JULY 2013

UF/IFAS RESEARCH ROADMAP UPDATE

Unit Visions

UF | UNIVERSITY of FLORIDA

INTRODUCTION

Though we live in an ever-changing world, UF/IFAS' fundamental mission to advance scientific understanding and provide relevant solutions for vexing problems remains unchanged. Across our academic departments, research and education centers, and extension offices, our faculty is constantly assessing the needs and challenges of our agricultural and natural resources stakeholders. This listening process leads to discoveries in food and food systems, the environment, health, economics, and family and community development, all with goal of improving the quality of life for Floridians and people around the world.

In 2009, IFAS Research published a "roadmap" detailing the research opportunities, core programs of the future, and critical hires needed to advance our mission. The present publication provides an update, summarizing the most recent research directions of our academic units and research and education centers. Together, these summaries coalesce to shape the collective vision and direction of IFAS Research.

UF/IFAS is committed to maintaining a high level of excellence in all that it does. In partnership with our stakeholders, colleagues across the university, and scientists and educators around the globe, UF/IFAS will continue to play a critical role in creating new knowledge and advancing understanding of the most important questions facing the state of Florida and the planet. This updated research roadmap points the direction toward that goal.

Unit Visions

DEPARTMENTS

Agricultural and Biological Engineering

RESEARCH OPPORTUNITIES

Research investments in several areas are essential to enable the Agricultural and Biological Engineering department to compete more aggressively and effectively in the areas of hydrologic, environmental, and biosystems modeling; climate change and variability effects on biological systems and natural resources; nano-scale science; nanobiotechnology; biofuels; bioproducts; and packaging engineering.

CORE PROGRAMS OF THE FUTURE

- Biocomplexity engineering, focusing on complex coupled natural and human systems
- Biological engineering in biofuels and bioproducts, including innovative sustainable packaging materials
- Postharvest engineering with a focus on specialty crops
- Sustainable water use engineering
- Nanobiotechnology and nano-scale science
- Irrigation engineering and technology, focused on automation and control systems for sustainable agriculture

CRITICAL HIRES

- Biocomplexity engineering
- Packaging and postharvest engineering
- Sustainable production and water engineering
- Irrigation systems engineering

Agricultural Education and Communication

RESEARCH OPPORTUNITIES

Agricultural Education and Communication department faculty members will use the 2011-2015 National Research Agenda to frame their research programs and enhance research collaboration, capacity, and impact on discipline-specific problems and challenges affecting the broader agriculture and natural resources (ANR) sectors. Areas of focus will include public and policy-maker understanding of ANR; increasing the academic and research interests of high school students in the agricultural sciences; providing meaningful and effective learning environments for secondary and university students; and enhancing the effectiveness of educators, communicators, and leaders in agriculture.

CORE PROGRAMS OF THE FUTURE

- Reaching objective, science-based decisions on public issues affecting ANR
- Leading and managing change in a global context
- Attracting students into academic programs that lead to careers in agricultural research
- Enhancing human capacity in domestic and international contexts related to ANR

CRITICAL HIRES

- Extension and nonformal education in domestic and international settings
- Integrated marketing communications

Agronomy

RESEARCH OPPORTUNITIES

The Agronomy department has closely followed the research roadmap developed in 2009 in guiding our decisions for position requests and resource allocations, and feels that the priorities outlined in that document are still those where the department should focus, with some minor changes. Agronomy will continue focus on sustainable production and use of food, feed, fiber, energy, and recreational crops. The research disciplines emphasized in the department will be plant breeding and molecular biology, physiology and ecology, carbon sequestration and ecosystem services, and weed ecology and management.

CORE PROGRAMS OF THE FUTURE

- Agroecology of sustainable food and feed production systems
- Genetics/genomics
- Bioenergy
- Invasive plants
- International programs

CRITICAL HIRES

- Aquatic/invasive plants
- Global agroecology of sustainable food production systems
- Bioenergy crop breeding
- International agronomy
- Precision agriculture cropping systems

Animal Sciences

RESEARCH OPPORTUNITIES

The focus of the Animal Sciences department will continue to be on the primary forage-consuming species (beef and dairy cattle and horses) and their products (meat, milk, recreation, and sport). Our research direction will be enhanced by our capacity to use tools of functional genomics and proteomics, combined with unique models of animal performance as they relate to tropical and subtropical environments.

