Nine permanent meter squared plots were established within each of these snakeweed control plots. Irrigation treatments were applied to these plots at a rate of 50% of the average monthly precipitation at different seasons (winter or summer) and at different frequencies (2 or 4 week interval). Summer burn plots had 67% of the total seedlings that germinated. Season or frequency of irrigation had no effect on the number of seedlings that germinated. Seedling survival was 80% on summer irrigation plots as compared to 38% on control plots.

The second objective of this study was to determine drought stress effects on mature snakeweed plants. At two sites, 60 mature plants were selected, 30 controls and 30 treated. Treated plants were excavated at apr. 10 cm beyond the canopy perimeter to a depth below the roots (apr. 30 cm) in November 1990 and May 1991. The ball of soil was then wrapped in 6 mil plastic to prevent precipitation from recharging soil moisture. Plants containerized in November 1990 steadily declined in soil moisture and increased their leaf water potential. After five or six months containerized plants were dead. All plants containerized in May 1991 were dead the first month after containerization. Data suggest drought stress may be less of a problem during the winter months and more important during early spring growth.

The final objective of this study was to determine the viability of snakeweed seeds found in the soil seed banks following fire, herbicide and control treatments. Laboratory research was conducted in the Range Greenhouse on the New Mexico State University campus. Six soil samples were taken with a 2 cm diameter soil probe to a depth of 5 cm from each treated plot. Samples were mixed by treatment and placed 1 cm deep over sterile sand in 15 cm diameter plastic pots. Pots were arranged in a completely randomized block design with three replications. Soil was watered as needed to maintain field capacity. Over the course of the study no snakeweed seedlings were observed.

FUEL AND ENVIRONMENTAL CHARACTERISTICS RELATED TO FIRE INTENSITY IN THE SHORTGRASS PRAIRIE

C. R. Hart and K. C. McDaniel

(Key Words: Prescribed Burning, Broom Snakeweed, Herbaceous Response)

This study was initiated to determine important fuel and environmental characteristics that can be used to predict fire intensity in the Shortgrass Prairie of New Mexico. The study was conducted on the NMSU Range and Livestock Research Center near Corona, New Mexico in Lincoln and Torrance Counties. Results from this study will be combined with results from seasonal mortality measurements of broom snakeweed and herbaceous response to develop a burning prescription for management of broom snakeweed infested rangelands.

A total of 26 plots were burned in late March (Spring) and 16 in late June (summer) of 1991 at two locations on the ranch. Plots were divided into 4 fine fuel categories and burned at specific air temperatures for regression analysis. Fine and coarse fuel loads and moisture contents; percent total plant cover, bare ground, and litter; and density of broom snakeweed were measured on each plot. Climatic measurements included air and soil temperature, soil moisture, wind speed and direction, and relative humidity. Fire measurements included maximum fire temperature, duration of heat, rate of spread, and degree-seconds of heat. Fire temperature measurements were made with temperature sensitive substances (Tempils) and thermocouples.

Average fire intensity characteristics obtained by season are presented in Table 1. Spring burns tended to be uniform with respect to rate of spread while burning quicker and cooler. By comparison, summer burns provided a wide range of fire temperatures which were generally higher and of longer duration than spring burns. With multiple regression techniques, 72% of the variation in spring thermocouple temperatures was explained by air temperature, grass yield, snakeweed cover, and snakeweed density while 90% of the summer variation was explained by total yield, air temperature, and soil temperature. Duration of heat above 60°C was most affected by soil and grass moisture, air temperature, and % bareground during spring (r^2=.60) and % litter, total yield, air temperature, and relative humidity during summer (r^2=.87).

Table 1. Summary of average values obtained for total burn time (TBT), average thermocouple temperature (TC), average tempil-strip temperature (TS), duration of heat (DOH), and rate of spread (ROS).

Variable	Season	Mean	Maximum	Minimum	S.E.
TBT (Min.)	Spring	2.0	6.0	1.0	0.24
	Summer	5.8	21.0	0.5	1.23
TC (°C)	Spring	249.8	361.0	147.0	12.17
	Summer	290.5	519.0	106.0	32.20
TS (°C)	Spring	100.6	154.0	46.0	5.93
	Summer	131.5	204.0	37.0	11.50
DOH (Seconds)	Spring	36.6	52.0	8.0	2.69
	Summer	48.8	71.0	19.0	4.89
ROS (m/sec.)	Spring	0.55	1.30	0.19	0.05
	Summer	0.34	1.17	0.03	0.11