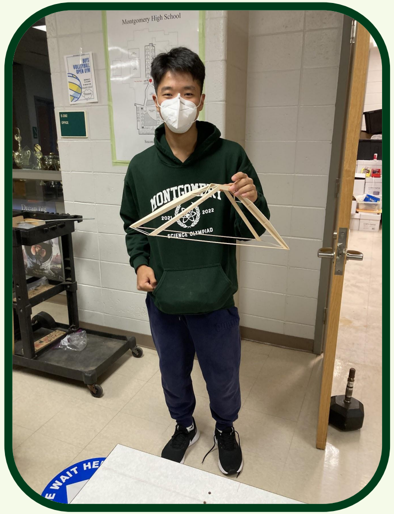
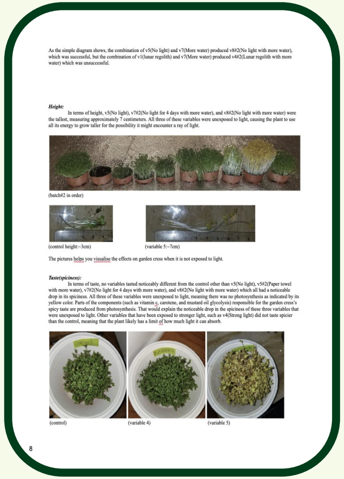
Reducing Plastic in Urban Mushroom Farming

By: Chanyoung Oh

Introduction




As the simple diagram shows, the combination of v5(No light) and v7(More water) produced v8#2(No light with more water), which was successful, but the combination of v1(lunar regolith) and v7(More water) produced v4#2(Lunar regolith with more water) which was unsuccessful.

Height:

In terms of height, v5(No light), v7#2(No light for 4 days with more water), and v8#2(No light with more water) were the tallest, measuring approximately 7 centimeters. All three of these variables were unexposed to light, causing the plant to use all its energy to grow taller for the possibility it might encounter a ray of light.

(batch#2 in order)

(control height:~3cm)

(variable 5:~7cm)

The pictures helps you visualise the effects on garden cress when it is not exposed to light.

Taste(spiciness):

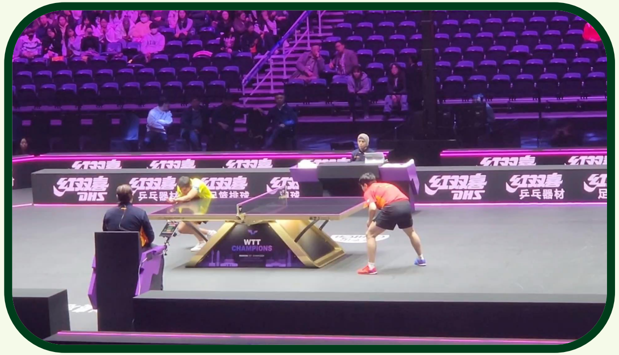
In terms of taste, no variables tasted noticeably different from the control other than v5(No light), v5#2(Paper towel with more water), v7#2(No light for 4 days with more water), and v8#2(No light with more water) which all had a noticeable drop in its spiciness. All three of these variables were unexposed to light, meaning there was no photosynthesis as indicated by its yellow color. Parts of the components (such as vitamin c, carotene, and mustard oil glycolysis) responsible for the garden cress's spicy taste are produced from photosynthesis. That would explain the noticeable drop in the spiciness of these three variables that were unexposed to light. Other variables that have been exposed to stronger light, such as v4(Strong light) did not taste spicier than the control, meaning that the plant likely has a limit of how much light it can absorb.

(control)

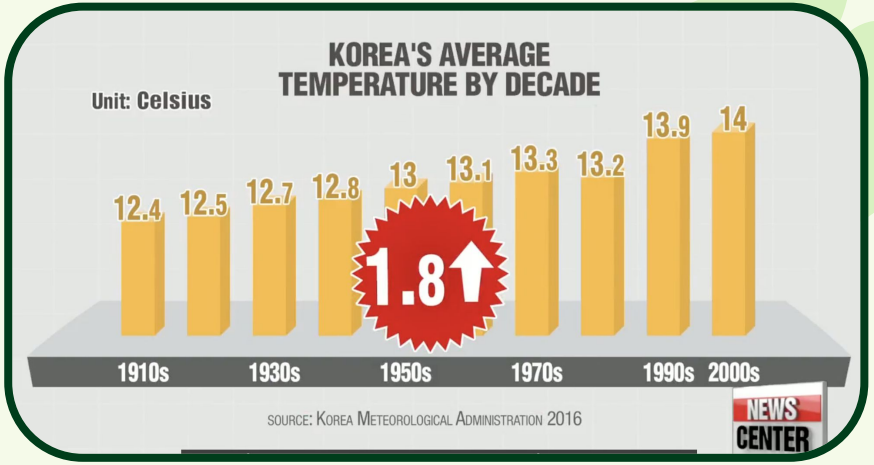
(variable 4)

