NEBRASKA Sustainable Agriculture Society

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Promoting agriculture and food systems that build healthy land, people, communities, and quality of life for present and future generations.

By Ali Clark

Lettuce Rejoice

Plants are more resilient than I give them credit for.

As I bike home from my off-farm job, I am reminded of this when I spy a green ruffling plume of lettuce growing between the curb and the city street. I can't help but chuckle as I wonder how lettuce seeds ended up there in the first place! Perhaps I should send a picture of the emerging greens to my relatives. They consider the job title of "urban farmer" to be just as absurd as using beans to make a burger.

As an urban farmer, this is not the first time I have seen lettuce growing in unexpected places. On our farm, we have food growing in raised beds, vacant lots, community gardens, and terra cotta pots. Regardless of the location that we plant our seeds, they seem to grow fervently, sending roots wherever nutrients are available and where water will reach.

It is my first year growing food on a large enough scale to share with others, and as the season continues, I encounter the many challenges inherent to agriculture. Further, we are constantly reminded of our urban locale as we encounter challenges unique to city farming: poor soil contaminated by years of heavy metal exposure and curious neighbors with hungry bellies and sticky fingers.

On the other hand, we are presented with a unique opportunity for growth. As I watch our seeds grow into plants, I see how they change the otherwise sterile landscape of cement and metal that we are surrounded by. Our communities are more diverse than the seeds we have planted, and I watch as our efforts bring people together around food.

As I continue to reflect on my encounter with the street lettuce, I realize that I have a lot in common with the little leafy greens. Compared to the greater movement of sustainable agriculture, our efforts here in Omaha are on a scale comparative to the lettuce growing from the curb. We will not feed the entire city of Omaha with our small plots, but we will feed some and share experiences with many. I can only hope that I will be as persistent and resilient as the seeds that grew into this plant, and that I can grow without feeling restricted by my surrounding environment: that I can put roots down where I land, and continue to grow abundantly.

At the end of the day, my fellow farmers and I are dead tired. Perhaps my relatives have reason to think my desire to grow food in the city is illogical, but everyday, I am side-by-side with my dear friends, and we laugh and play and grow food together, and if not that, then what else is there?

It becomes instantly clear that we are growing more than vegetables here; we are growing relationships with our neighbors and our friends, and with our environment and with our food.

Ali Clark is NSAS's Urban Agriculture Intern and works with Big Muddy Urban Farm in Omaha.

By Billene Nemec

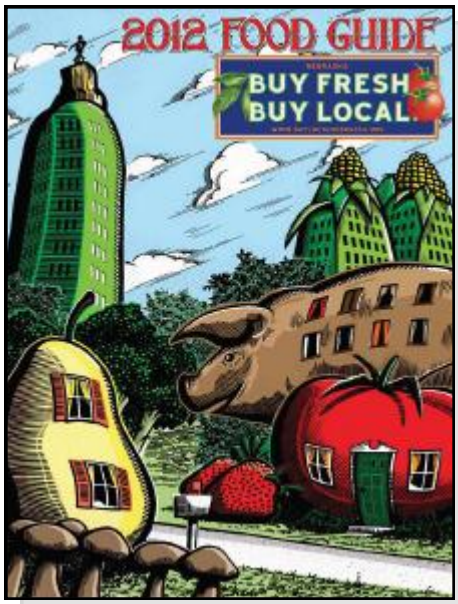
BFBLN 2012-13 Spring Food Guides Here

It's easy to buy locally. The Buy Fresh Buy Local Nebraska *2012-2013 Spring Food Guide* is now available!

Pick one up today at your local farmers' market or business/restaurant (check out our website for local listings: www.buylocalnebraska.org) and discover all the ways you can purchase and enjoy fresh, local food this year!

Or, download the 2012-2013 Spring Food Guide from the UNL at http://food.unl.edu/web/localfoods/home)

You probably have seen the BFBLN bumper stickers, posters, t-shirts, and tote bags around promoting "Buy Fresh Buy Local®." It's not just a marketing program—it's a philosophy that directs Buy Fresh Buy Local® Nebraska members in rebuilding local economics, starting with economies of food and food raised through environmentally sound methods.



The $10 Solution

If each of the 796,793 households in Nebraska committed to spending just $10 per week on locally grown foods, we would keep more than $414 million of our food dollars circulating here in Nebraska, helping both family farms and our local economy.

And we would have the added benefit of eating fresher, tastier, healthier food!

7 Reasons to Buy Local This Season

1) **You get to know Nebraska's seasons and the Nebraska farmers who are very knowledgeable about the food they raise.** They can tell and show you how they raise your food, what growing practices they use, when and how the food was harvested, and how they handle the food for your purchase. Knowing where your food comes from and how it is grown allows you to choose food from farmers you trust.
2) **Buying local strengthens food security.** When you buy local food, you know that the food is from a local farmer that eats and trusts the same crops you do.
3) **With the purchase of locally grown food, you are preserving a taste of yesterday.** Farmers are planting and harvesting a multitude of rediscovered heirloom treasures and raising rare and endangered heritage breeds of animals and poultry that are likely be impossible to find on most produce and meat counters. These farmers are ensuring the survival of thousands of varieties and diverse flavors that would otherwise be lost.
4) **By supporting local food, you are supporting Nebraska's vanishing family farms.** Did you know that less than 1% of the U.S. population claim farming as an occupation? On average, only 10 cents of each dollar spent on food returns to the farmer. The other 90 cents goes to corporations for packaging, marketing, transportation, etc. Farmers who sell direct to consumers receive 80 cents of each food dollar.
5) **Buying local strengthens the regional economy.** Buying local food keeps your dollars circulating in your community and increases local food security. With each local food purchase, you ensure that more of your money spent on food goes directly to local farmers and the local farmers often put their money back into the community.
6) **Enjoying local food protects the environment and improves land stewardship.** While most conventionally produced food is extremely resource-intensive, traveling an average of 1,500 to 2,500 miles from field to plate, local food is not. This reduces fossil fuel dependence, carbon dioxide emissions, and use of packing materials and garbage.
7) **Buying local food protects open spaces and farmland.** Keeping local family farms economically viable is critical to preserving the beautiful landscapes you see in the rural agricultural areas known as "foodsheds." By supporting Nebraska's family farmers you will ensure the farmland used to grow food remains preserved, now and in future generations.

