ORGANIC FARMING RESEARCH FOUNDATION

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INFORMATION BULLETIN

Who's Watching the USDA's Organic "Henhouse"?

by Joe Mendelson, Legal Director, Center for Food Safety

On October 21st USDA Secretary Ann Veneman announced the final rollout of the country's first national organic food standards and the marketplace appearance of the new green and white label identifying foods as "USDA Organic." The label represents the culmination of a decades-long struggle by organic farmers, environmentalists and consumers to create a viable alternative to our industrial agricultural system. The implementation of the organic standards represents a critical moment for the future of organic food and farming.

With the National Organic Program in place, however, top USDA officials clearly have focused on other issues. In a recent speech, Secretary Veneman seemed more intent on supplanting organic agriculture with genetic engineering as the agency wrestles with a vision of "sustainable agriculture." This apparent administrative apathy toward the role of a successful organic program has created an NOP that exists as an insular bureaucracy, failing to ensure continued public involvement and oversight in the evolution of the program. The result is that decisionmaking and policy discussions on critical issues have happened with little, if any, public notification or involvement.

Since the October launch the impacts of USDA's decision-making have become increasingly real. In particular, consumer and environmental advocates have raised questions about whether the NOP is properly performing its role as accreditor of organic certifying organizations. Fueling concern is the appearance of numerous new, previously unknown certifying agents applying for accreditation into the USDA program.

During development of the final standards in 2000, the USDA identified 49 existing organic certifying agents, including 13 state programs. In anticipation of its role as accreditor, the USDA predicted no significant growth in the number of certifying agents seeking accreditation by the new USDA-run program. Contrary to such projections, the number of applicants has far surpassed this number to now total 122. This large number of accreditation applicants presents important questions about whether an apparently disinterested agency is able to properly process and oversee the large volume of prospective organic certifiers for adherence to organic standards.

The Organic Foods Production Act (OFPA) clearly anticipated the potential for bureaucratic compromise during the accreditation process, specifically by calling for an accreditation Peer Review Panel as a public oversight mechanism to ensure that accreditation procedures are followed. The panel is critical to consumer confidence in the integrity of the organic label. After all, the organic food label is only as good as the certifying agents enforcing the standards.

While a February 2002 website posting by the NOP acknowledges this requirement, unfortunately, USDA has yet to establish the mandatory Peer Review Panel, despite having already accredited more than seventy organic certifiers, including a significant number of new certifying agents. This flaunting of the law has already shaken confidence in the process. Last spring, one company, Fieldale Farms, attempted to pressure the NOP into relaxing the 100% organic feed requirement for organic chicken production. While the agency did not accede to this demand, the NOP did accredit Fieldale's organic certifying agent, Georgia Crop Improvement Association. This raises questions as to how thoroughly USDA scrutinized this certifier's application and whether the processes of accreditation review and decision making are rigorous enough to prevent acceptance of new certifying agents intent on manipulating or weakening the organic standards.

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OFRF NEWS *by Don Burgett*

OFRF had quite a harvest season this past year. October 21, 2002 marked the beginning of a new era in organic farming and in U.S. agriculture as a whole. With the final implementation of National Organic Standards came a wave of major media attention, a new "USDA Organic" seal, and a lot of paperwork for farmers who used to market their products as organic without certifying them. After the long struggle to maintain the core values and high standards of organic farming's pioneers, we now have a uniform national definition of organic farming practices that can serve as the foundation for sustainable agriculture efforts in the U.S. and beyond. Enforcing the standards and upgrading them as we learn more about organic farming systems will remain a challenge for many years to come.

The development and transfer of information has been OFRF's primary focus since 1990, and 2002 was another busy year for this work. In this issue of the *Information Bulletin*, you will find updates from **Jane Sooby** on our Technical Program and **Brise Tencer** on our Policy Program. Here is some additional OFRF news of note.

Grantmaking

OFRF received 36 project proposals for our Fall grant cycle. The Board of Directors met in Georgia in November and awarded 13 grants totaling $103,832 for research and education projects in the coming year, bringing our annual total to $208,783 for 26 projects. That made 2002 a record-breaking year for OFRF grantmaking – again. In 2002, the grants program awarded 25% more money than it did in 2001. In spring, OFRF broke the $1 million mark in its 12-year history of grantmaking.

Of course the real impact is measured by the results of the projects funded. While much of the work appears esoteric to many, it can bring valuable information to farmers in the field. Recently, the OFRF Board has funded a number of seed breeding and development efforts, which are becoming more important as organic seed requirements phase in under the new national standards. **Frank Morton** of **Shoulder to Shoulder Farm** in Philmouth, OR, was awarded $6,600 in the spring to continue breeding work on disease-resistant lettuce grown in organic farms. Soon we will receive reports from North Dakota and Washington on work with small grain

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Erica Walz, Editor

Jane Sooby, Contributing Editor

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OUR MISSION • To sponsor research related to organic farming practices • To disseminate research results to organic farmers and to growers interested in adopting organic production systems • To educate the public and decision-makers about organic farming issues

cultivars and wheat varieties, respectively. Breeding plants that perform well in complex organic systems is a central element of developing more sustainable farms, and one which many organic growers currently lack.

Sometimes our grantees have a major impact in the larger world, too, as when **John Reganold**'s apple study made the cover of *Nature* in 2001 with findings that organic systems produced better fruit with equal yields using less energy than conventional or integrated systems. Now we may have another front-page story. Two years ago OFRF awarded $8,500 to two Cornell researchers working with dairy farmers in New York state to investigate antibiotic resistance in organic and conventional production systems. **Ynte Schukken** and **Linda Garrison-Tikofsky** sampled milk from 888 cows in 17 herds around the state. The results show that antimicrobial resistance is significantly greater among conventional herds than organic. The study is now under review for publication in the *New England Journal of Medicine*. If published, it will certainly make its way quickly into the mainstream media and add to the debate about the use of antibiotics in milk production and the consequences for human health.

Media & Events

Newsweek's September 30th cover story "Should You Buy Organic?" was perhaps the biggest media hit for OFRF in 2002. Written by the magazine's Chief Medical Writer, the article highlighted the personal and societal benefits of organic farming in a fair and positive manner. OFRF helped frame the story, and we believe it was influential in broadening the public's understanding of organic farming.

OFRF was also prominently featured in a national Associated Press story on the organic standards that was picked up by more than 80 daily newspapers, CNN and local network TV affiliates. The *New York Times* referred to **Bob Scowcroft** as an "organic pioneer" in its October 16th story on the standards, and the *Los Angeles Times* carried an Opinion piece co-authored by Bob on the 21st.

In September, OFRF celebrated our 10th Annual Fall Organic Harvest Luncheon benefit at **the Lark Creek Inn** in Larkspur, CA. With support from **Whole Foods Market**, which has co-hosted the event since 1993, over 130 supporters from across northern California packed the Inn to honor OFRF's work, acknowledge the tremendous contributions of the many organic pioneers in attendance, and celebrate the season with a five-course organic feast. The event also raised a record $23,000 for OFRF's general program fund.

At the Natural Products Expo-East, OFRF co-hosted the Spirit of Organic Awards dinner, which this year honored pioneering organic farmers **Phil and Katherine Foster** of California, **Klaas and Mary-Howell Martens** of New York, and **Tom and Irene Frantzen** of Iowa. Bob introduced each of the growers to the audience and then introduced surprise guest speaker **Senator Patrick Leahy** to the crowd of 400 industry leaders. Rounding out the evening, **Sonya Tuitele** and **Mary Mulry** of **Wild Oats Markets** presented OFRF with its largest organic industry donation ever: $82,500 raised by its national 5% Day for OFRF on September 16th.

Operations & Financial Support

OFRF bid farewell to Event Coordinator **Laura Ridenour** this fall, as she returned to school full-time. While we miss Laura's skills and experience, Development Assistant **Melissa**

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Advocates say organic program yielding to industry pressure

by Jack Kittredge

Several recent decisions by Richard Mathews, program director of the USDA's National Organic Program (NOP), have alarmed organic advocates. The program, which was implemented on October 21, 2002, sets the rules for certifying organic farms, producers and processors. According to the establishing legislation, the Organic Foods Production Act (OFPA) of 1990, the program is overseen by a National Organic Standards Board (NOSB) composed of unpaid members of the organic and scientific communities. The NOSB has been meeting for several years to draw up lists of materials suitable and not suitable for use in organic food production, and to set policy on hundreds of issues from compost making to standards for animal access to the out of doors. But respected members of the organic community now fear those NOSB policies are being undercut by NOP administrators.

This past fall Mathews said that he intends to add "List 3 Inerts" to the National List of approved substances. List 3 Inerts are the many hundreds of materials the Environmental Protection Agency (EPA) considers of "unknown toxicity". They include substances such as phenols, benzene, napthalene, ureas, acetone, chlorotoluene and piperonyl butoxide. In 1999 the NOSB Materials Committee voted unanimously not to allow any List 3 Inerts in organic agriculture unless they have been individually reviewed and approved. The NOP move to overrule the NOSB is "clearly in response to industry pressure," says Maine's Eric Sideman, vice chair of the NOSB Materials Committee at the time of the 1999 vote. Although some producers are pressing for inclusion of the materials, he noted, and will be hurt if they remain excluded, a much bigger problem will result for the organic program if they are included. "The consumers' and certifiers' loss of confidence that the NOP is following the Rule will hurt much more," he warns.

Another alarming move announced by Mathews is the exclusion of "food contact substances" from review by the NOSB. "Food contact substances" is an FDA classification which includes substrates used in the ion exchange process, a subject of controversy at a recent NOSB meeting. Now they will no longer be subject to NOSB review.

> This issue raises a basic question about the shape of organic farming under the NOP. Will organic "factory farms" be allowed to drive out family operations as they have in conventional agriculture?

NOP Threatens NOFA/Massachusetts Organic Certification Program

An NOP decision with special impact in the Northeast was announced by Mathews in November. At a meeting with organic growers in Connecticut, according to Bill Duesing, NOFA Interstate Council president, and several other organic farmers who also attended, the NOP program director announced that the NOP had overruled the NOFA/Mass Organic Certification Program on a case involving a Massachusetts egg producer. The producer, Mathews related, had applied to the Massachusetts program for certification and been presented with a list of ways in which his operation was not in compliance, including that the farm did not provide adequate access for the chickens to the out of doors. The producer came back with corrections to all the other points, but not the access one. Instead of coming into compliance on that issue, the producer appealed it to the NOP. Mathews said that, based on advice he received in a letter from a poultry expert, he decided on a "compromise" — to require the farm to provide access to the out of doors only in the months from May through September. He also said the NOFA/Mass Organic Certification program needed to certify the facility in question or lose accreditation for three years.

The farm in question, The Country Hen, in Hubbardstown, Massachusetts, had been certified by Quality Assurance International for several years. Owner George Bass has actively promoted his view that outside access for hens is, in many cases, detrimental—including to the health and safety of his 67,000 birds. In May of this year he testified at an NOSB hearing on animal access. He made three arguments:

1) He cited a recent outbreak of avian influenza in Virginia which killed 2.2 million birds and argued that danger from such infection is greater in a range-reared flock;
2) He explained that he has only 13 acres of land and his birds produce over 80 tons of wet manure a month, thus reasoning that allowing them outside would produce environmental damage to the surrounding watershed, and;
3) He calculated the cost of land and buildings which would be required to adequately rotate his birds so as to not pollute and arrived at a total of over $5,000,000.

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The question of organic eggs takes on a larger significance when one realizes the importance of eggs in virtually all baked and many processed products. If a processor is to have the preferred label of 100% organic, then organic eggs are required. For chickens not only to have access to the out of doors, but to be encouraged to go out when they feel like it, as the NOSB standards require, is hard to arrange in a large, centralized, multi-storied "industrial" chicken operation.

Thus the outcome of this issue raises a basic question about the shape of organic farming under the NOP. Will organic "factory farms" be allowed to drive out family operations as they have in conventional agriculture? The NOFA/Mass Organic Certification Program certifies several organic egg producers in Massachusetts, but none on the scale of The Country Hen.

Although The Country Hen has not been granted certification by the NOFA/Mass Organic Certification Program, the company's eggs have been on the market for weeks in local stores in boxes that bear the notation: "Certified Organic by NOFA Mass". When questioned about this an official of the NOFA/Mass Organic Certification Program said it was likely that Mr. Bass believed his eggs were certified, given his appeal to the NOP.

NOFA/Mass has not yet taken any action against the egg facility, hoping for a positive resolution of the certification dispute. But the organization is concerned about the situation because of its larger implications. According to the association's president, Jonathan von Ranson, "If NOP can, this early in the program, usurp the authority of the NOSB and flout basic rules about fairness and objectivity, then public trust in the value of the organic label may be permanently jeopardized." ■

This article was originally published in the Winter 2003 Issue of *The Natural Farmer,* the publication of the Northeast Organic Farming Association.

And, for historical perspective...

The first organic inspection

by Jeff Cox

In the spring of 1971, I'd been working as associate editor on Organic Gardening magazine in Emmaus, Pennsylvania, for about a year. One day Jerry Goldstein, the editor, called me into his office and declared that if organic foods were ever going to get into the marketplace, customers would have to know that the food really was organic. We at the magazine were going to have to certify that growers were organic. "We" meant the two managing editors, Lee Goldman and Maury Franz, and myself. I was to go out first and report back on how the certification went. Jerry gave me the name and phone number of a grower in Maryland who'd asked for our imprimatur and sent me on my way. I had no idea how to certify anything, but I thought I'd just wing it when I got to Maryland.

