



FACT SHEET ON: Producing Crops with Aquaponics

The purpose of this fact sheet is to provide an overview of the crops grown in aquaponics systems based on Namibian cultural culinary preferences. Additionally, the bases for this fact sheet lies in the ease, simplicity and affordability of these vegetables and their compatibility with aquaponics systems.

Introduction

Compounded factors such as reduced agricultural production, water scarcity, drought and Climate Change affect Namibia severely. The current agricultural production is described as "low and not sufficient, inadequate, limited on food, nutritionally insecure" and leaves many in the country "vulnerable to threats and crises," according to the United Nations' Food and Agricultural Organization (FAO). As of 2020, a measured 18% (430 000) of Namibians "face severe acute food insecurity,"* and remain "in need of urgent humanitarian action (FAO IPC, 2020)." To address the currently apparent concerns regarding Namibia's food insecurity, alternative farming methods are needed to help supplement the food needs of people, especially in rural areas. In addition to providing supplementary food, alternative farming practices such as aquaponics are environmentally friendly, water efficient, and present potential livelihood opportunities if leveraged and scaled to commercial levels. This fact sheet classifies crops into three main categories: vegetables, leafy greens and herbs (Encyclopædia Britannica, 2014, 2019, 2020; Science Daily, 2020).



Figure 1: Leafy Greens in an Aquaponic seedling tray
(Source: Upstartfarmers.com, 2020)

"Food is the moral right of all who are born into this world."

- Dr Norman Borlaug (1970) -

Aquaponics Vegetables

- Tomatoes
- Green Beans
- Bell Peppers
- Cucumbers
- Peas
- Chilli
- Cauliflower
- Broccoli
- Cabbage
- Egg Plant



Figure 2: Vegetables for Aquaponics
(Source: Abra, 2020; Shutterstock.com, 2020)

Planting & Seedling Trays

Crop production begins with planting seeds. The planting and seedling trays have a framed structure around it and are outfitted with an irrigation system and grow lights. The seedling trays come first, as seeds are planted and allowed to germinate. After the seeds germinate into seedlings, they remain in the seedling trays until they are mature enough to be inserted or transplanted into the growbeds. The layout and design of the system is such that the planting, seedling, and growbeds are layered in a clearly structured, step-by-step and systematic manner for ease of use, efficiency and effectiveness (EcoSmart Namibia, 2020).

Irrigation System

An irrigation system is positioned above the planting and seedling trays to provide water for the germinating seeds and maturing seedlings. The irrigation system is comprised of spray nozzles, which provide moisture to help with the germination process. A timer controls the moisture levels to avoid oversoaking the seeds and seedlings (EcoSmart Namibia, 2020).

Grow Lights

Plants and germinating seeds require sunlight to photosynthesise as they grow and thrive. Therefore, it is important to have controlled and optimised sunlight. Grow lights are specifically designed to emit a light spectrum similar to that of the sun, thus allowing the plants to continue photosynthesizing and grow, even at night. All this is to encourage continued plant production in the system. The light spectrum from the bulbs emits both heat and light energy.

Aquaponics Leafy Greens

- Kale
- Lettuce
- Spinach
- Chives
- Rocket



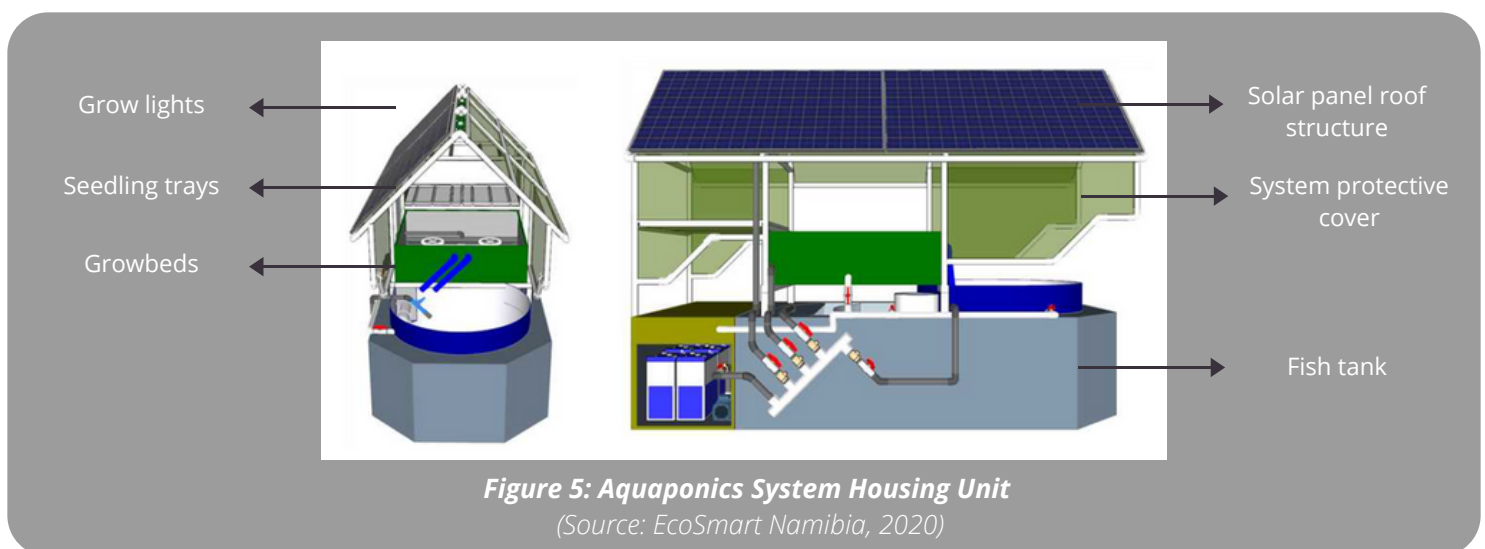
Figure 3: Produce for Aquaponics
(Source: Shutterstock.com, 2020)

