Black Carbon Initiative Scientific Exchange

FINAL REPORT

Visiting Scholars: Sofya Solovyeva and Artem Solopov

Kansas State University
January-March 2012

United States Department of State
Kansas State University - Lomonosov Moscow State University
Russian Engineering Academy of Management and Agribusiness

Cover Photo: Jim Shryoer.
All other photos are attributable to Carol Blocksome except where noted.

Overview and Expectations

Kansas State University hosted the Scientific Exchange in order to broaden our understanding of Russian agriculture, discover topics of mutual interest for further collaboration, and to understand more fully the international implications of black carbon deposition in the Arctic. Motivation for hosting this Exchange was provided by the similarities between Russian and Kansas agricultural crops and agricultural production methods, specifically wheat production and agricultural burning.

Farm visits provided the visiting scholars with first-hand knowledge of United States of America farming practices. Photo: Jim Shroyer.

The Exchange provided K-State mentors with a much clearer understanding of the challenges facing Russian agricultural producers, and the need for better technology transfer, such as the United States model for the Agricultural Extension Service. Existing continuing education programs at K-State, such as the grain science certification program, may be applicable and adaptable for Russian grain industry professionals. Perhaps the greatest value to K-State was an expanded knowledge of agriculture in a global context and the possibility of ongoing collaboration through contacts made during the exchange and follow-up visit.

Numerous K-State staff was involved in the exchange, providing a wide range of expertise. A listing of those who were consulted by Artem Solopov during his visit is in the attached spreadsheet. In addition to K-State staff, numerous contacts were made with other natural resource professionals, including farmers, federal agricultural program staff, and agricultural industry representatives.

Mentors and principle staff for this project were: Dr. Dan Devlin, PI; Dr. Jim Shroyer, Dr. Michael Langemier, Dr. Nina Lilja, Dr. Carol Blocksome, Dr. Aleksey Sheshukov and Randy Griffith.

Scholarship Background

Artem Solopov
Russian Engineering Academy of Management and Agribusiness

Dr. Jim Shroyer and Dr. Carol Blocksome, both in the Dept. of Agronomy at K-State, were primary mentors for Artem Solopov.

Dr. Carol Blocksome arranged numerous meetings with K-State staff on topics ranging from how media is used to further Extension messages to delineation of extent of burning from satellite images. In addition, she arranged several field trips, a farm visit, telephone calls to distant experts, and participation in several conferences and workshops.

Dr. Blocksome spent an extensive amount of time traveling with Artem and invited him to her family farm for a weekend visit. She interacted with Artem on a daily basis either by email or in person.

Jim Shroyer arranged several meetings with K-State staff on no-till and bioenergy. He also arranged and facilitated at four focus group meetings on use and non-use of wheat stubble burning as a management practice.

A detailed list of activities, with dates, and locations, is attached to this report. Research objectives delineated by Artem Solopov are followed by activities and consultations related to that topic. All locations are in Kansas except where noted. Initials of mentor arranging the activity are at right hand edge.

A farm visit in western Kansas gave Artem the opportunity to discuss with a young farmer, Eric Weeks, the sources of information he uses to remain updated on farming practices.

Mike Holder, Flint Hills Extension district agent, discusses how rural fire departments work with landowners who are conducting prescribed burning to ensure community safety.

David Criswell, builder, and duplex resident give Artem a tour of a straw bale house. The framed area to the right of the door offers a glimpse into the wall, showing the straw.

Artem dons a hard hat prior to touring the ICM plant in St. Joseph, Missouri. This cellulosic ethanol plant is run in conjunciton with a traditional grain ethanol plant, increasing the production efficiency of cellulosic ethanol production.

Using a drip torch, Artem participates in a demonstration burn hosted by the Shawnee County Fire Department. The burn demonstrated safety techniques in preparing for and executing a prescribed burn. Photo: Alkesey Sheshukov

Artem Solopov
Russian Engineering Academy of Management and Agribusiness

Objective 1. To learn of USA domestic policy towards agricultural grassland fires: laws, their implementation, fines and soon. Goal on this issue is to learn federal and local legislation in both unsuccessful states which use agricultural fires and successful which don't use them.

Feb. 24	**Smoke Monitoring and Regulation**			Field Trip
	Tom Gross, Doug Watson	Kansas Dept. of Health and Environment, Bureau of Air	Topeka	CB
Mar. 5	**You May Hide the Fire, But What About the Smoke? Public Perception and Regulation of Prescribed Burning and Smoke**			Lecture
	Carol Blocksome	Kansas State University, Dept. of Agronomy	Manhattan	CB

Objective 2. To learn Dr. Tami Bond's or any other black carbon researcher's experience to figure out means of geographically localizing black carbon emissions. This work can help to find Russia's most dangerous regions to concentrate our anti-fires efforts upon.

Feb. 10	**Detecting biomass with remote sensing**			Consultation
	Kevin Price, Nan An	Kansas State University, Dept. of Agronomy	Manhattan	CB
Feb. 14	**Black carbon in the U.S.**			Consultation
	Larry Erikson	Kansas State University, Dept. of Chemical Eng.	Manhattan	CB
Feb. 10	**Mapping burnt acres from satellite imagery**			Consultation
	Rhett Mohler	Kansas State University, Dept. of Geography	Manhattan	CB

Objective 3. To learn farmer's educational processes. We want to understand where do farmers educate and how training courses about harm of agricultural grassland fires are being designed and taught. Main goal is to understand American learning and methodological ways of working with farmers to adopt and to use them on Russian farmers.

