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EVOLUTION, CURRENT TRENDS AND FUTURE PROSPECTS OF VRIKSHAYURVEDA: A COMPREHENSIVE REVIEW

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Abstract

Vrikshayurveda, an ancient Indian system of plant medicine and agriculture, has been a significant part of sustainable farming for centuries. This review explores its historical evolution, current applications and future prospects. *Vrikshayurveda* is gaining renewed interest among researchers and farmers with the increasing demand for organic and sustainable agricultural practices. This paper highlights its traditional knowledge, modern scientific validation and its potential role in future agricultural sustainability. It also examines the role of government policies, technological advancements and international collaborations in reviving and mainstreaming *Vrikshayurveda*.

Keywords: *Vrikshayurveda*, history, *Ayurveda*, ancient plant science, *Ayurvedic* agriculture, biofertilizers, traditional farming practices.

1. Introduction

Vrikshayurveda, meaning "science of plant life" in Sanskrit, is a branch of *Ayurveda* dedicated to plant health and agriculture. Ancient texts such as '*Vrikshayurveda*' by *Surapala* provide insights into plant care, soil management, pest control and disease treatment using natural methods. Modern agriculture is facing challenges such as soil depletion, excessive use of synthetic chemicals and climate change lately, due to which the principles of *Vrikshayurveda* are being revisited for sustainable farming solutions and rightly so.

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The primary aim and objectives of this paper are:

- To explore the historical roots of *Vrikshayurveda*
- To analyze the current trends and scientific validations of its practices
- To discuss the future prospects and global relevance of *Vrikshayurveda* in sustainable agriculture

Background of *Vrikshayurveda*:

***Vrikshayurveda* in the *vedic* period:**
In the *Rigveda* (1500-1000 BC):

The hymns of the *Rigveda* mention 107 uses of plants to cure people of illness; these plants typically produce flowers, fruits, and other items. References to the use of plant knowledge for agricultural and other uses are lacking.[i]

In the *Atharvaveda* (1000-900 BC):

In the *Atharvaveda* hymns, several plants and herbs are identified, categorized, and commended for their therapeutic qualities. The relationship between plant knowledge and irrigation, agriculture, and other topics is not mentioned.[ii]

In the *Kautilya arthashastra* (300 BC):

This work mentions the phrase "*vrikshayurveda*" for the first time. According to this, the director of agriculture himself was knowledgeable about *krishitantra*, or agricultural practice.

***Vrikshayurveda* by *Salihotra* (around 400 B.C):**

There are 12 chapters in this book. Types of soil, preservation, seed care, and seed germination are discussed. The techniques for watering plants and the quantity of water needed for healthy plant growth are described. Plants were cultivated using a fertilizer known as *kunapajala*. The methods used to encourage plants and trees to produce flowers and fruits all year long, regardless of the season, climate, etc., are also covered in this book.

***Vrikshayurveda* in *puranas*:**

***Vrikshayurveda* in *Agnipurana* (A.D 900):**[iii]

There are fourteen verses in the *Agnipurana*'s chapter 282. *Dhanvantari* presents it in the form of a tale. It starts the story by advising on the planting orientation of the trees. Following religious ceremonies and under specific fortunate asterisms, the planting is to take place. The trees that need to be planted initially are named in the text. According to the needs of the soil, it discusses the need to water plants on a seasonal basis.

***Vrikshayurveda* in *Vishnudharmottara purana* (A.D 600- 1000):**[iv]

Vrikshayurveda is the title of chapter no. 300 of the second *khanda* of the *Vishnudharmottarapurana*. It takes the shape of a *Pushakra* story. He is speaking to *Bhargava Rama*. The trees, which are regarded as auspicious for the four directions, are mentioned by him. The left side of the home is where the garden is to be planted. Sesame seeds should be sown and ground into a powder before a tree is planted. Before planting, a proper worship is recommended. A list of asterisms that are good for planting is provided. The auspicious plants are called after the order in which they should be placed. After they are cultivated in large quantities, other trees should be planted; a garden connected to a temple is especially advised to avoid *shalmali, kovidara, devadaru, vibhitaka, asana,* and *palasha*. It is recommended that trees should be spaced appropriately apart. Trees are planted tightly together so that their roots can intertwine.

