## V(A). Planned Program (Summary)

**Program # 2**

**1. Name of the Planned Program**

Plants and Their Systems

☑ Reporting on this Program

**V(B). Program Knowledge Area(s)**

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms | 1% | | 22% | |
| 202 | Plant Genetic Resources | 1% | | 8% | |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants | 0% | | 26% | |
| 204 | Plant Product Quality and Utility (Preharvest) | 3% | | 3% | |
| 205 | Plant Management Systems | 11% | | 14% | |
| 206 | Basic Plant Biology | 13% | | 4% | |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants | 24% | | 5% | |
| 212 | Diseases and Nematodes Affecting Plants | 12% | | 7% | |
| 213 | Weeds Affecting Plants | 4% | | 1% | |
| 214 | Vertebrates, Mollusks, and Other Pests Affecting Plants | 0% | | 2% | |
| 215 | Biological Control of Pests Affecting Plants | 0% | | 2% | |
| 216 | Integrated Pest Management Systems | 31% | | 6% | |
| | **Total** | 100% | | 100% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of FTE/SYs expended this Program**

| Year: 2014 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| **Plan** | 8.1 | 0.0 | 64.2 | 0.0 |
| **Actual Paid** | 10.5 | 0.0 | 51.1 | 0.0 |
| **Actual Volunteer** | 4.6 | 0.0 | 0.0 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| **Smith-Lever 3b & 3c** | **1890 Extension** | **Hatch** | **Evans-Allen** |
| 409984 | 0 | 686379 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 409984 | 0 | 718933 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 0 | 0 | 0 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

- Collaborate with the USDA Sunflower Research Unit
- Conduct Research on Soybean Nodule Development
- Collaborate with the South Dakota Bureau of Indian Affairs
- Develop Novel Wheat Cultivars
- Conduct Research on Economic Impacts of Fungal Diseases
- Develop Superior Sunflower Germplasms
- Breed Perennial Grasses and Legumes for Bioenergy Production
- Analyze and Map Genes for Soybean Resistance of Aphids
- Develop New Multi-Purpose Oat Varieties
- Conduct Pesticide Applicator Training Sessions
- Conduct Integrated Pest Management Training Sessions
- Disseminate Research Results to the Public

### 2. Brief description of the target audience

- Oilseed and Other Specialty Crop Growers
- Research Community
- Soybean Growers
- Wheat Growers
- Corn Growers
- Biofuels Crop Industry
- Producers
- Graduate Students
- Private and Commercial Pesticide Applicators

### 3. How was eXtension used?

eXtension was not used in this program

## V(E). Planned Program (Outputs)

### 1. Standard output measures

| 2014 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 11327 | 919399 | 1559 | 12592 |

### 2. Number of Patent Applications Submitted (Standard Research Output)

**Patent Applications Submitted**

Year: 2014

Actual: 1

**Patents listed**
Variety: Redfield
Taxon: Triticum aestivum L.
Crop: Wheat, common

### 3. Publications (Standard General Output Measure)

**Number of Peer Reviewed Publications**

| 2014 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 0 | 16 | 16 |

## V(F). State Defined Outputs

**Output Target**

**Output #1**

**Output Measure**

- Percentage of all Hatch Research Projects in Plants and Their Systems

| Year | Actual |
|---|---|
| 2014 | 27 |

**Output #2**

**Output Measure**

- Number of Pesticide Applicator Training Sessions

| Year | Actual |
|---|---|
| 2014 | 122 |

**Output #3**

**Output Measure**

- Number of High Tunnel Workshops Conducted
  Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- Number of Integrated Pest Management Training Events Conducted

