

USING MORINGA AND DANDELION LEAVES FOR THE PRODUCTION OF TEA.**¹Rosemond Anyobodeh****²Felicia Koomson****³Esther Ofeibea Anoff****⁴Priscilla Agyekumaa****Takoradi Technical University. P .O. Box 235, Department of Hospitality, Takoradi.****Corresponding Author: Adelaide Spio-Kwofie: adelaidespiokwofie@ujs.edu.cn****ABSTRACT**

Dandelion and Moringa leaves are great sources of nutrient and has numerous uses but due to its availability especially Dandelion, most people see these leaves as mere weeds and therefore do not use them in food preparation. Dandelion leaves are used to add flavour to salads, sandwiches, and teas. Along the same line, Moringa can also be used for food. The researcher found out that there are many kinds of tea on the Ghanaian markets and since Moringa and Dandelion are a very good source of nutrient with low or no amount of caffeine, it can be introduced into the market to add more variety and flavor to tea consumers. Fifty (50) respondents which were made up of students and lectures were used for the convenience sampling technique to determine the sensory qualities of the product developed. The study revealed that most consumers are unaware of the health benefit of Dandelion and Moringa tea. It therefore recommended that food (breakfast items), manufactures and herbalist should educate the public on the health benefits of Dandelion and Moringa tea. Again, hotels, restaurants and other food joints should also add Dandelion and Moringa tea as part of their breakfast menu in order to create awareness of the product and enhance it sale.

INTRODUCTION

Imagine a tree in your backyard that will meet all your nutritional needs, take care of you medicinally, and purify your water for you, this tree actually exists. For centuries, the natives of northern India and many parts of Africa have known many benefits of Moringa (Yongabi, 2004). Its uses are as unique as the names it is known by, such as clarifier tree and in East Africa it is

called "mother's best friend". Virtually every part of the tree can be used. This tree, though little known in the Western world, is nutritional dynamite and literally hundreds of uses for this tree. In developing tropical countries, Moringa trees have been used to combat malnutrition, especially among infants and nursing mothers, (Yarnell & Abascal, 2009).

Moringaoleifera is one of the 14 species of family Moringaceae, native to India, Africa, Arabia, Southeast Asia, South America, and the Pacific and Caribbean Islands, (Hassan & Ibrahim, 2013). According to (Coppin (2008); Hassan & Ibrahim, 2013) the Moringa tree introduced to Africa from India at the turn of the twentieth century were used as a health supplement. The Moringa is consumed by humans throughout the century in diverse culinary ways (Ukpaka, 2016), almost all parts of the plant used for taste, flavor or as vegetable and seed activities, (Coppin, 2008).

While many people think of the Dandelion leaf as an ordinary weed, herbalists consider it valuable herb that can be used as food and medicine. Dandelion is rich source of vitamins A, B complex, and, D as well as minerals such as iron, potassium, and zinc (Hassan & Ibrahim, 2013). Dandelion leaves are used to add flavor to salads, sandwiches, and teas, and the root as coffee substitute.

Traditionally, Dandelion roots and leaves were used to treat liver problems and native Ghanaians also boiled Dandelion in water to treat kidney disease, swelling, skin problems, heart burn, and upset stomach. Herbalists use dandelion to treat stomach problems, appendicitis, and breast problems, such as inflammation or lack of milk flow. In time past, it was used in remedies for fever, boils, eyes problems, diabetes, and diarrhea. Today, the roots are mainly used as an appetite stimulant, and for liver and gallbladder problems. Dandelion leaves are used as a diuretic to their body to get rid of excess fluid. Dandelion leaves act as a diuretic, increasing the amount of urine the body produces. The leaves are used to stimulate the appetite and help digestion. Dandelion has antioxidant properties and may also help improve the immune system (Ukpaka, 2016).

There are many kinds of tea on the Ghanaian markets and since Moringa and Dandelion are a very good source of nutrient with low or no amount of caffeine, it can be introduced into the market to add more variety and flavor to tea consumers. It's in the researcher's interest to produce tea with Moringa and dandelion that is clean, has flavor, taste and also a lot of nutritional importance to the consumer.

