Technical Notes

A comparison of two furrow opener-depth control assemblies for seeding forage grasses

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Abstract

Seed from 45 strains of grass were sown with 2 drills fitted with different furrow openers and depth control devices. Standard (34-cm diameter) double disk openers (Kirchman (Lilliston Melroe)) fitted with depth control bands 2 cm wide and 5 cm smaller in diameter than the disk were used to seed 1 trial at a seeding depth of 2.5 cm. This seeding was compared to forage crop stands obtained from a drill fitted with an experimental opener using 2 disks of unequal diameter, the larger (38 cm diameter) running vertical and the smaller (28 cm diameter) angled at 7°. The center for mounting the small disk is 5 cm below and 2.5 cm behind the large disk, thus the bottoms of the disks are on the same horizontal plane. Seeding depths of 2.5 cm and 6.25 cm were accomplished by an adjustable rubber-tired depth gauge wheel assembled beside the large disk. At the 2.5 cm depth of seeding, the large-small disk opener assembly resulted in superior forage establishment compared to that obtained with the standard double disk assembly. Comparing either opener-depth control assembly set to seed at 2.5 cm depth with the large-small disk assembly set to seed at 6.25 cm depth confirmed the value of shallow seeding of forage crops to overcome establishment problems.

Key Words: furrow opener-depth control assemblies, forage emergence, seeding depth, Altai wild ryegrass, Russian wild ryegrass, intermediate wheatgrass, crested wheatgrass, tall wheatgrass

Observations made in producers' fields and experimental plots over the past 30 yr indicate that 80-90% of forage crop stand failures in the arid prairies can be attributed to seeding too deeply (Lawrence 1979). In an arid environment where dryland forages are adapted, lack of soil surface moisture or inappropriate seeding equipment are reasons for seeding at a depth greater than is commonly recommended. Double disk-type openers and other drills without depth controls are widely used to seed forage crops with variable success.

Methods

This study reports on a comparison between 2 furrow openers with depth control assemblies for seeding forage crops. Two Swift Current self-propelled 6-row plot seeders (McLaughlin and Dyck 1986) were fitted with different furrow openers and depth control devices. Drill I was fitted with the standard commercial (34 cm diameter) double disk opener assembly (Kirchman (Lilliston Melroe)) with a 2 cm wide depth control band on each disk. The depth control bands were 5 cm smaller in diameter than the disks. (Fig. 1). Drill II was fitted with an experimental opener using 2 disks of unequal diameter, the larger (38 cm diameter) running vertical and the smaller (28 cm diameter) angled at 7 ° toward the larger disk (Dyck 1982, Dyck and Tessier 1986). The center for mounting the small disk is 5 cm below and 2.5 cm behind the large disk, so that

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Table 1. Emergence of various grass strains as influenced by type of furrow opener-depth control assemblies and depth of seeding.

Grass	Strain	Emergence—No. seedlings/m		
		Drill I	Drill II	
		2.5-cm depth	2.5-cm depth	6.25-cm depth
Altai wild ryegrass	Sc A 3751	33	47	16
	Sc A 3752	26	58	23
	Sc A 3753	37	50	28
	Sc A 3754	32	54	31
	Sc A 3757	29	48	29
	Sc A 3758	21	37	7
	Sc A 3772	25	44	28
	Sc A 3773	29	34	33
	Sc A 3803	31	43	24
	Sc A 15011	34	52	26
	Sc A 15012	24	37	33
	Prairieland	28	47	38
Russian wild ryegrass	Sc R 3751	48	82	14
	Sc R 3742	34	47	11
	Sc R 3753	30	50	18
	Sc R 3761	28	44	16
	Sc R 3762	36	63	42
	Sc R 3793	37	52	22
	Sc R 17040	28	68	20
	Swift	54	65	12
	Mayak	32	46	22
	Cabree	28	47	5
	Idaho 100	28	50	12
	Sc R 4N 721	27	28	9
	Sc R 4N 722	20	30	10
	Sc RN 3761	35	50	10
Intermediate wheatgrass	Sc I 3701	39	56	26
	Sc I 3702	48	87	42
	Sc I 3711	44	52	24
	Sc I 3712	42	56	14
	Sc I 3713	34	53	30
	Sc I 3714	36	50	22
	Sc I 3715	30	40	15
	Sc I 3731	35	63	38
	Sc I 3732	20	42	41
	Sc I 3734	35	45	24
	Sc I 3761	36	41	34
	Sc I 3762	40	41	22
	Sc I 3763	29	51	30
	Clarke	32	41	21
	Chief	15	38	11
Crested wheatgrass	Commercial	70	94	16
Tall wheatgrass	Orbit	30	42	18
	Test Mean	34	51	22
	LSD (P=.05)	16	23	20
	SEM%	17	16	32

the bottoms of the disks are on the same horizontal plane. A single rubber-tired semipneumatic wheel 5 cm wide and 33 cm in diameter was mounted on a separate bracket beside the large disk to form an adjustable depth control gauge wheel (Fig. 2).

Three, 3-replicate randomized block tests including 12 strains of Altai wild ryegrass, *Leymus angustus* (Trin) Pilger; 14 strains of Russian wild ryegrass, *Psathyrostachys juncea* (Fisch.) Nevski; 15 strains of intermediate wheatgrass, *Thinopyrum intermedium* (Host) Barkworth and D.R. Dewey; 1 strain of each diploid crested wheatgrass, *Agropyron cristatum* (L.) Gaertner, tall wheatgrass, *Thinopyrum elongatum* (Host) D.R. Dewey were sown consecutively over a 2-day period on a test area. One test was sown with drill I at a depth of 2.5 cm and the other with drill II at 2.5 cm and 6.25 cm deep. Plots consisted of 2 rows 30 cm apart and 6 m long. The tests were seeded in May 1983 on fallow land described as a Swinton silty loam to loam soil (Ayres et al. 1985).