It should be mentioned that the *vrikshayurveda* chapter in the *Varahamihira brihatsamhita* appears to be the basis for the story in both the *Agnipurana* and the *Vishnudharmottara purana*.

***Vrikshayurveda* in *samhita* period:**

Varahamihira'sbrihatsamhita (505-580 A.D):[v]

Chapter 54th of this book is titled "*Vrikshayurveda*." There are thirty-one verses in it. It suggests creating *aaramas*, or gardens, within reservoir precincts. It covers topics including soil preparation, lucky trees, when to transplant, how to treat seeds, etc.

***Vrikshayurveda* in *Kashyapasamhita* (A.D 450):**[vi]

The precise title of the piece that *Kashyapa* wrote is unknown, but according to the stage at which branches of the tress and stems are growing, he suggests different seasons for replanting trees and lists particular needs such as suitable soil, auspicious trees, and smearing cow dung for seeds. He discusses the etiology of the condition, its symptoms, and the necessary course of treatment. He states that the afflicted area should be cut with a knife and then covered with *ghee* and *vidanga.*

***Vrikshayurveda* by *Sharangadhara*: (A.D 1363):**[vii]

Another ancient literature that discusses an associated topic, namely "arbor-horticulture," in its chapter "*upavanavinoda*," is an anthological compilation of *sharangadharapaddhati* by *sharangadhara* from the thirteenth century.

The 237 verses are divided into 15 sub-chapters, which include: glory of trees, good and bad omens related to living close to trees, choosing soil, classifying plants, planting, watering, protecting plants, building a garden house, examining soil for wells, nourishing plants, *kunapa* water, treating the health and diseases of plants, botanical marvels, and determining based on signs in plants.

***Vrikshayurveda* by *Surapala*: (A.D 1000)**

In the tenth century A.D., *Surapala*, a royal physician in King *Bhimapala's* court, wrote the *vrikshayurveda*, which was also recognized as *vaidyavidyavarenya*. The text contains 325 verses in all. There are 13 chapters[viii] in the work. The methodical formulation of *Surapala's vrikshayurveda* begins with the planting and exaltation of trees. It then goes on to cover a number of subjects related to the science of plant life, including how to obtain, preserve, and treat seeds before planting; how to prepare pits for planting saplings; how to choose soil; how to water; how to nourish and fertilize; how to prevent internal and external plant diseases; how to design a garden; agricultural and horticultural marvels; groundwater resources, etc.

Current Trends in *Vrikshayurveda*

1. Organic and Sustainable Farming

- Around the world, organic farming groups are reviving the *vrikshayurvedic* ideas. Organic fertilisers made from plant and animal organic matter, such as *Panchagavya*, *Jeevamrutha* and *Amritpani*, are being used by farmers more and more.
- Soil fertility and microbial activity are being enhanced by the revival of conventional composting methods like vermicomposting and the use of fermented plant extracts.
- Biodynamic farming, a holistic method with astrological effects, is becoming more and more popular. It frequently takes its cues fro
- Eco-labelling and organic certifications a boosting the commercial viability of agricultu goods derived from *vrikshayurveda*.

(i) *vrikshayurvedic* ideas.

- Training initiatives and awareness campaigns are assisting farmers in switching from chemical-based to conventional organic agricultural practices.

Case Study

Introduction: Sikkim's path to become the first all organic state in India started in 2003 when a policy was put into place that phased out the use of chemical pesticides and fertilisers, encouraged the use of organic agricultural methods, and established a strong certification system.

With effect from 2016, Sikkim became the first state in the world to achieve complete organic status. Other states that have set comparable goals include Tripura, Himachal Pradesh and Uttarakhand.

Sikkim Organic Mission (SOM):[ix]

In order to encourage the shift to fully organic farming, the government established the Sikkim Organic Mission in 2010 and gave farmers support, resources, and training in organic farming methods.

