Seeding Rate and Row-Spacing Effects on Seed Yield and Yield Components of *Leymus chinensis* (Trin.) Tzvel.

Yunhua Han
Northwest A&F University, China

Xianguo Wang
China Agricultural University, China

Tianming Hu
Northwest A&F University, China

Zhenlei Zhu
China-Africa Agriculture Investment Co., Ltd., China

Zhengwei Wang
Northwest A&F University, China

See next page for additional authors

The XXII International Grassland Congress (Revitalising Grasslands to Sustain Our Communities) took place in Sydney, Australia from September 15 through September 19, 2013.

Proceedings Editors: David L. Michalk, Geoffrey D. Millar, Warwick B. Badgery, and Kim M. Broadfoot

Publisher: New South Wales Department of Primary Industry, Kite St., Orange New South Wales, Australia

Presenter Information
Yunhua Han, Xianguo Wang, Tianming Hu, Zhenlei Zhu, Zhengwei Wang, and Ying Wang

Seeding rate and row-spacing effects on seed yield and yield components of *Leymus chinensis* (Trin.) Tzvel.

Yunhua Han [A], Xianguo Wang [B], Tianming Hu [A], Zhenlei Zhu [C], Zhengwei Wang [A] and Ying Wang [D]

[A] College of Animal Science and Technology, Northwest A&F University, Taicheng Road 1, 712100, Shanxi Yangling, People's Republic of China
[B] Institute of Grassland Science, China Agricultural University, Yuanmingyuan West Road 2, 100193, Beijing, People's Republic of China
[C] China-Africa Agriculture Investment Co., Ltd, 52 International Communication Plaza South Street of Zhongguancun, 100081, Beijing, People's Republic of China
[D] Jiuquan Agricultural Science Research Institute, North Street 53, Suzhou District, Jiuquan,735000, Gansu, People's Republic of China

Contact email: grasschina@126.com.

Keywords: *Leymus chinensis*, seeding rate, row spacing, seed yield.

Introduction

Chinese sheepgrass (*Leymus chinensis* (Trin.) Tzvel.) is widely distributed in the eastern portion of the Inner Mongolian Plateau and the Songnen Grassland of China. This grass is highly salt, cold and drought tolerant and has been the major source of forage for cows and other ruminants in China (Gao *et al*. 2012). Seed yield of this grass is very low under native conditions because of the low heading percentage and percentage of seed set (Wang *et al*. 2010). The Hexi Corridor, located in China's northwestern Gansu Province, is the seed production center of China because of its dry, sunny climate and favorable irrigation conditions. Our field study was conducted to determine the optimum seeding rate and row-spacing for seed production of Chinese sheepgrass in the Hexi Corridor, where this grass has not been previously grown.

Materials and methods

The study site was located at the China Agricultural University Grassland Research Station (39°37´N, 98°30´E). Soil at the site is Mot-Cal-Orthic Aridisols, classified as Xeric Haplocalcids in the USDA soil classification system. Initial chemical characteristics of the soil (0-30 cm) were pH (8.24), organic matter (9.00 g/kg), available P (5.67 mg/kg), available K (83.40 mg/kg) and available N (26.90 mg/kg). The study was conducted in 2011 and 2012 using a randomized block design with four replications. A total of 12 treatments were used: three seeding rates (0.1, 0.2 and 0.3 g/m as pure live seeds) and four row spacings (30, 50, 70 and 90 cm). Individual plot size was 3.0 m by 6.0 m, with 0.8-m spacing between adjacent plots. Before planting, 225 kg/ha $(NH_4)_2HPO_4$ was broadcast and incorporated into the soil. In each crop year, plots were irrigated five times, and 6.0 g/m pure N was applied as urea with about 1/3 applied in the fall and the rest applied in spring.

Results and discussion

Seeding rate did not affect any of the seed yield and yield components measured (data not shown). Seed yield and yield components varied among years, and the interactions of treatments were not significant (data not shown). Actual seed yields (ASY) with narrow-row spacing (30 and 50 cm) were higher than wide-row spacing (70 and 90 cm) for both years. Potential seed yield (PSY) increased from 1,103 kg/ha with 90-cm spacing to 2,028 kg/ha with 30-cm spacing in 2011 and from 1,196 to 2,032 kg/ha, respectively, in 2012. These results were attributable to a greater spike number/m^2

Table1. Mean values for actual seed yield (ASY), potential seed yield (PSY), spike number/m^2(SN), heading percentage (HP), seed set percentage (SSP), flower number per spikelet (FNS) and seed number per spikelet (SNS) under four row-spacing treatments in 2011 and 2012.

Row spacing	ASY (kg/hm^2)		PSY (kg/hm^2)		SN		HP (%)		SSP (%)		FNS		SNS	
	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
30	390ab[†]	617a	2028a	2032a	843a	1048a	24a	34a	35a	54a	108a	104a	70a	55a
50	432a	589ab	1295b	1841b	524b	838b	22a	36a	36a	58a	111a	101a	70a	58a
70	304b	414b	1281b	1267c	488b	587c	25a	36a	35a	62a	110a	95a	70a	58a
90	314ab	437b	1103b	1196c	441b	506c	27a	34a	37a	61a	110a	103a	69a	61a
Average	360	514	1427	1584	574	745	24	35	36	59	110	100	70	58

[†]Means in the same column with different letters are significantly different ($P \leq 0.05$).

(SN) with narrow-row spacing than wide-row spacing because SN is the most important component of seed yield in *L. chinensis* (Wang *et al*. 2010).

Spike number/m^2 (SN) was influenced significantly by year, row spacing and their interaction, and decreased with an increase in row spacing (Table 1). Heading percentage (HP), seed set percentage (SSP), flower number per spikelet (FS) and seed number per spikelet (SNS) were affected by year only. HP and SSP were higher in 2012 than 2011; however, HP and SSP were higher compared to a natural grassland. In contrast, FS and SNS were lower in 2012 than 2011.

Acknowledgments

This research was funded by the National Science and Technology Pillar Program (2011BAD17B01-02, 05), Modern Agro-Industry Technology Research System (CARS-35), Special Fund for Agro-Scientific Research in the Public Interest (200903060) and Beijing Key Laboratory of Grassland Science.

References

Gao S, Wang J, Zhang Z, Dong G, Guo J (2012) Seed production, mass, germinability, and subsequent seedling growth responses to parental warming environment in *Leymus chinensis*. *Crop and Pasture Science* **63**, 87-94.

Wang JF, Xie JF, Zhang YT, Gao S, Zhang JT, Mu CS (2010) Methods to improve seed yield of *Leymus chinensis* based on nitrogen application and precipitation analysis. *Agronomy Journal* **102**, 277-281.