

PLANT DISEASES AND THEIR TREATMENT IN SANSKRIT LITERATURE

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Abstract

The great ancient Indian scholars have made valuable contributions to conceptualize the plant diseases and formulations for their treatment. There are great amount of references in this context in Sanskrit texts. On any living beings (plants or animals or humans) general health and vitality is the first line of defence against disease. It is a fact that the plants do undergo ailments and diseases caused by natural forces and other aliens like pests and animals. Some of these are difficult to prevent, and some were treated using specific herbs. Various Sanskrit texts including *Atharvaveda*, *Agnipurāna*, *Kauṭīliya Arthaśāstra*, *Vṛkṣāyurveda*, *Upavanavinoda* and *Bṛhatsaṃhitā* etc. contain chapters dealing with diseases and treatment of plants.

Key words: Diseases, *Mantra*, Pathology, Prayer, Treatment

1. INTRODUCTION

From times immemorial plants have played a vital role in the existence of human being. Plants are indispensable for maintenance of life. The plants alone are the reasons for survival of the man and animals alike. They are also the source of food for all the living beings. Highlighting the importance of plants in one's life *Bṛhadāraṇyakaopaniṣad* (Edition of Sri Ramakrishna Math, Chennai, 1951) has equated the functioning of the plants with that of the human beings. It is said:

*yathā vṛkṣo vanaspatistathaiva
puruṣoamṛṣā |*

*tasya lomāni parṇāni tvagasyotpāṭikā
bahiḥ ||*

*tvaca evāsya rudhiraṃ prasyandi tvaca
utpaṭaḥ |*

*tasmāttadātrṇṇātpraiti raso
vṛkṣādivāhatāt ||*

*māmsānyasya śakarāṇi kināṭaṃ srāva
tatsthiram |*

*asthīnyantarato dārūṇi majjā majjopamā
kṛtā ||*

(*Bṛhadāraṇyaka Upaniṣad*, 3.9.28.1-3)

As is a big tree, so indeed is man. This is true. His hairs are its leaves, his skin its outer bark. It is from his skin that blood flows; sap too exudes from the bark. Therefore, blood issuing from a wounded person is like sap from a tree. His flesh is its inner bark; his sinews are its innermost layer of bark: it is firm. His bones, which lie within the sinews, are its wood, and his marrow is made similar to its pith.

Human beings have tried their level best to know the causes of the diseases and their treatment problems faced by them. Here one has to understand that if the functioning of the plants and the human beings is similar in many areas, as described by the *Bṛhadāraṇyakaopniṣad*, it becomes quite evident that plants might also fall

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prey to some or the other diseases. The plant related diseases is now studied under a discipline 'Plant Pathology'. Here one has to know that plant diseases are considered to be the barriers to the rapid progress of food production. Enormous losses of the crops are caused by the plant diseases. However, healthy plants perform all their normal physiological activities and give the expected yield according to their genetic potentiality.

As regards Sanskrit Literature, it is quite evident that whether it be Vedic literature or classical Sanskrit literature, all have given due importance to the plants. Though description of plants has been found in all the Sanskrit books, the present search is based on the sources with *Atharvaveda* (c. 2500 BC)¹, Kauṭilya's *Arthaśāstra* (c. 3rd century BC)², *Agni Purāṇa* (4th century AD)³, *Brhatsamhitā* (6th century AD)⁴, *Sukranīti* (8th century AD)⁵, *Kṛṣiparāśara* (6-10th century AD)⁶, *Vṛkṣāyurveda* (10th century AD)⁷, *Upavanavinoda* (13th century AD)⁸. Going by the Sanskrit Literature, it comes to light that the plant diseases and pests were well recognized by ancient Indian seers. They developed eco-friendly ways of crop cultivation and organic agents as pesticides. Destruction of corns by various kinds of reptiles and virmins has been referred to in *Atharvaveda*. It hints of various diseases by which plants get infected. Some of these are difficult to prevent, and some were treated using specific herbs.⁹ The *Sukranīti*¹⁰ makes it clear that grains get spoiled by poisons, fire or snows or eaten by worms and insects. Now modern agricultural science also accepts that traditional agronomic practices, organic manure and pesticides are better than the modern synthetic chemical ones. Some Sanskrit texts containing chapters dealing with diseases and treatment of plants are discussed here.

2. TYPES OF DISEASES IN PLANTS

While discussing the diseases of the plants, Sanskrit texts come up with the fact that the

diseases are basically of two types. It is specified in *Vṛkṣāyurveda* as:

*śārīrāṅgantu bhedena dviḥprakārāḥ
samāsataḥ |*

*śarvabhūruhajātīnām-āntakaḥ
parikīrtitaḥ ||*

(*Vṛkṣāyurveda*, 8.165)

Diseases of all types of trees are of two types- Internal and External.

Discussing these diseases, the text says:

*tatra vātātkaphātpittāccharīrāṅām
samudbhavāḥ |*

*āgaṃtūnām samutpattiḥ kīṣāśītādibhir-
bhavet ||*

(*Vṛkṣāyurveda*, 8.166)

The internal diseases are caused by *vāta*¹¹, *pitta*¹² and *kapha*¹³; and the external ones by insects, cold weather etc.

