

Role of Vrikshayurveda in Integrated Pest Management

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Introduction

Vrikshayurveda is an ancient Indian science of plant life. It is an ocean of knowledge that has been systematically compiled in the form of 325 Sanskrit shlokas in a text named “Vrikshayurveda” by Surapala written approximately a millennium ago. The mention of Vrikshayurveda was made for the first time in Kautilya’s Arthashastra in which Vrikshayurveda means “vrikshasya ayurveda” i.e., *Taruchikitsadi shasthra* meaning the “science of plants”. The major subjects under Vrikshayurveda are- *Bhoomi niroopanam* (identification and classification of soil conservation technique), *Beejopti vidhi* (sowing techniques), *Padapa vipaksha* (method of propagation), *Ropana vidhanam* (plantation technique), *Nishechana vidhi* (irrigation technique), *Poshana vidhi* (special nutritional care and management of plants with various biotechnological means), *Druma reksha* (conservation practices), *Taru chikitsa* (treatment with biomedicine) *Nivasa sanna tharu subha-asubha lakshanam* (selection of plants for planting near the residence based on their good/bad qualities.), *Tarumahima* (glory of trees – awareness programme) *Upavanakriya* (landscaping and gardening) and *Chithreekaranam* (research on plant biotechnology). In this article, we are focusing on the role of *Taru chikitsa* subject of Vrikshayurveda in Integrated Pest Management.

Background

IPM is a holistic broad-based approach to pest management that integrates practices (physical, chemical, biological, mechanical and cultural) for controlling the pest at economic level. The main aim of IPM is to suppress the pest population below the economic injury level (EIL). It is a safer pest control technique. The focus of IPM is to control, not to eradicate. IPM programmes mostly revolve around developing safe pest levels initially called the action thresholds and then take necessary control measures if the threshold is crossed. Since past many decades, people are using synthetic or inorganic pesticides in order to obtain rapid control over the pests in turn resulted in the loss of biological phenomena, flora and fauna associated with the crops, development of resistance in plant pathogen or pests, reduction in fruitfulness of plants and also has weakened the ecological base in addition to

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degradation of soil, environment and human health. To avoid all these health hazards, it is high time to adapt the old traditional mode of farming as the concept of organic farming is widely accepted in different parts of the world. (Budhar *et al.*,1991). The utilization of organic amendments has already been described in Vedas, Puranas and Arthashastra. Chemical fertilizers are polluting the land and hence, organic manures mentioned in Vrikshayurveda is taking pace these days. Details regarding the use of plants or their parts for their medicinal properties have been mentioned in ancient texts such as the Rigveda, Atharvaveda, Charak Samhita, Susruta Samhita, Mahabharata etc.

Impact of different components of Vrikshayurveda on Pest Control-

Vrikshayurveda has come into picture because of the following properties- anti-microbial, anti-fungal, wound healing, pesticidal or insecticidal action, disinfectant, anti-helminthic etc. Hence, can be considered under the biological control component of IPM.

- Use of Plant extracts in Vrikshayurveda :- Some of the plants in Vrikshayurveda that has the insecticidal or pesticidal properties are- *Azadirachta indica*, *Santalum album*, *Acorus calamus*, *Aegle marmelos*, *Pongamia pinnata*, *Nerium indicum*, *Argemone mexicana* etc. the most commonly used plant for pest control is Neem (*Azadirachta indica*) because of the presence of Nimbidine, Nimikrin and Nimbidin. Diluted Neem leaf extract @ 2.53 L in 50 L water and sprayed can be used against pests like *Helicoverpa armigera*, *Spodoptera litura*, *Leucinodes orbonalis*, tea mosquito bugs, whiteflies and other defoliators or sucking pests (Raghavendra *et al.*,2016). Also, the use of some microbial biocontrol agents for example the entomopathogenic fungi such as *Metarhizium anisopliae*, *Beauveria bassiana*, *Cordyceps sp.* etc. is taking momentum these days and it is found that the extracts of medicinal plants mentioned in Vrikshayurveda can also be used in combination with the microbial biocontrol agents in order to enhance their efficacy.
- **Use of Kunapajala in Vrikshayurveda:-** Vrikshayurveda is just not only about using plants or extracts of medicinal plants, it is beyond the use of plants. It is a vast repository of knowledge that describes the type of vegetation, particularly specific to a particular region. It has played a major role in controlling pests and diseases since the ancient times and has clearly outlined the use of Kunapa water (*Kunapajala*). *Kunapajala* is liquid organic manure mentioned in Vrikshayurveda, that acts as a good source of plant nutrient. There are two forms of it- original form (bone marrow, flesh of any horned animal like sheep, goat etc., milk, honey, *Sesamum indium L.* and *Vigna mungo*) developed by Surapala but possibly to avoid any religious controversy, vegetarian version of it was developed later for the same purpose, by Dr. Y. L. Nene in 2012 i.e., the herbal kunapajala- cow dung, cow urine, spoiled jaggery, sprouted urad, mustard or neem cake, local farm weeds and water). Both original and herbal kunapajala offer immense flexibility and freedom to the farmers. The composition of Kunapajala depends on regional vegetation, particularly specific to that region. Small and marginal farmers who cannot afford expensive chemicals for their crop or land,

