

# Increase Winter Income with Microgreens

Microgreens are a popular crop with both growers and consumers. With low start-up costs, a short growing period (typically between 10-25 days), potential to grow year-round, and high retail value, microgreens are an appealing crop for farmers. For consumers, microgreens are tasty and easy to prepare, with high nutritional value.

Given the potential of growing microgreens under lights in the winter, they hold a special appeal to farmers in the Northeast, where the growing season is short and farm income is low over the winter months.

We assessed the feasibility of growing microgreens in a modified cold storage room under lights, and with supplemental heat; and determined that growing microgreens in this arrangement is economically profitable.

## Methods & Materials

The study took place in our cold storage room, which is 8'x7'. To modify the room, we removed the air conditioner, leaving a 24" x 15 3/4" window. We then cut a piece of plywood and blue board insulation to fit the window. We then cut holes through the insulation and plywood to fit the axial fans and louvres (these must be sized accordingly for temperature control and carbon dioxide exchange based on the size and R value of your room). Three metal bakers racks (2' x 4') were installed, one on each wall. Shelves were adjusted to allow for 17" between the bottom of the light fixture and the top of the 10x20" trays. Four lamp T12 light fixtures were attached to the underside of each shelf.

Start-up Costs	Cost/Unit	No. Units	Actual Cost	Description
Grow Lights: Four Lamp T12 Light Fixture	\$ 119.88	9	\$ 1,078.88	Sourced 8, T5 lights at a lower cost
Outlet Plug-in Lighting Timer	\$ 4.92	1	\$ 4.92	Controls lighting, Up to 24 on/off settings, programmable in 30 minute intervals
Steel Wire Shelving Unit	\$ 109.00	3	\$ 327.00	Some microgreen materials are made specifically to fit 2x4' bakers racks (e.g., Bontanicare Pallet Rack Trays)
10x20 perforated microgreen flats	\$ 4.63	32	\$ 148.27	Make harvesting easier, last for hundreds of harvests
Botanicare Pallet Rack Trays	\$ 50.17	9	\$ 451.53	Allow bottom watering
Ceramic Space Heater	\$ 24.99	1	\$ 24.99	120 Volt, 12.5 Amp, 750/1500 Watts, 5120 BTU
Inkbird ITC 308 Temp. Controller	\$ 49.99	1	\$ 49.99	Connected to axial fan and ceramic space heater to control temperature of room
AcuRite Digital Humidity and Temperature Comfort Monitor	\$ 25.24	1	\$ 25.24	Gives daily high, low, and current readings for temperature and humidity
Kilowatt Hour Plug-In Meter	\$ 26.99	2	\$ 53.98	Need 2 to measure heat and fan separately
Axial fan	\$ 31.25	3	\$ 93.75	For CO2 exchange and temperature control
High Temperature Vent Hood, Plastic, 4"w	\$ 22.50	3	\$ 67.50	Vent required to circulate air back outside
<b>Total Cost</b>			<b>\$ 2,326.04</b>	





## Materials & Methods Continued

Each Shelf fits 4 , 10 x 20 tray for a total capacity of 36 trays. Trays were filled with pre-moistened Vermont Compost Co. Fort Vee Compost-Based Potting Mix. We weighed microgreen seeds by variety and ensured that the same amount of seed (0.4 oz for the three microgreen varieties and 6.8 oz for pea shoots) was evenly distributed across the prepared trays. To promote germination, we pre-soaked pea seeds in fresh, cold water for eight hours prior to seeding into trays.

We also covered microgreen trays with 10"x20" sheets of floating row cover (Agribon) and sprayed with water to soak the cover and ensure contact with seeds and soil. Similarly we placed an empty 10x20 tray on top of the pea seeds to hold in moisture and ensure the seeds stayed in contact with the soil. Agribon and trays were removed after germination. Trays were placed on the metal shelving under fluorescent grow lights. We hung the lights 17" above the trays and upon germination ran them for 14 hours in a 24 hour cycle until harvest. Due to heat produced by the lights, we ran the lights at night, during the coldest part of the 24 hour cycle.

Additionally, we seeded microgreens in perforated trays and placed them in Botanicare® 2 ft x 4 ft Rack Trays, which allowed us to water from below and reduce the chance of overwatering and damping off.

A ceramic convection heater was plugged into an Inkbird ITC 308 Temp. Controller, which was set at 3 degrees F above/below 75.



## Tips

- Before fitting your space with fans/louvres, we suggest that you determine the heat output from your lights to better understand what size fans and louvres you will need to control and maintain the desirable temperature range.
- Consider using a rollaway cart where you can store harvesting equipment, sanitizers, record keeping materials, etc.
- Find a labeling system that works for you. We used painters tape on the rack trays to keep track of crops and seeding dates.
- Clean rack trays and 10x20s after each harvest and sanitize with hydrogen peroxide-vinegar mix.



## Tips

- To improve germination and reduce seeds sticking to finished product, consider using floating row cover (e.g., Agribon) cut to 10x20 sheets and placing directly on freshly seeded trays. Water with a sprayer to soak the cover and ensure contact with soil and seeds. Remove after germination.
- We found sharp scissors to be easier to manage than knives for harvesting.
- Consider compostable clamshell containers for finished product. We found that they keep the greens fresh, while reducing plastic waste.

## Results

Ensuring that soil medium stays wet, but not soaking was key to even germination. Mold was not an issue in our operation, but was monitored for on daily inspections.

Given the 36, 10x20 tray capacity, 504 trays can be seeded in a 28-week season.

On average, the microgreens (across varieties) yield 7.31 ounces/tray (significantly less than the Johnny's Seeds 2017 Micro Greens trial) and pea shoots yield 17.28 ounces/tray.

Labor for harvesting and packing is the biggest variable cost (15 min/microgreen tray and 5 min/pea shoot tray).

Our budget analysis suggests that startup costs (\$2,326.04) could be recovered in year one, with a net income (returns less fixed and variable costs) of \$1,577 (12 trays microgreens/week) and \$1,090 (6 trays pea shoots/week).



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