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Review

A review on *Moringa peregrina* (Forssk.) Fiori as a threatened, medicinal plant species growing in South Sinai, Egypt

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ABSTRACT

The most well-known species of *Moringa* is *Moringa peregrina*, which belongs to the family Moringaceae. Saudi Arabia, the Middle East, Iran, and India are all major areas where *M. peregrina* is located. Since *M. oleifera* is a common species in Africa and Asia, where the common people are searching for nutritious foods in an affordable way to meet their demand for food sources, previous studies on the *Moringa* genus have mainly focused on *Moringa oleifera*. *M. peregrina* has recently attracted more attention because of its traditional, nutritional, industrial, and therapeutic uses. Due to the plant's wide range of medicinal applications, it has recently been tested for a number of pharmacological activities. Thus, the purpose of this paper was to investigate the biological and therapeutic effects of *M. peregrina*. *M. peregrina* has numerous traditional, nutritional, industrial, and therapeutic benefits. Folk medicine uses plant parts for a variety of human health issues, such as diabetes and wounds. Additionally, the paper aims to clarify the extent of the risks that this plant is exposed to in its environment and study the ecology and distribution of *moringa*. Finally, we aim to offer some recommendations for the preservation of the plant.

Keywords: *M. peregrina*, biological activities, distribution, ecology, morphology, chemical composition.

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INTRODUCTION

The *Moringa peregrina* (Moringaceae) species, commonly known as the Miracle Tree (Sengupta and Gupta, 1970; Ramachandran et al., 1980; Kleiman and Ashley, 2008; Rashid et al., 2008). There are fourteen species of *Moringa*, which belong to the Moringaceae family, and which have been identified in Egypt, India, the Philippines, Pakistan, the Caribbean Islands, Asia Minor, Africa, Central America, Cambodia, North America, South America, and the Western and Sub-Himalayan regions (Fahey, 2005; Mughal et al., 1999). The majority of *Moringa* species are utilized in Chinese and Indian folk medicine, and they go by a variety of traditional names, including Drumstick Tree, Horse Radish Tree, Miracle Tree, and Tree of Life (Dhakad et al., 2019). As any parts of the *Moringa* tree, including the leaf, seed, bark, gum, seed oil, meal, fruit (pods), flower, root, stem bark, and root bark, can be eaten or utilized in the production of plant-based meals and medications (Dhakad et al., 2019). It is used in the treatment of ovarian cancer, prostate cancer, breast cancer, phyto-oxidative damage, radioprotective issues, circulatory/endocrine disorders, anti-anemic, anti-atherosclerotic, and diuretic activity, detoxification, analgesic, anti-aging, and a number of other conditions which have drawn the attention of researchers who have studied some parts of these species for their various therapeutic properties (Al-Asmari et al., 2015; Ahmad et al., 2014; Waterman et al., 2015). Almost all parts of the *Moringa* plant, including the seeds, leaves, fruits, flowers, buds, and roots, are suitable for use by people in developing nations who want to use medicinal plants and low-cost foods for their daily needs and well-being. In this context, *Moringa* is a natural source of oil and fat in the context of global industrialization and has been used in areas like food security, renewable feedstock, and the support of sustainable and rural development (Rahman et al., 2009;

