

Research Article

POTENTIAL OF THE MICROGREEN INDUSTRY IN MYANMAR AND CONSUMER RESPONSE TO THIS RECENTLY DEVELOPED MARKET

*Johan Van Rooyen, Shaun Eindarey Khine, Yamin Inzali, Mahkaw Baw Seng

Department of Business and Technology, Webster University, Cha-am, Thailand

Received 24th November 2020; Accepted 20th December 2020; Published online 09th January 2021

ABSTRACT

Microgreens have gained increasing popularity as food ingredients in recent years due to their high nutritional content and numerous substantial health benefits. Microgreens are edible seedlings, including vegetables and herbs, which are used, primarily within the restaurant industry, to brighten cuisine. On the other hand, they are gaining continuing interest, not only for their nutritional value but also for their attractive traits and commercial potential. The purpose of this paper is to analyze whether there is a potential for the microgreen industry in Myanmar and how the consumers would respond to this newly developed market. Post-harvest techniques, cultivation, and packaging of microgreens are evaluated, but its nutritional value, analytical methods, and bio accessibility are also considered. The paper is delimited to an analysis of microgreens, essentially concentrates on testing if consumers in Myanmar have a piece of knowledge regarding microgreens and its benefits, and it is based on a hypothesis that microgreen business is a market with a significant number of commercial potentials in Asia, and is soon to be a booming industry in Myanmar. Microgreens' nutrient contents, food safety, shelf life, packaging, and factors that could derail the plan are also discussed to lift consumers' knowledge and awareness in Myanmar. In analyzing the microgreen industry, which would be interesting to investigate is consumer demand, whether microgreen is doing a better job in the Myanmar market than other organic greens and foods.

Keywords: Microgreens, Nutritional value, Post-harvest, Commercial potentials, and Mature greens.

INTRODUCTION

Microgreens are edible seedlings of vegetables and herbs which are considered an emerging superfood. They are much tinier than most of the regular and even baby greens. Some examples of common microgreens include radish, cabbage, broccoli, basil, cilantro and peas. They are also recognized as "vegetable confetti" since they are currently trendy in the organic market and gaining customer awareness, particularly in fine dining restaurants¹. They are dense in nutrition and can be consumed with salads, sandwiches, juice, and garnishes. Arugula, radish, basil, broccoli, and mustard microgreens, and some are pictured in Fig. 1. Its production is relatively faster than growing matured crops, as it takes only seven to fourteen days for microgreens to harvest fully. Moreover, microgreens are low maintenance compared to regular greens, as they require less water, process, and a short period to see the result. Several studies have shown that microgreens possess up to forty times more vital nutrients than mature crops and retain a greater concentration of components such as minerals, vitamins, and antioxidants, which increases the consumption of microgreens². Microgreens are often confused with sprouts; in fact, they are slightly different from one another. Sprouts are usually germinated with the use of water, while microgreens are grown in fertilized soil. Therefore, bacterial growth in sprouts is more likely because of the closed-loop system with water³. In earlier stages, sprouts were used as a health food staple and were once a mainstay of raw diets. However, they have been slowly dominated by microgreens. A few standard growing methods should be considered before operating a microgreen business. Firstly, the key components are a sunny location or a grow light, a container or special-designed trays for more intensive growing methods, any growing medium, a spray bottle, and finally, the seeds ("Herbs at Home," 2019).

Generally, there are two categories of growing mediums, soil-based, and soilless growing mediums. In the case of growing microgreens, any type of method is appropriate; however soil-based growing medium is recommended, as the healthier the soil, the more nutrients any plant can soak up, including microgreens intensive growing methods, any growing medium, a spray bottle, and finally the seeds ("Herbs at Home," 2019). Nevertheless, Turner, Buchanan, and Luo (2020) stated that one major limitation to the microgreen growth is fast quality deterioration postharvest.



Fig. 1. Examples of common microgreens

*Corresponding Author: Johan Van Rooyen,
Department of Business and Technology, Webster University, Cha-am, Thailand.

