



GROWING THE FUTURE

Department of Crop Science Strategic Plan



GROWING THE FUTURE

NC State's Department of Crop Science has a rich and successful history of outstanding innovation and discovery, rigorous academic programs leading students to successful careers in agriculture, and delivery of science-based information through strong extension programs. Today, thanks to the exceptional faculty, staff and students, we have the human capacity to develop solutions to global grand challenges like food security and sustainable production of food, feed and fiber. Our department is well positioned for Growing the Future.

The strategic planning process started with the Strategic Planning Committee (composed of faculty, staff and students) conducting surveys of internal (faculty, staff, students, college administration) and external (alumni, stakeholders, universities) groups. Over the course of a year, survey results were analyzed and interpreted by groups of faculty and staff to develop the strategic plan. Our strategic plan represents the collective wisdom and forward thinking of the department and our stakeholders. We now have the framework to plan strategically for the challenging path forward of Growing the Future.

The strategic plan centers on four strategic directions — student learning and innovative instruction; global crop science innovation; enhanced crop/turf production and sustainable food systems; and people, partnerships and advancement — that will serve as the foundation for the future of the department.

Each strategic direction contains strategies and tactics that we will continuously evaluate for success and modify as needed. By focusing on students, interdisciplinary research and outreach, our plan aligns well with those of the university and the college.

Agriculture has never been more important to the future of our state, country and the world. The Department of Crop Science will be a leader in developing science-based solutions to local and global agricultural challenges as we focus on Growing the Future.

A handwritten signature in black ink, appearing to be 'J. Jeffrey Mullahey'.

J. Jeffrey Mullahey
Department Head
Spring, 2015



1920s agronomy class in Patterson Hall



2013 crop science class on Lake Wheeler Road

HISTORY OF CROP SCIENCE

While the Department of Crop Science was formally created in 1962, its proud and rich heritage began years before. During the early 1900s, research and extension activities focused on crop production and soil management for North Carolina crops such as forages, cotton, tobacco and upland rice. Classes in crops and soils were first offered at NC State in 1914, and two student clubs were organized, including the present-day Agronomy Club.

In 1924 the Division of Agronomy was renamed the Department of Agronomy, led by Dr. C.B. Williams and housed in Patterson Hall. World War I and the Great Depression had a strong impact on the department's agronomic programs. Following World War II, the department experienced significant growth in faculty, students, new programs in plant breeding and the start of the Official Variety Testing Program (OVT). In 1952, the department moved to Williams Hall. In 1956, the department was divided into a Field Crops Department and a Soils Department. Rapid growth in the department occurred in the 1950s and 60s, with new faculty and research on additional crops, leading to the birth of today's Department of Crop Science.

The rapid growth in programs in the department evolved to present day with key discipline areas, such as plant breeding and genetics, crop management, crop physiology, turfgrass science, weed management and agroecology. Facilities in the Department of Crop Science to support educational programs include buildings on main campus (Williams Hall, greenhouses, Phytotron), the Method Road greenhouse complex and field facilities at the Reedy Creek Field Operations Unit and Lake Wheeler Field Lab for turf, crops and agroecology research. Faculty conducting field research also use the 18 N.C. Research Stations located throughout North Carolina and work on farms across the state.

In the past 25 years the department added new programs, received national recognition for programs and benefited from endowments to enhance existing programs. The department has continued to achieve and advance the crop science mission while generating more of its own research and extension resources from grants and partnerships with industry. Here are some of its recent achievements:

- Crop Science has a large presence at the Center for Environmental Farming Systems (CEFS) at the Cherry Farm facility near Goldsboro. From work at CEFS, two courses — Introduction to Agroecology and Advanced Agroecology — were developed in 2006 and the department developed an undergraduate concentration in Agroecology. In addition, a new research and extension program was started with a focus in organic cropping systems.
- The greatest development in the area of plant breeding has been the adoption of molecular techniques in crop improvement. The plant breeding program has maintained its national and international prominence despite a challenging fiscal climate. This outcome is in part attributable to the formation of the Center for Plant Breeding and Applied Plant Genomics, which has procured funding for training 25 graduate students from 2007 to 2014.
- Turfgrass Science at NC State is highly regarded both nationally and internationally. Bolstering this reputation is the creation of the Center for Turfgrass Environmental Research & Education, which supports both research and graduate education. In addition, a significant change for the turfgrass program was the relocation of the turf field laboratory from the University Club to the present Lake Wheeler Road location.
- Distance education began in the late 1990s and has become a vehicle to reach both enrolled and place-bound students.
- In 2008, a new degree track in Plant and Soil Sciences was developed with five concentrations: Agroecology, Agronomic Business, Agronomic Science, Crop Biotechnology and Crop Production. In 2011, the Agricultural Institute curriculum was changed to allow institute students to transfer into the 4-year program.
- The department received two endowments in 2014:
 - Dr. William K. Collins Distinguished Professorship along with the Dr. William K. Collins Tobacco Agronomist Position
 - Bayer CropScience Distinguished Professorship in Soybean Breeding