Kashyap et al., 2022). Additionally, knowledge and compiled information on the bioactive compound content of *Moringa* parts may aid in achieving health benefits and health-promoting effects. The taxon name *Moringa* is derived from Tamil 'murunggi' or Malayalam 'muringa' (Quattrocchi, 2000). Historical evidence shows that various civilizations such as the Indians, Greeks, and Egyptians used *moringa* for a variety of purposes for thousands of years. To maintain their skin health and mental fitness, they preferred to include the leaves and fruits of the *Moringa* plant in their diet. The ancient Maurian warriors of India were fed *Moringa* leaf extracts on the battlefield because it was thought that the concoction would relieve their pain and stress from fighting. Additionally, the beverage boosts energy levels on the battlefield (Jahn, 1996; Fuglie, 2001; Manzoor et al., 2007). Ancient Greek, Roman, and Egyptian civilizations highly valued edible oil with a pleasant taste (Ben oil) from the seeds of *Moringa* for making perfume and protecting their skin. The Egyptians have used ben oil since the middle and old kingdoms (3000–2000 BC) (Miller and Morris, 1988; ICUN, 2005). The important tree is now endangered in much of the Middle East and the Arabian Peninsula. Threats to *M. peregrina's* survival in Egypt, particularly in South Sinai, include climate aridity, especially in the last two decades, flower and seed-feeding insects, both of which are dangerously limiting factors in seed production and density of seedlings of many species, including the *Moringa* tree grown in South Sinai (Abd El-Wahab, 1995), as well as infection of the old trunks. The fatal factor that causes *M. peregrina* to completely vanish is its inability to regenerate and establish as young trees or young populations (Dadamouny 2009). Because *Moringa* seedlings are extremely rare, population dynamics research is crucial. Additionally, it has a high mortality rate and a small establishment (Dadamouny 2009). The partial conservation of this tree is apparently difficult, due to overriding its population genetics use, as a crop that is palatable to livestock; it has a range of values. Additionally, they are destroying trees without hesitation for use as fuel and using excessive amounts of *moringa* seeds in traditional medicine. To prevent the *M. peregrina* tree in South Sinai from being eaten by animals and Bedouins, conservation efforts are absolutely essential. Zaghloul (1997) reaffirmed the need for intensive, extensive, or long-term studies before taking any action to protect and manage the threatened species in South Sinai. Additionally, all bedouin activities in Southern Sinai should be controlled, including excessive grazing and cutting. Zaghloul (1997) suggested that research be done on soil seed banks and transplantation as a method of restoring endangered and threatened species. According to Springuel and Mekki (1994) and Moustafa (2001), Egypt has a lot of issues when its resources are mismanaged and not nourished by good management. Effective management can save our remaining natural resources and give us the opportunity to identify extinct species while they are being utilized, laying the groundwork for sustainable development. The current study focuses on *M. peregrina*, one of the species that occurs most rarely in South Sinai, which has high medicinal value and biological importance as one of its biotas. Why this species occurs under threats? How to conserve it? What about the present status of *M. peregrina* population aging and sustainable use studies?

Morphological appearance

M. peregrina is a deciduous tree of the *Moringa* family. *Moringa peregrina* is the fastest growing tree of the other *Moringa* species (Abd El-Wahab, 1995), 3 to 10 m tall, with grey-green bark and adapted to drought. The leaves are 30 to 40 cm long, alternate, obovate, and deciduous. One of the unique features of *M. Peregrina* is the shedding of the leaflets as the leaf matures, exposing the leaf spindle (Robiansyah et al., 2014; Olson et al., 2016). The plant has axillary inflorescences with branched racemes (18 to 30 cm long). Flowers 10 to 15 mm long, hermaphroditic, zygomorphic, 5-fold, pinkish white with white sepals. His single tree of *M. peregrina* can produce up to 1,000 pods per year, with pod lengths of 20 to 40 cm. Each pod contains 8 to 15 ovoid, wingless, triangular seeds (Afsharypuor et al., 2010). Another unique feature of *M. peregrina* is tuberous root formation during the seedling stage (Munyanziza and Yongabi, 2007) (Figure 1).

Distribution

In addition to being grown in West, East, and South Africa, tropical Asia, Latin America, the Caribbean, Florida, and the Pacific Islands, *moringa* is an essential crop in India, Ethiopia, the Philippines, and Sudan. *Moringa oleifera* is the economically maximum precious species and is local to South Asia, in which it grows inside the Himalayan foothills however is extensively cultivated throughout the tropics. Nine species arise in Japanese Ethiopia, northern Kenya, and Somalia, of which 8 are endemic to Africa. *Moringa peregrina* takes place certainly in arid or semi-arid international locations bordering the Red Sea, from Somalia and Yemen to Israel and directly to Syria. In tropical Africa its miles are mentioned from Sudan, Ethiopia, Eritrea, Djibouti, and Somalia. It is mentioned by Iran and Pakistan, however its incidence their wishes confirmation. In Egypt, *M. peregrina* grows into the Red Sea region, according to Kassas and Zahran (1962), *M. peregrina* is confined to the feet of mountains that are higher than 1300 to 1500 m. According to El-Hadidi et al. (1991), it stretches from Gebel Abou-Dukhan (lat. 27 20′N) to Gebel El Faryid (lat. 23 30′ N). According to Zahran and Willis (2009),

Figure 1. Morphology of *M. peregrina* (plant stem, leaves and flowers).