Billene Nemec is the coordinator for BFBL Nebraska in Lincoln. Learn more at www.buylocalnebraska.org, or by contacting her at 402-472-5273 or bnemec2@unl.edu.

The **NSAS Newsletter** is a bimonthly publication of the Nebraska Sustainable Agriculture Society (NSAS), a private non-profit organization. Our mission is to promote agriculture and food systems that build healthy land, people, communities, and quality of life for present and future generations. The purpose of this newsletter is to inform our readers on sustainable agricultural issues, resources, and activities. This newsletter is a NSAS membership benefit.

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Join the discussion at www.facebook.com/NebraskaSustainableAgricultureSociety:

- Rio+20 on "Getting Global Governance to Work for Hunger and Climate Change"

Select NSAS to raise money for us while you search or shop online!

NSAS Member News

Share what's going on in your lives, your communities, and on your farms. We are especially interested in:

- Happenings on your farm or ranch, such as research/experiments you're trying, new practices, varieties or breeds you're putting into place, fields days, successes and lessons learned.
- Community or family events, such as marriages, graduations, births, community activities, and educational pursuits.

Send contributions to healthyfarms@gmail.com or by postal mail to: NSAS, 414 CR 15, Ceresco, NE 68017.

About NSAS

NSAS is a non-profit, grass-roots membership organization. Initiated more than 30 years ago by farmer members, NSAS has grown into a dynamic organization with members from all across Nebraska. We welcome farmers and non-farmers alike...everyone eats!

Our mission: To promote agriculture and food systems that build healthy land, people, communities and quality of life, for present and future generations.

Our vision and work: We recognize that there is a strong relationship between a healthy local agriculture and a strong local food system. That relationship requires that much of the food consumed is grown and processed locally. This adds quality and security as well as social and ecological responsibility to the community diet. It is this understanding that motivates NSAS's work to strengthen and enhance these systems together. Our work is across Nebraska in all communities and settings to expand this system for the benefit of local agriculture and local residents.

NSAS is active in collaborative projects that support rural communities and the environment. These projects offer mentoring opportunities for beginning and experienced farmers, and opportunities for on-farm research, demonstration, and education. We offer opportunities for non-farmers to participate in a food system and network with sustainable Nebraska farmers, attend workshops and link with all our projects! Each year, NSAS sponsors a Healthy Farms Conference, workshops, farm tours, and field days. NSAS is a member of the Midwest Sustainable Agriculture Working Group.

NSAS is not just for farmers. Our diverse membership includes rural and urban consumers, market gardeners, educators, and of course farmers raising a fantastic array of goods. We welcome anyone who is concerned about family farming, environmental quality, and good, healthy food. We depend on the support of all that are concerned with renewing and enlivening a sustainable food system and sustainable farming in Nebraska!

- **Healthy land...** NSAS promotes farming practices which decrease soil erosion, increase soil fertility, reduce the need for off-farm inputs, protect natural resources and encourage a diverse landscape. NSAS offers a variety of workshops, tours, and projects which demonstrate environmentally and economically sound farming practices.
- **Healthy people...** NSAS works with growers to increase the availability of fresh produce, quality grain products, and farm-fresh beef, pork, poultry, eggs, and other animal products. We link concerned consumers with growers who market these foods. NSAS advocates farming practices which benefit the environment and human health.
- **Healthy communities...** NSAS programs are built on community networks of farmers, ranchers, businesses, technical assistance providers, and consumers. NSAS provides these networks with organizing support, information and education, and opportunities to exchange ideas and experience with other networks across the state.
- **Quality of life....** NSAS works to strengthen the economic and social base of family farms and rural communities by increasing the use of on-farm resources. NSAS recognizes the importance of increasing family farm profitability and strengthening local businesses while brightening the environment.
- **For present and future generations...** NSAS programs focus on the entire family, including opportunities for rural women and children, along side similar opportunities for urban refugees and immigrants. NSAS has a history which continues today of projects providing outreach, education and support to all ages, genders and across cultures.

Events

Tuesday-Thursday, June 26-28

North American Invasive Plant Ecology & Management Short Course

North Platte, NE

This second annual short course on the basics of invasive plant ecology and management will be held at the University of Nebraska-Lincoln's West Central Research and Extension Center in North Platte. CEU and CCA credits are available, as well as UNL graduate student credits.

More than a dozen instructors from across the United States, with expertise in restoration, GPS/GIS applications, plant identifications, and other topics related to invasive plants, will convene for three days of intense instruction through presentations, hands-on workshops, site visits, and instructor-led discussions. This year's special session will be on the topic of water use by invasive plant species and will include research specific to the introduced common reed (Phragmites australis) and eastern redcedar (Juniperus virginiana).

To register or for more information, visit http://ipscourse.unl.edu, call 308-696-6712, or e-mail llehmann@unlnotes.unl.edu.

