

TITLE:

Peanut Irrigation/Precision Agriculture Study at AG-CARES. Lamesa, Texas 2002.

AUTHORS:

Mike Schubert, Dana Porter, and Jacob Reed

METHODS AND MATERIALS:

Planting Date : May 2, 2002  
Variety : FlavorRunner 458, Tamrun96, Florunner @ 100 lb/ac  
Insecticide : None.  
Rhizobium : Nitragin "Implant +" granular inoculant applied in seed drill (5 lb/ac)  
Irrigation : 75% ET Low Energy Precision Application (LEPA)  
75% ET LEPA early with Low Elevation Spray Application (LESA) beginning  
July 7 with return to LEPA in late-September.  
Soil : Amarillo fine sandy loam  
Fertilizer : 10 lb/ac N, 34 P<sub>2</sub>O<sub>4</sub> lb/ac preplant.  
Harvest Date : Dug October 10. Threshed Oct 16, 17.

During the period from 1995 through 1999, the base peanut irrigation strategy that has been successful at this location involved: (1) pre-irrigation if needed to begin the season with a full profile; (2) application of approximately 0.50 inches of water immediately after planting; (3) supplying 0.50 to 0.75 inches of moisture per week during early vegetative growth until about July 1; (4) provision of sufficient water to replace 0.75 of calculated cotton evapotranspiration (ET) at 2.5 to 3.5-day intervals (usually 1.50 to 1.75 inches of moisture per week) throughout the rapid fruit development period from about July 1 through at least mid-September; and (5) reduced water supply of approximately 0.50 to 0.75 inches per week until harvest with perhaps 0.25 inches of water the day before digging if needed. Yields in 1996, 1997, 1998, and 1999 rivaled those of the better grower yields in the area. Yields in 1995 were lower than desired, probably because of under-watering early in the season. Yields in 2000 were lower than desired, but were attributed to poor weather at harvest time, which increased digging and combining losses. Throughout the 1995 to 2000 period, LEPA irrigation during the fruiting phase of development, running from approximately July 1 through mid-September equaled or exceeded the yields achieved with LESA irrigation.

As the 2001 season progressed, research personnel became concerned by late-July that pod development was not progressing normally. By early August concern intensified; and on August 14, we dropped drag hoses and socks off of all drops except for one 24-row area and applied two passes of 0.4" of irrigation water totaling 0.8" in an effort to wet the pod-development zone. Drag hoses and socks were then reinstalled and LEPA irrigation resumed. Those peanuts that had spray irrigation for only that short period yielded more than LEPA. This was generally attributed to the hot, dry conditions experienced that year. Although 2001 was hot and dry, it was not as hot and dry as 1998 when LEPA yields greatly exceeded LESA yields. When we looked at other factors that might be different throughout the years, we realized that the most obvious difference was varieties grown. In 1995, 1996, and 1997, we grew Florunner; in 1998 and 1999, we grew Tamrun88; and in 2000 and 2001, we grew FlavorRunner 458. We had no information about whether FlavorRunner 458 responds differently to irrigation application method, but other researchers have suggested that there is a difference in heat stress response between peanut varieties. We, therefore, decided to include varieties used in the past along with FlavorRunner 458 in our 2002 irrigation experiments at AG-CARES and at the Western Peanut Growers Research Farm (WPGRF). We were unable to obtain Tamrun88 seed, so we used Tamrun96 and Florunner along with FlavorRunner 458.

## RESULTS AND DISCUSSION:

Both the 2001 and 2002 crop years were dry. The average rainfall patterns of 1956-2000 is shown in Table 1. In addition, the table shows comparisons for approximate peanut crop growth phases: (1) Pre-watering April; (2) Vegetative phase May - June; and (3) Fruiting phase July - Mid-September, although the historic rainfall amounts includes July - September and is, therefore, perhaps an over-estimate of the duration of active pod development.

Table 1. Comparison of 2002 Rainfall with 2001 and 1956-2000 Averages by Month and Approximate Crop Development Period.

Month	2002	2001	1956-2000*	Crop Period	2002	2001	1956-2000*
April	1.79"	0.09"	1.25"	Pre-Water	1.79"	0.09"	1.25"
May	0.12"	1.60"	2.36"				
June	1.02"	1.43"	2.39"	Vegetative	1.62"	3.03"	4.75"
July	1.70"	0.00"	2.13"				
August	0.00"	0.67"	1.68"				
September	0.80"	1.37"	2.93"	Fruiting	2.50"	2.04"	6.74"

\*1956-2000 data includes all of September, while 2002 and 2001 is through mid-September.

