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Inoculation of Legumes

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You may get by without adding nitrogen when planting alfalfa, clover, beans, and other legumes, but it pays to add bacteria.

Certain kinds of bacteria (rhizobia) grow in the roots of legumes in structures called nodules. Working together, plant and bacterium can "fix" nitrogen from the air between the soil particles. The results are thriftier plants and increased yields without nitrogen fertilization. The living arrangements are beneficial to both partners, but you have to make the introductions.

Soybeans have no close relatives in the Great Plains, so no native or introduced bacteria of the correct kind have become established in our soils. A Wisconsin study, for example, has shown that only a quarter of the fields tested had good, effective legume bacteria for soybeans.

Only if planting follows the same legume by a year or two (and the former legume had been effectively nodulated), can you assume that sufficient effective bacteria are already in the soil.

If there is fertilizer in the soil, the plants will not nodulate. But if necessary, up to 80% of the

nitrogen requirement of soybeans can be obtained by nitrogen fixation in the nodules.

THE CORRECT BACTERIA

Not just any bacterium can team up with any legume. They are so choosy that in some cases only certain strains will work with the plant to fix atmospheric nitrogen. Legume seed must be manually inoculated with the proper strain. Wild rhizobia are not dependable.

ENOUGH BACTERIA

There must be adequate numbers of the right bacterium in the root zone when the seedlings are developing. Only a few of the many bacteria that try are successful in penetrating root hairs and causing the formation of nodules. Here again, if an effectively nodulated crop of the same species of legume has been grown on the field within the last year or two, sufficient bacteria of the correct type will probably be present.

INOCULATION METHODS

1. Powdered peat. This is the old method and works well. The bacteria are dried down on finely powdered peat. At inoculation the seeds are moistened and the dry peat mixture mixed in until the seeds are thoroughly coated. The inoculated seed will move freely through the planter.

2. Granular peat. This is for soybeans and other large seeded legumes. A granular peat vehicle contains the bacteria in a dry state. It is added from the granular applicator box of the seeder and placed with the seed in the furrow.

3. Pelleting. This is popular in other countries for forage legumes. The seed is pelleted with a binder containing lime and the correct bacteria.

4. Other methods. Preinoculation at the time of seed processing looked promising at one time, but it is usually done too far in advance of planting date for the bacteria to survive. Liquid inoculants and frozen preparations of the bacteria have also been marketed. Survival of the bacteria is often very poor.

The method that works for you is the one that applies (1) enough numbers of the (2) right bacterium which will (3) survive long enough on the seed and in the soil to nodulate the plants. Any other method is throwing money away.

Inoculum consists of billions of living bacteria and they must be alive

when placed in the soil. These conditions are met by most of the granular, pelleted, and peat base inoculants on the market now. Some bacteria will die during storage, but this is provided for. The inoculum must be used within the time specified on the package or you will have too many little deaths and not enough bacteria to successfully nodulate.

WHICH METHOD FOR ME?

One choice that you do not have is the bacterium itself. It must be the correct species (even strain sometimes) for the legume you are planting.

The form of inoculum is flexible — granular inoculum for large seeded legumes; pelleted seed for forage legumes; or dry inoculum to be applied to the seed at time of planting.

Cost varies among the forms — the least expensive is the powdered inoculum that is applied just prior to planting, but it will require more of your time. It is available for most crop legumes. Pelleted seed for small seeded legumes is next expensive; and the granular inoculum is highest in price but certainly convenient to apply. Cost also varies according to row spacing and seeding rate.

Use inoculum with this year's date on the bag. Keep your eyes open when you buy and do not accept inoculum that was stored near a window or other warm place. And always follow the manufacturer's directions for applying.

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