| Year | Actual |
|---|---|
| 2014 | 62 |

**Output #5**

**Output Measure**

- Conduct Research for Improved Oilseed Production

| Year | Actual |
|---|---|
| 2014 | 0 |

**Output #6**

**Output Measure**

- Identified Proteins in Corn and Wheat

| Year | Actual |
|---|---|
| 2014 | 0 |

**Output #7**

**Output Measure**

- Conduct Research on Spring Wheat Cultivars

| Year | Actual |
|---|---|
| 2014 | 0 |

**Output #8**

**Output Measure**

- Conduct research of Nodule Development in Soybeans

| Year | Actual |
|---|---|
| 2014 | 0 |

**Output #9**

**Output Measure**

- Increase Pollinator and Pollinator Habitat Knowledge

| Year | Actual |
|---|---|
| 2014 | 0 |

**Output #10**

**Output Measure**

- Number of Master Gardener Training Sessions

| Year | Actual |
|---|---|
| 2014 | 35 |

**Output #11**

**Output Measure**

- Number of Publications Posted on iGrow Website

| Year | Actual |
|---|---|
| 2014 | 120 |

**Output #12**

**Output Measure**

- Number of Articles Posted on iGrow Website

| Year | Actual |
|---|---|
| 2014 | 176 |

**Output #13**

**Output Measure**

- Number of Podcasts Posted on iGrow Website

| Year | Actual |
|---|---|
| 2014 | 14 |

## Output #14

### Output Measure

- Number of Radio Programs Posted on iGrow Website

| Year | Actual |
|---|---|
| 2014 | 104 |

## V(G). State Defined Outcomes

### V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Number of Plants and Their Systems Hatch Research Projects |
| 2 | Number of Pesticide Applicator Training Participants |
| 3 | Number High Tunnel Workshop Participants |
| 4 | Number of Integrated Pest Management Participants |
| 5 | Increase Oilseed Crop Knowledge and Productivity and Profitability |
| 6 | Enhanced the Understanding of Biotic and Abiotic Stress Resistance in Crop Plants |
| 7 | Release Spring Wheat Cultivars |
| 8 | Enhance Understanding of microRNAs Affecting Nodule Development in Soybeans |
| 9 | Number of Citizen Science Volunteers |
| 10 | Number of Participants Completing Master Gardener Training |

## Outcome #1

### 1. Outcome Measures

Number of Plants and Their Systems Hatch Research Projects

### 2. Associated Institution Types

- 1862 Extension
- 1862 Research

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

| Year | Actual |
|---|---|
| 2014 | 35 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
Crop diseases, insect pests, drought, changing climatic conditions, soil erosion, and fewer acres of land available for farming are all serious production constraints for all crops produced in South Dakota.

**What has been done**
Within the College of Agricultural and Biological Sciences, there are 35 Hatch projects that are categorized in the Planned Program of Plants and Their Systems. The research activities in this program are primarily supported by our Department of Plant Science and our Department of Biology and Microbiology. Projects include but are not limited to research studies in oilseed production, nodule development in soybeans, wheat genetics and genomics, perennial grasses for bioenergy, crop pests and diseases, grapevine mapping, and improved alfalfa production.

**Results**
Through research, we continue to build a scientific knowledge base to improve and understand plant varieties, increased agricultural productivity, plant diseases, and the impacts of tillage on soil carbon levels. Examples include:
The development of high-yield, pest resistant sunflower, oil extraction from oilseeds for biofuel production, wheat cultivars with elevated resistance to Fusarium head blight, prairie Cordgrass for remediating salt-impacted soils, and soybean plants that produce more of its own nitrogen. In addition, graduate students gain valuable knowledge and skills while collaborating on research projects.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 202 | Plant Genetic Resources |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 204 | Plant Product Quality and Utility (Preharvest) |
| 205 | Plant Management Systems |
| 206 | Basic Plant Biology |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |
| 212 | Diseases and Nematodes Affecting Plants |
| 213 | Weeds Affecting Plants |
| 214 | Vertebrates, Mollusks, and Other Pests Affecting Plants |
| 215 | Biological Control of Pests Affecting Plants |
| 216 | Integrated Pest Management Systems |

**Outcome #2**

**1. Outcome Measures**

Number of Pesticide Applicator Training Participants

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 4567 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Producers planning to apply any pesticide to a commodity worth $1,000 or more must be certified as a private applicator. Anyone that applies pesticides for hire must be certified and licensed as a commercial applicator.

