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Annual Report + Summary
PROGRESS REPORT

BID 1201

TO
NORTH CAROLINA PEANUT GROWERS ASSOCIATION, INC.

TITLE: **Offsetting the Input Cost of Breeding Plots at the Peanut Belt Research Station**
LEADER(S): **Thomas G. Isleib**
DEPARTMENT(S): **Crop Science**

REPORT:

The peanut breeding project at NCSU conducts trials at three research stations operated by the N.C. Department of Agriculture and Consumer Services (NCDA&CS): the Peanut Belt Research Station (PBRS) at Lewiston in Bertie County, the Upper Coastal Plains Research Station (UCPRS) in Edgecombe County east of Rocky Mount, and the Border Belt Tobacco Research Station (BBTRS) at Whiteville in Columbus County.

Our use of the three stations is not equal. At BBTRS, we grow only our Advanced Yield Test (AYT), the series of trials that generate the yield and grade data that we use to move breeding lines forward to the three-state official variety test for peanuts, the Peanut Variety and Quality Evaluation (PVQE) program. At UCPRS, we grow the AYT and a few other yield trials including the Preliminary Yield Test, our Disease Preliminary Test (DPT), a yield trial of lines selected from the accelerated disease resistance breeding program that has been supported by the N.C. Peanut Growers' Association for years, the Early Maturity Advanced Test (EAT), a test of lines selected for early maturity (125 to 135 days after planting) and compared at early and normal digging dates. UCPRS also has fields infested with *Cylindrocladium parasiticum*, the soil-borne fungus that causes Cylindrocladium black rot (CBR), and *Sclerotinia minor*, the fungus that causes Sclerotinia blight, where we conduct trials associated with the disease resistance breeding program

PBRS is our primary research site where we grow replicates of all the yield trials mentioned above in addition to trials of the 300 lines and families conducted with and without chemical control of leaf spots and trials conducted under conditions that promote tomato spotted wilt. We also grow the multi-state cooperative Uniform Peanut Performance Test of runner- and virginia-type breeding lines that is usually a last step before release of a new cultivar. We also use PBRS to grow nurseries of early generation breeding plots where we make our selections of individual plants leading to line development as well as the seed multiplication nurseries for all the lines and cultivars that come out of that process. We grow about 30 acres of plots at PBRS.

As the N.C. Agricultural Research Service and NCDA&CS attempt to cope with the state budget reductions stemming from the recent economic recession, we researchers have been informed that we must provide at least 50% of the input costs incurred by the research stations as they plant and tend our plots, perhaps ultimately all of those costs. As for PBRS, at my request superintendent Tommy Corbett estimated his variable cost per acre of plots at \$1000, excluding station labor, fuel, and irrigation. There is an additional bill of \$7,000 per year for the hand labor required to harvest pure seed of plant selections and seed multiplication plots too small for mechanical harvest. This comes to a total of \$36,200. We have been asked to cover 50% of

variable costs plus 12.5% of non-standard labor cost, making our anticipated project-specific share of plot cost \$15,875.

A total 10,487 of plots were grown by the NCSU peanut breeding project excluding plots of NCSU breeding lines grown by collaborating scientists in other states, for example in the PVQE program (Table 1). All 28 experimental lines in the 2013 PVQE program came from NCSU and were grown in nine two-rep tests at five locations. The NCSU project grew 8,230 plots at the Peanut Belt Research Station at Lewiston, NC, including plant selection plots, seed increase plots, and replicated trials for yield and grade as well as leaf spot and tomato spotted wilt virus (TSWV) resistance. There were 1,910 plots at the Upper Coastal Plain Research Station at Rocky Mount including replicated trials for yield and grade as well as *Cylindrocladium* black rot (CBR) and *Sclerotinia* blight resistance. At the Border Belt Tobacco Research Station in Whiteville, NC, we had only our Advanced Yield Test of 100 breeding lines and cultivars, comprising 200 plots for yield and grade. In all, the plots occupied approximately acres.

Table 1. Tests and nurseries grown by the NCSU peanut breeding program at N.C. State University.