CORE PROGRAMS OF THE FUTURE

- Genomics and proteomics
- Models of animal performance, particularly in tropical and subtropical environments
- Livestock systems analysis

CRITICAL HIRES

- Equine physiology
- Rumen microbiology
- Livestock systems management
- Forage utilization nutrition
- Animal behavior
- Meat science
- Nutrition management
- Physiological genetics, with emphasis on lactation and immune function
- Forage genetics

Environmental Horticulture

RESEARCH OPPORTUNITIES

Research opportunities for the Environmental Horticulture department include applications of horticultural practices to ornamental and turf production and best management practices, ecosystem conservation and restoration, landscape sustainability in design and installation of sustainable Florida landscapes, biotechnology, and conventional breeding leading to the production of new landscape varieties. Postharvest physiology may also be a core focus area in the future.

CORE PROGRAMS OF THE FUTURE

- Sustainable landscapes/turfgrass systems in terms of water and nutrient input requirements, nursery/greenhouse production, and best management practices
- Applications of horticultural practices to ecosystem conservation/restoration
- Breeding and biotechnology of improved landscape varieties that use fewer natural resources
- Invasive plant management

CRITICAL HIRES

- Ecophysiology (water/nutrient cycling in the landscape)
- Global supply chain analysis (international movement of plants, postharvest, and marketing for Florida as a global gateway)
- Tropical/subtropical plant breeding

Entomology and Nematology

RESEARCH OPPORTUNITIES

Due to Florida's susceptibility to invasion by exotic tropical and subtropical arthropods, nematodes, and weeds, the Entomology and Nematology department seeks to enhance interdisciplinary research efforts on specialty and organic crops, pesticide toxicology related to food safety and environmental contamination, the impact of invasive species on trade and ecosystem function, integration of biologically-based IPM with Best Management Practices (BMPs) and structural and landscape IPM programs for communities, and bio-based energy. The department's research on medical, veterinary and urban entomology will be pursued in cooperation with UF's School of Public Health, the Emerging Pathogens Institute, the Water Institute, and the School of Natural Resources and the Environment.

CORE PROGRAMS OF THE FUTURE

- Fundamental research, including molecular studies, behavior, and ecology
- Understanding the pathways of entry, mechanisms of survival and dispersal by invading pests, and the community and ecosystem-level effects of invasives
- Augmentative biological control, the integration of biological control into organic and sustainable agriculture, the ecology of insect vectors of plant disease, and delivery of alternatives to insecticides at the urban-rural interface
- Insect conservation and biodiversity by integrating research efforts in conservation ecology, community and ecosystem ecology, insect systematics, and molecular biology
- Interdisciplinary research and development on arthropod/weed management, especially on insect vectors of plant diseases to enhance efforts in Integrated Pest Management (IPM)
- Molecular genomics of pests and insect/nematode symbionts

CRITICAL HIRES
- Nematode molecular physiology/ genomics
- Systematics/taxonomy
- Pesticide resistance management
- Community ecology
- Insect/nematode symbiosis

Family, Youth, and Community Sciences

RESEARCH OPPORTUNITIES

The research efforts of the Family, Youth, and Community Sciences department seek to understand and improve the personal, social, economic, and environmental well-being of the individual and family throughout the life span. The interdisciplinary research conducted within the department shares a common purpose to understand and support individuals and families within diverse community and social systems.

CORE PROGRAMS OF THE FUTURE
- Family and consumer economics (individual and family resource management)
- Human development, family well-being, and youth development
- Nonprofit or community-based organizations and community development
- Nutrition, health, and wellness
- Effective teaching, program planning, and evaluation

CRITICAL HIRES
- Capacity building and modeling
- Nonprofit (community-based) organizational development/financial management
- Adult development and aging
- Quantitative and qualitative research methodology
- Infant and child development

Food and Resource Economics

RESEARCH OPPORTUNITIES

The Food and Resource Economics department is moving to address the broader questions of economics and policy for food, natural resources, the environment, and energy. Key research opportunities include: 1) examining how current world food production and marketing systems can be transformed to address the challenges of resource scarcity, energy independence, food security, global warming, and the nutritional requirements of healthful diets; and 2) conducting interdisciplinary research with biological scientists to investigate the sustained management of ecological systems, including agricultural systems, fisheries, wildlife, and water systems.