The drive to the grower's property took about two and a half hours. I pulled into the driveway of a neat little house with mature trees and shrubs around it. The grower came out to greet me. He was a man in his 40s, of serious demeanor, and, he assured me, all organic. Behind his house were a half-acre garden, a small garden shed, a hose bib, and a large pile of trimmings that I assumed was a compost pile. I walked the rows of the garden and wondered how in the world I could possibly tell if these crops were organic. When I looked in the gardening shed, there was a bottle of chemical pesticide on a shelf. "Do you use this?" I asked him. "Only when I have to," he said. I realized right then that I was in totally over my head. I looked helplessly around a little more, thanked the man, and left.

Back in Emmaus I told Jerry Goldstein that if certification were to be done by us three editors, he'd better hire three more editors, because it would take up all our time. Not only that, no one could certify a garden or farm organic just by looking at it. Certification, I said, would have to be done scientifically, with foolproof ways to ascertain whether a grower was organic or not. And that story of abject failure is, as far as I know, the story of the first organic inspection.

Jeff Cox is formerly an editor of Organic Gardening Magazine and a senior editor at Rodale Books. He is the author of 15 books and numerous articles about food, wine and gardening.

by Jane Sooby, Technical Program Coordinator

Technical year in review: Faith in the organic movement affirmed

This past year has been one of both personal and professional growth and change. In 2002 I traveled nationally and internationally for business and for pleasure, and responsibilities at OFRF continued to grow. This is both incredibly exciting and an increasing challenge to me.

What follows is a review of the year, focused on my travels.

In March, I attended the Upper Midwest Organic Farming Conference in LaCrosse, Wisconsin, and was again moved and impressed at the scope and heart of this inspirational gathering. This meeting proves to me that organic is still a viable movement in the United States, with thousands of intelligent, passionate followers living in every part of the country. People are thinking globally and acting locally, creating community and economic opportunity by establishing, for example, CSAs in the Midwest, where local vegetable production had retreated to backyard gardens.

At Upper Midwest, I moderated a panel, *Show me the Data*, that featured regional researchers presenting their findings, and gave a workshop on *The Research Revolution: How to Subvert the Government and Do It Yourself*, outlining how to do on-farm research.

I gave a presentation on *Compost Regulation in the National Organic Standards: History and Implications* at the Biocycle Conference in San Francisco in March. At this meeting, I learned the startling story about the persistent herbicide clopyralid that has contaminated compost in the Pacific Northwest, resulting in some Washington state organic farms losing their certification. You can read a briefing I wrote on clopyralid on the OFRF website.

A definite highlight of the year occurred in August. I traveled to Victoria, British Columbia, to participate in the International Federation of Organic Agricultural Movements (IFOAM) World Congress. Organized by the Canadian Organic Growers, the Canadians demonstrated their extraordinary talent in pulling together a world-class conference. I made a presentation, *Progress on Instituting Organic Farming Research*, as part of a panel with organic researchers from Brazil, Germany, and France. At IFOAM, I was impressed with the scope of the international organic movement. Organic agriculture is helping to feed people all around the world! What I saw in Wisconsin was reflected and magnified in Victoria as I heard presentations by people from Nicaragua, Benin, India, Sri Lanka, Costa Rica, Iran, New Zealand, Zimbabwe, and Nepal, among other countries. Altogether, over 92 countries were represented at this meeting.

In September, I traveled to New York state to participate in a SARE-funded conference, titled *Working with Organic Farmers: Enhancing Agency Involvement in the Northeast*. It was heartening to see the strong interest in organic by the Extension and university-based personnel who attended. I gave a presentation on *Getting 'Organic' Funding: Sources and Successful Approaches*. Organized by the Center for Sustainable Agriculture at the University of Vermont, this conference ought to have a long-term impact.

Afterwards, I drove to western New York and visited the farm of OFRF board member Steve Porter in Elba, between Rochester and Buffalo. Steve has a beautiful and diverse organic farm that includes a CSA operation, large-scale onion and cucumber production, and sheep.

I next visited Klaas and Mary-Howell Martens's farm in Penn Yan. The Martens and their neighbor, Guy Christensen, are cooperators on an OFRF-funded grant investigating corn performance under low-nitrogen stress. I examined both fields and saw great differences in performance between the different corn varieties.

I visited the New York Agricultural Experiment Station at Geneva, and Cornell University in Ithaca. Cornell has a new 30-acre organic research farm, and a healthy organic research and education program. More details will be included in the forthcoming *State of the States, 2nd Edition*, which will be completed in early 2003.

In October, I attended the SARE National Conference, *On the Road to Sustainable Agriculture*, in Raleigh, North Carolina, which highlighted farmer expertise with two days of well-planned excursions to farms and community projects. We visited North Carolina State University's Center for Environmental Farming Systems, one of the rare places in the U.S. where long-term, interdisciplinary systems research is being conducted with organic having a central role.

Despite the rise of the industrial side of organic, organic farming's historical identity is as a movement, and my travels confirmed that this movement continues to thrive around the world. This is because organic is more than a production method: organic implies a new relationship between humanity and nature, and new relationships within human communities. Food, hunger, environmental protection, and social justice issues are intimately related with organic production. Now is the time to continue improving organic farming methods so that organic's potential to feed the world and protect the environment will be realized. The immediate challenge in 2003 is to make explicit these connections, to continue to support organic farming, and to keep growing organic. ■

Power Point versions of Jane's presentations are available upon request.

Policy Program Notes

by Brise Tencer, Acting Policy Program Director

Organic Research Grant Updates

Section 406 Organic Transition Grants

CSREES is soliciting applications for fiscal year (FY) 2003 Organic Transition Grants. These grants are available as part of the Integrated Pest Management Grants Program. Applications must be received by **March 31, 2003.** Last year, close to $1.5 million was given in organic Transitions Grants.

❖ More information is available at: http://www.reeusda.gov/1700/funding/rfaintegrated_03.htm or, contact Dr, Tom Bewick tbewick@reeusda.gov or (202) 401-3356.

Organic Research and Extension Initiative

The 2002 Farm Bill mandates $15 million for the Organic Agriculture Research and Extension Initiative to be spent at $3 million a year from FY 2004 to FY 2008. The purpose of the program is to fund research that will enhance organic producers' and processors' ability to grow and market high quality organic food, feed and fiber. The program will be managed at the USDA Cooperative State Research, Education, and Extension Service (CSREES). They will be requesting applications around October 2003, which will likely be *due* in December, or in January 2004. If you are interested, start working on applications early, as that doesn't leave a lot of time to write your proposal. Farmers may apply independently, but are strongly encouraged to have a county Extension Specialist connect you with a university or other institution.

❖ For more information, see the administrative recommendations put together by OFRF and SCOAR at: http://ofrf.org/policy/index.html. Or contact Dr. Tom Bewick: tbewick@reeusda.gov (202) 401-3356.

SCOAR Updates

The Scientific Congress on Organic Agricultural Research (SCOAR) is currently working to finish up three projects. The SCOAR Steering Committee will be meeting in March to create a workplan for 2003 and discuss the identity of SCOAR and longer-term projects.

OrganicAgInfo Website Seeks Research Submissions

SCOAR, in collaboration with the Organic Agriculture Consortium (OAC), is still hard at work establishing the leading website dedicated to organic agriculture research dissemination.Expected to launch in early 2003, this international website will provide both scientifically and practically verified information covering a wide range of organic topics.

❖If you would like to contribute a publication, research report, case study, bulletin, or other farmer-to-farmer information, contact Brise Tencer at: 831-426-6606 or brise@ofrf.org.

Paper on Food Systems and Organic Agriculture

A SCOAR committee is working to produce a paper that sets forth the major principles and themes of ecological organic agriculture and systems research methodologies and the social, economic, and environmental consequences associated with such holistic systems. This paper should take the definition of organic beyond compliance with the National Rule and beyond input substitution. The paper, due out in spring, will be sent to scientific journals for submission.

National Agenda Development

A complete National Organic Research Agenda will be published and available in the spring of 2003. ■

Study finds organic diets linked to lower pesticide levels in children

A recent study conducted at the University of Washington found that children who eat organic foods have lower body levels of organophosphorus pesticides. The study compared the levels of an organophosphate metabolite in pre-school children in Seattle who consumed conventionally grown or organic produce. They found pesticide residue levels *nine times* higher *on average* in those who ate conventional fruits and vegetables. Consuming organic produce reduced the children's exposure levels to below the U.S. Environmental Protection Agency's safety levels, effectively shifting their exposures from a range of 'uncertain risk' to a range of 'negligible risk.' *"Consumption of organic produce appears to provide a relatively simple means for parents to reduce their children's exposure to organophosphorus pesticides,"* the authors concluded.

❖ To obtain a copy of the full article, contact lead author Cynthia Curl, Dept. of Environmental Health, University of Washington, phone (206) 685-1958; ccurl@u.washington.edu. An abstract is available online at: http://ehpnet1.niehs.nih.gov/docs/2003/5754/abstract.pdf.

Who's watching *continued from page 1*

Unfortunately, attempts by consumer and environmental organizations to analyze the USDA's performance in overseeing the first round of accrediting organic certifiers have been met with stiff government resistance. Several months ago, the Center for Food Safety (CFS) sought public release of all the documents used by USDA in making accreditation decisions. Absent the Peer Review Panel, the documents are the only way the public can determine whether the integrity of organic standards will be preserved by certifiers. To date, CFS's Freedom of Information Act request seeking the documents has been rebuffed. At varying points, government officials have claimed that the agency did not have all the documents currently in its possession or that their reproduction and release would cost CFS thousands of dollars and use up the entire USDA organic program budget. Such a response leaves the public wondering whether the Administration's antipathy toward organic is already winning out over the need to preserve the integrity of the hard fought standards through a strong accreditation program.

As special interests continue their efforts to exert influence over the organic program, transparency within the NOP will be paramount. For example, the United Egg Producers, an organization representing the majority of industrial-style egg producers, has openly sought to overturn the requirement that organic poultry have access to the outdoors. Whether at UEP's behest or simply as a holiday offering to agribusiness, USDA has moved to alter the outdoor access requirements without public notice or pronouncement. This fall the USDA overturned a Massachusetts certifier's refusal to certify a poultry operation that did not meet the national organic program requirements for outdoor access [see related story, page 4]. In accepting the poultry producer's appeal of the certification denial, USDA undercut the authority of one of its accredited certifiers by essentially telling it to "shut up and certify" a producer not in compliance with the law. Without a right to formally appeal the USDA's action, the certifier is now faced with the dilemma of following USDA's order or sticking to its principles while likely facing suspension of its accreditation.

This episode typifies how the absence of peer review and public oversight of the USDA-certifier interactions threatens the integrity of the organic program. By refereeing a confidential appeals process, USDA has made a decision that alters the meaning of "outdoor access" for poultry. Under this scenario, the organic consumer and most organic farmers lose. The consumer now cannot tell whether their certified product was produced in compliance with the standard, and upstanding organic farmers may lose a certifier that understands the values and interests of organic production and its consumers.

So as the new organic label makes a splashy entrance into stores across the country, it is critical that at this time the organic community takes steps to prevent erosion in consumer trust in the integrity of the organic label. To that end, the Center for Food Safety and several other organizations filed a legal petition with the USDA on October 16th giving the agency its last chance to create the critical Peer Review Panel before litigation is filed. The legal petition requests that the agency immediately act to create the Panel based upon recommendations of the NOSB. On an October national radio show USDA responded to the legal petition by stating plans to put the Peer Review Panel in place "soon," but offered no other specific details. Yet, the government agency has neither taken any steps to fulfill this promise nor has it moved to make its accreditation documents public. Unfortunately, without such action this may just be the beginning of a new multi-year battle to ensure that the new organic program does not become a victim of governmental abuse and neglect.

Under law the USDA must respond to the legal petition within a "reasonable" period of time. In general, our courts and other federal agencies have defined "reasonable" as a period of time from 180 days to 18 months. Should the USDA continue to stall on responding to the petition, CFS expects that it will file litigation to force such an answer within the year. In the meantime, USDA accreditation continues without public oversight. ■

Petition before the the USDA/AMS/NOP on accreditation peer review

Petitioners are: Center for Food Safety, Beyond Pesticides/National Campaign Against the Misuse of Pesticides, National Campaign for Sustainable Agriculture, Rural Advancement Foundation International – USA, and the Union of Concerned Scientists.

Petitioners request that the Secretary undertake the following actions:

(1) Establish the Peer Review Panel as a standing committee of the National Organic Standards Board, pursuant to the Federal Advisory Committee Act;
(2) Create a three member Peer Review Panel with one alternate member;
(3) Direct the National Organic Standards Board to recommend, by majority vote, members for appointment to the Peer Review Panel;
(4) Mandate that all appointees to the Peer Review Panel must have expertise in organic production and handling methods and certification procedures;
(5) Allow all current and former members of the National Organic Standards Board to serve as appointees to the Peer Review Panel; and
(6) Establish that appointees to the Peer Review Panel may serve up to two 3-year terms and that all appointments will be made on rotational basis.