**What has been done**

SDSU Extension organized and participated in 69 commercial applicator sessions and 43 private applicator training sessions across the state. Fifteen commercial categories were covered. Speakers at the sessions included SDSU Extension Specialists, State Department of Agriculture representatives, and State Department of Environment and Natural Resources.

**Results**
Participants enhanced their knowledge and understanding of safe and sustainable methods to apply pesticides. Topics covered during these trainings include proper selection of personal protective equipment, understanding and comprehension of label languages, resistance development on weeds and insects and ways to prevent its development, proper technique to measure pesticides and calibrate pesticide application equipment.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |

**Outcome #3**

**1. Outcome Measures**

Number High Tunnel Workshop Participants

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

Number of Integrated Pest Management Participants

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 2787 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
In the past decade, new invasive pests have been identified through the work of the SDSU Plant Diagnostic Lab, SDSU Extension Specialists, and the SDSU IPM program. And there is evidence that several common pests are becoming pesticide resistant. The proper identification of pests and the pest control measures used have a direct influence on the profitability of the farm operation. Without the improved knowledge of pest biology, unacceptable levels of pest damage can occur and pose risks to people, property and the environment.

**What has been done**
The South Dakota IPM Program is a collaborative effort between public and private agencies, multiple states, SDSU Extension, and SDSU Research. Approximately 2,787 people attended 62 training events in 2014, which included research farm tours, pesticide recertifications, workshops, field tours, and crop consultants' updates. More than 7,500 people visited SDSU Extension's traveling displays. The SDIPM Program also worked with the SD Bureau of Indian Affairs on noxious weeds and the Crow Creek tribe after finding and confirming a new invasive crop weed.

**Results**
Participants of the South Dakota IPM Program have increased their knowledge of pest biology, disease identification, pesticide label interpretation, pesticide handling, and environmental factors. This leads to increased use of IPM practices and objective, science-based decision-making on reducing risks from pests and preventing unacceptable levels of pest damage in both agricultural and residential settings. The increased use of IPM practices results in better pest management decisions which address the economic aspects of pest management while posing the least possible risk to people, property, resources, and the environment. Through this program, professional agronomists receive the best up-to-date information available to advise their clientele. Producers are then able to make sound crop pest management decisions that are economically beneficial to their operations.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 216 | Integrated Pest Management Systems |

**Outcome #5**

**1. Outcome Measures**

Increase Oilseed Crop Knowledge and Productivity and Profitability

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

| Year | Actual |
|---|---|
| 2014 | 0 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
Oilseed crops are important to South Dakota, which is currently the second leading producer of sunflower and flax in the United States. With a unique environment for sunflower production, South Dakota can benefit from genetic material specifically developed for this region. Other oilseed crops such as camelina and Carinata show promise as feedstocks for the production of biodiesel or jet fuel.

**What has been done**
SDSU AES conducted research with USDA-ARS and other researchers on sunflower and other oilseed crops. The research sought to develop sunflower populations and lines that contain high yield, quality, and pest resistance, and make them available to the seed industry for development of South Dakota adapted varieties. The research also evaluated sunflower hybrid performance and alternative oilseed crops. Trial sites were planted in many locations throughout South Dakota.

**Results**
With superior genotypes of sunflower breeding lines selected, data were collected on seed yield, seed oil content, days to flower, plant height, lodging, disease incidence. Several lines resistant to the red sunflower seed weevil were developed through cooperative efforts with the USDA Sunflower Research Unit in Fargo, North Dakota. At least two of the lines will likely be released in 2015. Performance trials of commercial oilseed and confection sunflower hybrids were conducted at multiple sites and the results were made available to farmers through the iGrow teaching platform and an Extension bulletin. Oil extraction and economic analyses are in progress and will help to determine which alternative oilseeds have the greatest potential for production as biofuel feedstock crops.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 204 | Plant Product Quality and Utility (Preharvest) |
| 205 | Plant Management Systems |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |
| 212 | Diseases and Nematodes Affecting Plants |
| 213 | Weeds Affecting Plants |

## Outcome #6

### 1. Outcome Measures

Enhanced the Understanding of Biotic and Abiotic Stress Resistance in Crop Plants

### 2. Associated Institution Types

- 1862 Research

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

| Year | Actual |
|---|---|
| 2014 | 0 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
Stress is a major factor in limiting plant growth, development and crop productivity. The discovery of unique proteins in resistant cultivars is important for plant breeders to develop better crop plants. Improved crop tolerance plants are necessary to keep pace with future food demands.

