



Nutritional and Health benefits of sun dried Red Amaranths and Drumstick leaves

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Abstract

Red amaranthus (*Amaranthus cruentus*) and drumstick leaves (*Moringa oleifera*) are two highly nutritious, bioactive rich plants widely used for their health benefits. Both plants are rich in essential rich in essential vitamins, minerals, antioxidants and dietary fiber contributing to various aspects of health. This review explores the combined health benefits of sun dried red amaranthus and drumstick leaves focusing on their nutritional content, immune boosting properties, anti-inflammatory effects, digestive health support and role in blood sugar regulation. The sun drying process not only enhances the concentration of these nutrients but also helps preserve bioactive compounds such as flavonoids, polyphenols and carotenoids which contribute to their health promoting properties. Red amaranthus with its high content of vitamins A, C, K and iron and drumstick leaves known for their rich protein, calcium and antioxidant profile, complement each other when consumed together. Their combined use offers a powerful nutritional synergy, supporting bone health, energy levels, immune function and overall vitality. This review emphasizes the potential of combining these two plants for holistic health benefits and encourages their use in functional foods and nutraceuticals.

Keywords: Anti-inflammatory, Polyphenols, immune boosting, bioactive compound and holistic

Introduction

Red amaranthus (*Amaranthus cruentus*) and drumstick leaves (*Moringa oleifera*) are two highly nutritious plants that have been utilized for centuries in various cultures due to their benefits. These plants are known for their rich content of vitamins, minerals, fiber and antioxidants making them powerful superfoods. When these leaves are sun dried their nutrient density is



concentrated, preserving and even enhancing their bioactive compounds making them even more beneficial for human health. Red amaranthus is a versatile leafy rich in protein, fiber, vitamins A, C and K and minerals like iron, calcium and magnesium (FAO, 2017). It is also recognized for its antioxidant properties which help combat oxidative stress and inflammation in the body (Bawa *et al.*, 2018). It has been a staple in many cuisines and is highly regarded for its ability to combat nutrient deficiencies and improve overall health (Das, 2012). Drumstick leaves, commonly known as moringa are packed with essential nutrients like vitamin A, C and E, as well as significant amounts of protein, calcium, iron and potassium (Anwar *et al.*, 2007). In traditional medicine, drumstick leaves have been used for their anti-inflammatory, antimicrobial and antidiabetic properties. They are particularly effective in managing anemia, enhancing immunity and lowering blood sugar levels (Leone *et al.*, 2015).

Sun drying these leaves not only extends their shelf life but also intensifies their nutritional benefits, making them ideal for incorporated into various food products such as soups, smoothies and powders. The drying process helps retain and sometimes even increase the levels of certain bioactive compounds like antioxidants which are crucial in reducing the risk of chronic diseases and boosting the immune system (Sharma *et al.*, 2019). Together, red amaranthus and drumstick leaves offer a powerhouse of nutrients and health promoting properties. Their combined use, especially in dried form, has the potential to significantly contribute to improving nutritional intake and combating prevalent health issues such as malnutrition, anemia and inflammation. Research has shown that sun drying retains up to 70-80% of key nutrients such as beta-carotene and ascorbic acid in leafy vegetables making it an effective preservation method (Sharma *et al.*, 2009).

Nutritional profile of Red amaranthus (*Amaranthus tricolor*)

Red amaranthus is a highly nutritious leafy that is rich in protein, fiber, vitamins and minerals. It is an excellent source of high quality plant protein, containing all nine essential amino acids. It has about 2.5-3.5g of protein per 100g of fresh leaves. Amaranthus leaves provide a good amount of dietary fiber which helps in digestion and maintaining gut health (Singh *et al.*, 2014).

It also a good source of vitamin C which aids in immune function and collagen synthesis and important for blood clotting and bone health. It contains a high amount of bioavailable iron making it beneficial for preventing iron deficiency anemia. Its calcium content helps in bone health and muscle function (Ashraf *et al.*, 2015).

Nutritional profile of Drumstick leaves (*Moringa oleifera*)

Moringa leaves are widely recognized for their exceptional nutritional value and medicinal properties. Moringa leaves are rich in protein containing about 6.7g per 100g of fresh leaves. Drumstick leaves are rich in beta carotene, essential for eye health and immune function. These are a good source of vitamin C important for immune system support and skin health. Leaves acts as a powerful antioxidant, protecting cells from oxidative stress. Moringa contains folate, niacin and pyridoxine which help in energy metabolism and red blood cell formation (Fahey, 2005). Moringa is a rich source of calcium aiding in bone and dental health. It provides non-heme iron essential for blood oxygen transport. Moringa is packed with antioxidants like quercetin, chlorogenic acid and beta carotene which have anti-inflammatory properties and protect against oxidative damage. It contains omega-3, omega-6 and omega-9 fatty acids beneficial for heart health (Anwar, *et al.*, 2007).

