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A RESEARCH PAPER ON ANTICANCER PROPERTIES OF MORINGA OLEIFERA

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ABSTRACT

Moringa is a multi-beneficial plant which is popularly known as 'the miracle tree' because of its healthy nutritional Value. Converting such wonderful commodity in the form of powder becomes important to avail all its nutritional Benefits. Moringa leaf powder is an excellent source of protein supplement for the peoples suffering from Malnutrition issues and in animal feed as well. The powder prepared from moringa leaves can be easy to store, Package and use at any time in different ways. It can be a source of income generation to the farmers if they are Willing to set a small scale moringa leaf processing plant and can also be helpful to add healthy nutrition.

KEY WORDS : *Moringa Lead Powder, Drying, Labelling, Anticancer, Antiproliferation*

INTRODUCTION

Moringa is a medicinal herb that may grow up to 10–12 meters tall and is a member of the Moringacea family. Many Indian local languages refer to it by a variety of names, including horseradish tree, drumstick tree, sahjan, shevga, moringa, sajna, or kelor. Numerous vital nutrients, including vitamins, minerals, amino acids, beta-carotene, antioxidants, and omega-3 and omega-6 fatty acids, can be found in it. Moringa leaves are thought to be a good source of protein, calcium, potassium, and vitamin C. Moringa has been used medicinally to cure a variety of illnesses, including cholera, anemia, anxiety, asthma, blackheads, blood impurities, chest congestion, and many more (Khawaja et al. 2010)

It consist of anti-inflammatory, anti-spasmodic, anti-hypertensive, antitumor, anti-oxidant, anti-pyretic, anti-ulcer, anti-epileptic, Cholesterol lowering and anti-diabetic properties (Fahey 2005). It has incredibly good market value in the future, as Researchers are now a day's focusing on conservation of its Nutritional and medicinal value by developing various kinds Of products for commercial purpose.

The powder made from moringa leaves can be easy to store, package and use at any Time in different ways.

Moringa In the Treatment of Cancer

Used to inhibition of cancer cell growth and Proliferation due to three bioactive components – 4-(α-Lrhamnosyloxy) benzyl isothiocyanate, β-sitosterol-3-O-β-Dglucopyranoside, and nizimicin.25 Glucosinolates in moringa Extracts have been found to be effective in induction of Apoptosis of cancer cells.26 In some cases, these extracts have Also acted to induce P53 tumour suppressor gene during Cancer therapy.

Anticancer properties have been observed in Leaf and bark extracts of moringa, while the seed extract has Not been proven to have an anti-proliferative effect on cancer Cells.27,28 Therapeutic activities of Moringa oleifera have also been Studied in cancer cachexia.

MO leaf diet has shown Improvement in ATPase activity in experimental animals, Thereby, implying help in muscular degeneration during Cancer cachexia.29 additionally, effect of MO



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has also been Found as having antioxidant properties, thereby reducing Oxidative stress during cancer cachexia.
However, these Properties have been proven in experimental animals, and Human studies need to be undertaken before definitive Evidence on efficacy is obtained for use of MO in cancer Cachexia.

Research has been done to show how MO extracts affect different cancer cell lines in vitro. More significantly, effects have been investigated in colorectal, hepatocellular, and oesophageal cancers. It is crucial to investigate the impact of MO extracts on oral cancer cell lines due to their influence on various cancer lines.

Benefits of Moringa Oleifera
Moringa oleifera, also known as sahjan or drumstick tree, is a nutrient-rich plant that offers numerous health benefits. Here are some of the benefits of moringa oleifera :

Nutritional Benefits



1. High in vitamins and minerals : Moringa oleifera is high in calcium, iron, magnesium, potassium, and the vitamins A, C, E, and K.
2. Antioxidant qualities : Moringa oleifera possesses antioxidant qualities that aid in preventing oxidative stress and cell damage.

