

Letter

Sustainable agriculture: Taking stock, moving forward

*Conference program features Paul Johnson,
Pat Boddy, much more*

The two-day program for the Leopold Center's ten-year anniversary conference has been announced by Rich Pirog, the Center's conference chair and education coordinator.



Set for July 30-31 at the Scheman Building in Ames, *Sustainable Agriculture: Taking Stock, Moving Forward* will offer dynamic speakers, roundtable discussions, networking opportunities, tours of research sites, videos, and posters about Center research.

Registration fees for the event will also cover meals and materials. Fees received before **July 15** are \$40 for the first day, \$30 for the second day, or \$60 for both days. After July 15, those fees rise, respectively, to \$45, \$35, and \$70. Attendees are asked to register by **July 25**. Brochure and registration materials will be mailed to Center audiences in June. Registration forms and questions may be directed to Deb Schmidt at ISU Extended and Continuing Education, 102 Scheman, Ames, Iowa 50011, phone (515) 294-5961. For information about the program, contact Pirog at (515) 294-3711.

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Center makes 1997 grant awards

By Jeri Neal
Research coordinator

The Leopold Center for Sustainable Agriculture recently awarded \$825,028 in its tenth annual round of competitive grants for research, education, and demonstration projects. Center director Dennis Keeney and the Leopold Center Advisory Board approved funding for 22 new projects and 18 existing projects renewed for a second or third year. Beginning July 1, these efforts will be conducted throughout Iowa. Grant amounts range from \$3,900 to \$40,000.

Competitive Grants Program



One priority of the competitive grants program is to build collaboration among diverse organizations. The 1997-98 projects involve 36 principal investigators representing 13 Iowa State University (ISU) departments and nine other educational and nonprofit organizations throughout Iowa.

The program also enables Iowa agronomists, environmental engineers, educators, and others to apply technology in new ways toward a sound agriculture. The 40 projects

cover a wide range of topics: pest management, the stability of antibiotics in manures, incorporating native grasses as forage, and integrating swine technologies, among others.

In its first ten years, the Leopold Center has awarded nearly \$7.3 million in 167 competitive grants across Iowa.

COMPETITIVE GRANTS

(continued on page 4)

The Leopold Challenge: Lessons from the field

By Mike Duffy
Associate director



One question facing sustainable agriculture proponents is how to encourage farmers to adopt more sustainable practices. Researchers and Extension staff have

made significant strides in the development of integrated crop management (ICM)—the synergistic use of practices that are more profitable and environmentally sound than conventional approaches. But although demonstrations and other efforts have conveyed these ICM concepts to farmers, use of ICM is not widespread; instead, preventive pesticide treatments and maintenance fertilizer rates predominate.

ICM generally involves crops, the way they are fed, and how pests are managed. It uses a variety of techniques, such as soil sampling and pest scouting, to optimize farmers' decisions given their individual circumstances, resources, and goals.

To increase the use of ICM, the Leopold Center initiated a project called the Leopold Challenge. It provided farmers with an ICM service on one of their fields and compared this field to a similar field farmed as they normally would. The rationale was that seeing results on their own fields would make farmers more likely to adopt ICM tactics.

The Challenge also sought to determine whether providing individualized services was a sound way to demonstrate research findings, and whether one-on-one contact influenced the likelihood of farmers trying new alternatives.

Approach

Two crop consulting services were hired to implement the Challenge: ABC Ag, operated by Chris Clark of

Ida Grove, and C⁸MP, operated by Kay Connelly of Cedar Falls. In fall 1995, each recruited six interested farmers from a total of five counties: four from Butler, three from Ida, two from Woodbury, two from Grundy, and one from Sac. Each farmer and consultant then selected two similar fields for the comparison in 1996. Although a single year is not adequate to fully evaluate ICM, one season was deemed sufficient for the project's purposes.

Field comparison results

Ten of the 12 cooperators maintained adequate records for the comparison. All ten had corn fields; two had both corn and soybeans.

Inputs: The ICM fields averaged \$13.59 less per acre in fertilizer expenses and had lower expenses in eight of 11 fields where fertilizer was

used (one of the soybean comparisons used no fertilizer on either field).

Herbicide use and products varied considerably between ICM and non-ICM fields. However, the average difference in herbicide expenditures was only \$.03/acre lower for the ICM fields.


The differences between ICM and non-ICM fields for the remaining cost categories were very small on average. In three cases, lime was recommended on the ICM fields (costs were prorated over all the acres for 3.5 years). Seed costs varied, but not by more than \$2.50 per acre. On four ICM fields, additional machinery operations were recommended.

Overall, the ICM fields averaged \$9.12 less per acre in total expenses. ICM expenses in nine of the 12 fields ranged from \$2.67 to \$59.06 lower.

CHALLENGE

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Celebrating 1987 - 1997



LEOPOLD CENTER

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The Leopold Center for Sustainable Agriculture seeks to identify and reduce adverse socioeconomic and environmental impacts of farming practices, develop profitable farming systems that conserve natural resources, and create educational programs with the ISU Extension Service. It was founded by the 1987 Iowa Groundwater Protection Act.

The Leopold Letter is available free from the Leopold Center at 209 Curtiss Hall, Iowa State University, Ames, Iowa 50011-1050; (515) 294-3711.

Editor: Elizabeth Weber



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The Gulf of Mexico—and of Iowa

Iowa's two great rivers, the Missouri and the Mississippi, play vital roles in Iowa's economy and quality of life. They provide recreation, serve as a source of water for cities and for industry, and act as a conduit for moving commercial and agricultural products to and from Iowa. The rivers also are part of hydrologic and geologic cycles that carry water—and materials that move with it through and off the land—to the Gulf of Mexico.

As with Iowa's rivers, Gulf waters have long played a vital role in the Gulf Coast's economy and quality of life. Boating and sports fishing have been favorite (and lucrative) recreational activities there, and commercial fishing and shrimping arguably are as vital to that local economy as farming is to ours. But recent studies conducted by federal and Louisiana state scientists indicate that human activities on the land are adding sediments and nutrients to the Gulf at such a rate that a large area is undergoing changes in water quality. Why is this so? And why should we in Iowa be concerned?

