Jane Holsopple, John Silva, Jane Wieczorek

Mrs. Charlwood

Biology II

23 May 2019

Zombie Survival

TV shows and movies all seem to show preparing for a zombie apocalypse the same: a family stocks up on insane amounts of packaged foods, toilet paper, hygienic products, and other items to supposedly going to save them from the end of the world. Could a family potentially survive on packaged foods for three years while waiting out a zombie attack? The better option seems to be thinking about survival with an understanding of the ecology. This would include being able to garden, raise animals, and tend to the garden’s needs. With ecology comes understanding the best methods of obtaining dietary needs, composting, gardening, and having a plan for water makes for a good chance of surviving a zombie apocalypse.

Gaining knowledge of one’s dietary needs can help to plant the seed of what fruits, vegetables, or legumes need to be in the garden. It is recommended that most people consume 130 grams of carbohydrates and 75 milligrams of vitamin C accounts for 100% of the daily value necessary (Iserloh). For protein, 25 to 35 grams a day is enough for most adults (Fetters). These statistics help us to figure out which plants are best to grow in our garden based on what is needed to maintain a healthy diet.

B1 & B4 Many different plants are available to satisfy vitamin C, carbohydrate, and protein needs. To fulfill vitamin C requirements is vital to grow tomatoes, bell peppers, strawberries, and potatoes. All of these combined about for over 244% of the daily value of vitamin C (“Nutrition”). Legumes are a vital part of ensuring that protein requirements are met. Lentils, pinto beans, and red kidney beans can all be grown, which average about 8.3 grams of protein (Robertson). Butternut squash seeds, goat milk, and goat meat will help to supplement the legumes adding another 46 grams of protein all together (Link). Tilapia and chickens can raised in the garden, tilapia has 26 grams of protein and one egg has 7 grams (Zelman). For carbohydrates, each legume provides 7% of the daily value of carbohydrates, butternut squash provides 16 grams, squash seeds out for 34 grams, and 1 cup of peanuts provides 24 grams (Robertson). All these are able to grow through hydroponic and aquaponic systems set up over a large pool (Walmart). Based on the size of the pool and space needed for each plant to grow, it will be best to grow 10 bell peppers, 10 spinach, 10 tomato, 6 strawberry, 6 potato, 6 butternut squash, 14 lentils, 8 pinto bean, and 8 peanut plants (Baker). There will also be room for 2 goats, and 17 chickens within the space for the garden room.

B2 & A1 Composting is another vital instrument to maintaining a garden throughout a long stretch of time with limited resources. We purchased a plastic container to hold our compost (Amazon). The compost will be used to recycle things like, excess plant waste and chicken egg shells. We will have to make sure that no chicken, goat, or fish meat and bones gets into the compost. There will also be worms to aerate the soil, and help the compost to cycle (Amazon). This is done when the worms eat the compost and excrete it. The compost will then be used to fertilize the corn ("Composting").

C1 Our greenhouse will be equipped with a well in the ground. The well water will be extracted from the ground using pump attached to a pipe (Menard’s) leading fifteen feet into the ground. This water will be used to fill the pool at the start and add fresh water every so often, it will be used to feed animals, and water the corn. The rest of the water will be recycled through the aquaponics system.

C1 Aquaponics is a form of agriculture that combines raising fish in tanks with growing plants hydroponically or, in case of potatoes, carrots, and other vegetables that need soil to grow in, in a grow bed. The fish eat the food and give off waste, which microbes and worms then convert to fertilizer for the plants. In consuming these nutrients, the plants help to purify the water for the fish (Bernstein). However, there are many more advantages to aquaponic gardening than the fact that the only input is fish food.

First of all, with the limited budget and space we have, the fact that operating aquaponics saves money, water, and space is essential. To begin with, due to the recirculating system, approximately 90% less water than with soil-based gardening where you have to water your plants daily and most of the water is wasted is used. Besides, since the fish waste provides organic food for the plants, it does not rely on the availability of good soil, nor on chemicals and synthetic fertilizers (Bernstein).