Saturday, June 30

Farm Beginnings Nebraska Twilight Tour & Potluck

Ceresco, NE, starting at 2:30 p.m.

Many of NSAS's members and supporters met the participants of the current Farm Beginnings Nebraska class at the 2012 Healthy Farms Conference in Nebraska City. Here's your opportunity to catch up with their farm plans. NSAS is hosting a meet-and-greet event during the final two farm tours for this class on June 30. Tours will be held at Woody Creek Lavendar Farm and Darby Springs Farm, both near Ceresco.

Woody Creek is opening Nebraska's first U-Pick lavender farm. Its first planting was in 2010 with 400 plants and 13 varieties. Eventually, the farm plans to provide many services, including fresh and dried lavender, oil distillation, wedding items, and on-farm events.

Darby Springs combines livestock production with stewardship of two fragile ecosystems. The land includes a tall grass prairie flowing down into a saline wetland with at least three natural springs.

The day will finish with a bonfire and potluck at Darby Springs.

This event is open to all past and present NSAS members and supporters. To RSVP, for directions, and for more information, e-mail healthyfarms@gmail.com.

NSAS provides an extensive list of all workshops, conferences, webinars, and other events designed to educate and support sustainable producers each week through our listserv and website. To join the listserv, e-mail healthyfarms@gmail.com.

NSAS Programs

Healthy Farms Conference, the annual meeting of the NSAS held in February in an Eastern or Central Nebraska community

Western Nebraska Sustainable Agriculture Conference, a joint NSAS-University of Nebraska event held annually in the Panhandle

Farm Beginnings Nebraska, a joint NSAS-University of Nebraska 10-week course for beginning farmers and growers

Nebraska Beginning Farmer Mentorship Program, connecting beginning/transitioning farmers and growers with mentors knowledgeable in sustainable practices

Market Nebraska, an online interactive map of Nebraska's local foods outlets

NSAS Memorial Library, a collection of books on sustainable practices housed at Ceresco, many of them donated by the family of the late holistic grazing expert Terry Gompert

Farmer Support Group, an in-person discussion group for all farmers and growers that meets monthly at Ceresco

Western Nebraska Fruit and Vegetable Group, an in-person discussion group for growers in the Panhandle

Nebraska High Tunnel Project, workshops and a webinar educating growers on high tunnels

Farm2School Project, connecting local foods producers with interested school cafeterias

USDA Funding Available

The U.S. Department of Agriculture has launched a new National Water Quality Initiative committed to improving one to seven impaired watersheds in every state and U.S. territory. The initiative is part of the Obama Administration's White House Rural Council which is working in partnership with farmers, ranchers, and forest owners to improve conservation of working lands in rural America.

The 157 selected watersheds were identified with assistance from state agencies, key partners, and USDA's Natural Resources Conservation Service. NRCS will make available at least $33 million in financial assistance to farmers, ranchers, and forest landowners this year to implement conservation practices to help provide cleaner water for their neighbors and communities.

Using funds from the Environmental Quality Incentives Program, NRCS will provide financial and technical assistance to producers for implementing conservation practices such as cover crops, nutrient management, filter strips, and terraces.

To deliver the initiative, NRCS worked in collaboration with local partners and state conservation and water quality agencies to identify watersheds where on-farm investments have the best chance to improve water quality. NRCS also will work with state and federal partners, such as the U.S. Environmental Protection Agency and the U.S. Geological Survey, to assess results over the long term. The initiative will build on ongoing efforts in the Mississippi River Basin, Great Lakes, Chesapeake Bay, and other landscape conservation initiatives across the Nation.

NRCS accepts applications for financial assistance on a continuous basis throughout the year. Producers can view an online map or check with their local NRCS office to see if they are located in a selected watershed. This summer, NRCS will notify all applicants of the results of the competitive selection process and begin developing contracts with applicants approved for funding.

USDA works with state, local, and Tribal governments and private landowners to conserve and protect our nation's natural resources – helping preserve our land, and clean our air and water. President Obama launched the America's Great Outdoors initiative in 2010 to foster a 21st century approach to conservation that is designed by and accomplished in partnership with the American people. During the past two years, USDA's conservation agencies—the Natural Resources Conservation Service, the U.S. Forest Service, and the Farm Service Agency—have delivered technical assistance and implemented restoration practices on public and private lands. We are working to better target conservation investments: embracing locally driven conservation and entering partnerships that focus on large, landscape-scale conservation.

Since 1935, NRCS's nationwide conservation delivery system works with private landowners to put conservation on the ground based on specific, local conservation needs, while accommodating state and national interests. For more information about the National Water Quality Initiative, visit http://go.usa.gov/Vjl.

By Gene Logsdon

Money Doesn't Grow on Trees, and Trees Don't Grow On Money

I was so gratified to see Wendell Berry's remarks in a recent interview ("Wendell Berry: Landsman" with Jim Leach in *Humanities* magazine, May/June 2012), where he makes a point about economics that is overlooked in these days when divisiveness rules the political roost.

The general view is that the economic battle is between capitalism and socialism, but as Wendell observes, "both are industrial systems and they have made the same mistakes in some ways." Both have ignored "the propriety of scale and the standard of ecological health."

Yes, yes, yes. But I would like to go farther (probably too far) than Wendell did. Both capitalism and socialism are similar industrial systems basically because both accept and practice the industrial idea that the fundamental tool to "growing an economy" is the ability to borrow money at compound interest rates. I certainly would be foolish to deny the effectiveness, maybe the necessity, of being able to borrow money. We borrowed to buy our first house and car. But seeing how borrowed money nearly ruined people I knew when I was growing up, I was determined never to borrow again if I could avoid it and I never did. Repaying a loan over a long period of time often means buying the house or car twice and, if one carries credit card debt all the time, to paying for stuff more than three times.

