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RESEARCH ARTICLE

FOOD AND HEALTH SECURITY OF MORINGA TREE – THE SOURCE OF FOOD AND ENERGY FOR THE 21ST CENTURY: THE CASE STUDY OF ETHIOPIA

***Kiros Abeselom**

Assistant Professor, Wolaita Sodo University, Ethiopia

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ABSTRACT

This study examined the paradox situation of the benefits of Moringa Tree, i.e. Firstly, Moringa is designated in the literature as the “The Miracle-Wonder Tree” or “The Source of Food and Energy for the twenty-first century” or in short as the “Tree of Life”. According to the literature, Moringa tree has the following benefits: Nutritional Value (healthy diet), i.e. Moringa of ingredients or contents, vitamins, minerals; Medicinal Value; Water Purification; Animal Feed; Environmental Protection benefits. Secondly, despite the fact that Ethiopia has an incredible variety of biodiversity of traditional useful plants and other untapped natural resources like Moringa tree, the people of Ethiopia are not getting the benefits of this huge resources of the country. Thirdly, although there are allegedly scientific researches and/or studies as well as indigenous knowledge about the multi-purposes of Moringa tree, for instance the above stated benefits, there is no any information about the systematic applications of the nutritional, medicinal and environmental benefits of Moringa tree in the society on the ground for example in Ethiopia whether these advantages and possible negative side effects of this plant are already tested and certified by the concerning authorities. In other words, these benefits of Moringa tree should be prescribed and fixed the dosages and the length of time of application by the authorized specialists and/or governmental institutions in Ethiopian context. Although four concerning Ethiopian Federal Institutions were requested by the author of this Paper (on behalf of Wolaita Sodo University) to share information with the University concerning this issue, none of these four Ethiopian Federal Institutions didn't respond. Therefore, the author of this Paper recommends that the results of the research on the benefits of Moringa tree should be available to the society (community) systematically, scientifically, easily understandable, legally useable. Because there are risks of massive utilization and inflated price in the market which may encourage indiscriminate adulteration with cheap materials that could have undesired effect on public health for instance in Ethiopia. Moreover, the main objective or purpose of a research is to make the results or the benefits of the research available to the society or community. Otherwise research without community services or outreach programs remain like (candle)-light in a big water pot or tanker. Therefore, to raise awareness among the community about the benefits, availability, usage (dosage) possible negative side effects of Moringa tree is important.

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INTRODUCTION

Background: According to the literature¹, Moringa is a plant that is native to Northern India (the sub-Himalayan areas of India), Pakistan, Bangladesh, and Afghanistan where it was first described around 2000 BC as a medicinal herb.²

***Corresponding author:** Kiros Abeselom
Assistant Professor, Wolaita Sodo University, Ethiopia
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The academic literature indicates that there are also accounts of it being utilized by the ancient Greeks, Romans, and Egyptians. The most famous and best-researched of the 13 species is Moringa Oleifera, which is native to the southern foothills of the Himalayas (India). The “Magic Tree” was described in the Vedas (sacred writings of Hinduism) 5000 years ago and is as medical plant an inherent part of the Ayurveda (traditional Indian medicine).³ Moringa is a common tree widely grown across India. In Hindi it is known as Sahjan or Munga. In Tamil, known as Murungai and in Malayalam known as Murunga. Referring to published literature, the Moringa tree is grown mainly in semiarid, tropical, and subtropical areas, i.e. it

¹Source: Miracle Health Corporation 18.08.2016, <https://www.facebook.com/miraclehealthcorp/posts>

² Source: Moringa History | Moringa: www.moringa.rubiconhealth.org/moringa-history/

³ Source: Moringafarm: Home: <https://moringafarm.eu/>

grows best in dry, sandy soil. Moringa is designated in the literature as the “The “Miracle-Wonder Tree” or “The Source of Food and Energy for the twenty-first century” or in short as the “Tree of Life”. Moringa is also called as “Mother’s Best Friend,” and “Never Die” in many African languages.⁴ Although there are technically 13 different species of Moringa tree, this Paper wants to give more attention to the two types of Moringa trees. This means:

- Moringa Oleifera – The “Miracle Tree” – (“The Source of Food and Energy for the twenty-first century”).
- Moringa Stenopetala (scientific name) - („Shiferaw - in amharic – and leko in the local language of North-OmoGofa / „Guluf“/southern Ethiopia).

Multipurposebenefits of Moringa Tree

According to the literature,Moringa Tree has the following benefits:

- Nutritional (healthy diet), i.e. Moringa of ingredients or contents, vitamins, minerals,
- Medicinal,
- Turbid Surface Water Purification,
- Animal Feed,
- Environmental Protection benefits.⁵

Referring to published literature,all parts of Moringa are used in some form or the other. Its leaves, immature pods (drumstick), seeds and flowers, and oil pressed from mature seeds are generally used as or in food. For example, flowers of Moringa Oleifera are rich in calcium, potassium and antioxidants, and are used in various dishes. Leaves are an excellent source of protein with 100 g of fresh raw leaves providing 9.8g of protein. Moringa contains proteins, vitamins, and minerals.⁶ Moringa tree has been referred to as the ‘Miracle tree’ for its versatility and experts all over the world believe Moringa to be an ideal plant to combat under-nutrition because of its nutritional benefits and availability. It has been estimated that fresh leaves of Moringa plant contain⁷:

- 4 times the vitamin A of carrots
- 7 times the vitamin C of oranges
- 4 times the calcium of milk
- 3 times the potassium of bananas
- 2 times the protein of yogurt

It is also a rich source of iron having almost three-fourth of the amount present in spinach leaves.