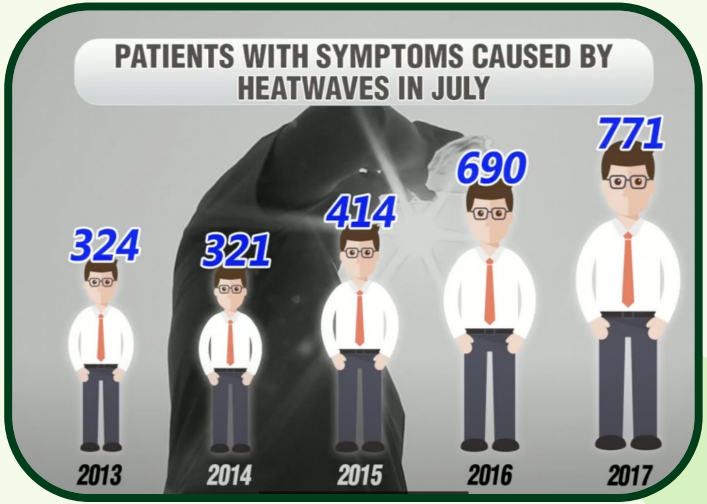
(variable 5)

8



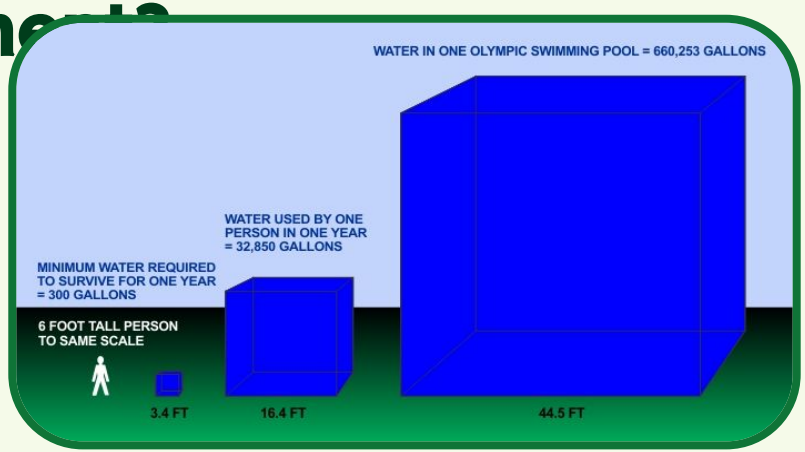
In Seoul Korea, coffee waste usually ends up in landfills where they decompose and release a potent greenhouse gas: methane.


KOREA'S AVERAGE TEMPERATURE BY DECADE
Unit: Celsius
12.4
12.5
12.7
12.8
13
13.1
13.3
13.2
13.9
14
1.8
1910s
1930s
1950s
1970s
1990s
2000s
SOURCE: KOREA METEOROLOGICAL ADMINISTRATION 2016
NEWS CENTER


PATIENTS WITH SYMPTOMS CAUSED BY HEATWAVES IN JULY
324
321
414
690
771
2013
2014
2015
2016
2017

Why is Coffee Waste Harmful to the Environment?

- An average Korean drinks 12.3 cups of coffee a week.
- 145 tons of coffee waste per day; around 70 cars.
- 49,300 cubic meters of methane; around 16 olympic swimming pools
- Methane is 25% of global warming



How can Mushrooms solve this problem?

- Part of the fungi kingdom
- Commercially grown in Wheat/Straw
- Can be grown on coffee
- “Coffee grounds are very rich in nutrients that are useful for the growth of mushrooms: phosphorus, nitrogen, and cellulose combined with an acidic pH” - Caffe Vergnano.

