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COMPARISON OF ALFALFA INOCULATION PRODUCTS

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Background. Legumes such as alfalfa have the ability to remove nitrogen (N) from the atmosphere if their roots are infected with the proper strain of rhizobia bacteria. To ensure that the correct rhizobia strain is present, inoculum containing the bacteria is applied to the seed before planting. Most alfalfa seed is bought preinoculated. This saves time and work for the producer. However, use of preinoculated alfalfa seed for autumn planting on Coastal Plain soils in northeast Texas has resulted in poor stand establishment. Inoculation techniques and products were compared for alfalfa establishment and stand persistence at the Texas A&M University Agricultural Research and Extension Center at Overton.

The study was planted on 12 Oct. 1995 in a prepared seedbed on a Redsprings fine sandy loam. Alfagraze alfalfa seed were drilled in 7-in. rows at 20 lb/acre in 8- x 15-ft plots. Inoculation treatments were: (1) uninoculated seed, (2) preinoculated seed, (3) preinoculated seed + 18 lb N/acre at planting, (4) preinoculated seed + 36 lb N/acre at planting, (5) preinoculated seed reinoculated immediately before planting with HiStick (MicroBio Company), (6) seed inoculated by Seed Biotics, and (7) seed inoculated by CelPril. Experimental design was a randomized complete block with four replications. Ten seedlings were removed at random from three to four locations in each plot on 14 Nov. 1995 and 13 Mar. 1996 to compare seedling weight and nodulation. Plots were harvested on 21 May 1996 to determine yield. The study was mowed once during the summer, and visual estimate of stand was made 22 Oct. 1996. From October 1995 to May 1996, only 40% of normal rainfall occurred with less than 1 in. per month in October, November, January, and February.

Research Findings. At the first sampling date, 33 days after planting, the only difference among inoculation treatments was nodules/seedling (data not shown). Seedlings from the uninoculated and preinoculated seed treatments had from 1 to 8 nodules while the seed inoculated before planting resulted in 30 to 43 nodules/seedling. At five months after planting (March) there was still no difference in shoot or root weight among treatments (Table 1). However, Nconcentration of shoots and roots and nodules/seedling was higher for the HiStick, CelPril and Seed Biotics inoculation treatments. Limited soil moisture lowered dry matter yields taken 22 May. The uninoculated and preinoculated without N treatments produced the lowest yields (Table 2). However, alfalfa from preinoculated seed with low amounts of N fertilizer was as productive as alfalfa produced from seed commercially inoculated before planting. After the May harvest, unfavorable moisture conditions continued during the summer so that no additional harvests were taken. Stand ratings were taken in October. The three commercial inoculants

applied before planting had the best stands ranging from 60 to 95%, while the uninoculated and preinoculated seed treatments had stands of 25% or less.

Application. Similar numbers of nodules per alfalfa seedling among the uninoculated and preinoculated seed indicate poor rhizobia survival on the preinoculated seed. This was a severe test for rhizobia survival because of very poor soil moisture conditions during the study period. It is recommended that alfalfa seed be inoculated immediately before planting instead of buying preinoculated seed to improve alfalfa establishment and stand persistence.

Table 1. Influence of inoculation treatment on alfalfa seedling weight, N content and nodulation 5 months after planting.

Treatment	Weight		N Concentration		Nodule Number
	Shoot	Root	Shoot	Root	
	-----g-----		-----%-----		
Uninoculated	1.0	1.1	3.0 b ^a	1.6 b	132.5 b
Preinoculated	1.1	1.2	2.9 b	1.5 bc	117.0 b
Preinoculated + 18 lb N/acre	1.3	1.4	2.9 b	1.4 c	118.0 b
Preinoculated + 36 lb N/acre	1.4	1.8	2.9 b	1.4 c	50.5 b
Preinoculated + HiStick	1.4	1.3	3.5 a	2.2 a	295.8 a
CelPril ^b	2.0	1.8	3.4 a	2.1 a	391.0 a
Seed Biotics ^b	1.7	1.5	3.5 a	2.1 a	349.5 a

^aValues within a column followed by the same letter are not significantly different at .05 level, Waller-Duncan Range Test.

^bInoculated by company and shipped to Overton.

Table 2. Influence of inoculation treatment on first harvest alfalfa yield (22 May) and percent stand 1 year after planting.

Treatment	Alfalfa Yield	Stand
	-----lb/acre-----	%
Uninoculated	924.4c ^a	15 d
Preinoculated	786.7c	13 d
Preinoculated + 18 lb/acre	1669.4 ab	25 d
Preinoculated + 36 lb/acre	1172.6 bc	23 d
Preinoculated + HiStick	1315.3 bc	60 c
CelPril ^b	1463.0 b	78 b
Seed Biotics ^b	2006.6 a	95 a

^aValues within a column followed by the same letter are not significantly different at .05 level, Waller-Duncan Multiple Range Test.

^bInoculated by company and shipped to Overton.