



Concept note

Vrikshayurveda – the ancient agro-techniques for organic farming of medicinal plants

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ABSTRACT

A resurgence of interest in Ayurveda and other traditional systems of medicine has resulted in the preference of health seekers towards a holistic approach and products of natural origin. Though chemical fertilizers can enhance the yield, however, it will be at the cost of soil fertility. Meantime, the alternatives such as age-old *Vrikshayurveda* practices which are organic in nature should be evaluated on medicinal plants for their acceptance and wider utility. The aim of this work is to review the relevancy of agricultural techniques mentioned in the *Vrikshayurveda* for the organic cultivation of medicinal plants. All the relevant data and information on *Vrikshayurveda* were assembled from the classical Ayurvedic literature and review and research articles from peer-reviewed journals. The adoption of various *Vrikshayurveda*-based agro techniques would certainly promote the sustainable growth of medicinal plants and improve the viability of the seeds of endangered plant species for better germination. This will ultimately enhance the quality as well as the production of raw materials for the production of medicines. *Vrikshayurveda* treatments were effective in terms of growth, physiological, biochemical, yield and quality attributes. Further studies are needed to evaluate the effect of *Vrikshayurveda* treatments on the quality and quantity of biomedically important phyto-compounds. Consequently, to reduce the pressure on agriculture for higher production, economical and eco-friendly *Vrikshayurveda* practices can be initiated for sustainable agriculture and can be considered as an alternative to conventional agricultural practices.

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INTRODUCTION

Ayurveda, a science which is based on the *Pancamahabhuta* and *Tridoṣa* theories, is as much applicable to plants and animals as it is to human beings. While the use of *Ayurveda* for mankind is increasing in popularity, especially in recent times, its use for animals and plants is not yet popular and widespread. The branches, respectively known as *Mrgayurveda* and *Vrikshayurveda*, however, have been in practice in ancient times. In India, the popular approach to achieve increased yield and production by the application of inorganic fertilizers. Knowing the demerits of using these chemicals, there is a thrust for alternatives for better yield and quality, which are eco-friendly too. Such practices for cultivation are available in the literature of ancient India, the major one being *Vrikshayurveda*.

Vrikshayurveda, an ancient science of plant life deals with the healthy growth of plants and their productivity. It is an age-old agro-practice which is of great relevance even today in the agriculture and horticulture sectors. It deals with pest and disease management of plants and also encompasses storage of seeds, sowing, germination, plant propagation, manuring, etc. (Sadhale, 1996; Nene, 2006; Aralelimath et al., 2016). Though chemical fertilizers can enhance the yield, however, it will be at the cost of soil

fertility. Meantime, the alternatives such as age-old *Vrikshayurveda* practices which are organic in nature should be evaluated on medicinal plants for their acceptance and wider utility. An effort is made here to review *Vrikshayurveda* literature related to agro techniques which can be used in the development of effective medicinal plants. It also highlights the current status of research and recent trends in the field of *Vrikshayurveda* related to organic production.

Many useful plants such as Nimba (antimicrobial), Vidanga (anthelmintic and insecticidal), Triphala (anthelmintic), Vacha (antibacterial), white mustard (nematocidal, and antifungal) Asafoetida (biocidal) and black pepper (insecticidal, antifungal and antibacterial) (Poornima, 2010) are highly emphasized for their cultivation.

VRIKSHAYURVEDA IN ANCIENT LITERATURE

The literature of *Vrikshayurveda* is found in various texts like *Agni Purana*, *Brihatsamhita* and *Sharangdhara Paddhati* of *Sharangdhara*. The term *Vrikshayurveda* was first mentioned in *Koutilya Arthashastra* but details are explained in *Brihatsamhita* and *Agni Purana*. Texts such as *Vishvavallabha*, *Krishni Parashara*, *Manasollas*, *Shivatatvaratnakara* and *Lokopkara* also contain

information related to the art of plantation. *Vrikshayurveda* is a text written by *Surpala* (1000 AD) highlighting the importance of agricultural practices. It is an Independent Ancient Sanskrit Text (325 Shlokas) on Plants. Mr Y. L. Nene (Chairman Asian Agri-History Foundation) procured a manuscript of *Vrikshayurveda* of *Surapala* from Bodleian Library, Oxford, UK. Dr Nalini Sadhale did the English translation of the manuscript (Ramachandran, 1984; Nene, 2006). Variety of information regarding nursery and agro techniques such as selection of soil, method of irrigation, pre-sowing treatment of seeds and planting materials, bio-fertilizers, techniques for healthy growth and management of pest control etc. (Mazumdar, 1935; NMPB, 2009).

