1.0 Agriculture and Food Systems

Brief Summary of Program

Our research and education is directed toward improvement of the global food system as a whole from “farm to table” and including analyses of domestic and international policies affecting the system, food security and hunger. Extension and research programs fit within the University’s priority of global health, defined as research, service, and training that address health problems that transcend national boundaries, that disproportionately affect the resource-poor, and that are best addressed through multidisciplinary solutions. Domestic programs enhance and may directly contribute to work internationally and particularly in developing countries. Programs cover multiple aspects of global food security such as soil resources and soil health, crop plant genomics, field evaluation of crops, reliable production guidelines, genetic improvement of animals and animal production, economics of production and farm management, integrated pest management, healthy produce, fruit and vegetable production and storage and facilitation of sustainable agriculture. Education complements research by encouraging farmers to grow new crop varieties and employ new production and business practices, through programs for agriculture sector businesses, by informing consumers about improved food products, and encouraging adults to serve the foods to children. Research analyses and education also affect policies to reform governmental food-related programs.

Research and extension programming to ensure agriculture, horticulture, and related business vitality is critical to the land grant mission. Cornell University has a commitment to farm and agricultural/horticultural business industries and to assist key decision makers in making the best choices in managing their farms or agriculturally related businesses. Research and educational programs help business owners improve productivity and sustainability through resource management, facilitate adoption of new technologies and practices, improved marketing strategies and business management skills and identifying alternative enterprises. Farm businesses, horticulturist, and natural resource managers utilize research-based knowledge to continue producing a stable, safe and affordable food, feed, fiber, and fuel supplies and robust, attractive horticultural plants in economically and environmentally sustainable ways.

Cornell University has a commitment to agriculture, horticulture, and natural resources enterprises and to assisting them in making the best choices when selecting production principles and practices to enhance economic and environmental sustainability in spite of changing climates. We provide comprehensive research and education programming focused on assessing existing and new production-management practices and techniques with special emphasis on agricultural environmental management. As part of our strategy, we emphasize integration of research and extension to accelerate: identification of problems, focusing scientific effort to resolving problems, field-testing and evaluation of technology and cultural practices, and implementation of environmentally superior innovations/practices for the agricultural, horticultural, and natural resource communities.

Situation and Priorities Statement

Agricultural and food industries contribute an estimated $30 billion a year to New York State’s economy. Improving production efficiency, and quality and safety of plants and animals in agricultural, horticultural, and natural resource production systems is fundamental to improving our ability to compete in a global economy. Managers of New York’s 36,000 farms and horticultural operations, and 3,000 natural resource producers face dynamic and complex production environments, including changing climatic trends. Extensive knowledge and skills are needed for identifying, selecting, and adopting principles and practices that optimize production management and improve profitability and sustainability in accordance with business goals. Technologies such as genetic engineering, satellite imagery and GIS, computer aided management decision tools are readily available today for adoption and use. Technical assistance providers have similar needs to remain up-to-date and able to provide appropriate recommendations for each enterprise.

Protecting and improving the integrity of our environment and maintaining ecological systems enable human prosperity. Expanding human populations cause growing consumer demands on the agriculture and food system. A finite or decreasing available land base and changing climates impose additional constraints. This magnifies challenges of balancing food production and processing with land stewardship and protection of the environment. The long-term sustainability of agriculture is inexorably linked to environmental quality.
Program priorities include: protecting and enhancing soil resources, crop plant genomics, field evaluation of crops, reliable production guidelines, genetic improvement of animals and animal production, economics of production and farm management, integrated pest management, healthy produce, fruit and vegetable production and storage, facilitation of sustainable agriculture and analyses of food system policies. Education promotes use or development of new crop varieties and employment of new production and business practices, supports a viable agriculture business sector in the economy and informs consumers about improved food products and how to improve their food security. Promoting understanding of the economic and social roles of agriculture is important to sustainability of the agriculture sector.

Assumptions
- New science is needed for the production and procurement of adequate and acceptable nourishment for the world’s population.
- Tackling the issues of global food security and hunger requires multidisciplinary, multi-institutional and collaborative research and extension efforts.
- Addressing hunger involves not only providing adequate calories but also meeting total human nutritional needs.
- Food system research and education must encompass a broad spectrum of from the study of basic plant and animal genomes, to effective and efficient production, to marketing, distribution and consumption practices, to policies affecting the quality and availability of a secure food supply.
- Integrated systems approaches are needed to expand our understanding of trade-offs and develop BMPs that better address current and future challenges as well as food safety.
- Producers, horticultural business people, and natural resource managers often are not fully aware of or skillful in managing production principles and practices that may help optimize their operations for economic and environmental sustainability and/or business management and development needs.
- Many agricultural/horticultural/natural resources businesses have opportunity to strengthen profitability through improved planning and management.
- There is opportunity for growth in the agricultural/horticultural/natural resources sectors through alternative, new, and value added enterprises which may not be apparent to potential investors.
- The supply and effective management of labor resources is a key to the viability of agricultural/horticultural/natural resources enterprises.
- Producers, horticultural business people, and natural resource managers often are not fully aware of potential environmental impacts of their operations and/or requirements and opportunities of environmental regulations and programs.
- Technical assistance providers relied upon by producers, horticultural business people, and natural resource managers have parallel needs for current information on appropriate production practices.
- In most cases, it is possible to simultaneously meet economic and environmental sustainability goals.

