

11336
2014

Annual Report &
Summary

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 2013 certified seed production figures as estimates of cultivar use in 2014, North Carolina releases were grown on 80% of peanut acreage in North Carolina and 75% of acreage in the VC area. Approximately 89% of the acreage in-state and 74% 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.

**PROGRESS REPORT
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 conducted trials at four research stations operated by the N.C. Department of Agriculture and Consumer Services (NCDA&CS) and NC State University: 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, the Border Belt Tobacco Research Station (BBTRS) at Whiteville in Columbus County, and the Sandhills Research Station (SRS) near Jackson Springs in Moore County.

Our use of the four stations was not equal. At SRS we grew only a small replicated test of 49 lines and cultivars for their wilt reactions to drought stress on the deep sandy soil (a Candor series sand soil a, "sandy, siliceous, thermic, grossarenic kandiudult") at the station. At BBTRS, we grew 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 grew the AYT and a few other yield trials including the Preliminary Yield Test (PYT), a Preliminary Yield Test of Black Podded lines (PYB), 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, a Preliminary Yield Test of Early Maturing lines (PYE), 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 300 lines and families conducted with and without chemical control of leaf spots and in 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.

In light of budget reductions at both the NC Agricultural Research Service and NCDA&CS, 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, and perhaps begin to plan to cover 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 of 10,895 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 23 experimental lines in the 2014 PVQE program came from NCSU and were grown in seven two-rep tests at five locations. The NCSU project grew 8,347 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 2,548 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 33 acres.

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

Name of test or nursery	Description
F1:2 Selection Nursery	Plant selection nursery of 257 plots in PBRS ^a Field C1
F2:3 Selection Nursery	Plant selection nursery of 56 plots in PBRS Field D6b
F2:4 Selection Nursery, Accelerated Program	Plant selection nursery of 120 plots in PBRS Field C1
F3:4 Insect Resistant Selection Nursery	Plant selection nursery of 88 plots in PBRS Field A1
F3:4 Selection Nursery	Plant selection nursery of 260 plots in PBRS Field C1
F4:5 Oil Content Selection Nursery	Plant selection nursery of 85 plots in PBRS Field C1
F4:5 Selection Nursery	Plant selection nursery of 496 plots in PBRS Field C3
F4:5 Selection Nursery, Black Pod and Seed	Plant selection nursery of 65 plots in PBRS Field D6b
F4:6 Selection Nursery, Accelerated Program	Plant selection nursery of 68 plots in PBRS Field C1
F5:6 Selection Nursery	Plant selection nursery of 305 plots in PBRS Field C1
F6:7 Selection Nursery	Plant selection nursery of 502 plots in PBRS Field B2
Preliminary Yield Test	Replicated (r=1) yield test of 140 plots in PBRS Field D3
Preliminary Yield Test, Early Maturity	Replicated (r=1) yield test of 120 plots in PBRS Field D3
Advanced Line Leafspot Test	Replicated (r=2) leaf spot reaction test of 112 plots in PBRS Field D9a&b
Disease Selection Test, Leafspot	Replicated (r=2) leaf spot reaction test of 420 plots in PBRS Field D9a&b
Leafspot Advanced Test, Sprayed	Replicated (r=2) leaf spot reaction test of 112 plots in PBRS Field D9a&b
Leafspot Advanced Test, Unsprayed	Replicated (r=2) leaf spot reaction test of 112 plots in PBRS Field D9a&b
Stalker Selection Test, Leaf Spot (H.T. Stalker)	Replicated (r=2) leaf spot reaction test of 60 plots in PBRS Field D9a&b
Disease Selection Test, TSWV	Replicated (r=2) TSWV reaction test of 420 plots in PBRS Field A1
Advanced Yield Test	Replicated (r=2) yield test of 200 plots in PBRS Field D3
Disease Preliminary Line Yield Test	Replicated (r=2) yield test of 60 plots in PBRS Field D3
Preliminary Yield Test, Black Pod	Replicated (r=2) yield test of 60 plots in PBRS Field D3
Holbrook Leaf Spot Test	Replicated (r=3) leaf spot reaction test of 588 plots in PBRS Field D9a&b
Advanced Line Disease Test, TSWV	Replicated (r=3) TSWV reaction test of 168 plots in PBRS Field A1
Disease Advanced Test, TSWV	Replicated (r=3) TSWV reaction test of 168 plots in PBRS Field A1

