

SEED COATING INNOVATIONS

John Walsh, Kelly Rooney and Joel Canestrino

INTRODUCTION

Seed coatings have been used on forage legumes for more than twenty years. Most people in the industry are familiar with seed coatings like Rhizo-Kote XL brand alfalfa coating and the benefits that are possible in stand establishment. The chief components of these coatings are Rhizobium bacteria for nitrogen fixation, a fungicide to protect against Pythium and Phytophthora and finely ground limestone to provide an improved microenvironment for seed germination and physical protection. The next generation seed coatings will likely bring more pesticides (probably insecticides and biological protectants), plant nutrient additions and various colorants. But what other seed coating innovations have been made recently and what might be in the pipeline for the future?

INNOVATIONS

FLUID SEEDING: Commercial fluid fertilizer applicators have pioneered this use which allows rapid seeding of up to 50 acres per hour. Coated alfalfa seed is added directly to the liquid fertilizer tank just prior to application. Without coating the Rhizobium inoculant and fungicide would be washed off the seed but the coating protects the rhizobia and keeps the inoculant and fungicide on the seed long enough for delivery to the soil.

TEMPERATURE CONTROLLED POLYMERS: Seed can be coated with a polymer that will prevent the seed from imbibing the water needed for germination until a desired temperature is reached. The set point at which the polymer becomes permeable to water can be readily adjusted by changing the polymer composition. Will this make it possible to prevent seeds from germinating too early in the field or can we synchronize germination better?

BIOCONTROLS: We have had foliar applied biocontrols such as B.t. for a number of years but we have seen little in the way of seed applied biocontrols. In the future we believe there will be more biocontrols such as Trichoderma harzianum, Pseudomonas spp. and Bacillus spp. Biocontrols have the unique advantage of being able to provide extended control as long as they are viable, unlike chemical controls which are metabolized. Seed coatings can provide storage protection and a microenvironment for establishment of these organisms in a field environment.

PRECISION SIZING: Genetic engineering will add valuable traits to alfalfa. At first there will be single gene changes but soon after there will be seeds with "stacked genes", which carry two or more new genes. This will add value to the seed and at the same time increase seed costs.

¹ J. Walsh, Research Director, CelPril, 251 Oak St., Manteca, CA 95337; K. Rooney, Research Agronomist, CelPril; J. Canestrino, Marketing Agronomist, CelPril. Published In: Proceedings, California/Nevada Alfalfa Symposium, 3-4 December, 1998, Reno Nevada.

Growers will look for ways to decrease planting rates and coating seed to a precision size may be one way to accomplish this, similar to practices used in the vegetable seed industry.

HERBICIDE PROTECTANTS: Sorghum growers are familiar with coating sorghum seed with oxabetrinil (ConcepII), a protectant which safeguards the seed from the subsequent application of metolachlor (Dual). Grass seed producers coat activated charcoal on the seed to provide herbicide protection. There may be other chemicals that will metabolize the herbicide or chemicals that can be added to the seed to provide physical protection from herbicides.

GENETICALLY ENGINEERED RHIZOBIA: EPA has approved the first genetically engineered Rhizobium strain for alfalfa. This first generation product has demonstrated measurable increases in nitrogen fixation. The engineered strain's effectiveness is diminished, however, by competing rhizobia frequently found in production alfalfa soils. Hopefully the next generation products will overcome this limitation.

SEED MARKERS: Special colorants or other chemicals can be added to seed coatings to distinguish seeds carrying different genetic traits or to tell varieties apart. This could help prevent misapplication of agricultural chemicals or even be used in cases of liability claims.

FERTILIZER PROTECTION: Seed is sometimes mixed with granular fertilizer and broadcast applied to the field in a one-step operation. It has been demonstrated that the lime coating on an alfalfa seed can protect the rhizobia in the coating for a sufficient amount of time for the seed to be planted. Survival of the rhizobia decreases as the time of exposure to the fertilizer is increased.

SLOW RELEASE CHEMICALS: Alfalfa seed coatings can carry as much as 10 or 15 pounds of material per acre depending on the planting rate. This is an excellent way to deliver some nutrients and ag chemicals but because of the rates applied and the proximity to the seed these chemicals may be toxic to the germinating seed. Encapsulation and slow release chemistry is one way to modify these toxic effects and still maintain the seed as a delivery system.