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A survey on the state of moringa cultivation and utilization in Kwazulu-Natal

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The African population is predicted to be 1,397,607,646, with the South African population estimated to be 60,635,919. With a continually expanding population across the continent, satisfying the demands of present and future generations will be a major global challenge. As a result, this study investigated *Moringa oleifera lam* as a superfood with the potential to reduce poverty and unemployment, promote rural economies, and close the rural-urban inequality gap. The study identified *M. oleifera* in the province, its current and potential consumption, and its economic value to rural farming. To do this, the study employed a mixed-method technique. Data was gathered using face-to-face interviews and online survey questionnaires. The study's target demographic included *M. oleifera* farmers and consumers from all 11 district municipalities in KwaZulu-Natal. The desired population size was 1,000, while the sample size was 550 respondents. According to the data, *M. oleifera* is cultivated on a modest scale in KZN. The findings show that 63% of respondents were *M. oleifera* consumers, 8% were traders, and 7% grew moringa in the province. Furthermore, 64.5% of respondents use *M. oleifera* for therapeutic and nutritional reasons.

Key words: *Moringa oleifera lam*, unemployment, poverty, inequality, value chain.

INTRODUCTION

Moringa oleifera lam is of the Moringaceae family and has common names such as moringa, horseradish tree, drumstick tree etc. (Mashamaite et al., 2021). There are 13 documented species of Moringaceae family (*M. Oleifera, M. arborea, M. concanensis, M. drouhardii, M. hildebarndtii, M. longituba, M. ovalifolia, M. peregrine, M. pygmaea, M. rivae, M. ruspoliana, M. stenopetala and M. borziana)* and are widely known for their multitude uses including medicine, plant growth enhancer, nutritional benefits, livestock feed, cosmetics, biofuel production and water purification (Mashamaite et al., 2021). *M. oleifera lam* is native to Western and sub-Himalayan tracts, India, Pakistan, and Africa (Luqman et al., 2012). This plant is well distributed in the Philippines, Cambodia, America, and the Caribbean Islands (Luqman et al., 2012). With continued cultivation, it has become naturalized in the

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tropic and sub-tropic regions of the world (Moyo et al., 2016). In South Africa, moringa is produced in Limpopo, Gauteng, Mpumalanga, KwaZulu-Natal, Free State, and the Northwest provinces (South African Department of Agriculture, Forestry and Fisheries, 2016). Among these provinces, it is mainly grown in the Limpopo province by farmers and at the household level (United Nations Department of Economic and Social Affairs, Population Division, 2019).

In 2013, the Moringa Development Association of South Africa (MDASA), a Non-Profit Organization (NPO) in Polokwane, was formed with a mandate to promote the production, use and commercialization of moringa (MDASA, 2013). MDASA serves as a hub for moringa farmers, product developers and consumers through collaboration with research institutes and organizations for new knowledge and developments (Mashamaite et al*.,* 2021). *M. oleifera* is grown in numerous (>1000) household gardens (MDASA, 2019). A research study reported by Joubert (2010) found that *M. oleifera* was ideally suited to produce biodiesel and related products while providing valuable nutrition. In other parts of the province, *M. oleifera* was planted at the household level for personal use. This explains why the farming industry in KZN is still in its infancy compared to other provinces.

Considering the very important market value of *M. oleifera*, investigations are needed to assess the profitability of its marketing and to establish the value chain (Luqman et al*.,* 2012). Globally, the moringa industry was estimated at $5.5 billion (R92.5 billion) in 2018 (Grandview Research, 2019). The moringa ingredients market was valued at US$ 4,513.92 million in 2021 and is projected to reach US$ 7,307.17 million by 2028; it is expected to grow at a compound annual growth rate (CAGR) of 7.1% from 2021 to 2028 (Research and Markets, 2022). The production of 200kg of moringa leaf generates an annual revenue of R190,000 (Luhlaza, 2019). The annual income of R190,000 is generated from selling R200kg of *M. oleifera* at R950/kg, resulting in a gross margin of R85,300.00 (Luhlaza, 2019). Furthermore, the production of 100kg of moringa leaf generates an annual revenue of R95,000. These numbers are limited to 1 hectare (ha) of land per annum with the input cost of R66 300 (Luhlaza, 2019).

Global actors such as the United Nations, the World Bank, the International Monetary Fund (IMF), and commonwealth countries have over the years made strides towards alleviating global poverty (World Bank, 2020). Since 1990, more than 1.2 billion people have risen out of extreme poverty (Andres et al*.,* 2022). In 2022, the World Bank reported that 9.2% of the world survives on less than $1.90 a day, compared to nearly 36% in 1990. While this indicates progress in the fight against poverty, the increased demand for food to alleviate hunger and malnutrition has remained a challenge in emerging countries over the last few decades (Mashamaite et al*.,* 2021). According to the World Bank (2021), global extreme poverty rose in 2020 for the first time in over 20 years as the disruption of the COVID-19 pandemic added pressure to economies already faced by conflict and climate change, which further contributed to the slow progress of poverty reduction. Additionally, between 13.1 and 14.1 million people in Ethiopia, Kenya and Somalia faced high levels of acute food insecurity and severe water shortages due to drought in the first quarter of 2022 (Snowdon, 2022).