¹<https://pdfs.semanticscholar.org/e3f4/a7f0c9800f90c42ca6e19359679c3246965e.pdf>

²<https://pdfs.semanticscholar.org/e3f4/a7f0c9800f90c42ca6e19359679c3246965e.pdf>

³<https://herbsathome.co/microgreens-vs-sprouts/>

Objective, mission and vision

This paper's principal purpose is to analyze whether there will be sufficient consumers for the microgreen industry. Primary research is conducted to see whether there is an adequate number of consumers willing to purchase, types of microgreens they prefer to buy, pricing, main benefits they are willing to retain, and so on. Our mission is to provide consumers in-depth knowledge regarding the terms, benefits,

and uses of microgreens. We conduct market research to learn more about the microgreen industry's potential and to perceive whether the industry can penetrate Myanmar's market in the future. Our vision is to identify microgreen business as a potentially profitable business in Myanmar. We aim to produce high-quality organic food for local people, families who are rich in protein, vitamins, minerals, etc.

Microgreen nutrients content

Xiao *et al.* (2012) stated that cilantro, red cabbage, garnet amaranth, and green daikon radish microgreen had an excessive concentration of carotenoids, ascorbic acid, and tocopherols respectively with a higher level of other bioactive compounds compared to other microgreens and some mature vegetable counterparts⁴. Moreover, de la Fuente *et al.* (2019) analyzed the bio accessibility of various bioactive components and minerals in kale, mustard and broccoli, and radish microgreens grown by hydroponics methods. Most mustard and radish microgreens were discovered to have the most considerable bio accessible fraction (BF) for ascorbic acid, carotenoids, and tocopherols, while broccoli, radish, and kale microgreens were found to have the highest BF for polyphenols. It is also reported that swiss chard and basil microgreens possess magnificent portions of potassium and magnesium, while purple basil microgreens were mostly a good source of ascorbic acid. Besides, Polash, Sakil, and Hossain (2018) discovered that most microgreens' antioxidants and bioactive compounds devalued rapidly after harvest. Therefore, it is recommended that microgreens should consume soon after the harvesting stage to obtain substantial health benefits. Two common treatments, preharvest, and postharvest calcium treatments, can affect microgreen phytonutrients; however, preharvest calcium treatment has much more significant advantages. Furthermore, there has been no research on the effect of microgreen's nutrient profile, while nighttime temperature and overall temperature may affect mature crops' nutrition (Burbott & Loomis, 1967; Steward *et al.*, 1959). According to research, microgreens are regarded as functional foods in diet-based disease prevention, as it helps combat type 2 diabetes, obesity and cardiovascular disease and some others (Choe, Yu & Wang, 2018). Huang *et al.* (2016) also discovered that supplementation of red cabbage microgreens possessed some health-promoting benefits in mice fed a high-fat diet.

Food safety and shelf life of microgreen

Unlike mature crops, microgreens are usually consumed raw to gain nutritional benefits. They are usually grown in controlled environments, avoid potential contamination such as growth media, irrigation water, and seeds, and are more vulnerable to bacterial internalization than mature plants. Studies have shown that microgreen hydroponic growing systems, among other systems, are more vulnerable to the proliferation of pathogens when the seeds are contaminated⁵. Furthermore, a couple of potential techniques for a better and more effective microgreen harvest. The first method is to apply a shear force that sterilizes the wound concurrently with a laser or heated wire. If the first technique seems complicated, it is also suggested to apply it to the edible coating that helps heal the wound. Microgreens are washed after harvest to remove soil and offer clean produce for packaging. Some farmers apply sanitization treatment to provide a cleaner product to consumers; in fact, it is not a pleasant control strategy. It leads to ineffective control because microgreens are fragile and can easily cause damage due to harsh sanitizing methods. Besides, temperature plays a crucial role in maintaining a perfect microgreen shelf life. Mir, Shah, and Mir (2017) also argued

that microgreens' shelf life is considered from 3-5 days in ambient conditions, and it is suggested to sell them when they are still rooted in the growth medium⁶. Moreover, microgreens right after harvesting should be stored cold to sustain quality. It is also recommended that they should be kept at a temperature of fewer than 5 degrees Celsius, as they will immediately go frozen if held below one degree Celsius. (Kou *et al.*, 2013; Xiao *et al.*, 2014). Hence, it is necessary to understand that critical measures to maintain post-harvest quality include harvesting at optimal maturity, maintaining the perfect temperature and humidity, and minimizing injury due to handling.

