

INVENTORY AND ANALYSIS OF LEAFY SPURGE (Euphorbia esula) SITES

... A Feasibility Study

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Background

Leafy spurge (Euphorbia esula L.) infests more than 2.25 million acres of agricultural and range lands in the United States and had an economic impact of \$10.5 million in 1978 (Noble et al. 1979). The most widespread and heaviest areas of infestation are in the northern and central Great Plains. However, quantitative information and compatible inventory and monitoring procedures for leafy spurge are lacking (Noble et al. 1979).

A recent symposium (North Dakota State University Cooperative Extension Service et al. 1979), emphasized the need to coordinate leafy spurge research and management, including improved uniform inventory procedures (MacIntyre 1979, Mitich 1979). A uniform evaluation procedure to compare infestations among states also is needed.

Armstrong (1979) is developing a method to inventory leafy spurge using aerial photography. The procedure uses color infrared photos at a scale of 1:24,000 taken at peak spurge flowering. No indication is given as to the site homogeneity necessary to obtain identification of spurge patches. However, at least 50% foliar cover is necessary to identify a 100-square-foot patch of spurge at the 1:24,000 scale, and there has been little success using LANDSAT image to identify known spurge patches of 40-50 acres (Armstrong 1979).^{1/}

Remote Sensing Data

Remote sensing may be one technique in an aerial-ground inventory system for leafy spurge, and a means to conduct large area surveys and monitor treatment areas. In a study by the Rocky Mountain Forest and Range Experiment Station, seven scales of color and color infrared aerial photography and 1:1 million scale color infrared composite imagery from LANDSAT are being tested. The seven aerial photo scales are 1:800, 1:2,000, 1:4,000, 1:8,000, 1:16,000, 1:32,000, and 1:64,000. These

^{1/} Armstrong, D. W., III. 1979. Personal communication. Botanist, Montana Department of Agriculture, Helena, Montana 59601.

test scales have been flown with either two or four Mauer 70-mm cameras to provide simultaneous site coverage by two films and a minimum of two scales. These scales and film types will be tested to determine which scale/film combination is best suited for large area surveys and for intense quantitative site measurements, inventory, and monitoring. Accurate interpretation of aerial photos and satellite imagery highly depends upon plant community structure, community juxtaposition, terrain, phenology, and other factors (Driscoll 1971, Francis and Driscoll 1976).

Ground Data

To fully interpret the remote sensing data and to develop a quantitative approach to leafy spurge community description, several site measurements are being made. The measurements include: (1) percent cover for vegetation (foliar) and soil surface factors, (2) plant density, (3) plant height, (4) dry weight production (phytomass), (5) relative dominance, and (6) phenology. These community attributes are collected by life form, species, and/or soil surface factors. Categories used for site data collection are: (1) leafy spurge, (2) grasses, (3) grasslikes, (4) forbs, (5) shrubs, (6) litter, (7) bare soil, (8) erosion pavement, (9) rock, and (10) cryptogams.

All sample site data are collected from 1-foot by 2-foot quadrats on a systematic sample basis. Production is obtained by double-sampling using clipped (harvested) plots and capacitance meter readings (Neal and Neal 1973, Currie et al. 1973). Five quadrats are metered for each quadrat harvested. In addition, vertical quadrat photos are taken. The intent is to develop a correlation between field measurements and measurements from the vertical quadrat and aerial photos as a possible way to speed-up site measurements and to increase the size and number of areas sampled. The ground and aerial photos also provide a permanent visual record of the site.

Because all spurge sites cannot be inventoried at peak flower, three sample dates were chosen throughout the growing season. The sample dates are based on leafy spurge phenology and include: peak flower, late or past flower, and fall color (reddish). The test aerial photos have been delineated on the ground as to known areas of spurge and to help identify other species.

Study Area

The current study area is the Custer National Forest, Little Missouri National Grassland (USFS) in southwestern North Dakota. Studies are being conducted in coordination and with personnel of the Medora Ranger District in Dickinson, North Dakota. Data were collected for one field season (three sample periods) in 1979. The analysis of the data is now underway.

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