

## **Establishing Elements of an Organic Peanut Value Chain in North Carolina**

Five objectives were developed for this research project. A summary of activities and results for each of these will follow. The major expenditure on the grant was salary for a PhD student. Based on the overall needs of project, the student is pursuing her degree in food science/nutrition with a minor in crop science. Amanda Kaufman, the student on this grant, began her PhD program at NC State University in January 2017. She is scheduled to complete her PhD in late spring 2020. The student passed her preliminary exam in October 2019. Funding for this student ends December 31, 2019. The student will be funded through a teaching assistantship in spring 2020 in food science to complete her program. Operating funds were provided during the first two years of the project by the Ag Foundation but not during year 3. USDA, through Dr. Lisa Dean's lab, has assisted with equipment and other supplies relative to food science-related expenditures and technical support. Funds associated with expenses for field research have been supplemented through grants from the North Carolina Peanut Growers Association (David Jordan, PI).

Objective 1. Facilitate certification at each step of production, shelling, and processing organic peanut.

Contacts with individuals in the peanut community continue to be established so that the facility that prepares peanut for sale and distribution is certified organic. However, this process has been hampered because the organic producers we have partnered with have failed to produce any peanuts in all three years of the project. The reasons for this failure were outlined initially in the *2019 Peanut Information* AG-331 series (the NC State Extension guide to peanut production in North Carolina) and more recently in a new organic production manual entitled: *North Carolina Organic Commodities Production Guide* AG-660 available at: <https://content.ces.ncsu.edu/north-carolina-organic-commodities-production-guide>.) This project provided seed, inoculant and expertise to two farmers. Weather conditions have been the major detriment to establishment of organic peanut and underscore how challenging this process can be.

Objective 2. Prepare a market assessment and production budgets for organic peanut.

The graduate student has been actively involved in this aspect of the project. She has been included in planning and administering surveys to determine both market appeal for various organic peanut products and ways NC farmers can tap into these markets. These surveys are regional in nature with questions relative organically-produced, in-shell peanuts. The complexity of certification at all steps through the supply chain is challenging. The current thought is that growers should market their peanut to buyers prior to shelling, allowing risks associated with handling and certification to be

experienced by the buyer. Over time it may be possible for a group of farmers growing peanut organically to become vertically integrated.

A second survey was administered at county peanut production meetings in North Carolina and at state peanut production meetings in South Carolina and Virginia during January and February 2019 to determine perceptions and interests of growers currently producing peanut with conventional practices in growing peanuts based OMRI requirements for organic production. We also attempted to receive information from organic growers to determine their interest in growing peanut on three occasions. The first attempt was at the organic commodity conference in winter 2019. A second attempt was at the organic field day in summer 2019. A final attempt included sending the survey to almost 400 people aligned with organic production using a list serve provided by Dr. David Suchoff in the Department of Crop and Soil Sciences.) Out of all of these three attempts, we received fewer than 10 completed surveys. This was very disappointing but may point out that organic growers are not interested in growing organic peanut.

The survey of peanut farmers in North Carolina, South Carolina, and Virginia indicated that 20% of the 218 farmers surveyed expressed interest in producing peanut organically. These farmers represent approximately one third of peanut acreage in the Virginia-Carolina region. Growers were asked what price differential between organic and conventional production was needed to consider organic production. Forty-seven percent of growers indicated that the price needed to be 3 times that of the conventional price. Nine, 27, and 16 percent of growers indicated that the price differential needed to be 1.5, 2, and 2.5 times higher for organic peanut. Six percent of growers indicated that peanut yield in organic and conventional production would likely be the same, while 26, 55, and 12 percent of growers indicated that yields in organic production would be 25, 50, and 75 percent lower than conventional production, respectively.

The ranking of limitations to organic production, in order of importance, was disease, weeds, insects, nematodes, stand establishment, and fertility. Growers also indicated that the primary infrastructure-related challenge associated with the transition to organic peanut production was the 3-year transition period. The certification process, establishing and maintaining markets for organic production, and maintaining segregation of organic and conventional produce were listed in order as other key challenges to organic peanut production.

