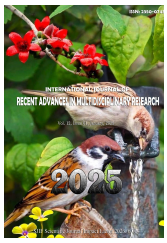
ISSN : 2350-0743

International Journal of Recent Advances in Multidisciplinary Research

Vol. 12, Issue 01, pp. 10664-10668, January, 2025



RESEARCH ARTICLE

PHYTOCHEMICAL SCREENING OF *MORINGA OLEIFERA* LEAF POWDER IN METHANOL EXTRACT

*** Shilpi Abha Toppo and Prof. Amia Ekka**

SoS Life Science, Pt. Ravishankar Shukla University, Raipur

ARTICLE INFO

Article History

Received 20th October, 2024
Received in revised form
16th November, 2024
Accepted 27th December, 2024
Published online 24th January, 2025

Keywords:

Moringa, Phytochemicals, Secondary metabolites, Beneficial.

****Corresponding author:***
Shilpi Abha Toppo

ABSTRACT

Within the Moringaceae family, *Moringa oleifera* is a tree that grows quickly and can withstand drought. Some common names for the tree are horseradish, drumstick, wonder, ben oil, and just *Moringa*. The plant may thrive in a wide range of environments, even hostile ones. The plant is utilized as a natural integrator to treat malnutrition because of its high phytonutrient concentration. Primary and secondary metabolites from several types of organic substances are abundant in plants, according to phytochemical analyses of their organs. The plant's ability to treat a number of illnesses and its nutraceutical qualities were validated by pharmacological research. This paper emphasizes on the phytochemicals which makes this plant beneficials to the humans. Terpenoids, flavonoids, phenols, tannins, Steroids, alkaloids, and glycosides were among the phytochemicals that were examined in the alcoholic extracts of *M. oleifera* leaves. Results showed that *M. oleifera* leaves produced glycosides, tannins, alkaloids, phenols, flavonoids, and saponin.

Citation: Shilpi Abha Toppo and Prof. Amia Ekka. 2025. "Phytochemical screening of *Moringa oleifera* leaf powder in methanol extract", *International Journal of Recent Advances in Multidisciplinary Research,* 12, (01), 10664-10668.

INTRODUCTION

Moringa olifera is well found in India. It has been shown that the stem bark, and roots of the plant have medicinal properties against various ailments, including fever, gastritis, cancer, asthma, inflammation, and dysentery. Plants produce compounds called phytochemicals that aid in their defence against competition. It has been shown that they contain substances that could be exploited to produce essential pharmaceuticals and industrial items (Gopalakrishnan *et al*., 2016). Moringa leaves, pods, and seeds contain a number of vital nutrients that contribute to its high nutritional value. *Moringa* is a nutrient-dense food since it is high in calcium, iron, protein, potassium, vitamin C, and vitamin A more than 20 times (Rockwood *et al*., 2013). The plant *Moringa oleifera*, which belongs to the Moringaceae family, is one of thirteen species in the monogeneric family (Dpaah *et al*., 2017). Benzolive tree, drumstick tree, horseradish tree, kelor tree, mother's best friend, never die tree, mlonge, moonga, moolangay, and many more are among the many common names for the tree that have been recorded (Korsor *et al*., 2019). With its fluffy leaves, spreading canopy, delicate limbs, and thick white bark, the evergreen *Moringa oleifera* tree grows swiftly.

Although the tree is indigenous to India, it has been planted all over the world and has become naturalized in many places. However, nutrient content varied depending on the preparation method, leaf age and harvest season. Even though some nutrients in vegetables are lost while cooking, AVRDC researches reported that cooked *Moringa* leaves or leaf powder provided at least three times more bioavailable iron that raw *Moringa* leaves. Boiling also enhanced the antioxidant activity of *Moringa* leaves. A plant growth hormone has been found in a leaf extract. Making an effective [spray containing] plant growth hormone from the juice of fresh *Moringa* leaves can boost yield by 25 – 30 % for almost any crop, including onions, bell peppers, soy, maize, sorghum, coffee tea, chilly, melon, etc. Zeatin, a plant hormone belonging to the cytokinin group, is one of the active ingredients (Bakr *et al*., 2021). It is said in Indian cultures that when young pods, called "drumsticks," are cooked, they taste like asparagus. Honeybees can obtain pollen from the blossoms. Cattle, sheep, goats, and camels eat the leaves and twigs as feed in various areas of their habitat. One of the nutrient-rich food plants is this one. It is rich in proteins, minerals, vitamins, polyphenols, also and essential amino acids. Among the several phytochemicals that are plentiful in it are flavonoids, anthocyanins, isothiocyanates, anthraquinone, alkaloids, essential oils, tannic acid, saponins, steroids, terpenoids, and cardiac glycosides

