

Modifications of X-stream(20) aeroponics system

2x X-Stream 20-slot Aeroponic Propagators purchased from Camgrow. The propagators have an option for mounting 2x 30cm Sunblaster fluorescent tube lights - but the specifications look less than ideal - with prominent non-photosynthetically active spectral components, and poor in red. Decided to make custom holders for standard LED panels.

Also the top plates of the aeroponics units are intended for use with either cups or collars to support shoot pieces for inducing roots. Purchased a packet of high-density plastic filter grids (680mm x 400mm), which could be cut to size and provide a flat support for the growing surface, and allow access by mist from below to wet and feed the membrane.



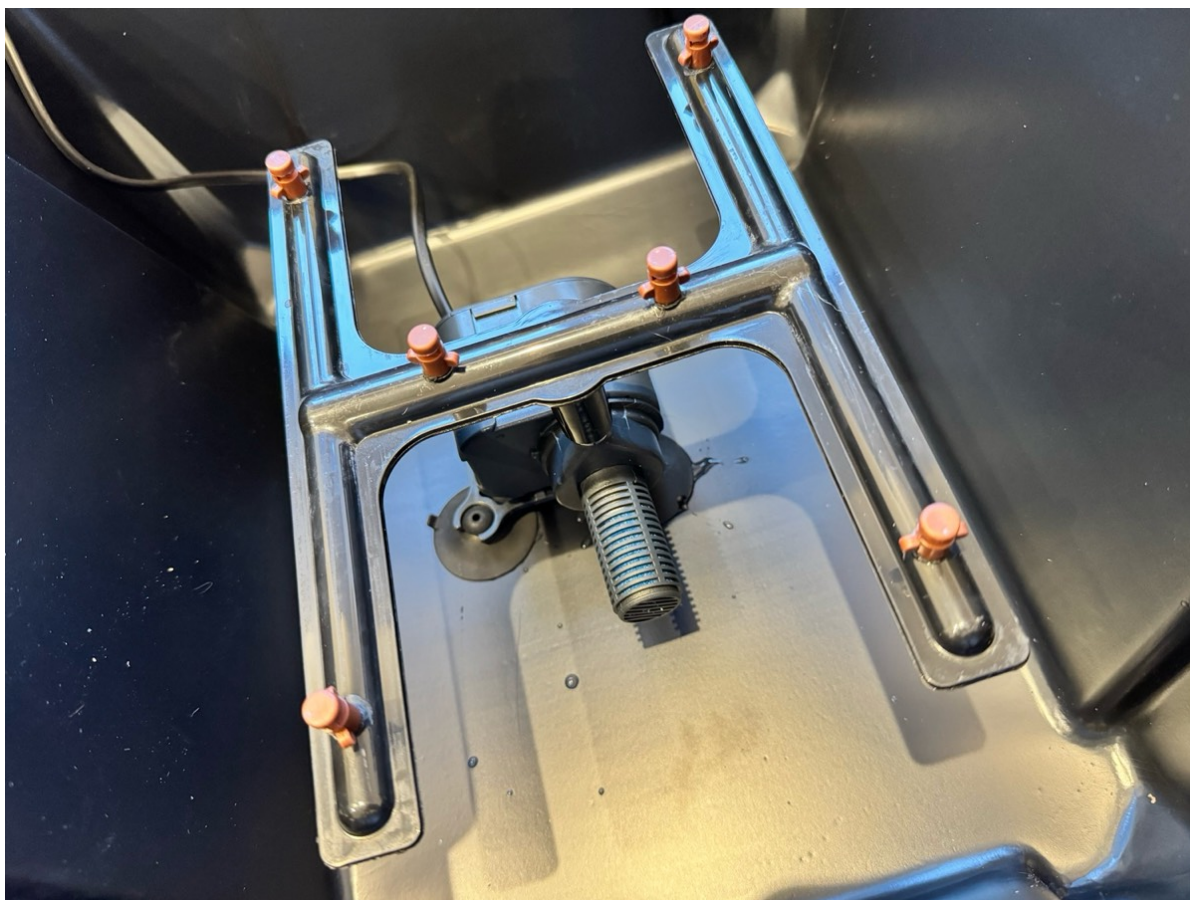
Lighting

LED panel supports were designed in Autodesk Fusion 360, and printed on a Bambu Lab printer using Extruder GreenTec Pro carbon fibre filament. LED panels were mounted with 25mm M3 hex bolts. Twin panels running at 100% provide fairly even lighting at a level of $175\mu\text{mol}/\text{sec}/\text{m}^2$.