Tea is one of the most important beverages in the world. Currently, tea consumption is continuously increased due to its excellent taste and aroma, and mainly its health benefits. The health benefits provided by tea generally include the prevention and treatment of cancer, cardiovascular diseases, osteoporosis and also dental caries (Gao et al., 1994; Hilal & Engelhardt, 2007). Several studies have shown that polyphenols and flavonoids in tea are good antioxidants and effective in reducing free radical-mediated degradation of cells and tissues in an organism (Hassan & Ibrahim, 2013). Tea can be divided by the degree of fermentation into unfermented and these are green tea, partially fermented oolong tea and completely fermented black tea (Kim, Goodner, Park, Choi, & Talcott, 2011). White tea tends to have the most delicate flavors and aromas and aromas tend towards subtle floral bouquets. The green tea leaves are heated before they're rolled (by hand or in a machine) and dried. Very little oxidation, but the extra steps bring out more natural flavor. Oolong tea is the most popular in Taiwan. It is referred to as semi-fermented tea and contains a mixture of non-oxidized monogenic polyphenols and higher molecular-weight flavins. Black teas, which the Chinese sometimes call red teas because of the amber colour of the infusion (not to be confused with rooibos red tea), are fully oxidized teas. While the history of this style of tea making is a little blurry, most evidence indicates that its origins are rooted in the Chinese tea trade with the West. Most probably a derivative of the more traditional and complicated oolong styles, the stronger and darker black teas were favored by the British and Dutch traders of the 18th century, (Kim et al., 2011).

Farmers have added the leaves to animal feed to maintain a healthy livestock (Morand-Fehr, Fedele, Decandia, & Le Frileux, 2007) while utilizing the manure and vegetable compost for crop growth (Flanders & Gillespie, 2015). Newer applications include the use of Moringa powder as a fish food in aqua-cultural systems and the Moringa leaves as a protein supplement for animals, such as cows. The feeding value of Moringa has been reported to be similar to that of soybeans and rapeseed meal (Flanders & Gillespie, 2015; Morand-Fehr et al., 2007). With the leaves being rich in nutrients, pregnant women and lactating mothers use the powdered leaves to enhance their child's or children's nourishment, especially in under developed countries suffering from malnutrition (Asghari, Palizban, & Bakhshaei, 2015). Moringa leaf has been purported to be a good source of nutrition and a naturally organic health supplement that can be used in many therapeutic ways (Ukpaka, 2016; Yarnell & Abascal, 2009). The leaves are a very rich source of nutrients and contain the essential vitamins A, C and E. Though not proven, it has

been considered by many to contain as much vitamin A as a carrot, vitamin C as an orange and vitamin E as a pomegranate.

Leaves rich in biologically active carotenoids, tocopherols and vitamin C have health-promoting potential in maintaining a balanced diet and preventing free-radical damage that can initiate many illnesses (Shahriar et al., 2012). In addition to the provitamins, Moringa leaves are also considered a rich source of minerals (Asghari et al., 2015; Ukpaka, 2016) alkaloids, and proteins (Owusu, Ellis, & Oduro, 2008). These essential nutrients can help decrease the nutritional deficit and combat many chronic inflammatory diseases.

The World Health Organization (WHO) has been studying the use of *M. Oleifera* for many decades as a low cost supplement enhancer in the poorest countries around the world (Hassan & Ibrahim, 2013). This organization has been promoting the use of this plant to help those countries suffering from malnutrition, which is one of the major causes of death worldwide. Moringa leaves have so many uses such as relieve headaches, stop bleeding from a shallow cut, treat diarrhea in Malawi and also used in the treatment of scurvy skin diseases (common bacterial infections of the skin) (Yongabi, 2004).

In 1997-98, Alternative Action for African Development (AGADA) and Church World Service tested the ability of Moringa leaf powder to prevent or cure malnutrition in pregnant or breast-feeding women and their children in Senegal. Malnutrition was a major problem in this area, with more than 600 malnourished infants treated every year. During the test, doctors, nurses, and midwives were trained in preparing and using Moringa leaf powder for treating malnutrition. Village women were also trained in the preparation and use of Moringa leaf powder in foods.

This test found the following effects to be common among subjects taking Moringa leaf powder: Children maintained or increased their weight and improved overall health, Pregnant women recovered from anemia and had babies with higher birth weights, and Breast-feeding women increased their production of milk Church World Service (Owusu et al., 2008).

