



# Plant Chicago

INDOOR VICTORY GARDEN

**2021**

# Introduction

The Indoor Victory Garden (IVG) is a shared-use, community-focused growing space run by Plant Chicago. Through this space we provide resources, equipment, and knowledge to individuals, families, and small businesses looking to expand their indoor growing capabilities. The idea of the IVG was grown out of the desire workshop attendees had to take the next steps in beginning their own hydroponic or aquaponic systems. For many, however, physical or financial resources make this step difficult. We set out for the IVG to be a place where exploration and experimentation can be undertaken with minimal risk or burden on behalf of those wishing to learn. Such spaces already exist outdoors in the form of community gardens, but this is the first initiative we are aware of that attempts to provide shared space within a professional indoor farming environment. With a mix of both commercial and individual growers, users also benefit from the kind of knowledge sharing that is facilitated by a collaborative and dynamic learning environment.

We began the pilot scale version of the Indoor Victory Garden in late 2020 with the intention of learning from a select group of users the information needed to properly scale-up to utilizing the building's entire North Garage. The information gathered would inform both the plans for renovations as well as operational logistics. Being little more than a floor with walls and a roof directly adjacent to our main operations (a former Chicago firehouse), it is a good blank slate for a



project such as this. The North Garage is a 1980's addition to the firehouse and was most likely used as a storage space. At approximately 1,400 square feet, it is on the small side to be a profitable indoor urban farm but large enough to provide room for experimentation and education.

Among our goals was the intention to gain a better understanding of who in particular is interested in utilizing such a space as well as insight into the day-to-day requirements of operating this unique resource. Our initial outreach for users of the space yielded primarily a mix of small commercial and non-commercial growers. Additionally, some interns joined in. Over the past 12 months, a total of 14 people used the space.

When fully built out, the Indoor Victory Garden will feature opportunities for both commercial and non-commercial growers to experiment and learn year-round with at least 5 different methods of growing food indoors, covering both plants and fungi.

## People

Since the idea for the IVG came from the feedback of individuals participating in our workshops, we anticipated that the users of the space would be an even allotment of commercial and non-commercial growers. We consider a commercial grower to be any individual / business that uses the IVG for the purposes of their business. A non-commercial / hobbyist grower is anyone whose primary use of the IVG is for education, skill development, or self-sufficiency. Since the IVG is used as a space for education and experimentation, most commercial users of the IVG still grow food for sale in more traditional outdoor



settings. Once fully built-out, we intend for the IVG to be an inspected and certified production space. This means that users will, with proper licensing, be able to directly sell items grown in the space.

In the pilot year, the IVG was of greater interest to commercial growers. For non-commercial growers, personal interest perhaps battles with time availability, whereas for commercial growers looking for available space there is a more pressing need. The past year has seen 5 commercial users of the IVG, compared to 2 non-commercial growers. Additionally, 4 interns and 1 Plant Chicago staff member have also used the IVG.

## Inputs & Outputs

For these growers, particularly those who requested after-hours access, we asked that they 'sign up' on a virtual calendar so that we could know who was in the building and track their frequency and duration of visits. We also asked that they weigh and note the production outputs of their crops - both edible greens and compost - on a clipboard next to the door.

In addition to growers' compost, Plant Chicago also tracked landfilled, recycled, and miscellaneous compostable materials generated in the IVG as a whole. Other inputs such as utilities (electricity, gas, water) were more difficult to track since we don't have that much granularity in our measuring system. By looking at all of this information together, we hoped to be able to gain insight into what it would take to scale up the IVG from ~5 users at a time to as many as 30.

## Takeaways From Year One: Challenges and Potential Solutions

### IVG Users


Fewer non-commercial (hobbyist) growers engaged with the IVG than anticipated. We expected that there would be barriers to involvement such as a perceived high time commitment and financial limitations. In order to ensure that money was not a barrier for access, we offered sliding scale rates. There could be other factors causing hesitation. These include language barriers, and perhaps some unacknowledged misgivings about what is currently an unfinished garage. Even though indoor farming can often be a solitary activity, fear and uncertainty

around COVID could also have played a significant role in overall engagement. An early 2022 highlight of the IVG in our monthly newsletter garnered significantly more interest than previous efforts, suggesting that many future users are still simply unaware of this opportunity.

