Organic Agriculture Research Symposium Program

Abstracts and Speaker Biographies

Brian Baker

A Comparison of European and North American organic agriculture research policies

Abstract

Continued growth in the organic sector will depend on overcoming challenges to production, handling and marketing. These challenges can be met by research, innovation, advancement in the technology, and broad dissemination of the results of that research and development. The methodology will involve analysis of public and private funding of organic agriculture research in the US, Canada, European Union member states, and key non-EU countries such as Norway and Switzerland. Priority setting and decision making processes will be compared. After several of growth, private funding for organic agriculture research stagnated in the US for several years starting around 2008. In Canada, private contributions appear to be minimal, with most funding for organic agriculture research funded by Federal and provincial sources. The public institutions have a strong partnership with the Organic Agriculture Centres of Canada. By contrast, the European Union has steadily increased funding for programs to conduct organic agriculture research, as have European countries outside of the EU. Some of the EU member states and private sector funding may have declined but on the whole, in contrast to the US, overall funding has increased. The EU has organized a technology platform for organic. On both sides of the Atlantic, funding is only part of the need. To be effective, research needs to be transferred as practical technologies that farmers can use. North America and Europe take different approaches to the dissemination and diffusion steps. Both sides can learn from the other's experience. The presentation closes with a discussion of opportunities for trans-Atlantic collaboration.

Bio

Baker is an independent consultant specializing in organic and sustainable agriculture. He has been part of the Organic Research and Extension Initiative's Value Added Grains project since 2011. Baker has worked as an International Research Networker for the Research Institute of Organic Agriculture (FiBL) in Frick, Switzerland. Prior to that, he was a Senior Research Fellow of The Organic Center. As a founder of the Organic Materials Review Institute (OMRI), he filled many roles, culminating in his position as Research Director. Dr. Baker has taught classes on organic farming and sustainable agriculture at the University of California, Santa Cruz, the University of Oregon, and the State University of New York at Alfred.

David Bane

Measurement of biomarkers in food animals to assess animal inflammation and wellness

Abstract

Monitoring of biomarkers in food animal populations may assist disease surveillance, help refine management procedures, and be useful to differentiate production systems. These procedures have the potential for practical field use to monitor animal and herd health, to measure therapeutic need or efficacy, to predict animal performance, and to monitor pre-harvest food safety. I intend to present information about biomarkers relevant for organic food animal producers.

Current methods of determining food animal wellness include clinical observation of individuals, herds and flocks; measurement of productivity (daily gain, feed efficiency, litter size, mortality); or measurement of exposure to disease (antibody testing, organism isolation). These methods are inadequate and lack sensitivity to accurately measure food animal wellness because they are crude, retrospective and variably effective depending on the observers, they may be difficult to quantify, or they may simply not correlate to animal

wellness. Disease surveillance and animal wellness measurements are more sensitive and specific in other species where biomarker monitoring is routinely used. Measurement of biomarkers, such as acute phase proteins, may provide objective, quantifiable physiologic data to measure nutritional, environmental, metabolic and subclinical disease problems in food animals. Sensitive, objective measurement of animal disease and stressful conditions could enhance the efficacy of intervention strategies. More research is needed to determine optimum applications of monitoring biomarkers in food animal populations.

Bio

David Bane is a graduate of the University of Illinois and the University of Minnesota. Dr. Bane has been a private veterinary practitioner, an associate professor at the University of Illinois Department of Veterinary Clinical Medicine, and a swine technical consultant for a pharmaceutical company. Currently Dr. Bane operates his own veterinary research and consulting business; and produces pasture-raised pork, beef, lamb, chicken, eggs and turkey on the family farm near Sidney, IL. His current research focus includes objective assessment of animal health and wellness. Dr. Bane's objective is to provide science-based information to farmers, students and veterinarians serving clients that produce and market natural and organic food animals.

Stéphane Bellon

Organics in 3D: diversity, dynamics and design of organic agriculture

Abstract

Together with its growing recognition, organic agriculture continues to develop. In this paper, we address this development with two paradigms - decomposition and identity – and in the perspective of organic redesign. Our viewpoint combines research in agronomic and social sciences. The proposed approach is threefold. First, we show that the tension between the diversity and identity of organics is solved by the adaptation of its frameworks. Then, we account for the main recent dynamics in the organic sector and translate them into research and development challenges, while specifying the roles of institutions in such orientations. Finally, we address two related issues: redesigning organic systems and redefining the expected performances for an organic agriculture in keeping with societal expectations.

Bio

Stéphane Bellon is an agronomist and a senior scientist. Before joining Inra (National Institute for Agricultural Research, Ecodevelopment Unit in Avignon) in 1991, he worked overseas and in a French extension service. His master thesis and first paper (in 1980) were dedicated to organic farming practices and their assessment. His area of work is on transitions to ecologically-based forms of agriculture. He co-authored more than 100 papers and coordinated two books on organic farming. The latest one was released last year (S. Bellon & S. Penvern (Eds), 2014. Organic Farming, Prototype for Sustainable Agricultures, Springer Ed.). He was responsible for the Inra research program on organic food and farming (2006-2013) and is representing Inra in the new Era-Net Core Organic+ ("Coordination of European Transnational Research in Organic Food and Farming Systems") involving 21 EU countries/ regions . He organized or contributed to national events on organic farming, and participated in all Ifoam/ Isofar conferences after 2002. He is one convener of a forthcoming event (https://colloque.inra.fr/innohort2015). He is a member of various national scientific committees and international societies, among which: steering committee of the International Farming Systems Association (EU group), Ecological Society of America, International Society for Horticultural Science. He is a member of the editorial board of the journal “Agroecology and Sustainable Food Systems”. He is also involved in teaching activities at master level, and in the scientific committee of the International Summer School of Agroecology (ISSAE: http://issae.enfa.fr/).

Charles Benbrook

Benefits of Organic Agriculture: Evidence Based Results

Abstract

Since passage of the Organic Food Production Act in 1991 and the establishment of the National Organic Program (NOP) within USDA's Agricultural Marketing Service, the Department has stated, as a matter of policy, that organic farming systems can deliver certain environmental benefits, but organic food is no safer nor more nutritious than conventionally grown food. In the last 20 years, substantial evidence has emerged — much of it grounded in USDA data and research — that contradicts these policy positions. For example, there is little question in the scientific community over whether organic farming systems reduce pesticide dietary risks. The grazing requirement in the NOP rule for dairy operations leads to milk with a more favorable (I.e., more nutritious) fatty acid profile, as well as higher levels of protein and antioxidants. The absence of antibiotic use in organic livestock production systems indisputably reduces the risk of the emergence and spread of antibiotic resistant bacteria with roots on the farm. Likewise, in some circumstances, reliance on animal manures and use of unstable compost by organic farmers increases the risk of microbiological contamination.

In addition, until the USDA openly supports research comparing the nutritional quality and safety of food grown and processed via conventional and organic value chains, the food industry will miss opportunities to advance both across the entire food industry. Reluctance within USDA to change its position and policy regarding the benefits of organic farming systems and technology, or to invest in cutting edge comparative research, is rooted in fear among some commodity groups and companies that new scientific findings and insights will erode confidence in, and hence demand for conventionally grown food, especially in safety and quality-conscious European and Pacific Rim markets.

Such fears will not materialize as long as USDA, and the food industry as a whole, embrace the model used successfully for a half-century by the German auto industry. The Department should recognize that there are often quality attributes in higher-priced organic food that are not present in most low-cost conventional food, just as there are almost always differences between a $35 bottle of Merlot, compared to a $9.00 bottle. Our food system will prosper and innovative more effectively when value-added, high-end products, whether organic or conventional, or something else, are allowed to compete on equal footing in the marketplace. At the same time, relatively lower price brands, conventional and/or organic, should also compete for market share on the merits. But denying that differences exist between premium and bargain-brand products does a disservice to everyone. The USDA needs to revisit its policy regarding the nutritional and food safety advantages of different production systems, and let sound science inform consumer decision-making and guide investments across the food system. Only then will competition and innovation set the stage for higher quality foods to gain market share, and over time improve the quality attributes and performance across the American food system.

Bio

Benbrook is Research Professor at the Center for Sustaining Agriculture and Natural Resources, Washington State University, where he leads a project quantifying the impacts of farming systems, technology, and policy on food nutritional quality, food safety, agricultural productivity, economic performance, natural resources and the environment.

Eric Bietila

Implementing cover crop-based reduced tillage in small scale organic vegetable production

Abstract

Cover crop-based reduced tillage (CCRT) techniques promote the conservation and improvement of soil resources, contributing to the long-term sustainability of cropping systems. Using these practices, the cover crop residues act as a mulch, suppressing weeds while preventing soil erosion and improving soil quality. The use of CCRT practices in small-scale vegetable production was assessed in order to evaluate its impacts on weed suppression and crop yields. Cereal rye, winter wheat, and hairy vetch were fall-sown in 300 ft2 plots in the fall of 2012 and 2013 in a strip-plot design, with traditional tillage and straw mulch included as control treatments. During the following spring, strip tillage was performed to eliminate the cover crops from a 9-inch zone, centered on 30-inch rows. Cover crops were terminated at anthesis in the spring using a sickle-bar mower. Bell peppers, snap beans, and potatoes were planted in each treatment at cover crop termination. Weeds were eliminated by hand as needed throughout the summer, with labor time recorded for each treatment. Cover crop biomass, weed density, and weed species were assessed at cover crop termination, and weed composition was evaluated regularly throughout the production season. Crop yield and quality were measured at harvest. Cereal rye produced greater amounts of biomass than the other cover crop treatments. Greater numbers of weeds were found in the wheat mulch as compared to the cereal rye, impacting the in-season labor required for weed management. Bean and pepper yields were lower in the CCRT treatments than either of the control treatments; however, potato yields did not differ between treatments. Adequate cover crop biomass production was found to be a key factor determining the extent of weed suppression and success of the system.

Bio

Bietila is a Master's student in the Agroecology Program at UW-Madison. His research focuses on the use of organic no-till methods in small scale vegetable production and plant-growth promoting traits in native rhizobacteria. He has enjoyed many years of experience working on organic and biodynamic farms and as an activist concerned with agriculture and environmental justice. He plans to pursue a doctoral degree examining how farming practices affect the ability of beneficial plant-associated bacteria to colonize plant roots.

Kathryn Boys

Export opportunities and import competition: Improving understanding of international markets for US organic farm and processed products

Abstract

As domestic organic policy and international trading relationships continue to evolve, markets are becoming more accessible to US organic farmers and processors. At the same time, due to ongoing efforts to establish organic equivalency agreements with our trading partners (Japan, EU, Canada), foreign firms are increasingly able to access the US market. As a result, both the variety and amount of organic food and ingredients available to US processors and consumers is expanding. The type and volumes of internationally traded organic products therefore have clear and important quantity, price and other market impacts for US organic farmers, ingredient manufacturers, food processors and consumers. Annual data is used to evaluate flows and trends in the type, volume, and timing of US organic food and ingredient exports and imports. Monthly data by aggregate categories (ingredients, finished products) and by disaggregated products (as available) is examined to better understand the opportunities and competition faced by US organic firms during the various product marketing windows. Monthly analysis results are compared against equivalent conventionally produced items to identify additional market trends and potential opportunities for US organic firms and those considering transition to certification.

Bio

Kathryn Boys is an applied economist working the Department of Agricultural and Resource Economics at North Carolina State University. Her research program is broadly focused on analyzing the operation food systems, and evaluating how government policy and private sector programs affect their operation and performance. Her work spans the fields of marketing, economic development, and international trade and is particularly focused on issues of food safety and security. Recent project have focused on barriers precluding smallholder produce farmers from accessing institutional markets, and the role of food safety and business certifications and standards (e.g. traceability, GAP/GHP, HACCP, ISO) in business operations, marketing and market access.

Alisha Bower (moderator)

Bio

Alisha Bower works for the IPM Institute of North America, based in Madison, WI, on School IPM. Alisha received her B.A. in Political Science and Spanish with a minor in Sustainability from the University of Minnesota. She grew up on a hobby farm in Wisconsin's beautiful Driftless Area and environmentally responsible agriculture has been her passion ever since. Working with several non-profits in sustainable agriculture education led her to continue her own studies around effective non-profit management and food systems policy while working on IPM policy and education communications with the IPM Institute. She is currently pursuing her Masters of International Public Affairs at the La Follette School of Public Affairs at UW Madison.

Aurélie Cardona

Collaboration between farmers, extension agents, wholesalers and consumers to design suitable sustainable and organic systems.

Abstract

In France, a great deal of public policies are implemented to support the development of organic farming and to reduce the use of synthetic inputs. However, the rate of organic agriculture areas, production or farmers remains low and France is still the first consumer of synthetic inputs in Europe. This raises the question of the efficiency of these public policies, but also the question of availability and suitability of knowledge on sustainable and organic agriculture. In this context, we see the development of initiatives to favor collaboration between farmers, extension agents, wholesalers and consumers to design suitable sustainable and organic systems. This research aims at understand what are the objectives and challenges of these initiatives.

Some of these initiatives come from consumers others from researchers, farmers or rural development organizations…Within this presentation, two initiatives, studied with interviews and participative observations, will be considered. The first one comes from peri-urban residents wanting to foster their farmer neighbors to adopt environmental-friendly practices. The second one is a research project taking place in an agronomical experimental station where researchers work with farmers, extension agents, wholesaler and consumers to collectively design and assess the experimented organic systems. Even if these initiatives are different, they highlight the interest of the collaboration between various actors of the agri-food system and also the challenges which have to be passed through.

