Plant Science Strategic Plan 2020-2025

Core Values

- Excellence, creativity and productivity in the scholarship of resident and distance learning through teaching, research and extension.
- Openness and respect in a stimulating work and student learning environment that values everyone as unique individuals to cultivate a community with diverse ways of thinking, views and perspectives, welcomes all members of our society and promotes belonging as well as professional and personal growth and development.
- Interdisciplinary collaboration and communication in enhancing knowledge creation and dissemination to solve problems for the common good.
- Commitment and responsibility in recognizing, investigating and addressing important emerging issues raised by our stakeholders.

Mission Statement

The Department of Plant Science's mission is to create and disseminate knowledge that promotes the understanding and sustainable management of agronomic, horticultural, and landscape systems. We focus on managed production and multi-use landscape ecosystems, food and fiber production, and environmental quality.

Vision

To maintain excellence as a regional and national leaders of knowledge and expertise in agronomic, horticultural, and landscape systems.

Signature Areas

1. Plant Stress, Climate Change and Food Systems
2. Root/Soil Processes
3. Sustainable Crop Production and Landscape Systems
4. Plant Nutrition, Soil Fertility and Nutrient Management

Thematic Areas for Plant Science

1. Plant Stress Resilience

Develop and apply a better understanding of plant adaptation to climate and other abiotic and biotic stressors by using emerging and increasingly more sophisticated tools addressing the interactions between genotype, environment and management thus maintaining our expertise and leadership in this area.

Objectives

1.1 Identify plant traits that can be managed to withstand existing and emerging stressors.
1.2 Improve plant growth and development models, as well as pest prediction models that can address shifts in regional and global climate.
1.3 Work with our stakeholders to understand their plant stressors and opportunities to assist them.

Action Items

1.1 Develop expertise of faculty, graduate and undergraduate students, staff and extension educators in techniques and tools to identify plant physiological responses to stress and resilience traits.
1.2 Identify diverse stakeholder groups and approaches to reach underserved stakeholders.
1.3 Improve and sustain our facilities for research, teaching and extension work in plant stress resilience.

2. Root and Rhizosphere Biology

Advance expertise in root biology and interactions with symbionts to create resilient crops and improved management of agricultural and landscape systems thus maintaining our expertise and leadership in this area.

Objectives

2.1 Identify plant root traits to improve nutrient and water capture under growth limiting conditions.
2.2 Identify rhizosphere organism and plant interactions for enhanced plant productivity and resilience.
2.3 Identify and develop plants with root systems that may enhance soil carbon storage and improve soil quality.
2.4 Work with our stakeholders to understand their plant root and rhizosphere needs to assist them.
2.5 Develop expertise of faculty, students, staff and extension educators in techniques and tools to enhance plant root and rhizosphere interactions for plant productivity and resilience.

Action Items

2.1 Develop expertise of faculty, graduate and undergraduate students, staff and extension educators in techniques and tools in root biology and interactions with symbionts.
2.2 Identify diverse stakeholder groups and approaches to reach underserved stakeholders.
2.3 Improve and sustain our facilities for research, teaching and extension work in root biology and interactions with symbionts.

3. Resilient, Regenerative and Sustainable Agriculture Systems and Landscapes

Advance expertise to design agricultural and landscape systems that can recover from perturbations, improve the ecosystem and human community conditions, and persist into the future while increasing profitable yields and ecosystem services.

Objectives

3.1 Identify plant, crop, weed, soil, and water management practices that facilitate adaptation to climate, and other abiotic, and biotic stress.
3.2 Identify plant, crop, weed, soil and water management practices that impact the urban managed ecosystem.
3.3 Expand support to the organic farming community thorough research and extension activities.