Bodies of water such as rivers, and especially lakes and estuaries (an area where a river meets a sea), are like land in that some parts of the whole are more productive—that is, they produce more ingredients for the food

chain. The food chain in waters starts with tiny organisms, algae and protozoa, and with rooted and floating plants, and ends with larger fish. When more nutrients (particularly

nitrogen and phosphorus) are available, the productivity is higher.

But after a certain point, the term “productivity” in water has very different ramifications than it does on land. On land, nutrients stay locked in the plant for the entire growing season. In water, many plants and microscopic animals grow and die over the course of a season. When they decompose, nitrogen and phosphorus are released, promoting the growth of organic matter. Each time these nutrients are cycled, more organic matter is produced. Sometimes the productivity in lakes and estuaries becomes very high, creating undesirable conditions. The organic matter is decomposed by microbes that need oxygen.

But fish and other higher organisms need oxygen too. If the water is insufficiently oxygenated over a prolonged time period, fish and shrimp will leave these waters for more oxygenated conditions. Smaller animals in the food chain may also die. In situations where oxygen replenishment cannot keep pace, microbes win

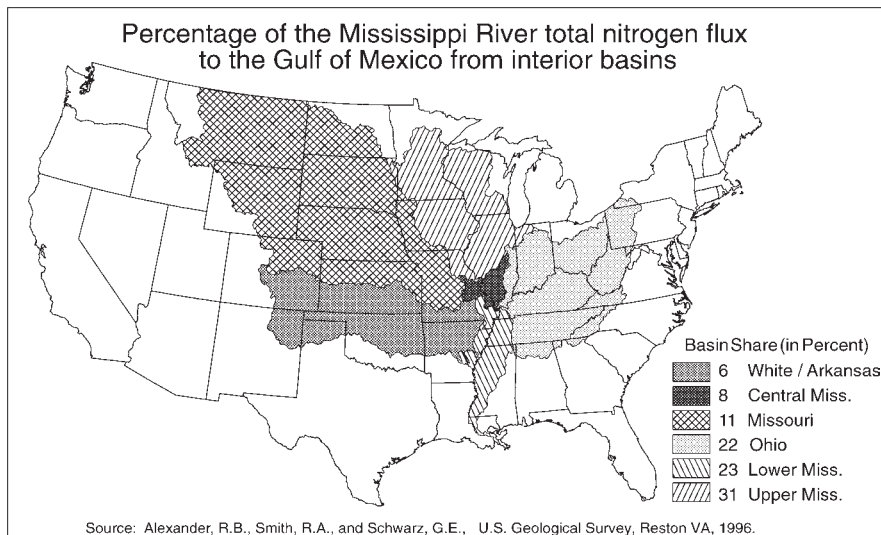
the area is not devoid of life; organisms that need little to no oxygen can persist there. (If there is no oxygen at all, the area becomes “anaerobic.”)

Phosphorus is most often the limiting nutrient in the productivity of freshwater lakes and impoundments—that is, to a point, more phosphorus equals more growth and more low-oxygen areas. But in estuaries, nitrogen seems to be the culprit. Mounting evidence, while not overwhelming, supports this nitrogen limitation theory for the Gulf of Mexico. Studies show that the amount of nitrogen leaving the Mississippi River at the Gulf has nearly doubled over the past 40 years.

Evidence being gathered by United States Geological Service (USGS) and coastal scientists, coupled with observations by long-time Gulf fishing operations, indicates that the hypoxic zone is growing larger. At its peak in midsummer, it now exceeds 7,000 square miles. The area starts forming in early spring and usually disappears by late fall. There is as yet no hard

evidence that fish and shrimp catches are affected, but data are difficult to collect and decipher. As the map shows, the Mississippi River drains over 40 percent of the United States, encompassing its most productive farmland—including Iowa. Agriculture is a likely major source of nitrogen in the river. While an irrefutable link has yet to

be made, common sense brings the issue home to Iowa.



out, creating a condition known as “hypoxia,” a volume of low-oxygen water. The area where it occurs is called a “hypoxic zone.” Technically,

GULF OF IOWA

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COMPETITIVE GRANTS

(continued from page 1)

NEW GRANTS

Pest Management



Biological Control and Sustainable Horticulture Principles for Iowa's Vocational Agriculture Curriculum, **\$8,100**; Gail Nonnecke, ISU department of horticulture—

A set of instructional materials on biological control and sustainable horticultural principles, the first of its kind in Iowa, will be developed with assistance from Iowa high school teachers and students. The materials will be in printed and electronic formats and will be distributed to Iowa agricultural teachers in the final project year.

Identification and Characterization of the Rose Rosette Disease Causal Agent, **\$35,145**; John H. Hill, ISU department of plant pathology—Although biocontrol methodology exists for multiflora rose by using rose rosette disease, scientists haven't identified the disease's causal agent; therefore use of this biocontrol could present a risk to non-target organisms. To insure there is no risk in using the disease for biocontrol of this noxious weed, the primary purpose of this project is the identification and characterization of the causal agent of rose rosette disease in multiflora rose.

Use of Intra-field Alfalfa Trap Cropping for Management of the Potato Leafhopper, **\$25,750**; John Obrycki, ISU department of entomology—Originating from farmer observations and practices, this project will research the use of an alfalfa trap crop for potato leaf hopper management. Through quantifying interactions among the trap crop, the biological cycles of the leafhopper populations, and development of the entomopathogen *Zoophthora radicans*, the project will assess effectiveness of intra-field alfalfa trap crop management at three locations in Iowa.

Biologically Intensive Pest Management: Iowa Apple Growers Take the Next Step Toward Sustainability, **\$16,200**; Mark Gleason, ISU department of plant pathology—Up to 20 apple growers will participate in cooperative trials to identify biologically intensive pest control tactics best suited to Iowa conditions. Research will focus on apple scab, codling moth, and the sooty-blotch/flyspeck complex.

