

What's Growing on Your Roof?

In the summer of 2016, HBS grew a crop of daikon radishes on the roof of McCollum hall. These radishes were harvested (400 lbs. to be exact), supplied to Restaurant Associates (our HBS dining hall operator), and then served to the HBS community in Spangler Hall. The whole thing was a bit serendipitous. It wasn't by design that we grew an edible crop on a campus green roof and served it to the HBS community. But with the help of an innovative green roof vendor, a progressive-thinking HBS operations staff, and a willing partner in Restaurants Associates (RA), HBS took another step into the realm of rooftop farming.



Daikon radishes being harvested atop an HBS roof.

The daikon radish harvest along with the herb garden on the Chao Center formed the basis for our project for the 2016/2017 academic year. We carried out a research project to explore whether we could expand existing rooftop capacity and what benefits different styles of green roofs would provide HBS.

Rooftop farming has been growing in popularity. Today, companies like Whole Foods are growing produce on their building roofs that they then harvest and sell at the same store. Rooftop farming is all about getting better at using limited resources. In urban areas, it enables the growth, harvest and consumption of food within a localized community. In doing so, it essentially eliminates the carbon footprint of transporting

the produce from where it would normally be grown (sometimes halfway across the world) to where it is consumed. It also allows growers to employ farming practices that use less pesticides and herbicides than conventional farming.

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In many ways, HBS is the perfect place for rooftop farming with a supportive and engaged community. The School currently has green roofs on seven buildings across campus with more on the way. The vendor that maintains the green roofs, Recover Green Roofs LLC, has freely shared their rooftop farming expertise with HBS. The School's open-minded operations department has dedicated itself to sustainability and pushing the boundaries of what's possible. Finally, RA is an enthusiastic partner that has supported rooftop farming on campus and has made it a point to incorporate a wider variety of interesting local produce into their menus.

However, while HBS has several green roofs, they are not all created equal. There are many considerations when installing a green roof such as desired level of maintenance, complexity, appearance, weight load, cost, etc. One common type of green roof is a sedum green roof which has a shallow soil bed (<6 in) that supports hearty succulents and vegetative mats. Sedum green roofs are simple, lightweight and easy to maintain. However, they cannot support the growth of edible produce. On the other hand, a productive green roof with deeper soil beds (6-24 in) can support rooftop farming. They require more maintenance and a higher weight capacity than a sedum roof, but have the ability to grow fresh produce and can be more effective at storm water retention

and heat reflection by virtue of being deeper. Productive green roofs can be built in place, or designed as a modular system that allows the building owner to more easily move or transport the plants.



Rooftop greenhouse on a NYC public school. Source: <http://www.farmxchange.org/top-8-urban-farms-in-the-world/>

Productive rooftops that take an “in-ground” approach are limited by weather conditions, a short Boston growing season, and irrigation capability. A rooftop greenhouse is another option that presents the opportunity to lengthen the growing season, allow for varied growing configurations (vertical), and enable a wider variety of crops through hydroponic farming. Of course, downsides include higher cost, higher building structure requirements due to weight, and more complicated operations and maintenance needs.

Our research also led us to explore the innovative practice of farming in a shipping container. Freight Farms, a Boston-based start-up, recycles old shipping containers and turns them into growing machines. They can achieve the perfect growing climate year-round using a closed-loop, hydroponic system that delivers nutrient-rich water directly to plants roots and carefully managed artificial UV light. With its ideal growing

conditions and vertical configuration, it becomes an incredibly productive solution for a small space. The system comes pre-built and ready to use.



Freight Farm's Leafy Green Machine. Source: <https://www.freightfarms.com/leafygreenmachine/>

Freight farms presents a great option for HBS as it addresses many of the challenges posed by “in-ground” and greenhouse rooftop farming and has relatively inexpensive startup and operating costs. The container can also be put anywhere—on a roof or an unused space behind a building (e.g. Batten Hall).

At the end of our project, we had the opportunity to present our research and recommendations to key campus stakeholders. Our message was this: Growing local is a real possibility at HBS! There are tangible environmental benefits and HBS is a perfect place to do this. The School has many options to move forward, from continuing to utilize existing productive green roof space, to installing a rooftop green house, to moving beyond the rooftop and partnering with Freight Farms. We were delighted with the interest and energy we sensed from HBS Operations and RA around these ideas. We are hopeful that in the near future, the HBS community will get to eat more produce grown right over their heads.