

**Kansas Soybean Commission**  
**March 7, 2012**  
**Report to the Kansas Senate**

Chairman Taddiken and members of the Kansas Senate Standing Committee on Agriculture:

I am Bob Haselwood from Berryton, chairman of the Kansas Soybean Commission and treasurer of the United Soybean Board.

The soybean checkoff continues to provide soybean farmers with an effective, efficient, self-directed program for research and development on both the state and national levels. Sixty-nine farmer-directors – including three Kansans – allocate our remittance and those of 30 other soybean-producing states at the national level. At the state level, nine soybean farmers volunteer their time to serve on the soybean commission to oversee the investment of checkoff funds in similar projects to benefit their industry.

The handouts include a copy of our latest marketing plan, which summarizes this fiscal year's program. A summary of our research also is in the handouts. Those priorities include best management practices, crop protection and pest management. We also fund a limited amount of research into new uses for soybeans and their derivatives.

Our international marketing efforts primarily are enacted through the International Grains Program at Kansas State University. We also work with export-marketing representatives within the Kansas Department of Commerce and the U.S. Soybean Export Council. Further, our international humanitarian projects, such as our collaborations with the World Initiative for Soy in Human Health, aim to improve people's nutrition and access to much-needed protein.

Our consumer-education program not only includes educating school children and the general public about convenient, healthful soyfoods, but it also promotes industrial soybean products like biodiesel and soy-based inks, adhesives, paints, stains, sealers and insulation.

Developed by the soybean checkoff and creating more than 5 times the energy used to produce it, biodiesel helps drive demand for U.S. soybeans and plays an important role in the nation's overall energy strategy. There is no more important issue to the biodiesel industry than a strong federal Renewable Fuel Standard, and our sister organization, the Kansas Soybean Association, is working to maintain the Environmental Protection Agency's proposed volume requirement of 1.28 billion gallons of biodiesel in 2013. Tax incentives make biodiesel more affordable; they are an integral part of sound public policy and another KSA concern.

Another domestic market priority is our serious commitment to protecting animal agriculture, which consumes about 98 percent of all soybean meal produced in the United States. We are working closely with Kansas animal, commodity and general farm organizations to educate Kansans about the social and economic importance of animal agriculture in our state and nationwide. In concert with the Kansas Soybean Association, the Kansas Animal Agriculture Coalition and the national Center for Food Integrity, we will take every step necessary to safeguard animal agriculture.

A copy of our redesigned *Soy Notes* newsletter, which is in the handouts, is but one example of our efforts to get the latest, most relevant information to our farmers. We recently have ventured into the social media, and you now can find us on Facebook, Twitter and YouTube.

Our administrative budget includes the cost of collections, audits, elections and other commission expenses. An outside, accredited accounting firm audits KSC's financial records each year, ensuring checkoff dollars are spent according to acceptable, efficient business practices. Our complete FY '11 audit is available at your request; and the handouts include our statements of net assets, statements of activities, statements of cash flows and schedules of program expenses from the last two audits. In addition, the United Soybean Board – the national checkoff organization – audits us every three years for compliance with U.S. Department of Agriculture regulations.

It has been my pleasure to share this brief synopsis of our program with you. Additional information, program details and project specifics are available at your request. Please accept the gratitude of the entire Kansas Soybean Commission and our state's soybean farmers – who generated nearly \$1.2 billion in farm receipts from the 2011 crop – for your continued support of our soybean checkoff because, as our new slogan goes, it is progress powered by Kansas farmers.

Bob Haselwood  
Berryton, Kansas

Kansas Soybean Commission  
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## **Kansas Soybean Commission FY2012 Marketing Plan**

The mission of the Kansas Soybean Commission is improving the profitability of Kansas's soybean producers. The Commissioners have identified the following priorities to work toward that mission:

1. Breeding/Production/Environmental Programs focusing on the most economical/efficient cropping systems with minimal impact on the environment including best management practices and crop protection/pest management; replacement of existing controls/seed treatments.
2. Animal/Human Nutrition studies that will increase the utilization of soybeans in the livestock feeding industry and new and innovative uses of soybeans as vital components in human nutrition.
3. Value-Added Projects developing and commercializing competitive industrial uses for soybeans including private entity cooperation.
4. Marketing Extension Program including extensive educational training of soybean pricing, crop disappearance/market share, crop insurance options, yield protection, farm program considerations and options in marketing available to Kansas soybean producers.
5. International market development with a focus on utilizing Kansas's soybeans.

In addition the Soybean Commission through its own work and through a contract with the Kansas Soybean Association promotes the nutritional benefits of using soybean products to consumers and because of its benefits to the environment, energy security and the farm economy, promotes the use of soy biodiesel as an alternative to diesel fuel. It also informs Kansas' soybean producers of their activities through producer communications efforts and participates in Industry Relations programs both state and nationally.

