



(REVIEW ARTICLE)



Vrukshayurveda: A resolution on harmful effects of pesticide on human health

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Abstract

India is a primarily an agricultural country. Agriculture is the art and science of cultivating the soil, growing crops and raising livestock. Growing Population rising the demand for resources such as food and water and better access to healthcare. It is our need to increase food production for growing populations. That's why our farmer widely uses pesticides in farm to control pests, including weeds and to save the tress and plants from pests. But because the tremendous uses of pesticides in agriculture we have to face many health issues such Skin disorders, asthma, Diabetes mellitus, Cancers, Nervous system disorders specially in childs also diseases related to Reproductive system such as infertility, cervical cancers and so on. Now its time to overcome this problems and make our body more healthy. But for that we have to prefer the Organic farming in which we can do farming by using the biofertilizers and produce healthy food production without using chemicals. Vrukshayurveda such a ancient science scripture in which all about the plant their structure, morphology, plant diseases and their treatment also biofertilizers, organic farming are described. This review draw the awareness towards the importance of vrukshayurveda in Organic farming.

Keywords: Pesticides; Pesticides harmful effect; Organic farming; Vrukshayurveda

1. Introduction

Agriculture is the India's main resource of income. It accounts for a quarter of the country's gross domestic product^[1]. Since few years the utility of pesticides in agriculture field are increases day by day. Pesticides are the chemical compounds that are used to kill pests, including insects, rodents, fungi and weed i.e unwanted plants. Farmers uses this pesticide in large amount without knowing proper method of application to improve the plant growth. But there are so many problems are created due to this pesticides, such health issues, air pollution, water pollution. This pesticides residues present in the food and they create harmful effects on human health. To solve this program now we look for towards the organic farming which giving us healthy nutritious food. Vrukshayurveda is the ancient science scripture which are written by two Acharya's Surpala and Salihotra have included all types of plant, types of plant, their morphology, plants nutrition, Seed germination, preservation of seed from microbial agent, Kunap-jala (one of the type of biofertilizers) plant diseases and herbal medicine remedies, organic farming and lots of things are mentioned in this scripture. This review try to focus the importance of Vrukshayurveda in our precious life.

1.1. Harmful effects of Pesticides on human health

Good diet is important our health. Our body growth are totally depend on our food. Pesticides are chemical substance that are meant to kill pests. It is a chemical or a biological agent such as a virus, bacterium, antimicrobial or disinfectant that deters, incapacitates, kills, pests. It is commonly used to eliminate or control a variety of agricultural pests that can damage crops and livestock and reduce farm productivity. The most commonly applied pesticides are insecticides to kill insects, herbicides to kill weeds, rodenticides to kill rodents, and fungicides to control fungi, mould, and mildew.

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Though each pesticide is meant to kill a certain pest, a very large percentage of pesticides reach a destination other than their target. Instead, they enter the air, water, sediments and even end up in our food. Residues of pesticides can be found in a great variety of everyday foods and beverages, including for instance cooked meals, water, wine, fruits juices and animal feeds.

Pesticides have been linked with human health hazards, from short-term impacts such as headaches and nausea, Skin disorders, gastrointestinal, respiratory to chronic impacts like cancer, endocrine effects and reproductive harm.

The use of these also decreases the general biodiversity in the soil. If there are no chemicals in the soil there is higher soil quality and this allows for higher water retention which is necessary for plants to grow^[4].

1.2. Organic Farming

Organic farming can be defined as an agricultural process that uses biological fertilizers and pest control obtained from animal and plant waste. It is an solution for to the environmental suffering resulting by the uses of chemical pesticides and synthetic fertilizers^[2].

1.3. Benefits of Organic farming

As compared to the chemical and fertilizer utilized products, organic products are more nutritional, healthy and important for good health. By using the biofertilizers we can save the environment to get polluted. It is economically cost effective because it is not expensive as chemical fertilizers. It is also good to improve soil fertility because it gives more yield by keeping soil quality constant. Now there is a huge demand for the organic products in India and across the globe which generates more income through export^[2].

