

**ANNUAL PROGRESS REPORT
TO
NORTH CAROLINA PEANUT GROWERS ASSOCIATION, INC.**

TITLE: Optimizing Peanut Production and Pest Management Through Applied Research and Extension Activities

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REPORT:

SUMMARY:

Forty-five trials were conducted during 2021 in North Carolina at the Peanut Belt Research Station, the Upper Coastal Plain Research Station, and the Border Belt Tobacco Research Station and with Cooperative Extension Service agents to compare a range of production and pest management practices. Experiments included: peanut response to inoculants; variety response to planting date, digging date, and prohexadione calcium; comparison of thrips management programs; production and pest management with different nozzles used throughout the growing season; yield of commercially-available Virginia, Runner, Spanish, and Valencia market types; influence of ground speed when digging in response to prohexadione calcium; peanut and weed response to herbicide programs; and leaf spot control and peanut yield with fungicide programs including Miravis and other recently released fungicides. Rotation trials that include a range of cropping sequences, tillage systems, and fescue were maintained at two research stations were maintained.

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.

Results from these trials are provided to NC State Extension agents, farmers and others in agribusiness. In addition, results from key trials are included in the annual NC State Extension *Peanut Information* series (AG-331), formal classroom instruction on campus or at county production meetings, Peanut Notes loaded on the NCCES portal (<https://peanut.ces.ncsu.edu/>) (231 to date in 2021), popular press articles (*V-C Peanut News*, *Peanut Grower* magazine), the peer-reviewed literature (*Peanut Science*, *Journal of Crop, Forage, and Turfgrass Management*, *Weed Science*, *MDPI Agronomy*), and at field days (*69th Annual North Carolina Peanut Field Day* and *10th Southeastern North Carolina Peanut Field Day*). Additionally, peanuts were featured on the annual CHROME and Northeast Ag Expo Field Day programs in June and July, respectively.

RESULTS AND DISCUSSION:

Six objectives were proposed in the activities of this grant. A summary of results from 2021 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 *2022 Peanut Information* and will be presented during county production meetings in February 2022 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 2021 with the number of times the trial was conducted in parenthesis (16 trials in total).

- Peanut Variety Response to Digging Date (1)
- Peanut Response to Planting Date (1)
- Yield of Virginia and Runner Market Types (1)
- Peanut Response to Apogee and Digging Speed (1)
- Peanut Response to Number of Apogee Applications (4)
- Peanut Response to Inoculants (4)
- Peanut Response to Gypsum Products (1)
- Peanut Response to Foliar Fertilizer (3)

Peanut variety response to digging date was similar over 4 digging dates initiated in early September through mid-October. Emery yielded greater than Bailey II, Sullivan or Walton. Bailey II and Sullivan yielded the same and greater than Walton. In similar work in 2020, Walton yielded more than Bailey II, Emery or Sullivan. Seed quality was lower for Walton in 2021 and this may have contributed to lower yield compared with other varieties.

Yield of Bailey II was greater when planted in May compared with June. No differences yield were noted when comparing planting dates within both months. The runner market types TUFrunner 297 and TUFrunner 511 yielded similar to Bailey II and Emery but were dug 2 weeks later than the Virginia market types. These varieties yielded more than Sullivan and Walton and the nematode-resistant runner market type TifNV-High O/L.

In small-pot research there was no difference in yield when peanut was dug at 2.6 mph versus 4.0 mph. Apogee did not affect yield regardless of digging speed.

The product Pro-Gyp as a banded application performed the same as a traditional broadcast application.

In rotated fields, inoculant did not affect peanut yield compared with non-inoculated peanut in 4 trials. Foliar fertilizers did not affect peanut yield at two locations.

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 2021 with the number of times the trial was conducted in parenthesis (16 trials in total).

