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EUROPEAN CRANE FLY

The European crane fly (*Tipula paludosa*) has become a major lawn pest in the Pacific Northwest. Although primarily a turf and pasture pest preferentially feeding on clover and grass species. The European crane fly larvae also feed on beet, potato, corn (maize), other garden vegetables, and ornamentals and nursery trees - young plants are most susceptible (Goix, 1980).

The European crane fly is a native of northern Europe where it only occasionally occurs in economically damaging numbers and where chemical control is not often necessary. Apparently, in Europe the European crane fly is well controlled by other indigenous biological organisms.

However, after importation without its complement of natural enemies, it has become a major pest in certain areas of North America.

The European crane fly was first found in North America in 1955 on Cape Breton Island, Nova Scotia. In 1959 damage by the European crane fly was reported to cabbage transplants and turnip seedlings in Newfoundland. In 1965 it was discovered in British Columbia in the area around eastern Vancouver. Previous to that, the European crane fly was unknown in the Pacific Northwest. For the subsequent four years, progress of the damage done by the European crane fly in B.C. was studied on pastures and lawns. Severe damage to lawns (bare areas and lodging of the grass) in the eastern outskirts of Vancouver was noted. Damage potential in pasture was first noted in 1966 when 10 acres of pasture grassland was nearly eliminated on a small farm near New Westminister. At that site an average of 110 larva were found per square foot (April & May) which translates to 4.5 million leatherjackets per acre. In 1980-1981 a major outbreak occurred in the Seattle, Washington, area causing total destruction of lawns, fairways, and greens. The pest has now become established in western Washington.

Environmental factors apparently limit establishment of the pest. To date, only rapid spread of the European crane fly has only occurred near the 50º North latitude zone: for example, at Newfoundland, Plymouth (England), and Vancouver (British Columbia, Canada) to western Washington. The southern range of the European crane fly seems to be 45º North latitude (i.e. southern France, Nova Scotia, and Salem, Oregon).

However, to date, the European crane fly has not been reported to be established in Oregon. The summer temperatures in the Willamette Valley may be too high for establishment. Soil moisture level also seems to be a critical factor: flooding (not necessarily drowning, but lack of oxygen) and extreme drying conditions (especially during oviposition) are limiting factors

European workers have concluded that the European crane fly is favored by mild winters, cool summers and rainfall averaging at least 24 inches.

Environmental tolerances for the European crane fly were studied at CDA research station in Vancouver, B.C. "In 1967 we had one of our hottest, driest years, especially during the egg and early larval stages, which are highly susceptible to desiccation. Although the population was down from the previous year it still averaged 46 per square foot in the test plots. In the winter of 1968-69 we had one of the longest cold periods experienced in several years, but it appears to have had little effect on the population." (Wilkinson, et. al. 1972). Dry soil in September dramatically reduces populations. (Campbell, 1979).

Even though the European crane fly apparently has not yet become established in Oregon, Antonelli states that he expects its range to eventually reach along the west coast from British Columbia to northern California.

Life Cycle

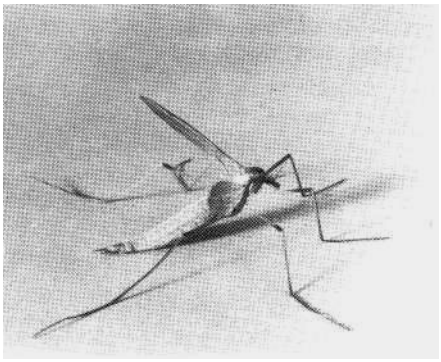

Figure 1 - Adult European crane fly.

Adult crane flies emerge from soil of lawns, pastures, and other grass areas from late August to mid-September. The adult crane fly has very long legs and looks like a large mosquito with a body about one inch long, not including the legs (Figure 1). It strongly resembles many native species. The females mate and lay eggs in grass within 24 hours after emerging. These eggs hatch into small, gray-brown, worm-like larvae (Figure 2).

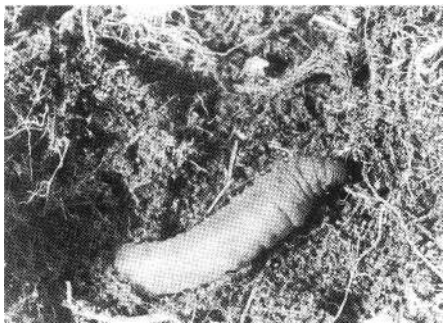

Figure 2 - Larva of the European crane fly - small, gray-brown, wormlike, approximately 1 inch long.