Manipulation of Predatory Insects for Enhanced Biological Control of Insect Pests, **\$23,905**; John Obrycki, ISU department of entomology—One impediment to manipulating predators for biological control is that scientists do not understand the chemical cues and behavior used by the predators to locate their prey. The goal of this project is to determine and characterize such behaviors used by predatory lacewings and adult lady beetles.

Community and Regional Regeneration



Rural Regeneration Through Direct Marketing Audubon County Meats,

\$12,153; Donna Bauer, Audubon

County Rural Action Committee—The

goal of the project is rural regeneration through direct marketing of Audubon County Meats. Project strategies include development of education materials, consumer research data, and cooperative marketing plans.

Community and Economic Regeneration through Strengthening the Local Food Economy, **\$16,400**; Kamyar Enshayan, Center for Energy and Environmental Education, Cedar Falls—This project will identify practical pathways that would enable institutional food buyers to feasibly invest their food dollars in Iowa to support Iowa/regional farmers, processors, and distributors.

Field to Family Community Project, **\$16,000**; Jan L. Flora, ISU department of sociology—This project, the education and community outreach arm for a local community-supported agriculture project, will work with community churches and social service institutions to link farmers with non-farmers in the local food system.

Rural Urban Stewardship Project, **\$6,600**; Jill Knapp, Iowa Soil and Water District Commissioners, Johnston, and Lisa Cooper, Iowa Heartland RC & D, Indianola—The project will develop discussion sessions and tours for Des Moines area residents to learn about farm practices and concepts of sustainability in agriculture.

Forage Management



Development of Switchgrass as a Viable Agricultural Commodity for Farmers in Southern Iowa, **\$30,000**;

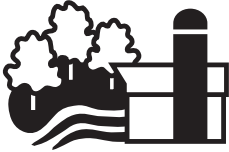
Jim Cooper, Chariton Valley RC&D,

Centerville—Funding will aid development and delivery of information and education for the multi-county, multi-agency Chariton Valley Biomass Power Project.

Evaluation of the Effects of Fiber Concentration on Protein Degradation Characteristics of Berseem Clover Silage on the Performance of Growing Beef Cattle, **\$20,250**; Jim Russell, ISU department of animal science—This study will compare effects of ensiling on composition of nitrogenous compounds in berseem clover and alfalfa silages and quantify effects of differences in the chemical composition of berseem and alfalfa silage on cattle growth performance.

Evaluation of Forage Plants Collected from Permanent Pastures Throughout Iowa, **\$5,000**; E. Charles Brummer, ISU department of agronomy—To improve producer pasture recommendations, this work will document genetic variation for traits important to persistence and survival in white clover, orchardgrass, and birdsfoot trefoil species that were collected from permanent pastures around Iowa.

Agroecology



Evaluation of Three Cropping Systems Grown Under the Influence of a Shelterbelt, \$5,500; Carl Mize, ISU department of forestry—This project will evaluate economic and biological

benefits of applying hog manure to strip-intercropping, with hog manure applied to harvested oat strips, continuous corn, and a corn-soybean rotation grown under a shelterbelt's influence south of Ogden.

Small Grain and Annual Forage Legume Intercrops for Iowa, \$7,000; Jim Holland, ISU department of agronomy—Five small grain and five annual forage cultivars will be grown alone and in combination to determine the most promising combinations for annual production rotations, best management practices, and changes in morphological and growth characteristics under different management regimes.

Soil Quality and Health



Soil Quality, Yield Stability, and Economic Attributes of Alternative Crop Rotations, \$20,000; Doug Karlen, USDA-ARS National Soil Tilth Lab, Ames—Indicators of soil quality,

including organic matter, compaction, fertility status, and microbial activity, will be assessed and used with crop rotation data from two 30-year studies, a 17-year study, and a 20-year study to analyze interactions between management practices and soil quality. The hypothesis is that diversified crop rotations (involving more than a two-year corn-soybean combination) will create and/or sustain better soil quality or soil health and that this soil condition will result in better economic returns because of more stable yields.

Development and Implementation of Cost-effective Fertilization and Tillage Practices for Improving Soil Quality in Corn-Soybean Rotations, \$24,450; Antonio Mallarino, ISU department of agronomy—Project objectives include development of phosphorus, potassium, and starter fertilization recommendations for corn and soybean under different tillage systems; evaluation of improved diagnostic tools to assess P and K soil fertility in no-till and ridge till; economic analysis of alternative fertilization and tillage practices; and demonstration of a methodology for on-farm research and demonstrations based on precision agriculture technologies.

Nutrient Management



**Statewide Manure Management Education Initiative, \$31,500;* Gerald Miller, ISU department of agronomy—Under leadership from ISU Extension, the Leopold Center, Iowa Veterinary Medical Association, soil and water conservation districts, and the Iowa Independent Crop Consultants' Association, this project will use intensive workshops with individualized participant plans to encourage appropriate decision making about utilization of manure nutrients.

Water Quality



Toxicity of Pesticides Adsorbed to Suspended Sediment to Larval Fish in the Cedar River, \$24,969; Robert C. Summerfelt, ISU department of animal ecology—In this National Research Initiative/Leopold Center grant, investigators will describe physical and chemical characteristics,

including pesticide residues, of sediment and water samples from the Cedar River; determine the toxicity of river sediments and water to larval walleye; measure adsorption and desorption of pesticides on clays; and determine whether toxic pesticides adsorbed to clays are toxic to larval fish.

Policy



Compensation of Farm Employees, \$18,000; William Edwards, ISU department of economics—This survey will acquire specific data on wages, benefits, bonuses, compensation, and working conditions of full-time agricultural workers in Iowa. Comparisons will be made

for different sizes and types of farm businesses, as will estimations of how factors such as age, longevity, experience, education, and gender impact the employment data.

Livestock Management



Botanicals as a Part of an Integrated Value-added Pork Production System, \$24,950; Eric Franzenburg,

Benton Development Group, Van Horne—Selected herbs are known to naturally possess antibacterial and

other characteristics which could be useful in animal protein production, possibly even in addressing concerns about development of antibiotic-resistant bacteria. This project will evaluate the use of four selected herbs to promote growth rate and feed efficiency in feeder swine.

