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Opportunistic Foraging of Eastern Woodrats (Neotoma floridana) in Manipulated Habitats

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ABSTRACT.—We evaluated diets of eastern woodrats (*Neotoma floridana*) on Cross Timbers rangeland subjected to experimental brush manipulation. Treatments were tebuthiuron and triclopyr herbicides, applied with and without annual prescribed burning. Untreated reference sites also were evaluated. Microhistological techniques were used to estimate relative percent composition of plant species in diets. A total of 23 plant species were found in diets from summer and winter samples. Eastern woodrats exhibited seasonal variation in diet selection, consuming mostly forbs in summer and browse in winter. Pokeweed (*Phytolacca americana*) and eastern redcedar (*Juniperus virginiana*) comprised the greatest percentages of diets in summer and winter, respectively. Experimental brush treatment also influenced diet composition. We hypothesized that eastern woodrats would exhibit opportunistic foraging behavior and use food types in proportion to their availability. Forb and browse diet classes were used in accordance with availability except for forbs on burned tebuthiuron sites. Eastern woodrats generally followed an opportunistic foraging strategy although occasions of selective foraging were observed, presumably in response to increased palatability and/or nutritional quality of available forage.

INTRODUCTION

The Cross Timbers accounts for nearly 8 million ha of rangeland in Oklahoma and surrounding states (Garrison *et al.*, 1977). Typically, this rangeland is of low quality and is used primarily for livestock production. Although the Cross Timbers is composed of a mosaic of upland oak (*Quercus* spp.) forests interspersed with tallgrass prairie, dense brushy vegetation is characteristic of the forested areas and usually prevents growth of most herbaceous plants (Ewing *et al.*, 1984). Livestock producers have increased their use of herbicides and prescribed burning as management tools in order to use these brushy areas more efficiently. Such range management techniques change vegetative structure and composition, usually removing the climax community and increasing production of early successional vegetation (Scifres, 1980). Changes in composition of the plant community will alter food available to resident wildlife. The benefits and costs of habitat alteration for wildlife species will in part depend on foraging strategy. Selective foragers could be at a disadvantage due to changes in habitat composition while opportunistic foragers could shift diet selection in response to habitat changes. Also, the ability to predict foraging responses by wildlife species would be useful for managers interested in using different habitat management techniques.

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Two herbicides, tebuthiuron (N-[5-(1,1-dimethyl-ethyl)-1,3,4-thiadiazol-2 yl]-N,N'dimethylurea) and triclopyr ([3,5,6-trichloro-2-pyridinyl) oxy] acetic acid), have become popular for controlling brushy vegetation in the Cross Timbers region of central Oklahoma. Although demographic responses of small mammal populations to herbicides (Keith *et al.*, 1959; Kirkland, 1978; Borrecco *et al.*, 1979; Santillo *et al.*, 1989) and prescribed burning (Lawrence, 1966; Kaufman *et al.*, 1988) have been examined in several ecosystems, dietary responses have received less attention (Keith *et al.*, 1959; Johnson, 1964). Eastern woodrats (*Neotoma floridana*) occupy a wide variety of habitats (Rainey, 1956), but availability of cover and nest sites appear to determine distribution (Birney, 1973). In oak-dominated forests of central Oklahoma, eastern woodrats are associated with upland forests and dry ravines (Goertz, 1970). Woody vegetation comprises a major component of the eastern woodrat diet, as indicated by studies of stomach contents (Strecker, 1929; Murphy, 1952; Cudmore, 1983) and food caches (Goodpastor and Hoffmeister, 1952; Rainey, 1956). However, food preferences vary substantially among populations of eastern woodrats in different habitats (Wiley, 1980).

