

**Christenberry raises worms in 3-ft. wide, 20-in. deep trenches. Lined by 1/2-in. thick plastic panels. They take advantage of the warmth of the earth.**



Tom Christenberry's is not. Vermicomposting for nearly 50 years, he has tried a variety of systems, but prefers trenches in the ground. He has had them outside, in greenhouses, and in long barns.

"I'm retired now, but still do some vermicomposting in the backyard," says Christenberry of Wilson, N.C. "The trenches were the easiest system to manage and the cheapest. They let you take advantage of the warmth of the earth."



**Sherman composting operation raises worms in 45 by 48-in. vegetable-hauling bins, which have smooth sides and ventilation slots on the sides and bottom.**

## Using Worms To Make Compost

Rhonda Sherman does worm composting by the book. In fact, she wrote a book called "The Worm Farmer's Handbook" and she operates a worm composting system at North Carolina State University's Compost Learning Lab.

"Often, people will see a YouTube video on the subject and decide to try it," says Sherman, an extension specialist. "After they have product, they will contact me and ask where to sell it."

She recommends developing business and marketing plans before thinking about equipment. And then start small.

Sherman suggests learning to feed and maintain about a pound of worms before expanding. Her book can help. It covers about 2 dozen successful vermicomposting operations in detail, including her own at the Compost Learning Lab.

She uses 45 by 48-in. vegetable-hauling bins with smooth sides and ventilation slots on every side and on the bottom. Each bin holds up to 1,300 lbs. and costs about \$230.

She insulates the bins to stabilize the temperature, which in her case with an open barn, is really hot in the summer and quite cold in the winter.

Sherman starts with 6 in. of moist, mature compost, fully cured and with a small particle size. This prevents it from heating up. She adds 1 lb. of worms per square foot of surface area. She then adds about an inch of dairy manure feedstock at a time. She feeds raw manure with straw, but recommends pre-composted manure to eliminate weed seeds and break down the straw.

"A 5-gal. bucketful is about right for the bin," she says. "I dump it in and spread it around, leaving a couple of inches of bedding exposed around the edges. This is a safe zone for the worms."

As the worms consume the chunky manure, the surface begins to flatten out. When it is flat like a pool table, it is time for more manure. In her open barn, it can take a week between feedings. In a temperature-controlled system, it might take only 2 or 3 days.

"No matter what kind of system, you feed according to consumption, not on a schedule," says Sherman.

The only problem with her system is harvest. She removes the top 6 in. where most of the worms can be found and digs out the castings.

If Sherman's system is labor intensive,

The trenches were uniformly 3 ft. wide and about 18 to 20 in. deep. Half-in. thick plastic panels lined the side walls to keep the worms in the trench. About 6 in. of 80 percent moisture, wood fiber-based compost, such as ground-up wood chips, were placed at the bottom of the trench.

With an open-topped system, it is essential to keep the area lit at night. "The lights keep the worms from climbing out of the beds at night," says Christenberry.

The width allowed him to straddle the trench with a tractor. He would drop in the woody compost and then apply the feedstock manure (he prefers hog manure for its fine grain) using a manure spreader without the spinner.

"I would lay down a 2 1/2-ft. wide stream of manure, never more than 3 in. thick," says Christenberry. "This left spaces at the sides for the worms to escape to, should the manure start to heat."

Christenberry would start out with Sherman's 1 lb. of worms per square foot and manage from there. "In a month, they can double," he says. "By the end of 2 months, you should move half of them out and into another bed."

In addition to managing the worm count, Christenberry emphasizes an 80 percent moisture level for the worms and maintaining a comfortable temperature. Excess moisture

drains away through the wood compost base. Adding moisture is as simple as driving over the trench and applying a mist as needed. Temperature is a matter of the facility. He recommends a greenhouse or open ended barn. In more northern climates, he suggests closed barns with heated water piped through the trench in the winter.

"When you see someone doing something well, copy it the best you can and follow their suggestions," says Christenberry. "People get greedy and take shortcuts, like keeping too many worms in a bed. Just like having too many cows or hogs in a pen, they won't do well."

Sherman notes that Christenberry was unique in using hog manure for his vermicompost. Most operations use dairy manure. However, University of Ohio researchers evaluated product from multiple different feedstocks and found Christenberry's best overall.

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## Organic Farm Specializes In Rare Crops

Larry Kandarian grows crops by the hundreds, and even thousands if different varieties are included. Most are on his 65 acres of niche crops. His advice to new growers is to avoid growing the same crops as everyone else in your market.

"Find a niche crop and build demand," says Kandarian. "Go to specialty stores in your area and look for rare and unique crops they carry and find things that will grow where you live. African crops are growing in popularity. Explore them."

Kandarian has explored such options throughout his life, including selling weed seed to government and industry researchers in the 1980's (see Vol. 11, No. 6). One of his niches today is fennel pollen. By harvesting, cutting it back and allowing it to regrow, he gets as many as 3 crops per year.

"It's used by chefs as the Italian saffron," says Kandarian. "I dry it and sell it through Amazon and at farmers markets, as well as co-packing it for several companies who also sell it."

Currently he is working to introduce and expand awareness of dryland or upland rice. Kandarian is growing out 35 different varieties as he searches for the best flavor and most productive for his area. He grows the rice in low tunnels and reports harvesting 5 lbs. per 25-ft. row.

"I have 6 or 7 that are good producers, they grow fast and overpower the weeds," says Kandarian. "I am teaching others how to grow and harvest."

Kandarian sells the rice at farmers markets. "I sell it to home gardeners by the gram and give it to food bloggers to share with their audience," he says. "There's room

for more and larger producers."

As was true of ancient grains, Kandarian recognizes that if rice is to take off, new low cost machinery is needed. He points to the popularity of flour mills with home breadmakers.

He plans to import small dehulling machines that sell for around \$59 each. They use an abrasion process to dehull the rice. Generally, if he can't find the right machine, he builds it.

"We grow Black Emmer, which like many ancient grains, has a husk," says Kandarian. "We have our own machines to remove it."

Kandarian has made a specialty out of ancient grains. In addition to the Black Emmer, he raises certified, organic quinoa, millet, flax, teff, chia, Ethiopian Blue Tinge farro and nearly a dozen more.

His innovation also extends to field equipment. He uses a 4,000-lb., home-built drag to help control weeds in his ancient grains. Four heavy well casings, with beads on top and bottom, mounted in a frame, scrape most weeds away, leaving the crops to grow.

He has developed novel ways to plant and harvest several trios of his crops in the same field.

The key, he says, is to match up grains with different seed sizes that can be separated at harvest or after. When possible, he matches up a nitrogen-fixing legume with one or more small grains.

He plants a perennial wheat grass. While the same genus and species as Kernza, he can't use the name, which is trademarked.

"I've been growing it for 20 some years, and I sell it as medium tall wheat grass," says



**Larry Kandarian says it's important to avoid growing the same organic crops as everyone else in your market.**



**Rare crops grown by Kandarian include fennel pollen (left) and white-seeded amaranth.**

Kandarian. "I've had the soil under it tested, and it is some of the best in the U.S. It will soak up 20 in. of rain in an hour."

Getting the seed needed to start with a niche crop is often the biggest challenge. Rare seed can often be obtained from the U.S. Seed Repository.

"Contact them, and if they have the seed,

you can get a few seeds and grow it out," he says. "Keep expanding until you have enough to do something with."

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