Such processes help to design systems in thinking on their insertion in the agri-food system. For instance, they help to think not only on the reduction of the use of herbicides but also on the impact of such a practice on the farming system, on the quality of the final product required by wholesaler and on the quality accepted by consumers. However, studying these kinds of initiatives shows that these various participants have different

ideas and knowledge concerning sustainable or organic systems or products. Therefore, they have various kinds of production of evidence and way to assess the systems and the practices. Farmers frequently assess the interest of a practice with economic and time-labor criteria. They also look at the links between a given practice and their conception of their work (e.g. being an entrepreneur, protecting the environment or creating a beautiful landscape). Consumers have economic interests but also look for healthy products. They are more or less concerned by the appearance of the product depending if they are more or less informed about the conditions of production etc…Misunderstandings about these different conceptions are often at the origin of lock-in phenomena in the processes of transition towards sustainable and organic practices. Consequently, it appears necessary to have space and time so that farmers, extension agents, wholesalers and consumers learn about one another and share perspectives in order to develop suitable sustainable and organic systems. And finally, this kind of research process does not necessary lead to the production of a given system but more on bearings for the conception and assessment of the system. This communication aims at open the discussion on the use of participatory processes for systems research.

Bio

Aurélie Cardona is a sociologist in the Écodéveloppement research unit at the French National Institute for Agricultural Research (INRA). During her formation in political sciences and sociology, she started to work on the development of alternative forms of agriculture. Her master thesis was dedicated to the changes in the labor organization and in the social network of farmers engaged in short supply chains. Then, during her Ph.D., she looked more closely at the changes in the farming practices and studied the role of non-farming people (consumers, environmental activists…) in transition processes towards sustainable farming.

Eric Carr

Deploying microbes as a seed treatment for protection against soil-borne plant pathogens

Abstract

Plant diseases, especially those caused by soil-borne seed infecting pathogens are a serious constraint to both greenhouse and field production of many agricultural crops. Conventional farming operations often use fumigants and chemical seed treatments for controlling seed and seedling pathogens. However, these materials can be harmful to human health and the environment. The use of many of these materials is also strictly prohibited in organic agriculture, limiting the options for plant disease control. Organic amendments such as compost and vermicompost are used as alternatives to synthetic control methods due, in part, to their success in controlling plant pathogens. Previous studies have confirmed consistent disease suppression using solid and liquid forms of organic amendments and the working hypothesis is that microbes are closely associated with suppression. Furthermore, only a subset of microbes from the bulk material that colonize the seed coat are responsible for disease suppression. So if the specific subset of microbes associated with seed colonization and suppression can be deployed as a seed treatment, can we still achieve plant protection from soil-borne pathogens?

Bio

From laboratory research to field applications, Rick Carr has been studying the science and utilization of compost, vermicompost, and liquid extracts. In 2012, Rick earned a Master of Science degree in Plant Pathology from Cornell University. Under the advisement of Dr. Eric Nelson, Rick conducted research on understanding the mechanisms associated with vermicompost-mediated disease suppression. His research has contributed to understanding biologically-based disease suppression as well as new information on *Pythium aphanidermatum* development and pathogenicity. When Rick was not in the lab, he was often doing outreach and education with Master Composters and Gardeners of New York State. Shortly after graduating from Cornell, Rick left the United States for a research opportunity on a large certified organic farm in Argentina.

While there he developed a new perspective on how laboratory studies translate to on-farm research and application, which has led to his current position at Rodale Institute. Rick has joined the research staff at Rodale Institute as the Compost Production Specialist and his current projects include a novel seed treatment project for suppressing soil-borne plant pathogens and developing additional technologies for urban agriculture.

Anna Cates

Long-term Tillage, Rotation, and Perennialization Effects on Particulate and Aggregate Organic Matter

Abstract

Perennialization and reducing tillage have shown increased soil organic carbon (SOC) in both protected aggregate and particulate organic matter (POM). Since POM is a large, labile fraction of soil organic matter it is considered to be an early indicator of a system's effect on storage of soil carbon and nitrogen. This study investigates how 20 years of management varying in crop rotation, tillage intensity and organic management have affected POM and aggregate C and N. The six systems from the Wisconsin Integrated Cropping Systems Trial (WICST) were: chisel plowed continuous corn (Zea mays L.) (CC), strip-tilled corn-soybean (Glycine max L.) (CS), organically managed corn-soybean-winter wheat (Triticum aestivum L.) inter-seeded with red clover (Trifolium pretense L.) (CSW), three years of alfalfa (Medicago sativa L.) followed by corn (C3A), organically managed oats (Avena sativa L.)/alfalfa for two years followed by corn (C2A) and a rotationally grazed pasture seeded to a mixture of red clover, timothy (Phleum pretense L.), smooth bromegrass (Bromusintermis L.) and orchardgrass (Dactylisglomerata L.) (P). We found significantly lower concentrations of POM in CS and CSW, and significantly greater concentrations of POM-C in P and POM-N in P and C2A. The CSW system had a lower proportion of soil in macroaggregates and lower stocks of C and N within macroaggregates. Our results indicate that the regular cultivation for weed control in CSW is likely disrupting formation of aggregates and storage of C and N therein. However in systems which were chisel plowed every one to three years high levels of biomass C inputs may support high levels of POM-C and POM-N as well as soil aggregation equivalent to the P system.

Bio

Anna Cates is a PhD candidate in Randy Jackson's lab at UW-Madison, studying how soil carbon is stored and cycled in agroecosystems. Anna grew up in Missoula, MT, and received a B.A. in History from Dartmouth College in 2006. She spent several years packing CSA boxes, making goat cheese, discussing local food policy, digging potatoes and washing them on organic vegetable farms in Oregon and Montana before she turned to graduate work in the natural sciences. Anna holds an MSc in Agroecology and Soil Science from UW-Madison. annacates.wordpress.com

Micaela Colley (moderator)

Bio

Micaela Colley is the Executive Director of the Organic Seed Alliance in Port Townsend, WA. Micaela Colley manages participatory plant breeding, research and education projects with farmers, university researchers and other seed professionals. She has authored several educational publications covering topics on organic seed production, on-farm crop improvement and variety trialing and teaches workshops on seed related topics. Micaela has eleven years of experience in the organic seed field including past experience in the organic seed industry.

Jessica Davis

Evaluation of an On-Farm Bio-Fertilizer Production System Using Cyanobacteria

Abstract
Organic agriculture is commonly dependent on off-farm N sources such as manure and compost, which contain about 1% N and are expensive to transport, and products shipped very long distances, such as fish emulsion or blood meal. On-farm fertilizer production has the potential to supply N to crops while reducing input costs and increasing energy-efficiency, ultimately improving agricultural sustainability. We are developing an on-farm biological N fixation system using cyanobacteria produced in ponds and harvested for use as fertilizer. Cyanobacteria fix N from the air using the Sun's energy through photosynthesis; thus, they have the potential to dramatically reduce fossil energy requirements for fertilizer production and transport. We have begun a collection of cyanobacterial cultures and have done laboratory research to select the most productive cultures. We have developed an organic nutrient media to supply nutrients to cyanobacteria so that they can fix N from the air. We compared our organic media to the commonly-used Allen-Arnon media in 2000 L outdoor ponds in a randomized complete block design with three replications; no significant difference in growth or net TKN was found between the two treatments.

We have also begun to evaluate the use of cyanobacterial bio-fertilizer as a liquid fertilizer applied through irrigation systems to lettuce, sweet corn, and kale. Field experiments were conducted during summer 2013 on certified organic land. The treatments in the lettuce and sweet corn experiments were solid organic fertilizers (feather meal and blood meal) and liquid fertilizers (fish emulsion and liquid cyanobacteria) applied at 50 and 100 lbs of N acre-1. Liquid fertilizers were split applied every two weeks while the solid fertilizers were applied prior to planting. There were no significant yield differences among treatments applied to lettuce. In sweet corn, cyanobacterial bio-fertilizer resulted in yields similar to those for fish emulsion and blood meal and higher than those for control and feather meal applications. In addition, three fertilizer treatments (hydrolyzed fish, alfalfa meal and liquid cyanobacteria) were applied to three varieties of kale, and no significant yield effects were found.

In addition to fertilizer efficacy, we have begun to evaluate N fate from different organic fertilizer sources. The solid fertilizers recorded significantly higher soil nitrate-N post-season compared to other treatments. Feather meal and blood meal also increased the N2O flux significantly as compared to the control. The liquid fertilizers did not increase N2O flux compared to the control, probably due to their application in small doses throughout the growing season as compared to the pre-plant application of the solid fertilizers. Our results indicate that cyanobacterial bio-fertilizer is promising for organic farmers since it can be produced on farm and could decrease the cost of fertilizer transportation compared to off-farm organic fertilizers. It will be critical to maximize cyanobacterial growth and N fixation while minimizing costs and to optimize the use of the bio-fertilizer so that N use efficiency is high and losses of N to the environment are low.

Bio
Jessica Davis received her PhD in Soil Science from Texas A&M University in 1989 and has been on the faculty at Colorado State University since 1995. Since 2009, Jessica's research team has focused on developing a process for making nitrogen fertilizer on-farm to eliminate fossil fuel usage in production and transportation of fertilizer while providing a truly local fertilizer for food systems in the USA and Ethiopia.

Kathleen Delate

Lessons from Italy: Policies and Provisions to Facilitate the Transition to Organic Farming

Abstract
In 2014, during a Faculty Professional Development Assignment (sabbatical leave) in Italy, observations and data were collected to understand why Italy was so far ahead of the U.S. when it came to the number of organic farmers (48,269 vs. 14,000 in the U.S.) and why 'organic' was considered a 'normal' way of farming,

compared to the Midwestern U.S. where many organic farmers and researchers experience prejudice and ill will from their neighbors and colleagues.

Methods used: An e-mail survey was conducted of organic farmers and researchers during the sabbatical to gauge opinions on organic research needs. Ten personal interviews were also conducted with organic farmers, researchers and public agency staff who worked on organic certification, marketing and regulations.

Summary of results: Results to date (surveys still arriving on 6/8/14) show a focus in the E.U. (Italy) on cooperation and support that is somewhat lacking in the U.S. An E.U. Focus Group on Organic Farming (EIP-AGRI Focus Group on Organic Farming, May 2014) formulated recommendations that included these critical factors: the need for a systems approach; the need to enhance knowledge sharing; the development of resilient systems; and the need for a broad cultural shift. For an efficient translation of research outcomes into mainstream practical innovation, the Focus Group experts recommend a participatory approach in the whole innovation process flow, from problem identification, to innovation design, generation and validation. A more circular co-production and sharing of knowledge among involved actors is hence recognized as crucial, and the organic sector seems to be at a vanguard in facilitating this method. Government support, in the form of direct payments for transition, also encourages organic transition in both the E.U. and the U.S., but support in the U.S. has been inadequate compared to the E.U. Increased involvement from U.S. government agencies, in terms of support payments and trainings, would be beneficial in developing the organic sector in the U.S.

Bio

Kathleen's current position as Professor at Iowa State University is a joint position between the departments of Horticulture and Agronomy, where she is responsible for research, extension and teaching in organic agriculture. She was awarded the first faculty position in Organic Agriculture at a Land Grant University in the United States in 1997. She has a B.S. in Agronomy and an M.S. in Horticulture from the University of Florida, and a Ph.D. in Agricultural Ecology from the University of California-Berkeley and has conducted over 130 research trials in organic systems in Iowa, Hawaii, and California.

Timothy A. Delbridge

The Barriers to Organic Transition: Impacts and Policy Solutions

Abstract

It has become evident that growth in organic production in the U.S. has not kept up with the growth in consumer demand for organic foods. Although for many years the U.S. was a net exporter of organic crops, imports now exceed exports by a wide margin, and even organic crops that are widely grown in the U.S. (e.g. soybeans, corn, wheat) are being imported in significant quantities. This raises the obvious question of why more farms have not transitioned to organic production. Recent research focusing on the economics of the organic transition decision for a representative crop farm in Minnesota has found that transition costs and uncertainty with respect to organic revenues create a significant barrier to organic adoption. Outside of the field of economics, there is a relatively robust literature focused on the motivations and characteristics of organic and transitioning farmers, and the factors that conventional farms cite as barriers to organic. Others have investigated the regulatory and marketing challenges cited by organic farmers that have returned to conventional production or allowed their certification to lapse. The objective of this paper is to tie together the quantitative studies of risk, returns, and transition costs that are available from the field of agricultural economics with the broader literature on organic adoption to present a more complete view of the barriers to organic transition. The paper will focus on the specific challenges facing organic and transitioning farms (e.g. lack of production data from comparable farms, uneven institutional support, and difficulty in marketing crops and sourcing inputs) as well as the policies that could help to mitigate these barriers and encourage further

transition. Though much of the discussion will be qualitative in nature, analysis of existing production and financial data from organic farms will be used to demonstrate the effect that these barriers have on expected net returns from organic crop management, and the resulting stifling effect that they have on adoption rates.

An Analysis of Crop Insurance Alternatives for Organic Crop Producing Farms

Abstract
There have been several changes made to the most popular crop insurance products available to organic producers for the 2014 crop year. USDA's Risk Management Agency (RMA) has eliminated an arbitrary 5% premium surcharge on organic yield and revenue policies, and has allowed organic specific price elections for a wider range of crops. Another major change creates separate T-yields for both organic and transitional crops for the first time. Both the RMA and outside auditors have argued that the previous practice of allowing organic producers to use conventional T-yields served to overstate the yield potential of many organic farms and resulted in a high level of loss claims. We expect the new T-yields, which are set at as low as 65% of the county's conventional T-yields to be less attractive to newly certified and transitioning farms than the old policies. For these farms, area risk protection insurance (ARPI) products might be a better risk management option.

