2007 PLANT PRODUCTION INTERNAL REVIEW PORTFOLIO

I. Background

This document was prepared in December 2007 as the internal review of Plant Production Portfolio for Fiscal Year 2007. It contains updates to the portfolio, responses to the comments of the external panel review, and changes to criteria scores with accompanying justifications. This document is a result of the efforts of the National Program Leaders with responsibilities for plant production in collaboration with the CSREES Office of Planning and Accountability.

- **The following knowledge areas (KAs) are included in the Portfolio.**

  - KA 201: Plant Genome, Genetics, and Genetic Mechanisms
  - KA 202: Plant Genetic Resources
  - KA 203: Biological Efficiency and Abiotic Stress
  - KA 204: Plant Product Quality (Pre-harvest)
  - KA 205: Plant Management Systems
  - KA 206: Basic Plant Biology

- **Portfolio reviews:**

  External Review: May 2004
  Internal reviews: January 2006, December 2007

- **Portfolio score from the PREP in 2004: 81**

Portfolio Plant Production received an overall score of 81 from the panel in the 2004 PREP. Table I-2 below shows the breakdown of scores for different questions and criteria.

Table I-2. Scorings

Criteria	Recommendations imported from the External Panel	Panel Score	2006 Score	2007 Score
Relevance (40% of total score)				
1. Scope		3	3	2.5
2. Focus		2	2	2
3. Emerging Issues		2	3	3
4. Integration		1	2	2
5. Multi-disciplinary		2	3	2.5
Quality (30% of total score)				
1. Significance		2	3	3
2. Stakeholder		3	3	3
3. Alignment		3	3	3
4. Methodology		3	3	3
Performance (30% of total score)				
1. Productivity		2	2	2
2. Comprehensiveness		2	3	2
3. Timeliness		2	3	3

4. Agency guidance		3	3	3
5. Accountability		2	3	2.5
Overall score		**81**	**93**	**87**

- **A brief summary of the PREP report with the panel's specific recommendations:**

The panel found that the people of CSREES Plant Production Portfolio make a significant difference and add considerable value to the work of both the agency and the partnership. The evidence presented in this portfolio reflects hard work and indicates high levels of productivity. There is evidence of increasing emphasis on integration and that CSREES staffs are becoming more creative and determined about planning and reporting as forms of accountability.

The Review Panel commends the Plant Production Portfolio National Program Leaders (NPLs) for the enthusiasm and professional competence exhibited in their presentations. They are fully engaged with multiple responsibilities which include: involvement in formula-funded project review and approval, the management and directing of Special Research Grants, administering and advising multistate research projects, managing and directing funding of National Research Initiative and other competitive grant programs, serving as liaisons with various farm groups, involvement in strategic planning, and reviewing state plans of work and annual reports of accomplishments.

The Review Panel also recognizes that there are significant constraints faced by NPLs in the performance of their roles: control and funding of most programs reside at the state level and performance resides with the individual scientists within the State Agricultural Experiment Stations (SAES) and 1890 Research Programs, and the Plant Production Portfolio has heterogeneous responsibilities distributed among NPLs. For example, some NPLs are responsible for competitive grants programs and are not within the same unit as the other NPLs; optimal integration of education, extension and research is still not uniformly apparent ten years after the creation of CSREES from the Extension Service and CSRS; reporting of the activities of extension and education through a CRIS-like system would help the NPLs better manage performance; the lack of discretionary funds hinders the development of such things as workshops and conferences; financial constraints prevent NPLs from having an active role in all multi-state projects, and NPLs rely on outputs from the states. The quality of the reports developed by NPLs depends in large measure on what is input into the reporting system from the states.

There is a need to standardize and expand the documentation and evaluation metrics across program areas and increase the archiving and accessibility of research project data (in the CRIS and other systems). This is necessary in order to permit meta-analysis of the data.

The panel recommends training on the logic model for agency employees and external and internal partners. Instead of just evaluating past performance, the panel also suggests developing strategic plans for each problem area and increasing stakeholder contributions by including panel members and other stakeholders in the development and review of CSREES strategic plans at the portfolio level.

Finally, the panel suggests increasing the documentation of outcomes. Formative evaluations to document program implementation successes and challenges should be performed.

II. CSREES response to PREP recommendations that cross all portfolios

In response to directives from the Office of Management and Budget (OMB) of the President, CSREES implemented the Portfolio Review Expert Panel (PREP) process to systematically review its progress in achieving its mission. Since this process began in 2003, fourteen expert review panels have been convened and each has published a report offering recommendations and guidance. These external reviews occur on a rolling five-year basis. In the four off years an internal panel is assembled to examine how well CSREES is addressing the expert panel's recommendations. These internal reports are crafted to specifically address the issues raised for a particular portfolio; however, despite the fact that the expert reports were all written independent of one another on portfolios comprised of very different subject matter, several themes common to the set of review reports have emerged. This set of issues has repeatedly been identified by expert panels and requires an agency-wide response. The agency has taken a series of steps to effectively respond to those overarching issues.

Issue 1: Getting Credit When Credit is Due

For the most part panelists were complimentary when examples showing partnerships and leveraging of funds were used. However, panelists saw a strong need for CSREES to better assert itself and its name into the reporting process. Panelists believed that principal investigators who conduct the research, education and extension activities funded by CSREES often do not highlight the contributions made by CSREES. Multiple panel reports suggested CSREES better monitor reports of its funding and ensure that the agency is properly credited. Many panelists were unaware of the breadth of CSREES activities and believe their lack of knowledge is partly a result of CSREES not receiving credit in publications and other material made possible by CSREES funding.

Issue 1: Agency Response:

To address the issue of lack of credit being given to CSREES for funded projects, the Agency implemented several efforts likely to improve this situation in 2005.

First it developed a standard paragraph about CSREES's work and funding that project managers can easily insert into documents, papers and other material funded in part or entirely by CSREES.

Second, the Agency is in the process of implementing the "One Solution" concept. One Solution will allow for the better integration, reporting, and publication of CSREES material on the web. In addition, the new Plan of Work (POW), centered a logic model framework, became operational in June 2006. The logic model framework is discussed in more detail below. Because of the new POW requirements and the POW training conducted by the Office of Planning and Accountability (also described in more detail below), it will be simpler for state and local partners to line up the work they are doing with agency expenditures. This in turn will make it easier for project managers to cite CSREES contributions when appropriate.

Issue 2: Partnership with Universities

Panelists felt that the concept of partnership was not being adequately presented. Panelists saw a need for more detail to be made available. Questions revolving around long-term planning between the entities were common as were ones that asked how the CSREES mission and goals were being supported through its partnership with universities and vice versa.

Issue 2: Agency Response:

CSREES has taken several steps to strengthen its relationship with university partners. First, to the extent possible, implementing partners will be attending the CSREES strategic development exercise which is intended to help partners and CSREES fully align what is done at the local level. Second, CSREES has realigned the state assignments for its National Program Leaders. Each state is now assigned to one specific NPL. By reducing the number of states on which any individual NPL is asked to concentrate and assigning and training NPLs for this duty, better communication between state and NPLs should occur. Finally,

several trainings that focused on the POW were conducted by CSREES in geographic regions throughout the country. A major goal of this training was to better communicate CSREES goals to state leaders which will facilitate better planning between the universities and CSREES.

Issue 3: National Program Leaders

Without exception the portfolio review panels were complimentary of the work being done by NPLs. They believe NPLs have significant responsibility, are experts in the field and do a difficult job admirably. Understanding the specific job functions of NPLs was something that helped panelists in the review process. Panelists did however mention that often times there are gaps in the assignments given to NPLs. Those gaps leave holes in programmatic coverage.

Issue 3: Agency Response:

CSREES values the substantive expertise that NPLs bring to the Agency and therefore requires all NPLs to be experts in their respective fields. Given the budget constraints often times faced by the agency, the agency has not always been able to fund needed positions and had to prioritize its hiring for open positions. In addition, because of the level of expertise CSREES requires of its NPLs, quick hires are not always possible. Often, CSREES is unable to meet the salary demands of those it wishes to hire. It is essential that position gaps not only be filled but that they be filled with the most qualified candidate.

Operating under these constraints, and given inevitable staff turnover, gaps will always remain. However, establishing and drawing together multidisciplinary teams required to complete the portfolio reviews has allowed the Agency to identify gaps in program knowledge and ensure that these needs are addressed in a timely fashion. To the extent that specific gaps are mentioned by the expert panels, the urgency to fill them is heightened.

Issue 4: Integration

Lack of integration has been highlighted throughout the panel reviews. While review panelists certainly noted in their reports where they observed instances of integration, almost without fail, panel reports sought more documentation in this regard.

Issue 4: Agency Response:

Complex problems require creative and integrated approaches that cut across disciplines and knowledge areas. CSREES has recognized the need for these approaches and has undertaken steps to remedy this situation. CSREES has recently mandated that up to twenty percent of all National Research Initiative (NRI) funds be put aside specifically for integrated projects. These projects cut across functions as well as disciplines and ensure that future Agency work will be better integrated. Finally, integration is advanced through the portfolio process which requires cooperation across units and programmatic areas.

Issue 5: Extension

While most panels seemed satisfied at the level of discussion that focused on research, the same does not hold true for extension. There was a call for more detail and more outcome examples based upon extension activities. There was a consistent request for more detail regarding not just the activities undertaken by extension but documentation of specific results these activities achieved.

Issue 5: Agency Response:

Outcomes that come about as a result of extension are, by the very nature of the work, more difficult to document than the outcomes of a research project. CSREES has recently shuffled its strategy of assigning NPLs to serve as liaisons for states. In the past, one NPL might serve as a liaison to several states or a region comprised of states. Each state will be assigned a specific NPL and no NPL will serve as the lead representative to more than one state. This will ensure more attention is paid to extension activities.

In addition CSREES also has been in discussion with partners and they have pledged to do their best to address this issue. The new POW will make extension-based results and reporting a priority. Placing heavy emphasis on logic models by CSREES will have the effect of necessitating the inclusion of extension activities into the state's POWs. This, in turn, will require more reporting on extension activities and allow for improved documentation of extension impact.

