1. Name of the Planned Program.
Corn and Soybean Production and Protection

2. Program knowledge areas.
KA 102 Soil, Plant, Water, Nutrient Relationships (20%)
KA 112 Watershed Protection and Management (10%)
KA 204 Plant Product Quality and Utility (Preharvest) (10%)
KA 205 Plant Production Management Systems (20%)
KA 206 Basic Plant Biology (20%)
KA 216 Integrated Pest Management Systems (20%)

3. Program existence
- Long Term (more than five years)

4. Program duration
- Long Term (more than five years)

5. Brief summary about Planned Program
Nearly two-thirds of Iowa's land surface (~23 million of 36 million acres) is annually dedicated to production of corn or soybean. Because of the importance of these crops to Iowa's economy, planned Extension programming focuses on enhancing profitable corn and soybean production and the other issues related to crop protection. These include efforts focused on the prevention or limitation of losses from weed, insect, crop disease and non-pathogen related damage. Soil, water and nutrient management issues are inherent to the two crops grown in annual monoculture and are likewise addressed. In addition, economical production of forages and small grains are issues that many farmers share, and the advent of alternative agronomic crops presents additional information needs for Extension to provide.

6. Situation and priorities
Corn or soybeans are grown on around 23 million acres of Iowa land each year, a full 90% of Iowa's farmland. Another 7 million acres are used for hay, pasture, small grains and conservation reserve. The direct economic contribution of all Iowa crops exceeded $7 billion in 2005, not including processing and use.

Managing Iowa's soil and water resources is critical for improving crop production and protecting the environment. Farm practices contribute to soil erosion and subsequent sediment and nutrient loading of water resources; increased adoption of economically viable soil, water, and crop nutrient practices is needed. Conservation systems protect soil quality, increase nutrient-use efficiency, and enhance profitability by reducing farming inputs. Potential crop residue use for energy production adds another challenge to the balance between productivity and environmental stewardship.
Corn and soybean monocultures involve a myriad of pest complexes, any one of which can reduce yield and profits. These pests continually adapt, requiring continuous adjustments in management strategies to keep pest populations below economic levels. Soybean aphid and soybean rust have recently altered overall soybean management. For soybean aphids, this has meant the increased use of insecticides. Soybean rust and the fungicides used for its management may present a similar situation. Biotechnology-based options for control of both insect pests and weeds have become available in the last ten years. Weed management has changed with the advent of crop varieties that are resistant to broad-spectrum herbicides such as glyphosate and glufosinate. Overuse of these new technologies may result in the evolution of resistant insects and weeds.

Pasture and hay crops offer critical value-added benefits as feed for Iowa’s livestock, while small grains are either sold to the food processing industry or used as feed. The soil-conserving attributes of forages are well known. They can also reduce losses of applied nitrogen and phosphorus from fields. Increased public concern about water quality has led to increased regulation of the agricultural industry by state and federal authorities, making the inclusion of forages in rotations increasingly important farm management tools. As components in value-added systems, these crops represent priority interests of Iowans in agricultural economic development.

New, expanding opportunities in value-added, organic, and lesser-known crops need to be integrated with developing industries. With increasing global competition capping prices and limiting the profitability of corn and soybean, Iowa producers are examining value-added crops and other new cropping opportunities. Forages are currently being evaluated for bio-energy generation, including ethanol. Forage for fiber production is also being investigated. Acreage of flax, adzuki beans and other lesser-known crops is increasing. Recently, organic crop-production acreage has been increasing by about 20% per year. Modified-trait grains, such as low linolenic soybeans, are providing solutions to human and animal health problems.

7. Assumptions made for the Program

Crop production practices and yields have changed markedly. Fewer individuals are farming larger areas, and a majority of the land is farmed by those who do not own it. A number of crop production changes arose from the changes in farm structure. The cost of production has increased dramatically with the increased prices of seed, commercial fertilizer, fuel and other farm inputs. In recent years, an increased demand for corn has developed around the ethanol industry. Many growers are considering switching or have already switched to crop rotations that include more corn following corn, in part to meet ethanol demand. Iowa is projected to be a corn-deficit state by 2010—2012 if present use trends continue.

Changes in cropping systems, increases in input costs, and increased concerns over agricultural impacts on water quality require more research and extension activities centered on tillage, soil fertility, variety selection, crop rotations, pest management (insects, diseases, and weeds), as well as costs of production. Grain quality issues for both corn and soybean have also become more important in recent years in light of increased world trade, the continuing introduction of specialty trait crops, and heightened concerns over food safety issues.

In a survey conducted in 2004, we found that private-sector Iowa agribusinesses relied on ISU Extension as a leading source of quality educational information. However, producers most often lost the connection of information to ISU Extension presented through private sector intermediaries. Extension-sourced crop information found great acceptance among end users, but the connection to ISU was either vague or lost. Much current effort in extension crop production is focusing on establishing relationships with private sector agribusinesses. In the five-year of this plan of work, the goal is to build on these cooperative relationships to enhance the efficiency of delivery of extension programming.
8. **Ultimate goal(s) of this Program**

**Goals: Corn and soybean production:**
1. Increase use of research-based crop management practices.
2. Adapt current commodity based practices to specialty trait or cropping systems.