VRIKSHAYURVEDA BASED AGRO-TECHNIQUES

The agro-techniques mentioned in various texts are mainly focused on the selection of the soil (*Bhumi Nirupana*), rules for sowing the seed (*Beejopathi Vidhi*), the process of planting (*Beejaropana Vidhanam*), rules for irrigating the plants (*Sechana Vidhi*), examination of soil as for indication of water (*Koopatham bhoomi pariksha*), rules for the protection of trees (*Druma raksha*), landscaping and gardening (*Upavana Vinoda*), special nutrition care for plants (*Poshana Vidhi*), use of organic manures (*Kunapa*) and treatment of plants (*Taru Chikitsa*) (Subrahmanya, 2006). These steps are described in the following heads.

Bhumi Nirupana (soil selection)

An ancient text related to *Vrikshayurveda* has given comprehensive information on the selection of soil for varieties of plants. In Anupa Bhumi (marshy land), the plants like Panasa, Narikela, Jambu, Tala, Vamsha, Jambeera, Vata, Kadamba, Kadali, Ketaki, etc. can be grown. In Jangala Bhumi (arid land), the plants such as Ashoka, Shami, Bilwa, Shigru, Saptaparna, Shaka, Nimba, Karira, etc. can be cultivated. Sadharana Bhumi (ordinary land) is suitable for the growth of Amra, Dadima, Champaka, Bijapuraka, Priyangu, etc.

Beejopathi Vidhi (pre-sowing treatment of seeds)

Certain pre-sowing treatments of seeds are mentioned which are beneficial for seed-sowing purposes.

1. Seeds extracted from dried fruit are sprinkled with milk and dried for five days. It is then smoked with mustard seeds mixed with *Vidanga* (*Emblia ribes* Burm. f).
2. Seeds sprinkled with milk rubbed with cow dung, dried and profusely smeared with *Vidanga Choorna* and *Madhu* will definitely sprout.
3. Seeds soaked in milk, dried well in shade and rolled in the powder of *Brihati* (*Solanum indicum* L.), *Tila* (*Sesamum indicum* L.) and mixed with mustard are excellent for sowing.

Favourable planting seasons

It is suggested that *Shravana* (rainy) month is most favourable for the plantation of *Dadima* (*Punica granatum*

L.), *Bakula* (*Mimusops elengi* L.), etc. The month of *Bhadrapada* (when rains are receding) is most suitable for cultivating *Amra* (*Mangifera indica* L.), *Lakucha* (*Artocarpus lakoocha* Roxb.), etc. *Saptaparna* (*Alstonia scholaris* L.) can be grown in the month of *Kartika* when the dry season starts. *Phalguna* (beginning of spring) is found most suitable for *Patola* (*Trichosanthes cucumerina* L.) whereas *Vaishakha*, at the beginning of summer is suggested for the cultivation of *Kadali* (*Musa paradisiaca* L.).

Sechana vidhi (method of irrigation)

The newly transplanted trees must be watered regularly. Watering must be done twice a day in summer and on alternative days in winter and if it is rainy season only when the soil dries up. Some trees grown in places with plenty of water such as *Jambu* (*Eugenia jambolana*), *Vetasa* (*Salix caprea*), *Kadamba* (*Anthocephalus cadamba*), *Udumbara* (*Ficus racemosa*), *Arjuna* (*Terminalia arjuna*), *Naktamala* (*Pongamia pinnata*), etc., hence, these required adequate amount of water.

Koopatham Bhoomi pariksha (Soil examination for water content)

The soil needs to be examined for the presence of water. One can search the trees generally found in places with plenty of water such as *Jambu* (*Eugenia jambolana*), *Vetasa* (*Salix caprea*), *Kadamba* (*Anthocephalus cadamba*), *Udumbara* (*Ficus racemosa*), *Arjuna* (*Terminalia arjuna*), *Naktamala* (*Pongamia pinnata*), etc.

Drumaraksha (conservation practices)

The idea of divinity in plants and religious sanctions against the destruction of plants is considered the most effective and successful method of conserving plants. Examples are *Neem* (*Azadirachta indica*), *Wood apple* (*Feronia elephantum*), *Tulsi* (*Ocimum sanctum*), etc. (Sundar Rajan, 2005).

Upavana Vinoda (landscaping/gardening)

It is mentioned in *Upavana Vinoda* of *Sarangadhara paddatti*. *Varahamihira* has given a detailed account of various horticultural practices. He mentions the plants suitable for gardens such as *Arista* (*Sapindus saponifera*), *Ashoka* (*Saraca indica*), *Punnaga* (*Calophyllum inophyllum*), *Sirisha* (*Albezzia lebbeck*) and *Priyangu* (*Calicarpa macrophylla*). He also mentions vegetative propagation (*kandaropana*) for certain trees like *Ashoka* (*Saraca indica*), *Jambu* (*Eugenia jambolana*), *Lakucha* (*Artocarpus lakucha*), *Dadima* (*Punica granatum*) and *Bijapuraka* (*Citrus medica*).