M. peregrina is restricted to the upstream regions of wadis that drain the slopes of higher mountains. Additionally, patches that only cover a small portion of the upstream runnels of the drainage systems serve as representations of the *M. peregrina* scrub. At the base of the taller mountains, there are runnels for collecting water. The Red Sea Mountains and south Sinai are the only places in Egypt where *M. peregrina* is found, making it a desert species. The upstream runnels at the mountain bases and slopes, where *M. peregrina* grows, are typically covered with coarse rock debris. According to Zahran and Willis (2009), *M. peregrina* is found in the higher zones of the north-facing slopes of the Red Sea Coast Mountains, particularly Gebel Shindodai. It is also found in the Samiuki, Nugrus and Shayeb groups of mountains. Typically, coarse rock debris covers the soil where *M. peregrina* grows. The fact that *M. peregrina* only lives at the base of higher mountains suggests that the high-altitude results in more abundant water sources. Additionally, it has been observed in a small area at the Feiran Oasis Mountains in South Sinai. It grows on the rocky slopes and cracks of mountains. Few populations remain in the wild today, and they are scattered throughout South Sinai, the Eastern Desert, and Gebel Elba in southeast Egypt (Abd El-Wahab, 1995). Moreover, the west-facing escarpments of Gebel Serbal are rich in *M. peregrina* trees, which grow on rocky slopes near springs (Danin, 1999) (Figure 2).

Chemical studies of *M. peregrina*

Numerous researchers have reported on the chemical composition, physical and chemical characteristics, protein functional properties, fatty acid composition, and therapeutic applications of *M. peregrina* seeds and seeds oil (Somali et al., 1984; FAO, 1988; Al-Kahtani and Abou-Arab, 1993). Along with having a high oil content (42 to 54%), seeds also have a high level of protein (23%) and a few minerals and vitamins. Its flour has been found to have more oil than soybean flour, but less of other nutrients like proteins, carbohydrates, and ash (Al-Kahtani and Abou-Arab, 1993). Natural habitats of *M. peregrina* (Forssk) Fiori, also known as Al-Ban or Al-Yassar locally, can be found in Jordan's lower Jordan Valley, Dead Sea region, Wadi Araba, and Wadi Feynan. The tree grows quickly and reaches a height of 5 to 15 m. It produces long seed pods with 15 to 20 seeds per pod (Al-Dabbas et al., 2010). The mature seeds have an oddly bittersweet flavor. The extracted seed oil, which Bedouins obtain by crushing and boiling seeds with water, then skimming off the oil that floats to the top, is used in cooking. Seeds are also used as a laxative, in medicine, and as feed for livestock (Hegazy et al., 2008). the seeds contained 24.1% crude protein, 53.5% fat, 2.6% ash and 2.4% moisture, with high potassium (630.2 mg/100 g) and phosphorus (620.5 mg/100 g) content(Al-Dabbas et al., 2010). The essential amino acids made up