Consequently, 1 billion people are now living in poverty (World Bank, 2023). Kharas (2020) predicted that, by 2030, the number of people living in poverty will be higher than the baseline of 2020 by 60 million people. The African population was estimated at 1,402,186,072 as of June 4, 2022 (Worldometer, 2022) and the current population of South Africa is 60,744,193 as of June 5, 2022 (Worldometer, 2022). As these populations continue to increase over time, meeting their needs such as food, shelter, clothing, education, clean water, sanitation, public transportation, access to medical care, and employment will be a challenge.

It is against this backdrop that this study posits that *M. oleifera* is the new superfood that has the potential to alleviate poverty, unemployment, boost rural economies, medicinal values and bridge the inequality gap between rural and urban areas in KwaZulu-Natal (KZN). Rural communities have been dependent on the diversity of plants for food, nutrition, medicine, shelter, and energy for their overall well-being (Liu et al*.,* 2018). Moringa is easily cultivable, it demands low-cost labour and its direct provisioning services to humans are food, cosmetics (Adegbe et al*.,* 2016), human nutrition and food science (Bolarinwa et al*.,* 2019), phytomedicine and phytotherapy (Oguntibeju et al*.,* 2020), water treatment (Gupta et al*.,* 2018), biodiesel production (Oladipo and Betiku, 2020), and food and animal feed (Su and Chen, 2020). Moringa makes it a sustainable remedy for malnutrition, holistic medicine, and fuel production. The plant is rich in nutrition owing to the presence of a variety of essential phytochemicals present in its leaves, pods, and seeds (Gopalakrishnan et al*.,* 2016). The pods provide 7 times more vitamin C than oranges, 10 times more vitamin A than carrots, 17 times more calcium than milk, 9 times more protein than yoghurt, 15 times more potassium than bananas and 25 times more iron than spinach (Rockwood et al*.,* 2013).

This study provides an overview of the cultivation, nutritional values, medicinal properties for commercial use and pharmacological properties of moringa by reviewing existing research on the cultivation and economic potential of growing moringa, reviewing moringa projects in South Africa, mapping out moringa plantations, cultivation and harvesting in KZN, and the economic benefit of commercialising moringa farming in rural KZN. *M. oleifera* is a significant superfood due to the

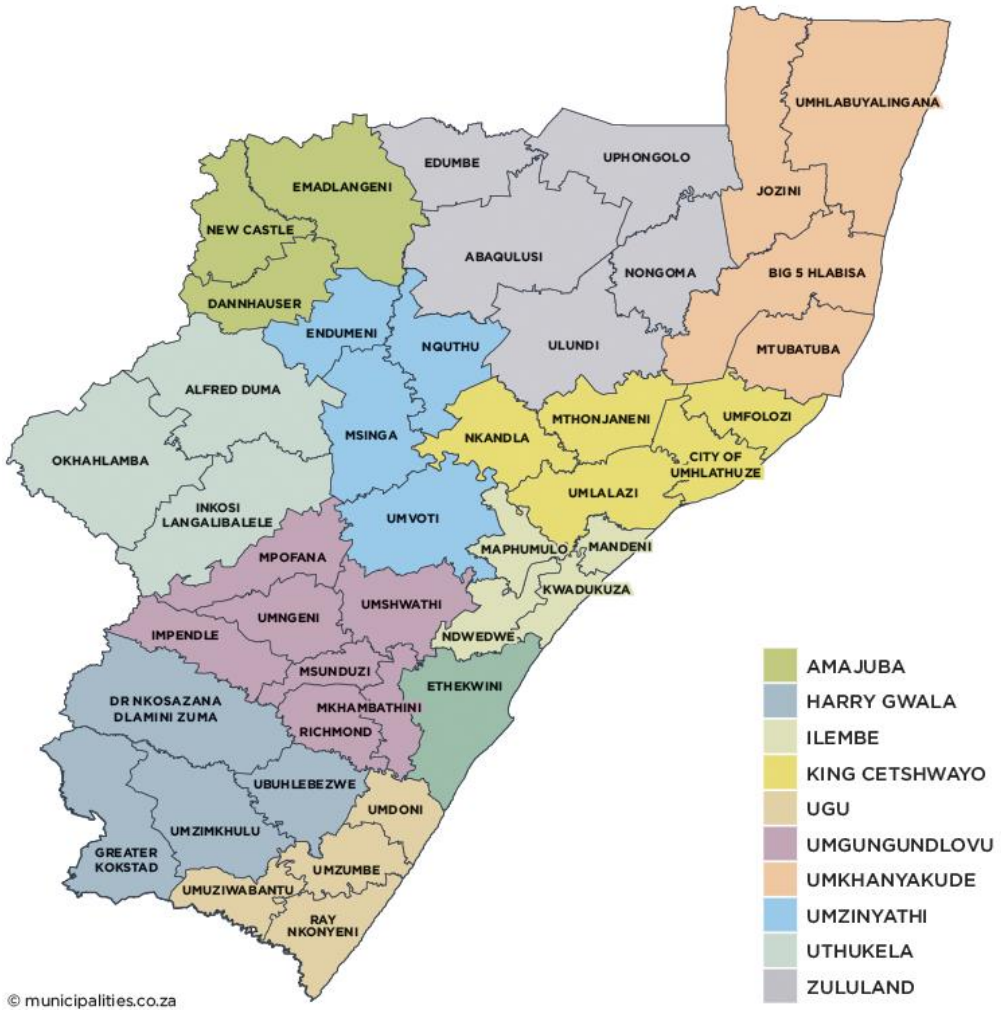

Figure 1. District municipalities in KZN.
Source: Survey Results (2022).

