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Biological Control of Leafy Spurge: Utilization and Implementation

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Abstract

Leafy spurge is an exotic, noxious, perennial weed which is widely established in the north central United States and is an especially serious problem in the northern Great Plains. In 1997, the Agricultural Research Service and Animal and Plant Health Inspection Service, US Department of Agriculture, initiated a major Integrated Pest Management (IPM) research and demonstration project, The Ecological Area-wide Management (TEAM) Leafy Spurge (TLS), to develop and demonstrate ecologically based IPM strategies that can produce effective, affordable leafy spurge control. A key component of the TLS project was expanding the use of biological control agents. To assess the level of insect utilization and implementation and the level of current and perceived future control of leafy spurge as a result of biological control agents, a mail survey of 468 individuals that obtained biological control agents (insects) at TLS-sponsored events and of all the county weed boards in North Dakota, South Dakota, Montana, and Wyoming was conducted. Forty-six percent of the landowner/land managers and 70% of the county weed boards responded to the questionnaire. Respondents reported basic information about the number and characteristics of release sites, and characteristics of the leafy spurge stands, as well as the level of control to date and perceived level of eventual control.

Resumen

"Leafy spurge" es una maleza perenne, exótica y nociva la cual esta ampliamente establecida en la parte norte-centro de Estados Unidos de América, y es un problema especialmente serio en las Grandes Planicies del Norte. En 1977, el Servicio de Investigación Agrícola y el Servicio de Inspección Sanitaria de Animales y Plantas del Departamento de Agricultura de Estados Unidos inicio un proyecto de investigación y demostración sobre Manejo Integrado de Plagas (IPM), el proyecto TEAM "Leafy Spurge" (TLS), para desarrollar y demostrar estrategias de IPM con bases ecológicas que puedan producir un control efectivo y económicamente viable del "Leafy spurge." Un componente clave del proyecto TLS fue ampliar el uso de agentes de control biológico. Para evaluar el nivel de implementación y utilización de insectos y el nivel actual y la percepción futura del control de "Leafy Spurge" como resultado de agentes de control biológico se condujo una entrevista a través del correo a 468 personas que obtuvieron agentes de control biológico (insectos) en eventos financiados por el TLS y a todos los comités de control de maleza municipales en North Dakota, South Dakota, Montana, y Wyoming. El 46% de los propietarios de tierras/manejadores de tierras y el 70% de los comités de control de maleza respondieron el cuestionario. Los que respondieron reportaron información básica acerca número y características de los sitios de liberación, las características de las poblaciones de "Leafy Spurge," así como del nivel de control a la fecha y el nivel percibido de un control eventual.

Key Words: *Aphthona* spp., flea beetle, noxious weeds, weed management

INTRODUCTION

Leafy spurge (*Euphorbia esula* L.), a noxious perennial weed native to Europe and Asia, has become widely established in North America and is now reported in 35 states and all but one Canadian province (Anderson et al. 2003). The weed has become a serious problem for ranchers and public land managers in the northern Great Plains states of Montana, North Dakota, South Dakota, and Wyoming, where an estimated 1.6 million acres (657 000 ha) are infested, resulting in an annual economic loss of $130 million (Leitch et al. 1996; Leistritz et al. 2004). Leafy spurge has proven particularly difficult to control on untilled land because of its ability to spread rapidly, displace native vegetation, and sustain itself despite repeated chemical treatments. Although extensive research has been devoted to developing more efficacious herbicide treatments, analyses to date indicate that chemicals offer, at best, only short-term control (Bangsund et al. 1996; Anderson et al. 2003) and the costs of repeated herbicide treatments limits their use (Sell et al. 1999; Hodur et al. 2002a, 2002b). As a result, alternative control methods have generated substantial interest, with biological control using introduced insect predators being increasingly viewed as a promising approach (Bangsund et al. 1999; Hodur et al. 2002a, 2002b; Lym 2005).

Leafy spurge was identified as a candidate for biological control when observations in the plant's native habitat (Europe and Asia) indicated that a variety of natural enemies appeared to keep the plant's density below the economic threshold (Carlson and Littlefield 1983). By the mid-1980s, several *Aphthona* flea beetle species had been identified as potential biological control agents and were approved for release by APHIS (US Animal and Plant Health Inspection Service). The first of these, *Aphthona flava*, was initially released in

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