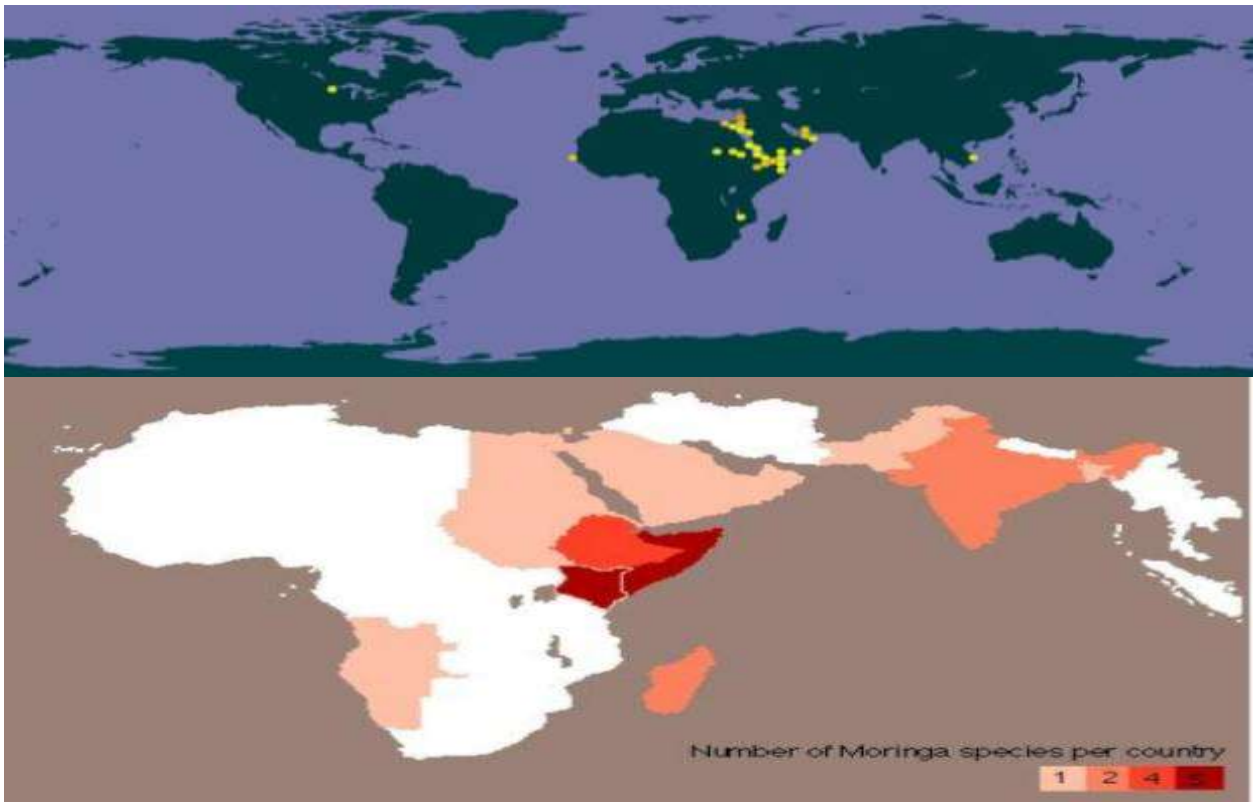

Figure 2. Map shows Africa, Madagascar, and parts of Asia, including Arabia and India. Countries in which Moringa occurs are shaded in color. The lightest shadings indicate that only one species of *Moringa* is found in that country, while darker colors denote countries with two, four, or five species. *Moringa* species almost always grow in stands, only rarely occurring singly, and no species have been found to occur sympatrically (to grow together in the same habitat at the same spot).

approximately 56% of the *moringa* protein, which was higher than the reference value (40%) recommended by FAO/WHO. The *moringa* protein was rich in arginine (15.3%), leucine (9%), glycine (8.4%), and proline (8.2%). The oil from the seeds was found to have a high concentration of unsaturated fatty acids (83.5%), especially oleic acid (74.8%). The most common saturated fatty acids were found to be behenic (2.6%), stearic (3.1%), and palmitic (8.9%) acids. Additionally, high concentrations of -sitosterol (28.3%), stigmasterol (24.54%), campesterol (23.7%), and -5-avenasterol (16.1%) were found in the seeds' oil (Al-Dabbas *et al*.,2010) This indicate that *M. peregrina* seeds have high potential as a food or feed due to its high content of oil, protein, amino acids, sterols, and polyunsaturated fatty acids.

Important uses

Tumor folk remedies use the roots, leaves, flowers, and seeds of *M. peregrina* (Hartwell, 1967, 69, 70 and 71). Pods treat joint pain, liver and spleen issues, and act as a de-wormer. Pods can treat malnutrition and diarrhoea because of their high protein and fibre content. Dropsy is treated with the root of *M. peregrina*, and its juice is applied topically as a rubefacient or anti-irritant. In addition, roots act as a bitter tonic for the body and lungs as well as an emmenagogue, expectorant, mild diuretic, and stimulant in conditions such as paralysis, epilepsy, and hysteria (Duke, 1983). *M. peregrina* leaves are used as a poultice on sores and for headaches. They are also said to have purgative effects and to stop bleeding. Has antibacterial and anti-inflammatory properties for use on wounds and insect bites. Extracts can be used instead for bacterial or fungal skin conditions. Leaf tea treats stomach ulcers, and diarrhea. The bark, leaves, and roots are sharply sharpened and removed. Promotes digestion (Duke, 1978; Freiberger et al., 1998). *M. peregrina* flower juice helps the urinary tract problem. In addition, it improves the quality and flow of mother's milk. Seed oil is used for diarrhea and vice versa for laxative effect. As reported by the Center for Africa and Hinduism in terms of versatility, *moringa* is used by bacteria, dryness, Fungi, Laterites, and Mycobacteria (Duke, 1978; Ramachandran et al., 1980). *M. peregrina* as a plant growth hormone: *M. peregrina* leaf juice potent plant growth hormone that increases yield by 25 to 30% in almost all crops. One of the active ingredients of *M. peregrina* in the leaves is zeatin. A plant hormone related

