



North Carolina Ag Biotech: Economic Growth Report

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Contents

Economic Growth Report: Executive Summary	1
North Carolina Ag Biotech: Economic Growth Report.....	2
Ag Biotech in North Carolina.....	2
Ag Biotech Companies and Employees	2
Prospective Growth in Ag Biotech.....	4
NCBiotech Support for Ag Biotech	5
Ag-focused Biotech Awards Bring High Returns to North Carolina.....	5
Overview of Ag Industry in North Carolina.....	5
Agriculture/Agribusiness Value-Added Analysis	5
Diversity of Agricultural Production.....	6
Agricultural Feedstock & Chemicals Sector Analysis	7
Ag-related Degrees Awarded.....	8
Federal Ag-related Grant Funding for North Carolina	9
Plant-related Patents Granted in North Carolina.....	10
Appendix 1: Ag Biotech Companies/Sites Founded or Relocated to NC since 2010.....	11
Appendix 2: Full Prospective Growth Report.....	13
Prospective Ag Biotech Investments.....	13
Prospective Ag Biotech Job Announcements	14
Appendix 3: North Carolina Agriculture and Agribusiness Income	15
Economic Analysis 2009-2017 (data from 2007-2015)	15
Appendix 4: TEconomy Analysis.....	16
TEconomy's Agricultural Feedstock & Chemicals Sector Analysis' NAICS Codes.....	16
Appendix 5: Patent Classification.....	16
TEconomy's Patent Codes:	16
Appendix 6: Schedule for Updates	17

Economic Growth Report: Executive Summary

The AgBiotech Initiative at NCBiotech was formed in January 2010 to stimulate the growth of agricultural biotechnology in North Carolina to create new opportunities that generate jobs, strengthen the economy and produce the technologies and products that help meet the global demand for food, fuel, medicine and sustainable materials. North Carolina is the global hub of ag biotech with tremendous assets driving the development of new innovations in ag biotech, combining the state's two largest industries – agriculture and biotechnology. Ag biotech applies the tools of biotech to crops, livestock, forestry and marine life to produce more food, fuels, fiber and goods.

Ag Biotech in North Carolina

There are more than 100 ag biotech companies of all sizes in North Carolina, some with multiple sites in the state, spanning from the mountains (West) to the coast (East/Southeast). These companies are involved in diverse sectors from plant and animal health and productivity to environmental remediation, industrial compounds and human medicines. Many of these companies are experiencing major ag biotech innovation and industry expansions in North Carolina. Five of the world leaders in ag biotech have operations in North Carolina - BASF Plant Science, Bayer CropScience, DuPont Pioneer, Monsanto and Syngenta. Three have their global or North American headquarters located here - BASF Plant Science, Bayer CropScience, and Syngenta. Novozymes, a leading global industrial and agricultural enzymes company, also has their North American headquarters and BioAg operations in the state. Approximately 9300 North Carolina citizens are employed by ag biotech companies across the state.

NCBiotech Support for Ag Biotech

NCBiotech has awarded 398 ag biotech grants and 44 ag biotech loans totaling \$20,325,250 and \$3,774,671, respectively. Every \$1 invested in ag-related grants yields \$37.50 in additional funding, and every \$1 invested in ag-related loans yields \$287 in additional funding.

Overview of Ag Industry in North Carolina

North Carolina's agricultural industry, including food, fiber and forestry, contributes nearly \$84 billion annually to the State's economy, accounts for 17% of the State's income, and employs 16% of the work force.

North Carolina is one of the most diversified agriculture states in the nation. The state's 48,800 farms grow over 80 different commodities, utilizing 8.2 million of the state's 31 million acres to furnish consumers a dependable and affordable supply of food and fiber. North Carolina's agricultural industry provides over \$10.6 billion in annual cash receipts to the state, ranking 9th in the nation in cash receipts, and 6th in total farm income.

North Carolina is ranked by TEconomy among the 12 largest states with a “sizable” share of total U.S. employment in agricultural biotechnology.

The number of agriculture-related patents granted in North Carolina annually has more than doubled since 2010. Additionally, North Carolina was ranked 7th for USDA funding in FY2015, and has seen a 37% growth in the number of Agriculture-related degrees awarded annually.

North Carolina Ag Biotech: Economic Growth Report

Ag Biotech in North Carolina

The AgBiotech Initiative at NCBiotech was formed in January 2010 to stimulate the growth of agricultural biotechnology in North Carolina to create new opportunities that generate jobs, strengthen the economy and produce the technologies and products that help meet the global demand for food, fuel, medicine and sustainable materials. North Carolina is a global hub of ag biotech with tremendous assets driving the development of new innovations in ag biotech, combining the state's two largest industries – agriculture and biotechnology.

Ag biotech applies the tools of biotech to crops, livestock, forestry and marine life to produce more food, fuels, fiber and goods. Ag biotech uses a broad range of scientific techniques including hybridization, genetic modification, marker-assisted breeding, and micropropagation to create products with lower costs and less environmental impact.

Ag Biotech Companies and Employees

There are more than 100 ag biotech companies of all sizes in North Carolina, some with multiple sites in the state, working within a number of agricultural sectors (and some in multiple sectors) including¹:

- Animal Health and Nutrition (22)
- Biofuels and Biomass Conversion (13)
- Crop and Plant Protection (30)
- Environmental Biotechnology (5)
- Aquaculture and Marine Sciences (6)
- Crop and Plant Biotechnology (19)
- Crop Yield and Health (16)
- Food Processing and Production (7)

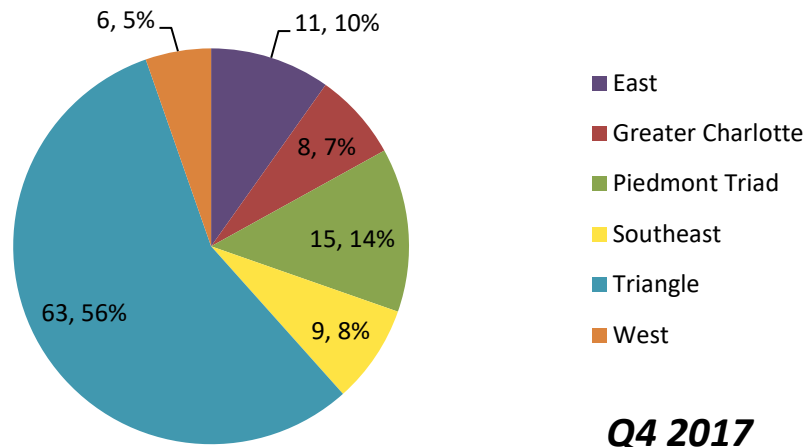
Five of the world leaders in ag biotech have operations in North Carolina - BASF Plant Science, Bayer CropScience, DuPont Pioneer, Monsanto and Syngenta. Three have their global or North American headquarters located here - BASF Plant Science, Bayer CropScience, and Syngenta. Novozymes, a leading global industrial and agricultural enzymes company, also has their North American headquarters and BioAg operations in the state.

