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Healthy Ecosystem

Infestations in turfgrass have already risen to highly damaging levels in NYS. In spring 2007 we recorded up to 70, 120 and 50 larvae/sq. ft in highly damaged lawns, fairways and putting greens.

Tandem Control of Invasive Crane Flies and White Grubs: Prospects for Scoring a Twofer

Not one, but two invasive crane fly species were detected in western New York State in 2004[1] . *Tipula paludosa* and *Tipula oleracea* are native to Europe, but have now established in three geographic regions of the U.S., most recently in the Great Lakes. Known as "leatherjackets," crane fly larvae can be problematic in any grass-based system. They inhabit the soil where they damage roots and stems below and above ground, leading to extensive thinning and dieback. All turf and forage grass species are acceptable hosts. Therefore, from sod farms to home lawns and golf courses, all 3.4 million acres of managed turf in NYS should be considered susceptible. Beyond turf, other horticultural systems will also be affected. In the Pacific Northwest, affected systems include peppermint, turnips, seedling nurseries, cereal crops, grass seed production, pastures and hayfields. In their native Europe, larvae damage pastures, winter cereals and other crops such as beets, brassicas, cabbage, clover, corn, lettuce, strawberries and turnips.

Infestations in turfgrass have already risen to highly damaging levels in NYS. In spring 2007 we recorded up to 70, 120 and 50 larvae/sq. ft in highly damaged lawns, fairways and putting greens, respectively, in the greater Buffalo and Rochester areas. The magnitude of populations caught the industry off guard. Lawn care providers and golf course superintendents are forced into rescue treatments that often rely on broad-spectrum carbamate insecticides. In addition, one species was also detected in sod farm turf for the first time in 2007. This appearance was inevitable, but it now fuels the idea that crane flies will likely move via infested soil media. The threat encompasses risk of infested sod, outbreak at the site of installation, establishment in a previously infested area of the state, as well as overall regulatory concerns. Our survey data reveal two zones of geographic establishment: both species in the western Erie Canal corridor and one on

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Long Island. The longer we can contain invasive crane flies, the longer we have to improve our diagnostic, decision-making and intervention tools.

Experience from Europe and areas of previous establishment, such as the PNW, serves as a starting point to develop best management practices for invasive crane flies in NYS. Nevertheless, that experience must be tailored to our growing conditions, production practices and pest ecology. In contrast to the PNW, both species appeared in NYS at the same time, infestations exploded to injurious levels within 3 years, and there is still a chance to proactively thwart their spread, thereby buying time to develop management strategies.

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T. paludosa larvae

Until longer-term approaches can be developed, insecticidal control must form the backbone of our rapid response. To date, biological control, cultural control and host plant resistance have had scarce offerings for crane fly IPM. Recommendations for insecticidal control will more rapidly give turfgrass managers the tools to prevent or suppress outbreaks. To date, we have evaluated control products in four field trials that were conducted over a 2-year period to target *T. paludosa* larvae. Two preventive autumn and two curative spring experiments were performed to define opportunities for each phenological control window. Applied in late autumn against small 1st and 2nd instars, the most efficacious (≥70% control in both trials) products were bifenthrin, carbaryl, chlorantraniliprole, clothianidin and trichlorfon. Applied in spring against large 4th instars, the most efficacious products were clothianidin and dinotefuran. Variable results were obtained for a host of other chemistries and biopesticides.

Several insecticides, therefore, will significantly reduce field populations of *T. paludosa* and offer alternatives for preventive and/or curative control. But, one of the most serious consequences of crane fly establishment is the need for an additional insecticide application. Current control windows are either too early (late April to May) or too late (late September to October) to overlap the traditional periods of preventive (June to early August) and curative (late August to early September) white grub control. This scenario forces turf managers to contemplate an additional insecticide application, implying a costly new economic and environmental burden to the turfgrass industry.

Recently, data from disparate studies is revealing that certain long-residual insecticides persist long enough to suppress

summer white grub populations even though they were applied in early spring to target a co-occurring pest. For instance, applied as early as 6 April for billbug control in Ohio, clothianidin, imidacloprid, indoxacarb and thiamethoxam gave 95-100% control of Japanese beetle. Applied as early as 11 April for annual bluegrass weevil control in New Jersey, imidacloprid and clothianidin+bifenthrin gave 90-100% control of Japanese beetle and northern masked chafer. And applied as early as 11 May in New Hampshire, imidacloprid and clothianidin+bifenthrin gave 85-100% control of European chafer.

This approach should be explored for its promise in areas of NYS that suffer – or will suffer - from both crane fly and white grub populations. Like white grubs, invasive crane flies are bound to become widespread locally. Based on our studies to measure local incidence, within one or two seasons after initial detection, 22-98% of golf course greens and tees are already infested. Control of both pest complexes may mean broad applications across whole lawns and fairways. We thereby propose to assess the feasibility of making a single insecticide application to control invasive crane flies and white grubs that occur at the same site but at different times. We will examine tandem control in both the spring and autumn, i.e. early spring applications to target crane flies with carry over to summer grub populations, and summer applications to target white grubs with carry over to late autumn crane fly populations.

Daniel Peck, Ph.D.

Tipula oleracea

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