The objective of this study is to compare crop insurance alternatives using a unique set of production and financial data for crop producing farms in Minnesota that are either currently transitioning land to organic management or have recently transitioned. Some of the 24 farms included in this data set are established organic farms with sufficient yield histories to calculate the farm's Actual Production History (APH) without the T-yields. Others, which are transitioning or newly certified, have yet to establish adequate yield history and would have to rely on the county T-yield to calculate their APH. This diversity allows us to analyze the organic crop insurance program for different types of farms, and to achieve insights into the effect that risk management challenges might have on future organic transition. Rather than simulate insurance products with assumed actuarial fairness, we calculate the actual premiums and indemnities that would have been experienced by these farms under different insurance alternatives. We also investigate the basis risk that these organic farms face when purchasing an area-based risk product. Since farm-level organic yields are presumably less strongly correlated with conventional county yields, the existing ARPI product might be less attractive for organic growers. We compare hypothetical outcomes for our sample farms under existing ARPI products and a product that allows an optimal hedge for organic producers.

Developing a well-performing crop insurance program for organic crops (and indeed, other crops with a paucity of yield data) has been a goal of researchers and insurers for many years. As more farm-level data become available for organic and transitioning farms, including from those that choose not to participate in insurance programs, more realistic analyzes are becoming possible. This study furthers the discussion of how to appropriately bring this growing subset of crop producers under the protective umbrella of the Federal Crop Insurance Corporation. An important part of this discussion is how to further adapt insurance products to be both more efficient and more attractive to growers. This study's analysis of area-based insurance options for organic crops is a step toward achieving this goal.

Bio
Delbridge is currently a Research Associate and Instructor in the Department of Applied Economics at the University of Minnesota. He earned a PhD in the department in July of 2014. Tim's research focuses on the economics of organic adoption, risk management in organic crop production, and other issues related to alternative agricultural systems.

Carolyn Dimitri

The Organic-Conventional Yield Gap

Abstract

One point of contention in discussions of the feasibility of widespread adoption of organic farming systems is the yield gap, where declines in yields are attributed to organic farming systems. As a result, the argument goes, organic farming systems are not practical in terms of providing a sufficient quantity of food. The counter to the argument is provided by analysis of long term cropping system trials, which find that "organic yields are good," and that yields of the organic crops studied averaged about 95 percent of their conventional counterparts. A more recent meta-analysis finds that with good management practices and growing conditions, on a global scale, organic and conventional yields are similar for certain crops. One drawback to many of the studies of organic-conventional yields is the reliance of data produced on research farms or through farming system trials rather than working farms. Clearly this type of work is important, since it presents a best case scenario for the performance of organic farming systems, in terms of food production. Yet the differences in farm size, management practices, and purpose (that is farming for research versus farming to make a living) may have significant implications for the results. Analysis of data collected by USDA's Agriculture Resource and Management Survey suggests that yield differences on working farms appear to be larger than the farming systems trials predict. Widespread analysis of differences between organic-conventional yields has been precluded by lack of data. This paper makes use of the recently released *Organic Production Surveys (2008 and 2011)* along with the Census of Agriculture to analyze, by crop, by state, and at a national level, differences in yields between organic and conventional crops. Other analysis of data explores how specialized organic farms are, relative to conventional farms, in terms of products raised. A final line of exploration uses the data to assess whether the organic farming system, as a whole, has more regional diversification in terms of products raised.

Bio

Carolyn Dimitri is an applied economist with expertise in food systems and food policy. She is currently on the faculty of the Department of Nutrition, Food Studies and Public Health of New York University. Dr. Dimitri is widely recognized as a leading expert on the procurement and marketing of organic food, and has published extensively on the distribution, processing, retailing, and consumption of organic food. Prior to joining the NYU faculty in 2010, Dr. Dimitri worked as a research economist at the Economic Research Service of the US Department of Agriculture for more than a decade. She earned a PhD in Agricultural and Natural Resource Economics from the University of Maryland, College Park, and a BA in Economics from the University at Buffalo.

Annie M. Donoghue

Organic Poultry: Developing Natural Solutions for Reducing Pathogens and Improving Production

Abstract

Organic poultry production is one of the fastest growing segments of organic agriculture (20% increase/year since the establishment of the National Organic Program). Although most management practices in organic production are designed to promote bird health and prevent disease, lack of consistently effective organic therapeutics for enteric diseases can adversely influence bird health and the wholesomeness of poultry products. Enteric diseases such as necrotic enteritis, and food safety hazards caused by the pathogens *Salmonella* and *Campylobacter*, are high priority issues for organic poultry producers. Therefore, there is a critical need to develop strategies to promote gut health and limit disease/pathogens in organically-raised birds. Research from our laboratories indicates that natural compounds such as fatty acids and plant-derived essential oils have antimicrobial efficacy against poultry enteric pathogens and could provide solutions to

address food safety and disease concerns in organic production systems. These selected compounds are all natural, listed as "Generally recognized as safe" (GRAS) by the Food and Drug Administration (FDA), and possess scientifically demonstrated antimicrobial properties. Data have shown that essential oil compounds such as *trans*-cinnamaldehyde from cinnamon (*Cinnamomum verum)*, thymol from thyme (*Thymus vulgaris)* or oregano (*Origanum glandulosum*) and eugenol from clove (*Syzygium aromaticum*), and the fatty acid caprylic acid, offer potentially safe and effective strategies for the control of health problems in organic poultry and comply with National Organic Program standards. Since the NOP is considering revised standards which require more outdoor access in the future, we are evaluating the effect of outdoor and pasture access on the prevalence of beneficial and pathogenic bacteria in poultry, as well as on the chemical, physical and sensory characteristics of the poultry products. In addition, we are evaluating the effect of different pasture compositions and ranging strategies on these parameters. These studies are being replicated at different times during the year to account for seasonal effects. Our team has been actively working to provide useful information to organic poultry producers. We have worked extensively with *eOrganic* to expand poultry-specific information (http://www.extension.org/pages/67911/organic-poultry-production-system). To date, 25 articles on organic poultry production are available to the public. In addition a webinar on food safety in organic poultry production is available on *eOrganic*.

Bio

Annie Donoghue is the Research Leader for the Poultry Production and Product Safety Research Unit, SEA, ARS, USDA and Research Professor within the Center of Excellence for Poultry Science at the University of Arkansas in Fayetteville AR and Acting Research Leader for the Dale Bumpers Small Farm Research Center, SEA, ARS, USDA in Booneville, AR. She received her degrees in Zoology (BS) from San Diego State University, Animal Science (MS) from Texas A&M University and Physiology (PhD) from the F. Edward Hebert School of Medicine, Uniformed Services University of the Health Sciences. After a postdoctoral fellowship at the Smithsonian Institution she joined ARS as a research scientist in Beltsville MD. In 2000 she moved to Arkansas to serve as Research Leader for the Fayetteville unit and served as the Research Leader for the Dale Bumpers Small Farm Research Center in 2008-2009 and again since 2012. The Center is located on 2,214 acres and focuses on increasing profitability of farmers by conducting research to develop innovative strategies and technologies for small/medium size forage/livestock/agroforestry farms that conserve natural resources, improve economic viability and environmental quality. Both units focus on sustainable animal production systems with key research in organic livestock and poultry production and developing environmentally-friendly methods to utilize manure. She has a special interest in working with military veterans interested in agriculture. Dr. Donoghue has published more than 200 peer-reviewed manuscripts, patents, invited proceedings or book chapters. She serves on the Administrative Council for Southern Sustainable Agriculture Research and Education (SSARE) and is the Science Advisor for the E. Kika de la Garza Fellowship Program. She received numerous honors including the U.S. Presidential Early Career Award for Scientists and Engineers; the HyLine International Research Award; and the National Excellence in Technology Transfer Award from the Federal Laboratory Consortium.

Ruth Genger

Building a healthy organic seed system for potatoes through farmer-researcher partnerships.

Abstract

Many important crops are propagated vegetatively, rather than by true seeds. These include root and tuber crops such as potato, sweet potato and yam, and many berries, tree fruits and nuts. A challenge in vegetative crop propagation is transmission of plant pathogens between generations, since pathogens infecting the parent plant will generally be present in the progeny. Certification programs, which certify planting stock as disease-free, exist for some crops including potato, sweet potato and strawberry, and contribute to improved

disease management for growers who purchase certified planting stock. These programs are often focused on conventional agriculture and do not meet the needs of organic growers for organic planting stock and for varieties suited to organic production and markets. We partner with Midwest organic farmers to conduct on-farm trials aimed at the following research goals: to optimize seed potato production under organic management; to evaluate existing potato varieties under organic management; and to breed new potato varieties for organic production in the Midwest.

Our early on-farm research (2008-2009) demonstrated that organic production of high quality seed potatoes is feasible in many locations throughout Wisconsin. From 2010-2012, we evaluated organic management strategies for seed potato production, focusing on control of potato viruses. We found that border crops were not a useful strategy, but pre-sprouting of seed tubers held promise. In addition, we optimized organic production methods for early generation seed potato production. From 2010 to 2012, we evaluated commercially available potato varieties on organic farms throughout Wisconsin, and on organically managed land at the West Madison Agricultural Research Station (ARS). Varieties were evaluated for early vigor, vine size, insect and disease damage, total and marketable yield, and tuber defects, and data on farm environment and management was collected. Significant differences in variety performance were noted, particularly for marketable yield. Tuber defects were a significant cause of loss, with between 24% and 38% of total yield culled. Three tuber defect diseases, common scab (Streptomyces scabies), silver scurf (Helminthosporium solani), and black scurf (Rhizoctonia solani), were the most common causes of post-harvest losses. In 2013 and 2014, we used a 'mother-baby' trial design to evaluate heirloom varieties from the Seed Savers Exchange collection in comparison to the best-performing varieties from previous trials. Replicated trials for all varieties (25 in 2013 and 50 in 2014) were planted at West Madison ARS (the 'mother' site) and single replicates of subsets of these varieties were grown at organic farms across the Midwest (25 farms in 2013 and 27 farms in 2014). Several heirloom varieties with potential for drought tolerance, early blight resistance, and potato leafhopper resistance were identified. We have developed breeding lines from crosses between high performing varieties and will present results from 2014 field trials.

Bio
Ruth Genger is a researcher in the Charkowski lab at the University of Wisconsin-Madison. She has been learning about organic potato production from and with Midwest farmers since 2007. Ruth's research focuses on organic production of healthy seed potatoes, and on selecting potato varieties adapted to organic production in the Midwest. Ruth's goal is to aid in the development of a healthy, resilient Midwest food system.

Walter Goldstein

Breeding high nutritional value corn for organic farmers.

Abstract
The Mandaamin Institute breeding program is part of a USDA/NIFA/OREI funded team (including USDA, Cornell University, New Mexico State University, Montgomery Consulting, and Mandaamin) that is breeding corn varieties for organic farmers. An organic winter nursery at the University of Puerto Rico enables us to have two breeding seasons each year.

The emphasis of the Mandaamin program is developing adapted, robust, weed competitive cultivars with 1) higher protein content, protein quality, and carotenoid content; 2) greater N efficiency (including positive yield and protein response to inoculation with diazotrophic bacteria); 3) cross incompatibility with transgenic cultivars to avoid pollen contamination from GMO's; and 4) greater competitive ability with weeds. Our

breeding program utilizes standard inbreeding procedures, early progeny testing, creation of improved synthetic breeding pools, and testing of hybrids and inbreds under organic conditions.
Two years of trials with competition between corn and weeds suggested that the hybrids from our program had significantly greater suppression of weeds than commercial hybrids or crosses with commercial inbreds. Outstanding combining ability is an additional key trait needed for making competitive hybrids. Yield trials are carried out on multiple sites and states in conjunction with USDA-ARS and the US Testing Network. A few of the hybrids that are crosses between our lines or crosses of our lines with commercial inbreds appear to be yield competitive, though sometimes slightly higher in moisture. Multi-year and multi-site positive results are needed before release of hybrids.

Our first set of inbreds with the Ga1 allele for gametophytic incompatibility appear to be highly effective at preventing contamination from normal cultivars that do not have that allele.
Seed selection includes visual selection for opaque kernels and carotenoids and spectrophotometric and chemical testing for essential amino acids. Opaque kernel traits associated with high methionine content have 'emerged' from a number of populations or inbred lines suggesting greater epigenetic suppression of the major storage protein in grain, α zein.

Testing for N efficiency involves seed inoculation with diazotrophic bacteria and employs field sites that are low in available N. Preliminary field results suggest that N efficiency has been increased by crossing Corn Belt inbreds with landraces that respond to inoculation with diazotrophic endophytes and perform relatively well on N limited soils. Initial data from the Institute of Ecology and Evolution, University of Oregon, suggests that breeding with these landraces and farming systems may affect the dynamics of seedborne microbes, specifically the relative abundance of Fusarium species, and diazotrophic bacteria that are carried in seed from one generation to another.

Bio
Walter Goldstein is Executive Director/Research Director at the Mandaamin Institute, Inc., located in SE Wisconsin. His work has included on-farm research (crop rotations, cover crops, soil organic matter, root health) and helping organic farming in Eastern Europe. Dr. Goldstein's present work focusses on breeding open pollinated and hybrid varieties of corn for organic farmers. Emphasis is on better nutritional quality, nitrogen efficiency, competitiveness with weeds, and breeding for the ability to prevent pollination from GM corn. The research is part of an OREI funded team project breeding corn for organic farmers. He is also active working together with organic organizations and other researchers to foster a Soil and Crop Quality Testing Network.

David Granatstein

Characteristics of Washington's Organic Farming Sector in a Period of Rapid Change

Abstract
The organic farm sector in Washington State experienced rapid growth from 2005-2009. Acres and number of farms have declined since, while farmgate sales reached new yearly highs in 2010-2013. Specialty crops appear to make up at least 70% of the $355 million in farmgate sales (2012). Market average organic yields were generally below NASS yields for the state, but higher prices often offset lower yields and led to greater gross revenue per acre. A number of organic growers are achieving yields ≥ the NASS averages, with higher yields correlated with larger farm size for some crops. In analyzing entry and exit trends of certified organic farms, scale, region, crop choice, and market (direct vs. wholesale) were important determinants of success. Entry rates were strongly positively correlated with total organic acres and varied widely, while exit rates were very stable over time whether in a period of expansion (2005-2009) or of decline (2009-2013).