This paper reports on the diet composition of eastern woodrats from untreated reference sites and several sites altered by one of two herbicides applied with and without annual burning. Previous papers reported that vegetative structure and composition were significantly altered on treated sites (Engle *et al.*, 1991; Stritzke *et al.*, 1991). Overall, forbs comprised a greater proportion (71%) of the total standing crop than browse (29%) on combined herbicide treatments (burned and unburned). By contrast, reference sites were dominated by browse (92%). Tebuthiuron-treated pastures (burned and unburned) had relatively more forbs (80% forbs, 20% browse) than triclopyr-treated sites (60% forbs, 40% browse). Burned (70% forbs, 30% browse) and unburned (72% forbs, 28% browse) sites were essentially identical (Engle *et al.*, 1991).

Our study was designed to explore relationships between diets of eastern woodrats and herbicide- and fire-induced alterations in plant community composition. Studies have indicated that eastern woodrats are opportunistic foragers (Rainey, 1956; Wiley, 1980) and obtain available foods in the immediate vicinity of the den. Therefore, we hypothesized that the relative contribution of forbs and browse to the diet would reflect the forb/browse composition of experimental and reference sites. Specifically, we predicted that woodrats would (1) consume more forbs and less browse on herbicide treatments compared to reference sites; (2) consume more forbs and less browse on tebuthiuron compared to triclopyr treatments, and (3) consume the same relative amounts of forbs and browse on burned compared to unburned treatments.

Study Area and Methods

Study area.—Our study was conducted on the Cross Timbers Experimental Range (CTER) located approximately 11 km SW of Stillwater, Oklahoma. The CTER encompassed 648 ha of typical Cross Timbers rangeland composed of upland forest and interspersed grassland-cedar savannas. Upland forests were dominated by post oak (*Quercus stellata*) and blackjack oak (*Q. marilandica*) in the overstory and eastern redcedar (*Juniperus virginiana*), roughleaf dogwood (*Cornus drummondii*), redbud (*Cercis canadensis*), American elm (*Ulmus americana*) and coralberry (*Symphoricarpos orbiculatus*) in the understory. Dominant herbaceous plants in the understory were little bluestem (*Schizachyrium scoparium*), indiangrass (*Sorghastrum nutans*), rosette panic grass (*Panicum oligosanthes*) and western ragweed (*Ambrosia psilostachya*).

Experimental design.—The CTER was divided into 20, 32.4-ha pastures which represented four replications of five treatments in a randomized block design. Four experimental treatments were included: (1) tebuthiuron (Dow Elanco), a pelleted herbicide applied aerially at 2.2 kg/ha in March 1983; (2) tebuthiuron (as with treatment #1) with annual prescribed burning beginning in April 1985; (3) triclopyr (Dow Elanco), a foliage-applied herbicide applied aerially at 2.2 kg/ha in June 1983; (4) triclopyr (as with treatment #3) with annual prescribed burning beginning in April 1985. The fifth treatment was a reference site with no herbicide use or prescribed fire, included for comparison with herbicide and burned treatments. Pastures were assigned to respective blocks according to similarity in total woody canopy cover to provide homogeneity among experimental groups within blocks. All 20 pastures were fenced and moderately grazed by yearling cattle from April to September of each year.

Animal collection.—Eastern woodrats were collected in June (summer) 1986 and January (winter) 1987 for dietary comparisons among experimental groups at seasonal extremes. Two of the four replicates of the five treatments were randomly selected and sampled in June using standard Victor rat traps (32 each) on a 1.1-ha grid randomly placed in upland forest habitat. The other two replicates of the five treatments were sampled in January. Grids consisted of eight parallel transect lines (each 90 m long and alternately staggered by 15 m) with a 15-m spacing between lines and 30-m spacing between trap stations within each line. Collected animals were returned to the laboratory, stomach contents removed and dried to a constant weight at 55 C, and stored in air-tight plastic bags until they could be processed.

