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Conservation and cultivation of medicinal plants by ancient agro techniques - The need of the hour

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Abstract

With the increasing deforestation, decreasing natural resources and extinction of valuable medicinal plants, it has become the need of the hour to conserve them and cultivate them to meet the growing demand of the Pharma companies. The quality of the medicinal crop plays a pivotal role in the therapeutic potency of the plant and its effect on human health. In this regard the ancient agro technique methods mentioned in the Vrikshayurveda have shown to be more effective. Vrikshayurveda deals with the plant science mainly with the different species of trees and their healthy growth and cultivation including water management, soil conservation, and usage of organic fertilizers and the treatment of various diseases affecting them. This paper highlights the importance of the organic farming and the research works carried on these traditional techniques which can be effectively adopted for the conservation and cultivation of the medicinal plants in the present scenario.

Keywords: Ancient Agro technique, Conservation, Cultivation, Medicinal Plants

Introduction

Vrikshayurveda is a science in Agriculture, Horticulture and Life science. It includes areas such as selection, collection, storage of seeds, sowing, germination techniques, propagation, grafting etc. [1] With the advent of new agro techniques using chemical fertilizers, insecticides and pesticides the quality and the therapeutic efficacy of the medicinal herbs are decreasing. Thus there is a need to adapt and develop the traditional cultivation techniques for the benefit of mankind. Not only the cultivation it should be backed up by the conservation techniques. Ancient and Traditional approach of agro techniques are found in Vrikshayurveda (which is a part of Atharvaveda) of Surapala and Parasara. Besides these texts mentioned above many other technical books also contain useful information such as Brhat samhita and Sharangadara paddhati.

Materials & Methods

Various texts focusing on ancient methods of agrotechniques has been reviewed and all the available resources were referred regarding this [2].

The agrotechniques mentioned in various books can be classified into criterias such as

- 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 (Koopartham bhoomi pariksha)
- Rules for protection of trees (Druma raksha)
- Landscaping and gardening (Upavana Vinoda)
- Special Nutrition care for plants (Poshana Vidhi)
- Use of Organic manures (Kunapa)
- Treatment of plants (Taru Chikitsa)

Selection of the soil (Bhumi Nirupana)

Soil is classified under 3 heads: Arid, Marshy and Ordinary.

It is further subdivided into 6 types of colours (black, white, pale, dark red and yellow) and flavours (sweet, salty, pungent, bitter and astringent)

Soil with poisonous components, stones, gravel, anthills, holes and having no accessibility to water is not suitable for farming land. The land which is even has accessibility to water and in and around with green grass is good for growing all kinds of trees.

Measure for preparing the ground for plantation

A soft soil which is not very hard is suitable for the growth of plants. In order to make the soil suitable for the growth of plants it is necessary to cultivate "Tila" (*Sesamum indicum*, Pedaliaceae) plant first and after they flower the entire crop has to be ploughed into the soil.

First plants in the garden to be grown are

- Arishta- *Sapindus saponifera* (Sapindaceae)
- Ashoka- *Saraca asoka* (Ceasalpinaceae)
- Punnaga-Calophyllum inophyllum (*Clusiaceae*)
- Shirisha – *Albizia lebbek* (Mimosaceae)

For Priyangu and Kapittha soil bed or pit where seed to be sown must be one feet in depth and should be filled with milk mixed with water.

Rules for sowing seed

To get healthy and good yield the seeds should be treated with various substances before sowing

- The seed should be smeared with ghee and immersed in milk for sometime. It should be removed from milk, dried and once again the process is repeated. This should be repeated for 10 days. Subsequently the seed should be mixed with cowdung, flesh of pig and deer and sown in the soil. The soil should be watered with water mixed with milk.
- Hard seed germination- To make it germinate early, the seed should be treated with a mixture of pootimamsa (blood soaked flesh), vrihi (Paddy- *Oryza sativa*, Poaceae), Masha, Tila and Saktu. Subsequently for sometime the seed should be immersed with dhoopa (smoke) or Haridra (Turmeric- *Curcuma longa*). By these germination of hard seeded tree species can be done.
- Other methods- seed of any tree may be treated with fruit extract or oil of Ankola (*Alangium salvifolium*) and Shleshmataka (*Cordia dichotoma*) to make it germinate quickly.

The process of planting - Planting should be done keeping in mind the soil and distance between the trees. Ideal, average and suitable distance to be maintained between the trees.

- Ideal distance between tree in vimshatihasta (20x25 feet) (assuming a hasta - distance to be a foot or little more.)
- Madhyama not very good-Shodasha (16 hasta)
- Adhama- Dwadasha (12 hasta)

Trees planted close by will have improper growth and production of fruits falls down.

Vegetative production

Varahi Samhita categorized two types of propagation

1. Transplantation (Padapasamropana)
2. Luting (Kandaropana)

The author mentions various trees from which the branches could be cut either at the base or at the nodal region. The branches cut off must be immediately pasted with cowdung and then should be planted in soil. The trees like Panasa, Ashoka, Kadali, Jambo, Lakucha, Bijapura can be propagated by this method. Another chapter by named Upavana Vinoda gives a detailed account of transplantation and the preparation of pits to transplant the trees. The pit should be filled half of the depth with fine soil, water adequately when the transplantation of tree is done.

Time for transplanting the trees

If the plants are very young with very few or no branches, they should be planted in the early winter season, where as plants with already emerged branches should be planted in the late winter while plants with very well developed branches should be planted in rainy season.