The propagators were assembled following the Nutsystems instructions. Option: The pump was mounted horizontally, to place the filtered inlet closer to the floor of the vessel, and minimise 'dead-space' for nutrient solution. (But the spray from the nozzles are further from the membrane underside, which could limit wetting from below - a consideration for early stages of growth).

The vessels were filled with 7.5L of Samurai Grow media diluted to 2.5mL per litre for each Solution A and B. This placed the level of nutrient media just under the nozzle supports.



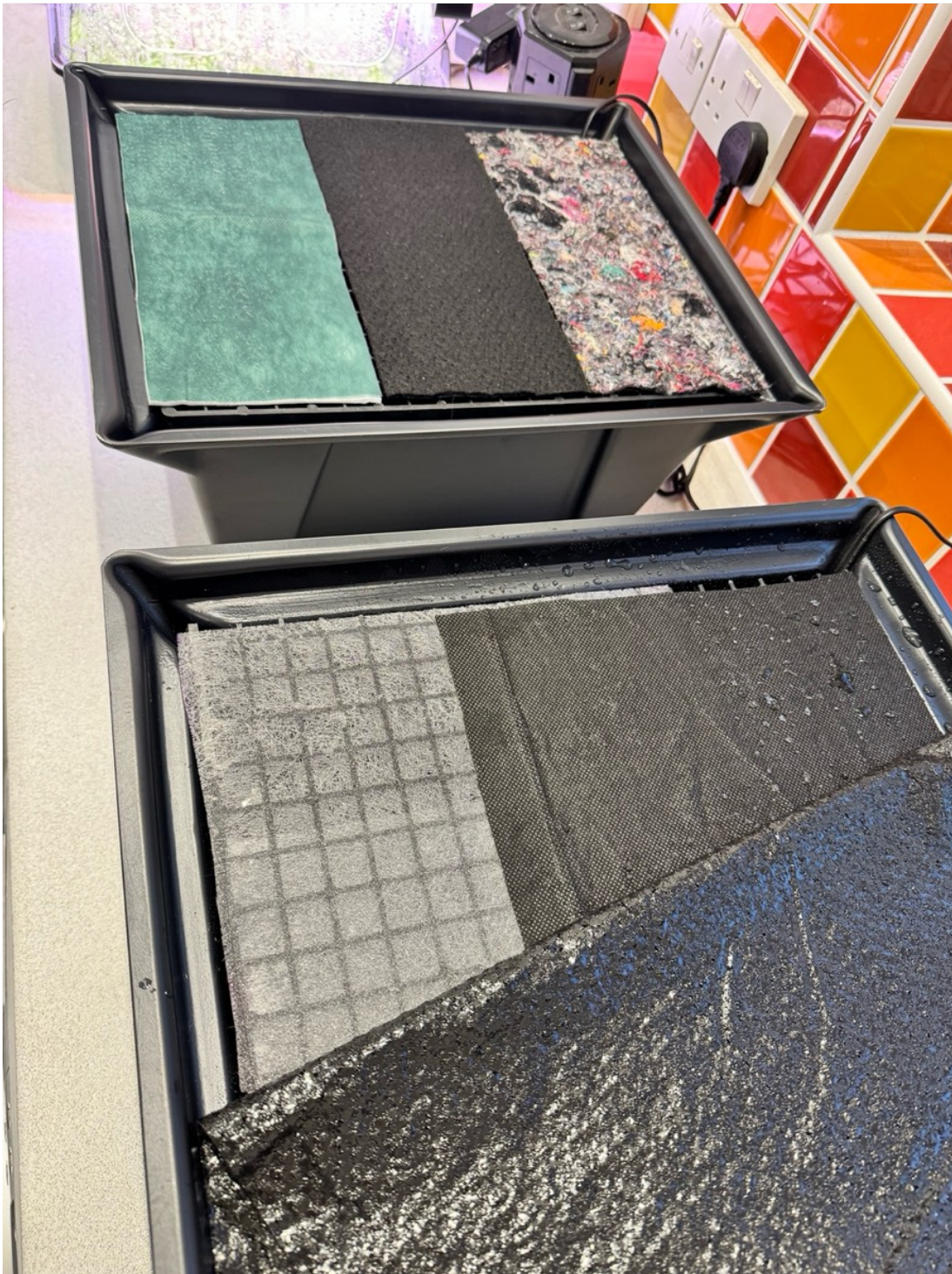
Testing different hybrid membrane surfaces