Ultimate Goal(s) of the Program
- Boost US agricultural production.
- Improve global capacity to meet growing food demand in spite of changing climate.
- Foster innovation in fighting hunger by addressing food insecurity in vulnerable populations.
- Assure the long-term viability and well being of the agricultural/horticulture industry and rural communities in New York State.
- Promote economically and environmentally sound products and practices, and safer and healthier products.
- Assist producers, horticulture businesses, and natural resource managers to optimize production management and improve profitability and sustainability in accordance with their goals.
- Increase the use of sustainable practices to result in improved or protected soil, air and water quality and production of high quality and safe food and fiber.
- Improve soil health and productivity, resulting in increased farm profitability and improved environmental quality.

Activities
This is a comprehensive program entailing a wide range of applied research activities and multiple education methods depending on context and need. Campus-based faculty and extension associates, regional specialists and county-based educators all are involved in designing, implementing, and evaluating tailored educational efforts depending on the focus and scope of their role.
Multi-disciplinary, multi-institutional and collaborative program examples include: Collaborative Crops Research Program (CCRP), Cornell-Eastern Europe-Mexico International Collaborative Project in Potato Late Blight Control (CEEM), Cornell International Institute for Food, Agriculture and Development (CIIFAD), Institute for Genomic Diversity (IGD), Institute for Global Learning, International Integrated Pest Management, International Programs Initiative for Biotechnology, International Research and Scientific Exchanges, Program in International Nutrition, Strategic World Initiative for Technology Transfer (SWIFTT), and The Essential Electronic Agricultural Library (TEEAL), work with the Gates Foundation, USAID and other private aid organizations.

Sample Statewide/Regional Initiatives that fall within this Plan of Work

- Capital District Vegetable and Small Fruit Program
- Central NY Dairy and Field Crops Program
- Cornell Vegetable Program (Western NY)
- Finger Lakes Grape Program
- Lake Erie Regional Grape Program
- Lake Ontario Fruit Program
- Northeast NY Fruit Program
- South Central NY Dairy and Field Crops Program
- Harvest NY
- Northwest NY Dairy Livestock and Field Crops Program
- Integrated Pest Management

Target Audiences

Key audiences served, directly and indirectly, in enhancing agribusiness viability include: established producers; new and young producers, consultants and service providers, input suppliers, cooperative directors and managers, marketing firms, governmental agencies, lenders, and local/state/federal governmental leaders.

Output and Outcome Indicators highlighted indicators are collected.

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Near-Term Outcomes</th>
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<tr>
<td># patents</td>
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Business Management Emphasis

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<tr>
<td>(1.1a) # producers/ horticulture/natural resources business persons completing education programs on business management, finance, business planning and marketing, human resource management, risk management, production economics, and business transitions.</td>
<td>(1.1b) # participants demonstrating knowledge or skill gains in business management, finance, business planning and marketing, human resource management, risk management, production economics, inter-generational transfer and other business transitions.</td>
<td>(1.1c) # participants documented to have applied knowledge or skills gained to strengthen existing business operations.</td>
<td>(1.1e) # participants reporting improved agricultural/ horticultural business profitability attributed at least in part to program participation.</td>
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<td>(1.1d) # participating family-owned agricultural/ horticultural/natural resources businesses that plan for succession, transfer, or sale of their business.</td>
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<td>(1.1f) # business owners successfully completing an intergenerational transfer or other desired dispensation of their business attributed at least in part to program participation.</td>
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### Agriculture/Natural Resources Enterprises Labor

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<td>(1.3b) # participants who demonstrate knowledge gains related to needs of potential employees and/or availability of qualified employees.</td>
<td>(1.3c) # participants documented to have made one or more changes in human resources practices to enhance labor availability or retention.</td>
<td>(1.3d) # producers/horticultural businesses reporting improved labor availability, performance, and/or retention of higher skilled and more valuable human resource team members attributed at least in part to program participation.</td>
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### Producer Alternatives/New Ventures