Moreover

- Fresh pods and seeds are a good source of a mono-unsaturated fatty acid, oleic acid.
- The seeds are used to treat allergies, inflammation, bacteria, neuralgia, abdominal tumors, and fever.
- This multipurpose tree is one of those plants that are compatible for sustainable agriculture.

- Moringa is used as forage for livestock.
- The tree parts are used as adjuvant (agent that enhances the immune response to an antigen) in modern medicine.
- Many parts and extracts of M. [Moringa] oleifera, including root bark, are used for treating various ailments such as diabetes, hypertension, inflammation and infectious diseases.
- In traditional medicine it is used as anthelmintic, and also for treatment of diabetes, cardiovascular disease, ulcers, and gastrointestinal problems.
- The plant is used as an aphrodisiac to stimulate sex drive.
- Moringa leaf can increase breast milk production in the early period after childbirth.
- Moringa oil is used in traditional medicine in treating snakebites or wounds. It is also used in hair care products and also as machine lubricants.⁸

According to the literature, many plants are used as herbal supplements for health-benefits, but the drumstick tree stands far ahead of its peers. Drumstick has the potential to improve the overall health of human being as it is nutrient-packed. Drumstick leaves are an excellent source of many vitamins and minerals. As per the USDA, one cup of fresh leaves (21 grams) contains the following:

- Protein: 2 grams
- Vitamin B6: 19% of the RDA
- Vitamin C: 12% of the RDA
- Iron: 11% of the RDA
- Riboflavin (B2): 11% of the RDA
- Vitamin A (from beta-carotene): 9% of the RDA
- Magnesium: 8% of the RDA
- Moringa (drumstick) leaves can lower blood sugar levels: High blood sugar is a serious problem for the civilized world. Most people link high blood sugar to diabetes risk.⁹

Here are also some more benefits of this “super” tree:

- Unless tender they are hard to digest so, pressure-cook them just like spinach and use it to prepare dal and curries.
- Drumstick leaves are used in the form of tea and are excellent antioxidants.
- Dried leaves are crushed to make powder, which is used in soups and sauces.
- Fresh Drumstick leaves can be used directly in recipes.
- The drumstick leaves are also used as forage for livestock.
- Drumstick leaves powder are used to make soap for hand-wash.¹⁰

Here are some more medicinal benefits of drumstick leaves:

- Help reduce diabetes: Drumstick leaves contain chlorogenic acid and isothiocyanates which help

⁴Moringafarm: Home: <https://moringafarm.eu/>

⁵ Source: Drumstick (MoringaOleifera) health benefits, side effects & precautions: <https://www.vitsupp.com/drumstick-benefits-side-effects/>

⁶ Source: Moringaoleifera (drumstick pods) nutrition facts and health benefits <https://www.nutrition-and-you.com/moringa.html>

⁷ Source: Medindia: Moringa | Drumstick Tree - Health Benefits and Side Effects - <https://www.medindia.net> › Diet and Nutrition, Jan 2, 2014 - Moringaoleifera has all the essential amino acids, omega oils, vital minerals ... Written by mitamajumdar | Article Reviewed by The Medindia ...

⁸ Source: www.healingmoringatree.com/moringa: Drumstick Health Benefits, Image Courtesy: healingmoringatree.com

⁹ Source: Drumstick (MoringaOleifera) health benefits, side effects & precautions <https://www.vitsupp.com/drumstick-benefits-side-effects/>

¹⁰ Drumstick (MoringaOleifera) health benefits, side effects & precautions <https://www.vitsupp.com/drumstick-benefits-side-effects/>

balance the sugar level in human body and hence reduce blood sugar levels in diabetes patients.

- Moringaoleifera can lower your cholesterol levels, potentially reducing the risk of heart disease.¹¹
- Protects your skin from free radicals: The drumstick leaf extracts contain antioxidants which prevent cell damage and ageing caused by free radicals such as cell damage, oxidative stress, inflammation, etc. It can also make your skin smooth and youthful.
- Good digestive health: Drumstick leaves are an excellent source of calcium and fibre; hence it is effective to maintain healthy digestive system. It is also instrumental in the treatment of kidney and liver disease, ulcers and kidney stones. It helps detoxify the body of heavy metal toxins.
- Moreover, the seed cake of Moringa remaining after oil extraction is used as a fertilizer and also to purify well water and to remove salt from seawater.¹²

Side Effects of Moringa/Drumstick

Referring to published literature, the United Nations Educational, Scientific and Cultural Organisation (UNESCO) claim that Moringa to be 'a non-toxic, easily digestible source of nutrition,' however, Moringa tree does have its quota of negative side effects as follows:

- Avoid eating the root of the moringa tree. It contains alkaloid spirochin, which is a potential neuro-paralytic toxin and that can cause paralysis and death.
- Leaves of moringa have laxative properties. When eaten in large quantities they may cause stomach upset, heart burn, gaseous distension, and diarrhea.
- Moringa when taken directly with water or raw may cause heart burns. It is better to cook it.
- The taste of moringa is not too pleasant. If you are using it for the first time, it may produce a gag reflex. It may also cause nausea when consumed in large quantities.
- The chemicals found in the roots, flowers and the bark could cause uterine contraction in pregnant women and increase the risk of a miscarriage.
- Avoid moringa if breast feeding, since the chemicals may not be safe for the infants.
- Do not take moringa if you are on blood thinning medications such as warfarin.
- Studies have shown that Moringa can also cause disorders affecting the blood such as white blood cell count decrease, gum bleeding, petechiae (red dots by bleeding under the skin because of broken blood vessels), lower number of blood platelets, etc.
- Drumstick is free from chemical additives, So, if used in pure form it doesn't cause any side effects. No impurities reported till date for Drumstick. Make sure you always take drumstick in the purest form. Since not much research has been done on the side effects of overdosage, it is best to avoid drumstick during pregnancy or while breastfeeding.
- Drumstick leaves have laxative properties, so, it may cause stomach upset, heartburn, and diarrhoea if

consumed in significant amount. The large quantity intake may also cause nausea so, avoid overconsumption and stay safe.

- Drumstick Side effects for pregnant women: A pregnant woman should avoid the consumption of bark and roots as they contain some chemical that may result in uterine contraction and consequently increase the risk of a miscarriage.¹³

However, the researches and/or studies concerning the nutritional, medicinal and turbid surface water purification benefits as well as side effects of Moringatree are so far fragmented and unorganized. Therefore, the reasons why the author has written this Paper is due to the paradox situation of the benefits of Moringatree, i.e. on one hand Moringa plant grows in all tropical climate regions of the world and it is available throughout the world for instance in Ethiopia but on the other hand there is no scientific research on the above mentioned benefits of Moringatree in order to make these benefits available to the societies for example in Ethiopia. Despite the fact that Ethiopia has an incredible variety of biodiversity of traditional useful plants and other untapped natural resources like Moringatree, the people of Ethiopia are not getting the benefits of this huge resources of the country. This is a paradox situation in Ethiopia. Although there are allegedly scientific researches and/or studies as well as indigenous knowledge about the multi-purposes of Moringatree, for instance the above stated benefits, there is no any information about the systematic applications of the nutritional, medicinal and environmental benefits of Moringatree in the society on the ground for example in Ethiopia whether these advantages and possible negative side effects of this plant are already tested and certified by the concerning authorities.

In other words, these benefits of Moringatree should be prescribed and fixed the dosages and the length of time of application by the authorized specialists and/or governmental institutions in Ethiopian context. Therefore, the author of this Paper recommends that the results of the research on the benefits of Moringatree should be available to the society (community) systematically, scientifically, easily understandable, legally useable. Because the main objective or purpose of a research is to make the results or the benefits of the research available to the society or community. Otherwise research without community services or outreach programs remain like (candle)-light in a big water pot or tanker. However, awareness creation among the community about the benefits, availability, usage (dosage) possible negative side effects of Moringatree is important. Therefore, the question is, what are the reasons, why there isn't scientific research on the benefits and side effects of Moringatree in Ethiopian context, although Moringa is designated in the literature as the "The "Miracle Tree" or "The Source of Food and Energy for the twenty-first century" or in short as the "Tree of Life"?"

Problem Statement

The motive of the author to write this Paper is, as already stated above, to ask and discuss on the reasons why the huge resource (Moringa tree) or as it is designated in the literature as the

¹¹ Source: 6 Science-Based Health Benefits of MoringaOleifera – Healthline: <https://www.healthline.com/nutrition/6-benefits-of-moringa-oleifera>

¹²Source: www.healingmoringatree.com/moringa: Drumstick Health Benefits, Image Courtesy: healingmoringatree.com

¹³Source: Side Effects of Moringa / Drumstick – Medindia: <https://www.medindia.net> › Diet and Nutrition, Jan 2, 2014 - Despite the many health benefits of Moringaoleifera or drumstick, the plant ... Written by mitamajumdar | Article Reviewed by The Medindia

“Miracle- Wonder Tree” or the “Source of Food and Energy for the twenty-first century” in short as the “Tree of Life” is neglected in Ethiopia as if it doesn’t have any value for the society?

In other words, what are the reasons why there is no scientific research yet conducted on these food and nutritional benefits and also on the possible side effects of Moringa tree in Ethiopian context.

According to the literature, Moringa tree has the following benefits:

- Nutritional value (healthy diet), i.e. Moringa of ingredients or contents, vitamins, minerals,
- Medicinal value
- Turbid Surface Water Purification,
- Animal Feed,
- Environmental Protection benefits.