Issue 6: Program Evaluation

Panelists were complimentary in that they saw the creation of the Office of Planning and Accountability and portfolio reviews as being the first steps towards more encompassing program evaluation work; however, they emphasized the need to see outcomes and often stated that the scores they gave were partially the result of their own personal experiences rather than specific program outcomes documented in the portfolios. In other words, they know first hand that CSREES is having an impact but would like to see more systematic and comprehensive documentation of this impact in the reports.

Issue 6: Agency Response:

The effective management of programs is at the heart of the work conducted at CSREES and program evaluation is an essential component of effective management. In 2003, the PREP process and subsequent internal reviews were implemented. Over the past three years, fourteen portfolios have been reviewed by expert panel members and each year this process improves. NPLs are now familiar with the process and the staff of the Planning and Accountability unit has implemented a systematic process for pulling together the material required for these reports.

Simply managing the process more effectively is not sufficient for raising the level of program evaluations being done on CSREES funded projects to the highest standard. Good program evaluation is a process that requires constant attention by all stakeholders and the agency has focused on building the skill sets of stakeholders in the area of program evaluation. The Office of Planning and Accountability has conducted training in the area of evaluation for both NPLs and for staff working at Land-Grant universities. This training is available electronically and the Office of Planning and Accountability will be working with NPLs to deliver training to those in the field.

The Office of Planning and Accountability is working more closely with individual programs to ensure successful evaluations are developed, implemented, and the data analyzed. Senior leadership at CSREES has begun to embrace program evaluation and, over the coming years, CSREES expects to see state leaders and project directors more effectively report on the outcomes of their programs as they begin to implement more rigorous program evaluation. The new POW system ensures data needed for good program evaluation will be available in the future.

Issue 7: Logic Models

Panelists were consistently impressed with the logic models and the range of their potential applications. They expressed the desire to see the logic model process used by all projects funded by CSREES and hoped not only would NPLs continue to use them in their work but, also, that those conducting the research and implementing extension activities would begin to incorporate them into their work plans.

Issue 7: Agency Response:

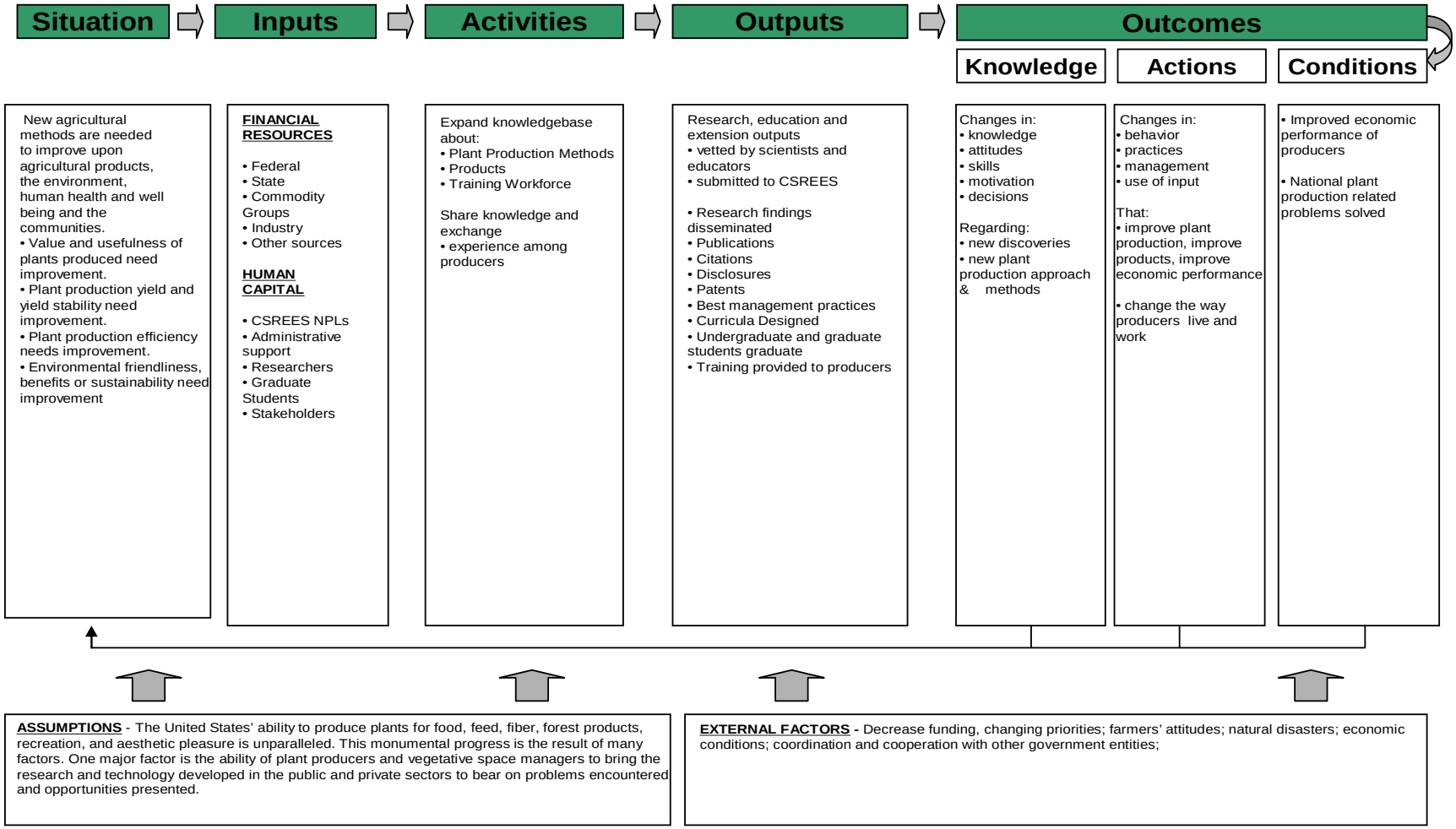
Logic models have become a staple of the work being done at CSREES and the Agency has been proactive in promoting the use of logic models to its state partners. Two recent initiatives highlight this. First, in 2005, the POW reporting system into which states submit descriptions of their accomplishments was completely revamped. The new reporting system now closely matches the logic models being used in portfolio reports. Beginning in fiscal year 2007, states will be required to enter all of the following components of a standard logic model. These components include describing the following:

- Program Situation
- Program Assumption

- Program Long Term Goals
- Program Inputs which include both monetary and staffing
- Program Output which include such things as patents
- Short Term Outcome Goals
- Medium Term Outcome Goals
- Long Term Outcome Goals
- External Factors
- Target Audience

The logic model for the Plant Production portfolio is presented below.

Plant Production Logic Model



ASSUMPTIONS - The United States' ability to produce plants for food, feed, fiber, forest products, recreation, and aesthetic pleasure is unparalleled. This monumental progress is the result of many factors. One major factor is the ability of plant producers and vegetative space managers to bring the research and technology developed in the public and private sectors to bear on problems encountered and opportunities presented.

EXTERNAL FACTORS - Decrease funding, changing priorities; farmers' attitudes; natural disasters; economic conditions; coordination and cooperation with other government entities;

Version 1.2

The system is now operational and states were required to begin using it by June of 2006. By requiring the inclusion of the data components listed above states are in essence, creating a logic model that CSREES believes will help improve both program management and outcome reporting. Please note a sample logic model has been included in Appendix A.

The second recent initiative by CSREES regarding logic models concerns a set of training sessions conducted by Planning and Accountability staff. In October and November of 2005 four separate training sessions were held in Monterrey, California; Lincoln, Nebraska; Washington, D.C.; and Charleston, South Carolina. More than 200 people representing land-grant universities attended these sessions where they were given training in logic model creation, program planning, and evaluation. In addition, two training sessions were provided to NPLs in December 2005 and January 2006 to further familiarize them with the logic model process. Ultimately it is hoped these representatives will pass on to others in the land-grant system what they learned about logic models, thus creating a network of individuals utilizing the same general approach to strategic planning. These materials also have been made available to the public on the CSREES website.

III. National Program Leader's response to PREP recommendations regarding the Plant Production Portfolio

A. Responses by the portfolio team to the external panel's comments and recommendations

The Plant Production Portfolio team has continued to implement the improvements suggested by the external review panel. The NPLs that comprise this team have found CSREES administration receptive and supportive in as far as is possible. Continued progress on portfolio improvement was somewhat hampered in 2007 because CSREES was operating on a year-long continuing resolution, which fixed the agency budget at 2006 levels. This not only resulted in stagnation of funding for the portfolio, but also decreased discretionary funding levels as increases in salaries and benefits had to be taken from administrative funds.

RELEVANCE

Scope

2007 Response: In 2006 this element was scored a 3, whereas in 2007 it was scored a 2.5. This is a result of the stakeholder input process that CSREES has engaged in that has identified new challenges that need solutions in research, education, and extension that the agency has not yet responded to. That response is currently being planned and will be implemented provided that funding is available.

a. Publish portfolio successes to a broad audience. Inform the public about activities and outcomes.

CSREES launched a new web site feature during 2007 that highlights the accomplishments and impacts of projects funded by the agency. Publications, land-grant university web sites, and press releases are also monitored by CSREES to track results from CSREES funding. This "In The News" feature is highlighted on the main page of the CSREES web site. Modifications to the CSREES Newsroom web page are also helping improve recognition of the results and impact of CSREES funding. On this page, the public can easily access News Releases and Features, National

Impacts (write-ups of the impacts of CSREES funding), Newsletters, and the Partners Video Magazine. CSREES also now offers news releases and announcements by e-mail and uses RSS Feeds to make available news releases, research results, and other announcements.
Project directors are provided specific text and sent reminders regarding proper acknowledgment of CSREES funding in scientific publications and other materials. These reminders are sent at the minimum twice a year.

b. Incorporate studies of return on investment of public funds, with the portfolio reporting approach.

No new studies have been conducted in this area.

Focus: Become proactive, for example, through use of a strategic plan.

