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Aerial infrared imagery of leafy spurge (*Euphorbia esula*)

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During the last several years an increasing awareness of the nature and extent of noxious plants has developed in Montana and surrounding areas. With this increase in awareness have come the strident calls for help and a feeling that something must be done to stem the invasion.

Leafy spurge (*Euphorbia esula*) has received nearly all of the attention of those individuals concerned with noxious weed control. Concerned parties cite numerous examples of the extent and pervasiveness of this plant. Estimates of the acres populated by leafy spurge in Montana range from 200,000 to nearly 600,000 acres depending on which agency or individual did the survey.

Beginning in 1975, we began to come to grips with the need to inventory our noxious weed problems. An inventory accomplishes several things:

1) The extent, nature, and locations of the target populations can be delineated and placed on maps. These maps allow interested parties to determine the number of acres of the plant and where populations of these plants can be found.

2) Populations of noxious plants can be recorded in terms of "net" and "gross" acres. Generally, plants of all kinds do not grow in solid mats of vegetation, but are distributed over an area groups or as individual plants. The total area that a surveyor may reasonably expect to find plants of the target population is referred to as the "gross" area. This figure provides and indication of labor required to search an area for a designated plant. The area in 1/100th acre (400 sq. ft.) increments, when designated plants from a single (gross) area are grouped together as a whole constitutes "net" acreage. Net acreage can be used to determine the amount of chemical required to treat a target area. Use of these two terms could be very useful for providing a standardized basis for reporting data about target plants.

3) Weed control is fraught with the "other guy" syndrome. The weed problem could be solved if only the "other guy" would control his weeds. Inventories allow each afflicted party to assess the extent of the problem on his land, his neighbor's land,

land in the county, land in state or even other states. Once people understand the extent of the problem and what they must deal with, then they are more likely to cooperate with a program.

4) Inventories are vital to the development of management plans. No one believes that we can solve the management of noxious plants with a one time program. Management of noxious plant requires planning, time, persistence and evaluation. Inventories are vital to all of these.

5) Often noxious plants afflict individuals and agencies alike. With the inventory completed and management plans written, money is more likely to be available to assist in solving the problem. Those that are asking private landowners and the public to pay must demonstrate an adequate and reasonable need for the money.

We have developed a method of inventorying leafy spurge using aerial photographic imagery. When leafy spurge is fully in bloom an image can be obtained on Kodak 2443 false color infrared film, which can be characterized as a ‘‘hot pink’’. This signature is characteristic of leafy spurge at full bloom and is not easily confused with any other plant. We used a 35 mm system described by Heyer (73, 78) to develop this signature. For mapping purposes we use the large format 9 X 9 2443 film. Our studies indicate that a scale of 1:24,000 (3 inches/mile) or larger are necessary to adequately image small leafy spurge patches. We have successfully imaged 100 sq. foot patches of leafy spurge at 1:24,000 scale. The best time to Image leafy spurge is between the 2nd week of June to the 2nd week of July.

In summary, leafy spurge can successfully be inventoried by using the following:

- Film: Kodak 1443 color infrared
- Filter: Yellow 12
- Film scale: 1:24,000 or larger
- Date: 2nd week of June - 2nd week of July
- Phenology: Leafy spurge should be in full “bloom’’ and growing vigorously.

Bibliography

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