Varāhamihira makes note of the natural causes of diseases as he narrates:

*śītavātātapai rogo jāyate pāṇḍupatrataḥ |
avrddhiśca pravālānām śākhāśoṣo
rasaśrutiḥ ||*

(*Brhatsamhitā*, 54.14)

Trees get disease from cold weather, strong winds, and hot sun. Consequently their leaves become pale-white, sprouts scanty and sickly, branches dry and their milk oozes out.

Kāśyapa is of the view that lack of the branches, stems, foliage, fruits, shade and leaves losing lustre gradually are the diseases of plants caused by cold, heat, rain, wind, roots of the trees being intertwined by the other trees growing very close to it and elephants rubbing their temples against the trees.¹⁴

2.1. Internal Diseases

2.1.1. Vāta Diseases

The causes of *vāta* diseases have been mentioned in *Vṛkṣāyurveda* by *Surapāla*.

*tatra rūkṣa-kaṣāyādi dravairatyartha
secitaiḥ |*

*bhūmi samśoṣaṇād-vṛkṣe bhavantiya
nabh- ajānilgadāḥ ||*
(*Vṛkṣāyurveda*, 8.167)

Vāta diseases are caused when the land is provided with dry and astringent elements by any means.

The same text has also discussed the outcome of the diseases.

*te kārśyakukṛtā granthi guṭīkārūḍha
patratā |*
*karkkaśālparasāsvādupalatā veti kīrtitā
||*
(*Vṛkṣāyurveda*, 8.168)

The diseases caused due to the adverse effect of *vāta* are stem becoming thin, knots appearing on leaves and stem and fruits becoming hard, less juicy and less sweet.

2.1.2. Kapha Diseases

Surapāla has narrated the root causes of the *kapha* diseases prevalent in the plant thus:.

*svādusnigdhāmla śītādravyairatya-
tyartha secitaiḥ |*
*himāgame vasanta ca bhavanti kaphajā-
gadāḥ ||*
(*Vṛkṣāyurveda*, 8.169)

Kapha generated diseases occur often in winter and spring season in trees when they are watered with the ingredients which are sweet, oily, sour and oily in nature.

*te cātīkālaphalatā pāṇḍutvaṃ
kubjapatratā |*
avṛddhi phalīte-nīrasatā ceti prakīrtitāḥ ||
(*Vṛkṣāyurveda*, 8.170)

Diseases caused due to imbalance of *kapha* are tree taking long time in bearing fruits, developing paleness, twisted leaves, improper growth of fruits and juiceless fruits.

2.1.3. Pitta Diseases

Surapāla cites the causes for the diseases generated due to imbalance of *pitta*.

*kadvamla-lavaṇai-stīkṣṇairdayairatrtha-
secilaiḥ |*

*bhavanti pittajā rogā grīṣmakāle
ghanātyaye ||*
(*Vṛkṣāyurveda*, 8.171)

Pitta generated diseases occur in summer, and on the arrival time of clouds when the trees are watered with bitter, sour, strong and salty things.

The same text, Surapāla has named the diseases that are likely to occur in plants.

*te pītapatratākāla phalasrāvo viśoṣa-
ṇam |*
*patrapuṣpaphalamlāniḥ sadanaṃ ceti
prakīrtitāḥ ||*
(*Vṛkṣāyurveda*, 8.172)

Diseases caused due to imbalance of *pitta* are untimely yellowness of leaves, untimely falling of fruits, dryness of trees, paleness of leaves, flowers and fruits and decay.

2.1.4. Pāṇḍu Disease

Sometimes the plants witness imbalance of all the three components i.e. *vāta*, *kapha* and *pitta*. If so happens plants fall prey to *pāṇḍu*¹⁵ disease as mentioned by Surapāla.

*kruddhā vātādayo doṣāḥ pāṇḍurogam
prakurvate |*
*tenārttāḥ śākhinaḥ santi pāṇḍu skandha
phalacchadāḥ ||*
(*Vṛkṣāyurveda*, 8.179)

In some trees if balance of *pitta*, *vāta* and *kapha* get disturbed and all these *doṣās*¹⁶ lead to *pāṇḍu* disease of the plant. Due to this disease, paleness develops in fruits, stem, and braches of the affected trees.

2.2. External Factors Leading to Diseases of Plants

Vṛkṣāyurveda has discussed in length about the external factors that causes diseases to the plants.

2.2.1. Attack of Insects

kṛmi-samjagghamūlāni-śoṣaṇa pīta patratā |

bhavecaṃ ḍā tapārttānāṃ pallava malānirulvaṇā ||
(*Vṛkṣāyurveda*, 8.173)

Sometimes trees start drying up due to the attack of insects. Due to this the leaves of the tree go pale. Scorching heat also results in fading of leaves.

