

LIGHTING THE WAY TO MARS

Plant Growth for Astronaut Consumption



NOT QUITE YET, MARK WATNEY.

Gardening in your Mars home?

While exploring hydroponics with Arcelite, and working on future methods of ISRU, we may find a way to farm potatoes in Martian regolith, but not just yet. We know some elements that may be found in the Martian soil, but each landing site will bring us a whole new set of chemicals and ratios to test with.





Benefits of chamber growing:

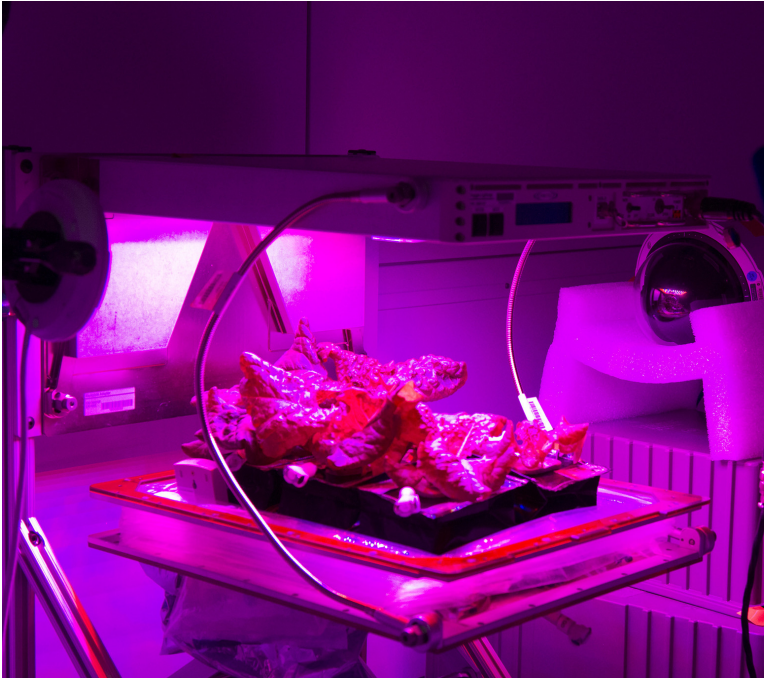
- Relative Humidity
- CO₂ PPM
- Temperature
- Lighting
- No outside debris
- Watering**
- Autonomy**



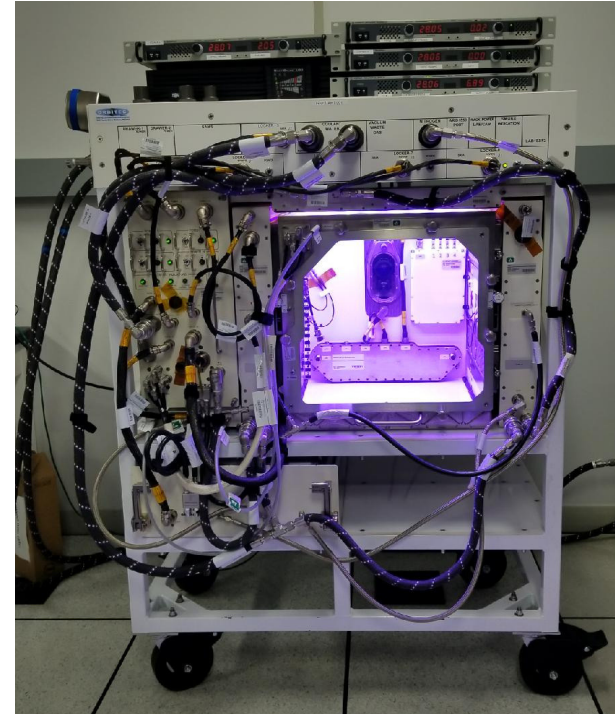
Controlled Environment Chambers

These chambers are used for scientific testing & ground control for flight experiments.

Most "indoor harvests" work in 28 day rounds, which is much shorter than typical crop cycle times!



Veggie Chamber



**Advanced Plant
Habitat (APH)**



548 CUPS OF VEGETABLES

*consumed by the average adult in American per year***

SLED 02 - TOKYO BEKANA

RECIPE:

WARM W

15% B



NEUTRAL W

20% B



COOL W

30% B



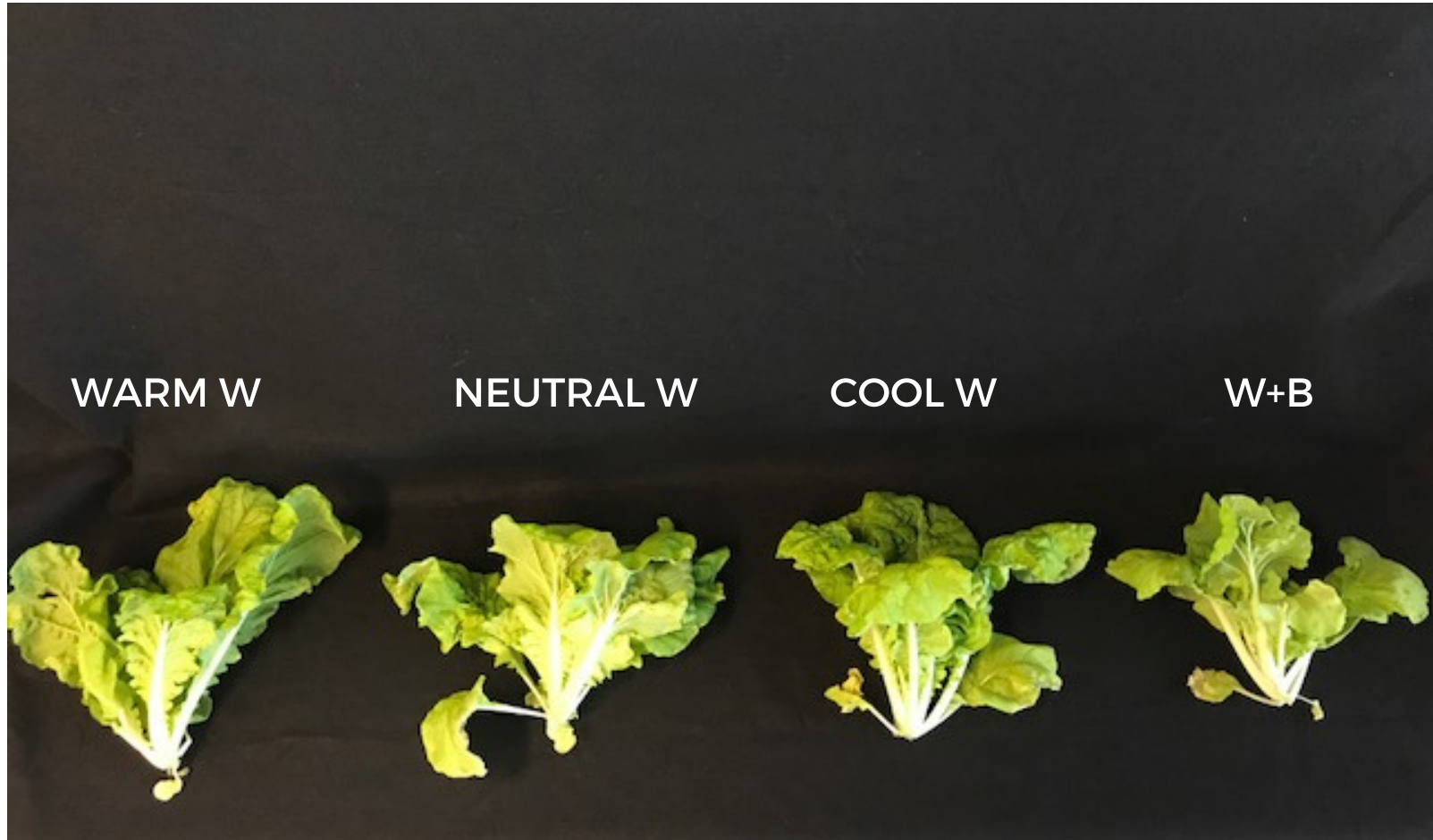
W+B LEDs

50% B



FRESH MASS (g)	45.6	44.9	52.2	44.3
LENGTH (mm)	250.4	246.0	259.1	238.6
DIAMETER (mm)	343.80	340.4	329.3	313.9
CHLOROPHYLL	18.09	18.56	20.64	23.1
LEAF #	12.1	11.4	11.6	11.4
LEAF AREA (cm ²)	831.15	809.24	830.04	747.59
DRY MASS (g)	2.59	2.4	2.87	2.63

SLED 02 - TOKYO BEKANA



SLED 01 - OUTREDEGEIOUS LETTUCE

RECIPE:

R+B LEDS

W+FR

RGB+FR (SUN)



FRESH MASS (g)	19.7	29.3	28.9
LENGTH (mm)	195.5	276.3	253.4
DIAMETER (mm)	300.4	414.9	390.0
CHLOROPHYLL	32.5	26.32	28.88
ANTHOCYANIN	7.7	4.4	6.0
LEAF #	15.2	17.2	17.1
LEAF AREA (cm ²)	605.16	943.69	902.45
DRY MASS (g)	1.413	2.095	2.530

SLED 01 - OUTREDEGEIOUS LETTUCE



GETTIN' THE GREENS

The astronauts seem to enjoy it so far... and we are just getting started!

 **Scott Kelly** 
@StationCDRKelly  

Tomorrow we'll eat the anticipated veggie harvest on @space_station! But first, lettuce take a #selfie. #YearInSpace



RETWEETS 1,958 FAVORITES 4,867 

4:47 PM - 9 Aug 2015

 **Peggy Whitson** 
@AstroPeggy  

My 3rd crop did the best! Chinese Cabbage we've been growing. The best part, after we harvested it for the #science, we got to eat the rest!



4:37 PM - 30 May 2017

602 Retweets 2,437 Likes 

IMPORTANCE OF PHYSIOLOGY & PSYCHOLOGY

'Space Salad' is currently being looked at as only a supplemental part of astronaut's diet, but who knows what food production system will evolve into as we go further into deep space!





SHINING A LIGHT ON WHAT'S AHEAD

NASA currently channels the light through fiber optics while in orbit. Solar spectrum LEDs will be going through ground testing soon and upcoming ISS research includes the use of sunlight in space!



THANKS
FOR
LISTENING!

Any questions?