



Review on navgraha vatika: An eco-friendly pathway to landscape gardening

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ABSTRACT

The word "navgraha" refers to the nine celestial bodies or planets of our solar system and "vatika" represents the garden and greenery. So, the "navgraha vatika" symbolizes the gardening techniques, done by planting nine special plants (which represent the nine planets), in appropriate directions. The navgraha vatika is closely related to rashi or nakshatra vatika established close to sacred places i.e., astrologically planned gardens. The history of gardening in Ancient India shows that it follows a formal garden pattern having sacred geometry. So, by taking that in consideration, navgraha vatika follows formalism having geometrical and symmetrical patterns. According to Indian Astrology, the presence of planets (grahas) maintains the overall balance of energy in the universe/cosmos. This is also a reason to establish navgraha vatika in order to bring the entire universe on the earth. It would be noteworthy to mention that more oxygen is being released by navgraha plant species as compared to any other plant species. The twigs as well as branches of the nine planetary plants are used in yagnas or holy rituals. In this review paper, the importance of navgraha on both humans and the environment has been discussed. Brief description about all the nine planets and plants associated with them, along with a layout, has also been thoroughly discussed.

Key words: : Indian custom and traditions, landscape gardening, navgraha vatika, rashi vatika

INTRODUCTION

Homo sapiens and their habitat get highly affected by the effects of herbs and horoscopes surrounding them (Maneesha et al., 2021). In conformity with Vedic astrology, planets (grahas) are stated as celestial bodies that have influence on human life on earth. Navgraha vatika is basically dedicated to the trees associated with these nine planets; and their arrangement in a formal manner following geometrical and symmetrical patterns. Navgraha vatika, is nothing more than a garden consisting of nine important plants. These plants represent the celestial bodies of our solar system. The concept of navgraha vatika is not new to

India. Our ancestors established navgraha "vatika" or "vana" near hallowed or dedicated places with indicative plants in order to display reverence and ensure strength and vigor. It also has a vast effect on life on earth and so affects the longevity of human beings too. Research has shown that navgraha plants are best known for their effect on human health and wellness, attracting divine energies and power, protecting the environment and also adding aesthetic beauty to the surrounding. Out of these indicative plants, majorities are infrequent medicinal tree species of pharmaceutical importance, which draws attention towards the forethought of our forebears which was to preserve these natural resources off-site, in order to make

its pharmaceutical benefits available for upcoming generations. In Ancient medicine, extensively used secondary metabolites like Antioxidants, alkaloids, saponins, terpenes, flavonoids and tannins are in abundance and well provided with these navgraha tree species. It has been demonstrated that (Vidula et al., 2021). This is how they freshen up and allow the flow of good vibrations to every living entity surrounding it.

The twigs as well as branches of the nine planetary plants are used in yagnas or holy rituals

also, because of the medicinal values of the plants as well as the smoke from the "yagna kundas" when gets released in the atmosphere, destroyed many harmful disease-causing organisms and purifies the air. The prime objective of demonstrating navagraha vaticas is to set up optimistic ways of promoting prosperity and tenacity on various levels: domain, discrete and community (Parihar and Sharma, 2021). All the navgrahas and the trees associated with them along with their specific directions of planting and their family is being summarized in the Table 1 below:

Table 1. Nine planets and the colour, direction, and plants associated with them

Sl. No.	Planet name	Colour	Direction of planting	Name of plant associated	Family
1.	Surya (Sun)	Light pink	Centre	<i>Calotropis gigantea</i> (Madar)	Asclepiadaceae
2.	Chandra (Moon)	White	S-E	<i>Butea monosperma</i> (Palash)	Fabaceae
3.	Budha (Mercury)	Green	North	<i>Achyranthes aspera</i> (Apamarg)	Amaranthaceae
4.	Shukra (Venus)	White	East	<i>Ficus racemosa</i> (Gular)	Moraceae
5.	Mangal (Mars)	Deep red	South	<i>Acacia catechu</i> (Khair)	Fabaceae
6.	Guru (Jupiter)	Yellow	N-E	<i>Ficus religiosa</i> (Peepal)	Moraceae
7.	Shani (Saturn)	Black	West	<i>Prosopis cineraria</i> (Shami)	Mimosaceae
8.	Rahu (Dragon's head)	Brown	S-W	<i>Cynodon dactylon</i> (Doob grass)	Poaceae
9.	Ketu (Dragon's tail)	Brown	N-W	<i>Desmostachya bipinnata</i> (Kush/Halfa grass)	Poaceae