2007 Response: The scoring for this element is unchanged. This is because the portfolio team feels that there is ample room for improvement in this area. The development of a strategic plan for the Plant Production Portfolio is being considered as a tool to bring more focus to the portfolio. Additionally, CSREES staff has continued to work with stakeholders to develop action plans that bring sharper focus to the USDA and CSREES strategic plans. In 2007, for example, the National Berry Crop Initiative finished its strategic plan, and a strategic research and extension plan for the National Vegetable Crop Initiative was drafted. Also, the "Engineering Solutions for Specialty Crop Challenges" workshop was used to prioritize industry needs and begin looking at solutions. Follow-up meetings have been used to begin a planning process.

Emerging Issues: Enhance coverage of sustainability, green industry, organic farming, agroforestry, link between human health and nutritional value of plants, and homeland security.

2007 Response: The scoring for this element is unchanged. The team remains very responsive to emerging issues. Team members have taken leadership roles in the response of both USDA and CSREES in the areas of bio-energy and bio-products, specialty crops, organic agriculture, food safety, and food security, to name a few. CSREES has reconfirmed its commitment to the sustainability of land management in 2007. This is evidenced in the publication of two documents on its website: "Science and Education for Working Lands and Ecosystems" and "Implementing Research, Education and Extension for Specialty Crops". The approach of the agency has evolved to look at these issues in a systems-based holistic fashion rather than in a reductionist approach.

Integration:

2007 Response: The score for this dimension remained unchanged. The team felt that there is room for improvement in this area.

a. Develop structure to help NPLs make the Research Education and Economics (REE) connection. Correct lack of awareness of NPLs about extension and education.

CSREES became proactively involved in a number of REE, USDA and government wide initiatives, providing leadership to the development of inter-agency action plans. These initiatives included: Colony Collapse Disorder, Specialty Crops, Bio-fuels and Bio-products, Food Safety and Security, and Human Health and Nutrition. Internally, NPLs in the Plant Production Portfolio team have become more involved in managing integrated grant programs, which has helped individuals

become more aware of the entire range of agency activities. Internal working groups have also been formed to increase communication and foster the integration of research, education, and extension activities and opportunities.

b. Provide data on numbers of students and postdocs, by discipline, associated with formula-funded projects.

CSREES initiated a portfolio review for education in 2007. This is the first time that such a review has been done for a specific function of the agency. It will allow CSREES to define how we approach collecting information on funding and outcomes for education, where there are gaps in our ability to capture the true impact of our funding, and identify improvements in our reporting process. As an outcome of the education portfolio review, we will develop methods to collect the data requested.

c. Align strategic plan goals and objectives with actual agricultural practices.

The USDA and CSREES strategic plans are intended to provide broad guidelines within which agencies conduct their business. Through numerous workshops and similar activities working in collaboration with partners and stakeholders, CSREES has fine-tuned those broad guidelines into focused action plans intended to allow producers and consumers meet real world challenges. One example of this process is the development of strategic plans for clusters of programs within the National Research Initiative. CSREES administration has also encouraged individual portfolios to create strategic plans that link various KAs in meaningful ways to create intended outcomes.

d. Establish a position of "chief scientist" responsible for multi-state research and extension and integration of research and extension.

CSREES has had a "chief scientist", who consults with the agency on research issues, for a number of years. In 2004, CSREES created the position of "Education Advisor" to complement the existing position. The Education advisor consults with CSREES on issues related to education, extension and integration of the three functions.

Multidisciplinary: Provide examples of multi-disciplinary projects e.g. engineering + economics + other disciplines.

2007 Response: In 2006 this dimension was scored 3, whereas in 2007 it was scored 2.5. This is a result of recalibration in the self-scoring process. In 2006, half-points were not possible. In 2007, half-points were allowable. If this had been the case in 2006, the scores would have been the same. The portfolio team is committed to continuing to foster multi- and trans-disciplinary approaches to meeting challenges in plant production. CSREES has made a commitment to promoting the integration of multi-discipline, or trans-discipline, teams into the funding process. This concept is central to both of the concept papers, "Science and Education for Working Lands and Ecosystems" and "Implementing Research, Education, and Extension for Specialty Crops".

QUALITY

Significance: Provide more examples and a summary of known outputs and impacts.

2007 Response: The scoring for this element is unchanged. The team continues to provide leadership to ensure that there are many significant outcomes from projects funded in the plant production portfolio. CSREES is using its web site, through the "Newsroom" feature, to more widely publicize known outputs and impacts from agency funded activities.

Stakeholder: Provide more discretionary funds for workshops and conferences, to enhance two-way communication with stakeholders.

2007 Response: The scoring for this element is unchanged. CSREES has developed new ways to encourage stakeholders to provide input for the betterment of its programs. CSREES operated on a year-long continuing resolution (CR) in fiscal year 2007. The CR capped CSREES spending at fiscal year 2006 levels. Without the availability of increased funding, it is not possible to provide more discretionary funds. However, CSREES continues to support workshops and conferences through a variety of mechanisms, including the use of those discretionary funds that do exist and awards for this purpose through competitive programs. In addition to workshops and conferences, CSREES now has a Stakeholder Input web page where stakeholders can submit input and access upcoming and past sources of input.

Alignment: Align strategic goals and objectives with actual agricultural practices.

2007 Response: The scoring for this element is unchanged. The team feels that the alignment of the portfolio with contemporary knowledge is excellent. Funding from the portfolio is creating contemporary knowledge.

The USDA and CSREES strategic plans are intended to provide broad guidelines within which agencies conduct their business. Through numerous workshops and similar activities working in collaboration with partners and stakeholders, CSREES has fine tuned those broad guidelines into focused action plans intended to allow producers and consumers to meet real world challenges. One example of this process is the development of strategic plans for clusters of programs within the National Research Initiative.

Methodology:

2007 Response: The scoring for this element is unchanged. Cutting edge methodologies are routinely applied and often developed by portfolio projects.

a. Improve the CSREES reporting system.

The One Solution Initiative is a comprehensive approach to develop a management strategy that CSREES can use to improve the quality and comprehensiveness of reports to OMB and Congress. CSREES will be implementing a One Solution integrated reporting system, referred to as the CSREES Information System (CIS) over the next several years. The goals of One Solution include the ability to reuse and combine existing data from various separate reporting systems; standardize reporting requirements and definitions; and maintain the CRIS legacy database but make it more accessible by migrating it to a new CIS platform.

b. Design metrics for applied projects.

As CSREES redirects focus of some of its major grant programs from strictly fundamental discovery to a more problem-solving focus, there is an increase in the number of projects awarded that might be considered applied. As this number continues to grow, program directors are developing ways to determine the outcomes and impacts of those projects.

c. The research methodologies are based on peer review and therefore, appropriate. The lack of good evidence for extension and education methods is a weakness of the Portfolio.

As Integrated Programs within CSREES mature, individual programs are developing metrics that make sense to the partner and stakeholder communities. The Director of Integrated Programs within the agency has facilitated dialogue among program directors offering integrated projects, which has hastened the adoption of relatively standardized metrics across programs. Interaction within the agency among units offering research, education, extension and/or integrated programs has led to the development of program priorities that address current issues and cut across unit boundaries.

PERFORMANCE

Productivity

2007 Response: The scoring for this element is unchanged. The team feels that productivity is often hard to demonstrate and even harder to improve without increased investment.

Comprehensiveness

2007 Response: In 2006 this element was scored a 3, whereas in 2007 it was scored a 2. Part of the decrease is due to a redefining of the scoring criteria for this dimension. The decrease can be further explained by a better understanding on the part of the team of what the scoring criteria actually mean. The team feels that the portfolio meets expectations but that there is room for improvement.

Timeliness

2007 Response: The scoring for this element is unchanged. Most projects achieve closure on time.

Agency Guidance

2007 Response: The scoring for this element is unchanged. Leadership and management of the portfolio are superior.

Accountability

2007 Response: In 2006 this element was scored a 3, whereas in 2007 it was scored a 2.5. This is a result of recalibration in the self-scoring process. In 2006, half-points were not possible. In 2007, half-points were allowable. If this had been the case in 2006, the scores would have been the same. The team feels that there is now a better understanding of what will be needed to raise the quality of project reports to the superior level.

B. Future Directions

Investment in the Plant Production Portfolio will continue to expand as new initiatives receive funding support. CSREES leadership in the areas of Colony Collapse Disorder, Specialty Crops and Bio-energy and Bio-products will inevitably result in more funded projects in this portfolio. Continued interaction with stakeholders and consumers will most likely result in prioritized objectives that will require additional investment in the portfolio.

IV. Updates of the internal review

1. Budget

The CSREES investment in the Plant Production Portfolio has averaged $99.7 million per year over the last seven years. CSREES investment in this portfolio over the last two years has exceeded the 7-year average indicating a positive response to stakeholder input received during strategic planning sessions. The total investment in the Plant Production Portfolio has averaged $478.6 million per year over the last 7 years. The total investment over the last two years has also exceeded the 7-year average indicating that CSREES leadership is resulting in a positive response from the entire federal-state partnership. Individual KAs within the portfolio have experienced either increases or remained consistent with the 7-year average in terms of CSREES investment and total investment. In only one case, CSREES investment in KA 204, was there a decrease when compared to the 7-year average. However, there was a very substantial increase in investment by CSREES in KA 205, which is closely related to KA 204. In addition, although the investment for KA 204 for fiscal year 2006 fell below the 7-year average, the total investment in KA 204 for any fiscal year was very consistent with the 7-year average. The Plant Production portfolio funding tables are presented below. The funding tables for each KA are presented in Appendix A.