CORE PROGRAMS OF THE FUTURE
- Agricultural, food, and resource policy, both domestic and international
  - » Issues involving agricultural and resource policies in an era of restricted fiscal budgets
  - » The conflict between domestic and global food security within the context of agricultural and trade policy
  - » Emerging issues regarding the resource budgets and the promotion of biofuels
  - » National and international programs to promote healthy diets
- Bioeconomic modeling of managed biological systems to ensure sustained provision of ecosystem services and economic benefits to resource managers
- Resource, labor, and trade issues in developing economies

CRITICAL HIRES
- Natural resource and environmental economics
- Development economics
- International economics
- Health economics (nutrition, obesity, and food safety)
- Econometrics

Food Science and Human Nutrition

RESEARCH OPPORTUNITIES

The Food Science and Human Nutrition department is well positioned to conduct interdisciplinary, multi-investigator research that focuses on strengths in both food and nutritional sciences. Our research capabilities encompass fundamental biomedical questions at the molecular level, as well as the applications of that knowledge for the benefit of communities and stakeholders. Research through the various centers – nutritional science, juice and beverage, smell and taste, and emerging pathogens will become increasingly important in the future.

CORE PROGRAMS OF THE FUTURE
- Food safety and microbiology
- Functional foods and bioactive ingredients
- Micronutrient research
- Healthy digestion and immunity
- Flavor and aroma characterization
- Obesity: mechanisms and solutions
- Seafood quality and safety

CRITICAL HIRES
- Micronutrient biology
- Food microbiology
- Flavor chemistry
- Microbiome/probiotic expertise
- Support in statistics and bioinformatics

Horticultural Sciences

RESEARCH OPPORTUNITIES

Faculty programs in the Horticultural Sciences department focus on the integration of applied and basic research to develop practical solutions enabling Florida's fruit and vegetable (specialty crop) producers to remain competitive in the market and in balance with increasingly urban environments. Opportunities exist to develop innovative, sustainable technologies for use in specialty crop improvement and production with national and international impact. Investigations of fundamental plant biology lay the foundation for new and improved crops adapted to future environments and production systems.

CORE PROGRAMS OF THE FUTURE

- Increase the understanding of fundamental plant biology to gain new insights in the basic life sciences and develop innovative methods for plant improvement and novel approaches towards horticultural crop sustainability and production
- Integrate traditional breeding with functional and structural genomics
- Improve production and harvest efficiencies, with emphasis on sustainability and development of strong markets for specialty crops at local and state levels
- Improve value-added qualities in specialty crops, especially nutritional value, flavor and postharvest quality

CRITICAL HIRES

- Biochemical genetics
- Computational biology
- Protected agriculture physiology and management
- Sweetcorn breeding and genetics

Microbiology and Cell Science

RESEARCH OPPORTUNITIES

The Microbiology and Cell Science department needs to prepare for the post-genomics era, wherein we are only limited by our ability to make sense of these data and to use them wisely in our pursuit of new knowledge. Achieving this goal will require that the department support campus-wide efforts in computational biology and its infrastructure, and a stronger campus-wide foundation in statistics and informatics. Research on extremophiles has expanded our view of the habitable zone of life on our planet and on other planets, and these areas will give a clearer picture of the evolution of life as we know it and open up new areas and opportunities in biogeochemistry, high temperature enzymatic processes, and alternative energy sources. Understanding and characterizing the human microbiome and its interactions with human cells and tissues promises to provide new approaches to persistent and chronic human diseases, and understanding host-microbe interactions will affect the progress towards lessening the burden of disease in agricultural crops, thus assuring a safer and more abundant food supply.