The petition is available at: http://www.centerforfoodsafety.org

To send comments in support of developing a Peer Review Panel for organic certifier accreditation, contact:

Richard Mathews
USDA-AMS-TMP-NOP
Room 4008-S
14th and Independence Ave., SW
Washington, DC 20250-0020
richard.mathews@usda.gov
tel. (202) 720-3252

Bat houses for integrated pest management—benefits for bats and organic farmers (Phase I)

Bats are helpful to farmers because they consume large quantities of insect pests, but many bat species are declining due to loss of roost sites. Farmers can help bats by providing new roosts in the form of bat houses while at the same time benefiting from bats' pest reduction services. Ten organic farms in central California were selected in 2000 as installation sites for bat houses, to initiate the first phase of an integrated pest management project: to test bat housing preferences and determine optimal design and mounting strategies for this region.

Objectives

The first objective of this study (Phase I) was to establish bat houses at 10 organic farms in California. Larger, experimental bat house designs were installed at five of these sites for testing purposes. The second objective (Phase II) will be to determine the degree of impact that bat house-roosting bats have in reducing crop pests.

Materials and Methods

Four wooden bat houses were installed at each site, and five of the sites also received a plastic insulated bat house. The wooden houses had four chambers and were built by Swetman Enterprises of Madison, Virginia (540-948-4146). External dimensions were 32" H x 18" W x 5" D. Wooden houses were patterned after the nursery house from *The Bat House Builder's Handbook* published by BCI. The experimental plastic insulated models were eight-chamber "Condo" houses with a commercial-grade stucco coating inside and out, built by Maberry Centre Bat Homes of Daingerfield, Texas (903-645-7780, www.maberrybat.com). External dimensions were 23" H x 19" W x 11 ½" D.

Photo 1. *Three bat houses were installed on a barn at Sierra Orchards, an organic walnut orchard, near Winters, CA. The house on the left is a plastic insulated model, while the other two are wooden nursery models. All three of the houses were occupied within three months of installation. They face east and receive approximately six hours of direct daily sun during summer.*

We tested pole-mounted houses versus building-mounted houses, as well as plastic versus wooden houses, and light-colored versus medium-colored houses. Bats use houses that best meet their temperature needs, and will move between different ones as ambient temperatures change (for example, on hot days, bats may choose light-colored houses, and on cool days, medium-colored houses).

Two wooden houses at each farm were painted a light color (off-white) and two were painted a medium color (medium brown) prior to installation. Plastic insulated bat houses were pre-painted either medium green or light gray. Two wooden houses per pole were installed side by side (one lighter, one darker) and the other two wooden houses side by side (one lighter, one darker) on a building. (Data from the North American Bat House Research Project shows that pairs or groups of houses are more successful than single houses.) Plastic insulated houses were attached adjacent to wooden houses on the same building at five sites. Overall, 25 houses were mounted on buildings and 20 houses were mounted on poles. Identification numbers were affixed to all houses to enable tracking over time.

Photo 2. *The owner of Anderson Almonds takes notes on his newly installed bat houses near Hilmar, CA.*

Mounting sites were selected to avoid afternoon sun exposure to prevent overheating. For this reason, most houses faced either north or east and were located north or east of large deciduous trees to block afternoon sun from the west in summer. Finished installation heights for houses mounted on buildings ranged from 13 to 20 feet. For pole-mounted houses, 21-foot-long, 2-inch inside diameter steel poles were used.

Following installation, bat houses were monitored for occupancy. Numbers of bats and species (if known) for each occupied house were forwarded to BCI. Other bat house data (habitat, farm type, distance to nearest water, etc.) were recorded at the time of installation and entered for inclusion with BCI's 2001 North American bat house survey.

Project Results

Bat houses at five of the 10 farms (50%) were used by bats within one to five months of installation. A total of 11 of 45 houses were occupied (24%), though several others may also have been used. Bat houses mounted on barns (9 of 25, 36%) were used more often than those on poles (2 of 20, 10%), though observations were limited to less than one full season. Two of the five plastic houses (40%) had confirmed use, indicating the design is acceptable to bats.

Based upon observations, at least two species were present. Most were Mexican free-tailed bats (*T. brasiliensis*), while some were thought to be big brown bats (*E. fuscus*). Multiple species often inhabit the same bat house, and as each species has different dietary preferences, attracting more than one species to a farm can increase the number of pest types consumed. For example, Mexican free-tailed bats feed primarily on moths, while big brown bats mainly eat beetles.

Principle investigators: Mark and Selena Kiser, Bat Conservation International, P.O. Box 162603, Austin, TX 78716-2603
tel. 512-327-9721
Co-investigator: Rachel Long, University of California (Yolo County) Cooperative Extension
Project locations: 10 organic farms in California's Central Valley
Project period: 3 years; report constitutes results of first year
Funding provided by OFRF: $5,800
Report submitted: January 2002
OFRF project report: No. 99-44, awarded Fall 2000. 13 pp., including bat house mounting diagrams. Available by mail from OFRF or at www.ofrf.org.

Benefits of Bats

More than half of the 45 species of bats living in the United States and Canada are either endangered or candidates for such status, and many of those still considered abundant are also in alarming decline. As was formerly the case with purple martins and bluebirds, roost loss is an important factor in decline. Millions of bats have been forced from caves and old growth forests by human activities. Many that have relocated to abandoned mines have been buried during mine safety closures. Others have occupied buildings from which they are increasingly being excluded. Bats are not well equipped to handle these threats because they are the world's slowest reproducing mammals for their size, and they form the largest and most vulnerable aggregations of any vertebrate.

Loss of bat habitat poses a particular problem to agriculture because bats are primary predators of vast numbers of pests that cost American farmers and foresters billions of dollars annually. For example, Brazilian (Mexican) free-tailed bats (*Tadarida brasiliensis mexicana*) from central Texas alone consume approximately two million pounds of insects nightly, a large proportion of which are corn earworm moths (a.k.a. cotton bollworm), the most damaging agricultural pest in America. In Indiana, a colony of just 150 big brown bats (*Eptesicus fuscus*) consumes sufficient cucumber beetles each summer to prevent egg laying that would produce 33 million of their rootworm larva, another costly pest. Without adequate habitat, however, bats are unable to fulfill their vital roles in keeping insect populations in check.

Recent studies show that the most common bat house occupants, big brown, little brown, and free-tailed bats, can be extremely beneficial to agriculture. An organic farmer in Oregon who attracted 600 little brown bats to bat houses reported elimination of a previously serious corn earworm problem. Not only do they consume pests, including corn earworm, armyworm, and tobacco budworm moths, but their mere presence can have an effect on insects. It has been documented that moths listen for bat echolocation sounds and avoid areas within 150 feet of where they hear even one bat.

The Bat House Project has already developed many successful bat house designs, but these models may not necessarily meet the needs of farmers. Most house only small numbers of bats and large designs are often too costly for most farmers to build or purchase for large colonies. In this study, BCI tested a newly-developed larger design, both inexpensive and lightweight, alongside conventional designs. These new houses are based on the latest research and are built by Maberry Centre Bat Homes. They can accommodate 500 to 800 bats (depending on species) in a space of approximately four cubic feet.

—Mark & Selena Kiser

[Supplemental data provided from June 2002 included observations of Yuma myotis (*Myotis yumanensis*) and pallid bats (*Antrozous pallidus*). At this time, overall bat house occupancy had increased to 35%.]

Discussion

We are encouraged that many of the bat houses were inhabited this early in the project, especially considering that they were installed in June and August. (The logistics of transporting 45 bat houses, poles, tools, hardware and paint to 10 farms over a seven county area was quite challenging.)

Photo 3. *Rachael Long, farm advisor with the University of California (Yolo County) Cooperative Extension, installs two wooden bat houses on a pole barn at Ferrari Farms, near Linden, CA.*

Photo 4. *Together with the owners of Living Farm Systems, Selena Kiser (left), project assistant for BCI's North American Bat House Research Project, installs wooden bat houses side by side on a pole on an organic farm near Livingston, CA.*

Ideally, bat houses would be installed by late winter. Occupancy may have been higher in 2001 if houses had been installed before March, before maternity colonies are formed. We are also pleased that two of the plastic houses were used. Monitoring will continue through 2003 to determine bat preferences for model, color and placement. It often takes several years for bats to be attracted and for colonies to become established.

Although results are preliminary, bat houses mounted on buildings performed better than those on poles. In the hot, dry summer climate of California's Central Valley, where daily temperature fluctuations are great, buildings act as heat sinks and help to buffer daily temperature changes. Therefore, temperatures inside bat houses mounted on buildings fluctuate less than those mounted on poles, which may explain why bat houses on barns had a higher occupancy rate. Elsewhere, pole-mounted houses do almost as well as those on buildings.

In Phase II of this study, sites where bats are attracted will be slated for crop pest comparison research by graduate students or other researchers. The study will identify the varieties and numbers of pests being eaten by bats, followed by comparison of pest numbers and/or damage at varying distances from bat houses. The amount of bat foraging activity over agricultural fields and bat-insect interactions will also be documented. Presence of foraging bats and changes in bat density will be documented using ultrasonic bat detectors and night vision verification, and pest abundance and damage will be compared to bat densities and distances from bat houses. Additional evidence will come from comparison of pest hatch times with the bats' activity patterns.

ATTRA's Organic Matters Series: Increasing organic farmer access to relevant and practical research-based information

ATTRA has recently published a series of cutting-edge publications on organic-pertinent topics targeted primarily to experienced organic producers. The series, entitled *Organic Matters*, addresses timely subjects and focuses on the presentation of current research.

Objectives

A vast amount of useful and practical research-based information does not reach organic farmers. The principal objective of this project is to make a greater proportion of relevant and practical research-based information available, specifically to an experienced organic farmer audience.

The *Organic Matters* series aims to provide concise and readable interpretive summaries of organic-pertinent research. Each publication is targeted to a specific topic. The series is designed to encourage specialists to tackle high-need and timely organic topic areas to a degree not customary in traditional ATTRA publications.

Another objective of this project is to more actively develop and disseminate information through ATTRA. Throughout most of its fifteen years of service, ATTRA has provided clientele with information that is as current and relevant as possible. However, the approach has been largely reactive. Farmers call ATTRA with questions and technical staff provide a response. When a subject area generates enough inquiries, a publication is often developed with periodic updating.

However, NCAT agriculture specialists are in an exceptionally good position to identify pertinent research. The in-house resource center archives more than 570 periodicals, including professional journals, trade magazines, and newsletters. Specialists systematically review this vast amount of literaure on a routine basis. This is in addition to monitoring information on the World Wide Web and electronic listservs. Furthermore, NCAT enjoys access to the University of Arkansas library and its resources.

The *Organic Matters* Series

Each document features two main sections. The first is an overall discussion of the topic. The second section presents a selection of research abstracts. The abstracts explain the research results and relate those findings to the previous discussion. In the majority of instances, the abstracted research is from recently published journals and other sources, though older research is also used where appropriate.

Organic Matters publications are submitted to the same internal technical and editorial review process accorded ATTRA publications. In most instances, external technical reviews were also sought.

Identifying Topics. Among the four topic areas chosen to begin the *Organic Matters* series, organic production of tree

Organic Matters

Four *Organic Matters* publications have been completed:

- ***Pursuing Conservation Tillage Systems for Organic Crop Production***
  by George Kuepper, published June 2001. This publication can be viewed at <http://www.attra.org/attra-pub/PDF/omconservtill.pdf>.
- ***Considerations in Organic Apple Production***
  by Guy Ames, published July 2001. This publication can be viewed at <http://www.attra.org/attra-pub/PDF/omapple.pdf>.
- ***Considerations in Organic Hog Production***
  by Lance Gegner, published July 2001. This publication can be viewed at <http://www.attra.org/attra-pub/PDF/omhog.pdf>.
- ***Protecting Water Quality on Organic Farms***
  by Barbara Bellows, published October 2002. This publication can be viewed at <http://attra.ncat.org/attra-pub/PDF/om-waterquality.pdf>.

fruit and hogs were chosen due to the significant gaps in information that existed. In the matter of tree fruits, the gaps related mostly to regional issues; in hogs, the gaps existed on virtually all levels.

The topics of the remaining two publications were chosen for a somewhat different reason. The subjects of conservation tillage and water quality were chosen because these issues currently command much interest in public debates about agriculture in general, and because the role and relationship of organic farming to these matters is poorly understood.

Future Developments

New publications in the series are currently under development. The two that have been announced are *Organic Herb Production* and *Organic Mulching Systems for Organic Market Gardeners*. We intend to continue the Organic Matters series as an ongoing publication category.

Sample abstract from *Protecting Water Quality on Organic Farms*: *Organic farming involves many practices that protect against nutrient leaching, water runoff, and soil erosion. Water quality protection is greatest when organic practices are implemented using a "systems approach" rather than simply following a general list of approved practices. By understanding the biological, chemical, and climatic processes occuring in each field, organic farmers can implement practices that both enhance production and protect water quality. When organic practices are implemented in a more piecemeal and less sustainable manner, they can cause environmental impacts similar to those found on conventional farms. Environmental problems most commonly found on organic farms result from mismanaging manure applications or soil incorporation of green-manure crops, and from improper storage of manure or compost. This publication discusses practices that protect and practices that fail to protect water quality. Farmers can use the guidelines provided here to modify management to suit their soil, climate, and farming conditions.*

Project coordinator: George L. Kuepper, Program Specialist, National Center for Appropriate Technology, Fayetteville, AR
OFRF support: $4,500
Additional support provided by: USDA Agricultural Marketing Service and Kerr Center for Sustainable Agriculture
Project period: 2000-2002
Report submitted: June 2002
OFRF project report: No. 99-49. 5 pp. Available by mail from OFRF or at www.ofrf.org.

