Hydroponics

Indoor farming only

Benefits

- Teaching the future generations nextgen farming styles
    - inspire them to create bigger
    - Protect against climate change
- Keeping food away from nature to not disturb it
- **versatile**
    - Modular
        - Interchangeable parts
    - Reusable
    - Scalable
- Automated
    - Effort - almost none
- Zero waste
    - Plants continue growing outside of vertical farm freely
- Best overall cost
    - near free after initial investment

Future

Direction, ideal

- Foraging
  - w/ - rewilding
- Indoor farming
  - Vertical farming
  - Hydroponics
  - aeroponics
  - Bioreactors
    - Algae
    - Cultured cells - plants
- Avoid food = <harming life
  - Non-living
    - Ex - digital food - VR
  - Less food
    - Ex - nutrient dense

vertical farming - ex's

- **Agrarian society 2.0 - inside every home**
- Entire
  - mechanized automation
  - reusability - 0 waste
  - buildings in cities
- <$
- Growing - what's typically not possible
  - Plants
    - Roots - at home - carrots, potatoes, etc.
    - >size - at >size farms - grains, trees, etc
  - methods
    - Space farming - O'Neill cylinders
    - Bioreactors
    - **Aeroponics**
      - Aerofarms - better products
    - Nutrient film
    - Membrane Meniscus Method

Holistic system - ideal

Food - sources

- Foraging
  - From - rewilding
- indoor farming
  - Like - vertical farming
- Non-living, <size
  - VR - e-food

Setup

1. Seeds
2. Sprouts
3. Microgreens
4. farming
   a. 10% experimental
5. Algae - bioreactors
6. Solar - agrovoltaics
7. Non-living food

Flexible

- Growing medium
- Type of setup
  - Levels - stack
- Spread out
  - Turn 2 sq ft into 16 sq ft
- Make use of existing space
  - Vines on posts
  - **Algaeponics**
- Lighting
- plants

Foods - sources

- Soaked seeds
- 1 - Sprouts
- 2 - Microgreens
- Crops (leaves, vegetables, etc.)
  - Sizes
    - 3 - Small
    - 4-6 - Full-size
- Algae
- Water plants
- Bonsai trees

#'s - plant growth stages

Stages of plant growth

Broccoli seed

https://growjourney.s3.amazonaws.com/Img/Blog/February%202018/Screen%20Shot%202018-02-01%20at%203.01.37%20PM.png

algaeponics

Future of vertical farming
Crops + bioreactor in one!

Benefits

- No extra space
  - Goes in aerovoir
- plants
  - Balances nutrient levels
    - = healthier plants
  - Supplements missing nutrients - like protein
- Self-sustaining
- <bad algae growth

Options (including, not limited to):

- Spirulina (1, 2, 3)
- duckweed
- Chlorella

Costs

Only worries

- Systems
  - upfront build
  - fertilizer
- Sprouts - seeds
  - Avoid - take from systems

free

- Seeds - collection
- Electricity - Solar panel + battery
- Fertilizer - only cost, but is $20 for 5 years
- Water - rainwater filtration

Avoid everything else once setup

- Extra modules (see next slide)

No

- Dehumidifier
- farmed bees

ROI (Return on Investment)

Equations

- $[spent = saved] = ROI
- # of times = ROI
  - 1 - uses = price of setup/price of food
  - 2 - rounds = ROI uses/round uses

food	sale $	setup	# of Uses	Math - 1	# rounds	Math - 2	time
sprouts	£1/bag	sprouter	15	£15/£1	<1	15/16	immediate
Sprouts or soaking		jars	2.43	(£47.40 + £10.99)/24 = £2.43/£1	>0.1	2.43/24	immediate
microgreens	£4/box	tray	0.96	£22.99/6 = £3.83/£4	0.48	0.96/2	immediate
vegetables	£1/bag	garden	875.19	£875.19/£1	29.17	875.19/30	months
		tower	850	£850/£1	10.63	850/80	months

Players in the field

VeganVille

Vegan real estate community builder
veganville.info

- The company that's creating the setup
- Has vertical farming goals
- Completely, 100% vegan

Brittany Bunk

Futuristic investor
Investor in VeganVille

- 30.5 years old
- Retired at 27
- Worked 70+ jobs
- volunteered 1000s of positions
- Environmental Health Science Bachelor's degree from CSUSB

http://brittany-bunk.weebly.com/hydroponics.html

Inspired at 6yrs old:

- Grandparent's farm
  - Grandparent's organized lettuce/tomato farm
  - Grew plants, like aloe, for medicine
  - Farmed into their 80s/90s
  - Ability to pick and choose what you want
  - Tasted and was better than a grocery store
- Went on - Living with the Land ride - at EPCOT
  - w/ - 'behind the seeds' tour
- Grew up in - New England