Jan. 21	**Kansas Grazers' Association Annual Conference**		Conference
		Emporia	CB
Jan. 24	**No-Till On the Plains**		Conference
		Salina	JS
Jan. 26-27	**Kansas Natural Resources Conference**		Conference
		Wichita	CB

Feb. 14	**Role of Experiment Stations in Technology Transfer**			Consultation	
	Bob Gillen	Western Kansas Agricultural Research Center	Manhattan		CB
Feb. 17	**Fire Science Education**			Consultation	
	John Cissel	Joint Fire Science Program	via telephone		CB
Feb. 18	**How Farmers Obtain Educational Information**			Farm Visit	
	Eric Weeks	farmer	Brownell		CB
Feb. 25	**Prescribed Burn Demonstration**			Field Trip	
	Joe Hawkins	Shawnee County Fire Department	Grove		CB
Feb. 27	**Farm Focus Group 1- Burning wheat stubble**			Meeting	
	Jim Shroyer	Kansas State University, Dept. of Agronomy	McPherson		JS
Feb. 27	**Farm Focus Group 2- Alternatives to burning wheat stubble**			Meeting	
	Jim Shroyer	Kansas State University, Dept. of Agronomy	McPherson		JS
Feb. 28	**Certification Programs at K-State**			Consultation	
	Gregg Hadley	Kansas State University, College of Agriculture	Manhattan		CB
Feb. 29	**Burn Workshop**			Field Trip	
	John Stannard	Kansas State University, Russell Co. Extension	Russell		CB
Mar. 1	**Extension Program Development Council**			Meeting	
		Kansas State University, Geary Co. Extension	Junction City		JS
Mar. 7	**Prescribed Fire Council Board Meeting**			Meeting	
	Walt Fick	Kansas State University, Dept. of Agronomy	Manhattan		CB
Mar. 8	**NRCS Farm Visit**			Farm Visit	
	Thomas Roth	Natural Resources Conservation Service	Lyon County		CB
Feb. 14	**Farm Focus Group 3 - Burning wheat stubble**			Meeting	
	Jim Shroyer	Kansas State University, Dept. of Agronomy	Salina		JS
Feb. 14	**Farm Focus Group 4 - Alternatives to burning wheat stubble**			Meeting	
	Jim Shroyer	Kansas State University, Dept. of Agronomy	Salina		JS

Scholarship Background, Cont.

Objective 4. To learn the farmer's economical motivations. Goal is to visit a couple of farm enterprises which specialize in producing feed for livestock. Technologies for grass gathering could be learned there. Goal is to find ways to get rid of grass (including dead grass) which could be appealing to the Russian farmers.

Feb. 13	**Residue management with no-till, minimum till, verticle till**			Consultation
	Deann Presley	Kansas State University, Dept. of Agronomy	Manhattan	JS
Mar. 2	**Biofuels, crop management**			Consultation
	Scott Staggenborg	Kansas State University, Dept. of Agronomy	Manhattan	JS
Mar. 5	**Biotechnology: fuel production from biomass**			Consultation
	Donghai Wang	Kansas State University, Dept. of Biological and Agricultral Engineering	Manhattan	CB
Mar. 6	**Alternatives to burning**			Consultation
	Jessica McCarty	University of Lousiville, Kentucky	via telephone	AS
Mar. 15	**Cellulosic ethanol plant tour**			Field Trip
	Doug Rivers	ICM, Inc.	St. Joseph, MO	CB
Mar. 16	**Straw house construction**			Field Trip
	David Criswell	Czech Cottages of Wilson, KS	Wilson	CB

Objective 5. To learn forest and grassland fires monitoring experience of US Forest Service including space monitoring. This could be used for making courses for Russian fire specialists.

Feb. 13	**Smoke and Fire Monitoring in the U.S.**			Consultation
	Susan O'Neill	Natural Resources Conservation Service	via telephone	CB
Feb. 24	**Smoke Monitoring and Regulation**			Field Trip
	Tom Gross, Doug Watson	Kansas Dept. of Health and Environment	Topeka	CB

Objective 6. To learn advertising and propaganda of agricultural fires harm: what methods does government use, what informational channels (radio, internet, etc.), what methods and ideas of persuasion. This information can help in designing mass media propaganda campaigns in Russia.

Feb. 20	**Mass media campaigns**			Consultation
	Kris Boone	Kansas State University, Dept. of Communications	Manhattan	CB
Feb. 10	**Extension media**			Consultation
	Elaine Edwards, Eric Atkinson, Pat Melgares	Kansas State University, Dept. of Communications	Manhattan	CB

Mar. 20	**Website development**				Consultation
	Marsha Landis	Kansas State University, Dept. of Agronomy	Manhattan		CB

Objective 7. To learn 4-H ways of rising generations attitude development. This methods could be easily adopted for Russian youth movements and work with village youth.

Mar. 5	**4-H and Youth Development**				Consultation
	Gary Gerhard	Kansas State University, 4-H Youth Development	Manhattan		CB

Objective 8. Other Topics of Interest, Federal Incentive Programs, Future Collaboration.