Health benefits of Red amaranthus and Drumstick leaves

Red amaranthus is packed with antioxidants including vitamin C and beta carotene which help combat oxidative stress and reduce the risk of chronic diseases like heart disease and cancer. Its high iron content supports better blood circulation and helps prevent iron deficiency anemia. Additionally, the plant's calcium and magnesium content contribute to bone health while its fiber content aids digestion and promotes gut health. It is also beneficial for immune health due to its combination of vitamin C and iron (Ashraf *et al.*, 2015). Drumstick leaves are known for their anti-inflammatory properties attributed to flavonoids and phenolic acids which help manage conditions like arthritis. The leaves provide an excellent source of plant based protein and essential amino acids promoting muscle repair and overall body growth. Moringa is also beneficial for regulating blood sugar levels, particularly useful for those with type 2 diabetes.



Furthermore, it supports heart health by lowering cholesterol levels and providing omega-3 fatty acids. The rich vitamin A and E content in drumstick leaves promotes healthy skin while the leaves antimicrobial and antiviral properties help combat infections. Moringa also has hepatoprotective effects, aiding in liver detoxification (**Gopalakrishnan *et al.*, 2016**).

Sun drying process: Enhances nutrient density

This process can significantly enhance the nutrient density of certain plant based foods including red amaranthus and drumstick leaves. The primary effect of sun drying is the reduction of water content in the plant material. As water is evaporated the remaining nutrients including vitamins, minerals and antioxidants become more concentrated. The drying process can also improve the bioavailability of certain nutrients such as minerals. With water removed the nutrients become more accessible to the body making them easier to absorb during digestion. Sun drying helps preserve water soluble vitamins like vitamin C and B- complex vitamins, though some degree of nutrient loss can still occur due to prolonged exposure to heat and UV light. However, when done properly sun drying can maintain a significant amount of these vitamins compared to other preservation methods like blanching. (**Patel *et al.*, 2013**). Both sun dried red amaranthus and drumstick leaves are highly versatile and nutrient dense ingredients that can be incorporated into a variety of culinary applications, such as soup premixes, smoothies and even as seasonings or garnishing for various dishes. These dried leaves retain their flavors, colors and most of their nutritional value making them an excellent addition to recipes aimed at boosting health and nutrition. Sun drying not only concentrates nutrients but also extends the shelf life of the product by reducing the moisture that promotes microbial growth. This allows the dried leaves to be stored for longer periods without refrigeration, making them an excellent option for preserving nutrients for extended use (**Akinmoladun *et al.*, 2017**).

Conclusion

The combination of red amaranthus and drumstick leaves offers a potent and nutrient dense approach to promoting optimal health. Both plants are rich in essential vitamins, minerals, antioxidants and fiber which support various aspects of health including immune function, bone

health, digestive wellness and blood sugar regulation. The sun drying process further enhances the nutritional density of these plants, preserving and concentrating bioactive compounds like flavonoids, polyphenols and carotenoids which have anti-inflammatory and antioxidant properties. When consumed together, red amaranthus and drumstick leaves create a powerful synergy that provides complementary benefits making them an ideal addition to a balanced diet. The combined use of these leaves in soup premixes, smoothies or as nutritional supplements can help address common health concerns such as malnutrition, anemia, immune deficiency and digestive disorders. Incorporating these nutrient dense plants into everyday meals can support overall vitality, improve metabolic health and reduce the risk of chronic diseases. Thus, the combination of red amaranthus and drumstick leaves not only offers significant health benefits but also represents a sustainable and accessible way to enhance dietary intake and support long term well-being.



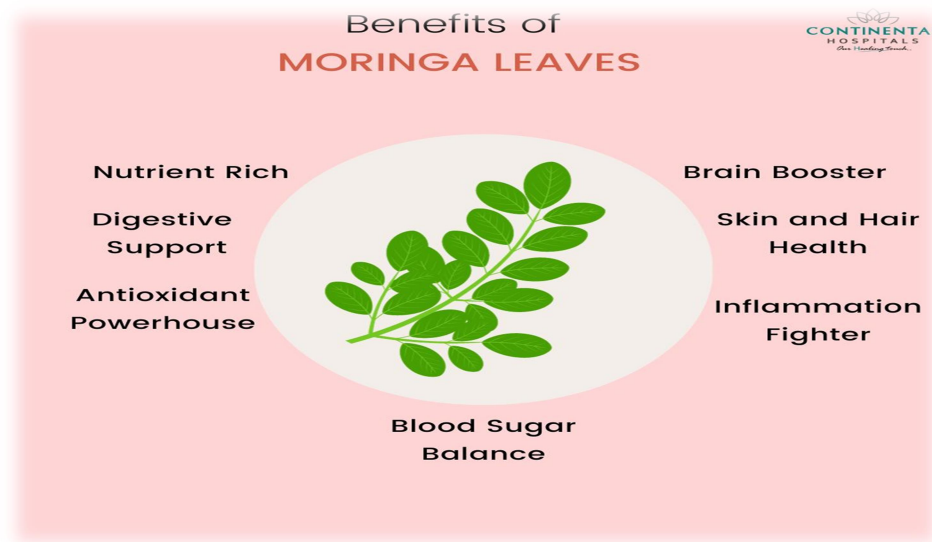


Fig: Health benefits of Red amaranthus and drumstick leaves

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