Key Strategies and Initiatives:

(i) Quality Control and Certification

To guarantee the integrity and quality of its organic produce, the state set up a strong organic certification system that complies with international standards.

(ii) Development of Infrastructure

To help the organic farming industry, the government made investments in market accessibility, transportation networks, and storage facilities.

(iii) Training and Extension Services

To guarantee that farmers had the requisite information and abilities, they got training on organic agricultural methods, composting, and pest control.

(iv) Community Involvement

To promote a sense of ownership and engagement, the government actively engaged nearby communities in the organic agricultural process.

Impact and Outcomes

Environmental Benefits

Switching to organic farming has had a major positive impact on the environment, resulting in decreased soil erosion, better water quality, and increased biodiversity.

(ii) Health and Well-Being

Sikkim's organic movement has improved farmers' and consumers' health by removing chemical residues from agricultural products.

(iii) Financial Gains

The organic farming industry has given farmers access to new markets, especially in the tourism and high-end organic product sectors.

(iv) Tourism Boost

Sikkim's natural charm has drawn visitors, which has increased the state's tourism industry and opened up new business prospects.

To sum up, Sikkim's path to becoming a 100% organic state is an inspiring example of environmentally conscious farming and sustainable development. Organic farming may be a feasible and sustainable route to economic and environmental well-being, as Sikkim has shown by utilizing traditional knowledge, putting effective legislation into place, as well as investing in infrastructure and training.

2. Preservation of Soil Health

- To enhance the texture and nutrient content of soil, natural soil conditioners such as biochar, green manure cow dung and cow urine are being used.
- Beneficial microorganisms are used to create microbial inoculants, which improve soil fertility, and inhibit dangerous infections.
- Techniques like intercropping, no-tilling farming and mulching with organic matter are assisting in re-establishing soil health and halting erosion.
- There is growing research on conventional soil remediation techniques, such as reviving depleted soils with certain plant-based compositions.
- Cover crops are being used to increase soil biodiversity and nitrogen fixation.
- To confirm the long-term advantages of *vrikshayurveda*-based soil treatments scientifically, field tests are being carried out to evaluate their effects.

For instance, the Indian government's main program for managing soil health is the **Soil Health Card (SHC) scheme** [x], which gives farmers advice on appropriate application of fertilizers and information on the nutritional status of their soil in an effort to increase soil production and health.

3. Pest and Disease Control

- As efficient substitutes for synthetic pesticides, biopesticides made from *neem*, turmeric, garlic, and chilli are being created and marketed.
- Scientists are beginning to recognize the antibacterial and insecticidal qualities of traditional formulations like *Dasaparni Kashaya*, which is a decoction of ten medicinal plants.
- Growing in popularity are companion planting strategies, which include growing specific plants together to improve nutrient uptake or deter pests.
- Formulations based on cow urine and fermented plant extracts are being evaluated for widespread use as natural insect repellents.
- Due to their effectiveness against a range of agricultural pests, essential oils extracted from plants are increasingly being used as biocontrol agents.
- Research is being done on the creation of integrated pest management (IPM) plans that apply *vrikshayurveda's* concepts.

In Tamil Nadu, through programs like the **National Mission on Oilseeds and Oil Palm (NMOOP)** and **Paramparagat Krishi Vikas Yojana (PKVY)**, the government is encouraging the use of biofertilizers and is providing financial support and subsidies for the production and purchase of the same.[xi]

4. Climate-Resilient Agriculture

- *Vrikshayurveda* places a strong emphasis on choosing plant species that can adapt to changing climates and crop kinds that can withstand stress.

- To fight water constraint, effective irrigation techniques including mulching and drip irrigation, as well as traditional rainwater gathering systems, are being resurrected.
- In order to improve carbon sequestration and biodiversity conservation, agroforestry and mixed cropping systems are being pushed.
- Taking inspiration from ancient *vrikshayurveda's* knowledge, research on plant species that can withstand salt and drought is improving tactics for climate adaptation.
- To maintain genetic variety and advance climate resilience, native and heirloom seed conservation is being promoted.
- Research is being done on how traditional farming methods can help reduce greenhouse gas emissions.