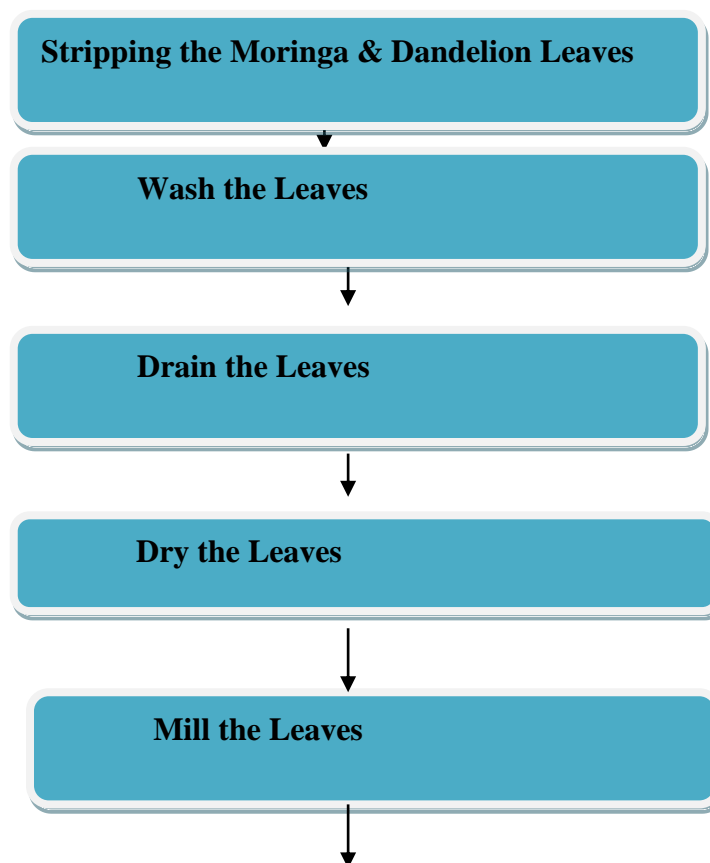
Dandelion has been a revered herb throughout history, regarded as one of the very best herbs known for gall, spleen and liver complaints, and one of the safest and most active plant diuretics. Dandelion is helpful for people who are suffering from allergies, eczema and other skin conditions, asthma, arthritis, gout, rheumatism, gallstone, metabolic disturbances, bone disorders, low blood pressure, poor circulation, ulcers, anemia, halitosis (bad breath), constipation, malignant tumors, colds, lowering cholesterol, cardiac edema, heart burn,

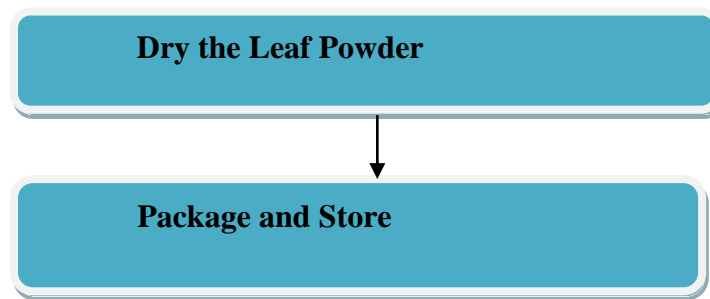
swollen glands, hot flushes, and as a sleep inducing night cap. Dandelion juice can help diabetic patients by stimulating the production of insulin from the pancreas, thereby keeping the blood sugar level low. Since dandelions are diuretic in nature, they increase urination in diabetic patients, which helps remove the excess sugar from the body. Diabetics are also prone to renal problems, so the diuretic properties of Dandelion can help removing the sugar deposition in the kidneys through increased urination. Furthermore, Dandelion juice is slightly bitter to taste, which effectively lowers the sugar level in the blood, as all bitter substances do. Dandelions can also be used as a vegetable and is a good source of fiber. It promotes digestion, and in the past, it was used to treat scurvy, because of its high levels of vitamin-C. It is for this reason the researchers sought to use Dandelion and Moringa to prepare tea.

Preparation of Moringa and Dandelion Powder

The Moringa and Dandelion leaves were harvested and after harvesting, it was dried at a cool dry place (not under direct sun drying). The leaves were crushed and allowed to air for 15-30 minute and packaged into tea bags.