A comparison of 2001 Peanut Yield Mapping System (PYMS) data from the 24-row area that remained LEPA was made with an adjacent 24-row area that received the August 14 LESA irrigation. The peanuts that received the LESA applications significantly out-yielded (3,775 lb/ac) those that remained LEPA (3,469 lb/ac).

In 2002, yields and grades were determined from four small plots (4 rows x 20 feet) selected as typical from each variety-irrigation method combination. Comparisons between varieties cannot be legitimately made from a statistical standpoint, because each variety was in a distinct portion of the field. Any comparisons would be especially worrisome when there are only four samples per treatment. Table 2 shows yields and grades from the varieties, irrigation methods, and irrigation methods for each variety.

Table 2. Peanut Yields and Grades from Small Plot Samples at AG-CARES 2002.

	<u>YIELD</u>	<u>GRADE</u>			
Florunner	2336	69.8			
FlavorRunner 458	2303	65.0			
Tamrun96	2369	67.6			
	<u>YIELD</u>	<u>GRADE</u>			
LEPA	2443 a <sup>1</sup>	67.9 a <sup>1</sup>			
LEPA-LESA-LEPA	2229 b	67.1 a			
	<u>LEPA</u>	<u>LEPA-LESA-LEPA</u>	<u>LEPA</u>	<u>LEPA-LESA-LEPA</u>	
	<u>YIELD</u>		<u>GRADE</u>		
Florunner	2439 a <sup>2</sup>	2232 a	---	70.8 a <sup>2</sup>	68.8 a
FlavorRunner 458	2363 a <sup>2</sup>	2243 a	---	66.2 a <sup>2</sup>	63.9 a
Tamrun96	2526 a <sup>2</sup>	2211 a	---	66.8 a <sup>2</sup>	68.5 a

<sup>1</sup> Values in each column followed by the same letter are not statistically different.

<sup>2</sup> Values in each row followed by the same letter are not statistically different.

The PYMS allows us to take a large number of measurements that are GPS-referenced so that we can identify each yield figure with other features at that specific site. PYMS was developed by engineers and scientists at the University of Georgia at Tifton, GA and is mounted on a 4-row KMC combine. Figure 1 shows the yield map for the 2002 peanut crop. We used PYMS yield data in two ways: (1) 150 random sites in each treatment (variety x irrigation method combination); and (2) All data sites in each treatment. Table 3 shows results from both data sets. When PYMS yield data was used LEPA significantly out-yielded the LEPA-LESA-LEPA system when the variety was Florunner. LEPA significantly out-yielded the LEPA-LESA-LEPA system in only the 150-random site comparison when the variety was FlavorRunner 458. There were no differences in yields between LEPA and LEPA-LESA-LEPA for Tamrun96 in any of the yield data sets.

We included the same three varieties at WPGRF, but with more irrigation treatments: Wobblers; LEPA 100 ET; LEPA 75 ET; LEPA 50 ET; LEPA-LESA-LEPA; and LESA. Table 4 lists relative yields for each irrigation treatment for each variety.

The three peanut varieties did, indeed, react differently to irrigation method at both AG-CARES and WPGRF.