Name of test or nursery	Description
Advanced Line Disease Test, TSWV (ALT)	Replicated (r=3) disease reaction trial of 147 plots in Field D2 at PBRS ^a
Advanced Line Leaf Spot Test (ALL)	Replicated (r=2) disease reaction trial of 98 plots in Field D6 at PBRS
Advanced Yield Test (AYT) Big-Ass Nursery (BAN)	Replicated (r=2) yield trial of 200 plots in Field D2 at PBRS Seed increase nursery of 15 plots in Field D8a&b at PBRS (each plot 6 times the area of a standard single seed increase plot)
Breeder Seed Increase Nursery (BSI)	Seed increase nursery of 150 plots in Field D8a&b at PBRS
Breeding Line Purification Nursery (PUR)	Seed purification nursery of 240 plots in Field C7b at PBRS
Disease Advanced Line Nursery (DAN)	Seed increase nursery of 150 plots in Field D8a&b at PBRS
Disease Advanced Test, TSWV (DAT)	Replicated (r=3) disease reaction trial of 128 plots in Field D2 at PBRS
Disease Preliminary Line Nursery (DPN)	Seed increase nursery of 68 plots in Field D8a&b at PBRS
Disease Preliminary Line Yield Test (DPT)	Replicated (r=2) yield trial of 144 plots in Field C7b at PBRS
Disease Selection Test, Leaf Spot (DSL)	Replicated (r=2) disease reaction trial of 420 plots in Field C6a&b at PBRS
Disease Selection Test, TSWV (DST)	Replicated (r=2) disease reaction trial of 420 plots in Field D2 at PBRS
Drought Resistance Line Nursery (DRN)	Seed increase nursery of 49 plots in Field D2 at PBRS
Early Maturity Advanced Test, Early Digging (EAE)	Replicated (r=2) yield trial, dug at 145-155 DAP of 45 plots in Field C6a&b at PBRS
Early Maturity Advanced Test, Late Digging (EAL)	Replicated (r=2) yield trial, dug at 145-155 DAP of 45 plots in Field B5 at PBRS
F1:2 Selection Nursery (F2N)	plant selection nursery of 112 plots in Field C7B at PBRS
F2:3 Drought RIL Development Nursery (F3D)	RIL development nursery of 344 plots in Field C6a&b at PBRS
F2:3 Insect Resistant Selection Nursery (F3I)	plant selection nursery of 78 plots in Field C6a&b at PBRS
F2:3 Selection Nursery (F3N)	plant selection nursery of 70 plots in Field C6a&b at PBRS
F2:4 Selection Nursery, Accelerated Program (F4A)	plant selection nursery of 120 plots in Field B5 at PBRS
F3:4 Selection Nursery (F4N)	plant selection nursery of 260 plots in Field C6a&b at PBRS
F4:5 Folate RIL Development Nursery (F5F)	RIL development nursery of 580 plots in Field C6a&b at PBRS
F4:5 Oil Content Selection Nursery (F5O)	plant selection nursery of 20 plots in Field C6a&b at PBRS
F4:5 Selection Nursery (F5N)	plant selection nursery of 219 plots in Field C6a&b at PBRS

(cont'd)

^a Peanut Belt Research Station at Lewiston in Bertie County, NC.

Table 1 (cont'd). Tests and nurseries grown by the NCSU peanut breeding program at N.C. State University.