Results and Discussion

At the 2.5 cm depth of seeding, the large-small disk arrangement with adjustable depth gauge wheel resulted in a significantly superior forage crop emergence ($t = 11.11$, $P = .0001$) to that obtained with the standard double disk with attached depth bands. Comparing the double disk opener assembly seeding at 2.5 cm depth with the large disk-small disk at 6.25 cm depth, stands of forage crop were superior using the former assembly ($t = 6.97$, $P = .0001$). Similarly, comparing the forage plant emergence from the 2.5 cm depth with that from the 6.25 cm depth, using the large disk-small disk assembly showed the superiority of shallow seeding with the same opener ($t = 13.04$, $P = .0001$). An observation made in the field during the course of this study suggests that a possible reason for poorer stands from deep seeding may be poor refilling of the seeding trench and consequent poor packing of soil around the seed.

It was concluded that the large-small disk assembly resulted in superior stands of forage crops at recommended seeding depths. Subsequent seedings of numerous forage tests using the large-small disk assembly have confirmed the superiority of this device for improving stand establishment.

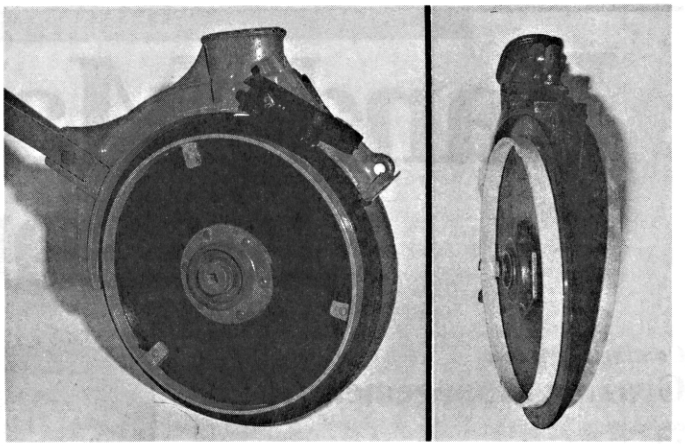

Fig. 1. Standard double disk opener fitted with depth control bands.

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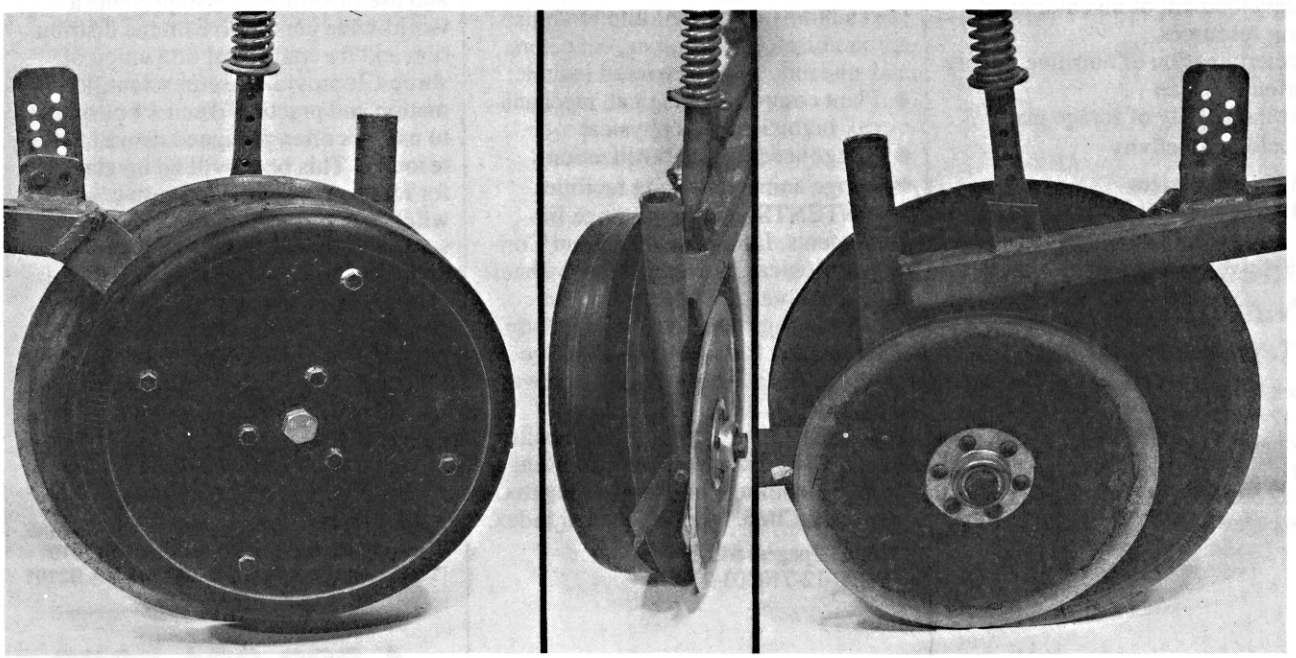

Fig. 2. Large-small double disk opener assembled with an adjustable rubber-tired depth gauge wheel.