(Fahey, 2017). It is also utilized for its pharmacological properties and to treat people who are severely malnourished. *M. oleifera* has been utilized in traditional medicine for a number of purposes like cancer treatment and lactation. Given its extensive therapeutic uses, *Moringa oleifera* is regarded as one of the mystical plants in India. Unlocking *Moringa oleifera* potential, however, will require further research into its phytocomponents, variations in extraction caused by solvents, potential qualities, and prospective uses in a variety of disciplines. Secondary metabolites play a common role in defense mechanisms and environmental adaptability in plants. In order to defend plants against herbivores and diseases, many secondary metabolites are harmful or repulsive to them. They also help plants have distinctive flavors, scents, and colors, and they draw pollinators and animals that disperse seeds.

MATERIALS AND METHODS

Preparation of methanolic extracts: A wild plant's leaves were collected from SoS Life Science, PRSU, shade-dried, and powdered into fine powder. A Soxhlet device was used to extract five grammes of each sample in methanol. An electric oven was used to evaporate the filtrate until it was completely dry. For additional examination, the extracted crude extract was placed in airtight plastic containers and kept in the refrigerator.

Fig 1. Moringa oleifera

Phytochemical analysis: Biologically active substances such as glycosides, phenolics, tannins, flavonoids, saponins, and sugars were screened for in the plant extracts.

Terpenoid test: In a test tube, 5 mg of plant extract and 5 ml of 100% methanol were combined to create a standard plant extract solution.

Fig 2. Methanolic extraction of the leaves by Soxhlet apparatus

Two millilitres of chloroform and one millilitre of concentrated H_2SO_4 were added to the extract solution. In contrast to the control, which showed no color change, the creation of a red solution signified a successful outcome.

Flavonoids test: Ten millilitres of distilled water were mixed with three millilitres of each extract, and the mixture was shaken. The mixture was mixed with 1 millilitre of a 10% NaOH solution. Precipitation's occurrence indicated a positive outcome, whereas the control revealed no changes.

Phenols and Tennin test: In a test tube, 10 mg of plant extract and 10 ml of distilled water were combined. The solution was mixed with 2 millilitres of a 2% $FeCl_3$ solution. The presence of phenols and tannins was shown by the production of a brown precipitate.

Wagner's test: In a test tube, 10 mg of plant extract and 10 ml of distilled water were combined. 50 millilitres of iodine solution (2 grammes in 100 millilitres of distilled water) and 50 millilitres of KI solution (6 grammes in 100 millilitres of distilled water) were combined to create Wagner's reagent. The presence of alkaloids in the sample was revealed by the red precipitate.

Mayer's test: Ten milligrammes of plant extract were put into a test tube containing ten millilitres of distilled water.
50 millilitres of KI solution (5 grammes in 100 millilitres of distilled water) and 50 millilitres of $HgCl_2$ solution (1.36 milligrammes in 100 millilitres of distilled water) were combined to create Mayer's reagent. Five millilitres of Mayer's reagent were added to the plant extract solution. The presence of alkaloids is indicated when a yellow precipitate forms.

Saponin test (Lead acetate test): When plant extracts (methanol) and 1% lead acetate solution were combined in equal amounts, a white precipitate formed, which indicates the presence of saponins.

Steroid test: Salkowski's technique, which involved adding five drops of concentrated H2SO4 to one millilitre of each extract in a different test tube, was used to identify steroids. The presence of steroids seemed to be indicated by the brown color.

Results Qualitative phytoconstituents of *M. oleifera* leaves: Numerous investigations were conducted to look for distinct phytochemicals that *M. oleifera* produces and are thought to be active ingredients in medicinal plants. The *M. oleifera* leaf extracts were used for the phytochemical analyses. The phytochemical analysis's findings demonstrated that while steroids were absent, alkaloids, phenols, flavonoids, saponins, terpenoids and tannins were present. The test for steroids did not exhibit a brown-colored solution that indicates that the leaf extract does not produce steroids. As demonstrated in Figures 3 – 8 and Table 1, the crude extract of *M. oleifera* leaves contained alkaloids, tannins, flavonoids, terpenoids, phenols and glycosides, respectively.

