

Growing Biotechnology for a Healthy North Carolina.

"Shaping the Economy. . .One Idea at a Time"

Institute for Emerging Issues Healthcare Forum
10 June 2011
Randall Johnson



Strong Assets for Biotechnology and HEALTHCARE

Better prevention, diagnosis, and treatment of disease

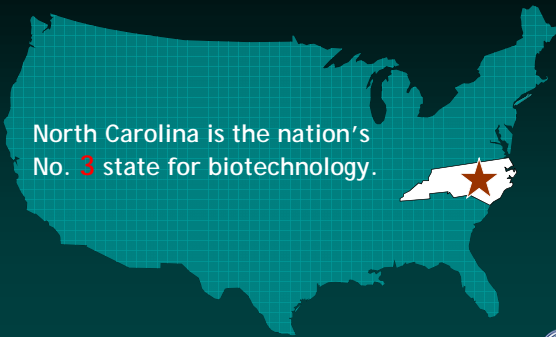
- Prevention: Healthier food, Vaccines, Pollution Reduction
- Diagnosis: quicker, more accurate tests
- Treatment: safer, more effective remedies with fewer side effects

NORTH CAROLINA BIOTECHNOLOGY CENTER



Biotechnology Development in North Carolina

North Carolina is the nation's
No. 3 state for biotechnology.



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What is Biotechnology?

"bio" = living

"technology" = solve problems
or make products

working together to improve the quality of life
and to **heal**, **fuel**, and **feed** the world

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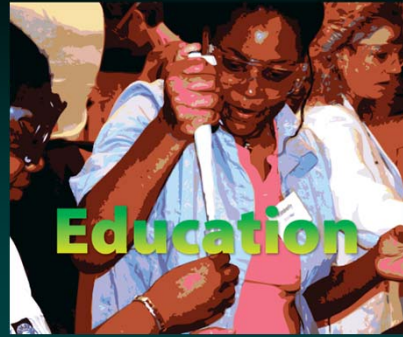
Biotechnology is



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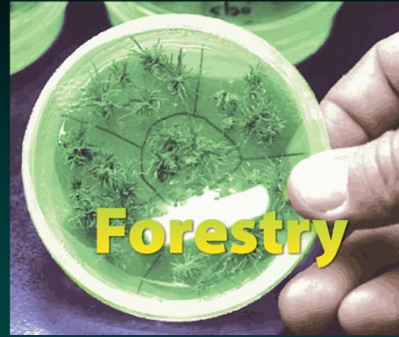
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Biotechnology is



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Biotechnology is Global



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North Carolina Biotechnology Center

- A private, non-profit corporation
- Established by the State in 1984
- 37-member board of directors
- 80-member staff
- Five regional offices



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What is Biotech and Why Should I Care?

Biotech Development is Economic Development



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What is Biotech and Why Should I Care?

Biotech Development is Economic Development

Investment in **EDUCATION & WORKFORCE TRAINING**

Teacher Workshops: over 1500 teachers trained to teach biotech

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What is Biotech and Why Should I Care?

Biotech Development is Economic Development

Investment in **RESEARCH**

Nobel Prize Winner: **Oliver Smithies**

2007 Physiology or Medicine

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What is Biotech and Why Should I Care?

Biotech Development is **Economic** Development

Investment in **COMPANIES**

\$23M → \$1.7B

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What is Biotech and Why Should I Care?

Biotech Development is **Economic** Development

Worldwide Leadership

- \$64.6 billion annual industry
- \$1.92 billion paid annually in state and local taxes
- 226,823 jobs in biotech and biotech-related fields
- \$74,829 average salary for biotech jobs
- 29% net job growth from 2001 - 2009
- \$1.2+ Billion invested since 1999

Battelle

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What is Biotech and Why Should I Care?

Biotech Development is **Economic** Development



to **heal**, **fuel**, and **feed** the world

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The Field of Action - A Plan for Statewide Presence



The Center's statewide activities and goals directly support key emphases and strategies of the plan *New Jobs Across North Carolina*.

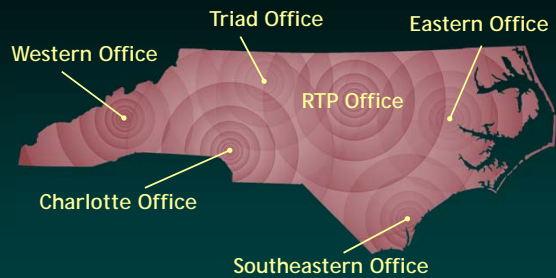
The plan's Immediate Priority #3 is *Develop biotechnology statewide*.