Factors that could derail the plan and potential injury

It is essential to minimize possible injuries of produce because injured plants and fruits are more likely to spoil quicker, and they possess a high chance of producing pathogens, microorganisms that cause disease and damage to fruits and vegetables⁷. Since microgreens are fragile and are more susceptible to cause physical damage than mature vegetables, injury prevention measures should be effectively handled during harvesting and distribution. It is recommended not to reuse soil while growing microgreens. Instead, fresh soil or a growing pad can be used, as there is a high chance of insect eggs and molds attached to old soil (Turner, Buchanan, & Luo, 2020). One of the significant factors that could ruin microgreens is growing at the wrong temperature. It is advised not to let the temperature excessively high as microgreens are delicate. Observing whether microgreens are grown at the right temperature and humidity can be checked by the smell⁸. It is the right humidity level if there is no smell emerging from the soil. Therefore, it is essential to understand that higher humidity leads to microgreens' physical damage, as the wet leaves create a great condition for mold⁹. The excellent ratio of the difference between root hairs and mold is shown below in Figure 2.



Fig. 2. Difference between mold and microgreen's root hairs

Moreover, uneven shelving can also derail the plan of rapid microgreen growth. Water is absorbed more on one end than the other if the shelf is uneven, which can lead one side to grow well and the other side is going to be water starved. A willon mistake while planting microgreens is when the root hairs and mold are mixed up¹⁰. Roots of microgreens produce much tinier roots, which seem like white fuzz looking mold. Root hairs evenly cover all the roots'

⁴<https://onlinelibrary.wiley.com/doi/full/10.1111/1750-3841.15049>

⁵<https://onlinelibrary.wiley.com/doi/full/10.1111/1750-3841.15049>

⁶<https://onlinelibrary.wiley.com/doi/full/10.1111/1750-3841.15049>

⁷<https://onlinelibrary.wiley.com/doi/full/10.1111/1750-3841.15049>

⁸ [https://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex15965/\\$file/268_18-1.pdf?OpenElement](https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex15965/$file/268_18-1.pdf?OpenElement)

⁹<https://gardeningtips.in/growing-hydroponic-microgreens-a-full-guide>.

¹⁰<https://planthardware.com/microgreen-mistakes/>

seedlings, whereas mold usually breaks out and spreads from the end. Therefore, the difference between root hairs and mold should be understood as they have a similar appearance.

FDA Regulations in Myanmar

We plan to implement the idea of operating a microgreen business by firstly researching information regarding FDA regulations in Myanmar for growing and selling various green products, including our primary objective, microgreens. The main focuses that will be covered are the legal requirements of producing and later distributing the products aiming for expansion in the future¹¹. Myanmar, a developing country whose economy has been freshly market-oriented, deals with food safety measures and challenges, as imports and exports of food commodities have become a booming industry. Myanmar had a massive failure to prevent illnesses related to low-quality food, littered with low public awareness and poor records of food safety practices among producers and distributors¹². A scarcity of cooperation among governments involved in food security and a few outdated food safety regulations is still under revision¹³. Nevertheless, pre- and post-market surveillance have regularly managed the quality and security of food for consumers.

METHODOLOGY

Research problem and approach

To support our research question, we have developed a possible potential research problem during this pandemic period. We would like to know if the microgreen business will be able to penetrate the markets and if people are interested in learning more about the benefits. There are two main prongs that our paper focuses on. First, we will have primary research where there is a potential for microgreen business in Myanmar. Next, we would like to research various methods which could execute the microgreens operation in Myanmar. Microgreen's existing market research is minimal but growing shortly. To develop clear insight into potential microgreen businesses in Myanmar, we performed primary research by observing online surveys, interviews with the participants in the microgreen market, observation of microgreen businesses in Thailand, and ethnographic research. Secondary research is through business databases, scholarly articles, journals, and research papers from other institutions.

Data collection tools

To this research, carefully constructed online survey questions were used. Online survey questionnaires used were more personal and unstructured interviews to discover the participant's emotions, feelings, and opinions regarding a particular research topic. The main advantage of in-depth survey questionnaires is to eliminate direct contact between the researcher and participants. In that way, we give more of a clear vision of our questions towards the participant and expect to get a more interactive result. Also, online surveys provide more scalability to gather information from a larger audience from anywhere around the world. Data collection tools and google survey forms were used to construct the questionnaire, which was used as a guide for the researcher. The researcher properly prepared questions to gather the proper result towards the satisfaction of the project research objectives.