TREES ASSOCIATED WITH THE PLANETS

Surya (Sun)

Plant associated - *Calotropis gigantea*

The Sun is the king of all planets. Heart, head, brain, right eye, bones etc. are all conquered by the mighty planet sun. The plant associated with it is *Calotropis gigantea* which is commonly known as "Madar" or "Wasteland weed". One of the dominant latex yielding plants with ethnopharmacological implementation and abundant in proteolytic enzymes, is *Calotropis gigantea* (Bhatia et al., 2022). The flowers and leaves of *calotropis* are of religious importance used to offer God in temples. Fresh foliage of madar heated with ghee is used to prepare ear drops to cure ear infection. There have been various documented mechanisms for the anticancer activity of *C. gigantea*. The

extract from the bark of stem from *C. gigantea*, including the dichloromethane component, has been shown to suppress antioxidant expression and promote the formation of reactive oxygen species (ROS) in anticipation of colon cancer cells (Suknoppakit et al., 2023).

Chandra (Moon)

Plant associated - *Butea monosperma*

The plant associated with this graha is *Butea monosperma* which is commonly known as "Palash". This planet rules the heart, blood, brain, lungs of the human body. Leaves, twigs, stem, bark, roots, and gums etc. are traditionally used for medical purposes. Palash flowers possess large medicinal values as they are used in treating enlarged spleen disorders, menstrual disorders and are also used as brain stimulants (Mazumder et al., 2011). It possesses

blood cleaning, anti-leprotic, anti-microbial as well as anti-ulcers properties (Das et al., 2011). For curing various ailments, plant-based natural products have been used for time immemorial. In the Indian traditional system, Palash tree holds an important place. Experiments and research have found that Bark of Palash tree has inhibitory actions on pro-carcinogenic proteins (Hassan et al., 2019). Sore throat can be treated by using boiled Palash leaves in water as well as by brushing teeth with twigs of palash, one can get rid of halitosis or bad breath.

Budha (Mercury)

Plant associated- *Acharyanthes aspera*

"Apamarg" plant commonly known as "chirchiri" belongs to the family Amaranthaceae. These are widely grown throughout the tropical world. The planet Budha favours- hair, face, nose, chest and tongue, and its effects can be controlled by the Apamarga tree. Leaf juice of apamarg can be extracted by squeezing it in between the palms. The leaf extract is mostly used as ear drops to heal contamination. Traditionally, this plant is used in asthma and cough treatment. It is pungent, anti-phlegmatic, antiperiodic, diuretic and laxative and hence useful in treating oedema, dropsy, piles and eruption of skin etc. (Pandey et al., 2013).

The roots, foliage and the other plant parts are used for medicinal purposes. These ingredients are highly recommended and useful in Ayurveda (Rehman et al., 2018). This medicinal plant starts germinating at the onset of monsoon and matures in the winter season and attains senescence in the summer season. *Acharyanthes aspera* also known as "chaff flower" is an extravagantly aromatic plant used as an herb. It contains low fat content and less caloric content. This plant also has ample number of vitamins and minerals. From dietary to devotion, this plant has got many importance and uses (Srivastav et al., 2011).