The Commission directly funds the following programs to reach their mission:

1. Kansas State University research and outreach:

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- Extension and Applied Research Programs for Kansas Soybean Production
  - Development of Soybean Host Plant Resistance and Other Management Options for the Soybean Stem Borer
  - Trait and Production Efficiency Enhancement in Soybean
  - Correction of Potassium Deficiency in Soybean Production in Kansas
  - Evaluation of Common Soybean Varieties in Southeast KS
  - Enhancement of Soybean through Genetic Engineering
  - Soy oil latex for pressure sensitive adhesives
  - Development of Farm Management Data Systems for Kansas Farmers
  - Keeping the Family Farming, Succession Planning Workshops for Kansas Farmers
  - Kansas Soybean Cyst Nematode Survey
  - Understanding soybean seed, seeding and root pathogens in Kansas
  - Improving yields of double crop soybean with starter and foliar fertilization
  - Evaluation of Soybean Inoculant Products and Techniques do Address Soybean Nodulation Problems in Kansas
  - Managing Glyphosate Resistant Kochia in Soybeans

2. Pittsburg State University research on:

- Soy-Based Polyester Polyols for Flexible Polyurethane Foams and Elastomers

3. The University of Kansas research on:
  - Biodiesel Glycerin Based Hydrogen Rich Fuel Gas Production for Electrical Generation from an Internal Combustion Engine
  - Determining the Impact of Biodiesel Age on Physical Properties and Engine Performance
4. Wichita State University
  - Understanding charcoal rot disease using a genetics approach
5. FAM Enterprises Inc.
  - Evaluating Whole Plant Health and Intensive Production Systems in Soybean
6. North Central Soybean Research Program
7. Ag in the Classroom, School Education Programs and state and county fairs
8. Youth Education Program
9. FFA program support
10. FACS education program
11. Biodiesel – Industrial Uses Advertising
  - Kansas State University Football Network
  - WIBW – Kansas University Sports
  - Others as approved by the commission
12. National Biodiesel Board/ Biodiesel
  - NBB Membership
  - State Regulatory Project
  - Securing Biodiesel Blends in Multi Product Pipelines
  - Advance Biofuel Initiative
  - Biodiesel Quality Assurance Support
  - MEG Regional Petroleum Outreach
13. Producer Radio, TV and Print Outreach
  - WIBW radio, Topeka
  - KRVN radio, Lexington, NE
  - KKOW radio, Pittsburg, KS
  - KFEQ radio, St. Joseph, MO
  - KFRM radio, Clay Center, KS
  - KBUF radio, Garden City, KS
  - AG am in Kansas on three TV stations in Kansas

Possible spot ads and other sponsorships:

  - Kansas Agricultural Network
  - Mid-America Ag Network
  - Agri-Talk Program at NBB Conference

Print Ads for specific promotions. Advertise to educate producers of soybean checkoff program sponsored by the KSC, *Straight Rows*. Work on earned media with *Kansas Farmer*, *High Plains Journal*, *Farm Talk*, *Midwest Producer* and *Grass and Grain*.
14. *Soynotes* Newsletter
15. Kansas Soybean Expo

16. No-till education including No-till On the Plains organization
17. Field Days, Farm/ Trade Shows, Crop Tours
18. International Market Development work
  - Kansas State University
    - International Grains Program
  - Karl Zhao, Kansas Department of Commerce, Chinese Consultant
  - WISHH Program
  - USSEC Latin American, Chinese, and Aquaculture Program work
  - AGP, Inc., Gray's Harbor Export Program
  - USAPEEC Expanding Poultry Exports to Mexico
  - US Meat Export Federation membership
19. Collection, meeting, administration and audit procedures
20. Program and administrative work by the Kansas Soybean Association  
(Attached projects including budgets for contracted and direct spending)
21. Leadership development and program management
22. First Purchaser Relations
  - Grain Grading Workshops
  - KGFA Annual meeting and trade show
  - KGFA meetings and golf outings
23. Soybean Production Yield Contest
24. USB Funded Cooperative Projects
25. Consumer Awareness Media Program
26. Soymeal Information Center

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27. Soy Aquaculture Alliance
28. US Farmer's & Rancher's Association

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KANSAS SOYBEAN COMMISSION

STATEMENTS OF NET ASSETS

June 30, 2011 and 2010

	<u>2011</u>	<u>2010</u>
<b>ASSETS</b>		
Current Assets		
Cash	\$ 5,094,424	\$ 3,415,698
Accounts receivable	3,363	19,493
Accounts receivable - KSA	-	<u>1,442</u>
Total Current Assets	<u>5,097,787</u>	<u>3,436,632</u>
Noncurrent assets		
Capital assets, net of accumulated depreciation	<u>1,569,483</u>	<u>1,685,961</u>
Total Assets	<u>6,667,270</u>	<u>5,122,594</u>
<b>LIABILITIES</b>		
Current Liabilities		
Accounts payable	436,703	187,496
Accounts payable - KSA	16,130	-
Current portion of long-term obligation	-	<u>2,600</u>
Total Current Liabilities	<u>452,833</u>	<u>190,096</u>
Long-term Liabilities		
Payable to American Soybean Association	<u>2,300</u>	<u>12,200</u>
Total Liabilities	<u>455,133</u>	<u>202,296</u>
<b>NET ASSETS</b>		
Invested in capital assets, net of related debt	1,569,483	1,685,961
Unrestricted:		
Designated	730,272	830,438
Undesignated	<u>3,912,382</u>	<u>2,403,899</u>
Total Net Assets	<u>\$ 6,212,137</u>	<u>\$ 4,920,298</u>