CORE PROGRAMS OF THE FUTURE

- Genomics and transcriptomics studies of microorganisms and enhancing the ability to process the enormous volumes of data that will be generated by present and new methodologies
- Explore the full range of life's metabolic capabilities, such as enzymes that work at high temperatures to degrade plant tissue during biofuel production
- Host-microbe interactions that cause persistent or chronic disease, some of which is refractory to antibiotic or other therapies
- Interaction of the human microbiome with the human immune and other systems, as well as epigenetic control of the human microbiome

CRITICAL HIRES

- Bioinformatics and computational biology
- Extremophile biology
- Host-microbe interactions
- Epigenetic influences on microorganism behaviors

Plant Pathology

RESEARCH OPPORTUNITIES

Emerging and reemerging diseases are threatening Florida's economically important and signature crops, and research advances have now put the Plant Pathology department in a position to greatly increase the diversity and profitability of Florida agriculture. Developments in sequencing plant and pathogen genomes and in understanding plant resistance mechanisms in model plant systems will allow not only more sustainable, safe, and economic approaches to production of existing crops, but will allow the production of new crops thought not applicable to the Florida environment because of disease pressure. An important contribution to sustainable production systems will be the expansion of transgenic technologies, and basic research conducted by plant pathologists will lead to the development of disease-resistant crops and alternative disease management strategies through biotechnology and metagenomics technologies.

CORE PROGRAMS OF THE FUTURE

- Emerging and reemerging pathogens: detection, ecology, epidemiology and management
- Plant disease resistance: bioinformatics, functional genomics, biotechnology
- Interactions of pathogens with their hosts and vectors: genetics, genomics, biochemistry, structural biology

- Plant-associated microbial communities: functional genomics, ecology, biological control
- Pathogen population genetics: evolution, biocide resistance, virulence characteristics

CRITICAL HIRES

- Bioinformatics of disease resistance in plants
- Functional genomics of plant/microbe associations
- Pathogen effector biology and biochemistry
- Ecology and epidemiology of emerging pathogens

School of Forest Resources and Conservation

RESEARCH OPPORTUNITIES

Research programs at the School of Forest Resources and Conservation focus on forest, fisheries, aquatic, and geospatial sciences, with the goal of attaining efficient production, sustainable management and informed conservation of natural resources. Our plan is to further enhance interdisciplinary research – spanning the terrestrial and freshwater to coastal ocean continuum and comprising the biological as well as social systems – to better understand, optimize, predict and communicate the whole-system effects of natural and human activities.

CORE PROGRAMS OF THE FUTURE

- Sustainability, including resource production, management, and conservation in a changing world
- Human dimensions, including conflict management, community engagement, and social systems
- Integrative systems research scaling from the molecular to the landscape level to understand processes, synthesize across disciplines, and make better predictions of future conditions

CRITICAL HIRES

- Geomatics – spatial analysis and mapping of terrestrial and aquatic natural resources
- Conflict resolution and community engagement
- Ecological and spatial biometrics
- Coastal ecology and conservation (located at WFREC)

Soil and Water Science

RESEARCH OPPORTUNITIES

The Soil and Water Science department's direction will address critical soil, water and environmental issues related to water quality; water conservation; soil quality; carbon sequestration; greenhouse gas emissions; emerging contaminants; waste management as related to environmental health; global change; and sustainable production of food, fiber, and fuel. The core programs will address issues in a range of ecosystems, including agricultural, forested, range land, urban, wetlands, and aquatic systems.

CORE PROGRAMS OF THE FUTURE

- Management of water, nutrients, pesticides, and wastes, with relevance to water quality and conservation, sustainable crop production, and climate adaptation
- Soil, water, and aquifer remediation, with relevance to public health
- Carbon dynamics and ecosystem services, with relevance to global change biology and climate change
- Wetlands and aquatic systems, with relevance to water quality, macro-elemental cycles, and sea level rise
- Modeling and landscape analysis, integration of environmental information across scales

CRITICAL HIRES

- Environmental soil and water chemistry
- Integrative soil and water scientist/environmental informatics
- Vadose zone hydrology and soil physics
- Soil quality management
- Atmospheric biogeochemistry
- Critical zone process modeling
- Aquatic biogeochemistry
- Soil microbiology (mycology)
- Waste management

Wildlife Ecology and Conservation

RESEARCH OPPORTUNITIES

The Wildlife Ecology and Conservation department addresses questions and seeks solutions to conserve biodiversity, maintain ecosystem health, and promote the sustainable use of natural resources. The WEC mission is pursued by conducting basic and applied science at all levels, from the genotype to the community and from microhabitats to landscape scales, and by engaging in the development of management and conservation recommendations. Opportunities are presented by emerging issues such as climate change and sea level rise, water use and energy demands, land-use change, emerging zoonoses, pollutants and invasive species, overexploitation, and resource extraction policies.