Due to lack of scientific research on the above mentioned benefits of Moringa tree in Ethiopian context, the society in Ethiopia is not getting the benefits of the huge resources of the country although Ethiopia has an incredible variety of biodiversity of traditional useful plants and other untapped natural resources like Moringa tree. Despite all the allegedly various researches and/or studies worldwide so far on the benefits of Moringa tree, there is nothing governmental official instructions or prescriptions about the benefits and/or side effects of Moringa tree in Ethiopian context. In other words, the benefits and/or side effects of Moringa tree should be clearly notified to the public backed by scientific evidences, duly authenticated by concerning Ethiopian governmental institutions. Any product on sale for the public should have prescription on dosage and length of time of application and should be controlled regularly in order to avoid misuse for private profit. Because of this risk there is already a warning by an Ethiopian Public Authority concerning the nutritional and medicinal problems of (Moringa) adulteration with cheap materials that could have undesired effect on human health. The speech of Dr. Yibeltal Assefa, Deputy Director General-Research & Technology transfer of Ethiopian Public Health Institute (EPHI) is a wake-up call for all the health-conscious citizens of Ethiopia. In our specific case, Moringa products too could be misused for private profit, if not monitored by scientific and legal authorities of the Ethiopian Government, who are supposed to take measures on quality, quantity, price, etc. regularly or continuously. The statement of the Deputy Director General points to the risks of massive utilization and inflated price in the market which may encourage indiscriminate adulteration with cheap materials that could have undesired effect on public health.¹⁴

However, contrary to the above quoted speech of Dr. Yibeltal Assefa, Deputy Director General-Research & Technology transfer of Ethiopian Public Health Institute (EPHI) a private agro product marketing agency, “ETHIO MORINGA” claims unverified on the Nutritional and Medicinal benefits of Moringa tree in its “EXPORT STANDARD” product label under the pretext of “Certified by Ethiopian Public Health Institute (EPHI)”. But the benefits of unadulterated Moringa

products are incontestable, the tall claims made by private agencies on their product packages, not subjected to quality certification would naturally raise concerns among public-health conscious stakeholders. Above all, such private claims made in Export Standard Products would have considerable reputation stake in the views of Ethio-product consumers of other countries.

The author of this Paper is duty-bound to draw the Federal Institutions’ attention to the apparently unverified claims of a private agro product marketing agency, “ETHIO MORINGA”, on the Nutritional and Medicinal benefits of Moringa tree. Consequently the author of this Paper has submitted the documents of this issue and four draft letters to the Office of Vice President for Research & Community Services of Wolaita Sodo University on 03.10.2017 and requested this Office to sign on the four letters to the following four concerning Ethiopian Federal Institutions with a letter head and stamp of Wolaita Sodo University. So that the author of this Paper could deliver the letters to the following four concerning Ethiopian Federal Institutions.

These are

- Ethiopian Federal Ministry of Health
- Food, Medicine and Health Care Administration and Control Authority of Ethiopia
- Ethiopian Public Health Institute
- Ethiopian Institute of Agricultural Research

However, the Office of Vice President for Research & Community Services of Wolaita Sodo University was not willing to write a letter to the above mentioned four Ethiopian Federal Institutions. According to the Office of Vice President for Research & Community Services of Wolaita Sodo University, the reason for not writing a letter is that Wolaita Sodo University may conduct a research on this issue.

But the question is, if the above mentioned four Ethiopian Federal Institutions have a result of a scientific research:

- Why should Wolaita Sodo University conduct a research on this issue?
- Does it give a sense to repeat a research without reason?
- Who will be responsible for such action?

But even Wolaita Sodo University would conduct a research on this issue, the University may submit the result of its research to the above mentioned four Ethiopian Federal Institutions for verification and patent right. But the result of the research of the University would be disqualified by these and other institutions if a research was already conducted by these four Ethiopian Federal Institutions or other institutions. Even though the Office of Vice President for Research & Community Services of Wolaita Sodo University had refused to write letters to the above mentioned four Ethiopian Federal Institutions, the author of this Paper has written letters to these four Institutions on 18.10.2017 on behalf of Wolaita Sodo University and requested them to verify or disprove the apparently unverified claims of the private agro product marketing agency, “ETHIO MORINGA”, on the Nutritional and Medicinal benefits of Moringa in their “EXPORT STANDARD” product label under the pretext of “Certified by Ethiopian Public Health Institute (EPHI)”. Moreover, the above mentioned four Ethiopian

¹⁴ Dr. Yibeltal Assefa, Deputy Director General-Research & Technology transfer of Ethiopian Public Health Institute (EPHI) at the Workshop in Bishoftu/Ethiopia (22-23.05.2014)

Federal Institutions were requested in the letters to send a copy of the result of a research on this issue to Wolaita Sodo University in case of verification of the apparently unverified claims of the private agro product marketing agency, "ETHIO MORINGA", on the Nutritional and Medicinal benefits of Moringa in their "EXPORT STANDARD" product label under the pretext of "Certified by Ethiopian Public Health Institute (EPHI)", in order to teach the community about the Nutritional and Medicinal benefits of Moringa tree by Wolaita Sodo University. But in the case of falsification of the apparently unverified claims of the private agro product marketing agency, "ETHIO MORINGA", on the Nutritional and Medicinal benefits of Moringa in their "EXPORT STANDARD" product label under the pretext of "Certified by Ethiopian Public Health Institute (EPHI)", Wolaita Sodo University could conduct further scientific research on this issue, i.e. about the Nutritional and Medicinal benefits of Moringa tree. At the active support of these authorities, Wolaita Sodo University is willing to launch an awareness campaign on the benefits of Moringa among farmers for cultivating Moringa, in their kitchen garden and the general public for consuming Moringa in raw/processed form towards better family health. But unfortunately the above mentioned four Ethiopian Federal Institutions didn't respond to the letters although Wolaita Sodo University and the author of this Paper awaited further directions of these authorities in this regard.

