

The European Crane Fly

A Serious Pasture Pest in Tillamook County

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This is a preliminary report, based on the latest research in Tillamook County and in western Washington. It will be updated in 1990.

The European crane fly, *Tipula paludosa* Meigen, has become a serious pest of pastures, hayfields, and lawns in coastal northwest Oregon. Larvae feed on the roots, crowns, stems, and leaves of a variety of pasture plants. They have recently caused considerable economic loss to the dairy industry of Tillamook County.

The larvae of the crane fly, sometimes called "leather jackets," are gray-brown and wormlike (no legs), and they have a tough skin. By late spring they may grow to be 1 to 1.5 inches long.

The adult crane fly has very long legs and looks like a large mosquito with a body about 1 inch long, excluding the legs. Literally thousands of these large flies may gather on the sides of buildings in late August and September.

The adult crane flies, which have nonfunctional mouth parts, neither bite nor sting. They don't damage buildings, but their numbers tend to alarm people.

The larvae feed on the roots and crowns of grasses and clovers. Injured plants are stunted and display poor vigor. Large infestations of larvae can result in the death of forage plants over extensive areas in pastures and turf grass.

Larval damage begins in late September, when most eggs have hatched, and continues through May of the following year. Adverse winter weather, overgrazing, and inadequate

plant fertilization can intensify the damage caused by this pest.

History

The European crane fly is native to northwestern Europe, where it has long been a problem. Introduction into North America apparently occurred in eastern Canada, where the pest was first reported in Newfoundland in 1952. Soil ballasts dumped on shore from ships at Cape Breton Island are believed to be the source of infestation.

On the west coast, European crane fly larvae were first discovered in 1965 in British Columbia; they caused severe damage to lawns on the outskirts of Vancouver. How they reached the west coast is not known.

The first U.S. reports of the European crane fly came late in the summer of 1966 in Blaine, Washington. By the spring of 1974, over 30,000 acres in Whatcom County, Washington, were infested. The infestation has spread slowly but steadily southward.

Today, most pastureland in Tillamook County has infestations of different levels. Advance warning of leather jacket infestations and using known control measures help control this pest.

Life cycle

In western Washington, adult crane flies emerge from the soil of lawns and pastures from mid-August through mid-September. The females mate and lay up to 300 eggs in the soil, usually within 24 hours after emerging. Eggs usually hatch in 11 to 15 days.

For about 2 months in the fall, the larvae feed vigorously, just below the

soil surface, on the roots and crowns of many plants, including clover and grasses. As winter temperatures drop, the larvae become relatively inactive until the late winter or early spring the following year.

As the weather warms in late February and March, the larvae resume active feeding, usually through May. Most larvae can be found in the top inch of soil in the fall. In the spring, they may be as deep as 2 inches. Damage caused by their feeding becomes especially noticeable in March and April.

During the day, leather jackets tend to stay underground, but on damp, warm nights they may migrate to the soil surface to feed on the aboveground parts of plants. Reports indicate that most leather jackets have finished feeding by about mid-May.

The larvae stay in the soil but are relatively inactive until pupation begins in late July. We don't know why there's a 6- to 8-week delay from the end of feeding until pupation begins. The adult flies emerge from the pupal stage in late August and early September.

Detecting damage and sampling for larvae

Telltale signs of turf and pasture infestations include areas of dead plants, unthrifty plants, and sparse vegetation in pastures or lawns. Grass hay-crop yields can be drastically reduced. These same symptoms were mistaken for

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winter kill or too much liquid manure on Tillamook County pastures in the spring of 1989.

Crane fly larvae can be detected in the spring by a number of methods. They can be observed by pulling up clumps of pasture plants and inspecting the roots and crowns for their presence.

One effective method for detecting larvae is to pour an irritating liquid (gasoline, chlorine bleach, or salt water) onto the soil surface. Usually larvae will wriggle to the surface within 5 to 30 seconds. However, if larvae have entered the nonfeeding stage (late May), or if the soil is unusually dry, they won't respond well to these irritants.

To determine the number of larvae—say, in a pasture—dig up an area measuring 1 square foot to a depth of 2 inches. With a screen, separate the larvae from the soil and plant material.

Sample at least a dozen such sites; be careful to cover the apparently infested area adequately and to record the number of larvae you find at each site. From this you can calculate an average number of larvae per square foot.

Factors affecting larval densities

Several factors determine the numbers of larvae occurring in soil. These include climate, soil, pasture plant composition, biological control agents, and pasture management.

Climate and weather. Mild winters, cool summers, and heavy rainfall are typical of Tillamook County—and they're ideal conditions for the crane fly.

