



University of Kentucky
UKnowledge

International Grassland Congress Proceedings

XXI International Grassland Congress / VIII
International Rangeland Congress

Experimental Study on Sowing Seeds by Air-Stream Metering Mechanism

Zhonghua Li

China Agricultural University, China

Decheng Wang

China Agricultural University, China

Guilin Liu

Chinese Academy of Agricultural Mechanization Sciences, China

Follow this and additional works at: <https://uknowledge.uky.edu/igc>



Part of the [Plant Sciences Commons](#), and the [Soil Science Commons](#)

This document is available at <https://uknowledge.uky.edu/igc/21/14-2/21>

The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

This Event is brought to you for free and open access by the Plant and Soil Sciences at UKnowledge. It has been accepted for inclusion in International Grassland Congress Proceedings by an authorized administrator of UKnowledge. For more information, please contact UKnowledge@lsv.uky.edu.

Experimental study on sowing seeds by air-stream metering mechanism

Zhonghua Li¹, Decheng Wang¹, Guilin Liu².

¹China Agricultural University, +0086 10 62737147. E-mail: joylzh@126.com. ²Huhhot branch of Chinese Academy of Agricultural Mechanization Sciences.

Key words air-stream, metering mechanism, experimental, uniformity, seeds

Introduction In China, grassland has many serious problems, such as degeneration, desertification and salinization and so on. S. J. Miles et al (1999) have studied a lightweight dibber drill, which can be capable of precisely metering small doses of granular pesticide with each seed. Tai Shuyun et al (2003) have designed an incline outer-fluted feed with upper distribution which can satisfy the planting demands of wheat precise seeding. At present, due to many merits, the outer groove-wheel metering mechanism are still inclined to sowing herbage and the crops in China. But, it had some disadvantages. This article proposed a new air-stream metering mechanism.

Materials and methods The air-stream metering mechanism (Figure 1) consisted of the outer groove-wheel metering framework and air-stream distributor. The outer groove-wheel metering framework was composed of two-section metering wheel and agitator machine. It has two kinds of operating condition, namely, is small sheave and big sheaves sowing state. It can sow big granule seeds such as maize, as well as small granule seeds such as *Medicago sativa* and *Onobrychis viciifolia* Scop. An air-stream distributor was developed in such a way that the circular plate held perpendicular to the airflow direction, intercepted and divided it into sub-streams. In order to prove the general versatility, the article chose seeds of *Medicago sativa*, seeds of *Elymus dahuricus* and seeds of *Zea mays* to experiment.

Table 1 Results of the metering's performance.

Type of seed	flow rate (kg/hm ²)	Stability of feeding rate in total				Stability of feeding rate between rows				Seed damage rate(%)	Productivity (hm ² /h)
		\bar{X} (g)	Δ' (%)	S (g)	V (%)	\bar{x} (g)	Δ (%)	s (g)	v (%)		
<i>Medicago sativa</i>	12.60	49.38	5.08	1.04	2.10	2.74	12.76	0.11	4.15	0.92	3.60
<i>Elymus dahuricus</i>	8.00	32.73	7.91	1.07	3.26	1.82	26.22	0.15	8.13	1.61	3.60
<i>Zea mays</i>	91.00	388.36	8.35	13.25	3.41	21.58	24.13	1.57	7.29	1.56	3.60

Results and discussion It recorded the weight of seeds collected at the outlet tubes and computed the indexes (Table 1), such as stability of feeding rate between rows and stability of feeding rate in total and so on. All the indexes achieved the requirements (JB 5159-91).

Conclusions Show in the experiment, the air-stream distributing feed mechanism could sow the legumes forage seeds (*Medicago sativa* seeds), the gramineous forage seeds (*Elymus dahuricus* seeds) and the crop seeds (*Zea mays* seeds), and its general versatility was well. The indexes of the uniformity of distribution were better than the standard, and it could sow equally. But the experiment fixed some parameters, namely, the velocity of fan rotate, speed of land-wheel and moisture rate of seeds were all changeless in the experiment. Hence, it should do some more experiments to research the influence of these parameters to the uniformity of distribution.

References

- S. J. Miles; J. N. Reed. Dibber Drill for Precise Placement of Seed and Granular Pesticide [J]. *J. agricultural Engineering Research*, 1999, 74: 127-133.
- Tai Shuyun, Fan Jie'e, Liu Xiangzhong. Design of Incline Outer-Fluted Feed with Upper Distribution. *Chinese Agricultural Mechanization*, 2003, (4): 34-35.
- Zhang Bobing. Mechanical Engineering of Modern Planting [M]. Beijing: China machine press, 1997: 326-366.
- The National Standard on Mechanization of China. JB 5159-91, *Seed Drill of Forage-Technical Term* [S].

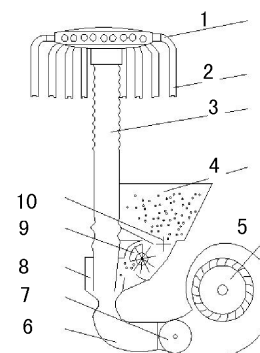


Figure 1 Structural diagram of metering mechanism

1. Distributor 2. Seed delivery tube 3. Diffuser 4. Seed hopper 5. Fan 6. Manifold 7. Butterfly valve 8. Venturi cone 9. Cell wheel 10. Agitator shaft.