

# Invasive Plants and Pollinator Interactions

by Diane L. Larson

Walking through a North Dakota mixed-grass prairie on a sunny June morning reveals an abundance of blooming forbs and the busy insects that rely on the floral rewards. Native plants are not the only ones offering pollen and nectar, however. Invasive plants, which often occur in monotypic stands (stands of a single species), can provide a dense source of sustenance for insects that rely on floral resources. To a human observer, a stand of the invasive forb leafy spurge

(*Euphorbia esula*) can seem alive with the buzzing of flies and bees, all attracted by the pollen-laden anthers and sweet drops of nectar that glisten in the sun.

Although invasive plants often compete with native plants for resources such as light and nutrients, they also may attract pollinators away from native flowers. On the other hand, a dense stand of flowering invasive plants may attract more pollinators to the area and, in the process, enhance pollination of neigh-

*Theodore Roosevelt National Park, North Dakota.*



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**Butterfly on a spurge.**

boring natives. However, if insects are carrying a mixed pollen load when they visit native flowers, they may deposit pollen of non-native species, rather than the pollen needed by the native plants for reproduction.

In addition to potential effects on native plant reproduction, invasive plants also may influence pollinator communities. For example, insects that can best exploit the floral structure of invasive plants might be favored, or the density of shoots and rhizomes may limit nesting sites for some ground-nesting insect species. These concerns take on added importance as pollinators continue their world-wide decline.

Over a two-year period, my colleagues Ron and Margaret Royer and I have studied the effects of one invasive plant species, leafy spurge, on pollination of

its native neighbors and on the insect communities that visit native flowers. Our study site was the South Unit of Theodore Roosevelt National Park in western North Dakota. Here, the native prairies have been protected for more than 50 years, but leafy spurge has been making its way across the park since the 1970s. We focused on six native species that were abundant and had floral morphologies (flower shapes) that varied from legumes with hidden nectaries and anthers (purple locoweed [*Oxytropis lambertii*] and American vetch [*Vicia americana*]), to species with dish-shaped flowers and obvious pollen and nectar (prairie flax [*Linum lewisii*], yellow sundrops [*Calylophus serrulatus*], and scarlet globemallow [*Sphaeralcea coccinea*]), to the bell-shaped flowers of blue bellflower (*Campanula rotundifolia*).



**A fly visits a spurge.**

All bloomed at the same time as leafy spurge and occurred both within spurge stands and in non-infested areas.

Of our findings, two are of particular importance to people interested in endangered species. First, stigmas collected from native flowers in infested areas typically had significantly less conspecific pollen (pollen from the same species) than those collected in non-infested areas. This was true in both years of the study. We found very little leafy spurge pollen on the stigmas of native flowers. Non-conspecific pollen was actually less abundant on the stigmas of native flowers in infested areas than in non-infested areas, likely because the diversity of plant species was lower in infested areas. Native flower morphology had no effect on how much conspecific pollen they received.

Second, despite a general increase in visits by native bees (family Halictidae) in non-infested areas between the first and second year of our study, visits in infested areas were down substantially over the same time period. We don't know the reason for this difference; however, it may be related to habitat requirements of the bees or to aspects of the floral community that we did not measure. Flies (family Diptera) were the most common visitors to leafy spurge in both years, so it did not seem likely that native bees were being lured away from the native flowers by leafy spurge.

The management implications of our study are twofold. Because we intentionally chose abundant native species for our study, conspecific flowers were always available within the foraging range of the pollinators. We suspect that the

decline in conspecific pollen on stigmas in infested areas will be greater in uncommon or rare species that have fewer local plants of the same species flowering concurrently. We can imagine a scenario in which rare native perennials persist for a number of years without successfully reproducing, resulting in a form of “cryptic extinction”; in other words, without reproduction, the species disappears as the remaining plants grow old and die. In addition, the year-to-year variability in insect pollinator populations, along with the difficulties in identification, present challenges to monitoring. Many years of data will be required to detect population trends in the presence of high variability.

The good news, at least in the northern Great Plains, is that leafy spurge is beginning to decline, largely as a result of the flea beetles (*Aphthona* spp.) that

have been released as biological control organisms. In many (unfortunately, not all) previously infested sites, native plants are again dominant. In assessing the need for restoration of these previously infested sites, we encourage managers to look not only at the vegetative composition, but also at the reproductive success of the native forbs that rely on pollinators. If seed production is limited, it may suggest the need for active restoration of pollinator communities before the ecosystem can fully recover.

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**Bee in a cactus flower.**