Treatment for the tree to be transplanted

Before transplantation the tree should be pre treated as follows. Equal quantity of ghee or ushira (roots of grass *Vetivera zizanoides*) tila (sesame) kshoudra (honey) vidanga fruits (*Embelia ribes*) kshira (milk) and gomaya (cow dung) should be mixed and made into paste. Tree that are to be transplanted should be anointed with this paste first and then only transplantation should be carried out.

Rules for irrigating the plants (Sechana vidhi)

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 soil dries up. Tree 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.

Examination of soil as for indication of water (Koopartham Bhoomi pariksha)

The soil need 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. indicative of water.

Rules for protection of trees (Drumaraksha--Ancient practices for conservation)

The idea of divinity in plants and religions sanctions against destruction of plants is considered the most effective and successful method of conserving the plants. Exmples are Neem (*Azadirachta indica*), Wood apple (*Feronia elephantum*), Tulasi (*Ocimum sanctum*) etc [3].

Table 1: Plants used for the protection against disease [4]

Particulars	Pharmacological Action
Nimba leaf (<i>Azadirachta indica</i>) decoction	Anti microbial property
Vidanga (<i>Embelia ribes</i>) powder	Antihelminthic, Insecticidal
Triphala	Antihelminthic
Asafoetida	Biocidal
Vacha (<i>Acorus calamus</i>)	Anti bacterial
White mustard	Nematicidal, Antibiosis, Antifungal
Black pepper	Bacteriostatic, Fungistatic, Insecticidal

Landscaping and Gardening

It is mentioned in Upavana Vinoda of Sarangadhara paddatti. Varahamihira has given 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 (*Albizia lebeck*) and Priyangu (*Callicarpa macrophylla*). He also mentions vegetative propagation (kandaropana) for certain trees like Ashoka (*Saraca indica*), Jambu (*Eugenia jambolana*), Lakucha (*Artocarpus lakucha*), Dadima (*Punica granatum*), Bijapuraka (*Citrus medica*).

Special nutrition for plants (Poshana Vidhi)

According to Varahamihira for special nutrition and to increase the growth of the trees use of manure for increasing the poshana (Nutrition and growth of trees) he mentions the manure preparation.

Method of Manure preparation

Dried and powdered dung of Avika (sheep) and Aja (Goat) should be taken two measures, tila (Sesamum) one measure, saktu (zinc compound) a little quantity and sufficient quantity of water is added to this and kept in a vessel for seven days. On 8th day the mixture should be applied to the trees. Such an application of manure to the trees, creepers will give nourishment along with helping in more flowering, fruiting and healthy growth^[5].

Kunapa Jala (liquid manure)

Flesh of deer, fish, sheep, goat and some insects are boiled in water. After cooling, powder of black gram and Sesame seeds are mixed. Later milk, honey and water is added. The whole mixture is kept in Sunlight for 15 days. The liquid manure thus prepared is called Kunapa-jala, which enhances growth and development of plants^[6].

Treatment of Diseased plants (Taru Chikitsa)

Vrksayurveda of Brhat Samhita that excess of cold and vata(wind) are mainly responsible for the diseases. Symptoms such as Bleaching (Chlorosis) of the leaves, falling off the buds, Drying of the branches and exudation of sap from the infected part needs to be treated. To treat these diseases first to be done is cut off the infected part, so that the disease will not spread and then a paste of ghee, Vidanga (*Embelia ribes*) and Silt (Mud mixed with plenty of water) should be applied to the infected parts. Milk mixed with water should be sprinkled on the infected parts subsequently.

Trees if not producing flowers and fruits the following treatments is to be given:

- Mix ingredients like Kulatha (Horsegram), Masha (Black gram), Mudga (Green gram) and Tila (Sesame) in milk. Cool the mixture and sprinkle on the trees.
- Prepare paste by pounding the barks of Karanja (*Pongamia pinnata*), Aragwadha (Cassia fistula), Arishta (*Sapindus saponifere*), Saptaparna (*Alistonia scholaris*), Vidanga (*Embelia ribes*) and Musta (*Cyperus rotundus*) with gomutra and applied to the roots of the infected parts^[5].

Results and Discussion

In the present scenario, the increased use of chemical fertilizers has led to the decline quality of herbs and the farming. The best remedy for this would be the use of organic matter like compost, manures, crop rotation, controlling of

pests and insects. In the regard the ancient agro techniques mentined in the vrkshayurveda and the Varahamihara Brhat samhita gives lot of information about the utilization and methods to adapt organic farming.

Traditional farming method include various area where we can do the research and adapt them in the present scenario. The research on Bakuchi (*Psorlea corilifolia*), treated with milk overnight and shade dried, kept in paste of brihati (*Solanum indicum*), tila (*Sesamum indicum*), kamala nala (*Nelumbo nucifera*) and ghee for 6 h showed better results in terms of number of seeds germinated (21.67 ± 4.19), germinability (21.67 ± 4.19), germination rate index (0.36 ± 0.07), emergence index (0.96 ± 0.12) and relative seed germination (148.69 ± 50.92), as compared to control (T1, treated with water) and standard groups (T2, T3 and T4, treated with sulphuric acid)^[7].

By adapting these methods of farming we can better manage the soil fertility, cultivation of crops giving good quality yield and moreover these techniques are very helpful to conserve and propogate Endangered medicinal species which are at the verge of extinction.

Conclusion

Vrkshayurveda and Brhat Samhita illustrate several aspects such as seed treatment, vegetative propogation, transplantation, irrigation, harvesting, nutrition to plants, soil aspect, treatment of diseases and plantation techniques. Thus it is the high time to do the research and adapt these ancient agrotechniques in the medicinal plant cultivation and conservation aspect.

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