

**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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DEPARTMENT(S): Crop and Soil Sciences,¹ Entomology & Plant Pathology,² Biological & Agricultural Engineering³

REPORT:

SUMMARY:

Sixty trials were conducted in 2023 in North Carolina at the Peanut Belt Research Station, the Upper Coastal Plain Research Station, and at on-farm locations to compare a range of production and pest management practices. Experiments included: peanut response to inoculants; peanut response to planting date; peanut response to prohexadione calcium; comparison of thrips management programs in peanut; efficacy of foliar-applied insecticides for southern corn rootworm control, yield of commercially-available Virginia, Runner, and Spanish market types; peanut and weed response to herbicide programs; leaf spot control and peanut yield with fungicide programs including microionized sulfur; response of leaf spot and peanut to cereal rye; and determining the interrelationship of peanut damage caused by zinc with soil pH and zinc levels. Rotation trials that include a range of cropping sequences, tillage systems, and fescue were maintained at two research stations were maintained with soybean planted in all plots in 2023.

Virtually all of the trials were conducted in cooperation with other research and extension faculty at NC State or 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. Results from key trials will be presented in the annual NC State Extension Peanut Information series (AG-331), during formal classroom instruction on campus or at county production meetings, in *Peanut Notes* posted on the NC State Extension portal (<https://peanut.ces.ncsu.edu/>) (250 to date in 2023), in popular press articles (*V-C Peanut News*, *Peanut Grower* magazine), and in the peer-reviewed literature (*Peanut Science*, *Journal of Crop, Forage, and Turfgrass Management*). Findings were discussed at field days in 2023 including the Annual North Carolina Peanut Field Day (Lewiston-Woodville), Southeastern North Carolina Peanut Field Day (Columbus and Bladen County On-Farm locations), CHROME Field Day (Lewiston-Woodville), and Northeast Ag Expo (Gates County). A late-season peanuts disease and harvest tour was conducted in late September at Lewiston-Woodville.

RESULTS AND DISCUSSION:

Six objectives were proposed in the activities of this grant. A summary of key results that are available from 2023 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. Results will be included in various chapters of *2024 Peanut Information* and will be presented during county production meetings in February 2024 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* on the Peanut Extension portal.

Objective 1. To develop solutions to agronomic issues associated with peanut production in North Carolina.

The following trials were conducted during 2023 with the number of times the trial was conducted in parenthesis (24 trials in total).

Peanut Response to Planting Date (1)
Peanut Response to Prohexadione Calcium Formulations (4)
Interactions of Prohexadione Calcium Formulations and Fungicides (3)
Peanut Response to Inoculants (2)
Peanut Response to Soil Stimulants and Micronutrients (1)
Yield of Commercially Available Varieties under Drip Irrigation (1)
Yield of Spanish and Virginia Market Types (1)
Peanut Response to Soil pH, Inoculant, and Gypsum (1)
Influence of Digging Date on Freeze Damage (2)
Comparison of Basalt and Ag Lime on Cotton and Corn Yield in a Peanut Rotation (1)
Relationship of Soil pH and Zinc Concentration in Soil (7)

Peanut yield for Bailey II was the greatest when planted in early May and mid-May compared with planting in early, mid or late June.

Peanut yield was not affected differently by formulations of prohexadione calcium.

Few differences in peanut yield were noted when peanuts were treated with commercially available inoculants in rotated ground. The insecticide Vydate was compatible with inoculants.

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 2023 with the number of times the trial was conducted in parenthesis (21 trials in total). In the absence of faculty in the Department of Entomology and Plant Pathology conducting research (Dr. Barbara Shew retired in 2020), this project conducted applied research in the area of peanut pathology from 2020 to 2023. One goal of this effort was to maintain interest from the agribusiness community in disease management work in peanuts at NC State. Clemson and Virginia Tech have excellent plant pathologists in place and industry could rely more heavily on those states if a presence in North Carolina was not maintained. This could have been the case even though North Carolina has more acres of peanuts than these states. Dr. LeAnn Lux joined NC State in July 2023 and will have responsibilities for disease management in peanut. In addition, this project supports Dr. Brandenburg's research program by assisting with planting and in most years with harvest. In 2023, this project conducted trials that complemented Dr. Brandenburg's efforts to determine the effectiveness of the insecticides Steward and Brigade on the adult insect (spotted cucumber beetle) that lays eggs that hatch into larva that ultimately feed on pods (southern corn rootworm).