Desired to build upon it all at home

Vertical farm experience

- volunteering at farms:
  - UCSB
    - Placed ladybugs on strawberries for pollination
    - Community garden - saw brussel sprouts grow
  - Ontario, CA - Amy's Farm
    - Educational tour and met farm owner there
    - Picked crops
  - designed backyard garden for neighbor - 10 years old
- learning
  - Farmer's market
    - Running a microgreens business with a microgreens booth - bought them seeds and researched containers/soil alternatives
    - Saw the tower garden used at another booth (in a picture)
  - LA County Fair
    - Saw different hydroponic setups, plants grown, and applications/integration
  - Insider information on the latest and greatest
    - Toured LGS (Local Grown Salads) setup
    - Discussed vertical farm funding rounds with 361firm

Vertical Farming Experience - Part 2

- R&D
  - Designs
  - history
  - Designing in my own mind
  - Living with the Land ride at EPCOT
    - Behind the seeds
    - By - Tower Garden
- Investment - stocks
  - Aerofarms when it was a stock: SV - Spring Valley Acquisition
  - Foundation Farms: GMEV

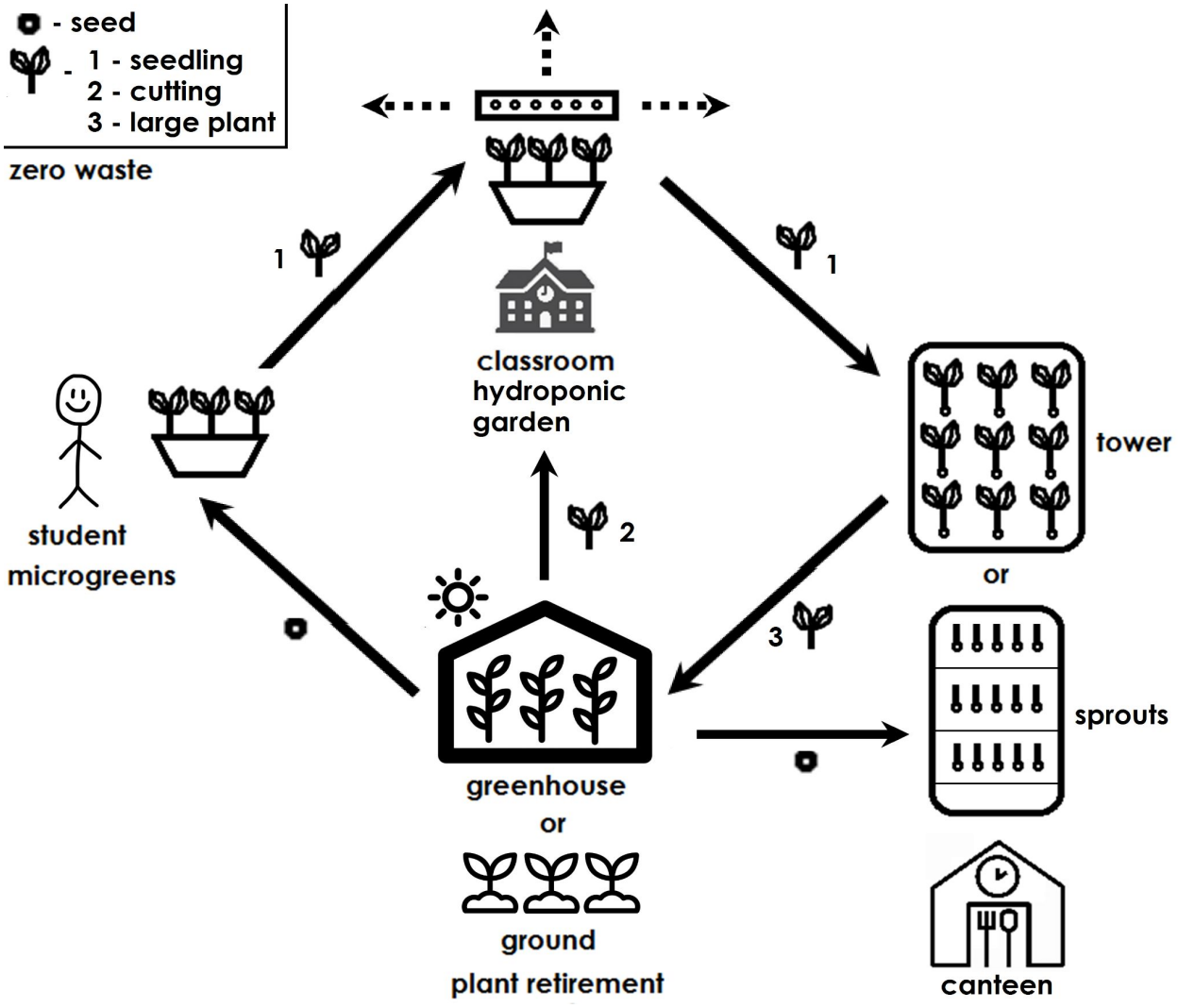
Part 3

- Growing on my own
  - indoors
    - Mini greenhouse
    - Soil pots
    - Hydroponically - aerogarden
  - Outdoors
    - Plant sanctuary - rescues London Rocket, pineapply aloe, nopales cactus
    - Forages weeds - believes that nothing should be labeled negatively, like ‘weeds’, ‘pests’, monsters, etc., but everything has a value, based on its use