Poshana Vidhi (nutrition for plants)

According to *Varahamihira*, for special nutrition and to increase the growth of the trees, the use of manure for increasing the *Poshana* (nutrition and growth of trees) is required. He mentioned the method of manure preparation. Bio-fertilizers in the name of *Kunapa Jala* which is special

liquid manure mentioned in *Surapala's Vrikshayurveda* which enhance the growth and development of plants. The *Kunapa Jala* (Surapala) is prepared by the excreta, flesh, brain, bone marrow, and head of a boar. All the ingredients are mixed with water and stored underground called *Kunapa*. It is then boiled after mixing with water and the mixture should be stored in an oiled pot after adding a sufficient quantity of husk, after roasting it in an Iron pot. Sesame oil cake, honey and soaked black gram were also added. Besides, a little ghee should be poured into it (Vidyanath, 2013).

Cultivation techniques to increase yield

Various specific techniques are suggested in *Vrikshayurveda* to increase the yield of medicinal plants. The sprinkling of ghee with cold milk is done for increasing production. Panasa (jack fruit) when watered with Triphala decoction and covered immediately with husk, bears big-sized fruits. Similarly, the orange tree bears good quality fruit when treated with water mixed with flesh, jaggery and milk. If trees don't bear flowers and fruit, these should be treated with a cold mixture of sesame, barley, Kulattha (*Dolichos biflorus* L.), green gram and black gram.

In *Vrikshayurveda*, *Panchmoola*, a combination of five plants' roots i.e. Bilva (*Aegle marmalos* L.), Agnimanth (*Clerodendrum phlomides* L.), Shonak (*Oroxylum indicum* Benth.), Patala (*Stereospermum suaveolens* Roxb.) and Gambhari (*Gmelina arboria* Roxb.) are used in various forms to treat different diseases in plants. It is also used for pest control and as a biofertilizer to enhance plant yield.

Taru chikitsa (pest control)

This is done by the fumigation with Sarshapa, Hingu, Vidanga (*Embelia ribes*), Vacha (*Acorus calamus*) and water mixed with powder of Bhallataka (*Semicarpus anacardium*). Paste prepared by pounding the barks of Karanja (*Pongamia pinnata*), Aragwadha (*Cassia fistula*), Vidanga (*Embelia ribes*), Musta (*Cyperus rotundus*) with cow urine is applied to the roots of the infected plant (Aralelimath et al., 2016).

CONCLUSION AND RECOMMENDATIONS

In the present scenario, the increased use of chemical fertilizers has led to the declining quality of herbs and farming. The best remedy for this would be the use of organic matter like compost, manures, crop rotation, and controlling pests and insects. In this regard, the ancient Agro techniques mentioned in the *Vrikshayurveda* and the *Varahamihara Brihat samhita* give a lot of information about the utilization and methods to adopt organic farming. The traditional farming method includes various areas where we can do the research and adapt them in the present scenario. The research on Bakuchi (*Psoralea corilifolia*), treated with milk overnight and shade dried, kept in a paste of Brihati (*Solanum indicum*), Tila (*Sesamum indicum*), Kamala nala (*Nelumbo nucifera*) and Ghee for 6 h showed better results in terms of the number of seeds germinated (21.67), germinability (21.67),

germination rate index (0.36), emergence index (0.96) and relative seed germination (148.69), as compared to control (treated with water) and standard groups (treated with sulphuric acid). By adapting these methods of farming, we can better manage soil fertility and the cultivation of crops giving a good quality yield. Moreover, these techniques are very helpful to conserve and propagate endangered medicinal species which are on the verge of extinction. *Vrikshayurveda* and *Brihat Samhita* illustrate several aspects such as seed treatment, vegetative propagation, transplantation, irrigation, harvesting, nutrition to plants, soil aspect, treatment of diseases and plantation techniques.

Greater incorporation of suitable traditional techniques during the development of nursery protocol, along with currently available practices, will definitely result in the production of quality planting material better suited for large-scale plantation programs. Many of the raw materials listed in the *Vrikshayurveda* texts, such as flesh and bone of animals, husk, oil cakes, dung and urine of cattle, etc., are waste products and re-utilization and recycling of these products will also result in their effective waste management.

In addition to the development of nursery technology for perennial medicinal plants, it will also enhance the health and livelihood security of the communities involved as well as the health of the environment. Thus, it is high time to do the research and adapt these ancient Agro techniques in the medicinal plant cultivation and conservation aspect.

CONFLICTS OF INTEREST

The author(s) declare(s) no conflicts of interest.

DECLARATION

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