Somehow this kind of insanity has become sanctified in our society as if it were holy scripture. The phrase, "free enterprise," is uttered by its high priests with all the fervor of a biblical evangelist uttering "the Lord Jesus Christ." I remember the first time I confronted this kind of reverence and realized with a shock, that "free enterprise," guided by what its followers called an "invisible hand," was almost a synonym for God.

For centuries, societies learned from experience that borrowing money on interest invariably results not in "free enterprise" but in the economic enslavement of indebtedness and usury. Humans, privately and as representatives of corporations and governments, eventually borrow more money than they can pay back. They just can't help it. And they lack the will to install the rigid controls necessary to keep money interest from, literally, captivating them.

Farmers who ignore the wisdom of the ages are most at risk in the world of manufactured money. (The most well-known example perhaps is from Shakespeare: "Neither a borrower or a lender be/ for loan oft loses both itself and friend/ and borrowing dulls the edge of husbandry.") Farm crops grow at their own sweet pace and know nothing about manipulated money growth—as I must have written a thousand times by now.

The trading shenanigans going on presently in the banks are spilling over into the Chicago Board of Trade. Are you watching the grain markets? Corn and soybean prices have been bouncing up and down like a drunken kangaroo on steroids. Expert marketers admit that they are mystified. But I hear very few of them suggest that the basic reason for this instability might be coming from the notion that we can make money grow faster than real things grow.

Banks do the same when they buy up mortgages or other bundles of paper and attempt to sell them in secondary markets for a kind of gain that can vanish overnight because it is based not on real material resources but on human desire. It is a form of usury to me, a method of trying to make something that exists only in the mind—money value—grow without any respect at all for "the propriety of scale or the standard of ecological health." This kind of speculation always comes to grief. Ask J.P.Morgan Chase. Money doesn't grow in trees and trees don't grow on money.

Gene Logsdon blogs at http://thecontraryfarmer.wordpress.com. This is excerpted from his [May 23, 2012, post](#).

Individual/family
memberships
only $45 a year

OCIA News

Organic Crop Improvement Association
Nebraska Chapter #1

Acupuncture Offers Alternative Healing

I am certified organic and I am always looking for alternative healing methods for treating my livestock. I feel animals tend to be more receptive to alternative healing than humans simply because they have no preconceived notions of what is going to happen to them.

Last year, one of my favorite cows started limping. I brought her into my vet and we checked her for the usual problems —stone in the hoof or pulled muscle—but no such luck.

Her problem turned out to be more serious. My vet believed she had pulled her stifle and that he could not treat her. He recommended that I cull her, but she is my favorite cow and I was not excited about culling her. My vet has worked with me for almost 20 years and he knows that I would be open to trying an alternative treatment. I think he has even begun to appreciate organic production. Therefore, he recommended a vet up by Howells, Neb., that did acupuncture. The American Veterinary Medical Association (AVMA) recognizes acupuncture as Complementary and Alternative Veterinary Medicine.

I thought it over and figured, why not give it a try? I called the vet and he said he would stop by that afternoon and take a look at her. The reason she is my favorite cow is that she is very tame. She likes being scratched and rubbed, so when we move cattle she always looks for the extra attention. I had a vet technician intern from the Nebraska College of Technical Agriculture in Curtis help me catch her and get a halter on her. We decided not to put her in a squeeze chute but rather tie her up to a nice sturdy tree in the pasture. We felt we could treat her out in the pasture without the stress of putting her in a squeeze chute.

Attaching the electrodes to the needles to stimulate the acupuncture points

The vet evaluated the cow and felt she would be a good candidate for acupuncture, so in the name of science, I said let's give it a try.

If you have ever had acupuncture, you have an idea of what it is about and the concept is the same for a cow as it is for a human: "According to Traditional Chinese medicine, stimulating these points can correct imbalances in the flow of 'qi' through channels known as meridians," according to Wikipedia. A trained acupuncturist places thin, solid needles into acupuncture points in the skin; then electrodes are attached to the ends of the needles and a slight electrical current stimulates the acupuncture points under the skin. The vet places the needles in specified locations to the part of the body that is hurt or needs to be worked on.

Well, my cow was not too excited about all this, but she stood there and had the needles placed around the areas of her problem. When the electrodes were attached, it was at this point she fidgeted a little put she made it through. We went on to give her three treatments, and each time, she got a little better. Finally, by the fifth treatment, she was walking around comfortably.

This method was more expensive, but if you have a special animal or pet and the conventional treatments have failed this may be an alternative approach. For more information on AVMA Guidelines for Complementary and Alternative Veterinary Medicine, visit www.avma.org/issues/policy/comp_alt_medicine.asp.

Liz Sarno is an University of Nebraska-Lincoln Extension educator and the state's Organic Project coordinator, working out of Concord. She also raises organic livestock.

By Rita Brhel

Microbiology 101 for Small Lockers

Nebraska is fortunate that there are a number of small meat processors around and a unique interest in local and homegrown foods. It's not unusual to talk to a producer who eats his own farm-raised beef, lamb, or pork butchered just down the road at the local locker.

But with the concerns over food-borne illnesses across the food industry—from vegetables and fruit and salads tainted with dangerous pathogens such as E. coli and listeria, not to mention meat—there is increasing pressure on these small lockers to keep them up to code. Small, and even mid-size, slaughter facilities can lack capacity, equipment, and the human and financial resources to upgrade.