Table 1. Phytochemical test of *M. oleifera* leaf crude extract with methanol solvents

S. No	Phytochemical	*Moringa oleifera*
1.	Terpenoid test	Positive
2.	Flavonoids test	Positive
3.	Phenol test	Positive
4.	Tennin test	Positive
5.	Wagner's test	Positive
6.	Mayer's test	Positive
7.	Saponin test	Positive
8.	Steroid test	Negative

Fig. 3. Mayer's test for alkaloids

Fig 4. Wagner's test for alkaloids

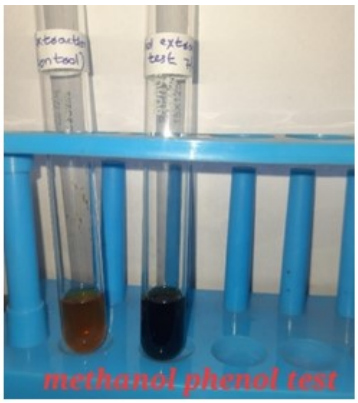


Fig 5. Presence of phenol

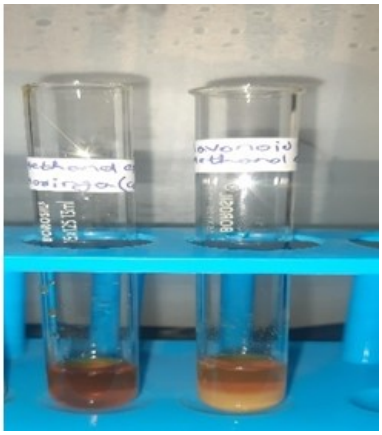


Fig 6. Presence of flavonoid

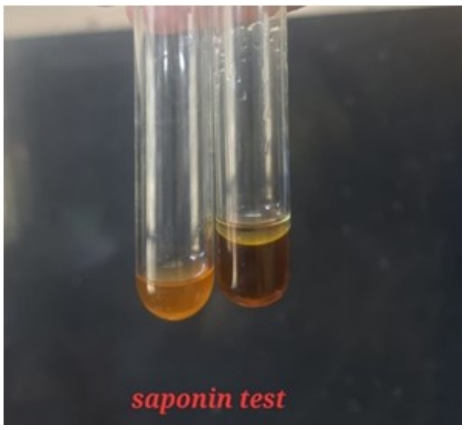


Fig 7. Presence of saponin

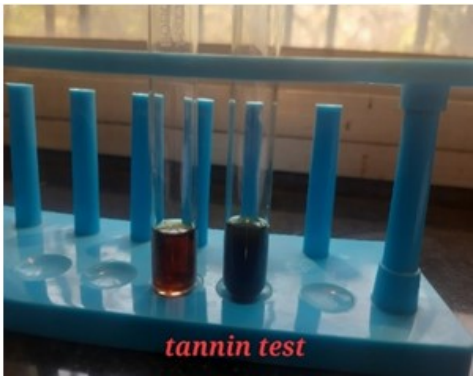


Fig. 8. Presence of tannin

Fig. 9. Absence of steroid

Fig. 10. Presence of terpenoid

DISCUSSION

Plants produce two types of organic compounds referred as primary and secondary metabolites. Proteins, carbohydrates, amino acids, and lipids are examples of primary metabolites that are involved in the growth and development of plants. Although secondary metabolites are not essential for plant survival, they play a critical role in how plants engage with their environment and continue to exist within their ecosystems. They are associated, for example, with the responses of plants to environmental stresses such as temperature, drought, UV light, and pathogens. Stress is one of the primary reasons of the buildup of secondary metabolites. Since secondary metabolites are more complex in structure and have a more limited dispersion than primary metabolites, a change in an individual's stressor may result in a variable secondary metabolite content even while other parameters remain the same.