Mar. 16	**Rural fire suppression**				Field Visit
	Mike Holder	Kansas State University, Extension Flint Hills	Cottonwood Falls		CB
Feb. 23	**Technology assistance for farmers**				Consultation
	Gaye Benfer	Natural Resources Conservation Service	Manhattan		CB
Feb. 23	**Working with farmers to implement conservation practices**				Consultation
	Thomas Roth	Natural Resources Conservation Service	Manhattan		CB
Feb. 23	**Mapping burnt acres from satellite imagery**				Consultation
	Rhett Mohler	Kansas State University, Dept. of Geography	Manhattan		CB
Feb. 23	**Biomass crop assistance and the Conservation Reserve Program**				Consultation
	Rod Winkler, Carla Wikoff	Farm Service Agency	Manhattan		CB
Feb. 20	**Continuing education certification program**				Consultation
	Gregg Hadley	Kansas State University, College of Agriculture	Manhattan		CB
	Continuing education certification program				Consultation
	Hulya Dogan, Mark Fowler	Kansas State University, Dept. of Grain Science and Industry	Manhattan		AS
Mar. 13	**Future collaboration between Academy and K-State**				Consultation
	Gary Pierzynski	Kansas State University, College of Agriculture	Manhattan		CB
Feb. 16	**Crop production and no-till in Kansas**				Farm Visit
			Manhattan		JS

Sofya Solovyeva
Lomonosov Moscow State University

Objective 1. To design and select options to offer Russian farmers to avoid, mitigate, or reduce agricultural burning.

Jan. 26-27	**Kansas Natural Resources Conference**		Wichita	Conference ML
Feb. 9	**Evaulating Effectiveness of the Environmental Quality Incentives Progam**			Consultation
	Josh Roe, Aleksey Sheshukiv	Kansas State University, Depts. of Agricultural Economics, Biological and Ag Engineering	Manhattan	
Feb. 14	**Redcedar biomass as a fuel source**			Meeting
		Kansas State University, Kiowa Co. Extension	Greensburg	CB
Feb. 15	**Bioenergy production**			Consultation
	Richard Nelson	Center for Sustainable Energy	Manhattan	
Feb. 16	**Critical factors for using agricultural residues for biofuel production**			Consultation
	Richard Nelson	Center for Sustainable Energy	Manhattan	
Feb. 16	**Crop production and no-till in Kansas**			Farm Visit
			Manhattan	JS
Feb. 17	**Creating a market for redcedar products**			Meeting
		Kansas Forest Service	Manhattan	CB
Feb. 17	**How U.S.D.A. programs are delivered to farmers**			Consultation
	Tom Roth	Natural Resources Conservation Service	Manhattan	CB
Feb. 20	**Voluntary incentive-based policies for farmers to manage the environment**			Consultation
	Jeff Peterson	Kansas State University, Dept. of Agricultural Economics	Manhattan	CB
Feb.21-22	**Management, Analysis, and Strategic Thinking**			Workshop
		Kansas State University, Dept. of Agricultural Economics	Manhattan	
Feb. 23	**Working with farmers to implement conservation practices**			Consultation
	Tom Roth	Natural Resources Conservation Service	Manhattan	CB

Feb. 23	**Biomass crop assistance and the Conservation Reserve Program**			Consultation	
	Rod Winkler, Carla Wikoff	Farm Service Agency	Manhattan	CB	
Feb. 23	**Technology assistance for farmers**			Consultation	
	Gaye Benfer	Natural Resources Conservation Service	Manhattan	CB	
Feb. 24	**Smoke Monitoring and Regulation**			Field Trip	
	Tom Gross, Doug Watson	Kansas Department of Health and Environment	Topeka	CB	
Feb. 28	**Economics of various tillage systems**			Consultation	
	Jeff Williams	Kansas State University, Dept. of Agricultural Economics	Manhattan	ML	
Mar. 1	**Extension Program Development Council**			Meeting	
		Kansas State University, Geary Co. Extension	Junction City	JS	
Mar. 2	**Options for using agricultural residues**			Consultation	
	Scott Staggenborg	Kansas State University, Dept. of Agronomy	Manhattan	CB	
Mar. 12	**Management practices to increase carbon sequestration**			Consultation	
	Chuck Rice	Kansas State University, Dept. of Agronomy	Manhattan	CB	
Mar. 13	**Science Exchange program and opportunities for future collaboration**			Consultation	
	Nina Lilja	Kansas State University, International Agricultural Programs	Manhattan	CB	

Follow-up Visit

\Approximately one week after the scholars departed, four scholars from K-State traveled to Russia (Mar. 23-30, 2012).

Drs. Dan Devlin, Michael Langemeier, and Carol Blocksome used the subway to visit Red Square and other sites of interest with guide Artem Solopov. Photo: Artem Solopov

Trip Itinerary:
Mar. 23 Depart Kansas City, U.S.A
Mar. 24 Arrive Moscow, Russia
Mar. 25 orientation and sightseeing
Mar. 26 sightseeing and preparation for conference
Mar. 27 visit Lomonosov Moscow State University
Mar. 28 attend/present at conference at Russian Engineering Academy of Management and Agribusiness (РИАМА)
Mar. 29 attend/present at conference at Russian Engineering Academy of Management and Agribusiness (РИАМА)
Mar. 30 Depart Moscow, Russia; Arrive Kansas City, U.S.A.

During the week-long trip, they visited Lomonosov Moscow State University and were introduced by Sofya Solovyeva to numerous staff in the Soils and Economics Departments. Contacts were made which may lead to further collaboration. Those attending this activity were Dr. Devlin, Dr. Langemier, and Dr. Blocksome.

