



Black Pearl Gardens

The concept of transforming otherwise underused, vacant spaces into indoor farms is quickly becoming a popular medium for sustainable agriculture in urban communities. Examples include “The Plant” in Chicago, Illinois and “Growing Underground” in London, England. In these cases, a former meat-packing warehouse and forgotten WWII tunnels were repurposed into spaces for productive urban agriculture. These models provided the inspiration for establishing Black Pearl Gardens (BPG) located in Ann Arbor, Michigan. The Dow Fellows student project team worked with Christy Kaledas, founder and developer of BPG, to assess and enhance the efficiency and sustainability of the indoor farm, and suggest possible avenues for a 17-acre future expansion.

BLACK PEARL GARDENS

Kaledas’ business began in her home basement, growing crops to meet the demands of several local restaurants near downtown Ann Arbor. Although, her client list quickly expanded beyond the capacity of her basement garden. In 2015, Kaledas partnered with the Black Pearl Restaurant to expand and move her indoor farm to the basement of the restaurant. Since the expansion of BPG to the Black Pearl restaurant basement, its client base has broadened to numerous other grocers and restaurants. Project team recommendations that accounted for optimal growing conditions in the new space led to the addition of multiple new crops, such as beet greens and scallions. And BPG is now purchasing soil-based microgreens from organic, non-GMO distributors.

CHALLENGES AND RECOMMENDATIONS

One significant challenge was finding reliable help for daily operations at the indoor farm. However, after hiring a full-time farmer, operations were well managed and yields became much steadier, allowing the manager to invest in planning and expanding the farm in the future.

An average humidity level of 70% due to the windowless basement structure was another challenge. The student team recommended a new ventilation system in conjunction with the existing dehumidifier and air conditioner to keep humidity levels at 50-60%, for optimal plant growth. The team also recommended shifting to an irrigation system that allows for simultaneous watering of multiple trays. This process change is an important factor, as daily watering is one of the most time-consuming tasks for BPG.

Energy from glow lights was a major financial cost for the business, with BPG spending \$5,200 on electricity annually, and the majority of that cost attributed to the need for artificial lighting in the basement garden. To reduce this cost, Kaledas plans to move the business to a 17-acre farm (known as the Geddes Farm) adjacent to Ann Arbor’s downtown area.

Another challenge with the current space is that public access to the BPG growing room is not possible. Building a new barn at the Geddes Farm would allow space for hosting Farm-To-Table events and other activities (see education below). Moving and expanding the business is part of BPGs 5-year business plan, and will also allow the business to grow larger crops in hoop houses and use an existing barn for livestock.

MONITORING AND IMPROVING EFFICIENCY

Currently, BPG is a completely indoor greenhouse with no natural light. The project team used Kill-A-Watt monitors to calculate energy-use efficiencies, and 500 grow lights (light bulbs designed to stimulate indoor plant growth) were installed and used 12 hours every day. Nearly 16 kWh/pound of microgreens were produced weekly. This is significantly higher than energy use on conventional farms. Continued on back...



MONITORING AND IMPROVING EFFICIENCY CONTINUED...

Although lighting was a significant cost, water usage averaged just 3% of water used in conventional farming, at .9 gallons of water/pound of microgreens. Additional costs, including transportation, accounted for a relatively small percentage of total energy use because most of BPG's clients are located near the garden. The student team configured an optimal route for BPG's customer deliveries to maximize transportation efficiency and minimize costs. All in all, the project team concluded that the Black Pearl Garden business was profitable, with a payback of 29 months.

The team also investigated the potential for pairing soil-free hydroponic methods, where plant roots are suspended in water, with aquaponic methods that use nutrient-rich waste from fish tanks to fertilize and irrigate hydroponic beds, and use just 10% of the water needed in conventional agriculture. These methods could be explored in the basement of the new barn to extend the growing season, and could potentially provide access to organic, fresh produce not readily accessible during winter months in urban areas. At the proposed farm location, a greenhouse using solar energy could potentially provide the electricity necessary for hydroponic or aquaponics growing methods

EDUCATION, COMMUNITY BUILDING, AND FARMING

Beyond providing fresh food, BPG is interested in making a positive impact on the Ann Arbor community, through education and community building. We anticipate that a new barn will allow for ongoing education efforts in partnership with educators in the area.

Kaledas envisions establishing a mixed-use urban farm as part of her 5-year expansion plan, using a 17-acre plot she recently purchased in Ann Arbor. She plans to construct a new barn made from reclaimed wood, creating more space for growing and learning. Expansion plans include hoop houses, livestock, restaurant and an indoor market space.

CONCLUSION

Sustainable urban agriculture can leverage vacant urban spaces, and benefit people and businesses. Urban farms contribute to building vibrant, healthy, and cohesive urban communities. Considerations like energy use, functional and dynamic spaces, reliable partnerships, diverse growing methods, and business expansion are all factors to consider when evaluating the success of an urban farm



Produce grown at the Black Pearl Gardens

TEAM MEMBERS

Lindsey Von Seggern, Taubman College of Architecture and Urban Planning (CAUP); Jillian Shotwell, School of Public Health; Andrew Zack, College of Literature, Science and the Arts; Frank Romo CAUP; and Luiz Roberto Queiroz de Abreu Sodre, Ross School of Business.

PROJECT PARTNERS

- Black Pearl Gardens
<http://www.blackpearlgardens.com>
- Black Pearl Restaurant
www.blackpearlonmain.com

READ MORE

- Full Project Report:
<http://sustainability.umich.edu/media/files/dow/Dow-Black-Pearl-Garden.pdf>
- More about the Dow Masters and Professional Fellowship:
<http://sustainability.umich.edu/dow/masters>

37192-AUG-2016

SUPPORT

Made possible by The Dow Chemical Company, the Dow Sustainability Fellows Program at the University of Michigan supports full-time graduate students and postdoctoral scholars at the university who are committed to finding interdisciplinary, actionable, and meaningful sustainability solutions on local-to-global scales. We believe that diversity is key to individual empowerment, and the advancement of sustainability knowledge, learning and leadership. The program prepares future sustainability leaders to make a positive difference in organizations worldwide. See: <http://www.sustainability.umich.edu>

Photo Credit: Black Pearl Restaurant, Black Pearl Gardens