"Emergence of a new turfgrass insect pest on golf courses in Quebec, the European crane fly [Diptera: Tipulidae]"

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Emergence of a new turfgrass insect pest on golf courses in Quebec, the European crane fly [Diptera: Tipulidae]

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A survey of European crane fly occurrence was performed in 2002 on 18 golf courses from different climatic regions of Quebec, Canada. At each golf course, the scouting was done weekly from early May to mid-October on three greens and three fairways using a grid and a golf course hole cutter, respectively. The European crane fly (*Tipula paludosa*), a major turfgrass insect pest, was identified on two golf courses in the Quebec City area. This is the first record of this species in Quebec. These European crane fly larvae were observed from mid-May to the end of August, and adults were detected from late August to mid-September. The European crane fly was found to be a pest on the two golf courses and insecticide applications were used to control the large populations of this insect.

Keywords: European crane fly, golf courses, *Tipula paludosa*, turfgrass insect pest.

[Apparition d'un nouvel insecte ravageur du gazon sur les terrains de golf du Québec, la tipule européenne [Diptera : Tipulidae]]

Une étude pour vérifier la présence de la tipule européenne a été réalisée en 2002 sur 18 terrains de golf de différentes régions climatiques du Québec, Canada. Sur chacun des terrains de golf, le dépistage a été fait hebdomadairement du début mai à la mi-octobre sur trois verts et trois allées à l'aide respectivement d'un quadrat et d'un perce-trou de golf. La présence de la tipule européenne (*Tipula paludosa*), un important insecte ravageur du gazon, a été rapportée sur deux terrains de golf de la région de Québec. Il s'agit d'une première mention de cet insecte au Québec. Des larves de la tipule européenne ont été observées de la mi-mai à la fin d'août et des adultes ont été détectés de la fin août à la mi-septembre. La tipule européenne s'est avérée nuisible sur les deux terrains de golf et des insecticides ont été appliqués afin de lutter contre les populations importantes de cet insecte.

Mots clés : Insecte ravageur du gazon, terrains de golf, *Tipula paludosa*, tipule européenne.

The European crane fly (ECF), *Tipula paludosa* Meigen [Diptera: Tipulidae], is native to northwestern Europe (Blackshaw and Coll 1999). In North America, the ECF was first detected in 1952 in Newfoundland, Canada (Beirne 1971; Jackson and Campbell 1975). This insect was probably introduced from soil dumped after being used as ship ballast (Beirne 1971; Fox 1957). The ECF was later found in other areas: Nova Scotia, 1955 (Fox 1957); British Columbia, 1965 (Wilkinson and MacCarthy 1967); Washington State, 1966; Oregon, 1984 (Tashiro 1987); and Ontario, 1996 (Charbonneau 2003). In Quebec, more than 300 species of crane flies have been reported (Harper and Lauzon 1985), but to our knowledge, there is no mention of ECF occurrence.

Larvae of crane flies, including ECF larvae, are commonly called "leatherjackets". They are polyphagous and have been recognized as major pests of grassland and spring cereals (Blackshaw and Coll 1999). They feed during the night and cloudy days on leaves, crowns and roots of cool season turfgrasses and may cause economic losses on residential lawns and golf courses (Tashiro 1987). High populations of leatherjackets observed on golf greens and tees early in the morning may interfere with the playability of the surfaces.

The ECF is univoltine in North America with four larval instars (Tashiro 1987). In Washington State, 95% of adult emergence takes place from late August

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Table 1. Golf courses in Quebec, Canada, sampled for European crane fly (ECF), *Tipula paludosa*, in 2002

Golf course		Location		ECF Presence
1	Club de golf Sherbrooke	Sherbrooke	45°24'N, 71°54'W	No
2	Whitlock Golf and Country Club	Hudson	45°27'N, 74°09'W	No
3	Club de golf Saint-Raphaël	Île Bizard	45°31'N, 73°39'W	No
4	Le Parcours du Cerf	Longueuil	45°32'N, 73°31'W	No
5	Country Club of Montreal	Saint-Lambert	45°32'N, 73°31'W	No
6	Club de golf Islesmere	Laval	45°35'N, 73°45'W	No
7	Club de golf La Providence	Saint-Hyacinthe	45°37'N, 72°57'W	No
8	Club de golf Saint-Hyacinthe	Saint-Hyacinthe	45°37'N, 72°57'W	No
9	Hillsdale Golf and Country Club	Mirabel	45°39'N, 74°05'W	No
10	Club de golf Saint-Janvier	Saint-Janvier	45°39'N, 74°05'W	No
11	Fairmount Le Château Montebello	Montebello	45°39'N, 74°56'W	No
12	Club de golf Piedmont	Piedmont	45°54'N, 74°08'W	No
13	Club de golf Montcalm	Saint-Liguori	46°00'N, 73°34'W	No
14	Club de golf Lévis	Lévis	46°48'N, 71°11'W	Yes
15	Club de golf Royal Charbourg	Charlesbourg	46°51'N, 71°16'W	No
16	Club de golf Saint-Michel	Saint-Michel-de-Bellechasse	46°52'N, 70°55'W	Yes
17	Club de golf du Bic	Bic	48°22'N, 68°42'W	No
18	Club de golf de Chicoutimi	Chicoutimi	48°25'N, 71°04'W	No

