TITLE:

MicroBio *Bradyrhizobium* Inoculant Field Trial on Runner Peanut, Gaines County, Texas, 2001

AUTHOR:

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OBJECTIVE:

Evaluate experimental *Bradyrhizobium* inoculants for peanut compared to conventional commercial inoculants for runner peanut in West Texas.

The commercial company MicroBio is developing and testing experimental *Bradyrhizobium* inoculants for peanut which incorporate fungicidal materials into the inoculant for placement in the soil root zone. This technology, if proven then developed commercially, could be beneficial to West Texas peanut growers, particularly where soil-borne and pod-rotting diseases are prevalent. This West Texas location essentially represents the only high pH soil where testing is being evaluated.

METHODS AND PROCEDURES:

Soil Type:	Brownfield loamy sand
Planting:	May 11, 2001, on 36” rows
Previous Crop:	Cotton
Seeding Rate:	Flavor Runner 458, ~4.5 seeds per row foot with vacuum planter (~85 lbs./A)
Plot Set-up:	RCBD, four reps for each of 9 treatments
Harvest Area:	4-36” rows X 36’8”
Inoculant:	See Table below
Fertilizer:	None
Herbicide:	Sonolan
Insecticide:	None
Rainfall:	~3” during the growing season
Irrigation level:	~18” applied in both spray and LEPA during the season
Date Dug:	October 24, 2001
Date Harvested:	November 2, 2001

Liquid inoculation application rate was adjusted to reflect recommended product application rate for each product diluted then applied at ~12 gallons of water per acre. Both experimental MicroBio liquid inoculants were applied at a rate of 15 fluid oz./A as was LiphaTech’s Lift (15 fluid oz./A). Urbana Lab’s FrozenPrep was applied at the rate of 1 container (60 milliliters) per 30 acres. Inoculant box settings of 25 for MicroBio experimental granular inoculant were used to achieve an application rate of 6 oz./1000 ft. or ~5.5 lbs./A. Seedbox inoculants MicroFix, HiStick N/T, and HiStick were applied at double rate due "adverse conditions" of potential desiccation of seed before planting as well as high soil pH. Seedbox inoculant rates were 100 g powder to 25 lbs. of seed wetted with 1.2 fluid ounces of water, or 36 mls, then mixed well by pouring seed back and forth between five gallon buckets about twelve times. Water used to apply liquid inoculants or wet seed box inoculants was from the irrigation wells at WPG (i.e., non-chlorinated). All treatments were applied immediately after preparation.

Texas A&M soil tests indicated soil nitrate, 13 ppm (low); phosphorus, 24 ppm (moderate); potassium, 297 ppm (high); calcium, 577 ppm (high); salinity, 440 ppm (none); and soil pH of 7.7.

Nodule counts were conducted on August 14, 2001, by removing 8 plants per plot and counting nodules for each replicate and each treatment. Peanuts were harvested with a Roanoke two-row thresher, and grade was determined from a composite sample of each treatment.

RESULTS AND DISCUSSION:

Peanuts receiving no inoculant and often the seedbox inoculant treatments as well were noticeably lighter in color. This reflects both low soil nitrogen and minimal nodulation. The degree of nodulation is always highly variable. Average nodule number was highest for the experimental MicroBio inoculants. The highest yielding individual plot was among HiStick Experimental A liquid where 56 nodules per plant were counted, and the yield was 3560 lbs./A. (Apart from that replicate the treatment averaged only 14 nodules per plant and yielded 2987 lbs./A.) Overall, nodulation was poor among seedbox treatments relative to all other inoculants. The controls suggested a small carryover of inoculum from a previous crop (most recently in peanuts in 1998?).

Significant yields were measured among inoculant treatments, generally higher with liquids (see Table). It is interesting to note on a plot by plot basis that the correlation coefficient of average plant nodules vs. yield was r = 0.67. A slight increase in grade (non-replicated) was observed with higher yield, again a high positive correlation (r = 0.84, based on comparison of treatment averages). Treatments with better grades were the same ones that apparently may have had more available nitrogen due to higher nodulation.

In general, this work demonstrates that seedbox inoculants, even though they may deliver the desired numbers of inoculum to the seed, are inferior products for satisfactory inoculation of peanut in West Texas. Observations in the Texas South Plains on other peanut fields inoculated with seedbox inoculant or even other crops such as soybean or guar inoculated with *Rhizobium* inoculants rarely provide satisfactory results.

Table 1. *Bradyrhizobium* inoculation treatments, average nodules per plant, yield, and grade for runner peanut in the Texas South Plains.

Treatment Number	Inoculant Treatment	14-Aug Avg. nodules per plant	Yield (lbs./A)^	Grade (%SMK SS)
1	MicroBio HiStick Experimental A liquid	24.4	3130 a	76.9
2	MicroBio HiStick Experimental B liquid	29.5	3094 a	76.9
3	Urbana FrozenPrep, 1X	13.9	2440 bc	75.6
4	LiphaTech Lift, 1X	16.7	2995 a	77.0
5	MicroBio Experimental Granules	21.2	2736 ab	76.3
6	MicroFix seedbox	8.0	2446 bc	76.4
7	HiStick N/T seedbox	6.9	2304 bc	76.3
8	HiStick seedbox	8.5	2257 c	75.0
9	Control (no inoculation)	4.3	2282 c	75.6
Treatment Average		14.8	2632	76.2
P Value			0.0003	N/A
Least Significant Difference (0.05), lbs./A			414	N/A
Coefficient of Variation (CV), %			16.1	N/A

^Means in the same column followed by the same letter are not significantly different at the 0.05 significance level.

Overall, I believe the lack of significant additional rainfall (~7" average in June-August), lack of full irrigation water due to two of three wells sucking air in August, minimal soil N, and low nodulation limited yields by about 1000-2000 lbs./A.

This trial represents only one year of data at one location and should not be used to make long-term conclusions about the effect of different inoculants on peanut nodulation and growth. Reliability of trials of this nature increases when tested across multiple locations and different cropping years.

For further information about peanut inoculation, product application and common mistakes, and nodule evaluation, call Calvin Trostle, or visit the Web at http://lubbock.tamu.edu/peanut/