Philosophically, 67% of growers indicated that if farmers could capture markets by producing organic peanuts it was a good idea. Twenty-one, 14, and 11 percent of growers indicated that presence of organic production suggests that there is a negative issue with conventional production, that organic production is safer than conventional production relative to the environment, and that organically-produced foods are safer,

respectively. Sixty-three percent of growers indicated that proponents of both organic and conventional production should be honest in their discussions about the benefits and challenges of both systems.

The IRB for the broader consumer survey is coming to completion and will be conducted in early 2020. Delays in implementing this survey were associated with unsuccessful attempts to gain funding to conduct a national survey. The consumer survey in early 2020 will focus more locally with emphasis on in-shell peanut.

A detailed chapter on organic peanut production was developed and published as chapter 7 in *North Carolina Organic Commodities Production Guide* AG-660 available at: <https://content.ces.ncsu.edu/north-carolina-organic-commodities-production-guide>.)

This chapter includes a budget on organic peanut production. The challenge with preparing this budget was that there are currently no farmers in North Carolina or surrounding states who have grown peanuts successfully under OMRI-approved recommendations. However, this chapter and budget serve as a good starting point for future efforts in this area. Derek Washburn (Department of Agricultural and Resource Economics) has been instrumental in assisting with the development of the organic peanut production budget.

Objective 3. Assist selected organic growers with incorporation of peanut into their operation.

We assisted one farmer in Nash County with his attempts at growing organic peanut. He is a successful organic farmer with substantial acreage of tobacco and sweetpotato. We had hoped to develop an accurate budget for organic peanut through work with this farmer. Weed control and stand establishment have long been considered the most difficult aspects of organic peanut production. The farmer planted 3 acres of non-treated peanut seed in late May 2017. While the later planting would most likely have enabled adequate stand establishment, the night after planting the field received more than 3 inches of rain. This prevented timely cultivation and annual grasses quickly dominated the field. A second rainfall event about one week later resulted in a complete weed control failure. Peanut production in this field was abandoned after the failure in weed control. In 2018, a weed control failure prevented production as well. In this case, the seedbed was prepared, but before planting occurred the field was inundated with weeds because of rain during the month of May. By the time the field dried, planting in mid-June was the only option, and activities related to sweetpotato and tobacco prevented the farmer from investing more time in peanut. A third attempt was made in 2019 to help the farmer grow peanuts using OMRI requirements. Time and logistical limitations with his operation prevented planting peanut. The farmer was sincere in his efforts and had even purchased a tine cultivator to control weeds in organic peanut. We assisted a second organic farmer in 2018 attempt to grow organic peanut. This attempt also failed.

The farmer made arrangements for someone to plant the peanuts, but this fell through at the last minute. In both cases, we helped the farmers by providing non-treated seed and OMRI-approved inoculant for their production. We were prepared to invest time and resources as the season progressed.

The inability to establish organic peanut in the field so that we could move peanut through the supply chain and to markets was very disappointing. We knew theoretically that organic peanut production can be difficult. This exercise underscored how challenging this is in reality. The graduate student will write a case study on these interactions. These experiences will be valuable in the future for individuals pursuing organic peanut production.

Objective 4. Establish a working group for organic peanut production.

The working group had its first meeting in spring 2017. This process was delayed from fall 2016 until spring 2017 so that the graduate student was not selected and was a key individual in the group. Rather than have a working group focus exclusively on peanut, the PI on this project is now linked with others in CALS working on larger-scale organic production issues. Through this linkage and working group, peanut will continue to be addressed as a possible organic crop. Greater exchange of ideas will occur in this manner rather than with an isolated peanut group.

The chapter on peanuts in the *North Carolina Organic Commodities Production Guide* will keep the idea of organic peanut production at the forefront of future projects.

Objective 5. Address production and pest management issues for organic peanut through research.

In 2016 a group of trials were completed (funded by the NCPGA) to determine the appropriate planting date for peanut in absence of commercial seed treatments in an effort to reduce seedling disease and minimize the impact of thrips injury. Results from these experiments are published in the peer-reviewed literature. In 2017 and 2018 in the current grant, research was expanded to determine the most effective seeding rate to ensure adequate stand establishment for organic peanut under different insect and disease-management practices. In addition to documenting pest and peanut response to treatments in the field, peanut pods were collected and provided to a sensory panel to compare peanut quality. Chemical analyses were also performed to determine if pest management practices affected the nutritional components of peanut.