2.2.2. Furious Winds

pracaṇḍapavanodvegairbhanganmūlan-amoṭanam |

bhagnasrast vibhedena tatra bhaṅgo dvidhā bhavet ||
(*Vṛkṣāyurveda*, 8.174)

Sometimes due to furious winds trees are broken, uprooted and twisted. On several occasions cracks develop in them and they get broken up in two parts.

2.2.3. Exposure of Fire and Lightning

vahni-vakṣādjuṣṭānān-tadaṅga pari-śoṣaṇam |

bhūmerniḥsāra bhāvena pānīyā-bhāvatastathā ||
(*Vṛkṣāyurveda*, 8.175)

The trees are dried due to exposure of fire, lightning, dryness of soil and absence of water.

2.2.4. Striking by Axe

sarvabhūruhajātīnāṃ śoṣaḥ samupajāyate |

kuṭhārādyabhihātēna bhūruhāṇāṃ vṛaṇo bhavet ||
(*Vṛkṣāyurveda*, 8.176)

The trees also go dry or their development is adversely affected when they are struck with an axe and injured.

2.2.5. Mistaken Treatment

bījasya doṣād-akṛtopa-cārān mithyopacārād apacārato va |

kruddhāḥ prakurvanti samīraṇādyā bandhyān aśeṣāna avanīruhāśca ||
(*Vṛkṣāyurveda*, 8.180)

All the trees become unfruitful due to faulty seeds, lack of treatment and mistaken treatment. They develop bareness and lose the capacity of production.

2.2.6. Excessive Irrigation and attack by Ants

daurgandhyaṃ gandhavibhramśaḥ patrapallavakubjatā |

pipīlikābhiṣāṅgācca pānīyā jīrṇato bhavet ||
(*Vṛkṣāyurveda*, 181)

Sometimes due to excessive irrigation (watering) indigestion develops within the tree. Due to attack by the ants, roots of the tree start suffering from bad smell. Dwarfing and twisting of leaves and tender leaves take place.

2.2.7. Wind, Friction, Shade and Weeds

hutavahapavanānya vṛkṣagharṣāḥ satattaṃ anātapadeśasamsthitaśca |

khaganicayanivāsavallitānopagata ṭṛṇāni ca śākhi-nāśakāni ||
(*Vṛkṣāyurveda*, 182)

Due to fire, wind, friction with other trees, staying in constant shade of other trees, becoming inhabitation of numbers of birds, growth of many creepers and weeds nearby; the development of trees are obstructed and they get damaged.

2.2.8. Hailstorm

Chāndogyopaniṣad (1.10.1) refers to a crop in the Kuru country destroyed by hailstorms.¹⁷

3. TREATMENT OF DISEASES OF PLANTS

The ancient seers not only discussed the causes of the diseases, they also came out with numbers of measures to cure the diseases. Surapāla has pointed out that treatment is to be done in careful manner keeping in mind various factors.

*iti vividhagadān-avekṣya nityaṃ nijanija-
kīrttiita lakṣaṇairamībhiḥ |*

*varatara matiruallasat-prayatno
dharāṇiruheṣu cikitsitaṃ vidadhyāt ||*
(*Vṛkṣāyurveda*, 8.183)

Keeping in mind various reasons that lead to diseases of the trees, treatment of trees should be done after examining the root causes of the diseases. Treatment should start only after proper diagnosis. Only those are to be contacted for treatment, who, are well versed in the concerned field and have high intellectual capacity. Only with the consultation of such personalities, treatment is to be started.

The composer of the *Bṛhatsaṃhitā*, Varāhmihira has also discussed the matter more or less in the same manner.

*cikitsitamathaiteṣāṃ śastreṇādau
viśodhanam |*

*viḍangaghṛtapankāktān secayet
kṣīravārīṇā ||*
(*Bṛhatsaṃhitā*, 55.15)

After the trees show symptoms of disease, then it should be treated. At the outset, the trees should be cleared of ulcers and the like (i.e. whatever is colourless and wet) with a knife. Then a paste made of *Viḍanga*, ghee and silt must be applied to those parts and they should be sprinkled with water and milk. If this is done they will be free from disease.

3.1. Treatment of Diseases caused due to Internal Factors

3.1.1. Treatment of Vāta generated Diseases

*ariṣṭgośṛṅgaturaṅgakeśo-śaṇaiḥ
sasarpīḥ śiśumārataileḥ |*

*sakolamedobhiruhāradhūpairnivāraye-
tmā ruta rogamaśū ||*
(*Vṛkṣāyurveda*, 186)

For treating *vāta* generated diseases, trees should be treated with the mixture of *ariṣṭha*, horn of cows, hair of horses, *śaṇa*, ghee, *śiśumāra* oil and marrow of *ankola*.

3.1.2. Treatment of Kapha generated Diseases

3.1.2.1. Surapāla has recommended the use of *Pañcamūla*¹⁸ for treating *Kapha* generated diseases.

*kaṣāyaiḥ kaṭukaistīkṣṇaiḥ kapha-
kṛtānatgadanājayet |*

*pañcamūlaṃ kṛtakvāthaiḥ surabhī
salilena tu.*

(*Vṛkṣāyurveda*, 8.187)

The *kapha* generated diseases should be treated with bitter, strong, and astringent decoctions made out of *pañcamūla* with fragrant water.