Bio

David Granatstein has been with the Washington State University (WSU) Center for Sustaining Agriculture and Natural Resources since its start in 1993. He has worked on sustainable agriculture and organic farming for over 35 years on different crops and in a number of states and countries. He currently focuses on tree fruit production, organic systems, soil quality, and organic statistics.

Stuart Grandy

Increased microbial efficiency and growth drive soil organic matter increases in organic cropping systems

Abstract

Soil carbon sequestration in agricultural systems is vital to promoting agroecosystem sustainability, yet the underlying mechanisms remain contentious. We examined whether variations in the diversity or chemistry of plant residue inputs in organic cropping systems, and their processing by microbial communities, may influence the stabilization efficiency of plant residue inputs. We explored a novel mechanism based on microbial ecophysiology for increases in soil carbon associated with organic production. We hypothesized that microbes in the organic production system would have higher growth rates and growth efficiencies and that this would result in greater biomass production and turnover time. We show that new carbon inputs are more rapidly incorporated into biomass in organic systems, which is related to 20% higher microbial growth rate, 15% higher biomass, and 20% higher growth efficiency. These differences in microbial physiology appear related to greater stabilization of new carbon inputs. Microbial communities in diverse organic cropping systems have microbial physiological characteristics that enhance the efficiency of new carbon input conversion to soil organic matter.

Bio

I am an Associate Professor of Soil Fertility and Biogeochemistry at the University of New Hampshire. Previously, I was an Assistant Professor at Michigan State University and a USDA postdoctoral fellow at the University of Colorado studying the effects on N fertilizer use on soil organic matter dynamics. Before that, I did my Ph.D. at the MSU W.K. Kellogg Biological Station Long-Term Ecological Research Project, studying how crop rotations, plant diversity, and tillage influence soil organisms and organic matter dynamics. My research examines how soil organisms interact with their environment to regulate ecosystem processes such as nutrient cycling, organic matter turnover, trace gas emissions, and productivity. This research encompasses multiple spatial scales and lies at the interface of soil ecology, agronomy, and ecosystem science. While I use a range of fundamental laboratory methods, which include molecular chemical and microbiological approaches, I always have an eye towards applying results to improve agroecosystem processes and management, and my results are frequently shared with stakeholders. I am currently the president of the Soil Ecology Society and lead editor of Biogeochemistry Letters; I have published 54 consistently well cited papers (H index of 23) to date in top-ranked journals including Ecology Letters, Nature Geosciences, Global Change Biology, and Agriculture, Ecosystems and Environment; and have given more than 30 invited talks and seminars on agroecosystem dynamics. A major emphasis in my program now is on how cropping system diversity and cover crops in organic and conventional cropping systems influence soil health.

Abbe Hamilton

How organic farmers maximize the ecosystem service provisioning potential of cover crops in the Mid-Atlantic

Abstract

Cover crops are annual crops planted on agricultural fields for a primary reason other than for harvest. They provide a suite of ecosystem services including the control of weed populations, soil erosion, structure, and organic matter as well as maintaining or improving ground and surface water quality. Planting cover crops is a significant step towards a more sustainable agriculture and is a practice employed by farmers across a broad sustainability gradient. Although it is a fast growing practice, there is a dearth of knowledge about how organic farmers are successfully incorporating cover crops within the constraints of their management practices and rotations. I am conducting an on-farm study of cover cropping practices among Pennsylvania farmers, with results easily applicable to farms throughout the Northeast and Mid-Atlantic. This research provides needed information on the patterns of farmer practice, site dependencies and farmer attitudes that result in cover crop adoption. It also explores the provisioning potential of cover crops under different management conditions as compared to the goals of the farmer in planting the cover crop. I do this by collecting and synthesizing case studies (using a standard set of survey questions) from approximately 40 farms, including a high number of organic and organically managed farms, using cover crops in field rotations. So far I've visited 22 cooperating farms.

On each farm I conduct an in-person survey of practices and attitudes and a rapid ecosystem assessment, assessing indicators of soil quality, cover crop biomass and a number of ecosystem services associated with the cover crop. I will then link the ecosystem service provisioning potential of the cover crop to its site's characteristics, cultural methods and indicators of farmer perspective. This process allows me to connect the farmer's opinions and practices with the provisioning quality of their cover crop in order to make novel conclusions about the link between the human and ecological elements of cover cropping.

Bio

Hamilton's Master's degree research at Penn State compares farmers' motivations to plant cover crops with the actual ecosystem services those crops provide. She is also interested in determining the current and ultimate limitations to cover cropping in the Mid-Atlantic region through farmer interviews, and the differences in cover crop needs among different types of farmers. She hopes to help determine the limits of cover cropping as a useful conservation tool. Abbe also contributes to the weed ecology operations of the ongoing Cover Crop Cocktails project.

Kitt Healy

Variety trials for direct market quality and flavor

Abstract

Sales to local food markets can be a valuable opportunity for organic producers. Access to these markets depends on raising high quality produce. Flavor and quality are difficult to measure in a quantitative way when selecting varieties, but critical to capturing high value markets. Recent interest from chefs and farmers in evaluating flavor with plant breeders gives us an opportunity to pursue selection for direct market quality and flavor in collaboration with endusers. We will present results from variety trials conducted in Southern Wisconsin in 2014 and focused on flavor and quality for direct market vegetable production. This project uses participatory research methods to evaluate 40 varieties of tomatoes and 250 varieties of carrots, as well as a few varieties of hot and sweet pepper, winter squash, melon, beet, onion, lettuce and brassica greens, for beneficial agronomic traits, disease resistance, flavor and quality for local and regional markets. The experimental design for this project follows a "mother daughter" model of participatory research, combining on farm trials of a few varieties with larger trials at the academic research station. Tomatoes, kale and carrots

will be grown in hoop house as well as field conditions to assess trial varieties' fitness for season extension and the effect of hoop house growing on agronomic and culinary traits. Varieties were chosen for the trials based on purported agronomic traits and culinary quality. Farmers, chefs, seed companies, seed saving organizations, and plant breeders were involved in variety selection. Agronomic traits include date of flowering and maturity, disease incidence, yield and marketable yield by weight. Farmers will score varieties and also contribute observational data about market characteristics. At harvest we will measure Brix, pH, titratable acidity, and phytonutrient content using high performance liquid chromatography (HPLC). We are collaborating with six chefs in the Madison area to conduct an expert sensory evaluation of all varieties. Flavor is complex trait and by involving chefs directly in the evaluation process, we will take advantage of their expertise in quality assessment and the development of metrics for sensory analysis. Trained sensory analysis panels are effective.

Bio

Kitt Healy is a Masters Candidate in Horticulture and Agroecology at UW Madison. Her research focuses building a collaborative network of farmers, breeders and chefs in the Madison area. Before coming to UW Madison in 2013, Kitt worked as the community outreach coordinator for Green City Market in Chicago, and as a community food systems research assistant and policy advocate in New Orleans.

Bradley Heins

Effect of Growth, Meat Quality, Profitability, and Consumer Acceptability of Organically Raised Dairy-Beef Steers

Abstract

There is an increase in global demand for organic products, and organic dairy-beef, especially grass-fed and finished, has the potential to address some of the consumer concerns associated with conventional dairy-beef. Furthermore, bull calves may represent a potential additional source of revenue for organic dairy producers. The overall objective of the proposed project is to determine the effect of growth, meat quality, consumer acceptability, and profitability of organically-fed dairy steers compared to conventionally-fed dairy steers.

The study was conducted at the University of Minnesota West Central Research and Outreach Center (WCROC), Morris, Minnesota. The research dairy at the West Central Research and Outreach Center, Morris has a 200-head low-input and organic grazing system. Dairy bull calves (n = 49) were born from March 18 to May 27, 2011. Calves were randomly assigned to 1 of 3 replicated groups at birth, but balanced by breed group to reduced potential breed bias; conventional (CONV, n = 16), organic (ORG, n = 16), and organic-grass only (GRASS, n = 17).

The CONV steers were fed a diet of 80% concentrate and 20% roughage and received steroidal implants. The ORG steers were fed a diet of organic corn, organic corn silage, and at least 30% of their diet consisted of organic pasture during the grazing season. The GRASS steers grazed pasture during the grazing season and were fed high quality hay or hay silage during the non-grazing season.

The grass-only dairy steers had greater days to slaughter, lower slaughter weights, and had lower average daily gains than conventional steers. Average daily gains from birth (lb/day) were 2.52 (conventional), 1.79 (organic), and 1.35 (grass-only). The fat from the grass-only steers was higher in Omega-3 fatty acid and lower in monounsaturated and saturated fat. Consumers who rated the beef found no significant difference for overall liking for the conventional and organic beef. The organic beef had significantly higher flavor liking than the conventional beef. However, consumers rated the grass-only beef the lowest in overall liking and flavor.

For profitability, grain costs were substantially higher for the organic steers, and therefore, resulted in a net loss per steer (-$644/steer). The grass-only steers had the highest profit per steer ($593 vs. $442) compared to conventional steers because of lower feed costs, mainly pasture.
The conventional steers had some advantage over the grass-only steers, and the conventional dairy steers grew much faster and required less time to slaughter. However, grass-only steers required fewer resources than conventional steers. Organic dairy producers trying to seek relief from high grain prices, with a little "extra" pasture may be able to make a profit from feeding organic dairy steers versus selling them to conventional markets.

Bio
Heins is Assistant Professor of Organic Dairy Management at the University of Minnesota's West Central Research Center in Morris. The Center has a 110-head herd in a certified organic system, and a 140-head herd in a conventional grazing system. Heins's research and extension program focuses on best management practices for organic dairy production, management intensive grazing, supplementation strategies for organic cattle, crossbreeding, and group rearing of calves in an organic system. He serves on the Minnesota Organic Advisory Task Force.

Erin Hill

Quantifying the impacts of cover crops on organic dry beans

Abstract
Cover crops benefit organic systems by suppressing weeds and increasing nutrient availability. Michigan is the number one organic dry bean producing state, and our goal was to determine the most beneficial cover crop for planting prior to dry beans. A field experiment was conducted at 6 university and 18 on-farm locations in Michigan over a three year period. The cover crops studied included: medium red clover, oilseed radish, and cereal rye; a no cover treatment was also included. Within each cover crop treatment there were up to four bean varieties planted; 'Zorro' and 'Black velvet' black beans and 'Vista' and 'R-99' (non-nodulating) navy beans. Cover crop biomass, percent cover, and nitrogen content were recorded at peak production. Nitrogen (N) availability was monitored by soil sampling in the fall and throughout the dry bean growing season. Differences in bean plant N were measured using a chlorophyll meter. After harvest total N in the bean seed was measured. Dry bean nodulation, populations and yield were also recorded. Weed counts and biomass were measured twice during each season. Over the three years of study, cover crop biomass averaged 6,900, 3,600, and 9,600 lbs/A for clover, oilseed radish, and rye, respectively at the university locations; average weed biomass in the no cover treatment was 2,900 lbs/A. Later cover crop planting dates at the on-farm sites generally resulted in lower cover crop biomass. Soil samples throughout the season indicate that when large amounts of clover biomass were present (>5,500 lbs/A) soil available N was increased by up to 50 lbs N/A compared to the no cover treatment at dry bean planting and V2. At half of the university site-years, an increase in available soil N, up to 15 lbs N/A, was observed following oilseed radish at V2. Conversely, rye biomass exceeding 10,500 lb/A decreased N available to beans at planting and V2 by up to 20 lbs N/A. Bean chlorophyll meter readings often mirrored these N differences, particularly for clover, and fewer nodules were found on beans following clover later in the season (R1), showing a reduced reliance on fixation. Higher soil N following clover sometimes increased weed numbers and biomass. Bean populations and yield were not often impacted by cover crop. Dry bean yields following clover were similar to yields in the no cover treatment; however seed N increased by 10-30% when clover biomass was >5,500 lbs/A. Rye and clover cover crops planted prior to dry beans present a slight risk to producers because of the potential for reduced N availability and increased weed pressure, respectively. Earlier spring management of these two cover crops, prior to excess biomass accumulation, could mitigate these risks. Oilseed radish did not influence dry bean stand, weed pressure, or N availability. With regard to dry bean variety, black bean populations were usually greater than

navy beans; however, yield was seldom greater. Of the two black bean varieties, 'Black velvet' showed increased nodulation and occasionally grain N content compared to 'Zorro'; 'Black velvet' is a later maturing variety.

Bio

Erin Hill is a research assistant with the Department of Plant, Soil and Microbial Sciences at Michigan State University. Her Ph.D. in Crop and Soil Science (2014) focused on how cover crops impact nutrient cycling and weed pressure in organic dry bean systems. Erin's M.S. research in horticulture explored the impacts of competition and allelopathy of hairy vetch and cowpea cover crops on weed communities in pickling cucumber. She has been a member of the Midwest Cover Crop Council since its inaugural meeting in 2006 and has served as the web administrator of MCCC.msu.edu since its 2008 launch. In addition to cover crops, Erin's research and extension interests include sustainable and organic weed management, weed ecology and herbicide resistance management.

John Jeavons (Thursday breakfast session)

Bio

John Jeavons is Director of the GROW BIOINTENSIVE Mini-Farming program for Ecology Action since 1972. John is giving the keynote and teaching workshops at the 2015 Organic Farming Conference. He is the author of *How to Grow More Vegetablesand Fruits, Nuts, Berries, Grains, and Other Crops Than You Ever Thought Possible On Less Land Than You Can Imagine*, the primer on sustainable Biointensive Mini-Farming, which is currently available in English, Spanish, German, French, Arabic, Hindi and Russian.