Of particular concern is the need for know-how when it comes to inspection and food safety. Just one outbreak of a food pathogen traced back to one of these small plants would be catastrophic to the business. So it's vital that small meat processors stay on top of pathogen control in their facilities.

Catherine Cutter and Martin Bucknavage, food safety experts at Pennsylvania State University, in cooperation with the Niche Meat Processing Assistance Network, www.nichemeatprocessing.org, are working hard to educate butchers to do just that. Recently, they presented a course on microbiology geared toward small meat processors so they can learn what they're up against.

Microbiology 101

Microorganisms are organisms that can't be seen with the naked eye. They require the assistance of a microscope to view them. Microorganisms in the form of food pathogens—while small in size (to get a feel for the size of bacteria, it would take 25,000 cells sitting side by side to be as long as one inch), they are not small in their impact.

Microorganisms include bacteria, fungi such as molds and yeast, viruses, and protozoa and parasites.

Bacteria

Bacteria are the largest group of both food pathogens and microorganisms. They may be single-cell organisms, but it is within this group of microorganisms that some of the most deadly food pathogens exist.

"They are very important to the food processor," Cutter said. Only a few cells are needed to infect a consumer with a major, hospitalizing illness.

There are a variety of different types of bacteria, categorized by shape such as rods or spirals and formation of cell wall such as gram-positive or negative.

Bacteria reproduce by binary fission, which is when one cell divides itself into two identical cells. Each cell has this ability, so once bacteria begin growing, they grow exponentially. Some bacteria, such as Bacillus and Clostridium, are able to produce endospores when conditions are inhospitable. These endospores are resistant to heat, drying, and chemicals—waiting until conditions are right before they start growing.

"This division occurs when there's enough food, enough time, when the cells are happy," Cutter said. "You need to realize that when these conditions are right, these cells can grow in only a few minutes. Once they take off and start to grow, those two cells become four, become eight, and so forth. We want to do everything we can to control them in the lag stage—the time before they start growing."

Fungi

Molds are multi-cellular fungal organisms. They propagate by spores transported by air, insects, and animals. The biggest concern for molds in foods is related to spoilage, but molds also produce mycotoxins, toxins that are released by the growth of molds that can sicken consumers.

Yeasts are one-cell fungi that reproduce by budding. They are mainly a problem in causing spoilage, particularly in hot dogs and ham.

Viruses

Viruses are submicroscopic, meaning they are very, very small—smaller than bacteria. They're also technically not a cellular organism. They're referred to as acellular in that they contain DNA or RNA inside a protein coat but that does not contain cellular processes. They are parasitic, infecting cells, including one-cell microorganisms.

In slaughter facilities, viruses of most concern are enteric viruses, such as Hepatitis A or Norwalk virus or Rotovirus, which are brought in by humans.

"We do know that these viruses can be transmitted by food," Cutter said, "most likely from people working in the plant."

Viruses can be easily controlled by promoted good personal hygiene, such as frequent hand-washing, as well as making sure that no one is allowed to work at the plant if they are ill.

Factors in Pathogen Growth

Because each class of microorganism is different, it should not be surprising that each pathogen has different growth requirements and therefore controlling pathogens is not a one-size-fits-all scenario.

Such factors that influence pathogen growth include:

- **Available Nutrients** – This would be the living cells that the pathogen is infecting.
- **pH Range** – Bacteria like a 4.0-8.8 pH, yeast like from 2.0-8.0, and molds like from 1.0-11.0.
- **Temperature** – Microorganisms that cause spoilage like the environment to be 68-86 degrees F, human pathogens are more likely at 68-113 degrees F, but some food pathogens are able to proliferate in temperatures as low as 32 degrees F up to 113 degrees F.
- **Available Oxygen** – Some microorganisms require free oxygen, while others like Clostridium need an oxygen-free environment to grow; still, there are some such as Lactobacillus and yeast that can grow with or without oxygen.
- **Available Free Moisture** – Microorganism growth can be discouraged by dehydrating meats, such as with jerky, but some processing techniques that add sugar actually encourage growth. To give perspective, water in its free-flowing, liquid state represents a free moisture value of 1.0. Raw chicken or tomatoes would have a value of 0.95, cocoa powder at 0.40, and dried milk

at 0.20. Bacteria like the environment to rate at 0.90 -0.99, yeasts like it to be about 0.87, and molds like it to be 0.70. This is why chemical preservatives such as sodium benzoate in foods is used widespread, and why it's important to use a sanitizer on surfaces, Cutter said.

Of course, pathogen control is much more complicated than going down a checklist pertaining to each of these factors. "You have to look at each of these factors together, how microbial load, temperature, and time work together or temperature, pH, and water," Cutter said.

Specific Pathogens to Watch Out For

All food pathogens are important to be aware of, but there are a few—mainly bacteria—that food processors have to pay particular attention to. These are the pathogens that cause the most concern leading to food recalls or national food safety warnings:

◊ **Salmonella** – This bacterium causes fever, vomiting, diarrhea, and sometimes arthritis. The infective dose can be as little as 20 cells. Onset of illness is typically 12 to 14 hours after ingestion of the infected meat. Symptoms usually last two or three days, but some people can get a case of reactive arthritis two to three months later. Salmonella is associated with undercooked meat, poultry, eggs, cereal, peanut butter, and produce; it can survive in dry and/or refrigerated foods for prolonged periods of time. This pathogen can grow with or without oxygen and in a wide range of pH, 4.5-9.5, and temperature, from 35-129 degrees F. Salmonella's primary source of contamination is the intestinal tract of animals, but another source is birds, insects, and contaminated eggs and produce.

