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Using remote sensing for detecting and mapping leafy spurge (*Euphorbia esula*)

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Leafy spurge is a troublesome weed in the northern Great Plains of the United States that is difficult to control. During June, leafy spurge produces showy yellow bracts that give this weed a conspicuous appearance. We conducted a study to determine the feasibility of using remote sensing techniques to detect leafy spurge in this phenological stage. Study sites were the Theodore Roosevelt National Park near Medora, North Dakota, and a rangeland area near Lewistown, Montana. Plant canopy reflectance measurements showed that leafy spurge had significantly higher ($P=0.05$) visible (0.63- to 0.69- μ m) reflectance than several associated plant species. The conspicuous yellow bracts gave leafy spurge distinct yellow-green and pink images on conventional color and color-infrared (CIR) aerial photographs, respectively. Leafy spurge could also be distinguished on conventional color video imagery where it had a golden yellow image response. Quantitative data obtained from digitized video images showed that leafy spurge had statistically different digital values from those of associated vegetation and soil. Computer analyses of video images showed that leafy spurge populations could be quantified from associated vegetation. This technique permits area estimates of small leafy spurge populations. Large format conventional color photographs of Theodore Roosevelt National Park were digitized and integrated with a geographic information system (GIS) to produce a map of leafy spurge populations within the park. The GIS can be useful to monitor the spread or contraction of leafy spurge.