Diana Jerkins (moderator)

Bio

Diana Jerkins serves as Research Program Director for the Organic Farming Research Foundation, headquartered in Santa Cruz, CA. She has decades of experience in agricultural research, federal program management, university administration and hands-on farming. She was a National Program Leader with the US Department of Agriculture's National Institute of Food and Agriculture (NIFA) between 2002 and 2014, and also helped implement the agency's first sustainable and organic agriculture programs. Prior to joining NIFA, Diana directed the Center for Regenerative Studies at Cal Poly Pomona. She earned her graduate degrees from the University of Georgia, including an MA in Agronomy, and a PhD in Entomology. She works remotely while continuing management of her historic, 240-acre organic farm in Gordonsville, VA.

Ken Johnson

Biocontrol of fire blight: why a yeast represents a new paradigm in disease suppression

Abstract

In 2015, apples and pears produced organically under the USDA National Organic Program standard must utilize non-antibiotic materials in spray programs for fire blight suppression. Recent research on effective fire blight management with non-antibiotic materials will be reviewed and approaches to integrated sequencing of materials will be presented. Fire blight control materials will be discussed in the context of orchard sanitation, pathogen growth on flowers, flower infection, and summer phases of the disease. Interactions among non-antibiotic materials and their potential to cause russeting on developing fruits will be addressed.

Bio

Johnson is Professor of Plant Pathology at Oregon State University. He teaches courses in introductory plant pathology and plant disease management. His research program is concerned with economically important

diseases of horticultural crops with an emphasis on bacterial pathogens including fire blight of pear and apple. With fire blight, Dr. Johnson's recent projects have focused on integrated non-antibiotic control, improved pathogen detection, and induction of acquired resistance in fruit trees to mitigate the damage caused by this disease.

Keefe Keeley

Woodland grazing management and hardwood silvopasture in the upper Midwest

Abstract

Most farms in the hilly Driftless region of the Upper Midwest include woodlands, and many farmers use their woodlands for grazing. Currently, farmers have limited professional guidance about best practices for managing grazing in woodlands, as most woodland research has focused on other forestry-related practices or has documented the well-known negative impacts of overgrazing, including woodland degradation, long-term loss of value, soil erosion, water quality impacts, and wildlife habitat loss. We present preliminary guidelines for improving the sustainability of grazing woodlands based on 26 interviews and 3 focus groups with farmers and resource professionals, as well as a survey of research literature. These guidelines are designed to enable farmers to assess their type of woods and the condition of woody and herbaceous vegetation, soils, water, and wildlife. Assessment of woodland pasture conditions can be used to adaptively manage woodland grazing. We also highlight woodland grazing research needs identified by farmers and resource professionals. As a management alternative to continuous overgrazing of woodlands, we evaluated the potential for adoption of silvopasture, an agroforestry practice that intensively integrates production of timber, forages, and livestock. We are developing case studies of silvopasture practices on several farms in the upper Midwest, and we are initiating experimental on-farm silvopasture trials that mimic southern Wisconsin's historic oak savannas. This research tests the influence of canopy thinning, forage establishment, and rotational grazing on environmental outcomes, beef production, and profitability in degraded oak woodlands. We do not propose that new or vulnerable woodlands be opened to grazing, but rather aim to fill a need for research on restorative grazing practices in woods historically degraded by overgrazing and other factors.

Bio

Keeley hails from the Kickapoo Valley of Wisconsin. He is currently a PhD student in the Environment and Resources program of the Gaylord Nelson Institute for Environmental Studies at the University of Wisconsin – Madison. In Wisconsin, he has worked in various capacities on diversified organic farms, as well as with the state's Department of Agriculture, Trade, and Consumer Protection in local food system development. He has also studied, and served with farmers in a dozen countries worldwide. Currently, as Executive Director of the Savanna Institute, he works with farmers on participatory research, education, and outreach about agro-ecosystems that mimic native oak savannas of the upper Midwest.

Lisa Kissing Kucek

Participatory Breeding of Wheat, Spelt, Emmer, and Einkorn for Organic Farming Systems in the Northeast United States

Abstract

Organic agriculture requires crop genotypes that are optimally suited to local agroecosystems and markets. However, few breeding programs are designed to meet the needs of organic farming. The high-input environments used in most breeding programs are not representative of the nitrogen limitations, heavy weed pressure, and limited pesticide options often encountered in organic agriculture. Consequently, cultivars released from conventional breeding programs have not consistently performed in organic systems. Moreover, organic farmers seek quality, stability, and use traits that differ from the targets of established

breeding programs. Despite the need to develop new genotypes, the relatively small size of the organic seed market discourages public and private investment in organic breeding. Decentralized breeding structures have been proposed as a practical alternative for organic agriculture. With decentralization, farmers are more involved in testing, selecting, and/or maintaining varieties adapted to their specific environments and management systems. Decentralized methods, such as participatory plant breeding, can also help increase farmer adoption of developed varieties, boost on-farm biological diversity, and establish ties between researchers and farmers that facilitate future agricultural innovation and problem solving.

A participatory breeding methodology was employed to select wheat, spelt, emmer, and einkorn genotypes for organic farms of the Northeast United States. Researchers conducted structured interviews with ten participating farms to identify crop ideotypes and rank priority traits for selection. The interview results were used to design plot layouts and selection protocols tailored to the breeding objectives of each farm. Farmers established and made selections of F3 and F4 populations derived from crosses between diverse parents. Using independent culling, each farmer selected 10% of individual plants that best expressed phenotypes for priority traits. To evaluate the impact of farmer selection on the early generation populations, researchers compared the 10% of selected individuals to a random sample from each population. Evaluated characteristics included protein, thousand-kernel weight, seed size, kernel color, and straw quality. Although each of the ten farmers identified a distinct set of priority traits, two predominant characteristics were critical to participating farms: weed competitive ability and straw quality. Wheat genotypes with superior weed competitive ability were selected through early vigor, planophile growth habit, and yield under uniform weed conditions. To select for straw quality, a farmer-established ranking system was used to identify superior stalks and tall height. Selection on certain farms also included kernel color, protein, and performance under wet soil conditions. Tolerance to lodging, fusarium head blight and preharvest sprouting are priority traits that will be evaluated in advanced yield trials once populations have reached homozygosity (~97%) in the F6 generation. Comparison of randomly sampled versus selected genotypes indicated that farmers can effectively make genetic gains in desirable traits. In conclusion, participatory breeding can design locally-adapted genotypes that optimize the productivity and marketability of organic food systems.

Bio

Kucek strives to build stable food systems for future generations. Her work focuses on empowering farmers to build agricultural systems that can withstand climate change, uncertain fossil fuel supplies and resource degradation. Using the tools of participatory plant breeding, she helps farmers select crops that meet their needs in sustainable farming systems. As a graduate student at Cornell University, she collaborates with organic farmers to breed new genotypes of wheat, spelt, emmer and einkorn for the Northeast United States.

Robert J. Kremer

Soil Health Improvement in an Organic Orchard Production System in Northwest Missouri

Abstract

Prairie Birthday Farm (PBF), a diversified, organic enterprise on the loess hill landscape in northwestern Missouri, was previously managed as a conventional corn-soybean production system. The soil (Sharpsburg silt loam; fine, montmorillonitic, mesic Typic Argiudolls) is mapped as an 'eroded soil phase' likely due to erosion under previous management that resulted in shallow topsoil depth of ≤5 cm on shoulder to 20 cm on summit landscape positions. Transition to organic farming began in 1995 and included soil organic matter restoration with native prairie establishment and organic amendments. Assessment of soil health was initiated in 2003 to monitor organic management impacts on soil productivity. Objectives of the PBF orchard study are to evaluate ecologically-based practices of integrating native plants in orchard alleys and organic amendments (composts, biochar) on biological indicators of soil health. Surface soils (10-cm depth) were collected annually (2008 –

2013) from three blocks imposed on the orchard site, which included native vegetation, compost and biochar treatments. Non-treated orchard and row-cropped sites were controls. Soil organic C (SOC) gradually increased by 25% to > 60 g kg-1 over six years compared with relatively stable SOC of about 30 g kg-1 during the same period at control sites. Soil aggregate stability increased by 70% in orchard alleys, reflecting contributions of established root systems of native vegetation and high SOC. Soil enzyme activities increased by ≥30% in alley and organically-amended sites, demonstrating substrate contributions from vigorous roots and systematic amendments with organic materials that enhanced soil microbial activity. Microbial community structure and biomass determined by phospholipid fatty acid analysis was similar in compost amended- soils and alley sites under either native vegetation or tall fescue (non-treated orchard); however, all sites were considerably higher than the conventional row-cropped site. Biochar amendment increased major microbial groups (gram-negative and –positive bacteria, total fungi, mycorrhizae) and microbial biomass compared with other treatments. Ecologically-based management at PBF restored and improved soil health on previously degraded landscapes. Microbial diversity improved slightly, however, improved functional diversity (soil enzyme activity, aggregate stability) suggests that microbial assemblages within organically managed soils were more effective in mediating biological processes to achieve improved soil health than in non-organic sites.

Bio

Bob Kremer is a Professor of Soil Microbiology at the University of Missouri and recently retired after a 32-year career as a microbiologist with U.S.D.A, Agricultural Research Service. Original research involves soil microbe-plant-pesticide interactions; soil health assessment; and impacts of genetically-modified crops on soil ecology and biology. He teaches soil microbiology, weed science, and sustainable agriculture; and has authored or co-authored 140 research articles, 15 book chapters, and co-authored a textbook. Dr. Kremer is a Certified Soil Scientist, a Fellow of the American Society of Agronomy and the Weed Science Society of America.

Tom Kriegl

Comparing Feed Costs of Different Dairy Systems (Mainly Wisconsin) From 1995 to 2010

Abstract

There is a perception that U.S. Agricultural input costs rose slowly and steadily through 2006 before taking a big jump in 2007 due to major increases in energy costs. This jolt caused dairy farmers — especially grazing and organic farms — to question if it pays to feed grain to dairy cows. Another, perception is that the "grazing advantage" increased with the 2006-2007 grain price jolt. To test these perceptions, farm financial data from Wisconsin confinement, grazing (non-organic) and organic farms from 1995 to 2010 was examined to compare feed costs and Net Farm Income From Operations.

Some results were:

1. Estimated total allocated feed costs/cwt. sold trended upward throughout the period for all, indicating that many external factors (weather, increasing energy costs) have somewhat similar effects on all dairy systems in most years.
2. As expected, estimated total allocated feed costs/cwt. sold increased noticeably from 2006 to 2007, and all of the yearly average numbers beginning in 2007 were higher than in any previous year for all Wisconsin groups, suggesting a new and higher plateau for feed costs.
3. Despite differences in the level of NFIFO of the Wisconsin dairy systems, their NFIFO/Cwt sold tended to move in the same direction most years indicating that many external factors (weather, milk prices) influencing profitability have similar effects on all dairy systems in most years.
4. 2008 was the year of the highest estimated total allocated feed costs and NFIFO /CWT

The Financial Performance Of Dairy Systems Across the U.S.A.

Abstract

The Great Lakes Grazing Network (GLGN) Grazing Dairy Farms Financial Summary project initially sponsored by USDA IFAFS grant project #00-52501-9708, revealed relatively consistent differences in financial performance between individual Great Lakes states and between dairy systems, and demonstrated that the official USDA cost of production estimates were far different from the cost of production calculated from actual farm financial data from the same states. Multiple years of actual farm financial data has been collected from many different systems from many states in the U.S. and put into a similar format to compare actual financial performance between states and dairy systems. This comparison shows; 1. That the financial performance differences between states and systems demonstrated in the GLGN project appear elsewhere in the country. 2. Large differences exist between the cost of production estimated by USDA and the cost of production calculated from actual farm financial performance for the same states. 3. Small dairy systems typically attain more net farm income from operations per dollar of revenue than large dairy systems in the same state. More information about this project can be accessed at http://cdp.wisc.edu.

The Financial Performance Of Grazing, Organic And Confinement Dairy Farms

Abstract

Ten Land Grant Universities plus Ontario standardized accounting rules and data collection procedures to gather, pool, summarize and analyze actual farm financial performance from many sustainable, small farming systems which then lacked credible financial data that producers need for decision-making, in a project initially sponsored by USDA IFAFS grant project #00-52501-9708. This effort, spawned by USDA IFAFS grant project #00- 52501-9708, primarily compares Wisconsin grazing dairy farm data to organic and confinement data. However, the Wisconsin data was also compared to the limited amount of organic data collected in other parts of North America. This project has over 124 farm years of Wisconsin organic dairy farm data spanning twelve years and many more years of data from other Wisconsin dairy systems to help understand the economic competitiveness of these dairy systems.

Can It Pay To Irrigate Pasture In The Mid West or North East Part of the U.S.A.?

Abstract

Production agriculture greatly depends on adequate rainfall for crop quality and yields. Farm operators using management intensive rotational grazing in their dairy and livestock operations try to maximize pasture use since pasture usually provides their most economical feed. Yet pasture is often perceived as being a low value crop that couldn't justify the cost of irrigation. However, the fact that many pastures are dominated by grasses that are not drought tolerant along with a substantial increase in many agricultural commodity and input prices since 2006 has increased curiosity about the economic feasibility of irrigating pasture in Wisconsin.