North Carolina's 100+ ag biotech companies span from the mountains (West) to the coast (East/Southeast) with the majority calling the Triangle area home. Of the current ag biotech companies in North Carolina, 34 of them (31%) have been founded or relocated to the state since 2010.² You can find the full list of ag biotech companies and company sites in the online NCBiotech Company Directory: <http://ow.ly/rRj9H>.

¹ List does not include companies that are pure biotech with no ag focus.

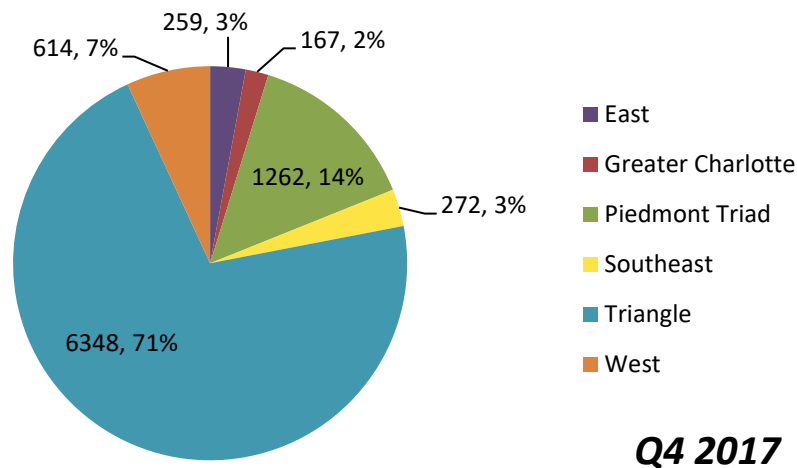
² Company names, websites, cities, and founding dates can be found in Appendix 1.

Ag Biotech Company Sites, by Region



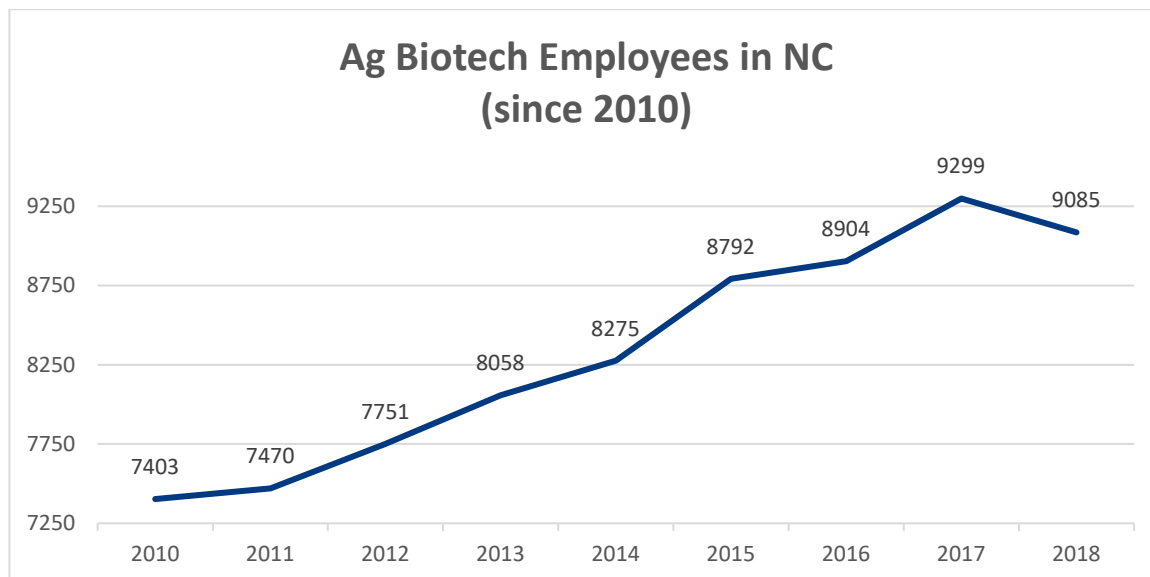
Approximately 9,085 North Carolina citizens are employed by ag biotech companies across the state.³

Ag Biotech Employees, by Region



³ Note: the figures below show the data split out by company site, therefore the employee totals add up to less than the total employed in North Carolina as a whole. This happens because some of the larger companies count employees acting as telecommuters or doing sales out of their home, working in NC but not at a specific site.

The total number of ag biotech employees in the state has increased from 7,403 to 9,085 since January 2010 (19.7% growth).



Prospective Growth in Ag Biotech⁴

Since 2010, there have been major ag biotech innovation and industry expansions in North Carolina:

- 14 ag biotech companies have announced more than \$694 million in prospective investments.
- 19 ag biotech companies have announced approximately 1405 prospective jobs.
- A number of these companies, including Bayer and Syngenta, have had multiple prospective investment and jobs announcements.

⁴ Details about prospective investments and jobs to be created can be found in Appendix 2.