Diet determination.—Specimen plants of the dominant browse, forb and grass components of the five treatments were collected in summer (June 1986) and winter (December 1986 and January 1987). Permanent microscopic slides of reference plants and stomach contents were prepared according to Davitt and Nelson (1980). If mass of stomach contents was <0.5 g dry weight, stomach contents were composited (Jenks *et al.,* 1989) by treatment group to obtain an adequate amount of sample. Several of the stomach content samples ($n = 53$) collected in June 1986 had to be composited resulting in 27 samples available for diet analysis. Stomach content samples ($n = 19$) collected in January 1987 were not composited. Three additional diet samples were collected from reference sites in January 1989 to supplement stomach content samples ($n = 3$) collected from reference sites in January 1987. Because reference sites were temporally static climax forests and reference diets examined in 1987 and 1989 were virtually identical, we believe it was legitimate to include the stomach contents collected in 1989 in the data set. Total diet samples per treatment ranged from 3–9 in summer and 3–6 in winter.

Three replicate diet slides were prepared for each individual or composite sample. Plant fragments were examined along random transects on each replicate slide until 25 identifiable fragments/slide were located (75 total fragments/sample). When an identifiable plant fragment was located, its cover was quantified at 100× by counting the 0.25-mm^2 squares on a 10 × 10-mm ocular grid that covered the fragment. Percent composition of each plant species in the diet was estimated (Kincaid and Cameron, 1982) by dividing the total grid area occupied by each plant species by the total grid area occupied by all plant species. Plant fragments were identified to species when possible. However, if a plant fragment had sufficient characteristics for identification but was not matchable with any specimen plant, it was classified as an unknown dicot or monocot.

Diet analysis.—Major and minor plant species in the diets and plant species grouped into forb and browse classes were analyzed. Plant species were considered major components of the diet if they occurred in woodrat diets from all treatments in either season. Minor plant species comprised $\geq 10\%$ of the diet from at least two but not all treatments in either season. Analysis of variance (PROC GLM, SAS, 1985) was used to test for differences in diet

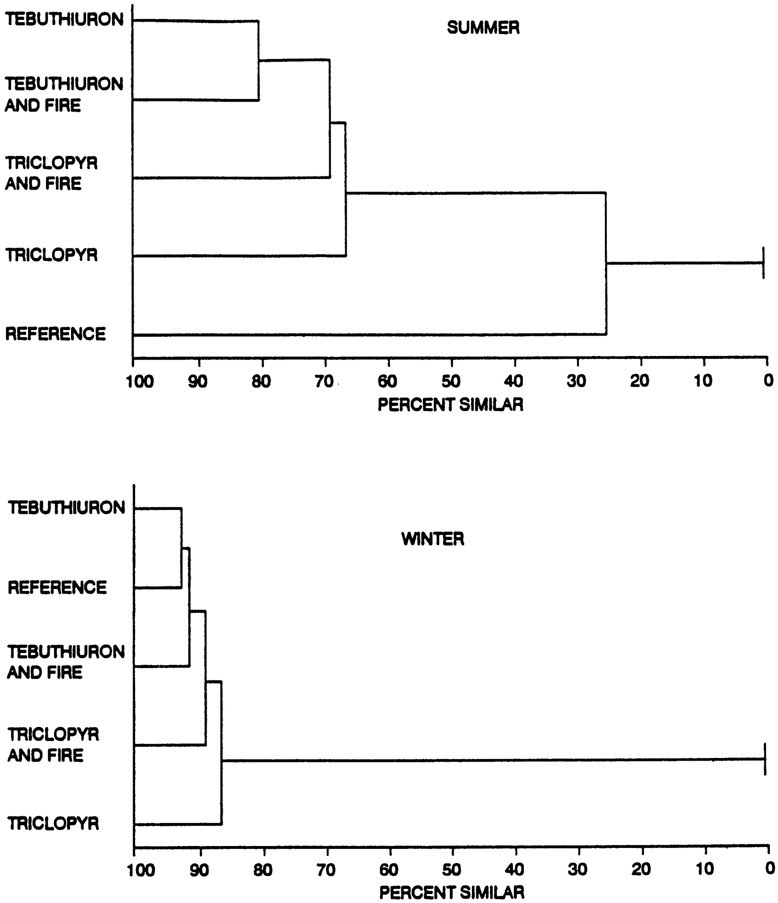

FIG. 1.—Dendrograms depicting similarity (Horn, 1966) of plant species composition in summer (June 1986) and winter (January 1987) diets of eastern woodrats from four experimental brush treatments and reference sites

