Agricultural Statistics Service; the 182 shiitake growers (those with at least 200 natural wood logs in production or commercial indoor growing space) brought to market 10.5 million pounds that generated $41 million.

But shiitakes (*Lentinula edodes*) still lag behind white button, crimini, and portobello mushroom crops (cultivars of *Agaricus bisporus*). All of these mushrooms, along with the widely produced oyster variety, grow by decomposing dead plant matter, Pforzheimer notes, unlike morels, chanterelles, porcinis, and truffles, which "live mutualistically with a living tree or plant." The majority of commercially produced shiitakes, therefore, are raised inside plastic bags. They feed on substrates like sawdust and manure, in climate-controlled warehouses where various horticultural methods can expedite the fruiting process and modulate volume and appearance.

Companies in the Netherlands, Kosovo, France, Japan, and increasingly in the Middle East and Africa, produce large volumes of shiitakes, and are major exporters, but, as a group, Asia-Pacific growers generate the bulk of the world's shiitakes. China leads the pack, and its growers are also exporting shiitake spawn, promoting sales to U.S. growers, retailers, and distributors, according to recent industry reports. Some current and former major U.S. producers, already squeezed in Pennsylvania, for example, by acute labor shortages, say the Chinese spawn—far cheaper, despite being imported at major expense in frozen logs—are undercutting their businesses. Just as concerning, they add, is that the fruited shiitakes are then sold as "Made in USA," even though the spawn is already a complete form, akin to a tomato seedling.

Pforzheimer says he has received several emails from Chinese "log manufacturers" himself, urging him to switch. But, in general, he explains, one of the main problems is the lack of "USDA regulation specific to the mushroom industry in this country, [which means] that the spawn blocks or logs can be made of, literally, anything. Many are marketed as 'oakwood shiitakes,' dissembling the reality that, at most, they are grown on media containing oak chips. Because mushrooms absorb and concentrate whatever they grow on, this lax regulation of growth media is a health problem."

For obvious reasons related to erratic temperatures and the nature of live cultures, wild-harvested organic shiitakes are far harder to grow—at least consistently—than those nurtured by an HVAC system. But they do thrive on the Vineyard. French learned years ago, through his landscape work and through projects with his father, the stone mason-artist Lew French, about the constant battle against moisture, viruses, and fungi waged by those who want fruit orchards. "We have 95 percent humidity in the summer. What doesn't like humidity? Apples, cherries, peaches," he says. "But with shiitakes, we don't have to fight it, and we're getting eight months of production—what crop here gets that? This year, with the addition of the solar greenhouse, we're likely to get 10."

And because of how they are grown, MV Mycological's shiitakes contain double the amount of fiber found in factory-produced specimens. "Again, it's common sense," Pforzheimer says. "Where are they getting the fiber from?" He gestures across the thousands of vertically upended logs in the greenhouse tent where the shiitake spawn have been feasting on cellulose, sugar, and moisture and are currently fruiting. Shiitakes and other mushrooms are already a primary source of protein and used in health practices in Pacific Rim countries, and nutritional testing has shown that MV Mycological's shiitakes also hold significantly more protein—2 grams per about four mushrooms—than typical store-bought varieties. That's no match for the average 18 grams of protein packed into a three-ounce serving of ground beef—but, Pforzheimer argues, "gram for gram," shiitakes are a healthier, more sustainable source: "One gram of shiitake protein requires about one-seventieth of the water and one-thirtieth of the land to produce." Moreover, shiitakes are high in lentinan, a type of sugar molecule found, in some U.S. laboratory studies, to bolster the immune system and possibly aid the cancer-fighting process. Shiitakes are also rich in B vitamins, copper, manganese, zinc, selenium, potassium, and other immune-boosting

Centennial Medalists

The graduate school of Arts and Sciences' Centennial Medal, first awarded in 1989 on the occasion of the school's hundredth anniversary, honors alumni who have made contributions to society that emerged from their graduate studies. It is the highest honor GSAS bestows, and awardees include some of Harvard's most accomplished graduates. The 2019 recipients, announced at a ceremony on May 29, are: **Carroll Bogert** '83, A.M. '86, a journalist and human-rights advocate; **Lael Brainard,** Ph.D. '89, a Federal Reserve Board governor and expert in international trade; **Roger Ferguson** '73, J.D. '79, Ph.D. '81, CEO of TIAA; **Jane Lubchenco,** Ph.D. '75, a marine ecologist; and **Joseph Nye,** Ph.D. '64, former dean of the Kennedy School and an authority on foreign policy and power. For more about the honorands, see **harvardmag.com/centennial-19**.

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Graduate School of Arts and Sciences honorands (from left) Lael Brainard, Joseph Nye, Jane Lubchenco, Caroll Bogert, and Roger Ferguson

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