Bio

Tom Kriegl recently officially retired as a Farm Financial Analyst at the University of Wisconsin Center For Dairy Profitability where he has been conducting research on the economic competitiveness of dairy systems both inside and outside of Wisconsin. Kriegl also provided support for Agricultural Agents in the subject matter areas of farm financial analysis and record keeping, budgeting and farm business management in general. He also has been the primary researcher in the Wisconsin Grazing Dairy Profitability Analysis and the lead researcher in the Great Lakes Grazing Network Dairy Financial Summary. His research shows that dairy farms small enough to be operated with one family's labor and that dairy farms using management intensive

rotational grazing and/or organic practices can be economically competitive. Some of Kriegl's reports can be found at http://cdp.wisc.edu/

David Lowenstein

Natural enemies and biological control of lepidopteran brassica pests in urban agriculture

Abstract

Urban farms bring economic and ecological productivity to underdeveloped spaces in Midwestern cities. By adding green spaces and providing a source of local produce, urban agriculture converts blighted sites to more productive uses with plant resources. The small scale of new farms provides an advantage at obtaining natural pest suppression, as many growers follow organic practices. However, the addition of planted row and vegetable crops also raises susceptibility to plant damage by herbivorous pests that locate new forage. We examine the potential for crop damage at community gardens (n=9), urban farms (n=8), and residential gardens (n=12) through surveying growers and investigating biological control at sites across a gradient of habitat complexity. We classified urban farms as agricultural sites managed as a whole unit as opposed to the allotment of independently managed spaces at community gardens. Through distributing a questionnaire regarding farm management practices, we identified cucurbits and brassica as the two crop families with the greatest pest pressure. In summer 2014, we investigated how habitat around brassica impacts parasitoids and mobile natural enemies. Yellow sticky cards were set up and replaced weekly from June through August to account for temporal variation in natural enemy populations. We measured floral diversity and the number of crop beds at each site to identify how resource diversity and the scale of urban agriculture affect natural enemies. In addition, we analyzed the efficacy of natural enemies in urban farms and community gardens at biological control through the use of sentinel cabbage looper (Trichoplusia ni Hübner), a pest of cole crops. We deployed eggs and larvae at sites for two 72 hour periods and assessed mortality of sentinel prey. We set up a time lapse camera at a subset of sites to visually identify natural enemies feeding on prey items. Contrary to work in large agroecosystems, we hypothesize that larger urban food production sites will have more beneficial parasitoid wasps and natural enemies. We anticipate greater resource diversity in farms compared to residential gardens, and we expect this to attract more natural enemies and in turn enhance biological control. This study will aid urban growers estimate natural pest suppression based on the presence of critical habitat and cultural practices. Gathering data on damage to brassica foliage every other week is expected to corroborate the finding that enhanced parasitoid abundance in larger gardens will effectively reduce plant damage and the occurrence of cabbage worms. Through analyzing seasonal natural enemy population patterns and the rate of biological control, we will offer an update, which accounts for habitat complexity and natural enemy population cycles, on the potential for pest outbreaks on urban brassica.

Bio

Lowenstein is a PhD Candidate in the Department of Biological Sciences at the University of Illinois at Chicago. His current research involves predator-prey interactions in brassicas and the impact of environmental and social variables on pollinators and natural enemies in urban neighborhoods. David has collaborated with a diverse group of stakeholders from ginseng and cucumber growers to overseeing citizen science projects led by urban gardeners and growers. Upon graduating, David hopes to continue work on insects in agricultural systems and on efforts to enhance biocontrol and pollination through a combination of research and extension.

Alexandra Lyon

Seed Needs and Challenges: Interviews with Wisconsin Organic Vegetable Growers

Abstract

Optimally adapted crop varieties are key to the continued success of organic agriculture, yet organic farmers often struggle to access seed for favored varieties or varieties specifically bred for organic conditions. Efforts to improve this situation reveal the need for a better understanding of organic farmers' decision-making and challenges in this area. From 2012 to 2014, we undertook a research project with the goal of capturing the needs and practices of Wisconsin organic vegetable growers with regard to seed and plant breeding. Results from the first part of this project, consisting of a quantitative survey of 219 farmers, were presented as a poster at the 2013 MOSES Organic Farming Conference. In this paper we present the second part, which consisted of qualitative interviews with growers from 12 farms representing a range of production scales and business strategies. Previous research in this area has shown organic farmers' priorities to be diverse and difficult to pinpoint. Therefore, our objectives in the interviews were to capture farmers' experiences and opinions in a more in-depth manner than is possible with survey methods alone, and to investigate the realities that drive organic farmers' interaction with seed and plant genetics. Interview respondents were recruited by advertising in organic email lists, at conferences, and through our farmer networks. Interviews were conducted in person using a semi-structured approach based on a flexible questionnaire. Transcripts were coded and interpreted using an approach based in the sociological methodology of grounded theory. Our results shed light on how organic vegetable growers test and select new varieties, on the meanings they place on organic certification of seed, on vulnerabilities they experience in a changing seed system, and on their methods of coping with those vulnerabilities. We argue that farmers' critiques of the conventional seed system are rooted in the values of organic agriculture, yet their ability to act according to those critiques are often limited by practical concerns. We hope that our findings will help advocates of organic seed systems interpret their experiences in working with farmer communities, and will provide context for understanding broader, quantitative investigations of organic farmers' needs.

Bio

Alexandra Lyon is a PhD candidate in the Nelson Institute for Environmental Science at UW-Madison, and a research assistant in the Organic and Sustainable Research Program run by Prof. Erin Silva. Alexandra's research explores the practices and priorities of organic vegetable growers in the Upper Midwest in relation to seed and plant breeding, and how participatory variety trials can help address these farmers' needs. In 2012 she helped launch the Student Organic Seed Symposium, an annual event aimed at supporting graduate student involvement in organic seed and plant breeding. She earned her M.S. in Agroecology from UW-Madison in 2008.

Jennifer MacAdam

Enhanced forage intake and milk production on birdsfoot trefoil pastures in the western US

Abstract

Irrigated birdsfoot trefoil (BFT; Lotus corniculatus L.) is a productive and persistent legume in the Mountain West USA. The low concentration of condensed tannin in BFT binds excess plant proteins in the rumen, preventing bloat, but allows high-quality bypass protein to be digested in the abomasum and absorbed in the small intestines. This study compared forage availability, intake and milk production of cattle grazing grass or BFT pastures on commercial organic dairy farms in Utah and Idaho. Forage dry matter was assessed before and after grazing using a rising plate meter calibrated for both mixed grass and BFT pastures, and milk production was determined for two consecutive days every two weeks. A total of four Organic Valley dairies participated in the project over the course of two years. Forage production, pasture intake and milk

production were significantly higher on BFT pastures during mid-summer. Birdsfoot trefoil's low tannin concentration prevents bloat and has been found to improve nitrogen use efficiency in dairy cattle. While BFT can be slow to establish, it grows well in mid-summer when grass growth slows, and is nutritious and highly digestible, enhancing dairy production on pastures.

Bio

Dr. MacAdam is an associate professor in the Department of Plants, Soils and Climate at Utah State, where she studies the production and management of perennial pastures for beef and dairy production. She is particularly interested in the value of tannin-containing perennial legumes for improved ruminant production, reduction of internal parasites, and reduced ammonia and methane emissions. Dr. MacAdam teaches an introductory course in plant physiology and plant anatomy, and authored the text Structure & Function of Plants, published by Wiley in 2009.

Michelle Miller (moderator)

Bio

Michelle Miller is Associate Director at the UW-Center for Integrated Agricultural Systems as a practicing anthropologist engaged in participatory research. A "Farmers Union Junior grown-up", in 1982 she coauthored Wisconsin's Cornucopia Report, a study of the state's food system. She went to work for the Wisconsin Department of Agriculture's Sustainable Agriculture Demonstration Program, organizing farmer demonstrations for all kinds of farm innovations, including organic. After grad school, Michelle worked for the World Wildlife Fund in the Great Lakes states and provinces on an agricultural pollution prevention project. For the last 15 years she has worked with fruit growers – organic and conventional - to assist them in their efforts to reduce pesticide risk. Current projects include work on decision case studies for teaching the transition to organic production with the University of Minnesota, supply chains for mid-scale farms, labor issues, emerging perennial crops like aronia and hazelnuts, regional food transportation, and climate change. Michelle serves on the Wisconsin Farmers Union Foundation board, and is a past director of the Organic Processing Institute and the Williamson Street Grocery Cooperative. www.cias.wisc.edu

Virginia Moore

Cover Crop Adoption on Organic Vegetable Farms in Wisconsin

Abstract

Cover crops are promising tools for many agronomic and environmental challenges faced by farmers across the agricultural landscape. They help reduce soil erosion, reduce nitrate leaching and chemical runoff, build soil organic matter, suppress weeds, and break disease and pest cycles. Cover crops hold especially strong potential in organic agriculture, since they serve as an alternative to chemical control of weeds, pests, and disease. Vegetable production systems also stand to benefit greatly from cover crops, since these systems tend to face problems related to the nutrient-intensive nature of many vegetable crops, loss of organic matter over time, and difficulties with erosion due to bare soil.

Despite the many documented benefits of cover cropping, adoption across the agricultural landscape has been somewhat limited. Much of this failure to adopt may be attributed to the broader economic context faced by farmers, and issues around uncertainty and perceived risk of adopting a new practice that can have variable results. Organic vegetable systems also have unique agronomic constraints, such as limited options for cover crop control and termination and a limited planting window. Economic theory and methods may offer insights into these obstacles to cover crop adoption and potential tools to incentivize adoption in the future.

The purposes of this study are: (1) to quantify cover crop adoption by organic vegetable farmers in Wisconsin; (2) to characterize their cover crop use in terms of intensity and commitment; (3) to assess the importance of

various motivations and obstacles for cover cropping; and (4) to assess current and potential future extension and policy strategies to incentivize cover cropping practices.
The primary method of data collection was a four-page survey, which was distributed from January to March of 2014. It was mailed to all organic vegetable farmers in Wisconsin, and addressed their cover cropping practices, their attitudes and beliefs around cover cropping, basic demographic information, characteristics and contexts of their farm, and information about their knowledge networks. Over 150 surveys were returned, and econometric methods will be used to assess the extent to which the above factors influence adoption, intensity, and commitment to cover cropping. Survey analysis will be completed by August 2014, after which the results will be used to assess current and future extension and policy approaches to improve adoption of cover cropping and other on-farm conservation practices.

Bio
Virginia Moore is a master's student in Agroecology and Agricultural & Applied Economics. Her current research investigates cover crop adoption by Wisconsin's vegetable growers, and more broadly the socioeconomics of farmer conservation behavior. She will begin a PhD in Plant Breeding & Plant Genetics in the summer of 2015.

Mathieu Ngouajio

Enhancing functional diversity in organic agriculture: The contribution of NIFA's organic programs

Abstract
Increasing cropping system diversity in space or time has been used in agriculture since early civilizations as a means to reduce external inputs and improve cropping system resiliency. Land intensification with modern agriculture has significantly reduced species richness and ecosystem functioning in most production systems. More recently, several scientists have argued that functional diversity (the value and range of species traits) was more important than the simple number of species for both short and long term ecosystem functioning. Functional diversity (rather than species diversity) may therefore be used to enhance the sustainability of intensive cropping systems. This is generally achieved through a judicious choice of crops/cultivars used in the rotation or through the use of cover crops as a means of enhancing the crop rotation. Using crop yield as an indicator of system performance, the simple increase in the number of species in the rotation does not always result in higher yield. In some cases high biodiversity has resulted in poor crop performance and low yield in comparison to the monoculture system. Also, the yield response has been shown to vary with the cash crop, further stressing the role of functional diversity in designing resilient cropping systems. Functional diversity is of particular importance in organic production because tools such as synthetic pesticides and fertilizers are generally not available to growers. Since 2001 NIFA has provided funding for many projects in organic agriculture research with special interest in biodiversity. Results of those studies have helped growers and the scientific community enhance functional diversity through multiple strategies including cover cropping, crop rotation, trap cropping, use of beneficial species, and soil health improvement. As agriculture continues to change to meet world food demand, our challenge will be to harness multiple species with complementary traits to develop robust cropping systems that remain resilient to biotic and abiotic stresses with a minimum reliance on external inputs.

Bio
Dr. Mathieu (Mat) Ngouajio joined NIFA in 2013 after 12 years at Michigan State University as Professor and Extension Specialist. In 2009 he received the Outstanding Extension Specialist Award in recognition for his contribution to Michigan State University Extension Programs. His worked closely with many farmers who received State and National Awards for innovative and sustainable production practices. At NIFA, Mat is a National Program Leader in the Division of Plant Systems-Production. He provides national leadership for

research, education and extension activities relating to crop production and organic agriculture. He administers capacity projects and competitive grant programs including the Organic Transitions (ORG), the Organic Agriculture Research and Extension Initiative (OREI) and the Agriculture and Food Research Initiative (AFRI): Food Security.

Tessa Peters

New methods for participatory development of sugary enhancer sweet corn varieties

Abstract

There is strong farmer interest in an early-maturing, open-pollinated sweet corn population in the organic sector of the Upper Midwest. As early as 1950, Lonnquist suggested the use of top-crossing as an effective way to evaluate combining ability of inbreds before selecting for agronomic traits within families. The goal of this study was to develop agronomically sound sweet corn for release using a participatory breeding program between the UW-Madison and Organic Farming Works in Farmington, Minnesota. Results from trials of ten top-cross populations of sugary enhancer type varieties are evaluated. An open pollinated population already developed through participatory breeding crossed to 10 male inbred lines developed by the University of Wisconsin-Madison. The top-crosses were developed to combat lodging and were evaluated for flavor, texture, number of marketable ears, lodging, and root development in three varied locations, two of them certified organic land at research stations managed by UW-Madison and one on certified organic land managed by Organic Farming Works. Top-crosses will be open-pollinated and it is possible that seed saved could be used to develop farm- or region-specific varieties in the future through participatory or other means.

Bio

Tessa Peters is a graduate student in Plant Breeding and Plant Genetics at the University of Wisconsin-Madison. Her research on sweet corn includes variety development for organic markets and she is committed to providing organic farmers with varieties that thrive in their diverse management systems and soil types. She is originally from Wyoming and worked on organic farms in her home state and in South America before learning about the importance of seed as part of the organic system. Since she was offered a Seed Matters fellowship through Professor Bill Tracy's breeding program, her enthusiasm for work in the organic seed sector has only grown. Currently, varieties developed through her research, and supported by the Ceres Trust, are being trialled for possible commercial development.