Shukra (Venus)

Plant associated - *Ficus racemosa*

Ficus racemosa, commonly known as "Gular" represents this planet. It belongs to the family "Moraceae" and is by and large found in

the tropical part of India. Fruits of gular are used in making vegetables, pickles, curries and are also used to make traditional liquor of South Africa. The bark of gular trees is highly effective for mosquito or any other insect bites and helps in curing mouth ulcers. Tender leaf juice consumption can be helpful in reducing dysentery. Flavonoids, triterpenoids, alkaloids etc. are highly present in the foliage parts of this plant (Yadav et al., 2015). Leaf latex, when soaked in cotton and applied in the affected areas, is found to be helpful in curing piles. Glucan acetate is the vital constituent of fruits of gular. From the leaves of *Ficus racemosa* tree, a novel biosorbent was derived using NaOH treatment, which was found helpful in removing lignin content from biomass and to promote development of significant pores. It is also proven beneficial in wound healing and hepatoprotective actions (Ahmed and Urooj, 2010). This tree absorbs and decreases the level of carbon dioxide, as well as enhance the aesthetic appeal and value of the property. The *Ficus racemosa* tree species does more organic carbon sequestration i.e. 65.367 tons per year (Dubal et al., 2013).

Mangal (Mars)

Plant associated - *Acacia catechu*

The neck, marrow and anal region of the human body are controlled by the planet Mangal. *Acacia catechu*, a deciduous tree, commonly known as "khair", well represents this planet. The heartwood of the khair tree, has multipurpose uses such as in furniture making and when boiled and processed, it is called "kattha" (catechin), which is used in "paan".

"Kattha" is an important ingredient in chewing Betel leaf, and regionally for pickling of leather and dye, "Cuth" is used which is a byproduct obtained while producing kattha (Bhattarai et al., 2020). The Duramen part of this tree is costly and fetch higher price in market than other species. In accordance with Hindu culture, the khair tree is also treated to be sacred or holy. From funerals to various functions, wood of this tree is useful in many ways. Roots of *A. catechu* hold up the soil tight and also helps in its nutrient enrichment and reducing erosion (Zhao et al., 2023). The size of acacia rhizobia colonies that exist spontaneously varies greatly in the field. When

acacia populations are tiny (<50 per g), rhizobial inoculation of the plant often leads to increased N fixation (Brockwell et al., 2005).

Bruhaspati / Guru (Jupiter)

Plant associated - *Ficus religiosa*

Ficus religiosa (peepal) is the state tree of Bihar and is one of the oldest trees known so far. Among all the herbal plants, this tree owns a significant place, as each bit and segment of peepal tree is proven to be helpful in traditional medicine treatment (Kumar et al., 2018). The major organs of human body viz., liver, kidney, and pancreas, are governed by the planet Guru. From its leaves, barks, seeds, and fruits every part is used in naturopathy or ayurveda. The juice extracted from the leaves helps in treating kidney disorders. Whooping cough and asthma can be treated by decocting the bark. In case of abdominal pain, powdered tender leaves with milk bring relief when taken. Fresh twigs of peepal can be the best substitute for a toothbrush. In the various sacred books viz., Puranas, Ramayana, Mahabharata, etc. *F. religiosa* is believed to find its authentication and declaration (Verma and Gupta, 2015). The fruits of the peepal tree are found to be reserved in proteins, minerals, and phytochemicals (Makhija et al., 2010).

Shani (Saturn)

Plant associated - *Prosopis cineraria*

Prosopis cineraria, commonly known as "Shami" is a significant medicinal, traditional and religious plant of India. This plant also rules the knees, legs, muscles, and teeth of the human body. This plant has been identified as both cultural heritage as well as immensely rich in raw materials for agri-food and pharmaceutical (Giustra et al., 2022). It can grow well not only in hot arid but also in semi-arid regions of the world (Garg and Mittal, 2013). For the treatment of dyspepsia, consumption of extract of fresh leaves when mixed with the lemon is found to be beneficial. *P. cineraria* (Khejri) is believed to have a significant role in the rural economy. Being a good source of fuel and timber, this tree holds higher importance in Hindu rituals. Researchers have proven that, under the canopy of this plant, there is

higher biomass and soil moisture content (Shankar et al., 1976; Gupta and Saxena, 1978). This plant also helps in adding microbial fertilizers in the soil by the process of nodulation (Basak and Goyal, 1975).