Contacts made at Lomonosov Moscow State University:
Soil Science Department
Prof. Academyc Sergey Shoba (Dean)
Prof. Evgenii Sheen (Head of Soil Physics Division)
Prof. Michael Makarov (Head of Soil Division)
Olga Yakimenko Ph.D, (International Relations)

Department of Economics
Prof. Sergey Kiselev (Head of Agricultural Economics Division)
Prof. Konstantin Papenov (Head of Environmental Economics Division)

The final two days in Russia were spent at a conference, “Developing Options for Avoiding, Reducing, or Mitigating Agricultural Burning that Contributes to Black Carbon in the Arctic.” The conference was held at the Russian Engineering Academy of Management and Agribusiness (РИАМА), Pushkino, Russia. Those attending this activity were Dr. Devlin, Dr. Langemier, Dr. Blocksome, and Dr. Sheshukov.

Contacts made at Russian Engineering Academy of Management and Agribusiness:
Temnikov Vladislav, (President)
Bushkina Maria (Provost)
Miloserdov Nikolay (Dept. Head)
Trunov Anatoly (Dept. Head)
Nazarenko Eugeny (Dept. Head)

Follow-up Visit, Cont.

Three presentations were made by K-State staff:
Dr. Carol Blocksome: From a Little Spark May Burst a Mighty Flame: Minimizing the Negative Impacts of Prescribed Burning

Dr. Michael Langemier: Benefits and Challenges of Alternatives to Agricultural Burning

Dr. Dan Devlin: Assisting Farmers in the U.S.A. to Adopt New Strategies

Dr. Aleksey Sheshukov participated as a session leader, utilizing his versatility in both Russian and English.

Artem Solopov reported "Thanks to the help from my mentors I was able to achieve most of the program's objectives. The only thing I didn't do is that I was unable to talk to any of the black carbon researchers (objective number 2) because Kansas State University didn't have any. All the other objectives were met and the information obtained will help to adjust the Russian educational programs to fight the black carbon emissions."

Sofya Solovyeva reported "The USDA scientific exchange program gave me the unique opportunity to learn the latest scientific development in Agricultural Economics and Agronomy. I have obtained the understanding of U.S. agriculture. As a result, feasible options to minimize agricultural burning that have worked and have the best economic and environmental benefits have been designed and selected."

Attendees at the "Developing Options for Avoiding, Reducing, or Mitigating Agricultural Burning that Contributes to Black Carbon in the Arctic" in Pushkino, Russia March 28-29, 2012. The conference provided both an expanded knowledge of black carbon issues and a chance to meet agency staff from across Russia. Colaborations with contacts made at this conference are anticipated. Photo: РИАМА Staff

Outcomes and Accomplishments

Informal inquiry with both visiting scholars indicated that their research and scholarship objectives were met during their visit to K-State.

Kansas State University is in final negotiations in developing a Memorandum of Agreement with the Russian Engineering Academy of Management and Agribusiness (РИАМА), Pushkino, Russia.

We expect there will be future faculty and student visits between the two institutions and joint agricultural training will occur. This will especially be prevalent among K-State extension faculty and the faculty at the Russian Engineering Academy.

Collaboration has already begun with contacts made during the follow-up visit. Dr. Blocksome is sharing information with Michiel Hotte, a contact made at the conference, on agricultural burning in Russia.

She has also contacted Dr. Olga Yakimenko at Lomonosov Moscow State University inquiring about the soil field trip held each summer, and consulted with Dr. Mickey Ransom about the potential for K-State students to attend this event.

Also contacted by Dr. Blocksome is Evgeny Kuznetsov with theUNDP/GEF steppe project. He is interested in working with with K-State and is developing proposals for collaborative work.

Dr. Sofya Solovyeva and Dr. Carol Blocksome visit with an another conference attendee. Contacts made through this project hold great potential for further collaboration. Photo: РИАМА Staff

Lessons Learned and Recommendations

In retrospect, there are several lessons learned from this visit.

1. It requires a very substantial amount of a mentor's time to adequately host a visiting scholar. It becomes difficult to keep up with the normal workload during the visit. Sharing the mentoring load for each scholar between two faculty members results in a more satisfactory experience for the mentor. In addition, it provides the scholar with two viewpoints and two sets of contacts to assist them in achieving their objectives.

2. Activities that were thought to be important prior to the visit by the scholars were sometimes not as important when scholar objectives were more fully understood. Leeway and flexibility need to be built into the proposed list of activities to account for these changes.

3. The time spent in Moscow by the mentors was very brief and during the winter, so there wasn't opportunity for farm visits to see how agricultural practices were implemented by farmers and ranchers. This may have decreased the ability of the mentors to make appropriate management recommendations and did not increase knowledge of cultural differences in farming between the two countries (U.S.A. and Russia).

As experienced during this visit to K-State, the U.S. Dept. of State program was successful and valuable for the host institution.

Final Notes

The trip to Moscow concluded the Science Exchange, but is hopefully only the beginning for further collaborative work with Russian colegues. Photo: Akeksey Sushkevov

During the follow-up visit, mentors used all available free time to visit cultural and historic venues in Moscow.

