	44 .1 b	42 .4 b	42 .6 bc
R3S2	57	15	1912	45 .4 b	46 .7 b	52 .4 b
R3S3	57	15	3756	48 .6 b	52 .2 ab	51 .4 b

It seeded normally in the following year in the plots with row spacing of 38 cm and 57 cm . The seed yields were the highest in treatment R2S2 (38 cm+1 .0 g/m) as 66 .4g/m^2 , 58 .6g/m^2 and 62 .4g/m^2 for years 1-3 and the lowest in treatment R1S3 (19 cm+2 .0 g/m) as 7 .4 g/m^2 , 6 .6 g/m^2 and 7 .1 g/m^2 for three years . There was nine times difference between the highest and the lowest seed yields . The seed yields ranked as R2S2 > R2S3 > R2S1 > R3S3 > R3S2 > R3S1 > R1S1 > R1S2 > R1S3 (Table 1) . Results showed that combinations of row spacing and sowing rate determined the plant density and may affect the total branches and reproductive branches which directly affect the seed yield . It appears that row spacing was more critical than sowing rate . The seed yield was much lower with the narrow row spacing although more total branches were produced , but less reproductive branches were developed . Since second year after sowing , the total branches and reproductive branches in the field tended to be stable , and seed yield was similar .

Conclusions The row spacing had greater impact on plant density than sowing rate , which affecting seed yield and quality of *Agropyron mongolicum* Keng . cv . Mengnong No .1 . The optimal row spacing for the seed production was 38cm , and the optimal sowing rate was 1 .0g/m .

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