composition among treatments. All estimates of diet composition were arcsine-transformed (Sokal and Rohlf, 1981) before analysis to correct for heterogeneity of variance. Single degree of freedom contrasts (Steel and Torrie, 1980) were used to test planned comparisons between means for major experimental groups (tebuthiuron vs. triclopyr, burned vs. unburned, herbicide-treated vs. reference).

To further examine the hypothesis of opportunistic foraging, a paired t-test (Sokal and Rohlf, 1981) was used to compare (1) mean differences between dietary browse composition for each treatment and the dietary browse composition of all other treatments with (2) the corresponding differences between dietary browse composition and percent available browse in treatments. If the differences between diets and corresponding treatments were less than differences among diets in the various treatments, an opportunistic foraging strategy would be indicated. A significance level of $P \leq 0.05$ was used in all tests.

Species richness was defined as the total number of different plant species in the diet. Horn's (1966) similarity index was used in a single linkage cluster analysis (Krebs, 1989) as an empirical comparison of estimated similarity of plant species composition in diets among the five experimental groups. Horn's similarity index was also used to determine similarity between composition of browse and forbs in diets and available browse and forbs in the habitat.

Weighted crude protein content of diets from all treatments in both seasons was estimated (Westoby, 1974) and used as a subjective comparison of diet quality among treatments. Dominant plant species totaling >85% of the diet were used to estimate dietary crude protein content. Crude protein values used in the calculations were derived from Short *et al.* (1975), McCullough and Ullrey (1985), O'Halloran *et al.* (1987) and Bogle *et al.* (1989). Crude protein value of ox-eye daisy (*Chrysanthemum leucanthemum*) was unavailable, so a similar composite, black-eyed susan (*Rudbeckia hirta*), was used as a substitute.

RESULTS

Diet characteristics.—A total of 23 different plant species were identified in diets of eastern woodrats in summer and winter. In summer, species richness was highest in diets of eastern woodrats from triclopyr-treated pastures and lowest on burned tebuthiuron treatments. In winter, species richness was highest on tebuthiuron-treated pastures and lowest on reference sites. Species richness of woodrat diets was less in winter than in summer (Table 1). In summer, similarity among diets was highest between burned and unburned tebuthiuron-treated pastures (Fig. 1). Diets of eastern woodrats from burned and unburned herbicide-treated pastures were dissimilar to those from reference sites. Composition of diets of eastern woodrats was similar among all treatment groups in winter.

Forage classes.—Percent composition of forb and browse in diets of eastern woodrats showed significant ($P < 0.001$) seasonal variation (Table 1). Forbs dominated diets in summer, but browse constituted most of the diet in winter. Percent composition of forbs in diets of eastern woodrats varied significantly ($P < 0.001$) among treatments (Fig. 2A) and there was a significant ($P < 0.008$) treatment by season interaction due to the lack of dietary forbs in winter on burned and unburned herbicide treatments (Table 1). Contrast analysis showed a significantly higher percentage of forbs in woodrat diets on herbicide treatments vs. reference sites ($P < 0.001$), tebuthiuron vs. triclopyr treatments ($P < 0.002$), and burned vs. unburned treatments ($P < 0.024$). Percent contribution of browse to the diet was not significantly ($P > 0.05$) influenced by treatment group, but there was a significant ($P < 0.018$) treatment by season interaction. In general, the interaction was due to an increase in browse consumption in winter, which was most pronounced in burned and unburned tebuthiuron treatments (Table 1). Contrasts showed that browse composition was significantly ($P < 0.013$) greater in woodrat diets from pastures treated with triclopyr compared to tebuthiuron. No significant ($P > 0.05$) contrasts were observed for dietary browse composition between herbicide-treated and reference sites or burned and unburned treatments.