Included Survey Question were the followings:

1. Age
2. Gender
3. Please describe your knowledge of microgreens.
4. How important is it for you to eat healthily and consume organic food?
5. Do you think microgreen has the potential to be a profitable business in Myanmar's market?
6. How quickly do you think the microgreens market is growing in Myanmar?
7. Who do you think are the typical consumers of microgreens in Myanmar?
8. What are the barriers to entry, i.e., what prevents a person from adopting microgreens? Please select any or all that apply.
9. Why do you buy microgreens? Or why might you buy them in the future?
10. Are you willing to purchase micro green packs regardless of the price?
11. How much will you pay for a tray of a microgreen pack?
12. What, in your opinion, are the most benefits of microgreens? Please rank the following from 1(main benefit) to 6 (less critical benefit);
13. How much would you like to spend on fresh vegetables in a week?
14. If you can get very fresh and organic vegetables, where would you prefer?
15. What would you prefer to deliver your greens in?
16. If there was a local business service available in which you could order fresh microgreen products to be custom grown for yourself, would you use it?
17. Would you be interested in a system that could grow your microgreens for you in your own house?
18. If so, ideally, what size system would you like to have?
19. In your opinion, to what extent microgreens will be in high demand in Myanmar's market?
20. Thank you for your time! Has this survey given an insight into the microgreen business?

Methods

Twenty questionnaires were formulated to find the consumer's awareness, knowledge, and attitude towards microgreens. The questionnaire was distributed to 32 respondents. The first section of the questionnaire consists of some demographic information about Age and Gender. The respondents were classified into four different age categories as follows, 16-25yrs, 26-35yrs, 36-45yrs, and 46-60yrs. The second section of the questionnaire deliberates about the respondent's awareness of microgreens. We aim to study the people's awareness of microgreen products and business in Myanmar. In the middle part of the section, the respondents answered their thoughts on healthy vegetables, nutritional benefits, and price range on how much they would spend on groceries. The very last section also where our main questions are involved deliberate about the consumer awareness of the microgreen market and its potential in profitable business.

RESULTS

A questionnaire was circulated among 32 respondents of the age group from 16-60 years to evoke information about their awareness, knowledge, and attitude towards microgreens terms and business in general. The respondents were classified into four categories: Age(yrs.)

16-25 (46.89% - 15 respondents)

¹¹<https://www.fda.gov.mm/?p=1789>

¹²<https://consult-myanmar.com/2019/08/15/getting-serious-about-food-safety-in-myanmar/>

¹³<http://www.fao.org/tempref/docrep/fao/meeting/008/ad813e.pdf>

26-35 (31.26% - 10 respondents)
 36-45 (15.63% - 5 respondents)
 45-60 (6.25% - 2 respondents)

Many of the respondents (81.30%) were somewhat aware of microgreens; 6.3% of respondents were fully aware of them, and (12.50%) have no awareness about microgreens' terms or knowledge Fig.3.

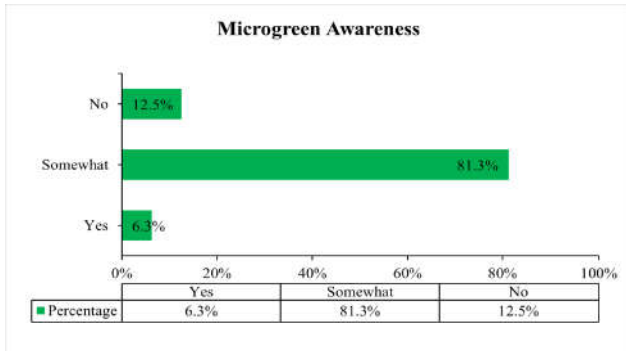


Fig.3. Microgreen Awareness

Most of the respondents (44%) believe that it is quite essential to consume healthy food and organic vegetables, (50%) think it is just essential, and (6%) of the respondents think it is somewhat essential, which is showing that they give a bit of attention on eating healthy and consuming fresh organic food.

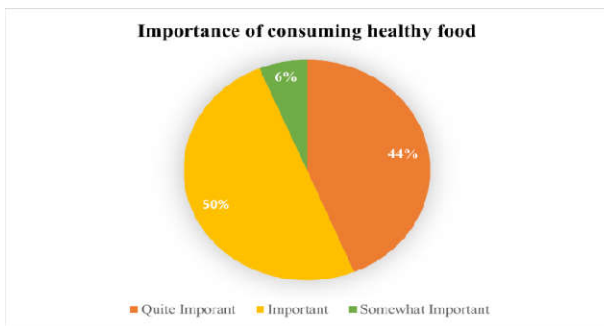


Fig.4 Customer Conception of consuming healthy food

Following the essential factor of microgreen and its nutritional benefits, 29% of the respondents answered that nutrition is the most important, followed by (14%) taste, (9%) texture, and (3%) decoration. On the other hand, the minority of the respondent's answers (10%) taste, (17%) texture, (5%) nutrition, and (9%) decoration was the least essential factor show below in table 1.

