

Annual Report & Summary
**PROGRESS REPORT
TO**

NORTH CAROLINA PEANUT GROWERS ASSOCIATION, INC.

TITLE: Optimizing Peanut Production and Pest Management through Applied Research

LEADER(S): David Jordan,¹ Rick Brandenburg,² Barbara Shew,³ Tom Isleib,¹ and Gary Roberson⁴

DEPARTMENT(S): Crop Science,¹ Entomology,² Plant Pathology³ and Biological and Agricultural Engineering⁴

REPORT:

I. Abstract.

Approximately 75 trials were conducted during 2014 to continue developing a database in areas of agronomic production, growth regulation, fertility, and digging and harvesting, integrated pest management, weed management, and cropping systems in order to refine recommendations for peanut growers in North Carolina and surrounding states. Results from key trials are included in the annual Cooperative Extension Service *Peanut Information* series, in formal classroom instruction on campus or at county production meetings, *Peanut Notes*, popular press articles, the peer-reviewed literature, and field days and plot tours. Results from these projects support the historical mission of the land grant system through research, extension, and teaching programs with emphasis on peanut. Virtually all of the trials are conducted in cooperation with other research and extension faculty at NC State and with other partnering institutions including NCDA&CS, Virginia Tech, Clemson University, and the University of Georgia.

Summary:

Approximately 75 trials were conducted during 2014 at the Peanut Belt Research Station, the Upper Coastal Plain Research Station, the Border Belt Tobacco Research Station, and at on-farm locations in Cumberland, Wilson, and Martin counties to compare a range of production and pest management practices. Experiments included: peanut response to inoculants and nitrogen rates in new and rotated fields; evaluation of planting and digging dates; comparison of thrips management programs; comparison of runner and Virginia market types; comparison of timing and sequence of applications of Apogee; weed management with non-registered preemergence and postemergence herbicides that may have potential in peanut; comparison of rotation schemes; and determining compatibility of pesticides and other products used in peanut. Results from these trials are provided to Cooperative Extension Service agents, farmers and others in agribusiness.

Objectives:

1. To develop solutions to agronomic issues associated with peanut production in North Carolina.
2. To cooperate with the plant pathologist, entomologist, and plant breeder at NCSU to refine IPM strategies for peanut in North Carolina.
3. To conduct appropriate research to develop weed management strategies for traditional and herbicide resistant weeds in peanut in North Carolina.
4. To continue rotation and tillage trials in order to develop more effective cropping systems.
5. To determine the feasibility of double-cropping peanut and other crops with wheat.
6. To assist Cooperative Extension Service agents with pod maturity clinics

Procedures:

Approximately 75 trials were conducted at various research stations and on-farm sites in North Carolina to address the topics listed in the six stated objectives. The experiments often were conducted at more than one location and included appropriate controls and commercial standards, with data analyzed statistically prior to making recommendations. Cooperative Extension Service agents and others, including farmers, were given the opportunity to observe these experiments.

Results and Discussion:

Six objectives were proposed in the activities of this grant. A summary of results from 2014 is provided for each objective. While yield data are still being processed, key results from these experiments will be included in various chapters of *2015 Peanut Information* and will be presented during county production meetings in February 2015 and at in-service Cooperative Extension Service agent training sessions. Results will also be included in articles written for *V-C Peanut News*.

Objective 1. To develop solutions to agronomic issues associated with peanut production in North Carolina. Four experiments were conducted to compare commercially available and experimental inoculants. Results from these experiments will be used to help growers make decisions on inoculant selection and will help manufacturers of inoculants develop more effective strains for North Carolina conditions. Compatibility of Admire Pro, generic imidacloprid, and Velum Total with liquid inoculant was determined at 3 locations for each insecticide. These insecticides did not adversely affect efficacy of inoculant. Two experiments were conducted to determine the economic return of nitrogen rates when a nitrogen deficiency occurs. The most economic rate of ammonium sulfate is 500 pounds/acre, although return of this treatment is much lower than applying inoculant correctly. Three experiments compared yield and market grades of the varieties Bailey, Sugg, Sullivan, and Wynne when dug on 4 dates beginning in early September and running through mid-October. Data from these trials are still being processed,

although preliminary assessments suggest that Wynne reaches optimum maturity later than the other 3 varieties in the study. Seven experiments were conducted to determine peanut response to Apogee under differing cultural practices. In one experiment peanut was planted in early, mid and late May with Apogee applied at the appropriate timing. Four digging dates were included to determine when peanut will respond favorably to Apogee and to see if planting date influences response. Other trials with Apogee included digging date factors only or a comparison of a single application of Apogee with 2 or 3 applications. Historically, Apogee increased yield of popular varieties grown in the region. However, few increases in yield have been observed for Bailey when comparing across a considerable number of locations and environmental conditions. Apogee does improve row visibility and ability of equipment to invert vines efficiently. It is postulated that Bailey has relatively good pod retention, and yield increases often attributed to Apogee for larger-seeded varieties that are prone to pod shed do not seem to translate into yield increases for the variety Bailey. While much of the data are being processed, results of key experiments will be included in the production section of *2015 Peanut Information* and will be widely available to growers.