scarce medical accessibility and malnutrition that exists in South Africa. There is potential for commercial and smallholder farmers in KZN to cultivate the tree to increase production (Makgolane, 2020). However, research studies by Luhlaza (2019), Teagle (2021), Mashamaite et al. (2021), and George et al. (2021) revealed that moringa farming was still in its infancy in South Africa. Moreover, most *M. oleifera* research studies that have been conducted in South Africa, tend to focus on metabolites and nutritional content of *M. oleifera.*

METHODOLOGY

Description of the study area

The cultivation of moringa is successful in areas that fall under the savanna biome because of warm temperatures (Mabapa et al., 2017). The findings suggest that *M. oleifera* can be cultivated in these districts of KZN: uMkhanyakude, Zululand, King Cetshwayo, Amajuba, uMzinyathi, and Harry Gwala. Data was collected in 10 district municipalities and 1 metropolitan area where it was found that *M. oleifera* was dominant in Amajuba, King Cetshwayo, Zululand and uMkhanyakude, the Northern parts of the province (Figure 1).

Research design

Data were gathered for this study using a mixed-method research methodology from all KZN municipalities. In-person interviews and an online survey were used to gather data in each of the 11 district municipalities.

With a 95% confidence level and a 3.5% margin of error, the population size was 1000 moringa producers and consumers, or 440 target group. Of these, 550 moringa farmers and consumers in KZN responded to the survey. Questionnaires were constructed to

address the objectives of this study. The Item - Content Validity [I-CVI] is the Content Validity Index (CVI) that was utilized in this investigation (Shi et al., 2017). On a 4-point Likert scale, with 1 denoting not relevant, 2 somewhat relevant, 3 relevant, and 4 denoting very relevant, three academic experts were asked to evaluate each question's relevance. Next, for every question, the number of experts who scored a 3 or a 4 (3.4 being relevant and 1.2 being nonrelevant) was tallied. I-CVI values between 0.78 and 1.00 are advised. After rating the questionnaire, the experts assigned it an I-CVI of 0.9.

Sampling strategies

In this investigation, a mixture of two sampling techniques—cluster sampling and focus group discussion—was employed. Focus Group Discussion (FGD) is a qualitative research method and data collection methodology in which a small group of people discuss a certain topic or issue in depth, supported by a professional, external moderator (Patton, 2002). To do this, people or groups of people who are particularly aware or experienced with a phenomenon of interest must be identified and chosen (Plano and Creswell, 2011). When using cluster sampling, every member of the population is separated into groups or clusters. These clusters are then randomly sampled, and all of these are included in the final sample (Wilson, 2010). This sampling technique reduces time and money and is useful for researchers whose respondents are dispersed over wide geographic areas, as is the situation with KZN districts (Davis and Cosenza, 2005). In all the KZN local municipalities, a sample of *M. oleifera* producers and consumers was taken for this study.

Data analysis

After identifying and removing all duplicate records and errors, the quantitative data was cleaned and validated, and any typos were fixed. Descriptive statistical techniques, such as frequency, mean, and standard deviation, were applied to the data analysis to yield the desired results. With the aid of Microsoft Excel and the Statistical Package for Social Sciences (SPSS), summary charts were created. Thematic analysis was employed to analyse qualitative data.

Exclusion criteria

People without any prior knowledge of or experience with *M. oleifera* were not allowed to participate in the survey, nor were minors under the age of 18.

Ethical considerations

The ethical considerations of research are crucial when working with human participants. Ethical issues include maintaining confidentiality, upholding privacy, fostering open and honest communication, and refraining from deception should all be considered when doing research (Weinbaum et al., 2019). Research in a variety of domains has acknowledged informed consent as a crucial component of ethics (Kang and Hwang, 2021). As a result, the following crucial ethical principles were considered when performing this research study: accountability, anonymity, secrecy, openness, and informed permission. Subjects were not compensated or under any duress to participate in this study; their participation was voluntary. The subjects also provided their informed consent.

Study limitation

There are no documented indigenous or vernacular names (*Zulu language*) for *M. oleifera,* which provided a significant barrier when conducting this study because some participants were unable to appropriately identify moringa trees, particularly in remote areas. To circumvent this problem, data collectors showed participants photos of the tree. This underscores the urgent necessity for the creation of an indigenous name that will aid in the promotion and cultivation of this tree.

RESULTS AND DISCUSSION

Respondents by district municipality

There were 550 survey respondents, with the bulk coming from uMgungundlovu (19%), Ugu (15%), and uMkhanyakude (13%) districts municipalities. Figure 2 depicts representations from the other district municipalities ranging from 4% to 9% each.

Gender of the participants

Figure 3 demonstrates that gender representation was virtually evenly distributed, with only a 5% advantage for females. Participants were selected randomly to minimize biasness. *M. oleifera* is a popular cosmetic product, which may explain why most responders (55%) who use moringa products are women. According to Palada (2019) and Nizioł-Łukaszewska et al. (2020), moringa seed oil contains antibacterial and anti-inflammatory qualities that help treat cuts, bruises, burns, insect bites, rashes, scrapes, and acne. Furthermore, Picodi (2020) discovered that 67% of South African women purchase eco-friendly cosmetics, whilst only 21% of men questioned do. This could further explain why there are more female respondents. Additionally, *M. oleifera* is also recognized to ease menstruation pain and discomfort.