Table 1. Consumer Perspective on the importance of micro-green

Micro-green main factor	Taste	Texture	Nutrition	Decoration
Most important	14%	9%	29%	3%
Least important	10%	17%	5%	9%

Microgreen market analysis questions were accompanied after, most of the respondents (53.1%) felt that home users are the primary consumers of the microgreen, (9.4%) retail, (21.9%) chef (15.6%) others usage customers shown in Table 2.

Table 2. Percentage of microgreen potential consumers

Potential Consumers	Percentage
Home users	53.1%
Retail	9.4%
Chef	21.9%
Other	15.6%

The majority (81.2%) felt that the microgreen market is growing initially in Myanmar, and (18.8%) some do not believe, so Figure.5 shown below.

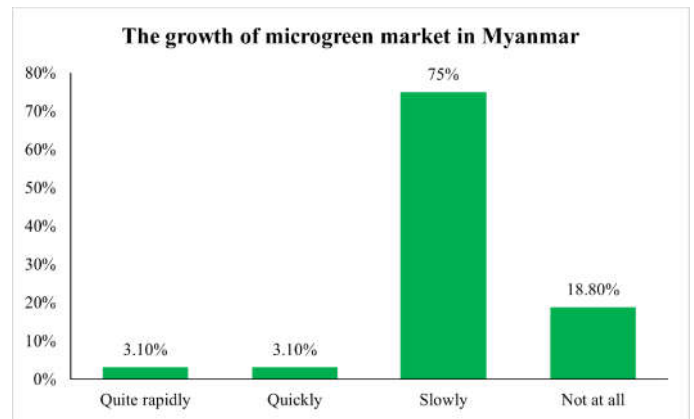


Fig.5. Response of the growth of microgreen market in Myanmar

The primary reason for not adopting microgreens is due to like to you use in future (3.1%), apathy: does not care to use and (25%) price concern (28.1%). According to the survey, most respondents strongly felt both unavailability and unawareness were the significant factors that prevented Burmese people from consuming microgreens. Owing to lack of awareness among people, the majority of them (43.8%) would like to purchase regardless of the price, (46.9%) were somewhat interested, and just significantly less minority group (9.4%) are not willing shown in Figure 6.

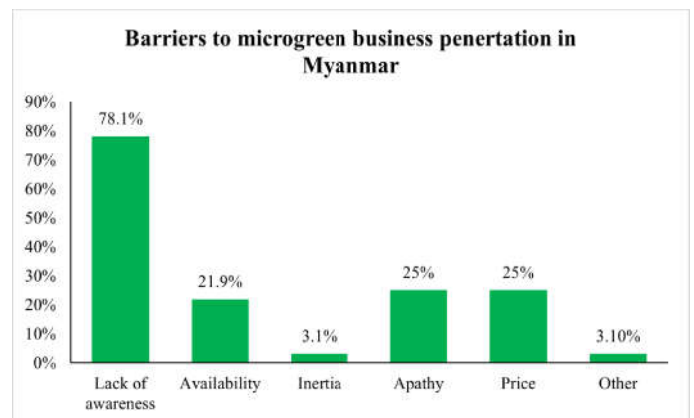


Fig.6. Barriers to microgreen business penetration in Myanmar

In addition to more details on price range, the majority of 65.6% answer the price range within 5000-6000 Kyats, 21.9% answer the price range of 6000-8000 Kyats and the rest chooses on as cheap as they could get can look in Figure (7).



Fig.7. The price range of microgreen potential consumer willing to pay

As people become more aware of the environment, most people started to look out for environmentally friendly ways to prevent pollution. Therefore, according to our survey respondents, a massive percentage of 40.6% want the microgreen package to use biodegradable plastic or paper box 37.5% where else some other options were cardboard box 15.6% and reusable bag and other cheap option shown below Table (3).