The secondary metabolites were most diverse in the leaves. Probably as a result of prolonged exposure to environmental factors like temperature. Nearly all phytochemicals can help the body fight infections by acting as natural antibiotics. Various compositions of these secondary metabolites may be responsible for the pharmacological actions of *M. oleifera* extracts. Documentational support for the validity of *M. oleifera* as a medicinal plant and a possible source of phytochemicals for use in drug development and discovery. It is advised to extract these plant components using alcoholic solvent extraction since it produces the greatest number of phytochemicals when compared to other solvent extraction methods.

Summary

Alkaloids, phenols, terpenoids, proteins, and carbohydrates are the main phytoconstituents found in *M. oleifera* plants. These early scientific results guaranteed its unqualified endorsement for application in the pharmaceutical and nutraceutical industries of *Moringa oleifera*.

Conflict of Interest: The author has no conflict of interest.

REFERENCES

Adu-Dapaah, H., Osei-Bonsu, I., Oduro, I., & Asiedu, J. (2017). Recent advances in production, processing and utilization of *Moringa oleifera* in Ghana. *Acta Horticulturae*, *1158*, 179–186. https://doi.org/10.17660/actahortic.2017.1158.21

Ali, G. H., El-taweel, G. E., & Ali, M. A. (2004). The cytotoxicity and antimicrobial efficiency of *Moringa oleifera* seeds extracts. *International Journal of Environmental Studies*, *61*(6), 699–708. https://doi.org/10.1080/0020723042000189877

Alok, S., Jain, S. K., Verma, A., Kumar, M., Mahor, A., & Sabharwal, M. (2013). Plant profile, phytochemistry and pharmacology of *Asparagus racemosus* (Shatavari): A review. *Asian Pacific Journal of Tropical Disease*, *3*(3), 242–251. https://doi.org/10.1016/s2222-1808(13)60049-3

Arora, D. S., & Onsare, J. G. (2013). In vitro antimicrobial evaluation and phytoconstituents of *Moringa oleifera* pod husks. *Industrial Crops and Products*, *52*, 125–135. https://doi.org/10.1016/j.indcrop.2013.09.016

Bakr, B. A., Sadak, M. S., El-Raz, T. M. A., & El, M. F. (2021). *Moringa* leaves extract and zeatin for maximizing yield and quality traits of two flax cultivars. *Asian Journal of Plant Sciences*, *20*(4), 620–630. https://doi.org/10.3923/ajps.2021.620.630

Bakre, A. G., Aderibigbe, A. O., & Ademowo, O. G. (2013). Studies on neuropharmacological profile of ethanol extract of *Moringa oleifera* leaves in mice. *Journal of Ethnopharmacology*, *149*(3), 783–789. https://doi.org/10.1016/j.jep.2013.08.006

Culver, M. (2012). Effect of *Moringa oleifera* leaf aqueous extract on growth and yield of rape and cabbage. *African journal of biotechnology*, *11*(73). https://doi.org/10.5897/ajb12.942

Dhakad, A. K., Ikram, M., Sharma, S., Khan, S., Pandey, V. V., & Singh, A. (2019). Biological, nutritional, and therapeutic significance of *Moringa oleifera* Lam. *Phytotherapy Research*, *33*(11), 2870–2903. https://doi.org/10.1002/ptr.6475

Dhakar, R., Pooniya, B., Gupta, M., Maurya, S., Bairwa, N., &Sanwarmal, N. (2011). *Moringa*: The herbal gold to combat malnutrition. *Chronicles of Young Scientists*, *2*(3), 119. https://doi.org/10.4103/2229-5186.90887

Elgamily, H., Moussa, A., Elboraey, A., El-Sayed, H., Al-Moghazy, M., & Abdalla, A. (2016). Microbiological assessment of *Moringa oleifera* extracts and its incorporation in novel dental remedies against some oral pathogens. *Open Access Macedonian Journal of Medical Sciences*, *4*(4), 585–590. https://doi.org/10.3889/oamjms.2016.132

Fahey, J. (2017). *Moringa oleifera*: a review of the medicinal potential. *Acta Horticulturae*, *1158*, 209–224. https://doi.org/10.17660/actahortic.2017.1158.25

Farooq, F., Rai, M., Tiwari, A., Khan, A. A., & Farooq, S. (2012). Medicinal properties of *Moringa oleifera*: An overview of promising healer. *Journal of Medicinal Plants Research*, *6*(27), 4368–4374. https://doi.org/10.5897/jmpr12.279