KANSAS SOYBEAN COMMISSION

STATEMENTS OF ACTIVITIES

For the years ended June 30, 2011 and 2010

	<u>2011</u>	<u>2010</u>
PROGRAM REVENUES		
Soybean assessments	\$ 8,159,747	\$ 7,546,696
Less:		
USB remittances	(3,972,747)	(3,664,444)
QSSB remittances	(207,205)	(210,834)
KDA collection fees	(3,261)	(3,846)
KDA first purchaser audits	(3,950)	(3,368)
Net assessments revenues	<u>3,972,584</u>	<u>3,664,204</u>
Program refunds	2,174	6,317
Interest income	27,643	10,238
Penalties	644	3,935
Grants	<u>42,363</u>	<u>120,329</u>
Total Revenues	4,045,408	3,805,023
PROGRAM EXPENSES		
Projects:		
Research	1,009,229	1,069,773
Other	1,446,006	943,132
Supportive Services:		
Administration	<u>297,932</u>	<u>242,330</u>
Total Program Expenses	<u>2,753,167</u>	<u>2,255,235</u>
Program Income	1,292,241	1,549,788
NONPROGRAM INCOME AND EXPENSES		
Other expense	(403)	-
Gain on sale of fixed assets	<u>-</u>	<u>937</u>
Net Other Income (Expenses)	<u>(403)</u>	<u>937</u>
Change in Net Assets	1,291,839	1,550,725
NET ASSETS, beginning of year	<u>4,920,298</u>	<u>3,369,573</u>
NET ASSETS, end of year	<u>\$ 6,212,137</u>	<u>\$ 4,920,298</u>



KANSAS SOYBEAN COMMISSION

STATEMENTS OF CASH FLOWS

For the years ended June 30, 2011 and 2010

	<u>2011</u>	<u>2010</u>
<b>CASH FLOWS FROM OPERATING ACTIVITIES</b>		
Cash received from checkoff	\$ 8,159,747	\$ 7,546,696
Cash received from others	62,751	107,080
Cash payments to suppliers for goods and services	(6,555,088)	(6,319,334)
Interest received	27,643	10,238
Net Cash Provided by Operating Activities	<u>1,695,053</u>	<u>1,344,680</u>
<b>CASH FLOWS FROM CAPITAL AND RELATED FINANCING ACTIVITIES</b>		
Payments for capital acquisitions	(3,827)	(1,384,131)
Proceeds from sale of capital assets	-	22,050
Change in long-term obligation	(12,500)	-
Net Cash Used by Capital and Related Financing Activities	<u>(16,327)</u>	<u>(1,362,081)</u>
NET CHANGE IN CASH	1,678,726	(17,401)
CASH, beginning of year	<u>3,415,698</u>	<u>3,433,099</u>
CASH, end of year	<u>\$ 5,094,424</u>	<u>\$ 3,415,698</u>

Reconciliation of Operating Income to Net Cash Provided by Operating Activities

Change in Net Assets	\$ 1,291,839	\$ 1,550,725
Adjustments to Reconcile Change in Net Assets to Net Cash Provided by Operating Activities:		
Depreciation	120,307	58,827
Change in assets and liabilities:		
(Increase) decrease in accounts receivable	17,570	(2,123)
Increase (decrease) in accounts payable	265,337	(262,749)
Net Cash Provided by Operating Activities	<u>\$ 1,695,053</u>	<u>\$ 1,344,680</u>

KANSAS SOYBEAN COMMISSION  
SCHEDULES OF PROGRAM EXPENSES

For the years ended June 30, 2011 and 2010

	<u>2011</u>	<u>2010</u>
<b>Research Program Expenses:</b>		
Kansas State University	\$ 725,125	\$ 649,256
Pittsburg State University	6,725	128,461
No Till on the Plains	15,000	15,000
WSU Research	29,306	28,745
North Central Soybean Research Program	100,000	100,000
Kansas University	73,649	69,814
Renewable Solutions, LLC	49,795	43,000
FAM Enterprises	3,000	-
Ohio Soybean Council	5,000	-
Refunded research funds	-	22,315
Miscellaneous research expenses	1,629	13,182
	<u>\$ 1,009,229</u>	<u>\$ 1,069,773</u>
<b>Total Research Program Expenses</b>		
<b>Other Program Expenses:</b>		
International market development	\$ 443,896	\$ 274,837
Consumer information	120,369	106,760
Youth education program	44,388	33,268
Consumer awareness	30,000	25,000
Biodiesel	263,835	127,748
Industrial uses market development	26,219	19,591
Industry information & relations	150,510	110,330
Producer communications	366,789	245,598
	<u>\$ 1,446,006</u>	<u>\$ 943,132</u>
<b>Total Other Program Expenses</b>		
<b>Administrative Support Services:</b>		
Kansas Soybean Association administrative contract fees	\$ 165,045	\$ 154,945
Contracted administration	710	628
Meeting expenses	6,776	8,323
Depreciation	111,215	40,018
Election costs	1,406	1,133
Professional services - audits	10,215	9,075
Legal & professional services	-	4,246
Postage	1,000	1,027
Office supplies	1,565	22,935
	<u>\$ 297,932</u>	<u>\$ 242,330</u>
<b>Total Administrative Support Services</b>		