Figure 1. Peanut Yield Map. AG-CARES, 2002

# AGCARES Peanut Plots 2002

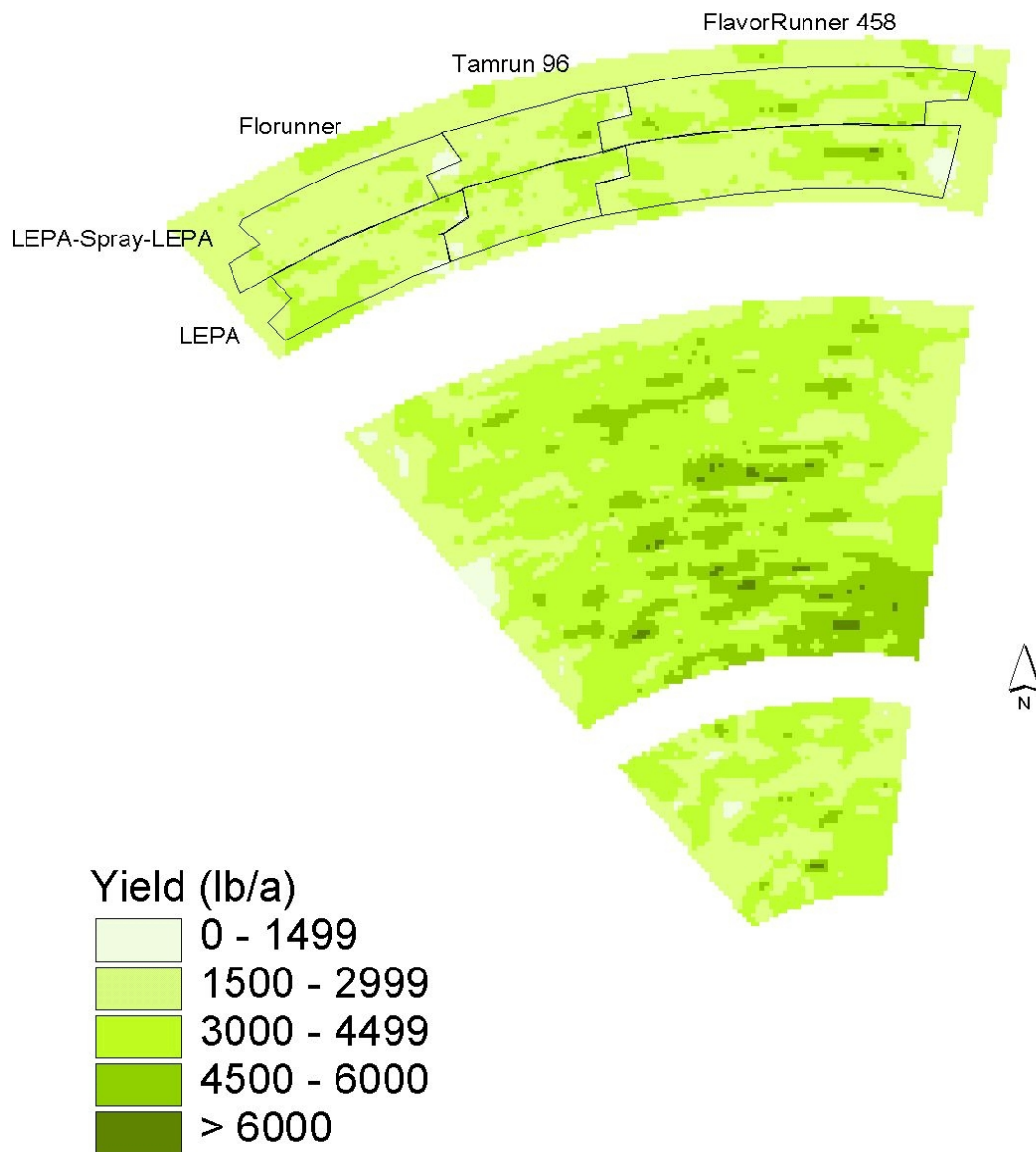


Table 3. Peanut Yields from Peanut Yield Mapping System (PYMS) at AG-CARES 2002.

	<u>150 Random</u>		<u>All</u>	
	<u>PYMS Sites</u>		<u>PYMS Sites</u>	
Florunner	2693		2746	
FlavorRunner 458	2996		2972	
Tamrun96	2749		2747	
	<u>150 Random</u>		<u>All</u>	
	<u>PYMS Sites</u>		<u>PYMS Sites</u>	
LEPA	2940 a <sup>1</sup>		2923 a <sup>1</sup>	
LEPA-LESA-LEPA	2685 b		2782 b	
	<u>150 Random</u>		<u>All</u>	
	<u>PYMS Sites</u>		<u>PYMS Sites</u>	
	LEPA	LEPA-LESA-LEPA	LEPA	LEPA-LESA-LEPA
Florunner	2892 a <sup>2</sup>	2494 b	---	2996 a <sup>2</sup> 2521 b
FlavorRunner 458	3124 a <sup>2</sup>	2869 b	---	2944 a <sup>2</sup> 3000 a
T-96	2805 a <sup>2</sup>	2693 a	---	2793 a <sup>2</sup> 2702 a

<sup>1</sup> Values in each column followed by the same letter are not statistically different.

<sup>2</sup> Values in each row followed by the same letter are not statistically different.

Table 4. Peanut Yields from 130 Random Points from each Variety x Irrigation Combination. Peanut Yield Mapping System (PYMS) at WPGRF 2002.

<b>Florunner</b>	<b>FlavorRunner 458</b>		<b>Tamrun96</b>	
LEPA100	4602	LEPA-LESA-LEPA	4305	LEPA-LESA-LEPA4530
LEPA75	4520	LEPA75	4277	LEPA100
LEPA-LESA-LEPA	4362	IWOB	4255	LEPA75
LESA	4256	LEPA100	4252	IWOB
IWOB	4094	LEPA50	4059	LESA
LEPA50	3930	LESA	3997	LEPA50
				3755

NOTE: We want to acknowledge the support of Lamesa Cotton Growers, Western Peanut Growers, Texas Peanut Producers Board, The Peanut Foundation, The National Peanut Board, and the High Plains Precision Agriculture Initiative in this and other peanut research at AG-CARES.