Similarity between percent browse composition in summer diets and browse composition in respective habitats was >90% in all treatments including reference sites (Table 2). Similarly, differences between diets and corresponding habitats were significantly less ($t_s = 5.21$, df = 4, $P < 0.010$) than differences among diets in the various treatments.

Major dietary components.—Six plant species were major components of diets of eastern woodrats (Table 1) and the relative dietary composition varied between seasons. Pokeweed, elm, tick clover ($P < 0.001$) and western ragweed ($P < 0.012$) comprised greater percentages of diets in summer than winter. Tick clover was found exclusively in summer diets, but pokeweed, elm and western ragweed occurred in trace amounts in some winter diets. Eastern redcedar ($P < 0.001$) and potentilla ($P < 0.003$) comprised greater percentages of diets in winter and occurred at relatively low (<3.9%) levels in summer diets.

TABLE 1.—Percent composition of plant species in diets of eastern woodrats from five experimental sites in summer (June 1986) and winter (January 1987)

Plant species	Summer					Winter				
	Teb[a]	Teb/f	Tric	Tric/f	Ref	Teb	Teb/f	Tric	Tric/f	Ref
Browse										
Elm (*Ulmus* spp.)[b]	9.6	1.0	51.7	5.1	2.8	0.0	0.0	0.0	0.0	1.7
Eastern redcedar (*Juniperus virginianus*)[b]	0.0	0.0	0.0	3.9	1.3	76.5	78.6	69.4	67.1	93.8
Grape (*Vitis* spp.)[c]	0.0	0.0	0.4	13.9	28.6	0.5	2.8	0.0	12.0	0.0
Hackberry (*Celtis* spp.)	0.0	0.0	0.0	0.0	32.2	0.0	0.0	0.0	0.0	0.1
Greenbriar (*Smilax* spp.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.3	0.8	0.0
Buckbrush (*Symphoricarpus orbiculatus*)	0.0	0.0	1.3	9.2	0.9	0.0	0.0	0.0	0.0	0.0
Plum (*Prunus* spp.)	0.0	0.0	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0
Forbs										
Pokeweed (*Phytolacca americana*)[b]	55.0	81.1	23.1	38.6	0.2	0.0	0.5	0.0	0.0	0.0
Tick clover (*Desmodium* spp.)[b]	3.8	6.8	3.7	10.8	0.6	0.0	0.0	0.0	0.0	0.0
Western ragweed (*Ambrosia psilostachya*)[b]	4.7	0.2	5.8	3.1	1.7	0.1	0.0	0.7	0.0	0.0
Potentilla (*Potentilla* spp.)[b]	0.0	0.3	0.0	0.7	0.0	4.7	15.5	2.1	5.6	0.5
Ox-eye daisy (*Chrysanthemum leucanthemum*)	17.3	0.8	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wild lettuce (*Lactuca canadensis*)	0.0	9.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Minor forbs[d]	5.0	0.1	3.1	2.3	0.0	0.5	0.8	0.0	0.0	0.0

TABLE 1.—Continued

Plant species	Summer					Winter				
	Teb[a]	Teb/f	Tric	Tric/f	Ref	Teb	Teb/f	Tric	Tric/f	Ref
Other										
Fungi[c]	0.0	0.0	0.0	0.0	31.0	4.7	0.0	11.1	13.7	0.0
Unknown dicots	4.6	0.0	10.1	3.6	0.9	13.0	1.8	1.1	0.8	3.4
Unknown grasses	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.5
Total number of species[e]	8	7	12	12	9	6	5	5	5	4

[a] Experimental treatments: Teb = tebuthiuron, Teb/f = tebuthiuron with fire, Tric = triclopyr, Tric/f = triclopyr with fire, and Ref = reference site
[b] Major species = plants that occurred in diets of eastern woodrats on all experimental treatments in either season
[c] Constituting >10% of the diet from at least two experimental treatments in either season
[d] Individual forbs represented <4% of the diet in all experimental treatments
[e] See McMurry (1989) for complete species lists