to cytokinins. This foliar spray should be used in addition to (not instead of). Other fertilizers, irrigation, and agricultural practices (Fuglie, 2001a). *M. peregrina* as a green manure: Using *M. peregrina* as a green manure can significantly enrich agricultural land. In this process, the land is first tilled, *Moringa* seed is then planted 1 to 2 cm deep at a spacing of 10 × 10 cm. (About one million seeds per hectare). After 25 days, the seedlings are plowed into the soil to a depth of 15 cm. The land is prepared. again, for the crop desired. Seed can be done mechanically if the seed is first de-hulled. Planting kernels will reduce germination time. by up to three days. A simple method of seeding is to first till the soil to a depth of 10 cm, then scatters the seed over the soil and rototill again to a depth of 2 to 3 cm (Fuglie, 2001b). *M. peregrina* as food: According to nutritional analysis, *M. Peregrina* contains a wealth of essential and disease-preventing properties. Nutrients and all essential amino acids (Verma et al., 1976; Freiberger et al., 1998).

BIOLOGICAL ACTIVITIES OF *MORINGA PEREGRINA*

M. peregrina parts were tested for a broad range of pharmacological activities as antioxidant, antimicrobial, anti-diabetic, anti-spasmodic, hypertension, hepatotoxicity, lipid-lowering activity, anti-inflammatory, anticancer, and memory disorders.

Antioxidant

Reactive oxygen species (ROS) are involved in the development and progression of numerous human diseases, including cancer, diabetes mellitus, atherosclerosis, cardiovascular disease, aging, and cirrhosis (Taniyama and Griendling, 2003). Previous studies have shown that plant extracts can prevent or delay the above diseases due to their redox properties, which can act as free radical scavengers, reducing agents, and hydrogen donors (Robards et al., 1999; Govindarajan et al., 2005). With this in mind, various extracts of *M. peregrina* were examined for their antioxidant capacity. Studied the antioxidant capacity of several plants growing in Oman. This includes *M. peregrina*, which is edible and used for wound healing. Aqueous and Ethanolic extracts of the plant showed good DPPH scavenging capacity with up to 87.8% inhibition and an IC_{50} value of 7.6 µg/ml. The total antioxidant capacity as gallic acid equivalents of the ethanol extract from *M. peregrina* was 814 mg/g. Although the DPPH scavenging potential assay for measuring the antioxidant activity of plant extracts is widely accepted, different test methods must be used to confirm the potential of extracts. This single assay provides only a reductive indication, as crude extracts may contain multiple compounds with different functional groups (Sacchetti et al., 2005).

Antimicrobial

Infectious diseases are the leading cause of death worldwide. Synthetic antibiotics are now widely used to prevent or treat various infections. The indiscriminate use of synthetic antibiotics poses a serious threat to humans as multidrug resistance evolves among disease-causing microorganisms (Lin *et al*., 2018). Therefore, scientists are looking to non-toxic/least toxic herbal medicines to treat infections. In addition, it helps overcome the problem of the emergence of multidrug resistance. Therefore, extracts of *M. peregrina* have been studied for antiviral, antibacterial, and antifungal activity. In 1997, Mehdi *et al*. He investigated the in vitro anti-hepatitis B virus activity of ethanol extracts from his *M. peregrina* and 18 other plant parts against the HepG2.2.15 cell line (Mehdi *et al*., 1997). The results showed that the *M. peregrina* extract did not inhibit the cell line with 100% viability. On the other hand, Soltan and Zaki (2009) examined 42 Egyptian medicinal plants, including *M. peregrina*, for their antiviral activity, and the authors found that a hydroalcoholic extract of *M. peregrina* at concentrations of 50–50 was effective against herpes simplex 1 we found it to have antiviral potential against the virus and showed 100. µg/ml, Rf 104. However, the extract inhibited host cell growth even though the experiment was performed at the maximum concentration of 100 µg/ml. *M. peregrina* extract has been found to be inactive against polio type 1 and vesicular stomatitis virus. Using the disc diffusion method and determination of the minimum inhibitory concentration, *S. epidermidis*, *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Enterobacter cloacae*, *Klebsiella pneumoniae*, *Candida albicans*, *and C. glabrata*. The activity was compared to standard antibiotics. Results showed that the oil was effective against all microorganisms tested (Lalas et al., 2012).