- Influence of Rye Cover Crop on Pest Management in Peanut (2)
- Thrips Control with In-furrow and Postemergence Systemic Insecticides (1)
- Interactions of Acephate and Contact and Residual Herbicides (2)
- Leaf Spot Control with Fungicides Applied to Bailey II, Emery and Sullivan (3)
- Duration of Leaf Spot Control with Miravis (3)
- Duration of Leaf Spot Control with Miravis Applied to Different Varieties (3)

Season-Long Pest Management using TTI and Flat Fan Nozzles (2)

Bailey II was less susceptible to leaf spot than Sullivan or Emery; Sullivan was less susceptible than Emery. The fungicide program that was the most consistent across three locations included chlorothalonil applied at the first and fifth spray (5-spray program) with three sprays of chlorothalonil plus tebuconazole applied for sprays 2-4. Other programs that performed well included chlorothalonil-Miravis plus Elatus-Provost Silver-chlorothalonil and chlorothalonil-Provost Silver-Revytek-Lucento-chlorothalonil.

A follow up application of fungicide at 3, 4 and 5 weeks after Miravis plus Elatus was compared at three locations. At Whiteville, control by Miravis plus Elatus was greater when the interval after the initial application was decreased. At Rocky Mount and Lewiston-Woodville, the interval between Miravis plus Elatus and the follow up spray did not result in differences in leaf spot incidence at harvest.

Peanut yield was similar when all pesticides and micronutrients were applied throughout the season using nozzles delivering large droplets (TTI nozzles) or nozzles delivering smaller droplets (regular flat fan nozzles).

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 2021 with the number of times the trial was conducted in parenthesis (10 trials in total).

Evaluations of Anthem Flex and other Residual Herbicides (5)
Compatibility of Clethodim Applied with Miravis and 2,4-DB (1)
Evaluation of Salvage Treatments for Weed Control (1)
Influence of Previous Cropping System and Herbicides on Weed Populations in Peanut (3)

Palmer amaranth, common ragweed, and annual grass control was similar with most residual herbicides (Dual Magnum, Warrant, Outlook, Zidua, Anthem Flex) when applied with Gramoxone plus Basagran or Storm plus Gramoxone. These residual herbicides did not affect annual grass control with clethodim or emerged Palmer amaranth control with 2,4-DB.

Objective 4. To continue rotation and tillage trials in order to develop more effective cropping systems. The following trials were maintained during 2021 with the number of locations for each trial in parenthesis (6 trials in total). Peanuts were included in two trials during 2021.

Determining Peanut Yield in Long-term Cropping System Trials with Corn, Cotton, Peanut, and Soybean (2)
Determining Peanut Yield in Tillage and Rotation Trials Including Corn, Cotton, and Peanut (2)
Determining Peanut Yield in Cropping System Trials Including Tall Fescue and Agronomic Crops (2)

Cotton (rotation) or corn (tillage and rotation) was planted in these trials during 2020. Peanuts were planted in all plots during 2021 to determine if Velum Total suppresses nematodes. In 2019, Velum Total had no effect on root knot nematode in peanut in four trials. Samples sent to the NCDA&CS Nematode Lab are currently being processed.

Objective 5. Assisting NC State 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 and posted

as *Peanut Notes* on the Extension portal for peanuts.

Objective 6. Enhancing NC State Extension agent expertise in managing peanut.

Three agent training sessions occurred during 2021. One in-person session was held in January and June in combination with cotton. One sessions was held in late-summer to address disease management issues. A formal class was held with corn, cotton, peanut, soybean, and tobacco. Approximately 25 students attended each session (June and September).

The following peer-reviewed articles in the scientific literature as well as abstracts and proceedings at professional conferences linked to this project in North Carolina are provided below for 2021. Extension publications linked to this project in North Carolina are also provided.

Peer-reviewed Articles (3)

Mahoney, D.J., D.L. Jordan, A.T. Hare, R.G. Leon, N. Roma-Burgos, M.C. Vann, K.M. Jennings, W.J. Everman, and C.W. Cahoon. 2021. Palmer amaranth (*Amaranthus palmeri*) growth and seed production when in competition with peanut and other crops in North Carolina. *Agronomy*, 11, 1734. [https:// doi.org/10.3390/agronomy11091734](https://doi.org/10.3390/agronomy11091734)

Monfort, S., A. Culbreath, M. Abney, R. Brandenburg, B. Royals, D. Jordan, A. Herbert, Jr., S. Taylor, and Sean Malone. 2021. Effect of thiamethoxam seed treatment on injury from tobacco thrips, incidence of spotted wilt disease, and peanut yield. *J. Crop, Forage, and Turfgrass Management*. (in press)