González-Burgos, E., Ureña-Vacas, I., Sánchez, M., & Gómez-Serranillos, M. P. (2021). Nutritional value of *Moringa oleifera* Lam. leaf powder extracts and their neuroprotective effects via antioxidative and mitochondrial regulation. *Nutrients*, *13*(7), 2203. https://doi.org/10.3390/nu13072203

Jaafar, N. N. S., Hamad, N. M. N., Alshammaa, N. D. A., & Noori, N. Z. S. (2022). Phytochemical study and thin layer chromatography of *Ficus religiosa* leaves extract cultivated in Iraq. *Al Mustansiriyah Journal of Pharmaceutical Sciences*, *21*(2), 31–39. https://doi.org/10.32947/ajps.v21i2.807

Khalid, S., Arshad, M., Mahmood, S., Ahmed, W., Siddique, F., Khalid, W., Zarlasht, M., Asar, T. O., & Hassan, F. a. M. (2023). Nutritional and phytochemical screening of *Moringa oleifera* leaf powder in aqueous and ethanol extract. *International Journal of Food Properties*, *26*(1), 2338–2348. https://doi.org/10.1080/10942912.2023.2246685

Doriya, L., K., & Kumar, D. S. (2016). *Moringa oleifera*: A review on nutritive importance and its medicinal application. *Food Science and Human Wellness*, *5*(2), 49–56. https://doi.org/10.1016/j.fshw.2016.04.001

Madhu, M., Sailaja, V., Satyadev, T., & Satyanarayana, M. (2016). Quantitative phytochemical analysis of selected medicinal plant species by using various organic solvents. *Journal of Pharmacognosy and Phytochemistry*, *5*(2), 25–29. https://www.phytojournal.com/ archives/2016/ vol5issue2/ Part A /5-1-31.

Renityas, N. N. (2018). The effectiveness of *Moringa* leaves extract and Cancunpoint massage towards breast milk volume on breastfeeding mothers. *Jurnal Ners Dan Kebidanan (Journal of Ners and Midwifery)*, *5*(2), 150–153. https://doi.org/10.26699/jnk.v5i2.art.p150-153

Rockwood, J. L., Anderson, B. G., & Casamatta, D. A. (2013). Potential uses of *Moringa oleifera* and an examination of antibiotic efficacy conferred by *M. oleifera* seed and leaf extracts using crude extraction techniques available to underserved indigenous population. *International journal of phytotherapy research*, *3*(2), 2013. https://miracletrees.org/*Moringa*-doc/potential-uses-of-*Moringa-oleifera*.

Santos, A. F. S., Argolo, A. C. C., Paiva, P. M. G., & Coelho, L. C. B. B. (2012). Antioxidant activity of *Moringa oleifera* tissue extracts. *Phytotherapy Research*, *26*(9), 1366–1370. https://doi.org/10.1002/ptr.4591

Sarmin, N. S. (2014). Effect of *Moringa oleifera* on germination and growth of *Triticum aestivum*. *Journal of Bioscience and Agriculture Research*, *2*(2), 59–68. https://doi.org/10.18801/jbar.020214.20

SatyaEswari, J., Dhagat, S., & Dibya, S. N. S. (2018b). *Oroxylum indicum* leaf extracts for screening of antimicrobial properties and phytochemicals. *Pharmaceutical Bioprocessing*, *6*(1), 07–14. https://www.openaccessjournals.com/articles/phytochemical-and-antimicrobial-studies-of-oroxylum-indicum-extracts.pdf

Sivapragasam, G., Devi, T. G., Ragavan, N. D., Suryadevara, N., Sridewi, N., Obaid, S. A., Alharbi, S. A., & Arulselvan, P. (2024). A comparative phytochemical characterization of *Moringa oleifera* plant parts by different solvent extraction. *Indian Journal of Pharmaceutical Education and Research*, *58*(2s), s648–s659. https://doi.org/10.5530/ijper.58.2s.69

Yang, L., Wen, K., Ruan, X., Zhao, Y., Wei, F., & Wang, Q. (2018). Response of plant secondary metabolites to environmental factors. *Molecules*, *23*(4), 762. https://doi.org/10.3390/molecules23040762

****