Furthermore, an aquaponic system also allows us to pack plants about twice as densely as you can in soil. This is because the plants don’t need to spread their roots out into lots of soil to get the nutrients they need. Additionally, plants not only grow two to three times faster, but you can also expect at least 20-25% bigger yields, which results in a highly increased productivity on a square foot basis compared to commercial field farming (“How”).

Moreover, not only vegetables, but also fish can be harvested as an additional food source. While there are only very few limits to the types of plants that will thrive in an aquaponic system, also any type of freshwater fish works well (Bernstein). However, the reasons why we decided to raise Tilapia are that they can survive wide ranges in pH and temperature, are fast growing and reproducing, can very efficiently convert food into body mass, and have an omnivorous diet (Genello).

C3 We will be using heirloom seeds instead of hybrid seeds because of the numerous benefits. Heirloom seeds are varieties that have been passed down and not hybridized. Although heirloom seeds are more expensive and produce less, the produce obtained from their plants are often more nutritious and taste better than hybrid. The seeds are also viable for many years if they are stored properly. Hybrid seeds, on the other hand, are reliable, and will almost always yield a lot of produce. However, the plants may not always be the same in future years. For example, planting seeds of large tomato may leave you with cherry tomatoes the next year (“Hybrid”). These factors helped us to make the decision to go with heirloom seeds. We want to make sure we are getting the most out of our produce, nutrition wise rather than the amount because there is always the option of planting more. The three-year time frame also makes heirloom the superior option. We need to be able to count on having the seeds consistently and not worry about getting different produce in the following years.

There are many pros and cons of square foot gardening, vertical gardening, and elevated gardening beds. “Square foot gardening divides growing area into one foot by one foot squares,” his helps to find and plan what is going in the garden. First off, square foot gardening is great because there is less weeding, fast set-up, and produces high yields. The downside of this is there is a high initial cost, little space, and insufficient depth (Nick). For vertical gardening, we would be growing plants on the wall. Vertical gardening is great for limited space and cleaning up clutter, however, it can be expensive, messy, and dry-out very quickly (“Pros”). Elevated gardening beds are exactly what they sound like, “gardening beds that are raised off the ground.” They are great because they assist with drainage and are easy on your back, but they can cause plants to dry out too quickly (Fitzgerald). Thanks to our pool aquaponic and hydroponic space we are able to grow many plants with an abundance of space, and it will provide us many of the same benefits of these systems. Also, we will not have to worry about plants drying out or the messiness that accompanies these methods. Therefore, we will not be using any of them.

B3 Pollination is key to keep a garden growing. This is a necessary process because “it moves the plant pollen to help fertilize the eggs in the flower.” Pollinators like bees, butterflies, bats, and flies do this job for us in the real world (“What are Pollinators”). This process can also be done manually using q-tips (Walmart). This is done by gathering pollen on the end of a q-tip and transferring it to another flower (Green). We chose this option rather than purchasing a beehive as it can be pricey and difficult to maintain throughout seasons.

We decided to get chickens and goats because of their nutritional value mention in the latter. The two goats will share one 3 ft. x 11 ft. pen and we will feed them corn (Goatzz). Groups of 4 chickens will share a stackable 4 feet x 2 feet x 2 feet cage with a removable board on the bottom to ensure cleanliness among the pens. The chickens will also be fed corn (Cackle).

Considering the many types of soil with various pH levels, consistencies, and components, it was vital to find one suitable for our needs. Different variations on the chemical breakdown of soil impact the amount of nutrients available for the plants to use. While we mainly considered the soil we are buying due to the price, an additional factor to our decision was the addition of fertilizer in the soil and features composted materials which include several key nutrients for our crops to be successful (Berg Stack). We will be using Schultz Flower & Vegetable Garden Soil (Menard’s*).*

Although stocking up on food may seem like the easy way out, for long term survival our plan will provide us with the best odds of surviving. Through our knowledge of ecology we devised the best solutions for growing and obtaining nutritional requirements. With much research, we explored the pros and cons of various types of gardening, would be able to run a successful aquaponics system, and much more. This research has provided us with the knowledge needed to survive, and make a garden that will not only provide, but thrive for the next three years.