◊ **E. coli O157:H7** – This bacterium causes bloody diarrhea and sometimes kidney failure due to hemolytic uremic syndrome. This is an extremely deadly strain of E. coli; in fact, half of all people infected by this pathogen require dialysis. It is associated with undercooked beef, particularly ground meat, contaminated with manure. This pathogen can grow with or without oxygen, and meat needs to be cooked to a high temperature in order to kill the bacteria. It's important to prevent cross-contamination between manure and the carcass or meat cuts.

◊ **Camphobacter** – This bacterium causes bloody diarrhea, fever, and sometimes partial paralysis. It is associated with meat and poultry. This pathogen is very difficult to grow in a laboratory setting, because it requires very low amounts of oxygen and is very sensitive to drying. Contamination sources include rodents and birds, livestock, and water.

◊ **Listeria** – This bacterium causes meningitis, septicemia, and abortion. In particular, risk groups are pregnant women and immune-suppressed individuals. It is associated with deli meats, ice cream, and cabbage. It likes environments that are cold and moist, with a low pH, and contamination sources can be any animals, plants, or water. Listeria won't grow in high-salt situations, such as in brine solutions, but it will still survive, waiting for a more ideal environment. To control this hardy pathogen, it's important to evaluate transfer points in the facility, as it often enters the plant on the underside of workers' shoes. It's also important to control moisture, getting rid of any standing water. And, Cutter said, keep in mind that freezing will not kill this pathogen.

◊ **Spoilage Organisms** – While some of these pathogens have the potential to sicken consumers, the bigger concern is that they shorten shelf life. In this category are bacteria such as Streptococcus, Lactobacillus, Lactococcus, Pediococcus, and Clostridium; yeasts; and molds.

Requirements for Meat Processors

The best strategy for controlling pathogen growth is prevention, and the number-one tool in prevention is testing the meat, equipment, and other surfaces around the facility for pathogens, said Bucknavage. There are two types of tests considered standard—one that tests for the presence or the absence of pathogens, and the other that goes for an actual count of pathogens.

Counts, such as the Aerobic Plate or the Fecal Coliform, are better for detecting aerobic pathogens, those requiring oxygen to grow, but are not great at assessing spoilage. Presence/absence analyses, such as ELISA or PCR or PFGE, are better for testing of various locations around the plant; the majority of testing will be done on phones, forklifts, or the slaughter equipment, although random sampling should also be done of food products, surfaces, people, and even air.

"The larger number of samples you take, the greater chance you have to find a pathogen," Bucknavage said. For example, taking 15 samples versus 60 increases the risk of missing a pathogen by 50%.

The purpose of testing is to determine how to move forward with a sanitation plan, Bucknavage said. "We can start to see trends, if counts start to pop up."

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By Rita Brhel

BIP Helps Beekeepers Study National Colony Loss Epidemics

For many people, the extent that beekeeping affects their lives seems limited—a jar of honey, perhaps a candle or lip balm made out of beeswax. But the business of keeping honey bees has farther-reaching implications: Much of the fruit, nuts, spices, and vegetables grown not only in the United States but around the world rely on bee pollination.

Without bees, or with a drastically shrunken population of bees, these food crops would not be able to keep up with consumption and food prices would soar.

In 2007, the media began describing a phenomenon where entire bee colonies were disappearing from their hives. Not unheard-of in apiculture, these hive abandonments took on the name Colony Collapse Disorder (CCD) because they had risen to epidemic proportions.

At about the same time, although it didn't receive the same level of public attention as CCD, there began to be an increase in winter colony losses. Unlike CCD, winter losses results in dead bees, not disappearances.

But, like CCD, although winter losses are normal in apiculture, the rate at which beekeepers began losing their bees was not: 33% of all U.S. bees having been dying every winter since.

"That is astronomical. Can you imagine if dairy producers or hog producers lost 33% of their operation every year?" said Dennis vanEngelsdorp, researcher and assistant professor in the University of Maryland's Entomology Department in College Park, Md. So far,

beekeepers have been able to quickly recover from these losses by splitting larger colonies to repopulate the empty hives, but it's troubling no less.

That's one of the big reasons behind the formation of the Bee Informed Partnership (BIP), sponsored by the U.S Department of Agriculture and the National Institute of Food and Agriculture. Project director vanEngelsdorp said BIP was developed on three premises:

1. The beekeeping industry is seeing unprecedented complex challenges such as high winter losses and CCD.
2. It's evident that some answers are out there because not all colonies are affected.
3. But competition has taken cooperation out of the beekeeping industry. BIP is essentially a way to get beekeepers talking.

"The answers are out there," said Shane Gebauer with Brushy Mountain Bee Farm in Moravian, N.C. "The beekeepers have the answers. We just need to get into the heads of the people out there."

BIP's major effort is an annual beekeeping survey, which vanEngelsdorp is certain holds the key to questions plaguing the industry. For example, during the 2010-2011 winter season, a quarter of the beekeepers surveyed lost 14% of their colonies, which is an acceptable loss rate. Another quarter lost 53% or more of their colonies.

But what's the difference? Nobody can pinpoint it yet, but if the industry was able to reduce the loss rate of that top quarter of beekeepers—those who lost at least 53% of their colonies last winter—this would translate to $1.29 million worth.

Highlights of the 2011 Survey

BIP is for all types of beekeepers, from backyard producing honey for farmers markets to commercial trucking bees up and down the West Coast pollinating almond trees. The 2011 management survey asked beekeepers to reflect back on their 2010-2011 winter, from October to end of March. In all, 2,895 of people surveyed were considered "backyard beekeepers" with less than 50 colonies; 44 were "commercial" with 500 or more colonies; and 111 were "sideline" operations with 50 to 500 colonies.