Fig 1: Processing of Moringa and Dandelion Powder into Tea Flow Chart





Composite of Moringa and Dandelion Tea Preparation

After preparing the raw material the samples were made with varied proportions of Moringa and Dandelion leaves powder. Products 'A' was made of 100% Moringa 0% of Dandelion leaf powder. Product 'B' was made 100% Dandelion and 0% of Moringa leaf powder, product 'C' was made of 50% Moringa and 50% Dandelion, product 'D' was made of 60% Moringa and 40% Dandelion, while product 'E' comprised of 70% Moringa leaf powder and 30% Dandelion leaf powder.

After picking the raw materials for the product from the Takoradi Polytechnic Community, both ingredient for tea making, Moringa and Dandelion leaves were sorted to get the best out of it.

After sorting, the raw products were washed with clean water to remove any dirt around it. The clean Moringa and Dandelion leaves were first dried, milled, sifted into Moringa and Dandelion powder, cooled and packaged in tea bags.

Packaging and Storing

The temperature and humidity must be controlled in the packaging room, to avoid dehumidification of the product. After drying, the powder is left to cool and packed into clean, single-use polythene bags and sealed. This is enclosed in a second polythene bag and heat-sealed. This is to maintain freshness and dryness prior to further use. The bags should be stored in a cool, dry place.

Labeling

Each package of Moringa and Dandelion leaf product must be legibly marked with the following information: Name of product, Net content, Name and address of producer, Country of origin, Lot / batch identification number or code, Instructions for use, Production date, Nutritional information (optional).

Sensory Evaluation

Fifty panelist were selected and trained to have a test of the product been produced. These people were made up of students and lecturers of the Takoradi Polytechnic. The panelists were trained on the appropriate time and how the testing is to be done. The testing was done around 11:00am and they were taught to rinse their mouth and re - test if they are not sure of their answer.

To make the sensory evaluation successful a score sheet was prepared and the people were trained to tick (√) to the product best preferred to the product next most preferred and to the product least preferred. The use of preference test using ranking and codes really make the sensory evaluation bias free.

Figure 2: Images on Dandelion and Moringa Leaves and Tea



Fresh Dandelion Leaves



Fresh Moringa Leaves



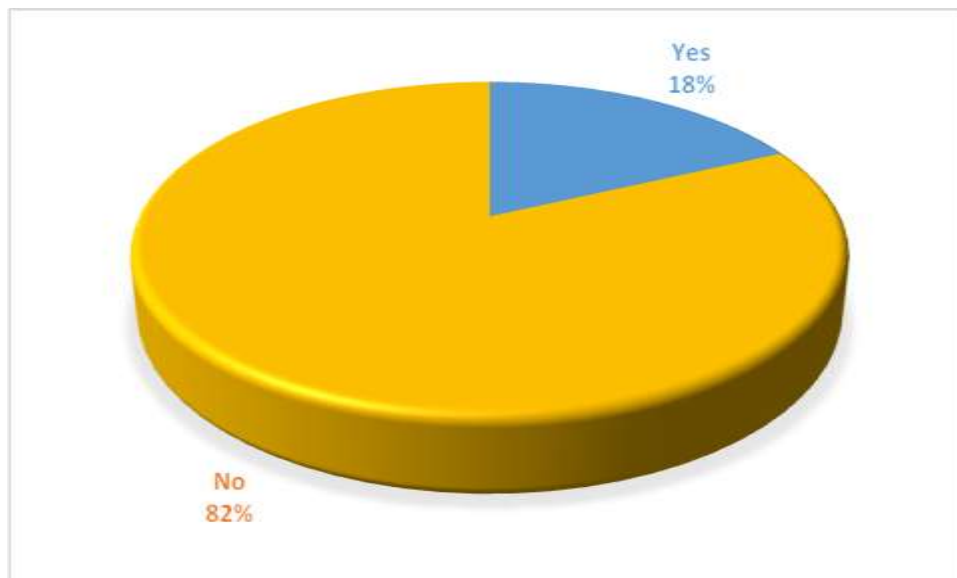
Dry Leaves of Dandelion



Dry Leaves of Moringa



The final product of Dandelion and Moringa Tea



(Source: field work, June, 2016)

Figure 3: Whether respondents have used Moringa/Dandelion in tea preparation before.

