

Parasitic Nematode Found in Annual Bluegrass Greens

by LARRY COSTELLO,* U.C. Cooperative Extension,
San Mateo and San Francisco Counties, California

A PARASITIC NEMATODE, *Anguina radicicola*,** has caused considerable damage in annual bluegrass (*Poa annua*) greens at coastal courses in the San Francisco Bay and Monterey Bay areas of Northern California. Greens with a yellow, mottled appearance were found to have prominent swellings at the crowns of individual annual bluegrass plants, with less obvious swellings on roots. A close inspection of these swellings revealed microscopic nematodes, subsequently identified as *A. radicicola*. This nematode has not previously been known as a pest in *Poa annua* greens. It does not appear to affect bentgrasses in infested greens.

Anguina radicicola is an endoparasite, i.e., it feeds within the host plant. The juvenile stage bores into the stem of the host and subsequently matures within the crown, causing noticeable swellings. An infestation causes growth reduction and dieback in individual plants. Dieback is usually preceded by yellowing or chlorosis in the leaf blade. Roots

appear stunted and twisted with swellings (galls). Overall, greens exhibit a mottled appearance, somewhat similar to damage caused by water mold fungi, such as *Pythium* and *Rhizoctonia* species. Infestations do not always appear to be fatal. Often, the nematode seems to feed within the host for a time without causing death. Serious infestation stresses annual bluegrass turf and may predispose it to damage by pathogenic fungi.

A. radicicola is found in Scandinavia, Europe, England, Canada, and along the California coast. Known hosts are all grasses: barley, rye, timothy, and Kentucky blue. Studies using barley have shown that larvae enter through roots and then pass through four molts to become adults in two to three weeks. Eggs are laid after 10 to 12 days, with the life cycle taking 56 to 64 days. Usually only one generation per year develops. Adults measure from 1.0 to 1.5 mm in length. Galls on barley roots measure from 0.5 to 6.00 mm. As many



Gall on *Poa annua* plant resulting from *Anguina radicicola* infestation.

*LARRY COSTELLO is the Farm Extension Advisor for San Mateo and San Francisco Counties, California. He received his Ph.D. in plant physiology from the University of California at Berkeley in 1980. He has also served as assistant professor in ornamental horticulture and lecturer in landscape architecture within the University of California system. With this article, Dr. Costello is unraveling one of the most current and perplexing problems some Northern California superintendents have had — mottled yellow greens.

**Although most evidence indicates that the nematode isolated from *Poa annua* galls is *Anguina radicicola*, there is still some question concerning this identification. It has been suggested that this nematode may be a biotype of *A. radicicola*.



(Above, left) Annual bluegrass green at San Francisco Golf Club exhibiting damage from nematode infestation (August, 1982).