Appropriate Technology Transfer for Rural Areas

ATTRA—Appropriate Technology Transfer for Rural Areas—is the national sustainable farming information center operated by the private nonprofit National Center for Appropriate Technology (NCAT). ATTRA provides technical assistance to farmers, Extension agents, market gardeners, agricultural researchers, and other agricultural professionals in all 50 states. Topics addressed by ATTRA can be categorized into three broad areas:

- Sustainable farming production practices
- Alternative crop and livestock enterprises
- Innovative marketing

Technical assistance, publications, and resources are provided free of charge to appropriate users. ATTRA is funded through a cooperative agreement with the USDA Rural Business--Cooperative Service agency.

The National Center for Appropriate Technology is a 501(c)3 non-profit organization with programs in sustainable agriculture, rural development, renewable energy, and low-income housing. The ATTRA program is one of several sustainable agriculture projects managed by NCAT.

In addition to web availability, all ATTRA publications, including *Organic Matters,* may be obtained free of charge by mail.

Contact information:

Appropriate Technology Transfer for Rural Areas
P.O. Box 3657
Fayetteville, AR 72702
1-800-346-9140
M-F 7:00am-7:00pm CST
www.attra.org

Respondents to OFRF's *Third Biennial National Organic Farmers' Survey* named ATTRA more frequently than any other resource as a preferred source of organic production information. Many respondents included comments, such as: *ATTRA has good publications; Staff are very helpful; They're the best! —EW*

Conservation tillage systems for organic vegetable production

A primary goal in developing environmentally sound and profitable farming systems is to prevent soil degradation and erosion loss, and wherever possible, enhance soil quality through organic matter management. Conventional tillage practices currently used for vegetable production in the Willamette Valley involve from 5-8 passes over the field.

Over a four-year period we worked with vegetable growers to develop an integrated system of vegetable production using winter annual cover crops and rotary strip-tillage. The strip-till system uses a single pass of a strip-rototiller and tills approximately 30% of the soil surface. In the experiment described here, we wanted to evaluate the feasibility of strip-till vegetable production in an organic system.

Procedures

An experiment was established at the OSU Vegetable Research Farm in a block that has been farmed using organic production practices since 1995. In the fall of 1998, an experiment was initiated with two cover crops and three tillage treatments.

The two cover crop treatments included:

1. **A mixture of 'Steptoe' barley (60 lbs/acre),** common vetch (50 lbs/acre) and phacelia (10 lbs/acre); and
2. **A mixture of 'Celia' triticale (60 lbs/acre),** common vetch (50 lbs/acre) and phacelia (10 lbs/acre).

Prior to cover crop planting in the fall, a pelletized fish fertilizer (9-3-5) was applied at 200 lbs/acre to provide a small amount of N to assist establishment of the cover crops. A Lely roterra® was used to incorporate the fertilizer and prepare a seedbed. Cover crop treatments were randomized within future tillage treatments.

- Oct. 23, 1999. Cover crop species were mixed and hand seeded, in plots 25 x 60 ft. A spike-toothed harrow was used to incorporate the cover crop seed;
- May 14, 2000. Cover crops in all treatment plots were shredded using a Buffalo® stalk chopper with rolling blades. This method did not adequately suppress the cover crop growth; and so, on
- May 21, a flail mower was used on all plots immediately prior to tillage.

Tillage treatments included:

1. **Conventional tillage (CT)** using a power spader, followed by 2 passes with a Lely roterra®;
2. **Strip-tillage/mow (ST-M)** using a single pass of a Northwest Farm Tillers 12' rototiller modified to till four 6 inch-wide strips approximately 6 inches deep (with between row cover crops and weeds suppressed with successive mowing); and
3. **Strip-tillage/cultivate (ST-C)**, with strip tillage as in Treatment 2, but with between row vegetation suppressed by mowing and a single cultivation with a Buffalo high residue cultivator.

Photo 1. *Tilling strips into a mowed cover crop using a modified Northwest Tillers rototiller.*

Principle investigator: John Luna, Dept of Horticulture, Oregon State University, Corvallis, OR 97331
tel. 541-737-5430 email: lunaj@bcc.orst.edu
Research collaborator: Mary Staben, Dept. of Horticulture, OSU
Location: Oregon State University Research Farm, Corvallis
Funding provided by OFRF: $4,825.00
Project period: 1999-2000
Results submitted: December 2000.
Report No. 99-21. 9 pp. including 2 figures, 6 tables. Available by mail from OFRF or at www.ofrf.org.

Table 1. The effect of tillage (strip-till or conventional) and cover crop treatments (barley or triticale) on broccoli yields (kg/ha).

Treatment	#1 Grade	#2 Grade	Total #1s and #2s
CT-B [a]	9,760	1,555	11,312
CT-T [b]	10,089	1,604	11,693
ST-C-B [c]	7,687	1,975	9,662
ST-C-T [d]	7,599	1,370	8,969
ST-M-B [e]	7,368	1,811	9,179
ST-M-T [f]	7,455	2,726	10,181
Treatments pooled by tillage treatment:			
CT [g]	9,924	1,579	11,503
ST-M [h]	7,648	1,672	9,318
ST-C [i]	7,587	2,269	9,856
Treatments pooled by cover crop:			
Barley mix	8,365	1,780	10,145
Triticale mix	8,381	1,900	10,281

a = conventional till in barley, b = conventional till in triticale, c = strip till plus cultivation in barley, d = strip till plus cultivation in triticale, e = strip till plus mow in barley, f = strip till plus mow in triticale, g = conventional till, h = strip till plus mow, i = strip till plus cultivate

In the strip-till plots, BioGrow fish fertilizer was applied by hand in a 6-inch wide band over the tilled strip at a rate of 980 lbs/acre (88 lbs N/acre). In the CT plots, strings were stretched over the rows to be planted and fish fertilizer applied similarly to the ST plots. The strip tiller was then used to incorporate the fish fertilizer in ST and CT plots.

- May 28. Broccoli (Var. = 'Arcadia') was transplanted using a mechanical transplanter and skips were filled by hand to assure a uniform stand.
- June 14 and June 27. Mowing was conducted between the broccoli rows in the ST-M and ST-C plots using a DR® weed trimmer equipped with a shield.
- June 27. The CT and the ST-C plots were cultivated with the Buffalo cultivator.
- July 1 and July 7. Weeds within the rows were controlled by hand hoeing.

Results

Cover crop above-ground biomass. There was more than twice the biomass of barley (1664 kg/ha) than triticale (708 kg/ha) in the plots, and biomass of vetch (average: 2,067 kg/ha) and phacelia (average: 626 kg/ha) was quite similar between the cover crop treatments. Vetch clearly contributed the greatest biomass and nitrogen of the cover crop components, with slightly more than 70 kg N/ha.

Soil nitrate and leaf nitrogen. Soil nitrate levels ranged from 6.7 to 9.5 ppm among the cover crop/tillage treatments. Pooled across cover crops, CT had higher soil nitrate levels in the broccoli row than the ST treatments. Soil nitrate levels were higher between the rows in the CT than the ST-M, but the ST-C contained the highest level. Soil nitrate was slightly higher in the barley treatments than in the triticale. Percent total nitrogen in the broccoli leaves ranged from 3.6 to 5.2 among the treatments on July 13. CT had higher N than either of the ST treatments and the barley cover crop mixture had slightly higher levels than triticale.

Broccoli yield. There was very similar total number of usable broccoli heads among the treatments, with a trend toward more No.1 heads in the CT than in the ST treatments. *Broccoli yield, however, was significantly greater for CT than the ST treatments, with CT producing nearly one ton/ha more yield* (Table 1). Most of this yield increase was in No.1 grade heads, which were larger than No.1 heads in the ST plots. There was no cover crop effect on yield.

Weeds. Density of purslane, hairy nightshade, and Persian speedwell were all greater in the CT plots than in the ST plots (Fig. 1). Purslane continued to emerge in the CT plots in spite of repeated cultivations. Although abundance of chickweed was low compared to other weeds, ST plots had more chickweed than CT (Fig. 1). The stimulatory effect of tillage on weed germination is well known and the lack of tillage in the ST plots apparently reduced weed germination in this trial. However annual blue grass was present throughout the ST plots, since the mowing had little effect on the low-growing grass.

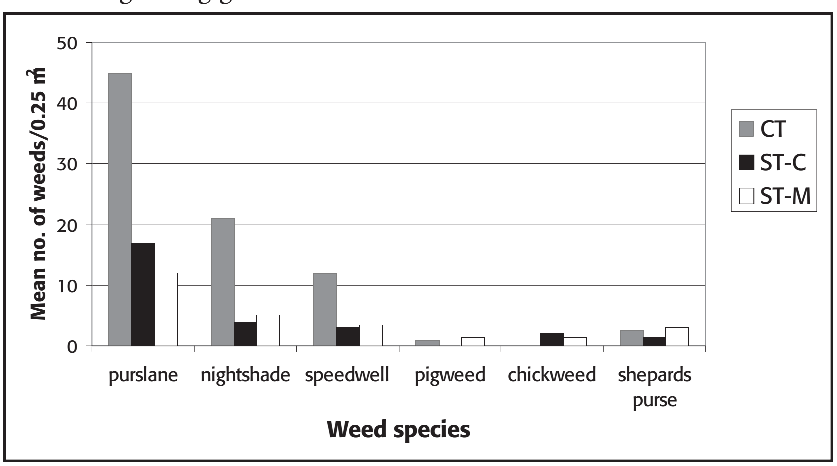

Fig. 1. Effects of tillage systems on weeds sampled between broccoli rows, 25 days after transplanting broccoli. Values are mean number of weed species per 0.25m², pooled across cover crop treatments (N=8). CT = conventional tillage; ST-C = strip-till with cultivating vegetation between rows; ST-M = strip-till with mowing vegetation between rows.

Insects. Dramatic differences in numbers of flea beetles *(Phyllotreta brassicae)* were observed among the tillage treatments, with significantly more beetles found on the CT plots than in the ST plots on all four sampling dates. Flea beetles in the CT plots caused a considerable ragging of the broccoli leaf edges, but disappeared from the broccoli soon after the June 29 sampling date and the broccoli rapidly grew out of the damage.

There were no significant treatment effects of tillage or cover crops on pest or natural enemy abundance sampled on the broccoli leaves during the growing season. Nor were there any significant effects of treatments on insect contamination of broccoli heads.

Discussion

Nitrogen availability to the broccoli crop may be a key factor in the yield reduction shown in the ST treatments. The CT treatment apparently mineralized more N, as indicated by the soil nitrate tests. The competition of the between-row vegetation for nutrients and water is also a factor. Although the mowing suppressed the regrowth of the barley fairly well, there was some regrowth of the triticale. In the ST plots, annual blue grass combined with other summer annual weeds to form a living vegetative cover between the rows. Excellent weed control within the broccoli rows was maintained using hand hoeing, however the clean-cultivated strips were rather narrow (about 6”) and competition from between-row vegetation was likely.

The dramatic reduction of flea beetle infestations in the strip-till plots has implications for future control strategies for organic growers. However the mechanism that is causing the differences in insect numbers among the tillage treatments is not understood.

The relatively high level of imported cabbage worm *(Pieris rapae)* larvae found in the heads is interesting. While organic growers may use *Bacillis thuringiensis* (Bt) to control worms in broccoli, we did not have adequate spray equipment to apply insecticides. Also, we had planted 2 x 35 m strips of buckwheat *(Fagopyron esculentum)* along the outside edges of the experimental block as insectary plants to provide nectar and pollen for beneficial insects. Unfortunately, many insectary plants also provide resources for pest species, and in this experiment we observed hundreds of *P. rapae* moths feeding on the buckwheat and moving directly into the broccoli to lay eggs. In other OFRF-supported work, we have also shown that buckwheat is attractive to *P. rapae.* Therefore we believe that buckwheat should not be planted near cruciferous crops.

The rotary strip tiller used in this trial does not prepare a very wide or deep tilled strip (approx. 6” wide x 6” deep) compared to the newer transtiller, which tills about 12” wide and 14” deep. In future work with strip-tillage in organic systems, we will use the transtiller. Additional suppression of the cover crop and weeds growing between the rows is also necessary, and future research will focus on thermal vegetation control devices. Thermal weed control involves the injection of superheated gas into a semi-enclosed containment vessel moving over the soil surface and has been shown to be more effective with larger vegetation than traditional propane flaming (J. Luna, unpublished data). Higher rates of fertilizer application would also help assure availability of N to the crop. One of the major constraints in this project was in-row weed control, since the row was too narrow to use cultivation equipment. Hand hoeing was also difficult in the narrow strips because the compacted, untilled areas between the rows constricted the action of the hoes.

Photo 2. *Comparison of strip tillage (left) with the conventional tillage (right) immediately after transplanting broccoli.*

Photo 3. *Broccoli growing in the strip-till plots, showing cover crop regrowth and other vegetation between the rows.*

Organic management of garden symphylans in annual cropping systems

The garden symphylan *(Scutigerella immaculata)* is an increasingly common problem on organic farms. Symphylans have a diverse diet, feeding on decaying organic matter and on the roots of a very wide range of crops and other plants, including many weeds. Heavy symphylan populations can severely stunt and even kill most annual crops. To our knowledge, there are no organically acceptable symphylan control strategies that have been shown to work consistently. Most of the information about organic control strategies is anecdotal and often contradictory.