Here, the respondents were asked if they had used Moringa/Dandelion in preparing tea before. It was found that out of 100%, only 18% respondents had used Dandelion/Moringa in preparing tea. The greater portion of the respondents representing 82% stated that they have never tried using Moringa/Dandelion in preparing tea before. This finding shows that most of the respondents are unaware that Moringa/Dandelion can also be used in preparing tea. According to Fahey (2005) the whole seeds can also be eaten green, roasted or powdered, and steamed in tea and curries

In relation to the preparation method used by the respondents, some stated that they use fresh leaves whilst others said they dry the leaves before using. However in each case they boil the leaves before using. In addition some prefer drinking it raw whilst others prefer adding milk and sugar.

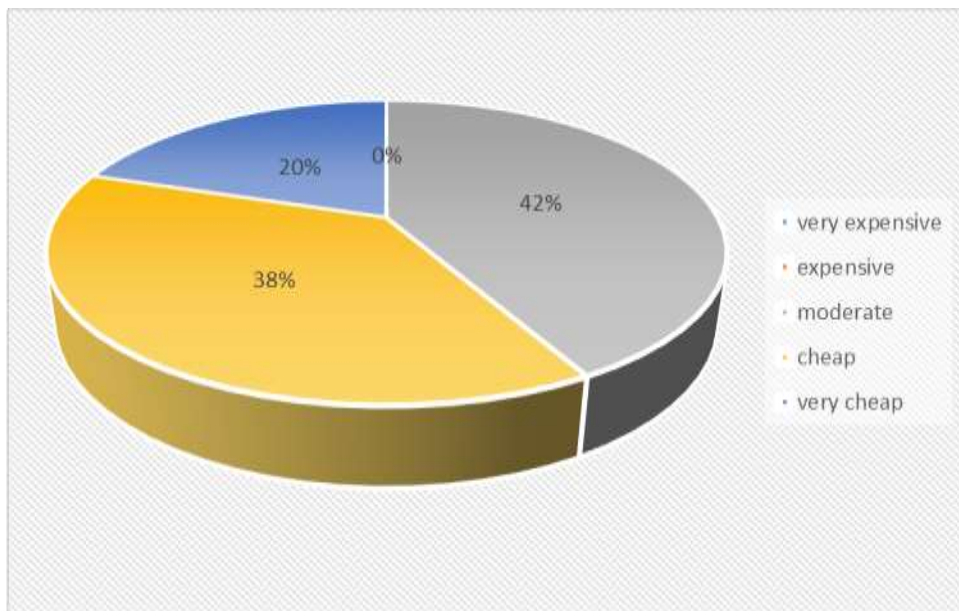
Table 1: Sample of Dandelion (50%): Moringa (50%)

	1=Excellent (%)	2=Very Good (%)	3=Good (%)	4=Poor (%)	5=Very Poor
	1(%)	2(%)	3(%)	4(%)	5(%)
Appearance	12	46	42	-	-
Aroma	2	76	20	2	-
Taste	20	32	42	8	-
After Taste	12	28	54	6	-

(Source: field work, June, 2016)

This sample was a mixture of Dandelion and Moringa in the ratio 50%:50%. From the results, it was found that 12% respondents which form the minority argued that the appearance of Moringa/Dandelion tea was excellent.

However, majority representing 46% confirmed the appearance was very good, 76% stated the aroma of the product was very good and on the taste of the mixture minority (8%) said its poor while majority 42% said its good. In the same vein, 6% which forms minority of respondents (6) rated the “aftertaste” of the mixture as poor whilst 54% rated it as good. Concerning overall grading of the product majority of respondents confirmed that the product is very good. This accounted for 46%.