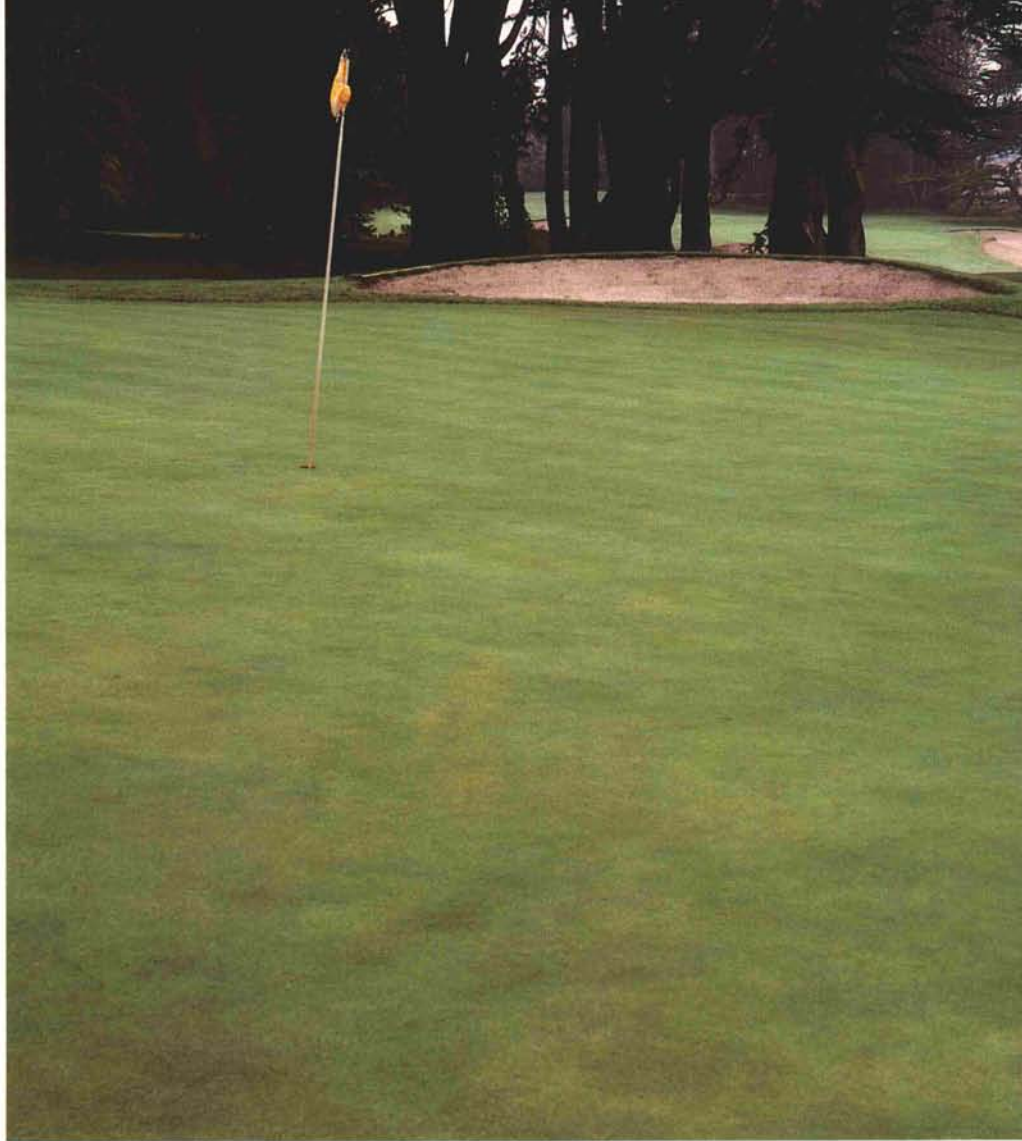
(Above, center) Annual bluegrass green at San Francisco Golf Club three weeks after treatment for nematodes (September, 1982).

(Above, right) Annual bluegrass green at San Francisco Golf Club six weeks after treatment for nematodes (October, 1982).

as 500 larvae have been found in a single gall. It is not known if the life cycle of *A. radicolica* is precisely the same in annual bluegrass as that reported in barley.

PROMINENT SWELLINGS at the crown of individual annual bluegrass plants are perhaps the best indicators of an infestation. Swellings, or galls, resemble miniature onion bulbs. Turf samples from suspected areas can be removed by using a knife and by carefully separating individual plants. Galls on infested plants can be seen easily without magnification. Young galls appear white, while old galls turn brown. Confirmation of the presence of *A. radicolica* should be made by a qualified laboratory.

As yet there is no recommendation available from federal or state agencies for the control of *A. radicolica* in annual bluegrass. Since this is the first find of this nematode in golf greens, we



have very little information that can be used for practical control. However, a number of considerations must be made when contemplating a control program:

1. Time of application must be considered. In native grasses, *A. radiculicola* is most active in the spring, usually April or May. When these grasses die in late spring or early summer, the nematode aestivates, or enters a dormant stage. There is usually only one generation per year. On golf greens, however, it is not known how many generations may occur. The continual renewal of turf on golf greens may lead to multiple generations. Preliminary evidence has suggested that several generations do occur in greens. As such, repeat applications for control should be necessary.

2. Since *A. radiculicola* is an endoparasite, a systemic nematicide would seem preferable to a contact nematicide. Adults feeding within the host could be controlled using a systemic material, while a contact material may only be

effective against larvae moving from galls to new plants.

3. A material selected for use should have some residual action. Highly soluble nematicides may leach out of the root zone before they reach their site of action. Considering the substantial amounts of water applied to golf greens, this would be an important consideration.

Thus far, Namacur® and Dasanit® have been used to control *A. radiculicola* in greens at three golf courses in the San Francisco area. Both are highly toxic materials that require permits for use. Results have been encouraging using both materials. Recovery of treated greens occurred two to three weeks after application. Root and top growth have increased substantially. Treated greens appear to respond more readily to fertilizer and fungicide applications. Research on the life history and control of this nematode in golf greens is currently in progress at the University of California, Davis.