The grid surfaces are ~38cm x 30cm. The grid surface of each vessel was divided into 3, and layered with 30cm x 13cm strips of different materials:

1. Spreader mat
2. Spreader mat + Weedban cloth
3. Weedban cloth
4. "Standard" capillary mat
5. Henofa Klavermat 300
6. Henofa recycle mat 400

The surface of each vessel was then covered with a 42cm x 35cm piece of Henofa microperforated black plastic film. The pump was engaged and the capillary matting was observed to see how long the wetting process would take - given that the spray nozzles produced a light mist. Only slight dampening of the capillary mats after 2 hours of running the pumps, while the simple spreader mat option shows encouraging wetting - allow to run overnight.

(Option: mount pump vertically for closer proximity of spray/mist to underside of membranes?)



Note: the foam filters for the pump inlets were installed improperly - moved them to form an outside sleeve as expected, which increased the water pressure and velocity of the jets from the misting nozzles. Still more spray than mist, but effectively wet all the membranes from underneath.

Seeding of the aeroponic surfaces

Gemmae were harvested from Cam-1/2 crossed plants (sporelings planted for spore production) - gemma cups picked off with sharp forceps and transferred to a water-filled 50mL Falcon tube. Gemmae were then pipetted onto the surface of the two aeroponics vessels with a disposable Pasteur pipette at 20:00, 7th October 2025. The parts of the trays that had underlying spreader mat or Klavermat 300 showed the best absorption of pipetted water. Water absorption was

noticeably slow (beading on the micro perforated plastic membrane) over the Weedban cloth and the Henofa 400 capillary matting (made from recycled fibres).