3.1.2.2. Paste of mustard has also been recommended by Surpāla for curing *kapha* generated diseases.

*sitasarṣapakalkaṃ ca mūle datvā
niṣecayet |*

*tila-bhūti jalaiḥ sarva-kapha-roga-
nivṛttaye ||*

(*Vṛkṣāyurveda*, 8.188)

To do away with *kapha* generated diseases in plants, the paste of white mustard should be deposited at the root and the trees should be watered with a mixture of sesame and ashes.

3.1.2.3. Surapāla has also recommended replacing old soil with new one for alleviating *kapha* generated diseases in plants.

*uddhṛtyāṃhniṃṛdaṃ tatra rūkṣāmanyāṃ
mṛdaṃ nyaseta |*

*valāsarogiṇāṃ prājñastadroga
vinivṛtaye ||*

(*Vṛkṣāyurveda*, 8.189)

For treating *kapha* generated diseases in the plants, soil around the roots of the tree should be removed and replaced by new and dry soil.

3.1.3. Treatment of Pitta generated diseases in Plants

3.1.3.1. Cool and sweet substances are recommended for *pitta* generated diseases.

*śītalaiḥrmadhuraprāyairdravyaiḥ pitta-
samudbhavān |*

*sarvabhūruhajātīnām rogānapan-ayet
sudhīh ||*

(*Vṛkṣāyurveda*, 8.190)

Those who treat *pitta* generated diseases in the plants with cool and sweet substances are called an intelligent person.

3.1.3.2. Decoction of milk, honey, *yaṣṭimadhu* and *madhūka* is also recommended for treatment of *Pitta* generated diseases.

*kṣīreṇa madhumisreṇa yaṣṭimadhuma-
dhūkajaiḥ |*

*pittarogād-vimucyante siktāḥ kvāthaiś ca
śākhīnaḥ ||*

(*Vṛkṣāyurveda*, 8.191)

When tree fall prey to diseases originated due to *pitta*, they should be watered with the decoction of milk, honey, *yaṣṭimadhu*, and *madhūka*. When done so the diseases vanish.

3.1.3.3. Decoction of fruits, *triphalā*¹⁹, *ghee* and honey is also recommended for *pitta* related diseases.

*phalatriphalajaiḥ siktāḥ sarpirmadhu-
samanvitaiḥ |*

*mūñcanti bhūruhāḥ sarve rogān pitta-
samudbhavān ||*

(*Vṛkṣāyurveda*, 8.192)

For curing *pitta* generated diseases, trees should be watered with the decoctions of fruits, *triphalā*, *ghee*, and honey.

3.2. Treatment of Diseases caused due to External Factors

3.2.1. Insects

3.2.1.1. Insects found on stem and branches

*uddhṛtya-mūlataḥ prājñā kṛmīn
kāṇḍarakādīkān |*

*niṣiñcecchīta-salilairbhūruhān
saptavāsarān ||*

(*Vṛkṣāyurveda*, 8.193)

When insects are found on stem and branches, then an intelligent man should

water the trees with cold water for seven days.

3.2.1.2. Attack of worms on tree

*payah kuṇapabhilloṭa-vacā-goviḍjalaṃ
jayet |*

*siddhārthāvda vacā-kuṣṭātiviṣālepanam
kṛmīn ||*

(*Vṛkṣāyurveda*, 8.194)

The worms that attack trees can be removed with help of by the paste prepared of milk, *kuṇapa* water²⁰, and cow dung mixed with water and also by smearing the roots with the mixture of white mustard, *vaca*, *kuṣṭha*, and *ativiṣa*.

3.2.1.3. Creepers adversely affected due to insects

*secayet kṛmibhirjagdhām latām ca
khalikājalaiḥ |*

*jayed-bhasmeṣṭkā-cūrṇerddhūlanam ca
kṛmīn dale ||*

(*Vṛkṣāyurveda*, 8.197)

If creepers get adversely affected due to insects, water mixed with oil cake should be sprinkled over it. By sprinkling the powder of ashes and brick dust, the insects on the leaves can be destroyed.

According to *Mānasollāsa*, there are two methods given for the destruction of worms and insects. Firstly, the trees should be perfumed with the smoke produced by burning *niśā*, *viḍanga*, *siddhārtha* and *arjuna* flowers mixed with flesh of *rohita* fish. Besides killing insects and worms, it also helps in the luxuriant growth of flowers and fruits. Secondly, the insects and worms can also be killed if the trees are perfumed with smoke caused by burning of *viḍanga*, *hingu*, *sindhura*, *marīca*, *ativiṣa*, *vaca*, *bhallātaka* and the horns of the buffalo mixed together in equal quantities. This process also destroys all the diseases of the plants.²¹

3.2.2. Wounded by Animals

Sometimes plants get wounded by the animals for one reason or the other. Due to this

plants fall prey to certain diseases. For curing them Surapāla has said:

*jantughnatilagamūtrasarpiḥ-siddhārtha
lepitaḥ |*

*saṁsikrḥ-payasā jantukṛtaḥ samrohitāḥ
vraṇaḥ ||*

(*Vṛkṣāyurveda*, 8.198)

If the trees are wounded by animals, then they get healed if sprinkled with milk and a mixture of *viḍanga*, sesame, cow's urine, *ghee*, and mustard.