Objective 2. To cooperate with the plant pathologist, entomologist, and plant breeder at NCSU to refine IPM strategies for peanut in North Carolina. A major emphasis of research during 2014 mirrored that of 2013 with a focus on developing strategies to manage thrips. Eight experiments were conducted in cooperation with Dr. Brandenburg to compare a range of in-furrow products and seed treatments, both with and without foliar applications of insecticides in some cases. Additional trials were conducted to compare peanut response to insecticides when different planting dates were included. A final set of experiments included combinations of herbicides and insecticide applied when peanuts were healthy or had been damaged by thrips feeding. Preliminary data indicate that Admire Pro, Orthene or Thimet applied in the seed furrow controlled thrips relatively well and more effectively than Cruiser Maxx applied as a seed treatment.

Objective 3. To conduct appropriate research to develop weed management strategies for traditional and herbicide resistant weeds in peanut in North Carolina. Ten experiments were conducted to compare herbicides that may serve as viable alternatives to those currently used in peanut, especially to control Palmer amaranth and other resistant weeds. The herbicides Brake F2, Fierce, Zidua, and Warrant were compared in multiple experiments. While these herbicides showed promise, they generally did not control the entire weed spectrum present. Results from these trials will be used to formulate strategies that control a broad spectrum of weeds in peanut. The impact of planting date on peanut response to Fierce and Valor SX was compared at one location during 2014 in a manner similar to trials during 2013. Peanut responded the same to both Fierce and Valor SX when applied at the suggested use rate. Fierce was more injurious than Valor SX when applied at higher rates. As was noted previously, rainfall pattern within the first two weeks after planting affected injury potential. The greatest injury was noted when rainfall did not occur until peanut were beginning to emerge. Peanut tolerance to Brake F2 and Zidua was adequate and the manufacturers of these herbicides most likely will pursue labels for peanut.

Objective 4. To continue rotation and tillage trials in order to develop more effective cropping systems. Experiments have been in place at two locations since 1997 to compare cropping systems that include various rotations, tillage systems, and pest management inputs. Two experiments were conducted to determine peanut yield after farmers previously transitioned out of peanut-based cropping systems, then to corn/wheat/soybean systems and now back to peanut. Results during 2013 allowed a comparison of all treatments relative to peanut yield. Experiments during 2014 included initial phases of the next cycle of rotation.

Objective 5. To determine the feasibility of double-cropping peanut and other crops with wheat. This experiment was a repeat of work during 2013 with yield data from double crop plantings yet to be compared. This trial will be conducted for two more years with an economic analyses performed to determine what commodity prices have to be in place to make double cropping peanut with wheat a feasible alternative to soybean and grain sorghum.

Objective 6. Assisting Cooperative Extension agents with pod maturity clinics. Dewayne Johnson assisted many Cooperative Extension Service agents with pod maturity clinics in their counties, especially county agents with limited experience with this process. Dewayne participated in 14 maturity clinics and processed approximately 300 samples. He also made numerous contacts visits with individual farmers. It is estimated that Dewayne helped make recommendations for about 20,000 acres in the process. Although economic calculations on the benefit of his input are challenging to capture, his assistance may have contributed to farmers generating over 1 million dollars due to timely digging.

The following peer-reviewed articles have been published in the scientific literature over the past 3 years and in most cases are the result of research linked to this project.

Jordan, D.L., P.D. Johnson, T. Corbett, J. Schultheis, B. Shew, R. Brandenburg, and W. Ye. 2014. Peanut response to crop rotations including clary sage, snap bean, and sweet potato. *J. Crop Management*. DOI 10.2134/CM-2014-0038-RS. 5 pages.

Foote, W., R. Nuti, K. Edmisten, D.L. Jordan, R. Wells, and L. Fisher. 2014. Crop response to furrow diking in North Carolina. *J. Crop Management*. DOI 10.2134/CM-2014-0008-RS. 5 pages.

Roberson, G.T. and D.L. Jordan. 2014. RTK GPS and automatic steering for peanut digging. *Am. Soc. of Agricultural and Biological Engineers*. 30(3):405-409.

Poirier, A.H., A.C. York, D.L. Jordan, A. Chandi, W.J. Everman, and J.R. Whitaker. 2014. Distribution of glyphosate- and thifensulfuron-resistant Palmer amaranth (*Amaranthus palmeri*) in North Carolina. *J. International Agronomy*, Volume 2014, Article ID 747810, 7 pages, doi.org/10.1155/2014/747810.