Here is one of the four letters which are addressed to the above mentioned four concerning Ethiopian Federal Institutions: Example:

To: The Ethiopian Public Health Institute (EPHI):

Attn: Dr. Ebba Abate (Director General) - Addis Ababa - Ethiopia, date: 18.10.2017

Sub: Moringa, the "Wonder" Tree - Nutritional and Medicinal Properties – Certification Issue in Ethiopia – Responsibility to Government Agencies and Researchers

Dear Dr. Ebba Abate:

I, Dr. Kiros Abeselom from Wolaita Sodo University, am duty-bound to draw your kind attention to the apparently unverified claims of the private agro product marketing agency, "ETHIO MORINGA", on the Nutritional and Medicinal benefits of Moringa tree in their "EXPORT STANDARD" product label under the pretext of "Certified by Ethiopian Public Health Institute (EPHI)".

While the benefits of unadulterated Moringa tree products are uncontested, the tall claims made by private agencies on their product packages, not subjected to quality certification would naturally raise concerns among public-health conscious stakeholders. Above all, such private claims made in Export Standard Products would have considerable reputation stake in the views of Ethio-product consumers of other countries. I have made prima facie investigation of the issue and herewith attached a "Preliminary Note", seeking further investigation of such private claims in the market. I would like to request the authority to inform us of any further scientific enquiry/research to be conducted by the university either on the private claims or the general public health benefits of Moringa. At your active support, we are willing to launch awareness campaign on the benefits of Moringa tree among farmers for cultivating Moringa

tree, in their kitchen garden and the general public for consuming Moringa in raw / processed form towards better family health.

I await your further direction in this regard.

Yours sincerely,

Dr. Kiros Abeselom

Attached: Preliminary Note

Justification to write the letters to the above mentioned four Ethiopian Federal Institutions

The following example is the reason why the author of this Paper is worried about the possible misuse and/or adulteration of Moringa leaves for example by private enterprises:

Private Market Agency's Blanket Claim

"ETHIO MORINGA", an Addis Ababa based private enterprise, produces and commercializes Moringa products. "ETHIO MORINGA" describes the benefits of Moringa products as well as how to use them on its package. It says on its package: "The powdered product inside this package is a supplement for the human body with no side effect. Use Moringa. Stay healthy".

Moreover, "ETHIO MORINGA" product package carries "Benefits of Moringa" as follows:

- "It protects from cancer disease
- Supply natural energy
- Clear and smooth the skin
- Create 'Good' cholesterol
- Promotes healthy metabolism system
- Supports the normal sugar levels of the body
- Relieve inflammation
- Nourish and protect the bone
- Achieve a better night sleep
- Acts as antioxidant
- Helps as a diet replacement for HIV/AIDS patients to boost their immunity [ies]

The private enterprise "ETHIO MORINGA" writes further on its package: "How to Use" as "It can be consumed with any food and served as tea. Consume one spoon of Moringa Powder 3 times a day." Its supplement Facts carries names of vitamins, proteins and minerals. On top of it, it claims "There is no side effect of using Moringa."¹⁵ Although UNESCO purports Moringa to be 'a non-toxic, easily digestible source of nutrition', the tree does have its quota of negative side effects, this is in stark contrast to the precautions given by Mita Majumdar below.¹⁶ This shows that there are gaps in all publications or studies so far everywhere how they have treated the topics, i. e. isolated, fragmented, unorganized and uncoordinated. Therefore, there is a Need for Scientific Enquiry on the Moringa Products because there are Claims and Counter-Claims as Mita Majumdar has written an article under

¹⁵ "ETHIO MORINGA" shows on its package: "EXPORT STANDARD"-Ethiopian Public Health Institute (EPHI) has "certified"

¹⁶ Majumdar, Mita: Article Reviewed by The Medindia Medical Review Team on Feb 19, 2016

the title: “Health Benefits of Moringa - Side Effects of Moringa” as follows:

Precautions

MitaMajumdar¹⁷ has written an article under the title: “Health Benefits of Moringa - Side Effects of Moringa”. He admits that UNESCO acknowledges Moringa to be ‘a non-toxic, easily digestible source of nutrition’ He, however, cautions that the tree does have its quota of negative side effects. Listed are some of the common ones:

- Avoid eating the root of the Moringa tree. It contains alkaloid spirochin, which is a potential neuro-paralytic toxin and that can cause paralysis and death.
- Leaves of Moringa have laxative properties. When eaten in large quantities they may cause stomach upset, heart burn, gaseous distension, and diarrhea.
- Moringa when taken directly with water or raw may cause heart burns. It is better to cook it.
- The taste of Moringa is not too pleasant. If you are using it for the first time, it may produce a gag reflex. It may also cause nausea when consumed in large quantities.
- The chemicals found in the roots, flowers and the bark could cause uterine contraction in pregnant women and increase the risk of a miscarriage.
- Avoid Moringa if breast feeding, since the chemicals may not be safe for the infants.
- Do not take Moringa if you are on blood thinning medications such as warfarin.
- Studies have shown that Moringa can also cause disorders affecting the blood such as white blood cell count decrease, gum bleeding, petechiae (red dots by bleeding under the skin because of broken blood vessels), lower number of blood platelets, etc.”

Questions to be answered by the above noted four Ethiopian Federal Institutions but especially by the Ethiopian Public Health Institute (EPHI)

1. Who is “ETHIOPIO MORINGA”? Is it a private enterprise?
2. Does “ETHIOPIO MORINGA” have a license to produce and commercialize the products of Moringa Tree exclusive, i.e. as a monopoly?
3. If yes, from whom did “ETHIOPIO MORINGA” get the license?
4. How did “ETHIOPIO MORINGA” get the license?
5. Is there a scientific research result in Ethiopia about the benefits of Moringa Tree, conducted by the agency?
6. If yes, who has conducted the research and when and where?
7. If yes, on which type of Moringa Tree has been conducted a research, i.e. on MoringaOleiferaor MoringaStenopetala or on both?
8. Is this the right way to inform the public or raise awareness of the society (community) about the benefits of Moringa by giving a permission to a private enterprise like “ETHIOPIO MORINGA”?
9. How can the poor people afford the price 54 birr (2017) but 2018 (55 birr) for 250gm for a package of Moringa leaves? By the way this is not a luxury item!

10. How can the community around Wolaita District, Arba Minch, Konso etc. where Moringatree grows get the benefits of Moringa tree without the instructions of experts?

However, in addition to “ETHIOPIO MORINGA” there is MORINGA TEA in TEA BAGS from a company “EthioAgri-CEFT PLC”. But unlike “ETHIOPIO MORINGA”, “EthioAgri-CEFT PLC” doesn't say anything about the benefits of Moringa Tea. But both “ETHIOPIO MORINGA” and “EthioAgri-CEFT PLC” use the leaves of MoringaOleifera and not MoringaStenopetala, as it shows on the packages of these companies. Therefore, the question is, does Moringa Stenopetala have the same benefits or effects as Moringa Oleifera? If yes, who has conducted the research and when/where?

A. Preliminary Inquiry by author of this Paper

The author of this Paper has made a prima facie investigation of the issue and herewith attached a “Preliminary Note”, seeking further investigation of such private claims in the market. In addition to the above mentioned attempts, the author of this Paper had made an effort to organize a team of the concerning researchers of six different departments of Wolaita Sodo University on 31.08.2017 in order to conduct a research on the following benefits of Moringa tree:

- Nutritional (healthy diet), i.e. Moringa of ingredients or contents, vitamins, minerals,
- Medicinal,
- Turbid Surface Water Purification,
- Animal Feed,
- Environmental Protection benefits.

The author of this Paper had invited all the six concerning researchers of different departments of WolaitaSodo University for consultation and further steps to propose and submit a common Research Project Proposal to the Office of Vice President for Research & Community Services of WolaitaSodo University in order to get research fund. Although theauthor of this Paper had given a summary of the publications on the above mentioned benefits of Moringa tree so far and a draft Research Project Proposal to all the researchers, unfortunately none of these researchers was interested to write and submit a Research Project Proposal. However, such phenomenon is nowadays a trend in Ethiopian universities that scholars or academicians are not willing to conduct research and community services without extra payment, i.e. “professional fee”. Butthis phenomenon shows weaknesses, lack of consciousness, lack of motivation, lack of responsibility and accountability, lack of common vision or common interest, lack of maturity in understanding duties and obligation for the community. If there were coordination between the concerning professional experts and governmental institutions to organize the researches and/or studies on the benefits of Moringa tree so far, Moringa tree could contribute to the solutions of the economic, social, and environmental problems of the society for instance in Ethiopia and furthermore.

Objectives

The main objective or purpose of a researcher should be focused (after the research) on the availability or access of the benefits or results of the research to the society. Otherwise

¹⁷ The details of the author to be given here

research without community services or outreach programs remain like (candle)-light in a big water pot or tanker, i.e. without beneficiary. Therefore, the objective of this Paper is to make the benefits of Moringatree available to the society for instance in Ethiopia, i. e. professionally, systematically, scientifically, easily understandable, legally useable. In other words, the dosages as well as the length of time of applications should be prescribed by the authorized specialists and/or concerning governmental institutions in Ethiopian context.

General Objectives

- To evaluate the collected data about the benefits of Moringa tree in Ethiopian context.
- To contribute to serious discussions on the reasons why scientific research is not yet conducted on the above mentioned benefits of Moringatree in Ethiopia.

