Title: Identifying the "Metabolic Fitness" of Peanut Varieties for Texas Production Systems

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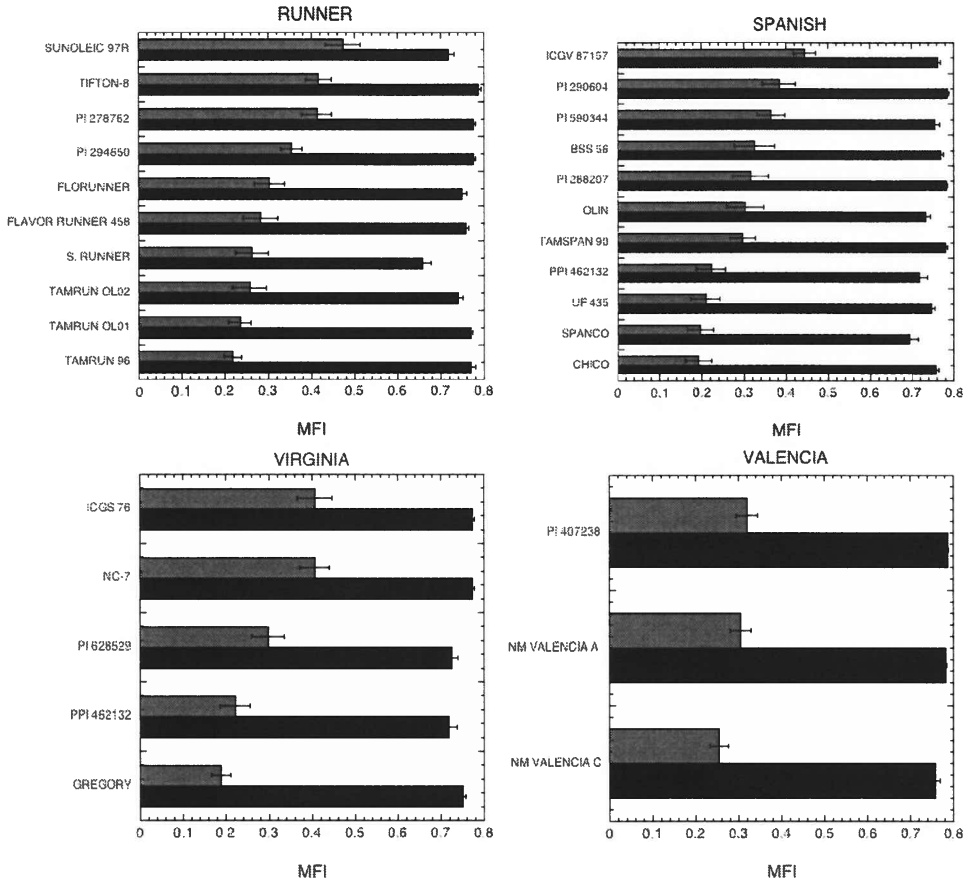
Progress Report:

In the first year of this study we evaluated the impact of high temperature stress on a subset of Runner, Spanish, Virginia and Valencia varieties. Plants were grown under 82 F night and 108 F day temperatures in a greenhouse (Figure 1). The plants were watered with an automated drip system and nutrients provided to the plants daily.

Samples were harvested at solar noon throughout the month of July and the Metabolic Fitness Index determined using an OSFL-1 Pulse Fluorometer.

Two-fold differences in MFI were observed among the Runner, Spanish and Virginia varieties; while variability of only 30 to 50% of maximum levels was seen in the Valencia varieties analyzed.



During the month of July, the morphology of the canopy changed in some of the lines studied. Leaf angle went from diaheliotropic (perpendicular to incoming radiation) to paraheliotropic (parallel to incoming radiation), thereby allowing the plant to avoid excess light interception. An example is shown in the next figure. The line on the left is paraheliotropic and the line on the right is diaheliotropic.

A visual rating of all lines is shown in the following table.

Runner Lines:	**Diaheliotropism**	**Paraheliotropism**
Sunoleic 97R	X	
Tifton-8		X
PI 278762		X
Florunner		X
Flavor Runner 458	X	
S. Runner	X	
Tamrun OL02	X	
Tamrun OL01	X	
Tamrun 96		X
Spanish Lines:		
ICGV 87157	X	
PI 290604	X	
PI 590344		X
BSS56		X

Spanish Lines: (continued)		
PI 288297	X	
Olin	X	
Tamspan 90		X
PI 462132	X	
UF 435		X
Spanco		X
Chico	X	
Virginia Lines:		
ICGS 76		X
NC-7		X
PI 628529	X	
PI 462132	X	
GREGORY	X	
Valencia Lines:		
PI 407238		X
NM Valencia A		X
NM Valencia C		X

These findings raise several questions about peanut responses to high temperatures. Because of the general trend for higher Metabolic Fitness Indicies in those lines exhibiting paraheliotropism we need to determine what impact this leaf movement has on yield. Does this light avoidance response result in reduced yield, or does it ensure yield stability? Do those lines showing high Metabolic Fitness Indicies that are diaheleotropic produce greater yields than those paraheleotropic lines with similar MFIs? Because of the ease of scoring peanuts for this leaf movement characteristic it may serve as a useful selection tool in identifying lines with improved performance under stressful environments.