(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
Early Maturity Advanced Test, Early Digging	Replicated (r=3) yield test of 30 plots in PBRS Field D3
Early Maturity Advanced Test, Late Digging	Replicated (r=3) yield test of 30 plots in PBRS Field D3
Uniform Peanut Performance Test	Replicated (r=6) yield test of 180 plots in PBRS Field D3
F2:4 Drought RIL Development Nursery	RIL population development nursery of 341 plots in PBRS Field B2
F2:6 Folate RIL Development Nursery	RIL population development nursery of 572 plots in PBRS Field B2
Big-Ass Nursery	Seed increase nursery of 14 plots in PBRS Field D3 & B2 (very large plots planted solid at 9" seed spacing)
Breeder Seed Increase Nursery	Seed increase nursery of 16 plots in PBRS Field D3 (each plot six times as large as a standard seed increase plot)
Disease Advanced Line Nursery	Seed increase nursery of 42 plots in PBRS Field B2 (each plot three times as large as a standard seed increase plot)
Disease Preliminary Line Nursery	Seed increase nursery of 33 plots in PBRS Field D6b
Drought Resistance Line Nursery	Seed increase nursery of 49 plots in PBRS Field B2
Large Plot Increase Nursery	Seed increase nursery of 57 plots in PBRS Field D3 (each plot six times as large as a standard seed increase plot)
Preliminary Yield Line (Black Pod) Nursery	Seed increase nursery of 28 plots in PBRS Field B2
Preliminary Yield Line (Early Maturity) Nursery	Seed increase nursery of 502 plots in PBRS Field B2
Preliminary Yield Line Nursery	Seed increase nursery of 113 plots in PBRS Field B2
Small Plot Increase Nursery	Seed increase nursery of 137 plots in PBRS Field B2
Stalker Selection Test, TSWV (H.T. Stalker)	Seed increase nursery of 60 plots in PBRS Field A1
Breeding Line Purification Nursery	Seed purification nursery of 693 plots in PBRS Field D3, B2, & C1
Single-Plant Harvest Purification Nursery	Seed purification nursery of 15 plots in PBRS Field B2
Preliminary Yield Test	Replicated (r=1) yield test of 140 plots in UCPRS Field F1
Preliminary Yield Test, Early Maturity	Replicated (r=1) yield test of 120 plots in UCPRS Field F1
Disease Selection Test, CBR	Replicated (r=2) CBR reaction test of 420 plots in UCPRS Field D1
Disease Selection Test, Sclerotinia blight	Replicated (r=2) Sclerotinia blight reaction test of 420 plots in UCPRS Field C2
Advanced Yield Test	Replicated (r=2) yield test of 200 plots in UCPRS Field F1
Disease Preliminary Line Yield Test	Replicated (r=2) yield test of 60 plots in UCPRS Field F1
Preliminary Yield Test, Black Pod	Replicated (r=2) yield test of 60 plots in UCPRS Field F1
Advanced Line Disease Test, CBR	Replicated (r=3) CBR reaction test of 168 plots in UCPRS Field D1
Disease Advanced Test, CBR	Replicated (r=3) CBR reaction test of 168 plots in UCPRS Field D1
Advanced Line Disease Test, Sclerotinia blight	Replicated (r=3) Sclerotinia blight reaction test of 168 plots in UCPRS Field C2
Disease Advanced Test, Sclerotinia blight	Replicated (r=3) Sclerotinia blight reaction test of 168 plots in UCPRS Field C2
Early Maturity Advanced Test, Early Digging	Replicated (r=3) yield test of 30 plots in UCPRS Field F1
Early Maturity Advanced Test, Late Digging	Replicated (r=3) yield test of 30 plots in UCPRS Field F1
Advanced Yield Test	Replicated (r=2) yield test of 200 plots in BBTRS Field F11 & F12
Drought Resistance Test	Replicated (r=4) drought reaction test of 196 plots in SRS Field E6b

^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.