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ANNUAL PROGRESS REPORT
TO
NORTH CAROLINA PEANUT GROWERS ASSOCIAITON, INC.

TITLE: Optimizing Peanut Production and Pest Management through Applied Research

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REPORT:

Approximately 85 trials were conducted during 2017 at the Peanut Belt Research Station, the Upper Coastal Plain Research Station, the Border Belt Tobacco Research Station, and off-station locations to compare a range of production and pest management practices. Experiments included: peanut response to inoculants; evaluation of planting dates; comparison of thrips management programs; comparison of timing, rates and sequence of applications of Apogee; peanut response to Quick-Sol and Peg Power; weed management with recently registered postemergence herbicides; comparison of cropping systems; southern corn rootworm control with Prevathon versus Lorsban; leaf spot control when fungicides are applied using nozzles delivering coarse versus fine droplets; and leaf spot control when chlorothalonil and copper fungicides are mixed with fungicides that are prone to evolved resistance. Results from these trials are provided to Cooperative Extension Service agents, farmers and others in agribusiness.

Eight objectives were proposed in the activities of this grant. A summary of results from 2017 is provided for each objective. Yield and quality data for many of these trials are still being processed at the time of writing this report. Final results will be included in various chapters of *2018 Peanut Information* and will be presented during county production meetings in February 2018 and at in-service Cooperative Extension Service agent training sessions. Results will also be included in articles written for *V-C Peanut News* and distributed in the form of *Peanut Notes*.

Objective 1. *To develop solutions to agronomic issues associated with peanut production in North Carolina.* The following trials were conducted during 2017 with the number of times the trial was conducted in parenthesis (32 trials in total).

Peanut Response to Apogee rate (3)
Peanut Response to Number of Apogee Applications (3)
Peanut Variety Response to Apogee (1)
Peanut Response to Apogee and Digging Date (1)
Peanut Response to Peg Power (3)
Peanut Response to Quick Sol (4)
Peanut Response to Late-Season Applications of Potassium (4)
Peanut Response to Commercially Available Inoculants (3)
Peanut Response to Experimental Inoculants (2)
Comparison of Virginia, Runner, and Spanish Market Types (1)
Peanut Response to Radiate (3)
Peanut Response to Planting Date (2)
Peanut and Soybean Response to Soil pH (1)
Interactions of Variety, Plant Population, and Digging Date (1)

Peanut response to Apogee rates varied at each location. With respect to row visibility, rates below the manufacturer's suggested use rate was inadequate at one location. However, at two locations two sequential applications at 0.75X provided row visibility similar to the recommended rate. In a second set of experiments at 3 locations, two applications of Apogee were needed to optimize row visibility while 3 applications did not improve row visibility over 2 applications. Row visibility was increased when Apogee was applied to the cultivars Bailey, Emery, and Wynne. However, response by Sullivan was less prominent and applications could be delayed by 7 to 10 days for this variety compared with other varieties.

Peanut yield was not improved when peanut was treated with Peg Power (3 experiments) or Quick Sol (4 experiments). The plant growth regulator Radiate did not affect peanut yield in 3 experiments. Late-season applications of potassium did not negatively affect peanut yield. These experiments were not conducted in fields with a potassium deficiency. The experiment was designed to document a negative impact of potassium (interference with calcium absorption into developing pods and kernels) when potash is applied late in the season to address a potassium deficiency. A study was conducted in cooperation with other researchers across the peanut belt to compare commercially available inoculants.

A study was repeated at Lewiston-Woodville to compare peanut yield and market grades when the varieties Bailey, Sullivan, and Wynne were planted in mid-May at various seeding rates with 4 digging dates from early September through mid-October. In 2016 results indicated that maturity differed little between these varieties. In 2017, Bailey appeared to mature slightly sooner than Sullivan or Wynne. In both years pod yield was similar when seeding rates exceeded 4 plants per foot of row with no advantage of seeding at higher rates.

Objective 2. *To cooperate with the plant pathologist, entomologist, and plant breeder at NCSU to refine IPM strategies for peanut in North Carolina).* The following trials were conducted during 2017 with the number of times the trial was conducted in parenthesis (25 trials in total).

Southern Corn Rootworm Control with Prevathon (7)
Thrips Control with In-furrow and Postemergence Systemic Insecticides (2)
Leaf Spot Control with Fungicides Applied with Different Nozzles (5)
Sclerotinia Blight Control with Fungicides Applied with Different Nozzles (2)
Newer Fungicides Applied with Chlorothalonil or Copper for Resistance Management (2)
Disease Management in Low and High Input Systems (2)
Disease and Insect Management in Low and High Input Systems (2)
Southern Corn Rootworm Control Based on Irrigation Delivery Systems (1)
Nematode Control with Velum Total (2)

Experiments in 2016 demonstrated that Prevathon is less effective than Lorsban in controlling southern corn rootworm, although in some experiments peanut scarring from root worms with Prevathon was lower than the non-treated control. Samples for 2017 are currently being processed.