CORE PROGRAMS OF THE FUTURE

- Conservation biology
- Wildlife ecology
- Wetlands, uplands, and coastal systems ecology
- Human dimensions
- Implications of environmental change
- Natural areas management and conservation
- Sustainability in natural and modified landscapes
- International wildlife conservation and ecology

CRITICAL HIRES

- Conservation implications of environmental change (climate, invasive species, etc.)
- Conservation implications of water and energy use and extraction
- Conservation planning, policy, and economics
- Ecology of human-dominated and working landscapes
- International conservation and management of wildlife and protected areas
- Wildlife disease ecology

RESEARCH AND EDUCATION CENTERS (REC)

Citrus REC – Lake Alfred

RESEARCH OPPORTUNITIES

A major objective of Citrus REC's research is to provide the basic foundation for sustainable, economically viable solutions to Huanglongbing disease (aka greening or HLB). The realistic threat of exotic disease introduction provides an opportunity to develop proactive programs addressing management and control. Critical research opportunities include development of new citrus production systems; biorational pest control strategies; site -specific and regional water management programs; innovative technologies and approaches for sustainable citrus production, processing, and food safety; and novel citrus improvement strategies.

CORE PROGRAMS OF THE FUTURE

- Exotic disease control and management
- Bioinformatics, functional genomics, and computational biology
- Integrated pest management and chemical ecology
- Produce and juice food safety and quality
- Citrus water and agrosystems management
- Citrus breeding and improvement
- Citrus products, by-products, biochemistry, and process engineering
- Citrus nursery and grove production systems
- Whole plant approaches to stress and disease

CRITICAL HIRES

- Citrus water management and agrosystems specialist
- Citrus computational biologist
- Citrus molecular biologist/physiologist
- Insect toxicologist
- Citrus flavor and products biochemist
- Citrus and natural resource economist

Everglades REC – Belle Glade

RESEARCH OPPORTUNITIES

The Everglades REC is positioned to become a leader in biofuels energy research. Other major trends to address include decreasing agriculture's carbon footprint, developing farming systems for marginal soils (shallow mucks and sands), understanding the processes controlling nutrient availability and retention in soils, improving food quality and safety, and linking agriculture to sustainability.

CORE PROGRAMS OF THE FUTURE

- Farming systems for shallow muck soils
- Plant breeding, agronomy, and pest management for biofuels
- Maintaining soil quality for agricultural production
- Everglades restoration and management practices at the farm level to improve water quality
- Wetlands restoration, wildlife habitat, and wildlife/agriculture interactions

CRITICAL HIRES

- Irrigation systems engineering
- Wetlands and wildlife ecology
- Economics
- Grass breeding/agronomy for biofuels
- Food safety and food microbiology

Florida Medical Entomology Lab – Vero Beach

RESEARCH OPPORTUNITIES

The Florida Medical Entomology Lab's research will continue to address the potential for emerging vector-borne diseases. Florida and the U.S. rely on our research efforts to develop more accurate methods of vector surveillance, vector-borne disease surveillance and more effective vector control.

CORE PROGRAMS OF THE FUTURE

- Molecular and biochemical aspects of arthropod biology
- Biology and ecology of arthropods in their natural environment
- Physiology of mosquitoes and other insects
- Genetics, including transgenesis and transformation of insects
- Insect behavior and ecology
- Vector-virus interactions
- Improved control strategies

CRITICAL HIRES

- Arbovirus epidemiology
- Molecular biology of arboviruses
- Vector genomics

Ft. Lauderdale REC

RESEARCH OPPORTUNITIES

Ft. Lauderdale REC develops sustainable management for tropical and subtropical landscape systems and for reducing the impact of invasive animals and plants on both natural and highly urbanized habitats. Our research focuses on water, nutrition, and pesticide management on turf and ornamentals, structural pest management, biodiversity and conservation issues, invasive plant and animal mitigation, geomatics, and landscape analysis and modeling to understand potential ramifications of increasing sea level, decreasing natural resources and declining water quality in south Florida and elsewhere.