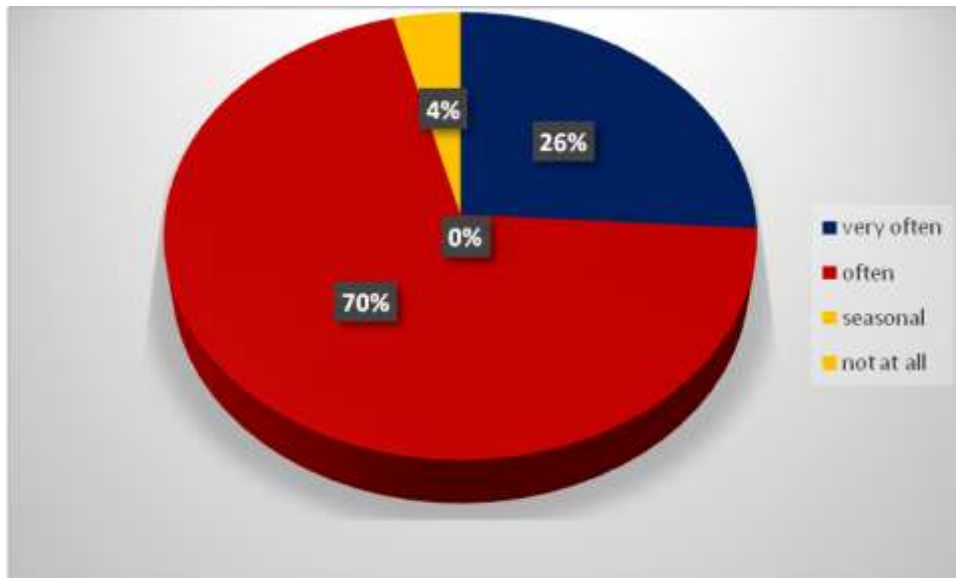


(Source: field work, June, 2016)

Figure 4: View on price of Dandelion and Moringa tea

From the results obtained, none of the respondents stated that Dandelion/Moringa tea is expensive or very expensive as compared to other green tea on the market. 42% respondents stated that the price of Dandelion and Moringa tea is moderate; 38% respondents perceive the price as being cheap and 20% said the price of Moringa/Dandelion tea is cheaper than other green tea on the market. The results therefore suggest that Dandelion/ Moringa tea is very affordable as compared to other green tea on the market.

Availability of Dandelion and Moringa



(Source: field work, June, 2016)

Figure 5: How often Dandelion and Moringa is available

From the results obtained, 26% respondents said they get Dandelion and Moringa very often whilst 70% said they get Dandelion and Moringa often. This implies that it is not very difficult getting Dandelion and Moringa leaves. Only 4% respondents stated that the availability of Dandelion and Moringa is seasonal. Concerning availability of the herbs, Shindano and Chitundu (2008) stated that Moringa is adaptable to a wide range of environmental conditions from hot and dry to hot, humid, wet conditions and is available throughout the year in tropical areas especially

This study aimed to find out the use of Moringa and Dandelion in the production of tea. Based on the set objectives and the main purpose of the study, it found out that it is possible to use Dandelion and Moringa in making tea. Both leaves can be used in their fresh state and can also be dried before using. However in both case hot water is added. In addition to tea preparation, the study also found out that both Dandelion and Moringa can be used for dishes like stew, soups, and salads among others.

The study also found that a combination of Dandelion and Moringa in tea preparation will be accepted when introduced. From the survey, 46% confirmed that the appearance of Dandelion and Moringa tea was very good, 76% stated that the aroma of the product was very good and 42% said the product has a good taste. In addition to the quality of the product, 70% respondents stated that it is not difficult getting Dandelion and Moringa and it is very affordable and nutritious as compared to other green tea on the market.

Conclusions/ Recommendations

Dandelion and Moringa leaves are great sources of nutrient and has numerous uses. Due to its availability especially Dandelion, most people see these leaves as mere weeds and therefore do not use them in food preparation. Both Dandelion and Moringa have nutritional benefits and are also known for their medicinal purposes especially in developing tropical countries. For instance, Dandelion is rich source of vitamins A, B complex, and, D as well as minerals such as iron, potassium, and zinc. Dandelion leaves are used to add flavour to salads, sandwiches, and teas. Along the same line, Moringa is also a rich source of vitamins A, B and C, calcium, iron and protein and can also be used for food. The study therefore concludes that the use of Dandelion and Moringa leaves in tea preparation should be encouraged.

Most consumers are unaware of the health benefit of Dandelion and Moringa tea. It is therefore recommended that food (breakfast items) manufactures and herbalist should educate the public on the health benefits of Dandelion and Moringa tea.

Hotels, restaurants and other food joints should also add Dandelion and Moringa tea as part of their breakfast menu in order to create awareness of the product and enhance it sale.

Menu planners should also include Moringa / Dandelion tea when planning menu for breakfast. Finally, in order to make the accessibility of Dandelion and Moringa very convenient,

individuals should grow the plant in their backyard gardens.

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