Rahu (Dragon's head)

Plant associated- *Cynodon dactylon*

Rahu is often referred as shadow body as it causes an eclipse dedicated to the ascending (or north) lunar node. *Cynodon dactylon* commonly known as "Durva", is the plant associated with planet Rahu. This plant is generally kept in the category of weed, throughout the country, but is also believed to be used for worshipping Lord Ganesha and offering doob grass to complete the Puja. This plant is also referred to as doob or dhuv in Hindi, Shataparva in Sanskrit and Bermuda grass/Bahama grass in English. *C. dactylon* offers antidiabetic properties and is used in treating heavy bleeding and other menstrual problems. Research have shown that *C. dactylon* is used as hemostatic and acts as wound healing agent (Biswas et al., 2017). In landscape design planning, this doob grass is also known in the name of turf grass and has a wide range of medical and health benefits. Various issues related to health and well-being like ulcers, arthritis, bacterial infection can be solved by implementation of the essence of this herbal plant (Ashokkumar et al., 2013).

Ketu (Dragon's tail)

Plant associated - *Desmostachya bipinnata*

Ketu is also referred as shadow body as it causes an eclipse dedicated to the descending (or south) lunar node. The plant associated with ketu graha is the darbha grass, which is also known as "Halfa grass". The darbha grass is highly rich in antioxidants properties and is a strong tonic (Khyade et al., 2018). "Kusha is the other name of this grass in Sanskrit language. It is also referred to as an extremely victorious monocotyledon herb on earth, because of the presence of important phytochemical contents in it. In defiance of several ecological changes, this grass is said to exist long on the earth (Fakhireh et al., 2012). Because of its herbal and phytochemical effects, these grasses have huge importance in traditional medicine and ayurveda

and hence their taxonomic family is examined to be sacred. This perennial grass holds various economic purposes both as medicine and cattle fodder. *D. bipinnata* is believed to be grown well in arid, semi-arid and hyper-arid regions, and there they show the autecological characteristics. In recent research, a unique phenomenon about this plant has been identified, which shows its resistance towards salinity (Adnan et al., 2016).

ESTABLISHMENT AND MANAGEMENT OF NAVGRAHA VATIKAS

It is a skillful task, designing any type of garden, and it requires proper planning for successfully designing a new garden. Consideration and analysis of several things is required like type of garden, purposes, theme etc. The next phase would be examining all necessary physical inputs and judging feasibility of developing the particular type of garden decided. Every type of garden has a set of requirements, and one has to evaluate all those things in detail, once the conceptualization is over.

SELECTION AND SURVEY OF AREA

Navgraha vatika are more likely to be established in tropical or subtropical areas either manually or with the help of instruments. This helps to know natural grades, topography, level difference etc. for best use of the area retaining its natural characters.

SOIL AND CLIMATE

Area should be best equipped with fertile soil with required macro and micro nutrients in it, better source of water supply and good drainage facilities. Analysis of soil with respect to type (clay/loam/sandy), pH (acidic or alkaline) and availability of plant nutrients is a primary requirement. For growing major associated tree species, Loamy soil with pH 5.0-6.0 is highly recommended. Type of soil and climate are the two important factors which influence selection of plants and, therefore, should be considered carefully.

BASIC FACILITIES

Requirements of basic facilities like, electricity, light, water sources, drainage,

expenditure estimates are needed for garden development. Current and correct market rates are the basic requirement for preparation of proper estimates of expenditure (Roy, 2020).

DESIGN AND LAYOUT

While preparing the layout of the garden, good decision for directions and angle of every tree is a prerequisite. The size and canopy of each tree must be given special attention and accordingly spacing between the tree species should be maintained. Here, I have designed a layout of navgraha vatika, keeping in mind, to follow geometry and symmetrical pattern.