The existence of moringa plantation/farm

Survey respondents were asked if their municipality had any *M. oleifera* farms or plantations. Figure 4 summarizes the responses by district municipality. It should be highlighted that, on average, only 15% of respondents indicated there were moringa farms in their area, 40% said there were no *M. oleifera* trees planted, and 45% were unfamiliar with the tree. This demands educational awareness campaigns to encourage the production and use of this plant. There are prominent districts, with at least 22% of respondents reporting moringa farms in their communities. The findings are congruent with the report by Tshabalala et al. (2020), who found that moringa is cultivated in uMkhanyakude, Zululand, King Cetshwayo, Amajuba, uMzinyathi, and Harry Gwala. Figure 4 shows

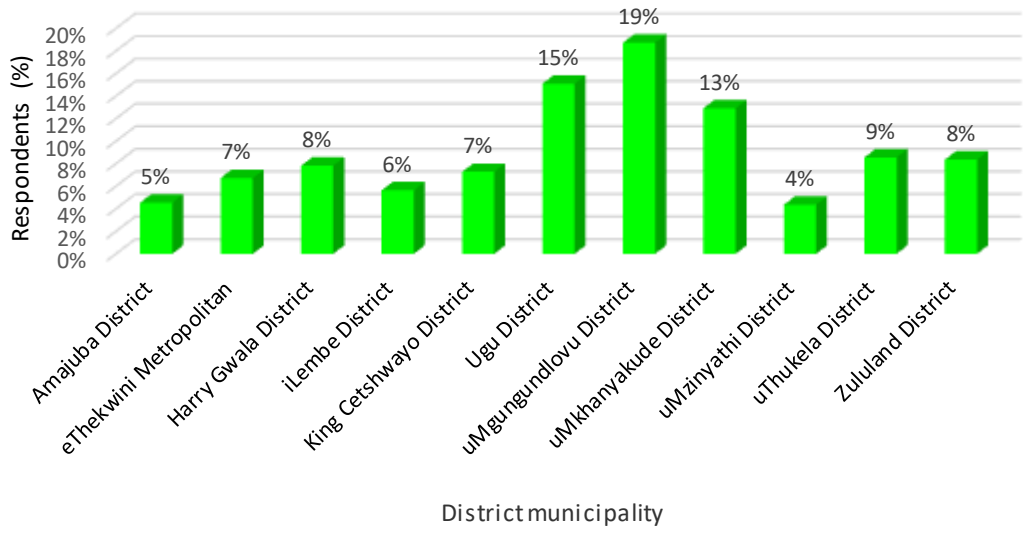

Figure 2. Respondents per district municipality.
Source: Survey Results (2022).

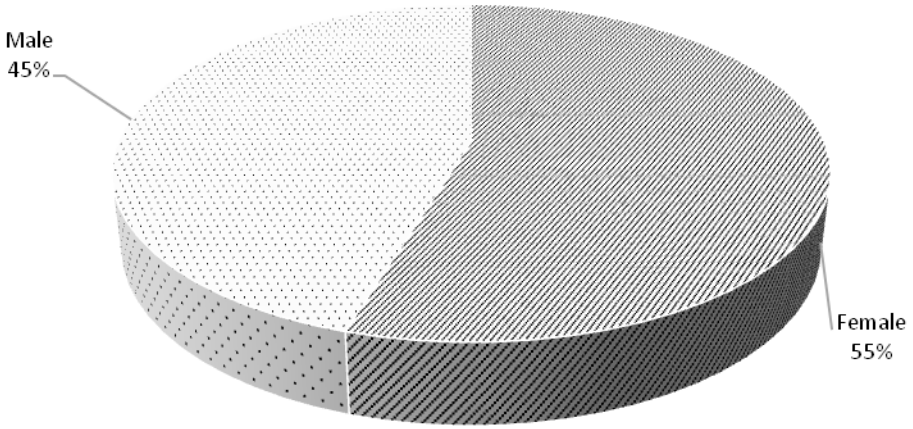

Figure 3. Gender of the participants.
Source: Survey Results (2022).

that moringa farms were most common in Amajuba (40%), King Cetshwayo (28%), uMkhanyakude (27%), and Zululand (22%), all of which are in the north of KwaZulu Natal. Temperatures in these districts range from 16 to 25°C in winter and 23 to 33°C in summer (September to April), making them ideal for moringa cultivation.