Plant Production Funding Tables

Portfolio: Plant Production									
(as reported in the Current Research Information System)									
$ in the thousands									
Year	**HATCH**	**MC-STN**	**EVANS ALLEN**	**ANIMAL HEALTH**	**SPECIAL GRANTS**	**NRI GRANTS**	**SBIR GRANTS**	**OTHER CSREES**	**TOTAL CSREES**
2000	34,889	980	4,114	0	9,309	15,648	448	18,288	83,676
2001	33,517	1,096	4,468	0	15,823	30,690	1,277	30,043	116,914
2002	33,329	1,297	5,424	3	17,261	26,681	1,281	4,189	89,465
2003	32,189	1,473	5,779	3	21,589	27,303	1,197	8,339	97,872
2004	33,078	1,107	5,292	0	22,325	24,355	2,200	8,305	96,662
2005	34,650	1,170	5,783	0	22,690	29,737	1,386	9,944	105,359
2006	33,501	1,297	5,746	0	24,869	32,092	979	9,480	107,966
Portfolio Total	235,153	8,420	36,606	6	133,866	186,506	8,768	88,588	697,914

Portfolio: Plant Production								
(as reported in the Current Research Information System)								
$ in the thousands								
Year	**CSREES Admin**	**Other USDA**	**Other Federal**	**State Appr.**	**Self-Gen**	**Ind/Gr Agrmt**	**Other Non-Fed**	**Total**
2000	83,674	11,077	51,399	185,632	10,020	40,935	23,463	406,201
2001	116,911	11,421	52,996	190,595	13,506	41,194	25,674	452,295
2002	89,463	11,844	61,383	192,052	12,448	42,044	32,194	441,425
2003	97,868	13,807	72,145	190,908	15,604	42,264	25,387	457,986
2004	96,657	14,471	81,279	191,247	15,020	43,448	26,260	468,382
2005	105,359	17,674	121,104	245,395	29,586	56,047	42,366	617,530
2006	107,966	13,746	89,838	205,336	19,558	42,072	27,775	506,291
Portfolio Total	697,898	94,040	530,144	1,401,165	115,742	308,004	203,119	3,350,110

2. Evidence of Success/Accomplishments by KAs

KA 201 Plant Genome, Genetics, and Genetic Mechanisms

Identifying Genetic Factors Conferring Cold Tolerance
Due to the adverse effects of cold temperature on winter wheat, frost tolerance is an important trait for breeding programs in areas with severe winters. Researchers at Washington State University and the University of California report the discovery of the frost tolerance locus Fr-A2 in wheat located on chromosome 5A. Results of this and related research will improve efforts to reduce grower risk of winter injury in wheat. **(NRI funded project)**

Examining Lignin Biosynthesis in Forest Trees
Similar genes regulate the growth of shoot tips and tree trunks. Researchers at the USDA Forest Service, Institute of Forest Genetics have shown that a key genetic pathway that regulates the growth of shoot tips also regulates the radial growth of trees, which are composed primarily of lignin. Lignin is responsible for wood properties affecting applications including paper making and biofuels. **(NRI funded project)**

Classroom Activities in Plant Biotechnology
Research educators at Colorado State University and Ohio State University have developed an outreach program that uses "Classroom Activities in Plant Biotechnology" to introduce children to the importance of food crops in their lives and the problems that will occur in food production if we are not able to overcome pathogens and climate changes. The infusion of integrated funds has enabled expansion of the program to reach schools in areas with high Latino and/or American Indian populations. K-12 teachers and students learn and use the laboratory techniques utilized in crop improvement, such as DNA extraction, gel electrophoresis, PCR, and microarray technology. Two educational units introduce 1) the effects of plant disease on human and plant health and 2) the effects of global warming. The units facilitate learning about how important agricultural science is in the solution to these issues. **(NRI funded project)**

KA 202 Plant Genetic Resources

Genetic Improvement of Strawberries and Blueberries
Researchers at Michigan State University, in collaboration with USDA-ARS scientists, have been able to reconstruct the original accidental cross of wild strawberry species that created today's cultivated strawberry. The new hybrid populations, based on selected wild genotypes, are designed as sources of a new generation of extremely high quality berries having minimum pesticide requirements. (**Hatch accession number 0173180**)

Evaluation and Breeding of Greenhouse Tomatoes
Researchers at the University of West Virginia have produced tomato hybrids by crossing heirloom varieties with newly-developed disease-resistant cultivars from cooperating universities. These populations are being selected for flavorful, disease-resistant types for U.S. greenhouse growers who face disease problems different from those of field growers. The resulting cultivars will allow the greenhouse industry to respond to consumer demand to flavorful tomatoes while avoiding the need to apply fungicides and other pesticides. (**Evans-Allen accession number 0206266**)

Using Exotic Weed Invasions to Select Competitive Native Grass Genotypes
Researchers at the University of Wyoming are studying the genetic diversity of native plants from sites with and without invasive species to determine if differences exist in competitive ability within native species and to create strategies for developing and selecting native plants that are more competitive with invasive species for restoration. This research will not only save money in restoration efforts but will shorten the time that it

takes to restore habitats disturbed by fire and other natural disasters, potentially protecting threatened and endangered species. (**NRI accession number 0195869**)

KA 203 Biological Efficiency and Abiotic Stress

VAM-GRO: Alternative Growth Media to Promote VAM Colonization
A major problem in the revegetation industry is the inability of container growers to consistently produce plant colonized by Vesicular Arbuscular Mycorrhizas (VAM) as stipulated in contracts. Bitterroot Restoration, Inc. has developed a growing medium (VAM-Gro) that improves VAM colonization of container grown plants. The research is examining root biomass production under nursery conditions, field survival, and field growth rates for plants grown in VAM-Gro to confirm that it is an above industry standard growth media. This will benefit the restoration industry in the U.S., which totals several hundred million dollars annually. (**SBIR accession number 0200728**)

Genetic Dissection of ROS-mediated ABA Signaling in Guard Cells
Researchers at the University of Maryland are characterizing the role of mitogen-activated protein kinase cascade genes in the control of stomatal movements, focusing on regulation of the movements by the plant hormone abscisic acid and by reactive oxygen species. Plants can lose over 95% of their water through stomatal pores, openings in the leaf epidermis involved in gas exchange. A rapid response of plants during drought stress is the closure of the stomatal pores which is mediated by abscisic acid. This project identified a new pathway that enables rapid increase of abscisic acid in response to dehydration stress, thus allowing the plant to tolerate dehydration and water deficit. The results from the study may lead to strategies for improvement of drought tolerance and to more sustainable water use in plants. (**NRI accession 0200723**)

An Improved Model of the Impacts of Ozone Pollution on Soybean
Elevated levels of ozone in the lower atmosphere of the Midwest are decreasing soybean yields. On average, predicted yield losses are about 10% for the Midwest and will rise if ozone continues to increase as projected by the Intergovernmental Panel for Climate Change. Researchers at the University of Illinois are developing improved models for predicting yield loss based on the mechanism of ozone damage to the soybean plant. This model incorporates a physiologically based response to ozone and its interactions with temperature, light, humidity and CO_2. It can predict affects of ozone on individual leaf photosynthesis, and the research is now integrating this into the growing canopy and partitioning of photosynthate to grain. Modeling will aid accurate forecasting of the future impacts of ozone and climate change on the soybean crop in different regions of the U.S. which is critical to planning and setting priorities for crop improvement. (**Hatch accession number 0201358**)

KA 204 Plant Product Quality (Pre-harvest)

Agroecology
Researchers at the University of Maryland are determining ways of maintaining the productivity of working lands in the state by developing new crops and new management tools for both crop production and forestry. By offering land owners profitable options, working lands can be preserved from urban and suburban development, which will help maintain the rural character of much of the state. (**Special Grant accession number 0207549**)

Improving Landscape and Christmas Tree Varieties
Researchers at Pennsylvania State University are creating genetically improved evergreen trees that can be used both in landscapes and as Christmas trees. They are also evaluating the growth and health of utility-compatible street tree cultivars under urban growing conditions. This research will have economic and operational benefits, prevent costly and uncomfortable power outages, increase profit for producers and enjoyment for consumers. (**McIntire-Stennis accession number 0208559**)

Nitrogen Cycling, Loading, and Use Efficiency in Forage-based Livestock Production Systems
Researchers at Iowa State University are determining the protein quality and quantity in warm-season perennial grasses that are used as livestock forages as they relate to developmental morphology. The results will provide a basis for determining optimum stage of harvest/grazing for commonly grown native warm-season grasses. By utilizing the grasses when they are at their optimum in terms of protein content, substantially higher carrying capacity will result, leading to increased profits for ranchers. (**Hatch Multi-State accession number 0202631**)

KA 205 Plant Management Systems

PM10 Particulate Emission Prediction and Control from Agricultural Lands in the Pacific Northwest
Researchers at Washington State University are developing improved methods, technologies and strategies for predicting and controlling wind-induced soil erosion and dust emissions. Conservation practices are being developed that will enable farmers to control wind erosion and dust emissions without suffering economic hardship. Extension programs are being developed to assist farmers with adoption of the improved practices. (**Other Grant accession number 0203503**)

Precision Irrigation, Fertilization, and Management with Wireless Sensor Networks
Researchers at the University of California, Davis are developing wireless, solar-powered valve controllers using simple radio modules that self-assemble into a network and communicate with each other by sending messages. The controllers will be used to open and close irrigation valves and will allow growers/operators in orchards, vineyards, nurseries and landscapes develop management practices for application of water and fertilizer in a more ecological and sustainable manner. (**Hatch accession number 0212544**)

Soil Ecosystem Changes in C and N Budgets Induced by a Shift to Biofuels Production
Researchers at Washington State University are determining how shifts in land use and cropping practices associated with biomass based energy production will impact soil quality and how natural and managed ecosystems function. By determining how biomass removal affects carbon, nitrogen and microbial activity in soils, a sustainable system for bio-energy production can be developed. (**NRI accession number 0210833**)

KA 206 Basic Plant Biology

Transcriptional Regulation of Programmed Cell Death in Plant Development and Response to Pathogens
Researchers at the University of Nebraska are developing basic understanding of the molecular mechanisms controlling cell death in plants. The research is filling gaps in knowledge about programmed cell death (PCD) by yielding new insights into the mechanisms of PCD in plant

growth, development, and response to pathogen attack. The project is identifying the genes regulated by FBR6, a transcription factor regulating cell death and plant development; identifying and characterizing additional components of the FBR6-dependent signal transduction pathway controlling PCD-related plant development; and determining the functions of FBR6-interacting proteins in regulating gene expression. The improved understanding of PCD could aid in developing effective strategies to engineer plants with improved disease resistance and/or altered development for enhanced crop yield and quality. (**Hatch accession number 0199387**)