School Setup

Process: circular

1. Students: grow seedlings at home
2. Classroom: seedlings go into hydroponic garden
3. Canteen: larger plants transfer to a tower
4. Greenhouse:
    a. Canteen: sprouts
    b. students: microgreen trays


- seed
1 - seedling
2 - cutting
3 - large plant
zero waste
1
1
classroom
hydroponic
garden
tower
or
student
microgreens
2
3
sprouts
greenhouse
or
ground
plant retirement
canteen

Home - Students

Microgreens/sprouts: reasons

- Quick growing time
- No
  - Soil alternative - only water
  - Fertilizer - seeds have everything they need
- Flexibility in options
  - Bring it to school's hydroponics
  - Plant in garden
  - Eat
- Start small to grow into bigger
  - Makes them excited and cherish bigger investments if they do it themselves - like grow lights, fertilizer, aerogardens, towers, etc. for their own home

Sprouter

Simplest - sprouting jar

- Mason jar (£47.40 / 24 pack) + mesh for lid (£10.99)

Microgreens

Better - microgreens tray (6 for £22.99 = £3.83/person)

Can give led strips (£9.99) (strips)

- if able to handle the light

No hydroponic systems - reasons

- >>
  - Expensive
  - Complicated
    - Wouldn't know what to do with the equipment
      - Esp - after, when done
        - As seen in the 2ndary market
  - Much
    - Risk of damaging it
    - Maintenance
- Lights
  - may bother - students, their family
- Might not be for them
- They can see the hydroponics at the school
  - Learn - hydroponics together - mistakes, achievements, etc.

School

Agrovoltaics - electricity

Solar panel - £284.77

Portable power station w/ AC port and % amount - £100-300

- Example - https://www.amazon.co.uk/Portable-Station-40800mAh-Flashlight-Emergency/dp/B08P7C64M3
- Reason - avoid plug adapter
  - Has AC port

= £300-500

Classroom - hydroponic garden

Ideal - AeroGarden Farm 24Plus (£875.19) for each classroom

- Reason - stackable
- Good for craft room - 1 for entire school

Cheapest versions - each classroom

- £120 on amazon
- Cheaper on ebay or fb
  - Reason - people have no use when done
  - Will get cheaper over time

Accessories:

- AeroVoir (£46.24)
  - Solder - poke hole
  - 3d print - plug
  - Rubber - stopper
- Plug adapter
  - US plug
  - Avoid if using batteries from solar
- Solar panel + battery
- Aluminum foil
  - Can do growing lights instead - faster
  - Poke holes
- Spray mister
- Optional - tracing paper
- Replacement
  - Net cups + sponges (£13.99)
    - Might be able to do w/o cups
  - Seeds/algae cultures
  - Fertilizer
- Drip irrigation cord (£6.99)
- Tomatoes - bee pollinator (£19.12)
  - Or - electric toothbrush
- Strawberries - wood chips

Canteen


95% LESS WATER
NO SOIL NEEDED
3X-6X FASTER
40% MORE YIELD
Vertical Systems for Organic Farming

hydroponic towers

- Nutrabinns - have to be shipped to me - a US location - $3000 total
- Tower garden. Agrotonomy - ships to UK - unsure of legitimacy - £850
    - Even has a school program