1.4. Vrikshayurveda

Vrikshayurveda is the ancient science of plant life. Its name basically means 'Ayurveda for trees'. Vrikshayurveda deals with all species of trees and their healthy growth and productivity. Vrikshayurveda optimizes the productivity of plants and allows the control of pests and diseases without using any chemicals. It is the original science of what is today called permaculture or agroforestry. Treatise called Vrikshayurveda mentions in depth about the plants, its importance, diseases suffered by them, treatment, protection from external factors, increasing the yield, conservation techniques like protection of plants from mist, pests etc. Chemical fertilizers show dramatic short-term benefits, but in the longer run they adversely impact the soil, water and perhaps the nutritional quality of the plants. A detailed study of Vrikshayurveda gives us insights into what an optimal, holistic agricultural and gardening system would look like^[3].

- Two main scriptures are specifically dedicated to Vrikshayurveda:
- *Vrikshayurveda* written by Salihotra (around 400 B.C), which describes techniques to help plants and trees to bear fruits throughout the year irrespective of the season, climatic conditions etc^[3]
- *Vrikshayurveda* written by Surapala (1000. A.D) — This scripture explains countless techniques about how to fertilize the soil or raise larger fruits. The cultivation of about 170 plant species are described, including water management, soil conservation, fertilizers, the various diseases affecting the plants and their treatment. It describes in details the cultivation and preservation of the plant from its seed till its maturity. There was only one existing copy on palm leaves manuscript of Surapala's *Vrikshayurveda*, which was preserved at the Oxford University, before its recent translation into English. It discusses various topics connected with the science of plant life such as procuring, preserving, and treating of seeds before planting; preparing pits for planting saplings; selection of soil; method of watering; nourishment and fertilizers; plant diseases and plant protection from internal and external diseases; the ideal layout of gardens; managing groundwater resources; etc. In addition to pre treatments applicable to all seeds in general, treatments specific to specific plants also have been described. Various seed priming processes have been carefully designed in Vrikshayurveda to allow early germination, to obtain good quality of seedlings by following the classical techniques. The different chapters of *Vrikshayurveda* deal with horticulture, home gardening, preservation of plants, soil treatment, water management and fertilizers. Planting trees like Bilva, Nyagrodha (Banyan), Ashwatta (Sacred Fig), Dhatri (Gooseberry) Mango, Neem, Udumbar (Cluster Fig) is presented as a sacred deed^[3,6].
- Need & Importance of Vrikshayurveda: The ignorance of our ancient texts is responsible for the degeneration of our agricultural practices. Ancient sciences are now making a comeback, as there is a huge demand of the conservation and sustainable utilization of forest products as well as the medicinal plant sciences. The availability of quality medicinal herbs with the desired pharmacological and biological markers has become a challenge, due to the degradation of soils worldwide. The necessity of a controlled, quality cultivation becomes

significant in the sector of medicinal plants. To overcome this, the protocols and methods of *Vrikshayurveda* are promising^[3].

2. Important Parts From *Vrukshayurveda*^[3]:

- **Bijotpattividhi**The chapter “Bijotpattividhi” illustrated about the process of seed germination and explains about grading and preservation of seeds. The methods described for seed preservation is to mix the seeds with ashes and it was also suggested that the seeds should be exposed to the medicated smoke which can serve as an antimicrobial agent.
- **Drumaraksa**: It is the chapter deals with several advices to save plants and trees from the weather and other conditions like winds and storms.
- The chapter “Citrikarana” depicts some outstanding techniques such as to make a plant bloom throughout the year irrespective of the seasons.
- The scripture explains about the method for increasing the fragrance of flowers. Different manures are used for different flowering plants.

2.1. KunapJala

The literary meaning of the Sanskrit word Kunapa is “smelling like a dead or stinking” and the name is apt for the liquid manure which is prepared using excreta, bones, fish, decayed plant products etc.

2.1.1. Benefits of KunapJala

Being a liquid biofertilizer it is a more suitable form of manure and can be beneficial in growth of medicinal plants with probably minimal toxic effects on human body when compared to chemical fertilizer. Usually the raw organic matter decomposes into humus which will be further digested by soil microbes producing high levels of organic acids like humic, carbonic and fulvic acids and increases high cation (+) exchange capacity. This capacity is responsible for the mobilization of calcium, potassium and other plant nutrients. In order to obtain good results aerobic composting is said to be beneficial.