NCBiotech Support for Ag Biotech

Ag-focused Biotech Awards Bring High Returns to North Carolina

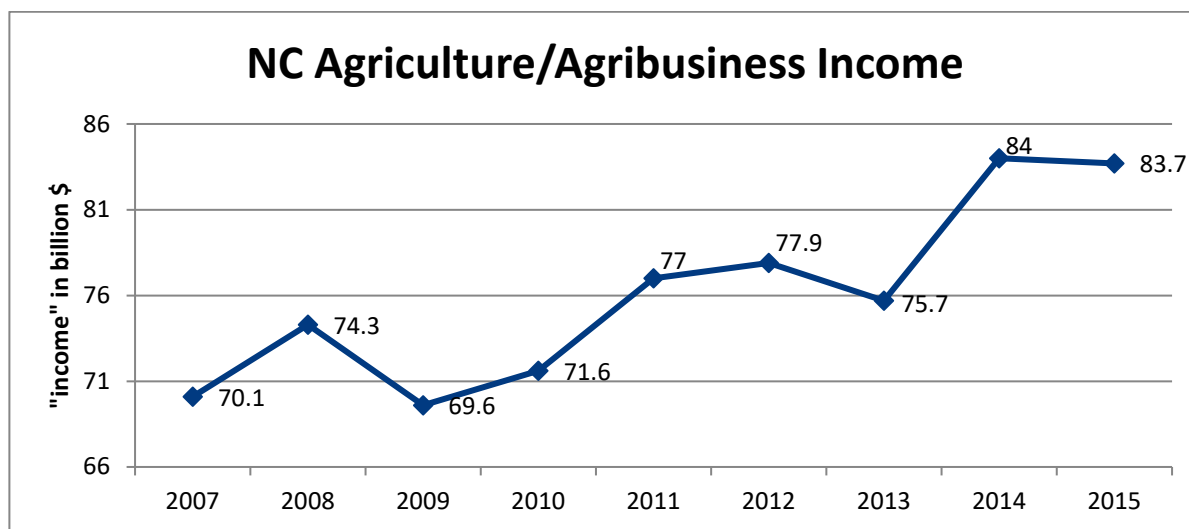
NCBiotech has awarded 398 ag biotech grants and 44 ag biotech loans totaling \$20,325,250 and \$3,774,671, respectively. Grant programs and low interest loans are available, <http://www.ncbiotech.org/funding>. Every \$1 invested in ag-related grants yields \$37.50 in additional funding, and every \$1 invested in ag-related loans yields \$287 in additional funding⁵.

Overview of Ag Industry in North Carolina⁶

North Carolina's agricultural industry, including food, fiber and forestry, contributes nearly \$84 billion annually to the State's economy, accounts for almost 17% of the State's income, and employs 686,000 of the state's 4.2 million employees, or about 16% of the workforce.

Agriculture/Agribusiness Value-Added Analysis

Dr. Michael L. Walden, Ph.D. is an agricultural and resource economics professor at NC State University and annually publishes an economic analysis of the impact of agriculture and agribusiness on the state. The most recent analysis from Dr. Walden shows that agriculture and agribusiness contributed nearly \$84 billion to North Carolina's economy in 2015, an increase of about twenty percent since 2007.



⁵ NCBiotech grants awarded and additional funding yielded are based on currently-tracked research grants (as of FY2017 this includes BRG, CFG, IDG, MRG, and TEG programs) through June 30, 2017. NCBiotech loans awarded and additional funding yielded through June 30, 2017.

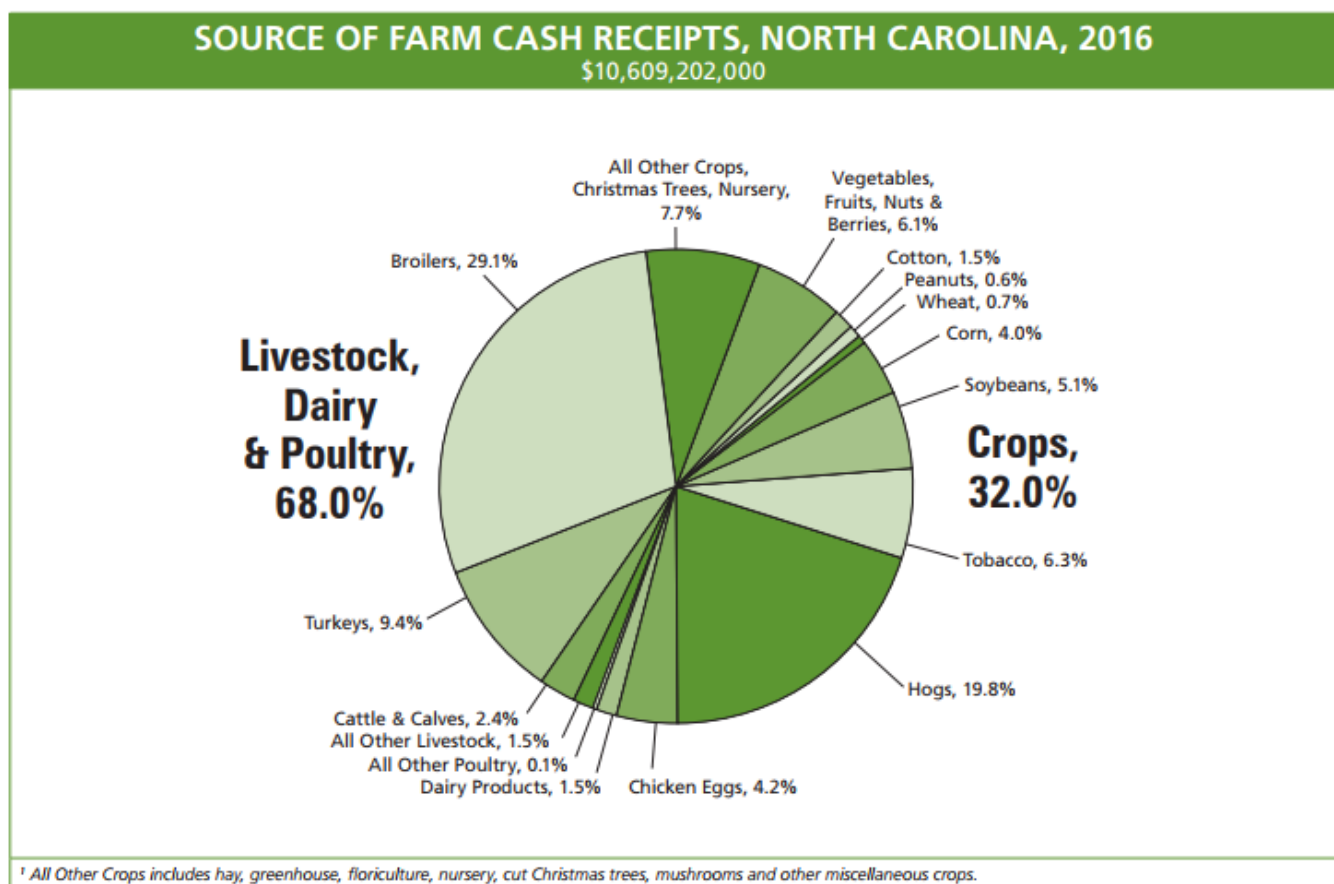
⁶ Walden, Michael. "Agriculture and Agribusiness: North Carolina's Number One Industry." NC State University College of Agriculture and Life Sciences, May 2017 (2015 data). <https://ag-econ.ncsu.edu/wp-content/uploads/2017/05/NCState-WaldenAgBusinessReport-051017.pdf> Details can be found in Appendix 3.