Coordinated Production and Marketing System for Flowering Orchid Plants
Potted orchids have a wholesale value of $107 million and are the second-ranked flowering-plant in the U.S. The major problems for Hawaii producers are distance from market and high air transportation costs of tall plants. Pacific Paradise Orchids is addressing these problems through an innovative coordinated production and marketing system. It is developing new technology to control orchid plant height, coordinated with adding value through new plant forms and packaging that addresses transportation costs and needs of buyers. The major accomplishments of this project are (1) development of packaging design for combined shipping and in-store display of plant merchandise direct from Hawaii to U.S. chain stores, (2) development of the knowledge to conduct business with a major big box chain, and (3) registration of a new company to do business exporting plant products from Hawaii directly to U.S. mainland chain stores. (**SBIR accession number 0201041)**

Cucumber mosaic virus (CMV) is among the most successful plant pathogens. CMV 2b is one of the first two viral suppressors of RNA silencing reported in 1998. Researchers at the University of California, Riverside are using molecular and biochemical approaches to determine how 2b suppresses RNA silencing and mediates viral pathogenesis. This work will contribute to the understanding on how pathogens evade host defense. The results are revealing how plant viruses induce and overcome the host RNA silencing antiviral immunity and the molecular mechanism involved in the induction of diseases by plant viruses. (**NRI accession number 0202393**)

3. Challenges and opportunities

One of the challenges/opportunities facing plant production is bioenergy, such as development of bioenergy crops for specific regions and with enhanced processing characteristics. As more land is diverted to growth of biofuel crops, plant production is faced with the challenge of producing more food, feed, and fiber on less land. Research and technology development will allow agriculture both to add production of plants for bioenergy needs and to maintain food, feed, and fiber production without increasing costs to consumers and harm to the environment. Research, education, and extension will also provide producers and rural communities with tools to face changes in agriculture as plant production expands to take care of energy needs along with those for affordable food, feed, and fiber.

Another opportunity for plant production is in the training of the future generation of agricultural plant scientists. Many areas of plant science such as breeding, agronomy, and physiology, are losing vital expertise for research, education, and extension. Attracting and training new students in these areas is critical for U.S. plant production to face the challenges of international competition, a changing climate, and the loss of agricultural land.

A third opportunity/challenge is the use of knowledge generated through research for development of new products and technology, technology transfer, regulatory issues.

A fourth area is horticultural needs (education/extension) in the urban, suburban, and exurban environments.

V. Summary

The plant production portfolio contains 3017 active projects in 2007. Only 18 have been highlighted here, although many more were nominated as excellent projects. The plant production portfolio is becoming more integrated in terms of academic function, with more grant programs offering an increasing number of integrated project opportunities. During the various strategic planning processes, stakeholders indicated that even more integration is needed. The NPLs on the plant production portfolio team are collaborating to insure that new knowledge, generated in KAs which their programs focus on, is being transferred into projects in other KAs across the agency. This has led to a fruitful interaction of programs which has resulted in stakeholders being able to successfully meet the challenges inherent in a global economy. The Economic Research Service recently published a report indicating that net farm income for 2007 will exceed $87.5 billion in 2007, an increase of over $28.5 billion from 2006 and greater than the all-time high net farm income reported in 2004. Crop farms account for 60 % of the total net farm income. The ability of American farmers to respond to increased demand for bio-energy crops and an increased demand for exports is directly related to the success of the plant production portfolio. The NPLs on the plant production portfolio team are providing leadership within USDA and with the land-grant partnership that is bringing the entire agricultural knowledge system in line with the recommendations of the 2004 PREP. This process should result in a continued growth in net farm income in the future.

APPENDIX A
KA Funding Tables

KA 201: Plant Genome, Genetics, and Genetic Mechanisms CSREES Funding									
(as reported by the Current Research Information System)									
$ in the thousands									
Year	HATCH	MC-STN	EVANS ALLEN	ANIMAL HEALTH	SPECIAL GRANTS	NRI GRANTS	SBIR GRANTS	OTHER CSREES	TOTAL CSREES
2000	3,665	309	1,043	0	1,837	6,619	0	10,815	24,288
2001	4,207	313	1,010	0	3,116	8,840	204	13,275	30,965
2002	5,021	316	1,025	0	3,460	10,363	456	896	21,537
2003	5,411	328	1,201	0	4,807	10,810	296	3,080	25,933
2004	6,217	192	1,206	0	5,145	9,625	248	2,708	25,341
2005	6,211	284	1,246	0	4,595	11,160	470	2,236	26,202
2006	5,919	375	1,172	0	6,185	15,042	56	1,644	30,393
Total	36,651	2,117	7,903	0	29,145	72,459	1,730	34,654	184,659

KA 201: Plant Breeding, Genome, Genetics, and Genetic Mechanisms Overall Funding								
(as reported by the Current Research Information System)								
$ in the thousands								
Year	CSREES Admin	Other USDA	Other Federal	State Appr.	Self-Gen	Ind/Gr Agrmt	Other Non-Fed	Total
2000	24,288	2,884	13,907	23,847	1,428	7,861	3,223	77,438
2001	30,965	2,235	15,525	32,229	2,089	8,087	4,628	95,758
2002	21,536	2,643	21,850	35,842	2,071	8,968	6,291	99,200
2003	25,933	3,618	25,472	41,888	3,268	10,667	5,825	116,672
2004	25,340	4,083	38,896	44,291	3,293	11,653	5,887	133,444
2005	26,202	5,048	53,049	51,618	6,077	17,443	9,618	169,055
2006	30,393	3,639	42,411	45,137	4,307	12,655	5,668	144,211
Total	184,657	24,150	211,110	274,852	22,533	77,334	41,140	835,778

KA 202: Plant Genetic Resources CSREES Funding									
(as reported by the Current Research Information System)									
$ in the thousands									
Year	**HATCH**	**MC-STN**	**EVANS ALLEN**	**ANIMAL HEALTH**	**SPECIAL GRANTS**	**NRI GRANTS**	**SBIR GRANTS**	**OTHER CSREES**	**TOTAL CSREES**
2000	6,726	73	269	0	1,263	829	0	1,213	10,373
2001	5,943	91	487	0	1,424	1,091	0	754	9,790
2002	6,276	133	675	0	1,598	442	59	874	10,057
2003	5,787	205	813	0	2,149	740	0	1,091	10,785
2004	5,811	189	817	0	3,048	1,033	289	746	11,933
2005	5,889	175	870	0	3,129	783	0	826	11,672
2006	5,760	186	969	0	4,443	1,523	16	170	13,067
Total	42,192	1,052	4,900	0	17,054	6,441	364	5,674	77,677

KA 202: Plant Genetic Resources and Biodiversity Overall Funding								
(as reported by the Current Research Information System)								
$ in the thousands								
Year	**CSREES Admin**	**Other USDA**	**Other Federal**	**State Appr.**	**Self-Gen**	**Ind/Gr Agrmt**	**Other Non-Fed**	**Total**
2000	10,372	2,087	4,375	30,702	1,176	5,715	3,564	57,990
2001	9,789	2,475	4,472	24,168	1,823	6,025	3,748	52,499
2002	10,056	2,160	6,197	26,590	960	6,414	3,436	55,814
2003	10,784	2,474	5,945	23,470	1,341	4,834	3,312	52,161
2004	11,932	2,254	6,418	22,231	1,610	4,927	3,416	52,788
2005	11,672	3,186	8,134	31,394	5,659	6,506	5,779	72,329
2006	13,067	2,173	6,621	24,668	2,135	4,774	3,777	57,214
Total	77,672	16,809	42,162	183,223	14,704	39,195	27,032	400,795

KA 203: Plant Biological Efficiency and Abiotic Stresses Affecting Plants CSREES Funding									
(as reported by the Current Research Information System)									
$ in the thousands									
Year	**HATCH**	**MC-STN**	**EVANS ALLEN**	**ANIMAL HEALTH**	**SPECIAL GRANTS**	**NRI GRANTS**	**SBIR GRANTS**	**OTHER CSREES**	**TOTAL CSREES**
2000	9,176	290	584	0	763	3,866	0	420	15,099
2001	7,862	379	736	0	1,841	4,771	271	518	16,378
2002	6,629	464	1,101	3	2,196	3,418	0	353	14,164
2003	5,699	484	1,360	3	2,229	3,044	83	512	13,414
2004	5,364	329	943	0	2,154	3,890	376	621	13,677
2005	6,248	380	536	0	2,822	3,999	0	1,091	15,076
2006	5,563	358	331	0	2,859	4,271	0	1,344	14,727
Total	46,541	2,684	5,591	6	14,864	27,259	730	4,859	102,531

KA 203: Plant Biological Efficiency and Abiotic Stresses Affecting Plants Overall Funding								
(as reported by the Current Research Information System)								
$ in the thousands								
Year	**CSREES Admin**	**Other USDA**	**Other Federal**	**State Appr.**	**Self-Gen**	**Ind/Gr Agrmt**	**Other Non-Fed**	**Total**
2000	15,098	1,360	9,972	46,565	2,176	10,480	5,216	90,869
2001	16,377	2,043	7,680	45,641	3,204	9,214	5,126	89,285
2002	14,163	1,727	8,401	40,742	2,831	8,313	5,264	81,440
2003	13,413	2,069	9,105	34,952	3,348	8,489	3,847	75,223
2004	13,677	1,876	8,751	33,692	2,087	7,157	4,422	71,660
2005	15,076	2,356	13,591	40,464	3,982	7,495	8,074	91,038
2006	14,727	2,018	9,495	34,105	2,873	7,245	5,280	75,743
Total	102,531	13,449	66,995	276,161	20,501	58,393	37,229	575,258

KA 204: Plant Product Quality and Utility (Preharvest) CSREES Funding									
(as reported by the Current Research Information System)									
$ in the thousands									
Year	**HATCH**	**MC-STN**	**EVANS ALLEN**	**ANIMAL HEALTH**	**SPECIAL GRANTS**	**NRI GRANTS**	**SBIR GRANTS**	**OTHER CSREES**	**TOTAL CSREES**
2000	3,932	55	642	0	1,037	250	250	351	6,517
2001	3,298	100	600	0	2,519	327	397	3,872	11,113
2002	3,359	127	362	0	1,673	481	503	277	6,782
2003	3,163	103	282	0	1,615	599	496	391	6,649
2004	2,849	96	508	0	3,848	553	378	1,492	9,724
2005	3,003	69	665	0	3,457	757	296	957	9,203
2006	2,843	93	472	0	1,657	1,362	199	338	6,964
Total	22,447	643	3,531	0	15,806	4,329	2,519	7,678	56,952

