PHOTOS BY NANCE KLEHM

Restaurants provide abundant organic waste for building compost.

# New Ground Rules

## Diverting Waste to Heal Urban Soils

*by SHAWNDRA MILLER*

When people wonder where fifth-generation horticulturalist Nance Klehm gets her energy, she tells them it comes from working with living organisms every day. With her hands in a load of half-rotten vegetable scraps destined to become rich compost, this radical ecologist speaks of microbes as if they are old friends.

Her Chicago business, The Ground Rules (TGR), effectively partners with bacteria, fungi and other organisms to demonstrate a different way of dealing with food scraps and other waste. Instead of spiriting the waste away, she keeps it local and harnesses the power of natural processes to create something new.

The work is restorative not only to Klehm, but to beleaguered urban soils. She works to rebalance the life under foot, so that the soil can naturally regenerate itself.

"Most people are working with dead things, negative or problematic flows or information, or they're at workplaces that don't value their workers," she says. "I feel like I'm tapped into something that's bigger and more important that gives me energy."

Though the shorthand description of her project is "waste hauling and composting," it actually encompasses two distinct elements: soil building and bioremediation. Bioremediation is the practice of using living organisms to safely break down, bind or remove harmful substances from soil and water.

Klehm has established a half-dozen "soil centers" in various neighborhoods across the city. Each is affiliated with a community garden that welcomes the fertility produced by Klehm and her team. The team collects about 1,000 gallons of waste per week, converting it into potent soil amendments over several months.

A separate bioremediation site in Chicago's Humboldt Park neighborhood has about 25 test plots, each a square meter, containing one plant variety. Here Klehm and her helpers work with common weeds and native plants to demonstrate how plants can contribute to soil remediation. They planted mugwort, cantaloupe, amaranth and other varieties after measuring the soil for contaminants. They plan to conduct lab tests of dried plant material at the end of the season to determine the kinds of pollutants taken up by each species.

Bacterially active compost produced at the soil centers is also used as a remediation tool. Klehm likes to say inorganic chemicals break down with help from four kingdoms: animal, bacterial, fungal and plant.

Soil contamination is rampant in Chicago, as in most large cities.

"What struck me the most about our urban soils when I moved here 25 years ago is how damaged and sad they are."

But she's begun to see a shift.

"Nothing is more exciting than to be outside and to see beautiful, rich-smelling soil and insects and birds and healthy plants growing. You start seeing that just by redirecting some beautiful, useable stuff."

## EVERYTHING PRODUCES

Initially, it was an "abundance problem" that motivated Klehm to compost. On her 50-acre parcel of conservation land in rural Illinois, a 10-year-old food forest offers more than enough, not only for herself but for wildlife. She put in hazelnuts, persimmons, pawpaws and shagbark hickory for ecosystem restoration rather than harvest.

"I'm not focusing on production," she says. "I'm more focused on creating habitat. If I focus on building habitat and healthy soil, everything produces."

Everything produces so heartily, in fact, that she can't keep up.

"That's why I started doing hard cider and vinegar," she said. "I couldn't figure out what to do with all my fruit. I can only make so much jam."

So she turned the excess into a gift for the soil. She created more "nutrient communication within the soil" with rich, bacterially diverse compost – resulting in more nutritious nuts and berries for birds, muskrats and other animals, as well as for humans.

Her next step, two years ago, was to take on some of the surpluses of city life, offering Chicago restaurants and other businesses a way to turn their waste into a community asset. Now she spends half of each week at her Chicago home and half on her rural land. She hopes to create a few jobs by drumming up more compost contracts – with a goal of earning enough hauling fees to support part-time help (The project is also supported by workshop and speaking fees).

Klehm aims to reduce food waste by setting up "soil centers" in various neighborhoods across the city, where she collects waste from restaurants and other area businesses.

Scaling up is tricky; she needs to be strategic about the location and size of partner businesses. Some have approached her requesting the service, but their volume is too low to make the partnership viable. Also, food businesses have just a brief window of down time during the course of a day or week.

"With some (smaller) places, it can be too much of an effort to stop,

Inky Caps (*Coprinopsis atramentaria*) are a common decomposer found in compost piles.

navigate the situation and get out of there," she explains. "We try to do this when it's convenient for them. They have many hours of the day when they're too busy to have us in there."

"It's a lot more complicated than it would seem."

Compared to most haulers who simply pick up waste material and transport it elsewhere, The Ground Rules is all about using the material locally.

She argues that sending organic waste elsewhere through municipal or private means amounts to removing a community's inherent wealth. Organic waste from yard-work and food production can be important assets to a neighborhood if they stay local, she says.

According to the World Resources Institute, 42 percent of the food supply in the United States is wasted; a figure that galls Klehm. Some of this is from home kitchens, some from restaurants and some from grocery stores, where shoppers have come to expect lavish piles of produce on display at all times.

