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## Leafy spurge (*Euphorbia esula* L.) spread in Iowa

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### Abstract:

Leafy spurge, (*Euphorbia esula* L.), a noxious perennial weed spreading south from the northern Great Plains into Iowa, is considered a threat to Iowa's prairie preserves because it is an aggressive non-native plant that dominates the landscape through rapid sexual and asexual reproduction. Methods to control leafy spurge include cultural and chemical controls, and biological controls are currently being developed. In 1992 and 1993 we surveyed the extent of leafy spurge spread in Iowa and found 26 of 99 Iowa counties with leafy spurge populations. Iowa's leafy spurge populations are rapidly expanding on untilled lands such as roadsides, especially in the Loess Hills and in northeastern Iowa. Integration of cultural, chemical and biological controls combined with public education are needed to control its spread.

### Index descriptors:

Leafy spurge, *Euphorbia esula*, Biological control, Iowa.

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Leafy spurge, *Euphorbia esula* L., a noxious exotic perennial weed found throughout the northern Great Plains, thrives in untilled, noncropland habitats such as abandoned fields, pastures, rangelands, woodlands, roadsides, and waste areas (Watson 1985). Introduced into North America from Eurasia, leafy spurge was first collected in 1827 in Massachusetts (Britton 1921), but it did not spread, at that time, in eastern North America (Watson 1985). Leafy spurge introduction in central North America may be attributed to Mennonite immigrants who planted contaminated seed grain in the late 1800s (Dunn 1985).

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Leafy spurge is an economic problem in many northwestern plains states (Watson 1985) where it displaces native species and desirable forages, and it appears to be moving steadily south through Iowa, Illinois, Missouri, and Nebraska. It contains toxic substances that can cause scours and weakness in cattle, often resulting in death (Selleck *et al.* 1962). The prairie preserve areas of the Loess Hills and the karst landscape of northeastern Iowa are particularly susceptible due to the inability of native species to compete with this invader. The sandy soils in western Iowa, steep slopes, and large areas of infestation discourage herbicide use because of the danger of water contamination through runoff and destruction of native vegetation.

The first Iowa collections were made at Mount Pleasant (Henry County) in 1899 and at Ames (Story County) in 1907. Bakke (1936) noted that it had become a pest in Cherokee, Clay, Delaware, Lyon and Sioux counties and was common in Buena Vista, Carroll, Dickinson, Henry, Muscatine, O'Brien, Osceola, Plymouth, Story, and Woodbury counties. A later survey of leafy spurge by Dunn (1979) noted 11 Iowa counties: Buena Vista, Cherokee, Delaware, Fremont, Iowa, Mills, Montgomery, Page, Sioux, Story, and Webster and he determined all Iowa infestations to be less than 25 acres. By 1979, leafy spurge infestations had been documented in 21 counties in Iowa (Fig. 1).

The objective of this study was to survey and document the current extent of leafy spurge in Iowa.

## Methods

### Survey

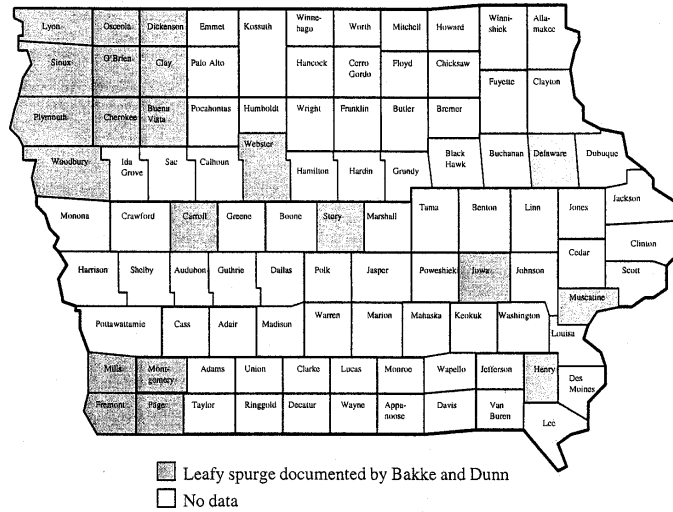
In the spring of 1992 and 1993, extension and rangeland personnel, County Conservation Board directors, roadside biologists, botanists, Iowa Department of Transportation personnel, land owners, and weed commissioners were asked to list known or possible spurge infestations within Iowa. Documentation from herbarium specimens from the Iowa State University Ada Hayden Herbarium added more locations of possible sites of leafy spurge establishment.

Visits to potential sites occurred between 27 May 1992 through 9 June 1992 and 31 May 1993 through 6 June 1993. If leafy spurge occurred at the site, a handheld global positioning system (Ensign GPS-Trimble Navigation) documented site latitude and longitude. Other information pertinent to the site included name of county, township and sections, and a description of the area.