KA 204: Plant Product Quality and Utility (Preharvest) Overall Funding								
(as reported by the Current Research Information System)								
$ in the thousands								
Year	**CSREES Admin**	**Other USDA**	**Other Federal**	**State Appr.**	**Self-Gen**	**Ind/Gr Agrmt**	**Other Non-Fed**	**Total**
2000	6,518	1,587	2,021	19,655	1,633	4,230	2,713	38,357
2001	11,113	1,458	1,519	19,444	1,791	4,457	3,309	43,091
2002	6,782	1,822	1,952	19,757	1,328	3,650	6,769	42,059
2003	6,647	1,931	1,045	21,329	1,873	3,486	3,812	40,123
2004	9,724	2,059	1,517	20,679	1,749	3,909	3,393	43,029
2005	9,203	2,425	4,227	26,858	2,869	5,239	4,613	55,434
2006	6,964	1,845	2,129	22,080	2,462	3,571	3,239	42,290
Total	56,951	13,127	14,410	149,802	13,705	28,542	27,848	304,383

KA 205: Plant Management Systems CSREES Funding									
(as reported by the Current Research Information System)									
$ in the thousands									
Year	HATCH	MC-STN	EVANS ALLEN	ANIMAL HEALTH	SPECIAL GRANTS	NRI GRANTS	SBIR GRANTS	OTHER CSREES	TOTAL CSREES
2000	7,618	83	1,541	0	4,069	348	198	5,460	19,317
2001	8,293	50	1,602	0	6,465	870	405	11,051	28,736
2002	7,822	98	2,110	0	7,818	730	263	1,669	20,510
2003	8,027	92	1,874	0	10,032	1,543	322	2,991	24,881
2004	8,584	76	1,430	0	7,385	116	709	2,177	20,477
2005	8,544	67	1,986	0	8,156	1,069	580	4,196	24,597
2006	8,222	50	2,557	0	9,074	1,513	708	4,696	26,820
Total	57,110	516	13,100	0	52,999	6,189	3,185	32,240	165,338

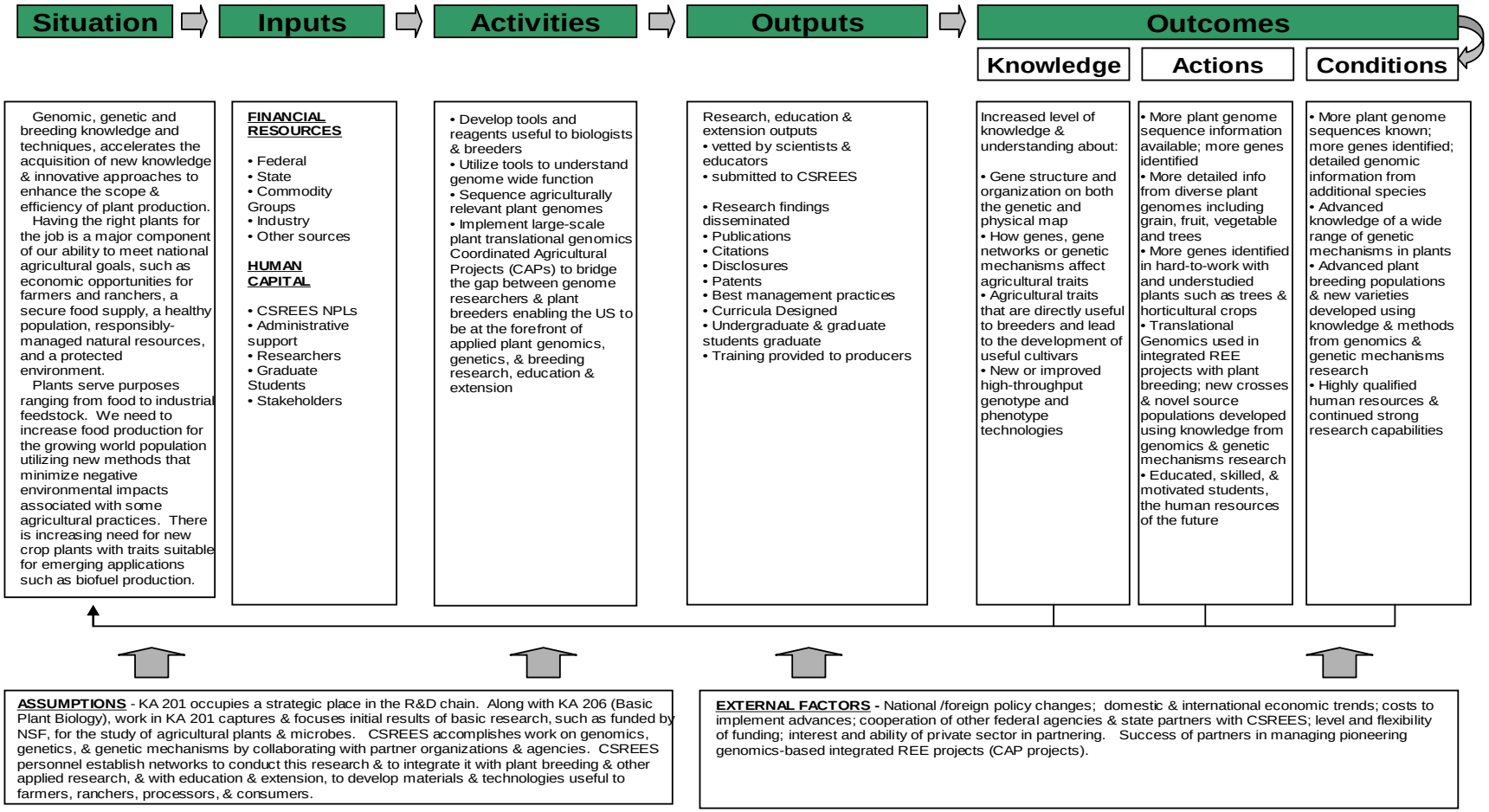
KA 205: Plant Management Systems Overall Funding								
(as reported by the Current Research Information System)								
$ in the thousands								
Year	CSREES Admin	Other USDA	Other Federal	State Appr.	Self-Gen	Ind/Gr Agrmt	Other Non-Fed	Total
2000	19,316	1,515	3,028	39,050	2,842	7,392	5,412	78,555
2001	28,735	1,828	3,586	42,390	3,692	7,105	5,891	93,226
2002	20,511	2,361	4,365	43,833	4,244	7,396	6,361	89,071
2003	24,880	2,371	4,968	42,973	4,582	6,988	5,949	92,712
2004	20,476	3,077	3,700	41,534	4,173	6,862	6,038	85,861
2005	24,597	3,313	7,255	58,956	8,306	10,015	9,599	122,042
2006	26,820	2,860	5,108	46,792	5,572	8,030	6,423	101,606
Total	165,335	17,325	32,010	315,528	33,411	53,788	45,673	663,073

KA 206: Basic Plant Biology CSREES Funding									
(as reported by the Current Research Information System)									
$ in the thousands									
Year	HATCH	MC-STN	EVANS ALLEN	ANIMAL HEALTH	SPECIAL GRANTS	NRI GRANTS	SBIR GRANTS	OTHER CSREES	TOTAL CSREES
2000	3,772	170	35	0	340	3,736	0	29	8,082
2001	3,914	163	33	0	458	14,791	0	573	19,932
2002	4,222	159	151	0	516	11,247	0	120	16,415
2003	4,102	261	249	0	757	10,567	0	274	16,210
2004	4,253	225	388	0	745	9,138	200	561	15,510
2005	4,755	195	480	0	531	11,969	40	638	18,609
2006	5,194	235	245	0	651	8,381	0	1,288	15,995
Total	30,212	1,408	1,581	0	3,998	69,829	240	3,483	110,753

KA 206: Basic Plant Biology Overall Funding								
(as reported by the Current Research Information System)								
$ in the thousands								
Year	CSREES Admin	Other USDA	Other Federal	State Appr.	Self-Gen	Ind/Gr Agrmt	Other Non-Fed	Total
2000	8,082	1,644	18,096	25,813	765	5,257	3,335	62,992
2001	19,932	1,382	20,214	26,723	907	6,306	2,972	78,436
2002	16,415	1,131	18,618	25,288	1,014	7,303	4,073	73,841
2003	16,211	1,344	25,610	26,296	1,192	7,800	2,642	81,095
2004	15,508	1,122	21,997	28,820	2,108	8,940	3,104	81,600
2005	18,609	1,346	34,848	36,105	2,693	9,349	4,683	107,632
2006	15,995	1,211	24,074	32,554	2,209	5,797	3,388	85,227
Total	110,752	9,180	163,457	201,599	10,888	50,752	24,197	570,823

