

Endophyte-enhanced grasses for chinch bug control? Landscape New Brunswick and Maritime MicroBiologicals Inc.

Much has been said about the ability of endophyte-enhanced grass to resist insect attack. The idea is that ‘good-guy’ fungi that naturally reside in the leaves of some grasses (endophytes) make compounds (alkaloids) that repel or kill insects feeding on the grass. The seeds are not inoculated, since the fungus is in the seed already. In ‘endophyte-enhanced’ seeds, the fungus starts growing when the seed germinates, its filamentous cells (“hyphae”) growing with the plant, up through its above ground parts. Field tests have demonstrated that *some* endophyte-enhanced grass *sometimes* resists *some* insects under *some* conditions. We wanted to know: *Would using endophyte-enhanced seeds stop chinch bugs from destroying lawns in New Brunswick?*

First, we planted many types of “endophyte enhanced” seeds, then stained the leaves that grew from them so we could see the fungi. Only a small percentage (<20%) of the plants had the characteristic hyphae. We then focused our effort on the two seed lots with the most endophyte.

We assessed persistence of the fungus in the seeds after storing them in various ways (see Table 1). With Perennial Rye (*Lolium perenne*) 31% of the 85% of the seeds that germinated contained live endophyte. With the chewings fescue (*Festuca rubra commutata*) var “T”, 60% of the 87% of the seeds that germinated had endophyte. However, in both cases the endophyte died when the seeds were stored. With “T” it was almost completely dead after 5 months. After 10 months, it was completely dead with both species, regardless of storage condition. The seeds survived (germinated) much longer than the endophyte, so the net result was endophyte-free plants.

It has been shown that chinch control requires that a high proportion of the plants contain the endophyte (Richmond and Shetlar 2000). This would not occur if one planted many of the endophyte-enhanced seeds that are being sold, particularly if they have been stored.

Table 1. Seed and endophyte viability after storing under various conditions*.

	Initial	After 5 months				After 10 months			
		Cool Dry	Cool Moist	Warm Dry	Warm Moist	Cool Dry	Cool Moist	Warm Dry	Warm Moist
Scotts Perennial Rye									
%germination	85%	88	80	84	85	61	96	76	14
%endophyte	31%	25	31	8	16	0	0	0	0
Chewings Fescue “T”									
% germination	87%	90	93	82	57	76	81	77	0
% endophyte	60%	0	0	0	17	0	0	0	0

* Cool = 4°C. Warm = 25°C. Dry = < 10%RH. Moist = 75% RH.

We then looked to see how chinch bugs responded to endophyte-enhanced “T”. For this, we grew the grass in small, chinch-containing transparent containers. Endophyte-containing grass was in one area and endophyte-free grass in another. The chinch did not obviously avoid the grass with the endophyte - In fact, we saw chinch feeding on it (See Fig. 1). When this particular blade of grass was stained, hyphae could be seen growing among the cells of the leaf sheath where the chinch had been. It was clear that this piece of grass did not get much chinch protection from its endophyte!

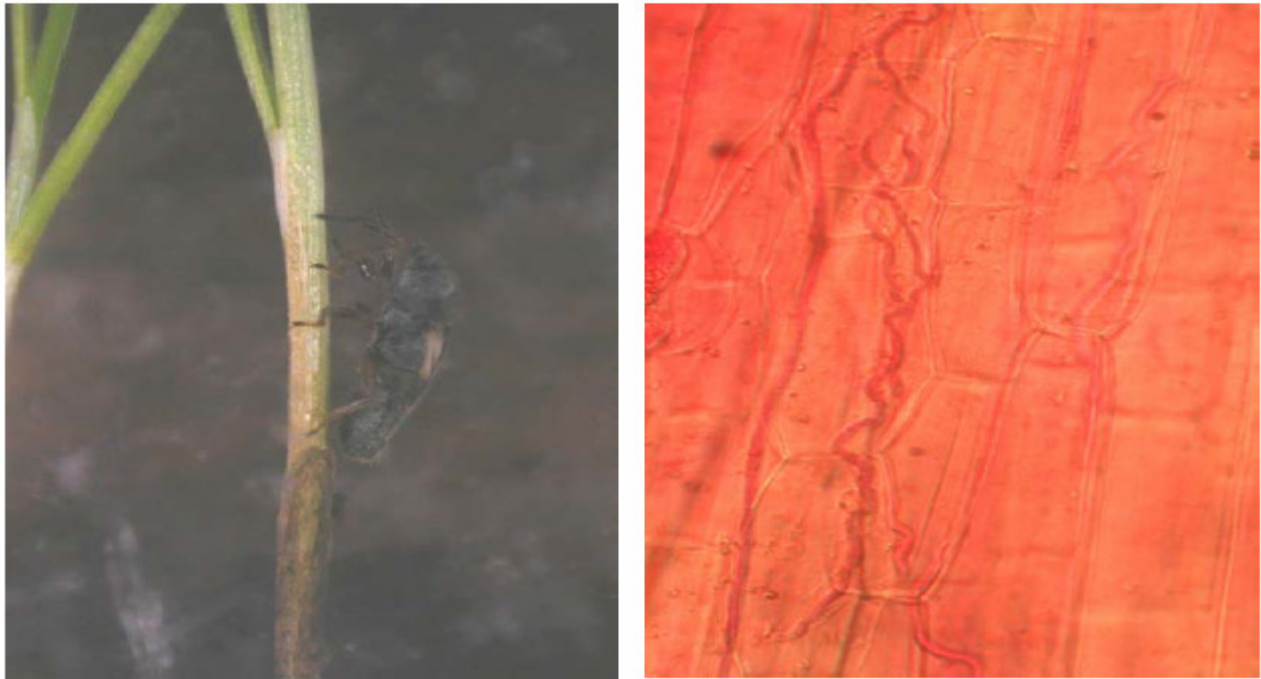


Fig. 1. *Left.* Chinch on “T” leaf sheath. *Rt.* Hyphae (darker red winding filament) between cortical cells (lighter red) of the same leaf sheath. 400X

In short, the research determined that using “endophyte enhanced” seed will not necessarily reduce Hairy Chinch Bug infestations in New Brunswick. Endophytic fungi *can* decrease grazing by insects (and also larger herbivores) but this only *sometimes* happens. It is important that the right fungus is present, that it persists and that it produces its insect-inhibiting compounds under the conditions where it is being used. More research is clearly required to determine the types of endophyte-enhanced seeds and turf species that are most suitable for NB lawns and the optimum storage conditions for them. Until this happens, it is “Buyer-beware”!

Further information: <http://www.omafra.gov.on.ca/english/crops/facts/endophyt.htm>,
<http://versicolor.ca/lawns/endophytes/index.html>,

Richmond, D. S. and D. J. Shetlar. 2000. *Journal of Economic Entomology*. 93:1167-1172.