"We realize beekeepers than have much larger colonies are going to have different management strategies than beekeepers who have fewer bees," said vanEngelsdorp, but those differences may give a clue as to what is working or not.

Regionally, beekeepers in the northern tier of the United States saw a 40% loss, whereas those in the southern states saw only a 25% loss. The Northeast region of the United States saw particularly high loss rates. This in and of itself provides no definitive link, but beekeepers in the South tend to be of commercial size, and therefore more experienced.

An area of bee management of particular interest to vanEngelsdorp is the use of products to control Varroa mites, a parasite specific to honey bees: "We've been saying that Varroa mites are the number-one enemy for a very long time," he said. Yet, only 40% of beekeepers surveyed said they used a control product—meaning the majority of beekeepers are ignoring the effects of a known honey bee killer.

"That's a huge indicator," vanEngelsdorp said.

A second common bee pest, the small hive beetle, invades hives to feed on honey and pollen but can do considerable damage. Not surprisingly, the beekeepers surveyed who used traps for these beetles experienced fewer colony losses, especially in the northern states.

Another area with a significant impact seems to be winter feeding. Beekeepers who fed their bees in the winter fared better overall than those who didn't, but those who chose to feed frames of honey lost more colonies than those who fed other forms of carbohydrates. Again, vanEngelsdorp said that because the survey is not a controlled study, he cannot for sure say what winter-feeding method causes higher winter loss rates, but "certainly I would think twice before feeding frames of honey to my colonies," he said.

Surveyed beekeepers who stored equipment also lost significantly more colonies than those who didn't, as did beekeepers who bought packages of bees to populate their hives rather than splitting or another method of increasing colonies.

Colonies placed near corn or cranberries also saw higher colony losses than other crops.

2012 Survey

The 2012 management survey opened on March 30 and is gathering information from beekeepers from October 2011 through March 2012. Beekeepers responding to the survey are voluntary, anonymous, and confidential. The survey is available at http://beeinformed.org.

In future years, BIP plans to expand to include a quarterly survey on specific topics with a focus group of beekeepers as well as the annual management survey. The information is being entered into a database that also satellite and weather data from Honey Bee Net, historic and diagnostic data from USDA APHIS, and individual beekeepers' data from Hive Tracks. The data can then be customized to a beekeeper's particular variables, such as location, specific management techniques, and disease trends to allow beekeepers to compare their operations with others without revealing their identity.

Other BIP goals are to pinpoint resistant bee stock and to look at the cost effectiveness of treating colonies with various products.

By Rita Brhel

Superior Nutrition Starts in the Soil

Across the nation, there is a huge demand for local, farm-fresh, organic fruits and vegetables but there is also a great gap in knowledge among producers as to how to grow quality food without the use of chemicals.

When thought of, the image conjured in the mind is of a pest-ridden garden bearing little produce for the number of plants and the amount of work.

Dan Kittredge, executive director of The Real Food Campaign at North Brookfield, Mass., wants to change this image of organic production—by educating producers on how to grow quality food, economically.

"As an organic farmer, I have watched many crops suffer pestilence and disease, and I have seen many poor yields through the years," he said. "I'm not opposed to not growing organically; I just think it's quite possible and plausible to grow organic well, that anyone can do it."

What needs to change for frustrated organic producers is to focus less on the fact that organic means no chemicals and to look more at the whole picture: "The biological system will flourish if given the opportunity," Kittredge said. "Minerals, soil life, organic matter, water, and air: These are the central components to any living system."

On the flip side, consumers are seeking out organic produce because they are reportedly healthier. This doesn't mean just being fresh, but that they contain higher amounts of nutrients than their grocery chain counterparts. And there is a strong connection between the health of a garden and the nutrient content of its produce, Kittredge said.

"The critical role of soil health is that it is central to a functional plant," he said. In the average soil, all nutrients have dropped since the 1930s, some as much as 300%; consequently, the fruits and vegetables grown on these mineral-deficient soils contain less nutrition, too. "This correlates directly to degenerative disease [in humans]," he added.

First Step: Soil Testing

If nutrition of fruits and vegetables depends on plant nutrition, and plant nutrition depends on soil nutrition, organic producers need to refocus their efforts to improving soil health. And the first step is to determine the soil's nutrient deficiencies. This means taking an annual soil test.

There are two types of soil tests available:

1) A **strong acid soil test**, which should be done in the fall, preferably at the end of September or in early October, after the growing season is done but before the cover crops are growing.
2) A **weak acid soil test**, which should be done four to six weeks after germination, in time to correct any deficiencies before the fruit is filling.

Kittredge recommends that producers begin with a strong acid soil test, to get an overall view of the soil and to learn what needs to be done to improve the soil for the long term.

"The strong acid soil test is like your savings account," in that producers are learning what minerals are always present," he said. "Your weak acid test is like your checking account."

Here are the macronutrients to pay attention to for common deficiencies in organic gardens:

- **Sulfur** – Ideally, this level would be at 75 parts per million (ppm). Most soils are deficient, ranging from 15-25 ppm.
- **Phosphorus** – 75 ppm ideally, but is only available for plant use in all but Brassica like broccoli with the presence of functional mycorrhizal fungi in the soil.
- **Calcium** – 65-70% ideally.
- **Magnesium** – 12-16% ideally.
- **Potassium** – 3-5% ideally.

Not all labs test for the wide array of trace minerals, but this is one area of soil testing that Kittredge warns producers not to skimp on: "I grew up in the organic movement, but I heard almost nothing about trace elements in the first 20 years of farming. They're key, crucial."