Growth after 1 week

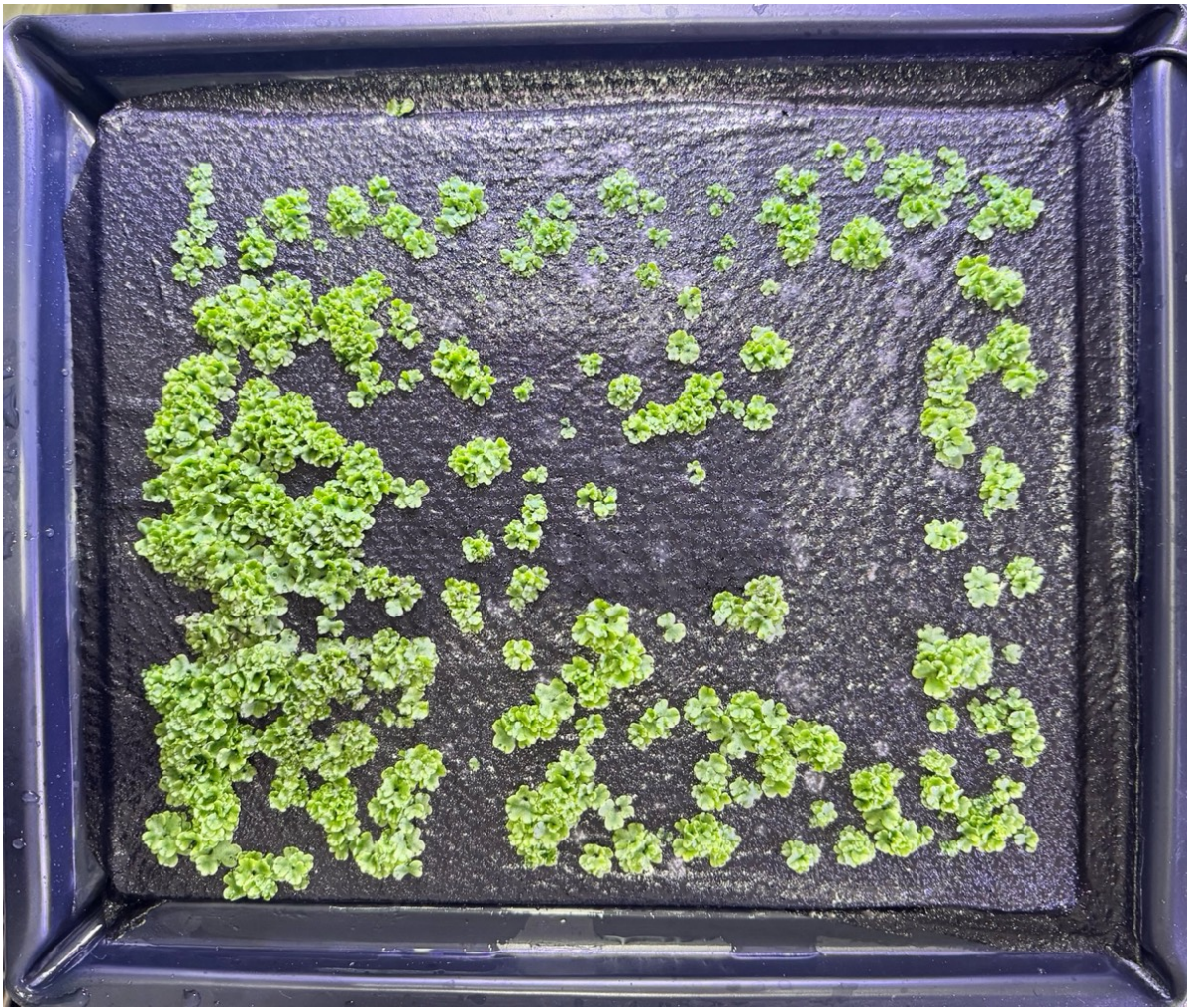
Tank 1 (spreader mat; spreader mat+Weedban; Weedban) after 1 week



Relatively poor growth compared to plants on capillary matting - clear fungal growth on Weedban under-cloth. Vessels were running warm due to heating from the pumps and lights.



