

**Peer Assessment of 5-year Performance
ARS National Program 305:
Crop Production**

**Summary Comments and
Recommendations
Ken Richards, Panel Chair
December 15, 2006**



**Agriculture and
Agri-Food Canada**

**Agriculture et
Agroalimentaire Canada**

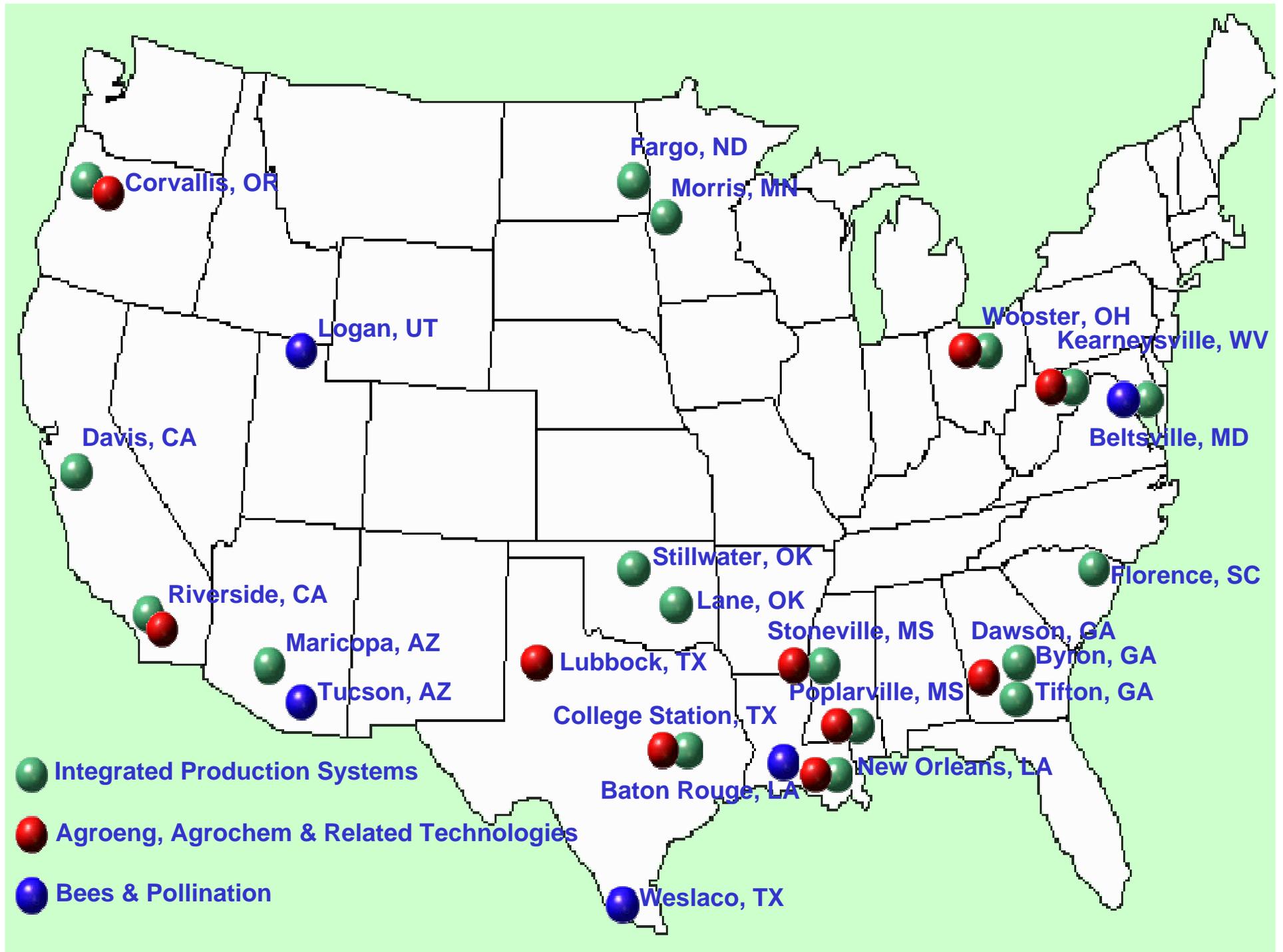
Canada 

National Program 305 Assessment Panel

- Six accomplished scientists (agronomy, crop modeling, application technology, horticulture, entomology, genetic resources)
- Diverse in expertise, employment assignments, geographic location
- Panel convened in Beltsville October 31, November 1, 2006

