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Black-tailed Jackrabbit Preferences for Eight Forages Used for Reclamation of Great Basin Rangelands[1]

Abstract

During peak periods of their population cycles black-tailed jackrabbits (*Lepus californicus*) may compete with other herbivores for forage and negatively impact the health and production of the forage resource. This study was conducted on the Northern Great Basin Experimental Range near Burns, Oregon. Our objective was to establish the growing season relative preferences of jackrabbits for eight selections of grasses available for reclamation of Great Basin rangelands. Response variables included percent of plants defoliated and degree of utilization from plots supporting equal numbers of all selections. The percent of plants grazed and utilization levels of two crested wheatgrass cultivars were nearly twice those of the other grasses. Two cultivars of basin wildrye and one selection of Russian wildrye were avoided by jackrabbits, while one cultivar of bluebunch wheatgrass and two selections of thick-spiked wheatgrass were passively foraged upon. Seedings of unpalatable cultivars are suggested to: (1) discourage jackrabbit presence in right-of-ways where they pose a danger, (2) to reduce competition between jackrabbits and livestock for forage, or (3) reduce potential damage to ground cover or forage resources in critical areas during jackrabbit population peaks. Conversely, seedings of palatable cultivars might be used to lure jackrabbits away from less palatable, but more valuable crops or forages.

Introduction

Black-tailed jackrabbits (*Lepus californicus*) frequent North American range and croplands from Washington, east to the Dakotas in the United States, and extend south into Mexico (Hall 1981). Jackrabbit populations are cyclic, with 7 to 10 years typically separating peak numbers (Gross *et al.* 1974). When high populations occur, jackrabbits can compete with wild and domestic herbivores for forage (Currie and Goodwin 1966, Johnson 1979). Many feel that high populations of these animals affect stature and composition of rangeland vegetation through selective grazing (Stewart and Hull 1949, Sparks 1968, Uresk 1978, Roundy *et al.* 1985, Crawley 1990). Others suggest, however, that because populations are cyclic, and the hares exert feeding pressure on nearly all important components of plant communities, they have little influence on vegetation composition of good condition rangelands (Anderson and Shumar 1986).

Agricultural crops and reclaimed rangelands, particularly crested wheatgrass (*Agropyron desertorum* (Fischer ex Link) Schultes) seedings, are often preferred by black-tailed jackrabbits (Fagerstone *et al.* 1980, Roundy *et al.* 1985). Jackrabbits select grasses in early spring and summer, forbs in late summer and fall, and shrubs during winter months (Currie and Goodwin 1966, Sparks 1968). The spring and early summer period coincides with the late-boot and early anthesis stages of phenology of our caespitose grasses, a period when severe defoliation may significantly affect vigor or health of these plants (McIlvanie 1942, Cook *et al.* 1958, Ganskopp 1988). Reclamation or revegetation specialists may avoid potential stand failures and competition for forage if information on relative preferences of black-tailed jackrabbits for common cultivars was available.

We evaluated the relative preferences of black-tailed jackrabbits for eight selections of grasses adapted to and available for reseeding areas in the arid Great Basin. Selections (and recommended precipitation ranges for planting) were: 2 cultivars of basin wildrye (*Leymus cinereus* (Scribner & Merrill A. Löve)), Magnar (20-63 cm) and Trailhead (20-41 cm); 1 cultivar of bluebunch wheatgrass (*Pseudoroegneria spicata* (Pursh) A. Löve), Goldar (20-46 cm); 2 cultivars of thick-spiked wheatgrass (*Elymus lanceolatus* ((Scribner & J.G. Smith)Gould), selection #9021076 (15-41 cm) and Secar (20-46 cm); the Bozoisky (31-36 cm) cultivar of Russian wild-rye (*Psathyrostachys junceus* (Fischer)Nevsk); Nordan crested wheatgrass (*Agropyron desertorum* (Fischer ex Link) Schultes) (20-30 cm); and a crested wheatgrass cross called

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Hycrest II (20-20 cm), a product of *Agropyron desertorum* and *Agropyron cristatum* (L.) Gaertner). Our objective was to identify selections which might be attractive to or avoided by black-tailed jackrabbits. This was accomplished by monitoring frequency and intensity of utilization of plants by native black-tailed jackrabbits having access to plots where all selections were equally available.