Only minor differences in leaf spot and Sclerotinia blight control were noted when fungicides were applied using AI spray nozzles (fine droplets) compared with TTI spray nozzles (coarse droplets). This experiment was designed to determine if the nozzle system growers are using to apply dicamba and 2,4-D in cotton and soybean are adequate for leaf spot and Sclerotinia blight control. The fungicides used in these experiments had systemic activity and this may explain why control was often adequate with larger droplets (TTI nozzles) compared with finer-droplets delivered by the AI nozzles.

Leaf spot control with strobilurin and triazole chemistry was improved when either chlorothalonil or copper-based fungicide was co-applied with these products. Chlorothalonil was more effective than the copper-based fungicide. In simulated organic production experiments, copper fungicide was less effective than synthetic fungicides currently on the market. Increasing the seeding rate by 30% was needed when peanut seed was not treated with fungicide compared with treated seed.

Experiments conducted in cooperation with Cooperative Extension Agents were designed to compare nematode control with Velum Total compared with imidacloprid alone. Thrips control was similar for both products. Nematode populations were low and erratic at both locations and prevented a clear comparison of efficacy.

Objective 3. *To conduct appropriate research to develop weed management strategies for traditional and herbicide resistant weeds in peanut in North Carolina.* The following trials were conducted during 2017 with the number of times the trial was conducted in parenthesis (11 trials in total).

Weed Control with Zidua Compared with other Residual Herbicides (2)
Peanut Tolerance of Paraquat with EMD Safener (1)
Interactions of Paraquat, Zidua and Acephate (1)
Peanut Response to Postemergence Herbicides Applied with Zidua and Dual Magnum (1)
Impact of Weed Control in Peanut on Subsequent Weed Populations (2)
Influence of Timing of Weed Management on Yield of Peanut and other Crops (2)
Morningglory Control with Aim (2)

Morningglory control was similar when Zidua, Dual Magnum, Outlook and Warrant were applied with paraquat and Basagran. These treatments followed Valor SX applied preemergence. Rainfall was adequate for effective control of Palmer amaranth and common ragweed and prevented determining length of control by these herbicides when applied in a mixture with paraquat and Basagran. Morningglory control was relatively good for all residual herbicides but a postemergence application of Cobra or Ultra Blazer was needed for season-long control.

The product EMD increased peanut recovery from injury caused by paraquat. Thrips injury and injury caused by paraquat were affected by phorate, acephate and Zidua but the response in most cases was independent. When applied with contact herbicides, there was no difference in peanut response when Zidua and Dual Magnum were co-applied with these herbicides.

At least 3 herbicide sprays were needed within the first 6 weeks of the season to optimize peanut yield while 1, 2, 2, and 3 sprays were needed for corn, grain sorghum, soybean, and cotton, respectively. Poor weed control in these crops translated into greater weed infestations in cotton planted the following season.

Aim effectively controlled pitted morningglory when applied 10 days prior to digging and vine inversion.

Approximately 125 samples of Palmer amaranth seed were collected in the coastal plain of North Carolina from peanut, cotton, soybean, and sweet potato fields during fall 2016. Preliminary results from screening of these samples to PPO-inhibiting herbicides suggest that 3 of the samples may be resistant to this group of herbicides. Additional research is being conducted in the greenhouse to characterize the level of tolerance and/or resistance in the populations and to define the mechanism of resistance to this group of herbicides.

Objective 4. *To continue rotation and tillage trials in order to develop more effective cropping systems.* The following trials were conducted during 2017 with the number of times the trial was conducted in parenthesis (17 trials in total).

Maintenance of Long-term Cropping System Trials with Corn, Cotton, Peanut, and Soybean (2)
Maintenance of Cropping System Trials with Corn, Cotton, Grain Sorghum and Peanut (2)
Maintenance of Tillage and Rotation Trials Including Corn, Cotton, and Peanut (2)
Maintenance of Cropping System Trials Including Tall Fescue and Agronomic Crops (2)
Nitrogen Contribution of Peanut and Soybean to Corn, Cotton, and Tobacco (7)
Weed Management in Cropping Systems that Include Cotton, Peanut, Soybean, Sweet Potato, and Tobacco (2)

Objective 5. *To determine yield and economics of seeding rates in twin and single rows with commercially available varieties.*

This experiment included 3 levels of variety (Bailey, Sullivan, Wynne), two levels of plant population (4 and 6 plants per foot of row), and two levels of Apogee (with and without two applications). This experiment was conducted at one location.

Objective 6. *Assisting Cooperative Extension agents with pod maturity clinics.*

Digital images of crop maturation and heat unit accumulation from several trials and locations across North Carolina during August, September and October were provided to agents.

Objective 7. *Enhancing Cooperative Extension Service agent expertise in managing peanut.*

Four agent training sessions occurred during 2017. One in-class session was conducted in January in combination with cotton. An in-field session was also conducted with cotton in June to compare weed and thrips control programs in peanut and discuss herbicide injury symptoms. Two additional training sessions were conducted in late August to discuss late-season disease management and crop maturation.