Advantages for Health

1. Anti-inflammatory qualities: The anti-inflammatory qualities of Moringa oleifera may aid in lowering inflammation and easing the symptoms of diseases like arthritis.
2. Cardiovascular health: Moringa oleifera may help prevent cardiovascular disease, lower blood pressure, and lower cholesterol.
3. Digestive health: Constipation, diarrhea, and irritable bowel syndrome are among the digestive problems that Moringa oleifera may help alleviate.
4. Support for the immune system: Moringa oleifera may strengthen the immune system and ward against ailments like the flu and the common cold.

Additional Advantages

1. Benefits for skin and hair: Moringa oleifera may aid to promote healthy hair development, lessen wrinkles, and enhance skin health.
2. Eye health: Moringa oleifera may enhance vision and guard against age-related macular degeneration.

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3. Anticancer qualities: More research is required, although some studies indicate that moringa oleifera may have anticancer potential.

Methods for Eating Moringa Oleifera

1. Powder: You can use Moringa oleifera powder into salads, soups, and smoothies.
2. Capsules: As dietary supplements, Moringa oleifera capsules are offered. 3. Tea: To make Moringa oleifera tea, soak the leaves in boiling water.

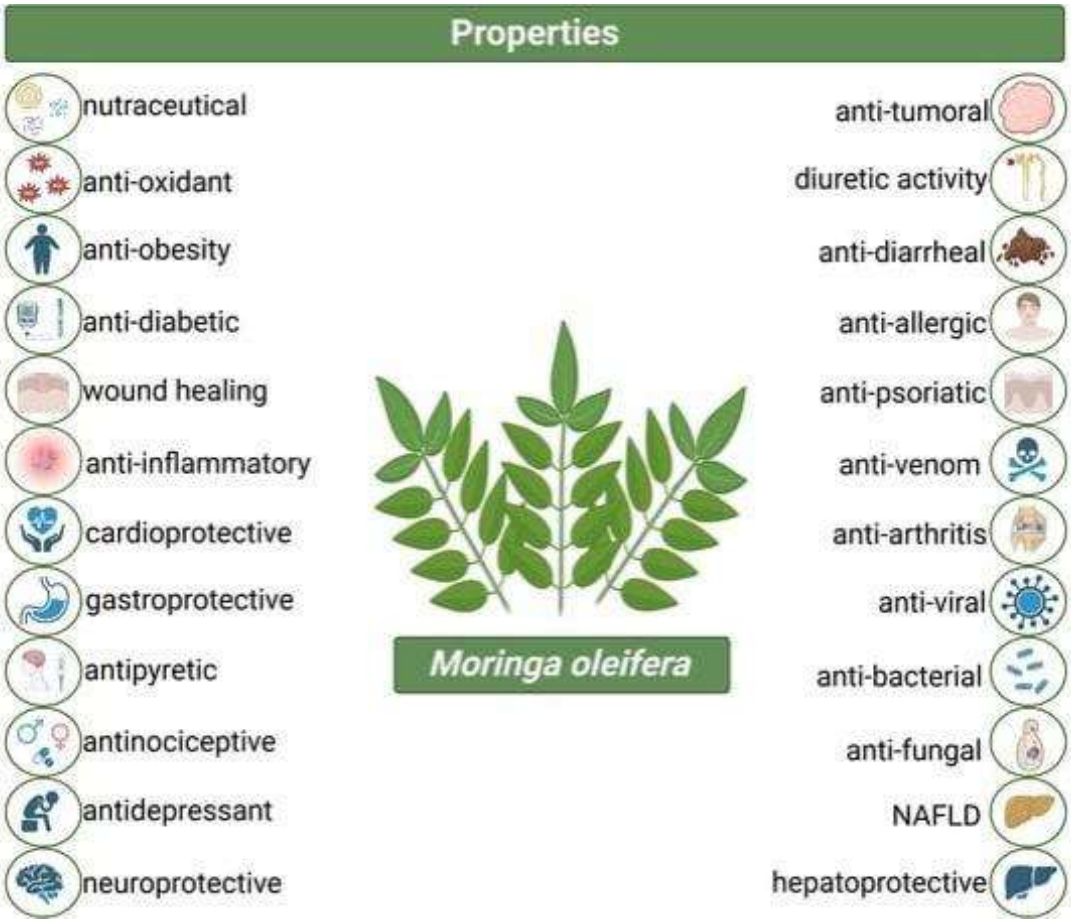
Statement of Problem

"Cancer remains one of the leading causes of death worldwide, and despite advances in conventional treatments, there is a growing interest in exploring natural products with potential anticancer properties.

