DISKING OF IMPROVED RANGELAND TO INCREASE WILDFLIFE FOOD PLANTS

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ABSTRACT

This study was conducted to determine effects of 3 intensities of soil disturbance by disking on abundance of wildlife food plants in improved rangeland. No disking (control) and 1, 2, and 3 passes with an 11-foot offset disk were replicated in improved pastures dominated by either Rhodesgrass (*Chloris gayana*), buffelgrass (*Cenchrus ciliaris*), or Kleberg bluestem (*Dichanthium annulatum*). Plots were disked in May 1984. At 1, 2, 4, 10, 15, and 17 months after disking, percent canopy cover of perennial grasses on plots disked with 3 passes was lower than that on control plots. Percent canopy cover of annual forbs was higher on plots disked with 3 passes 7 and 10 months after treatment. Disking did not affect the growth of annual grasses, perennial forbs, and shrubs. We recommend disking with 3 passes to increase abundance of annual forbs and reduce perennial grasses in improved rangeland.

INTRODUCTION

Large areas of rangeland in south Texas are dominated by introduced forage grasses. Rhodesgrass (*Chloris gayana*), buffelgrass (*Cenchrus ciliaris*), and Kleberg bluestem (*Dichanthium annulatum*) are commonly planted in the region. Planting monocultures of these grasses reduces quality of rangeland for wildlife habitat. These grasses outcompete and reduce the abundance of native wildlife food plants (Lehmann, 1985). Seeds of these exotics are not consumed by game birds such as bobwhite quail (*Colinus viginianus*) (Lehmann, 1985). Moreover, thick stands of exotic grasses make habitat unsuitable for quail impeding travel (Guthery, 1986). Although white-tailed deer (*Odocoileus virginianus*) eat fresh, succulent growth (Meyer, 1982), grasses normally compose a small percentage of deer diets in south Texas (Arnold, 1976).

Improving rangeland dominated by introduced grasses for wildlife habitat is an important consideration since income for commercial hunting exceeds income from livestock on many south Texas ranches (Fulbright and Beasom, 1986). Disking rangeland may increase the abundance of plants eaten by several wildlife species (Webb and Guthery, 1983). The response of plants to disking varies with plant species composition, range site and condition, and the degree of soil disturbance. This study was conducted to determine the degree of soil disturbance by disking needed to increase wildlife food plants in rangeland dominated by introduced grasses.

STUDY AREA

The study was conducted in 3 pastures of the Texas A&I University Farm about 3 miles north of Kingsville, Kleberg County, Texas. The pastures were dominated vegetatively by either Rhodesgrass, buffelgrass, or Kleberg bluestem. Soil in the Rhodesgrass pasture was Clareville clay loam, classified as a fine, mixed hyperthermic Pachic Argiustoll. Orelia fine sandy loam, classified as a mixed, hyperthermic Typic Ocraqualf was present in the buffelgrass pasture. The soil in the Kleberg bluestem pasture was Willacy fine sandy loam classified as a mixed, hyperthermic Udic Argiustoll. Elevation is about 65 feet above sea level. The climate is subtropical and average rainfall is about 25 inches. Precipitation for 1984 and 1985 is presented in Figure 1.

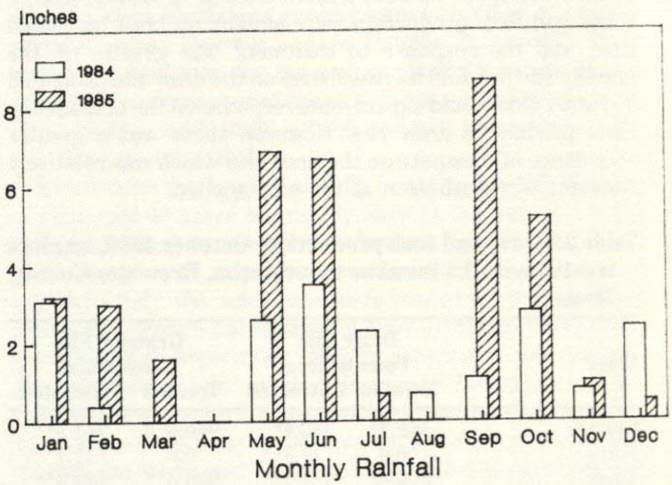

Figure 1. Monthly rainfall (inches) during 1984 and 1985 at the Texas A&I University Farm, Kingsville, Texas.

MATERIAL AND METHODS

A randomized complete-block experimental design with pastures as blocks was used in the study. Treatments consisted of 0, 1, 2, or 3 passes with an 11-foot-wide offset disk pulled by a farm tractor. Each treatment was randomly assigned to a 15- by 120- foot plot in each pasture. Plots were disked on 25 May 1984. Depth of disk penetration ranged from 3 to 6 inches. Plots were separated by 3-foot buffers and deer and livestock were excluded by an electric fence.