Aquaponics Herbs

- Spring Onions
- Coriander
- Parsley
- Basil
- Fennel



Figure 4: Herbs for Aquaponics
(Source: Maximumyield.com, 2020; farmingaquaponics.com, 2020)



Harvesting

Aquaponics allows one to develop a cycle of production planned and synchronised between the planting and harvesting periods. This is to ensure that there is a constant supply of crops being harvested and planted. Once the crops are harvested, minimal packaging is needed as the vegetables and produce could easily be sold at the planting site, a nearby farmer's market or picked up daily by clients. These crops can be used for subsistence and commercial livelihood benefits.

Advantages of Crops in Aquaponics

- **Fast Plant Growth** – plants thrive incredibly well and taste better in the closed-loop system where the rich fish nutrients encourage faster growth (Aqua-gardening, 2020; Go Green Aquaponics, 2019; Endless Food Systems, 2020).
- **Health Benefits** – this is a positive shift towards practicing and adopting a healthy lifestyle (The Aquaponics Source, 2020).
- **Reduced Chemical Use** – aquaponics requires little to no pesticides or chemicals (Aqua Gardening, 2020).
- **Food Localisation** – rural areas could reverse the massive imports of food and supply crops to urban areas, thus leaving a cleaner sustainability footprint (Aqua Gardening, 2020; The Aquaponics Source, 2020).
- **Food Security** – aquaponics crop production helps supplement food to Namibians experiencing food insecurity, induced by Climate Change (Aqua Gardening, 2020; Go Green Aquaponics, 2019; The Aquaponics Source, 2020).
- **Smart-agriculture Practice** – impact on the natural land is reduced to a minimal as no large fields across landscapes need to be cultivated (Aqua Gardening, 2020).
- **Reduced Water Use** – aquaponics farming supports and encourages positive water conservation efforts and positive ecosystem impact (Aqua Gardening, 2020; Volcano Veggies, 2019; Go Green Aquaponics, 2019; Endless Food Systems, 2020).
- **Livelihood Benefit** – with the potential for scalability, aquaponics farming could produce higher yields of crops for income (The Aquaponics Source, 2020).
- **Year-round Garden** – aquaponics has no seasonal limitations allowing for a continuous, full-time income and supply of crops potentially (Go Green Aquaponics, 2019).
- **Less Land is Needed** – aquaponics systems can be fitted in any space, across multiple (urban or rural) areas (McCarthy, 2011; Volcano Veggies, 2019; Aqua Gardening, 2020; The Aquaponics Source, 2020; Endless Food Systems, 2020).

Disadvantages of Crops in Aquaponics

- **Expensive Start-up** - initial start-up system costs can be high as aquaponics infrastructure is expensive (McCarthy, 2011).
- **Technical Know-how** – these systems require a significant level of technical know-how and maintenance (McCarthy, 2011).
- **Tight Precision and Planning** – a high level of effort must be invested in executing the optimal functioning of the system. Timing and precision is the major secret in a perfectly synchronised and calibrated system (McCarthy, 2011).
- **Only Selected Crops Grow** - Aquaponics limits the variety of crops that can be grown in the system, such as most tubers (McCarthy, 2011).

Conclusion

The medical field affirms that a diet of vegetables provides significant health benefits and is globally encouraged. The United Nations (UN) Food and Agriculture Organization (FAO) classifies 18% (430,000) of Namibians as currently facing Phase 3+ acute food insecurity, and there remains a level of urgency to address the country's food challenges (FAO IPC, 2020). The following challenges are identified as causes of food insecurity: a significant reduction in agricultural production, persistent and frequent severe droughts and lastly, a shortage of water. Aquaponics agriculture addresses all three of these challenges and bears merit and potential to alleviate Namibia's food insecurity, hunger and malnourishment. The current global COVID-19 pandemic presents even more negative effects on the country, the full impact of which is yet to be determined. This is an opportune time to leverage aquaponics as a climate-smart agriculture practice for crop production in Namibia.

Glossary

Aquaponics - refers to a system where fish and plants are grown together. Fish waste in the water produces nutrients for the plants and the plants use the nutrients and provide clean, filtered water for the fish (Bernstein, 2011).

Crops - these are plant products that can be grown and harvested for sustenance (Encyclopædia Britannica, 2014)

Ecosystem - refers to the interaction of a community of organisms with their environment. When talking about aquaponics, this forms an ecosystem of fish, plants, and bacteria (Bernstein, 2011).

Food Insecurity - is a situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life (FAO, 2010).

Food Security - is having reliable access to a sufficient and healthy quantity of food (Government of the Republic of Namibia, 2004).

Hydroponics - is a method of growing plants without any soil. The plants are placed in grow beds and use only water and chemical nutrients (Bernstein, 2011).

Malnourishment - is a human state of suffering from malnutrition, a lack of sufficient healthy nutrients (Online Dictionary, 2020).

Sustainability - in this context refers to the ability of aquaponics to protect and restore the environment, rather than harm it (Bernstein, 2011).

References & Resources

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