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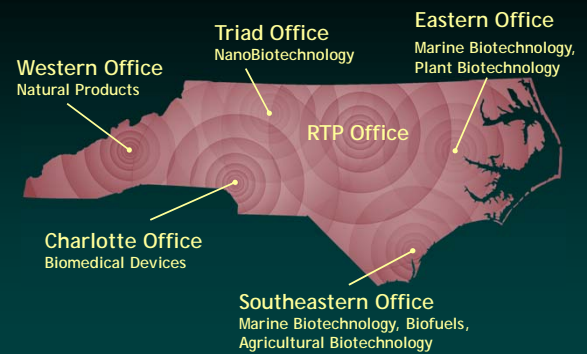
The Field of Action - A Statewide Presence



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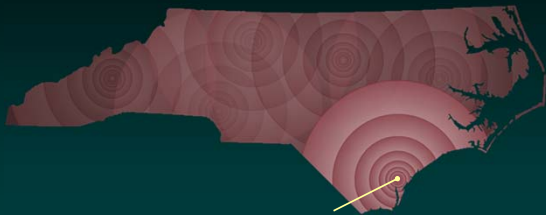
The Field of Action - Sectors Vary by Region



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The Field of Action - Southeastern Region



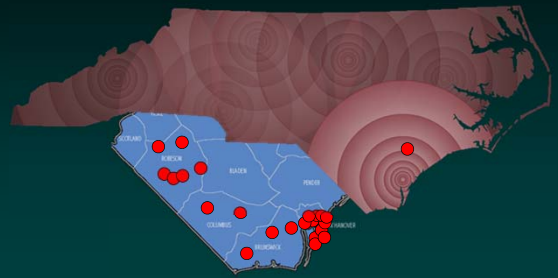
Southeastern Office
Marine Biotechnology, Biofuels,
Agricultural Biotechnology

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Strong Assets for Biotechnology Development

Advisory Committee for Biotechnology
in Southeastern North Carolina



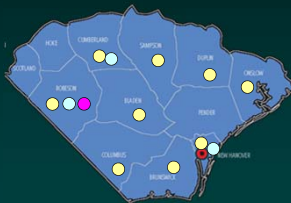
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Strong Assets for Biotechnology Development

Educational Institutions

- Community Colleges
- Community College BioNetwork
- Universities



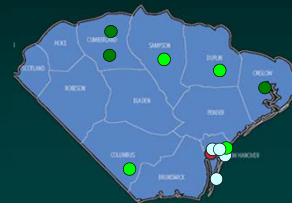
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Strong Assets for Biotechnology Development