Scope of National Program 305

- 62 full-time scientists
- 23 USA locations
- Annual budget of \$23 million
- **MISSION:** to develop and transfer sound, research-derived knowledge that will result in the economical production of food and fiber crops and products that are safe for consumption and use, while preserving environmental quality



Charge to the Assessment Panel:

- Assess 5-year performance and impact level for 3 components and 11 research problem areas
- Consider overall national program and problem areas, not individual projects
- Provide feedback to ARS leaders, stakeholders, and partners

The Assessment also Provides....

- Feedback and guidance to ARS scientists and leaders to help focus efforts on the potential problem areas and goals for the next five-year program cycle

Criteria used to Assess Components and Problem Areas

- Accomplishments reflect the goals in the Action Plan
- Research contributes to the development and/or implementation of regulations or reduces regulations
- Influence on other researchers, government, industry in the same or related fields

Criteria used to Assess Components and Problem Areas

- Advance scientific knowledge
- Major agricultural, environmental or natural resource problems ameliorated, mitigated, or solved
- Technology that has been publicly released, patented, licensed, registered and/or commercialized

Criteria used to Assess Components and Problem Areas

- Research yielded health, social or economic advantages for consumers
- New / improved methods or technologies developed and adopted by others
- Accomplishments commensurate with the investment

Documentation available to assess Goals and determine Impact

- NP305 Action Plan
- 2001-2006 Accomplishment Report
- National Program Leader(s) Overview
- Publications and databases
- Professional working knowledge of panelists

NP 305 Composed of 3 Research Components

- Integrated Production Systems
- Agroengineering, Agrochemicals and related Technologies
- Bees and Pollination

Overarching comments

- NP 305 plays a significant role in US and world agriculture
- NP 305 scientists are making key scientific discoveries which are having significant impact
- Several problem areas within NP 305 are unique to ARS and represent the only national effort in the area

Overarching comments

- Three disjunct components have little in common among themselves
 - have more in common with other NP's (301, 302)
- Significant need for economic analysis and return on investment type analysis
- Wonder why some research was initiated / continued when there was no economic, competitive advantage, market for product or environmental / social gain

Overarching Comments

- Significant gap in Controlled Environmental Production Systems
 - not being competitive in the development of technologies for high value crop production in controlled environments (greenhouses, high tunnels)

Research Component I

- Integrated Production Systems
 - 4 problem areas



Problem Area Ia – Models and Decision Aids

- Medium Impact
- Develop models which predict crop performance in defined environments
- Develop web-based applications vs personal computer-based approach
- Develop greenhouse design software to include design / evaluation of high tunnels

Problem Area 1b – Integrated Pest Management (IPM)

- High Impact
- Build on successful commercialization and adoption of particle film technology
- Multi-pest and holistic approaches deserve more attention
- Develop strategies to include basic insect physiology / biochemistry on neuropeptides
- Develop strategies applicable for small-scale (niche) operations
- Enhance benefits of pollen database

Problem Area 1c – Sustainable Cropping Systems

- Low to Medium Impact (potential higher)
- New alternative crops
 - Continue targeting niche markets in which there is currently no competing crop
 - Continue working with university scientists and full range of industry partners to ensure germplasm or processes developed will be utilized by industry
 - Return on investment analysis needed

Problem Area 1c – Sustainable Cropping Systems (cont.)