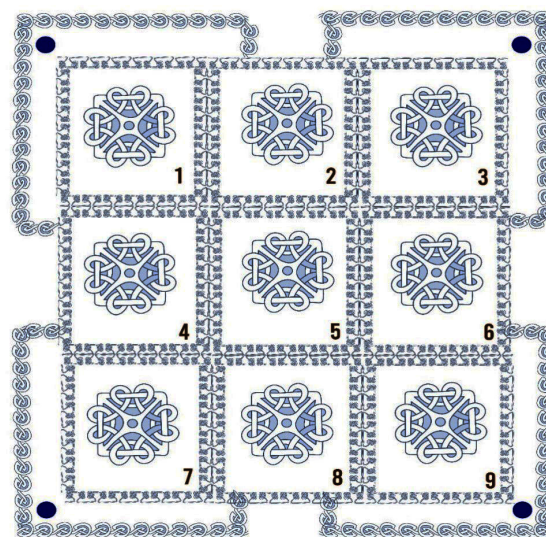


Fig. 1. A formal layout and landscaping of navgraha vatika

INDEX (Fig. 1)

- i. Buddha (*Achyranthes aspera*)
- ii. Shukra (*Ficus racemosa*)
- iii. Chandra (*Butea monosperma*)
- iv. Guru (*Ficus religiosa*)
- v. Surya (*Calotropis gigantea*)
- vi. Mangal (*Acacia catechu*)
- vii. Ketu (*Desmostachya bipinnata*)
- viii. Shani (*Prosopis cineraria*)
- ix. Rahu (*Cyanodon dactylon*)
- x. Concrete walkways
- xi. Hedges
- xii. Fountains/water bodies

This layout illustrates not only navgraha garden but also, our Indian custom and traditions. Above design depicts formal gardening style having a concrete walkway that surrounds the garden. The center piece is divided into nine equal square having nine navagraha associated plants. The four corners of the centerpiece is surrounded by L-shapes structure which can be decorated by using hedges viz., *Alternanthera*, *Bougainville*, *duranta*, *Jatropha* etc. In the above layout, the corners of these L-shapes structures are beautified by establishing fountains.

SELECTION OF PLANTING MATERIAL

Selection of healthy plants, free from pests and disease should be the primary task. Besides the nine navagraha trees, other varieties of ornamental and flowering plants are also needed to exhibit different forms of growth, texture, colour, to add on the beauty of the garden (Roy, 2013). Therefore, trees, shrubs, climbers, annuals, etc. usually find a place in the garden along with other primary plants.

PLANTING OF THE NAVGRAHA TREES

The plants which are linked with the navgraha vatika, are mainly vigorous and durable in nature and are accessible to cultivate. The area where vatika is to be established, should be first levelled, and ploughed well. All kind of plant debris, pebbles, and unwanted materials if present in the soil, should be removed. Required amount of vermicompost, green manure or farmyard manure should be applied over the top layer of soil to increase its fertility and nutrient availability. After that, it is advisable to start the planting of the plant on the onset of monsoon i.e. in the month of May-June (Maneesha et al., 2021). This can be done by making required size of pits which should be stuffed with FYM and manures. When the planting is completed, labelling of each plant should be done in order to make the visitors aware about their botanical name, family, as well as their medicinal importance. Proper plant to plant and row to row distance should be maintained so that the visitors could walk around easily and could enjoy the vista of the vatika (Roy, 2020).

MANAGEMENT PRACTICES

The garden layout should be fenced well to protect it from grazing animals and other disturbance during initial years. Various Horticultural practices viz., weeding, irrigation, pruning, mulching, manuring, pest management etc. is required to establish the garden successfully. Monsoon is the right time for pruning to keep the shrubs in shape as well as to encourage new growth and flowering; and to enhance the elegance of the garden in manifold. The ultimate purpose of care and maintenance of navgraha vatika is to keep the garden well maintained and presentable round the year.

CONCLUSION

Research has shown that these trees that are associated with planetary movements, have strong effects on surroundings. They help in air purification for better survival of flora and fauna. In addition, when the twigs of these are burnt out, the smoke that evolves helps in destroying all kinds of disease producing microorganisms. This navgraha vatika can be established around or in temples or any public places, because of its countless benefits. It has also been believed that the place where these trees are being planted, holds the high frequency of energy, and hence brings joy and prosperity in the surroundings. In this dynamic era of advanced technologies, the longevity of human beings is in threat and there is a great need to rediscover and re-establish our lost tradition of worshiping and valuing navgraha, and their plants. So, together let's take an initiative to make people aware about this natural heritage of ours and grow these trees and live a prosperous life.