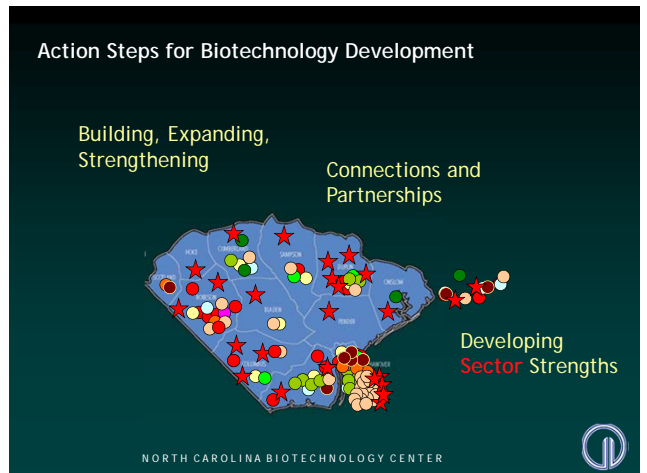
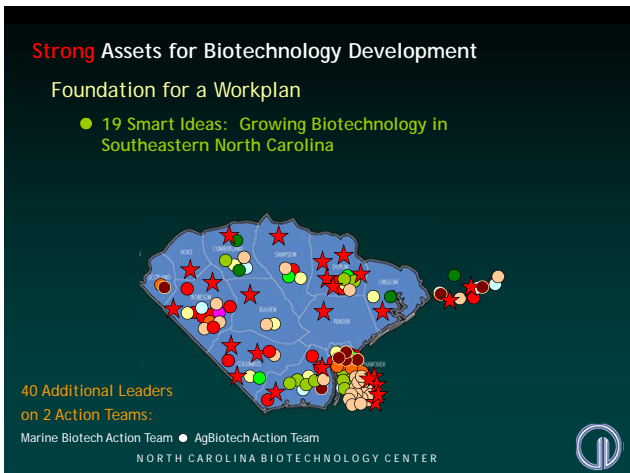
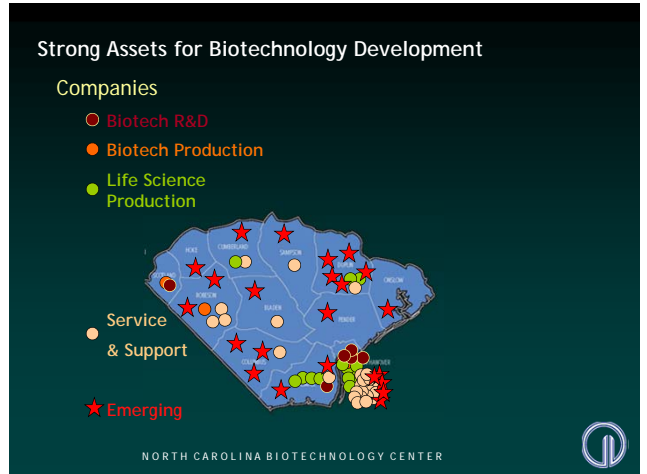
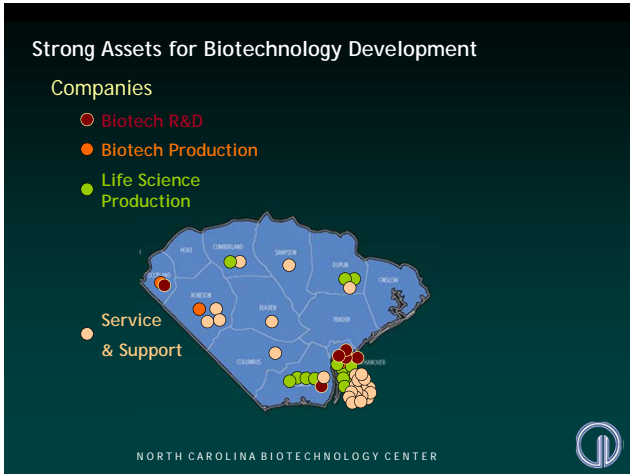
Other State and Federal Sites

- Research Centers
- State Research Farms
- Military



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Strong Assets for Biotechnology Development

Sector-based Opportunities

- Marine Biotechnology
- Biofuels
- Agricultural Biotechnology



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Strong Assets for Biotechnology Development

Sector

- Marine Biotechnology
 - Pharma, Fish Farming, Fuel*

Pharmaceuticals Environmental Assessment & Remediation

Nutraceuticals Biofuel

Fish Farming

Bioactivity Screening BioSensors: Water Safety and Food Safety



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Strong Assets for Biotechnology Development

Sectors

- Biofuels


Alternative Crops

Biodiesel Waste Products


Algae

Ethanol

Cellulosic Ethanol



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Strong Assets for Biotechnology Development

Sectors - A New Vision for Agriculture in NC

- Agricultural Biotechnology

Improving Crop Yields

Pharmaceuticals

Improving Animal Health

New Crops

Vaccines

Micropropagation

Nutraceuticals

Biofuel

Regenerative Medicine



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Strong Assets for Biotechnology and HEALTHCARE

Better prevention, diagnosis, and treatment of disease

- **Prevention: Healthier food, Vaccines, Pollution Reduction**
- **Diagnosis: quicker, more accurate tests**
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Strong Assets for Biotechnology and HEALTHCARE

Better prevention, diagnosis, and treatment of disease

● **Prevention—AgBiotech & Marine Biotech:**



- **Vaccines from plants - Tobacco at Medicago**
- **Healthier, Plentiful Food - Toxin testing and fewer pesticides**
- **Pollution Reduction - Marine microbes that clean up waste**

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Strong Assets for Biotechnology and HEALTHCARE

Better prevention, diagnosis, and treatment of disease

- **Diagnosis:**
 - **Genetic Testing - Detect DNA abnormalities**
 - **Biomarkers - Predict disease before onset**
 - **Tests - Portable, easier to read and interpret**

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Strong Assets for Biotechnology and HEALTHCARE

Better prevention, diagnosis, and treatment of disease

- **Treatment:**
 - **Medicine from plants and animals - Natural Products from marine and land**
 - **Gene Therapy - Replace defective genes**
 - **Regenerative Medicine - Regrow damaged cells**

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Strong Assets for Biotechnology and HEALTHCARE

Better prevention, diagnosis, and treatment of disease

● **Treatment:**

- Tissue Engineering
- Biomaterials as Medical Devices
- Xenotransplantation
- Nanobiotechnology
- Replacing Missing Proteins

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Strong Assets for Biotechnology and HEALTHCARE

Better prevention, diagnosis, and treatment of disease

● **Personalized Medicine:**

- Individualized prevention, diagnosis, and treatment of disease through understanding a person's genetic makeup.

