

Osamequin Farm hosts a cooperative of 6 small farms, sharing one 120'x30' propagation greenhouse in Seekonk MA. We grow vegetables, herbs, flowers, and native landscaping plants. We received a TIE grant to construct a germination chamber for use primarily in late winter and early spring, when heating our entire greenhouse (or even a portion of it) to ideal germination temperatures is cost prohibitive. The germination chamber was especially appealing to us since we have multiple farms sharing space, but we think it is just as valuable for a single farm operation.

- Overview -

There are many ways to approach a germination chamber - the model we chose (basically a free standing box, framed with 2x4s and enclosed with rigid foam insulation) is a low cost and easy to construct option that holds between 75 and 80 trays at a time and has the potential to significantly limit the need for supplemental heat in your greenhouse space during the winter/spring propagation season. The small space is easy to climate control, and is a more efficient way to achieve ideal germination conditions than heating a greenhouse space. An added benefit for us was that the germination chamber is rodent proof, so we aren't battling mice digging up and eating our beet and sunflower seeds like in the greenhouse!

Our germination chamber is 8' tall, 16' long, and 4' deep. It's constructed from 2x4s and ½" plywood (for the floor only), with 1" foam board insulation on all sides, and spray foam used to seal up the cracks and gaps. Inside there are shelves all the way across, 8' of LED shop lights, a small space heater, and an Inkbird temperature controller. The shelves can hold ~75 standard 1020 size nursery trays. Our initial design included half the space under lights, and half the space unlit. We placed the Inkbird thermometer inside a 3" pot of soil in the chamber to run the heater at a set soil temperature of 70 degrees. We planned to include a crock pot makeshift humidifier, but quickly found that not necessary (more on that below).

Our construction costs in February of 2022 were about \$1350, with another \$150 in costs for accessories like the Inkbird, heat source, and remote temperature sensor to track the temperature inside and outside of the chamber.

- Lessons learned -

We learned some lessons very quickly! First, we had planned to construct this chamber in our garage workshop and move it into the greenhouse completed. LOL. It was so big and heavy that made no sense, so we ended up constructing it in place. To get eight feet of height, the chamber needed to be quite a few feet away from the slanted edges of the greenhouse, so placement was another hurdle. After constructing the box, we realized that our planned 16' of shelving was too long to fit inside our 16' box, because of the foam insulation taking up space on each end. So we repurposed one of the 4' metal shelving units we had purchased and got a smaller 3' unit for a total of 15' of shelves across, 6' high. The design we had based our chamber off of (found in a farming facebook group) suggested using a Sweeter Heater infrared heater, which would have been the safest option. But we did not find the Sweeter Heater to be very effective, so we switched to a traditional space heater with a built in fan. With that better heat source in place, we were still not achieving the temperature we wanted (we were seeing air temperature lows of

40 overnight, when the rest of the greenhouse was at 32 degrees overnight). We found we needed to seal any cracks and gaps with foam insulation spray - the foam board sagged a little and our construction was definitely not perfectly square, so we had gaps of 1/4" - 1/2" around some of the connection between walls and ceiling.

With gaps sealed and heater running, we were achieving overnight air temperatures in the high 50s or in the 60s, compared to low 30s in the rest of the greenhouse. By late March on sunny days our chamber was WAY too hot during the day - ambient greenhouse temperatures were around 75 and inside the chamber it could quickly reach 100 degrees F. We began a practice of opening the door during the day to let out heat. Conveniently, that process served a second function of ventilation. Before the door opening habit, we experienced some mold on our trays - the moisture from all those freshly watered trays in a small enclosed heated space created a lot of humidity.

- Germination experience -

Our experience was that, with the soil temperature set to a constant 70 degrees F, seeds popped on the early end of seed packet suggested time frames. (ie, if the seed packet says expect germination in 5-7 days at 75 degrees, we saw germination at 4 or 5 days). Some specific crops we noted: onions 10 days, stock 8 days, asters 7 days, strawflowers 5 days, spinach 2 days, statice 3 days, chamomile 5 days, zinnias 4 days, zucchini 4 days.

We got in the habit of pulling trays out as soon as more than 5% of the cells had germinated, and allowing the rest of the cells to pop out in the greenhouse. Usually this practice resulted in most of the cells having visible germination by the end of the day, but occasionally we'd put the tray back into the protected chamber environment for one or two more nights, pulling them out into the sunlight during the day. We had only put lights over half of the shelves, and only on the top shelf. We found there was strong light on second highest shelf as well, so we had basically 2 shelves, 8' long, that were provided with strong light. A lot of our flower crops need light to germinate, and this space was usually sufficient for those trays, but we decided by the end that we would have liked lights all the way across for the added heat they provide, and for the practical purpose of providing light for us to see germination! The unlit half of the chamber required a flashlight to see what was happening in the cells, which was just annoying.

- Next steps and suggestions -

We'll add more lights to have the full length of the chamber lit up this year. We're also going to experiment with adding a reflective surface inside on the walls to bounce the light around more. We're hoping this will cut down on the number of seedlings that quickly grow leggy if they germinate in the unlit areas.

Due to some prolonged permitting issues, we did not end up having heat in our greenhouse space beyond inside the germination chamber, but this year with propane heat in place in the area surrounding the chamber, we expect to achieve the stable 70 degrees we were aiming for inside the chamber (soil temp - actual air temperature will likely be different).

We found trays only needed to be watered about every 3 or 4 days while inside the chamber. We recommend establishing a system for how you load trays into the chamber, so you aren't shuffling them around and searching to see what needs water and what doesn't. It's a tight space, with the shelves and trays in place! Also, set up a watering table just outside the chamber, and let your trays drain well before moving them back inside (or else it gets very messy!).

Overall, we are thrilled with our germination chamber - the faster germination and rodent protection alone are enough of a win for us, but the bonus of saving on heating costs make it a no brainer. We don't currently track our electricity costs for the greenhouse specifically, but we might have the capacity to do so this year, and will happily share the electricity data for running the chamber with anyone once we have that info. I'm confident that we will come out ahead, vs the cost of running our propane heater at a comparable temperature.

Included is a build guide - please note that we are competent but not skilled builders, and truly anyone can do this! You'll need something to cut your lumber (we used a chop saw) and a drill or driver to put your screws in. Beyond that, just a tape measure and some patience. Feel free to reach out to me, Sarah, at 774-901-4725 with a text or by email at Sarah@osamequinfarm.com if you're thinking about building your own and have a question. We'll also be hosting a gathering on the farm (80 Walnut St Seekonk MA) in February for anyone who's interested in building one of their own to check ours out and talk through the process. If you can't make the scheduled gathering and want to set up a different time to come by, just reach out!