Diversity of Agricultural Production

North Carolina is one of the most diversified agriculture states in the nation. The state's 48,000 farms grow over 80 different commodities, utilizing 8.2 million of the state's 31 million acres to furnish consumers a dependable and affordable supply of food and fiber.⁷

North Carolina produces more tobacco and sweet potatoes than any other state and ranks second in the production of hogs, turkeys and trout. The state ranks 6th nationally in net farm income, though net farm income has recently seen a decrease from \$3.85 billion in 2014 to \$2.46 billion in 2016 Net income per farm in the state has correspondingly decreased from \$77,860 in 2014 to \$51,169 in 2016⁸

North Carolina's agricultural industry provides over \$10.6 billion in annual cash receipts to the state, from a wide variety of crops.



National rankings show that North Carolina is highly competitive in the following production areas;

⁷ "North Carolina Agricultural Statistics 2017." Annual publication of the NCDA&CS, based on data from USDA NASS. (shows 2016 statistics) <http://www.ncagr.gov/stats/AgStat/NCaStatBook.pdf>

⁸ "Farm finance indicators, state ranking 2014." USDA-ERS, Farm Income and Wealth Statistics database, 2014 data. Accessed 9 December 2015. <https://www.ers.usda.gov/data-products/farm-income-and-wealth-statistics/> [net income per farm was calculated from available data = net farm income / number of farms]

- #1 – tobacco, combined poultry & egg, and sweet potatoes
- #2 – hogs, trout and turkeys
- #3 – fresh market strawberries
- #4 – eggs, broilers/meat chickens, and pumpkin
- #5 – catfish and cucumbers

North Carolina farm income ranks 7th in overall livestock, dairy and poultry, and 17th in overall crops. North Carolina ranks 9th in the nation in total cash receipts.⁹

Agricultural Feedstock & Chemicals Sector Analysis

Every two years, TEconomy (formerly Battelle) and BIO publish a comparison of states based on various sectors of biotechnology. Here are the most recent results for North Carolina's "Agricultural Feedstock & Chemicals" sector.¹⁰

Industry Subsector	North Carolina		United States	
	2014	2012–2014 Change	2014	2012–2014 Change
Agricultural Feedstock and Chemicals				
Establishments	53	3.9%	1,811	2.2%
Employment	3,116	-4.7%	77,545	1.5%
Location Quotient	1.38		n/a	
Direct-Effect Employment Multiplier	17.7		18.4	
Total Employment Impact	55,030		1,432,125	
Average Annual Wage	\$88,908	1.9%	\$80,540	6.3%

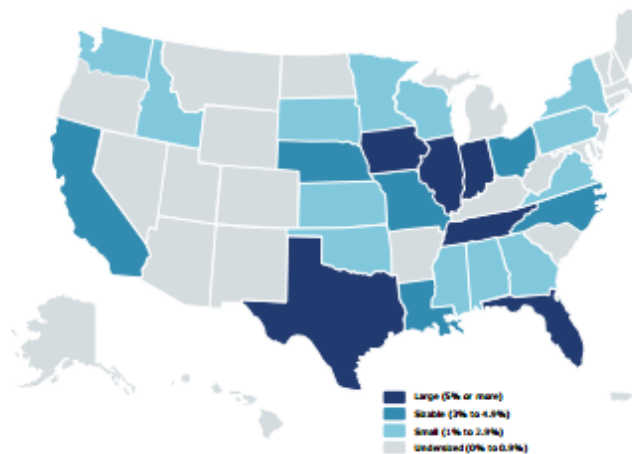
North Carolina is ranked among the 12 largest states with what Battelle defines as a "sizable" share of total U.S. employment in this sector and a specialized employment concentration.¹¹

⁹ "North Carolina Agricultural Statistics 2017." Annual publication of the NCDA&CS, based on data from USDA NASS. (shows 2016 statistics) <http://www.ncagr.gov/stats/AgStat/NCaStatBook.pdf>

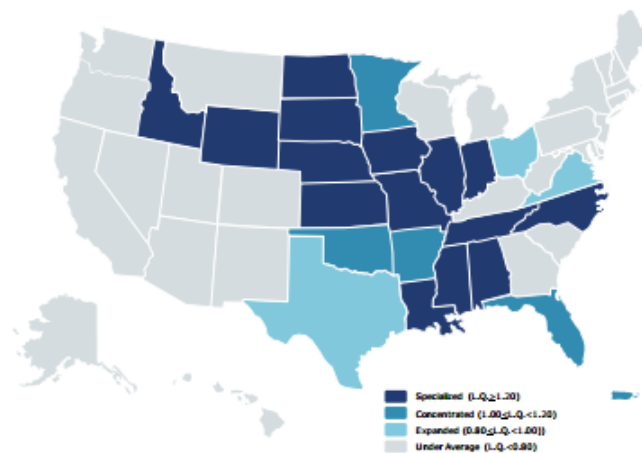
¹⁰ TEconomy/BIO The Value of Bioscience Innovation in Growing Jobs and Improving Quality of Life 2016 North Carolina, p.2. https://www.bio.org/sites/default/files/SP_North_Carolina_0.pdf

¹¹ Legend: Total employment - Large (5% or more), Sizable (3% to 4.9%), Small (1% to 2.9%), Undersized (0% to 0.9%); Concentration - Specialized (L.Q. more than 1.2), Concentrated (L.Q. between 1.0-1.2), Expanded (L.Q. between 0.8 and 1.0), Under Average (L.Q. less than 0.8)