Influence of Rye Cover Crop on Pest Management in Peanut (2)
Influence of Rye Cover Crop on Leaf Spot Control Comparing Chlorothalonil and Sulfur (2)
Influence of Rye Cover Crop and Rescue Fungicide Treatments on Leaf Spot (1)
Influence of Variety on Leaf Spot Control with Various Fungicide Programs (1)
Nematode Suppression with Propulse (1)
Thrips Control with In-furrow and Postemergence Systemic Insecticides (1)
Duration of Leaf Spot Control with Miravis Depending on Start Date (1)
Efficacy of Commercial Fungicide Treatments (8)
Southern Corn Rootworm Control with Foliar Insecticides (2)
Influence of Apogee on Leaf Spot Development in Peanut (1)
Comparison of Peanut Yield when Digging is Delayed at Various Levels of Leaf Spot (1)

Data from these trials are being analyzed and findings will be discussed at winter production meetings and posted on the Peanut Extension Portal. Of particular note is the finding that Miravis plus Elatus controls Sclerotinia blight well.

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 2023 with the number of times the trial was conducted in parenthesis (10 trials in total).

Evaluation of Brake Herbicide (5)
Evaluation of Anthem Flex and other Residual Herbicides (1)
Evaluation of New BASF PPO Inhibitor in Peanut in Virginia and Runner Market Types (1)
Potential for the Herbicide Command in Peanut Weed Management (1)
Weed Seed Production When Removed from Fields at Various Stages of Development (2)

Control of Palmer amaranth, common ragweed, and annual grasses with Brake applied with other residual herbicides was similar in many cases compared with control by Valor SX plus other residual herbicides.

Objective 4. To continue rotation and tillage trials in order to develop more effective cropping systems.

The following trials were maintained during 2023 with the number of locations for each trial is parenthesis (6 trials in total).

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)

Soybean was planted in all plots in 2023 in both full-season and double cropping with wheat. In 2024, peanut will be planted to determine impact of soybean on peanut yield and pest reaction following these soybean production systems.

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.

Two agent training sessions were conducted in 2023. One in-person session was held in January and June in combination with cotton.

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 2023. Extension publications linked to this project in North Carolina are also provided.

Peer-reviewed Articles (4)

Mahoney, D.J., D.L. Jordan, R. Leon, F.H. Oreja, and N. Roma-Burgos. 2023. Fecundity and maternal effects on Palmer amaranth height following season-long interference in corn, cotton, and peanut. *Crop, Forage, and Turfgrass Management*. <https://doi.org/10.1002/cft2.20233>.

Oreja, F.H., A.T. Hare, D.L. Jordan, and R.G. Leon. 2023. Previous crop and herbicide timing application effects on weed population growth rate. *Crop, Forage, and Turfgrass Management*. <https://doi.org/10.1002/cft2.20232>.

Moore, L.D., K.M. Jennings, D.W. Monks, M.D. Boyette, R.G. Leon, D.L. Jordan, S.J. Ippolito, C.D. Blankenship, and Patrick Chang. 2023. Evaluation of electrical and mechanical Palmer amaranth (*Amaranthus palmeri*) management in cucumber, peanut, and sweetpotato. *Weed Technology*. 37:53-59.

Jordan, D.L., B.B. Shew, R.L. Brandenburg, D. Anco, and M. Balota. 2023. Summary of tillage practices in peanut in Virginia-Carolina region of the United States. *Crop, Forage, and Turfgrass Management*. <https://doi.org/10.1002/cft2.20222>.

Abstracts and Proceedings (11)

BARROW, B., C. ELLISON, L. GRIMES, A. COLF, R. GURGANUS, M. STRICKLAND, L. MILES, M. CARROLL, D. KING, S. JALAI, P. SMITH, B. PIKE, B. PARRISH, T. BRITTON, D. LILLEY, H. WALLACE, L. CHILDERS, J. MORGAN, J. KENNEDY, L. GRIMES, M. WATERS, M. HUFFMAN, M. SEITZ, J. HARRELL, M. SMITH, A. GROVE, M. MALLOY, R. WOOD, J. WARD, D. ANDERSON, T. BATTS, J. ANDERSON, Z. PARKER, R. BRANDENBURG, D. REISIG, and D.L. JORDAN. 2023. Summary of Production Practices by Top Growers in North Carolina in 2022. *Proceedings American Peanut Research and Education Society*. (in press)

BRANDEBURG, R., B. ROYALS, D. REISIG, and D.L. JORDAN. 2023. Change in Thrips Suppression by Imidacloprid in North Carolina from 2013-2022. *Proceedings American Peanut Research and Education Society*. (in press)

BUOL, G.S., and D.L. JORDAN. 2023. A Tool to Estimate the Financial Value of Digging Based on Pod Maturity. *Proceedings American Peanut Research and Education Society*. (in press)

