West Texas Peanut Nutrition—*Rhizobium* and Nitrogen

Calvin Trostle, Extension Agronomy, Texas A&M—Lubbock, (806) 746-6101, c-trostle@tamu.edu

INTRODUCTION:

This report continues the update of the *Rhizobium* X Nitrogen project in West Texas soils. In 2001, we reported significant response to N, to inoculants, and timing of N in Gaines Co. The year 2002 was a "nodulation year" as research and grower reports indicated high numbers of *Rhizobium* nodules per plant. With that in mind, we again saw significant response to both inoculation and N applications at WPGRF, but we saw no significant response to N (not even a trend) at any of five on-farm N trials.

The objective is to conduct a combination of Rhizobium *inoculation treatments and N fertilizer treatments (amount and timing) on to ascertain the comparative importance of good nodulation and N fertilizer on yield.*

METHODS AND PROCEDURES—Field Research:

The following trial was conducted at the Western Peanut Growers Assn. research farm in north central Gaines Co., Texas.

	Gaines County **Normal Soil**
Soil Type:	Brownfield loamy sand
Peanut variety:	Flavor Runner 458
Planting:	April 24, 2002, on 36" rows
Previous Crop:	Cotton
Seeding Rate:	~4.5 seeds per row foot
Plot Set-up:	RCBD, four reps each treatment
Harvest Area:	4 rows X 50'
Inoculant:	Numerous—see tables (includes liquid, granular frozen at 0X, 1X, & 2X rates)
N Fertilizer:	Numerous—see tables (include 0, 20, 100 lbs. N/A with different timing)
Herbicide:	Sonolan
Insecticide:	None
Rainfall:	~5.2" during the growing season
Irrigation level:	~19"
Soil test NO3:	0-8", 15 ppm (low); 8-36", 5 ppm (low)
Soil pH:	7.5
Date Dug:	November 5, 2002
Date Harvested:	November 13, 2002

All fertilizer applications were conducted with hand broadcast urea on to dry soil, and watering occurred within 3 to 20 hours. Liquid tanks on the tractor were well cleaned between using different inoculants. *Rhizobium* nodules counts were June 6 and August 2. Plots were harvested with a small plot combine.

RESULTS AND DISCUSSION:

Excellent yields were obtained in 2002 with the main trial average yield at WPG Farm over 4900 lbs./A (with a top of well over 6,000 lbs./A). Please refer to the attached table for a complete listing of inoculant treatments, N applications, etc. High-yielding inoculant treatments demonstrated high nodulation at the June 6th sampling date. Inoculation of often increased yields over 1 ton per acre when using liquid inoculants other than Urbana.

Testing at WPGRF in 2001-2002 as well as one on-farm location indicates that Urbana liquid inoculants are not nodulating as should be expected. In 2001 I noticed that Urbana FrozenPrep experienced poor nodulation as well reduced yields in my two trials. In 2002, I repeated the study and also tested the conventional Urbana LiquiPrep inoculant, which has the same strains as the frozen material. Again, in both cases the inoculants did not perform adequately both in terms of nodulation and yield.

Until I and others can find out what the problem is with the Urbana liquids (now owned by Microbio/BeckerUnderwood), I recommend that growers consider using other liquid inoculants in 2003 while further testing is conducted.

Granular inoculants also increased yield though not nearly as much as Lift or INTX Microbials. Granular inoculants are still a good choice if cannot be applied, and in fact in some circumstances (see below) can out-perform liquid inoculants under adverse conditions.

ADDITIONAL ACTIVITIES AT WPGRF:

1) Effect of Seeding Depth and Irrigation Regime on Rhizobium Nodulation (Trostle/Radtke)

Using Urbana RhizoStick granular inoculant and Liphatech Lift liquid inoculant as separate treatments, peanuts were planted at 0.5, 1.0, 2.0, or 3.0" deep. In addition, plastic sheeting was used to cover the ground during the first or the first and second irrigations after planting. Nodule counts were determined. Peanut stand was often poor with the ½" seeeding depth. Nodulation in general was somewhat better at the 1.0 and 2.0" depths. Further analysis is still needed on this data.

2) Mid-May Peanut Planting with Liquid and Granular Inoculants (Trostle/Radtke)

As part of our collaboration with MicroBio, now BeckerUnderwood, we again planted experimental inoculants with controls in mid-May at WPGRF. What was particularly striking was that nodulation among granular inoculants, the color of the plants, and ultimately the yields was much better with granular inoculants. This is in contrast to the results reported above. Granular inoculant from Urbana and INTX Microbials yielded near 4,000 lbs./A. Controls (no inoculant) were very yellow, with yields near 2,300 lbs./A. Liquid inoculants as a class yielded approximately 2,700 lbs./A. We at first thought that we had planter problems, but we know that the planter was applying the liquid inoculant properly. Barring any toxic contaminant in the inoculant tanks (we used an approved chemical cleanser before planting), we believe the failure of the liquid inoculants may be attributed to warmer soil temperatures in mid-May and the infrequent irrigation to maintain soil moisture in the top 1". The surrounding area the peanuts were planted in May 15th had emerged about 7 days earlier, thus did not require as frequent irrigation. We believe the soil dried out, and nodulation numbers reflect the buffering ability of the granular inoculant to stave off desiccation of the inoculum.