Anti-diabetic

Diabetes is one of the most common metabolic diseases resulting in significant morbidity and mortality (Deshpande *et al*., 2008). Chronic hyperglycemia in diabetes is associated with persistent dysfunction, damage, and failure of various organs, particularly the kidneys, heart, eyes, and blood vessels. There is a growing demand for medicinal plants that have traditionally been used to treat diabetes and its complications. This is because insulin and oral antidiabetic drug use are associated with side effects (Holman and Turner, 1991; Rao et al., 2001). In addition, medicinal plants are cheap, readily available, and have little or no toxicity. In the past, *M. peregrina* has been

reported for hypoglycemic properties (Ahmed et al., 2010).

El-Haddad et al. (2002) reported the antidiabetic activity of a hydroalcoholic extract of *M. peregrina* seeds in streptozotocin-induced diabetic rats. Administration of the hydroalcoholic extract significantly lowered blood glucose levels at a dose of 200 mg/kg body weight. Chloroform and petroleum ether fractions also lowered blood sugar levels. Furthermore, histopathological studies showed that hepatocytes from chloroform-treated rats were non-toxic and regenerated the diabetic effects induced by streptozotocin. The antidiabetic effect of his *M. peregrina* ethanol extract aerial parts on streptozotocin-induced diabetic rats was reported by Elbatran *et al.* (2005). The extract significantly reduced serum glucose, aspartate aminotransferase, and alanine aminotransferase levels. Administration of an ethanol extract of *M. peregrina* also decreased serum triglycerides, cholesterol, and low-density lipoprotein. The extract increased high-density lipoprotein levels. In toxicological studies, *M. peregrina* extract was associated with increased respiratory rate, general depression, cyanosis of mucous membranes, loss of righting reflex, convulsions, and death. caused The alcoholic extract to have an LD_{50} value of 113.4 mg/100 g body weight.

Hypertension

Hypertension is a cardiovascular disease and one of the leading causes of death worldwide. Various antihypertensive drugs have been developed to treat hypertension. However, the drug showed efficacy with associated side effects (Alamgeer et al., 2017). The study of edible and medicinal plants remains important due to their potential benefits (Kalia, 2005). Because of its edible importance and traditional uses, *M. peregrina* was studied on blood pressure and oxidative status in dexamethasone-induced hypertensive rats. After treatment, systolic blood pressure, thymus weight, body weight, plasma hydrogen peroxide concentration, and plasma iron (III) reducing antioxidant activity were measured. Results of prevention studies show that *M. peregrina* extract prevents elevation of systolic blood pressure at a dose of 400 mg/kg. In a reverse study*, M. Peregrina* extract failed to lower SBP in dexamethasone-induced hypertension in rats. Oral administration of *M. peregrina* extract had no significant effect on thymic weight loss, and moreover, the extract failed to prevent weight change. In contrast, Rouhi-Broujeni et al. (2013) stated that *M. peregrina* caused a loss in average weight. In a prophylaxis study, treatment with 200 and 400 mg/kg extract prevented elevated H2O2 concentrations. In a converse study, administration of 400 mg/kg *M. peregrina* extract reduced elevated plasma hydrogen peroxide levels. In both prevention and reversal studies, rats were dosed with 400 mg/kg *M. peregrina* extract significantly reduced the antioxidant capacity to reduce plasma iron (Safaeian et al., 2015). Antihypertensive activity may therefore be related to the availability of antioxidant molecules present in *M. peregrina*. Antioxidant molecules have played an important role in lowering blood pressure (Duarte et al., 2001; Jalili et al., 2006).

