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Effects of Snowmobiling on Alfalfa, Trees, and Soil Bacteria

Michigan State University

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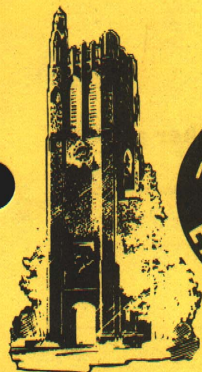
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# Effects of Snowmobiling on Alfalfa, Trees & Soil Bacteria

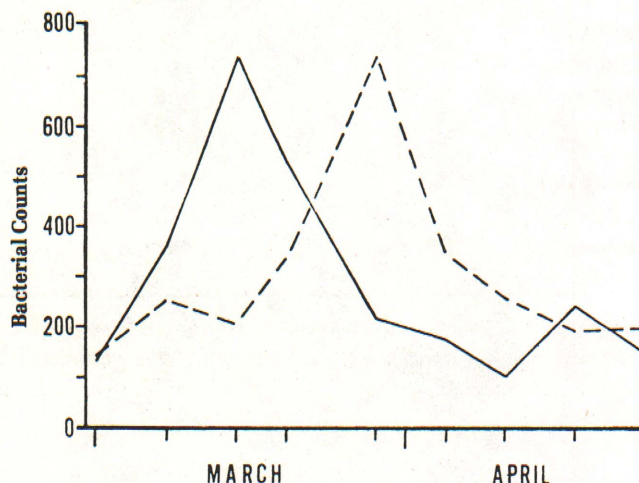
By Eugene F. Dice,  
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The effects of snowmobiling on plants and soil have not been thoroughly studied, but limited research suggests the following guidelines. Results over time and under varied conditions need to be verified. At the moment, the limited results provide some direction for land managers and their advisors which, when added to their general knowledge of biology, will aid in making decisions.

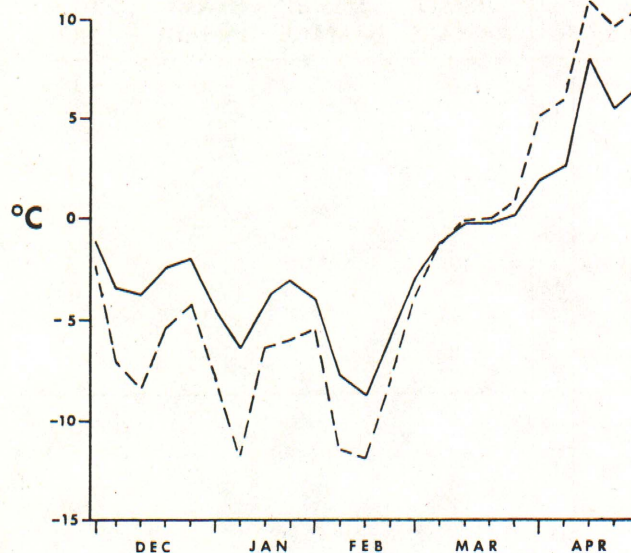
## Observations

1. First cutting alfalfa yields were reduced 33% under compacted areas.
2. Grasses and weeds grew faster where the alfalfa was retarded, resulting in poorer quality in the first cutting "hay."
3. Soil temperatures were colder and later in spring thawing under the compacted test areas, which resulted in,
4. Later (by two weeks) resumption of soil bacterial activity.
5. The amount of damaged and dead trees (saplings) in Red and Jack pine increased in test areas as the intensity of use of snowmobiles increased.
6. Damage to deciduous trees and forest shrubs varied with species and their rooting and stooling habits.

The relationship between depth of snow and damage by snowmobile passes is important to managers. To avoid damage, use should be prohibited when there is less than four inches of snow cover. Typically, light use results in less damage than heave use. Therefore, a land owner has two options for use of, for example, an alfalfa field by snowmobilers: he can mark trails in the field and commit these areas to heavy use with expected damage: or he can permit dispersed use (no limited trails) and hope that there is no heavily compacted damage areas. In either case, the need for management control is obvious.



The effects of snowmobiling on the resumption of soil bacterial activity in the spring. The solid line represents soil bacteria under undisturbed snow and the broken line represents bacteria under the snowmobile trail.



Soil temperatures 6 in. below the surface in alfalfa fields located on different soil types (solid line is for a loamy soil and the broken line is for a sandy soil).



**TABLE 1. The effect of varying intensities of snowmobiling on the productivity of alfalfa and other plants. (Average weights (oven dry) for each date are for ten clipped plots.)**

PLOT	May 16	May 25	June 6
	AVG. WT. GRAMS/SQ. FT.	AVG. WT. GRAMS/SQ. FT.	AVG. WT. GRAMS/SQ. FT.
<b>Control</b>			
Alfalfa	7.00	16.57	34.04
Grasses*	3.03	2.30	2.38
Other**	1.23	2.25	4.53
<b>Light Use</b>			
Alfalfa	4.03	6.39	20.48
Grasses	1.38	3.01	4.54
Other	1.49	3.10	6.60
<b>Heavy Use</b>			
Alfalfa	2.58	7.42	25.01
Grasses	.47	1.05	7.30
Other	.83	2.76	3.85

\*Includes mostly "weedy" species such as quackgrass (*Agropyron repens*) and pigeongrass (*Setaria glauca*).

\*\*Consists mainly of dandelion (*Taraxacum officinale*), white cockle (*Lychnis alba*) and dock (*Rumex crispus*).

**TABLE 2. Damage to pine saplings subjected to light, moderate and heavy snowmobile traffic (160 saplings were Norway pine, *Pinus resinosa* and 27 were jack pine, *Pinus banksiana*).**

TRAFFIC	Number of Saplings			
	NO VISIBLE DAMAGE	SOME DAMAGE	HEAVY DAMAGE	DEAD TREES
Control	46	0	0	0
Light Traffic	27	13	7	2
Moderate Traffic	13	17	6	5
Heavy Traffic	8	7	13	23

\* \* \*

The data reported here are from research done in Minnesota in the period of 1971-73 as reported by Wallace J. Wanek in *Proceedings of The Snowmobile and Off-Road Vehicles Symposium*, Michigan State University Department of Park and Recreation Resources. Individual copies of that report are available from the Department, in limited quantity.

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