- Small fruits, tree fruits and vineyards
 - Continue targeting niche and organic operations; flexible in incorporating new germplasm / techniques into practices
- Continue work on cover crops and other practices with environmental benefits
- Emphasize effectiveness of practices in work with agronomic crops

Problem Area 1c – Sustainable Cropping Systems (cont.)

- Continue cross cutting issues: waste water use, heavy metals in forages, water use / salt tolerance for rice are tackling needed technologies for specific regions and commodities
- Molecular farming is futuristic with good potential; return on investment required
- Strength: improved understanding of the effects of cultural practices on plant growth and development

Problem Area Id – Economic Evaluations

- No rating
- No specific economic evaluations conducted
- Problem area somewhat covered in other Problem areas
- Strong need for investment evaluations for most Problem areas within Component I

Component II

- Agroengineering, Agrochemical, and Related Technologies
 - 5 problem areas



Problem Area IIa – Automation and Mechanization to Improve Labor Productivity

- Medium to high impact
- Encourage addressing original goals – floral, ornamental and greenhouse industries
- Significant gains to be made to assist domestic producers to remain competitive

Problem Area IIb – Application Technology for Agrichemicals and Bioproducts

- High impact
- Continue to model new spray nozzles for droplet size
- Expand nozzle modeling work and other aerial specific research to include designs for ground based sprayers
- Expand testing of adjuvants for improved deposition and drift reduction

Problem Area IIb – Application Technology for Agrichemicals and Bioproducts (cont.)

- Expand canopy penetration and coverage
– both aerial and ground
- Attractant research encouraged to integrate negative effects on non-target pollinators / beneficials
- Focus some effort to address worker safety and health

Problem Area IIc – Sensor and Sensing Technologies

- Medium to high impact
- Need critical review and evaluation for monitoring runoff to ensure new leading edge work
 - Crucial to expand to large scale, if not already done
- Continue to evaluate aerial aircraft for sensing purposes, but consider cost effectiveness for using this type of aircraft
- What about ground based applications rather than aerial applications for monitoring?

Problem Area IId – Controlled Environment Production Systems

- Moderate
- Research into “true” controlled environments needs to be strengthened by ARS / will require significant investment in capital and infrastructure
 - required before USA will be competitive in world trade commodities
- Previous goals / outcomes were not addressed directly; need better refinement in terms of specific science outputs

Problem Area IIe – Worker Safety and Ergonomics

- Not rated
- Congress did not commit funds to Problem Area
- Other Components and Problem areas partially address issue
- Contributions could be in conveyors and mechanical harvest devices for horticultural crops

Component III

- Bees and Pollination
 - 2 problem areas



Problem Area IIIa – Pest Management

- Medium to high impact
- Emphasize development of control measures for Varroa and breeding technologies for tolerance using latest technologies
- Capitalize on recent developments in the honey bee genome – id. genes involved in specific resistance-mechanisms impacting disease and mite infestations

Problem Area IIIa – Pest Management

- Continue studies on the genetic basis of immunity for foulbrood, viral detection methodology (low-cost) and disease etiology
- Collaboration with researchers within US and internationally is encouraged
- Emphasize pest and disease control for non-Apis bees

Problem Area IIIb – Bee Management and Pollination

- Low to medium impact
- Expand research on non-Apis bee species in crop pollination, either by bee culture or managing bee habitat
 - More species, more crops, more effort
- Ensure pollination research is taking place with emphasis on examining the optimum number of pollinators required to pollinate a crop. Old information are “guesstimates” and not hypothesis driven research.
- Continue cryopreservation research

Problem Area IIIb – Bee Management and Pollination

- Investigate pollination biology of endangered plant species
- Obtain baseline population data for a wide geographic survey of native pollinators
 - Implies expanded bee systematics to support biodiversity, climate change issues
- Refocus efforts / resources in honey bee and non-Apis bee pollination to meet pollination demands in California, particularly to support the almond industry

NP 305 Accomplishment Report

The panelists thank you for the opportunity to contribute to making a strong and productive National Program 305 even better.

Thanks for listening!