Moringa oleifera, a plant rich in bioactive compounds, has been traditionally used for its medicinal properties, including anti-inflammatory and antioxidant effects. However, the anticancer potential of Moringa oleifera powder remains understudied.

This research aims to investigate the anticancer properties of Moringa oleifera powder and its potential as a complementary or alternative therapy for cancer treatment."

Properties of Moringa Oleifera



Aim and Objective

Anticancer Properties of Moringa Oleifera leaf Powder.

Methods and material

Process of preparation of Moringa leaf powder

Rich in vitamins, minerals and protein, moringa leaves Processed into powder can helps to improve the diet of adults and nursing mothers, and can also be used as A medicine for diabetes, digestive and respiratory problems' A detailed method of preparation of moringa leaf powder With photographic representation is given in following Subheadings.

Harvesting of Moringa leaves First harvesting of moringa leaves can be done 3-4 Months after sowing and can be continued after every 30 to 45 days.

The leaves can be harvested as shown in From the desired height of 30 cm to 1 m above ground with The help of a sickle or a sharp knife or by removing the Leaves, picking them directly off the tree. It should be Harvested at the coolest time of the day: early morning or Iate in the evening.

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It is important to make sure there is no Dew on the produce before harvesting, especially in the Morning, to avoid rot during transport,



1.Transportation



The harvested branches as whole can directly be Transported before stripping the leaves from branches to the Processing area if nearby.

In case the processing area is atIu, dittany" it's better to strip the leaves off the branches and Tied them together in bunch before transporting.

Freshly Harvested material should be transported as quickly as Possible to avoid deterioration. Fresh moringa leaves, transported loosely, should be well ventilated' For shorter Distances aerated baskets or perforated plastic containers Should be used to transposing the fresh leaves' Leaves being Transported over long distances should be in air-conditioned Or refrigerated vans to keep them cool until delivery at the Processing centre 'Washing

The three step washing process Is important for the step Production of good quality moringa leaf powder. In first step dust and traces of insects and bird's droppings if any From the leaflets can be removed by washing them in clean And fresh water (Fig 2). Drain the extra water utilized in first Step from the leaflets by flipping them. Wash the koolleaves Again with 1% saline solution

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for 3-5 minutes in second step To remove microbes and bacteria's present. Finally in third Step wash the leaves again in clean water.

2.Stripping the leaflets



Strip at the leaflets from the leaf petiole manually at The processing area. This can be done directly from the Branches if the leaves have not been stripped off the main Branch before transportation.

The diseased and damaged and Unwanted leaves can be discarded at this step. Use the Remaining green branches as animal fodder, they make a Good protein supplement. Maintaining hygienic atmosphere In the-surrounding area and personal hygiene of the workers Is important to get good quality product.

3.Drying



Properly washed leaves must be dried as quickly as Possible from sunlight and dust to avoid mould Growth and degradation of the nutritional components by Ultraviolet light (UV). There are three main methods for Drying moringa leaves.

Drain the water from Place the leaves in perforated buckets, distribute the leaflets on food-grade mesh trays, and let them drain for fifteen minutes.

4.Rack drying in room

Allow moisture from the leaflets to remove without Supplementing any external heat by spreading them in a thin Taker on the rack made of wood or on a mesh tied on shelves (green house net, fishing net or mosquito net mesh can be Used) in a well-ventilated room as shown in (Fig 3)' The Drying room

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should be insect, rodent and dust proof' It is Possible to use a fan to reduce the drying time, but the air Must not be directly oriented towards the leaves, as it can Increase contamination with germs in the air' Tum the Leaves upside
Down at least once, for uniform drying' Leaves Should be completely dry within a maximum of 4 days' The Loading density should not exceed 1 kg.

