Endophytes in perennial ryegrass Phillip Ford, PGG Wrightson Turf

Endophytes in perennial ryegrass are beneficial fungi that live inside the grass plant and produce alkaloids that deter animals from eating it. That's a neat sentence that sums up a very complex topic. A longer discussion on endophytes in turf can be found on the PGG Wrightson Turf website (www.ppgwrightsonturf.com.au, under the Research and development menu, Recent trials, Endophytes in perennial ryegrass). Endophytes, or the alkaloids they produce, can deter a wide range of animals, from insects through to birds and mammals. The type of endophyte in a ryegrass host determines the range and potency of its alkaloids. Grazing animals can suffer many problems if fed on high-endophyte ryegrass, so the emphasis in agriculture is to produce ryegrasses with endophytes that deter insect pests, such as stem weevils and armyworms, but that don't cause problems for livestock.

In turf, of course, we don't really want anything eating the grass, so there is scope to seek out endophytes with high levels of the most potent alkaloids available. AgResearch in New Zealand have been able to find and isolate these endophytes from grasses growing in the wild, and then inoculate them into elite turf-type perennial ryegrasses. As a commercial partner of AgResearch, PGG Wrightson produces the seed and brings it to market. A main target market of the novel endophyte ryegrasses is bird deterrence at airports, so the trademark 'Avanex' has been coined. An Avanex perennial ryegrass such as Colosseum Avanex works in three or four different ways. At sowing, the high-endophyte seed is repulsive to seed-eaters such as pigeons. After establishment, the reduction in insect pests will reduce the number of insectivorous birds such as magpies and crows. In addition, the alkaloid content in the foliage deters herbivorous birds such as ducks and geese. By reducing the numbers of all these birds, as well as small mammals such as mice, predatory birds such as hawks should also be reduced. The end result is fewer birds around the runways, and a reduced risk of bird-strike at airports.

But perennial ryegrass with the Avanex endophyte is also available for amenity turf. The real purpose of this article is to pass on an interesting result from a trial I'm running at Ballarat. The main aim of the trial was to investigate the effect of the Avanex endophyte on cockchafer grubs. I knew this area of the plots had a large population of Black Headed Cockchafer (*Acrossidius tasmaniae*, see Photo 1) and Red Headed Cockchafer (*Adoryphorus couloni*, see photo 2). So I had sown 1.5m x 2m plots of the turf-type perennial ryegrass 'Colosseum', either as a nil-endophyte treatment or with the Avanex endophyte. The plots were sown in early March. By April 15th, when the following photos were taken, the magpies and crows moved in at one end of the plots to start feeding on the juicy, fat Red Headed Cockchafers. Photo 3 shows what happened. The nil-endophyte Colosseum was totally ripped up, whereas the Colosseum with Avanex endophyte was left alone. You could see where the birds started on one corner of the plot, but didn't go any further. The feeding damage has ruined the trial (I was planning on counting grubs in each plot), but a picture is worth a thousand words. Whether the endophyte knocked the grubs, or the birds simply didn't like ripping into the foliage, the end result was clear; the Avanex had virtually eliminated bird damage from the plot.

Colosseum Avanex

Nil-endophyte Colosseum