## Kansas Soybean Commission

**Development of genetic and chemical tactics for management of the *Decetes* stem borer in soybean;** *Lawrent Buschman, C. Michael Smith, Brian McCornack, William Schapaugh and Jeff Whitworth (Kansas State University); (\$56,065). (lbuschma@ksu.edu)*

**Key Words:** Decetes Stem Borer, Soybean Germplasm Screening, Soybean Variety Testing, Soybean Insect Control, Soybean Educational Activities

The occurrence of the *Decetes* stem borer, *Decetes texanus*, is increasing in parts of Kansas. However, the reason for this expansion is not known but may be attributed to the availability of alternate hosts, winter survival and other environmental factors. The *Decetes* stem borer has been known to cause severe lodging problems to soybeans in Kansas, especially in the north-central and southwestern parts of the state. Infestations of 50 to 80 % plants with tunneling are common in some fields. Such infestations can cause significant harvesting problems or yield losses due to the lodged plants.

The objective of this project is to:

- Refine methods necessary to determine the genetics of *Decetes* resistance in soybean PI 165673;
- Evaluate the efficacy of fipronil and other chemicals and the yield response of soybean to *Decetes* stem borer feeding to support Section 18 registration;
- Evaluate the impact of alternate hosts and other environmental factors on *Decetes* stem borer infestations in soybean; and
- Expand web pages and other educational materials associated with soybean insect pests.

The proposed studies should successfully improve soybean *Decetes* resistance evaluation protocols and successfully map gene(s) in soybean PI165673 controlling resistance to *Decetes* stem borer larvae. They will use molecular markers linked to these genes to develop a marker-based protocol for accurate, precise screening of progeny from crosses involving PI165673. In future collaborations with co-PI Schapaugh (beyond the scope of this proposal) they will use these methods to develop Kansas varieties with *Decetes* larval resistance.

The proposed studies are expected to lead to improved crop protection/best management practices that suppress losses caused by this pest. They have demonstrated that aerial and systemic insecticide can be used to manage the pest in small-scale research plots. However, effective systemic insecticides are not currently registered for producer use on soybeans. They will be collecting additional efficacy data and pest occurrence information so they can pursue registration of effective insecticides on soybeans.

**Biodiesel glycerin based hydrogen rich fuel gas production for electrical generation from an internal combustion engine;** *Christopher Depcik and Susan Williams (Kansas University); (\$50,890), (depcik@uk.edu)*

**Key Words:** Glycerol Use, Biodiesel

Preliminary studies at Kansas University have shown that augmenting air intake of diesel engines running on biodiesel with the synthetic gas out of the reformer can drastically reduce fuel consumption of a diesel engine. THz could offer a second use for crude glycerin/glycerol at the biodiesel production facility. Instead of installing an engine generator system at the biodiesel production plant, a diesel generation could be installed to power the plant with a glycerin reformer augmenting the air intake. The objective of this project would be to continue the laboratory efforts to investigate the use of syngas-augmented biodiesel combustion to demonstrate fuel economy gains and potential emission reduction.

**Kansas soybean cyst nematode survey;** *Douglas J. Jardine, Tim C. Todd, Stewart R. Duncan and Douglas Shoup (Kansas State University); (\$9,320). (djardine@ksu.edu)*

*Key Word:* Soybean Cyst Nematode-Survey

This project will conduct a statewide soil survey for soybean cyst nematode and to determine the severity of the pest. It will determine the HG type of those fields testing positive. Results will be delivered through a large variety of outlets which include local, regional, and statewide meetings, newsletters, Extension publications, and the internet.

**Understanding soybean seed, seedling, and root pathogens in Kansas;** *Christopher R. Little and Timothy C. Todd (Kansas State University); (\$35,829). (crlittle@ksu.edu)*

*Key Words:* Fungal Pathogens, Fusarium Species, Soybean Fungicide Studies, Soybean Seed Treatments, Soybean Cyst Nematode-Disease Interactions

From 1997-2008, the estimated reduction of soybean yields in Kansas have averaged 2.7 million bu/yr for seedling blights, 6.2 million bu/yr for charcoal rot, and more than 2.4 million bu/yr for other root diseases (including SCN, SDS, *Phytophthora* and *Fusarium* root rots). To reduce these annual losses, the research team plans to:

- Determine the identity of soil- and seedborne *Fusarium* spp. of soybeans in Kansas;
- Evaluate the pathogenicity of soil- and seedborne *Fusarium* spp. upon commonly grown soybean varieties;
- Determine sensitivity and resistance of *Fusarium* pathogens to biologicals and compare with commercial seed treatment fungicides; and
- Examine the interactions between seedling (*Fusarium*, *Pythium ultimum*, and *Rhizoctonia solani*) and root pathogens (*Macrophomina phaseolina*, *Fusarium virguliforme*, and *Heterodera glycines*).