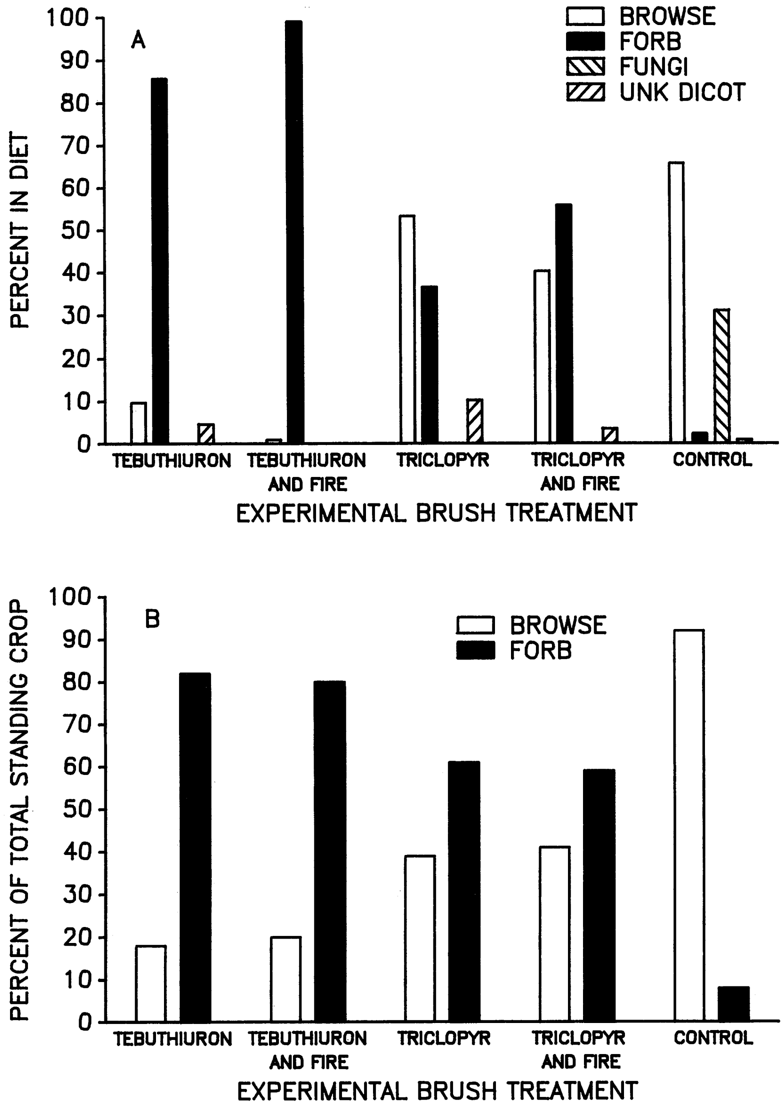

FIG. 2.—Differences in relative percent composition of browse, forbs, fungi, and unknown dicots in summer (June 1986) diets of eastern woodrats (A) and differences in percent standing crop of browse and forbs (B) among four experimental brush treatments and reference sites

Percent composition of pokeweed and elm in woodrat diets was significantly ($P < 0.001$) influenced by treatment, and there was a significant ($P < 0.001$) treatment by season interaction. Pokeweed consumption across seasons and treatments followed the pattern exhibited by forbs in general. However, elm use between summer and winter was not much different on any treatment except unburned triclopyr sites where diet composition of elm declined from 51.7% in summer to 0% in winter (Table 1). Specific contrasts showed that pokeweed comprised a greater portion of diets of eastern woodrats from herbicide-treated

TABLE 2.—Maximum indices of similarity (Ro) between percent diet composition of eastern woodrats and percent habitat composition from four experimental brush treatments and reference sites in summer 1986

