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Department of Agronomy

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SOYBEAN INOCULATION

J. L. Sims

Well-nodulated soybean plants are needed for most efficient soybean production. Recent research by University of Kentucky Agronomy Department personnel indicated that on Maury soil without N fertilizer, nodulating plant types of Clark 63 variety yielded 8 bushels per acre more than the non-nodulating Clark 63. With application of 125 lbs N per acre to the non-nodulating type only, both types yielded the same, showing the value of good nodulation.

Inoculation is probably not necessary in fields having produced nodulated soybeans during the last 3 to 5 years. These soils usually contain enough rhizobia (bacteria) for adequate nodulation. However, soybeans are being grown in many fields for the first time, particularly in central Kentucky. Soybean seed used on these fields should be inoculated and the inoculant should be of good quality.

A variety of inoculants are commercially available (see Table). Besides rhizobia, some products include essential trace elements such as molybdenum, or a fungicide. Product complexity often makes selection of the best product for a given field difficult. The most popular, and perhaps the most economical and reliable inoculants are those of the peat-base type. Manufacturers recommend that these inoculants be applied to the seed, either before planting or mixed with seed in the planter box. Although most growers inoculate the seed dry, use of a sticker to get better seed-inoculum mixing is more effective. Tests have shown that most of the brands listed under Type I in the Table contain adequate numbers of viable organisms except those containing molybdenum and fungicides. When these chemicals are added to rhizobia-peat mixtures and stored dry, numbers of live rhizobia decrease rapidly.

Products are also marketed containing the inoculum and chemicals packaged separately (Type II of the Table). Instructions call for mixing the contents of the two containers just prior to inoculating the seed. Supposedly, this allows for better survival of the rhizobia since they have not been stored in contact with the molybdenum and fungicide. Oil-base products (Type III) contain a suspension of rhizobia and/or molybdenum and fungicides. The suspension is purported to protect the rhizobia from the chemicals. Laboratory tests have shown adequate numbers of viable organisms in these products. When aliquots of these liquids are poured onto the seed and mixed, Adherence of rhizobia to the seed is excellent. Granular (Type IV; brands Soil Implant and Dormal Granular) and frozen concentrates (Type V; brands Frozen Aid and Hi-Rhize) (Types IV and V) are

relatively new products on the market. The granulars are for application directly to soil in the furrow with the seed; the frozen concentrates, when thawed, may be applied either to seed or the soil. These products normally are applied at about 5 lbs per acre, but the rate will vary with soybean row width. Larger than normal rates of rhizobia can be applied with granulars and concentrates, but are more expensive.

Most products listed in the Table will provide adequate nodulation for efficient soybean production if used according to the producers recommendation. However, growers should be aware that a given field may, or may not, need the additional molybdenum and fungicide. In general, if soil pH is below 6.2, molybdenum should be used, and if soybeans have not been grown in a field for the previous 2-3 years, soybean inoculum should be used.

Table - Characteristics of some commercial soybean inoculants

Type	Brands	Application Method	Contains Molybdenum	Contains Fungicide
I. Peat, humus, or clay-base	Nitragin	To seed in planter box	No	No
	Urbana	"	No	No
	Hansen	"	No	No
	Unico	"	No	No
	Noculator	"	No	No
	Legume Aid	"	No	No
	Noctin	"	No	No
	Molynoctin	"	Yes	No
	Triplenocin	"	Yes	Yes
	Dormal	"	No	No
Dormal Moly	"	Yes	No	
Trace Nitra Fix	"	No	No	
II. Inoculum and chemicals packaged separately	Dormal Moly	"	Yes	No
	Nitragin Nitra Mo	"	Yes	No
	Nitragin Protreat	"	No	Yes
	Protreat -2	"	Yes	No
	Protreat -3	"	Yes	Yes
	Trace Nitra Fix	"	Yes	No
III. Oil-Base	Noctin L	"	No	Yes
	Molynoctin L	"	Yes	No
	Triplenocin L	"	Yes	Yes

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