We conducted field and laboratory studies at the Davis and Santa Cruz campuses of the University of California to evaluate a number of symphylan management and control strategies and to develop and evaluate methods for studying symphylans and their management. In field studies we evaluated the effects of a number of cover crop and cash crop residue treatments, shrimp shell extracts and tillage effects on symphylan populations over time. In laboratory trials, we evaluated modifications of soil pH, a number of neem formulations, the commercial product Farewell, mustard seed extracts and three species of predatory nematodes for their effects on symphylans.

Jack Kelly Clark, University of California

Garden symphylans (also called garden centipedes) are not insects; they are in their own arthropod class Symphyla. When full grown they are not more than 0.33 inch long, have 15 body segments and 11 to 12 pairs of legs. They are slender, elongated, and white with prominent antennae.
—UC Statewide IPM Program

Objectives

- To determine the effect of different management strategies on established populations of *Scutigerella immaculata* in replicated field trials.

- To develop effective symphylan-rearing media and techniques for the amplification of stock populations to use in studying potential biological control agents.

Materials and Methods

This project consisted of four field studies and three laboratory studies (a fourth laboratory study consisting of rearing symphylans is described in the full project report).

Field Studies

1 Comparison of symphylan baiting methods —Field trial

These trials compared different soil surface bait materials, to identify the best types of bait and the optimal baiting time interval. Lettuce, beet and potato pieces (2.5 in. diameter) were placed at bait stations on moist soil surface and covered with a 4 inch dark plastic pot. Symphylans were counted by randomly checking bait stations over a period of five days.

Results. Beets appeared generally superior to potatoes or lettuce for long sample periods and also for numbers of symphylans recovered. There was no demonstrated advantage between the 24 or 48 hour sampling time periods tested.

Investigators: Mark Van Horn, University of California-Davis Student Experimental Farm, Davis, California, 95616. tel 530-752-7645
Mario Ambrosino, Oregon State University
Jim Leap, University of California-Santa Cruz Center for Agroecology and Sustainable Food Systems
Funding provided by OFRF: $6,950
Project period: 1999-2000
Report submitted: March 2001
Project number: 99-53, awarded Fall 1999. 16 pp., including 6 figures, 2 tables. Available by mail from OFRF, or at www.ofrf.org

2 Effects of various incorporated plants and micronized shrimp shells—Field trial, UC-Davis

This trial was conducted in a field with high symphylan pressure. The six treatments compared were:

1. **Mustard**: 'Martagena' mustard cover crop;
2. **Barley:** 'Micah' barley cover crop;
3. **Vetch:** cover crop mix of 'Lana' woolypod, Common and Purple vetches;
4. **Shrimp shells:** micronized shrimp shells applied in conjunction with two irrigations;
5. **Brassica residues:** organic collard, cabbage and Brussels sprout crop residues; and
6. **Control:** untreated resident vegetation minimized by winter mowing.

- The three cover crop treatments were sown in November, and mowed or topped in March/April.
- Brassica residues were applied in April and these plots were flail mowed, disced and tarped the day following application.
- Weeds in the Shrimp shell and Control plots were mowed in March. In the Shrimp shell plots, water suspensions of micronized shrimp shells were applied with a backpack sprayer at a label rate of 50 pounds/acre/application on March 22 and April 10.
- On April 20, cover crop treatments were flail mowed and disced three times. All mustard and brassica plots were tarped with 4 mil clear plastic within 24 hours of incorporation. The tarps remained on these plots for 20 days.
- Tomato transplants (organically grown) were machine transplanted in all plots on May 4. Symphylan surface numbers were collected by surface baiting at monthly intervals for a total of seven dates. The first five dates were during the cover crop growing season, the last two were during the tomato growing season.

Results, by sample dates:

- January 9, 2000. The numbers of symphylans in the barley and mustard plots were significantly lower than those in the other three treatments.
- February 9. The three cover crop treatments again had significantly fewer symphylans than the other treatments; the barley also had significantly fewer symphylans than the mustard and vetch.
- March 12. Symphylan counts in the brassica and barley treatments were significantly higher than the other treatments.
- April 9. Populations in barley remained significantly higher than the other treatments.
- May 11. Sampling occurred seven days after tomatoes were transplanted into all plots. Symphylan numbers had increased at the surface in all treatments except for the barley, which had significantly fewer symphylans than all other treatments. Mustard had significantly more symphylans than any of the other treatments.
- May 18. There was a similar increase in symphylan numbers in all treatments; the barley still showed significantly fewer symphylans and the mustard significantly more symphylans than the other treatments.
- By July 31 over eighty percent of the tomato transplants had died. Comparison of the number and size of surviving tomato plants showed no significant differences between treatments.

3 Effects of various cover crops and extra tillage—Field trial, UC-Santa Cruz

This trial was conducted in a field with high symphylan pressure. Four treatments were compared:

1. **VOB:** a mix of vetch seeded at 40 lbs/acre, oats seeded at 7 lbs./acre and bell beans seeded at 50 lbs/acre;
2. **VOB-T:** the VOB mix with an extra tillage event in the spring prior to cash crop planting;
3. **Barley:** 'Micah' barley, 100 lbs/acre; and
4. **Fallow:** a weedy fallow.

Seed of the cover crop treatments was broadcast on November 30, 1999 and rototilled in. All plots in the trial were flail mowed, mechanically spade incorporated to a 14" depth and bedded up on March 24, 2000. Light tillage was done on all beds for weed control on April 24. The VOB-T plots were rototilled to a 8" depth on April 27 when coring showed the symphylans to be near the surface. Beds were shaped, sprinkler-irrigated and flame weeded. 'Di Cicco' broccoli was direct seeded into all plots on June 12 and the crop was grown until September.

Results. Regular baiting and sampling indicated symphylans were below 6" for most of November 1999 to May 2000. Symphylan numbers were obtained on several dates:

- January 7, 2000 (65 days after seeding cover crops). There were no significant differences in the number of symphylans found per core sample between treatments.
- May 13. (16 days after extra tillage in the VOB-T plots). The VOB-T and barley plots had significantly fewer symphylans than the VOB plots, but not significantly less than the weedy fallow plots.

- Core samples were also taken on April 24 (3 days before extra till) and May 7 (10 days after extra till) to more precisely assess the effects of the extra tillage. Samples showed apparent reductions in symphylan numbers in all treatments, but this was most dramatic in the plots which received the extra tillage (VOB-T). The reduction in the barley plots was also substantial.

No symphylans or symphylan damage were observed in these plots following the planting of broccoli on June 12, either in the broccoli root examinations performed periodically during the growing season, nor in the core samples that were taken.

4 Effects of Oats vs. Barley in a Cover Crop Mix —Field Trial II, UCSC

A separate trial was conducted to compare the effects of adding oats vs. barley, when grown in combination with a Fall-Winter cover crop of vetch and bell beans, on symphylan populations and the following crop.

Results. In the subsequent Spring, no significant differences were noticed in either the 145 days after seeding cover crop coring, nor in the spring crop bait sampling.

Laboratory Studies

5 Neem Trial

After successfully rearing populations of symphylans in the laboratory (methods described in full project report), a laboratory trial was conducted to evaluate the effects of four commercial azadirachtin (neem) based materials. 2” pots were filled with fluffed SuperSoil and the following treatments applied (based upon label rates).

1. **Agroneem:** 744 ml in 200 ml water added to pots (equivalent to 32 oz. a.i./acre)
2. **Ecozin:** 232 ml in 200 ml water (10 oz. a.i./acre)
3. **GWN 1535:** 744 ml in 200 ml water (32 oz. a.i./acre)
4. **Neemix 4.5:** 372 ml in 200 ml water (at 16 oz. a.i./acre)
5. **WFS 8.0 1/2%:** (Spreader-sticker) 1 ml in 200 ml water
6. **Distilled water:** 200 ml

Four sections of romaine lettuce were dipped in each of the six solutions and placed on the surface of four different symphylan colonies living in coco peat without a food source. These were assessed daily for feeding activity for seven days.

Results. All 6 treatments appeared to have the same general level of mortality (around 75%), *including* the distilled water and spreadersticker controls.

6 Soil Amendments Trial

The following treatments were compared:

1. **Control:** coco peat slightly moistened with water in a closed 1 pint container;
2. **Neem:** same as Control, but moistened with a neem solution (0.025% azadirachtin, Neemix, W.R. Grace & Co.).
3. **Mustard:** same as control, but moistened with a solution from grinding ‘Martagena’ mustard seeds and soaking for 10 minutes in water at v/v ratio of 2:1.
4. **High pH:** same as control, but with sufficient $CaCO_3$ added to achieve pH of 8.2; and
5. **Farewell:** same as control, but moistened with 5% dilution of Farewell (Organic Alternatives, Inc.).

Ten symphylans were taken from the field and placed into each container. After 13 days, containers were opened and examined for the number of live and dead symphylans.

Results. In contrast to the above trial, the neem had a significant effect on the symphylans. In this trial, the Farewell treatment also had a significant effect on the symphylans and the mustard seed extract also appeared to cause symphylan mortality, although not as dramatically.

7 Predatory Nematode Trials

Trials were conducted to evaluate three nematode species *(Heterorhabditis marelatus, Steinernema feltiae* and *S. carpocapsae)* as potential biological control agents.

Plastic 1/2 pint containers were filled 3/4 full with moistened coco peat. 20 symphylans were added to each pot. There were three replications of each of treatments:

1. ***H. marelatus*** @ 100 IJs per sq. cm
2. ***H. marelatus*** @ 500 IJs per sq. cm
3. ***S. feltiae*** @ 100 IJs per sq. cm
4. ***S. carpocapsae*** @ 500 IJs per sq. cm
5. **Water control**

Inoculum consisted of the specified nematode rate concentrated into 2.3 ml deionized water and applied to substrate surface in a circular pattern. Lettuce discs were used as a food source for the symphylans and the number of surviving symphylans was determined after seven days.

Results. There were no reductions in symphylan numbers following exposure to any of the predatory nematode species utilized in the trials.

Discussion

The results of our field studies did not indicate any single practice or material that significantly reduced symphylan populations by an agronomically significant amount. Our laboratory studies indicated some materials had a biological effect on symphylans under laboratory conditions, but whether and how such materials could be used effectively to reduce symphylan populations under field conditions could not be explored within this work. Based primarily on our own studies, but also influenced by the experiences of others, we have drawn the following conclusions:

1 It is very difficult to study the effects of management practices on symphylans because:

- a. Their unpredictable vertical movement in the soil profile means they commonly disappear from the soil surface layers for several months and then return.
- b. Their fragility makes direct sampling difficult at the surface and very time consuming and difficult from depths below a few inches; baiting methods allow more rapid assessments of symphylan numbers at the soil surface, but only attract symphylans during active feeding stages.
- c. Since they can move up to one foot/day laterally in the soil, plot sizes may need to be quite large. On the other hand, symphylan spatial distribution is typically very non-uniform, so large plots are very difficult to use.

2 In our field studies, none of the management practices that we tried proved to be successful in reducing symphylan numbers. This may be because:

- a. The practices truly did not have a significant biological effect, or
- b. There may have been some small effect, but it may take more than one season of treatment for any effect to be agronomically meaningful, or
- c. there may have been effects, but symphylan movement between plots did not allow us to measure the effects.

3 In the Davis trial, while the barley cover crop resulted in significantly lower symphylan numbers shortly after transplanting the subsequent tomato cash crop, barley also showed the highest numbers of symphylans in the last sampling before mowing and discing the cover crops. In addition, barley did not seem to help the tomatoes as the season progressed. One possible explanation for this is that somehow the barley stimulated the symphylans to move closer to the soil surface than the other treatments late in the cover crop season and, therefore, the tillage that occurred at this time was more damaging to the symphylan population in the barley plots. Thus, there was a temporary reduction in the surface population of symphylans following spring tillage, but either this reduction was insufficient to reduce damage to the subsequent tomato crop or migration of symphylans from deeper in the soil or adjacent plots eliminated surface population reduction over the course of the tomato growing season.

4 The Santa Cruz trial was hindered by a general lack of symphylan activity in the surface layers of the soil (where sampling is possible) for the almost 12 month duration of the trial, despite the fact that relatively high numbers of symphylans were seen in this soil both before and after the trial. In this trial, there were few statistically significant differences between treatments. However, there was some indication that, compared to a vetch/oat/bell bean mix cover crop with "regular" tillage, the same cover crop mix with an extra tillage (conducted when symphylans were observed near the surface) resulted in fewer symphylans at the soil surface, as did a barley cover crop with only "regular" tillage.

5 Our laboratory studies indicated that some organically acceptable materials may have biological activity on symphylans. However, we did not demonstrate any such activity in the field. There are several factors that may cause a material that is effective under certain laboratory conditions to be ineffective in the field. In the case of symphylans, one of these factors is the symphylans' ability to move a number of feet deep in the soil. From our results, neem extracts and products such as Farewell seem to warrant further study. The mustard seed extract also appeared to have potential although its effects were not as great as the other two materials. While it was not demonstrated in this study, the mode of action of the mustard seed extracts might be similar to the demonstrated mode of action of decomposing Brassica crops on various soil bome organisms, which we were not able to demonstrate on symphylans in our "Brassica" treatment in the Davis field study.