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<td>(1.2a) # producers/horticulture business persons completing programs to expand profitability, develop marketing options, diversify or substitute alternative products or enterprises, and/or increase operational efficiencies.</td>
<td>(1.2b) # participants demonstrating knowledge or skill gains related to expanding profitability, developing marketing options, diversifying or substituting alternative products or enterprises, and/or increasing operational efficiencies to solve immediate concerns.</td>
<td>(1.2c) # participants documented to have adopted innovations in food enterprises including production, allied services, processing, and distribution.</td>
<td>(1.2e) # of new food, horticultural, and agricultural businesses and/or new enterprises within existing businesses reported by program participants and attributed at least in part to program participation.</td>
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<td>(1.2d) # participants or producer groups who adopt practices of value-added production through retaining control of their product further in the processing chain, starting their own value added business, or forming alliances.</td>
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### General Production Practices

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<td>(1.4a) # producers, horticulture business persons, and/or natural resource managers completing education programs on existing and new production-management practices and techniques.</td>
<td>(1.4b) # of producers, horticulture business persons, and/or natural resource managers demonstrating knowledge/skill gains in existing/new practices and techniques; improved product handling and storage to maintain quality and food safety; and/or improving production efficiency and/or environmental protection through adoption of best management practices.</td>
<td>(1.4c) # of producers, horticulture business persons, and/or natural resource managers modifying existing practices and/or adopted new production best practices or technologies to address current issues and improve yield efficiency, consistency and/or quality and/or conservation of resources.</td>
<td>(1.4f) # of producers, horticulture business persons, reporting increased dollar returns per acre or reduced costs per acre.</td>
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<td>(1.4d) # of producers, horticulture business persons, and/or natural resource managers who report improved ability to anticipate and respond to environmental and market variations through alternative production management strategies.</td>
<td>(1.4e) # technical assistance providers documented to have incorporated current best management practices in their recommendations.</td>
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### Agricultural Environmental Management

| (1.5a) # producers, horticulture businesses, and/or natural resource enterprise managers completing education programs on potential environmental impacts of practices, requirements and opportunities of environmental regulations and programs, and whole farm systems | (1.5b) # of producers, horticulture businesses, and/or natural resource managers demonstrating knowledge/skill gains in environmental impacts of practices, environmental regulations and programs, whole farm systems including integrated nutrient management, integrated pest management, waste management, and water protection. | (1.5c) # of producers, horticulture businesses, and/or natural resource managers documented to have assessed potential environmental impacts of their operations and developed and acted on plans to eliminate or minimize those concerns. | (1.5d) # of producers, horticulture businesses, and/or natural resource managers documented to have developed and implement nutrient management and/or waste management plans or modified existing plans to meet production and environmental goals and meet regulations. | (1.5e) # of producers, horticulture businesses, and/or natural resource managers documented to meet or exceed current environmental protection standards as a result of participating in relevant educational programs. | (1.5f) # resource managers reporting reduced environmental concerns for participating enterprises. |

### External Factors

Agricultural/horticultural/natural resources enterprises operate in a complex and volatile context involving susceptibility to weather extremes, changing governmental policies and regulations, competitive land uses and shifting development patterns, evolving consumer demands, and globally influenced markets. Fundamental change is occurring in the state and regional economies within which agricultural/horticultural/natural resources enterprises operate. The specific implications of these external factors vary greatly by locale and across commodities and business forms. Population and land use changes in farming communities can lead to producer/neighbor issues that influence choice of production practices. Economic stress exacerbates issues of food insecurity and hunger and many community organizations are over-burdened and unable to meet demands.
The evaluation approach included in our plan can more accurately described as an evaluation "system" rather than as bounded "studies" or investigations. Because each of the plans addresses a broad combination of applied research and extension initiatives spanning multiple audiences, methods, and intended outcomes, a combination of routine program monitoring and documentation, near-term outcome assessment, and targeted follow-up activities is required to provide comprehensive assessment. In addition, specialized data needs of funding partners must be addressed, sometimes using methods and/or accountability structures required by the funders.

Cornell Cooperative Extension works with the Cornell Office of Research and Evaluation (CORE) to influence our evaluation patterns and procedures. CORE has piloted the Evaluation Partnership Project (EPP) over the last decade documenting processes that work for Cornell Cooperative Extension and teaching process. The CORE Evaluation Partnership Project has included intensive program development and evaluation planning with a number of targeted programs and counties.

We employ a combination of routine program monitoring and documentation, near-term outcome assessment, and targeted follow-up activities for each of our planned programs. The results are aggregated in a statewide accountability system which leads to the summary results reported in the State Defined Outcomes in each plan including selected impact statements and success stories from a pool of more than 400 documented narratives.

To strengthen evaluation of commercial agriculture programs, our two commercial vegetable regional specialist teams participated in an Evaluation Planning Partnership with the Cornell Office for Research on Evaluation in 2010 and 2011. Past participation in the EPP continues to drive evaluation efforts. This year the Small Farms Program participated in a self-driven version of the Evaluation Planning Partnership program.