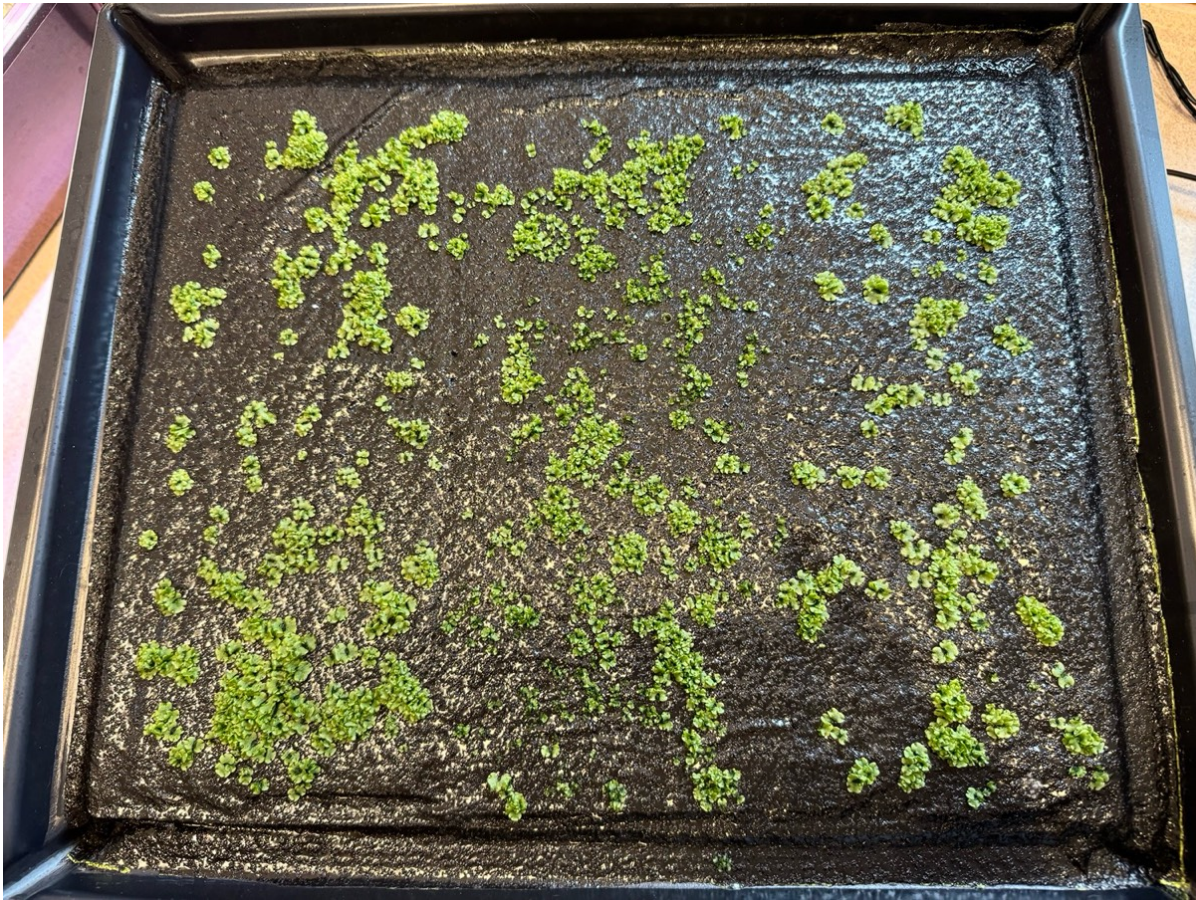
Tank 1 (spreader mat; spreader mat+Weedban; Weedban) after 2 weeks



