Sharon Fox Gamble, Agricultural Agent, IV

Why and How to Get It Done: Inoculating Legumes Before Planting

Legumes are important plants because they can fix atmospheric nitrogen into their tissues. They do so through soil bacteria (called Rhizobia), which are able to invade legume roots forming atmospheric nitrogen harvesting nodules. Rhizobia thus act as fertilizer "brokers" and the plants have higher nitrogen, and consequently protein, and nutritive value.

Not all Rhizobia are interchangeable. The correct strain of Rhizobia must be match the legume seed type or species. Take care to make sure the proper live strain is purchased with seed. Several legume species may be inoculated by one type of bacteria, if this is the case, they are termed cross-inoculation groups. In some cases, only one species of legume may be in a group.

Remember Rhizobia are living organisms. They must remain alive in order to "fix" nitrogen in the roots. Active fixation can be observed by the presence of nodules on roots (see Figure 1). Not all nodules are shaped the same. Some are round. Some are oblong. Active fixation can be noted by the presence of a Pinkish coloration on the inside of the nodule.

While you can use soil from a "rhizobia infected" field, generally it is more convenient to "stick" the inoculant to the seed prior to planting. The practice of spreading a commercially prepared strain of nodule bacteria into the seed furrow at planting is very effective Table 1 lists an accepted method of sticking inoculant to seed:

Table 1: Accepted Method of Sticking Inoculant to Seed:

1. Mix 2 ounces of syrup of molasses with 8 ounces of water or mix 1 cup of sugar with 2 cups of water, or use milk. Stir or shake well to dissolve. (It was once suggested, and all through the literature to use carbonated beverages. Do Not Use carbonated beverages….the pH of the beverages may be as low as 2.0 which is harmful to Rhizobia).
2. Add about 1/3 bag of fresh inoculant (2 ounces) to about 1 cup of the sticking agents. Mix to form a black slurry.
3. Place 25 pounds of seed in a tub or similar container.
4. Add the black slurry (6 – 7 ounces) to the seed in the tub and thoroughly mix. Be sure to coat seed as evenly as possible. Add the remainder of the bag of dry inoculant to coat and dry the seeds. The inoculant may be several times the manufacturer's recommended rate of inoculant.
5. Allow seeds to dry in the shade. Sunlight kills. To speed the drying process, add more inoculant or a small amount of finely ground limestone. DO NOT USE burnt, hydrated, slaked or builder's lime. It will damage Rhizobia!
6. Plant inoculated seed as soon as possible or keep in cool, shaded conditions for no longer than one to three days. Do not leave the bag of inoculants or treated seed in direct sunlight. Sunlight kills. DO NOT mix inoculated seed with fertilizer. Fertilizers are salts and acids. It will kill Rhizobia.
7. If molybdenum or fungicides are needed, apply them to seed after inoculation and plant immediately. (Generally inoculants premixed with a fungicide and/or molybdenum have fewer viable rhizobia than other inoculants and should not be used.)

Table 2: Cross-inoculation groups of field and forage crop legumes:

ALFALFA GROUP		
Alfalfa	Buttonclover	Sourclover
Black medic	Fenugreek	Sweetclover
Bur-clover		
BEAN GROUP		
Garden bean	Pinto bean	Wax bean
Kidney bean	Scarlet runner bean	
CLOVER GROUP		
Alsike	Hop Clovers	Strawberry clover
Arrowleaf clover[1]	Ladino clovers	Sub clover
Ball clover	Persian clover	White clover
Berseem clover	Red clover	Other true clovers
Crimson clover		
COWPEA		
Aeschynomene	Guar	Partridge pea
Alyce	Hoary tickclover	Peanut
Beggarweed	Indigo	Pigeonpea
Bushclover	Kudzu	Savanna Stylo
Cowpea	Lespedeza	Stylosanthes humilis
Crotalia	Mung bean	Velvetbean
		Carpon Desmodium
Lupine Group		**Soybean Group**
Lupine	Seradella	Soybean
Vetch and Pea Group		
Austrian winter pea	Horsebean	Sweet pea
Field pea	Lentil	Tangier pea
Garden pea	Rough pea	Vetch
Big trefoil, birdsfoot trefoil and sesbania may require specific strains nodule bacteria strains. Special orders may be needed to locate effective bacteria.		

[1] Use inoculant that is specifically for arrowleaf clover.

References:
MCUcares.com Inoculation Procedure for 25 Pounds of Legume Seed
Wright, D.L., Newman, Y.C., Whitty, E.B. Inoculation of Agronomic and Forage Crop Legumes. Pub #SS-AGR-154

*Photo by: Yoana Newman: Detail of nodules containing the N-fixing Rhizobium bactera.