**There should be other options for involvement aside from formal renting.** We would like to see a tiered system implemented that allows Plant Chicago interns, volunteers, and those with limited time to also partake. The Plant Chicago Auxiliary Board (PCAB) will also be helping to maintain the space in 2022, which gives them the opportunity to help lead community members interested in getting involved but not yet committed to renting space.

**Self-reported data collection proved difficult.** Calendar-use tapers off and becomes sporadic after a few weeks or recurring visits are entered into the calendar but are not always adhered to. Users will also typically track harvest data for a short time before tapering off. With no current incentive for folks to track their outputs, this makes sense. Since no conflict arose from users overlapping in the space, it seems natural that people would not pay careful attention to the calendar. As the number of total users increases, however, this could change and calendar usage will be more critical.





If access to the IVG were switched from a lockbox system to a card / pin code system, we could track users' access to the IVG in order to better assess overall usage. The other intention of using an online calendar however, is to allow users to see when one another will be present, giving folks the opportunity to collaborate or work alone if they prefer.

To encourage proper procedures are followed, and address any concerns or issues, we would like to hold monthly / quarterly group meetings or individual check-ins with users.


**Users tend to gradually utilize more space than was initially provided, particularly for storage.** Empty shelves and floor space can quickly get filled with extra materials. Unmarked materials are particularly tricky in a shared space, as the average user doesn't always know whether the materials are supposed to be there or to whom they belong. Providing space for long term storage (for items not immediately needed for regular growing operations) can help to declutter the primary growing space. Some growers, particularly those who also grow outdoors, need additional outdoor storage space for tools / supplies. There is also a role that the manager of the space (Plant Chicago) can play by quickly contacting users that start to take up more space.

### **Cleanliness and Pests**

**Maintaining cleanliness of the space was more difficult than anticipated.** Soil and other detritus spread throughout the space quite easily and was not always simple to clean up without moving equipment / supplies around. Limiting the amount of material stored in the space and standardizing the height of the lowest shelf (6" minimum, 8" optimal) will enable more effective vacuuming and mopping. Soil / growing medium spillage would be made easier to clean with the use of shelf liners on the growing racks as well.

**Flying pest issues (mainly fruit flies and house flies) were also more prominent than expected.** A staged entry, such as a gowning room, along with filtered intake and circulation air would greatly limit pest intrusion. Similarly, finding ways to incentivize users to immediately place organics (such as used soil / compost / growing medium) in outdoor compost systems would limit pest proliferation.

Physical separation of soil-based and hydroponic growing would help keep hydroponic areas cleaner. Included in our renovation proposal is



a plan to delineate separate rooms for soil-based growing, hydroponic growing, and a sterile lab for mycology. Limiting access to certain areas as well as proper PPE application will drastically reduce contamination.

Color coding of cleaning tools and establishing protocols to prevent cross contamination of materials will also reduce pest, bacterial, and fungal proliferation. A strict cleaning and maintenance schedule on the part of Plant Chicago is needed in order to make up for the shortfalls in users' cleanliness.

## Environment and Infrastructure

**The North Garage, where the IVG is located, is under-insulated.** The unit heaters were sufficient to properly heat the space in the cooler months (using a lot of gas in the process), but a lack of A/C meant that the roof exhaust alone was unable to adequately lower temperature / humidity. During cooler months, unit heaters also remove too much moisture from the air. The ideal temperature and humidity for a growing space is 60-70F and 50-70% RH. Peak summertime temperatures would easily reach 85F at 80% humidity, whereas winter humidity dropped below 35%. These issues should be corrected with planned renovations for the IVG in 2022, detailed below.