3.2.3. Cold and Heat

There are several diseases that are caused due to excessive cold or heat. *Upavanavinoda* (vide Tr. by G.P. Majumdar, Calcutta, 1935) has come up with some preventive measures that would be helpful in curing diseases caused due to cold or heat.

*vidyudāhatavṛkṣasya bhūmimādāya
sarvataḥ |*

*rakṣārthaṁ vikiredeṣāṁ tayā na
himabādhanam ||*

(*Upavanavinoda*, 5.79)

One should take up the ashes of the trees struck by lightning and throw the same on the trees and plants. This spray of ashes would help the trees to withstand the cold.

Vṛkṣāyurveda has also a curing solution for the plants affected from snowfall or scorching heat:

*himacaṇḍātapārtānāṁ kāryam-ācchād-
anaṁ vahiḥ |*

*kuṇapāmbupayobhiśca pariṣekaḥ
praśiṣyate ||*

(*Vṛkṣāyurveda*, 8.199)

If the trees are adversely affected due to snowfall or scorching heat, they should be externally covered. Thereafter, they should be sprinkled with *kuṇapa* water and milk. They will get relief.

3.2.4. Rain

On various occasions it rains in such a way that plants get adversely affected and become

prone to diseases. *Upavanavinoda* prescribes sprinkling a specific mixture on the plant.

*sitaśālyodana dadhnā saindhavena
yutaṁ vane |*

*kṣepaṇīyaṁ ca parito garāṇaṁ
vṛṣṭivāraṇam ||*

(*Upavanavinoda*, 5.80)

To avoid diseases caused by harmful rains, boiled rice of white variety mixed with curd and rock salt should be thrown round the trees. (Tr. by G.P. Majumdar, Calcutta, 1935)

3.3. Treatment of some Specific Diseases

3.3.1. Fruits destroyed prematurely

It is seen that on various occasions fruits get destroyed prematurely for one reason or the other. Varāhmihira has discussed the treatment of such trees.

*phalanāśe kulatthaiśca māṣairmudgai-
stilairyavaiḥ |*

*śṛtaśītapayaḥ sekaḥ phalapuṣpas-
amṛddhaye ||*

(*Bṛhatsaṁhitā*, 55.16)

When the fruits of a tree are destroyed prematurely, it should be watered with milk that has been cooled after being boiled, with horse gram, black gram, green gram, sesamum and barley. Being treated thus, it will have abundant flowers and fruits.

If the fruits get destroyed they should be watered along with *kulattha* pulse, *māṣa*, *mudga*, sesamum and barely mixed with cold water. Fruits and flowers could be obtained by doing so.²² *Sukra Nīti*²³ expresses almost similar view for treatment of trees.

3.3.2. Treatment of Broken Trees

Some trees are broken either due to certain diseases or stormy conditions. *Vṛkṣāyurveda* has suggested treatment for this. It says:

*plakṣodumbara-vaikala-ghṛtamadhu-
madirā-payobhir anvatayā |*

*sudṛḍham palāla-rajivā vaddhā
saṃbhīdya taireva ||*

*āpūrya sāramṛdvirmahrṣī kṣīreṇa sapadi
saṃsiktāḥ |*

*salilāpūrīta-mūlā bhavanti suṣṭhā
mahīruhābhagnāḥ ||*
(*Vṛkṣāyurveda*, 8.200-201)

The broken trees should be smeared with the paste of the bark of *plakṣa* and *udumbara* mixed with ghee, honey, wine, and milk and the broken parts should be firmly tied together with the rope of a rice stalk. Fresh soil should then be filled in the basin around the trees, sprinkled immediately with the milk of buffalo and flooded with water. Thus they recover.

Sometimes branches fall off. For this too *Vṛkṣāyurveda* has prescribed the treatment.

*srastaśākhākhāśca tatsthāne saṃliptā
madhusarpiṣā*

*siktāḥ payombubhiḥ santi śākārudha-
nabḥ-asthalā.*
(*Vṛkṣāyurveda*, 8.203)

If the branches fall off, the particular spot should be anointed with the mixture of honey and ghee and sprinkled over by milk and water so that the tree will have its branches reaching the sky.

3.3.3. Treatment of burnt Branches and Trees

3.3.3.1. Burnt Branches

*vahnīdagdhāśca tatsthāne chītvā-siktāḥ
poyombubhiḥ |*

*kulīraparyarādyaiśca dhūpitā syuḥ
supallavāḥ ||*
(*Vṛkṣāyurveda*, 8.204)

If the branches are burnt they should be cut off and the particular spots should be sprinkled with water mixed with milk. Thereafter, they should be smoked with crab shell. New seed-bud sprout out of that tree and healthy leaves are seen everywhere.