2.2. Examples of plant optimization techniques^[3]

- For flowering in all seasons: Mixture of Sesame oil cakes, Vidanga (*Embeliaribes*), sugar cane juice and cow dung is sprinkled to the root of a plant. This practice enables flowering of the plant in all the seasons.
- For seedless fruits: Paste of Yastimadhu (*Glycyrrhizaglabra*), sugar, Kustha (*Saussurealuppa*), flowers of Madhuka (*Madhucaindica*) is applied to the root of a tree to produce seedless fruit.
- To control weed: The cut branches of Arka (*Calotropisprocera*) are kept at the entrance of rain water channel. This method minimizes weed population if repeated for several times during rainy season.
- Paddy pest control: Cactus milk is poured into the water inlets of the paddy field to control the pests and insects in paddy field.
- To prevent flower and fruit drop: Asafoetida is applied on the root of the plant and a fine bandage cloth is tied around it. It is used to prevent flower and fruit dropping.
- For wounds to the trees: the treatise recommends to apply the paste of bark of Nyrodha (*Ficus bengalensis*), Udumbara (*Ficus racemosa*), cow dung, honey and ghee.
- If a plant is burnt: it can be treated with application of mud and paste of lotus. The irrigation should be done with water mixed with sugar, sesame and milk.
- To purify water: The powders of gooseberry, Kataka (*Strychnos potatorum*), Musta (*Cyprus rotundus*) is added to the water to purify it.

2.2.1. Soil

In *Vrikshayurveda*, soils are classified based on vegetation of plants of medicinal and economic value, the fertility of soils were also taken into account to avoid infertile land and choose soil correctly for growing plants and crops. In the 1st chapter of *Vrikshayurveda* by Salihotra, the types of land are described:

- **Anupadesha** (Marshy area): The land is fertile in nature with abundant water, green trees, climate suitable for the growth of plants and soil rich in natural nutrients.
- **Jangaladesha** (Arid area): The land is dry and barren. Water content in the soil is less
- **Sadharanadesha**: The land has moderate water, greenery and soil is having natural nutrients in moderate quantity^[3].

2.2.2. Drug Collection^[5]

The harvest of different parts of plants during various seasons is also explained so that maximum potency can be obtained from the parts:

- Flowers and Fruits - During their flowering and fruiting season
- Leaves and Branches - During rainy season or spring
- Roots - During summer or late winter
- Bark, Stem - Early winter

2.3. Plant diseases and Treatment^[5]

Various diseases of the plant are divided on the basis of Tridosha such as Vata, Pitta and Kapha. All symptoms are classified on the basis of Tridosha and also treatment mentioned as per the Dosha

Table 1 Tridosha Diseases and treatment of plants

Dosha	Symptoms	Treatment
VataDosha	Plant become lean, deformed, Presence of knots and globules on trunks or leaves, fruits become hard and less juicy	Irrigation with flesh and fat of animals along with 'kunapjala' followed by fumigation with Neem leaves (Azadirachta indica)
Pitta Dosha	Yellowish discoloration of leaves, frequent shedding of branches, difficult to withstand the sun rays, bearing of premature fruit.	Irrigation with decoction of Yasthimadhu (Glycyrrhiza glabra), Madhuka (Madhuka indica) and milk mixed with honey, fumigation with honey and ghee to the affected part of plant.
KaphaDosha	The branches and leaves become glossy, all parts of the plant are surrounded by creepers	Apply decoction prepared from herbs like Apamarga (Achyranthes aspera), Pippali (Piper longum), The roots of affected trees are applied with cake of white mustard and irrigate with Tilakshara (ash of sesame plant) mixed water.

3. Conclusion

Pesticides which are the harmful chemical substances widely used in agriculture and getting resulting into lots of health issues. We have to be conscious about our health and ultimately for our diet. For that in the present time everything looks for the organic farming food and for that various methods of organic farming are found in which Vrikshayurveda will be most helpful. The use of herbal medicines, kunapajala and other procedures mentioned in this Vrikshayurveda can be studied further for efficacy and if found to be appropriate can be adopted for the different methods involved in advancement of organic farming protocol for medicinal plants. Numerous of the raw materials listed in the Vrikshayurveda texts, such as bone of animals, husk, oil cakes, dung and urine of cattle, etc., are waste products and reutilization and recycling of these products will also result in their efficient waste management. With the help of ancient texts and modern methods of agriculture we can't only scientifically prove the sayings of the text but we could also set up some novel modified methods for the agricultural systems.

The proper analysis and availability of Vrikshayurveda we can also play a significant role in the field of intercropping and put forward for the use of organic fertilizers and can play a vital role to make the eco-friendly environment.

Compliance with ethical standards

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Disclosure of conflict of interest

Authors declare that there is no conflict of interest.

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