Anticancer

Resistance to cancer therapy is a serious problem and remains one of the leading causes of death (Batist et al., 2011). Resistance can occur through several biological mechanisms, including decreased drug uptake, increased drug efflux, and altered cell signaling (Tan *et al*., 2016). Plant molecules are known to be potential substitutes for overcoming resistance to synthetic anticancer drugs. Over 3000 plants worldwide, including *M. peregrina*, have been studied for their anticancer properties (Solowey et al., 2014). The in vitro anticancer properties of *M. peregrina* seed oil have been demonstrated in various cell lines such as MCF-7 (breast cancer cell line), HepG2 (liver cancer cell line), CACO-2 (colon cancer cell line), HeLa was studied in (cervical cancer) cell line) and L929 (mouse fibroblast). A significant cytotoxic potential was observed against all cell lines tested and its activity was dose-dependent. One milligram of seed oil showed the highest cytotoxic potential against the cell lines tested. , HeLa, HepG2, MCF-7, CACO-2 and L929 were 366.3, 604.3, 850.9, 721.7 and 935.8 µg/ml. Cell line (Elsayed et al., 2016). Based on these results, a comprehensive investigation into the isolation of anticancer molecules is recommended. It may help overcome tolerance issues and reduce treatment costs.

Memory impairment

Age-related neurodegenerative diseases, namely Parkinson's disease, Huntington's disease, and Alzheimer's disease, are increasing in the population (Aruoma et al., 2003). Recently, due to the lack of effective treatments for the above conditions, research has been conducted to develop new strategies to slow disease progression (Abushouk et al., 2017). Recent studies have shown that medicinal plants possess superior neuroprotection (de Rus Jacquet et al., 2017; Zhang et al., 2017). The neuroprotective effects of aqueous extracts of *M. peregrina* leaves have been studied and reported by studying learning and memory in mice (Elsaey et al., 2016). The extract was administered four times and two different timer times (3:00 rest period and 15:00 active phase). Intranasally administered insulin served as a positive control. Memory performance results showed that intranasal administration of the extract improved memory function similar to positive control insulin. Showed the difference .00 memory and learning.

Subchronic administration did not significantly differ in memory and learning at timer time 15.00 it was also observed that when a single dose of *M. peregrina* extract was administered intranasally followed by acute administration, no locomotor activity was observed at either dose or at both time points. Also, there was no significant difference in locomotor activity when the extract was administered sub chronically. Based on the results, it was concluded that *M. peregrina* aqueous extract enhances memory function in scopolamine-induced amnesia in mice.

Traditional uses

Moringa and its healing powers were first recorded in Indian Vedic literature about 5000 years ago (Patwardhan, 2000). In folk medicine, extracts of *M. peregrina* leaves are applied to the skin to treat paralysis and rashes (Ghazanfar and Al-Al-Sabahi, 1993). In the northern regions of Oman, pod oil is used to treat spasms and polio (Miller and Morris, 1988). Its seeds are most commonly used to combat diabetes in the Sultanate of Oman (Reddy et al., 2015). In the Indian subcontinent, it is also used effectively for diabetes-related conditions such as hyperlipidemia and hyperglycemia. The young leaves of *M. peregrina* are traditionally used as an antioxidant and in folk medicine to heal wounds in Arab countries. Bark juice is also used as an antiseptic (Marwah et al., 2007) and is used to treat fever, headache, constipation, back and muscle pain, weakness, burns, and labor (Boulos, 2000; Elbatran et al.., 2005; Tahany et al., 2010). The leaves are used to treat wounds (Nawash and Al-Horani, 2011) and the seeds are used to treat abdominal pain (Van der Vossen and Mkamilo, 2007). The roots and leaves of *M. peregrina* are mixed with water and used to treat hypertension, malaria, asthma, stomach ailments, and diabetes, and to expel a retained placenta (Mekonnen *et al*., 1999). Traditionally, the oil of this plant has been used to treat skin problems such as freckles, itching and scabies (Al-Dhaheri, 2016).