6 Lacking a clear organic method for achieving large reductions in symphylan populations, what strategies might be suggested for farming fields with significant symphylan populations? We can make the following suggestions:

a. We know that it is common for symphylan populations to move vertically in the soil in what appears to be an annual cycle. The seasonality of this cycle is generally consistent, but significant annual variation may occur. For example, in some locations with hot summers, surface symphylan numbers are typically high in the spring, but decrease dramatically in early summer. It is important to note that the timing of the decrease can vary by several weeks from one year to the next. Since symphylans are most damaging when feeding on roots of young plants near the surface of the soil, planting crops *after* the symphylans have left the surface layers of the soil can allow successful crop production in fields with significant populations. However, it is not possible to predict precisely when the symphylans will leave the soil surface for deeper layers.

b. For a number of reasons, it is useful for growers to be able to sample their soil for symphylans. Baiting is a relatively simple and accurate method for detecting populations near the soil surface, if done correctly. A reliable method uses 1/4" to 1/2" thick slices of beets or potatoes that are placed on the soil surface. Typically, it may be necessary to remove a dry or crusty layer of the soil to get the beet piece in good contact with moist, intact, non-crusty soil and/or to cover the beet piece with something (e.g., a piece of wood approximately 6" x 6" or a 6" diameter PVC plastic cap) to prevent desiccation. Bait pieces are checked in one or two days by picking up each piece and looking *quickly* at the soil where the piece had been to see symphylans rapidly moving into the soil voids and then immediately examining the bait piece itself for symphylans crawling on its surface. To sample for symphylans deeper in the soil, the most reliable method we have found involves carefully looking through shovels-full of soil. This method can be very time consuming and care must be taken not to destroy the small and fragile symphylans in the process. If the goal of sampling is not quantitative, but rather to detect the presence of any symphylans in the soil, this method may produce satisfactory results with less careful sample handling, especially if the symphylan population is relatively large.

c. Aggressive soil tillage when there are symphylans near the soil surface may sometimes reduce surface symphylan numbers by either directly killing some of them and/or hastening their movement down into the soil. However, because symphylans can migrate quite rapidly in the soil, re-colonization of the soil surface by individuals from below the tillage zone may limit the effectiveness of this technique in many situations.

d. Because symphylans feed heavily on plants' small feeder roots, using healthy transplants with large, vigorous root systems and keeping young plants well watered can sometimes help a crop survive symphylan feeding early in the season until the symphylans migrate deeper in the soil. However, irrigation may also make the surface environment more favorable to symphylans and, with prolonged feeding by heavy symphylan populations, these strategies are usually not sufficient to allow the crop to survive and grow well.

e. Since our observations confirm that symphylans are attracted to and feed on beets and carrots, and because it has been shown elsewhere that symphylans very successfully reproduce on fresh plant material, it is advisable to remove as completely as possible all unharvested beets and carrots (or similar root crops) prior to the end of the season. This may help minimize food sources that have the potential to increase symphylan populations. It should also be noted that established symphylan populations can persist for long periods with very little, or no, input of fresh plant material.

7 The workshop we conducted at the Ecological Farming Conference reconfirmed that symphylans are a significant problem for a number of organic growers. Similarly, it reconfirmed that there are many seemingly contradictory growers' experiences with symphylans. During our discussion there were a number of examples of management strategies that appeared to be successful for one individual but not for one or more of the other participants. ■

Ed. note: An additional resource about symphylans has been compiled by these project researchers: *Garden Symphylans: Ecology, Distribution and Management - a Brief Literature Review for Growers*. This document is available from OFRF either by mail or via our website. It is included as an Appendix with the unabridged report for this project. The unabridged report also contains detailed methodologies not fully presented here.

Maintaining nutrient balances in container-grown tomatoes utilizing soluble organic fertilizers

There are several possible approaches to developing organic fertilization regimes for container-grown greenhouse tomatoes, and to comparing these regimes to conventional fertilization practices. Three constraints to any approach are: 1) the cropping period is long—up to 10 months from seeding to crop removal; 2) during this period they have an extremely high demand for nutrients as per-plant fruit production can be as high as 40-50 lbs; 3) tomatoes are highly sensitive to the ratio between N and K, which regulates whether new growth occurs in vegetative tissue or in the fruit and roots. In conventional production, this ratio is carefully manipulated to balance the growth of the plant.

In previous studies, we compared organic and conventional systems for producing greenhouse tomatoes over five growing seasons. For conventionally fertilized tomatoes, we used the standard potting mix with a starter charge and wetting agent recommended for upright bag culture. For the organic substrates we had to design our own mix. No guidelines were available for organic fertilization of drip-irrigated greenhouse tomatoes or for organic production in containers.

By the final experiments, yields and percent marketable fruit were similar in conventional and organic systems. However, the formula developed for organic fertilization required the use of five separate ingredients from a commercial supplier, all of which were expensive, not available in large quantities, and complicated to mix (Photo 1). Clogging continued to be somewhat of a problem as well.

Objectives

The purpose of this study was to use the same substrate (peat/perlite), the same additions (low rates of limestone), and the same greenhouse for all treatments. We wanted to try several materials recently approved by OMRI which might be less expensive and easier to formulate and apply with the drip system.

Principal investigators: Janet Miles and Mary Peet, Horticultural Science Department, North Carolina State University, Campus Box 7609/Kilgore Hall, Raleigh, NC 27695-7609 tel. 919-515-3131
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***Photo 1.** Mixing fertilizers using five different sources in previous study.*

Although two were recommended by their manufacturers as complete fertilizers, as far as we are aware, neither had previously been tested on tomatoes either in the field or in containers.

Materials and Methods

Greenhouse tomato plants, 'Trust' were seeded Dec. 13, 2000 then transplanted Feb. 21 into soilless medium (Photo 2, mixing substrate) made of 70% Canadian sphagnum peat moss and 30% perlite to which dolomitic limestone was added at a rate of 3 lbs/ yd^3.

Three organic fertilizers, including two commercial mixes and a nutritionally balanced 'in-house blend', were compared to a conventional fertilizer for production of greenhouse tomatoes in containers. Treatments consisted of:

1. ***Natural Organic-Grow* (NOG)** Jedward's International, Inc., Quincy, Mass., analysis: 3-2-0.3;
2. ***Omega* (OM)** Peaceful Valley Farm Supply, Grass Valley, CA], analysis: 6-6-6;
3. ***NCSU Blend* (NCS)** that was formulated from readily available, organically certifiable products. Materials used in NCS were blood meal: 14-0-0, Micro Phos: 0-2-0 (Peaceful Valley Farm Supply, Grass Valley, CA), and Maxicrop: 1-0.11-12, plus micronutrients (Maxicrop U.S.A., Inc., Arlington Hts., Ill.)
4. ***Chem-Gro* (CV)**, a conventional fertilizer from HydroGardens (HydroGardens, Colorado Springs, Colo.), supplemented with calcium nitrate [$Ca(NO_3)_2$], calcium chloride ($CaCl_2$), potassium nitrate (KNO_3), and $MgSO_4$.

Photo 2. *Mixing fertilizer substrates in current study.*

Photo 3. *Drip irrigation system with Dosatro injectors and stock tanks.*

The commercial organic fertilizers, OM and NOG, were not amended, as they were recommended by the manufacturers as 'stand-alone' fertilizers. Rates of application of these two organic fertilizers were set to match the nitrogen (N) concentration of the CV fertilizer. Since NCS was comprised of various products, it could be formulated to match the NPK concentrations of the CV fertilizer. All fertilizers were applied through a drip irrigation system (Photo 3).

The experiment was conducted in one 20 ft. x 17 ft. greenhouse. Plants were staked when they were about 2 ft. tall and topped after development of the sixth cluster. Suckers were pruned weekly. Plants were mechanically pollinated daily. Fertigation was controlled by time clocks.

Four fertilizer treatments were assigned in a randomized complete block design with four plants per treatment and four treatments in each of three blocks, for a total of 48 plants.

Data Collection and Results

Plant Development

Days to flower and plant vigor: Fertilizer treatments did not result in any significant differences in the rate of tomato plant development. However, by the end of the experiment, vegetative growth was excessive in OM-fertilized plants, which displayed thick stems, dark green leaves, lush foliar growth and poor fruitset. These plants were several feet taller than the plants in the other treatment. On the other hand, in NOG-fertilized plants, vigor was low, and plants showed signs of severe potassium deficiency (Photo 4) and no fruit set in the upper clusters. Harvests were discontinued after the second cluster because there was little or no fruit to harvest in the NOG and OM treatments. Plant vigor in NCS-fertilized plants was similar to that in the conventionally fertilized plants, although initial problems with solubilizing bloodmeal (Photo 6) may have slowed growth.

Nutrient content of tissue: Nutrient concentrations of tomato leaf tissue, were collected 1 week and one month after the start of treatments. Only minor differences between treatments were noted in initial tissue samples and none were outside the range of adequate values. After 1 month, tissue levels in all treatments were adequate based on North Carolina Department of Agriculture (NCDA) guidelines, but not excessive, with the following exceptions:

N concentrations in OM-fertilized plants (>5%) were significantly higher than in the other treatments (<3.5).

Potassium levels, an important nutrient for tomato fruit quality, were initially highest in the NOG-fertilized plants (3.6%) and slightly below the adequate range (3.5-5%) in the other 3 treatments. However after a month of treatment, potassium levels increased in the other treatments to well within the adequate range, but declined in the NOG treatment to the deficiency level of 2.5% at fruiting.

N:K ratios are also critical. In greenhouse tomato feed recommendations, N concentrations are gradually decreased from week 1 to 5, to steer growth from vegetative to fruiting, then increased again to balance growth. Potassium, on the other hand, is increased steadily until almost the end of production in conventional production. Suggested K:N ratios are 1.7 for the first 3 weeks after transplanting, then increased to 1.4 and finally to 1.2 by week 9 after transplanting. In our fertilizers, K:N was lowest in the NOG fertilizer (0.08) and highest in the stage 1 conventional fertilizer (2.2). The OM and NCS blend were intermediate, with K:N ratios of 0.8 and 0.7, respectively.

Another important difference between treatments was in tissue calcium levels. Initially, all were slightly below the NCDA adequate range (1-3%). After a month of treatment, calcium levels increased in all treatments except OM, where they decreased to 0.4%, well below the deficiency level of 1%, and significantly lower than the other treatments, which did not differ. Blossom-end rot, a calcium-related disorder was evident in about 20% of fruit from the OM treatment, giving it the lowest percentage of marketable fruit of all the treatments (56%). Magnesium was also significantly lower in the OM treatments by the second sampling date, and at 0.31% was below the adequate level of 0.35-1.0%. For magnesium, highest levels were found in the NOG and NCS treatments and intermediate levels in the conventional feed. For the micronutrients, although there were significant differences between treatments, none fell outside the adequate zone except for boron which was above 75 ppm in all treatments except OM, and Zn which was below 18 pm in the CV plants.

Photo 4. *Potassium-deficient plant from NOG treatment in left foreground. Note plant with medium shade foliage from conventional treatment immediately to the right and plant from OM treatment with dark foliage slightly in background and to the right. Another plant from the OM treatment, at the extreme right, is much taller than plants from the other treatments.*

Substrate pH, CEC, and nutrient content: Throughout the experiment, substrate pH values were somewhat lower (5.1-6.1) than recommended for tomato production (5.5-6.5). Of all the fertilizers, tested, the NCS blend maintained pH nearest to optimal values, ending at a pH of 6.10, which was significantly higher than in the other treatments. Cation exchange capacity was also good in the NCS blend with significantly higher CEC than the OM-fertilized substrates, and not significantly lower CEC than in the conventional and NOG treatments.

Soluble salt index values were low-medium, ranging from 9 to 31, where 11-25 is considered in the low range. Sodium, which can indicate excess salinity, increased in all treatments, but the increase was much higher in the NOG and NCS formulations.

Large differences between treatments were seen in potassium values. By the end of the experiment, substrate potassium index levels remained high in the OM and NCS treatments, but declined in the conventional and NOG treatments to levels considered low (19 and 13%, respectively where 25-50 is considered medium).

Phosphorus values were low in all treatments, according to NCDA index values, although they increased over the growing season in the NOG and NCS treatments to reach the medium range (25-50) by the end of the experiment.

By the final sampling date, levels of substrate micronutrients (S, Mn, Zn, and Cu), did not differ in most cases between treatments. All the treatments were high in Zn, had high or medium levels of sulfur and were low in manganese and copper.

Comparing the NCS and conventional treatment, pH was nearer optimal in the NCS treatment, as were P and Mg.

Harvest yields: Tomato plants grown with NCS produced the highest percentage of marketable fruit. OM resulted in

Table 1. Harvest yields. Weight per cluster (g) of total and marketable (No. 1) tomato fruit harvested per plant using 3 organic fertilizers and a conventional fertilizer. Spring 2001.

	Average weight (g) / plant			
	Cluster 1		Cluster 2	
Treatment	All fruit	No. 1 fruit	All fruit	No. 1 fruit
OM	743	506	560	213
NOG	884	671	611	559
NCS	766	709	476	396
CV	1301	1012	932	838

OM = Omega; NOG = Natural Organic Grow; NCS = North Carolina State Formula; CV = Conventional the lowest percentage of marketable fruit because of a high incidence of blossom-end rot (BER) and cracking (C), both defects associated with calcium deficiency. Incidence of fruit with BER also accounted for a large percentage of the defects in the NOG and CV treatments. Tomatoes grown with NCS had a higher incidence of small fruit (SF) and open locule (OL) than the other treatments, but little BER.

CV produced significantly greater total and No. 1 yields than any of the organic treatments, averaging 39% and 41% more total fruit than organic treatments for the first and second cluster, respectively. Differences in marketable fruit were similar for the first cluster (38%), but by the time of harvest of the second cluster, differences between the organic treatments in marketable fruit were much greater. The conventional treatment produced 75, 33 and 52% more marketable fruit than the OM, NOG and NCS treatments, respectively.