CORE PROGRAMS OF THE FUTURE

- Climate change: Impacts and sustainability
- Aquatic and wetland habitats: Algae, plants, and animals
- Invasive species: Detection, ecology, and management
- Urban landscapes: Environmentally responsible management
- Structural pests: Environmentally responsible management
- Genomics: Nematodes, insects, and plant pathogens
- Geospatial research: Mapping ourselves into the interdependent web of life
- Commercial turf and ornamental production systems

CRITICAL HIRES

- Algology
- Plant vector entomology
- Environmental change biometrics
- Environmental change conservation biology
- Invasive ecology
- Insect microbiology
- Insect/Nematode molecular physiology/genomics

Gulf Coast REC – Balm/Plant City

RESEARCH OPPORTUNITIES

The Gulf Coast REC will develop and disseminate new scientific knowledge and technology for commercial agriculture that will assist Florida's producers to be competitive both nationally and in the world economy. Key elements of the center's research mission are to develop low-input horticultural crop production and pest management systems, to develop conservation efforts by discovering strategies to improve sustainability of agriculture and urban landscape, and to improve genetics of commercially important horticultural crops.

CORE PROGRAMS OF THE FUTURE

- Genetic improvement and cultivar development (disease resistance, improved horticultural characteristics) of tomato, strawberry and other small fruits, and landscape and ornamental crops
- Management of protected agriculture systems for vegetables and fruit crops
- Sustainable and integrated biological, chemical, and cultural pest management systems (diseases, insects, and weeds)
- Use of disease forecasting techniques
- Development of best management practices for sustainable production systems
- Conservation and protection of water resources
- Urban landscapes and management practices to improve water quality
- Impact of known and emerging contaminants on surface and groundwater resources
- Economics for profitable vegetable and fruit crop production
- Remote sensing and geographic information applications for agriculture and the environmental monitoring

CRITICAL HIRES

- Entomology (small fruits/ornamentals)
- Horticulture/Pathology- Food Safety (postharvest physiology and/or pathology)
- Soil and Water Science (landscape nutrient management)
- Agricultural Engineering (water management)

Indian River REC – Ft. Pierce

RESEARCH OPPORTUNITIES

Indian River REC's research addresses both sustainable agriculture and sustainable urban development and their interactions with the environment. Research directions include collaborative programs in best management practices (BMPs), water quality, biological control of invasive species, aquaculture, landscaping, and alternative crops (such as energy crops).

CORE PROGRAMS OF THE FUTURE

- Citrus canker and greening – biotechnology-based solutions and grove architecture
- Biological control of invasive plants and insects
- Specialty crops and high value-added production horticultural products
- Environmental quality and restoration of wetlands and estuaries
- Alternative agricultural systems (aquaculture, biofuel feedstocks)
- Interaction of sustainable agriculture and environmental quality

CRITICAL HIRES

- Soil and water science (environmental science – coastal wetlands)
- Plant pathology (emerging citrus pathogens)
- Bioinformatics
- Economic entomology
- Environmental ecology
- Agricultural economics
- Invasive Plant ecology

Mid-Florida REC – Apopka

RESEARCH OPPORTUNITIES

The Mid-Florida REC will need to expand to meet the needs of the increasing urban population and associated infrastructure. Sustainability and protected crop production are growing trends in the horticultural and environmental horticultural industries, and are areas in which the Mid-Florida REC can bridge the gap between current research efforts and future needs in plant production, protection, and development.

CORE PROGRAMS OF THE FUTURE

- Emerging pests in urban and sustainable production systems
- Nutrient management and water quality
- Invasive weed management
- Biological control of nematodes
- Protected horticulture
- Breeding of plants for sustainable landscapes

CRITICAL HIRES

- Urban soil and water quality
- Weed science
- Nematology
- Risk and crisis communication science
- Urban entomology
- Protected horticulture
- Molecular and translational genetics
- Plant physiology

North Florida REC – Quincy/Marianna

RESEARCH OPPORTUNITIES

The major natural resource economic impacts and job impacts in north and northwest Florida occur due to 1) vegetable and melon production, 2) cattle and row crop enterprises, and 3) forest resource management and harvest (2010 Ag Statistics Data courtesy of Dr. Alan Hodges). In order to succeed in our mission to enhance agriculture, natural resources, and quality of life through science, our research opportunities are focused on these areas via a team-based systems approach.