Moringa value chain

According to the results of this study, the majority (63%) are at the consuming end of the moringa value chain, with 8% trading and only 7% planting *M. oleifera* (Figure 5). Approximately 19% of respondents were either unaware of the tree or unable to recognize it. Respondents from Ndwedwe, iLembe District, claimed that the moringa tree was not common in their municipality. In most cases, the Department of Agriculture did not have any records on *M. oleifera* growers, which respondents regarded as a barrier to participation in the value chain. It is apparent that there has been poor or no drive by the department to promote the cultivation of moringa especially in rural arears. As a result, growers were unable to access the resources, infrastructure, moringa seed, or transplants required for

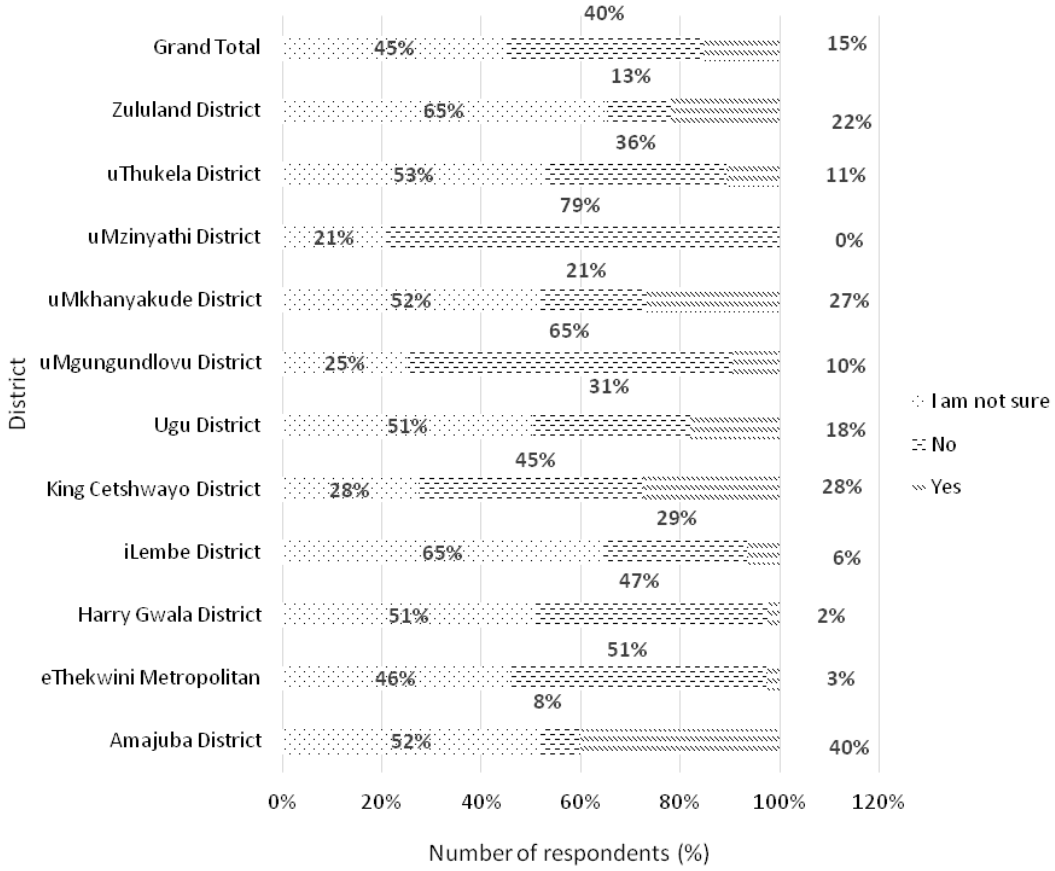

Figure 4. Moringa plantation per district.
Source: Survey Results (2022).

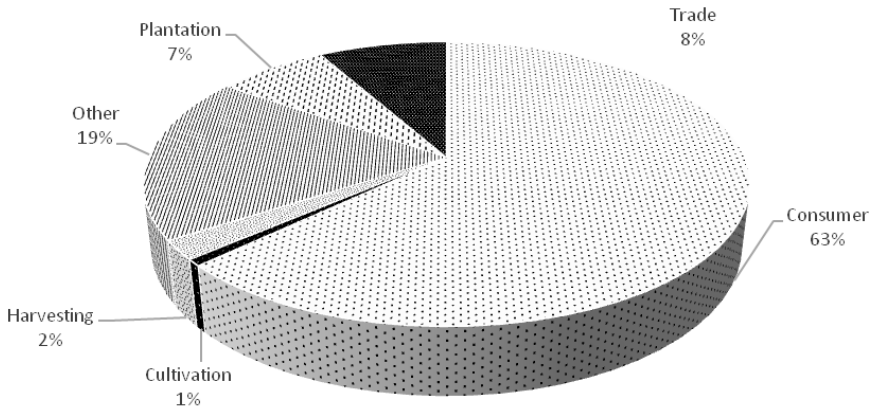

Figure 5. Role of respondents in *M. oleifera* value chain.
Source: Survey Results (2022).

growing moringa.

In cases where moringa consumption was higher, respondents learned about nutritional benefit and characteristics from social media and radio advertisements. Participants in uLundi, for example, were between the ages of 60 and 80 and did not have access

Table 1. *Moringa Oleifera Lam* cultivars in KZN.

