Understanding Endophytes
A FUNGUS FOUND IN GRASS AND OTHER PLANT SPECIES

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The following question has been asked by RLF's New Zealand Distributor Jason Reid on behalf of his clients.

Question:

In NZ over 80% of our pasture has endophyte fungus added at seed treatment time.

The reason for this is that the endophyte functions, in a symbiotic way, to protect the grass from insect disease and also to boost pasture performance and animal health. I am visiting clients shortly and they have asked specifically about this for when **BSN**-treated seed is used.

Can you please advise of any known or noted effect of **BSN** on endophyte viability, current experience with the use of **BSN** + endophyte, and any other comment.

Answer:

In providing an answer to the practice of treating grass seeds with endophytic fungi or bacteria, I do not see any issue if the two are applied separately to the seed.

The preferred order would be to apply **BSN** first, followed by the endophytes.

The endophytes (i.e. *Neotyphodium*) that live symbiotically with the grasses and are vertically transmitted to the seed are located in different parts of embryo as well as in other seed tissues and components. This means that they are well protected from any likely adverse effect of **BSN** application.

The rates of **BSN** and water recommended in our technical bulletins allows for good seed coverage and, based on our experience, **BSN** by and large does not reach the embryo in most cases – however one could choose a lower rate of **BSN** in grass seeds if adverse effects of high rates is of concern.

When grass seeds are treated with **BSN** the endophyte survival in seed is like its survival in untreated seed and is best achieved at conditions that are required for maintaining seed viability (e.g. low moisture and temperature).

BSN-treated seeds increase root activity/exudation at seedling stage, which helps with endophyte reproduction and entry into the plant.

These comments relate equally to endophytes whether naturally occurring or applied as a treatment to augment this process.

The link that follows :
http://forages.oregonstate.edu/tallfescuemonograph/symbiosis/authors is helpful and you will find much more information at this site.

The following further general comments are made in relation to this question, to better understand the context in which your clients are operating.

The Endophyte Life Cycle

Endophyte is a fungus found in many grass species while mycorrhiza extend into the soil , the Endophytes only live within the plant cells and move vertically, horizontally or both within the plants. There is yet much to be learned about the role of these symbiotic fungi in different plants – it is a common and natural occurrence in many grass species. The fungal strands grow between the plant cells, transmitting themselves to the next grass generation by growing into the developing seed head in those fungi such as Neotyphodium that move vertically within the plant, and then growing out of the seed into the subsequent grass seedling.

Endophyte movement in plant is in one of the following forms:

1. Moving horizontally only in root or rhizomes.
2. Moving horizontally only in shoot.
3. Moving horizontally and vertically in which case the fungus can move from root to shoot and also be transferred to seeds and thus to the next generation.

Endophytes enhance the yield and persistence of the grass, because it produces a number of compounds that are toxic (such as alkaloids) to various insects and other grass pests.

However, endophytes can also lead to stock health problems when applied and not used correctly.

Conclusion

BSN-treated seed therefore, can play an important part in improving the health and vitality of the crop by promoting an environment conducive to naturally occurring organisms, as it increases both root activity and the quality of the root system's organic matter.

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