**What has been done**
The screening of 14 imported germplasms of wheat along with five South Dakota local germplasms for drought and heat tolerance at physiological and genomic levels was completed. During physiological studies of wheat it was noticed that photosynthesis is the major activity at plant level that get affected with the limitation of water and high temperatures in susceptible germplasms compared to the resistant ones. By doing global proteomic experiments, several putative candidate genes were identified that play major roles in protecting the photosynthetic systems in the resistant germplasms. A protein-protein interaction network between these proteins by applying bioinformatics approach was established.

**Results**
With the completion of this project, a total of 100 genes were identified for drought, heat, and scab responses in economically important field crops. A goal was to enhance public understanding for science and to increase the interest for careers in science and technology. The results were disseminated to producers, students, faculty and other researchers. Peer reviewed journal articles, magazines, and presentations were all used to reach the public. Through this project, two students graduated in the agricultural sciences field.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 206 | Basic Plant Biology |

**Outcome #7**

**1. Outcome Measures**

Release Spring Wheat Cultivars

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 1 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
South Dakota's spring wheat producers desire cultivars that are adapted to a large geographic area, reliably produce high yields with little or no loss to disease or abiotic stress, and have acceptable test weight, protein levels, and other end-use qualities. Research in applied plant breeding methods is needed to develop and release cultivars that meet or exceed the expectations of South Dakota spring wheat producers.

**What has been done**
The SDSU spring wheat breeding and genetics program conducted applied and basic research focused on increasing grain yield and general agronomic performance potential of new spring wheat cultivars. This was carried out through utilizing South Dakota growing environments to select and advance promising experimental breeding populations and lines that possess increased yield potential and stability, elevated levels of disease and abiotic stress resistance, as well as increased end-use quality parameter values.

**Results**
An illustration of economic impact, which results from genetic gain, can be developed through comparing the performance of Focus with the performance one that was released previously. 'Briggs' was released by this program in 2002 and was very popular among growers for several years. Over all AYT locations during years 2012 through 2014, Focus produced approximately 2.7

more bushels of grain per acre than Briggs. At a market value of $5.00 per bushel, this equates to an advantage of $13.50 per acre that is available to growers that choose to plant this new cultivar as opposed to continually growing Briggs. Although Focus does consistently produce more grain than Briggs, it was largely released for its elevated levels of resistance to Fusarium head blight.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 202 | Plant Genetic Resources |
| 212 | Diseases and Nematodes Affecting Plants |

**Outcome #8**

**1. Outcome Measures**

Enhance Understanding of microRNAs Affecting Nodule Development in Soybeans

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Nitrogen is a major plant nutrient and a main component of chemical fertilizers for crops. A soybean plant that can produce more of its own nitrogen will require less fertilizer, which will lower production costs and reduce the potential for runoff. Studying nodule development in soybean, a major food, feed and potential biofuel crop is of high significance in modern U.S agriculture.

**What has been done**
During the last three years, SDSU researcher Senthil Subramanian and his team have identified nearly 150 microRNAs that may potentially affect nodule development. And they have documented how microRNA 160 affects nodule development. Last fall, Subramanian received a five-year National Science Foundation Faculty Early Career Development award for nearly $660,000 to support this work.