- Jordan, D.L., P.D. Johnson, G.L. Grabow, and T. Corbett. 2014. Corn, cotton, and peanut response to tillage and sub-surface drip irrigation in North Carolina. *Agron. J.* 106:962-967.
- Chahal, G.S., D.L. Jordan, P.M. Eure, and R.L. Brandenburg. 2014. Compatibility of acephate with herbicides applied postemergence in peanut. *Peanut Sci.* 41:58-64.
- Drake, W.L., D.L. Jordan, P.D. Johnson, B.B. Shew, R.L. Brandenburg, T. Corbett. 2014. Peanut response to interactions of planting date, tillage, and cultivar. *Agron. J.* 106:486-490.
- Sun, M., J.F. Spears, T.G. Isleib, and D.L. Jordan. 2014. Effect of production environment on seed quality of normal and high-oleate large seeded virginia-type peanut (*Arachis hypogaea* L.). *Peanut Sci.* 41:90-99.
- Chahal, G.S., D.L. Jordan, A.C. York, R.L. Brandenburg, B.B. Shew, J.D. Burton, and D. Danehower. 2013. Interactions of clethodim and sethoxydim with other pesticides. *Peanut Sci.* 40:127-134.
- Prostko, E.P., T.M. Webster, M.W. Marshall, R.G. Leon, T.L. Grey, J.A. Ferrell, P. A. Dotray, D.L. Jordan, W.J. Grichar, and B.J. Brecke. 2013. Glufosinate application timing and rate affect peanut yield. *Peanut Sci.* 40:115-119.
- Eure, P.M., D.L. Jordan, L.R. Fisher, and A.C. York. 2013. Efficacy of herbicides when spray solution application is delayed. *J. International Agronomy*, Volume 2013, Article ID 782486, 7 pages, doi.org/10.1155/2013/782486
- Eure, P.M., D.L. Jordan, L.R. Fisher, and A.C. York. 2013. Evaluation of peanut agrochemical efficacy in situations where spray solution application is delayed. *Peanut Sci.* 40:52-61.
- Chahal, G.S., D.L. Jordan, B.B. Shew, R.L. Brandenburg, J.D. Burton, D. Danehower, and P.M. Eure. 2012. Influence of selected fungicides on efficacy of clethodim and 2,4-DB. *Peanut Sci.* 39:121-126.
- Chahal, G.S., D.L. Jordan, B.B. Shew, R.L. Brandenburg, A.C. York, J.D. Burton, and D. Danehower. 2012. Interactions of agrochemicals applied to peanut; Part 1: Effects on herbicides. *J. Crop Protection* 41:134-142. doi:10.1016/j.cropro.2012.05.014.
- Chahal, G.S., D.L. Jordan, B.B. Shew, R.L. Brandenburg, J.D. Burton, D. Danehower, and A.C. York. 2012. Interactions of agrochemicals applied to peanut; Part 2: Effects on fungicides. *J. Crop Protection* 41:143-149. doi:10.1016/j.cropro.2012.05.008
- Chahal, G.S., D.L. Jordan, R.L. Brandenburg, B.B. Shew, J.D. Burton, D. Danehower, and A.C. York. 2012. Interactions of agrochemicals applied to peanut; Part 3: Effects on insecticides and prohexadione calcium. *J. Crop Protection* 41:150-157. doi:10.1016/j.cropro.2012.05.006

Grichar, J., D. L. Jordan, E. P. Prostko. 2012. Weed control and peanut (*Arachis hypogaea* L.) response to formulations of imazapic. *J. Crop Protection* 36:31-36.

Nuti, R., G. Collins, D. Jordan, T. Corbett, J. Lanier, K. Edmisten, R. Wells, and G. Grabow. 2012. Cotton response to sub-surface irrigation, planting date, cultivar, and mepiquat chloride. *J. Crop Management* doi:10.1094/CM-2012-0319-01-RS.

Jordan, D.L., S.H. Lancaster, J.E. Lanier, P.D. Johnson, J.B. Beam, A.C. York, and R.L. Brandenburg. 2012. Influence of application variables on efficacy of manganese-containing fertilizers applied to peanut (*Arachis hypogaea* L.). *Peanut Sci.* 39:1-8.

Johnson, V.A., L.R. Fisher, D.L. Jordan, K.E. Edmisten, A.M. Stewart, and A.C. York. 2012. Cotton, peanut, and soybean response to sub-lethal rates of dicamba, glufosinate, and 2,4-D. *Weed Technol.* 26:195-206.

Chandi, A., D.L. Jordan, A.C. York, and B.R. Lassiter. 2012. Confirmation and management of common ragweed resistant to diclosulam. *Weed Technol.* 26:29-36.