Experimental group[a]	Diet composition[b]		Habitat composition		Ro[c]
	Browse	Forb	Browse	Forb	
Teb	10.2	89.8	18	82	0.991
Teb/f	1.0	99.0	20	80	0.917
Tric	59.4	40.6	39	61	0.970
Tric/f	41.9	58.1	41	59	1.000
Ref	96.4	3.6	92	8	0.994

[a] Experimental groups: Teb = tebuthiuron, Teb/f = tebuthiuron with fire, Tric = triclopyr, Tric/f = triclopyr with fire, and Ref = reference site

[b] Because habitat composition data were only available for browse and forbs, diet composition in this evaluation was adjusted to equal 100% from those two forage classes

[c] Horn's (1966) index of similarity

compared to reference sites ($P < 0.001$), burned compared to unburned treatments ($P < 0.045$) and tebuthiuron compared to triclopyr treatments ($P < 0.014$). Elm comprised a greater portion of diets of eastern woodrats from triclopyr ($P < 0.009$) and unburned ($P < 0.003$) treatments compared to tebuthiuron-treated and burned treatments, respectively. Eastern redcedar, tick clover, western ragweed and potentially were not influenced ($P > 0.05$) by treatment. Two minor components of the diet, fungi and grape (*Vitis* sp.), were analyzed in addition to the major diet items and neither differed ($P > 0.05$) between seasons or among treatments (Table 1).

Diet quality.—Estimated mean (±SE) crude protein content of diets was lower in winter (9.00 ± 0.45) than summer (16.78 ± 0.88) and was positively influenced by the percent forbs in the diet. In summer, dietary crude protein was higher on tebuthiuron-treated pastures (18.65 ± 1.35) than in other sites (15.53 ± 0.18). Prescribed burning appeared to influence percent dietary protein on tebuthiuron treatments (20.01 vs. 17.28) but not on triclopyr treatments (15.22 vs. 15.80). No apparent differences were observed in percent protein content of diets among the treatment groups in winter.

DISCUSSION

Forb and browse competition in diets of eastern woodrats generally paralleled forb and browse availability on experimental treatments and reference sites (Table 2). Relative contribution of forbs to plant standing crop was higher on herbicide treatments compared to reference sites and tebuthiuron treatments compared to triclopyr-treated sites but was equal between burned and unburned treatments. We hypothesized that relative forb and browse contributions to diets would reflect relative forb and browse composition in habitats. Percent forbs in the diet was higher for woodrats collected on herbicide-treated sites than for those from reference sites as well as for woodrats on tebuthiuron- compared to triclopyr-treated sites. By comparison, woodrats from tebuthiuron-treated sites consumed less browse than their counterparts from triclopyr treatments. These results confirm the first prediction of our hypothesis relative to forb composition in the diet and the second prediction relative to forb and browse composition in the diet.

However, in contrast to the first prediction concerning browse consumption on herbicide treatments and reference sites, browse consumption by woodrats from herbicide treatments and reference sites was equal. This observation may be primarily a result of diet composition from reference sites rather than selection of browse on herbicide-treated sites. Three food items provided >90% of the total diet for woodrats on reference sites. Grape and hackberry constituted >60% and fungi equaled 31% of the total diet. Statistically, the contribution by fungi de-emphasized the importance of browse as a dietary item on reference sites and may have precluded our ability to demonstrate significant differences between herbicide treatments and reference sites. However, there was an overall trend for reduced browse consumption on herbicide treatments. Due to the lack of data on the availability of fungi, we cannot make conclusions regarding foraging strategy.

Because the proportions of forb and browse standing crop were essentially equal between paired burned and unburned treatments (Fig. 2B), our third prediction was that woodrat diets would be the same in burned and unburned treatments. Percent of the diet composed of browse did not differ between burned and unburned treatments. However, percent forbs in the diet was greater for woodrats from burned treatments compared to counterparts on unburned sites. It appears that woodrats ate more forbs on burned treatments than on unburned treatments, possibly in response to increased nutritional quality induced by burning (Allen *et al.,* 1976).