Aleksey Sheshukov (far left) provided the entire team with support throughout the Science Exchange. His knowledge of the Russian language and culture and his willingness to assist were greatly appreciated. He worked with both scholars to make their stay in Kansas as smooth as possible and arranged extra-curricular and social activities. Photo: Photo: РИАМА Staff.

Conference Presentations

FROM A LITTLE SPARK MAY BURST A MIGHTY FLAME*

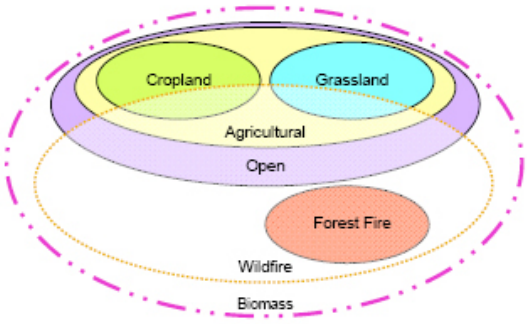
MINIMIZING THE NEGATIVE IMPACTS OF PRESCRIBED BURNING

Photo: Dirk Dennert

Carol Blocksome, Ph.D
Dept. of Agronomy,
Range Management
Kansas State University
Black Carbon Workshop
Moscow, Russia
Mar. 28-29, 2012

* Dante Alighieri

DEFINING TERMS



Prescribed Burning = Agricultural Burning

WHAT IS PRESCRIBED BURNING?

- Has clear objectives.
- Parameters defined in a "prescription".
- Is confined to the intended area.

WHAT ARE LIKELY OBJECTIVES?

- Grassland fires in Kansas, U.S.A.
  - Remove litter.
  - Improve forage quality and quantity.
  - Improve cattle weight gains.
  - Reduce undesirable species.
  - Provide wildlife habitat.
  - Maintain ecosystem.

WHAT ARE LIKELY OBJECTIVES?

- Cropland fires in Russia.
  - Prepare seedbed.
  - Reduce diseases and pests.
  - Increased soil fertility.
- Grassland fires in Russia.
  - Clear brush for grazing.
  - Remove litter.
  - Improve forage quality.
  - Increase rate of forage growth (early green-up).
  - Create firebreaks around housing.
  - Reduce ticks.

- Arson and negligence.
- Lightening or other natural fires.
- Burning without specific objectives.
- Burning without defined parameters.
- Wildfires.

NOT PRESCRIBED FIRES!

Conference Presentations, cont.

NEGATIVE IMPACTS OF PRESCRIBED BURNING

- Black carbon depositions in Arctic.
- Impaired air quality.
- Fire escapes that cause wildfires.
  - 98% of forest fires (wildfires) in Russia begin from grass fires on agriculture lands.

REDUCING BLACK CARBON DEPOSITION IN THE ARCTIC

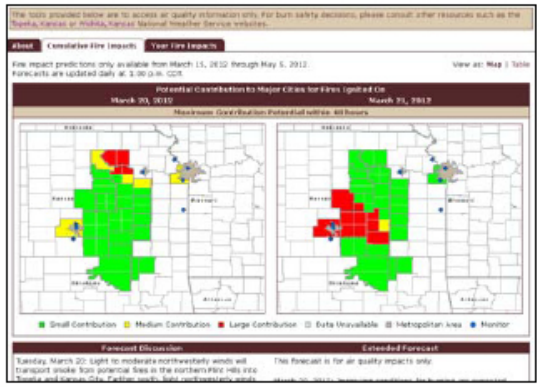
1. Avoid producing emissions.
2. Dilute emissions.
3. Reduce emissions.

AVOID EMISSIONS PROBLEMS

- Burn only when necessary.
- Burn when emissions will not impact sensitive areas.

DILUTE EMISSIONS

- Burn when dispersion is good.
- Spread out burning activities (temporal and spatial).
- Requires good weather data and ability to work across jurisdictional lines.



REDUCE EMISSIONS

- Reduce fuel load (grazing, haying).
- Increase combustion efficiency.
- Reduce acreage burned.

STRATAGIES

- Reduce incidence of wildfires.
  - Careless negligence 75% of all fires.
  - Agricultural burns 20% of all fires.
- Agricultural fires emit less black carbon than forest fires.
  - Different emissions.
  - Smoldering fuels (longer emission time).
  - Duration of the fire.
  - Height of smoke column (transportation).
  - Amount of fuel.

Conference Presentations, cont.

STRATEGIES

- Increase educational efforts.
  - Prescribed burning workshops.
  - Demonstration burns.
- Encourage joint burn planning
  - Burn cooperatives.
  - Fire council.
- Enhance availability of accurate weather forecasts.

STRATEGIES

- Improve local fire suppression.
  - Equipment for farmers.
  - Volunteer fire units.

- Provide professional burn plans.

STRATEGIES

- Penalize burning that is not carried out according to a prescription.
- Increase cooperation across jurisdictions.
- Clarify land ownership/responsibilites.
- Focus on human factors.

TRADEOFFS

- Backfires burn more efficiently than headfires;
- Headfires take less time to burn.
- Efficient burns emit increased levels of NO_x and CO_2;.
- Efficient burns have fewer overall pollutants.
- Frequent burning results in a larger number of acres burned each year;
- Areas frequently burned have more rapid burn completion times due to fewer woody fuels.
- Frequent burning can reduce wildfire occurrence, extent, and severity.
  - Few options for managing smoke under wildfire conditions.