to early September (Jackson and Campbell 1975). Oviposition occurs predominantly on the first night of adult life (Tashiro 1987). Larvae usually complete the first two instars in less than 2 months and enter diapause as third instars. In early spring, larvae feed intensively until moulting to fourth instars in late April and pupate in early August (Jackson and Campbell 1975). The most severe turf damage occurs in spring when larvae are feeding actively (Tashiro 1987). In Ontario, leatherjackets reach the fourth instar by May, and turf damage is generally observed at this time (Charbonneau 2003).

A survey of ECF occurrence was performed in 2002 on 18 golf courses from different climatic regions of Quebec (Table 1). The ECF was scouted weekly from early May to mid-October on three greens and three fairways at each golf course. Only two greens and two fairways were available for scouting at the *Club de golf Lévis*. Adults on the green were counted early in the morning before mowing using a 0.25 m^2 grid. On the fairway, a golf course hole cutter (10.8 cm in diam) was used for sampling ECF larvae in thatch and soil to a depth of 8 cm. Once removed, samples were broken up and insects were counted. A total of 25 grids per green and 25 golf course hole cutter samples per fairway were randomly taken each week on each golf course. Fewer samples were collected on June 3 and 20, on July 31, and in September and October. On June 3, there was no scouting on the greens at Saint-Michel; on June 20, five samples were taken per fairway at Lévis and Saint-Michel; on July 31, 15 samples were taken per fairway at Saint-Michel; in September, 10 samples were taken per fairway at Saint-Michel; and in October, 10 samples were taken per fairway and 10 per green at Lévis and Saint-Michel. All captures were brought back to the laboratory for identification (Alexander and Byers 1981; Gelhaus 1986).

The survey revealed the presence of the ECF on two golf courses in the Quebec City area (Lévis and Saint-Michel) (Fig. 1). Total numbers of ECF are presented in the figure because we observed a significant variability between golf course hole cutter and grid counts, which we attribute to the contagious distribution of this insect pest (Jackson and Campbell 1975). This is the first record of this species in Quebec. At these two golf courses, leatherjackets were observed from mid-May to the end of August, and adults were detected from late August to mid-September.

A lower population of leatherjackets was observed at the *Club de golf Saint-Michel* because insecticide applications were made in fall 2001 and spring 2002. Even though we cannot precisely describe the seasonal pattern of abundance of ECF because cultural practices differed between golf courses and pesticides were applied, our observations suggest that the ECF completes one generation per year in Quebec and its seasonal life cycle is similar to the one described by Jackson and Campbell (1975) for Washington State. Voucher specimens are housed at the Collection d'insectes du Québec of the Ministère des Ressources naturelles et de la Faune du Québec.

The ECF was not detected on the other golf courses we surveyed from other climatic and geographic regions of Quebec (Table 1). Considering that the ECF has been found in northerly latitudes in Europe (Commonwealth Institute of Entomology 1977), the distribution of this pest is likely to expand in North America. This insect pest is common in British Columbia (MacDonald 2002) and has shown a rapid spread in Ontario since 1996 (Charbonneau 2003).