"The right drug at the right dose at the right time."

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Our Challenge - Food and Health Products for 9 Billion People by 2050



The Entrepreneurial Farmer's AgBiotech Opportunity



Current North Carolina AgBiotech Industry

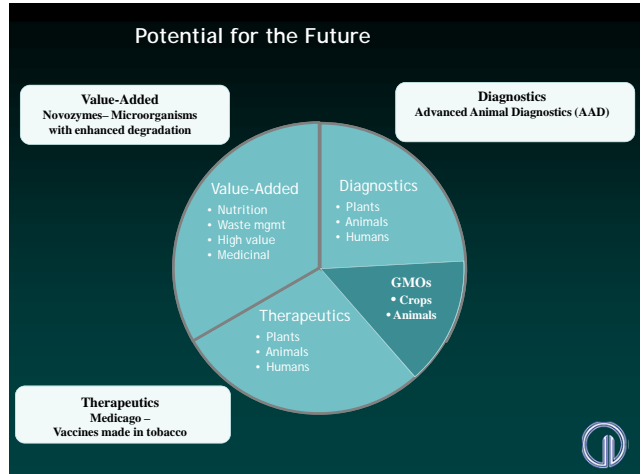
80 companies
4,000 employees
Four of the top five AgBiotech companies

BASF
The Chemical Company

BAYER Bayer CropScience

MONSANTO
imagine

syngenta



What does the future of farms look like?

New Opportunities for Farming and Health

Biotech Crops...

- Produce higher yields
- Save time, which means money
- Allow widespread no-till
- Reduce pesticide use
- Reduce soil erosion
- Reduce greenhouse gas emissions

Biotech Crops with Improved Post-Harvest Characteristics



How does agribusiness change if more high value crops actually make it to the market?



Biotech Crops Grown for a Specialty Product



What if you measure yield by mL's instead of bushels?



Industrial Sweet Potatoes



Farm and Waste Products

Become

Cleaner Fuel

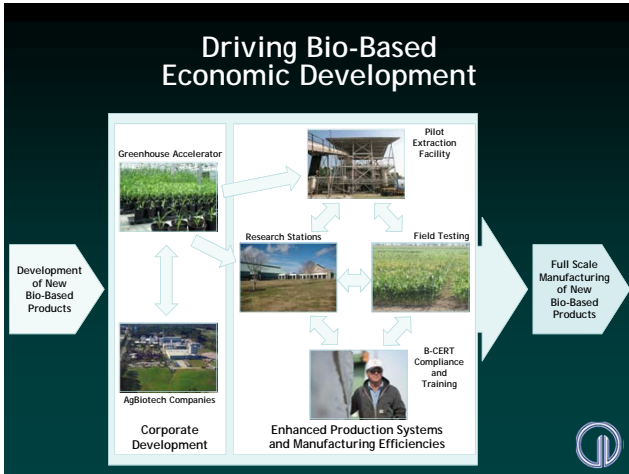


Biotech Crops Grown in Greenhouses



Millions of vaccine doses per greenhouse acre





Opportunities for Biotechnology Jobs

The slide highlights opportunities for biotechnology jobs. It features a poster titled **CAREER PATHWAYS** with the text **Focus on BIOTECHNOLOGY** and a list of bullet points: *Work with your hands and your mind*, *Work with great people and great products*, and *Work in many careers and build your future*. To the right is a screenshot of the **North Carolina Biotechnology Center** website, showing a **Job Search** section with various filters and a list of job openings.

www.ncbiotech.org

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- ### Career Pathways for Biotechnology and HEALTHCARE
- Better prevention, diagnosis, and treatment of disease
- Scientists
 - Research Technicians
 - Engineers
 - Process Technicians
 - Maintenance Technicians
 - Instrumentation Technicians
 - Corporate Scientific Professionals
- and...ENTREPRENEURS!**
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Opportunity: Connecting the Dots **Statewide**

Biotech Development is **Community** Development



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Biotech Development is **Economic** Development



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