ECO FRIENDLY

Summary

- Koreans drink 600 cups daily
- Only 0.2% of coffee is used
- In Seoul, 140 tons of coffee is produced daily
- Coffee waste can be recycled as mushroom substrate or as fertilizer

서울특별시

ECO FRIENDLY

KIS Mushroom Farm

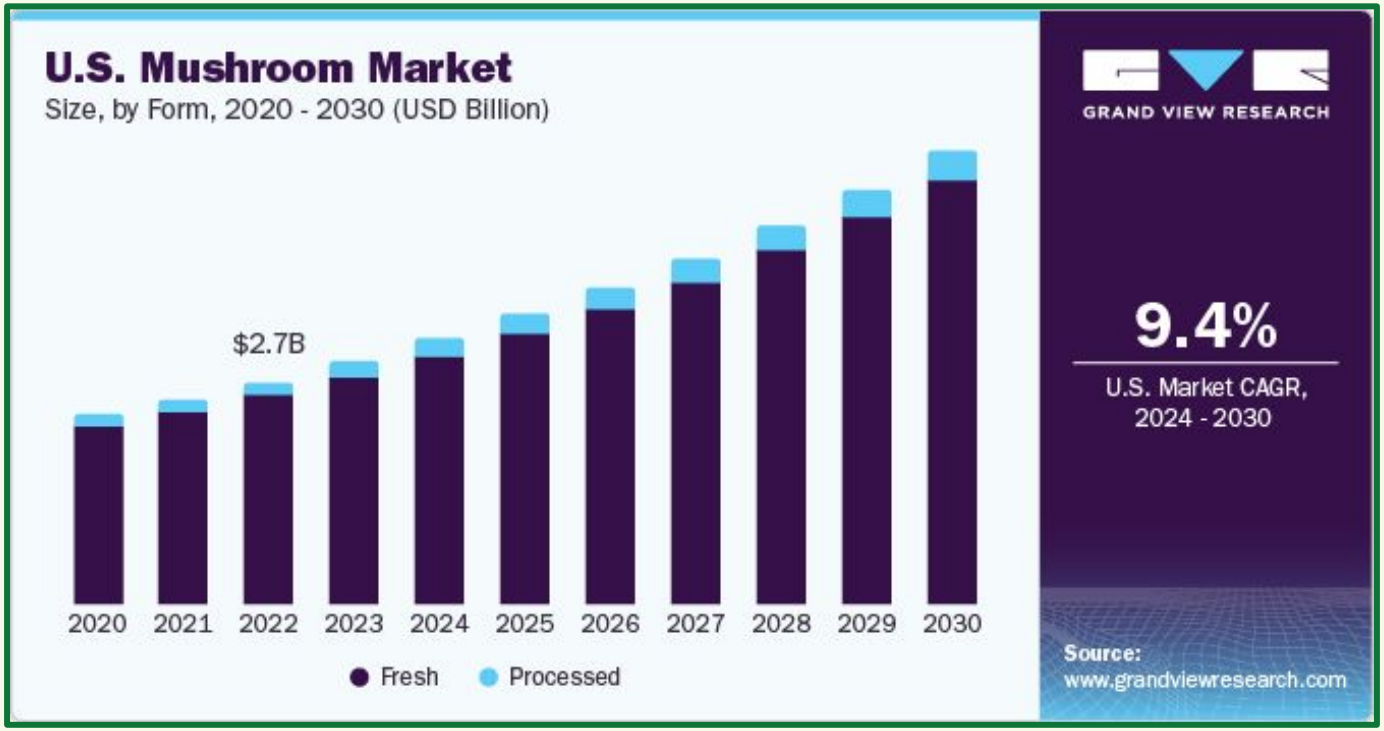
KIS Mushroom Farm

KIS Mushroom Farm

KIS Mushroom Farm

Plastic Pollution in the Mushroom Industry

Growing Mushroom Industry



Plastic Waste Reduction Assessment

- 48.34 million metric tons of Mushrooms world-wide
- 100 kg of plastic / 1 ton of mushrooms
- 4.8 million tons of Plastic Produced annually
- Around 1.3% of all plastic waste produced globally

Sterilization

- Bags can easily be placed in autoclaves
- Zero contamination (ie. mold, bacteria, insect larvae, etc)

Pros & Cons

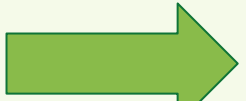
- Easy to Sterilize
- Easy to handle
- Less contamination
- Filter patch breathability

- Expensive
- Single use
- Labor intensive

Plastic Waste in the KIS Mushroom Farm

Solution


MUSHROOM
GROWING
BAGS
25-PACKS
0.2 MICRON FILTER PATCH
LARGE SIZE: 8" X 5" X 20"
FOR MUSHROOM GROWING AND SPAWN




CleverMade

Button - Tray Method

King Trumpet - Bottles

Shiitake - Incubation Cylinders

Lion's Mane - Bucket Method

Oyster - Tray Method

100% Biodegradable Bags

- More expensive
- Not heat-treatable
- Could still take decades to degrade fully
- Step in the right direction

YouTube, www.youtube.com/watch?v=hmoxtryhVFU. Accessed 19 Aug. 2024.

Additional Experimentation

Q&A