Conclusions and Discussion

By using the same substrate in all the treatments it was possible to separate the effects on pH and EC of organic fertilizers from the effects of organic additions to the substrate. Conventional fertilizers generally drive down substrate pH, while organic fertilizers may have the opposite effect. Thus, instead of adding lime at the generally recommended rate for conventional fertilizers of 10 lbs/yd^3, the rate of limestone used was less than that recommended for conventional practices, but more than was reported to be optimal for organic production. In the present experiment, we therefore expected below-optimal pH in the conventional treatments and above-optimal pH in the organic treatments.

However, without organic additions to the peat/perlite substrate, pH was slightly below optimal in all treatments. Low pH may have somewhat reduced availability of Ca and K. We would recommend careful testing of all substrate/fertilizer combinations for effects on substrate pH and EC and adjusting substrate pH with lime or sulfur as necessary. We recommend a minimal number of substrate additions to increase fertility. Overall fertility was easier to control with drip irrigation than with substrate additions, however.

Plants grown with OM had the poorest yields, both in actual amounts (Table 1) and in percent marketable, OM fertilizer might be useful for transplants, but should be discontinued for tomato production after flowering. Tomatoes are generally fertilized at a ratio of 1-2-2, or a K:N ratio of 1.5 after transplanting. It would be difficult to add enough K to the feed to maintain this ratio without burning the plants.

Plants in the NCS and conventional treatments were in good shape in terms of balanced vegetative and generative growth. Most characteristics of tissue and substrate nutrition were similar to the conventionally fertilized plants, and although marketable yields were similar, total yields were significantly lower. This may have been caused by the difficulties in getting bloodmeal into solution, reducing nitrogen, and causing clogging in the weeks after transplanting. Substituting NOG for bloodmeal and microphos in the NCS blend might be a good combination.

In conclusion, as in our previous work, organic fertilizers did not differ greatly from conventional fertilizers in their effect on plant growth rates, percentage marketable fruit, and tissue nutrient content. Unlike the previous study, actual yields were 38-54% lower than plants given conventional fertilizers and we found few differences in substrate pH and EC. We attribute lower yields to not matching as many of the components of the conventional mix as we did in the previous study with the commercial mixes.

As more OMRI-certified soluble commercial fertilizers are available in bulk, we suggest combining them based on approximating conventional nutrient solutions as closely as possible and limiting substrate additions to the amount required for pH correction. This should allow greater stability of EC and pH and increased control of rootzone conditions throughout development. Both tissue and substrates should be monitored regularly during the development process to ensure that pH, EC, and nutrients remain in the optimal range.

Photo 5. *Janet Miles consulting with Brenda Cleveland, NCDA Agronomist, about the results of tissue and substrate analyses.*

A comparison of antibiotic susceptibility patterns in organic and conventional dairy herds

There is a concern that antibiotics used in animals are creating a reservoir of resistant bacteria that may be transferred to humans via various food products and present a threat to human health.

Objectives

The purpose of this project was to compare antibiotic resistance in *Staphylococcus aureus*, a common bovine mastitis pathogen, isolated from milk from conventional and organic dairy herds. Our hypothesis was that there is less antibiotic resistance on organic farms than on conventional farms because of reduced or absent antibiotic use.

Routine, non-therapeutic use of antibiotics and growth promotants in animals raised on certified organic farms is not allowed. Antibiotics are used in rare cases for the welfare of the animal to treat a specific disease, and are followed by an extensive period of withdrawal from the herd. This is in contrast to conventional farms where antibiotics are used as routine therapeutics (mastitis and other diseases), as growth promotants (milk replacers) and prophylaxis (dry cow treatment).

Materials and Methods

A total of 144 *Staph aureus* isolates were taken from seventeen certified organic farms in New York and from five certified organic farms in Vermont. For comparison, 117 *Staph aureus* isolates were already available in the lab from sixteen conventional herds.

Principle investigators: Linda Tikofsky and Ynte Schukken, Quality Milk Promotion Services, Cornell University, Parkview Technology Center I, 22 Thornwood Drive, Ithaca, NY 14850 tel. 607-255-8202.
Project locations: New York and Vermont
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Antibiotics selected for the study were ampicillin (10mg), cephalothin (30 mg), erythromycin (15 mg), novobiocin (30 mg) oxacillin (1mg), penicillin (10 IU), penicillin-novobiocin (10 IU/30 mg), pirlimycin (2 mg), tetracycline (30 mg), and vancomycin (30mg).

Results and Discussion

Isolates from the organic and conventional herds showed statistically significant differences in resistant susceptibilities for ampicillin, penicillin and tetracycline (Table 1). More isolates from the conventional herds were resistant to these three antibiotics than isolates from the organic herds. In addition, when compared on the basis of quantitative zone diameter (indicating a specific category of resistance), an even larger difference between isolates from organic herds and those from conventional herds was noted. Isolates from organic herds were more susceptible than the isolates from conventional herds to most of the antibiotics that we tested.

Because of this association between decreased antibiotic use and an increase in susceptibility, antibiotic use in dairy herds should be reevaluated. It would be of great additional value to follow mastitis pathogens in herds undergoing transition from conventional to organic farming, to determine if there is an increased susceptibility over time in the same populations of *Staph aureus* strains.

Table 1. Comparison of antibiotic sensitivity and resistance results for organic and conventional dairy herds.

	Conventional (# of isolates=117)		Organic (# of isolates=144)		Significant difference
Antibiotic	**sensitive**	**resistant**	**sensitive**	**resistant**	
ampicillin	72	45	116	28	p=0.0007
caphalothin	117	0	144	0	No diff.
cloxacillin	117	0	144	0	No diff.
erythromycin	58	59	80	64	p=0.3365
novobiocin	116	1	144	0	No diff.
penicillin	77	40	115	29	p=0.0106
penicillin-novobiocin	117	0	144	0	No diff.
pirlimycin	117	0	144	0	No diff.
tetracycline	102	15	143	1	p=0.00003
vancomycin	117	0	144	0	No diff.

Corn variety performance trials for Ohio organic farms – 2001

In this study we evaluated corn varieties for organic corn production in Ohio during the year 2001. This project consisted of a second year of variety trials originally supported by a SARE producer grant for the year 2000. Enthusiasm was high among our producers who very much wanted to see a second year of this research conducted.

There is a lack of information for Ohio organic grain producers to help them select varieties adapted to their farming systems. Many of our organic producers suspect that commercial hybrids currently available have been developed for use in high input systems. Grain crops grown organically often are raised in conditions unlike that experienced in university and commercial variety performance trials. Producers also prefer crop performance results conducted in the vicinity of their farms grown on area soil types and under similar climate conditions.

Objectives

- ◆ Evaluate the agronomic and grain quality performance of corn hybrids selected by certified organic grain producers
- ◆ Determine if varieties suited to high input conditions are the same as those suited to low input conditions.
- ◆ Assess the need for wide plots in evaluating grain quality.
- ◆ Evaluate specialty corn grain quality performance in low input conditions.
- ◆ Assess the effects of varying plant density on grain nutrient composition.

Principle Investigators: Phil E. Rzewnicki, Extension Associate, On-Farm Research Coordinator, Ohio State University Horticulture and Crop Science Dept., 2021 Coffey Rd. Columbus, OH 43210
tel. 614-292-0117 email: rzewnicki.1@osu.edu
Peter Thomison, Extension State Specialist, Corn Production
Charlie Eselgroth, Ross County Farmer
Participating producers: Joe Hammond, Jeff Dean, Don Reinhart, Gary Mennell, Dean McIlvaine, Art Riggenbach, Ron Miller, Stratford Center, Elias Poston, Stuart Veatch, Rex Spray, Dan Young, Dwight Law.
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Background

Thirteen certified organic farms within Ohio participated in the project. Twelve corn varieties were selected by the participating farmers at an organizational meeting in early February of 2001. Five of the hybrids were selected due to their yield performance in on-farm trials conducted the previous year. The varieties selected and their listed maturities were the following (hybrids that were also evaluated the previous year are designated by an asterisk):

- ❍ Agrigold A6447* – 109-day;
- ❍ Bird Hybrids B54V – 108-day;
- ❍ Campbell Seed 6380 – 107-day;
- ❍ Doebler 636XY* – 109-day;
- ❍ French's 440* – 108-day;
- ❍ Kidron Seeds 711 – 106-day;
- ❍ Masters Choice MC620 – 112-day;
- ❍ NC+Organics 3448 – 107-day;
- ❍ NC+Organics 4880* – 112-day;
- ❍ Pioneer 34K77* – 107-day;
- ❍ Seed Consultants 1091 – 109-day;
- ❍ Warner Seeds 297 – 109-day

The farmers participating in the trial requested that the following data be collected:

- ◆ Soil information: soil tests to measure P, K, Organic Matter, N levels;
- ◆ Early growth information: emerged population, height 3 weeks after planting;
- ◆ Harvest time information: ear droppage, lodging, % barren, test weight, harvest moisture, yield.

Photo 1. *Seed distribution day at Stratford Ecological Center. Participating farmers sort out seed bags at beginning of project.*

Table 1 includes cropping histories for the previous three years, selected soil test levels for each field measured approximately three weeks after corn planting, corn planting dates and harvest dates.

Table 1. Rotation history, selected soil test levels, and corn planting and harvest dates for test plots on participating farms.*

Farm No.	pH	Rotations (previous crops 2000/1999/1998)	NO_3-N	P ppm	K ppm	O.M. (%)	Planting date	Harvest date
1	7.7	Alfalfa/alfalfa/spelt	10.3	14	118	3.9	5/10/01	11/16/01
2	7.1	Clover/spelt/soybean	15.3	27	83	2.2	5/21/01	11/09/01
3	6.4	Soybean/corn/soybean	3.3	44	131	3.5	5/03/01	11/05/01
4	6.6	Alfalfa-clover-grass hay two yr/soybean	7.3	16	98	3.3	5/21/01	11/13/01
5	6.7	Spelt+clover/soybean/ spelt+clover	6.0	24	80	2.5	5/11/01	11/22/01
6	6.9	Alfalfa hay/wheat/corn	38.8	60	203	3.5	5/16/01	12/12/01
7	6.3	Alfalfa-timothy-clover hay two yr/spelt	22.8	20	104	3.2	5/31/01	11/24/01
8	6.8	Alfalfa-grass hay two yr/oats	13.1	18	89	3.1	6/11/01	12/03/01
9	6.6	Fallow/spring barley +sweet clover/soybean	4.7	23	127	2.8	6/18/01	No data
10	6.3	Alfalfa +wheat+clover /wheat/soybean	17.8	28	138	2.8	5/06/01	11/20/01
11	5.8	Clover/wheat/soybean	12.0	19	100	5.2	6/09/01	No data
12	6.6	Soybean/corn/clover	12.4	34	115	4.0	6/20/01	11/15/01
13	6.4	Soybean+winter cover rye/soybean/corn	7.2	19	121	5.1	6/14/01	11/21/01

* Optimum soil test levels in for corn in Ohio according to Ohio State University guidelines are: pH >6.3, P >15ppm, K >(75ppm plus 2.5 times the CEC), and NO_3N >21ppm.

Methods

The study was conducted as a randomized complete block design beginning with the use of 13 farms as blocks or replicates. The varieties were randomized at each farm (one replication per location) in field length strips averaging 1200 feet in length with widths varying from 10 to 60 feet (4 rows to 24 rows), but averaging 27 feet. Farmers were instructed to use planting rates they normally use. Average seeding rate was slightly below 25,000 seeds per acre across all farms. All the crop rotations except one included a legume in the year just prior to corn planting. Tillage was conducted in all fields prior to planting.

To assess an additional factor of seeding rate effect on grain nutrient composition, two plant populations were created on the farms using the wide plots. Rates examined were the organic farmers' rates and one-third less. This was done by thinning 4-row sections that were 50 feet in length near the centers of each variety plot.

As a comparison, the twelve hybrids selected by participating producers, the six specialty corns and conventional check were also established using conventional inputs at four OSU-OARDC research farms.

Organic producers have a difficult time obtaining seed that is not commercially treated. For this trial, all of the varieties were treated to avoid comparing a mixture of untreated and treated hybrids. (Permission was attained from the International Office of the Organic Crop Improvement Association so that the certification status of participating producers would not be jeopardized by the use of chemically treated seed.)

Only 11 of the 13 farms successfully brought the test varieties completely to harvest. Excessive rain hindered mechanical weed control and delayed planting for nearly half the participants. In general, the varieties were grown under typical organic farm conditions with moderate weed pressure and marginally low soil fertility.

Results and Discussion

According to the soil tests, 11 of the 13 farms were nitrogen deficient, 8 were potassium deficient, one was phosphorus deficient, and two were too acidic for optimum production.

Early Height and Emergence

Organic grain producers regard early plant vigor as an important characteristic of varieties for their weed management programs. Normally planting is done later than conventional farms to mechanically control early occurring weeds. Once the corn emerges, fast growth is desirable to compensate for late planting and to provide a canopy over weeds that emerge after planting.

The varieties tested in 2001 showed no significant difference in timing of emergence and rate of emergence from planted rates. Average emergence rate over all varieties was 91.1% of seeds planted.

There was no significant difference in days that it took for approximately half the seeds from each variety to unfold the first leaf after planting. There was an average of 9.8 days after planting for this stage to occur.