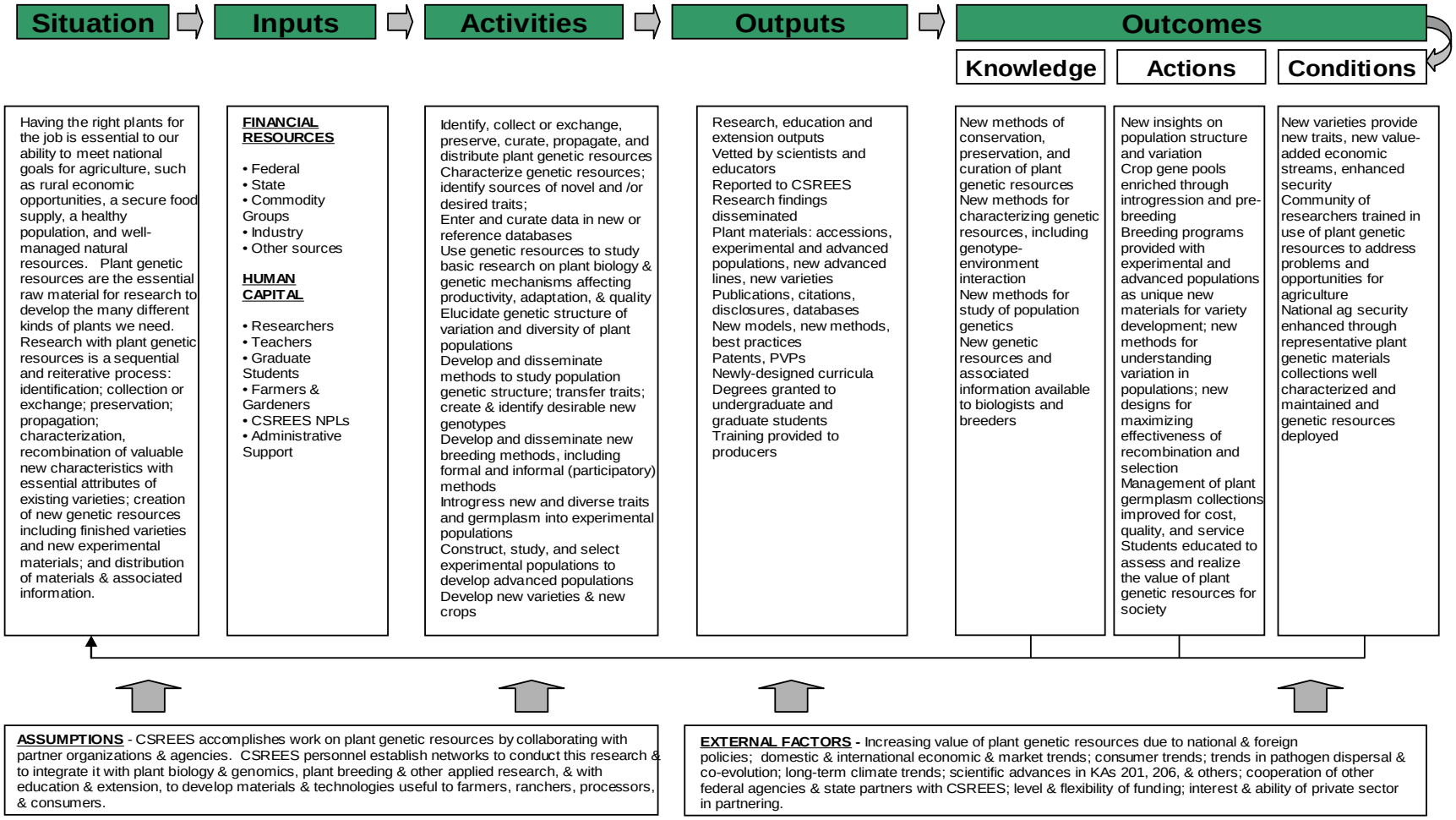
APPENDIX B
KA Logic Models

KA 201: Genomics, Genetics, Genetic Mechanisms



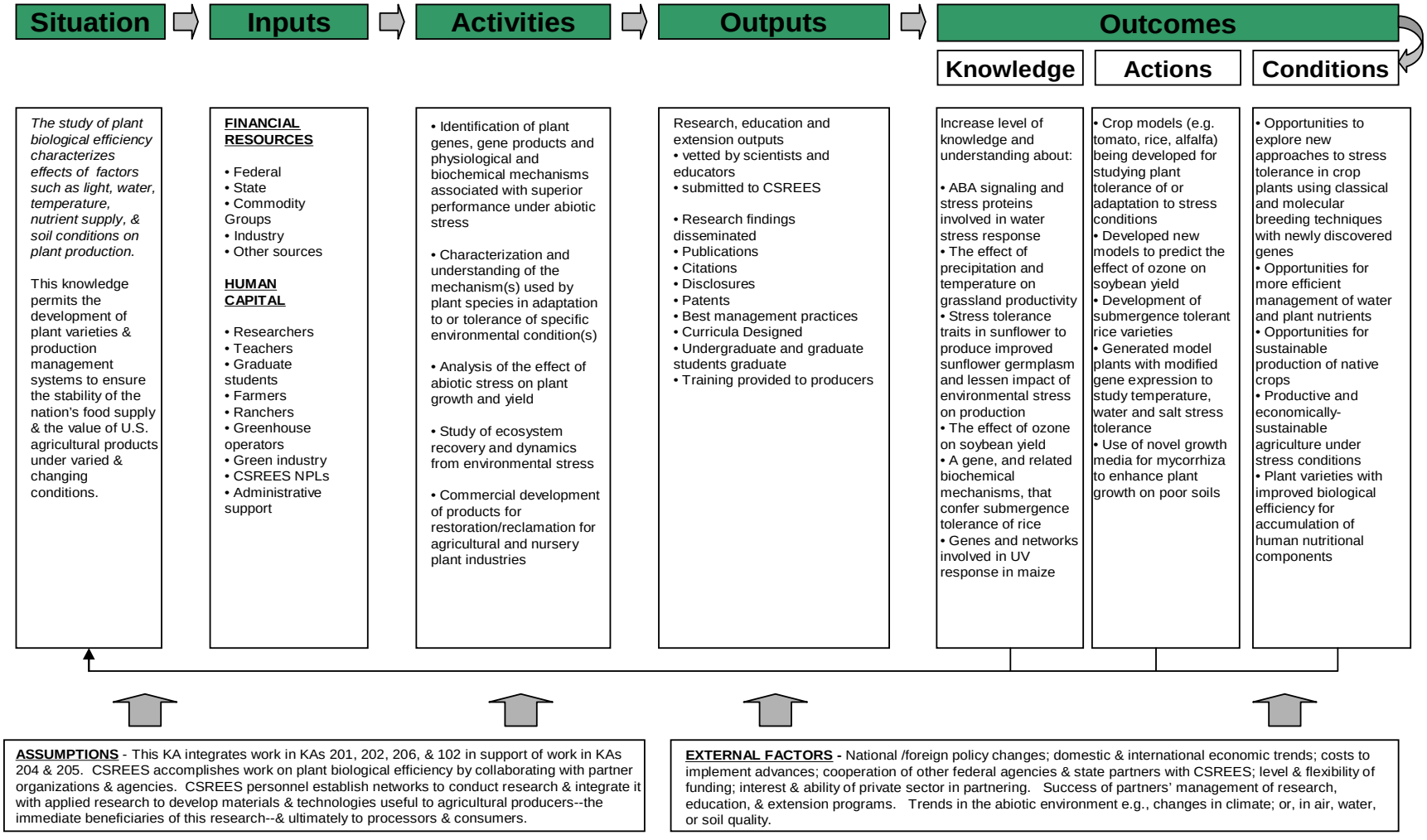
Version 1.2

KA 202: Plant Genetic Resources



Version 1.2

KA: 203 Plant Biological Efficiency

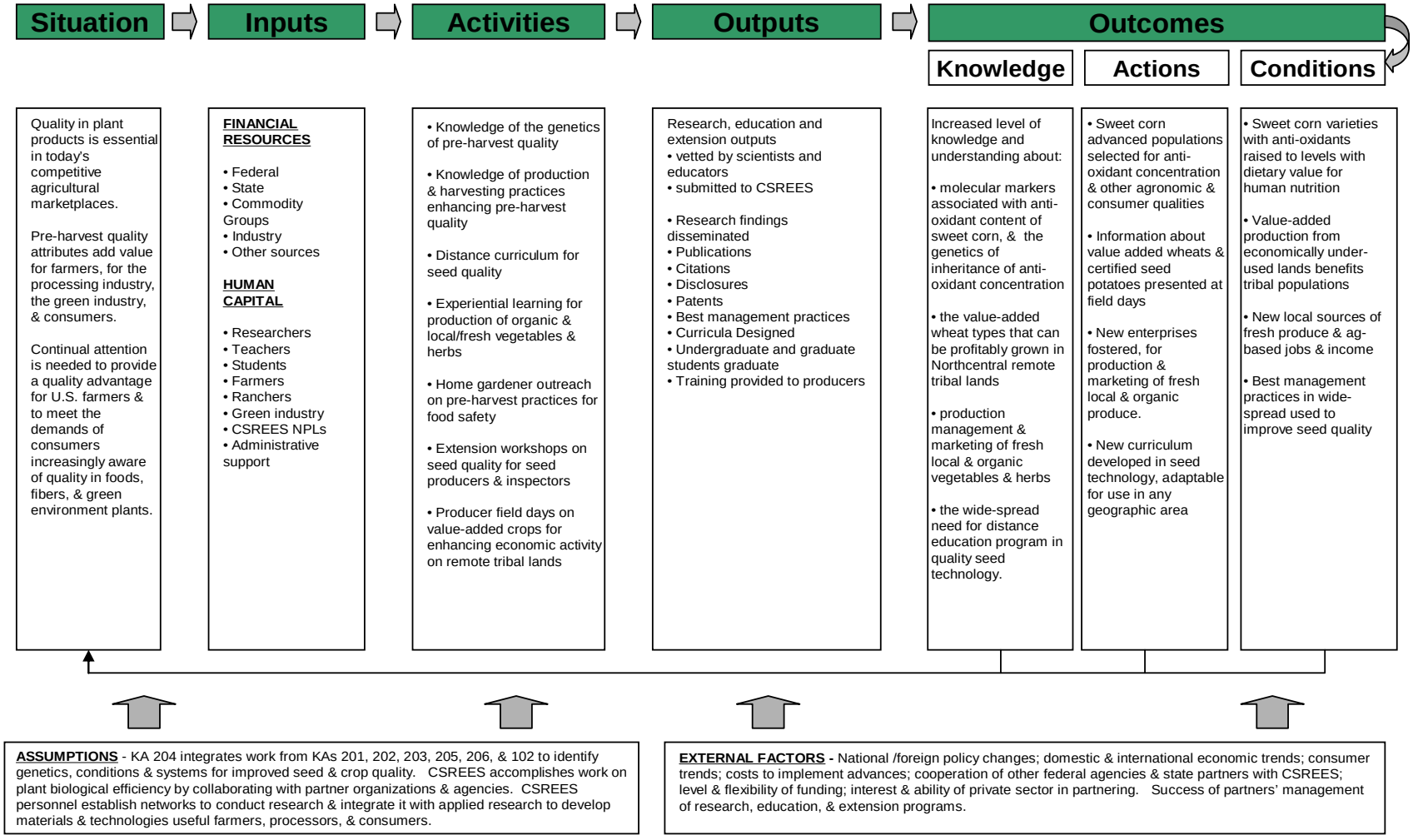


ASSUMPTIONS - This KA integrates work in KAs 201, 202, 206, & 102 in support of work in KAs 204 & 205. CSREES accomplishes work on plant biological efficiency by collaborating with partner organizations & agencies. CSREES personnel establish networks to conduct research & integrate it with applied research to develop materials & technologies useful to agricultural producers--the immediate beneficiaries of this research--& ultimately to processors & consumers.