Other Topics



Ecology and Restoration of Farmland Woods in Central Iowa, \$13,430; Jim Raich, ISU department of botany—The project will identify the species and the species/site associations that characterize high-quality woodlands and provide information that will assist landowners and groups in woodland restoration.

Wildlife Use of Terraces in Iowa Rowcrop Fields, \$21,185; Louis Best, ISU department of animal ecology—Terrace benefits to wildlife are widely extolled, but poorly documented. This study is designed to provide data on how terrace design and management influence wildlife.

(continued on next page)

RENEWED GRANTS

Pest Management



Spring-seeded Smother Plants for Weed Control in Corn and Soybean, \$34,000; Douglas Buhler, National Soil Tilth Laboratory, USDA-ARS-MWA—This project uses berseem clover, varieties of medic, a short-cycling brassica, corn, and soybeans to study

the biological interactions among the crops, weeds, and smother plants that would determine their feasibility in a spring-seeded smother plant system.

**Integrated Pest Management for Wireworms, \$25,500;* Larry Pedigo, ISU department of entomology—By using soil sampling, computer modeling, and Geographical Information Systems technology, and by developing user-friendly diagnostic tools for farmers, the goal is to reduce excessive application of insecticides by developing an “early warning system” for sites at risk for wireworm problems.

Biocontrol of Sclerotinia Stem Rot in Soybeans with S. sclerotivorum, \$21,290; Charles Martinson, ISU department of plant pathology—Because certain soil-conserving practices encourage the disease potential of the white mold fungus *S. sclerotivorum*, this project is investigating the use of biocontrol fungal parasites, such as *S. sclerotivorum*, to control soybean stem rot in narrow row and minimum tillage operations.

Evaluation of the Impact of Tillage/Cropping on Soil Microflora and Weed Seedbank Predation, \$20,000; Micheal Owen, ISU department of agronomy—Work is in progress on former eight-year Conservation Reserve Program land at the McNay research farm near Chariton to assess the impact of tillage and cropping systems on the weed seed bank, including the influence of soil microorganism populations and changes in soil microflora resulting from CRP.

Transferring Biological Control Technology to Iowa Strawberry Growers, \$15,000; Donald Lewis, ISU department of entomology—The project is investigating field effectiveness and economics of a number of biocontrol technologies for strawberries, including a biocontrol fungus (*Beauveria*) that attacks tarnished plant bug, fungi that suppress gray mold growth, and corn gluten as an inhibitor of weed germination.

Pheromone Mating Disruption: Novel, Non-toxic Control of the European Corn Borer, \$37,232; Thomas Baker, ISU department of entomology—By dispensing synthetic sources of European corn borer sex pheromones on grassy breeding areas, researchers hope to make male corn borers insensitive to the females’ pheromones, thus reducing their rate of mating and consequent damage to corn crops.

Biological Control of Purple Loosestrife by Two Host-specific European Leaf-Feeding Beetles in Iowa Wetlands, \$8,000; John Obrycki, ISU department of entomology—This project is investigating two beetle species that feed specifically on purple loosestrife leaves and stems, reducing the weed’s ability to compete with desirable native plant species.

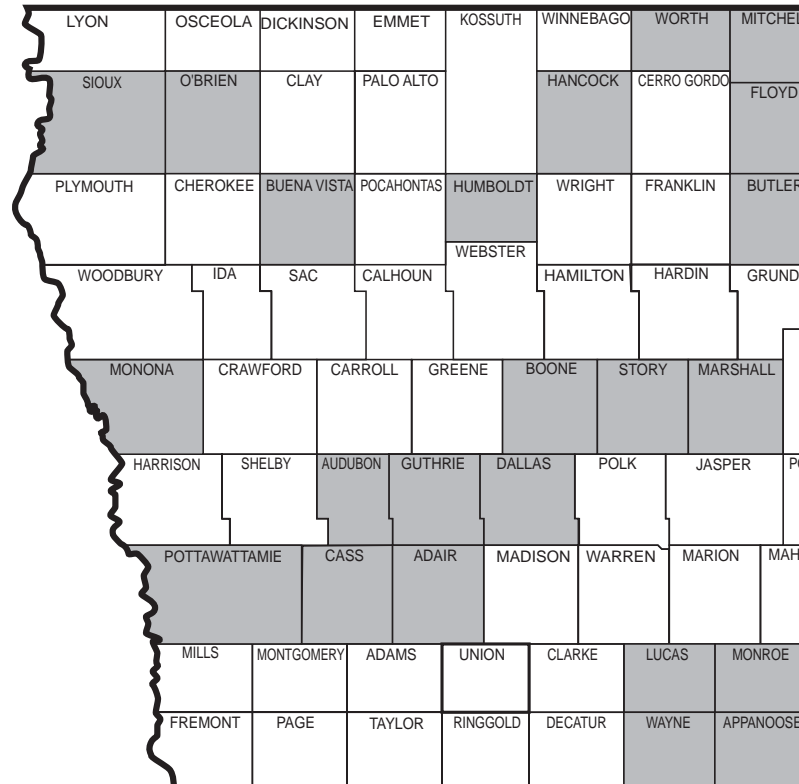
Livestock Management



Coupling Swine Technologies: Pig Production Systems for Iowa, \$40,000; Mark Honeyman, ISU Outlying Research Centers—To demonstrate

alternative approaches for raising swine in Iowa, farmer cooperators will coordinate with outlying research farms to study outdoor pig production options, combinations of technologies, and economics of these systems.

Stability and Activity of Antibiotics in Animal Manures, \$11,600; H. M. Stahr, ISU department of veterinary medicine—Because the presence of antibiotics and pesticides in livestock manures has ramifications for niche food production and odor reduction, this project will evaluate manures from different systems to determine the residuals and stability of common drugs during manure storage and processing.



Two of the FY98 projects (denoted by * in the text) will be active in 1997. Shaded areas indicate additional Iowa counties that will be sites in July 1997.