Action Items

3.1 Identify and secure certified organic land for research and extension purposes and enhance funding opportunities.
3.2 Identify plant, crop, weed, soil, water and pest management practices that enhance long-term productivity and profitability while providing ecosystem services.
3.3 Integrate landscape design as an intrinsic aspect of agricultural systems management, considering site-specific and landscape level processes and feedbacks.
3.4 Develop expertise of faculty, graduate and undergraduate students, staff and extension educators in techniques and tools to identify plant, crop, weed, soil and water management practices for resilient, regenerative and sustainable agriculture systems and landscapes.
3.5 Identify diverse stakeholder groups and approaches to reach underserved stakeholders.
3.6 Improve and sustain our facilities for research, teaching and extension work in plant crop, weed, soil, and water management practices for resilient, regenerative and sustainable agriculture systems and landscapes.

4. Digital Innovation

We advance digital innovation by integrating models, proximal and remote sensing technologies as well as artificial intelligence to assimilate spatial and temporal data to improve agronomic, horticultural, and landscape systems.

Objectives

4.1 Enhance plant production and health utilizing existing and developing proximal and remote sensing technologies.
4.2 Utilize big data, machine learning, artificial intelligence and mechanistic models to develop the next generation of decision support systems for nutrient, water, and pest management.
4.3 Integrate our expertise with engineers, computer scientists and others to identify cost-effective robotic and precision agriculture tools.
4.4 Develop expertise of faculty, graduate and undergraduate students, staff and extension educators in techniques and tools to advance digital innovation in plant ecosystem production and management.
4.5 Identify diverse stakeholder groups and approaches to reach underserved stakeholders.
4.6 Improve and sustain our facilities for research, teaching and extension work in digital innovation in plant ecosystem production and management.

Action Items

4.1 Develop expertise of faculty, graduate and undergraduate students, staff and extension educators in techniques and tools to advance digital innovation in plant ecosystem production and management.
4.2 Identify diverse stakeholder groups and approaches to reach underserved stakeholders.

4.3 Improve and sustain our facilities for research, teaching and extension work in digital innovation in plant ecosystem production and management.

5. **Nutritional Quality of Plant Foods for Human and Animal Health**

We advance the study of plant nutritional quality and beneficial secondary metabolites through plant biology, genetics, and crop management including postharvest physiology.

Objectives

5.1 Breed plants for improved nutritional value.
5.2 Determine the effects of production practices and environment on plant food nutritional value.
5.3 Identify production practices and postharvest management practices that enhance and protect plant food nutritional value.
5.4 Enhance our understanding of therapeutic and medicinal plant products.

Action Items

5.1 Develop expertise of faculty, graduate and undergraduate students, staff and extension educators in techniques and tools to improve and protect plant nutritional traits.
5.2 Identify diverse stakeholder groups and approaches to reach underserved stakeholders.
5.3 Improve and sustain our facilities for research, teaching and extension work to improve and protect plant nutritional traits.

Institutes, Centers and Initiatives

The Department of Plant Science is a leader in numerous areas represented by the Plant Institute, various formed centers of excellence and collaborative relationships. Emphasis should be on enhancing the visibility and productivity of each of these initiatives.

1. Leadership in the Plant Institute
2. Leadership in Center for Root Biology
3. Leadership in Center for Turfgrass Science
4. Leadership in Center for Digital Agriculture
5. Involvement in the Institute for Sustainable Agricultural, Food, & Environmental Science (SAFES)
6. International Nexus (Nottingham Collaboration and other initiatives)

Transforming Education

We transform plant science education through new and existing residential and extension programs.

1. Residential and Extension Education

Develop and enhance residential and extension education, through new, existing, and online courses and extension materials and programs. Enhance residential experiential learning and engaged scholarship.

1.1 Develop new general education courses (e.g., Cannabis 101, Landscape Light) to expose new students to our majors.
1.2 Determine the potential for existing classes to successfully launch through World Campus.
1.3 Utilize components of residential and online classes to develop segmented extension modules.
1.4 Implement new, engaging teaching methodologies into our courses including technology-based strategies.
1.5 Determine educational needs and learning preferences for underserved extension audiences. Develop targeted extension programming to connect with these audiences.
1.6 Develop innovative strategies for science communication to better message our science to extension audiences.
1.7 Develop new in-person and distance technologies to reach all extension audiences.