**Goals: Crop protection:**
1. Enhance the knowledge of persons involved in production agriculture (farmers, ag supply personnel, crop consultants, etc.) on the biology, ecology and management of important crop pests. This knowledge will lead to implementation of more effective and economic pest management systems.
2. Continuously modify crop protection recommendations to anticipate the changing mix of products being grown.

**Goals: Forages, small grains and new opportunities:**
1. Increase adoption of Best Management Practices (BMP) for forages and the production of non-traditional crops.
2. The value of forages in organic production and in Conservation Security plans better communicate to all producers.

**Goals: Soil, water and nutrient management:**
1. Increase the acreage of corn and soybean in conservation systems in Iowa.
2. Assist producers who bring USDA-conservation reserve program (CRP) acreage back into crop production to employ appropriate best management practices for nutrient and soil quality on those acres that includes no-till, chisel plow, sod-based rotations, improved waterways and conservation buffers.
3. Educate producers and service providers on the use and benefits of diagnostic and other resource tools, including the Iowa P-Index, RUSLE2, soil nutrient testing, plant-based nutrient testing, etc., so that they are eligible for state and Federal conservation programs benefits.
4. Increase the adoption of specific, economically appropriate practices of N and P from both fertilizer and animal manures including application timing and rates that integrate with the producer’s cropping system.

9. **Scope of Program**

In-State Extension
In-State Research
Multi-state Integrated Research and Extension

**Inputs for the Program**

10. **Expending formula funds or state-matching funds**
    - Yes

11. **Expending funds other than formula funds or state-matching funds**
    - Yes
12. Estimated amount of professional FTEs/SYs to be budgeted for this Program

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13. Activity (What will be done?)

- Conduct replicated research experiments and demonstrations at ISU research farms, grower fields and agribusiness partner locations.
- Organize and maintain monitoring programs for appropriate crop pests (for example adult corn rootworms, Asian soybean rust, aflatoxin) and disseminate the results to inform growers and crop advisors when to scout for these pests.
- Convey research results and recommended crop production and pest management practices to Iowa growers via conferences, field days, publications, and web-based information.
- Conduct core training on applied agronomic sciences for agribusiness professionals (for producers, Certified Crop Advisers and other agribusiness personnel) through formal and informal sessions including those programs coordinated, organized, and conducted by the ISU Extension Agribusiness Education Program (Field Extension Education Laboratory programs, Integrated Crop Management Conference, Agrichemical Dealer Updates, Crop Advantage Series meetings, annual ISU scout school and short courses, etc.) and related activities (Integrated Crop Management Newsletter).
- Conduct pasture-walks and pasture weed management demonstrations to demonstrate grazing best management practices to improve profitability and sustainability of livestock operations.
- Partner with commodity organizations, agricultural input suppliers, seed companies, and other agribusinesses to conduct replicated research experiments and extension demonstrations of recommended crop production and pest management practices in grower fields.
- Partner with commodity organizations, agricultural input suppliers, seed companies, and other agribusinesses to convey research-based information through meetings, field days, publications, and web-based materials of the partnering organizations.
- Develop and deliver a curriculum covering an integrated approach for soil, water, and nutrient management. Create area-specific adaptations of the curriculum. This training would meet requirements for annual training of over 2000 confinement site manure applicators and over 1200 commercial manure applicators.
- Prepare farmers within different watersheds for the Conservation Security Program (CSP) by educating them about the value of conservation systems and the nutrient management that need to be considered to be involved in the CSP.
- Conduct training workshops and education opportunities for different management tools such as P-Index, RUSLE2 for soil erosion estimation, residue estimation, nitrogen calculation, and others.
- Conduct workshops and training opportunities for alternative management of CRP lands to enhance and preserve the environmental benefits that were developed during the years of the CRP contracts. Identify appropriate opportunities to use CRP acreage after the contract expiration.
• Promote use of ISU corn, soybean, alfalfa and small grain variety trial data in selecting adapted crop varieties.
• Promote Total Quality Management systems (for example, ISO 9000) as a means of reconciling diverse regulatory and production needs into profitable production systems.

14. Type(s) of methods will be used to reach direct and indirect contacts.

<table>
<thead>
<tr>
<th>Extension</th>
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<tr>
<td><strong>Direct Methods</strong></td>
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<tr>
<td>• Train the trainer sessions</td>
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<td>• In-service training</td>
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<td>• Field meetings</td>
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<td>• Workshops</td>
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<td>• Conferences</td>
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<td>• Certification training</td>
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15. Description of targeted audience.

Crop producers
Livestock producers
Certified Crop Advisors
Agribusiness personnel
Commodity organizations
USDA agencies
Commercial manure applicators
Land owners
Agricultural lenders

Target for the number of persons (contacts) to be reached through direct and indirect contact methods.