are growing their crops organically using only herbal kunapajala, eliminating the need of additional biopesticides and organic manures. Farmers from various parts of the country especially from remote villages of M.P., Kerala and Uttarakhand are already getting benefitted from its use as it contributes to low input farming and increased net profit. The small and marginal farmers have been able to minimize their cost of cultivation and ensure good productivity and significantly increased their net profits in different crops ranging from 0.25 to 5 times. As said by Surapala, worms causing infection can be eliminated by the paste of milk, kunapa water and cow dung mixed water and also smearing the roots with the mixture of white mustard, vacha (*Acorus calamus*), kusta (*Saussurea lappa*) and ativisha (*Aconitum heterophyllum*). The worms accumulated on the trees can easily be treated by smoking with a mixture of white mustard, vidanga (*Embllica ribes*), vacha (*Acorus calamus*) and usana and water with other materials. Also, the insects on the leaves can be destroyed by sprinkling the powder of ashes and brick dust. It is also found that the wounds and falling off of branches due to any pest infestation can be healed by treating the spot with the mixture of vidanga (*Embllica ribes*), sesame, cow's urine ghee and mustard and with a mixture of ghee and honey and sprinkled over by milk and water respectively. The oozing in plants due to pest attack can be cured by applying the paste of bark of nyagvodha and udumbana, cow dung, honey and ghee and then covering the spot after application of the mixture with bark of dhana (*Anogeissus latifolia*), sriparnika (*Myrica esculenta*), syana (*Ichnocarpus frutescens*), vetasa (*Salix caprea*) and arjuna.

- **Use of Panchagavya in Vrikshayurveda:-** Coming to another important liquid organic manure used in Vrikshayurveda, *Panchagavya*. *Panchagavya* is a term used in Ayurveda to describe the mixture of five important products obtained from cow namely- cow urine, cow dung, milk, ghee and curd. Mostly, *Panchagavya* is used in some rituals (puja and medicinal purposes) but it has also been named as cowpathy treatment because of its role in Ayurvedic medicine. The mention of *Panchagavya* in this article is solely made with the purpose to enlighten its use in agriculture for pest management. The recipe for *Panchagavya* is as follows- Mixing fresh cow dung with cow ghee, incubating for 2 days then adding of cow urine mixed with 5 liters of water, stirring the mixture every morning and evening for one week then adding gram powder, then adding of cow milk and cow curd, again stirring the mixture every morning and evening for two weeks, the *Panchagavya* mixture is ready to use. Dosage- 3ml of *Panchagavya* in 100 ml of water should be sprayed over plants and soil once after 14 days interval (Singh, 2019). *Panchagavya* contains growth hormones such as IAA, GA, Cytokinin and essential plant nutrients, effective micro-organisms like lactic acid bacterium, yeast and actinomycetes (Boomirajet *al.*, 2004). It also contains biofertilizers such as Acetobactor, Azospirillum and Phosphobacterium and plant protection substances.

Panchagavya has been found to be effective against defoliators such as meadow grasshoppers, hadda beetle, common ground hopper, sucking pests like- aphids, mealy bugs. It also acts as an effective pest repellent. It is highly effective in controlling the fruit fly menace in fruit crops. Boomiraj *et al.* (2004) reported that Panchagavya was effective against *Amrasca biguttulabiguttula* and *Bemisia tabacci* in okra. Mudigora *et al* (2009) documented that Panchagavya + cow urine in combination with Neem Seed kernel Extract proved effective in controlling *Atherigona soccata*. Highest mortality of *Spodoptera litura* was recorded in neem oil 3% + Panchagavya 3% mixture under laboratory conditions (Sathya *et al.* 2019).

Atharvaveda says-

“O gau arka (cow urine), you are the saboteur of all the germs and toxins. You wage war hereditary diseases. You are the giver of prolonged life”, these lines describe the importance of cow urine in pest and disease control in supporting life on Earth.

Conclusion-

To cut a long story short, wrapping up this article with the following lines- Excessive use of chemicals has led to degradation of plant and animal life, devastating the environment as well. Therefore, there is an utmost need to move to organic farming practices in order to avoid these issues. Vrikshayurveda offers the scope for smooth transition from inorganic farming to organic farming. It helps in better conservation of major soil flora and fauna. It is environmentally safe and energy self-sufficient, cost effective and sustainable and can be easily incorporated in Integrated Pest Management modules in order to grow healthy and nutritious crops to minimize the use of chemical pesticides

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