

Trees and shrubs offer new food crops to diversify the farm

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Schematic of multifunctional woody polyculture plots. Credit: University of Illinois

What if we could design a landscape that would provide a variety of nutritious foods, high-quality habitat, and ecosystem services, while also delivering a healthy profit to the landowner? According to University of Illinois researchers, it is not only possible, it should be adopted more widely, now.

"We need to be on the road to figuring things out before we get to

tipping points on climate change or food security, or we could be left way behind. In future environments, people might get paid for [ecosystem services](#) or carbon credits, or food might become more valuable. If so, these systems become much more attractive for landowners," says Sarah Taylor Lovell, an agroecologist in the Department of Crop Sciences at U of I.

Lovell believes multifunctional woody polyculture is the way forward. She and several co-authors introduce the concept and discuss their experimental design in a recent paper published in *Agroforestry Systems*.

Essentially, the idea is to incorporate berry- and nut-bearing shrubs and trees in an alley cropping system with hay or other row [crops](#). The combination is meant to mimic the habitat features, carbon storage, and nutrient-holding capacities of a natural system. "We wanted to capture that aspect, but we also wanted it to be commercially viable," Lovell says. "The trees and shrubs need to fit in perfect linear rows 30 feet apart, so you can fit equipment. That was a much more practical agronomic consideration."

Lovell and her colleagues are three years into what they hope will be a long-term experiment on the U of I campus. Their trial consists of seven combinations of species in commercial-scale plots, from simple combinations of two tree species to highly diverse combinations including multiple species of trees, shrubs, and forage crops. "We added increasingly diverse systems so we can get a sense of how much is too much diversity in terms of trying to manage everything in a feasible way," she says.

The researchers will measure crop productivity, management strategies, and economic potential as the experiment gets established. "We're keeping track of all the person-hours that go into each of these different

combinations, so we'll capture the labor involved and figure out whether it's economically viable," Lovell says.

Farmers accustomed to traditional row crops may be daunted by the long wait associated with nut crops. Lovell says chestnuts and hazelnuts don't produce worthwhile harvests until 7 to 12 years after planting. But, she says, the other species can bring in profits while farmers wait. Hay or vegetable crops can be harvested from the alleys in year one. And shrubs could start bearing high-value fruit crops, such as currants or aronia berries, within a couple of years.

Lovell points out that the market for some nuts is growing. For example, Nutella lovers may recall headlines about an international hazelnut shortage a couple of years ago. "It would take a while to saturate that market," she says. But she also points out that some nuts could be used more generically for their starchy or oily products.

Another barrier to adoption may be the cost of specialized equipment needed to harvest tree nuts, berries, and [row crops](#). "There's a tradeoff in terms of how complex to get and still be able to manage it in a reasonable way," Lovell says. But she suggests the potential of farming cooperatives with shared equipment as a way to defray costs.

It will be several years before Lovell will have results to share, but other trials have shown that multifunctional woody polyculture could be both economically viable and environmentally beneficial. Lovell's article details the outcomes of long-standing experimental sites in France and Missouri, but she says those two sites are the only large-scale examples in the temperate region. "That really shows just how little research there is on this so far," she says. "We need to invest in this research now because it's going to take so long to get to the solutions."

The research team is working with regional farmers to replicate small-

and large-scale versions of their experimental setup on-farm. Lovell knows it might take some convincing, but points out that many farmers are willing to set aside portions of their land into the Conservation Reserve Program. "If we can provide the same benefits in terms of water quality, habitat, biodiversity, and nutrient cycling as CRP but then also have this harvestable product, why wouldn't you consider that?"

The article, "Temperate agroforestry research: considering multifunctional woody polycultures and the design of long-term field trials," is published in *Agroforestry Systems*.

More information: Sarah Taylor Lovell et al. Temperate agroforestry research: considering multifunctional woody polycultures and the design of long-term field trials, *Agroforestry Systems* (2017). [DOI: 10.1007/s10457-017-0087-4](https://doi.org/10.1007/s10457-017-0087-4)

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