Tank 1 (spreader mat; spreader mat+Weedban; Weedban) after 3.2 weeks



Tank 2 (Green_capillarymat; Klavermat300; Henofa400) after 1 week

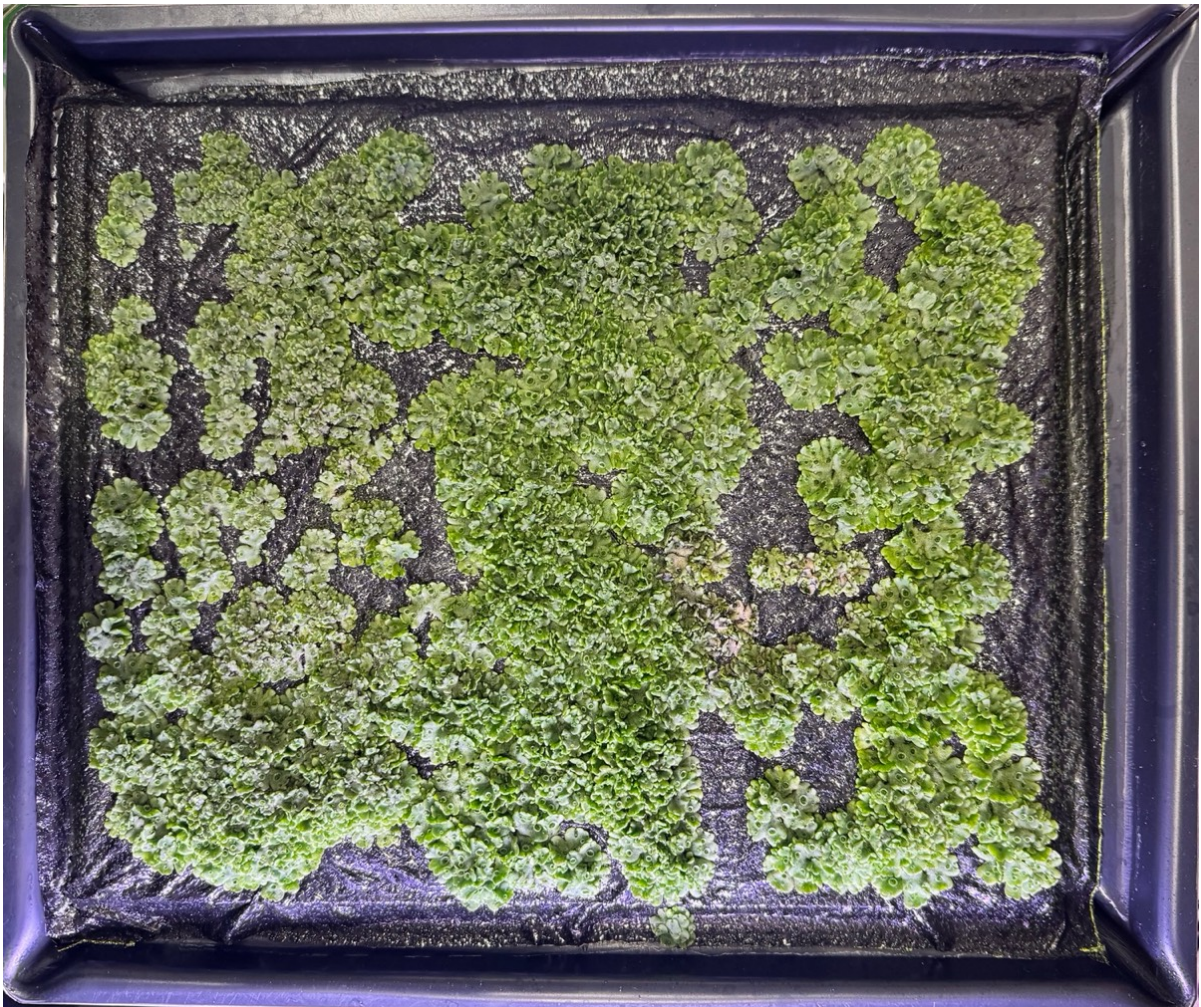


Healthier fast growth - Klavermat300 shows slowest development at this stage - the Henofa400 matting shows slightly faster growth than the generic green capillary matting.





Tank 2 (Green_capillarymat; Klavermat300; Henofa400) after 2 weeks



Rhizoid growth has emerged from below capillary mats - especially prominent with Klavermat 300 support.



