Pharmacognosy Communications, 2024; 14(1):44-45.
https://www.phcogcommn.org

Medicinal Plant Images

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Figure 1: *Moringa oleifera* Lam. (commonly known as horse radish tree, drumstick tree, tree of life) is a fast growing, drought resistant tree which has widespread cultivation in tropical and subtropical regions globally. It is particularly common in northwest regions of India, from where it is believed to have originated, although it has been naturalised worldwide. Most parts of the tree are edible and are consumed as nutritious vegetables.[1] The leaves, fruit, seeds, flowers, bark and sap are also incorporated into several traditional medicine systems and several antimicrobial studies have reported growth inhibitory activity for various parts of *M. oleifera* against a range of pathogens. One study reported that aqueous, acetone and ethanolic leaf extracts displayed antibacterial activity comparable to that of ciprofloxacin, cotrimoxazole and chloramphenicol.[2] Another study reported potent inhibition of the growth of a broad bacterial panel by *M. oleifera* leaf juice.[3] *Shigella dysenteriae, Bacillus cereus, Escherichia coli* and *Salmonella typhi* were considered to be especially susceptible to seed extract.[4] However, the published literature is contradictory, with several studies reporting little or no inhibitory activity against many of the same bacterial species. A recent study reported that *M. oleifera* leaf solvent extracts were completely ineffective against multiple species of *Bacillus, Streptococcus, Klebsiella* and *Pseudomonas*,[5] where previously potent activity was reported.4 Whilst the latter study[5] did report activity against some bacterial species previously reported to be highly susceptible to *M. oleifera* (*E. coli, S. aureus*) in other studies, the concentrations required to achieve growth inhibition (≥5 mg/mL) in that study indicated only low antibacterial activity. A recent study reported that whilst *M. oleifera* extracts had moderate antibacterial activity against a panel of bacterial pathogens, combinations of the extracts with conventional antibiotics were substantially more effective, with the extracts potentiating the activity of some antibiotics substantially in excess of four fold, even against bacterial strains otherwise resistant to those antibiotics.[6]

Figure 2: *Aloe* is a genus of approximately 400 succulent plants, many of which are native to Africa. Plants of the genus *Aloe* have one of the longest recorded history of medicinal usage and are amongst the most widely used plants for traditional medicinal purposes worldwide. The Aloes have been used since ancient times, particularly for the treatment of microbial infections, gastrointestinal disorders and inflammatory conditions.[7] Some *Aloe* spp. have also been used to treat fungal skin disease,[8] bacterial[9] and viral respiratory diseases,[10] malaria,[11] diabetes[12] and parasite infestations.[13] *Aloe vera*, *Aloe ferox*, *Aloe arborescens* and *Aloe perryi* are the best known and most widely used, although many other species are also used for their therapeutic properties. Despite their wide spread usage, studies from different laboratories often report wide variations in the therapeutic bioactivities from *Aloe* spp., with some studiers reporting potent antibacterial activity,[14,15] yet other studies reporting a complete lack of activity.[16] Leaves from individual plants within the same species may have widely varying levels of the bioactive phytochemicals and thus wide variances in bioactivity. Phytochemical analyses have shown that many Aloe species contain various carbohydrate polymers (notably glucomannans) and a range of other low molecular weight phenolic compounds including alkaloids, anthraquinones, anthrones, benzene and furan derivatives, chromones, coumarins, flavonoids, phytosterols, pyrans and pyrenes.[7] Intra- and interspecies differences in the levels and redox states of the individual *Aloe* components (and in the ratios of these components) may affect the physiological properties of *Aloe* extracts.[17] Due to the structure and chemical nature of many of the Aloe phytochemicals, it is likely that many of the reported medicinal properties are due to antioxidant or prooxidant effects. The antioxidant/prooxidant activities of many *Aloe* spp. phytochemicals depend not only on their individual levels, but also on the ratios between the various components and their individual redox states. Therefore, discrepencies between bioactivity studies are likely when using different crude mixtures. This photograph was taken by Dr Ian Cock in 2012.

DOI: 10.5530/pc.2024.1.7

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