Meanwhile, city soils are deemed unsafe to grow food, so people who want to plant a garden typically end up spending money on bagged topsoil and other products. As Klehm points out, those products come from farms being stripped of their own wealth. "Someone else's fertility – another ecosystem that depends on it, is being stripped."

## NO DOWNSIDE

It's a philosophy that resonates with Amber Zook, produce manager at the Chicago food cooperative, The Dill Pickle. She switched to Klehm's service after learning of her unique approach. The nearby Monticello Community Garden hosts the soil center, receiving vegetable trimmings and blemished produce from The Dill Pickle.

The food co-op's waste previously went to the city composting program, but Klehm's hyperlocal focus suits its mission better.

"I think (TGR) creates a sense of the cycle, and how we all play a part in being responsible about food," said Zook. "The co-op's mission in general is to support the community."

Beyond the feel-good aspect of enriching a neighborhood garden, Zook says the operation is competitively priced and efficiently run. The pails have screw-on sealable lids that keep bugs and smells at bay, so there's no downside to participating.

At the 22-seat cafe, Cellar Door Provisions, commitment to waste reduction is what drew chef Ethan Pikas to TGR.

"Having worked in restaurants all my adult life, there's so much waste in so many restaurants … It's really problematic, especially given the fact that there are food shortages everywhere. If restaurants can start being more conscious about that, it will make a huge impact on the community, and it creates a stronger culture within the restaurant and within the purveyors you work with."

Pikas notes that larger establishments might have to work a bit harder to get their system reorganized to allow for composting.

"It's really one or two staff meetings, and they could probably manage it," he says.

## THE ALCHEMY OF COMPOST

Intern Jacob Blecher works on the project a few days each week. A typical day starts with revving up Klehm's truck, its bed filled with red 5-gallon buckets. Slipping in the back door of restaurants, coffee shops and microbreweries, Blecher swaps out empty buckets for filled ones, sometimes up to 20 buckets depending on the size of the operation.

Then it's back in the truck to head to the nearest composting site. Large wooden bins – wrapped in hardware cloth to protect from rat incursions – stand ready to receive the day's nitrogen-heavy haul. Each bin holds 6 to 15 cubic yards of material. Restaurant waste might include the stems from greens, tops of carrots, chunks of onion, coconut shells – and once, a whole fish head. Paper towels, biodegradable cups and plate scrapings are also accepted.

About 1,000 gallons of scraps each week, on average, land in these bins –

Daikon radish phytoremediation test plot.

along with carbon material to balance out the volume.

Klehm's objective is to heat the compost heaps to temperatures supporting thermophilic (heat-loving) bacteria: above 113° and below 150°F. Ideal temperature is around 130°F. "We usually don't like to go to 140°," she says. "Above 150° is pasteurization. We don't want to kill off the microbes; we just want to keep them excited and proliferating, and we want to kill off any potential pathogens."

As it cooks, some 70 percent of the material gets digested and reorganized or evaporates. Because her team works the piles by hand, they only turn the material about three times over the course of cooking. Her compost finishes in three to six months, vs. three to six weeks with more frequent turning.

Klehm pays close attention to the makeup of each pile. Unlike industrial composters, she can account for the contents of each pile, notwithstanding the occasional addition from community gardeners. She doesn't put weed seeds in, but her site partners might – another reason to heat the piles.

Depending on how fast a nitrogen material breaks down, she adds lighter carbons (like alfalfa hay, straw, or shredded office paper) or heavier carbon materials (like sawdust and wood chips).

The moisture level of nitrogen inputs is another factor: Material from

a juice bar requires a bulky carbon to create air pockets, for example. But a large batch of dry material – such as 30 gallons of artichoke leaves – requires a different offset. The same holds true for biodegradable plastic cups, which she says will shrink down, become opaque, and eventually disappear in a very active pile.

"When we have those kind of things, we have to make sure we don't have too much air and that it's a wet enough pile that it can support the bacteria to digest things that are harder to digest."

Then there are seasonal variations. With June the wettest month on record in Illinois, she found herself dealing with waterlogged compost. She and Blecher worked to aerate the piles, tucking extra carbons in to soak up the moisture. And the project doesn't stop in the winter months, when constant attention heats the compost enough to keep the piles from freezing through.

"It's like cooking," she says. "It's a lot more subtle than just chucking things into a pile."

In fact, she likes to compare composting to preparing a long-simmered Mexican mole sauce: Over time, from diverse inputs, comes a finished product that bears little resemblance to any of the original ingredients. This "alchemical magic" is one of the things that draws volunteers to TGR. That, and the simple fun of working with the mucky leavings of the food industry.

"It's really funny and remarkably weird, some days, to work with that much food slop," says Klehm.

