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A Quiet Push to Grow Crops Under Cover of Trees

By **JIM ROBBINS**

HELENA, Mont. — On a forested hill in the mountains north of Montana’s capital, beneath a canopy of pine and spruce, Marc and [Gloria Flora](#) have planted more than 300 smaller trees, from apple and pear to black walnut and chestnut.

Beneath the trees are layers of crops: shrubs like buffalo berries and raspberries, edible flowers like day lilies, vines like grapes and hops, and medicinal plants, including yarrow and arnica.

Turkeys and chickens wander the two-acre plot, gobbling hackberries and bird cherries that have fallen from trees planted in their pen, and leaving manure to nourish the plants.

For the Floras, the garden is more than a source of food for personal use and sale. Ms. Flora, an environmental consultant and former supervisor for the United States Forest Service, is hoping it serves as a demonstration project to spur the growth of agroforestry — the science of incorporating trees into traditional agriculture.

The extensive tree canopy and the use of native plants, she says, make the garden more resilient in the face of a changing climate, needing less water, no chemical fertilizers and few, if any, pesticides. “It’s far more sustainable” than conventional agriculture, she said.

The idea is to harness the ecological services that trees provide. “Agroforestry is not converting farms to forest,” said Andy Mason, director of the Forest Service’s [National Agroforestry Center](#). “It’s the right tree in the right place for the right reason.”

The Department of Agriculture, the Forest Service’s parent agency, began an initiative this year to encourage [agroforestry](#).

Depending on the species, trees make all sorts of contributions to agriculture, experts say. Trees in a shelter belt reduce wind and water erosion. Some trees serve as fertilizers — they

take in nitrogen from the atmosphere, or pump it from deep underground and, when they drop their leaves, make it available upon decomposition.

Trees planted along streams can take up and scrub out polluted farm runoff. They increase species diversity by providing habitat, and some of those species are friendly to farmers — **bees** and butterflies that help pollinate crops, for example. (One study showed that 66 species of birds benefit from windbreaks on farms.) Trees can keep a field cooler and more moist.

Some research also shows that cattle farmers can improve their income by introducing trees, both by selling timber and by cooling cows in the shade.

And trees in general help the environment by absorbing greenhouse gases and by cleaning up polluted water — countering some of the effects of large-scale agriculture.

“The biggest problem with food production is environmental degradation,” said Gene Garrett, an emeritus professor of forestry and former director of the Center for Agroforestry at the University of Missouri.

Properly placed belts of trees and other vegetation along streams can filter out 95 percent of the soil sediment that washes off farm fields, studies show, and up to 80 percent of phosphate and nitrogen that runs off.

While the idea of farming with trees is being reborn in the United States, **it is not new**. It got its start here in the Dust Bowl era, when trees were planted in shelter belts to stop severe wind erosion, Mr. Mason said. And around the world, agroforestry goes back centuries. “Many generations have been on the land,” said Jill M. Belsky, a professor of rural and environmental sociology at the University of Montana who has studied forest farms. “They have deep ecological knowledge and many cycles of these seasons.

“For example, they taste the soil and say, ‘We need a few more chickens in here’ ” for fertilizer.

Elsewhere, “working” trees are being used to replenish eroded or desert landscapes. A program in Niger has greened millions of acres in the last 20 years.

There are **several approaches** to agroforestry. Grazing livestock under a canopy of trees is called silvo-pasture, for instance. In alley cropping, an ancient technique that is becoming more common in the United States, rows of commercially valuable hardwood trees like oak are alternated with rows of corn, wheat or grasses for biofuel.

Agroforestry operations are also helping raise specialty crops. Nicola MacPherson raises timber in the Ozarks, and grows shiitake and oyster mushrooms on the waste branches; she is also establishing a truffle orchard. Then there are forest gardens like the one the Floras are creating.

Agroforestry is not just as simple as sticking trees in the ground — it can be a sophisticated form of management. “The key to a lot of systems is how they manage shade and light,” Dr. Belsky said. In one common system — teak trees over vegetable crops — as the over-story closes, limiting light, “the types of crops below change.”

Here in Montana, the Floras say they hope that their garden will evolve as conditions change. The climate of the northern Rockies, though, is a world away from tropical forest farms, and the Floras are pioneers.

They have had their share of learning experiences. Bees left their hives and never came back; the Floras had to pollinate their fruit trees by hand, with paintbrushes. One October, trees were killed by a snowstorm and bitter cold. And there are rodents.

“Gophers do a lot of damage,” Ms. Flora said. “They eat tree roots, carrots and potatoes.” Her Yorkshire terrier, Rocky, has been the best remedy so far.

The soil is nutrient-poor, but a forest garden turns marginal soil into much more fertile ground. As the needles and leaves fall and animal waste collects, nutrients increase over time.

One major hurdle to widespread adoption of agroforestry, though, might be conventional thinking about trees.

“Families spent generations removing trees to practice agriculture, and we’re up against that,” said Dr. Garrett, the emeritus professor here. “We have to stress that if you don’t put them in the way, you can use working trees to benefit agriculture.”