Works Cited

*Amazon*. Amazon, n.d. Web. 16 May 2019.

*Baker Creek Heirloom Seeds.* Baker Creek Heirloom Seeds, n.d. Web. 16 May 2019.

Berg Stack, Lois. “Soil and Plant Nutrition: A Gardener’s Perspective.” *The University of Maine*. The University of Maine, 2011. Web. 24 May 2019.

Bernstein, Sylvia. “Aquaponic Gardening: Growing Fish and Vegetables Together.” *Mother Earth News.* Ogden Publications, Inc., 3 Apr. 2012. Web. 16 May 2019.

Brook, Russell. “How To Build A Cheap Aquaponics System From Your Own Home.” *Home Aquaponics System*, 9 Mar. 2014. Web. 16 May 2019.

*Cackle Hatchery*. Cackle Hatchery, n.d. Web. 16 May 2019.

Clarke, Paul. "20 Vertical Gardening Ideas for Turning a Small Space into a Big Harvest." *Walden Labs*. Walden Labs, 24 Nov 2015. Web. 16 May 2019.

"Composting Benefits." *Earth Easy*. EarthEasy.com, n.d. Web.16 May 2019.

*Container Store.* Container Store, n.d. Web. 16 May 2019.

Fetters, Aleisha. "Are You Getting to Much Protein? Here's Why it Matters." *U.S. News*. U.S. News, 3 Aug 2018. Web. 16 May 2019.

Fitzgerald, Maureen. "Build Your Own Elevated Raised Garden Bed." *Wisconsin Mommy*. Wisconsin Mommy, n.d. Web. 16 May 2019.

Genello, Laura. "Why Tilapia? Species Selection at the Aquaponics Project." *Center for a Livable Future*. Center for a Livable Future, 8 Jan 2015. Web. 16 May 2019.

*Goatzz*. Goatzz, n.d. Web. 16 May 2019.

Green, David. “Hand Pollination.” *The Pollination Home Page*. n.s., 25 Feb 2012. Web. 24 May 2019.

*Home Depot.* Home Depot, n.d. Web. 16 May 2019.

"How to Start Growing with Hydroponics for Beginners." *Advanced Nutrients.* Advanced Nutrients, n.d. Web. 16 May 2019.

"Hybrid vs. Heirloom Garden Seed." *Welcome to Life Unplugged.* Welcome to Life Unplugged, n.d. Web. 16 May 2019.

Iserloh, Jennifer. "What are the Healthiest Sources of Carbohydrates?" *Skinny Chef*. Iserloh Ventures, n.d. Web. 16 May 2019.

*Lakeway Tilapia*. Lakeway Tilapia, n.d. Web. 16 May 2019.

Link, Rachel. "Goat Milk Benefits are Superior to Cow Milk." *Dr. Axe*. Dr. Axe, 22 Nov 2018. 16 May 2019.

*Lowe's.* Lowe's, n.d. Web. 16 May 2019.

*Menard's*. Menard's, n.d. Web. 16 May 2019.

Nick, Jean. "The Pros and Cons of Square Foot Gardening." *Good Housekeeping.* Good Housekeeping, 30 July 2018. Web. 16 May 2019.

"Nutrition Information for Raw Fruits, Vegetables, and Fish." *U.S. Food and Drug Administration.* FDA, n.d. Web. 16 May 2019.

"Pros and Cons of Vertical Gardens." *Easy Vertical Gardening.* Easy Vertical Gardening, n.d. Web. 16 May 2019.

Robertson, Ruairi. "The 9 Healthiest Beans and Legumes You Can Eat." *Healthline*. Healthline Media, 1 Dec 2017. Web. 16 May 2019.

Tardiff, Micheal. "Goat Meat Nutrition." *Livestrong.com*. Leaf Group, n.d. Web. 16 May 2019.

*Walmart.* Walmart, n.d. Web. 16 May 2019

"What are pollinators and why do we need them?" *Penn State.* The Pennsylvania State University, 2019. Web. 16 May 2019.

Zelman, Kathleen M. "Good Eggs: For Nutrition, They're Hard to Beat." *Web MD.* Web MD, n.d. Web. 16 May 2019.