The **National Mission for Sustainable Agriculture (NMSA)**[xii], for example, began operations in 2014–2015. It emphasizes implementing climate-resilient sustainable agriculture methods, encouraging organic nutrient management, and improving water-use efficiency. In order to promote the adoption of organic and sustainable farming practices, it offers farmers cash incentives, training courses, and technical assistance.

5. Integration with Modern Technology

- *Vrikshayurveda*'s legitimacy is growing as a result of scientific confirmation of traditional techniques through agronomic, microbiological, and biochemical research.
- Conventional agricultural practices are being optimized through the use of precision agriculture tools, such as remote sensing and GIS mapping.
- Real-time tracking of crop growth, pest activity, and soil health is being achieved through the integration of AI and IoT-based monitoring systems into organic farming.
- Traditional biofertilizers and compounds that promote plant development are being improved and refined via the use of biotechnology.
- Mobile applications and digital platforms are being created to inform and mentor farmers on the most effective *vrikshayurveda* agricultural techniques.
- Agricultural universities and specialists in traditional knowledge are working together on research projects that are bridging the gap between traditional knowledge and contemporary science.

For example, combinations of various organic materials were recommended in *Vrikshayurveda* to protect plants from various pathogenic attacks, have antibacterial properties, and encourage plant development, flowering, fruiting, and other processes. The following are the most crucial prescriptions: 1. *Panchagavya* 2. *Panchamula* and 3. *Kunapajala*.

1. *Panchagavya*

Since *Maharshi Vasistha's* prehistoric era, cows have also been referred to as "*Kamdhenu*" or "*Goumata*." In addition to offering us a variety of commercially significant items, cows are also connected to our culture and rural way of life.[xiii] The Sanskrit term "*Gavya*" refers to each of the five organic products made by cows: i) cow dung, ii) curd, iii) milk, iv) ghee, and v) cow urine. With the use of these five "*Gavya*," which together are known as "*Panchagavya*" and are also included in our sacred script, the "*Vedas*," *Maharshi Dhanvantari* created a miraculous medication. This mixture has been used to shield plants from a number of illnesses, such as Panama disease and Fusarium wilt. In the current version of *Panchagavya* (MPG-3), which is being utilized in organic farming, yeast and regular salt are added together with the other five ingredients.

2. *Kunapajala*

One of the earliest methods of making liquid manures from organic waste is *kunapajala*, also known *as kunapambu*, which literally translates to "filthy fluid" or "fermented filth."[xiv] In the history of agriculture, *Kunapajala*was the first attempt to produce fermented organic fertilizer. The Sanskrit terms "*Kunapa*," which means "to smell like a dead body or corpse," and "*Jala*," which means "water" were the sources of the name *Kunapajala*. The first mention of *Kunapajala* preparation may be found in *Surapala's* "*Vrikshayurveda*," which was written in Eastern India

circa 1,000 AD, and in *Chavundaraya's "Lokopakara,"* which was compiled in Karnataka, South India, circa 1,025 AD.[xv] *Kunapajala*, which contains fundamental nutrients including sugar, fatty acids, keratins, amino acids, and macro and micronutrients that support plant growth and development, is made from animal wastes such as flesh, dung, urine, marrow, and skin.