Predominant cultivars	Respondents
Moringa oleifera Lam	331
I do not know specific cultivars	124
Moringa ovalifolia Dinter & Berger	26
Moringa longituba Eng	13
Crops and plants	11
Moringa arborea Verd	5
Vegetables, fruits, and houseplants	5
Moringa rivae	4
Not applicable	3
House plants and crops	2
Moringa peregrina	2
Moringa stenopetala	2
Crops, Ginger Bush	1
Liquid Moringa	1
Moringa	1
Moringa borziana Mattei	1
Moringa drouhardii Jum	1
Moringa hildebrandtii	1
Moringa nutrition products	1
Moringa Powder	1
Moringa ruspoliana	1
Moringa tea	1
PKM1	1
Plants and crops	1
Powder	1
Tissue oil	1
We use organic moringa from Malawi	1
Weight Loss	1
Grand Total	**544**

Source: Survey results (2022).

to necessary resources for moringa production, which might potentially contribute to the municipality's economic development. As a result, this age group consumed and cultivated moringa at a small scale. Farming in rural areas is typically done by elderly women and men, primarily for subsistence purposes. This age group (60-80 years) lacks access to information, best agricultural practices, technologies, and resources required to promote this industry. Hence, fucus must be placed in promoting the participation of rural communities in the moringa value chain. These findings warrant the investment into growing *M. oleifera* industry in KZN.

Predominant cultivars in this area

The survey's findings showed that while participants were aware of *M. oleifera*, only 331 of them were able to distinguish between the distinct species, leading them to choose the tree's compound name (Table 1). A sizeable portion was unaware of any moringa cultivars. Furthermore, it should be mentioned that only 26 people planted *Moringa ovalifolia dinter* and *berger* to treat chronic illnesses and infections like herpes and HIV. The only people who could differentiate between the various moringa varieties were commercial growers. This emphasizes the necessity of educational and awareness campaigns designed to encourage the growing of various species of moringa. According to Mashamaite et al. (2021), there are 13 species of the Moringaceae family that have been identified. These species include *M. Oleifera, M. Arborea, M. Concanensis, M. Drouhardii, M. Hildebarndtii, M. Longituba, M. ovalifolia, M. Peregrine, M. Pygmaea, M. rivae, M. ruspoliana, M. stenopetala,*

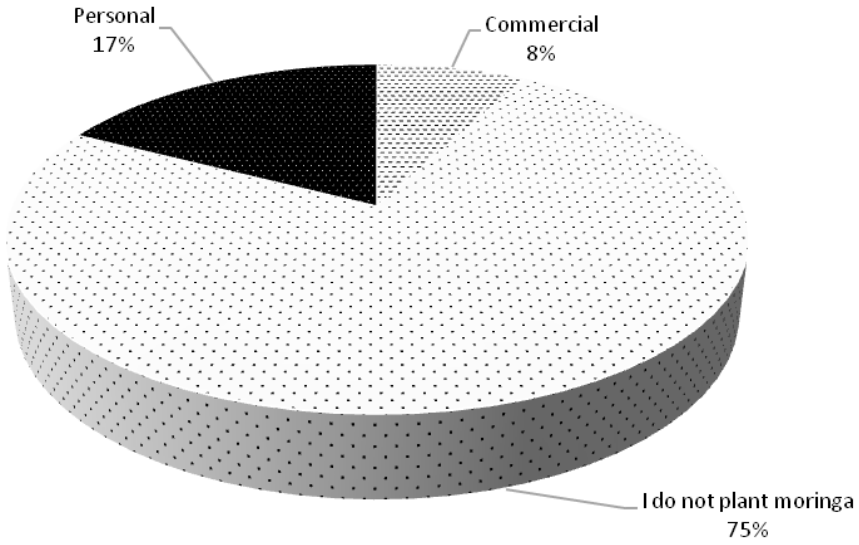

Figure 6. Reasons for planting *M. oleifera*
Source: Survey Results (2022).

and *M. Borziana*. They are well-known for their numerous applications, including medicine, plant growth enhancers, nutritional benefits; livestock feed, cosmetics, biofuel production, and water purification.

Reason for planting *M. oleifera*

Figure 6 shows that 75% of respondents stated they do not plant *M. oleifera*, while 8% plant it for commercial purposes and 17% for personal usage. These findings are consistent with research conducted by Mashamaite et al. (2021) and Mabapa et al. (2017), which showed that *M. oleifera* farming in KZN is still in its infancy and needs to be developed to support rural communities that are impoverished and plagued by high rates of unemployment and inequality. Priority should be placed in ensuring that KZN communities participate in the entire moringa value chain.

Uses of *M. oleifera* by respondents

Moringa is used medicinally and nutritionally by approximately 64.5% of respondents due to its nutritional content and healing properties for skin ailments such as dermatitis, hyperpigmentation, and acne, malnutrition in children, immune system booster, weight loss, and exercise (Figure 7). Moringa users reported that the plant relieves headaches and illness, lowers high blood pressure, ulcers and heart diseases, arthritis, and fertility, and increases CD4 count. The 11.6% of respondents that use moringa for holistic healing typically treat chronic ailments such as diabetes and cancer tumours. Consistent with these findings, Madi et al. (2016) found that moringa characteristics have anticancer effect when elevated reactive oxygen species activate caspases and PARP-1 cleavage led in apoptosis in cancer cell lines. In addition, Al-Asmari et al. (2015) studied the anti-cancer properties of *M. oleifera* leaf, bark, and seed extracts. When tested against MDA-MB-231 and HCT-8 cancer cell lines, extracts of leaves and bark showed substantial anti-cancer activities, whereas seed extracts exhibited almost none. The findings imply that moringa leaf and bark extracts have anti-cancer properties that could be utilized to generate novel medications for the treatment of breast and colorectal cancers (Al-Asmari et al., 2015). Moreover, Abdull Razis et al. (2014) concurred that almost all the parts from Moringa can be used as a source for nutrition with other useful values.