**Evaluating whole plant health and intensive production systems in soybean;** *James Long (Kansas State University); (\$5,000). (jrml@ksu.edu)*

*Key Words:* Environmental Studies, Best Management Practices, Soybean On-farm Research Soybean Production Management Systems, Soybean Educational Activities

This project will develop provide information on the use of whole plant health, intensive farming techniques, and best management practices (BMPs) on soybean in Kansas. Whole plant health efforts will target most serious diseases, such as charcoal rot, first then build higher yield levels using BMPs gleaned from maximum yield studies that start at high yield levels and use those production practices that are most cost efficient. This project will then take research findings to the field in simple strip plots to adjust them to real-world situations and speed acceptance in the farm community.

The objectives for this project are to:

- Evaluate varying levels of seed treatment and foliar treatments of fungicides and insecticides;
- Work with industry to develop novel or more useful field assessment methods of treatments on plant stand, plant growth and development, and yield component;

- Determine the maximum yield potential of soybean. This will involve using all best management practices as well as some novel approaches learned from area farmers to see if the yield envelope can be pushed higher; and
- Take what we have learned in the three-year study and apply it on farmer fields using simple check versus best treatment strip plots. This is very similar to strip tests done with weigh wagons that farmers are now used to. Some of the best research information scientists can gather comes after the data are applied to the farm.

**Correction of potassium (K) deficiency in soybean production in Kansas;** *David B. Mengel and Dorivar Ruiz Diaz (Kansas State University); (\$30,750). ([dmengel@ksu.edu](mailto:dmengel@ksu.edu))*

*Key Words:* Potassium (K), Soil Fertility Studies

Potassium is a mineral that is often deficient in Kansas soils. This study is directed at developing information on the scope of the problems and solutions needed to maximize soybean yields in Kansas. This project was initiated in 2009 on cooperating farmer's fields in Southeast Kansas. The initial project plan involved establishing K response trials with soybeans on soils varying in K soil test levels and monitoring soybean response to applied K in the year the plot was established. In addition, K soil tests for the control and highest applied rate of K were monitored regularly from initial site selection to date.

The proposed plan for FY12 is to:

- Continue to monitor changes in soil test levels in all of the plots established in 2009, 2010 and 2011, with the goal of determining if and when K availability changes during the growing season, and how much;
- Determine the response of the rotational corn in 2011 on plots established in 2010, to both the residual effects from K applied in 2010 and "Nutrient Sufficiency" based annual K applications in 2011;
- Identify the mechanism(s) driving changes in soil test K levels and K availability to crops, document when these changes occur during the growing season and the extent of these changes; and
- Use this information to develop more effective K management strategies; identify a soil sampling system which will identify soils prone to changes in K availability, identify how low the soil test/availability is likely to be driven and develop alternative K fertilizer recommendation strategies to prevent yield impacts from reduced soil K availability.

**Securing biodiesel blends in multi product pipeline;** *Dough Whitehead, Steve Howell and Paul Nazzaro (National Biodiesel Board); (\$40,000). ([dwhitehead@biodiesel.org](mailto:dwhitehead@biodiesel.org))*

*Key Word:* Biodiesel

This continuing project addresses the technical and regulatory barriers to the transport of biodiesel blends in US pipelines. Pipeline transport of biodiesel can result in savings of as much as 20 cents per gallon compared to current truck, rail and barge transport, while improving the overall environmental footprint of using biodiesel. This savings will help to solidify biodiesel's role as a cost effective means for refiners and other obligated parties to meet the upcoming Renewable Fuel Standard.

**Bioheat: Data to secure ASTM standards and UL approval for biodiesel blends in existing equipment;** *Doug Whitehead, Steve Howell and Paul Nazzaro (The National Biodiesel Board and Advanced Fuel Solutions); (\$40,000). ([dwhitehead@biodiesel.org](mailto:dwhitehead@biodiesel.org))*

*Key Words:* Biodiesel, Soybean Oil-Utilization

Biodiesel is predominantly produced from domestic soybean oil in the US. As a soybean growing state, Kansas will have a direct benefit from the increase in biodiesel use. According to a recent study by the independent consulting group, Centrec, biodiesel volumes provide a long term estimated impact of an additional 25 cents per bushel for soybeans in the US market.

Heating oil is a promising new market for biodiesel. Traditionally, volumes of biodiesel sales decrease in the winter time, and this provides an opportunity for winter biodiesel sales. In addition, biodiesel has been shown to reduce NOx in open flame applications such as heating oil while maintaining the HC, CO and Particulate Matter (black smoke) benefits associated with use in on/off road diesel engines. It also has the significant advantage of being fully embraced by the petroleum heating oil dealers as a major competitive strategy to protect oil heat market share from further erosion by natural gas.

The objectives of this project are to address the technical and regulatory barriers in the use of blends over B5 in home heating oil. This will create a new potential winter market for biodiesel.