This work was funded by the National Peanut Board. For more information on peanuts in the Texas South Plains, visit the website of the Texas A&M Center , Lubbock, at http://lubbock.tamu.edu

2002 Rhizobium X Nitrogen Trial @ Western Peanut Growers Assn. Research Farm, Gaines Co., TX

Calvin Trotle, Extension Agronomy, Texas A&M—Lubbock, 806-746-6101, c-trostle@tamu.edu

	Planted April 24, 2002			Mid-	Nodule	Nodule	Average	Visual			
				season	Count	Count	Inches From	Rating	Average		
Treat-		*Brady-*	At-Plant	(June)	(Avg. of	(Avg. of	Lapping	1 is yellow	Chloro-	Average	Average
ment	*Bradyhizobium*	*rhizobium*	N	N^	8 plants)	8 plants)	(36" rows)	5 is green	phyll	Yield	Grade
#	Inoculant	Rate	(lbs./A)	(lbs./A)	6/6/02	8/2/02	9/14/02	#####	Reading#	(Lbs.A)	%SMK+SS
1	None	None	0	0	2.8	XX	13.0	1.0	33.2	2446	75.4
2	None	None	20	0	0.3	12.0	11.3	1.1	35.8	3124	74.0
3	None	None	20	80	1.9	10.4	6.5	2.4	39.4	4739	76.4
4	None	None	20	4x20	1.7	11.7	6.3	2.6	40.2	5247	78.2
5	None	None	100	0	0.5	XX	6.0	2.3	38.4	4470	76.7
6	Urbana RhizoFlo granular	1X	20	0	15.8	28.6	8.3	3.4	41.7	4220	75.1
7	Urbana RhizoFlo granular	1X	20	80	12.9	24.8	5.3	3.6	44.1	5442	76.2
8	Urbana RhizoFlo granular	2X	20	0	24.0	27.9	8.3	3.8	44.2	4653	75.3
9	Urbana RhizoFlo granular	2X	20	80	23.8	23.9	5.5	4.0	43.5	5983	75.8
10	Nitragin Lift liquid	1X	0	0	20.2	45.0	7.0	4.0	49.1	5396	76.9
11	Nitragin Lift liquid	1X	20	0	24.1	48.1	5.5	3.6	46.3	5584	77.3
12	Nitragin Lift liquid	1X	20	80	18.0	XX	4.0	4.3	46.2	6778	75.8
13	Nitragin Lift liquid	1X	20	4x20	15.8	37.5	3.3	3.9	47.7	6633	78.1
14	Nitragin Lift liquid	1X	100	0	18.6	29.1	7.0	4.2	47.6	5460	77.6
15	Nitragin Lift liquid	2X	20	0	19.4	38.0	7.4	3.4	44.8	5236	77.1
16	Nitragin Lift liquid	2X	20	80	21.6	XX	5.8	4.0	47.8	5976	75.8
17	Nitragin Lift liquid	2X	20	4x20	17.7	35.8	3.0	3.6	47.0	6046	76.8
18	Nitragin Lift liquid	2X	100	0	15.0	26.6	6.3	3.8	46.2	5524	76.8
19	Urbana FrozenPrep	1X	20	0	8.2	17.7	10.0	2.5	40.3	3531	75.0
20	Urbana FrozenPrep	1X	20	80	9.9	12.4	6.8	2.9	43.6	4844	76.7
21	Urbana FrozenPrep	2X	20	0	6.6	6.3	8.8	1.9	36.4	3810	74.1
22	Urbana FrozenPrep	2X	20	80	6.0	6.0	6.8	2.9	42.3	5000	75.4
23	Urbana Liqui-Prep	1X	20	0	9.4	26.9	9.8	2.9	40.2	4242	74.5
24	Urbana Liqui-Prep	2X	20	0	4.4	24.2	10.8	2.0	37.0	3647	73.5
25	INTX Microbials N-TAKE liquid	1X	20	0	22.9	34.1	6.8	4.1	48.0	5874	77.1
26	INTX Microbials N-Furrow granular	1X	20	0	3.9	16.7	10.2	2.5	39.9	3759	75.0
27	Nitragin Lift/RhizoFlo gran.	1X/1X	20	0	25.2	41.0	6.5	3.8	44.0	5640	75.8
^Applied June 11. Hand broadcast urea N. 4X20 means that the first 20lb. N/a application was applied, and sub-20 lb. N/A applications on ~14 day intervals.									Average	4937	76.0
									P-Value	<0.0001	0.016
#Higher readings mean greener plants, and the more chlorophyll in the plants, indicating more positive N status.									PLSD (0.05)	911	2.5
									CV (%)	23.1	2.6