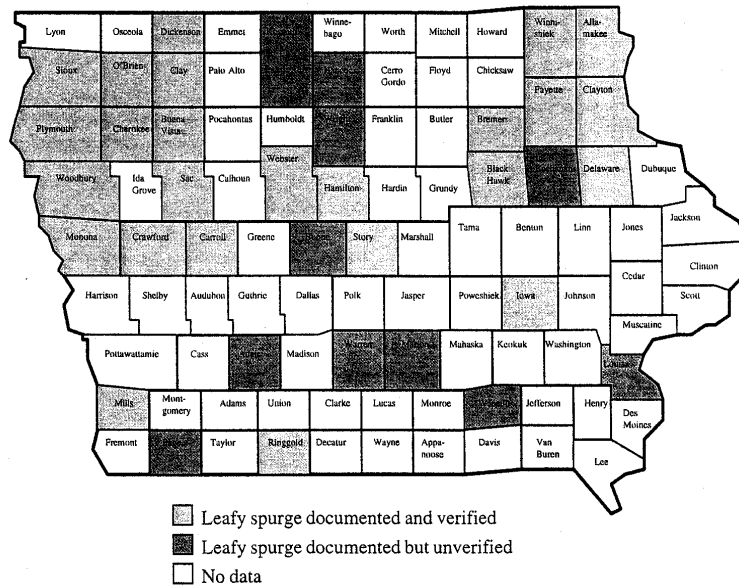
## Results

Of the 99 Iowa counties, 40 counties had spurge infestations prior to 1992. The number of counties found to be infested resulted from: herbarium specimens (21), personal contacts (2), and county conservation board, roadside biologist, or botanist telephone contacts (10). Twenty-six of the 40 counties had verifiable populations of leafy spurge infestations (Fig. 2). Of these counties, especially heavy infestations occur in Cherokee, Delaware, Monona, Plymouth, Sioux, Webster, and Woodbury. Buena Vista, Carroll,

Clay, and Sac counties contain infested sites that will likely become problems in the next few years.



**Fig. 1. Distribution of leafy spurge in Iowa by 1979. Early surveys of leafy spurge by Bakke (1936) and Dunn (1979) documented leafy spurge populations in 21 counties.**



**Fig. 2. Distribution of leafy spurge in Iowa in 1993. Documented counties had either written or verbal notice of spurge populations; verified sites had spurge present, and unverified sites had no spurge present.**

## Discussion

While the number of counties infested with leafy spurge remained similar to herbarium records, the number of sites of leafy spurge in each of the counties had increased. Especially notable was the increased number of infested counties in the light, sandy soils of the Loess Hills and karst landscape of northeastern corner of the Iowa (Fig. 2) compared to earlier documentation by Bakke (1936) and Dunn (1979) (Fig. 1).

Both surveys in 1992 and 1993 occurred in early to mid-June. A few possible sites of leafy spurge populations were mis-identified as wild parsnip (*Pastinaca sativa*) in some southern Iowa counties, and leafy spurge may have been confused with flowering populations of sweet clover (*Medicago* spp.) or mustard (*Brassica* spp.). Positive identification is a necessary tool for leafy spurge survey and documentation.

Many leafy spurge sites in counties infested after Dunn's (1979) study appeared on roadways or river beds growing mainly in large, circular patches. Seed-contaminated soils used in road construction, transport of contaminated hay, or a lack of roadside mowing could cause spreading of leafy spurge in Iowa. Although leafy spurge can be mown to decrease its spread, these roadside patches are potential sites of seed production if mowing does not occur frequently from May to October. Seeds from these plants then blow along the roadway and into nearby fields, where continuation of leafy spurge spread occurs.

Aerial photography may aid in leafy spurge population surveys. One study evaluated different films and flying heights (Dalsted *et al.* 1988). They found that photographs from altitudes of 1500' provided 80% accuracy of spurge detection, although this is prohibitively costly for full area surveys. Color enhancements are possible at greater distances (3000'), which could be more cost effective. In general, low densities of spurge (< 7 plants/m<sup>2</sup>) were difficult to identify. Aerial photography would be most cost-effective for estimations of known infestations and county mapping rather than surveying the state, due to film, photographer and plane costs. Heavily spurge-infested Iowa counties should consider this type of action to assess the extent of leafy spurge infestation.

## Control of leafy spurge

Chemical control of leafy spurge is the most prevalent method in use today, but a single herbicide treatment rarely eradicates leafy spurge (Lym and Messersmith 1985). Burning is not an effective control of leafy spurge and appears to promote plant growth, but may be used in conjunction with chemicals or grazing to reduce spurge stands (Masters 1990).

Biological control of leafy spurge is being developed and may be more effective than other options in native prairie where plant preservation is important. A number of insects, mainly flea beetles (*Aphthona* spp. (Chrysomelidae)), have shown some promise for controlling leafy spurge. Other species, including *Spurgia esulae* (Gagné) (Cecidomyiidae) and *Oberea ethyrocephala* Schrank (Cermambycidae), are also effective (Harris *et al.* 1985, Biological Control of Persistent Weeds Progress Report 1992). Eradication of leafy

spurge is not likely using biological controls, but reduction of infestations may be substantial (Harris *et al.* 1985).

## Acknowledgements

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