3.3.3.2. Burnt Trees

sarvāṅge padminīpankairliptāḥ |

*kuṇṇāmbupayaḥ siktāḥ santi śākhāvṛtām
barāḥ ||*

(*Vṛkṣāyurveda*, 205)

When the tree gets burnt, then all sides of the tree should be plastered with *padminī* and mud. Thereafter, *kuṇṇāpa* water should be sprinkled over it. After doing so, new branches develop tending to touch the sky.

*kuṇṇāpajalapayoniṣiktamūlāḥ sarasījak-
andavilīptasarvagātraḥ*

*taruranalahato vibarti bhūyo
markatarangaharinti pallavāni.*
(*Upavanavinoda*, 5.185)

The treatment to the trees burnt with the fire is that the trunk of the trees should be besmeared with lotus bulbs pasted with *kuṇṇāpa* water and milk. This makes the trees bear leaves that are bright green.

3.3.3.3. Burning due to Lightning

vidārī-sarkarā-nāgajihvātilavilepitāḥ |

*santi satpallvā vajradagdhāḥ siktāḥ
payombubhiḥ ||*
(*Vṛkṣāyurveda*, SP 8.206)

If the tree is put to loss due to struck of lightning, then the tree concerned should be irrigated with water mixed with milk. The tree should also be plastered with the paste made up of the mixture of *vidārī*, sugar, *nāgajihvā* and *tila*. If done so leaves sprout from the tree.

3.3.4. Treatment of Dry Trees

3.3.4.1. Dryness due to Burning

*sarkarāmbutilakṣīraiḥ sekallepāt-
samantataḥ |*

*padminīdarddamairllepād-vahnīśoṣaḥ
praśāmyati ||*
(*Vṛkṣāyurveda*, SP8.207)

If the tree has gone dry after being burnt from fire then plaster should be applied over it which has been prepared with the mixture of sweet water (water mixed with sugar), *tila*, milk, *padminī* and mud. The disease developed in the tree is thus done away with.

3.3.4.2. Dryness due to Problems in Soil

*śoṣe-niḥsāramṛdbhūte tāṃ harenmūla-
mṛttikāṃ |*

*anyāṃ sārvaṭim tatra nyaset siṅ
cetpayombubhiḥ ||*

(*Vṛkṣāyurveda*, 8.208)

If the trees are dried due to problems in soil, then that soil should be replaced with new one. Thereafter, it should be watered with water mixed with milk.

3.3.5. Treatment of Barrenness

*vandhyā mahīruhāḥ siktāḥ payaḥ
kuṇapavāribhiḥ |*

*bhavanti puṣpaphalitaḥ sarvāśā-
pūrikāḥ ||*

(*Vṛkṣāyurveda*, 8.214)

For those trees that are unproductive or barren, they should watered with milk mixed with *kuṇapa jāla*. After done so, the tree is loaded with flowers and fruits.

*tilayavakulatthabhāṣairmurdgana ca
saṃbhṛtaiḥ sītaiḥ |*

*vandhyāstaravo nityaṃ puṣpaphalaiḥ
pūrayaṅtyāśāṃ ||*

(*Vṛkṣāyurveda*, 8.215)

If the barren tree is irrigated with cold water mixed with *Tila*, *Jau*, *kulattha*, *māṣa* and *mudga*, it becomes productive and loaded with flowers and fruits.

*viḍaṅga ghr̥tāṅkāktānsecayecchīta-
vāriṇā |*

*phalanāśe kulatthaiśca māṣairmudg-
airyavaistilaiḥ ||*

*ghṛtaśītapayaḥ sekaḥ phalapuṣpāya
sarvadā |*

*āvikājaśkr̥ccūrṇaṃ yavacūṇaṃ tilāni
ca ||*

(*Agni Mahapurāṇa*, 282.10-11)

In case where barrenness would be apprehended, the leaves and branches of the tree should be sprinkled over with a solution of cold water, saturated with *viḍaṅga*, clarified butter, pulverised *mudga*, *māṣa* and *kulattha* pulse.

Similarly a tree sprinkled with a solution of cold water and clarified butter, laden with abundant fruits and blossoms.

3.3.6. Treatment for Dotage

*janayitvā phalakuṣumaṃ yaḥ
phalarūpayāti vandhyatāṃ śākhī |*

*sakṣīraiḥ kuṇapajaḍalaiḥ bhūyaḥ siktāḥ
phalanyeva ||*

(*Upavanavinoda*, 5.189)

Regarding the old age trees that have reached their dotage through repeated production of flowers and fruits, such trees are to be treated with *kuṇapa* water and milk separately and they will surely bear fruits.

3.3.7. Treatment for Diseases related to Water

Sometimes it so happens that excessive of watering or lack of watering to plants leads to numerous diseases. Seers have suggested treatment for such diseases too.

*asekatoatyantniṣekataśca śākhāviśeṣ-
aphalino nirūpya |*

*saptāhamātram śṛtameva sarpividṅg-
adugdḥāmbuniṣecanīyam ||*

(*Upavanavinoda*, 5.190)

Excess of water or lack of it makes the branches of the tree become dry. To cure this *Viḍaṅga*, clarified butter and milk should be boiled together and the trees should be boiled together and the trees should be sprinkled continuously for week.