**Biodiesel quality assurance support:** *Doug Whitehead, Steve Howell, Kyle Anderson (National Biodiesel Board (NBB); (\$30,000). ([dwhitehead@biodiesel.org](mailto:dwhitehead@biodiesel.org))*

*Key Word:* Biodiesel

Biodiesel customers, diesel engine companies, and diesel vehicle manufacturers all want fuel that is trouble free. While conventional petrodiesel is not without its own set of cold flow, storage and handling issues, since biodiesel is still relatively new any fuel quality issue is immediately blamed on the presence of biodiesel—whether the problem is biodiesel or one of the normal petrodiesel issues. In recent times, mandates have been temporarily halted due to out of specification biodiesel being found in the market. OEM's and users alike have encouraged the biodiesel industry and the NBB to implement a strong emphasis on quality and meeting the ASTM specifications. In addition, as new information is produced about biodiesel use in diesel engines, the ASTM specification we currently have must be constantly updated to take into account un-anticipated issues with new diesel engine technologies and the still relatively new Ultra Low Sulfur Diesel used in these new engine technologies. This project will provide resources to support the BQ-9000 quality program and other key trade association quality assurance functions that have been demanded by customers and the diesel engine community if they are to fully accept and support biodiesel without reservation.

**Industrial uses of high oleic soybean oil;** *Tom Fontana (Ohio Soybean Council) and Barry McGraw (Battelle); (\$50,000). ([tfontana@soyohio.org](mailto:tfontana@soyohio.org))*

*Key Word:* Soybean Oil-Industrial Use

The potential of this project is to develop differentiated, value-added industrial products due to the unique attributes of this soybean oil variety. The initial phase of this research program seeks to identify the industrial opportunities for high oleic soybean oil based on the technical and economic merits of the concepts. Subsequent phases will continue the development of the technologies and facilitate the

commercialization of those technologies with licensees. The principle objective is to increase the demand and market value of soybeans by developing new industrial uses enabled by the specific characteristics of high oleic soybeans. Several application areas are expected to benefit from this composition including biobased lubricants, oleochemical feedstocks, monomers for plastics, and specialty surfactants.

**Evaluation of soybean inoculant products and techniques to address soybean nodulation problems in Kansas;** *Charles Rice, Kraig Roozeboom and Brian Olson; (Kansas State University); (\$23,685). (kraig@ksu.edu)*

*Key Words:* Nitrogen Fixation, Soybean Nodulation

In recent years, an increasing number of questions have come to the Department of Agronomy dealing with nodulation problems in soybeans. Usually the problems are on land that had either not been in soybeans before or had been out of soybean production for 10 years or more due to the Conservation Reserve Program (CRP). In almost every case, the soybean seed had been inoculated according to standard procedures or based on seed company or inoculant supplier recommendations. Often field or environmental conditions (e.g. compaction, tillage, soil moisture) seemed to influence the degree of nodulation, but no systematic pattern was evident.

The objectives of this study is to evaluate existing products and techniques in several environments to identify ways to adjust inoculation and/or planting practices for different field situations that will increase nodulation success and improve soybean yields.

**Extension and applied research programs for Kansas soybean production;** *Kraig Roozeboom (Kansas State University); (\$5,379). (kraig@ksu.edu)*

*Key Words:* Soybean Production Management Systems, Soybean Educational Activities, Best Management Practices

The funding will be used to support Extension and applied research programs in Kansas. Effective extension programming in soybean production and cropping systems includes an array of activities across Kansas. Awareness of local issues, communication with agents and producers, and site visits to address specific production issues requires extensive in-state travel. Presentations at crop schools, soybean plot tours, experiment field and research center field days, and training sessions deal with all aspects of soybean production. Existing documents must be updated and new publications may need to be developed to address emerging issues.

The effort involves collaborations with off-campus faculty, including county agents, provide local oversight. Results from these studies are summarized, interpreted, and disseminated as part of the overall outreach program and in specific venues tailored to address specific issues. Refereed journal articles and presentations at professional meetings are pursued as appropriate to facilitate wider distribution..

Professional development and subject matter proficiency require participation in meetings of appropriate professional societies, commodity groups, government agencies, and the like. These meetings provide updates in current research results, policy developments, and educational programming. Activities include attendance, presentations, networking with other research, extension, and industry professionals, and service in professional societies.

**Improving yields of double crop soybean with starter and foliar fertilization;** *Dorivar Ruiz Diaz, Doug Shoup, Stu Duncan and Kent Martin (Kansas State University); (\$31,909).* ([ruizdiaz@ksu.edu](mailto:ruizdiaz@ksu.edu))

*Key Word:* Soybean Fertility Studies

Nutrient availability is highest when fertilizer is applied just prior to soybean needs. However, particularly under double crop system, fertilizer is usually applied before wheat for both crops. A good wheat crop can take up more nutrients than expected, often leaving soybeans short of nutrients and limiting soybean yields. Wheat and soybeans have different nutrient requirements and grow under different soil conditions, and fertilization of each crop separately may be beneficial and increase yields. Soil fertility research on double crop soybean after wheat is limited, and most studies focus on regular full season soybean. Producers question about possible differences in nutrient requirements, and specific nutrients that may be particularly important under double crop system compared to full season.