Specific Objectives

To contribute to Food Security & Poverty Reduction with the help of the “Miracle- Wonder” Moringatree, because Moringa is designated in the literature also as the “Source of Food and Energy for the twenty-first century” or in short as the “Tree of Life”.

To contribute to sustainable solutions of the economic, social, and environmental problems of the society in Ethiopia.

To fulfill the gaps of the publications so far about the benefits of Moringatree because the publications are isolated, fragmented, unorganized and uncoordinated.

To indicate the right way how the society in Ethiopia could use the benefits of Moringatree, i. e. the dosages as well as the length of time of applications should be prescribed by the authorized specialists and/or concerning governmental institutions in order to avoid misuse and/or side effects. Because there is no any prescription in the publication so far about the dosages as well as the length of time of applications.

Research Questions

As already discussed above, the Nutritional, Medicinal, Water Purification, Animal Feed, Environmental Protection benefits of Moringatree are not yet applied in Ethiopia professionally, systematically, scientifically, easily understandable, legally useable by the society, although there are allegedly a lot of scientific researches and/or studies conducted so far worldwide on the multi-purposes of Moringatree. Moreover, Moringa tree is simple available in Ethiopia. Therefore, the question is, what are the reasons behind this paradox? In other words, why couldn't the society in Ethiopia still get the medicinal, nutritional and environmental benefits as well as the purification of turbid surface water of Moringa tree?

Who is responsible for such negligence of fulfilling duties and obligations?

Another question is why the above mentioned four concerned Federal Institutions do not feel neither Responsive nor Accountable to the request of the author and/or Wolaita Sodo University although this issue concerns the whole nation?

If these four concerned Federal Institutions are not responsive and accountable for such issue, who then could be responsive and accountable for such negligence of fulfilling duties and obligations?

If there is no responsibility and accountability in the government and in the society, how can a country or a society achieve good governance, i.e. for example Rule of Law and Democracy?

Therefore, the question is, what is the duty or responsibility of the Ethiopian executive institutions like the prosecutors¹⁸?

Hypothesis

The fact that the Nutritional, Medicinal, Water Purification, Animal Feed, Environmental Protection benefits of Moringa tree are not yet systematically and professionally applied in Ethiopia although Moringa tree is simple available and it has multipurpose useful natural resource in Ethiopia. However, people especially in the southern Region of Ethiopia use Moringa leaves as food and traditional medicine for different cases based on indigenous knowledge but without scientific approval. Therefore, the lack of applicable solutions of the benefits of Moringa tree in Ethiopia shows weaknesses, lack of consciousness, lack of motivation, lack of responsibility and accountability, lack of common vision or common interest, lack of maturity in understanding duties and obligation for the community.

Methodology

The author of this Paper wants to find out the reasons behind the debates and discussions on the Nutritional, Medicinal, Water Purification, Animal Feed, Environmental Protection benefits of Moringatree without any applicable solution in Ethiopia although Moringa tree is simple available in Ethiopia. Therefore, the following methodologies are applied in order to find out scientific facts:

After collecting the secondary data from various sources, i. e. historical and present publications, interviews, empirical studies and/or observations are reviewed. As already explained above, the author of this Paper has made a prima facie investigation of the issue, i.e. the author of this Paper has written letters to the above mentioned four Ethiopian Federal Institutions on 18.10.2017 on behalf of Wolaita Sodo University and requested them to verify or disprove the apparently unverified claims of the private agro product marketing agency, “ETHIO MORINGA”, on the Nutritional and Medicinal benefits of Moringa in their “EXPORT STANDARD” product label under the pretext of “Certified by Ethiopian Public Health Institute (EPHI)”. But unfortunately the above mentioned four Ethiopian Federal Institutions didn't respond to the letters although Wolaita Sodo University and the author of this Paper awaited further directions of these authorities in this regard.

Justification to write this Paper

According to the literature, there are publications so far about researches and studies on the Nutritional, Medicinal, Water

¹⁸ According to the law, a public prosecutor shall investigate immediately when he is aware of law-offending cases through complaint, reporting, surrender of the suspect and other sources. The prosecutor has the responsibility of directing the enforcement of criminal decision made by the court for the enforcement of state penalty, efficiency and justice of law.

Purification, Animal Feed, Environmental Protection benefits of Moringatree worldwide. However, there is a big gap between the objectives or aims of the researches and/or studies so far on the advantages of Moringatree and their applications for the society, i.e. the beneficiaries. In other words, the results of these researches and/or studies as well as the indigenous knowledge about the benefits of Moringatree should be made available to the public. However, these benefits of Moringa tree should be prepared professionally, systematically, scientifically, easily understandable, legally useable by the society. This means, the dosages as well as the length of time of application should be prescribed by the authorized specialists and/or concerning governmental institutions.

But first and foremost, public awareness about the following benefits of Moringa tree should be raised:

- Nutritional (healthy diet), i.e. Moringa of ingredients or contents, vitamins, minerals,
- Medicinal,
- Turbid Surface Water Purification,
- Animal Feed,
- Environmental Protection benefits.