EXTERNAL FACTORS - National /foreign policy changes; domestic & international economic trends; costs to implement advances; cooperation of other federal agencies & state partners with CSREES; level & flexibility of funding; interest & ability of private sector in partnering. Success of partners' management of research, education, & extension programs. Trends in the abiotic environment e.g., changes in climate; or, in air, water, or soil quality.

Version 1.2

Knowledge Area: 204 Plant Production Quality (Pre-harvest)

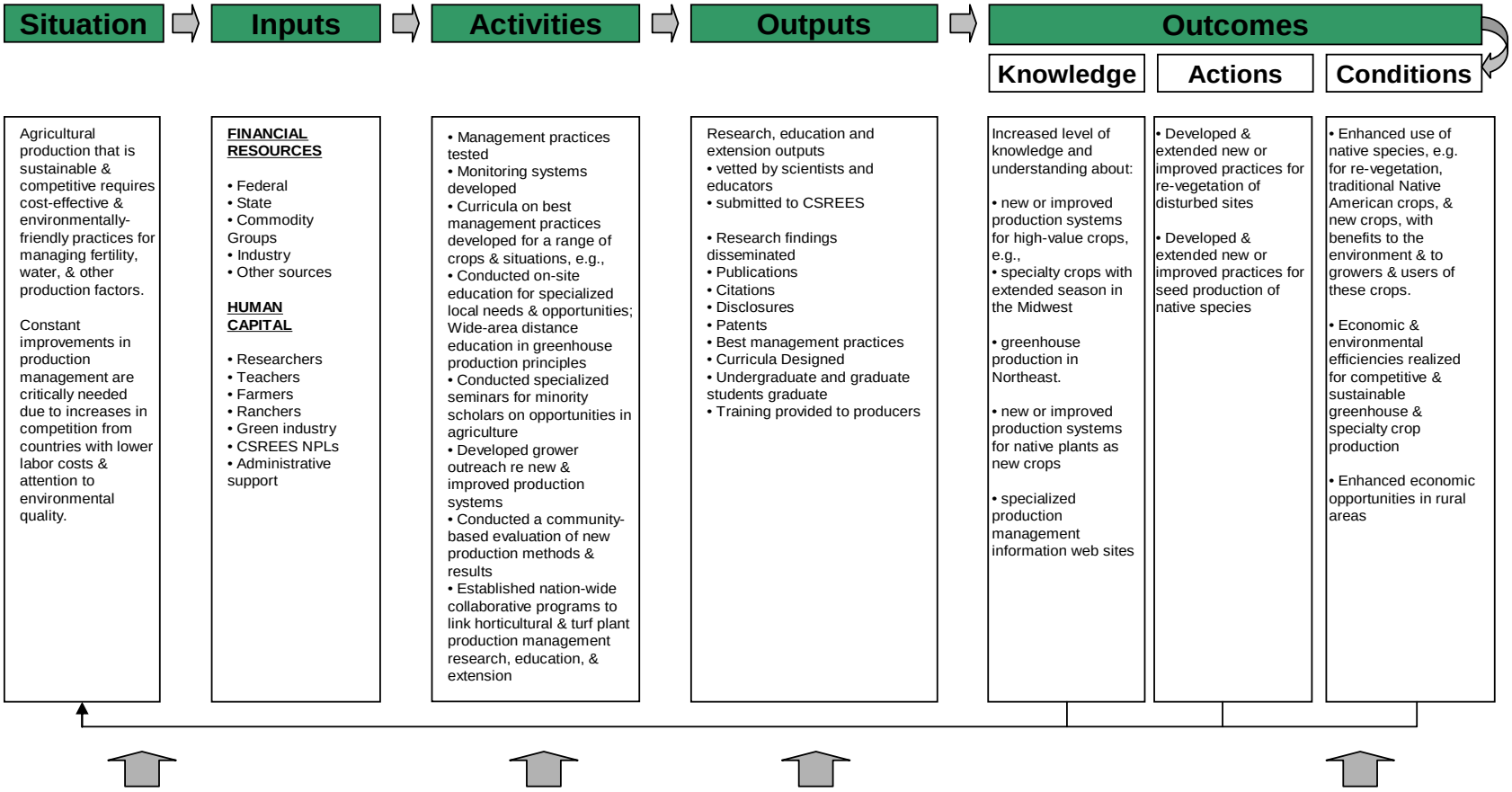


ASSUMPTIONS - KA 204 integrates work from KAs 201, 202, 203, 205, 206, & 102 to identify genetics, conditions & systems for improved seed & crop quality. CSREES accomplishes work on plant biological efficiency by collaborating with partner organizations & agencies. CSREES personnel establish networks to conduct research & integrate it with applied research to develop materials & technologies useful farmers, processors, & consumers.

EXTERNAL FACTORS - National /foreign policy changes; domestic & international economic trends; consumer trends; costs to implement advances; cooperation of other federal agencies & state partners with CSREES; level & flexibility of funding; interest & ability of private sector in partnering. Success of partners' management of research, education, & extension programs.

Version 1.2

KA 205: Plant Production Management Systems

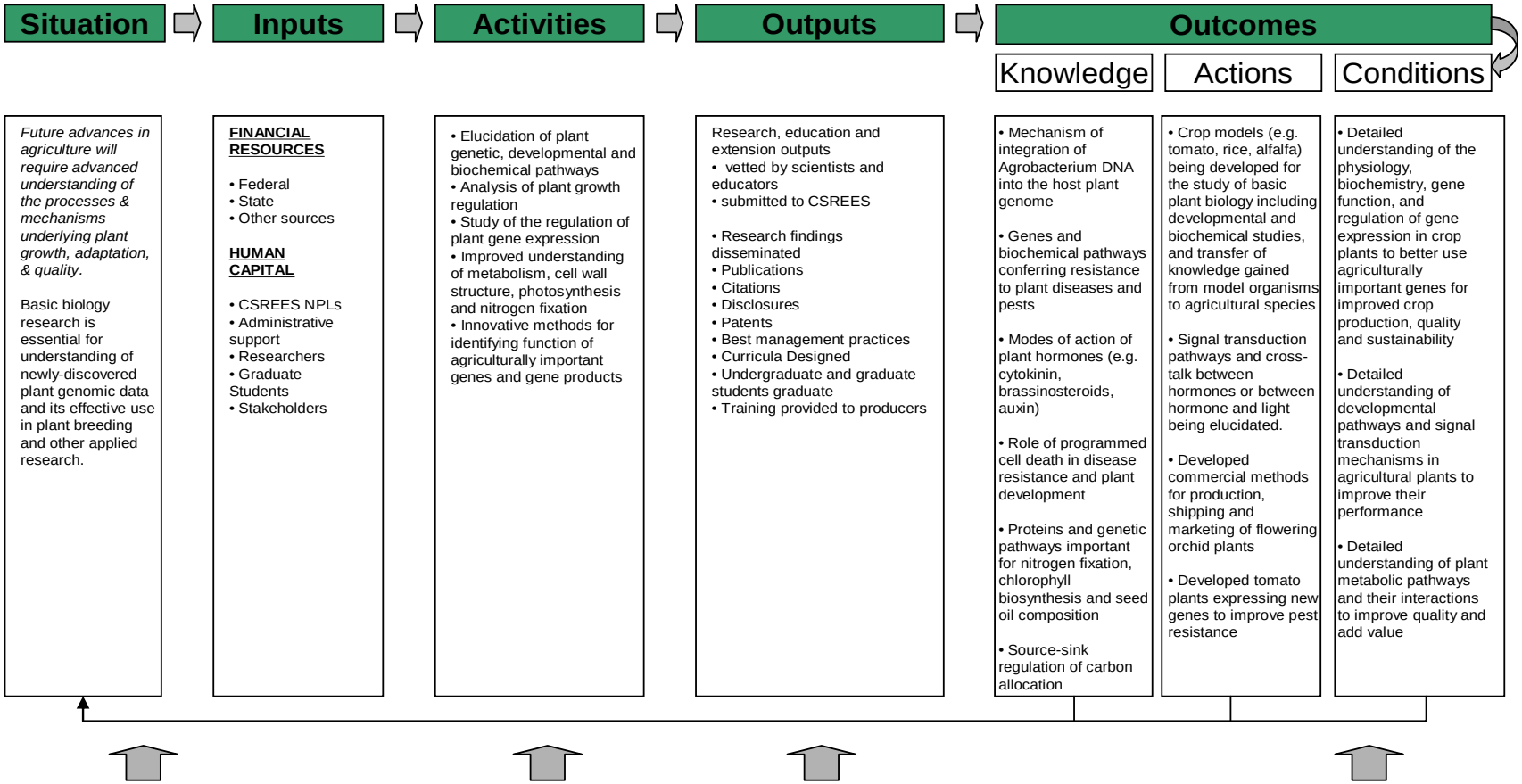


ASSUMPTIONS - This KA integrates knowledge from KAs 203, 204, & 206; 101-104 (Soil); 111-112 (Water); & the 400 series (Engineering & Support Systems). CSREES accomplishes work on plant biological efficiency by collaborating with partner organizations & agencies. CSREES personnel establish networks to conduct research & integrate it with applied research to develop materials & technologies useful to agricultural producers--the immediate beneficiaries of this research--& ultimately to processors & consumers.

EXTERNAL FACTORS - National /foreign policy changes; domestic & international economic trends; costs to implement advances; cooperation of other federal agencies & state partners with CSREES; level & flexibility of funding; interest & ability of private sector in partnering. Success of partners' management of research, education, & extension programs.

Version 1.2

KA 206: Basic Plant Biology



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