State Share of Total U.S. Employment
2014

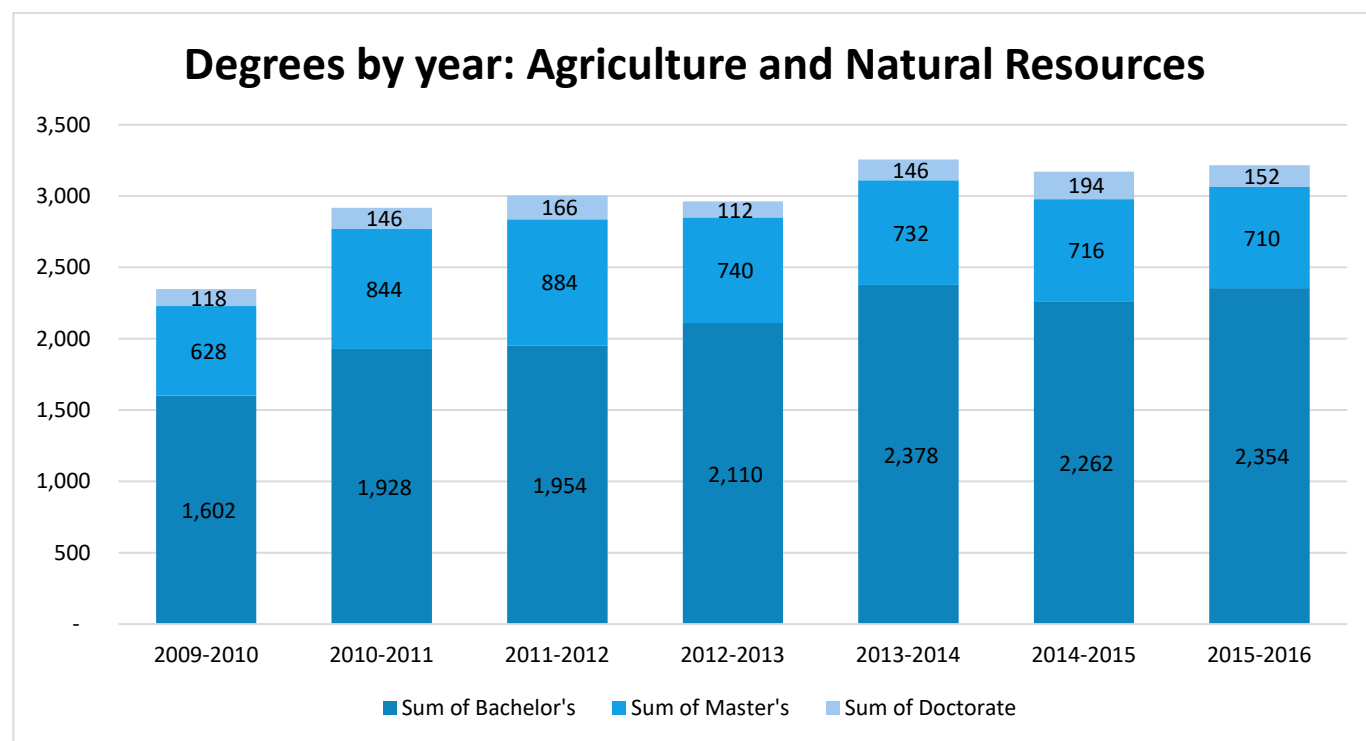


Employment Concentration Relative to the U.S.
2014



Ag-related Degrees Awarded

Since the 2009-2010 academic year, North Carolina has seen a 37% increase in the number of students earning bachelor's, master's and doctoral degrees in agriculture and natural sciences.¹²

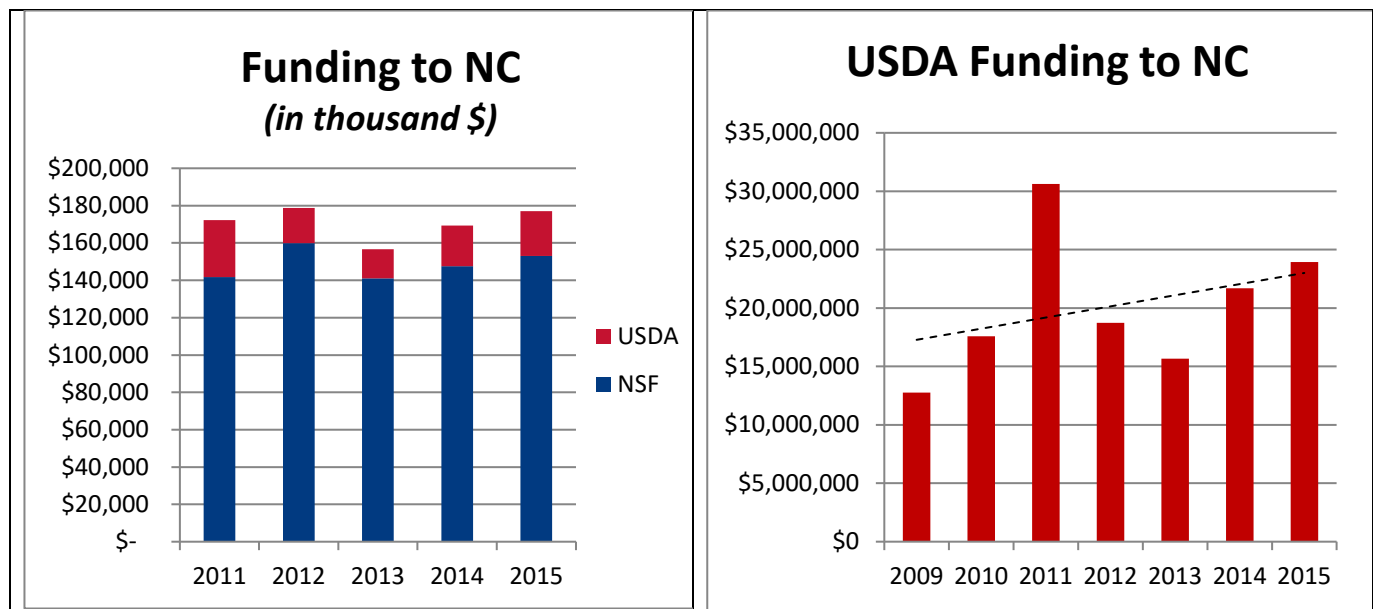


¹² Data compiled by NCBiotech Life Science Intelligence staff, from Chmura's JobsEQ database.

