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The presence of pocket gophers on rangeland and farmland is highly visible due to the earth mounds which they build. The nuisance impact of their mounds and acknowledged long-term beneficial effects on soil (Laycock and Richardson 1975) result in a value which is debatable. The impact of various species of Thomomys on herbage production of rangelands has been widely reported (Fitch and Bentley 1949; Richens 1965; Turner 1969; Laycock and Richardson 1975; Alsager 1977). However, besides our studies in Nebraska, we could find no literature concerning the effect of Geomys on forage production and no literature concerning the effect of any gopher on alfalfa production.

The objective of our paper is to review the impact of plains pocket gophers (Geomys bursarius) on forage production. This includes the effects of gophers on alfalfa production.

METHODS

Rangeland. This study area is in Dawes County in the panhandle of Nebraska, about 56 km southeast of Chadron. Four range sites on the study area were selected. Two 0.64 ha areas were selected on each site, one with gophers present and one without. Each of the 0.64 ha areas was subdivided into four replicates. In September of 1975 and 1976 the areas were harvested to a height of 2.5 cm above ground level. Each range site also had a cattle exclosure which was harvested at the same time. Harvest data were adjusted upward to ungrazed status and all weight data are on an oven-dry basis.

Alfalfa Field. This study area is in Lancaster County, Nebraska, approximately 8 km east of Lincoln. Two alfalfa fields were selected. On each field four paired areas were chosen, one of each pair had gophers present while they were absent on the other. Each area was harvested to a height of 2.5 cm above ground level just prior to the landowner's harvesting of the fields during 1978. Mean oven-dry weights of three cuttings were computed.

RESULTS

Range condition within each of the four sites did not differ during the two year study. The condition of the four sites were different from each other, however, and the areas where gophers were present were usually lower and never higher in range condition than the areas where they were absent (Table 1).

Table 1. Range condition (Nichols et al. 1978) on four sites in western Nebraska with and without plains pocket gophers.

Range Site	Gophers Present	Range Condition
Sands	Yes	Good
	No	High Good
Sands	Yes	Good
	No	Excellent
Silty	Yes	Low Fair
	No	High Fair
Silty	Yes	Low Fair
	No	Low Fair

Forage yields on each of the range sites were significantly less ($P<0.05$) on areas where gophers were present compared to where they were absent (Table 2). The 2-year average decrease in forage production due to the presence of gophers ranged from 21% to 49% on the different sites.

Table 2. Effect of plains pocket gophers on forage yield on four range sites in western Nebraska.

Range Site	Gophers Present	Year		Average	Decrease
		1975	1976		
		kg/ha			
Sands	Yes	1054	1411	1233	36%
	No	1669	2155	1912	
Sands	Yes	1105	1801	1453	47%
	No	2107	3338	2723	
Silty	Yes	665	672	669	49%
	No	1307	1316	1312	
Silty	Yes	638	605	622	21%
	No	778	806	792	

Gophers reduced forage yield on alfalfa fields by an amount similar to that on rangeland (Table 3). The yield of alfalfa was significantly less ($P<0.05$) and the weed yield significantly higher ($P<0.05$) opportunities of the field where gophers were present compared to areas where they were absent. Although the weed yield increased dramatically, the combined yield of alfalfa and weeds where gophers were present was 38% less than where gophers were absent.

Table 3. Effect of plains pocket gophers on alfalfa and weed yield in alfalfa fields in southeastern Nebraska.

Gophers Present	Alfalfa Yield	Weed Yield	Combined Yield	Decrease
	kg /ha			
Yes	5577	741	6318	38%
No	10017	105	10122	

DISCUSSION

In additiontodecreased forage yields, plains pocket gophers increased the percentage of bare soil, decreased basal cover and decreased perennial grasses with a concomitant increase in annual grasses on the rangeland study area in western Nebraska (Foster and Stubbendieck 1980). Alfalfa plant density *was* decreased and frequency of weed species occurrence increased on gopher inhabited areas of alfalfa fields (Luce 1979).

When examining the significance of gophers on yield and considering possible control methods, the following is important: if gophers decrease yield 50% but occupy only 10% of the area, then the total loss in forage production is only 5%. Control decisions are then based upon the concentration of the gopher population and time and money necessary for control.

Pocket gophers are often thought to be characteristic of overgrazed land (Phillips 1936). In fact, Mielke (1977) suggested that gophers complemented the overgrazing and trampling of bison which resulted in increased forbs. The gophers, he suggested, then thrived and in working the soil stimulated vegetation growth suitable for bison. Myers and Vaughan (1964) and Luce et al. (1980) both documented that plains pocket gophers eat primarily grasses. When examining range condition in this study, it appears that the activity of gophers sets back succession. Thus the poorer range conditions may not be a prerequisite for gopher habitation; the gophers are likely a cause of poorer range conditions.

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