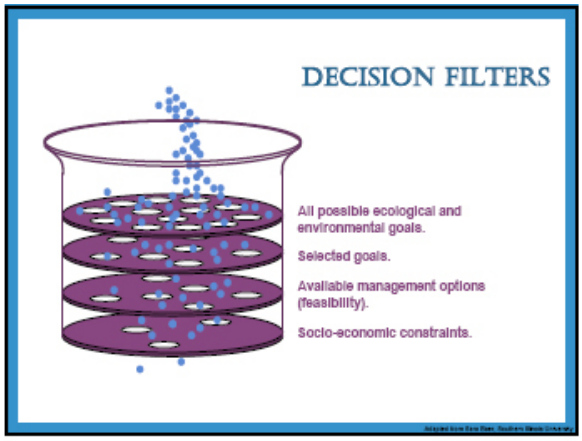
OTHER ANTHROPOMORPHIC FIRE

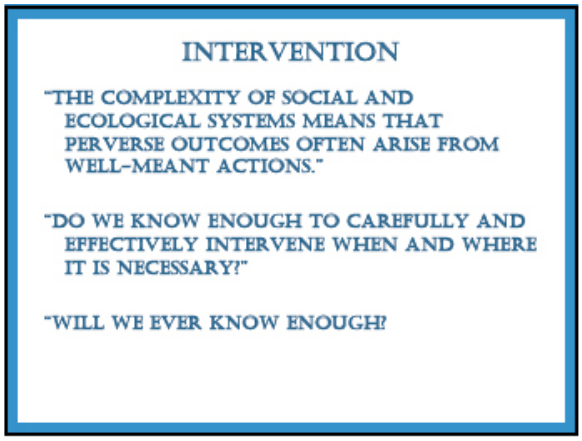
- Humans are estimated to cause 70% of all fires at the national level (Russia).
  - Open burning (brush piles, slash).
  - Abandoning land (no active management).
  - Establishing firebreaks around structures.

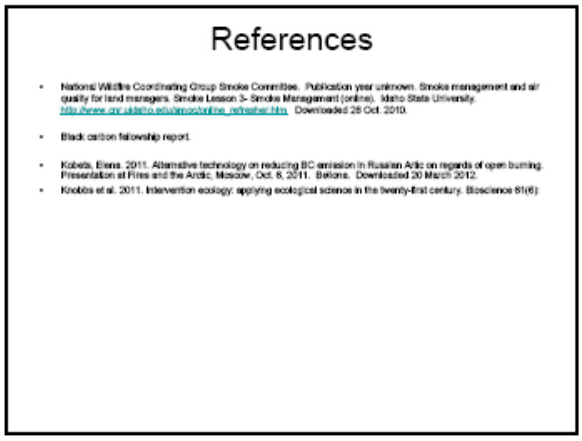
THE FIRE WITHIN VS. THE FIRE WITHOUT.

- Carbon will be released into the air regardless of burning activity.
  - Without fire: microorganism respiration.
  - With fire: smoke and microorganism respiration.
- With burning, "grazed and ungrazed tallgrass prairie appeared to be carbon-storage neutral."
- Carbon (CO_2) has more impact on temperature than black carbon.

Conference Presentations, cont.







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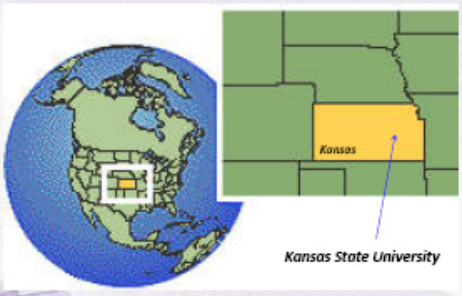
Conference Presentations, cont.

Assisting USA Farmers Adopt New Strategies

Daniel L. Devlin, Ph.D.
Director, Kansas Center for Agricultural Resources and the Environment

K-STATE Research and Extension
Knowledge for Life

Kansas State University



K-STATE Research and Extension
Knowledge for Life

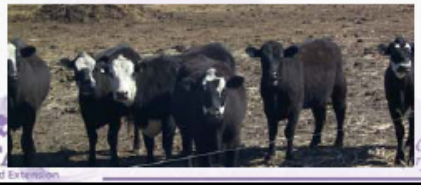
Kansas Resources

- Annual rainfall varies from 400 to 1000 mm; frost-free period of about 180 d
- Continental climate, hot summers and cold winters
- Soils are generally deep, medium to fine texture; formed under prairie/grasslands
- Population: 2.6 million

K-STATE Research and Extension
Knowledge for Life

Kansas Agriculture

• Total land in Agriculture	18.6 million ha
• Cropland	9.1 million ha
• Grass/Grazinglands	9.5 million ha
• Livestock (Cattle)	6.65 million



K-STATE Research and Extension
Knowledge for Life

Major Crops

- Wheat, 3.7 million ha
- Maize (Corn), 1.4 million ha
- Soybean, 1.1 million ha
- Grain Sorghum, 1.0 million ha
- Hay, 0.8 million ha

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Trends in Kansas Agriculture

- Less government involvement/more dependent upon markets
- Rapid adoption of new technology
- Major expansion in no tillage systems
- Almost no burning of crop residues
- High profitability in agriculture
- Farm size getting larger
- Greater variety of crops being planted
- Alternative uses for crop residues (cellulosic bioenergy)
- Environmental issues are getting more important

All changes are voluntary. Very few regulatory requirements. Most changes are profit driven.