Federal Ag-related Grant Funding for North Carolina

Federal dollars coming into the state from the National Science Foundation (NSF) and United States Department of Agriculture (USDA), the major federal funders of ag-related projects, totaled more than \$177 million in FY 2015.

Agency	Dollars (FY 2015)	State Ranking
NSF	\$ 153,086,000	13
USDA	\$ 23,931,542	7
ALL Federal Grants	\$ 16.5 billion	

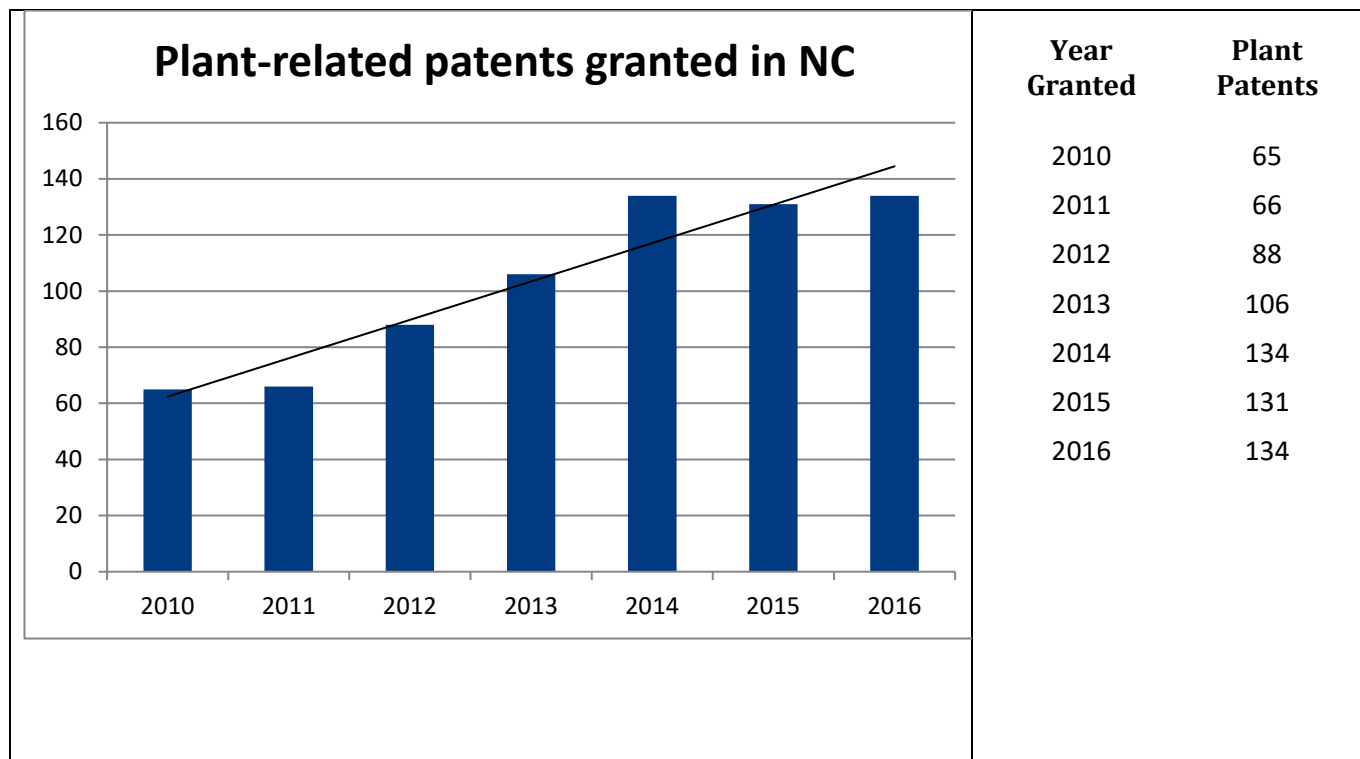


The high USDA funding shown above for 2011 is likely due to a \$25 million grant awarded to North Carolina State University for the study of food-borne illnesses. The grant was awarded through the National Institute of Food and Agriculture (NIFA) Agriculture and Food Research Initiative (AFRI) competitive grants program to PI LeeAnn Jaykus and an established consortium with other universities, providing a portion of the funding to other states.¹³

¹³ http://www.nifa.usda.gov/newsroom/news/2011news/08031_norovirus.html

Plant-related Patents Granted in North Carolina¹⁴

The number of plant-related patents granted per year in the state has more than doubled since 2010 - from 65 to 134 patents.



Note: The patent search is conducted by assignee state or inventor state: North Carolina. An “assignee” is the individual or entity to which ownership of the patent was assigned at the time of patent issue. When a company or university is involved in filing the patent, they are usually listed as “assignee”, while any individuals are listed as “inventor”.

In mid-year 2015, the U.S. Patent Office began exclusively using the Cooperative Patent Classification (CPC) system instead of the former U.S. patent classification codes. All previous patents have been categorized historically by patent office staff. The CPC used to create this chart are those used by TEconomy (formerly Battelle) to represent their “Agricultural Feedstock & Chemicals” sector of biotechnology.¹⁵

¹⁴ In-house analysis, data gathered from U.S. Patent and Trademark Office, see Appendix 5 for patent classification codes and search strategies used. <http://patft.uspto.gov/netahtml/PTO/search-adv.htm>

¹⁵ TEconomy/BIO The Value of Bioscience Innovation in Growing Jobs and Improving Quality of Life 2016 (based on 2014 statistics), p.27-29, <http://www.teconomypartners.com/wp-content/uploads/BIO-2016-Report-FINAL-DIGITAL.pdf>