VISION

We will be a world leader in crop science education and in the generation and application of knowledge required for economically and environmentally sustainable crop systems and products.

MISSION

We develop future crop science leaders, improve crop plants and products, devise effective and sustainable crop production systems, and disseminate crop science knowledge for the benefit of users and producers of food, feed, turf, biofuels and fiber in North Carolina, the nation and the world.

CORE VALUES

As Crop Science LEADERS, we embrace our core values to create success.

We are Growing the Future through:

Leadership

We manifest leadership in all our endeavors through transparency, integrity and professionalism to advance the land-grant mission.

Excellence

We pursue excellence through creating an environment that encourages innovation and success.

Accomplishment

We develop and implement forefront solutions to challenging crop science problems.

Diversity

We include diverse approaches, perspectives, opinions and people to enhance our collective effectiveness and continuing development.

Education

We engage students, staff, faculty members and clientele in impactful learning and professional development opportunities.

Responsiveness

We disseminate timely science-based information to stakeholders in North Carolina, our region and around the world.

Stewardship

We promote the wellbeing of consumers of agricultural products, farming communities, agricultural industries and workers, and agroecosystems.



STUDENT LEARNING AND INNOVATIVE INSTRUCTION

We will address the challenges of society by excelling in the education, training and development of people involved in the diverse fields of crop science.

STRATEGY 1.1

- 1.1 Increase Enrollment and Diversity of Students in Educational Programs about Crop Plants and Agricultural Systems

TACTICS

- 1.1A Recruit, attract and enroll more students in crop science majors through interfaces with existing and new student pipelines and use of diverse communication tools.
- 1.1B Attract greater numbers of talented students into a curriculum that better prepares them for graduate school.
- 1.1C Maintain a critical mass of faculty members who are deeply engaged in teaching and academic programs.

STRATEGY 1.2

- 1.2: Enhance Curriculum Design to Address Emerging Trends and Challenges.

TACTICS

- 1.2A Review and revise majors and concentrations to keep up with changes in the field while maintaining the core mission of education about crop plants and agricultural systems.
- 1.2B Promote an understanding of societal and global challenges throughout the crop science curriculum to broaden the perspectives of students..
- 1.2C Enhance student career opportunities through a 'curriculum to careers' strategy that highlights many career paths in crop science.
- 1.2D Broaden the undergraduate curriculum, including approaches such as cooperation with other departments and team teaching.
- 1.2E Strengthen graduate student education through revised and expanded courses, including interdepartmental collaborations.

STRATEGY 1.3

- 1.3 Expand Educational Opportunities for Students through Effective Use of Distance Education and other Online Learning Tools and Platforms

TACTICS

- 1.3A Identify areas where distance education may increase educational access and efficiency for enrolled and place-bound students.
- 1.3B Increase educational effectiveness through appropriate use of on-line learning tools.

STRATEGY 1.4

- 1.4 Increase Student Engagement through Experiential Learning

TACTICS

- 1.4A Increase research, internships and international opportunities to enhance student learning and development.
- 1.4B Enhance hands-on learning and skills development in the curriculum using resources such as laboratories, greenhouses, the Fike Crop Science Teaching Garden, the Agroecology Education Farm and the Turfgrass Field Laboratory.
- 1.4C Enable career success for students through fostering professional and leadership development opportunities and experiences.



GLOBAL CROP SCIENCE INNOVATION

We will create innovative approaches to enhance food security and agricultural systems while protecting the environment.