Soil. Larvae have been found in all soil types. In Tillamook County, soil type doesn't seem to be a major factor affecting distribution of the larvae. Some research indicates sandy soils are more susceptible to heavy infestations.

Pasture characteristics. Leather jackets feed on a wide variety of grasses and other plants. Our observations so far indicate the larvae cause heaviest damage on newer stands of pasture.

Predominantly fescue pastures don't appear to be as extensively damaged by this pest as pastures of other grass species. Even though white clover has been reported to be a favorite food, clover plants in our area appear to withstand infestations better than many grasses.

Biological control agents. Although a number of predators, parasites, and microbial agents are associated with European crane fly, none have effectively reduced leather jacket numbers in northwest Oregon thus far.

Birds and moles are known to be natural predators of the larvae in the Pacific Northwest. Starlings and sea gulls eat a number of adult flies; however, most female flies usually begin to fly after the majority of their eggs are laid, so this feeding has little impact.

Pasture management. Some Tillamook County dairy producers have reported more larval damage in fields where they applied liquid manure. Timing of manure application also seems to have some effect (but this may be purely coincidental).

Need for control

When you determine the need for control of leather jackets in your pastures, consider a number of factors:

- the extent and level of infestation,
- the amount and condition of the forage present,
- the time of year,
- your need for pasture,
- the environmental hazards,
- the availability of chemicals and equipment, and
- the cost.

Extent of infestation. The extent of your farm's total acreage that's infested by crane fly may indicate that you need only partial treatment. It's difficult to justify treatment of the whole farm if only a few isolated patches of pasture show damage.

However, consider also the possible future expansion of the infestation into uninfested areas. Maybe spot treatment is your answer.

Level of infestation. The number of leather jackets per square foot doesn't *by itself* mean that you must apply an insecticide. Pasture grass and clover composition, as well as age and vigor, are important.

Past research hasn't adequately related yield loss to larval numbers. However, new seedlings and stands of poor vigor, or those subjected to heavy grazing, will suffer the most damage.

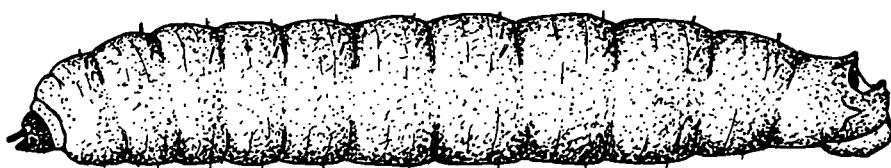
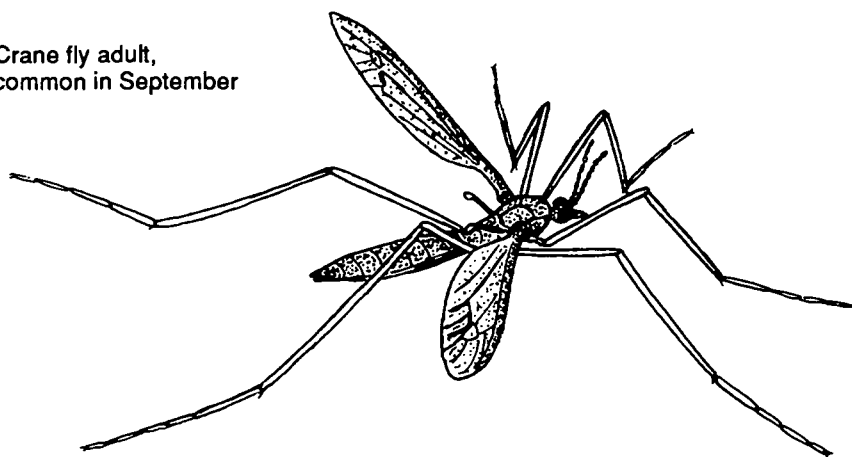
In Washington, the recommendation is that at levels of 25 or more larvae per square foot, the damage to pastures is enough to warrant control. In Tillamook County, however, considerable damage has been observed at levels as low as 15 larvae per square foot.

Amount and height of forage present. In dense, tall stands, carbaryl (Sevin) probably won't be effective because the insecticide must reach the plant crowns and ground surface. Heavy top growth will trap carbaryl before it reaches the target area. (Sevin 80S, a wettable powder, was recommended for chemical control in Tillamook pastures in the spring of 1989.)

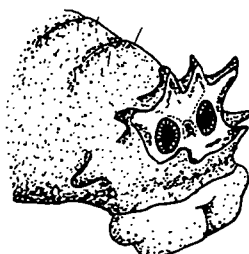
Time of year. Crane fly larval populations can decline by 50% from fall through winter and may diminish by another 50% from March 15 through May 15 as a result of natural control.