3. *Panchamula*

Aegle marmelos (bael), Clerodendrum phlomides (Agnimantha), Gmelina arborea (Gambhari), Oroxylum indicum (Sonapatha), and *Steteospermum suaveolens (Padhal)* are the five plants whose dried roots are combined into a powdered mixture. These plants are all antibacterial and antifungal. Among these plants, *Agnimantha* has antifungal, antiviral, antibacterial, and insect antifeedant qualities; *Gambhari* has antiviral qualities; *Sonapatha* has antimicrobial qualities; *Padhal* has antifungal and antibacterial qualities; and *Bael* has nematicidal, antifungal, and insect antifeedant qualities.[xvi]

Future Prospects

1. Research and Development:

- To examine and confirm the effectiveness of different *vrikshayurveda*-based formulations, substantial scientific research is needed.
- The active ingredients in conventional biofertilizers and pest control formulations can be identified with the use of sophisticated biochemical, microbiological, and agronomic research.
- *Vrikshayurveda* methods can be further improved and modernized through cooperative study involving agricultural universities, conventional practitioners, and international scientific organizations.
- The creation of climate-resilient crops and the preservation of biodiversity can both benefit from genetic research on native and heirloom plant types.

For instance, India's first agricultural university is **G. B. Pant University of Agriculture and Technology**, also referred to as **Pantnagar University**. This university's research program focuses on natural farming methods based on *Vrikshayurveda*, including assessing the effects of herbal *kunapajal* and other organic mixtures on different crops. [xvii]

2. Policy Support:

- Using the principles of *vrikshayurveda*, governments should develop regulatory frameworks to support organic and sustainable farming.
- Subsidies, tax breaks, and grants for farmers who use conventional farming methods are examples of incentive schemes that can promote a widespread transition to environmentally friendly farming.
- Organic products based on *vrikshayurveda* might benefit from certification systems that boost consumer confidence and ease international trade.
- The establishment of *vrikshayurveda* research centres at the national and regional levels can facilitate the fusion of contemporary agricultural science and traditional knowledge.

For instance, by giving farmers financial support, the 2015-launched **Paramparagat Krishi Vikas Yojana** [xviii]promotes the use of organic farming methods.

3. Commercialization:

- A strong market for sustainable agricultural inputs can be established by producing and distributing bio-pesticides, organic fertilizers, and plant growth stimulants according to *vrikshayurveda's* principles.
- Creating cooperatives and farmer-producer organizations (FPOs) to jointly market *vrikshayurveda* products can increase sustainability and profitability.
- Traditional agricultural products can be made more widely available to a worldwide audience by utilizing e-commerce platforms and digital marketplaces.

- Innovative, environmentally friendly farming methods based on *vrikshayurveda* can be developed through private sector investment in research and development.

For instance, **e-NAM** is a government-funded program run by the **Ministry of Agriculture and Farmers Welfare's** [xix] entity **Small Farmers Agribusiness Consortium (SFAC).** By establishing a network among the current Agricultural Produce Market Committees (APMC) *mandis*, it seeks to create a single national market for agricultural goods.

4. Education and Awareness:

- Students and aspiring agricultural professionals might become more aware of *vrikshayurveda* by including it into the curriculum of schools and universities.
- To teach farmers about the advantages and practical applications of *vrikshayurveda* methods, training courses, workshops, and demonstration farms might be established.
- Farmers can benefit from real-time guidance on organic agricultural practices through digital platforms and mobile applications.
- Publishing of more and more Research papers, case studies, and success stories about *vrikshayurveda* can be published to raise awareness and promote adoption among stakeholders and policymakers.

Such as,

(i) National Centre for Organic and Natural Farming (NCONF) and its Regional Centers (RCONF):[xx]

They organize conferences, awareness campaigns, and training programs on organic and natural farming and their benefits. This includes 30-day certificate courses, two-day training for extension staff and one-day training for farmers.

(ii) Indian Council of Agricultural Research (ICAR):[xxi]

Teaches farmers about organic farming and organic fertilizers through training, front-line demonstrations, and awareness campaigns to encourage them to follow in the future.

5. International Recognition:

- Standardizing *vrikshayurveda*-based farming methods for international adoption can be facilitated by cooperation with international agricultural and environmental groups.
- Spreading awareness of *vrikshayurveda* at international gatherings, conferences, and summits on sustainable agriculture can provide a forum for information sharing and cross-border application.
- Promoting intercultural research that contrasts *vrikshayurveda* with other conventional agricultural sciences, such Chinese and Permaculture methods, can aid in the integration of knowledge about sustainable farming worldwide.
- Creating a worldwide certification and quality control system for products derived from *vrikshayurveda* can help then enter foreign organic markets.