Upavanavinoda suggests remedies for trees that are unable to digest water.

*unnidratā matsyasagandhikā ca
pravālahāniḥ sapipīlikatvam |*

*tvagbhraṃśaṅśdv-ārikṛt-ādajīrṇ
āttarorbhavettatra cikitsanīyam ||*

*talmūlaśūlaṃ paraśuprahārai-
viṃsrāvitaṃ doṣarasaṃ nihatya |*

*kṣaudrājyaṅtughnatilaiḥ pralīptaṃ
mṛtpūritaṃ dugdhajalairniṣīcet ||*

śarkarānilagokṣīravārisekāttayā taroḥ|
śoṣaḥ śāmyati vṛkṣasya lepāddhapo-
pacārataḥ||
 (Upavanavinoda, 5.191-193)

The incapacity of the trees to digest water causes the trees to become pale, devoid of leaves, full of ants and smell like fish; in places the trees are devoid of barks. For this the treatment given is-the trees suffering from indigestion will have to be treated from the root to the affected places. Firstly, the poisonous sap is to be removed out of the trunk and then the affected places are to be treated. The paste of honey, *viḍanga* powder and sesamum are to be applied to the affected place; that part is also to be covered with earth and sprinkled with water and milk. The atrophy (*śoṣa*) of a tree is cured when it is treated with the above mentioned paste and sprinkled with the mixture of sugar, sesamum, milk and water. The tree then has to be fumigated.

3.4. Prayer and Mantra based Treatment

3.4.1. Ancestors believed that treatment of the diseases could also be done from prayers and mantras.

yaste pṛthu stanayitnurya ṛṣyo daivaḥ
keturviśvamābhūṣatīdam |
mā no vadhūrvidyutā deva sasyaṃ
mota vadhī raśmibhiḥ sūryasya ||
 (Atharvaveda, 7.11.1)

Let not this *deva*, the cloud kill out growing crop with the burning rays of sun and let it not strike the crop with that lightening which is far spreading, grand, is like a high celestial signal, thundering and which comes to all this world.

na grīṃstāpa na himo jaghāna pra
nabhatāṃ pṛthivī jīradānuḥ |
āpaścidasmai ghṛtamit kṣaranti yatra
soma sadamit tatra bhadrām ||
 (Atharvaveda, 1.18.2)

Let not Sun's heat burn, let not cold destroy anything, let the middle region or

cloud with all its quickening drops burst open, these rainy waters strength and vigour for this world and even for those plants, where vegetation ever remains there remains happiness forever.

hataṃ tardaṃ samnkamākhumaśvinā-
chintaṃ śiro api pṛṣṭūḥ |
yavānnedadānapi nahyataṃ mukhma-
thābhayaṃ kṛṇutaṃ dhānyāpi ||
 (Atharvaveda, 6.50.1)

O pleasant man and women! Kill injurious rat, boring beast and cut off their heads and crush their ribs. Bind fast their mouths to enable them so that they do not eat that barley and thus make safety for the crop.

tarda hai patanga hai jabhya hā upkva-
sa |
brahmevāsamsthitaṃ haviradanta imān
yavānahimsanto apodita ||
 (Atharvaveda, 6.50.2)

Let the injurious insects, birds and locusts, noxious insects and grass-hoppers fly away devouring not and injuring not the corn like the priest who does not accept uncleaned things for oblation.

3.4.2. Treatment based on Mantras

Parāśara specifically gives the following *mantra* for controlling grain destroyers to the feet of the revered preceptor.

om siddhiḥ śrīgurupādebhyo namaḥ.
savasti himgiriśikharaśankha-
kundendudhavalāśilātaṭāt nanda-
navanasamāyatnāt parameśvarapara-
mabhaṭṭā rakamahārājādhirāja
śrīmadrāmapādā vijayinaḥ samudrataṭe
anekaśatasahasravānaragaṇamadhye
kharanakharacaraṇordhalāngūlaṃ
pavanasutaṃ vātavegaṃ paracakra-
pramathanaṃ śrīmaddhanumaṃtam-āj-
āpayanta kuśalamanyasya-amuka
gotrasya śriamukasya kṣetrakhaṇḍe vātā
bhāmbhā bhāntaṃ sāṅkhīgāndhīpāṇḍa-
ramuṇḍādhūlīśringārīkumārīmadagā-
dayaḥ. Ajācaṭakaśukaśūkaramṛgama-
hiṣavarāhapatangādayaśca sarve

*śasyopaghātino yadi tvadīyavacanena tat
kṣetraṃ na tyajanti tadā tān
vajrālāngūlena tādyiṣyasīti.*

*likhitvācālaktakenāpi mantram śasyeṣu
bandhayet*

*na vyādhikīṭahimsrāṇāṃ bhayaṃ tatra
bhavet kvacit.*

(Kriṣiparāśaraḥ, 195)