To raise public awareness about the benefits of Moringa tree is needed because

Firstly, there is lack of awareness and consciousness about the above noted benefits of the Moringatree in the society. Even among the majority of the academicians there are only rumors about the benefits of these plants.

Secondly, awareness creation among the society and make available the Nutritional, Medicinal and Environmental benefits of the MoringaTtree to the society should be the main objectives or purposes of a research.

Thirdly, to expose the weaknesses of the responsible institutions or persons in Ethiopia who neglect their duties and responsibilities to make available the benefits of Moringa tree to the society although Moringa tree is simple available in Ethiopia. This means, for example, there is no any information about the systematic applications of the nutritional, medicinal and environmental benefits of Moringatree in the society on the ground which are tested and certified or attested the advantages and/or side effects of these plants. Therefore, the medicinal and nutrition benefits of Moringa trees should be fixed or prescribed their dose and limited the length of their application time by the concerning professional experts. As already discussed above, the publications about the benefits of Moringatree are unfortunately isolated, i. e. without any coordination between the concerning professional experts. In other words, these researches and/or studies are “hanging in the air” especially in Ethiopia.

Conclusion

It is already discussed in this Paper about the gaps in the publications or studies so far about the benefits of Moringatree for instance in Ethiopia. Moreover, there is no any prescription in the publication so far about the dosages as well as the length of time of applications. In other words, the publications or studies so far are unfortunately isolated, fragmented, unorganized and uncoordinated, i. e. without any coordination between the concerning professional experts. In other words, these researches and/or studies are “hanging in the air” in

Ethiopian context. Although Ethiopia has an incredible variety of biodiversity of traditional useful plants and other untapped natural resources, the people in Ethiopia are not getting the benefits of these huge resources of the country for instance Moringa tree. As already stated above, Moringa tree is simple available in Ethiopia, especially in the southern Region of Ethiopia. But Moring tree is grown mainly in semiarid, tropical, and subtropical areas, i.e. it grows best in dry and sandy soil. Despite such opportunities, Moringa tree is not available in the dry areas of Ethiopian regions. However, Moringa tree could protect the environment, i.e. against drought if it were planted in semiarid, dry and sandy soil areas of the country. This tree could also save the lives of pastoralists and their livestock. Therefore, the question is, who is responsible for such negligence of fulfilling duties and obligations?

Contrary to the practices of many governmental institutions, the following 12 “Good Governance Principles” or Ethical Principles are posted theoretically at all the offices of the Ethiopian Federal and Regional Institutions: Principle 1 - Fair Conduct of Elections, Representation and Participation, Principle 2 – Responsiveness, Principle 3 - Efficiency and Effectiveness, Principle 4 - Openness and Transparency, Principle 5 - Rule of Law, Principle 6 - Ethical Conduct, Principle 7 - Competence and Capacity, Principle 8 - Innovation and Openness to Change, Principle 9 - Sustainability and Long-term Orientation, Principle 10 - Sound Financial Management, Principle 11 - Human rights, Cultural Diversity and Social Cohesion, Principle 12 - Accountability.

However, unfortunately none of these principles are considered by the executive institutions like for example the prosecutors as relevant for “Good Governance” or Ethics in the Ethiopian society.

Recommendations

As already discussed in this Paper, the results of the researches and/or studies as well as the indigenous knowledge about the benefits of Moringatree should be clearly notified to the public backed by scientific evidences, duly authenticated by concerning Ethiopian governmental institutions and then made available to the public, i.e. to the society professionally, systematically, scientifically, easily understandable, legally useable. This means, the concerning professional stakeholders should sit together and make convention on the results of these researches, i.e.:

1. For what purpose is the Moringatree good (practically on the ground with scientific evidence)?
2. How the society can use or apply these benefits of Moringatree?
3. How much & how long should the patients take the medicine and/or the food?
4. Do the nutritional & medicinal values have side effect (s)?

As already noted above, Ethiopia has an incredible variety of biodiversity of traditional useful plants and other untapped natural resources but unfortunately the people in Ethiopia are not getting the benefits of these huge resources of the country for example Moringatree.

Therefore, the following benefits of Moringatree should be available to the public in Ethiopia:

- Nutritional (Food source for human beings: Main food and as food substitution. (Leaves, fruits, flower or bloom, seed, oil and powder from the leaves),
- Medicinal,
- Turbid Surface Water Purification,
- Animal Feed (Food source for animals),
- Environmental Protection,

However, the Medicinal and Nutrition Values as well as the Purification of Turbid Surface Water Effect of Moringa Tree should be prescribed their dosage and the length of time of application by the authorized specialists and/or governmental institutions in Ethiopian context. Because there is a risk of misusing the Moringa leaves which could be replaced by other leaves which could have negative consequences on nutritional and medicinal problems or adulteration with cheap materials that could have undesired effect on health. But if there is no responsibility, accountability & Rule of Law or Law & Order in a country, who will control the private enterprises for example from Moringa adulteration with cheap materials that could have undesired effect on health. Therefore, any product on sale for the public should have prescription on dosage and length of time of application and should be controlled regularly in order to avoid misuse for private profit. Otherwise, if there is no Rule of Law or Law & Order, then injustice and corruption will dominate the daily life of the society.

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