Brandenburg, R., B. Royals, S. Taylor, S. Malone, D. Jordan, and A. Hare. 2021. Tobacco thrips and peanut response to imidacloprid and fluopyram. *J. Crop, Forage, and Turfgrass Management*. (in press)

Abstracts and Proceedings (4)

Foote, W., T. Hardiman, D.L. Jordan, and M. Balota. 2021. Interesting issues associated with varieties and seed quality in North Carolina and Virginia over the past decade. *Proceedings 53nd Annual Meeting American Peanut Research and Education Society*. (in press)

Foote, E. and D.L. Jordan. 2021. Interactions of foliar applied herbicides with residual herbicides and fungicides. *Proceedings 53nd Annual Meeting American Peanut Research and Education Society*. (in press)

Jordan, D.L. 2021. Influence of heat unit accumulation and low temperatures on pod maturation: an example from North Carolina during the 2020 growing season. *Proceedings 53nd Annual Meeting American Peanut Research and Education Society*. (in press)

Royals, B. and R.L. Brandenburg. 2021. Thrips and peanut response to imidacloprid and fluopyram applied at planting. *Proceedings 53nd Annual Meeting American Peanut Research and Education Society*. (in press)

Extension Publications (11)

Washburn, D. and D.L. Jordan. 2021. Peanut production budgets. Pages 2-15 *in* 2021 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 186 pages.

Jordan, D.L. and B. Foote. 2021. Peanut seed. Pages 17-20 *in* 2021 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 186 pages.

Jordan, D.L. 2021. Peanut production practices. Pages 21-46 *in* 2021 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 186 pages.

Jordan, D.L. 2021. Peanut weed management. Pages 47-82 *in* 2021 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 186 pages.

Jordan, D.L. and B. Sutter. 2021. Guidelines for the North Carolina peanut production contest and 5,000 pound club. Pages 162-167 *in* 2021 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 186 pages.

Jordan, D.L., B.B. Shew, and R.L. Brandenburg. 2021. Compatibility of agrochemicals applied to peanut. Pages 168-175 *in* 2021 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 186 pages.

Jordan, D.L. 2021. Peanut growth and development and peanut industry terminology. Pages 176-180 *in* 2021 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 186 pages.

Jordan, D.L., B.B. Shew, R.L. Brandenburg, and G. Buol. 2021. Risk of pests in peanut, integrated pest management, and pesticide stewardship. Pages 181-186 *in* 2021 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 186 pages.

Castillo, M., C.R. Crozier, K.L. Edmisten, M. Vann, R.W. Heiniger, D.L. Jordan, D.L. Osmond, A. Post, R. Vann, L.C. Gatiboni, and D.H. Hardy. 2021. Lime and fertilizer suggestions - field, pasture, and hay crops. Pages 42-44 *in* 2021 North Carolina Agricultural Chemicals Manual. The College of Agriculture and Life Sciences, North Carolina State University, Raleigh, NC.

Jordan, D. 2021. Chemical weed control in peanuts. Pages 272-278 *in* 2021 North Carolina Agricultural Chemicals Manual. The College of Agriculture and Life Sciences, North Carolina State University, Raleigh, NC.

Jordan, D. 2021. Growth regulators for peanut. Page 433 *in* 2021 North Carolina Agricultural Chemicals Manual. The College of Agriculture and Life Sciences, North Carolina State University, Raleigh, NC.

IMPACT STATEMENT

In addition to the publications listed above, results from these projects support the historical mission of the land grant system through research, extension, and academic programs with emphasis on peanut. And, results from these trials are provided to NC State Extension agents, farmers and others in agribusiness. In addition, results from key trials are included in the annual NC State Extension *Peanut Information* series, formal classroom instruction on campus or at county production meetings, Peanut Notes loaded on the NCCES portal (<https://peanut.ces.ncsu.edu/>) (231 to date in 2021), popular press articles (*V-C Peanut News*, *Peanut Grower* magazine), the peer-reviewed literature (*Peanut Science*, *Journal of Crop, Forage, Turfgrass Management*, *Weed Science*, *MDPI Agronomy*), and at field days (combined 69th Annual North Carolina Peanut Field Day and 10th Southeastern North Carolina Peanut Field Day).