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REFERENCES

- Adnan, M.Y., Hussain, T., Asrar, H., Hameed, A., Gul, B., Nielsen, B.L., and Khan, M.A. 2016. *Desmostachya bipinnata* manages photosynthesis and oxidative stress at moderate salinity. *Flora* 225: 1-9.

- Ahmed, F. and Urooj, A. 2010. Traditional uses, medicinal properties, and phytopharmacology of *Ficus racemosa*: A review. *Pharm. Biol.* **48**(6): 672-681.
- Ashok kumar, K., Selvaraj, K. and Muthukrishnan, S.D. 2013. *Cynodon dactylon* (L.) Pers.: An updated review of its phytochemistry and pharmacology. *J. Med. Plants Res.* **7**(48): 3477-3483.
- Basak, M.K. and Goyal, S.K. 1975. Studies on tree legumes. nodulation pattern and characterization of the symbiont. *Ann. Arid Zone* **14**(4): 367-370.
- Bhatia, S., Al-Harrasi, A., Kumar, A., Behl, T., Sehgal, A., Singh, S., Sharma, N., Anwer, M.K., Kaushik, D., Mittal, V. and Chigurupati, S. 2022. Anti-migraine activity of freeze-dried latex obtained from *Calotropis gigantea* Linn. *Environ. Sci. Pollut. Res.* **29**: 27460-27478.
- Bhattarai, R., Sharma, P., Wagle, B., Adhikari, A. and Acharya, S. 2020. Revision and compilation of health management plan of Khair (*Acacia catechu*). *Grassroots J. Nat. Resour.* **3**(1): 15-28.
- Biswas, T.K., Pandit, S., Chakrabarti, S., Banerjee, S., Poyra, N. and Seal, T. 2017. Evaluation of *Cynodon dactylon* for wound healing activity. *J. Ethnopharmacol.* **197**: 128-137.
- Brockwell, J., Searle, S.D., Jeavons, A.C. and Waayers, M. 2005. *Nitrogen fixation in acacias: an untapped resource for sustainable plantations, farm forestry and land reclamation* (No. 435-2016-33700). URL: <https://www.aciar.gov.au/sites/default/files/legacy/node/619/mn115part1.pdf>
- Das, M.S., Mazumdar, P.M., Das, S. and Das, S. 2011. *Butea monosperma* (LAM.) Kuntze- A comprehensive review. *Int. Res. J. Plant Sci.* **2**(7): 1390-1393.
- Dubal, K., Ghorpade, P., Dongare, M. and Patil, S. 2013. Carbon sequestration in the standing trees at campus of Shivaji University, Kolhapur. *Nat. Environ. Pollut. Technol.* **12**(4): 725.
- Fakhireh, A., Ajorlo, M., Shahryari, A., Mansouri, S., Nouri, S., and Pahlavanravi, A. 2012. The autecological characteristics of *Desmostachya bipinnata* in hyper-arid regions. *Turkish J. Bot.* **36**(6): 690-696.
- Garg, A. and Mittal, S.K. 2013. Review on *Prosopis cineraria*: A potential herb of Thar desert. *Drug Invention Today* **5**(1): 60-65.
- Giustra, M., Cerri, F., Anadol, Y., Salvioni, L., Antonelli Abella, T., Prospero, D. and Colombo, M. 2022. Eco-luxury: Making sustainable drugs and cosmetics with *Prosopis cineraria* natural extracts. *Front. Sustain.* **3**: 1047218.
- Gupta, J.P. and Saxena, S.K. 1978. Studies on monitoring of the dynamics of moisture in the soil and the performance of ground flora under desertic communities of trees. *Indian J. Ecol.* **5**: 30-36.
- Hasan, S., Khan, N.I., Sherwani, O.A., Bhatt, V. and Srivastava, H. 2019. Hepatoprotective activity of some medicinal plants: a review. *Int. Res. J. Pharm.* **10**(5): 9-16.
- Khyade, V.B., Pawar, S.S., and Sarwade, J.P. 2018. Novel sacrificial medicinal repositories: halfa grass, *Desmostachya bipinnata* (L.) and cogon grass, *Imperata cylindrica* (L.). *World Sci. News* **100**: 35-50.
- Kumar, A., Tomer, V., Gat, Y. and Kumar, V. 2018. *Ficus religiosa*: A wholesome medicinal tree. *J. Pharmacog. Phytochem.* **7**(4): 32-37.
- Makhija, I.K., Sharma, I.P. and Khamar, D. 2010. Phytochemistry and Pharmacological properties of *Ficus religiosa*: an overview. *Ann. Biol. Res.* **1**(4): 171-180
- Maneesha, S.R., Vidula, P., Ubarhande, V.A. and Chakurkar, E.B. 2021. Astrologically designed medicinal gardens of India. *Int. J. Bio-resour. Stress Manage.* **12**(2): 108-120.
- Mazumder, P.M., Das, M.K., Das, S. and Das, S. 2011. *Butea monosperma* (Lam) Kuntze-A comprehensive review. *Int. J. Pharm. Sci. Nanotech.* **4**(2): 1390-1393.
- Pandey, N.K., Sharma, H.P., Amit, P. and Jain, P. 2013. A review on potential magic folk herbal medicinal plant: *Achyranthes aspera* L. *Int. J. Med. Plants* **105**: 350-363.
- Parihar, S. and Sharma, D. 2021. Navagraha (nine planets) plants: the traditional uses and the therapeutic potential of nine sacred plants of India that symbolises nine planets. *Int. J. Res. Anal. Rev.* **8**(4): 96-108.
- Rehman, R., Melki, D., Shehzad, A., Nadeem, F. and Khalid, T. 2018. Commercial importance, medicinal