Table 3. Type of package that consumer like to purchase microgreen

Type	Percentage
Cardboard Box	15.6%
Biodegradable Plastic	40.6%
Paper Box	37.5%
Reusable Bag	3.1%
Cheap Option	3.1%

According to our response on which market platform that they would like to purchase microgreen, their answers were following; 53.10% direct from farmers, 21.9% from supermarkets, 18.8% local market, and 6.3% from whatever the cheapest option shown in the Table (4) below.

Table 4. Place that potential customer like to purchase

Purchase Place	Percentage
Farmer	53.1%
Supermarket	21.9%
Local Market	18.8%
Cheapest Option	6.3%

We have included one of the bonus questionnaires about installing a system where microgreens will be grown inside the house to have access to their microgreens. Towards this kind of system, there was a potential for the service as (62.5%) were interested in it were (21.9%) answered somewhat interested, and (15.6%) were completely not interested in it. Moreover, about the microgreen home installing system, there was a demand for the service for the family size of 4 (46.9%), family size of 2 (32.4%), and (18.8%) answers for the service for individuals shown in Table 5.

Table 5. Potential Interest in home system service

Grow home system	Percentage
Yes	62.5%
Maybe	21.9%
No	15.6%

Toward the cancer cure, there was almost an equal number of knowledges of it, which were 53.1% (YES) and 46.9% (NO). To conclude, among the respondents (53 %) think that this research survey has given them an insight of microgreen business, where else on the other hand (46.9%) refuse to say so.

Discussion

As it has been mentioned in the results that most of the population are only somewhat aware of the knowledge and advantages of microgreens, more knowledge sharing regarding the microgreen industry is solely required. According to our primary research, the consumers assume that the microgreen market is growing very slowly, and the significant barrier to entering the industry is the lack of awareness of microgreens and their benefits. Most of them have thoughts that the bigger the vegetables, the more nutrients they will contain. So, they begin to compare the size of mature crops and microgreens and start having misconceptions. Price, too, plays a very significant role in this market research. A 100g pack of microgreens is

way more costly than mature vegetables, making them reconsider purchasing. Moreover, some participants are not aware of the microgreen market, as they believe that a pack of microgreens should only cost under 5,000 kyats (USD 3), which is significantly low. More than half of them are okay with the price, which is assumed to be a good sign for our research objective. Furthermore, the research shows that most of the respondents are highly interested in growing microgreens in their own houses. Therefore, it is assumed that they would buy the seeds and grow by themselves rather than purchasing them. Lastly, the knowledge regarding microgreens is highly needed before the industry introduced in the country.

Analysis of External Environment

The COVID pandemic is positively affecting supply chains over businesses. Eateries have experienced closures or considerable drop-off in a request, and numerous ranches have adjusted their trade to remain afloat. Unexpected external impacts are critical to expect when deciding the reasonability of a market. The level of chance or opportunity displayed by external influences can direct a new operation trading methodology. The PESTLE system investigates the outside environment by recognizing the political, financial, sociocultural, innovative, legitimate, and natural strengths affecting an advertisement¹⁴. Food safety, openness, and quality are frequently the subject of public approach and political discussion due to public health. Shifts in direction at the government, state, and metropolitan levels can influence financial movement at different parts of the supply chain. Most microgreen production is domestic; however, the food supply chain in its entirety is becoming increasingly globalized, making food production and trade a developing range of residential arrangements and outside relations¹⁵. Appropriations and tariffs on agricultural products can influence demand, costs, and funding. The Cultivate Charge of 2018 provided the USDA's National Organized of Nourishment and Agribusiness with up to \$10 million of yearly financing toward a competitive allow program supporting the development of urban, indoor, and developing agriculture practices (USDA). Government-funded programs have the potential to extend financing openings for hydroponics farms.

Microgreens trade at a premium compared to other vegetables, with average costs extending from \$25 to \$45 per pound¹⁶. According to the IBIS World industry report for organic crop farming, standard financial variables such as expendable pay levels, the unemployment rate, and economic retreat have verifiably affected organic produce and strength products (IBIS World). The 2020 pandemic is expected to decelerate request development for natural crops due to decreased optional spending. Moreover, large-scale makers constrained to stop trades will need to raise domestic costs to ensure income. According to the USDA's April 2020 viewpoint for new vegetable sales, the shift in demand for food to primary need store channels may diminish the request for items more commonly found in eatery dishes, such as garnishes and vegetables not as widely seen in buyer home cooking. Whereas developing conditions for microgreens are subject to temperature and humidity changes, San Diego's climate is perfect for growing crops and livestock¹⁷. Therefore, developing strategies like hydroponics is vital for minimizing costs related to water and land utilization. Indoor farming is additionally less vulnerable to extreme climate and natural catastrophes, and soilless developing frameworks