Significant differences were found among the hybrids in early growth plant height. Bird Hybrids B54V, French's 440, NC+ 3448 and Seed Consultants 1091 as a group were the tallest hybrids 24-25 days after planting whether planted before or after the excessive rain experienced in the last half of May. For the seven fields with timely dates of planting (5/3/01 to 5/21/01), the average plant height 24-25 days after planting was 3.8 inches (Table 2). For the six fields planted late (5/31/01 to 6/20/01), the average plant height 24-25 days after planting was 12.1 inches (Table 3).

Photo 2. *Weed-free corn field—variety test plot.*

Harvest Results

Grain characteristics. Harvest yields, grain moisture and test weight for the 11 farms growing the selected hybrids are given in Table 4. Three hybrids as a group yielded significantly higher than other varieties: Bird Hybrids B54V, French's 440 and Seed Consultants 1091. These three were not significantly different from one another as the highest yielding group. They were also not significantly different in test weight or in oil, protein and starch levels. French's 440 was significantly better in terms of harvest moisture compared to Bird Hybrids B54V but not the Seed Consultants 1091 hybrid.

Stand characteristics. As a group the smallest amount of lodging was found with Seed Consultants 1091, Kidron Seeds 711, NC+ Organics 3448 and Warner Seeds 297. There was only slight differentiation among the hybrids with respect to barren plant scores with an overall average of 12.2%.

There was no significant difference in two-year yield averages for the five hybrids tested in *both* years of the trial. Among these hybrids French's 440 and Pioneer 34K77 as a group had the most favorable harvest moisture.

Nitrogen was the single most significant soil nutrient associated with yield. Nearly all the variation in yield averages across participating farms could be attributed to variation in nitrogen levels. Its effect was probably so strong as to surpass any detectable effect of various levels of the other soil nutrients tested. On nine of the farms stalk nitrate levels were in the low category (700 ppm). There is a high probability that greater availability of N in low category locations would have resulted in higher yields. However, three of the farms tested in the excess category for stalk nitrate (>2000 ppm) despite having less than critical soil test levels for nitrate nitrogen. A possible explanation for this is that in some areas of the state near drought like conditions existed in the last two months of corn development. Under drought-related stress nitrate accumulates in corn stalks and is not distributed to the developing ear.

Table 2. Average corn height 24-25 days after planting for 7 farms with planting dates prior to 5/22/01.

Variety	Height (inches)
NC+ Organics 3448	4.07 a
Seed Consultants 1091	4.01 ab
Pioneer 34K77	3.95 abc
Bird Hybrids B54V	3.92 abc
Agrigold A6447	3.89 abc
Frenchs 440	3.86 abcd
NC+ Organics 4880	3.75 abcd
Warner Seeds 297	3.71 bcd
Campbell Seed 6380	3.67 cd
Doeblers 636XY	3.55 de
Kidron Seeds 711	3.55 de
Masters Choice MC620	3.35 e

Table 3. Average corn height 24-25 days after planting for 6 farms with planting date after 5/30/01.

Variety	Height (inches)
Bird Hybrids B54V	13.8 a
NC+ Organics 3448	13.1 ab
Frenchs 440	12.9 abc
Seed Consultants 1091	12.9 abc
Warner Seeds 297	12.4 bcd
Doeblers 636XY	12.2 bcde
Campbell Seed 6380	12.1 bcde
Agrigold A6447	12.0 cde
Pioneer 34K77	11.8 def
Kidron Seeds 711	11.1 ef
NC+ Organics 4880	10.8 fg
Masters Choice MC620	10.0 g

Means followed by the same letter are not significantly different at 5% level of significance.

Grain quality and plot width. Results of the grain quality analysis for the twelve selected corn hybrids for protein, starch and lysine indicate that plot width influences composition values and suggest that wide plots are a more reliable indicator of grain quality traits strongly influenced by the xenia effect (the influence of pollen drift from neighboring fields). In this trial, it appears protein, starch and lysine levels were most affected.

Enhanced protein and lysine with accompanying reductions in grain starch levels were found with reduced plant population. Results indicate that a 1/3 reduction in plant stand significantly increased protein and lysine content and significantly decreased starch content of grain, but had little effect on grain oil content or M.E. (non-ruminant metatolizable energy content). This was likely due to reduced plant competition for marginally available resources, particularly soil nitrogen.

Summary

Significant yield differences were found among varieties selected by organic producers. Lowest yielding hybrids were as low as 30 to 50 percent of the best yielding entries. Correlation between agronomic performance on university sites and that on the organic farms was moderately good. In the first year 90% of the yield variation was held in common between the testing areas. However, in the second year only 45% of the variation in yield was common to both. Harvest moisture and test weight results correlated well between university plots and farm sites. However, lodging scores, in similar fashion to yields, correlated well the first year but not the next.

Thus, it appears Ohio organic producers can refer to university performance trials for general performance differences between commercially available varieties. However, single year results should not be relied upon for selecting varieties to plant. Selecting for hybrids that perform well under a variety of environments as may be reflected in multiple year summaries is likely the selection strategy of choice for organic producers.

Contrary to producers' opinions that early season vigor corresponds to corn yields, the results of this trial did not confirm this point. There was no significant correlation between variation in emergence, rate of emergence and early plant growth and final yields.

Nitrogen was the critical factor for yield performance across all farms. It overshadowed any effect from other soil nutrients monitored in the trial. As a result we now realize that more research is needed to enhance the nitrogen management of Ohio organic farms. ■

Table 4. Corn grain characteristics (yield, harvest moisture and test weight) from 11 certified organic farms; and average grain quality characteristics at harvest using results from the three widest plots: 60′, 45′ and 40′[1].

Variety	Yield[2] (bu/A)	Harvest moisture (%)	Test weight[3] (lb/bu)	Oil (dw%)	Protein (dw%)	Starch (dw%)	Lysine (dw%)	ME (dw Kcal/lb)
Seed Consultants 1091	99.4 a	19.81 abc	53.8 b	3.53 abc	7.55 abc	73.93 abcd	0.278 abc	1755 abc
Bird Hybrids B54V	90.2 ab	20.27 bcd	53.0 bcd	3.38 bc	7.20 c	73.77 abcd	0.272 c	1750 bc
Frenchs 440	88.4 abc	18.42 a	53.9 b	3.66 ab	7.95 abc	73.15 cd	0.284 abc	1759 ab
Kidron Seeds 711	86.4 bc	20.71 bcd	53.4 bc	3.87 a	7.42 bc	74.08 abc	0.280 abc	1766 a
Pioneer 34K77	84.9 bc	20.25 bcd	56.1 a	3.64 ab	8.62 a	73.32 bcd	0.293 a	1759 ab
Agrigold A6447	83.9 bcd	20.22 bcd	54.7 ab	3.56 abc	8.32 ab	72.88 d	0.288 ab	1756 abc
Campbell Seed 6380	83.2 bcd	20.84 cd	53.2 bc	3.36 bc	7.92 abc	73.95 abcd	0.281 abc	1750 bc
NC+ Organics 4880	81.9 bcd	20.20 abcd	53.9 b	3.86 a	7.40 bc	74.27 ab	0.280 abc	1766 a
NC+ Organics 3448	81.7 bcd	19.00 ab	55.7 a	3.17 c	7.58 abc	73.74 abcd	0.275 bc	1744 c
Doeblers 636XY	78.8 bcd	21.62 d	52.0 cd	3.72 ab	7.82 abc	73.18 bcd	0.283 abc	1762 ab
Warner Seeds 297	77.5 cd	21.79 d	52.0 cd	3.74 ab	7.86 abc	73.32 bcd	0.284 abc	1761 ab
Masters Choice MC620	72.4 d	23.92 e	51.5 d	3.30 bc	8.62 a	74.75 a	0.289 ab	1747 bc

[1] Means followed by the same letter in the same column are not significantly different.
[2] Yields adjusted to 15.0% grain moisture.
[3] Data missing from 3 farms.
Oil, protein and starch by NIR; M.E. and lysine by calculation. M.E. is non-ruminant metabolizable energy content.

Matthewson is charging ahead on event planning for 2003. She and Development Coordinator **Don Burgett** are now collaborating on the full range of development activities.

Don was particularly busy this fall representing OFRF in our first campaign season with **Earth Share of California**, a workplace giving federation of more than 80 environmental organizations. Fall is the time when many large public and corporate workplaces hold events and distribute information about raising money for charities, so Don made the rounds of local cities, counties and companies to encourage folks to support OFRF and our Earth Share partners. The federation expects to award at least $16,000 to OFRF in the coming spring.

We are very grateful for the amazing work of our 2002 OFRF Interns. Policy intern **Ellen Gray** provided critical support for Interim Policy Program Director Brise Tencer on a variety of fronts; **Lauren Warboy** did much of the leg work for our update of *State of the States*, due out this spring; and **Gabe Thomas Jackson-Oppegaard** is currently working with Program Associate/ Office Manager **Juli Chamberlin** on administrative projects.

National Organic Farmers' Survey

The stalwart data entry crew of **Juli Chamberlin**, **Katie Peck**, **Josh Cohen**, **Zack Frieders** and **Melissa Matthewson** has completed the monumental 5-month task of inputting the extensive data from 1,200 responses to our *4th National Organic Farmers' Survey*. The Survey also garnered new support this Fall when the **True North Foundation** awarded $25,000 to OFRF, $10,000 of which is dedicated to our Survey work.

And thanks to generous in-kind donations from **Ferrari Tractor**, **Heritage Fence Company, Rincon Vitova Insectaries, Acres USA, Johnny's Selected Seeds, Seeds of Change, Peaceful Valley Farm Supply, Harmony Farm Supply** and **Growing for Market,** we were able to provide gifts to 35 farmers responding to our survey through our prize drawing.

Erica Walz and **Melissa Matthewson** are just beginning to process this round of survey data, and we expect to begin the first roll-outs of information from the survey by the end of February.

The Year Ahead

Despite the challenge of raising funds in the current economic downturn, OFRF maintained staffing and core program activities and continued to create change across the agricultural landscape. The record support we received from the organic industry in 2002 was critical to our success this year. As we enter 2003, we are concerned about continuing economic problems and reduced foundation giving but hopeful that we can make up for it in other ways. We will look to an expanded high donor campaign, major benefit events, continued growth in corporate giving, new relationships and workplace giving to buck the trends and fuel a growth budget, the current draft of which stands at just over $1 million. It will be a very busy year for us (again!) if all goes well.

Change in proposal deadline

In 2003, there will be two funding cycles with deadlines for proposals on July 15 and, in a departure from past years, Dec. 15, 2003. This permanent change in the OFRF spring grants deadline will allow the Board more time to evaluate the spring proposals.

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Grants Awarded

OFRF FALL 2002 GRANTS

Total in competitive grants awarded: $103,835
**Grants marked with an asterisk are conditional*

Fresh and postharvest assessment of nutritional quality of organically- and conventionally-grown lettuce and other salad greens.
Edward Carey, Kansas State Univ. Research & Extension Center, Olathe, KS $8,000*

Feeding beef cattle to produce a healthier and highly acceptable beef.
Ron and Maria Rosmann, Rosmann Family Farms, Harlan, IA $13,870

Cover crop seeding rate and planting arrangement effects on cover crop performance and weed management on organic vegetable farms on the Central Coast of California.
Eric Brennan, USDA-ARS, Salinas, CA $14,360

Whole system seed: crop breeding for sustainable agriculture. Year 2.
Frank Morton, Shoulder to Shoulder Farm, Philmouth, OR $8,978

Biointensive and organically acceptable pest management literacy training.
Rex Dufour, NCAT/ATTRA, Davis, CA $6,999

Effects of organic alternatives for weed control and ground cover management on tree fruit growth, development, and productivity. Year 3. Funded in partnership with EPA.
Steve Ela, Silver Spruce Orchards, Hotchkiss, CO $7,680

New cover crops and cover crop management for organic vegetable producers in Maryland. Year 2.
Caragh Fitzgerald, Maryland Cooperative Extension, Ellicott City, MD $9,360*

Production and use of Monarda as an organic control for soilborne seedling diseases of greenhouse crops. Funded in partnership with Frontier Natural Products Cooperative.
Kimberly Gwinn, University of Tennessee, Knoxville, TN $7,631*

Forage brassicas as a component of organic production systems. Year 2.
Nancy Callan, Montana State Univ., Western Agricultural Research Center, Corvallis, MT $5,324*

The integration of foliar-applied seaweed and fish products into the fertility management of organically grown sweet peppers.
Jeanine Davis, North Carolina State Univ., Mountain Hort. Crops R&E Center, Fletcher, NC $2,500

Irrigation requirements and weed control methods for organic medicinal herb production in New Mexico. Funded in partnership with Frontier Natural Products Cooperative.
Charles Martin, New Mexico State Univ., Sust Agriculture Science Center, Alcalde, NM $7,133

Improving the quality of Minnesota grown, organic medicinal herbs. Funded in partnership with Frontier Natural Products Cooperative.
Craig Hassel, Univ. of Minnesota, St. Paul, MN $5,000

Management of bermudagrass in organic horticultural systems.
George Kuepper, NCAT/ATTRA, Fayetteville, AR $7,000
declined

OFRF awards grants for organic farming research and education projects two times per year. Grant application deadlines are July 15 and December 15. Projects may be farmer initiated, and/or should involve farmers in project design and execution and take place on organic farms whenever possible. OFRF considers funding requests within the range of $1,000 to $15,000.

To obtain our **Procedures for Grant Applications**, please contact OFRF at: tel. 831-426-6606, or visit our website at www.ofrf.org.

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