In Washington, insecticide application is considered most effective, in most situations, between April 1 and April 15. March 15 to May 15 is the period when most spring damage occurs and chemical control is possible.

Crane fly adult,
common in September



Above: Crane fly larva ("leather jacket"),
in pastures from October through July



Right: Crane fly larva, showing an enlarged
posterior end

less active. Significant bird kills were not reported in Tillamook County in the spring of 1989.

Consider, too, the hazards of *not* controlling crane fly: increased soil erosion caused by bare ground, and the invasion of noxious weeds and undesirable plants.

Cost. In Tillamook, a spring insecticide application cost was estimated at around \$7 per acre for chemical, plus \$2 to \$3 per acre application cost. Many dairy producers may incur considerable unexpected expenses in 1989 and 1990 because of pasture loss from European crane fly, for two reasons: rental pasture is in short supply, and dairy-quality alfalfa hay approaches \$150/ton.

Availability of chemicals

Two insecticides are registered for use on pasture grasses, methyl parathion and carbaryl. Location of housing developments and a lack of commercial pest control operators in the county make use of the more hazardous methyl parathion impractical. Therefore, carbaryl was the chemical widely used in Tillamook in spring 1989.

Control and management options

The three basic management options for European crane fly are doing nothing, increasing pasture fertilization, and starting an insecticide spray program.

Do nothing. If larval numbers are low in pastures or if expenses cause you to decide not to treat your pastures one spring, you should reevaluate potential problems each year in early March. On the other hand, you could deal with low to moderate infestations by increasing plant vigor.

Increase fertilization. Apply as much fertilizer as practical and keep grazing pressure low until pasture

The April dates are more effective than earlier in the year because the larvae more often migrate to the soil surface at night. It's this surface migration and aboveground feeding that exposes them to the insecticide.

Spraying much later than mid-April may not be effective—the larvae are larger and harder to control, and the majority of pasture damage has probably occurred already. Fall spraying will be researched in Tillamook County in 1989.

Forage availability. The availability and cost of replacement forage will vary from farm to farm. When you assess your need for control, consider hay and silage costs, pasture rental costs, and availability.

Environmental hazards. Consider the hazard of chemical control on beneficial insects and birds. Early spraying (March and early April) may minimize bee mortality—few weeds or clover blooms are present, and bees are

Use pesticides safely!

- Wear protective clothing and safety devices as recommended on the label. **Bathe or shower** after each use.
- Read the pesticide label—even if you've used the pesticide before. Follow closely the instructions on the label (and any other directions you have).
- Be cautious when you apply pesticides. **Know** your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from pesticide use.

growth is adequate. Commercial fast-release fertilizers such as urea or ammonium sulfate provide the best results.

Start a spray program. If you do use chemical control, consult the product's label for information about application rate, mixing, restrictions, time between application and repasturing of stock, and other regulations.

You'll need a lot of water to move carbaryl down through foliage to reach the crown area of the pasture plants. In Tillamook County, the recommendation is 25 to 40 gallons/acre from a high-pressure sprayer.

If forage is too dense or tall (over 5 inches high), you might consider pretreatment clipping or grazing. If a crust from manure application or heavy layer of thatch or dead grass exists, harrowing before spraying may improve efficiency (heavy deposits of organic debris both shield the crane fly from the spray and adhere to the insecticide, reducing its effectiveness).

Because considerable rainy periods are a predominant weather pattern in Tillamook in the spring, effectiveness

and runoff of the insecticide was a concern during application.

After you apply carbaryl to a pasture, note these important points:

1. Allow enough time for the chemical to dry onto the crowns of plants before significant precipitation occurs. However, a light rain (less than .25 inch) may help push carbaryl into the crowns, thereby increasing its effectiveness.
2. Wait 48 hours before you apply any irrigation.
3. Wait at least 7 days before you apply liquid manure.
4. Wait 14 days before you allow livestock back into the pasture.

Because of the 14-day withdrawal period for livestock, some dairy producers used this time last spring to spray their fields with herbicides for weed control. If you follow this plan, be

sure to check that carbaryl is compatible with the herbicides you plan to use.

Preliminary observations of carbaryl applications to pastures during April 1989 in Tillamook County indicated about 50% control of larvae within 48 hours. Increased mortality is usually expected with this chemical over about a 2-week period.

Pasture reseeding

Don't reseed pastures damaged from current infestations of European crane fly until after May 15, when most of the active feeding ceases. However, you can reseed heavily damaged pastures in late March or April—but first clip them (if top growth exceeds 4 inches) and treat them with carbaryl.

Wait 2 weeks after spraying before you cultivate pastures, to allow enough time for the insecticide to effectively control the larvae.



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