Materials and Methods

The study was conducted on the Northern Great Basin Experimental Range (119°43′W, 43°29′N) 70 km west-southwest of Burns, OR. Mean annual precipitation is 28 cm with peak monthly accumulations in November, December, January, and May (ranging from 2.8 to 3.6 cm); and a mean minimum accumulation (0.8 cm) in July. Mean annual temperature is 7°C with extremes of −29 and 42°C. Mean crop-year precipitation (Sept.-June) is 23 cm. Soil where plots were established was a Holtle (coarse-loamy, mixed, frigid Aridic Duric Haploxerolls) Milican (coarse-loamy, mixed, frigid Orthidic Durixerolls) complex (Lentz and Simonson 1986).

With the exception of Hycrest II, from USDA-ARS Logan, UT, seed was acquired from the SCS Pullman Plant Materials Center, Washington. Seedlings were established in tubes in a green house during the winter and transplanted to plots in early April 1990. Crop-year precipitation for 1990 was 74% of average, but because plants were growing essentially free from competition, they tillered prolifically. Planting design was a randomized complete block with eight treatments (cultivars) and nine replications. A replicate contained 98 plants of each selection (total/replicate = 784 plants) randomly planted within a 28 X 28 matrix. Matrix rows and columns were 76 cm apart with each of the nine replicates being 20.6 m to a side. Plots were kept weed-free by mechanical means. Vegetation adjacent to the plots was native sagebrush (*Artemisia* spp.)/bunchgrass to the west and crested wheatgrass to the north, east and south. Herbage production, sampled for an unrelated project in one of our adjacent crested wheatgrass pastures, was 294 kg/ha (±6.0, 95% CI). Although we did not sample production in our plots, the level of herbage available appeared to equal or slightly exceed that of the neighboring crested wheatgrass. Production in the native sagebrush/bunchgrass vegetation appeared to be lower than the neighboring crested wheatgrass pastures. Small rodents, primarily Townsend ground squirrels (*Spermophilus townsendi*), were eliminated both within and adjacent to the plots with zinc phosphide. Trails, frequent sightings, and jackrabbit scat on nearly every square meter of our plots gave us confidence that black-tailed jackrabbits were the main herbivores.

Jackrabbits from surrounding terrain had free access to the plots from early June until 10 July 1990. Most foraging was nocturnal, and we did not census the animals. One would, however, typically encounter a jackrabbit for every 50 to 75 m of day-time travel in the adjacent sagebrush/bunchgrass vegetation. Night road surveys of jackrabbit numbers in Harney County have been compiled by Oregon Department of Fish and Wildlife personnel for the last 12 years and indexed as numbers/100 km traveled. Variation is extreme, and numbers range from 0 in 1985 to a high of 183/100 km in 1981. The mean and standard deviation for this same period are 46 and 58.7/100 km, respectively. The index for 1990 was 40/100 km (personal communication, George Keister, Or. Dept. Fish & Wildl.).

During the period the jackrabbits had access to plots, plants were in the vegetative and early-boot stages of phenology. The latter stage is the time when severe defoliation most negatively affects subsequent vigor and production of cool-season grasses (McIlvanie 1942, Cook *et al.* 1958, Ganskopp 1988). Diameters of individual plants ranged between 3 and 12 cm. After hares were excluded from plots by fencing, each plant was scored for presence or absence of any sign of defoliation, indexed as either a 0 or a 1, and degree of utilization as indexed by scores ranging from zero to three. Scores, based on appearance of plants, indicated: 0) no utilization, 1) 1-20% herbage weight removed, 2) 20 to 40% weight removed, and 3) >40% weight removed. Scores (n=98) for both response variables were summed by cultivar (n=8) within each replication (n=9) with the totals functioning as single observations (n=72) in randomized-complete-block analyses of variance. Data were converted to percentages after analyses.

Mean separations and preference ratings were accomplished with Least Significant Difference (LSD) procedures (P=0.05). Selections scoring > than 1 LSD above the mean were viewed as "preferred," those <1 LSD below the mean were recognized as "avoided," and those within ± 1 LSD of the mean were considered to be "passively"

foraged upon by jackrabbits. Degree of association between relative rankings established for the selections by the two response variables was quantified with Spearman's rank correlation coefficient (Gibbons 1971).

Results and Discussion

Approximately 34% of all plants received some degree of defoliation with the range extending from 4% for "Trailhead" basin wild-rye to 69% for "Hycrest II" crested wheatgrass. Mean percentages of plants defoliated ($F = 61.4$ with 7 and 56 df) and levels of utilization ($F = 57.9$ with 7 and 56 df) by black-tailed jackrabbits differed significantly among selections with nearly identical interpretations derived from both response variables (Figures 1 and 2). The crested wheatgrass cultivars (Nordan and Hycrest II) were clearly preferred forages. Percent of plants defoliated and levels of utilization for both cultivars were nearly two times greater than scores of the other selections, and approximately 6% of these plants were actually killed by overgrazing. The bluebunch wheatgrass cultivar (Goldar) and the two thick-spiked wheatgrasses were foraged upon at roughly mean levels and were assigned a passive rating. The Bozoisky Russian wild-rye and two basin wild-rye cultivars, Trailhead and Magnar, were lightly foraged upon and ranked as avoided. Relative rankings among selections were nearly identical between the two response variables (Spearman's coefficient of rank correlation $r_s = 0.98$) with the only discrepancy being a nonsignificant ($P > 0.05$) exchange of "Secar" and thick-spiked wheatgrasses as ranked by the two indices (Figures 1 and 2).