ELLISON, C., A. COLF, B. BARROW, R. GURGANUS, M. STRICKLAND, L. MILES, M. CARROLL, D. KING, S. JALAI, P. SMITH, B. PIKE, B. PARRISH, T. BRITTON, D. LILLEY, H. WALLACE, L. CHILDERS, J. MORGAN, J. KENNEDY, L. GRIMES, M. WATERS, M. HUFFMAN, M. SEITZ, J. HARRELL, M. SMITH, A. GROVE, M. MALLOY, R. WOOD, J. WARD, D. ANDERSON, T. BATTS, J. ANDERSON, Z. PARKER, R. BRANDENBURG, D. REISIG, D.L. JORDAN, L. PREISSER, N. CLARK, E. COOPER, M. PARRISH, S. REITER, S. RUTHERFORD, M. BALOTA, D. LANGSTON, S. MALONE, and D. ANCO. 2023. Summary of Practices Associated with Key Pests and Digging Peanut in the Virginia-Carolina Region in 2022. *Proceedings American Peanut Research and Education Society*. (in press)

FOOTE, E., D.L. JORDAN, J. DUNNE, A. GORNEY, and D. REISIG. 2023. Comparison of Pest Management Practices in Peanut Planted into a Cereal Rye Cover Crop. Proceedings American Peanut Research and Education Society. (in press)

FOOTE, E., D.L. JORDAN, J. DUNNE, A. GORNEY, and D. REISIG. 2023. Influence of Variety and Tillage Practices on Leaf Spot Control with Sulfur. Proceedings American Peanut Research and Education Society. (in press)

GRIMES, L., B. BARROW, C. ELLISON, L. GRIMES, D. ANDERSON, M. LEARY, D.L. JORDAN, B. STEVENS, M. BRAKE, S. DEAL, and L. RANSOM. 2023. Summary of Large-Plot Trials in North Carolina in 2022. Proceedings American Peanut Research and Education Society. (in press)

BUOL, G.S., and D.L. JORDAN. 2023. Introduction of a Herbicide Selector Tool for Peanut. Proceedings American Peanut Research and Education Society. (in press)

SMITH, M. and D.L. JORDAN. 2023. Contrasting 2021 and 2022 Growing Seasons in Pitt County, North Carolina. Proceedings American Peanut Research and Education Society. (in press)

SEELY, T., J. DUNNE, D. JORDAN, and R. FERNANDEZ. 2023. Speed Breeding of Peanut for Faster Improvement in Cultivar Development. Proceedings American Peanut Research and Education Society. (in press)

GARRITY, N., J. DUNNE, R. ANDRES, R. AUSTIN, D. JORDAN, and C. YENCHO. 2023. Computer vision method for size characterization of pods in Peanut (*A. hypogaea*). Proceedings American Peanut Research and Education Society. (in press)

Extension Publications (11)

Washburn, D. and D.L. Jordan. 2023. Peanut production budgets. Pages 2-15 *in* 2023 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 202 pages.

Jordan, D.L. and D. Auman. 2023. Peanut seed. Pages 16-19 *in* 2023 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 202 pages.

Jordan, D.L. 2023. Peanut production practices. Pages 20-47 *in* 2023 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 202 pages.

Jordan, D.L. 2023. Peanut weed management. Pages 48-82 *in* 2023 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 202 pages.

Jordan, D.L. and A. Collins. 2023. Guidelines for the North Carolina peanut production contest, 5,000 pound club, and group of sixty. Pages 166-172 *in* 2023 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 202 pages.

Jordan, D.L., B.B. Shew, R.L. Brandenburg, and D. Reising. 2023. Compatibility of agrochemicals applied to peanut. Pages 173-180 *in* 2023 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 202 pages.

Jordan, D.L. 2023. Peanut growth and development and peanut industry terminology. Pages 181-185 *in* 2023 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 202 pages.

Jordan, D.L., B.B. Shew, R.L. Brandenburg, D. Reisig, and G. Buol. 2023. Risk of pests in peanut, integrated pest management, and pesticide stewardship. Pages 186-193 *in* 2023 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 202 pages.

Jordan, D. 2023. Growth regulators for peanut. Page 456 *in* 2023 North Carolina Agricultural Chemicals Manual. The College of Agriculture and Life Sciences, North Carolina State University, Raleigh, NC.

Jordan, D. 2023. Chemical weed control in peanuts. Pages 286-292 *in* 2023 North Carolina Agricultural Chemicals Manual. The College of Agriculture and Life Sciences, North Carolina State University, Raleigh, NC.

Castillo, M., 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. 2023. Lime and fertilizer suggestions - field, pasture, and hay crops. Pages 42-45 *in* 2023 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. 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/>) (249 to date in 2023), popular press articles (*V-C Peanut News*, *Peanut Grower* magazine), the peer-reviewed literature (*Peanut Science*, *Journal of Crop, Forage, Turfgrass Management*), and at field days (*Annual North Carolina Peanut Field Day*, *Southeastern North Carolina Peanut Field Day*, *CHROME Field Day*, Northeast Ag Expo, and *Late-Season Peanut Disease and Harvest Tour*).