Which should organic producers be most aware of?

- **Boron** – 3 ppm ideally, but deficiencies are common with usual levels at 0.2-0.6 ppm.
- **Manganese** – 80-90 ppm ideally.
- **Copper** – 4 ppm ideally.
- **Zinc** – 8 ppm ideally.
- **Cobalt** – 2 ppm ideally. This nutrient is a central part of the vitamin B12, which like humans, 80 percent of all soil life has a B12 dependency.
- **Molybdenum** – 1 ppm ideally. This nutrient helps plants with nitrogen fixation.
- **Selenium** – 0.5 ppm ideally.

"Whatever percentage of the ideal level of nutrients your soil is at, say only 10%, that is all the yield potential you'll ever get—10% of the yield potential," Kittredge said. For example, "one tomato plant has a potential of 150 pounds, but the average tomato plant in the U.S. only produces six to eight pounds."

This is obviously a shocking difference in yield potential for the producer, but the missed opportunities don't stop there—poor soil nutrition affects consumers as well: "You can do everything else well," Kittredge said, "but if you don't have the crucial minerals in the soil that your plants need to live, they'll never be fed as well as the need to be and will not produce fruits and vegetables with as much nutrition as they can."

"Some producers do a good job of getting a high level of nutrients into their crops, and some growers do a poor job at getting nutrients into their crops," he added. "From a consumer's perspective, what they want is nutrition. They don't really want pounds; they want quality."

That's what they're paying the higher price tag for.

Correcting Deficiencies

There are plenty of options of soil amendments to apply to correct deficiencies, but some producers have trouble calculating how much of each nutrient to add. Pounds per acre (ppa) basically equals ppm multiplied by two. To determine how much of a nutrient to apply, subtract the actual ppm from the ideal ppm and put it through the calculation to convert it to ppa. Once the amount of each mineral needed to be applied is calculated, and the amendments are selected, Kittredge recommended making a mix of the amendments and applying them at the same time.

"When applying trace elements, you want to do it in the fall. The best way to do this is in the compost. This gives plenty of time for these minerals to work into the soil and not have toxicity issues," he said. One producer he knows applied his mineral mix too closely to the growing season and his tomatoes grew white instead of red; the problem was able to be resolved during the growing season, but this isn't always the case. "Trace elements are like salt in the soup: A touch will pull the flavors together; too much will make it repugnant," he added.

Correcting deficiencies is more than a matter of dumping on nutrients: "If you think of soil as a living system, we do not want to give the soil indigestion," Kittredge said. "Effectively, it might take you two to three years for deficiencies to be addressed."

Some producers see improvements in only a year, but they using other management techniques in combination with applying amendments to the soil.

Other Tips

Improving soil nutrition is the most direct link to improving nutritional content of fruits and vegetables on consumers' plates. But it's only one of several factors producers should take into consideration to improve their yields. Here are few more to keep in mind:

⇒ The bigger, heavier seeds have more vigor, so request seeds from companies that have larger test weights. And when selecting your own seeds, cull the late starters: The seedlings that are behind the bulk are the "runts of the litter" and will never catch up in terms of vigor or yield or quality of produce. As Kittredge puts it, "the health of the mother will have a strong correlation to the health of the child."

⇒ Choose almost anything over sterile potting soil. Some options are compost, peat vermiculite, alfalfa meal, perlite, and kelp. Plants need the best start possible, and sterile potting soils don't give seedlings the boost of nutrition they can get from other soil environments. Kittredge illustrates it this way: "I consider this [sterile potting soil] to injecting a person with an intravenous drip. We can be kept alive, but it's not how we eat."

⇒ Tillage can be a useful tool in controlling weeds, but it is often used poorly. The result is a loss in soil profile and soil life, which translates into poor plant health. The presence of soil life, such as earthworms and bacteria, is a major indicator of soil health. A good baseline for organic soil is 25,000 species of bacteria and fungi, but most soils only have about 5,000. Reasons for this are damage from the fallout from nuclear testing and DDT use in the past, current widespread use of glyphosate and other chemicals, and the common practice of tillage. Kittredge advises using tillage as minimally as possible: "If you don't need to go over it three times, then don't. If you don't need to till in the fall, then don't. If you don't need to go down six inches, then only go down two."

⇒ Pest resistance lies in the health of the plant. When plants are healthy, they are indigestible to diseases and insects and frost-hardy, able to survive 25-degree nights as if nothing happened.

⇒ Second to soil nutrient deficiencies, lack of adequate soil moisture is a big reason for a poor crop. A good soil moisture level is when soil that has been clenched into a ball remains in a ball. If it crumbles, more frequent irrigation is needed.

⇒ Foliar sprays are an effective way to feed plants, especially in mineral-deficient soils, through the growing season. Kittredge recommends a mist blower over the less expensive pump-action backpack sprayer for a small farm. Foliar spraying should be done "when the birds are singing, when they are the loudest," said Kittredge, but for late risers, 8 a.m. is about the latest in the morning to do the chore as spraying when there is too much direct sunlight will burn the leaves.

⇒ Weeds are big issue in organic gardens, and weeding is a must for any grower who doesn't want to lose a good deal of his potential yield to competing plants.

Look to the Soil

If a plant appears sickly—diseased, stunted, producing small or few fruit—producers need to train themselves to look at the problem systematically, rather than symptomatically. They can treat the symptoms of a sickly plant, but it's not until they address the base problem—the system-wide issue of soil health that they can resolve it. By the time a plant begins to show signs of growth issues, it's already three to four weeks into a deficiency, putting the crop well behind, Kittredge said.