

Stop #13: A New Nematicide Against the Pacific Shoot-gall Nematode *Anguina pacifica*

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For the past four decades, the main turf nematode problem along the Northern California coast has been *Anguina pacifica*. This roundworm causes galls at the stem base of annual bluegrass (*Poa annua*). The disease has been found only along an approximately 20-30 mile-wide coastal corridor from Carmel to Mendocino. The often cool, foggy and damp weather conditions create and maintain a water film on the plant surface that allows the second-stage nematodes to move from the soil up the stems and penetrate the shoot apex. There the nematodes initiate a cavity by enzymatic degradation of the middle lamella and puncturing surrounding cells (McClure et al., 2008). Through cell proliferation and enlargement this eventually forms the shoot-gall. Meanwhile, the nematodes in the cavity continue two more molts until they mature and mate. The females may lay as many as 1200 eggs. As with all animals whose body temperature depends on external sources, the rate of their development is dependent on the ambient temperature. After the first molt in the egg, the second-stage juveniles hatch and the gall cavity may contain several hundreds or more of them. Once the gall disintegrates, the nematodes may move back into the soil or attack another shoot or plant. The disease typically stunts the affected shoot, leads to additional branching, with *Poa* greens becoming sparse and pitted.

From the beginning, crop protection strategies against the Pacific shoot-gall nematode disease have been at best marginally successful (Westerdahl et al., 2005). Short-term disease mitigation with Namacur® was phased out when Bayer agreed to end sales in 2008. Based on laboratory bioassays, McClure and Schmitt (2012) recommended biweekly application of products with the active ingredient azadirachtin that was derived from the Indian Neem tree (*Azadirachta indica*). Consequently, several golf courses with severe *A. pacifica* infestations have been using Neemix® 4.5 (Certis) throughout the season. Recently Bayer CropScience developed fluopyram as a nematicide with excellent activity against several plant parasitic nematodes. Originally it was discovered as a broad-spectrum acropetal penetrant fungicide (Luna®) in the succinate dehydrogenase inhibitor class (FRAC Code No. 7. However, Luna® is not registered as a turf fungicide. In 2014, we first tested its nematicidal efficacy at the Pebble Beach Golf Links against *A. pacifica* in comparison to biweekly Neemix® 4.5 applications and a non-treated control. Fluopyram significantly reduced the *A. pacifica* population and associated shoot galls. It improved turf quality, *P. annua* biomass, and number of *Poa* shoots compared to either Neemix® 4.5 or the non-treated control.

From 2015 to present, we have conducted additional turf trials with fluopyram at Links at Half Moon Bay, Links at Bodega Harbour, Pajaro Valley Golf Club in Watsonville, and Pasatiempo Golf Club in Santa Cruz. At Pasatiempo, the trial took place under severe *A. pacificae* disease pressure. Two applications of fluopyram at either 0.195 or 0.39 oz/1,000 ft² effectively restored turf health.

In June 2016 Bayer received EPA registration for fluopyram (Indemnify™) turf nematicide; California registration is pending. In our trials 1-2 applications of fluopyram at either the low or high rate have provided season-long protection of *A. pacificae* due in part to long soil residual (> 200 days) of this active ingredient. While previous turf grass nematicides were labeled with the signal word “Danger” (high toxicity) or “Warning” (moderate toxicity), the Indemnify™ label displays only the signal word “caution” (low toxicity).

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Literature

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