

**NOTE****Lily leaf beetle, *Lilioceris lili* (Coleoptera: Chrysomelidae), in Maine and the Maritime Provinces: the continuing dispersal of an invasive species**

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The lily leaf beetle, *Lilioceris lili* (Scopoli, 1763) (Figure 1) is a voracious feeder on plants in the genera *Fritillaria* and *Lilium*, and increasingly a cause of concern in many areas where it has been introduced. It has a widespread Palearctic distribution being found throughout continental Europe (except Greece) and Russia east through Siberia to Tuva, and south to the Caucasus, Kazakhstan, Xinjiang, Inner Mongolia, and in North Africa (Yu et al. 2001; Audisio 2011). In Great Britain, short-lived adventive populations were found in the nineteenth century, however an established population was found in Surrey in 1940. It has since spread to every county in England, to Scotland and Northern Ireland (Fox Wilson 1943; Salisbury 2003).

It was discovered in North America on the island of Montréal in 1943, although Say's (1826) description of *Lema melanocephala* (type specimen now lost) appears to match this species (Majka and LeSage 2008). For almost 40 years the beetle remained confined to insular Montreal, after which it started to expand its range, appearing in Ottawa, Ontario in 1981; in Toronto, Ontario in 1993; and Portage la Prairie, Manitoba, in 1999 (LeSage 1983; LeSage and Elliott 2003). In the United States, it was first found in Cambridge, Massachusetts in 1992. It has since spread to many areas of southern Maine (1997), New Hampshire (1997), some parts of Rhode Island (1999), Connecticut (2001), in northern counties of Vermont (1998), and New York (2000) (Gold 2003).

Majka and Lesage (2008) surveyed the dispersal history of the species in the Maritime Provinces of Canada (New Brunswick, Nova Scotia, and Prince Edward Island) from 1992, when the beetle was first discovered in Halifax, Nova Scotia, until 2007 when populations were found in a number of areas in all three Maritime Provinces. Majka and Lesage (2008) proposed that the Halifax metropolitan area served as the primary source from which the species has spread by natural and human-assisted means to secondary loci in the Fredericton, Moncton, Annapolis Valley, Bridgewater, Antigonish, and Cape Breton areas. In Halifax, natural aerial dispersal was readily observable. During the dispersal phase early in the spring the beetles readily fly from garden to garden, seeking host plants. Secondary colonization to other sites in the Maritimes appeared to take place in association with the horticultural commerce in lilies and the movement of plants from area to area. For example, in 2002 in Kentville, Nova Scotia, the beetles were discovered in a plant nursery, while in 2010 a garden center in Windsor, Nova Scotia had segregated infested lilies and was selling them at a discount. Majka and LeSage (2008) also reported that *Lilioceris lili* had spread to native Canada lilies, *Lilium canadense* L., in the Marysville area of New Brunswick, a significant cause of concern in relation to this already rare native plant species (Roland 1998; Dolan 2004). Ernst et al. (2007) expressed concern for the spread of *Lilioceris lili* onto the native wood lily (*Lilium philadelphicum* L.). In no-choice tests, *Lilioceris lili* was very reluctant to oviposit on native hosts in the genera *Medeola*, *Clintonia*, *Streptopus*, and *Polygonatum* and survivorship to adult on these hosts was almost zero.

In the course of this research, a wide range of gardeners, garden supply establishments, garden clubs, and horticultural organizations were contacted to determine whether lily leaf beetles were present, and if so, the earliest year they had observed the beetles in their particular localities. The logbooks of the University of Maine Cooperative Extension's

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Figure 1. Habitus photo of *Lilioceris lili* feeding on a lily leaf. **Photo credit:** Tom Murray, Groton, Massachusetts.



Insect & Plant Disease Diagnostic Lab, where insect pests are brought for identification, were also comprehensively checked to obtain early dates of detection of this species for many localities in the state. The dates shown in Figures 2 & 3 only represent the earliest known dates of detection of *Lilioceris lili* in those localities. At many sites, on-going reports indicate that the species continues to be present.

Since the publication of Majka and Lesage (2008), *Lilioceris lili* has continued to disperse in both New Brunswick and Nova Scotia. There are now new records from the southeast of the New Brunswick in the Moncton, Riverview, Shediac and Sackville areas; a new population in the Quispamsis and Rothesay areas near the central Bay of Fundy region; in the St. Stephen and St. Andrews areas on Passamaquoddy Bay; and in the northwest of the province in the Edmundston, St. Basile, and St. Jacques area (Figure 2). In Nova Scotia the beetles have continued to disperse in the Annapolis Valley and Halifax areas and there is now a population established near Truro (Figure 2).

In Maine the biology of the species was summarized by Stack and Stack (2008). The beetle was first reported from Ogunquit, York County in July 1997 in the extreme southwest of the state (P. Stack, University of Maine, Orono (UMO), personal communication). By the next year *Lilioceris lili* had spread north to Cumberland County, and by 2004 it had been found throughout much of southwestern and south-central Maine in Cumberland, Franklin, Kennebec, Knox, Oxford, Penobscot, Piscataquis, and York counties (Figure 3). Over the next three years additional localities were recorded in this region from Androscoggin, Lincoln, Penobscot, and Sagadahoc

counties, as well as an early report from Eastport in southeastern Washington County. In 2011, *Lilioceris lili* is found throughout almost the entirety of southern Maine in every county in the state, including a record from Presque Isle in Aroostook County in the northeast of Maine (Figure 3). The records in Eastport (2005) and Jonesboro (2007) in southeastern corner of Washington County are isolated from other infected sites in that state and in New Brunswick, suggesting that *Lilioceris lili* might have been brought there in transplanted, infested garden stock and subsequently colonized areas to the north and west in both Maine and New Brunswick. If populations of *Lilioceris lili* originating in the Maritime Provinces and New England have not already merged, they appear on the cusp of doing so.