Two permanent 100-foot transects were randomly located in each treatment and control plot. Thirty 0.66-by 1.64-foot sample plots were placed along the right side of each transect at 3-foot intervals. Percent canopy cover of vegetation was estimated before disking, monthly during the first 7 months after disking, and bimonthly during the following 9 months.

Vegetation canopy cover data were tabulated and then classified for statistical analysis into annual and perennial grasses, annual and perennial forbs, and shrubs. Horsetail Conyza (**Conyza canadensis**), an annual forb, was analyzed separately because of its abundance. Analysis of variance (SAS 1982) was used to compare the treatment effects, and Tukey's test was used at the 0.05 level of probability to identify significantly different means for each sampling date.

RESULTS AND DISCUSSION

Canopy cover of vegetation was similar (**P** >0.05) among treatment plots before disking (Figs. 2-7). One, 2, and 3 passes reduced canopy cover by 35, 71, and 80%, respectively.

Percent canopy cover of annual grasses, horsetail Conyza,

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perennial forbs, and shrubs was similar (**P** >0.05) among treatments on all sampling dates (Figs. 2-5). The percent canopy cover of perennial grasses on plots disked with 3 passes was lower than that of controls 1 (June 1984), 2 (July 1984), 4 (September 1984), and 10 (March 1985) months after disking, but was similar to that on plots disked with 2 passes (Fig. 6). Fifteen months after disking (August 1985), percent canopy cover of perennial grasses on plots disked with 3 passes was lower than on plots disked with other treatments and controls. Seventeen months (October 1985) after disking, canopy cover on plots disked with 3 passes was lower than controls and 1 pass, but was similar (**P** > 0.05) to that on plots disked with 2 passes. Percent canopy cover of perennial grasses on all other sampling dates was similar (**P** >0.05) among treatments and control plots.

Disking with 1 or 2 passes did not affect canopy cover of annual forbs (Fig. 7). In December 1984 and March 1985, the percent canopy cover of annual forbs on plots disked 3 passes was higher than that on controls, but was similar to that on plots disked with 1 or 2 passes. Annual forbs on 3-pass plots that are important wildlife food plants included tallow weed (**Plantago hookeriana**), **Verbena runyonii**, evening primrose (**Oenothera** sp.), yellow woodsorrel (**Oxalis dillenii**), and annual lazy daisy (**Aphanosthepus kidderi**) (Martin and Nelson, 1951; Buckner and Landers, 1979). Arnold (1976) found that annual lazy daisy and tallow weed composed 6.10 and 0.13% by weight of white-tailed deer diets, respectively. Meyer (1985) reported that yellow woodsorrel was an important white-tailed deer food, especially during the spring (February-March). Wood (1985) found that yellow woodsorrel composed 2.7 to 7.9% by weight of northern bobwhite diets.

The reduction in perennial grass cover resulting from disking with 3 passes may benefit bobwhite quail. The birds need fairly open land for feeding and movement on the ground (Lehmann, 1985; Guthery, 1986). Canopy cover of perennial grasses on strips disked with 3 passes increased to 50% in October 1985, thus disking reduces cover only temporarily. To maintain reduced cover of introduced grasses and increase annual forbs, disking with 3 passes probably should be repeated at 2-3 year intervals.

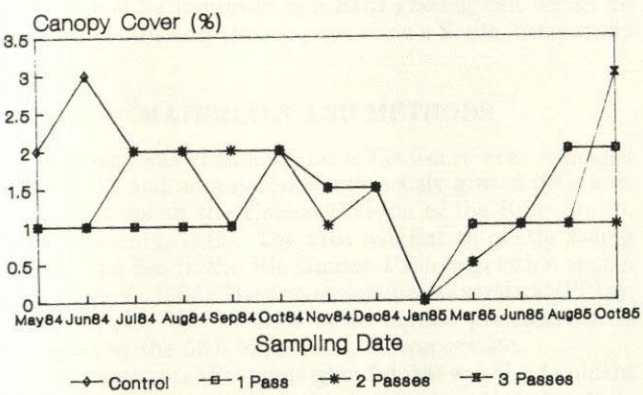

Figure 2. Mean canopy cover (%) of annual grasses during 1984 and 1985 on controls and plots disked in May 1984 with 1, 2, or 3 passes. There were no significant (P >0.05) differences among treatments on all sampling dates.

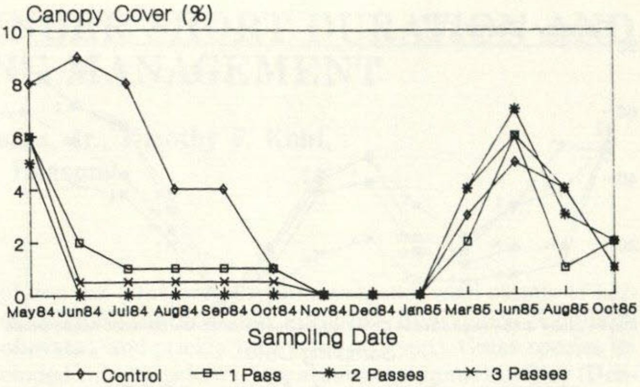

Figure 3. Mean canopy cover (%) of horsetail Conyza during 1984 and 1985 on controls and plots disked in May 1984 with 1, 2, Or 3 passes. There were no significant (P >0.05) differences among treatments on all sampling dates.

