

Change in Species Composition of Grassland Communities in Response to Grazing Intensity

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Three adjacent sites located two miles north and a quarter mile east of Stillwater offered an opportunity to study variation in plant communities resulting from different grazing intensities. The areas are very similar in all factors other than treatment. The soils of the areas are of the Zaneis type (Gray and Galloway, 1959) which have brown loam topsoils with granular, reddish, heavy clay loam subsoils and are 30 to 40 inches in depth. One area has been protected from grazing for several years; one has been moderately grazed; and one has been severely overgrazed. The moderately grazed area has a slight northeast to southwest slope; the other two are fairly level. The soil structure in the overgrazed area probably has been altered due to trampling and puddling.

Data were obtained using a one-tenth m² quadrat and taking 100 random samples in each area during June, July, August and September. In this way, it was hoped that annual species which complete their life cycle early, or come in late, would be included in the data. All species occurring within a quadrat were recorded. After all samples were taken, per cent frequency of occurrence was calculated for each species based on 400 quadrats per area.

A total of 84 species were recorded from all three areas. This total included 40 from the protected site, 43 from the moderately grazed site, and 62 from the overgrazed site. Of the 40 species from the protected site, 17 were grasses, 18 were forbs, and five were legumes. The 43 species from the moderately grazed site included 19 grasses, 18 forbs and six legumes. Twenty five grasses, 34 forbs and three legumes comprised the 62 species from the overgrazed site. Of the 84 species recorded about 30% of them occurred frequently enough to warrant consideration. These are listed in Table I along with their frequency of occurrence.

On the protected site *Andropogon gerardi*, *A. scoparius* and *Aster ericoides* were of primary importance while *Panicum oligoanthos*, *Sorghastrum nutans*, *Ambrosia psilostachya* and *Erigeron strigosus* were of secondary importance. On the moderately grazed site *Andropogon scoparius*, *Ambrosia psilostachya* and *Aster ericoides* occurred most frequently while *Andropogon saccharoides* and *Sporobolus asper* occurred less frequently but were still important. *Bromus japonicus* occurred primarily in June and was not considered at other times.

On the overgrazed site *Buchloe dactyloides* and *Chloris verticillata* were of primary importance with *Bouteloua curtipendula*, *B. gracilis*, *B. hirsuta*, *Eragrostis intermedia*, *Paspalum ciliatifolium*, *Achillea lanulosa*, *Ambrosia psilostachya*, *Euphorbia chamaesyce*, *Oxalis stricta* and *Plantago purshii* occurring as secondary species. Again, *Bromus japonicus* was important only in June.

Based on their frequency of occurrence the species were classified as decreaseers, increaseers or invaders. A decreaseer decreases under grazing; increaseers increase until grazing pressure becomes too heavy, then decrease; invaders are plants which are either not present or are low in abundance under climax conditions and increase even under intense grazing pressure. Classification is given in Table II.

As can be seen *Andropogon gerardi* is the principal decreaseer with *Panicum virgatum*, *P. oligoanthos*, *Sorghastrum nutans*, and *Aster ericoides* also responding in this manner.

TABLE I. PER CENT FREQUENCY OF OCCURRENCE

Species ¹	Protected	Mod. Grazed	Overgrazed
<i>Andropogon gerardi</i>	71	2	15
<i>A. scoparius</i>	67	98	3
<i>A. saccharoides</i>	3	39	5
<i>Bouteloua gracilis</i>	1	0	26
<i>B. hirsuta</i>	1	1	18
<i>B. curtipendula</i>	4	1	16
<i>Bromus japonicus</i> *	1	46	40
<i>Buchloe dactyloides</i>	0	1	68
<i>Chloris verticillata</i>	0	1	59
<i>Eragrostis intermedia</i>	2	2	31
<i>Panicum virgatum</i>	13	1	4
<i>P. oligosanthes</i>	35	14	3
<i>Paspalum ciliatifolium</i>	0	1	29
<i>Sorghastrum nutans</i>	33	4	9
<i>Sporobolus asper</i>	9	17	5
<i>Achillea lanulosa</i>	7	6	39
<i>Ambrosia psilostachya</i>	19	76	22
<i>Aster ericoides</i>	53	51	3
<i>Erigeron strigosus</i>	19	3	6
<i>Euphorbia chamaesyce</i>	0	1	24
<i>Gutierrezia</i>	0	3	13
<i>dracunculoides</i>			
<i>Oxalis stricta</i>	5	4	23
<i>Plantago purshii</i>	7	2	28

*Based on 100 quadrats because they are annual species that occurred during only one sampling period.

¹Nomenclature after Waterfall (1962).

TABLE II. RESPONSE TO GRAZING PRESSURE

Decreasers	Increasesers	Invaders
<i>Andropogon gerardi</i>	<i>Andropogon scoparius</i>	<i>Bouteloua curtipendula</i>
<i>Panicum virgatum</i>	<i>A. saccharoides</i>	<i>B. gracilis</i>
<i>P. oligosanthes</i>	<i>Sporobolus asper</i>	<i>B. hirsuta</i>
<i>Sorghastrum nutans</i>	<i>Ambrosia psilostachya</i>	<i>Bromus japonicus</i>
<i>Aster ericoides</i>		<i>Buchloe dactyloides</i>
<i>Erigeron strigosus</i>		<i>Chloris verticillata</i>
		<i>Eragrostis intermedia</i>
		<i>Paspalum ciliatifolium</i>
		<i>Achillea lanulosa</i>
		<i>Euphorbia chamaesyce</i>
		<i>Gutierrezia</i>
		<i>dracunculoides</i>
		<i>Oxalis stricta</i>
		<i>Plantago purshii</i>

Andropogon scoparius is the major increaseser with *A. saccharoides*, *Ambrosia psilostachya*, and *Sporobolus asper* also being important.

Principal invading grasses include *Bouteloua gracilis*, *Buchloe dactyloides*, *Chloris verticillata*, *Eragrostis intermedia*, and *Paspalum ciliatifolium*, along with several forbs.

Grazing response for any given species is based on results obtained in the described areas and quite probably would vary on different soil types, even under otherwise identical conditions.

LITERATURE CITED

- Gray, Fenton and H. M. Galloway. 1959. *Soils of Oklahoma*. Stillwater. Okla. State Univ. Misc. Publ. 56. 65 p.
- Waterfall, U. T. 1962. *Keys to the Flora of Oklahoma*, 2nd ed. Stillwater, Oklahoma. 243 p.
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