



LEGUME SEED INOCULATION

Inoculation is the process of attaching Rhizobium to legume seed prior to seeding. The most important part of the whole procedure is to understand what these organisms are and why they are needed. Rhizobium are bacteria. They form a symbiotic relationship with plants in the legume family, whereby both the bacteria and the plant benefit from the relationship. These bacteria penetrate the root hairs of the plant and multiply, forming a nodule. The nodules are small lumps on the root. They are white on the outside and pink/red on the inside, when they are actively fixing nitrogen. The size will vary, depending upon the crop and the growing conditions. Generally, there are larger nodules on peas than there are on alfalfa. The bacteria

survive on nutrients provided by the plant and in return, they take atmospheric nitrogen from the air spaces in the soil and "fix it" into a form the plant can use. As a result, leguminous plants do not need the amount of nitrogen fertilizer that a non-leguminous plant would need. This relationship between the bacteria and the plant is extremely valuable. A well-nodulated crop of alfalfa under good conditions can fix as much as 200 lbs. of actual nitrogen per acre. The amount of nitrogen fixed varies, depending on the soil type, the climate and the activity of the bacteria, but the range is anywhere from 50 lbs. of nitrogen through to 200 lbs/acre per year.

INOCULATION PROCEDURE

In order to obtain this benefit, make sure that your legume crop has been properly inoculated; different types of legumes require different strains of bacteria. Strains specific to alfalfa and sweet clover will not work on peas and vice versa. Bacteria are living organisms and must be kept alive to enable them to perform the task that you want them to. If you are inoculating your own seed, you should use a sticker. Be sure that the

sticker does not contain any bactericide or fungicide, and is not too acidic or too alkali. Add the sticker to the bare seed in a mixer, such as a cement mixer. This allows for even application for both the sticker and the inoculant itself. After the sticker has evenly coated the seed, add the correct amount of inoculant. If conditions are adverse, a double or triple rate may be used.

STICKERS FOR INOCULATION

<u>STICKING AGENT</u>	<u>NODULES PER PLANT</u>
NO INOCULANT	0
WATER	39
HONEY SOLUTION	94
COMMERCIAL	109

INOCULATION PRECAUTIONS

1. Storage of inoculated seed is risky. Keep cool and covered. May last up to three days.
2. Increase inoculant rate if conditions are unfavourable.
3. Recalibration may be required.
4. Seed treatments are often toxic. Clean out drills.
5. Phosphate fertilizer is too acid. Don't mix.

PRODUCT STORAGE

It is imperative that you keep the inoculated seed out of direct sunlight and that you keep it in a cool, dry place until you seed. Under warm conditions with bright sunshine, your inoculant may not last more than 8 hours. Given optimum conditions (a temperature of about 40 degrees F), the inoculant can last for two to three days, so it is imperative that you do get it into the ground as

soon as possible. If all the conditions are right and the product is applied to a small-seeded legume in the correct manner without any contaminants, you can expect approximately a thousand cells per seed immediately after you have done the inoculation.

ALTERNATIVES

There are alternatives to doing this yourself. One of them is to buy pre-inoculated seed; seed that has been inoculated by a third party. Unfortunately, the random sampling that's being done by the Federal Government has shown that pre-inoculation may be somewhat unreliable. The results from 1989 showed that only 41% of the samples tested for live cells passed the thousand cells per seed required for pre-inoculated product. Pre-inoculation may not always be a more effective alternative.

Some seed coating firms have produced high quality pre-inoculated seed that is coated to protect the Rhizobium. The numbers of live cells

per seed are about 10 to 25 times higher than those obtained by on-farm inoculation. The coated product also lasts much longer under poor conditions. After six months of normal seed storage, the numbers are still very satisfactory. This procedure has proven to be most satisfactory and has made a very significant change in pre-inoculated seed.

Reputable seed coaters now have a quality control program in place to prevent inferior grade material getting to the marketplace.

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