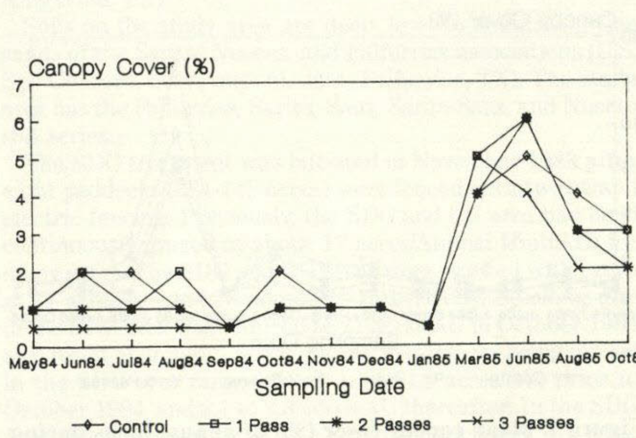

Figure 4. Mean canopy cover (%) of perennial forbs during 1984 and 1985 on controls and plots disked in May 1984 with 1, 2, or 3 passes. There were no significant (P >0.05) differences among treatments on all sampling dates.

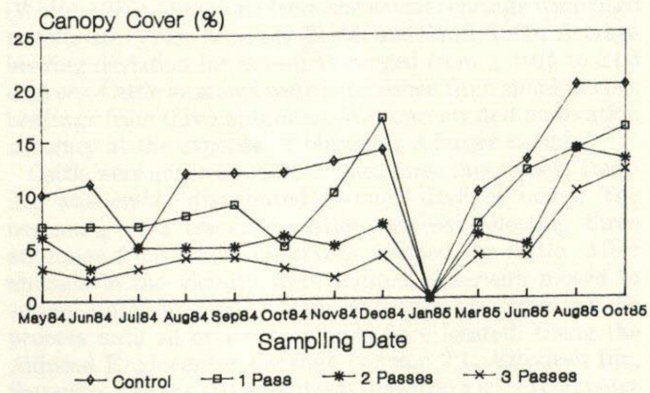

Figure 5. Mean canopy cover (%) of shrubs during 1984 and 1985 on controls and plots disked in May 1984 with 1, 2, or 3 passes. There were no significant (P >0.05) differences among treatments on all sampling dates.

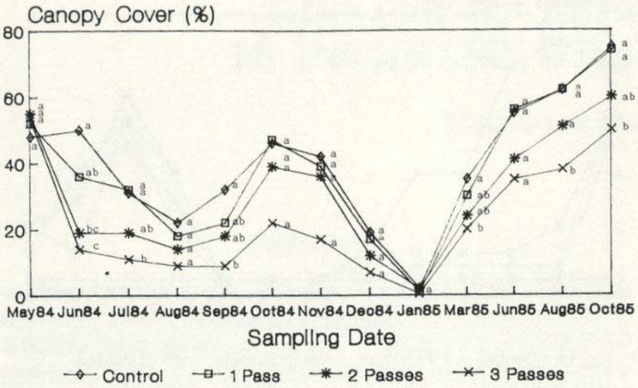

Figure 6. Mean canopy cover (%) of perennial grasses during 1984 and 1985 on controls and plots disked in May 1984 with 1, 2, or 3 passes. Means for sampling date associated with the same letter are not significantly different (P >0.05).

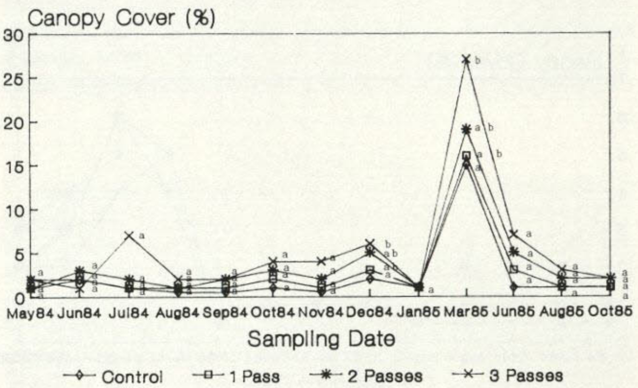

Figure 7. Mean canopy cover (%) of annual forbs during 1984 and 1985 on controls and plots disked in May 1984 with 1, 2, or 3 passes. Means for a sampling date associated with the same letter are not significantly different (P >0.05).

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