Tank 2 (Green_capillarymat; Klavermat300; Henofa400) after 3.2 weeks

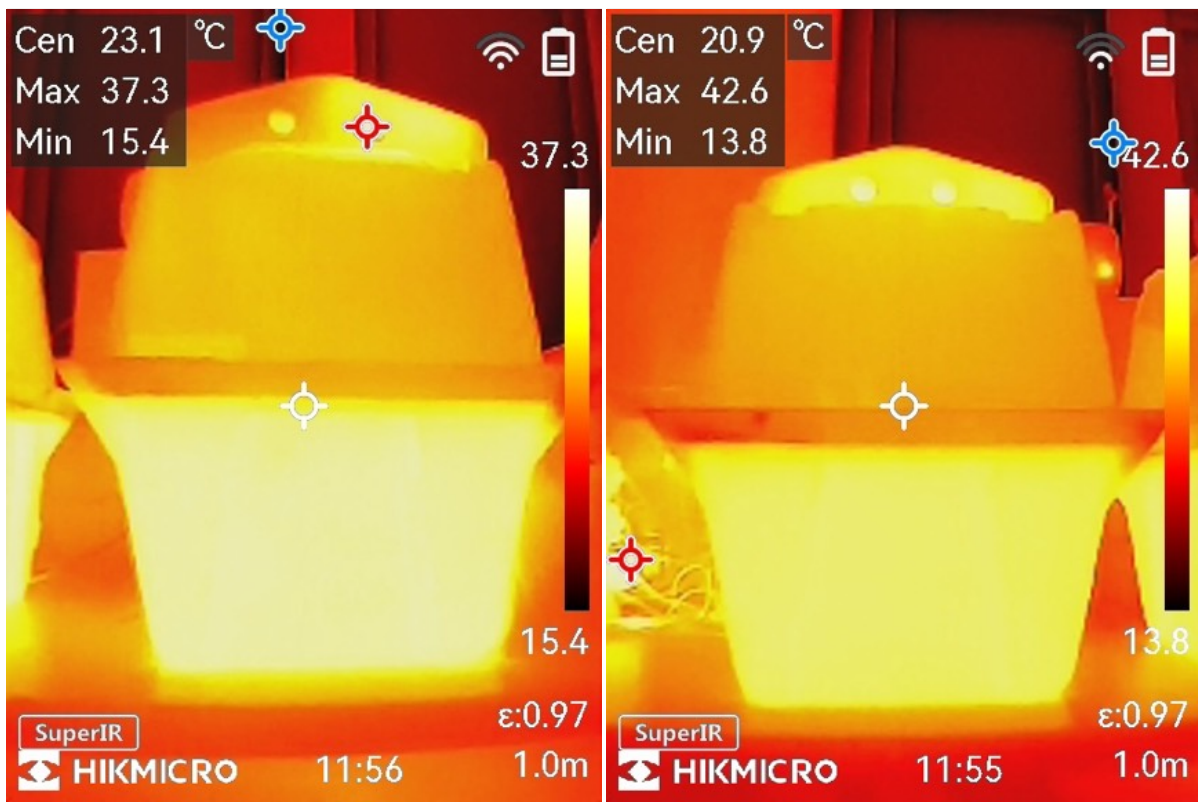


Below: Internal view of Tank1 (left) and Tank 2 (right)



Growth not as fast/vigorous as expected - checked temperature of the media.

Below: Thermal image of Tank 1 (left) and Tank 2 (right). Media temperature was around 25-26°C, with ambient temperature ~15°C. **(Test effect of water chiller to reduce media temperature)**