Nutrient Management

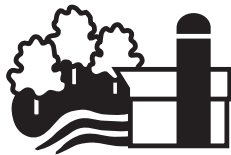


Development of Guidelines for Swine Manure Application in Corn for N Management, \$25,000; Alfred Blackmer, ISU department of agronomy—Using late-spring soil nitrate tests, end-of-season cornstalk tests, and more

than 100 on-farm trials from across Iowa, this project continues work to generate guidelines for site-specific use of swine manure as corn fertilizer.

Education-based Incentive Program to Enhance Long-term Adoption of Sustainable Nutrient and Pest Management—A Demonstration with Farmers in Northeast Iowa, \$3,900; Gerald Miller, ISU department of agronomy—By equipping producers, particularly early career farmers, with expertise in soil map reading, soil testing, setting realistic yield goals, and other skills, this demonstration project hopes to provide a model for farmers to consistently apply techniques they have learned.

Agroecology



Evaluation of Interactions within a Shelterbelt Agroecosystem, \$12,035; Carl W. Mize, ISU department of forestry—In continuing work with a computer model based on a shelterbelt near Ogden, this project is

expanding its efforts to quantify the economic and environmental impact of shelterbelts on production of corn, soybeans, and oats.

Forage Management

Incorporating Native Plant Communities on Farms for Forage and Wildlife, \$20,342; Laura Jackson, University of Northern Iowa department of biology—The project is

establishing native pasture plants in existing cool-season rotational pastures on northeast Iowa farms, testing establishment methods, measuring quality and quantity of forage, and monitoring grazing intensity levels.

Determination of Early Summer Pasture Conditions to Optimize Forage and Calf Productivity and Profitability, \$39,445; Ann Cowen, ISU Cooperative Extension Service—This project will correlate soil properties, forage growth, and stocking rates at the beginning of spring grazing with forage yields, cow reproduction, calf

weight gain, and profitability over the summer to help farmers determine optimal conditions for initiating early spring grazing.

Establishment and Persistence of Legumes on Sites Varying in Aspect, Landscape Position, and Soil Type, \$17,745; Kenneth Moore, ISU department of agronomy—Because of the narrow species diversity in Iowa pastures, this work will investigate increasing the diversity of legume species and mixtures in pastures and assessing their impacts on forage quality and quantity.

Eastern Gamagrass Seed Dormancy, \$11,800; Allen Knapp, ISU department of agronomy—Eastern gamagrass, a highly productive, warm-season perennial that is palatable to cattle, is a potential forage crop for marginal land. But it is impractical for use because it is very difficult to germinate. This work will try to unlock this perennial's seed dormancy mechanisms.

Economic and Environmental Evaluation of Crop Management Systems for Sustainable Agriculture, \$34,616; William D. Batchelor, ISU department of ag and biosystems engineering—This work will investigate various levels of crop management: traditional practices, grid-based soil sampling and crop scouting, sampling and scouting assisted by global positions systems technology, and full precision crop management which maximizes use of GPS, in an effort to help participating farmers determine the best combination of tools for their operations.

Policy



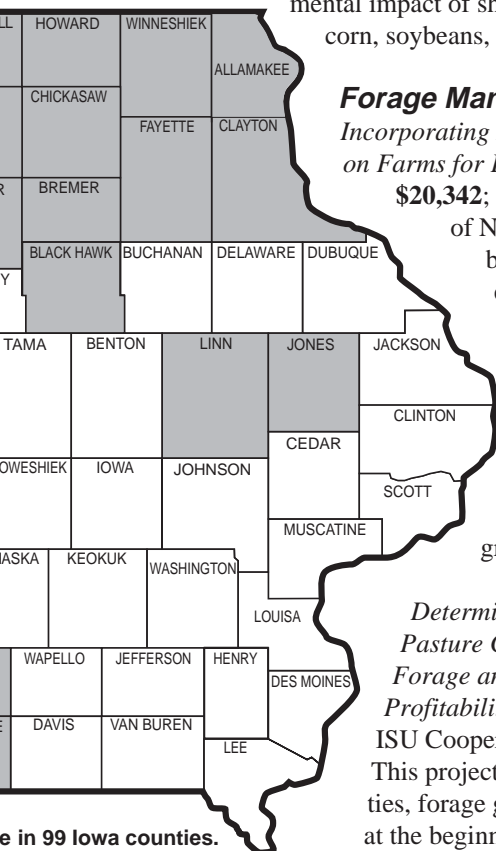
Determining the Benefits of Environmental Improvements in Agricultural Production and Their Sustainability: A Community-based Study of Iowa's Pork Industry, \$29,636; James B. Kliebenstein, ISU department of economics—Surveys and experimental auctions will

be used to assess the willingness of participants (pork producers, neighbors, rural community residents, and non-local pork consumers) to pay for products produced in systems representing various environmental improvements or impacts.

FY99 Request for Proposals to be released soon

The next call for competitive grant proposals—the FY99 Leopold Center RFP—will be released in late July 1997. It will solicit projects to start on July 1, 1998. If you do not receive a copy of the RFP in the mail by early August, please contact the Center at (515) 294-3711.

NOTE: Leopold Letter subscribers do not automatically receive the RFP. If you have not specifically requested this document in the past, please contact the Center to ensure that you receive a copy. The tentative deadline for preproposals responding to the FY99 RFP is Monday Sept. 8, 1997.



in 99 Iowa counties.
s for projects beginning

What influences weed management decisions?

By Micheal D.K. Owen

Professor of agronomy and weed science and

Mike Duffy

Professor of agricultural economics

(both Iowa State University)

In recent years, weed management decisions for many growers in Iowa and the Midwest have become more an issue of herbicide selection than development of an integrated management program. A number of factors are thought to have influenced this change: the competitive nature of the agricultural chemical industry, the shift toward custom application of agricultural chemicals, increasing farm size, increasing percentage of farmland that is rented versus owned by the operator, and adoption of conservation tillage practices.

In addition, because almost all Iowa corn and soybean acres are currently treated with herbicides, the only means for a company to increase sales is to replace one herbicide with another. This has created an extremely competitive marketplace—and extremely high weed-control expectations among growers. One outcome is that many companies now “guarantee” herbicide performance. Growers are less likely to use alternative weed management practices when companies provide a herbicide respray essentially on demand.