2. Recruitment and Retention

Provide support for and develop new recruitment and retention activities to attract diverse students, extension stakeholders, extension educators, and tenure track faculty.

2.1 Enhance participation in existing high school recruitment activities (e.g., Governors School, FFA, etc.).
2.2 Develop new recruitment opportunities targeting under enrolled majors.
2.3 Develop and solicit input from focus groups within varies sectors of the industry.
2.4 Develop materials in additional languages (e.g., Spanish) to improve recruitment.

3. Enhanced Facilities

Enhance or improve residential teaching and extension education facilities (greenhouses, teaching laboratories, research and teaching farms) to attract diverse new students, extension educators, and faculty.

3.1 Renovate and enhance wet labs and teaching spaces.
3.2 Update and improve field research facilities used for teaching and extension activities.
3.3 Better utilize greenhouse space for experimental learning within courses and extension activities.

Engaging our Stakeholders

Objective

Continue to serve our industries by gathering input from stakeholders and customers to ensure we are working to find timely, researched-based solutions in the areas they care about most, and around the issues they face daily.

Action Items

1.1 Continue developing meaningful, science-based and unbiased educational programming.
1.2 Develop an emphasis on reaching and hearing from under-served stakeholders, in addition to traditional audiences.

1.3 Develop industry-specific advisory councils.
1.4 Develop innovative technologies to reach stakeholders, in addition to using traditional methodologies.
1.5 Use best practices in science communication to connect with stakeholders.
1.6 Partner with industry groups to develop educational programming with stakeholders and serve on their advisory councils and boards.
1.7 Engage stakeholders at high- and low-profile conferences, workshops and other events.

Infrastructure for Plant Science

Recent and ongoing efforts promise to remedy some long-standing issues, but additional efforts are needed to improve facilities to enable us to:

1. compete for research funding in various areas.
2. conduct applied research needed by our stakeholders.
3. provide high-quality teaching programs.
4. provide high-quality extension programs.

Diversity, Inclusivity and Belonging

Objective

The Department of Plant Science will strive to be represented by and serve a diverse community. This will be done by creating an atmosphere of inclusivity and belonging for all faculty, students and staff.

Action Items

1.1 Develop accounting practices for hiring and promotion to recruit and retain a diverse faculty and staff.
1.2 Develop mentoring practices for new faculty that includes addressing unique challenges faced by those belonging to underrepresented groups.
1.3 Participate in leadership trainings at the college and university level to promote the success of faculty, students, and staff belonging to underrepresented groups.
1.4 Develop recruitment, retention and accounting practices for increasing belonging for underrepresented students.
1.5 Encourage participation diversity, inclusion and belonging events and trainings throughout the college and university.
1.6 Dedicate time in department meetings to diversity, inclusivity and belonging topics several times a year.
1.7 Encourage students belonging to underrepresented groups to continue training through graduate school.

Department Engagement in this Strategic Plan

In August of 2018 the Department of Plant Science's Advisory Committee recommended the following people serve on the Department Strategic Planning Committee:

Elsa Sanchez (chair), Michela Centinari, John Kaminski, Heather Karsten, Armen Kemanian and Charlie White

Individuals were chosen to represent each of the Department's signature areas. It was determined that faculty working in the area of landscapes were not well represented. The Advisory Committee recommended Margaret Hoffman be asked to join the committee.

The committee met four times and developed an analysis of departmental strengths, weaknesses, opportunities and weaknesses. The analysis was provided to the department head and members of the Advisory Committee whose feedback was included.

The opportunities part of the analysis was the focus of a departmental mini retreat which occurred on May 8, 2019. During the retreat the department at large assessed and prioritized opportunities.

The committee met six more times to develop this strategic plan.