¹⁴http://csusmdspace.calstate.edu/bitstream/handle/10211.3/217154/EnssleNicole_Summer2020.pdf?sequence=1

¹⁵<https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-outlook-for-global-growth-in-2015#>

¹⁶http://csusmdspace.calstate.edu/bitstream/handle/10211.3/217154/EnssleNicole_Summer2020.pdf?sequence=1

¹⁷https://www.sandiego.gov/sites/default/files/economic_development_strategy_2017-2019.pdf.pdf

are less inclined to bothers and soil born microscopic organisms¹⁸. While working on research on whether there was the microgreen industry before, the first microgreen business in Myanmar was operated in the year of 2000. The restaurant named "Sharkey's" was the first and only shop that sold organic food and bakery¹⁹. They distribute microgreens to other well-known dining places and individuals. However, microgreen seeds and plants were not their major products. They were well-known because of their signature ice-cream (an ice-cream mixed with microgreens). It was quite popular for a year or two, but they went bankrupt after a few years. According to research, it was not the consumers disliking the products; however, it was the the bad harvesting system and other factors that derail the industry²⁰. The shop they are selling is at one state and the city they were harvesting microgreens were at the other state which produces the mold and rotten stage which led to bankrupt. Hence, potential farmers and business starters can learn from the previous microgreen business in Myanmar.

Literature Review

According to Nicole Enssle of California State University, the paper was presented on 4th August 2020. This paper's main idea is to identify the method for the Solution Farm to execute the plan in expanding its products during this pandemic by introducing micro green in the local market. Microgreen business is a potential business to introduce in the local market. Microgreens are low maintenance, low cost, and efficient to grow. A microgreen is gaining popularity in this era on a global scale (Koppert Cress) as well. According to the USDA research reports, it is stated that microgreens contain approximately five times greater nutrients than mature vegetables. During the pandemic, consumers become more aware of their diet, which increases the demand for organic foods and "superfood." This grows awareness of an interest in eating a healthy diet. Furthermore, a microgreen business requires limited resources and space to expect a quick turnover rate. It can grow year-round and profitable because it can harvest in one to two weeks. The growth of microgreen benefits also includes easily adaptable demand due to short harvest time with less expense. Therefore, the method is to understand the product market, business model to figure out the competitors, supply chain, and potential impacts of macro-levels events like COVID-19. Another central idea by Ellen R. Turner, Yaguang Luo, and Robert L. Buchanan (6th March 2020) is that postharvest quality and safety and several pre-harvest practices affect the postharvest nutrition profile, food safety, and shelf life of microgreens. One major limitation to the microgreen industry's growth is the rapid quality deterioration that occurs soon after harvest, which keeps prices high and restricts commerce to local sales. Moreover, the rapidly growing microgreen industry is facing many challenges. Moreover, this paper reveals that different crops are harvested at different ages according to industry standards and achieve marketable hypocotyl length and leaf area. Microgreens can be assumed that preventing physical injury during harvesting and subsequent handling, distribution, and marketing is critical since they are very delicate and more susceptible to physical damage. A third main idea by the author Elsevier, 2016, demonstrated that microgreens earn enormous potential for adjusting leafy vegetable production to a micro-scale and for improving nutritional value in the human diet. Significant preharvest variables of microgreens

production, such as species choice, fertilization, biofortification, lighting, and growth arranged at harvest, are addressed using physiology and quality. Besides, the fundamental prospects for future investigation pointing to enhance the quality and shelf-life of microgreens are highlighted. Indigenous landraces, underutilized crops, and wild edible plants constitute a tremendous store for a choice of hereditary fabric for microgreens. Modular fertilization may fortify microgreen's bioactive content and expand their sensorial qualities. Pre- and postharvest select-waveband concentrated, and photoperiod combinations can inspire compound-specific changes in functional quality and shelf-life. Therefore, an investigation is required to recognize successful sanitizers and drying strategies non-abusive on quality and shelf-life for commercialization of ready to eat packaged microgreen.