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Contacts Adults</th>
<th>Indirect Contacts Adults</th>
<th>Direct Contacts Youth</th>
<th>Indirect Contact Youth</th>
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<tbody>
<tr>
<td>2007</td>
<td>20,000</td>
<td>10,000</td>
<td>Target</td>
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<td>2008</td>
<td>20,000</td>
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<td>2009</td>
<td>20,000</td>
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<td>2010</td>
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<tr>
<td>2011</td>
<td>20,000</td>
<td>10,000</td>
<td>Target</td>
<td>Target</td>
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17. (Standard Research Target) Number of patents.

<table>
<thead>
<tr>
<th>Expected Patents</th>
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<tbody>
<tr>
<td>Year</td>
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<tr>
<td>2007</td>
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<td>2010</td>
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18. Output measures
Output Text: Number of applied-research experiments and demonstrations at ISU research farms, grower fields, agribusiness partner locations.
2007 Target: 100
2008 Target: 100
2009 Target: 100
2010 Target: 100
2011 Target: 100

Output Text: Number of monitoring programs for appropriate crop pests.
2007 Target: 4
2008 Target: 4
2009 Target: 4
2010 Target: 4
2011 Target: 4

Outcomes for the Program
19. Outcome measures
Outcome Text: Number of producers and service providers attending corn and soybean programming that focuses on improving agronomic practices.
2007 Target: 10,000
2008 Target: 10,000
2009 Target: 10,000
2010 Target: 10,000
2011 Target: 10,000

Outcome Text: Number of producers and service providers attending programs to learn and apply Integrated Pest Management practices.
2007 Target: 10,000
2008 Target: 10,000
2009 Target: 10,000
2010 Target: 10,000
2011 Target: 10,000

Outcome Text: Number of producers and service providers who participate in programs designed to increase forage production and profitability and forage-based production systems.
2007 Target: 400
2008 Target: 400
2009 Target: 400
2010 Target: 400
2011 Target: 400

Outcome Text: Number of producers and service providers who attend programs designed to increase the awareness of new crop opportunities and varieties appropriate for bio-energy production.
2007 Target: 100
2008 Target: 100
2009 Target: 100
2010 Target: 100
2011 Target: 100

Outcome Text: Number of producers and service providers who participate in programs designed to increase the adoption of conservation systems on Iowa’s corn and soybean acreage.
2007 Target: 500
2008 Target: 500
2009 Target: 500
2010 Target: 500
2011 Target: 500
**Outcome Text:** Number of landowners and producers attending programs that focus on applying best management practices to land coming out of the Conservation Reserve Program.

- **2007 Target:** 100
- **2008 Target:** 100
- **2009 Target:** 100
- **2010 Target:** 100
- **2011 Target:** 100

**Outcome Text:** Number of producers and service providers trained to use diagnostic and other resource tools related to crop nutrient management.

- **2007 Target:** 400
- **2008 Target:** 400
- **2009 Target:** 400
- **2010 Target:** 400
- **2011 Target:** 400

**Outcome Text:** Number of farmers and service providers trained in managing the nitrogen and phosphorus content of animal manure in relation to the appropriate cropping system.

- **2007 Target:** 2,500
- **2008 Target:** 2,500
- **2009 Target:** 2,500
- **2010 Target:** 2,500
- **2011 Target:** 2,500

20. **External factors which may affect outcomes.**

- Resistance to changes in techniques and management tactics is a potential obstacle to achieving these objectives. Reduction of traditionally available public and private sector financial-risk mitigation programs add to this resistance to try/adopt innovative practices. These include:
  - Federal farm program incentives
  - Availability of insurance
  - Tax abatement/tax incentive programs
  - Energy policies
  - Pollution related regulations
  - Public sponsored environmental training and information opportunities

21. **Evaluation studies planned.**

- End of meeting surveys that evaluate awareness and likelihood of practice adoption are key evaluation methods.
- Additionally, selected post-program surveys (6-month or one year later) will provide practice adoption information.
- Baseline data for quantifying some objectives are available from the following:
  - IDALS databases
  - Iowa Geological Survey Bureau and other watershed/water body contaminant loading surveys
  - NASS, USDA-ERS and other production and economic survey data
- Collection of adoption/awareness information from growers, Certified Crop Advisers, and other agribusiness professionals. Periodic surveys will document corn and soybean production and pest management practices with these stakeholders.
- Focus group discussions with targeted groups of growers and agricultural professionals will assess impacts of ISU research and educational programs.
- Surveys of private sector cooperators in targeted pest monitoring programs conducted by ISU Extension.
22. Data Collection Methods.

- [x] Sampling
- [x] Whole Population
- [x] Survey
- [x] Mail (surface, electronic)
- [x] Telephone
- [x] On-site
- [x] Interview
- [x] Structured/unstructured
- [ ] Case study
- [x] Observation
- [ ] Portfolio reviews
- [x] Tests
- [ ] Journals
- Other