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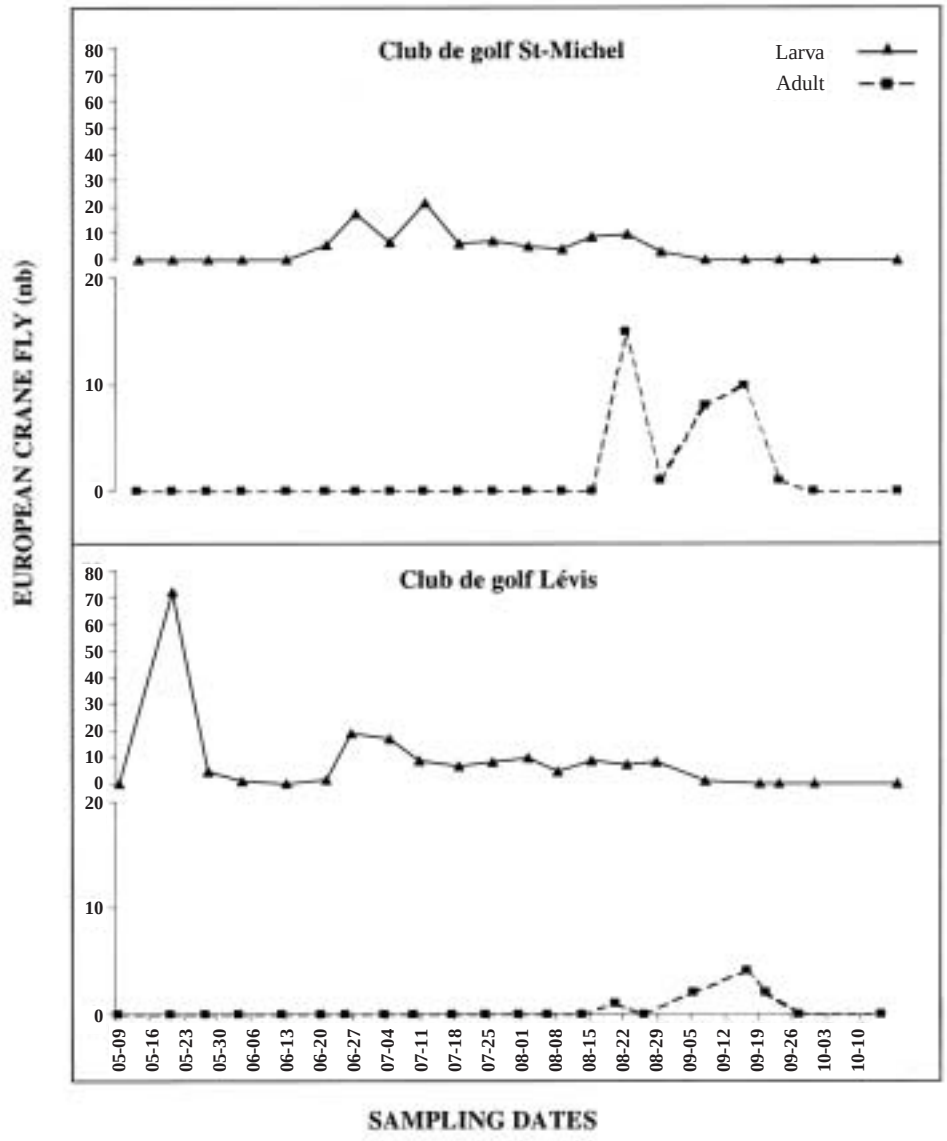

Figure 1. Seasonal abundance of the European crane fly, *Tipula paludosa*, on two golf courses in the Quebec City area in 2002.

REFERENCES

Alexander, C.P., and G.W. Byers. 1981. Tipulidae. *In* J.F. McAlpine, B.V. Peterson, G.E. Shewell, H.J. Teskey, J.R. Vockeroth, and D.M. Wood., Manual of Nearctic Diptera. Vol. 1. Research Branch, Agriculture Canada, Monograph 27 : 153-190.

Beirne, B.P. 1971. Pest insects of annual crop plants in Canada. I. Lepidoptera. II. Diptera. III. Coleoptera. Mem. Entomol. Soc. Can. 78 : 124 p.

Blackshaw, R.P., and C. Coll. 1999. Economically important leatherjackets of grassland and cereals: biology, impact and control. Integr. Pest Manag. Rev. 4 : 143-160.

Charbonneau, P. 2003. Leatherjackets in Ontario - What Gives? [on line], [http://www.omafra.gov.on.ca/english/crops/facts/turf_leather_may2198.htm – consulted on March 13, 2006].

Commonwealth Institute of Entomology. 1977. Distribution maps of pests, series A (Agricultural) No 370. Commonwealth Institute of Entomology, London, UK.

Fox, D.J.S. 1957. Note on occurrence in Cape Breton Island of *Tipula paludosa* Meig. (Diptera: Tipulidae). Can. Entomol. 89 : 288.

Gelhaus, J. 1986. Larvae of the crane fly genus *Tipula* in North America. Univ. Kans. Sci. Bull. 53 : 121-182.

Harper, P.P., and M. Lauzon. 1985. The crane fly fauna of a Laurentian woodland, with special reference to the aquatic species (Diptera: Tipulidae). Rev. Entomol. Qué. 30 : 3-22.

Jackson, D.M., and R.L. Campbell. 1975. Biology of the European crane fly, *Tipula paludosa* Meigen, in western Washington (Tipulidae: Diptera). Wash. State Univ. Coll. Agric. Res. Cent. Tech. Bull. 81 : 23 p.

MacDonald, L. 2002. IPM for turfgrass managers: a guide to disease, insect and weed management in B.C. Western Canada Turfgrass Association, Maple Ridge. p. 16-17.

Tashiro, H. 1987. Turfgrass insects of the United States and Canada. Cornell University Press, Ithaca. 391 p.

Wilkinson, A.T.S., and H.R. MacCarthy. 1967. The marsh crane fly, *Tipula paludosa* Mg., a new pest in British Columbia (Diptera: Tipulidae). J. Entomol. Soc. B.C. 64 : 29-34.