The following peer-reviewed articles and abstracts/proceeding entries at conferences have been published in the scientific literature over the past year and in most cases is the result of research linked to this project.

Peer-reviewed articles related to peanut:

Jordan, D.L., T. Corbett, C. Bogle, B. Shew, R. Brandenburg, and W. Ye. 2017. Effect of previous rotation on plant parasitic nematode population in peanut and crop yield. J. Crop, Forage, and Turfgrass Management. Vol. 3: doi:10.2134/cftm2016.12.0086.

Jordan, D.L., B.B. Shew, and R.L. Brandenburg. 2017. Peanut response to acephate, *Bradyrhizobia* inoculant, and prothioconazole applied in the seed furrow at planting. J. Crop, Forage, and Turfgrass Management. Vol. 3: doi:10.2134/cftm2017.01.0007.

Jordan, D.L., T. Corbett, C. Bogle, B. Shew, and R. Brandenburg. 2017. Residual impact of tall fescue on corn, cotton, and peanut yield. J. Crop, Forage, and Turfgrass Management. Vol. 3: doi:10.2134/cftm2016.03.0024.

Chaudhari, S., D. Jordan, and K. Jennings. 2017. Peanut (*Arachis hypogaea* L.) response to carfentrazone-ethyl and pyraflufen-ethyl applied close to harvest. Peanut Sci. 44:47-52.

Abstracts or Proceedings at Conferences related to peanut: (7 total)

Hare, D.T., D.L. Jordan, M.D. Inman, and A.C. York. 2017. Influence of timing of weed management on weed control and yield of five agronomic crops. Proc. Southern. Weed Sci. Soc. (105)

Inman, M.D., D.L. Jordan, D.T. Hare, A.C. York, and M.C. Vann. 2017. Cotton and weed response to timing of herbicide application. Proc. Southern. Weed Sci. Soc. (117)

Britton, T., B. Barrow, J. Hurry, A. Cochran, L. Grimes, B. Royals, A.T. Hare, R.L. Brandenburg, and D.L. Jordan. 2017. Control of southern corn rootworm with chlorantraniliprole (Prevathon) applied at pegging. Proc. Am. Peanut Res. Ed. Soc. (in press)

Oakes, J.C., M. Balota, D.L. Jordan, and A.T. Hare. 2017. Examining the effect of seeding rate and digging date on yield of the peanut cultivars grown in the Virginia-Carolina region. Proc. Am. Peanut Res. Ed. Soc. (in press)

Mclean, B., B. Sandlin, B. Barrow, J. Hurry, M. Leary, M. Shaw, M. Carroll, T. Adams, A. Bradley, P. Smith, R. Thagard, A. Whitehead, B. Parish, J. Holland, T. Britton, J. Morgan, A. Cochran, C. Ellison, M. Huffman, M. Seitz, D. Lilley, L. Grimes, M. Malloy, D. King, R. Wood, A. Williams, T. Whaley, N. Harrell, D.L. Jordan, B.B Shew, R.L. Brandenburg, D.J. Anco, D.J. Croft, A. Warner, P. Dehond, H. Mikell, J. Varn, J. Crouch, M. Balota, H. Mehl, S.V. Taylor, J. Spencer, J. Reiter, and L. Preisser. 2017. Results from surveys on application variables associated with production and pest management in peanut in North Carolina, South Carolina, and Virginia. Proc. Am. Peanut Res. Ed. Soc. (in press)

Shew, B.B., M.C. Cannon, and D.L. Jordan. 2017. Response of the peanut cultivars Bailey and Sullivan to late season epidemics of Sclerotinia Blight. Proc. Am. Peanut Res. Ed. Soc. (in press)

Hare, A.T., D.L. Jordan, and T. Corbett. 2017. Potential for peanut in a wheat-peanut cropping system in North Carolina. Proc. Am. Peanut. Res, Ed. Soc. (in press)

Hare, D.T., D.L. Jordan, M.D. Inman, and A.C. York. 2017. Influence of timing of weed management on weed control and yield of five agronomic crops. Proc. Southern. Weed Sci. Soc. (105)

IMPACT STATEMENT

Approximately 85 trials were conducted during 2017 at the Peanut Belt Research Station, the Upper Coastal Plain Research Station, the Border Belt Tobacco Research Station, and off-station locations to compare a range of production and pest management practices. Experiments included: peanut response to inoculants; evaluation of planting dates; comparison of thrips management programs; comparison of timing, rates and sequence of applications of Apogee; peanut response to Quick-Sol and Peg Power; weed management with recently registered postemergence herbicides; comparison of cropping systems; southern corn rootworm control with Prevathon versus Lorsban; leaf spot control when fungicides are applied using nozzles delivering coarse versus fine droplets; and leaf spot control when chlorothalonil and copper fungicides are mixed with fungicides that are prone to evolved resistance. Results from these trials are provided to Cooperative Extension Service agents, farmers and others in agribusiness.