Effect of Snowmobile Traffic on Bluegrass (*Poa pratensis*)[1]

C. L. Foresman, D. K. Ryerson, R. N. Walejko, W. H. Paulson, and J. W. Pendleton[2]

ABSTRACT

Varying snowmobile traffic was imposed on established bluegrass (*Poa pratensis*) areas at Arlington and Lancaster, Wisconsin for three winters. The effect on the stands, recovery, and vigor the following summer was monitored by close observations and the yield of frequent clippings.

No reduction in bluegrass stands occurred following snowmobiling. Early spring recovery and growth was slower in snowmobile track areas than in nontract areas. However, by early summer, traffic and nontraffic areas showed no differences in vigor, color, or growth as measured by clipping weights. Soil bulk density determinations did not differ between snowmobile track and nontrack areas.

Additional Index Words: turf, plant hardiness, recreational vehicles.

One of the fastest growing winter sports in snow areas is snowmobiling. North America has over 1.5 million snowmobiles. Michigan, Minnesota, and Wisconsin had 372,000; 279,000; and 222,000 registered as of March 1974.[3] Snowmobiles are used primarily for recreation. Whittaker (1972) found that snowmobiles were used for pleasure 96% of the time in Maine. Brown (1973) reported, in a survey of 500 snowmobilers, the following reasons for their participation in the sport: opportunity for adventure, 24%; family winter recreation, 22%; enjoyment of nature, 18%; change in routine, 16%; companionship, 9%; physical exercise, 7%; and thrill of fast riding, 4%.

With the increase in the number of motorized snow vehicles, concern has grown about their impact on the environment. While the snowmobile owner has discovered a means of winter mobility into areas which were previously almost inaccessible and a means of enjoying nature's winter beauty, nonusers are concerned about the possible destruction of plant, soil, wildlife, and serenity.

While many states are moving rapidly to regulate snowmobiling and provide aid in the establishment of permanent trails, much private and public grassland is available and presently used by snowmobilers. Rohweder[4] reported 303,525 ha (750,000 acres) of turf in Wisconsin alone. The predominant grass species in this state and other northern snowbelt states is bluegrass.

The objective of this research was to determine the effect of varying snowmobile traffic levels on open bluegrass turf or pasture areas.

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[2]Research Assistants, Assistant Professor, and Professor, Dep. of Agron.

[3]Correspondence with International Snowmobile Industry Assoc. and Dep. of Natural Resources, State of Wisconsin, Madison. Nov. 1974.

[4]D. A. Rohweder. Turf, foe or friend. 1972. Agron. Mimeo. Field Crop 220. Coop. Ext. Serv., Univ. of Wisconsin, Madison.

MATERIALS AND METHODS

Established bluegrass (*Poa pratensis*) areas on two University of Wisconsin Experimental Farms (Arlington and Lancaster) located in southern Wisconsin were used for the studies over a three-winter period. Traffic variables were 0, 6, 10, and 20 passes per week in the track area when snow depth was $\geqq 5$ cm. Several periods existed each winter when snow was not present. A pass consisted of one snowmobile run or trip across the designated track area and the number of passes per week was obtained by daily runs as follows:

- 0 runs per week—control
- 6 runs per week—2 passes every other day (Monday, Wednesday, Friday)
- 10 runs per week—2 passes per day (Monday-Friday)
- 20 runs per week—4 passes per day (Monday-Friday).

In 1972-73 and 1973-74 at Arlington there was no 6 runs/week treatment; instead there was a 10 run/week treatment on Monday of each week. Colored guide posts were spaced every 9 m in the appropriate areas to assist the snowmobile operator to keep on the designated track areas. The control plots were protected within each test site. Four replications were established at each location on relatively level topography.

For herbage harvest, a special self-propelled mower with a catch basket was used to cut periodically an area 50.8 cm by 7.62 m of each plot at a height of 3.8 cm. The material was dried for 48 hours at 65C and dry matter yield calculated.

The soil type at Lancaster was Fayette silty loam and at Arlington a Paar silt loam. Soil bulk density measurements were taken on the control and heaviest traveled areas (20 passes/week) each year using a modification of the method described by Wilde et al. (1964). Daily air temperature and snow depths were recorded on days when snowmobiles were run. Since these trials were conducted in southern Wisconsin the snowmobiles were not run for certain periods during the winter because snow was either absent or <5 cm deep. Medium weight, family type snowmobiles with tracks 38 cm wide were run at relatively high speeds.

Fall height management treatment of the bluegrass was included as subplots prior to the winters of 1972-73 and 1973-74 at Arlington. During the fall one area was managed as a lawn and the other area allowed to grow unclipped as often occurs on roadsides or unmanaged areas. On 1 November the average plant heights in the two areas were 6 and 18 cm.