CORE PROGRAMS OF THE FUTURE

- Beef/forage systems, including breeding of valuable new forages
- Specialty crop systems, including new crop enterprises for north and northwest Florida
- Row crop systems for sustainable production of food and energy, including breeding of high oleic peanuts for a growing farming and candy industry
- Natural resource systems for wildlife habitat, alternative forest products (including energy) and agriculture/forest/urban interface as urbanization increases and land uses change

CRITICAL HIRES

- Water issues science
- Row crop pathology (also support for oil crop bioenergy)
- Specialty crop entomology (also support for woody biomass and oil crop development)

Range Cattle REC – Ona

RESEARCH OPPORTUNITIES

The Range Cattle REC is directing research to respond to emerging challenges and opportunities facing grazing lands, among them the increasing costs of fertilizers and fuel, loss of grazing land to urbanization and public acquisition, and the environmental impacts and ecological benefits of pasture- and rangeland-based animal production. In addition to maximizing production, our research efforts will focus on sustainable production practices that seek to improve the economic efficiency and environmental quality of grazing lands in Florida and throughout the world.

CORE PROGRAMS OF THE FUTURE

- Soil and water management
- Grazing land management
- Weed control and management
- Beef production
- Wildlife habitat and ecology
- Climate change and mitigation
- Biomass production

CRITICAL HIRES

- Forage agronomy (extension)
- Watershed biogeochemistry

Southwest Florida REC – Immokalee

RESEARCH OPPORTUNITIES

The Southwest Florida REC will address agricultural and natural resource issues that arise from the complex interplay among agricultural, urban, and natural systems. The overarching goal of SWFREC's research programs is to sustain a profitable agriculture industry, vital environmental services and quality of life in southwest Florida. Major research opportunities are in areas such as land and water use, pests and diseases of citrus and vegetables, alternative crops, and improved crop production systems and new technologies that more efficiently allocate resources for optimized agricultural productivity while protecting and conserving the natural environment and resources of the region.

CORE PROGRAMS OF THE FUTURE

- Maximizing sustainability and profitability in production agriculture
- Alternative crops and enhanced uses of land-biofuels and ecosystem services
- Sustainable pest management systems and biological control
- Improved agricultural technologies and cropping systems
- Water quality, quantity, and conservation
- Ecology

CRITICAL HIRES

- Citrus and vegetable pathology
- Citrus horticulture
- Precision agriculture
- Natural resource economics and conservation

Tropical REC – Homestead

RESEARCH OPPORTUNITIES

The unique tropical/subtropical setting of the Tropical REC, diverse agricultural industries, and the accompanying ecological restoration and conservation efforts in the Everglades set the center's research direction. Critical focus areas include developing sustainable production and landscape systems for tropical fruit, vegetable, ornamental, and biofuels crops; developing and patenting new tropical crop cultivars using cutting-edge technology; and addressing natural resource challenges such as water quality, invasive species, and salt water intrusion.

CORE PROGRAMS OF THE FUTURE

- Tropical/subtropical ornamentals
  - Biotechnology and breeding
  - Sustainable mechanized production systems
  - Sustainable landscape management
- Tropical/subtropical fruit crops
  - Biotechnology and breeding
  - Sustainable systems focused on pest and disease management
- Natural resources, especially water and soil quality
- Traditional and tropical vegetable crops
  - Biotechnology and breeding
  - Sustainable pest and disease management systems
  - Soil disinfestation technologies in urban areas

CRITICAL HIRES

- Plant breeding/genetics-tropical fruit
- Vegetable horticulture (extension/research)
- Postharvest physiology

West Florida REC – Milton/Jay

RESEARCH OPPORTUNITIES

The West Florida REC's focus will be on the integration of traditional agricultural systems with new components, including specialty and biofuel crops, natural resource conservation and management, and managed landscape sustainability.

CORE PROGRAMS OF THE FUTURE

- Turfgrass science
- Landscape and nursery horticulture
- Coastal ecology and restoration
- Forest ecology and management
- Weed ecology and management
- Invasive species management
- Integrated cropping systems
- Watershed management
- Pest management for ornamentals, turf, and forestry
- Agricultural and biological engineering

CRITICAL HIRES

- Agricultural cropping systems
- Watershed management
- Coastal resources and ecosystems
- Coastal wildlife ecology
- Agricultural and biological engineering
- Pest management for ornamentals, turf, and forestry








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