Conclusion

Microgreens contain many substantial health benefits, and its content is loaded with various nutrients. Consumers and distributors can easily decide which microgreen product to purchase or sell as the paper introduces different nutrition portions for different microgreens. Moreover, shelf life, food safety, and packaging of microgreens are mentioned above to target the potential consumers or farmers that are growing microgreens in their own houses or in the farm. Not only possible injury while harvesting and taking care of microgreens but also factors that could derail the plans of growing them are taken into consideration as well. In the study of the microgreen industry, both primary and secondary research are conducted. The primary research consists of sending out surveys to targeted samples and secondary research is mainly conducted from reliable sources and journals. Besides, FDA regulations and analysis of the external environment are added in order to understand Myanmar's food safety laws and regulations. According to our primary research, although the knowledge regarding microgreen towards consumers is highly needed before the industry is introduced in the country, the majority of the participants are highly aware of eating healthy, and are willing to both purchase and grow by themselves which is a positive sign to penetrate the microgreen industry soon in Myanmar.

REFERENCES

- Admin. (2020, February 17). Food and Drug Administration, Myanmar. Retrieved from <https://www.fda.gov.mm/?p=1789>
- Admin. (2020, May 19). *Coronavirus Disease 2019 (COVID-19)* Food and Drug Administration, Myanmar. Retrieved from <https://www.fda.gov.mm/?p=3110>
- Growing Hydroponic Microgreens - A Full Guide*. Gardening Tips. Retrieved from <https://gardeningtips.in/growing-hydroponic-microgreens-a-full-guide>.
- Htoon, K., &Htoon, K. (2020, May 20). Greens grew to order. Retrieved December 04, 2020, Retrieved from https://www.frontiermyanmar.net/en/greens-grown-to-order/?fbclid=IwAR0aR_E8TyYXkHlvknxU_v6cGsl_KlwleQDuiCJ-JsOkfEFjHZex-FY3-ZI
- Lafreniere, A. (2020, May 16). *Top 15 Mistakes to Avoid when Growing Microgreens (Solved!)* Plant Hardware. Retrieved from <https://planthardware.com/microgreen-mistakes/>
- Luis Enriquez, Ina kota, and seven smit , (2015, March 1). The outlook of global growth. Retrieved from <https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-outlook-for-global-growth-in-2015#>
- [Microgreens vs Sprouts: Growing, uses, and benefits. (2019, September 17). Retrieved December 04, 2020, from <https://herbsathome.co/microgreens-vs-sprouts/>

¹⁸http://csusmdspace.calstate.edu/bitstream/handle/10211.3/217154/EnssleNicole_Su_mmer2020.pdf?sequence=1

¹⁹https://www.frontiermyanmar.net/en/greens-grown-to-order/?fbclid=IwAR0aR_E8TyYXkHlvknxU_v6cGsl_KlwleQDuiCJ-JsOkfEFjHZex-FY3-ZI

²⁰https://www.frontiermyanmar.net/en/greens-grown-to-order/?fbclid=IwAR0aR_E8TyYXkHlvknxU_v6cGsl_KlwleQDuiCJ-JsOkfEFjHZex-FY3-ZI

- Nicole Enssle, (2020, August 4) Microgreens: Market Analysis, Growing Methods and Models. Retrieved from http://csusmdspace.calstate.edu/bitstream/handle/10211.3/217154/EnssleNicole_Summer2020.pdf?sequence=1
- Thiha. (2019, August 15). Getting serious about food safety in... Retrieved December 04, 2020 from <https://consult-myanmar.com/2019/08/15/getting-serious-about-food-safety-in-myanmar/>
- Turner, E. R., Luo, Y., & Buchanan, R. L. (2020, March 6). *Microgreen nutrition, food safety, and shelf life: A review*. Wiley Online Library. Retrieved from <https://onlinelibrary.wiley.com/doi/full/10.1111/1750-3841.15049>
- https://www.sandiego.gov/sites/default/files/economic_development_strategy_2017-2019_pdf.pdf
- [https://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex15965/\\$file/268_18-1.pdf?OpenElement](https://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex15965/$file/268_18-1.pdf?OpenElement)
- <https://pdfs.semanticscholar.org/e3f4/a7f0c9800f90c42ca6e19359679c3246965e.pdf>
- <http://www.fao.org/tempref/docrep/fao/meeting/008/ad813e.pdf>
- <https://www.healthline.com/authors/adrienne-santos-longhurst>