Information is also needed to provide data to evaluate current fertilization recommendations in Kansas. With uncertainty in fertilizer prices and with increasing average crop yields, Kansas soybean producers can maximize profits by identifying situations where fertilizer should or should not be applied.

The specific objectives of this project are to:

- Determine fertilization requirements for soybean growth under double crop systems after wheat as compared to full season soybean including nutrient uptake and yield;
- Assessment of soybean grain yield and early growth response to starter application of NPK, Sulfur, and micronutrients (Zn, Mn, Fe), and compare responses with and without additional foliar fertilizer application;
- Verify potential soil parameters that could be related to responses to starter and foliar applied macro and micronutrients; and
- Determine if foliar applied fertilizers can maximize yields and increase nutrient use efficiency when combined with starter applied fertilizers.

**Trait and production efficiency enhancement in soybean;** *Bill Schapaugh, Tim Todd, Harold Trick and Kelly Kusel (Kansas State University); (\$285,764).* ([wts@ksu.edu](mailto:wts@ksu.edu))

*Key Words:* Soybean Breeding, Soybean Breeding-Composition, Dectes Stem Borer, Soybean Breeding-Disease Resistance, Charcoal Rot, Sudden Death Syndrome (SDS)

The soybean breeding project will develop high yielding, multiple pest resistant varieties; special purpose varieties for use in food, feed or industrial products; germplasm with specific disease and insect resistance; and lines with improved oil quality. The breeding targets are increased seed yield under dryland and irrigated production systems; seed composition disease and insect resistance (soybean cyst nematode (SCN), soybean sudden death syndrome (SDS), *Dectes* stem borer, soybean aphid and soybean rust).

The researchers are involved in incorporating transgenic events into elite breeding lines, mapping resistance genes for the soybean aphid, and improving selection efficiency in breeding for specific traits.

**Soybean response to fungicide and insecticides;** *Doug Shoup and Stu Duncan (Kansas State University); (\$10,000).* ([dshoup@ksu.edu](mailto:dshoup@ksu.edu))



*Key Words:* Soybean Insect-Management, Soybean Fungicide Studies

Increasing commodity prices are causing producers to consider including seed or foliar fungicide and insecticides into their soybean production system. During grower meetings and personal interaction, we continue to get questioned on the yield benefit to adding these potentially expensive inputs into soybean production. There has been a fair amount of data collected in Kansas on the use of fungicides and insecticides and their impact on yield and, in general, if the pest is present these additional inputs are beneficial.

The goal of this project is to evaluate fungicides and insecticides on soybean yield throughout Eastern and Southeast Kansas. The specific objectives are to:

- Evaluate control of soybean insect and disease pests and its impact on soybean yield with combinations of seed and foliar applications of fungicides and insecticides; and
- Educate producers on potential value of soybean fungicides and insecticides and their best management practices.

**Development of farm management data systems for Kansas farmers;** *Bryan Schurle, Kevin Herbel and Michael Langemeier (Kansas State University); (\$15,000). ([bschurle@ksu.edu](mailto:bschurle@ksu.edu))*

*Key Words:* Soybean Production Management Systems, Soybean Educational Activities

The objective of this project is to develop new database systems for farm management data for Kansas farmers. Specifically, they intend to:

- Develop a new data collection system that collects farm management data in a similar fashion to the system currently in place, but with vastly superior flexibility in data handling ability and report writing capacity;
- Develop a new report writing system that improves readability by utilizing graphs and charts for comparison purposes; and
- Develop new and improved benchmarks for enterprises and whole farm analyses.

**Understand charcoal rot disease using a genetics approach;** *Bin Shuai (Wichita State University); (\$31,611). ([bin.shuai@wichita.edu](mailto:bin.shuai@wichita.edu))*

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*Key Word:* Charcoal Rot

In Kansas, the crop most affected by charcoal rot is soybeans, especially in southeast and east central Kansas. Currently, there are no soybean strains that have been identified that are resistant to the pathogen and there are no other effective methods available for control the disease. The host-pathogen interaction has not been studied at the molecular level, making genetic engineering an impossible strategy at the present time.

The research goal of this project is to better understand the molecular mechanism of the charcoal rot disease *Medicago* as the model. The researchers will:

- Continue genetic screens in Tnt1 insertion mutant lines to isolate mutants with altered susceptibility in *M. phaseolina*;
- Identify genes and pathways that are involved in host-pathogen interaction; and
- Study the cell biology of the infection process using inverted microscope and confocal microscope

**Managing glyphosate-resistant kochia in soybeans;** Phillip Stahlman, Dallas Pederson, Danile O'Brian and Curtis Thompson (Kansas State University); (\$22,425). ([Stahlman@ksu.edu](mailto:Stahlman@ksu.edu))

*Key Words:* Weed Control-Herbicide Resistance, Weed Control

The research will evaluate the efficacy and comparative costs of alternative herbicide options for the management of glyphosate-resistant kochia in soybeans. Specifically, the research will:

- Compare the season-long weed control effectiveness of several alternative herbicide treatments versus a common standard treatment of two in-crop applications of glyphosate plus non-ionic surfactant and ammonium sulfate;
- Compare the season-long effectiveness of weed management tactics implemented by each cooperating grower (his/her choice) versus one or two management practices recommended by K-State weed scientists; and
- Compare the economics of the alternative herbicide treatments with the standard treatment in objective 1, and of the grower implemented tactics versus tactics recommended by K-State weed scientists in objective 2.