Name of test or nursery	Description
F5:6 Selection Nursery (F6N)	plant selection nursery of 435 plots in Field D8a&b at PBRS
F6:7 Nursery, CAP Program (CAP)	RIL development nursery of 667 plots in Field C6a&b at PBRS
F6:7 Selection Nursery, Black Pod (F7B)	plant selection nursery of 78 plots in Field D8a&b at PBRS
F6:7 Selection Nursery, Early Maturity Program (F7E)	family selection nursery of 386 plots in Field D2 at PBRS
Holbrook Leaf Spot Test (HLT)	Replicated (r=2) disease reaction trial of 588 plots in Field D8a&b at PBRS
Large Plot Increase Nursery (LPI)	Seed increase nursery of 264 plots in Field D8a&b at PBRS (each plot 6 times the area of a standard single seed increase plot)
Leafspot Advanced Test, Sprayed (LAS)	Replicated (r=2) disease reaction trial of 128 plots in Field C6a&b at PBRS
Leafspot Advanced Test, Unsprayed (LAU)	Replicated (r=2) disease reaction trial of 128 plots in Field D8a&b at PBRS
Plant Introduction Nursery (PIN)	Seed increase nursery of 100 plots in Field D2 at PBRS
Preliminary Yield Line Nursery (PYN)	Seed increase nursery of 119 plots in Field D8a&b at PBRS
Preliminary Yield Test (PYT)	Replicated (r=1 for preliminary lines, r=6 for checks) yield trial of 150 plots in Field C7b at PBRS
Selected Line Test, Leafspot (S.P. Tallury) (LSL)	Replicated (r=2) disease reaction trial of 112 plots in Field C6a&b at PBRS
Selected Line Test, TSWV (S.P. Tallury) (TSL)	Replicated (r=2) disease reaction trial of 112 plots in Field C6a&b at PBRS
Single-Plant Harvest Purification Nursery (SGL)	Seed purification nursery of 15 plots in Field C6a&b at PBRS
Small Plot Increase Nursery (SPI)	Seed increase nursery of 117 plots in Field D2 at PBRS
Stalker Sclerotia Line Increase (SCI)	Seed increase nursery of 36 plots in Field D1 at PBRS
Uniform Peanut Performance Test (UPT)	Replicated (r=6) yield trial of 180 plots in Field C2 at PBRS
Advanced Line Disease Test, CBR (ALC)	Replicated (r=3) disease reaction trial of 147 plots in Field E4 at UCPRS ^b
Advanced Line Disease Test, Sclerotinia blight (ALS)	Replicated (r=3) disease reaction trial of 147 plots in Field D1 at UCPRS
Advanced Yield Test (AYT)	Replicated (r=2) yield trial of 200 plots in Field C2 at UCPRS
Disease Advanced Test, CBR (DAC)	Replicated (r=3) disease reaction trial of 192 plots in Field E4 at UCPRS
Disease Advanced Test, Sclerotinia blight (DAS)	Replicated (r=3) disease reaction trial of 192 plots in Field D1 at UCPRS
Disease Preliminary Line Yield Test (DPT)	Replicated (r=2) yield trial of 144 plots in Field C2 at UCPRS
Disease Selection Test, CBR (DSC)	Replicated (r=3) disease reaction trial of 420 plots in Field E4 at UCPRS
Disease Selection Test, Sclerotinia blight (DSS)	Replicated (r=2) disease reaction trial of 420 plots in Field E4 at UCPRS
Early Maturity Advanced Test, Late Digging (EAL)	Replicated (r=2) yield trial, dug at 145-150 DAP of 45 plots in Field E4 at UCPRS
Preliminary Yield Test (PYT)	Replicated (r=1 for preliminary lines, r=6 for checks) yield trial of 150 plots in Field at UCPRS
Advanced Yield Test (AYT)	Replicated (r=2) yield trial of 200 plots in Field at BBTRS ^c

^a Peanut Belt Research Station at Lewiston in Bertie County, NC.

^b Upper Coastal Plain Research Station at Rocky Mount in Edgecombe County, NC.

^a Border Belt Tobacco Research Station at Lewiston in Columbus County, NC.

IMPACT STATEMENT

Although we gain information each year on each line tested, the main measurable outcome of the project is the release of new cultivars and/or registered breeding lines. The latter are released because they have one or more desirable traits but are not sufficiently good to be cultivars. Our last two releases were the high-oleic cultivars Sullivan and Wynne in the spring of 2013. Foundation seed of those two releases was grown in 2013, but because there is a lag in availability of seed following release, necessary to allow for multiplication of seed to a commercial scale in the North Carolina seed chain, they will not be widely available until the spring of 2016. The Bailey and Sugg cultivars were released in 2008 and 2009, and the 2012 season was the first in which that seed became widely available to growers. Using the 2012 certified seed production figures as estimates of cultivar use in 2013, North Carolina releases were grown on 82% of peanut acreage in North Carolina and 71% of acreage in the VC area. Approximately 72% of the acreage in-state and 61% region-wide were in Bailey and Sugg. An estimate of the difference in crop value achieved by the new releases, using value-per-acre figures at the loan rate taken from the PVQE program, is \$10 million region-wide. Such estimation requires a lot of assumptions, but even if the estimate is inflated twofold, the improvement would still be \$5 million in a single year.