Andy Petran

Extending the Season for Organic Strawberry Production in the Midwest

Abstract

Availability of locally grown, organic strawberries is extremely limited in the Upper Midwest due to the short growing season and cultivars with narrow harvest windows. These cultivars are termed ‘June bearing’ because of the approximate 6 weeks of fruiting in June and early July. While there is an expressed interest in having greater access to local and organically grown strawberries throughout the year, lack of knowledge for innovative production systems using ‘day neutral’ (DN) cultivars has limited growers from being able to fulfill this need in our region. Flowering of DN cultivars are photoperiod insensitive, representing a potential for vastly extended seasons, and while older DN cultivars have historically performed poorly in the Midwest, new DN cultivars in combination with optimal cultural practices allow the possibility for extended-season strawberry production to be commercially viable in our region. The purpose of this project was to address the three major facets of sustainability: provide organic farmers with production methodologies to implement extended season strawberry production on their farms (economic sustainability), provide consumers with a

product they desire at an unconventional time (social sustainability), and determine which cultural practices performed the best under organic management (environmental sustainability).

Field sites were located in Saint Paul and Morris, MN. Both sites employed a split plot design, with three whole plot treatments representing cultural practices (straw mulch, plasticulture and plasticulture with low tunnels) and six split plots, one for each cultivar tested. Whole plots contained four replications of each split plot treatment. In 2013, data was taken on the average yield, berry weight and sweetness of each cultivar/practice combination, in addition to average weeding time of each whole plot treatment. In 2014 the same experiment was replicated, in addition to a pairwise comparison of soil microbial biomass of each whole plot, in an attempt to quantify differences in the soil building characteristics of each cultural practice.

Total yield across both locations in 2013 averaged 9,830 lbs/acre for straw mulch, 17,000 lbs/acre for plasticulture and 21,000 lbs/acre for plasticulture with low tunnels. This is an impressive contrast from June bearing cultivars, which produce an average of 8,000 lbs/acre after the initial establishment year. Assuming the 2012 average price for strawberries ($1.34/lb), this increase in productivity would improve the average annual gross revenue for growers by $12,080 or $17,440 per acre when using day neutral cultivars combined with plasticulture, without and with low tunnels, respectively. These are conservative estimates, however, since the premiums placed on local, organic, out of season strawberries would likely raise the average price well above $1.34/lb. Average size and sweetness of berries were comparable to June bearers as well.

Bio

Petran is a PhD candidate at the University of Minnesota, studying production horticulture in the Applied Plant Sciences department. His MS project explored interspecific grafting of tomato onto eggplant rootstock, and its potential to provide flood and drought tolerance. His current project is more delicious: strawberry season extension using organic practices. He hopes to finish up his degree in the next year or so, and will begin looking for work as a teaching professor focused on sustainable agriculture curriculum design.

Jim Riddle (moderator)

Bio

Jim Riddle directs the Ceres Trust. Jim is a well-known speaker, author, and policy expert. He founded the Winona Farmers Market and the International Organic Inspectors Association (IOIA), and co-author of the IFOAM/IOIA International Organic Inspection Manual. Riddle served on the Minnesota Department of Agriculture's Organic Advisory Task Force, and the boards of the International Organic Accreditation Service, Beyond Pesticides, and the Organic Processing Institute. Jim Riddle currently serves on the Leadership Team for eOrganic, the national Extension Community of Practice for organic agriculture; on the Citizens Board for the Minnesota Pollution Control Agency; and on the Minnesota Agricultural Water Quality Certification Advisory Committee. He is the elected Chair of the Winona County Soil and Water Conservation District Board and owns and operates Blue Fruit Farm. Jim Riddle is also former chair of the USDA National Organic Standards Board.

Lisa Schlessinger

Pollen Drift: Reframing the Biotechnology Liability Debate

Abstract

The advent of genetic engineering and its application to agriculture has transformed the rural landscape at a microscopic level. A cursory glance of current production fails to reveal the underlying legal tensions at work in post-modern agriculture. The seemingly natural and necessary event of drifting, sexually viable pollen, however, implicates legal rights and responsibilities at the farm level with a ripple effect felt throughout the

international commodity food and feed supply chain. Despite the ubiquitous nature of agricultural biotechnology, disputes arising from simple pollen drift lack a clear legal doctrine to define the multitude of subjects implicated ranging from tort liability, contracts and administrative law.
Although others have discussed the limits of traditional tort doctrine as applied to pollen drift events, to enhance the accuracy of the debate, this Article evaluates actual cost and return data from GM and non-GM (organic) farmers to highlight the true nature of the assignment of burden and benefit these legal doctrines impose. We argue that social welfare maximization requires, in the instance of pollen drift, legislative assistance in the design of efficient liability rules. We further suggest that, with respect to liability rules, care must be taken to distinguish unilateral and bilateral accidents, with the ultimate goal of minimizing the total costs of preventive action of both parties in light of the expected damage. This could be done on the premises of negligence and the least cost-avoider theory, a result that shares the liability burden amongst conventional and GM farmers alike.

Bio
Lisa Schlessinger is a postdoctoral legal research associate at the University of Illinois in the Department of Agricultural and Consumer Economics. Her research interests include the legal aspects of sustainable agriculture and food law; including issues arising from direct farm sales, aspects of the farm business, community supported agriculture and the impact of biotechnology on organic and conventional farms. She also teaches food law to undergraduate students.

Jessica Shade

The effects of organic farming practices on nitrogen pollution: Calculating organic virtual nitrogen factors for vegetable products

Abstract
Organic practices in food production attempt to reduce the detrimental impacts of agricultural systems on the environment and human health. This study explores the effects such practices have on nitrogen pollution, which is the excess accumulation of reactive forms of nitrogen, in comparison to conventional food production practices. Virtual nitrogen (N) factors, or the amount of nitrogen released to the environment during the production of food per unit of nitrogen endogenous to that food, were determined for organic produce and compared with the existing virtual N factors for conventionally produced food. An organic virtual N factor of 4.6 was calculated for vegetables (37% lower than the conventional virtual N factor), 0.9 for starchy roots (-64%), 0.7 for grains (-86%) and 0.3 for beans (-53%) using data from a literature review on organic crop yields and rates of nitrogen application. These factors were then used to compare the nitrogen footprints, or the amount of nitrogen released to the environment, of servings of organic and conventional vegetables, starchy roots, grains and beans. This study found that organic practices reduce nitrogen pollution with respect to conventional practices of food production. Tracking the effects of organic practices on nitrogen pollution will contribute to promoting the better management of nitrogen in agricultural systems and reducing the negative environmental and human health consequences associated with nitrogen pollution.

Bio
Dr. Jessica Shade is the Director of Science Programs at The Organic Center, where she leads projects associated with communicating and conducting science supporting the benefits of organic.
Dr. Shade started her involvement in the organic movement as an undergraduate at the University of California, Santa Cruz, where she was a co-owner of the Kresge Natural Foods Cooperative. During her time there, she developed a deep interest in the science supporting the environmental, public health, and cultural benefits of organic practices, and that passion followed her through her graduate career at the University of California, Berkeley, where she received a Ph.D. in Integrative Biology.

Most of her research focuses on conservation ecology, population genetics, and selective landscapes, but she also has experience studying effective restoration techniques, plant secondary compounds, and microbial symbiosis. She has taught several courses to students of all ages, including ethnobotany, plant ecology, agroecology, and research technique development.
In addition to scientific research, Dr. Shade is dedicated to food system science communication, collaboration, environmental education, and social equity and inclusion in the sciences. She has worked with several organizations to mentor under-represented students in the sciences, and increase environmental science collaborations such as Building Diversity in Science, Puente, the Biology Scholars Program, and Strategies for Ecology Education, Diversity and Sustainability. She also founded and directed the Diversity Mentorship Program, which trains and mentors graduate students on inclusive teaching practices.
In addition, Dr. Shade is interested in creative approaches to conducting and communicating environmental research. She has led panels on using artistic approaches to disseminating scientific research, as well as curating, designing, and participating in many environmentally themed art exhibits.

Adrienne Shelton

Collaborative Release of an Organic Open-Pollinated Sweet Corn (Zea mays L.) Variety

Abstract
An increasing number of breeding projects for organic agriculture utilize a methodology called participatory plant breeding (PPB), in which farmers and breeders work collaboratively to develop improved varieties. As a relatively new breeding process in the United States, however, there are few examples of successful paths to commercialization of organic PPB varieties. PPB projects often rely on federal funding available to public breeders at Land Grant Universities (LGU). As such, the resulting varieties are subject to ownership by the university's technology transfer office, a requirement of the Bayh-Dole Act of 1980, which can undermine the collaborative spirit in which the varieties are developed. In addition, unique specifications of varieties developed for organic farmers require a more nuanced approach for their release and commercialization. This paper describes the release and commercialization of an organic open-pollinated sweet corn (Zea mays L.) variety that was developed from 2008 – 2013, by a collaboration among breeders at the University of Wisconsin – Madison, the Organic Seed Alliance, and organic farmers in Minnesota. The commercialization of this variety represents just one potential model, but highlights the need for more flexible policies to ensure that products developed through innovative collaborations can be made available to the public.

Bio
Shelton is the Product Development Coordinator at High Mowing Organic Seeds, and a Seed Matters post-doctoral fellow at the University of Wisconsin-Madison. Her research includes policy analysis and advocacy to support public plant breeding programs at land grant universities. She earned a master's degree in Plant Breeding and Plant Genetics and a doctorate in Environment and Resources at the University of Wisconsin-Madison. She is proud to have participated in the breeding and release of Who Gets Kissed?, an open-pollinated sweet corn bred for and with organic farmers. Shelton has been involved with the organic farming movement as a farmer, organizer, seed saver and breeder for 15 years.

Erin Silva

Comparison of Labor Needs for Field Production, Harvest, and Packing on Organic Diversified Vegetable Farms in the Upper Midwest

Abstract
The number of organic vegetable farms continues to increase in the United States. Many of the farms are small to medium-sized and highly diversified, both with respect to crops and markets. Questions remain,

however, as to the long-term profitability of these farms, in part due to the failure to set prices to cover costs of production. Labor comprises the largest proportion of production costs on these farms; unfortunately, accurately capturing these costs remains an elusive task for farmers. This study investigated labor hours required for the field production, harvest, and packing of nine different vegetable crops on organic diversified vegetable farms in the upper Midwest. Twelve farms ranging from 1-40.5 ha collected daily labor data over a three year period. Small farms (0-2 ha) tended to require more labor hours per row foot of production, most likely indicative of the impact of greater levels of mechanization on the larger farms. High coefficients of variation existed for all values, indicating high farm-to-farm variability and the necessity of collecting farm-specific data to be used in cost-of-production determinations. Results from farm-specific data collection can be further used to determine production and labor inefficiencies, identify priorities for equipment investment, and aid in the determination of optimal levels of diversification.

Bio

Erin Silva is an Assistant Professor and Extension Organic and Sustainable Cropping Systems Specialist with the Department of Plant Pathology at UW-Madison. Erin's responsibilities include research of production practices including cover crops and cover crop-based no-till production in vegetables and row crops, as well as variety trials for fresh market vegetable farms. Erin is also focuses on Extension programming on in-field and postharvest food safety practices. Erin is originally from Hartland, WI. She earned her BS in Biology from University of WI- Stevens Point and her MS and PhD in Horticulture from Washington State University. Before joining the faculty at UW-Madison, she was an assistant professor at New Mexico State University.

Philipp Simon

The CIOA (Carrot Improvement for Organic Agriculture) Project: Location and Genetic Background Influence Carrot Field Performance and Flavor

Abstract

U.S. organic farmers surveyed listed improved seedling germination and Alternaria leaf blight resistance as top breeding priorities for field production of organic carrots. Nematode resistance is also very important for growers. Flavor was deemed the most important consumer trait to improve in carrots, and nutrition the most important product quality variable for consumers. To address these needs, field trials of 34 diverse carrots varying in top size, disease and pest resistance, root shape and color, flavor, and nutritional value were evaluated by the Carrot Improvement for Organic Agriculture (CIOA) Project in 2012 and 2013 on both organic and conventional farms in each of California, Indiana, Washington, and Wisconsin. Wide ranges of seedling growth rates and canopy sizes were observed in this diverse carrot germplasm that includes, not only orange carrots, but also novel purple, yellow, and red storage root colors. Top height varied two-fold among entries at a given location. The relative rankings of genetic stocks for top height, top width, root weight, top weight, sweetness and harshness varied among some region-year combinations, but were generally consistent between organic and conventional systems within a region in a given year. Some carrot entries were much more stable in performance across environments than others. Soil assays comparing organic and conventional trials at each site indicated significant differences among locations, and between organic vs. conventional paired trials in all four locations, including labile organic matter pools, and bacterial, fungal and archaeal community composition. Nematode and Alternaria leaf blight resistance trials demonstrated a wide range of variation among genetic stocks. Other diseases observed in some trials were bacterial blight, Cercospora leaf spot, and powdery mildew, with differences in prevalent diseases among the four states as well as between the paired organic and conventional trials in each state. The CIOA Project reached approximately 1760 producers and other stakeholders in 2012-14 with education on organic breeding and variety trials.

Bio

Philipp Simon is a professor of Horticulture at the University of Wisconsin-Madison. His primary interests are the Genetics and biochemistry of culinary and nutritive factors in carrots and garlic. He also researches terpenoid and sugar genetics; genetics, plant cell culture, and genetic transformation.

Ulrike Sorge

Health and Disease on Organic Dairy Farms

Abstract

Organic farming has exponentially grown over the recent decade; yet little is still known about the management practices and the health of organic dairy herds. Therefore, the objective of this study was to investigate management practices and the frequency of diseases on organic dairy farms in Minnesota. In 2012 (June-November), 35 organic and 28 conventional herds were visited once. A survey about management practices and disease frequencies on farm over the previous 12 months were applied. Furthermore, at least 20% of the mature herd was evaluated for lameness, hock lesions and hygiene, 20 fecal samples from breeding age heifers were collected for gastrointestinal parasite egg analysis, 6 environmental samples were collected to determine the Mycobacterium avium subsp. paratuberculosis (MAP) infection status of the herd and a bulk tank milk sample was collected for bacterial culture. The conventional herds were split into small conventional (SC, n=15) and medium sized conventional herds (MC, n=13), so that SC herds were comparable in size to the organic herds. Appropriate non-parametric tests were used to compare observations among the herd types.