The goal of this research is to determine the most effective production package that delivers high quality, high oleic peanut for the organic market. A part of this research also includes determining the impact of harvest date on expression of the high oleic trait. The graduate student has completed data analysis and is in the process of

preparing manuscripts for publication and her dissertation. Results suggest that under the best of circumstances (weeds were controlled with herbicides), the combination of less effective disease and insect control in the organic system results in yield that is approximately 50-75% of yield in conventional systems. When combined with risk of complete weed control failure, results point to major challenges and great risk of this endeavor.

Publications Associated with this project: (A. Kaufman is the graduate student funded through this project)

### **Contributions to the Literature:**

#### ***Extension Guides:***

Jordan, D.L., B.B Shew, R.L. Brandenburg, C. Reberg-Horton, S.G. Bullen, D. Washburn, **A. Kaufman**, L. Dean, and B. Sutter. 2019. Chapter 7: Crop production management – peanuts. *IN* North Carolina Organic Commodities Production Guide, North Carolina Cooperative Extension Service Publication AG-660.

Jordan, D.L., B.B Shew, R.L. Brandenburg, C. Reberg-Horton, S.G. Bullen, D. Washburn, **A. Kaufman**, L. Dean, and B. Sutter. 2019. Organic peanut production. Pages 182-191 *in* 2019 Peanut Information. North Carolina Cooperative Extension Service Publication AG-331. 193 pages.

#### ***Abstracts and Proceedings:***

**Kaufman, A.A.**, L.L. Dean, D.L. Jordan, A.T. Hare, B.B. Shew, R.L. Brandenburg, and B.R. Royals. 2018. Quality and flavor profile following various pesticide inputs in peanut (*Arachis hypogaea* L.) grown in North Carolina. Proc. Am. Peanut Res. Ed. Soc. 50:26.

**Kaufman, A.A.**, L.L. Dean, and D.L. Jordan. 2019. The influence of digging date on fatty acid and tocopherol expression in normal and high-oleic Virginia peanut varieties grown in North Carolina. Proc. Am. Peanut Res. and Ed. Soc. 51:63.

**Kaufman, A.A.**, L.L. Dean, D.L. Jordan, and M.K. Booth. 2019. Assessing the composition of a high-oleic peanut cultivar grown in North Carolina using various pesticide inputs. Proc. Am. Peanut Res. and Ed. Soc. 51:139.

#### ***Peer-reviewed Articles: (papers are not a part of the current PhD student program)***

Mahoney, D.J., D.L. Jordan, R.L. Brandenburg, B.B. Shew, B.R. Royals, M.D. Inman, and A.T. Hare. 2019. Influence of planting date, fungicide seed treatment, and phorate on peanut in North Carolina. Peanut Sci. 46:14-21.

Mahoney, D.J., D.L. Jordan, R.L. Brandenburg, B.R. Royals, M.D. Inman, A.T. Hare, and B.B. Shew. 2018. Influence of planting date and insecticide on injury caused by tobacco thrips and peanut yield in North Carolina. *Peanut Sci.* 45:70-74.

***Proposed Dissertation Chapters:***

Perceptions and Interests of Conventional Peanut Grower with Respect Organic Peanut Production

Challenges with Organic Peanut Production: A Case Study of an Organic Producer in North Carolina

Consumer Interest in Organic Peanut in North Carolina

Pest Management, Yield, Flavor, and Chemical Composition of a High-Oleic Peanut Cultivar in North Carolina Using Various Levels of Pesticide Input

Expression of Fatty Acid and Tocopherol Composition of Three High Oleic Peanut Cultivars Associated with Category of Pod Mesocarp Color

***Graduate Student Recognition:***

Amanda Kaufman, the student funded by this grant, has been recognized as the top speaker in the graduate student oral presentation contest at the annual meeting of the American Peanut Research and Education Society in 2019.

***Impact:***

Activities on this project have resulted in an Extension guide to help farmers in their pursuit of organic peanut production. Limitations with respect to weed control and stand establishment were clearly evident in the process. Surveys of farmers and consumers will enable future efforts in this area to have a firmer foundation from which to proceed.