To improve understanding of how current management decisions are made, the Leopold Center’s weed management issue team conducted a broad-based survey designed to answer questions about how growers view weed management and how they choose sources of information on which to base decisions. The survey was conducted cooperatively with the Bureau of Agricultural Statistics, Iowa Department of Agriculture. Survey response was excellent; over 1,000 usable responses were received.

Major findings

Weed-management strategies used in corn and soybeans were similar. Herbicides were the primary strategy in both crops; however, 76% of respondents indicated that herbicides were very important in corn, while the value was 84% in soybeans. Herbicides were assessed as very effective 51% of the time in corn and 60% in soybeans. These differences likely reflect differences in planting time, herbicides available, and the high use of post-emergence applications in soybeans. Cultivation was rated “very important” as a corn weed-management strategy for 36% of the respondents, who nevertheless rated this strategy “very effective” only 28% of the time. In soybeans, these values were 30% (for cultivation importance) and 24% (for cultivation effectiveness).

These effectiveness ratings for cultivation are much lower than cur-



Micheal Owen

rent research findings suggest. But in fact, cultivation is an important alternative weed management strategy: when done in a timely fashion, it is highly effective and consistent. The low values reported from the survey likely reflect the dominance of herbicides as a weed management strategy and may be influenced by marketing programs that suggest herbicides will provide season-long weed control. Only 73% of the respondents re-

ported that corn was cultivated; only 55% of the soybeans were cultivated. Rotary hoeing was used on only 18% of the corn and 13% of the soybeans. Unplanned post-emergence resprays were used on 16% of corn acres and on 19% of the soybeans. Interestingly, unplanned herbicide applications were used by 50% more landowners than renters for corn and approximately twice as often for soybeans.

Alternative strategies

Other strategies such as crop rotation, crop competition, and planting date were assessed as very important by 40 to 50% of respondents for corn weed management, while in soybeans, those who reported using these strategies represented only 30% of respondents. Again, university-based research recommendations suggest that these strategies are actually very important components of an overall weed management program. Why growers do not value the contribution of alternative strategies to a weed management program is unknown, but the reasons likely reflect the importance placed on herbicides in current management systems. In addition, agricultural chemical companies assume some liability for the performance of herbicides, while the grower assumes total responsibility for the alternative strategies’ effectiveness.

Herbicides

When asked about the impact of certain herbicide characteristics on their selection process, 81% of respondents ranked effectiveness as very important. Only 17% of the respondents reported that university recommendations were a very

Weed team members

Weed scientists

Bob Hartzler (leader), Doug Buhler, Jack Dekker, Mindy Hoffman, Mike Owen, Brent Pearce

Associated biological scientists

Tom Jurik, Keith Whigham, Dana Dinnes

Farmers

Erick Hovey, Eric Franzenberg, Lee Miller

Agribusiness representatives

Jim Penney, Heart of Iowa Coop; Tom Smidt, independent crop consultant; Steve Strachen, DuPont Agricultural Products

Ag economists

Mike Duffy, Bruce Babcock

important factor in their choice of herbicides, while dealer recommendations tallied 47%. Surprisingly, only 2% of respondents reported advertising as a very important influence in herbicide selection. Also surprising was that growers were evenly split about the influence of guarantees and price on herbicide selection decisions. It was disturbing that 59% of respondents reported that concerns about herbicide resistance in weeds did not influence their herbicide selection.

The previous weed infestation in the field was the most important factor influencing growers' weed management recommendations, while recommendations from dealers and industry representatives were more than twice as important

as university recommendations. The percentage of those reporting that previous weed populations were an important influence was the same for landowners and renters.

Owners and renters

One prevailing presumption in the industry for a number of years is that landlords influence weed control expectations and, consequently, herbicide use. The importance of cost, minimizing trips, maintaining weed-free fields, and combining herbicides and mechanical control strategies was ranked similarly between growers who rent and own farmland.

WEED MANAGEMENT

(continued on page 12)

CHALLENGE

(continued from page 2)

Yields and returns: ICM fields averaged 2.7 bushels higher for corn and 4.5 bushels higher for soybeans. Yields were greater in half the corn fields and both soybean fields.

Assuming \$2.50 corn and \$6.50 soybeans, the ICM fields averaged \$19.62/acre greater net returns. Returns were higher on nine of the 12 fields.

Although the Leopold Challenge was not structured as a scientific research project, this project showed that ICM practices do use resources more efficiently, increasing net returns. Costs, especially for fertilizer, can be reduced.

Impact

In 1997, the 12 cooperators were surveyed about the 1996 growing season and the Challenge program. Although cooperators had been provided free, personalized ICM services and crop consulting, only ten kept adequate records for the comparisons, and only six completed the survey.

The majority of respondents indicated that they had heard of ICM prior to the Challenge project. Two said that the project had changed their perception of ICM. Five of the six respondents said that they would hire an ICM service in the future, and that they would be willing to pay an average of \$3.33/acre for such a service.

Cooperators ranked seven information sources by their importance in influencing decisions. Personal experience was cited as most important by five cooperators and second in importance by the sixth. Among other information sources, crop supply dealers were ranked first, second, or third in importance by five of the six respondents. The other sources, in descending order, were neighbors, university recommendations, crop consultants, company representatives, and printed material.

Five of the six respondents had talked to friends or neighbors about ICM. But only three indicated that those people were interested in ICM; the others were not sure.

Cooperators were also asked about the Leopold Center. Half had heard of the Center prior to the project. One said the Center needed to work harder to "capture the masses." Cooperators also suggested that the Center explore (1) ways to obtain optimal returns while scrutinizing input use, (2)

genetic improvements in plants and animals, (3) global positioning systems, and (4) programs to help sustain small family farms.

Conclusions

Although not a research project *per se*, Challenge results concurred with earlier research showing that ICM can improve farm profitability. Net returns were higher on nine of 12 ICM fields; the average advantage of ICM over conventional practices was \$19.62 per acre. When the costs of ICM service and/or soil testing are considered (about \$6/acre total), the ICM strategy still would have improved net returns by at least \$13/acre.

