

# Endophyte-Enhanced Turf: Not Just For Bug Control

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## What is an Endophyte?

Just to refresh your memory, or to lay to rest misconceptions about endophytes. . . an endophyte, simply put, is a bacteria or fungus that lives within a plant *without causing disease*. The endophytes of greatest interest to turfgrass managers and researchers are fungi from the genus *Acremonium* that infect perennial rye grass, tall fescue and fine fescue.

The fungus can be transferred from plant-to-plant in two ways. One is via seed that came from a mother plant that was also infected with the fungus. The second way is by tillering and rhizomes as affected mother plants produce new plants which in turn contain endophytes. The fungus does not grow into the roots of grasses, an important point to remember when it comes to using endophyte-enhanced turf for insect control. Some seed varieties tend to possess high endophyte levels, but this will vary from one seed to another. The endophyte can be easily killed if the seed is stored for too long of a period, especially under warm conditions.

Once an endophyte-containing plant is established it is virtually impossible to kill the endophyte unless, of course, the plant is killed. Pesticides, including fungicides, do not appear to significantly reduce endophyte levels in turf.

Endophytes apparently CANNOT be spread to non-infected plants via grass clippings, mowing or just by growing next to an infected plant. The only way to introduce endophytes into an existing turf is via overseeding with seed that contains the endophyte. To get endophyte-enhanced seed, you specifically request it when you are purchasing seed. The seed tag will indicate what percent of the seed contains endophytes.

## Insect-Resistant Turf

The first recognized benefit offered by endophytes was that certain insects, most importantly those insects that feed on leaves or suck juices out of the plant leaves appear to be affected by the presence of endophytes. Top feeding insects like army worm, cutworm and sod webworm larvae, as well as adult billbugs, chinch bugs and green bugs (aphids) are most affected. The mechanisms by which the plant/endophyte combination repel these insects is probably a combination of *non-preference* (the endophyte-infected plants just plain taste or smell bad to the insect) and *antibiosis* (toxic chemicals occur in the plant which kill the insects or interfere with normal insect development). It is thought that at least 70% of the turf should contain endophyte-enhanced plants to substantially repel damaging insects. Even under considerable insect pressure, a loss of 30% of the turf to insects can often be tolerated until the area can regain its density by itself or via overseeding.

## Other Benefits of Endophytes

Research has demonstrated that endophyte-enhanced turf is more resistant to environmental stresses like heat and drought, and more resistant to infection by other fungi which cause turf diseases. Fine fescue varieties which contain endophytes appear to grow better in shade than do

identical varieties. Stands of endophyte-enhanced turf appear to maintain density better (and have fewer weeds), probably because they are less prone to damage by insect feeding, disease and heat and drought stresses.

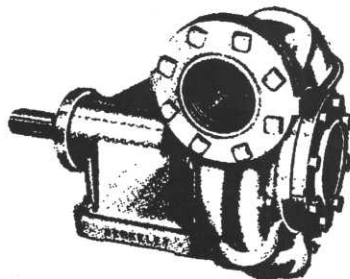
## Is There a Down-Side To Endophytes?

Endophytes can cause problems for animals which may feed on infected grass plants. For example, cattle may get "fescue summer syndrome" (fescue toxicosis), sheep may get "ryegrass staggers" (not to be confused with the behavior of some golfers on hot afternoons!) and mares may suffer from agalactia (suppressed milk development). Domesticated animals do not seem to distinguish between grass which contains endophyte and that which does not. On the other hand, wild animals (like deer) are possibly able to discriminate in their feeding so as to avoid endophyte-containing turf. Endophyte contamination in pastures is a major problem for beef and sheep producers in some parts of the country.

In summary, the use of endophyte-enhanced turf varieties is yet another way for turf managers to practice integrated pest management. And while doing so, they may just be producing turf areas that are also more disease and stress resistant. Maybe it will even keep the geese and elk away!

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