AQUAPONICS

By Leeya, Jesse, Jonluca, Tucker, and Paige

WHAT IS AQUAPONICS? JONLUCA

"Aquaponics refers to any system that combines aquaculture with hydroponics in a symbiotic environment. In normal aquaculture, excretions from the animals being raised can accumulate in the water. In aquaponics system, water from aquaculture system is fed to a hydroponic system where the bi-products are broken down by bacteria." (Wikipedia.org)



Plants that grew using the system of aquaponics.

The pipe going from the fish tanks to the plants to balance the aquaponic system.



HOW DOES AQUAPONICS WORK? BY JESSE AND JONLUCA

"Aquaponics recirculates water from a fish tank through a vegetable grow bed. Nutrients from the fish waste feed the plants, and the plants filter the water to keep the fish healthy. The two main components of the system are the fish tank and the grow beds with a small pump moving water between the two.

Aquaponics is the ideal answer to a fish farmer's problem of disposing of nutrient rich water and a hydroponic grower's need for nutrient rich water. Essentially, aquaponics mimics every natural waterway on earth. It is used to grow food crops in a concentrated, yet sustainable manner." www.wikipedia.com

HOW DOES AQUAPONICS WORK? BY JESSE AND JONLUCA

"An aquaponics system is a system wherein fish farming and crop cultivation is simultaneously carried out, with minimal use of water and no fertilizers. The word aquaponics is a combination of the words aquaculture (growing fish or other aquatic organisms) and hydroponics (growing plants with nutrient-enriched water). Aquaponics relies on the recirculation of fish waste and recycled water, each of which helps in the growth of the plants and the fish, respectively." (Wikipedia.com).

WHERE IS AQUAPONICS USED? BY LEEYA

Aquaponics is used in greenhouses across the world for agricultural work or gardening work to grow fresh, healthy plants in a way that benefits both sides of the aquaponics contraption: the fish and the plants. Aquaponics is also used in places where fertile soil is scarce such as deserts, so that people can grow crops for food without the hassle of needing soil.



Aquaponics in the WMS greenhouse

> Aquaponics in the Egyptian deserts



WHY IS AQUAPONICS USED? BY LEEYA

Aquaponics is used to efficiently grow fresh, healthy plants for industrial, agricultural, or gardening purposes while aiding fish and helping them survive. It is also used because it takes advantage of the symbiotic relationship between fish and plants to benefit humans. The relationship is mutualism, meaning both species are helped.



WMS's aquaponic plants are growing strong and tall thanks to the nutrients in the fish feces.

> The aquaponic fish are thriving and living well thanks to the nutrients from the plants.



WHO WOULD USE AQUAPONICS? BY: TUCKER

People that use aquaponics are greenhouse workers, farmers, and biologists in order to grow vegetables, plants, and carry out experiments.



Jonluca measuring

Aquaponics being farmed



WHAT DO AQUAPONICS LOOK LIKE IN THE WMS GREENHOUSE? $_{\scriptscriptstyle \mathsf{Paige}}$

The aquaponics at the WMS greenhouse includes two tanks with fish in it. On top of the tanks there are several plants growing. There are rocks on the bottom of all these plants. Also there are tubes for water to be transferred from the tanks to the plants. There are plants grown there such as, tomatoes, white coleus, coleus, and chroton.



Clay

rocks

The fish and the growing lettuce.

WHAT DID EACH PERSON DO WHILE IN THE GREENHOUSE? BY LEEYA

Everybody did one of the following at least once every day:

- Measuring the pH level of the water (with and without a probe) to see if the water was close to neutral in pH level and therefore balanced to fit both the needs of both the plants and fish
- Measuring the ammonia level of the water to see if it's a healthy amount for both organisms
- Measuring the nitrate level of the water to see if it is a healthy amount
- Measuring the nitrite level of the water to see if it is a healthy amount
- Measuring the height of the plants to observe their progress and how well the system is working
- Feeding the fish so that they wouldn't starve
- Shooing white flies away from the plants so that they didn't eat the leaves

We measured the plants daily.





These are the fluids we mixed with some tank water to measure the pH, ammonia, nitrite, and nitrate level of the water.



This is the pH level-measuring probe.

рН	7.2	7.2	7.0	7.2	6.6				
Ammonia	0.25ppm	0.25 ppm	0 ppm	0.25 ppm	0 ppm				
Nitrite	0 ppm	0 ppm	0 ppm	0 ppm	0 ppm				
Nitrate	80ppm	160 ppm	160 ppm	30 ppm	100-120 ppm				
Probe	Not measured	7.39	7.39	7.72	7.20				
White Coleus	Not measured	28 cm.	18 cm.	11 cm.	15 cm.	Ρ	ai	g	е
Collius	Not measured	21 cm.	30 cm.	22 cm.	19 cm.				
Chorton	Not measured	25 ½ cm.	Not measured	Not measured	24.5 cm.				
Tomato	Not Measured	74 cm.	100 cm.	100cm.	122 cm.				
Date:	12/12/17	12/19/17	1/3/17	1/11/17	1/17/17				

WHY ARE THE GRAPH RESULTS GOOD? BY LEEYA, JONLUCA, AND PAIGE

These were normal measurements. However there was an exception for 1/17/17 because some things were reset. These measurements showed how the aquaponics system helped the plants and fish thrive and live well in those conditions. The normal pH level is 7.2 and the measurement that we got was 7.2 which means the pH level was good and balanced. The certain amount of acidity and basicity in the water can seriously affect the aquaponic system. The measurements of the tomato plant was very positive and the tomato plant was actively growing. The reason why the coleus and the white coleus were smaller on 1/17/17 because those two plants were replanted that week. If there is too much nitrite the fish can die, the good thing about our measure ments was that there was no nitrite it was 0 ppm.



WHAT ARE OUR THOUGHTS ABOUT AQUAPONICS? BY JESSE AND TUCKER

It's cool because it benefits both fish and plants in a symbiotic relationship that nobody would actually think of. Also, it was really interesting the way that it could also be used for farming.

We tested the pH, ammonia, nitrite, and nitrate

This is a picture of the chemicals we put in the Water to test it.