The Challenge showed that providing personal services and facilitating comparisons on the individual farms did not offset other factors that influence farmers' decisions. Although the dollar results were promising, the cooperators' response to the personalized service was disappointing. The Challenge shows that personal experience, trust, and neighbors are still primary determinants of change. One cooperator said that when his supplier recommended one course of action and the crop consultant another, he followed the supplier's advice because he didn't know if he could "trust" the consultant's judgment.

The Challenge showed that trust cannot be bought—and one growing season is not enough time to earn trust. Only half the cooperators completed the end-of-program survey. And the personal service and direct comparisons were rated "highly effective" by only half of those who did respond. This suggests that the Challenge's approach was not very effective, and that personal experience may still be the key to making changes.

However, in other instances, Iowa farmers have shown that they *are* willing to change. For example, drilled soybeans have increased from two percent of acres in 1989 to 27 percent in 1994. Those farmers made a change without the benefit of personal experience or free comparisons on their fields. Farmers will change if they believe it is in their best interest to do so; therefore, the real challenge, for all of us in research and education, is to develop systems and alternatives that make farmers want to change.

*"One growing season
is not enough time
to earn trust."*

Sustainable agriculture and stock, moving forward

Preliminary Program, July 30–31, 1997, Scheman Continuing Education Building
Iowa State University, Ames, Iowa

WEDNESDAY, JULY 30

- 8:30 - 9:30 a.m. **Registration and coffee**
- 9:30 - 10:45 a.m. **Welcome**
Dennis Keeney, Leopold Center director, and Stanley Johnson, ISU vice provost for Extension
- Conservation as a Commodity**
Paul Johnson, chief, Natural Resources Conservation Service
- 10:45 - 11:15 a.m. **Break/Posters**
- 11:15 a.m. - 12 noon **Gaining support for a sustainable agriculture**
Pat Boddy, Boddy Consulting Group
- 12 noon - 1:00 p.m. **Lunch**
- 1:00 - 2:15 p.m. **Concurrent Session I**
Past and present interdisciplinary issue teams (roundtables or panels; seven choices)
Riparian management systems; Biological controls; Manure management for Iowa farms; Globalization, social change and social capital; Grazing systems/pasture management
Weed research in Iowa; Cropping systems
- 2:15 - 3:00 p.m. **Break/Posters**
- 3:00 - 4:30 p.m. **Concurrent Session II**
• Nitrogen management practices for a new generation
• The future of organic/community supported agriculture
OR
- 3:00 - 5:00 p.m. **Tours** (five choices)
Bear Creek riparian management systems (Roland), Shelterbelts and cropping systems (Ogden), ISU Horticulture Research Farm: Sustainable horticulture research (Ogden), Hooped structures/alternative swine housing, Dave Deyoe farm (Nevada), Beef Nutrition Farm grazing systems (Ames)
- 4:30 - 6:00 p.m. **Social: Cash bar and posters**
- 6:00 - 7:00 p.m. **Dinner** (outdoors, weather permitting)
- 7:15 - 9:00 p.m. **An evening with Nina Leopold Bradley and Michael Carey** (open to public, Benton Auditorium)

THURSDAY, JULY 31

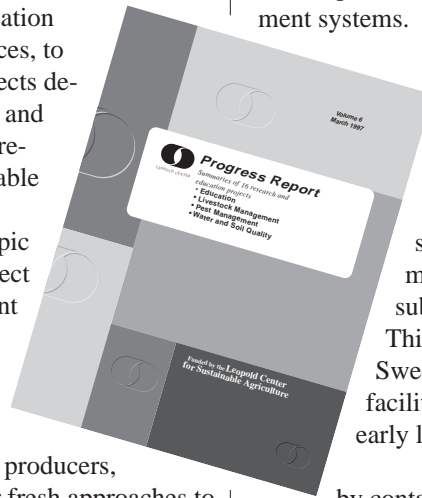
- 7:00 - 8:45 a.m. **Early Bird Tours** (two choices)
• Constructed wetlands/mesocosms, Hinds Farm, north Ames
• Wetlands, Doug McCay Farm, west Ames
- 8:45 - 10:00 a.m. **Concurrent Session III** (three choices)
Swine system options, Food system visions, Water quality research in Iowa, Rural/urban issues, ICM /Integrated Crop Management, Iowa Groundwater Protection Act panel
- 10:00 - 10:45 a.m. **Break/Posters**
- 10:00 a.m. - 12 noon **Tours** (five choices)
Ames Water Pollution Control Facility and Agroforestry system, Swine Nutrition Farm (Ames), Bear Creek riparian management systems (Roland), Jordan Containment Facility Environmental Protection Technology (West Central Coop), Walnut Creek Water Quality Management Systems Evaluation (MSEA)
OR
- 10:45 a.m. - 12 noon **Concurrent Session IV** (two choices)
• Organic and community supported agriculture
• New tests for nitrogen management
- 12:00 - 1:15 p.m. **(Lunch)** **The future of Iowa's water quality programs**
George Hallberg, University of Iowa Hygienic Laboratory director
- 1:15 p.m. - 2:30 p.m. **Concurrent Session V**
Past and present issue teams (seven choices)
Riparian management systems; Biological controls; Manure management for Iowa farms; Globalization, social change and social capital; Grazing systems/pasture management; Weed research in Iowa; Cropping systems
- 2:30 - 2:45 p.m. **Break**
- 2:45 - 4:00 p.m. **Final keynote and wrap-up** (open to public), Benton Auditorium
Dennis Keeney, moderator
- Planting the Future: Aldo Leopold and Henry A. Wallace on Agriculture's Next Century**
Curt Meine, Leopold biographer and naturalist; John Hyde, Wallace biographer; and David Williams, farmer and Leopold Center advisory board member

1997 progress report, fact sheets released

The sixth annual Leopold Center progress report was released in early April. The 60-page volume features illustrated summaries of 16 completed projects funded by the Center, ranging from an agricultural education placemat, to innovative cultivation practices, to shelterbelt establishment. Six of the projects described were directly related to education and outreach; three education delivery teams reported on their efforts to promote sustainable agriculture. Integrated Pest Management strategies were also a well-represented topic for this group of investigators. Other project descriptions include livestock management and soil and water quality. Copies are available at no charge; just phone, fax, or e-mail the Center.