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Conference Presentations, cont.

Conference Presentations, cont.

Our Mission

TEACHING
RESEARCH
EXTENSION

The three missions of a land-grant university are funded through local, county, state, federal, and private funding

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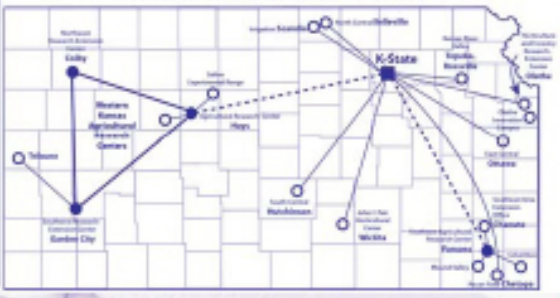
Research and Extension Facilities



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2011

University Functions to Develop New Technology, Test It and Then Help Farmers Adopt It

- Basic and Applied Development
- Demonstrate New Technology
- Educate Farmers and Agri-Business Personnel
  - ✓ Workshops, Field Days, Short Courses, Web Sites, Publications, Newspaper Articles, Radio
  - ✓ One-on-One Farm Visits

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Influencers on Our Farmers

- Land Grant Universities
  - Research Stations and Centers
  - Extension/Outreach Educational Programs
- Government Agencies
  - USDA Natural Resources Conservation Service
  - Environmental Agencies – Federal and State
- Agribusiness
  - Seed, Pesticide/Chemical Dealers
  - Crop Consultants
  - Machinery Manufacturers/Dealers
- News Media (Magazines, Websites, Radio and TV)
- NGOs
- Neighbors

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USDA - Natural Resources Conservation Service

- Federal Agency that has a local presence (office) in every county in Kansas
- Does not have regulatory authority
- Provides technical assistance and cost share and incentive funding for natural resources conservation and adoption of new technologies, such as no-tillage

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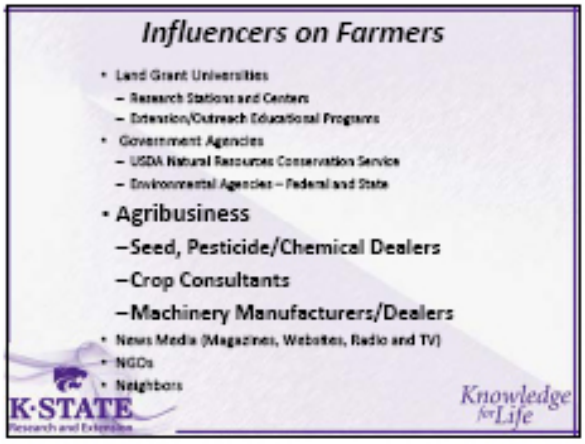
Conference Presentations, cont.



Conference Presentations, cont.

Benefits and Challenges of Alternatives to Agricultural Burning

Michael Langemeier
Department of Agricultural Economics, Kansas State University
Black Carbon Workshop
March 29th, 2012, Moscow, Russia

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Presentation Topics

- U.S. and Russian Crop Acreage and Yields
- Crop Rotations and Acreage Shifts
- Adoption of Reduced Tillage Practices
- Cellulosic Ethanol Production

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U.S. and Russian Crop Acreage and Yields

- Russia (09)
  - Arable land and hay: 132.7 million hectares
  - Maize
    - 1.4 million hectares
    - Average yield of 3.53 mt/ha
  - Wheat
    - 28.7 million hectares
    - Average yield of 2.34 mt/ha
- United States (11/12)
  - All Crops, Hay, and CRP: 135.9 million hectares
  - Maize
    - 37.2 million hectares
    - Average yield of 9.24 mt/ha
  - Wheat
    - 22.0 million hectares
    - Average yield of 2.94 mt/ha

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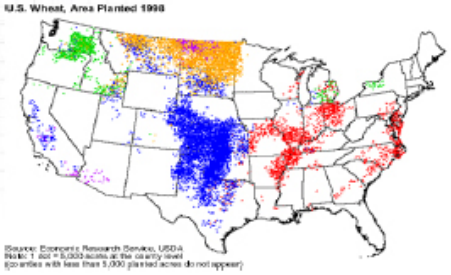

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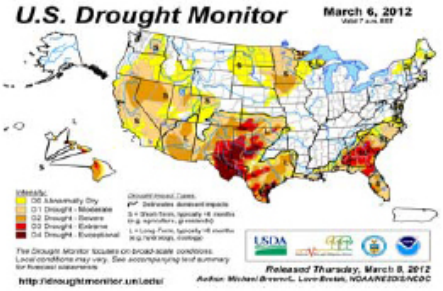

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Trends in Kansas Crop Acreage

- Kansas has 18.70 million hectares of land in farms, and 11.42 million hectares of cropland, of which approximately 10% is irrigated.
- Key Trends, Kansas Farm Management Association (KFMA) Farms
  - Non-Irrigated Farms
    - Increase in maize
    - Decrease in grain sorghum
    - Increase in soybeans
    - Decrease in wheat
  - Crop Intensity (harvested acres / planted acres) on Non-Irrigated Farms
    - East:
      - Increased from 1.0515 to 1.0873 (1996-2000 to 2006-2010)
    - Central:
      - Increased from 0.9481 to 1.0152 (1996-2000 to 2006-2010)
    - West:
      - Increased from 0.6049 to 0.6842 (1996-2000 to 2006-2010)

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Conference Presentations, cont.