Appendix 1: Ag Biotech Companies/Sites Founded or Relocated to NC since 2010

Company Name*	City	Year Established	Primary Activity**	Employment Range
AgBiome Inc.	Research Triangle Park	2013	R&D	50-99
AGgrow Tech	Greensboro	2010	R&D	1-19
ARK Research	Mebane	2013	CR&T	1-19
Avazyme	Research Triangle Park	2015	CR&T	1-19
Avista Pharma Solutions	Durham	2015	CR&T	50-99
Bayer CropScience	Pikeville	2015	R&D	1000-1099
Benson Hill Biosystems Inc.	Research Triangle Park	2012	R&D	1-19
BioDeptronix	Chapel Hill	2012	R&D	1-19
BioGreen Synergy	Greensboro	2014	P&M	1-19
Biological Applied Research	Raleigh	2014	CR&T	1-19
Biotality	Durham	2017	R&D	1-19
Boragen Inc.	Research Triangle Park	2017	R&D	1-19
Edison Agrosiences	Chapel Hill	2013	R&D	1-19
FMC Corp. <i>(acquired RTI's Center for Ag and Environmental Biosolutions)</i>	Research Triangle Park	2013	R&D	20-49
General Mills Agricultural Research	Kannapolis	2010	R&D	1-19
Ideal Health Biotechnology LLC	Kannapolis	2016	R&D	1-19
IngateyGen LLC	Elizabeth City	2014	R&D	1-19
Medicago USA Inc.	Research Triangle Park	2010	R&D	50-99
Mirimichi Green Express	Castle Hayne	2013	P&M	1-19
Noah's Inc.	Charlotte	2014	P&M	1-19
Novozymes BioAg	Research Triangle Park	2014	R&D	500-999
Plant Health Care Inc.	Raleigh	2013	R&D	1-19
Plant Impact Inc.	Morrisville	2016	R&D	1-19
Precision PlantSciences Inc.	Durham	2012	R&D	20-49
Premex Innovation Labs	Durham	2016	R&D	1-19
Skyline Vet Pharma	Research Triangle Park	2017	R&D	1-19
Soil Health Institute	Morrisville	2015	R&D	1-19
SynShark	Cornelius	2015	R&D	1-19
TyraTech Inc.	Morrisville	2011	R&D	20-49
Tyton NC Biofuels	Raeford	2014	P&M	20-49
Verdesian Life Sciences LLC	Cary	2012	R&D	20-49
Waters Agricultural Laboratories	Warsaw	2014	CR&T	1-19
Xanofi	Raleigh	2010	R&D	1-19
Zoion Pharma Inc.	Raleigh	2011	R&D	1-19

*Does not include companies/sites that have closed.

** R&D = Research and Development, CR&T = Contract Research & Testing, P&M = Production and Manufacturing

Appendix 2: Full Prospective Growth Report

Prospective Ag Biotech Investments

Full Name / Company / Person	Prospective Investment Announcement	Date (approximate)	Project
Alexandria Center for Ag, Science and Technology – RTP (<i>formerly Alexandria Ag-Tech Center</i>)	\$20,000,000	3/18/2014	Convergence Campus (<i>at The Hamner Institutes</i>)
BASF Corp.	\$33,000,000	2/15/2012	RTP Expansion - Plant Biotechnology and Crop Protection Research
Bayer CropScience LP	\$20,000,000	3/2/2011	Greenhouse 5
Bayer CropScience LP	\$6,200,000	12/20/2012	Land Purchase
Bayer CropScience LP	\$2,400,000	5/30/2013	Bee Care Center
Bayer CropScience LP	\$16,100,000	5/2013	North American Facilities
Bayer CropScience LP	\$33,000,000	10/17/2013	North American HQ Renovation
Bayer CropScience LP	\$29,600,000	6/30/2014	Greenhouse 1
Bayer CropScience LP	\$34,200,000	6/24/2015	Greenhouse 6
Carolina Cellulosic Biofuels LLC	\$200,000,000	12/2/2013	Production Center
DuPont Pioneer - Kinston Research Center	\$2,300,000	5/17/2011	R&D Facility
Gaia Herbs	\$5,000,000	6/8/2016	Expansion
Medicago USA Inc.	\$7,500,000	8/10/2010	RTP Facility
Novozymes	\$36,000,000	4/24/2014	Bio Ag R&D Facility
Piedmont Pharmaceuticals LLC	\$279,000	9/17/2012	HQ Expansion
Stallergenes Greer (<i>formerly Greer Laboratories Inc.</i>)	\$30,000,000	9/24/2013	HQ Expansion
Syngenta Biotechnology Inc.	\$71,000,000	5/20/2011	Advanced Crop Lab
Syngenta Biotechnology Inc.	\$94,000,000	7/30/2013	Lab and Offices
Tyton NC Biofuels LLC	\$36,000,000	6/3/2014	Ethanol Production Plant and R&D Lab
TOTAL PROSPECTIVE INVESTMENT ANNOUNCEMENTS	\$676,579,000		

Prospective Ag Biotech Job Announcements

Full Name / Company / Person	Prospective Jobs Announcement	Date (approximate)	Project
Advanced Animal Diagnostics Inc.	5	2/1/2012	Launch of first product
AgBiome Inc.	35	7/24/2015	Greenhouse RTP
BASF Corp.	123	1/17/2012	Plant science HQ move to RTP
BASF Corp.	30	1/11/2013	Pest control business move to RTP
Bayer	25	3/1/2011	Greenhouse 5
Bayer	100	5/30/2013	Bee Care Center
Bayer	100	10/18/2013	North American HQ Renovation
Bayer	6	11/2/2016	Production Ornaments
BioAgilytix Labs Inc.	60	11/11/2016	Expansion
Carolina Cellulosic Biofuels LLC	65	12/2/2013	Production Center
Chemtex	300	7/9/2013	Ethanol Refinery Sampson County
DuPont Pioneer - Kinston Research Center	10	5/17/2011	R&D facility
Gaia Herbs	25	6/8/2016	Expansion
Medicago USA Inc.	85	8/10/2010	RTP facility
Novozymes	100	4/24/14	Bio Ag R&D Facility
Piedmont Pharmaceuticals LLC	14	9/17/2012	HQ expansion
Plant Health Care Inc.	9	7/9/2013	
FMC Corp. (acquired RTI's Center for Ag and Environmental Biosolutions)	10	12/16/2011	Center for Agriculture and Environmental Biosolutions (CAEB)
Metabolon Inc.	15	8/15/2016	Durham
Stallergenes Greer (formerly Greer Laboratories Inc.)	125	9/24/2013	HQ expansion
Syngenta Biotechnology Inc.	15	5/20/2011	Advanced Crop Lab
Syngenta Biotechnology Inc.	25	7/27/2012	Expansion
Syngenta Biotechnology Inc.	150	7/30/2013	New lab and offices
TyraTech Inc.	105	3/1/2011	Relocation to NC
Tyton NC Biofuels LLC	79	6/3/2014	Ethanol Production Plant and R&D Lab
TOTAL PROSPECTIVE JOB ANNOUNCEMENTS	1461		