Sprouters

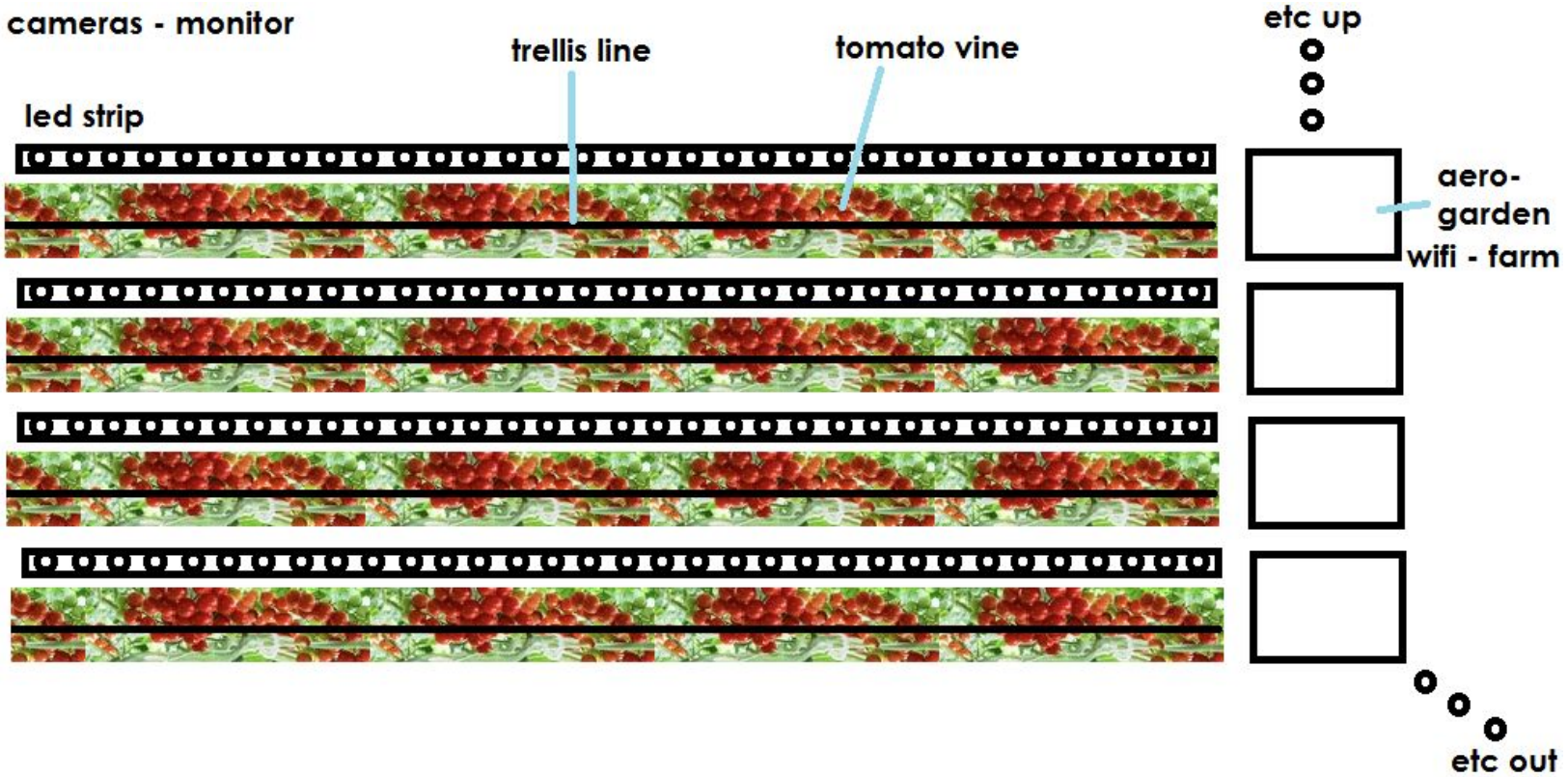
Sprouter (£14.99 * 9000/16 = £8431.86 - but not everyone will eat sprouts - <$)

- Needs - lots of seeds
- Quickest, cheapest
- Continuous
    - Grow time - every 2-3 days
- Add soil/bamboo mat ↠ empty row ↠ extra tray

warehouse

Notes: Might need

- aerogarden - on other side
- bee the bee pollinator
- ring - to water bin - to raise it - for the roots
- Supports if gets too high



Plant list - Sprout (cost analysis) (fav's - *, extra *'s - = >)

Good

- *Basil
- alfalfa
- *Sunflower
- **Meyer lemon
- *Beet - bull's blood
- Kale
- Oat grass
- *Melon - water, canteloupe
- Lettuce
- *clover

Maybe

- Flax
- Lavender
- Cucumber
- Mung
- Carrot
- Cilantro
- *Chamomile - pineapple
- *Amaranth
- Oat
- *buckwheat
- Millet
- sesame

Avoid

- Pea
- Radish
- Herbs - like **chervil (winter), *papalo
- Chia
- Papaya
- Nightshade - tomato
- Corn
- Rice
- Beans
- Soy
- Brassicas (except kale)
- Alliums - garlic, etc.
- (*some) Weeds - purslane, etc.
- Wheatgrass
- Lentils
- Jute
- Hemp
- Spaghetti squash

Plant list cont. - **vine - warehouse**

- tomatoes
- peas
- cucumbers
- grapes
- mint
- bell pepper
- strawberry
- papalo
- melons
- okra
- eggplant
- goji berry
- currant?
- lentils, beans - chickpeas
- thyme?
- Chamomile
- Potato
- Kiwi
- Nasturtium
- Passionfruit
- Loofah
- Malabar spinach
- Jasmine
- Chayote squash