**Enhancement of soybean through genetic engineering;** Harold Trick, William Schapaugh and Tim Todd (Kansas State University); (\$75,914). ([hnt@ksu.edu](mailto:hnt@ksu.edu))

*Key Words:* Soybean Bioengineering, Genetically Engineered Soybeans, Virus-Induced Gene Silencing

This project will continue to produce and evaluate genetically engineered soybeans for increased fungal resistance. Use gene silencing (RNAi) to enhance Soybean Cyst Nematode (SCN) resistance in transgenic soybean. Produce phenylalanine-free corn protein in transgenic soybean to produce a nutraceutical (value-added) trait that may open new markets for Kansas' soybeans.

The specific objectives of this study are to:

- Field test of transgenic lines with increased SCN resistance;
- Enhance soybean cyst nematode (SCN) resistance in transgenic soybean by modifying current RNAi strategies;
- Test the effectiveness of RNAi for root knot nematode resistance using RKN genes homologous to effective SCN genes; and
- Continue to produce and evaluate genetically engineered soybean for increased fungal

**Soy-based polyester polyols for flexible polyurethane foams and elastomers;** Mihail Ionescu and Henry Emadipour (Pittsburg State University); (\$50,000). ([hemadipeu@pittstate.edu](mailto:hemadipeu@pittstate.edu))

*Key Words:* Industrial Uses, Soy-based Foams

When vegetable oil polyols are made, hydroxyl (OH) groups are introduced in the position of double bonds. This produces products of molecular weight amount 1,000, suitable for rigid and semi-rigid polyurethanes. For flexible application (flexible foams, elastomers and sealants) the requested molecular weights of polyols are 3,000-6,000. Increasing molecular weights can be done by alkoxylation or esterification. Alkoxylation requires changes to industry plants, toxin gases, and additional investment.

The objectives of this project are to develop new types of polyols for flexible polyurethane foams elastomers and sealants. The specific objectives are to:

- Prepare soy polyols by ring opening of epoxidized soybean oils;
- Esterification of soy polyols with fatty acids, diols and lactides;
- Prepare and test flexible foams; and
- Prepare and test elastomers.

**Determining the impact of biodiesel age on physical properties and engine performance;** *Susan Stagg-Williams (University of Kansas); (\$49,170). (swilliams@ku.edu)*

*Key Word:* Biodiesel

Biodiesel continues to be consumed in larger quantities and utilized in more diverse applications as shown by the more than 3 billion gallons produced worldwide on an annual basis. The standards that describe what can be considered biodiesel continue to evolve as well. It is critically important that these standards, which are mostly composed of physical property testing, continue to be closely linked to actual engine performance. One major issue that remains an open area of research is the viscosity of biodiesel and biodiesel blends as they become subjected to ever greater pressures in modern fuel injector applications. Current fuel injection systems for compression ignition (diesel) engines reach pressures approaching 1600 and 1400 atmospheres for passenger car and commercial vehicle systems respectively. Future systems are targeting even higher pressures in excess of 2000 atmospheres. Under these pressures, the liquid viscosity of the fuel can increase up to approximately ten times what may be expected under ambient atmospheric levels. Upon injection of the fuel in the cylinder, the large de-pressurization of the fuel results in a significant range of the viscous properties of the fluid. Thus, a proper understanding of the effect of pressure and temperature on the viscosity is required in order to optimize performance while minimizing emissions.

Another important issue is accurately measuring the stability of fuel. Studies have shown that some of the physical properties of biodiesel can change up to 20% as the biodiesel ages. It is generally acknowledged that the shelf life of biodiesel fuel is approximately six months. However; no simple tests to assess fuel quality are readily available to producers or consumers. The majority of the tests require complicated and expensive ASTM testing equipment. Furthermore, it is unclear that this six month shelf life, which may be loosely correlated to changes in physical properties, is a good indicator of when engine performance begins to be affected. Thus, systematic studies on the effect of biodiesel age on the ASTM properties, high pressure viscosity, and engine performance need to be completed and less expensive more practical methods for determining biofuel stability need to be developed.

During the first year of this proposed project, the impact of fuel age on the physical properties including high pressure viscosity of soybean based biodiesel and biodiesel blends will be investigated. During this time, alternative methods of monitoring biofuel quality will be evaluated to determine the relationship between the quick assessment and ASTM physical property tests. The second year of the project will then attempt to correlate any observed changes in the physical properties with changes in engine performance to determine a more accurate shelf life of soybean based biodiesel.

The specific objectives for this continuing project are:

- Prepare soybean based biodiesel and biodiesel/diesel blends up to B20;
- Complete ASTM physical property and high pressure viscosity testing of biodiesel and biodiesel blends every 2 weeks for the first two months, followed by monthly testing for the remainder of the first year of the proposal; and
- Determine the feasibility of using quick assessment tests to predict fuel age.

**North Central Soybean Research Program; (\$200,000).**

