

Newton scientist teaches beer brewing

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Microbiologist Sam Fogel opened a can of malt while he brewed beer at home.

Sam Fogel knows beer. But not so much in a palate-aroma-which-glass-is-best way. Instead, the Newton resident prefers to talk about the perfect anaerobic conditions, the right temperatures, and how stored carbohydrates are coaxed out of their endosperm to make lager or ale.

He's a microbiologist, and it's impossible for him to separate his scientific background from the search for a good-tasting brew. But his approach works because, it turns out, home brewing is one big science experiment.

On a recent morning, Fogel, 74, shared his take on a hobby that has exploded in popularity.

"My interest is communicating something about microbiological sciences," he said, sitting at his kitchen table between stages of lager making, the aroma of hops in the air. "So much of what we do in life these days is not hands on. It's pretty much a black box, electronically speaking at least. I turn my iPhone on

and I don't know how it works really, but with beer making and hard cider making we can get our hands into it enough that we feel a connection with the process."

For the last four years, Fogel has taught home-brewing classes at the city-owned [Newton Community Farm](#), where he also tends a small orchard of dwarf apple trees and provides instruction on urban gardening.

The science of suds isn't so different from his day job. Fogel and his wife, Margaret Findlay, own a lab in Watertown, Bioremediation Consulting Inc., where they breed anaerobic bacteria that eat noxious chemicals to keep them from polluting the environment. The yeasts in beer operate without oxygen just like his "bugs," as he calls them.

"My role is . . . to explain the formation of sugars from the barley and then the ethanol from the sugars," he said, preparing for his next round of beer-making classes. "And I sort of get a kick out of it."

In this case, Fogel's passion for microbiology happens to intersect with popular culture.

"There's more people brewing than ever," said Brian Powers, owner of Marlborough-based Strange Brew Beer & Wine Making Supplies. "It's like an experiment and you're drinking the results."

His customers are newbies as well as veteran brewers who are becoming more adventurous, trying out new ingredients such as acorns. Several factors have coincided to make this the "golden age of home brewing," said Powers.

"People just like good beer," he said. "I also think a few years back when the economy took a hit, a lot of people took up brewing at home because it's cheaper. It's a cost-effective way to drink quality beer. It's the stay-cation idea."

Stir into that the social aspect as well as the growing movement toward fresh and local in all things food related, and it's no wonder making beer at home is a robust avocation, Powers said.

Gary Glass, director of the [American Homebrewers Association](#), based in Boulder, Colo., said suppliers nationally saw revenue grow 24 percent in 2011 over the previous year, fueled by the growing popularity of the DIY mindset and the locavore movement.

"People are supporting their local breweries, but you're not going to get any more local than brewing your own beer at home," said Glass.

As Fogel starts a new batch of lager in his Newton kitchen, water heats in a giant pot on the stove. He pours barley through a funnel and into a mesh bag that will act like a tea bag. When the temperature is right, the barley bag goes into the pot and the kitchen smells alternately of pine cones, rye bread, and warm forest.

Once the barley bag has steeped, the brew is known as wort, which must be brought to a boil before malt extract, and then hops, are added. After the hops cook for almost an hour, the wort is cooled quickly in an ice bath before it goes into a fermenter, which is essentially a large pail. Yeast is stirred in and a lid and airlock are secured so the fermenting can begin.

After about two months of fermenting, and once the alcohol is at the right level, Fogel says, he will add sugar to provide natural carbonation, bottle his brew, and think about sharing it with friends and family.

“I think it’s good for him to use his scientific skills in a way that is more for fun than it is for business,” said Fogel’s son Michael.

The younger Fogel, an emergency room doctor, designed a label for his dad’s beer years ago. Squirrel Shot Ale, named after the urban gardener’s number one nemesis, is made with “two parts love, one part crazy, a dash of nut, and any of the backyard fruit that our furry little bandits didn’t steal,” according to the label.

Making beer fits nicely into an ethos that is tinged with “mad scientist” and infused with curiosity, said Michael Fogel, who fondly recalls being raised, along with his brother, by parents who both had research backgrounds (and doctorates).

“We were the sort of kids that learned about how combustion works with our birthday candles,” he said. “It’s really a way of looking at the world. They use that same approach in everything they do, from gardening to their health.”

And the same unconventionality is on display in front of their home, where the front yard has been replaced with a vegetable garden that brings passing cars to a stop in the summer, Michael said.

Sam Fogel is optimistic that his experimental brew will yield a successful German-style, dark brown lager.

“It’s always more interesting than most bottled beers,” he said. “It’s always the sort of thing where you say, ‘Hmm, I did pretty good.’”



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Fogel funneled barley seeds into a cheesecloth bag to seep in hot water.



While waiting for his brew pot to heat up to 150 degrees, Sam Fogel pours roasted barley seeds into a grain bag, made of fine mesh like cheesecloth.



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The grain bag steeps like tea for 20 minutes and the temperature must stay about 150 degrees. After the grain bag is removed, the brew is called "wort."



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After bringing the wort to a boil, Fogel adds syrupy malt extract.



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Fogel uses prepackaged hops for this recipe because he is going for a German-style lager. The hops are added to the boiling wort.



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The wort must be cooled quickly and then poured into the 5-gallon fermenter.

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A hydrometer can be used to help calculate the alcohol content.



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After the yeast goes in, the lid and airlock are secured. Let the fermentation begin!