Other respondents, particularly traditional healers from the Indian community, use moringa plants as spiritual offerings in traditional rites and prayers. Black traditional healers frequently combined moringa with other plants to spiritually cleanse and heal a variety of ailments. Most holistic health practitioners source their supplies from local farmers and traders, resulting in a value chain between farmers, traders, and consumers. Other farmers (5.8%) use moringa as animal feed for cows, goats, sheep, and poultry. Consistent with the findings of this study, Meireles et al. (2020) stated that *M. oleifera* is used to treat a variety of illnesses, including malnutrition, diabetes, blindness, anaemia, hypertension, stress, depression, skin, arthritis, joints, and kidney stone issues. Furthermore, this miraculous tree can treat a variety of physical and psychological health issues by providing an

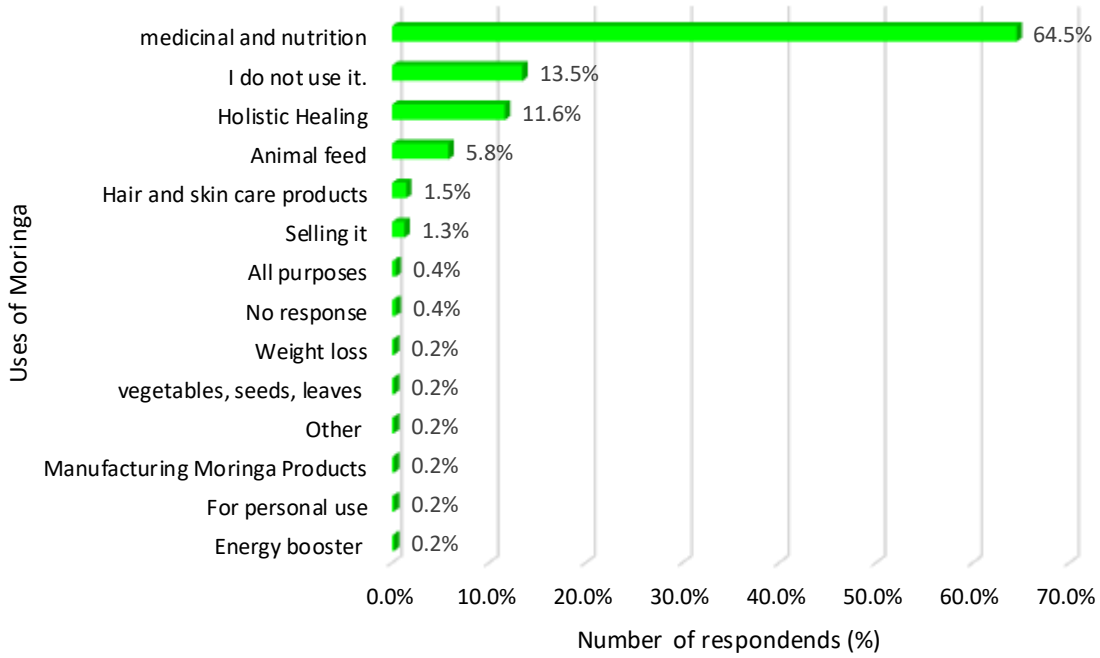

Figure 7. Uses of *M. oleifera*.
Source: Survey Results (2022).

energetic action and structural rebuilder for the body, as well as generating emotions associated with highly positive attitudes toward life (Meireles et al., 2020). Furthermore, 13.5% of respondents were unfamiliar with the plant or its application. According to this study, the expansion and promotion of moringa cultivation in KZN will raise awareness and interest in the sector, enticing young people and women to work as farmers, manufacturers, merchants, investors etc. This would eventually boost youth participation in agriculture, thus addressing the issue of high youth unemployment (59.4%) in South Africa.

Commercial potential of *M. oleifera* plants

Most respondents believed that moringa had a feasible market in medicine and pharmaceuticals, particularly for chronic diseases and immune boosters following COVID-19, agriculture and agro-processing, and the cosmetics business (survey qualitative data). They based their responses on the fact that the products were widely available in grocery stores and pharmacies and its benefits are well documented. Others remarked that because of global demand for moringa as a holistic product, there is positive expansion of moringa markets; therefore there is a significant opportunity for growth in KZN. According to the respondents, individuals primarily use *M. oleifera* for personal reasons, but if the plant were marketed as an economic driver, more people would become farmers, investors, and merchants. Approximately 1.3% of respondents selling *M. oleifera* (figure 7 above) claimed that moringa production in the province has the potential to combat poverty and unemployment in rural and township areas; nevertheless, land issues and a lack of information about the plant were obstacles. Other farmers noted that moringa has the potential to grow; however, the moringa business in KZN is still in its early stages because most farmers are focused on sugarcane and animal production. Most respondents were unaware of the plant's applications; thus, they requested in-depth study, information sharing regarding the plant's economic and nutritional benefits especially for rural and township communities in KZN.