**Airflow needs to be improved.** Indoor farms typically incorporate some form of fan to move air across plants. Increased airflow reduces pests as well as mold and helps stimulate plant growth. Currently, air is being circulated by ceiling mounted greenhouse fans. These fans, while powerful, create areas of high wind which can dry out crops quickly as well as create areas with little to no circulation. The greenhouse fans also operate 24/7 and run regardless of the number of plants or operating grow units.

Ideal environmental controls would include an air-sealed and insulated building envelope with filtered fresh air intake as well as an HVAC system capable of handling the heat load of grow lights and equipment in addition to the humidity load of the plants. This moisture would ideally either be directed toward other spaces in the building that needed it, or extracted from the air and saved for additional use.

Ventilation would be positively pressurized to the rest of the building and operated in a push-pull layout with supply air blown in on one end of the room and return air at the other. This would help maintain even

temperatures without the chaotic flow of ceiling-mounted fans. Airflow at the plant level will be handled at each grow rack via fans or ducted blowers. This will also allow for greater control of airflow based on plants' individual needs based on age, crop type, etc.

The floor in the North Garage was built for vehicles and storage, not growing. This means that it is pitched to each door (any spills run out of the building) and insufficient care was taken during installation to prevent cracking and shifting of the slab. This unevenness leads to some ladder / table instability as well as pooling of water. The concrete of the floor is also unfinished and uninsulated. This means that our floor is porous, hard to clean, and actually loses heat to the ground.

An ideal floor would be mainly flat while gently sloping toward drains in each workspace and have proper expansion and control joints. A light, solid-colored epoxy finish over the floor and baseboards would ensure a waterproof and easy to clean surface. If we used an insulated, radiant heated slab, the floor would provide space heating without removing moisture from the air.



Some growing racks have different lighting than others. While not an inherent problem, these differences require us to have different physical setups depending on the quality and intensity of the lights. One particular light also requires a different voltage than the rest, leading to additional challenges. Limiting the lighting schemes (3 maximum) increases modularity and repairability as well as giving a more cohesive and standardized look to the space. Ensuring that all schemes have the ability to turn lights on / off at the individual shelf level will minimize wasted electricity.



# Additional Considerations

To provide an appropriate environment for growing, the overall design of the HVAC system and its effects on both the IVG and the rest of the building need to be carefully considered. Placement and size of equipment can affect other spaces (such as future plans for the rooftop). Proper locating of ductwork within the space will affect its performance and cleanability. Additionally, when dealing with pressurized spaces, (such as the hydroponic grow space and mycology clean room) it's important to be thoughtful of where the air is coming from, how it is filtered, and where it goes to. Maintaining a balance of proper airflow will ensure that pests and pathogens are minimized while

still efficiently maintaining proper environmental parameters. Since every space and application is different, what this all looks like will depend on further work with HVAC engineers and contractors.

In order to be a fully functional growing space where folks can grow food that can be sold to others, the IVG will need to pass a USDA inspection. Any additional infrastructure requirements for this inspection need to be implemented at the design stage to limit the potential for future retrofitting.

Since the IVG as a whole consists of a Wet Lab / Wash + Pack, Gowning Room, Mycology Lab, and Grow Room, the location and size of each space is important to determining what can happen in each. Initial thinking was that the Grow Room should be entirely hydroponic, with little to no soil introduced into the space. The pest and mold issues experienced during the summer of year one substantiated this idea. Being, however, that a large amount of production in the pilot has also been soil-based, we should evaluate how much space we provide for these activities vs. hydroponic-only growing. We are also considering whether soil-based growing should have its own dedicated space separate from the Wash + Pack. With the limited overall square footage of the North Garage (~1000 sqft), this may be difficult to achieve.



## Next Steps

We have determined an itemized fee schedule for 2022, broken down by the amount of space a user needs by type (plant growing, dry goods, and refrigerated). This should help maintain equity of usage among the various growers and scales of operations. We plan to increase outreach and education. Communicating the opportunities our IVG presents and the benefits of growing your own food will be a priority in 2022. With feedback from stakeholders, Plant Chicago will prioritize implementation of improvements to the space and operation. Metrics for prioritization include cost / benefit analysis as well as short / long-term impact as it relates to potential future construction.