STRATEGY 2.1

- 2.1 Discover and Apply Fundamental Knowledge in Plant Science to Improve Crop Performance

TACTICS

- 2.1A Solve systems-level problems through formation of interdisciplinary teams of agronomists, breeders, crop ecologists, modelers, plant physiologists, weed scientists and others.
- 2.1B Enhance faculty expertise in fundamental plant science disciplines required for the crop science mission through departmental and university cluster hires.
- 2.1C Enhance access to quantitative and computational tools in plant breeding, such as quantitative genetics, genomic selection, Bayesian techniques and mining of large data sets.
- 2.1D Foster innovation and discovery through interactions and synergies between multi-disciplinary and multi-sector research programs.

STRATEGY 2.2

- 2.2 Develop New Methods for the Collection, Analysis and Application of Agricultural Data

TACTICS

- 2.2A Generate faster paths to crop improvement through building and characterizing large germplasm sets, including use of technologies such as genome editing, DNA/RNA sequencing and high throughput phenotyping.
- 2.2B Improve crop production and decision tools through collaborative development and use of advanced precision agriculture, agroclimatology tools and remote sensing and spatial georeferencing using unmanned aerial vehicles and other technologies.

STRATEGY 2.3

- 2.3 Develop and Apply Knowledge of Interactions between Agricultural Inputs and Agroecosystems to Minimize Environmental Impacts

TACTICS

- 2.3A Identify opportunities for multidisciplinary and collaborative research in the area of sustainable agriculture.
- 2.3B Discover, develop and apply knowledge of plant biology and genetics, ecology and agri-chemistry to improve weed management systems and mitigate herbicide resistance.
- 2.3C Expand research in 'green' landscapes and turf irrigation systems.
- 2.3D Develop improved cultivars to increase environmental sustainability related to crop production and other land uses.



CROP/TURF PRODUCTION AND SUSTAINABLE FOOD SYSTEMS

We will develop economically and environmentally sound systems for crop production and turf management with value to producers, industrial users and consumers.

STRATEGY 3.1

- 3.1 Solve Emerging Problems in Crop and Turf Production, Quality and Management

TACTICS

- 3.1A Improve the efficiency and effectiveness of field research facilities to allow us to be more responsive to the needs of clientele.
- 3.1B Establish a sustainable Extension structure through organizing specialists and agents into teams to create solutions in crop production and turf management.
- 3.1C Continue to improve production practices through developing new technologies related to stress resistance, weed control, yield improvement, water and nutrient use efficiency, and soil and water quality.

STRATEGY 3.2

- 3.2 Disseminate Timely Information about Solutions to Problems in Crop Systems

TACTICS

- 3.2A Increase the efficiency of technology transfer to producers through the Extension portal and other resources such as websites, webinars, phone applications and social media.
- 3.2B Apply new communication tools and expertise to meet the needs of our clientele and society.



PEOPLE, PARTNERSHIPS and ADVANCEMENT

We will positively impact crop science by developing people, focusing on partnerships and collaborations and creating advancement strategies to support departmental programs.

STRATEGY 4.1

- 4.1 Foster a Diverse, Creative and Effective Work Environment

TACTICS

- 4.1A Plan strategically to address budgetary and resource needs to fulfill our mission.
- 4.1B Provide ongoing opportunities and incentives for professional and leadership development by staff and faculty to enhance effectiveness and success.
- 4.1C Foster a departmental climate of diversity and inclusiveness where faculty and staff can reach their full personal and professional potential.
- 4.1D Improve inter-departmental communications, workflow platforms and infrastructure to promote and enhance work effectiveness.

STRATEGY 4.2

- 4.2 Form Partnerships and Collaborations to Support Education, Research and Extension

TACTICS

- 4.2A Enhance public-private partnerships with private companies and commodity groups, seeking their input and support on future research programs.
- 4.2B Address local and global challenges in agriculture through increased interdisciplinary collaborations and teams within NC State and with other universities and the agricultural industry.
- 4.3C Identify partners, collaborators and agencies to assist students with costs of experiential learning opportunities.

STRATEGY 4.3

- 4.3 Engage in Advancement Activities to Support Departmental Goals

TACTICS

- 4.3A Communicate our departmental successes, outcomes and creative ideas to alumni, stakeholders, clientele groups and supporters of the department as a means of raising funds to support facilities and teaching, research and extension programs.
- 4.3B Advocate for increasing the current percentages of facilities and administration costs and royalties to the originating teams to reinvest in research.
- 4.3C Identify internal and external resources to remodel and improve facilities in order to promote all aspects of the Crop Science mission.

NC STATE CROP SCIENCE

Growing the future for North Carolina,
the nation and the world.