## "SOIL TIME"

Greg Schultz is one volunteer who was drawn by Klehm's vision. He spends about four hours a week tending the bioremediation site in Humboldt Park. Schultz waters and weeds the boxes, some of which sport plants 4 feet tall by early summer. He says that test plots (and weeds between them) thrive not only because of his ministrations. "There's a fuller life under the ground," he explains. "It's not a monoculture. There's fungi in there and bacteria. That environment in the soil is much healthier."

He's deepened his appreciation of this interplay between bacteria, fungi and plants since working with Klehm, whose stock-in-trade is this connectivity. She looks at bioremediation as a long-term prospect taking place in "soil time," meaning centuries, instead of in the shorter cycles that dominate most modern-day people's lives.

But she emphasizes that getting organic matter back into the soil jumpstarts this process right away. Microbes and fungi feed on organic matter, and as they do so, soils can "heal themselves of disturbance, compaction, contamination and poor fertility," she says. "Natural systems do this anyway. Abundance and complexity is always the goal of nature. Fertility and healing is always the result."

Abundance seems to follow Klehm as a growing number of supporters are attracted by her quirky radicalism and solid knowledge base. Volunteer workdays bring neighbors out to participate in the hands-on work, and a handful of regulars commit their time each week. A local laboratory supplies lab tests to measure the bioremediation effects of plants at the Humboldt Park location.

And recently in its Best of Chicago edition, *Chicago Reader* magazine recognized TGR with the "Best Use of Food Waste" award.

Earlier this year, Klehm's crowdfunding initiative raised more than $15,000 in a resounding vote of confidence. The funds will allow her team to produce a manual for others interested in community-based bioremediation. The booklet blends practical, technical information with information on each site's history and unique challenges.

Blecher, who's working on the manual along with a recent new hire, admits that it's a stretch to hope for widespread change in societal norms around waste management. "But at the very least, at this localized level, we can do this performance which at least hints at an alternative," he says. As a Ph.D. candidate in political theory, he is interested in the intersection of private business and larger purpose.

**NEED MORE INFORMATION?**
For more information visit *spontaneous vegetation.net*.

Teacher, consultant, blogger, steward of the Earth, Nance Klehm.

Not only does the project draw attention to the amount of productive material that's discarded, it can also add a new layer of meaning to labor, he says.

By taking even a small amount of this "garbage" and transforming it into useful material, projects like TGR can open up new possibilities in how people think of their livelihoods.

He tells the story of one restaurant's sous chef who starts his work at 3 a.m. each day by himself.

"We usually go in at 9 a.m., so he's been working for six hours chopping vegetables," said Blecher. "And he is one of the most excited people about this project that we've run into."

## INTERNATIONAL DEMAND

Klehm's reputation as an ecological systems designer has brought her to the attention of forward-thinking international communities. After the devastating 2010 earthquake hit Haiti, she was invited to the island to install composting toilets at a camp for displaced people. Invitations to Poland, Finland and Scotland have followed.

In Chicago, she was the driving force behind a project called "The Humble Pile" which collected 1,500 gallons of human waste and converted it over two years into a safe soil amendment.

"When people ask, 'what's possible?'" she says, referring to composting, "I've done it. I have photographs and data and

Extending oyster spawn onto wheat berries.

Prepping food pantry waste.

anecdotal experience from living in Chicago for 25 years."

She helps craft new composting ordinances in the city, in hopes of supporting scaled-up efforts. In "Composting 401" workshops and other presentations, she shares the untapped potential of waste material to heal soils and build fertility.

Knowing that arsenic, cadmium and other contaminant levels plague city soils in particular, Klehm wants to inspire others to rehabilitate the ground under their feet. "[These chemicals] have been deposited in the soil since the industrial revolution, but we can lean into it and know that this is part of what we can do in the community."

Incremental acts, she says, bring slow but steady changes, and over time the health of the soil – the basis of all life – can and will improve. She runs into pushback all the time, but she's congenial about it.

"Five years ago I met these architects," she recalls, giving one example of the skepticism she's encountered. The group of young professionals, each interested in sustainability, began hurrying through dinner as Klehm started talking about her hopes of widespread change. She recalls them saying, "Why are you talking about things that are so fantastical?"

"But they're not," she remembers insisting. "They're happening. Groups are doing these things. It's not pie-in-the-sky stuff. I can give you names and numbers of people to talk to."

"I got on my bike, and I was thinking, 'They still don't believe me.' They thought I was being a fool. Who cares? On some level maybe they'll eventually get it."

She notes that anyone who looks closely can see pockets of change where urbanites are finding their footing and reconnecting to the natural processes on which all life depends.

"It's about reaching for something way bigger, that we don't think we can do ourselves," she says. "That's the most exciting part of this work."