In Maine, the broad arc of dispersal appears to have moved from the southwestern corner of the state, northward and eastward over the span of the last 15 years. Because beetles disperse naturally, and are also moved by human agency via the transplantation of infected lilies, it is difficult to establish the relative roles each dispersal method have played in the expansion of this species North American range. Also uninvestigated in Maine is whether there has been any colonization of *Lilioceris lili* on native Canada lilies.

This continuing and rapid dispersal in the northeastern portion of the continent makes it probable that there will soon be no area of suitable habitat in the region where *Lilioceris lili* does not occur. In addition to its impact on commercial and recreational gardeners and the horticultural industry, it is likely that this wide and increasing distribution will provide further opportunities for *Lilioceris lili* to colonize native lilies, with a potentially significant impact on what are already rare species. Trials of biocontrol methods, such as those currently being investigated in the United States (Gold 2003; Casagrande and Kenis 2004; Tewksbury 2005; Casagrande, University of Rhode Island (URI), personal communication), need to be expanded if we are to take seriously the protection of both garden and native lilies on the continent.

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Figure 2. Distribution of *Lilioceris lili* in the Maritime Provinces of Canada and neighbouring areas of Maine. Dates indicated are those of the earliest known date of detection at that locality.

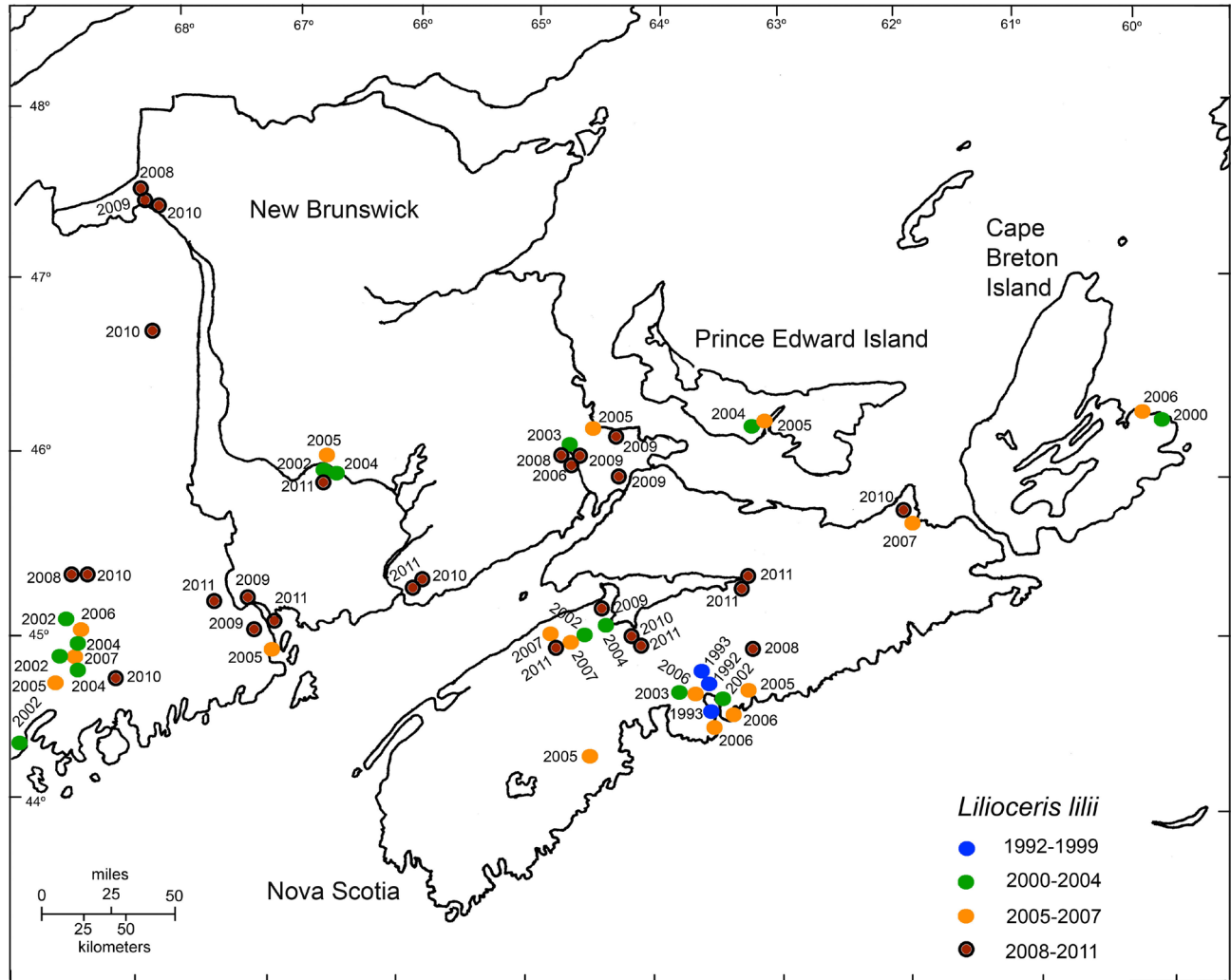


Figure 3. Distribution of *Lilicercis lili* in the state of Maine, USA, and neighbouring areas of New Brunswick. Dates indicated are those of the earliest known date of detection at that locality.