All organic and most (n=20) conventional herds allowed their livestock access to pasture. Organic herds consisted of a higher proportion of 3rd lactation and cross-bred cows than conventional herds, but the average age of the oldest cow did not differ among herd types. Organic herds produced, on average, less milk per cow, had a higher recent bulk tank somatic cell count and similar milk bacteria burden compared to conventional herds. Mastitis was the most commonly reported disease on all farms, although it was reported at lower rates on organic and SC herds than MC herds. Death losses of mature cows and reported disease frequencies were overall lower in organic than conventional herds. The rate of milk fever was comparable across herd types. Although the fecal parasite egg counts were generally low, it was higher in organic than conventional herds. Only 6 organic (17%) and one SC producer considered parasite control when setting up their grazing schedule and hardly any organic herds saw gastrointestinal parasites as a problem for their herd. The percent of lame (score ≥ 3 of 5) or dirty (≥ 3 of 4) cows were comparable across herd types, on average 25% of cows were lame, but the percent of cows with hock lesions was particularly low on organic farms. Approximately half of the organic (43%) and SC herds (47%) and most of the MC herds (93%) were positive for MAP, the bacterium that causes Johne's disease. Although reported disease frequencies were lower on organic than conventional farms, observed disease frequencies were comparable. Future studies need to identify best preventive management practices for organic dairy farms.

Bio

Riki Sorge (Dr. med. vet., MS, PhD, DACVPM) is a veterinarian and Assistant Professor for Dairy Production Medicine at the College of Veterinary Medicine of the University of Minnesota. Her research focuses on the organic dairy production and impact of human-animal interactions on cattle health and production.

Alex Stone

Contans as a tool for organic white mold management

Abstract

White mold is an important disease in organic vegetable farming systems. Contans is the commercial formulation of Coniothyrium minitans (Cm), a fungus that parasitizes Sclerotinia sclerotiorum (Ss, causal agent of white mold).

The goals of this research were to 1) determine if a Contans application to diseased crop residues generates a 'biocontrol epidemic', and 2) evaluate efficacy of low rate Contans applications.

Exp. 1. A diseased cauliflower crop was flailed in November; Contans (2 lbs/A) was applied to the residues. Sterile sclerotia were placed in bags on 4 dates then removed and evaluated for viability and Cm colonization.

Exp. 2. Eight bean fields were planted, inoculated with Ss, and flailed at maturity. Sclerotia were collected, bagged and replaced in each field. Contans (1.5 lbs/A) was applied to 4 fields. Bags were removed and evaluated for viability and Cm colonization over 2 years.

Exp. 3. Water or 1lb/A Contans application were applied at bloom to 2 bean fields (one with/one without Contans history). Sclerotia were collected at harvest and evaluated for Cm colonization.

Exp. 1. Sterile sclerotia incubated on the soil surface in a diseased cauliflower field to which Contans was applied in November were colonized by Cm throughout the year except when < 45°F.

Exp. 2. In flailed diseased bean fields to which low rate Contans was applied in the fall:

a)By spring after application, 40% of Cm+ sclerotia (buried/surface) were viable compared to 67% of buried (80% surface) Cm-

b)By spring 2 yrs after application, 14% of buried (5% surface) Cm+ sclerotia were viable vs 50% (buried/surface) Cm-

c)By fall yr 3: surface - 3% vs 25%; buried – 6% vs 22%

In sclerotia developed on beans planted in 2010 (in which Contans was or was not applied to flailed residues in 2009), by the following May, viability in Cm+ and Cm- fields was 8.5 and 74%.

Exp. 3. Contans application to beans at bloom resulted in 75% sclerotial colonization. 17% of the sclerotia were colonized in the historically Cm- field as compared to 46% in the Cm+ field. Contans application did not reduce white mold incidence.

1) Contans applications are effective in destroying Ss sclerotia over time.

2) Contans applications to sclerotia left on the soil surface 'grew up' Cm and provided a long-term reservoir of Cm in the field.

3) Sclerotia developed on beans grown in fields with a recent history of Contans application were colonized by Cm even though Contans was not applied in that season due to the reservoir of Cm+ sclerotia in the field.

4) Contans applications during bean bloom were dramatically more effective in destroying sclerotia generated on beans than applications to diseased residues after harvest but at-bloom applications are not currently a registered use.

5) Cm destroys sclerotia more rapidly when introduced earlier in the process of white mold/sclerotia development.

Bio

Alex Stone has been the vegetable cropping systems specialist at Oregon State University since 2000. She received her PhD in Environmental Science (emphases in soil science and plant pathology) in 1997 from Ohio

State, and was an organic vegetable farmer in Massachusetts from 1987 – 1993. Her research and extension interests are in the design of biologically-driven and profitable vegetable farming systems.

Marc Tchamitchian

Research and development integration to foster Organic Farming in France

Abstract

France has organized its research and development system after the Second World War according to a linear directed scheme going from research to end users through development services. This scheme has been very effective in achieving unprecedented progress, leading to a huge increase in the quantity and stability of the French agricultural production, especially in arable crops, milk and some livestock productions. However, this scheme has been pointed out as responsible for the development of an agriculture highly dependent on external inputs, with negative impacts on the environment and leading to systems lock-in. Within this R&D system, organic farming and other alternative paradigms of agriculture hardly found their place: France is still far behind some other European countries (Austria, Denmark for example) in terms of organic agriculture areas, production or farmers.

Indeed, Organic Farming in France has occupied a special place in terms of research and development structure in France. While conventional agricultural productions had their institutional development organizations (called Instituts techniques) to ensure the relay between scientific research and farmers, Organic Agriculture did not. Such relays existed, but were not recognized in the same way, leading to less financial support from the government for example. Only last year (2013) has this situation been upgraded, with the recognition of a specific development organization devoted to Organic Farming. In parallel, the recognition that Organic Farming deserved a special interest from science has increased, leading to the fact that the last governmental plan for Organic Agriculture development makes a special mention for the needs in research. There are still some resistances, as proven by the very recent polemic raised by French governmental report about the performances and the specific needs of Organic Farming. Nonetheless, this increased awareness on the role of Organic Agriculture in the society, as a food provider, as a contributor to environmental friendly agricultures and to rural development and empowerment, as guidance for the changes called for in conventional agriculture has led to a better integration between research, development and farmers' associations. It also leads to the creation of a national relay to the European TP-Organics Platform which aims at supporting the development of Organic Farming throughout Europe, especially through actions aiming at increasing the support (financial mainly) to Organic activities, whether production, transformation, development or research. This presentation will detail this evolution of the French R&D system devoted to Organic Farming highlighting its differences to the system in place for conventional agriculture. It will show how integration in this knowledge system has increased, and try to analyze under which pressures and initiatives this integration happened. Finally, the links between this system and the European structure will be presented to underline the opportunities that this new structure can seize to support a larger development of Organic Agriculture in France.

Bio

Dr, HDR, Marc Tchamitchian is laboratory head for the Écodéveloppement research unit at the French National Institute for Agricultural Research (INRA). He first worked on greenhouse climate control, using optimal control methods applied to greenhouse crop and climate models. Later on he also applied Artificial Intelligence methods to more general greenhouse control problems and contributed to the setup of an expert system. His focus is more specifically on crop health management, facing both soil-borne or aerial pests and diseases, applied to vegetable production. He is also interested on the methods that allow merging and validating knowledge originating from different sources (stakeholders and scientists).

Brise Tencer (moderator)

Bio

Brise Tencer is Executive Director for the Organic Farming Research Foundation. She brings 14 years of leadership experience working on organic food policy, farming, and research issues, and strong relationships across all sectors of the organic community. Ms. Tencer most recently served as Director of Policy and Programs for California Certified Organic Farmers (CCOF). At CCOF she managed the government affairs and grower education program, coordinated their regional chapters of members, and ran a grant-making program. Prior to that, she served as lead lobbyist on food and agriculture issues for the Union of Concerned Scientists. There she developed legislative campaigns on a range of agriculture issues, including organic (focusing on the connection between organic practices and climate change), USDA research priorities, and food safety. She also worked on a successful campaign to end overuse of antibiotics in livestock production.

Brise worked as Acting Policy Program Director and later as Legislative Coordinator for The Organic Farming Research Foundation from 2000 to 2006. While here, she helped initiate the Organic Agricultural Caucus in the U.S. House of Representatives and the Organic Farmers Action Network (OFAN), a grassroots political action network to support organic-friendly policies. She helped secure language in the Agriculture Risk Management Act of 2000, which said that organic farming was considered a "good farming practice", that enabled organic producers to be eligible to participate in federal crop insurance programs for the first time.

Brise has served on the boards of the Northwest Center for Alternatives to Pesticides, the California Climate and Agricultural Network, and the National Sustainable Agriculture Coalition. She holds a B.A. in Community Studies from University of California, Santa Cruz and received both a Certificate in Conflict Resolution and a M.A. in International Environmental Policy from the Monterey Institute of International Studies. She lives in Santa Cruz, California with her husband and two children.

Bill Tracy (moderator)

Bio

Bill Tracy is professor and chair of the dept. of agronomy, UW-Madison. He served as interim dean of the College of Agricultural and Life Sciences. Bill's research is on sweet corn breeding. He works closely with commercial sweet corn breeders and has developed sweet corn inbreds grown commercially on every continent (with arable land). Bill and his collaborators have developed sweet corn hybrids and open pollinated varieties for organic growers. Bill has has had the pleasure of mentoring nearly 40 graduate students most of whom work in commercial plant breeding with some dedicated to breeding in organic systems. He serves the maize community in a number of roles including chairing the Maize Crop Germplasm Committee and the International Sweet Corn Development Association. He is current chair of of the corn breeding executive committee. Bill has taught introductory agronomy for 30 years and has advised over 300 undergrads.

Sarah Turner

Evaluation of carrot (Daucus carota, L.) for traits related to early seedling establishment and canopy growth at different planting densities in organic systems

Abstract

Carrot production in organic systems is limited by erratic germination, poor seedling growth, and delayed canopy establishment, all of which make weed control a major challenge. Varieties with early germination, quick seedling development, and competitive growth response are one viable option for improving weed management. Preliminary field trials have demonstrated that carrot genotypes have variable germination rates and responses to planting density, ranging from no response to an increase in canopy growth as planting

density increases. Consequently, crop yield also varies widely. This project aimed to elucidate the growth response of diverse carrot breeding stocks across a range of population densities. Eight genotypes were planted on certified organic land at three locations in Wisconsin using a split-plot design with three replications and three planting densities (30, 60, and 90 plants per meter). Emergence rate, canopy height, and canopy width were monitored throughout the growing season and postharvest measurements included fresh leaf weight, root weight, and dry leaf weight. Increasing planting density promoted top growth, specifically with genotypes that tended to have smaller tops.

Bio

Turner received her BS in Horticulture in 2009 and MS in Plant Breeding in 2012 from Texas A&M University, where she was part of the Potato and Vegetable Legume Improvement Program. She is currently a PhD student with Dr. Philipp Simon in the Plant Breeding and Plant Genetics program at the University of Wisconsin-Madison, where her research focuses on the genetic basis of top growth in carrots and the development of improved varieties for organic production systems. Sarah is most interested in breeding for higher nutritional content in food crops and adaptation to diverse cropping systems.

Jared Zystro

State of Organic Seed: Results of a Survey

Abstract

The USDA's National Organic Program requires the use of organically produced seed. However, as the organic industry has grown, the organic seed sector has struggled meet this demand. Currently, the lack of sufficient high quality organically bred and produced seed is a barrier to the success of organic farming.

State of Organic Seed (SOS) is a project to monitor organic seed in the United States. This project aims to increase stakeholder involvement in policy, research, and education activities, and improve the quality and use of organic seed. In 2009, Organic Seed Alliance completed the first comprehensive analysis of the challenges and opportunities in the organic seed sector. In 2015, we are updating our analysis to see where organic seed has come in five years, and how far it still has to go.

In the last five years, preliminary SOS data show that organic seed systems are improving. In general, more farmers are using more organic seed. Still, challenges remain for expanding organic seed systems. While priorities vary by crop, region and sector, commonalities are clear, including the need to:

- Develop seed systems that are responsive to the diverse needs of organic farmers.
- Engage in policy initiatives that move organic seed forward.
- Invigorate organic public plant breeding.
- Protect organic seed systems from the concentrated ownership of plant genetics.
- Protect organic seed systems from contamination from genetically engineered traits.
- Improve sharing of information in the areas of organic seed availability and field trial data.

Bio

Jared Zystro is OSA's research and education assistant director. He has a master's degree in plant breeding and plant genetics from the University of Wisconsin. Jared has worked in the organic seed industry for over 12 years, managing seed production at two farms and conducting research and education projects with OSA. In his work at OSA, he manages OSA's regional development, conducts participatory breeding projects and

variety trials, and teaches farmers about seed production and plant breeding through publications and at workshops, conferences and field days.

PROCEEDINGS FOR THE ORGANIC AGRICULTURE RESEARCH SYMPOSIUM 2015

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Erin Silva—University of Wisconsin
Deb Stinner—The Ohio State University (emerita)
Alexandra Stone—Oregon State University
Brise Tencer—Organic Farming Research Foundation
William Tracy—University of Wisconsin

Conference coordinator and visionary: Brian Baker

The Vital Role of Research to Advance Organic Agriculture Worldwide. Mathieu Ngouajio, USDA/NIFA National Program Leader in Cropping Systems. USDA- NIFA support for Organic Agriculture Research, Education and Extension. 10:30AM â€“ Noon Pacific Time (11:30AM Mountain, 12:30PM Central, 1:30PM Eastern Time) Soil Health. Anthony Yannarell, University of Illinois.