Fact sheets: A new ISU Extension/Leopold Center fact sheet is available for producers, scientists, and Extension staff looking for fresh approaches to managing weed problems. Titled "Relative emergence sequence for weeds of corn and soybeans," this four-page publication, prepared by the Center's weed management team

(see p. 8), explains how weed life cycles, and emergence timing and sequence, might be used with tillage and other cultural practices to develop more integrated weed management systems.



The second installment of the Center's series on options for swine production, "Swedish deep-bedded group nursing systems for feeder pig production," covers options for indoor swine operations based on a model developed by Swedish farmers seeking more natural, stress-free weaning methods to comply with restrictions banning subtherapeutic antibiotic use in animal feeds. This publication describes many features of the Swedish system and explains how to carry out facility design and management through pigs' early lives.

Copies of these fact sheets can be obtained by contacting Extension Publications Distribution at (515) 294-5247; cite SA-11/April 1997 for the weed management bulletin and SA-12/May 1997 for the swine production publication.

News and notes

The Leopold Center received the **Iowa Academy of Science Distinguished Service Award**, accepted by Dennis Keeney at April ceremonies in Dubuque. The award recognizes exceptional service in science, technology, and public service. The Academy is affiliated with the American Association for the Advancement of Science.

The Leopold Center, the Story County Conservation Board, ISU Extension, and several other state and county-based organizations and businesses have developed a **Master Conservationist program** for Story County.

Participants will attend 30 hours of classes in various disciplines related to conservation and will work 32 or more hours to complete a community service project. The program will be held Tuesdays for eight consecutive weeks starting June 3. For information contact Mary Born, Story County Conservation Center, (515) 232-2516.

Eric Brevik is the Center's summer 1997 intern. He holds B.S. and M.A. degrees in geology from the University of North Dakota, and is working on a



Eric Brevik

Ph.D. in soil morphology and genesis at ISU. Eric worked as an environmental consultant before coming to ISU. He hopes to teach and conduct research at a university upon completing his degree. He will arrange field tours and prepare posters for the Center's tenth anniversary conference.

Center director **Dennis Keeney** is on a coordinating team for a leadership program sponsored by the Council for Agricultural Science and Technology. "Scientific Societies: Conversations on Change" drew 50 members to a March workshop to examine changes affecting scientists and technologists in food- and agriculture-related professional societies.

GULF OF IOWA

(continued from page 3)

To help protect the Gulf of Mexico, one of our nation's great resources, those of us upriver must reduce the undesirable substances we put in the river—sewage, disease-causing organisms, pesticides, sediment, or nutrients—before the situation leads to legislation. Iowa farmers want to be good neighbors. This ethic should extend to coastal residents. The agricultural activity that fuels our economy and enhances our quality of life must not detract from the well-being of our Gulf Coast neighbors.

Fortunately, the solution can be win-win. We already

know how to test for side-dress fertilizer nitrogen needs, use legumes in crop rotations, take credit for nitrogen in the soil from manure and legumes, plant buffer and filter strips, and use manure wisely. The challenge is to make these practices even more economical and to increase their adoption.

In the meantime, enjoy those Gulf shrimp.

Dennis R. Keeney

Dennis Keeney is chair of a recently formed USDA hypoxia study committee.

WEED MANAGEMENT

(continued from page 9)

However, land owners were 50% more likely than renters to rank reducing herbicide use as a “very important” part of their management plan. By contrast, renters’ weed management decisions were influenced heavily by landlord or peer pressure. Twice as many renters as owners ranked this as “important” or “very important.” These results suggest that landlords may indeed have a great influence on weed management decisions, and may actually increase the amount of herbicides used. Similarly, renters reported that recommendations from university, dealer, and industry representatives were less important than recommendations from independent crop consultants and landlords.

The survey also addressed the influence of specific weeds on weed-management decisions. When growers were asked what their strategy would be for a non-economically damaging infestation of weeds, generally they replied that they would spray or cultivate. In keeping with general trends, only 15 to 20% of the respondents reported that they would do nothing. While “walking” was suggested as a strategy, only growers with cocklebur

in corn (10%) reported that they would use this option. In soybeans, velvetleaf (13%) and cocklebur (19%) were the weeds for which growers would use walking as a weed management strategy on non-economic infestations.

The survey will require further analysis to understand all the relationships among land ownership, farm size, and weed management attitudes. This preliminary summary has reinforced preconceived ideas about cultivation, landlords, and sources of recommendations; however, advertising and guarantees were not as important as originally thought. Growers reported that alternative strategies were not used frequently, and when used, were not considered as effective as herbicides.

Survey results suggest that the importance of herbicides in a weed management program, and the accountability for performance provided by the agrichemical industry, have decreased the likelihood that growers will select alternative strategies. Ultimately, this trend could lessen the value of herbicides to future weed management programs by increasing the potential for crop injury and encouraging a shift in weed populations to species or biotypes that are better adapted to these management systems, either due to resistance or other biological characteristics.

Events

- July 10** Emmetsburg) **July 11** (Menville)—Northwest Iowa Managed Intensive Grazing Conference and Field Demonstration. Contact Dennis DeWitt, ISU Extension (712) 336-3488.
- July 28-29** Prairie Pastures: Native Plants and Wildlife for Rotational Grazing Systems, Protivin. Contact Laura Jackson, University of Northern Iowa (319) 273-2456.
- July 30-31**—**Tenth Anniversary Conference, Leopold Center for Sustainable Agriculture** Lehman Building, Ames. To register call Deb Schmidt (515) 294-5961. For program information, call Rich Pirog (515) 294-3711.
- Sept. 23-24** Iowa Conference on Emerging Environmental Health Issues, hosted by the Center for Health Effects of Environmental Contamination. University of Iowa campus. Contact David Riley (319) 335-4550.
- Nov. 20**—Iowa’s Water Quality: Shaping Our Future Together, Des Moines. Contact Linda Appelgate, Iowa Environmental Council (515) 237-5321.



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