Eastern KFMA Farms
Percent of Harvested Acres

5-Year Period	Maize	Grain Sorghum	Soybeans	Wheat
1981-1985	11.60%	17.05%	31.79%	31.86%
1986-1990	14.02%	16.51%	37.57%	24.56%
1991-1995	11.93%	16.10%	37.82%	27.06%
1996-2000	16.63%	13.77%	44.21%	18.46%
2001-2005	24.42%	8.54%	41.42%	18.20%
2006-2010	27.36%	2.98%	43.43%	17.14%

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Central KFMA Farms
Percent of Harvested Acres

5-Year Period	Maize	Grain Sorghum	Soybeans	Wheat
1981-1985	1.15%	21.14%	4.32%	63.45%
1986-1990	2.02%	19.81%	4.61%	62.61%
1991-1995	4.29%	18.72%	5.16%	61.21%
1996-2000	5.81%	22.88%	8.81%	52.80%
2001-2005	7.17%	21.34%	11.44%	49.13%
2006-2010	8.58%	15.69%	17.28%	49.32%

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Western KFMA Farms
Percent of Harvested Acres

5-Year Period	Maize	Grain Sorghum	Soybeans	Wheat
1981-1985	1.54%	17.04%	0.82%	73.63%
1986-1990	2.04%	19.47%	0.48%	67.86%
1991-1995	6.18%	11.92%	0.23%	76.61%
1996-2000	13.56%	14.99%	0.81%	62.82%
2001-2005	11.12%	18.91%	2.30%	58.96%
2006-2010	22.62%	16.11%	1.24%	54.56%

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Driving Forces

- Strong Feed Grain and Soybean Prices
- Improvements in Maize and Soybean Seed Technology
- Cash Rent and Land Value Increases
  - Relatively high net returns and relatively low interest rates since 2007
  - Increases the importance of crop intensity (harvested acres / planted acres)

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Adoption of Reduced Tillage Practices

- Reduced tillage, and in particular no-till adoption, have enabled farmers to more readily produce feed grains and oilseeds. Also, reduced tillage makes it easier to increase double-cropping.
- Yields for no-till crops are similar to that for crops produced under other tillage practices. For example, using data for the NC KFMA, yields for the 2006 to 2010 period were 2.82 and 2.89 mt/ha for reduced and conventional tillage wheat and no-till wheat, respectively.
- The next slide compares net return to labor and management per hectare for maize, grain sorghum, soybeans, and wheat on NC KFMA farms from 2006 to 2010.

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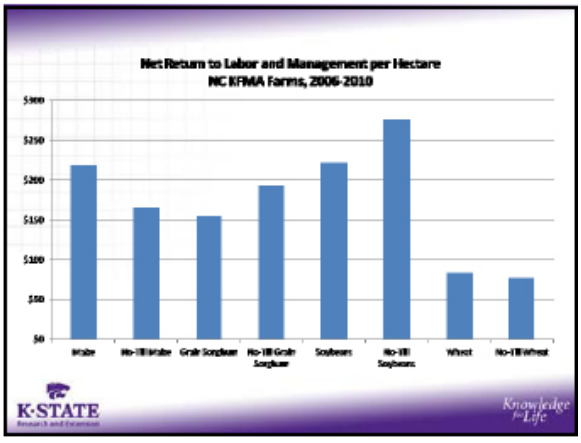

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Conference Presentations, cont.

Cellulosic Ethanol Production

- Cellulosic ethanol production is currently of minor importance to ethanol supply in the United States.
- However, production is expected to increase during the next 10 years. In 2021/2022, cellulosic ethanol production is forecasted to represent 18% of total ethanol supply in the United States (FAPRI, March 2012).
- Sources of cellulosic ethanol include crop residues, energy crops, animal fat, vegetable oil, and wood waste.
- The impact of cellulosic ethanol from crop residue on the erosion and runoff needs to be examined.

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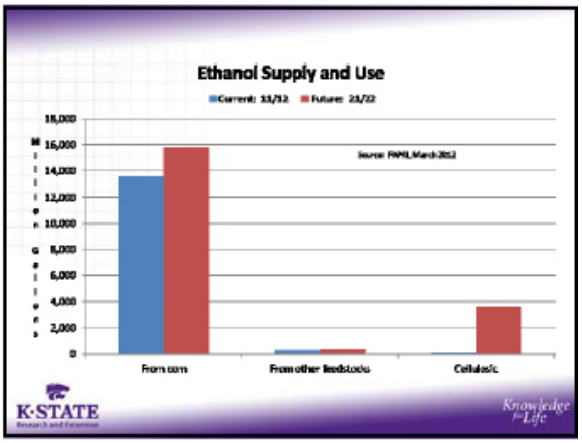

Summary

- Wheat acreage has declined in major U.S. wheat producing states such as Kansas.
- Seed technology improvements for maize and soybeans, relatively strong feed grain and soybean prices, and the adoption of reduced tillage systems have been major factors in the decline of wheat acreage.
- Reduced tillage practices have enabled farmers in Kansas to more readily add feed grains and oilseeds to their crop rotations. Average profitability is relatively higher on no-till farms.
- Cellulosic ethanol production is currently of minor importance to ethanol supply, but is expected to represent 18% of supply in 10 years.

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