**Results**

A negative role for auxin in nodule development was identified via a regulatory circuit involving miR160 and its target ARF transcription factors. A hypothetical model was developed for its role during drought stress to regulate nodule formation.
A key role for local auxin and gibberellin biosynthesis during nodule formation was identified from the analysis of transcriptomics data. Functional validation of additional hypothesis is in progress.
Comparison of physiological and morphological parameters during colonization of soybean with rhizobia of varying efficiencies has identified early markers associated with partner selection.
Two graduate students and two undergraduates were trained in RNA-Seq analysis of global gene expression, designing loss and gain of function experiments, examination of nodule development, bioinformatics, and composite plant transformation. In addition, one of the undergraduates received training in fluorescence and confocal microscopy.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |

**Outcome #9**

**1. Outcome Measures**

Number of Citizen Science Volunteers

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 17 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Pollinators are necessary for fruit production and seed set in many home garden and agricultural crops. Bees are great pollinators, but there has been a decline in their population during the last half century. The disappearance of large numbers of honey bees in the mid-2000s, called colony collapse disorder, concerned both the bee-keeping industry and the general public. Populations of native bees are also at risk, due to habitat loss, disease, pesticide use, and other possibly unknown causes. Community engagement is needed to help increase local pollinator population

and diversity.

**What has been done**
The Backyard Biodiversity program uses citizen science (active involvement from everyday people) to improve awareness of pollinators, and create and conserve pollinator habitat. An observation protocol and data sheet was developed for participants. Training was provided on the data collection methods and basic insect identification through a series of webinar training sessions that were recorded for reference. The protocol focused on identifying broad groups of insects like butterflies, flies, beetles and bees.

**Results**
Seventeen volunteers submitted data for the project totaling more than 1400 insect observations. The volunteers were mostly Master Gardeners. The bee bowl collections were completed at 3 sites and resulted in more than 150 pinned insects that are awaiting identification. The most common bee bowl catches were flies and bees, with a few small butterflies and the occasional beetle. Due to the volume of specimens collected, the final identification data will be available in 2015.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |

**Outcome #10**

**1. Outcome Measures**

Number of Participants Completing Master Gardener Training

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Actual |
|---|---|
| 2014 | 72 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
High food costs and the lack of ability in small rural communities to obtain high quality fresh fruits and vegetables have led to the need for increased garden education. Schools, community

groups, the elderly, and service groups have requested information on basic gardening skills, assistance with starting gardens, and having basic garden questions answered. Home gardeners also want to know how to better take care of their yards and the plants growing in them.

**What has been done**
The Master Gardener program provides horticulture training to individuals who then volunteer in their communities; teaching neighbors, friends and others valuable gardening skills. Hands-on learning is an important part of the program, but the addition of online training allows more people to be reached, especially in remote locations. Seventy-two Master Gardeners completed the training and are now engaged in the volunteer service in their communities.

**Results**
Through the close partnership of SDSU Extension and Master Gardeners, citizens across South Dakota have access to public education that enables them to improve their health and lifestyle by growing nutritious foods. Adults and youth have gained confidence that their gardening skills are based on accurate, research-based information. By growing their own food, gardeners are saving money, eating fresher produce, and making their own decisions about pesticide use. During this reporting period, Master Gardeners volunteered over 12,700 hours, a value of approximately $241,800.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |

## V(H). Planned Program (External Factors)

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Public priorities
- Competing Programmatic Challenges

**Brief Explanation**

Western South Dakota experienced one its worst blizzards on record, killing an estimated 50,000 or more livestock. Valuable man-hours and resources had to be redirected for both livestock and non-livestock issues.

Salary and benefit increases have eroded the impact of federal funds, deferring vacancy fills in both SDSU Research and SDSU Extension.

Many of the research facilities at SDSU have exceeded their useful life and no longer accommodate the needs of the scientists in the Agricultural Experiment Station. Deferred maintenance and repair of facilities remain a serious limit to research, faculty recruiting and retention.

## V(I). Planned Program (Evaluation Studies)

## Evaluation Results

### Focus Wheat Cultivar

Even though it was largely released for its elevated resistance to Fusarium head blight, Focus produced approximately 2.7 more bushels of grain per acre than Briggs, which was released in 2002 and was very popular for several years. At a market value of $5.00 per bushel, this equates to an advantage of $13.50 per acre.

## Key Items of Evaluation

### Focus Wheat Cultivar

New cultivar Focus produced approximately 2.7 more bushels of grain per acre than Briggs, which was released in 2002. At a market value of $5.00 per bushel, this equates to an advantage of $13.50 per acre.