The larvae develop a tough skin; hence their common name,"leatherjackets." The leatherjackets feed on the root crowns of clover and grass during the fall (Figure 3).

Figure 3. Leatherjacket is the third instar larvae; it has a tough, gray-brown skin – hence the common name "Leatherjacket". *(Photo by A.Antonelli)*

They winter in the leatherjacket stage. As the weather warms in the spring, they continue to feed. Damage by their feeding may become especially noticeable in March and April.

During the day, leatherjackets, about 1 inch long, mostly stay underground, but on damp, warm nights they come to the surface to feed on the above-ground parts of many plants. Leatherjacket feeding stops about mid-May.

Leatherjackets go into a nonfeeding stage just below the soil surface during July and August. From late August through September pupae wriggle to the surface and the adult crane flies emerge.

Environmental and Biological Controls for European Crane Fly:

The crane fly larvae thrive in moist conditions, and can survive in wet soils but not in saturated ones. Heavy soils are also detrimental to the flies. Drought during late summer is one good natural control method, for it is a limiting factor during young larval development after egg hatch in August and September.

Biological controls effective against European crane fly in laboratory tests include:

1) A baculovirus (Revet, Guelpa, 1979)
2) *Tipula iridescent* virus (Carter, J.B. 1978)
3) *Rasajeyna nannyla*, a coccidia bacterium (Beesley, J.E. 1977)
4) *Bacillus thuringiensis*, (Lam & Webster, 1972)
5) *Entomochthora gigantea*, and *Entomophthora caroliniana* entomapathogenous fungi (Keller, S. 1977)
6) *Neoaplectana carpocapsae*, pathogenic nematode (Lam & Webster, 1972)
7) *Siphona geniculata*, a tachinid parasitoid (Wilkinson, Gerber, 1972)
8) *Megaselia paludosa* (Carter, J.B. 1977)

With additional research, the listed organisms might be factors in a successful biological control program. However, "In four years of studying this pest (in British Columbia) we have encountered no parasites or diseases. The only predators observed were spiders, European starlings and seagulls that feed primarily on the adults." (Wilkinson & Gerber, 1972). This assessment is also true of the European crane fly in western Washington (Antonelli and Campbell, 1981).

Chemical Controls for European Crane Fly:

Crane fly larval populations will generally decline by 50 percent between March 15 and May 15 through natural controls. Insecticide application is most effective between April 1 and April 15, although March 15 to May 15 is the period when damage occurs.

Chemical controls include Diazinon and Dursban on lawns and methyl parathion in pastures.

The dates for application previously mentioned reflect normal years and, as such, are generalizations. There have been years when temperatures in December and January were unseasonably warm, and since European crane fly undergoes a weak "hibernation" (prolonged warm periods can awaken them), such warm periods result in early feeding that lead to serious lawn damage at that time of year. Therefore, if warm winters occur, then one should watch the lawn carefully for damage development, particularly if there has been a history of cranefly problems.

Preventive fall applications (between October 1 and October 31) have been successful. This is the time when most of the eggs have hatched and the larvae are small and vulnerable. This application period is encouraged for turf/sod industries to prevent possible shipment of cranefly to uninfested areas, and for golf greens which are extremely expensive to repair. If a fall application is made, then there should be no need for an application the following spring, since this insect has only one generation annually. It is not a recommended date for homeowners because it reflects prevention spraying, which is not good practice as a rule because it suggests spraying when a pest problem in spring may not even occur. Research has shown that, often as not, high fall populations may be largely eliminated by natural controls, and thus the same populations the following spring have dropped below damage levels, demonstrating no need for sprays.

Therefore, we recommend surveying in early spring (March) or when temperatures begin to be consistently warmer to see if crane fly is abundant. This can be done easily by selecting four or five random spots in the lawn - one square foot size sample - digging up the top layer (1-2 inches) and counting larvae. If the average number of craneflies for these samples exceeds 25 per square foot, you should consider a chemical treatment.

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[1]Based on information presented at the 1982 Ornamentals Northwest Seminars by Dr. Art Antonelli (Extension Entomologist, Washington State University, WWREC, Puyallup, WA 98371) and reported by D. L. Wienecke (Graduate Student, OSU Horticulture Department, Corvallis, Oregon 97331) and WSU Extension Bulletin 0856 - The European Crane Fly.