5.Solar Drying
The solar dryers can be effectively used for drying to The moringa leaves. The air should be filtered with muslin Cloth to keep out dust. Spread the leaves in layer of 1-2 cm On mesh and dry in the dryer for about 4 hours at Temperature of 35oC-55oC. Solar drying can be used for Both small and large scale processing or in rural Communities where there is no electricity. Loading density Should not exceed 2kglm in this case. This is fast method of Drying which takes only 4 hours compared to rack drying in Room which takes 4 days to completely dry the leaves.

6.Mechanical Drying
Different types of electric or hot air dryers can also be Used for large scale production of the powder in short period Of time. Drying temperatures in this case should range Between 50oC-55'C. Leaves will turn brown and nutritional Loss occurs at a drying temperature above 55oC. Leaves Should be dried until their moisture content is below 10%. Loading density should not exceed 2.5 kglm2.

7.Milling/Grinding
Moringa leaves at moisture content below 10% are Ready to mill in grinding mill. Mill dry leaves using a food Grade stainless steel hammer mill or burr mill for large scale Commercial purpose, For personal or household use, leaves Can be pounded in a mortar, or milled with a kitchen Blender. Fine moringa leaf powder is the product we will be Getting after milling the leaves. Sieve the powder if needed To separate coarse particles and again grind the material Which is sieved to get fine powder (Bedim 2016), Drying the leaf powder Moringa leaf powder is highly hygroscopic in nature And has tendency to absorbs moisture from surrounding Which can leads spoilage and deterioration of the product Therefore it should be dried again at 50'C for 30 minutes to Reduce moisture content below 7.

8.Packaging
Packaging the moringa leaf powder in suitable packing Material or in container is important for its safe storage, Convenient handling, and easy transportation, preserve Nutritional value and improve its appearance (Fig 5).

The Persons and the area involved in packaging of moringa leaf Powder must be hygienic.

Everyone should make sure that their personal hygiene and cleanliness are maintained while they are on duty. During the process packaging, personal safety equipment such nasal masks, head caps, and gloves must be worn. Following drying, the powder should be allowed to cool before being packaged in dry containers made of materials that won't compromise the product's quality or in sterile, single-use Polyene bags. To stop moisture absorption and content loss, every package needs to be properly sealed. The packages need to be kept somewhere dry and cool.

9. Labelling
It's critical to strategically label the packaged moringa powder to draw in customers, promote the product, provide a synopsis of the product, and establish a market for it. The name, net content, producer's name and address, country of origin, lot or batch identification number or code, usage directions, production date, and nutritional data must all be written on each moringa leaf powder container.

10. Nutritional information of Moringa leaf powder



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Vitamins, minerals, amino acids, beta-carotene, antioxidants, and omega-3 and omega-6 fatty acids are all abundant in moringa. It is rich in protein, calcium, potassium, and vitamin C. Moringa's green leaves are thought to have a higher iron content than other green leafy vegetables. According to Gopalakrishnan et al. (2016), it has anti-inflammatory, spasmodic, anti-hypertensive, anti-tumor, anti-oxidant, antipyretic, anti-ulcer, anti-epileptic, cholesterol-lowering, and anti-diabetic qualities. The leaf powder still includes a highly rich nutritional complement, even if a significant portion of the vitamins are lost during washing, drying, and storage. The nutritional data for 100 grams of powdered moringa leaf is provided.

CONCLUSION

In conclusion, powdered moringa leaves that have been dried at 50 to 55 degrees Celsius without the use of chemicals can be a healthy source of proteins, vitamins, and minerals. If added in the necessary quantity, it can boost the nutritional value of our regular meals and help children, adults, and nursing mothers eat better. Additionally, this powder can be made into pellets and capsules to treat respiratory, digestive, and diabetic issues. Other items, such as oil, beverages, chocolates, noodles, roasted seeds, ointments, and cosmetics, can be made from moringa in addition to its leaf powder. Therefore, this miracle tree might undoubtedly be employed as a commodity to begin with or as a nutritional supplement for both humans and animals.
In a farmer's field is a small-scale moringa processing plant.

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