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## PROGRESS REPORT

### SUBJECT AREAS

Improved flavor potential in West Texas peanuts resulting in improved market economics.

Improved crop management and handling improvements based on peanut physiological responses to West Texas environments during production and field curing.

### TITLE

**West Texas Crop Management and Handling Practices to Improve Market Quality and Competitive Position of Peanuts in Texas**

### PERSONNEL AND AGENCY

Dr. A. M. (Mike) Schubert  
Texas Agricultural Experiment Station  
TAMU Ag. Res. & Ext. Center  
Lubbock, TX

Timothy H. Sanders  
USDA, ARS, Market Quality and Handling Research Unit  
Raleigh, North Carolina

Diane L. Rowland  
USDA, ARS National Peanut Research Laboratory  
Dawson, GA

Christopher L. Butts  
USDA, ARS National Peanut Research Laboratory  
Dawson, GA

### Contact

Dr. A. M. (Mike) Schubert  
Texas Agricultural Experiment Station  
TAMU Ag. Res. & Ext. Center  
Rt. 3 Box 219  
Lubbock, TX 79403-9803  
Phone: 806-746-6101 ext 4027  
Fax: 806-746-6528  
Mobile: 806-778-2353  
E-mail: a-schubert@tamu.edu

or

Dr. Tim Sanders  
3127 Ligon Street, Box 7631  
NC State University  
Raleigh, NC 27695-7624  
919 515 6312  
919 856-4598 FAX  
Email: tim\_sanders@ncsu.edu

## **STATEMENT OF PROBLEM AND NEED**

### Problem

According to all major peanut product manufacturers, peanuts produced in West Texas have considerably higher incidence of fruity fermented off-flavor than other production regions and this condition impacts markets for West Texas peanuts. As long as supply and demand are equal, this may not be an issue, but with the level of off-flavor in 2003, many manufacturers sought sources of peanuts other than West Texas.

### Need

To significantly reduce the incidence of this problem, research must be continued to define the role of parameters of environment, such as cool night temperature, and resulting plant physiology that affect sugar content and maturity level during production. The relationship of these factors to various windrow and artificial curing conditions, which are known to contribute to off-flavor development, must be determined. Without an understanding of the factors related to maturation of peanuts and the incidence of fruity fermented off-flavor, the focused development of methods to reduce the problem can not be accomplished. The solution might be the absolute need for an early maturing variety or it could entail production and cultural practice changes. For example, studies last year demonstrated the reduction in fruity fermented off flavor by use of sandwich windrows and Surround spray. Simply put, if the causes are not defined, the problem will continue for lack of a focused plan for solution.

## **PLAN OF ACTION**

This proposal is a continuation of research initiated last year.

All objectives listed below will be accomplished through field studies located in West Texas.

### **Objectives**

- 1) Further evaluate the role of soil temperature in development of high sugar content in peanuts produced in West Texas. This will be accomplished by determining the effect of a minimum soil temperature on sugar concentration in peanuts grown in West Texas. Soil temperature in a plot will be controlled above a certain minimum (20 C) with heating cables to determine if high sugar content is related to cool soil temperatures. Sugar concentration and other metabolites, such as starch, and maturity patterns will be determined in the heated plot and in a non-heated plot during the growing season. Peanuts from these plots will be used to determine if high sugar is responsible for higher incidence of off-flavor (next objective).

- 2) Determine the effect of various curing temperatures on off-flavor development in normal West Texas peanut sugar levels from non-heated plots and lower sugar peanuts from heated plots as defined in the first objective.
- 3) Continue to evaluate seasonal fluctuations in soil temperature, soil moisture, and ambient temperature and correlate these environmental conditions with seed chemistry and ultimately with flavor/off-flavor. This information will provide a platform for further investigation into specific chemical mechanisms responsible for flavor and identify environmental factors that might respond to variations in cultural practices. This would allow for production and curing strategies that enhance maturation, ameliorate sugar production and optimize West Texas peanut flavor.
- 4) Determine the effect of spray treatments of Surround WP (a wettable powder of white kaolin clay), sandwich windrows, and tented windrows (plants leaning against each other with peanuts on the bottom) on peanut pod temperatures in windrows. High temperatures in windrows were definitely responsible for fruity fermented off-flavor in 2003. Studies last year demonstrated lower temperature and a slower rate of temperature rise in sandwich windrows and lower levels of fruity fermented off flavor.

## PROGRESS

The soil heating equipment was again installed in spring 2004 at the Grissom farm near Seminole and a repeat of the soil temperature modification was conducted through the growing season. Soil, water application, and ambient conditions were continuously monitored and compiled on an hourly basis. Plant chemical analysis samples were collected throughout the season and maturity samples were collected twice during late season to monitor the development of the crop. Plots were harvested, cured, and analyzed for yield, quality, and flavor.

Based on the results of 2003 and 2004, two primary environmental factors appear to be affecting crop maturity and the eventual development of fruity fermented off-flavors. While soil heating did lead to decreased fruity fermented off-flavors, the differences in pod sugar levels between heated plot and control plot samples was not large enough to have been solely responsible for the observed differences in flavor. In addition, average soil temperatures were lower in 2004 than in 2003 but the crop from 2004 had improved flavor characteristics. When comparing environmental conditions between 2003 and 2004, soil moisture levels, ambient air temperature and relative humidity, as well as crop stress reflected through canopy surface temperature showed that the crop suffered much more water stress in 2003, which correlated with higher fruity fermented off-flavors. We conclude that adequate soil moisture is likely just as important as soil temperature in the prevention of off-flavors and we are proposing to continue this work by developing irrigation scheduling support systems for the region.

Curing temperature affected the development of fruity fermented as has been previously shown. Mature peanuts from the windrow studies developed fruity fermented off flavor when cured at 120 F.

Windrow studies proved once again that sandwich type windrows helped control temperature of peanut pods during curing. Tent type windrows were similar to sandwich windrows in temperature control. Surround helped control pod temperatures relative to untreated windrows. These studies have conclusively shown that sandwich windrows help control pod temperatures during windrow curing and in certain environmental conditions are effective in reducing fruity fermented off flavor.