Table 1—Clipping yields from bluegrass lawn areas subjected to varying snowmobile traffic during the winter of 1971-72

Snowmobile traffic		Harvest dates the following summer					
Passes per week	Total passes	27 May	20 June	19 July	2 Aug.	18 Aug.	
		metric tons/ha					
		Arlington					
0	0	0.79	0.30	0.26	0.15	0.19	
6	67	0.48	0.31	0.25	0.15	0.21	
10	112	0.41	0.31	0.25	0.15	0.21	
20	224	0.28	0.26	0.22	0.13	0.20	
L.S.D. (0.05)		0.35	0.04	0.02	NS†	NS†	
		Lancaster					
		13 May	6 June	19 June	14 July	3 Aug.	22 Aug.
0	0	0.65	1.14	0.23	0.27	0.17	0.25
6	44	0.38	1.02	0.26	0.24	0.75	0.25
10	72	0.33	1.17	0.19	0.23	0.71	0.25
20	144	0.21	0.90	0.16	0.21	0.73	0.24
L.S.D. (0.05)		0.07	0.16	0.02	NS†	NS†	NS†

† NS, not significant.

Table 2—The effect of snowmobile traffic on bluegrass forage yields entering the winter at two different heights. Arlington, Wisconsin

Snowmobile traffic: Passes per week	Total passes	Harvest dates, 1973: 28 Apr.	29 May	5 July	22 Sept.	Total passes	Harvest dates, 1974: 20 May	10 June	12 July	9 Aug.
		metric tons/ha					metric tons/ha			
				Short Grass Area (6 cm) in Fall						
0	0	0.41	1.76	1.11	1.04	0	1.98	1.17	0.57	0.62
10, two per day	48	0.17	1.34	1.12	1.29	32	1.71	1.07	0.49	0.60
10, all one day	40	0.30	1.60	1.10	1.22	30	1.62	1.05	0.45	0.53
20, four per day	96	0.24	1.38	1.02	1.12	64	1.38	1.17	0.49	0.51
				Tall Grass Area (18 cm) in Fall						
0	0	2.26	1.20	0.83	0.78	0	2.92	1.09	0.55	0.57
10, two per day	48	1.25	1.27	0.74	0.69	32	2.16	1.08	0.51	0.50
10, all one day	40	1.60	1.23	0.71	0.87	30	2.35	0.99	0.54	0.61
20, four per day	96	1.63	1.39	0.68	0.89	64	1.88	0.96	0.54	0.50
L.S.D. (0.05)		0.32	NS†	NS†	NS†		0.40	NS†	NS†	NS†

† NS, not significant.

RESULTS AND DISCUSSION

The effect of snowmobile traffic on established bluegrasss stands was similar at Arlington and Lancaster in 1972. No reduction in stands occurred, but slower early spring growth and vigor were apparent. Weights of early spring clippings were less from traffic areas than control areas. However, the harvests from all treatment plots were comparable by midsummer at both locations (Table 1). Table 2 presents the yield results of 1972–73 and 1973–74 at Arlington involving fall height management of bluegrass. Snowmobile traffic reduced first harvest yields following both fall management systems. However, yield loss was magnified in the tall area. Clipping harvests taken later in the summer indicated no differences between management or traffic treatments. Early spring growth was delayed in the track areas, but by early summer no visual differences were noted between the track and nontrack areas in stand, height, or color of the vegetation. The traffic treatments in the Arlington experiment were imposed on the same track areas for three winters. Observers in the late summer of 1974 could not detect these traffic strips in the field.

Soil bulk densities were taken in the control and most heavily traveled track areas. These measurements indicated snowmobiles cause no soil compaction (Table 3).

These trials were conducted in the generally light and variable snow area of southern Wisconsin. The insulation afforded the underlying bluegrass was less in the heavy track area than in the nontrack areas. Soil temperature measurements taken at the soil surface under the heavily traveled track areas were sometimes 2–3C lower than under nontrack areas. Others (Neumann and Merriam, 1972; Thorud and Duncan, 1972; Wanek, 1971) have also reported soil temperature differences due to snowmobiling. This difference in temperature and the relatively shallow roots and rhizomes of bluegrass probably causes the slower spring growth. Another contributing factor is the general horizontal matting of plant residues on the soil surface in snowmobile track areas. This could result in slower soil warm up in the spring and/or mechanical impedance to the new bluegrass shoots. Often during spring warm periods, the more compact or icy track areas remain longer than the control areas. This depends on how high the temperature rises, for how long, and whether rain occurs. In these trials, 3 days was the maximum difference observed in the disappearance of snow or ice.

Table 3—Bulk density of soil in snowmobile track and nontrack bluegrass areas

Locations	Sampling date	Treatment: Traffic, 20 passes/week	No traffic, control	L.S.D., 0.05
		g/cm^3		
Lancaster	23 July 1972	1.38	1.40	NS†
Arlington	24 July 1972	1.25	1.27	NS†
Arlington	3 Oct. 1973	1.30	1.32	NS†
Arlington	24 May 1974	1.22	1.17	NS†

† NS, not significant.

The traffic imposed on these trial sites may or may not represent what happens on general grassland areas. Our traffic levels would probably be greater than where entire fields are randomly used but would not be equal to the traffic on regular trails used by the public or snowmobile clubs.

In conclusion, a land owner utilizing bluegrass for early spring pasture for livestock may suffer an economic loss depending on the extensiveness of snowmobile traffic. Whereas, either public or private areas simply being clipped for maintenance such as parks or roadsides may have little or no concern for an early season plant growth delay. The legislative trend toward the regulation of indiscriminate snowmobiling and the establishment of trails also greatly reduces the total area needed for snowmobiling and some of the other objections to this growing winter recreation.

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