Let success prevail! The ever victorious feet of Rama (i.e., Rāma himself). the Lord of Lords, the Emperor of Emperors, the revered One, commands from his heavenly abode situated on the peak of the Himalayas, the slope of which are white like the conch, the jasmine flower, the Moon-Hanuman, the son of Wind, moving fast like wind, destroyer of invaders, standing on the seashore amidst hundreds and thousands of monkeys with his tail raised and claws harsh and strong, t there be well being. Winds are blowing with great force in a section of a farm belonging to so and so hailing from such and such family/group. If the destroyers of crops such as *gandhi*, *śankhi*, *pandarmundi*, *dhuli*, *śringari*, *kumāri*, *madaka*, etc. and goats, wild boars, pigs, deer, buffaloes, parrots, sparrows, winged insects, etc. do not leave that farm by your order, you shall strike them hard.

The *mantra* had to be written with the red lac-dye on a leaf and tied in the field. By doing so fear of diseases, insects and animals are done away with.

4. CONCLUSION

Going through the facts mentioned above it is clear that ancient Indian seers not only pondered over the causes and treatment of diseases faced by human being, they also tried their level best in identifying diseases of the plants and suggested measures for their treatment.

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8. http://www.ayusoft.cdac.in/PsHome/Apps/EN/src/Articles/Siddhaanta/Introduction_To_Vrikshaayurveda.htm
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10. *Sukranīti*, op. cit., 4.2.28
11. *Vāta* is one of the physiological terms of *āyurveda*. (CS. Sū. 18. 6). It is one of the three *doṣas* that form the basics of *āyurveda* doctrine. Nervous system is directly related to it. *Vāta* creates dryness in the body.
12. *Pitta* is one of the three *doṣas* which is responsible for all metabolic processes in the body. It controls all heat and heat disorders. Together with *vāta* it controls the hormonal function.
13. *Kapha* mainly exists in the body as plasma, blood, muscle and fat tissues. Flexibility and growth are controlled by *kapha*. Moisture and fluid retention is maintained by this *doṣa*. When *kapha* is too high it restricts *vāta* and subdues *pitta*. Too little *kapha* is like high *vāta*, dryness and ungrounded thoughts and actions.

14. Trikha, Nirmal. *Scientific Knowledge in Sanskrit Literature*. Eastern Book Linkers, Delhi, 2009, p 97
15. *Pāṇḍu* disease generate whitish yellow discolouration of the skin. Varieties of *pāṇḍu roga* includes the five types of it depending upon the causative factors viz. *vāyu*, *pitta*, *kapha*, *sannipāta* (when all the three *doṣas* are simultaneously vitiated) and intake of earth.
16. *Doṣa* is of three types as per *āyurveda*. They are *kapha*, *pitta* and *vāyu*. Their function is compared to the dynamism of the three basic physical forces, i. e. *Soma*, *Sūrya* and *Anila* or the Moon, Sun and Air respectively. These maintain the integrity of the universe by emission, absorption, and dispersion respectively. In other words, *vāta*, *pitta*, and *kapha* may also be designated accordingly as regulatory, excitatory, and inhibitory forces (energy).
17. *Chāndogyopniṣad*, Swāmī Svāhānanda. Sri Ramakrishna Math, Mylapore, Madras, 1956
18. *Pañcamūla* are divided in two groups. They are *Bṛhat Pañcamūla* and *Laghu Pañcamūla*. *Bṛhat Pañcamūla* is group of major herb roots including (1) *Bilva* (2) *Agnimantha* (3) *Gambhārī* (4) *Śyonaka* and (5) *Pāṭala*. *Laghu Pañcamūla* is group of minor variety of five roots. This group includes the (1) *Gokṣura*, (2) *Bṛhatī*, (3) *Kaṅṭhakāri*, (4) *Śāliparṇī* (5) *Prṣṇīparṇī*.
19. *Triphalā* is collection following three herbs: *Harītikī* (*Terminalia chebula*, *myrobalan*), *Āmala* (*Phyllanthus emblica*), and *Vibhītaka* (*Terminalia belerica*). *Triphalā* is capable to cure many diseases. Together they alleviate wounds and are capable to cure skin diseases also. Excessive moisture of the tissues, obesity, diabetes, aggravation of *kapha* and blood are also checked by this group of herbs.
20. One should boil the flesh, fat, marrow of deer, pig, fish, sheep, goat, and rhinoceros in water, and when it is properly boiled one should put the mixture in an earthen pot and add into the compound milk, powders of sesame oil cake, black gram boiled in honey, the decoction of pulses, ghee, and hot water. There is no fixity as to the amount of these elements; when the said pot is put in a warm place for about a fortnight; the compound becomes what is called *kunapa* water (*kunapajala*), which is very nourishing for plants in general. www.armchairpatriot.com/HardCorePrepper/AgriSurapala.pdf.
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22. *Viṣṇudharmottara Purāṇa*, Shah Dr. Priyabala (Tr.). Parimal Publications, Delhi, 2002 2.30.19
23. *Śukranīti*, op. cit.4.4.54