- value and therapeutic potentials of chaff flower (*Achyranthes aspera*)-a review. *Int. J. Chem. Biochem. Sci.* **14**: 62-70.
- Roy, R.K. 2013. *Fundamental of garden designing*. New India Publishing Agency.
- Roy, R.K. 2020. *A Guide Book: Home Gardening*. Roy's Greens and Gardens Foundation.
- Shankar, V., Dadhich, N.K. and Saxena, S.K. 1976. Effect of khejri tree (*Prosopis cineraria*) on range grass species growing in its vicinity. *Forage Res.* **2**: 91-96
- Srivastav, S., Singh, P., Mishra, G., Jha, K.K. and Khosa, R.L. 2011. *Achyranthes aspera*-An important medicinal plant: A review. *J. Nat. Prod. Plant Resour.* **1**(1): 1-14.
- Suknoppakit, P., Wangteeraprasert, A., Simanurak, O., Somran, J., Parhira, S., Pekthong, D., and Srisawang, P. 2023. *Calotropis gigantea* stem bark extract activates HepG2 cell apoptosis through ROS and its effect on cytochrome. *Heliyon* **9**(5): 450.
- Verma, I. and Gupta, R.K. 2015. Estimation of phytochemical, nutritional, antioxidant and antibacterial activity of dried fruit of sacred figs (*Ficus religiosa*) and formulation of value added product (Hard Candy). *J. Pharmacog. Phytochem.* **4**: 257-267.
- Vidula, P., Ubarhande, V.A. and Chakurkar, E.B. 2021. Astrologically Designed Medicinal Gardens of India. *Int. J. Bio-resour. Stress Manage.* **12**(2): 108-120.
- Yadav, R.K., Nandy, B.C., Maity, S., Sarkar, S. and Saha, S. 2015. Phytochemistry, pharmacology, toxicology, and clinical trial of *Ficus racemosa*. *Pharmacog. Rev.* **9**(17): 73.
- Zhao, S., Zhang, A., Zhao, Q., Dong, Y., Su, L., Sun, Y., Zhu, F., Hua, D. and Xiong, W. 2023. The impact of main *Areca catechu* root exudates on soil microbial community structure and function in coffee plantation soils. *Front. Microbiol.* **14**: 1257164.