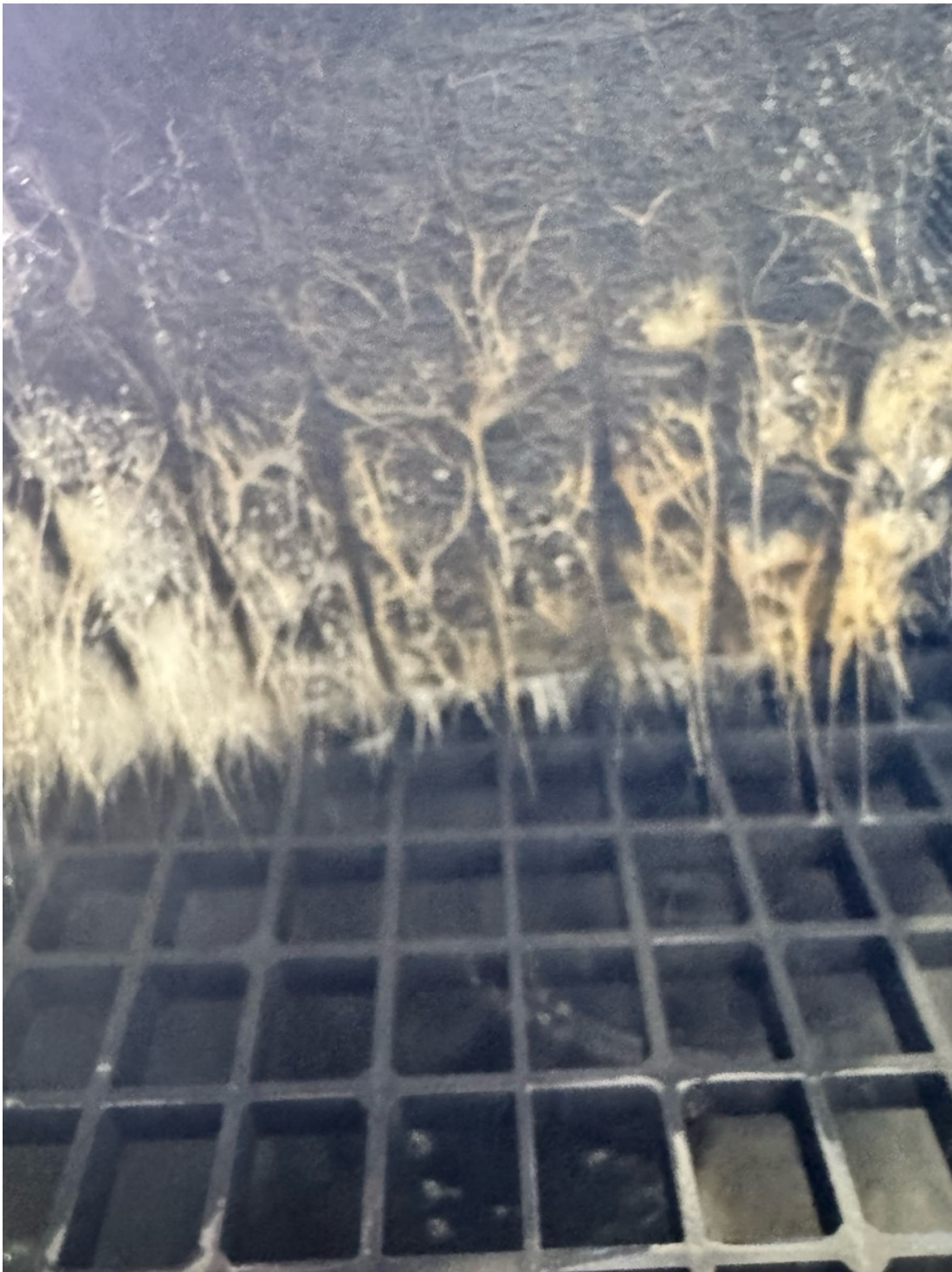


Rhizoid growth after 4 weeks

Below: substrate 1 - **Spreader mat** + micro perforated plastic (+5 days fogponics)



Below: substrate 2 - **Weedban+Spreader mat** + micro perforated plastic (+5 days fogponics)



Below: substrate 3 - **Weedban** + micro perforated plastic (+5 days fogponics)



Below: substrate 4 - **green/white capillary mat** + micro perforated plastic (+1 day fogponics)



Below: substrate 5 - **Klavermat300** + micro perforated plastic (+1 day fogponics)



Below: substrate 6 - **Klavermat400 (recycled)** + micro perforated plastic (+1 day fogponics)



Future options for scale up

The sizes of the 20 and 40 site propagators allow use of single platforms cut from 60cm x 48cm filter grids. The larger size tank will require multiple grids. (There is a question whether the width of the 120cm tank can be spanned by a grid that is maximum of 60cm wide. I.e. what is the actual width of the tray supports for this model, which will be smaller than 68cm).

20 SITE PROPAGATOR

Dimensions: L 46cm x W 39cm x H 40cm

Tank Size: 8 litre

40 SITE PROPAGATOR

Dimensions: L 60cm x W 41cm x H 41cm

Tank Size: 14 litres

80 SITE PROPAGATOR

Dimensions: L 76cm x W 61cm x H 41cm

Tank Size: 25 litres

120 SITE PROPAGATOR

Dimensions: L 120cm x W 68cm x H 47cm

Tank Size: 40 litres

Dimensions of Lids

Model	External(inc. lip)	Internal(base)
12 or 20	41 x 34 x 19cm(tall)	38 x 31 x 18cm(tall)
40	56 x 37.5 x 19cm	53 x 34.5 x 18cm
80	72 x 57 x 23cm	68.5 x 54 x 19cm
120	106.5 x 59 x 23cm	95 x 45 x 19cm