For instance, **Rajiv Gandhi National Institute of Youth Development (RGNIYD)** organized the **International Workshop on Organic Agriculture 3.0** to support and promote organic agriculture best practices, especially among young people in rural areas.[xxii]

Conclusion

At the moment, traditional, conservative, and organic farming practices are receiving more attention worldwide. In addition to offering other suggestions for preserving biodiversity, *Vrikshayurveda* has long placed an emphasis on prevention rather than treatment. Many of the recipes for organic pesticides and manures found in the ancient *Ayurvedic* literature are being successfully used by contemporary agricultural professionals and research institutes. *Vrikshayurveda* provides long-term answers to contemporary environmental and agricultural problems. By fusing traditional knowledge with new scientific discoveries, it has the potential to completely transform

environmentally friendly farming methods. With adequate funding for ongoing studies, government policy backing, and access to general information on the available methods, *Vrikshayurveda* can play a significant role in advancing food security, soil conservation, and environmental sustainability in the twenty-first century.

References

i Girija-Prasanna Majumdar, Vanaspati, Plants and plant life as in Indian treatises and traditions, published by the university of calcutta 1927, p 7.

ii Ibid (1).

iii Lallanji gopal, Vrukshayurveda in Ancient India, published by Sundeep prakashan 2000, New delhi, Chapter 2, p 11.

iv Lallanji gopal, Vrukshayurveda in Ancient India, published by Sundeep prakashan 2000, New delhi, Chapter 6, p 40.

v Lallanji gopal, Vrukshayurveda in Ancient India, published by Sundeep prakashan 2000, New delhi, Chapter 6, p 44.

vi Lallanji gopal, Vrukshayurveda in Ancient India, published by Sundeep prakashan 2000, New delhi, Chapter 3, p 19.

vii Lallanji gopal, Vrukshayurveda in Ancient India, published by Sundeep prakashan 2000, New delhi, Chapter 5, p 31.

viii Lallanji gopal, Vrukshayurveda in Ancient India, published by Sundeep prakashan 2000, New delhi, Chapter 8, p 77.

ix https://sikkim.gov.in/Mission/Mission-info/1?Mission=Sikkim%20Organic%20Mission

x https://soilhealth.dac.gov.in/home.

xihttps://pib.gov.in/pressreleaseiframepage.aspx?prid=1656146.

xiihttps://pib.gov.in/PressReleasePage.aspx?PRID=1556469#:~:text=National%20Mission%20for%20Sustainable%20Agriculture%20(NMSA)%20has%20been%20made%20operational,(Drip%20and%20Sprinkler%20Irrigation

xiii M Sharat Chandra, R K Naresh, N Lavanya, N Varsha, S W Chand, P Chandana, Shivangi., B N Kumar, R Kumar, R I Navsare, Production and potential of ancient liquid organics panchagavya and Kunapajala to improve soil health and crop productivity: A review. Journal of Pharmacognosy and Phytochemistry, 8(6), 702-713, (2019).

xiv P K Mishra, Effects of Kunapajalam Vrikshayurveda on growth of paddy. Indian Journal of Traditional Knowledge, 6(2), 307-310, (2007).

xv M N Ali, S Chakraborty, A Paramanik, Enhancing the shelf life of Kunapajala and Shasyagavya and their effects on crop yield, International Journal of Bio-resource and Stress Management, 3(3), 289-294, (2012).

xvi Y L Nene, Potential of some methods described in Vrikshayurvedas in crop yield increase and disease management, Asian Agri-Hisory., 16(1), 45-54, (2012).

xvii https://www.gbpuat.res.in/DES/NF/natural_farming.

xviii Ibid. (11).

xix https://agriwelfare.gov.in/

xx https://nconf.dac.gov.in/

xxi https://icar.org.in

xxii https://www.rgniyd.gov.in/?q=content/international-workshop-organic-agriculture-30-0.