Challenges encountered with cultivating *M. oleifera.*

Respondents identified many obstacles in moringa planting, cultivation, and harvesting. These included scarcity of *M. oleifera* trees, which made it an expensive acquisition (a plant costs around R500); low profit margins; lack of access to markets, producer associations, water, and land; a lack of expertise, skills, and funds; and pests (survey qualitative data). Consistent with these findings, Mudyiwa et al. (2013) found that growers have no guaranteed markets for moringa tree products, and knowledge about accessible markets is

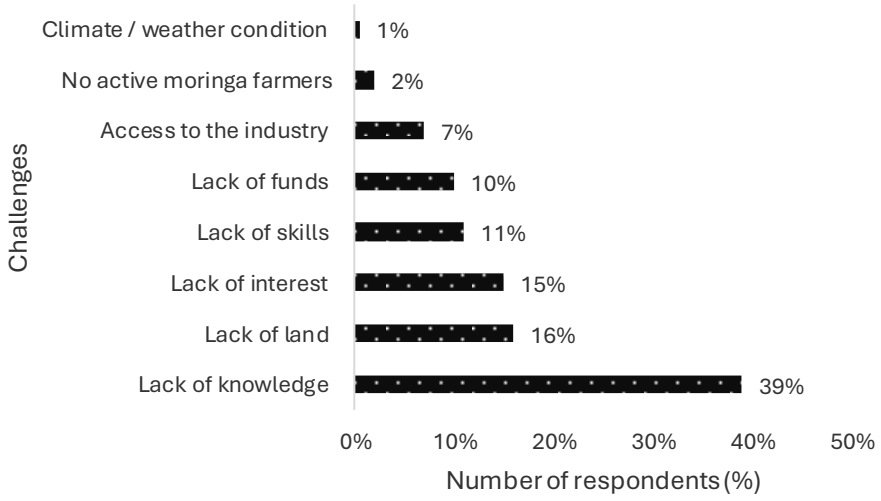

Figure 8. Challenges preventing *M. oleifera* farming.
Source: Survey Results (2022).

poor. Kotikal and Math (2016) identified insect pests linked with *M. oleifera* in India, including defoliators, sap feeders, and bark, pod, and seed borers. Moreover, Yusuf and Yusif (2014) identified *M. oleifera* leaf-feeding insect larvae (Ulopeza phaeothoracica) in Nigeria. According to Mudyiwa et al. (2013), most producers (30%) experienced irrigation related problems during dry periods. This necessitates the development of a country wide strategies, policies, and best management practices that will boost moringa cultivation. Consistent with the findings of this study, Kumssa et al. (2017) stated that moringa farming households experience several obstacles, including a lack of credible information on nutritional and medicinal properties, limited market access for their products, and insect and disease stress on their plants. Therefore, research and development are required to address these issues and promote the use of moringa in combating poverty and hunger.

Challenges preventing the cultivation of *M. oleifera.*

The most common barriers preventing the cultivation of *M. oleifera* were a lack of knowledge (39%), land (16%), and interest (15%), as depicted in Figure 8. Respondents were not encouraged to participate in moringa farming because the industry has not been promoted at the same level as sugarcane, maize, beans and farming in KZN, and there were no market structures in place to encourage grower participation in the moringa value chain. Similarly, Hlophe-Ginindza and Mpandeli (2020) claimed that small-scale farmers in South Africa face a variety of challenges, including access to land, markets, and financial markets, climate change crisis, and food security and productivity. These difficulties trace back to the colonial period (Von Loeper et al., 2016). It is believed that if given the required help, black farmers are more likely to prosper and perhaps contribute to South Africa's agricultural and economic success (Sebola, 2018). Equivalently, Dar (2015) reported that there are numerous challenges associated with moringa cultivation, such as shifting from backyard production to commercial economies of scale; significant financial investment; situating moringa R&D results to local situations; building awareness to reach a wider market and obtaining regulatory approval for moringa products; maintaining quality control through proper packaging; and having sufficient information on the use of effective equipment/ methodology for leaf processing and oil extraction for higher yield and better quality. These difficulties must be overcome in order to promote moringa commercialization and industrialization.

Conclusion

This study examined the state of moringa planting and consumption in KZN. The findings show that this tree grows best in Amajuba, Mkhanyakude, King Cetshwayo, and Zululand. There are regional variances in how moringa is commonly used and which parts of the plant are consumed, indicating opportunities to raise awareness of *M. oleifera* as a superfood and a crucial driver of rural economic development. Most people in the province are not participating as key drivers in the moringa value chain due to a lack of knowledge,

awareness of the commercial and economic benefits of moringa farming, land issues, lack of conducive conditions for growing moringa trees, lack of water and agricultural infrastructure, seeds, and other factors. Policymakers should implement necessary workshops in rural regions to raise awareness of moringa's multiple functions and economic benefits. The Department of Agriculture has a crucial role to play in promoting moringa cultivation, which could include financial support, skills development, infrastructure, and other forms of developmental support.

Some potential impediments were documented to expand the usage of this plant, according to current producers. These include pest and disease control, as well as access to secure markets. These multipurpose tree species require a thorough, integrated, and interdisciplinary research effort, as well as connections with development and extension agents, to be developed as crops that help alleviate hunger and potentially serve as a commodity crop that can address several complex socioeconomic issues in tropical and subtropical developing nations. This study recommends extensive research and development concerning various moringa species and their suitability for the KZN climate. Furthermore, there is an urgent need to build a national and provincial moringa industry initiative. Establishing solid agricultural methods and regulatory standards to ensure the quality and stability of moringa products should be a top priority for the province. The prospects for moringa-based goods are promising, and businesses are attempting to break into the worldwide market; thus, South Africa (KZN) must actively seek to leverage overseas markets.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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