In addition to its medical importance, *M. peregrina* has significant nutritional importance. Young leaves of *M. peregrina* can be used as a vegetable (Al-Dhaheri, 2016). Immature seeds are eaten in India, and mature seeds are roasted or fried in Malawi (FAO, 1988; Elbatran et al., 2005; Afsharypuor *et al*., 2010). In traditional Chinese medicine, plant seeds are mixed with other herbs and used as food to treat malnutrition (MPCP, 2006). Furthermore, *M. Peregrina* is one of the most important native trees in the United Arab Emirates due to its cultural, spiritual and religious links. Locally, the leaves of the plant are used to flavor the meat when cooking smoked meat (tanur). Indigenous peoples of the United Arab Emirates still follow this traditional practice (Al-Dhaheri, 2016). Moringa extract has been shown to be effective in inhibiting and controlling weight gain in mice. Its high vitamin B content contributes to smooth and efficient digestion, helping the body convert food into fat. It can help convert it into energy instead of storing it. Moringa reduces weight gain, lowers cholesterol and blood pressure, prevents inflammation, helps the body convert fat into energy, reduces fatigue and increases energy levels.

CONCLUSION

Moringa peregrina is a medicinal, economical and valuable tree. it is one of the most endangered species due to overplanting, overgrazing and extreme drought. Uncontrolled anthropogenic practices are putting a dramatic strain on the trees of *M. peregrina* in South Sinai. If these activities are not controlled, the ultimate fate of the current population is extinction. especially during extreme climates that are likely to have a large impact on the population structure for several years. Furthermore, *M. peregrina* precise populations and management options. Conservation strategies (*in situ* and *ex situ*) to preserve current populations of his *M. peregrina* trees in southern Sinai (starting with the most exploited trees in *W. Feiran* and least stressed in (W. Zaghra) from trees. Finally, care efforts should be directed to *M. peregrina* tree of South Sinai during the period of establishment and growth to prevent extinction. The conservation status of *M. peregrina* is an economically valuable tree of Egyptian deserts. It is used medicinally, provides a highly nutritious supplement to Bedouin diets, provides fodder for livestock, and is used for firewood. *M. peregrina* seeds have been a source of high-quality oil for cosmetics and perfumes since antiquity. Due to unmanaged grazing and over-collection, *M. peregrina* has become one of the most endangered tree species in the Egyptian desert ecosystem. A long-term conservation program is urgently needed to maintain or increase the number and size of *M. peregrina* populations. Ten populations harboring a total of 130 adult *M. peregrina* were sampled from three disjunction Wadis in South Sinai (W. Me'ar, W. Fieran and W. Zaghra). Open-pollinated seedlings were electrophoretic ally analyzed to address two basic questions: (1) how is genetic diversity distributed within and among populations within these three Wadis; and (2) what is the mating system of this species. *M. peregrina* has a mixed mating system with a selfing rate of up to 16% and has limited genetic diversity within and significant genetic differentiation among its populations, the majority of which occurs among Wadis. Direct protection is urgently needed to decrease genetic deterioration within *M. peregrina* populations and to improve their ability to maintain or improve their population numbers. The priority of in situ conservation should be to conserve a few large well-distributed populations representing

different Wadis. *Ex situ* germplasm collections should be made across the species' range to ensure a representative sample of its genetic variation. Seed orchards designed to maximize cross-fertilization among unrelated individuals should be established to generate propagules to supplement natural populations. Based on the results to date, looking at the future of *M. peregrina* populations in the study area suggests the following:

(1) Develop an *in situ* and *ex situ* conservation plan to conserve the current population of *M. peregrina* trees in southern Sinai (starting with the most utilized trees in W. Feiran and ending with the most used in W. Zaghra). Start with the least stressed tree.
(2) Supporting the idea of fencing, which plays an important role in reducing threat intensity and increasing the productivity of *M. peregrina* populations; The need to build enclosures around *M. peregrina* trees, especially the trees most utilized in W. Feiran and W. as a zaghra the best.
(3) There is a need to manage Bedouin behavior against excessive logging and overgrazing, and to increase awareness of the time and rate of plant collection. In addition, encourage the Bedouin to develop means of increasing his income from his *M. peregrina* in South Sinai. Just like growing this important plant in your habitat or botanical garden.
(4) *M. peregrina* trees in South Sinai, therefore, need to be tended during the period of establishment and growth to prevent their extinction.
(5) Further studies of the genetic diversity and heterozygosity of *M. peregrina* are needed for the population in southern Sinai.

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