

384/  
1407  
2015

## I. Identification

a. Project Title: **Valencia Peanut Breeding for Drought Tolerance-Year 1**

b. Funding Year: 2015

c. Principal Investigator(s): Naveen Puppala

d. Cooperating Personnel

e. Total Funds Requested: **\$ 8,214; Invoiced amount \$ 5,837.76**

f. Location(s) where research will be performed Clovis, New Mexico

g. New or Continuing Project: New

i. If continuing, how many years and amounts of previous NPB funding have been received? Briefly describe the progress and accomplishments to-date on the project.

Continuing from 2014. I received the funds \$ 11,734 in April, 2014. Initiated crosses at Costa Rica winter nursery in August. The parents were planted in August and crosses are being done for Valencia-C (female parent) with three drought tolerant lines (male parents) namely C76-16, ICGS-76 and ICGS-91114. I hope to continue my F2 populations at the same location. I will be continuing with this project in 2015 and will need more resources when my populations are ready to be evaluated in F2 generation in New Mexico.

ii. Will funds be required in subsequent years to complete the objectives? If yes, how many years do you anticipate requiring funding?

- Yes we will need funds in 2015 and 2016 to advance the populations.

iii. What other sources of funding are being requested, i.e. list States, Foundations, USDA, etc. Are these funds included in the total funds requested from NPB?

-None requested this year

## II. Layman's Summary

Water stress or Drought is a major limitation to peanut production in New Mexico. New Mexico is under semiarid climate where Valencia peanuts are grown under irrigation. Annual rainfall received is 18 inches per annum. Ogallala Aquifer that extends from South Dakota through West Texas and New Mexico is getting depleted and water is getting scarce and expensive. For this reason we need to develop varieties that are tolerant to drought and use water more efficiently.

### **III. Project Purpose**

Drought is the major abiotic stress constraint affecting peanut productivity and quality in eastern New Mexico and west Texas. There is a pressing need to improve the water use efficiency of peanut production. Breeding varieties with higher water use efficiency is seen as providing part of the solution. The objective of this work is to develop a high yielding peanut that produces more peanuts per unit of water consumed.

### **IV. Hypothesis and Objectives**

The primary goal of this proposal will be to develop a drought tolerant Valencia peanut. Drought stress for the last two years has resulted in significant yield losses in west Texas and eastern New Mexico. Development has been hampered by variable incidence of drought stress in the field, lack of means to measure drought stress response, and poor understanding of the nature of tolerance. This proposal addresses all three of these aspects.

- 1. Develop Drought Tolerant Valencia Varieties:** We will cross Valencia-C (female parent) with three drought tolerant lines (male parents) namely C76-16, ICGS-76 and ICGS-91114.
- 2. Determine phenotypic responses to drought stress response and other traits in an F<sub>2</sub> mapping population.** Other traits will include a limited characterization of drought stress response, and agronomic traits including yield, plant type, maturity, and seed size.

### **V. Progress made in 2015:**

We selected 108 families from the F<sub>4</sub> generation of a cross between Valencia-C X ICGS-91114. These families were replicated twice and planted in 2016 under center pivot irrigation system under grower's field at one location. Span-1 was stressed until 45 days after planting and Span-2 was stressed from 45 days until end of the season. The yield of these families ranged from 2750 to 4000 pounds per acre under full irrigation system. We are monitoring the soil moisture, leaf temperature and amount of water that is applied at each irrigation. We will make selection under water deficit conditions and advance these lines to further generations. This research will continue in 2016 from funds received from National Peanut Board.

We also collected DNA from both stress and irrigated plots of Valencia-C and C76-16. We sent these samples for transcriptome sequencing to National Center for Genome Resources (NCGR) lab at Sante Fe, New Mexico. We used funds from other funding source to conduct this study. Data filtration and alignment of data was completed. The reads were mapped on both A and B-genome, separately. We completed with annotations of transcripts and pathway analysis. We are designing primers from the above to be screened in a set of germplasm having varied degree of tolerance to abiotic stresses and could also be validated in a biparental population.