

Tipula paludosa Meigen and T. oleracea Meigen, European Crane Flies New to the Eastern United States: Potentially Serious Turfgrass and Pasture Pests

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Background:

In early June 2004, ground personnel of the Niagara County Country Club in Lockport, NY noticed large numbers of crane flies emerging from the turf. They found pupal cases first, and shortly thereafter adults were discovered. Some flies were collected and sent to the Cornell University Insect Diagnostic Laboratory for identification. They represented one of the European crane flies, *Tipula oleracea* Meigen, which was previously recorded from the Pacific Northwest. This is the first record of this Old World crane fly in eastern North America.



Pupal case



Adult European crane fly

By August 2004, word of this detection had spread and other golf course superintendents were on the lookout for the presence of unusually large numbers of crane flies. In Lewiston, NY at the Niagara Country Club, the course superintendent collected a number of crane flies for identification because large numbers were observed emerging from the rough areas of the turf. Interestingly enough, these flies were identified as yet another European crane fly, *Tipula paludosa* Meigen, a species reported from the Canadian Maritimes, the Pacific Northwest, and the Niagara peninsula of Ontario, Canada.

Both species are listed as primary targets for the national CAPS (Cooperative Agricultural Pest Survey) program. After these initial finds, horticultural inspectors for the NYS Department of Agriculture and Markets continued to collect crane flies from the two original sites and from surrounding areas. Two other collections of *T. paludosa* in Erie Co. and Niagara Co. were confirmed: one in the town of Amherst, and the other from parks in the Lewiston area, respectively.

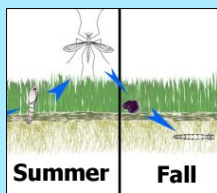
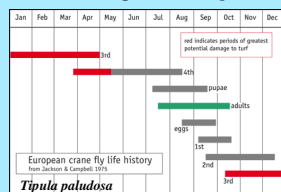
Several native species also collected in abundance at the same sites in Lockport and Lewiston included *Tipula furca*, *T. borealis*, *T. sayi*, *T. patrifera*, and *T. ultima*.

Distribution:

Crane flies belonging to *Tipula* (subgenus *Tipula*) are principally Palearctic and Ethiopian in their distribution. No indigenous species of the subgenus *Tipula* have been recorded in the New World. However, *T. paludosa*, a widespread northern European species, was accidentally introduced into Newfoundland and reached the mainland of Canada in northern Nova Scotia (Cape Breton Island) as early as 1955. This species was rediscovered in 1965 in British Columbia and in the Niagara Peninsula of Ontario in 1997. *Tipula oleracea*, another common species native to Europe, was first reported from the New World, specifically from Andean Ecuador in 1999, and between 1998 and 1999 it was found in a few locations in western British Columbia, western Washington, and western Oregon.

Biology:

Tipula paludosa and *T. oleracea* are extremely similar biologically. *Tipula paludosa* completes a single generation annually (see below), with adult emergence beginning in late August (in NY), and their numbers peaking in September and continuing into October. *Tipula oleracea*, on the other hand, completes 2 generations annually, with adult emergence in the spring (late May to early July) and again in the fall (mid-August to late September, for 2004 in NY).



Life cycle and habits of T. paludosa

Adult crane flies emerge from the soil of lawns, pastures, and other grassy areas in late August to early October. Females mate and lay eggs in grass within 24 hours after emerging.



Eggs

Eggs hatch into small, gray-brown, worm-like larvae, which develop a tough leathery cuticle and thus they are called "leatherjackets."

Leatherjackets feed on turf found in home lawns, golf courses, and sometimes pasture grasses. Overwintering occurs in the larval stage.

As weather warms in the spring, larvae continue to feed. Damage by their feeding may become especially noticeable in March and April. During the day, larvae feed at or below the surface of the turf on root hairs, roots, and crowns, but on damp, warm nights they come to the surface to feed on the aboveground parts of turf and eat stems and grass blades.

Larvae stop feeding about mid- to late May. Larvae go into a non-feeding stage just below the soil surface during July and August. From late August through September, pupae wiggle to the surface and adult crane flies emerge.



Larva



Economic Importance, Hosts, and Damage:

European crane flies are largely turf and pasture pests in the Old World. *Tipula paludosa* is probably the most injurious crane fly in northern Europe, where it is frequently reported in the literature as injuring grasses, cereals, beet, strawberries, hemp, flax, tobacco, and other crops. In the Pacific Northwest and in Nova Scotia, *T. paludosa* has been found feeding on such hosts as annual and perennial flowers and several types of vegetables and small fruits. Economic injury may occur as the larvae feed in the root zone of the plants, and if large enough numbers of crane fly larvae, or leatherjackets, are present the damaged turf can be rolled up (similar to the way one can roll up turf from Japanese beetle larval feeding). In portions of the Niagara peninsula in Ontario, large populations have caused destruction of many home lawns. In a few locations in western British Columbia, and in western Washington and Oregon, *T. oleracea* has become a most serious economic pest of lawns, pastures, and hayfields.



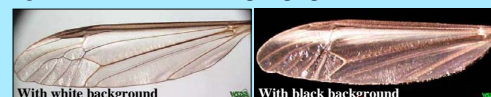
In addition to turf and pasture plants, leatherjackets will also attack seedlings of many plant species in nurseries. The larvae will attack most coniferous tree seedlings. They browse on grass roots and also will strip all root hairs and bark off the roots of bare root spruce stock in commercial nurseries. Larvae can survive in fallow soil by eating decaying seedling or weed roots. In seeded grasslands specifically, plants die in patches following the severing of grass stems. Grass tufts become sparse and yellowed.

References:

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- Jackson, D. M. and R. L. Campbell. 1975. Biology of the European crane fly, *Tipula paludosa* Meigen, in western Washington. *Washington State University Technical Bulletin* 81:1-23.
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<http://mda.state.mn.us/invasives/craneflies/default.htm>

Identification:

These two European crane fly species are almost identical in appearance - both are large in stature (1/4 to 1 1/2 inches; females generally larger), with grayish brown bodies and wings slightly cloudy. Although this character is often difficult to see but diagnostic, along the leading edge of the wing, there is a darker area and a "whitish" stripe (illustrated below under 2 lighting regimes).



With white background

With black background

In addition, there are no pigmented areas on the veins or cross-veins and no other spots or "pictures" are present on the wings.

Separating the European crane flies from native species can sometimes be difficult and should be left to a specialist. However, to distinguish the two European species from each other, the following characters can be utilized:

Eye separation character:

A key morphological feature for distinguishing the two species is the separation of the compound eyes on the ventral, or underside, of the head capsule. This character works for both males and females. In *T. paludosa*, the eye separation is quite broad, usually several times the width of the basal antennal segment. In sharp contrast, in *T. oleracea* the area between the eyes is very narrow, only as wide as the width of the basal antennal segment.



T. paludosa: head venter



T. oleracea: head venter

Wing length character:

Another feature that will separate the two species, but which only applies to the females, is wing length relative to the abdomen. Wings of female *T. paludosa* are shorter than the abdomen. Wings of female *T. oleracea* are clearly longer than the abdomen (see below).



Male genitalic characters:

The shape of the pallic characters (inner appendages of abdominal segment 9) of the male are quite different between the two species, and are illustrated in the images below for easy recognition.



T. paludosa



T. oleracea