Appendix 3: North Carolina Agriculture and Agribusiness Income

Economic Analysis 2009-2017 (data from 2007-2015)

("income" in billion \$)

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Agriculture/Food									
Farming	13.5	14.4	13.6	14.1	14.9	16.1	16.6	17.1	15.6
Manufacturing	22.3	23.5	20.2	22.9	25.8	27.5	22.5	27.7	28.2
Wholesaling	6	6.7	6.3	6.9	7.6	5.8	6.6	6.9	7.1
Retailing	15.6	16.9	18.4	18.3	19.1	16.8	18.1	18.8	19.3
Total	57.4	61.5	58.5	62.2	67.4	66.2	63.8	70.5	70.2
Fiber Industries									
Manufacturing	2.6	2.6	2.1	1.9	1.9	2.1	1.7	1.2	1.2
Wholesaling	0.8	0.8	0.8	0.9	0.9	0.9	1	1.1	1.1
Retailing	2.8	2.9	2.6	1.1	1.2	1.6	1.7	1.8	1.8
Total	6.2	6.3	5.5	3.9	4	4.6	4.4	4.1	4.1
Forestry									
Farming	0.8	0.8	0.6	0.9	0.8	0.2	0.3	0.3	0.3
Manufacturing	5.7	5.7	5	4.6	4.8	3.9	3.8	5.4	5.4
Wholesaling	-	-	-	-	-	2.3	2.5	2.7	2.7
Retailing	-	-	-	-	-	0.7	0.9	1	1
Total	6.5	6.5	5.6	5.5	5.6	7.1	7.5	9.4	9.4
Grand Total	70.1	74.3	69.6	71.6	77	77.9	75.7	84	83.7
	-	-	-	-	-	-	-	-	-
Farming alone	2007	2008	2009	2010	2011	2012	2013	2014	2015
	13.5	14.4	13.6	14.1	14.9	16.1	16.6	17.1	15.6
	0.8	0.8	0.6	0.9	0.8	0.2	0.3	0.3	0.3
	14.3	15.2	14.2	15	15.7	16.3	16.9	17.4	15.9

Last updated July 2017 from most recent annual report published by Mike Walden, May 2017.

Appendix 4: TEconomy Analysis

TEconomy's Agricultural Feedstock & Chemicals Sector Analysis' NAICS Codes

311221	Wet corn milling	325311	Nitrogenous fertilizer manufacturing
311222	Soybean processing	325312	Phosphatic fertilizer manufacturing
311223	Other oilseed processing	325314	Fertilizer (mixing only) manufacturing
325193	All other basic organic	325320	Pesticide and other agricultural
chemical			chemical manufacturing
	manufacturing		
325221	Cellulosic organic fiber		
	manufacturing		

Appendix 5: Patent Classification

TEconomy's Patent Codes:

Agricultural Bioscience

A01H	New plant varieties, cultivars, genotypes, and processes for engineering them
A01N	Preservation of human or animal bodies and plants, biocides/pesticides, and plant growth regulators C05B Phosphatic fertilizers
C05C	Nitrogenous fertilizers
C05D	Inorganic fertilizers
C05F	Organic fertilizers
C05G	Fertilizer mixtures

In mid-year 2015, the U.S. Patent Office began exclusively using the Cooperative Patent Classification (CPC) system instead of the former U.S. patent classification codes. The CPC system was developed as a joint harmonization effort between the U.S. and European patent offices, and is compliant with International Patent Classification system standards. More details on the CPC system and history can be found here: www.cooperativepatentclassification.org/about.html. Because of this change, the 2015 North Carolina patent totals cannot be determined using the set of codes previously identified for “plant-related” patents.

In both classifications systems, animal and human health products and services (drugs, devices, and procedures) are not distinguished from each other. Therefore, the only specific ag-related patent statistics that can be extracted are the plant-related ones.

- Keywords could be used for searching, but with patents this is not recommended – not only because of the large number of keywords and synonyms that would need to be determined, but also because of the nature of patent writing. Patents are often filed with intentionally unclear language in order to ‘hide’ the technological processes from competitors.
- Animal Husbandry (113) is a distinct classification code - “this class provides for methods or apparatus for the propagation, rearing, training, exercising, amusing, feeding, milking, grooming, housing, controlling, handling, or general care of a living animal unless provided for elsewhere.” This one category could be included, but would not be representative of all animal agriculture.

Appendix 6: Schedule for Updates

The following updates are made biannually and are included in the quarter of the NC Ag Biotech Economic Growth Report.

First Quarter (July Report)

- Ag Biotech Companies and Employees
- Ag Biotech Companies Founded/Relocated to NC (including Appendix 1)
- Prospective Growth in Ag Biotech (including Appendix 2)
- Ag-focused Awards Bring High Returns to North Carolina
- Agriculture/Agribusiness Value-Added Analysis (Walden/NCSU, including Appendix 3)
- Agricultural Feedstock & Chemicals Sector Analysis (BIO/Battelle, including Appendix 4, biennial – next 2018)
- Plant-related Patents Granted (including Appendix 5)

Third Quarter (January Report)

- Prospective Growth in Ag Biotech (including Appendix 2)
- Ag-related Degrees Awarded (*updated in Chmura JobsEQ annually in August, last updated July 2017*)
- Federal Ag-related Grant Funding (USDA and NSF)
- Diversity of Agricultural Production (NCDA&CS)



NCBiotech is a private, non-profit corporation supported by the N.C. General Assembly. Its mission is to provide long-term economic and societal benefits to North Carolina by supporting biotechnology research, business, education and strategic policy statewide.

The North Carolina AgBiotech Initiative stimulates the growth of agricultural biotechnology in the state of North Carolina to create new opportunities that generate jobs, strengthen the economy and produce the technologies and products that help meet the global demand for food, fuel, medicine and sustainable material.

North Carolina Biotechnology Center

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