Only two of the major plant species analyzed showed significant variation among treatment groups. Pokeweed was more abundant in woodrat diets from herbicide treatments compared to reference sites, which parallels vegetation data from CTER (Engle *et al.,* 1987). Pokeweed occurred on all herbicide-treated pastures but did not occur in samples from reference sites. Pokeweed also constituted a higher percentage of the diet from tebuthiuron and burned treatments compared to triclopyr and unburned treatments, respectively. These results indicate possible selection for pokeweed because mean percent frequency of occurrence of pokeweed was 15.5% on triclopyr treatments vs. 8% on tebuthiuron treatments and 13% on unburned treatments vs. 10.5% on burned treatments (Engle *et al.,* 1987).

Percent elm in the diet was higher for triclopyr and unburned treatments compared to tebuthiuron and burned treatments, respectively, which paralleled observed trends in relative elm occurrence in the habitat. Proportion of elm (stem density <1 m in height) available among 12 browse species in 1986 was 5% on triclopyr treatments compared to 1.5% on tebuthiuron treatments and 4.8% on unburned compared to 3.7% on burned treatments (Stritzke *et al.,* 1991). These data tend to confirm an opportunistic foraging strategy.

Overall, summer diets on experimental sites consisted of nearly equal parts forb and browse, represented primarily by pokeweed and elm on treated sites. However, diets from reference sites consisted almost entirely of hackberry, grape and fungi. In winter, similarity of diets among treatment groups was high, as eastern redcedar was the principal diet component although woodrats on triclopyr treatments supplemented their diet with fungi. On reference sites, eastern redcedar was used almost exclusively, suggesting it was the only abundant food on reference sites. Cudmore (1983) noted that eastern redcedar was a primary winter diet item for eastern woodrats in Indiana. Potentilla was used more in winter than summer and because it is not an evergreen plant, woodrats must have cached it before winter. Selection of potentilla may be related to a combination of nutrient quality and its ability to withstand desiccation. Rainey (1956) noted that green vegetation in Kansas could overwinter in woodrat nests without severe desiccation. The presence of other forbs in woodrat diets may be attributable to caching as well.

Differences in nutritional quality of diets among habitats can have special implications for wildlife populations as demonstrated by the positive relationship of diet quantity and quality with reproductive potential of female white-footed mice (*Peromyscus leucopus*) (Merson, 1979; Bomford and Redhead, 1987). The tendency toward selective foraging on burned treatments may reflect selection of forages of higher nutritive quality. Dietary crude protein requirements for laboratory rats are reported as 4.2% for maintenance and 12% for growth, gestation or lactation (NRC, 1978). Our estimates indicate that maintenance requirements were met during summer and winter and production requirements were met in summer on all areas sampled. However, the higher proportion of forbs in diets of woodrats collected from tebuthiuron treatments vs. triclopyr treatments may yield more available protein due to the greater digestibility of forbs than browse (Bogle *et al.,* 1989).

Eastern woodrats have been shown routinely to make use of locally abundant food items (Fitch and Rainey, 1956; Wiley, 1980) and are considered relatively unspecialized consumers (Fitch and Rainey, 1956). Johnson (1964) noted that small mammal species may shift their diets as a result of habitat alteration by herbicides. Eastern woodrats on the CTER experienced dietary shifts on experimental pastures and although a certain amount of variability was evident in choice of individual plant species, diet selection typically reflected an opportunistic foraging strategy. This was especially evident when comparing similarity between summer diet and habitat composition of browse and forbs with similarity between summer diets from different treatments. The higher degree of similarity between diet and habitat composition substantiates the observation of opportunistic foraging by eastern woodrats. An exception was the use of pokeweed on tebuthiuron and burned treatments where increased palatability and/or nutritional quality of the vegetation may promote selective foraging in an otherwise opportunistic forager.

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