Our results suggest these cultivars could be used as management tools to either discourage or encourage black-tailed jackrabbit use of an area. For example, plantings of the wildrye cultivars might avoid attraction to road or aircraft runway right of ways. In a similar vein, the basin and Russian wild-rye cultivars might function as protective

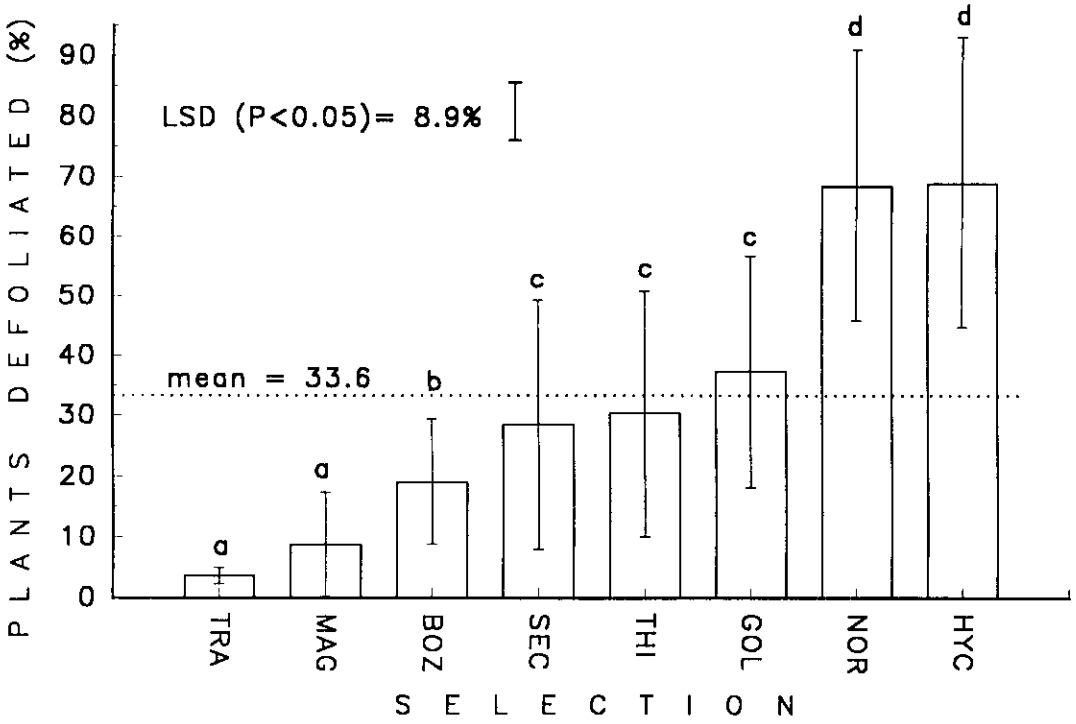

Figure 1. Percentages of plants defoliated by black-tailed jackrabbits among eight selections of grasses at the Northern Great Basin Experimental Range. Selections are, respectively: Trailhead basin wildrye (TRA), Magnar basin wildrye (MAG), Bozoisky Russian wildrye (BOZ), Secar bluebunch wheatgrass (SEC), thickspike wheatgrass (THI), Goldar bluebunch wheatgrass (GOL), Nordan crested wheatgrass (NOR), and Hycrest II crested wheatgrass (HYC). Error bars denote ±1 standard deviation of the mean for each cultivar. Columns sharing a common letter are not significantly different ($P > 0.05$).

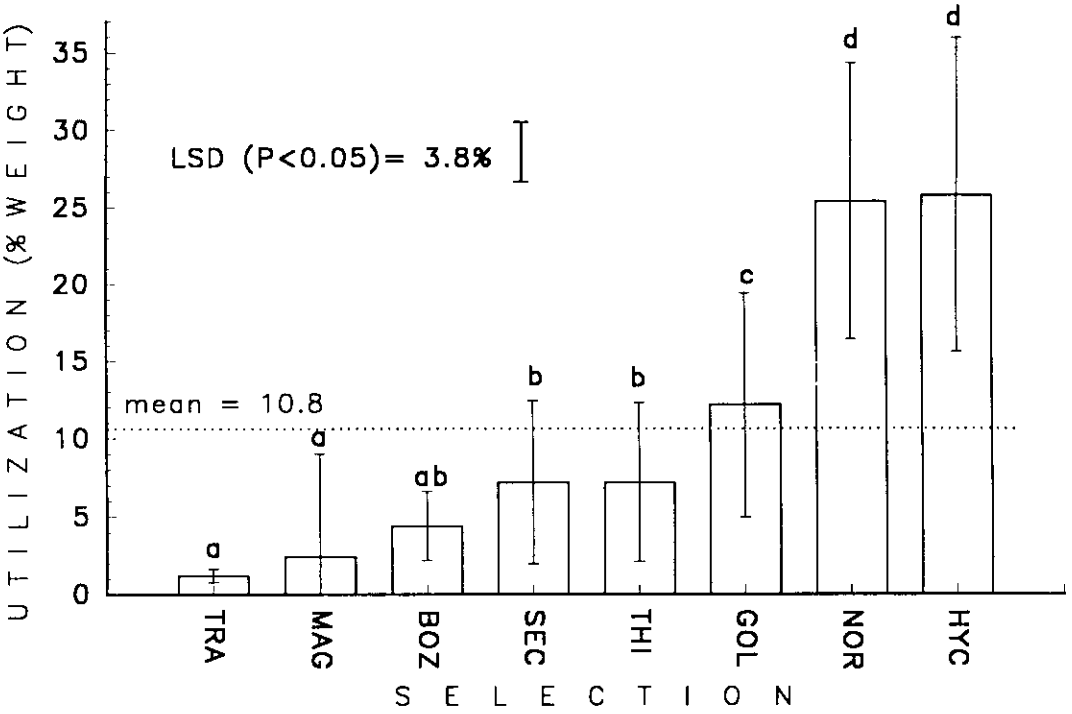

Figure 2. Percent utilization reflecting amount of material removed from eight selections of grasses by black-tailed jackrabbits at the Northern Great Basin Experimental Range. Selection abbreviations are referenced in Figure 1 heading. Error bars denote ± 1 standard deviation of the mean for each cultivar. Columns sharing a common letter are not significantly different ($P>0.05$).

buffers around more valuable crops as suggested by Fagerstone *et al.* (1980) or as alternative livestock forages less likely to be consumed or damaged by black-tailed jackrabbits. Conversely, plantings of crested wheatgrass cultivars might lure jackrabbits away from more valuable, but less palatable, crops or critical areas. Efficacy of buffer strips for crop protection has not been tested, however, and additional research is needed to address applicability of this hypothesis.

In the sagebrush-steppe, black-tailed jackrabbits typically inhabit shrub dominated areas during daylight and make feeding forays into areas offering higher quality forage but less overhead cover at night (Johnson and Anderson 1984). Research by Longland (1991) detected significantly less use of palatable feed by jackrabbits when distance from cover was only 5 to 10 m. Under more applied conditions, in large seedings, and with high populations, black-tailed jackrabbits typically forage within a 300-m band adjacent to protective cover (Westoby and Wagner 1973, Roundy *et al.* 1985, McAdoo *et al.* 1987). We saw no significant evidence of a utilization gradient in our plots which ranged from 5 to 65 m from protective shrubs. Percent of plant weight utilized averaged 9% for the 3 replications closest to cover and 12% in the 3 most distant blocks. The fact that crested wheatgrass bounded our plots on 3 sides raises the possibility that jackrabbits might have been preconditioned to select these cultivars. The duration (about 40 days) of this trial, however, was sufficient to allow the hares to develop selective priorities. Indeed, in more controlled preference experiments, animals are frequently given much less acclimation time and forced to deplete their forage resources to a greater degree (Currie and Goodwin 1966, Murray 1984). Additionally, our observations indicated the hares occupied the sagebrush/bunchgrass vegetation during daylight hours where they had access to a diversity of native grasses as well.

Our findings, and those of others (Johnson and Anderson 1984, Crawley 1990) clearly demonstrate

selective grazing by black-tailed jackrabbits. Having identified favored and avoided cultivars, we suggest planting avoided selections in areas prone to frequent out-breaks of black-tailed jackrabbits. Possible benefits include: (1) minimizing potential damage to growing forage or arid land ground cover during its most susceptible stage of phenology, (2) reducing competition with livestock or other wildlife for forage, and (3) perhaps discouraging immigration and/or encouraging emigration of these hares to other areas.

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